

Kelp, Climate, & More in Sitka Sound

Two Marine and Environmental Science Cadets spent much of their summer in Alaska establishing long-term monitoring sites.

By Lucy Vlietstra, Ph.D., Professor, USCGA Science Department; Lauren Bell, Research Biologist, Sitka Sound Science Center; and LT Jason Condon, USCG Air Station Sitka



Sitka, Alaska (Photo by Lucy Vlietstra)

Sitka, Alaska, is a picturesque community situated on the outer coast of Alaska's Inside Passage. Surrounded by mountains, whales, seabirds, and fishing boats, the town is home to USCG Air Station Sitka, USCGC MAPLE, and Sitka Sound Science Center, a premier destination for scientists, educators, and visitors studying Alaska's natural environment. This summer, Sitka Sound Science Center (SSSC) partnered with USCG Air Station Sitka and the USCG Academy to host two cadets in a six-week internship at the center, the first partnership of its kind for the three institutions.

Selected for the internships were 1/c Karisa Maurer and 1/c Aimee Valencia, both majoring in Marine and Environmental Sciences at the Academy. Maurer and Valencia participated in

many projects during the summer, but their primary responsibility was to establish long-term monitoring sites in Sitka Sound to track gradual changes in sea conditions and kelp forests brought on by climate change.

Kelps are large seaweeds abundant along rocky coastlines in the Pacific Northwest. They grow best in cold water, so elevated ocean temperatures are expected to reduce their abundance in southeast Alaska along with the biodiversity they support. Because kelp beds are essential habitat for many fishes of commercial importance, their loss could have serious economic implications for coastal Alaskan communities that depend upon the fishing industry.

Working with SSSC scientists, Maurer and Valencia surveyed some

of the many kelp beds in Sitka Sound, identifying those most suitable for long-term monitoring. At regular intervals, Maurer and Valencia used a skiff to visit those sites and a GPS device to record the latitude and longitude of points along the perimeters of kelp beds at low tide. They uploaded locations into ArcGIS software, which allowed them to measure changes in kelp bed size over time, a key variable of interest in the long-term monitoring project. Within the kelp beds, they made measurements of sea water temperature, salinity, pH, and other ocean parameters affected by climate change. Maurer and Valencia also deployed a variety of oceanographic instruments in the field to continuously monitor environmental conditions in Sitka Sound over a longer period time.

In the end, the cadets had not only collected valuable baseline information against which future data will be compared, but they also established a rigorous sampling protocol for cadets to replicate and expand upon in future years. "This whole project has really given us the chance to take what we've learned inside the classroom at the Academy and apply it in the field," said Valencia. "Because we're the ones developing the project, it really helped us grow as scientists."

Mentoring cadets on the kelp project was Lauren Bell, a native of Homer, Alaska, and research scientist at SSSC. A recent graduate of the University of Alaska-Fairbanks, she earned an M.S. degree in Marine Biology, focusing on the influence of terrestrial food sources in Arctic marine food webs. Bell said that Maurer and Valencia were truly exceptional students who took ownership of the kelp project as well as their own scientific exploration. "Everyone who had the opportunity to interact with the cadets was rightfully impressed with the skill and depth of scientific knowledge that they brought to our organization and to the community of Sitka."

Research conducted by Maurer and Valencia was supported by a grant from Alaska Sea Grant Program, which is operated by the National Oceanic and Atmospheric Administration and the University of Alaska. Principle



1/c Aimee Valencia (left) and 1/c Karisa Maurer (right) measure sea conditions in a kelp bed in Sitka Sound, Alaska. (Photo by Lauren Bell)

investigators include Victoria O'Connell (SSSC Research Director), Lucy Vlietstra (Professor, USCGA), and Kyle Hebert (Alaska Department of Fish and Game), each of whom brings a different perspective to the study. In 2014, Vlietstra served for one month as Scientist-in-Residence at SSSC, exploring opportunities for cadets to conduct relevant scientific research in Sitka Sound. From that experience grew the interdisciplinary, long-term monitoring project focused on kelp forests, climate change, and coastal resilience in southeast Alaska.

When Maurer and Valencia weren't working on the kelp study, Bell had them involved in a variety of other projects. For example, the cadets worked as skiff tenders alongside biologists conducting SCUBA surveys for pinto abalone in some of the same kelp beds that they selected for long-term monitoring. Pinto abalone is a shellfish subject to historical overfishing and recently considered for listing under the Endangered Species Act. Abalone density estimates developed by the biologists will be compared to kelp bed data collected by cadets to better understand how pinto abalone populations are influenced by the health of Alaska's kelp forests. This information is particularly valuable to state biologists, including collaborators at the Alaska Department of Fish Game, who are charged with managing the state's natural resources.

