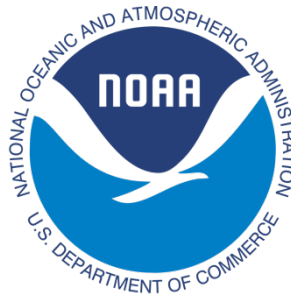


**Our World-Underwater  
Scholarship Society®  
American Academy of  
Underwater Sciences Mitchell  
Scientific Diving Research  
Intern**



Host: Dr. Brenda Konar  
University of Alaska, Fairbanks  
NOAA Kasitsna Bay Laboratory, Seldovia, AK

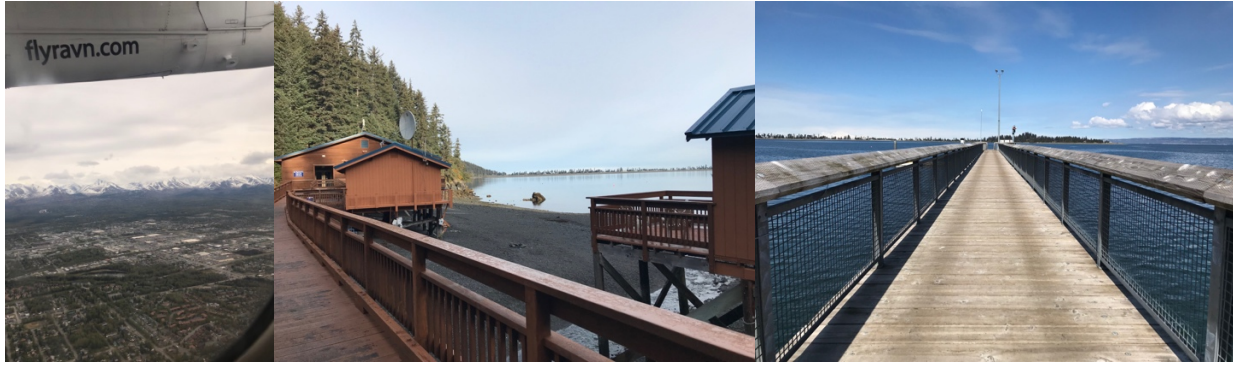


**Liza Hasan  
2019**

## **A Summer Under the Waves in the Land of the Midnight Sun**

The opportunity to be the 2019 Our World Underwater Scholarship Society AAUS Mitchell Scientific Diving Research Intern has been a dream come true in so many ways. I understand what an honor it is to represent OWUSS and AAUS, and I am humbled to have been selected. I am confident in saying that this past summer has been the best summer of my life. I have learned valuable lessons and skills, grown as a diver, and paved a path for my future in marine ecology.

Two days after my snowy graduation in Colorado, I was off to Alaska for two months of diving and intertidal ecology research. I had never been to Alaska before and was excited, yet nervous, for what Alaska had to offer. After a whirlwind night of saying goodbye to friends and packing up the last of my belongings, I was off to the airport at 3:30am. What was lacking in sleep was made up for in anticipation for what was yet to come in the land of the midnight sun. I flew from Denver to Seattle to Anchorage to Homer. My first view of the grandiose Alaskan mountains was from the airport in Anchorage. After months of field work, those first photographs of mountains through dirty airport windows do not even begin to describe this state's beauty. The amazement persisted as the 20-person Ravn Alaska flight took off and headed towards Homer over mountains, bays, and plains. After landing at the Homer airport, I made my way to the water taxi stand on the Homer spit. The water taxi ride gave me my first views of Kachemak Bay. I was sad that I hadn't taken pictures of the bay from the boat, but would soon find out that I would frequently see much of the bay throughout the summer.



The day after my arrival, I jumped right into lab work sorting biomass samples for the Alaska EPSCoR Fire and Ice project. EPSCoR is an NSF funded program that provides funding to states that less frequently receive federal grants. The Alaska EPSCoR Fire and Ice project studies climate change through the lenses of boreal forest fires and coastal change. Dr. Konar's lab is part of the coastal margins team that includes labs studying intertidal ecology, glacial geology, ocean acidification, and oceanography. The main components of the direct projects of the Konar Lab were intertidal community structure, larval recruitment, and reproductive output. These topics are being studied by MSc student Katie McCabe.

