

State of Possession Sound (SOPS) Update



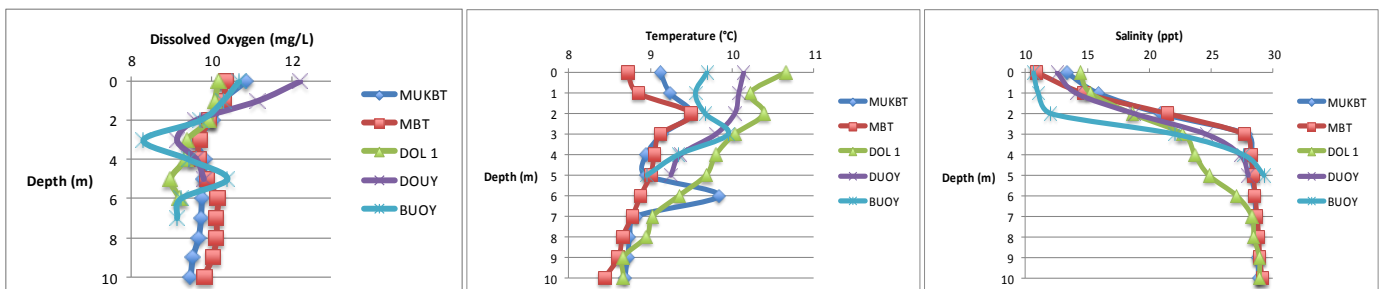
EVERETT COMMUNITY COLLEGE'S OCEAN RESEARCH COLLEGE ACADEMY



SOPS Cruise 50

Students complete 50th Research Cruise!

Since inception of the State of Possession Sound (SOPS), ORCA students have been on SOPS cruises once a month during the school year for the past six years. Designed as a project to integrate academic content in a real world setting and loosely modeled after Puget Sound Monitoring conducted by the Washington State Department of Ecology, SOPS has been a powerful component of the ORCA curriculum and the cornerstone of interdisciplinary learning. In celebration of the 50th SOPS cruise, we are starting our first update of the findings.



Four locations are visited monthly and students monitor Dissolved Oxygen, Temperature and Salinity (DOTS), pH, and relative chlorophyll concentration with a YSI multiparameter probe. Samples are collected at the surface, halocline and near the bottom with a Niskin bottle and tested for fecal coliform, nitrate and phosphate levels. A sediment sample is collected using a Ponar Grab, and the resulting sample is sent to Everett Environmental Laboratory for heavy metal analysis (As, Cd, Cu, Hg, Pb, Zn). Vertical plankton tows are collected with a 253 micron net towed from 10 meters to the surface. Horizontal plankton tows are collected at the halocline with a 20 micron net towed for three minutes. These samples are quantified back at the ORCA lab. Marine bird and marine mammal surveys are conducted while underway. Wind speed and water clarity are also monitored on station. An underwater video camera is deployed and video is captured of the seafloor.

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DOTS Data

The Snohomish River flow coupled with the tidal cycle has the largest impact on the DOTS data. Less dense fresh water layers over the more dense Sound water. Sea surface temperature averaged 9.1°C due to spring run off. Surface salinities were below 13 ppt as the fresh water from the river spread over our sampling areas. Dissolved oxygen levels were high (10 mg/L). Students (and faculty) struggle to explain the warmer surface temperature at Dolphin 1 (Southeast Hat Island). Perhaps the shallower depth allowed great surface warming.



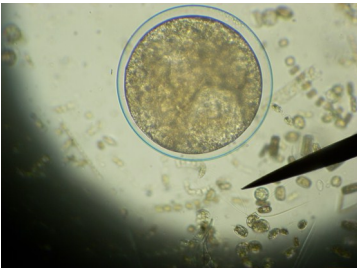
Marine Birds and Marine Mammals

California Sea lions made their usual showing hauled out on buoys. Over 20 were utilizing the Navy base to sun themselves, staying out of the colder than usual water. A harbor seal was spotted at every station. Cormorant and Surf Scoters were the most numerous until we encountered a large raft of nearly 200 Western Grebes at Station Buoy. According to research by the SeaDoc Society, Western Grebes only swim when in the region, flying only twice a year during their migration.



