



University of Alaska Fairbanks
**College of Fisheries and
Ocean Sciences**

Annual Report
2018



COLLEGE OF FISHERIES
AND OCEAN SCIENCES

University of Alaska Fairbanks



Message from the Dean

The great maritime explorer Sir Ernest Shackleton is revered for leading the storied *Endurance* expedition to Antarctica, when his crew survived for months after their ship was crushed by pack ice in the Weddell Sea. While the College of Fisheries and Ocean Sciences hasn't experienced quite the same fate as *Endurance*, together we have persevered through one of the largest and most sustained financial challenges in the history of the university.

Indeed, the more than 300 students, staff and faculty of CFOS have lived up to Shackleton's family motto, *Fortitudine Vincimus* (by endurance we conquer). As described in this Annual Report, after navigating through four years of unprecedented state budget decrements, we are witnessing an impressive sea change for CFOS—and the future looks bright.

Among the milestones, on the academic front we developed new degree programs, have begun work on a new Blue MBA program in collaboration with the UAF School of Management, and we bolstered efforts to recruit students. Our diverse research programs include two new Long-term Ecological Research programs in the Northern Gulf of Alaska and Beaufort Sea Lagoons, the longest and most comprehensive time-series of Arctic fishes, and the establishment of new ocean observatories to better understand and manage Alaska's changing offshore ecosystems. Seagoing capability is one of our key observational strengths, including operation of R/V *Sikuliaq*, which is now part of the international Arctic Research Icebreaker Consortium. We have

commissioned a new coastal research vessel to replace R/V *Little Dipper*. And, we continue to strengthen our outreach and communication activities with Alaska's coastal communities, subsistence hunting organizations, and key stakeholders.

One of the most exciting developments is our campaign to hire up to ten tenure-track faculty in fisheries and ocean sciences. We are also hiring research faculty and have initiated a new policy to reinvest in our research enterprise. With these new hires and resources, we are working to advance the mission of CFOS as a world-class organization engaged in education, research and public service programs that benefit Alaska and the nation.

CFOS is on an exciting path forward, one that rewards the challenges and sacrifices we have all endured. I welcome your engagement and support as we work to advance understanding of Alaska's maritime and inland aquatic ecosystems and resources.

As noted by Shackleton: "Difficulties are just things to overcome, after all."

A handwritten signature in blue ink that reads "S. Bradley Moran". The signature is fluid and cursive, with a long horizontal stroke at the end.

S. Bradley Moran, Dean
College of Fisheries and Ocean Sciences

Contents

- 4 Academics
- 6 Research
- 11 Research Centers, Institutes and Facilities
- 12 *R/V Sikuliaq*
- 14 Alaska Sea Grant
- 16 Development
- 18 Budget and Finance



Sikuliaq arrives in Seward to pick up a new research team. Photo by Sarah Spanos.



Academics

Ali Schuler uses a theodolite to track humpback whale behavior in Southeast Alaska. Photo courtesy of Ali Schuler. ▲

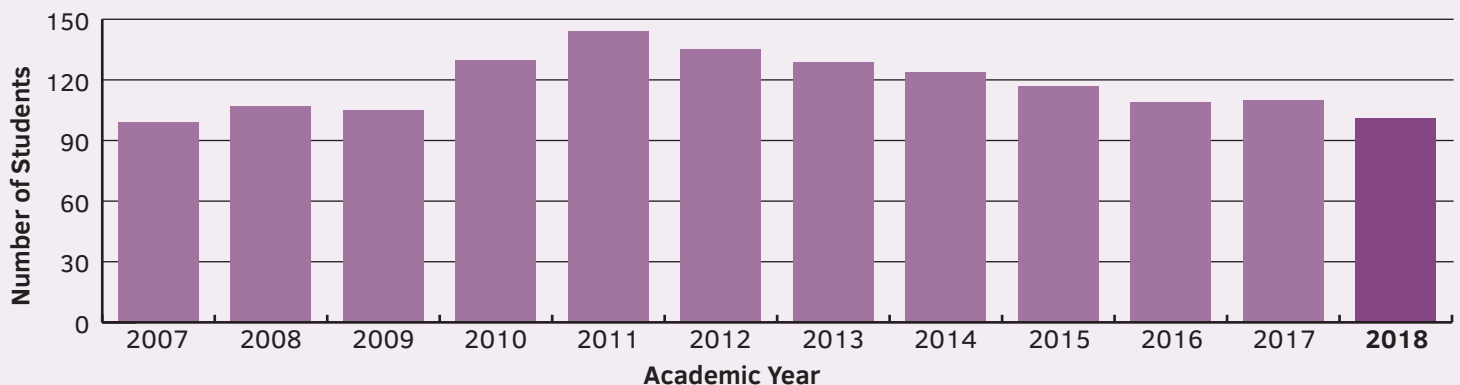
The 2017–2018 academic year marked another successful period for CFOS academics. We developed two new degree programs, and our students continue to be supported by many awards and fellowships.

The University of Alaska Board of Regents approved a new joint Bachelor of Science in Fisheries and Ocean Sciences degree program with a Fisheries Science concentration. This collaboration between CFOS and the University of Alaska Southeast (UAS) School of Arts and Sciences allows UAS students located in Juneau to remain at UAS and complete our Fisheries Science degree program.

The Faculty Senate approved a new STEM MBA program, which combines the Master of Business Administration degree in the UAF School of Management (SOM) with concentrations in different STEM disciplines. In collaboration with SOM, CFOS is developing a new Blue MBA degree program with a concentration in Fisheries, Marine Biology and Oceanography. The UAF Blue MBA is designed to increase opportunities and the marketability of individuals interested in pursuing a career focused on the business of fisheries and ocean sciences.