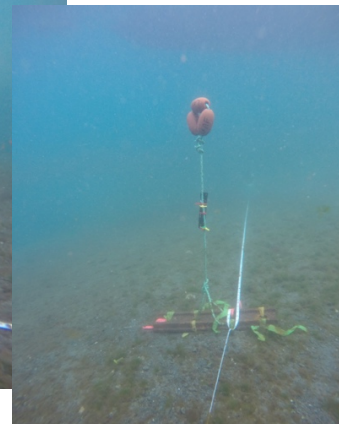
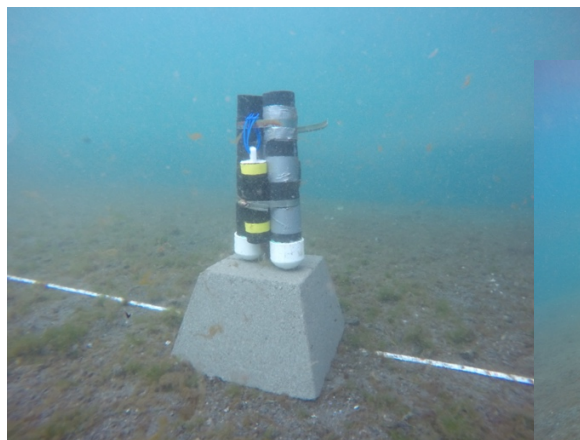
In the lab, Katie, undergraduate interns Tibor, Emily, and Brian, and I sorted through biomass samples from the five sites in Kachemak Bay and five sites in Lynn Canal in Juneau to analyze community structure. There were also larval samples to be sorted using a dissecting microscope. Additionally, each of us interns had our own projects that fit in to the larger framework. With a typical field schedule of sampling once a month, it would take all of the three remaining weeks each month to get through samples and prep for the next round of collections.

The first week of each month we would set out around Kachemak Bay to sample all five of our EPSCoR sites. The five watersheds we worked in vary in glacial coverage from 0-60% glaciated. Since EPSCoR Fire and Ice is a collaborative study across University of Alaska, Fairbanks, Anchorage, and Southeast, we assisted with data collection for researchers not located

in Kachemak Bay. A typical field day consisted of heading out about two hours before the low tide so that we had plenty of time to work. At least two people would go to the rocky intertidal site, at least three people would beach seine for fish, and at least two people would stay on the boat for zooplankton trawls.



With so many moving pieces, it took a lot of coordination and task management to make sure we had all the correct sampling gear for the day. As we neared low tide, the sediment tube and environmental sensors were often peeking out of the water near the rocky intertidal site. It was usually my duty to monitor the tide and watch for their emergence. Each month, all five of the environmental sensors were switched out and downloaded in addition to taking water samples for sensor calibration. If the tide was not low enough for the sensors to be visible, we would dive in order to switch them out. Two sites were sampled by way of diving and the remaining three were accessible from shore.



