College of Fisheries and Ocean Sciences

ANNUAL REPORT 2023



UNIVERSITY OF ALASKA FAIRBANKS

Message from the Dean



The College of Fisheries and Ocean Sciences continues to make impressive strides in advancing our mission as a world-class organization focused on high-latitude aquatic ecosystem research and diverse academic programs. As highlighted in this report, our exceptional students, staff and faculty are working diligently and creatively to address some of the most pressing environmental challenges facing Alaska and beyond.

Among the milestones over the past year, undergraduate enrollment increased by roughly 40% to a record high, and graduate enrollment is now close to our highest enrollment over the past decade. These trends underscore that students are increasingly choosing CFOS to advance their careers in fisheries, marine policy, marine biology and oceanography. This is also a testament to our talented faculty and staff for their hard work strengthening and growing our academic programs.

A hallmark of our college is the breadth of research, from individual investigator projects to large multidisciplinary programs. Notably, we again realized record funding in support of numerous research grants and contracts. A major accomplishment is the support of the National Science Foundation to continue our operation of *Sikuliaq* under a new cooperative agreement that will extend through calendar year 2029. We were also successful in our renewal of the NSF Northern Gulf of Alaska Long-Term Ecological Research program, and are in the process of renewing our cooperative agreement with the National Oceanic and Atmospheric Administration to co-manage the Kasitsna Bay Laboratory.

Several new faculty appointments were made during the past year. Steve Dykstra and Kay McMonigal were appointed tenure-track assistant professors in the Department of Oceanography, and Shannon Doherty was appointed as research assistant professor in the Department of Oceanography. Active searches are underway for new tenure-track faculty in fisheries, marine policy and oceanography. In administration, Ana Aguilar-Islas was appointed associate dean for academic programs, and Franz Mueter took the helm as chair of the Department of Fisheries. We also hired a number of staff to support our education and research programs and ship operations. And finally, Demian Schane, chief of the Alaska Section of the NOAA General Counsel Office, was appointed to the CFOS Advisory Council.

I invite you to learn more about our growing academic programs and the outstanding research being conducted by our dedicated community of students, staff and faculty.

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

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A school of coho salmon. Photo courtesy of Alaska Sea Grant.

New Faculty Appointments

Shannon Doherty



Shannon Doherty, a marine biogeochemist, joined CFOS in summer 2023 as a research assistant professor. She is interested in the interactions between plankton ecosystems and chemical cycles in the ocean, particularly the carbon cycle. Doherty's current projects focus on the ecology of foraminifera, a zooplankton whose fossils are used as proxies for the chemistry of past ocean environments.

Doherty uses a suite of chemical tools in her research, including compound-specific stable isotope techniques. As an isotope chemist, she is looking forward to working at her "dream lab" at UAF's Alaska Stable Isotope Facility. "As an oceanographer, Alaska is a dynamic and exciting place to work. I am looking forward to working in communities that are so interconnected with marine ecosystems."

Steven Dykstra



Steve Dykstra joined the Department of Oceanography in summer 2023 as an assistant professor. He researches ocean-land-atmosphere interactions, focusing on river-marine transitions and the role of human impacts. His research advances the scientific understanding of flood risks, global warming impacts and environmental change.

Dykstra has also led field research and outdoor education programs in diverse environments throughout the world. He began working in coastal Alaska in 2005 as a naturalist at Kenai Fjords National Park. "After spending the last decade working throughout Asia, Africa, and North America, I'm excited to return to Alaska."

Kay McMonigal



Kay McMonigal joined the Department of Oceanography as an assistant professor in summer 2023. Their research focuses on how ocean circulation is being affected by climate change, and how those changes impact weather and ecosystems. Much of McMonigal's previous work focused on how ocean circulation changes have led to a buildup of heat in the Indian Ocean, and they plan to apply a similar methodology to the Arctic. "I'm excited to join CFOS because the Arctic is one of the fastest changing regions due to climate change. The people, location and resources of CFOS make it a great place to tackle this important problem."

McMonigal also is passionate about making oceanography more diverse and inclusive, serving on the University-National Oceanographic Laboratory System committee for Maintaining an Environment of Respect Aboard Ships.

Academics

New Programs and Curriculum Changes

Over the past year, several CFOS academic programs were strategically amended to be more flexible and promote inclusion, with a goal of broadening the pool of students who can envision themselves pursuing a CFOS degree.

The Bachelor of Science in Fisheries and Marine Science degree program began offering new asynchronous courses, which allows more flexible scheduling and the ability to earn the degree exclusively online for students who do not choose a concentration. The Fisheries Bachelor of Arts program now includes elective courses from a wider pool of social science disciplines and uses course designators rather than a long list of specific courses. These changes are expected to better serve the diverse interests of students.

Among graduate programs, the flexible format and requirements of the Master of Marine Policy degree have contributed to its growth (see page 7 for additional information). The Master of Marine Studies degree was revamped to encompass a wide range of interests, allowing students to select from a variety of elective courses from several programs and departments within UAF. Although the MMS degree does not require a research-oriented thesis, MMS students still have excellent opportunities for laboratory and field experiences. CFOS also continues to work with the College of Business and Security Management to offer the fully asynchronous Blue MBA program.