The cadets also spent a day collecting marine debris from remote shorelines of Sitka Sound, a project motivated by concerns about radioactive debris carried by prevailing currents to North America following the 2011 Japan tsunami. In addition, Maurer and Valencia were introduced to an ongoing research project in which high-tech sonar instruments are used to study the behavior of sperm whales stealing hooked fish from long lines deployed in the Gulf of Alaska. Information derived from the study could help scientists devise new techniques for preventing sperm whales from reducing the commercial catch. The cadets also toured a local commercial fish processing plant and salmon hatchery, participated in kelp mariculture, and collected specimens for the public aquarium.



USCG Air Station Sitka. (Photo by Lucy Vlietstra)



Sitka Sound Science Center, Sitka, Alaska (Photo by Sitka Sound Science Center)

From the beginning, the internship was designed to integrate cadets into Sitka's scientific community and introduce them to prominent issues affecting coastal ecosystems in southeast Alaska. Victoria O'Connell, SSSC Research Director, wanted to make sure that the cadets had broad scientific exposure during their internship, saying "We believe that exposing students to the kind of research that interests people who depend on marine resources is truly an investment in the future of coastal communities and in science-based policy."

In addition to the science center, USCG Air Station Sitka played a crucial role in the cadets' internship experience, providing them with essential housing and meals as well as opportunities for professional development. LT Jason Condon (CGA '07) arranged for cadets to engage in daily operations at the station whenever possible. For example, Maurer and Valencia participated in training flights in Sitka Sound, and Maurer became qualified to participate in exercises involving rescue swimmers, serving as a simulated survivor who would be hoisted to safety in the helicopter.

"Maurer and Valencia's summer experience was unique," Condon said, "because they were able to use their academic skills to strengthen partnerships in the Sitka community while experiencing first-hand, from the rotor-wash, how the Coast Guard provides service to southeast Alaska." Reflecting on his own experience at the Academy, Condon said, "My most significant memories as a cadet are of my diverse summer training experiences, ranging from serving on a patrol boat to evaluating hydrodynamic properties of the 47MLB propeller. The Academy does a good job of exposing cadets to future duties as officers while promoting hands-on learning."

Maurer's primary goal after graduation is to attend flight school, so collaborating with the air station while studying marine science was especially gratifying. "I have been waiting so long to make it to Alaska," Maurer beamed. "When we got to the Air Station [in Sitka] and saw the helicopters, I knew that this was what I wanted to do for the rest of

my life. I want to make it back to Sitka, and I want to fly one of these helicopters and assist people in need.”

Despite their busy work schedule, Maurer and Valencia found some time to enjoy the spectacular scenery around Sitka and to interact with the local community. They marched in the July 4th parade with the Air Station, backpacked to the summit of Mt. Edgecumbe and Mt. Verstovia, went sport fishing for salmon, and sat for interviews at the local public radio station (KCAW Raven Radio). In the final days of the internship, Maurer and Valencia presented their research results to members of the local community.

Lisa Busch, SSSC Executive Director, appreciates the long-term benefits that the collaboration brings not only to the cadets but to everyone involved in the partnership. “The people of Alaska, especially those living in

coastal communities, are vested in good science and are also dependent on the Coast Guard.” said Busch, “With the new interest and changes happening in the North - particularly in the Arctic, where the Coast Guard will play an increasingly important role - this is a very special time to be working with the Academy.”

Acknowledgements

We wish to gratefully acknowledge the USCGA Alumni Association’s Class of ‘65 Endowment for Marine Science for supporting cadet participation in the internship and the Environmental Endowment Fund for supporting faculty travel to Alaska. Without this support, the cadet internship program in Sitka would not have been possible. We also thank the Alaska Sea Grant Program for funding the kelp-abalone research project (Project #R/100-03). Also due thanks are LT Raymond Jamros, USCG Air Station Sitka, for help in coordinating cadet activities in Alaska and both PROF Karina Mrakovcich and LT Brian Gismervik (CGA ‘06), USCG Academy, for coordinating and overseeing the Science Department’s Internship Program.

THE MASSACHUSETTS PORT AUTHORITY & THE PORT OF BOSTON SALUTE THE UNITED STATES COAST GUARD ON ITS 225th ANNIVERSARY



port of boston 