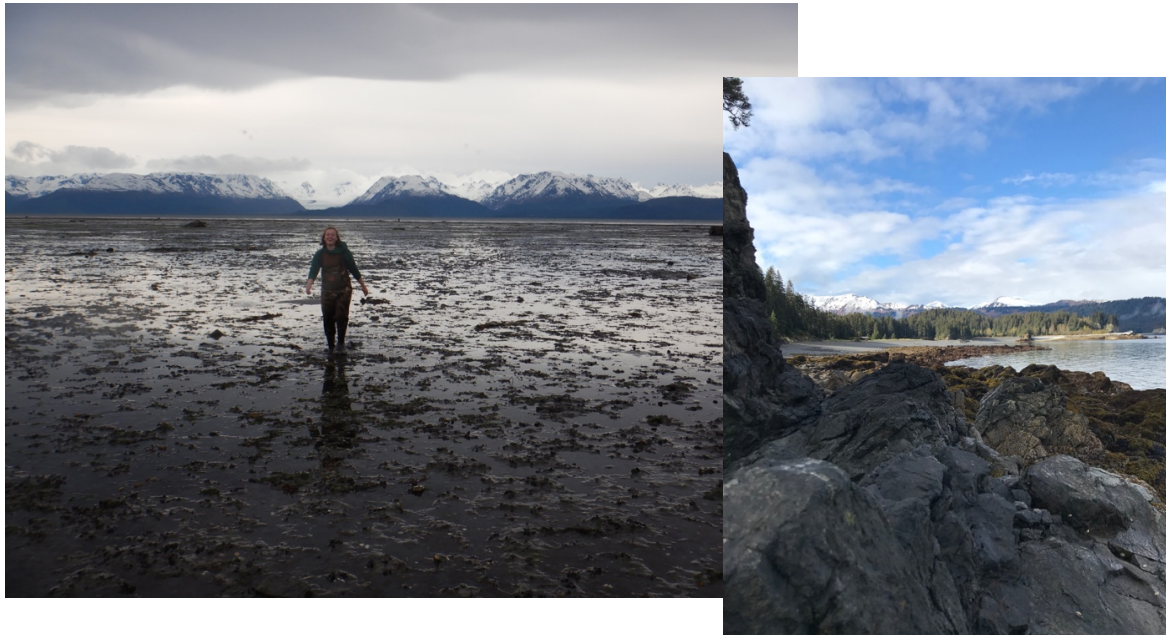
Additionally, my independent research project for the summer was on subtidal community structure, for which I sampled near the environmental sensors. After switching out the sensors and taking water samples, I laid out a 30 meter transect extending from either end of the sensor array. Along each transect, I took biomass samples within a quarter meter squared quadrat at five randomly selected points. Similar to the sensors, I was able to sample from the surface at a very low tide at three of the sites. The remaining two sites always had to be sampled at slack tide due to strong currents. Back in the lab, I would sort through my samples by species and record weight and quantity. I will be using these data for a poster presentation at the Alaska Marine Science Symposium and will include this project in my talk at the AAUS Symposium. I'm very excited to be one of the recipients of the Kevin Flanagan Travel Award in order to attend the 2019 AAUS Diving for Science Symposium in Vancouver, BC.

In addition to beach seining, conducting zooplankton trawls, and taking water samples for other EPSCoR components, we also set out drifter buoys each month for oceanographic modelling. Before the start of my internship, one of the best pieces of advice I received was to always say yes to opportunities. I took any chance I had to go out on the boat or help with a different project, including setting out buoys. We had four buoys equipped with GPS and attached to underwater sails that were set out at the same point in the bay each deployment. By monitoring the buoys' locations on the Pacific Gyre tracking website, we were able to determine when to pick the buoys up to be set out again. The buoys logged their locations every ten minutes, creating an interesting challenge when searching for them in Kachemak Bay. Sometimes we would travel to the last known GPS point and the buoy would be right there, while other times we would spend an hour following a buoy's path in order to spot the small

orange dot bobbing in the water. It was a fun and exciting task to set out across the bay either to deploy or collect drifter buoys.



While EPSCoR was the largest project we worked on this summer between monthly field and lab work, we also had various other projects scattered over three months. The first non-EPSCoR project the Konar Lab assisted with was Gulf Watch of Alaska. Gulf Watch is a yearly monitoring program for the Gulf of Alaska that is conducted in Kachemak Bay, Prince William Sound, Katmai, and Kenai Fjords. Gulf Watch monitoring has multiple components, including mussel bed sampling, rocky intertidal species composition surveys, clam sampling, seagrass bed monitoring, fish sampling, and marine bird and mammal surveys. The US Geological Survey conducts all of these components at each location, except for Kachemak Bay. In Kachemak Bay, the mussel bed, intertidal, clam, and seagrass components are taken over by the Konar Lab. Since there are six sites in Kachemak Bay for Gulf Watch, this sampling took a full week to complete. We were fortunate to have additional help from visiting lab members and USGS folks.



I was also lucky enough to assist with the marine bird and mammal surveys later in the summer when USGS returned. I spent three days out on a USGS skiff with Dan Esler from

USGS and David Green from Simon Frasier University. My job was to record species during survey transects that covered most of the southern coastline of Kachemak Bay. I have never considered myself much of a bird person, but this opportunity really made me more aware of the marine birds in Kachemak Bay. I found myself noticing and trying to identify more and more birds around me that I may not have paid much attention to before assisting with these surveys. While we were surveying, the other skiff was hunting down black oystercatcher breeding pairs for a migration study through Simon Frasier University. I even had the opportunity to hold a bird that was being tagged when we stopped by to check on their progress! After all marine bird and mammal surveys and black oystercatcher tagging were complete, we moved on to the fish component of Gulf Watch. We were fishing for black rockfish and kelp greenling and later poked around the intertidal for crescent gunnels. Although I do not have a fishing license of my own, I was able to fish on their permit. As someone who has only held a fishing rod a few times in my life, I was very excited to catch my first fish and then some!