The Tamamta program welcomed four graduate student fellows last fall in its second cohort and added six fellows this fall in its third cohort. The NSF-funded graduate traineeship focuses on integrating Indigenous knowledge and perspectives in fisheries and ocean sciences. Efforts are underway to improve undergraduate advising for CFOS Alaska Native students by addressing cultural differences and norms in communication and meeting styles.



Emily Reynolds and Natalie Kiley-Bergen examine the intertidal algal community in Little Tutka Bay, Kachemak Bay, while taking the Field Methods in Marine Ecology and Fisheries course in May. Photo by Katrin Iken.

Internships and Awards



As part of their degree requirements, undergraduate students Tony Blade, Linnaea Doerner, Katarina Leavitt, Gwendolyn Bunch, Miles Cowles, Keet Lorrigan, Rheannon Williams and Nicholas Rimelman completed internships at various agencies and organizations. Their work included partnerships with the Alaska Department of Fish and Game, Douglas Island Pink and Chum, Go Dive Mossel Bay, Owl Ridge Natural Resource Consultants, and U.S. Fish and Wildlife Service.

CFOS undergraduate and graduate students also received several awards for their academic, research, leadership and service achievements. Congratulations to these individuals, and all CFOS students, for their hard work during the past year.

CFOS student Gwen Bunch kisses a salmon on the Kenai River. Photo by Brandy Helms.

Pikok honored by Explorers Club

Tamamta fellow Kimberly Kivvaq Pikok was honored for her conservation efforts by the Explorers Club, which named her one of "50 people changing the world that the world needs to know about."

The Explorers Club 50 was established in 2020 to amplify science communication that is "more inclusive and represents the many diverse voices in the global scientific community."

Pikok graduated from UAF in 2021 with a bachelor of science degree in wildlife biology. She is continuing her studies as an interdisciplinary studies graduate student in the Tamamta Fellowship Program.

Pikok is researching seasonal changes in Utqiagvik's spring whaling season by collecting local observations from hunters and whalers, conducting interviews, using community-based research methods, and gathering knowledge from the Alaska Arctic Observatory and Knowledge Hub database.



Kimberly Kivvaq Pikok was honored as a member of the Explorers Club 50 in February. Photo by Lloyd Pikok Jr.

Graduate Awards

CFOS DEAN'S CHOICE AWARD

Outstanding Graduate Student: Hannah Myers

DEAN'S GRADUATE RESEARCH ASSISTANT AWARD

Shelby Bacus

UAF UNDERGRADUATE RESEARCH AND SCHOLARLY ACTIVITY MENTOR AWARDS

Jonah Bacon, Amber Perk

UAF URSA INNOVATIVE TECHNOLOGY AND EDUCATION AWARDS

Sydney Almgren, Anna Medina

RASMUSON FISHERIES RESEARCH CENTER FELLOWSHIP AWARDS

James Crimp, Garrett Dunne, Chelsea Kovalcsik, Amber Perk

UA FOUNDATION SCHOLARSHIPS AND AWARDS

Alfred and Frances Baker Scholarship: Sydney Wilkinson

Dieter Family Marine Sciences Research Scholarship: Annie Maliguine and Sonia Kumar

Francis "Bud" Fay Memorial Scholarship: Chelsea Kovalcsik

Donald Hood Memorial Scholarship: Dana Bloch

Oscar Dyson Memorial Scholarship: Kat Leavitt

Northern Gulf of Alaska Research Award: Sydney Almgren, Sonia Kumar, Garrett Dunne