During the academic year, eleven baccalaureate students, four master’s students and five doctoral students graduated from CFOS.

Graduate Student Enrollment by Year





▲ The 2018 scientific diving class poses after a successful week of fieldwork in Kasitsna Bay. Photo by Andrew Peperone.

Graduate thesis topics ranged from the consequences of humpback whale predation at salmon hatchery release sites to the role of algae in community structure.

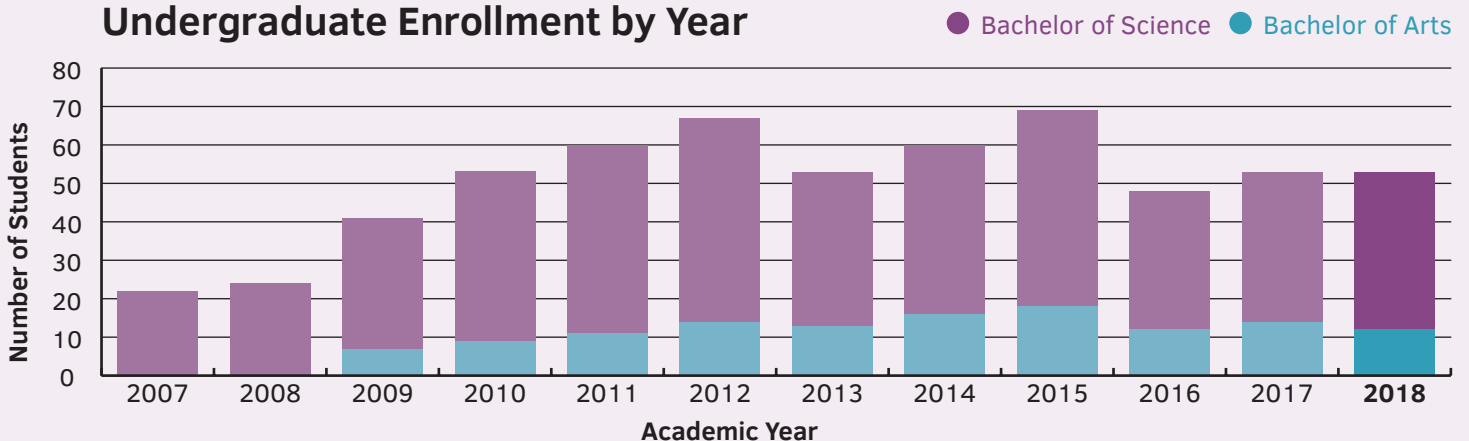
Our students continue to thrive in their undergraduate internships. During summer 2018, seven students worked on a variety of projects for organizations located across Alaska, including the Alaska Department of Fish and Game, the Alaska SeaLife Center, the Bristol Bay Economic Development Corporation and the Southern Southeast Regional Aquaculture Association.

CFOS students received many fellowships and awards over the past year. Kaitlyn Manishin received

a research fellowship from the Pollock Conservation Cooperative Research Center for her project to examine salmon shark predation on Chinook salmon. Cheryl Barnes, Amanda Blackburn, Maggie Chan, Janessa Esquible, Julia McMahon, Kirsten Ressel and Leah (Sloan) Zacher received fellowship support from the Rasmuson Fisheries Research Center. Undergraduates Tibor Dorsaz and Jonathan Napier received UAF Undergraduate Research and Scholarly Activity (URSA) fellowships, and graduate student Duncan Green received an URSA mentor award for developing a respirometer for fish metabolism studies.

Congratulations to all of our students and faculty for another successful academic year.

Undergraduate Enrollment by Year





Research

The College continues to advance its diverse research influence with both focused, individual-principal-investigator projects and large multidisciplinary programs. Ongoing research programs include the two new Long-term Ecological Research programs located in the Northern Gulf of Alaska and Beaufort Sea Lagoons; the Arctic Shelf Growth, Advection, Respiration and Deposition (ASGARD) program; the Arctic Ecosystem Integrated Survey (Arctic Eis); and the Arctic Marine Biodiversity Observing Network (AMBON). Many CFOS research projects and programs focus on Arctic- and Alaska-specific issues, while others are more geographically diverse in nature, ranging from rivers and lakes to coastal habitats and deep ocean regions.

CFOS works collaboratively with many state and federal agencies and organizations to support a variety of research programs. For example, over the past year, UA researchers received approximately \$2.2 million from Alaska Sea Grant, \$490,000 from the Pollock Conservation Cooperative Research Center, \$660,000 from the Coastal Marine Institute (funded by the Bureau of Ocean and Energy Management), and \$250,000 from the Rasmuson Fisheries Research Center.

Through these programs and other activities, CFOS continues to address the most pressing research issues in fisheries, marine biology and oceanography.

▲ *Nate Cathcart and Brian Crabill cross the Chena River to get to a logjam. Photo by JR Ancheta.*

Chena River Logjams as Salmon Habitats

Juvenile salmon are vulnerable to strong river currents and predation by larger fish as they grow, and they need a constant, stable source of food. Researchers hypothesize that river logjams may provide an ideal habitat for these fish.

In summer 2017, researchers from CFOS and the US Fish and Wildlife Service, led by Jeff Falke, mapped sizes and distributions of logjams in the Chena River and measured the abundance of juvenile Chinook salmon at each logjam. These measurements will help determine how salmon use different types of logjams, whether certain areas of the Chena River provide better habitats, and the number of salmon that logjams might support. Understanding the value that logjams provide for salmon populations and ecosystems as a whole will help managers consider if and how constructed logjams may enhance salmon populations in the Chena River.

