



Journal of Student Research on Puget Sound

The collected reports of the student scientific explorations aboard the *SV Carlyn*

Salish Sea Expeditions is a catalyst for students in their inquiry of Puget Sound through boat based-scientific exploration.

The Effect of Time of Day and Depth on the Amount of Plankton in the Water

International Community School 7th-12th Grades
Kirkland, Washington



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Grades: 7-12th
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I. Title

The Effect of Time of Day and Depth on the Amount of Plankton in the Water

II. Abstract

We hypothesized that if we tested the water at daytime and nighttime then there will be more plankton at the surface during the day than at night because the phytoplankton photosynthesize and the zooplankton follow the phytoplankton. To our astonishment, we were amazed that our prediction was proven correct. Some people in the group had the idea of using the secchi disk next time, so we know the clarity of the water. In addition, we thought it might have been better if we used the Niskin bottle so we would be able to collect different waters from different depths. These two ideas may have further improved our experiment.

III. Introduction

Our class, a group of students from the International Community School ranging from 7th grade to 11th, ventured aboard the Carlyn in June 2007 for our annual Focus Week. We set out with a goal of experimenting and researching plankton in the Puget Sound given the types of equipment available to us on the boat.

Our prediction questioned the amounts of plankton in the water at different times of day. We hypothesized that if we tested the water at daytime and nighttime, then there would be more plankton at the surface during the day than at night because the phytoplankton photosynthesize and the zooplankton follow the phytoplankton. This makes the variables in our experiment 1) the depth at which we towed, 2) the length of tow, and 3) the time of day. We predicted that there would be more phytoplankton at the surface because there was more sunlight and we already knew that phytoplankton survive through photosynthesis. Therefore we decided to perform both a surface and a ten meter tow for each type of plankton at different times of the day; one tow in the morning, one in the afternoon and one at night.

We decided upon this specific experiment because we knew that there was a large and plentiful plankton community residing in the Puget Sound coupled with the fact that plankton seemed like it would be the easiest to catch and analyze based on the equipment provided. In the end, our results came back very much consistent with what we hypothesized: there were more of both types of plankton at the surface.

IV. Experimental Design

We tested the water in the morning, afternoon, and in the evening at two different depths. During the morning science watch, the Wind or Water group would take samples of plankton, which we then filtered and later examined as we recorded the data. The same procedure was done for the afternoon watch, and whichever group was sleeping on Carlyn would take samples at night.

Materials:

- °Zooplankton Net
- °Phytoplankton Net
- °Rope Lines
- °Lead Weights
- °Plankton Settler
- °Graduated Cylinders
- °Timer
- °Plastic Tubs
- °Funnel
- °Spoons
- °Squeegee
- °Wash Bottle
- °Microscopes

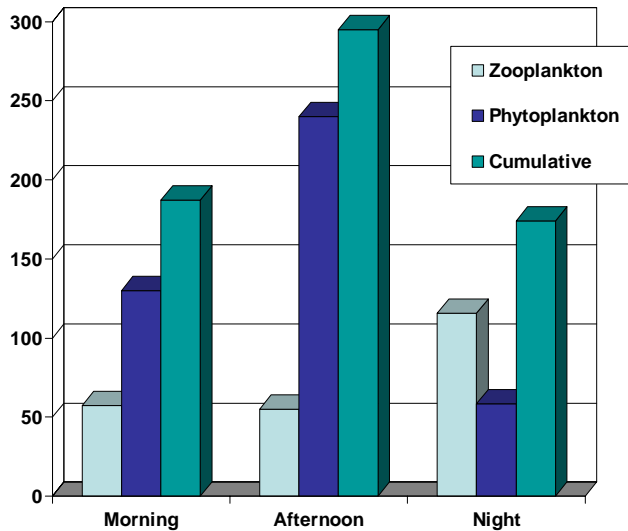
We tested the water for phytoplankton and zooplankton between 1000 -1100, 1400-1500 and at least 30 minutes after sunset. Additionally, at each of these times we deployed the plankton net between 0-1 m from the surface and 8-10 m from the surface.

After preparing the nets by securing the nets to the stanchions and attaching the weights to the nets, we requested permission from the captain to deploy the nets. After we received confirmation from the captain, we deployed the nets for 3 minutes at the surface. Originally, we deployed the nets for 5 minutes but after receiving a superfluous amount of plankton we reduced the time to 3 minutes. Then we repeated the tow at our second depth of 8-10 m.