Ken Turner Memorial Fellowship: Jonah Jossart

Sport Fish Conservation Award: Will Samuel

Al Tyler Memorial Scholarship: Queenie Turner

Undergraduate Awards

CFOS DEAN'S CHOICE AWARD

Outstanding undergraduate student: Rachel Heimke

OUTSTANDING CFOS STUDENT ACADEMIC AWARDS

Freshman: Lucy White

Sophomore: Shelby Thompson

Junior: Samantha Allen

Senior: Rachel Heimke

UAF UNDERGRADUATE RESEARCH AND SCHOLARLY ACTIVITY PROJECT AWARDS

Fall 2022: Katherine LeBlanc, Jennifer Tusten

Spring 2023: Isabelle Nicolier, Sierra Lloyd

Summer 2023: Samantha Allen

UAF URSA RESEARCH AND ACTIVITY DAY DEAN'S CHOICE AWARDS

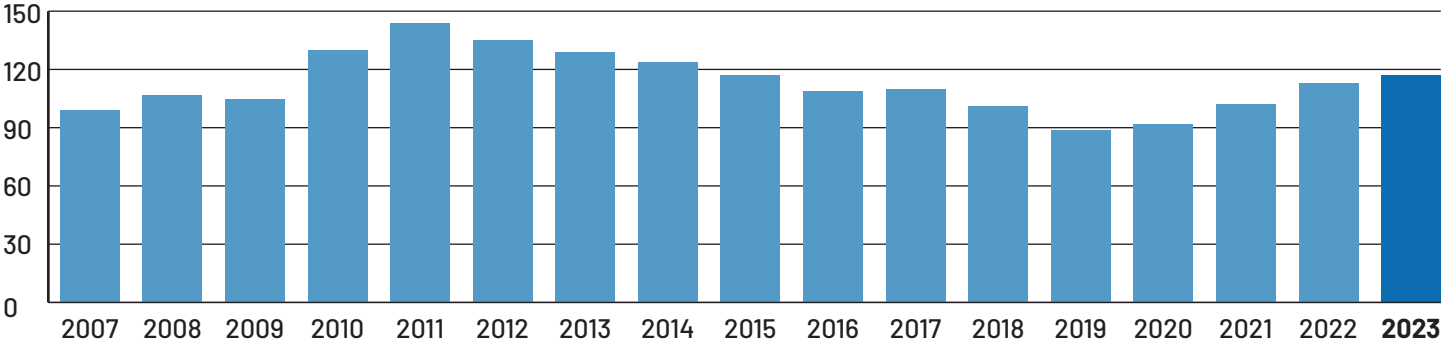
CFOS Dean's Choice: Isabelle Nicolier

CFOS Honorable Mention: Kristen Reece

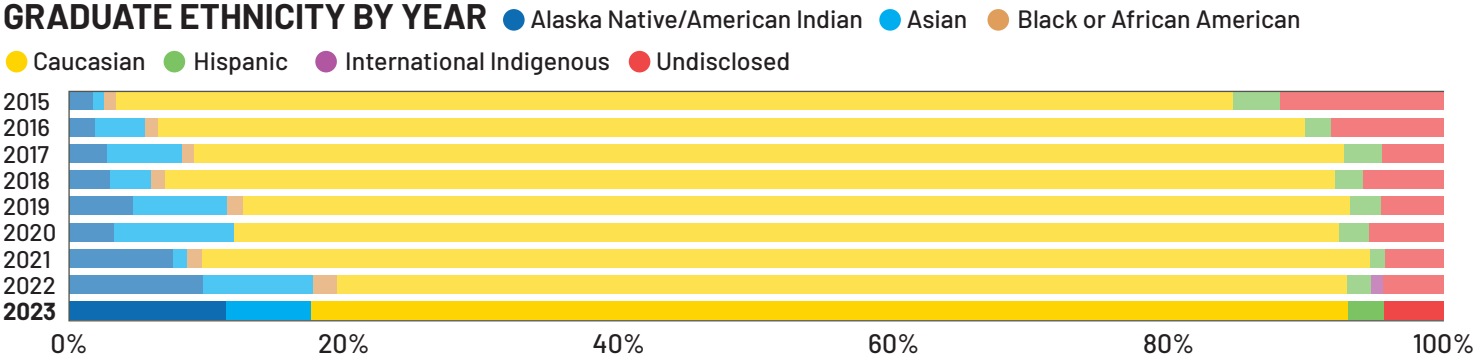
Participants in the summer Tamamta retreat in a circle discussion at Howard Luke Gaalee'ya Spirit Camp. Tamamta, a joint program of CFOS and the College of Rural and Community Development, provides funding for Indigenous and non-Indigenous CFOS graduate students over five years. Tamamta fellows for fall 2023 include Alex Jenkins, Chris Tran, Craig Chythlook, Hanna Hellen, Justin Leon and Rachel Lekanoff. Photo by Courtney Carothers.