CFOS active grants as of June 30, 2018

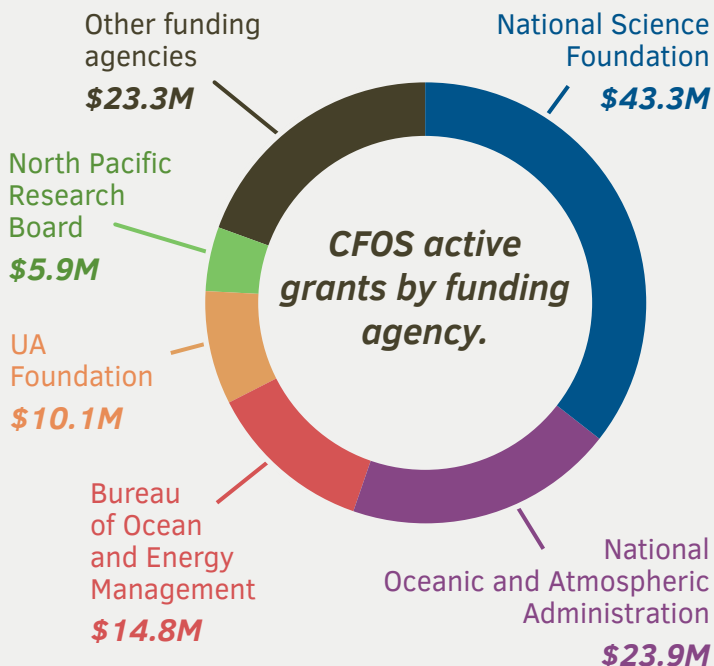
- Total active grants: **223**
- Total current research funding: **\$121 million**

Unleashing the Invertebrates

Approximately 30,000 marine invertebrate specimens are now available for researchers from around the world to use through the University of Alaska Museum of the North, thanks to a collaborative effort between the museum and a CFOS research team consisting of Andrés López, Angela Gastaldi and Sarah Hardy.

Since the 1960s, the museum has been building its collection of marine invertebrates. However, without digital records linked to specimens in the collection, it was nearly impossible for researchers to access this resource. The CFOS research team has spent the last two years organizing the specimens and creating an online database of records for the collection.

The database can be used to map each specimen record by species type, location and date collected. Making this information available for each species in the collection provides a useful tool for those studying how species distributions are changing. Researchers can also apply to use individual specimens for an expanding range of scientific purposes, from taxonomic, genetic and isotopic analyses to larger-scale ecological studies.



▲ A red-faced cormorant on its nest on St. Paul Island. Photo by Veronica Padula.

Plastic Contamination of Aleutian Seabirds

Veronica Padula is working with a team of researchers at the University of Alaska Anchorage to measure concentrations of plastic-related chemicals in seabird tissues collected from western Aleutian Island seabirds. These chemicals may be a contributing factor to the major decline in seabird populations that has occurred in this region over the past few decades.

Padula's team reported that Aleutian seabirds were often found with plastic-associated chemicals known as phthalates in their tissues. Additionally, roughly one-fourth of the birds had plastics in their stomachs at the time they were collected.

Anthropogenic phthalates have traveled thousands of miles in the ocean to affect birds of the western Aleutians. Thus, this research may also shed light on the far-reaching implications of human impact, noted Padula. Understanding why seabird numbers are declining may in turn provide clues to the nature of larger-scale environmental change.

Ocean Circulation Modeling

Harper Simmons studies how islands divert ocean currents. He develops theoretical ocean models that simulate circulation patterns based on ocean observations. Understanding how ocean currents move from region to region can help researchers predict how currents transport not only water but also animals, nutrients, contaminants and other material.

One of Simmons' current projects is focused on how small islands in the western Pacific, such as Palau,

disrupt a strong current that flows parallel to the equator. These physical obstacles act to stir up the water and transport nutrients to the surface, which may contribute to the thriving coral reef ecosystems off the coasts of these islands.

“Being able to better measure how these nutrients are moving is important for our understanding of this highly productive region,” Simmons said. “But for me, I’m simply fascinated by the way the currents move.”

Walrus Population Dynamics

Casey Clark, Lara Horstmann and Nicole Misarti are using zinc concentrations in walrus teeth to better understand changes in walrus populations.

Zinc can be used as a temporal indicator of when a walrus first reached sexual maturity. These researchers propose that if animals are able to start reproducing early in life, this may indicate that enough resources are available for population growth. “If a population is doing really well, with low stress and abundant food, animals will grow quickly and reproduce at a younger age,” said Clark. “In contrast, if there are too many walruses for the

amount of food available, it can take longer for each animal to grow enough to reach a place where they are capable of reproducing.”

The ability to track age of first reproduction over time could help resource managers understand how the walrus population has changed in the past and may change in the future. This information is vitally important for subsistence hunters in the Arctic who rely on walruses as a source of food.

▼ *A Pacific walrus takes a nap on a small ice floe in the Chukchi Sea. Photo by Casey Clark.*





Research Spotlight

▲ Sockeye salmon swim together in Bristol Bay. Photo by Jonny Armstrong through Salmon-net.