An additional part of Gulf Watch that was performed in Kachemak Bay only were kelp forest surveys. These surveys were originally part of the NaGISA project and were added to Gulf Watch once the program stopped. Kelp forest monitoring was conducted at four of the six Gulf Watch sites. Diving for these surveys was my first experience diving in a kelp forest. It was also my first time working underwater in a dry suit. Prior to these surveys, I had done training dives



with Dr. Konar around the lab to get used to diving in a dry suit. Despite still getting used to feeling clunky above water, I was feeling comfortable underwater. The main challenge I found was the limited dexterity I had in 7mm neoprene gloves. Luckily, not too much fine motor control is needed for clearing kelp and shoving it in a pillow case. After each day of dive sampling, the samples were sorted in the lab. It was amazing to see how many invertebrates were in the samples that I had not noticed while clearing underwater.



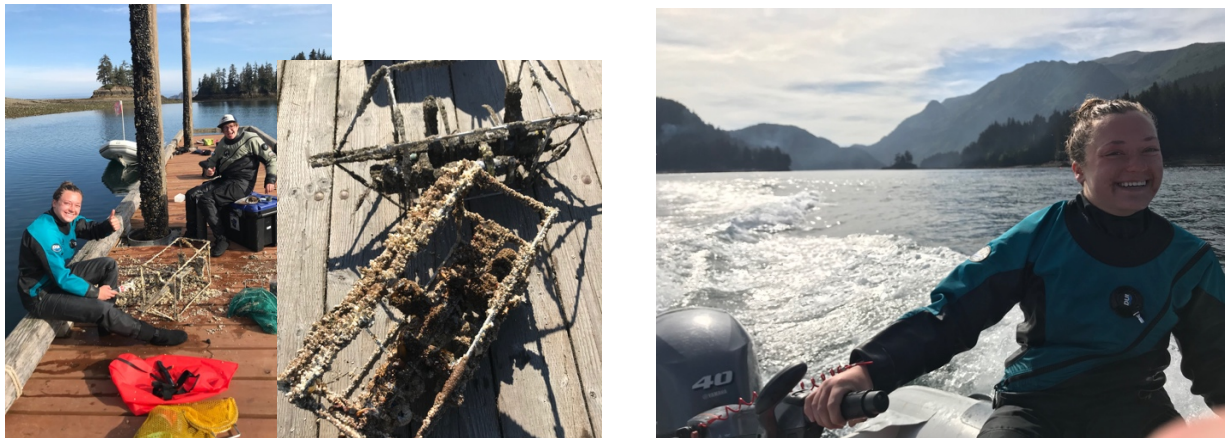
Another project the Konar Lab contributed this summer was the Kelp Ecosystem Ecology Network (KEEN). The KEEN project is a global kelp forest study led by Jarrett Byrnes of University of Massachusetts-Amherst. High latitude surveys had been long desired as a contribution to this project, and it was an exciting experience to be part of making that come to fruition. When I first arrived at the lab, we discussed the KEEN protocol, and I was responsible for creating the Alaska regional species list and field guide. Due to our busy field and lab schedule throughout the summer, it was not until the end of the field season that we were able to fit the KEEN sampling in. The KEEN protocol requires four 40 meter transects at each site, each taking a full dive to complete. The KEEN protocol reminded me of the Atlantic Gulf Rapid Reef Assessment project that which I contributed to while I was on Bonaire: a nice flashback to my last AAUS experience. It was exciting to tackle the challenge of creating a dive plan to efficiently complete this complex sampling protocol. Each diver took on one of four

components: fish swath, uniform point count, target species swath, and quadrat community composition. When KEEN sampling day finally arrived, we took off with four divers, a surface tender, a whole boatload (literally) of cylinders, and various sampling equipment. With the weight of humans, gear, and cylinders, we had to split up between the Boston whaler and a skiff. Sadly, the little skiff had some mechanical trouble and we had to turn around prematurely. With some additional dive planning, we were able to reduce the number of tanks we needed to bring and pile into the Boston whaler. To our delight, the sampling went swimmingly and we were able to complete all four of our transects. Since this was the first year of contributing to KEEN in Alaska, we decided to only take on completing one site. The hope is to be able to complete more than one site in the future! All of our survey data will be publicly available through the KEEN project.