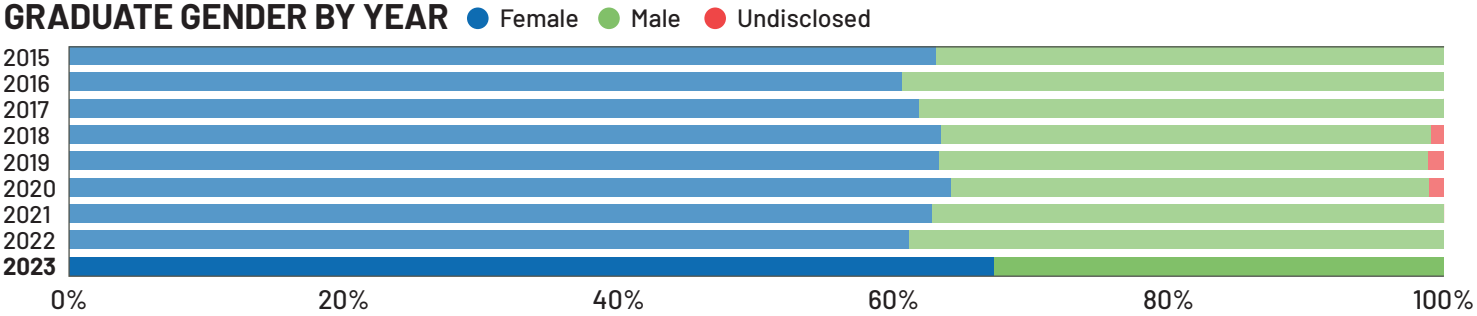
GRADUATE STUDENT ENROLLMENT BY YEAR



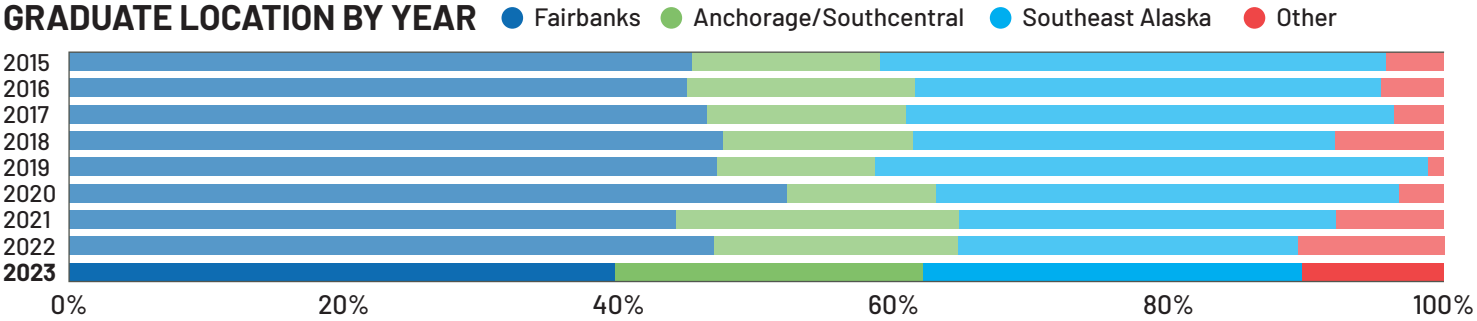
GRADUATE ETHNICITY BY YEAR



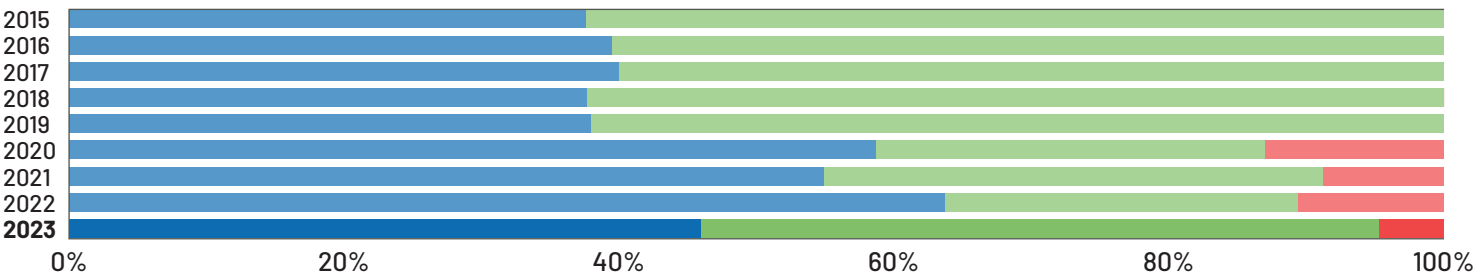
GRADUATE GENDER BY YEAR