Plankton

Students learned a new term in plankton counting—Too Numerous To Count (TNTC). *Thalassiosira* was the most abundant phytoplankton along with many other centric diatoms. Predominant zooplankton representatives included crab zoea and copepods. For the first time ever, a vertical sample was collected from 45m, which included *Okiopluera*. Most of the stations are relatively shallow (~10m) and so a vertical sample in deeper water should collect zooplankton that migrates deeper during the daylight hours.



Benthic Survey

Both the Ponar grab and the Splashcam provide glimpses into what creatures inhabit the sea-floor. Station Mukilteo provides the most visible organisms on the video screen, with red rock crabs, anemones and flatfish in the field of view. This station has the most hard substrate, contributing to the most biodiversity of the benthic organisms observed on this cruise.



SOPS Cruise 50

Faculty Perspective by Josh Searle



Our fiftieth research cruise, a milestone seven years in the making, is reason enough to celebrate.

For ORCA faculty, it is also confirmation of a hypothesis on learning proposed eight years ago, and today, I am compelled to recall the nervous excitement of cruise number one, when the radical idea of a boat-based, long-term monitoring project for an experimental program at EvCC subjected itself to the fates of weather, an aging vessel, an unknown captain, rented sampling equipment, and a surprisingly under-studied body of water. Fifty cruises later, we know more about Possession Sound from the sediment to the skies, equipment has multiplied, our vessel and captain have changed, and the weather still rules supreme. However, firmly anchored at the center of our experience on the Sound is a group of young student scientists enthusiastically asking questions and collecting data with the potential to teach all of us more about our dynamic ecosystem.

As I reflect on our cruise, Robert Frost's "Neither Out Far Nor in Deep" wells up from the sediment of memory. Near the end of the poem, the speaker claims, "And the people look at the sea./ They cannot look out far./ The cannot look in deep./ But when was that ever a bar/ To any watch they keep." This pull of the sea nearly universally motivates us, but ORCA students are bound to move beyond the shore. They are determined to look both far and deep, and I am content to join them.

During cruise fifty, we linger near Hat Island with the faint hope that gray whales will return to feed and delight us all. Alas, today the grays chose other areas of the Salish Sea to sample bountiful invertebrates. On our previous cruise, when I spied a glimpse of a gray whale's exhalation, its back and fluke, I was filled with questions. I have glimpsed less than ten percent of this magnificent creature, and I want to know more. Our focus at ORCA is plankton and water chemistry, among other measures, but we have begun to study whether the gray whales are vocalizing as they feed in Possession Sound. As we spend more time with our new hydrophone, we'll formalize our research. In this way, we hope to better hear the deep.

Up on the fore and aft decks of our research platform, students are using binoculars and identification guides. They tally birds and mammals throughout our trip. Though I love to spot the ospreys that have returned this year, I feel an equal jolt of excitement for the large flock of over 200 Western grebes spotted in the distance. Back in the lab, students will count the grebes in photographs taken to confirm population size. They are tracking population size and diversity throughout the year, focusing particularly on species of concern such as grebes, cormorants, surf scoters, and bald eagles, among others. The data they gather is intended to help all of us see.

Word trickles down that the sediments group, located in the bow, has an equipment failure. We are using a reconditioned sediment grab, and the implement used to release the grab on the sediment floor has sheared off after years of use. It takes a group effort, one student stripping out individual nylon cords from a larger rope. In the end, the captain offers zip ties and some ingenuity to rig up a new implement, and the sediments group gamely lowers its dredge into the water. The first attempt comes up empty, but the new implement works, and in a second attempt the students pull up a successful sample of the sediment floor, ready to process through multiple sieves. They will later estimate sediment size and content, and as a result, they help us see depths never observed from shore.

On this day, our fiftieth cruise, the sun joins us from time to time, the winds remain light, and the students efficiently carry out their work. We return to the dock to celebrate our milestone, with thoughts of the plankton that will be identified and quantified in two days. When we return to our classrooms, lab, and offices, however, I am drawn back to the windows and to the body of water beyond. As Frost's speaker suggests, we must "look at the sea." I, too, have fallen under its spell, but fifty cruises have moved us beyond the shore. For the next fifty, our aim is to remove even more bars, to look far and look deep.