An additional project that I had the opportunity to assist with outside of the Konar Lab was for ocean acidification research in Kachemak Bay with Dr. Amanda Kelley. After the field season for the Konar Lab wrapped up and everyone made their way back to Fairbanks, I stuck around the lab for an extra week. Dr. Kelley is a professor at the University of Alaska, Fairbanks, and runs the Kachemak Bay underwater sensor network. I had the opportunity to be her dive buddy for the week to help switch out SeaFET sensors located at five sites around the bay. These dives were far different than the surveying and sampling dives I had been on the rest of the

summer. I was used to dive duties consisting of clearing kelp and other critters, conducting monitoring surveys, or switching out small sensors. While still under the blanket of AAUS research diving, the dives with Dr. Kelley felt much more like commercial diving. All of her sensor units are connected to metal frames approximately three feet in height. The frames are then strapped and clamped onto pilings for which an underwater drill is necessary to properly secure the unit. Our dives consisted of first descending to collect a Niskin bottle water sample right at the 3-hour data logging interval in order to calibrate the sensor. After passing off the bottle, we would descend again with the replacement sensor unit, straps, hose clamps, and the drill. My job was to pass off equipment and hold onto the frames while they were being removed or secured. The dives were usually quick and efficient. These dives were often near docks or in low visibility water, creating a new and challenging diving environment where attention to detail was essential.



I had an interesting turn of events this summer that showed me just how unpredictable life is and how many opportunities are out there. I had originally planned to stay in Alaska for two months, pass through Chicago for three days to switch out my clothes and gear, and then venture to Costa Rica for six months. I was supposed to work as a field research assistant on a sea turtle conservation project. After making lists of pros and cons and taking time to weigh my

options, I decided it would be best for me to not go to Costa Rica. While the experience would have been rewarding in many ways, I have no regrets for the decision I made to stay in Alaska. The third month I spent at the Kasitsna Bay Lab was the best month yet. Half of my dives for the summer were in the final third of my internship, and I would not have had the chance to join USGS for surveys, conduct KEEN dives, or join Dr. Kelley in switching out sensors if I had not stayed. It was also in that final month that I had the chance to roam around some of the beautiful mountains in the Kachemak Bay State Park, including Grace Ridge and Red Mountain.



Over the course of the summer, I went on 40 dives, learned countless new skills, and made lasting connections with university and government agency researchers. Not to mention, I was offered a MSc position in the lab of Dr. Brenda Konar! With my interests in habitat mapping, marine reserve management, top predators, and ecosystem dynamics, I will be focusing

my thesis on sea otter use-habitat type interactions in Kachemak Bay. Building on data that have been collection on habitat and sea otter locations, my project will aid in management decisions, permitting, and fill the knowledge gap in how sea otters are interacting with the subtidal habitat in different areas.

I am amazed by the number of connections I have made throughout this summer on projects with the Konar Lab and for my proposed MSc research. Since the Kasitsna Bay Lab is jointly run by University of Alaska, Fairbanks, and NOAA, I had the opportunity to work with NOAA scientists weekly. I also had the opportunity to work with USGS scientists, visiting NOAA personnel, members of the Kachemak Bay National Estuarine Research Reserve, members of the US Fish and Wildlife service, and professors from various university across Alaska, Canada, and the rest of the US.

As an ecologist from Colorado whose prior marine experience was in the Caribbean, my marine skills and knowledge, especially in rocky intertidal and kelp forest ecosystems, has skyrocketed. During my internship, I was often asked how I ended up studying marine biology yet came from Colorado. I am honored and endlessly grateful that I had the chance to expand my marine science and research diving experience this summer in pursuit of my career goals as a marine ecologist. I am also constantly inspired by Dr. Konar and her commitment to mentorship and research. I cannot thank Dr. Konar, OWUSS, and AAUS enough for choosing me as the 2019 AAUS Mitchell Intern!



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