Collective Movement of Salmon

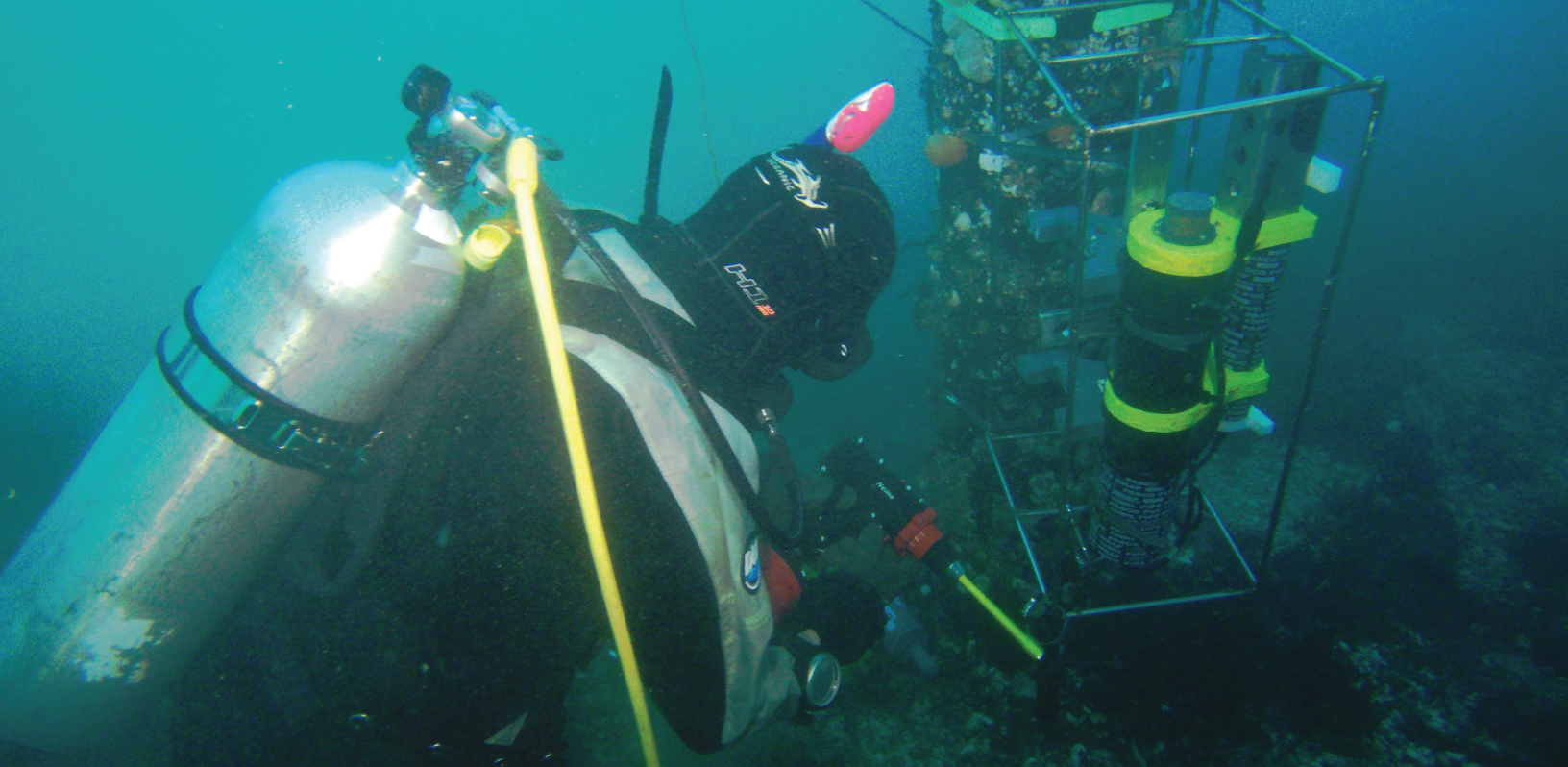
Peter Westley is part of an international team of scientists working to consolidate information on why and how fish and other animals move together in groups. This field of study, called collective movement, can explain many aspects of fish behavior. Westley's team found that collective movement may have important implications for how we manage species such as Alaska salmon. Just as people often make decisions based on social factors, many of the choices that salmon make are driven by group dynamics. However, social information has yet to be used by fisheries managers. "Changing our thinking to incorporate social dynamics into this understanding of how populations move around is critical to making the best decisions about their management," Westley said.

For example, research suggests that groups of Alaska salmon that travel to the open ocean from rivers located farther from the coast tend to leave

sooner, and tend to head back to these rivers sooner, than groups with a shorter travel distance to the ocean. This information could benefit managers seeking to adjust the timing of when to open particular fisheries in different regions.

Additionally, social dynamics can influence how a group behaves in response to changing population size. "Some fish such as the northern cod have really tight social interactions," Westley said. "As populations decrease, the fish tend to stay closer together. But this can make them susceptible to overfishing."

Westley explained that incorporating social data into decision-making may help managers either target or avoid species, depending on what they are trying to accomplish. These social data provide a more complete picture of the factors affecting salmon movement.



Research Spotlight

▲ *Amanda Kelley installs an ocean acidification sensor in Kasitsna Bay. Photo by Alta Dean.*

Measuring Coastal Ocean Acidification

Nearshore ecosystems help to protect the coastline and provide important habitat for marine animals. Despite Alaska's vast coastline and vital fisheries, little is known about how ocean acidification (OA) affects the nearshore environment. Because these ecosystems are highly dynamic and complex, in the past it has been challenging to accurately monitor changes in OA in coastal waters.

A research team led by Amanda Kelley installed five sensors to continuously monitor OA conditions in Kachemak Bay. These data will be used to study how OA affects different organisms in shallow areas along the coast.

As OA is predicted to intensify in the future, animals such as crabs and mollusks that build shells made of calcium carbonate may have difficulty growing or maintaining their shells. Often, these animals are most vulnerable to changes in pH during the early stages of their development.

"Many commercial fish and shellfish species in Alaska use the nearshore region as a nursery environment," said Kelley. "Understanding

how pH fluctuates in nearshore environments will help us better understand what it might mean for species that are trying to grow and develop in Kachemak Bay."

If animals are accustomed to rapidly changing pH conditions in the nearshore, they might be better adapted to withstand changes in pH than animals in environments with more stable pH levels. Monitoring seasonal fluctuations in pH will help Kelley's team understand the extent of pH variability that nearshore species can tolerate.