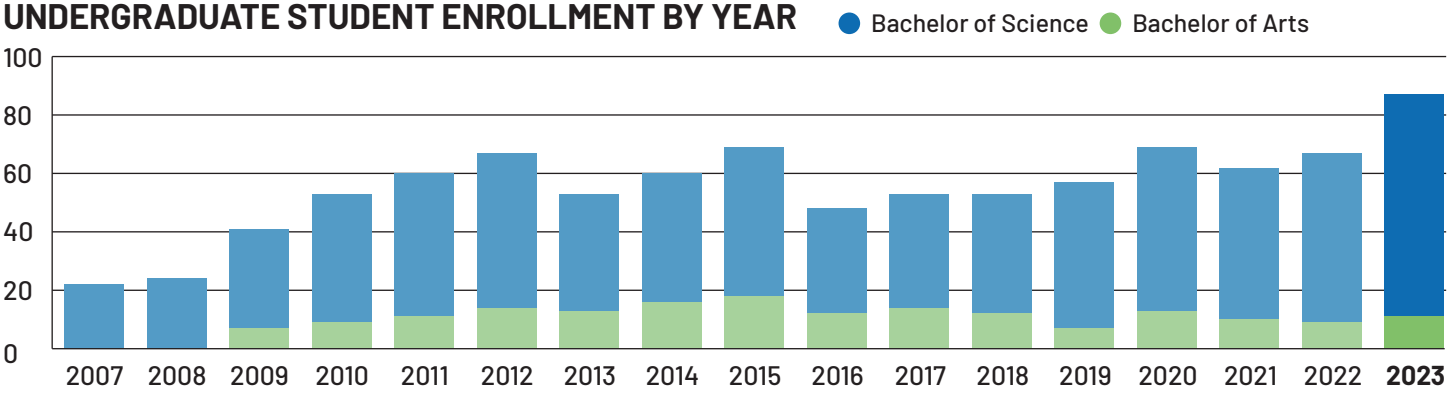
GRADUATE LOCATION BY YEAR



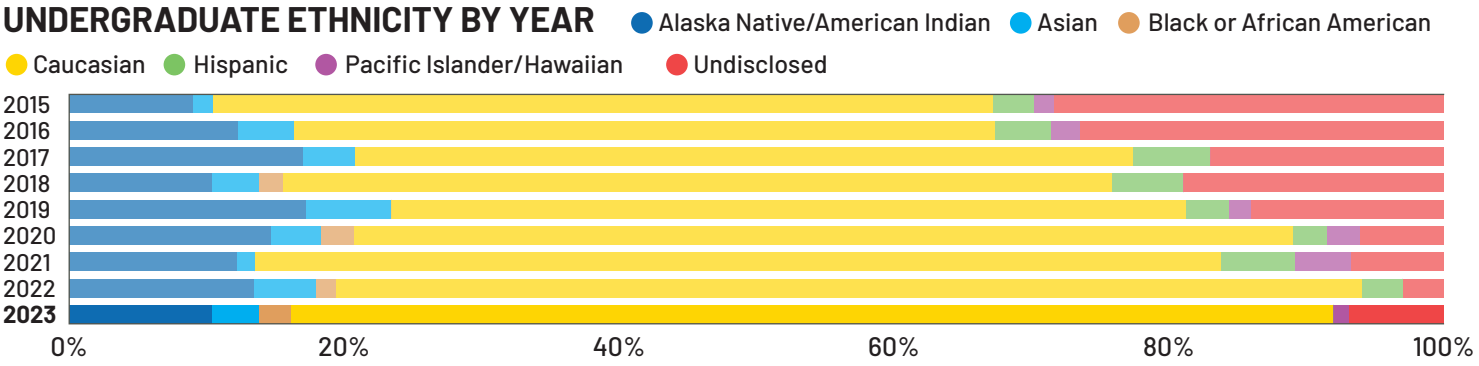
GRADUATE RESIDENTIAL STATUS BY YEAR



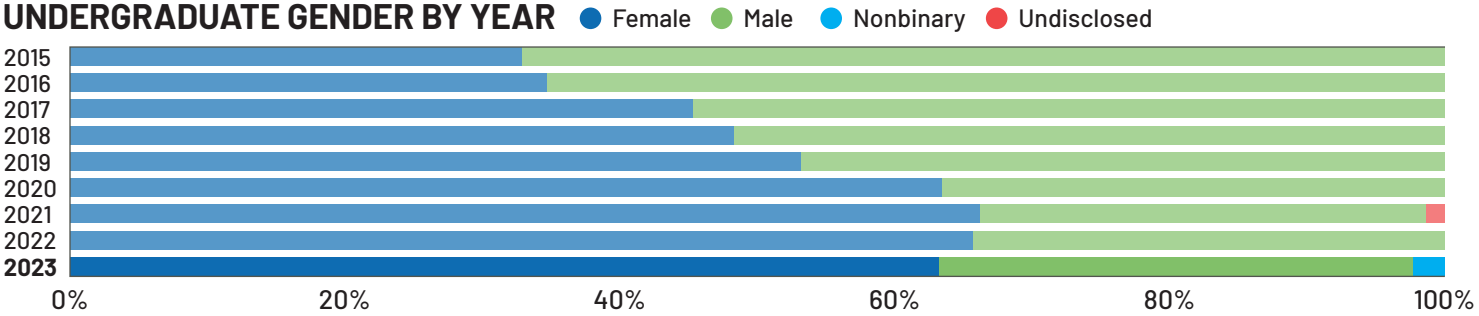
UNDERGRADUATE STUDENT ENROLLMENT BY YEAR