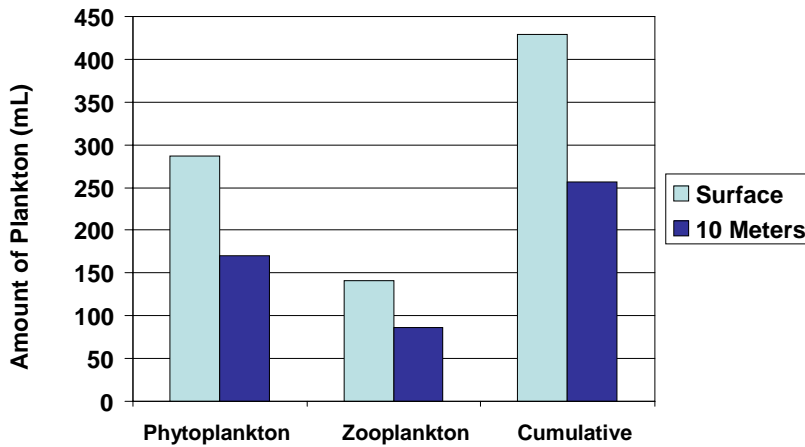
After the completion of the tow, the water was filtered out of the sample with the plankton settler, spoons, squeegee, and wash bottle over the tubs to prevent loss of the plankton sample. Then the collection of plankton was funneled into graduated cylinders labeled with the time, type of plankton and depth. Then we repeated the tows at the other times. The samples were left to settle and we measured and recorded the volume of the plankton. Then we averaged and graphed the data.

V. Results

Plankton vs. Time of Day



Plankton vs. Depth



VI. Discussion

As the data in the graphs show, our results were consistent with our prediction: there were more of both types of plankton at the surface, and the daytime tows, especially the afternoon tow, produced a higher

volume of plankton. This made sense since the afternoon tows were done at the time of day when the plankton had been exposed to sun for the longest, and had had the most time to drift towards the surface.

Some people in the group had the idea of using the secchi disk next time, so we would know the clarity of the water at each sample site. In addition, we think it will be better if we use the Niskin bottle to collect different waters from different depths so we can look at other characteristics of the water. We would also like to include more information about the tides to see if tides affect plankton levels.

One unique thing about our samples was that we collected many more milliliters of plankton when we were right next to the sewage outflow area off of Seattle than in our other sample sites. We know that plankton feed off the nutrients in the water, and the higher nutrient levels near the sewage area probably caused this huge increase in the plankton volume. It would be interesting to design a future study comparing plankton levels around Puget Sound at different distances from sewage outflow areas.

VII. Cruise Summary

Over the three nights that we sailed on Carlyn, we stayed at Fay Bainbridge State Park and at two different locations on Blake Island. During our stay, we had many delicious meals that we prepared. Some memorable meals include three batches of homemade macaroni and cheese, chocolate chip pancakes, and fifty grilled cheese sandwiches. We had some very delicious desserts, as well. These included apple crisp, dip 'n go, and banana boats.

On the last day of our trip, we elected captain, mate, navigator, chief scientist, and a couple more jobs. This gave us an experience of what it was like to be a part of the crew on Carlyn. We were able to sail by ourselves and navigate our way back to Elliott Bay. However, there wasn't any wind, so we did not get the full experience of running a sixty foot sailboat by ourselves.

Wind was a giant factor that greatly impacted our trip. At three in the morning while anchored near Blake Island, the wind began to upset Carlyn by knocking her into the buoy area. So Captain Scott, Erin, and Dave ran around on deck and relocated us to the other side of Blake Island. Also, we were very thankful to not have any rain. Although we put on our bright yellow raingear, it did not shower at all, contrary to the weather prediction.

On shore, we had dip 'n go and played Carlyn Family Fun Fun Fun (Fun). Our two watches are very competitive and to hear that we tied did not make us very happy. Dip 'n go was great, and we invented a new kind called "dip 'n whip 'n go." Our favorite things to dip are the alphabet cookies, bananas, and pretzels.

We saw much wildlife throughout our trip. On Blake Island, we saw raccoons and a couple of deer, and while sailing, we saw about six or seven sea lions. Also, we saw many, many jellyfish. Thanks to further research after our trip, we have discovered that the highly dense population of jellyfish might be due to global warming.