Data collected by these OA sensors will provide an important record of Kachemak Bay pH variability throughout the annual cycle. By comparing trends in pH to biological and ecosystem data, Kelley's team hopes to understand how OA fits into the broader context of ecosystem change in Kachemak Bay.

Eventually, Kelley and her team hope to expand this monitoring project to other coastal regions in Alaska. The project is a collaborative effort between CFOS, the Kachemak Bay Research Reserve and the Kasitsna Bay Laboratory.

Research Centers, Institutes and Facilities

Center for Salmon and Society

In 2018, UAF approved the Center for Salmon and Society (CSS), which was created to foster collaborative partnerships that support sustainable salmon populations in Alaska. Recently, CSS hosted two public education forums on the status of salmon habitat protections in Alaska. State and federal managers, scientists and a variety of fishing and development representatives gave presentations and participated in panel discussions.

Coastal Marine Institute

The Coastal Marine Institute supports marine research projects focused on areas potentially influenced by oil exploration and extraction. Newly funded projects include studies on Cook Inlet salmon and Arctic cod.

Kasitsna Bay Laboratory

The Kasitsna Bay Laboratory monitors coastal waters in partnership with NOAA. The laboratory has expanded its focus to include management questions regarding seaweed harvesting and juvenile salmon habitat. The lab's capabilities were recently bolstered with a new NSF Facilities Improvement award that funded new equipment and building improvements.

Kodiak Seafood and Marine Science Center

The Kodiak Seafood and Marine Science Center (KSMSC) is dedicated to advancing seafood science and

processing. The center recently expanded its research repertoire to include fisheries oceanography with the addition of research faculty Mike Litzow. Additionally, CFOS was recently approved to hire a new mariculture professor at KSMSC.

Lena Point Fisheries Facility

The Lena Point Fisheries Facility located in Juneau held its first-ever open house this past year. The event brought more than 500 community members to explore rooms filled with marine science-focused presentations, games and activities, including touch tanks and computer games. The organizers hope this will become a biennial event.

The Lena Point facility is also leading two tenure-track faculty searches: a President's Professorship in quantitative fisheries and ecosystems, and a NOAA Quantitative Ecological and Socioeconomic Training program faculty position in quantitative fisheries. And, as part of a new NSF Established Program to Stimulate Competitive Research (EPSCoR) award to UAF, next year we anticipate hiring a new tenure-track faculty in fisheries genetics.

Ocean Acidification Research Center

The Ocean Acidification Research Center (OARC) was reorganized to include two main foci, one on open ocean and coastal monitoring and one on impacts of ocean acidification on marine animals. OARC continues to serve the state and nation by analyzing water samples and is working to expand its monitoring and experimental research programs.

Pollock Conservation Cooperative Research Center

The Pollock Conservation Cooperative Research Center supports a number of research projects and graduate fellowships. Current projects focus on groundfish and other related fisheries and marine mammals.

Rasmuson Fisheries Research Center

The Rasmuson Fisheries Research Center funds CFOS graduate student research. Newly funded research topics include a study on Prince William Sound lingcod and another on the health of humpback whales.

Seward Marine Center

The Seward Marine Center (SMC) supports R/V *Sikuliaq* operations and hosts a variety of research and outreach activities. SMC supported the first year of sampling for the new NSF-funded Northern Gulf of Alaska Long-term Ecological Research program (NGA LTER). The NGA LTER program will greatly expand on the historical Seward Line research program. SMC is also leading the effort to commission the construction of a new coastal research vessel to replace R/V *Little Dipper*.

R/V *Sikuliaq*

Sikuliaq glides through icy water in the Arctic. Photo by Roger Topp. ▼

In her second full year of operations, the research vessel *Sikuliaq* hosted twelve science projects. Chief and co-chief scientists for these projects were based at nine different universities and institutions. Two Alaska-based cruises were led by CFOS researchers.

In FY18, UAF students, staff and faculty participated in approximately 40% of *Sikuliaq* science days at sea—a testament to the active seagoing research programs at CFOS and UAF. In that regard, a key highlight is the search to hire up to five tenure-track seagoing faculty, which will strengthen our academic and research programs while bolstering use of *Sikuliaq*. We also anticipate hiring a new professor in marine biology, supported in part by the NSF EPSCoR award to UAF.

Sikuliaq spent over a quarter of the year in the Arctic and transited north of 72° north latitude. Other cruises took *Sikuliaq* to the West Coast of the United States, west to Hawai'i, and as far south as the US–Mexico border.

The crew of *Sikuliaq* continues to stand out for its attention to detail and willingness to help scientists meet their research goals. We look forward to new adventures and successes that 2019 will bring for *Sikuliaq*.



FY18 *Sikuliaq* Statistics

31,164 nm traveled • **233** total ship days • **164** days of science (not including mob/demob days)
79 days in the Arctic (as defined by the Arctic Research and Policy Act of 1984) • **455** CTD casts
346 net tows • **69** moorings deployed • **20** moorings recovered • **30** gliders deployed
32 gliders recovered • **50** sediment cores collected



▲ Researchers deploy a glider from one of *Sikuliaq*'s small boats during summer 2018. Photo by Roger Topp.

▲ *R/V Sikuliaq* FY18 ship track

Northern Gulf of Alaska Long-term Ecological Research

Summer 2018 was the first season of cruises for the newly funded NGA LTER program, led by Russ Hopcroft. The NGA LTER builds on two decades of research in the Gulf of Alaska associated with the Seward Line program. With new LTER funding and use of *Sikuliaq*, the scope of this fieldwork has greatly expanded. Researchers are now able to study specific biological and physical processes that drive environmental variability in the gulf. During the May

process cruise, researchers conducted extensive microscope work and incubation experiments, and mapped the ocean floor at a resolution not possible using prior research platforms.