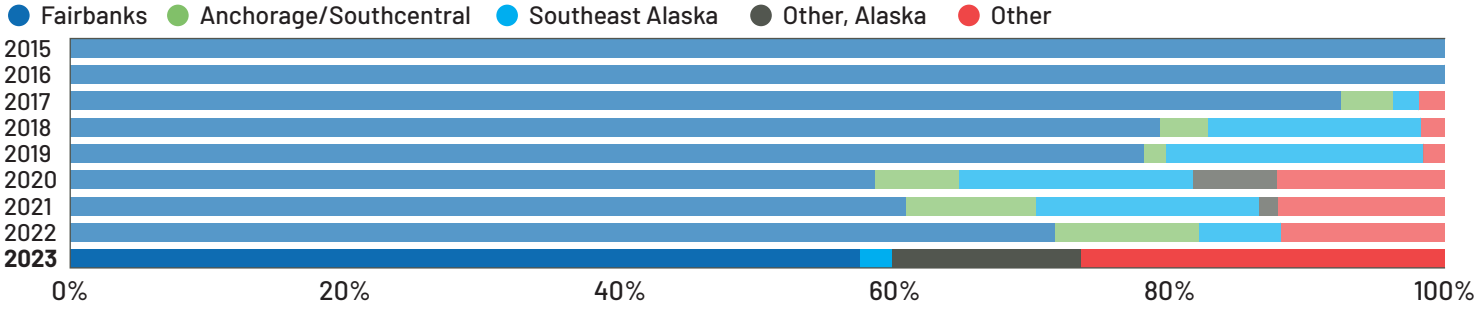
UNDERGRADUATE ETHNICITY BY YEAR



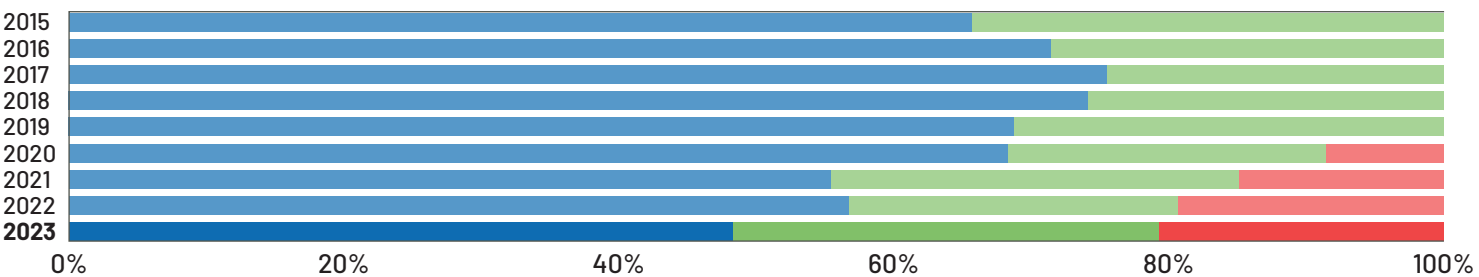
UNDERGRADUATE GENDER BY YEAR



UNDERGRADUATE LOCATION BY YEAR



UNDERGRADUATE RESIDENTIAL STATUS BY YEAR



Master of Marine Policy program continues to grow

Since its approval in 2022, the Master of Marine Policy program has shown encouraging growth, with 14 students enrolled as of fall 2023.

With approval by UAF and University of Alaska Southeast faculty senates, the UA Board of Regents and the Northwest Commission on Colleges and Universities, the MMP degree is a distance-delivered program offered jointly between CFOS and the UAS School of Arts and Sciences. The program is co-directed by Keith Criddle (UAF Ted Stevens Distinguished Professor of Marine Policy) and LJ Medenica (Associate Professor, UAS Business and Public Administration Program).

Its flexible format is designed for professionals who are seeking to enhance their knowledge of marine policy in the United States and globally. Courses include four core areas of study: living marine resources and their management; analytical methods; law and policy; and economics, development and sustainability. The flexible internship requirements can be fulfilled with a federal, state, local or tribal government, a marine-dependent industry or a marine-focused nongovernmental organization.

Most of the students admitted into the program are professionals working in various capacities for federal, state or local governments or tribes. While a few students live in Juneau or Fairbanks, most are scattered across Alaska, and several are pursuing the program from the Lower 48.

Maritime and Fisheries Law and Policy courses developed for the MMP are also proving popular with Fisheries and Marine Biology students who want to enrich their graduate training with a practical understanding of national and international regulatory frameworks and processes.

The growth of the program has resulted in UAF and UAS recruiting new faculty to support the program's expansion and enhance the breadth and depth of course offerings. CFOS hopes to double the program enrollment in the upcoming year.

A gillnetter fishes in Sumner Strait. Photo courtesy of Alaska Sea Grant.