“It’s like we have moved from working out of a camper van to working out of an entire house,” explained Hopcroft. “The ship we have been using in the past could fit on the back deck of *Sikuliaq*.”

Arctic Research Icebreaker Consortium

CFOS and *Sikuliaq* have joined 13 other partners from Europe and Canada in the international Arctic Research Icebreaker Consortium (ARICE). The new collaboration supports transnational planning and implementation of Arctic research cruises.

Research icebreakers provide the infrastructure and tools to study the remote ice-covered waters of the Arctic Ocean. However, there are limited icebreakers available to support polar research needs. An objective of the ARICE program is to increase the efficiency of how icebreaker cruise time is designated in order to optimize the use of polar research vessels.

Recognizing the need to provide polar scientists with improved access to research icebreaker capacities in the Arctic, the European Commission is providing over \$7 million to support ARICE over the course of four years. International Arctic scientists can apply for fully funded access to six international icebreakers, including *Sikuliaq*, to conduct research in the Arctic Ocean.

As the US representative in ARICE, *Sikuliaq* is well positioned to serve an increasingly international audience and to foster greater collaboration between US Arctic ship users and international scientific partners.



Alaska Sea Grant

▲ A humpback whale breaches in Alaska waters. Photo by Kaitlin Thoresen of the National Park Service.

One of 33 programs in coastal states and territories of the United States, Alaska Sea Grant (ASG) is a partnership between NOAA and CFOS/UAF. The program's Marine Advisory agents are located across Alaska and work closely with local communities to help build strong and resilient ecosystems and economies. ASG also funds research, marine education in K–12 school districts, and career-building fellowships for current and recently graduated MS and PhD students.

ASG welcomes Heather Brandon as the new director as of August 2018.

Supporting Alaska's Fishing Industry

ASG has provided training and support to nearly 4,000 fishermen and direct marketers over the past 20 years. This year ASG updated one of its most popular books, the *Fishermen's Direct Marketing Manual*. This fifth edition is packed with new information on branding, product placement, social media and emerging products for fishermen who sell their catch directly to buyers. The manual helps readers decide whether this business model is right for them and provides information on how to launch a new business or fine-tune an existing one.

"When I began selling a portion of my catch, the *Fishermen's Direct Marketing Manual* was my single most valuable resource in navigating that brand-new arena," said Shannon Ford, owner of Two If By Seafoods, based in Washington and Alaska. "Now, 10 years later, I still refer to it as a comprehensive guide and reference."

ASG convened the seventh statewide Alaska Young Fishermen's Summit in 2017, the largest since it

began a decade ago. More than 85 people from 27 coastal communities participated in this professional development and networking conference. Alaska Governor Bill Walker and Lt. Governor Byron Mallott were among the speakers at this meeting.

Paula Cullenberg and Courtney Carothers coauthored "Turning the Tide," a study that looks at the cultural implications of an aging Alaskan fishing fleet and outsourcing of labor to the lower 48 states for Alaska's coastal communities. They collaborated on the project with Rachel Donkersloot, Jesse Coleman and Danielle Ringer.

"Finding a way to keep local residents involved in commercial fishing in their region is key to keeping the economic health of these communities strong and vibrant. This is not just an Alaska problem, and our report shares what has been done in other parts of the globe," said Cullenberg.



▲ *Ali Schuler's 2017 field team heads to Point Retreat. Photo by Heidi Pearson.*

The Next Generation of Scientists

Twelve graduate students worked on Alaska Sea Grant-funded research projects this year. Maggie Chan is serving as a Sea Grant Knauss Marine Policy Fellow in Washington, DC, and five Alaska Sea Grant State Fellows are working in Alaska state and federal agencies this year to gain valuable career experience.

For the fourth year, Gabe Dunham partnered with former Alaska legislator and emeritus professor Mike Davis to teach “Fisheries and the Legislative Process” to Bristol Bay residents. Students traveled to the state capital in January for an intensive week of interaction with lawmakers and professionals. Past students have testified on legislation, served on fisheries committees, and assumed other leadership positions. Many students noted the positive impact this course has had on their careers.

Whales and Tourism

Ali Schuler is studying how humpback whales are responding to Southeast Alaska’s burgeoning tourism industry. About one million people come to Southeast Alaska by cruise ship annually, and about one-quarter of them participate in whale-watching tours. As the whale-watching industry grows, the health of the whale population and the viability of the industry may be jeopardized if whale-watch pressure changes foraging behavior or causes chronic stress. The goal of Schuler’s work is to assess the costs and benefits of whale-watching in Juneau, one of Alaska’s most popular whale-watching destinations.

Invasive Species Detection

For several years, Gary Freitag has helped detect nonindigenous species in Alaska’s waters through monitoring and outreach. This year, Freitag deployed invasive tunicate sampling plates in Ketchikan, helped with a citizen sampling program to monitor for European green crab, and concluded the northern part of a three-year international study of nearshore invertebrates led by Temple University and the Smithsonian Environmental Research Center (SERC). Freitag’s public lectures and classes are raising awareness of this potential ecological hazard.

In Unalaska, Melissa Good and volunteers are placing invasive species detection devices at docks in partnership with SERC.

▼ *Gary Freitag documented an unusually large amount of Botryllus sp. at Ben Harbor in Ketchikan via a submerged plate system. Photo by Gary Freitag.*





Development

Deanna Klobucar and Elizabeth Hinckle use an electroshocker to collect fish in Cripple Creek. Photo by Lauren Frisch. ▲

The College appreciates and thanks all of its donors who over many years have generously given to support and advance our mission. In FY18, CFOS received \$853,224 in charitable gifts. These generous gifts help the College create scholarships and fellowships and support new student and faculty research.

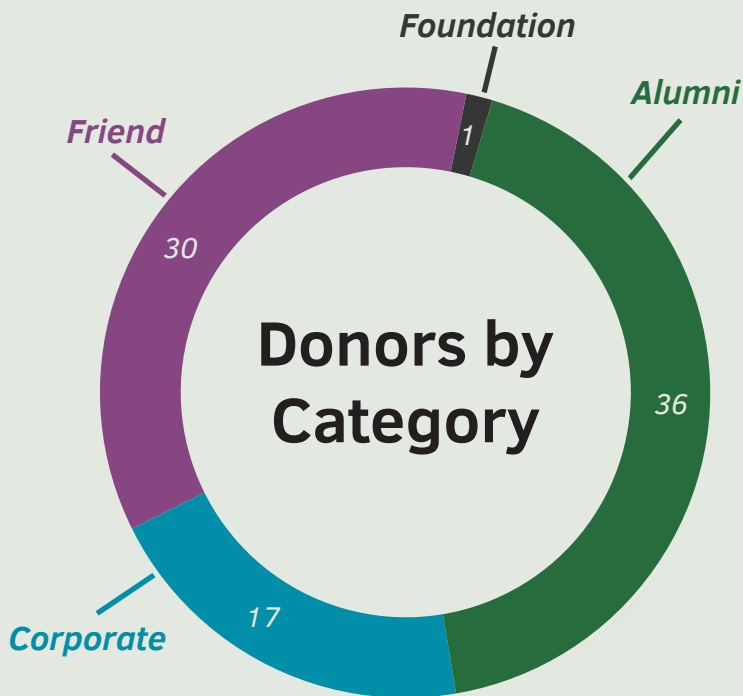
The University of Alaska system recently changed the development structure at UAF and CFOS. University leadership is transitioning to a centralized development structure to optimize opportunities for giving and further strengthen research and academic programs across the university. As a result, going forward the UAF Development Office has assumed responsibility for development efforts on behalf of the College.

We look forward to exploring opportunities for new philanthropic giving to CFOS in areas of vital importance to the health and economy of Alaska's oceans, coasts and inland waters.

Ashley Bolwerk and her dog Abalone study rocky intertidal communities on Prince of Wales Island. Photo by Nicole LaRoche. ►

FY18 CFOS Fundraising

Total giving: **\$853,224**



Total number of donors: **84**

Number of new donors: **26**

Major Donors

- 57 Degrees North
- Alaska General Seafoods
- Alaska Ocean Seafood
- Dr. Vera Alexander
- American Seafoods Company
- Arctic Storm
- AT&T
- Frances S. Baker*
- Bering Sea Fisheries Research Foundation
- Blue Evolution
- Robert and Kathleen Byrd
- Shirley A. Carlson
- Coastal Villages Region Fund
- CoBank
- Consortium for Ocean Leadership
- Crowley Marine Services
- E. R. Dolly Dieter
- Douglas Island Pink & Chum
- Ardella P. Follmann
- Glacier Fish Company
- The Glostén Associates
- John J. Goering*
- Highland Light Seafoods
- Hilcorp Alaska
- Holland America Princess Alaska
- Icicle Seafoods
- William F. Meek*
- Gordon and Betty Moore Foundation
- M. J. Murdock Charitable Trust
- Nelbro Packing Company
- Northrim Bank
- Ocean Beauty Seafoods
- Phoenix Processors
- Prince William Sound Science Center
- Elmer and Mary Louise Rasmuson*
- Rasmuson Foundation
- Wendel Raymond
- William S. Reeburgh
- Santa Monica Seafood
- Shell Exploration and Production Company
- Starbound
- Trident Seafoods
- United Catcher Boats
- Usibelli Coal Mine
- Frankie Wakefield*
- Wards Cove Packing Company