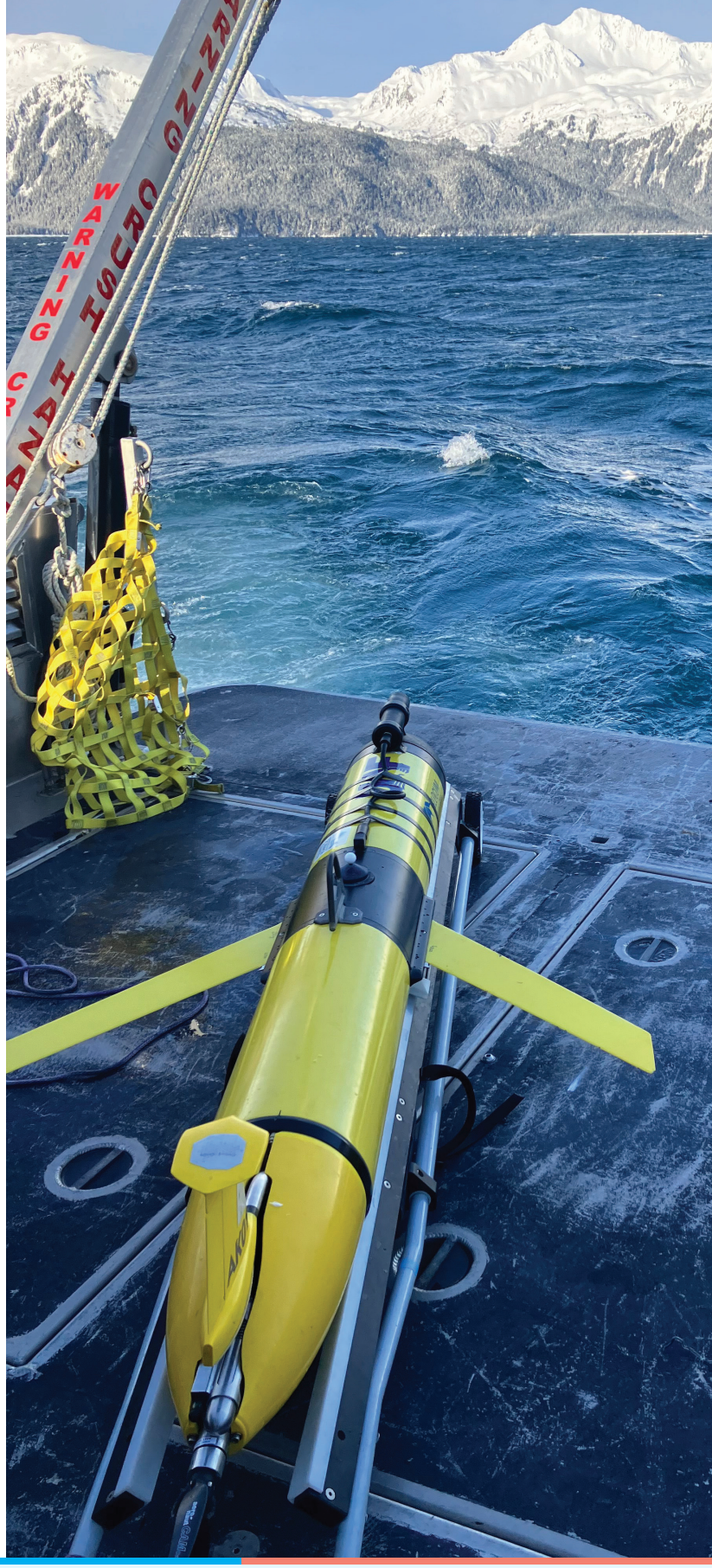


Research

Through field research, cruises and citizen science partnerships, CFOS scientists pursued a variety of research efforts during the past year. Research included both more focused individual studies and large integrative projects that address the structure and dynamics of marine ecosystems. CFOS continues to be a major user of R/V *Sikuliaq*.

Major projects focused on the impact of mariculture on coastal Alaska ecosystems, the effects of zooplankton blooms on Gulf of Alaska fisheries, marine mammal behavior and ecology, and struggling salmon and crab populations in a changing climate. Long-term monitoring and time series data collection also continues. One of these efforts, the Northern Gulf of Alaska Long-Term Ecological Research project, is moving into its second phase of National Science Foundation support for studying the physical, chemical and biological processes that structure the marine ecosystem in the region.

CFOS research continues to receive strong support from a variety of state and federal agencies and partner organizations, including the National Science Foundation, the Alaska Ocean Observing System, the North Pacific Research Board, the Alaska Department of Fish and Game, the National Oceanic and Atmospheric Administration, and the Bureau of Ocean and Energy Management.



An autonomous underwater vehicle named Shackleton sits on the deck of the R/V *Nanuq* before its launch into Resurrection Bay. Photo by Brian Mullaly.

CFOS Active Grants as of June 30, 2023

Total current research funding (awarded): **$153 million**
Total active grants: **182**

Northern Gulf of Alaska LTER wraps up first research phase

The Northern Gulf of Alaska Long-Term Ecological Research program concluded its first round of National Science Foundation–sponsored research in 2023, a milestone for one of the newest sites in the LTER network.

The initial five-year research period for the Northern Gulf of Alaska site ended up running for six years due to pandemic delays. Still, it's been an auspicious start for the NGA LTER, which has been awarded an additional five years of NSF funding for its next phase. The project, which was launched in 2017, focuses on the physical, chemical and biological processes that contribute to environmental variability in the region.

The NGA LTER benefits from a long legacy of data collection in the Northern Gulf of Alaska. The project is anchored by the GAK-1 mooring near Seward, which has been taking surface measurements for the past 50 years. It also builds off 25 years of observations along the Seward Line, which stretches from GAK-1 to far beyond the continental shelf break.

"We're trying to observe and understand the ecological interactions in the region, particularly the lower trophic level communities and their relation to the physical environment," said Russ Hopcroft, who leads the research program. "We also aim to provide information on the region's productivity for fisheries."

The extensive area of research encompasses coastal river runoff and glacial melt, a broad continental shelf, and the deep water of the ocean. The project provides long-term data crucial for scientists grappling with changes in a complex marine ecosystem. Hopcroft said a longer view helps researchers see through the noise of short-term fluctuations.