*Deceased





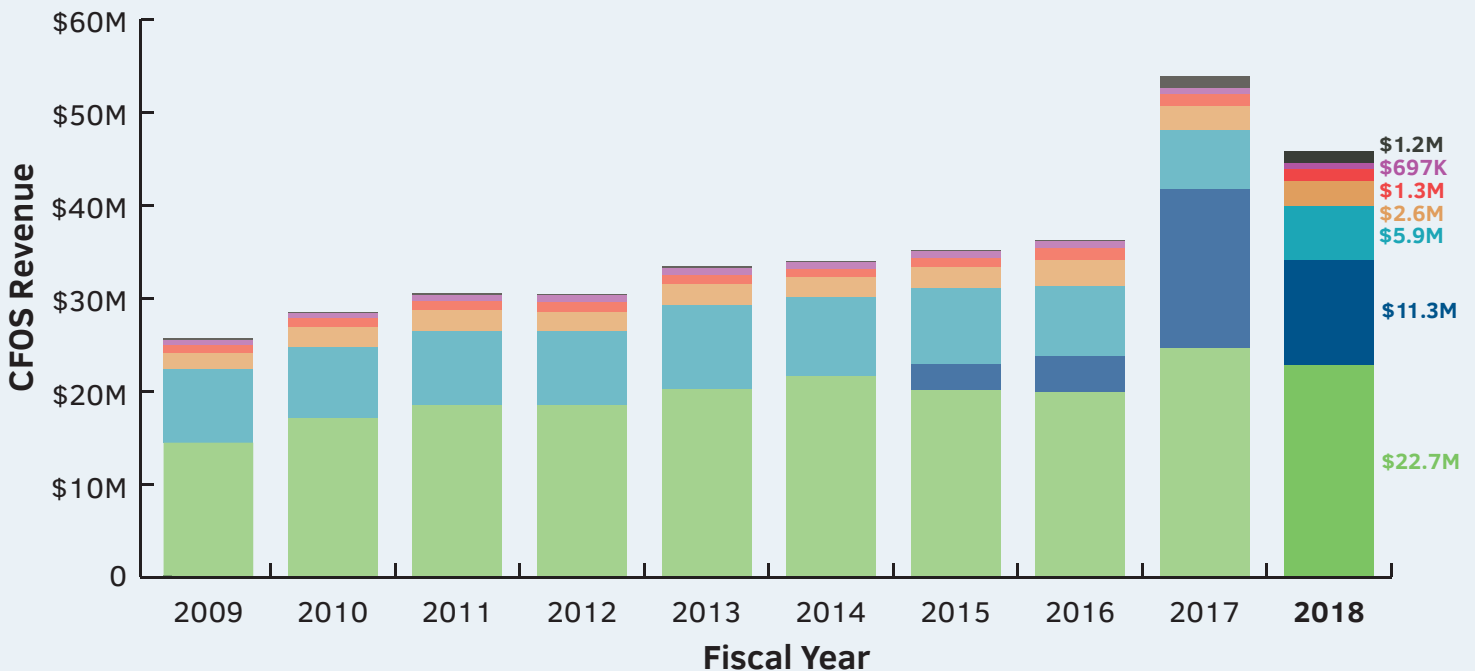
Budget and Finance

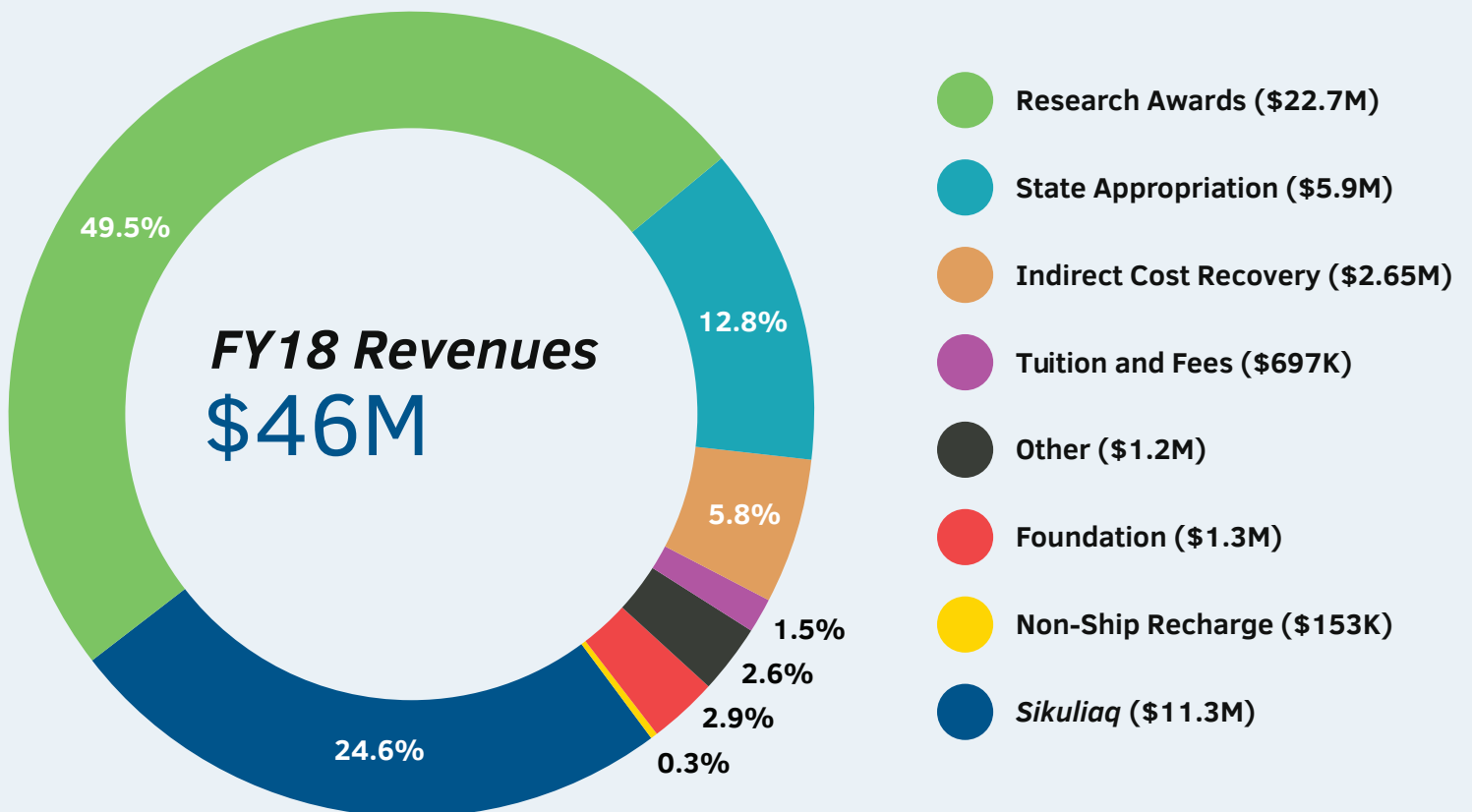
▲ Walrus rest on sea ice in the Arctic. Photo by Roger Topp.

CFOS Revenue Trend

*Non-Ship Recharge and American Reinvestment and Recovery Act funding (2011 - 2016) excluded.

- Research Awards*
- Sikuliaq
- State Appropriation
- Indirect Cost Recovery
- Foundation
- Tuition & Fees
- Other Revenue







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