The project focuses on ship-based measurements, including one or two cruises annually aboard R/V *Sikuliaq*, which allows for on-site sampling that can't be achieved with satellite observations.

Hopcroft noted that the NGA LTER also provides a large-scale, long-term opportunity for CFOS students, which supports enough work to "provide the meat" for graduate student projects.

"As opposed to some of the other things we get funded, the scope of the LTER is big enough to support a student for 3 to 5 years," he said. "It's done a great job of increasing the student opportunities in the oceanography department."

NSF is the primary funder of the project, along with the North Pacific Research Board, Alaska Ocean Observing System, and the *Exxon Valdez* Oil Spill Trustee Council. The Northern Gulf of Alaska LTER is one of 28 NSF-funded LTER sites around the United States.



Harbor seals rest on ice floes in Icy Bay, Prince William Sound, with Chenega Glacier in the background. Photo by Nicole Webster.

Researchers confirm that salmon are spawning in Arctic rivers

A CFOS-led research team has confirmed that salmon are spawning in an Arctic Ocean watershed, suggesting that at least some salmon species could be expanding to new territory as climate change reshapes their habitat.

Researchers found about 100 chum salmon in the Anaktuvuk and Itkillik rivers on Alaska's North Slope that were either actively spawning or had finished spawning. Peter Westley, who led the project, said the discovery of these fish aligns with a hypothesis that salmon are being pushed north as their traditional habitat changes.

"Throughout most parts of the salmon's range, things have gotten too warm and they're starting to blink off," said Westley. "In the Arctic, the water is getting warm enough and they're starting to blink on."

Westley, who has studied potential shifts in salmon habitat for the past decade, credited a December 2022 workshop hosted by Alaska Sea Grant for shaping the goals of this research. Scientists, community members and Indigenous fishermen met in Anchorage to discuss the increasing number of salmon being observed in the Arctic Ocean and their possible origin. The workshop helped steer researchers toward the Colville River watershed, approximately 60 miles southwest of Prudhoe Bay.



Peter Westley holds a spawning male chum salmon on the Anaktuvuk River. Photo by Joe Spencer/ADFG.

"One major theme was that salmon have always been on the North Slope, but they're also increasing in recent years," said Elizabeth Mik'aq Lindley, a UAF graduate student who helped organize the meeting. "I don't want to portray our discovery as the first ever. That assumes no one has ever seen this before, and people have been there for thousands of years."

Other CFOS contributors included fisheries professor Andy Seitz, research assistant Julia McMahon, and graduate students Joe Spencer and Lindley.

It's still unknown whether attempts by salmon to reproduce in the region have been successful. Researchers left temperature sensors in some of the chum salmon nests to determine whether the rivers completely freeze during the winter, destroying any developing embryos. A return trip is planned in fall 2024 to look for smolt or a new wave of spawning adults. Salmon bones and tissue will also undergo analyses to help determine whether the fish lived their entire lives in Arctic waters.

Kelp farms could help reduce coastal marine pollution

The water-filtering abilities of farmed kelp could help reduce marine pollution in coastal areas, according to new CFOS research.

Schery Umanzor analyzed carbon and nitrogen levels at two mixed-species kelp farms in Southcentral and Southeast Alaska during the 2020–2021 growing season. Tissue and seawater samples showed that various seaweed species may have different capabilities to remove nutrients from their surroundings.

"Some seaweeds are literally like sponges—they suck and suck and never saturate," Umanzor said. "Although carbon and carbon sequestration by kelp has received most of the attention, kelp is actually much better at mitigating excessive amounts of nitrogen than carbon. I think that's a story that's really underlooked."

Nitrogen pollution in coastal areas is caused by factors such as urban sewage, domestic water runoff or fisheries waste disposal. It can lead to a variety of potential threats in marine environments, including toxic algae blooms, higher bacterial activity and depleted oxygen levels. Kelp grown in polluted waters shouldn't be used for food but could still be a promising tool for cleaning such areas.

Kelp farming is an emerging industry in Alaska, touted to improve food security and create new job opportunities. It's also been considered as a global-scale method for storing carbon, which could be a way to reduce levels of atmospheric carbon that contribute to climate change.

Analysis of kelp tissue samples from the farms determined that ribbon kelp was more effective than sugar kelp at absorbing both nitrogen and carbon, although that difference was somewhat offset by the higher density of farmed sugar kelp forests. Umanzor is processing a larger collection of samples from six Alaska kelp farms to broaden the dataset.

"Maybe it's a function of species, maybe it's the site, maybe it's the type of carbon and nitrogen out there," Umanzor said. "There's a lot to know in a follow-up study."



Kelp is harvested at the Seagrove Kelp Co. farm near Craig, Alaska. Photo by Jordan Hollarsmith/ NOAA.

Scant 'forever chemicals' found in Arctic fish

An analysis of chemical contamination in Arctic coastal fish species uncovered only minute levels of PFAS, an encouraging finding for residents who rely on them for subsistence foods.

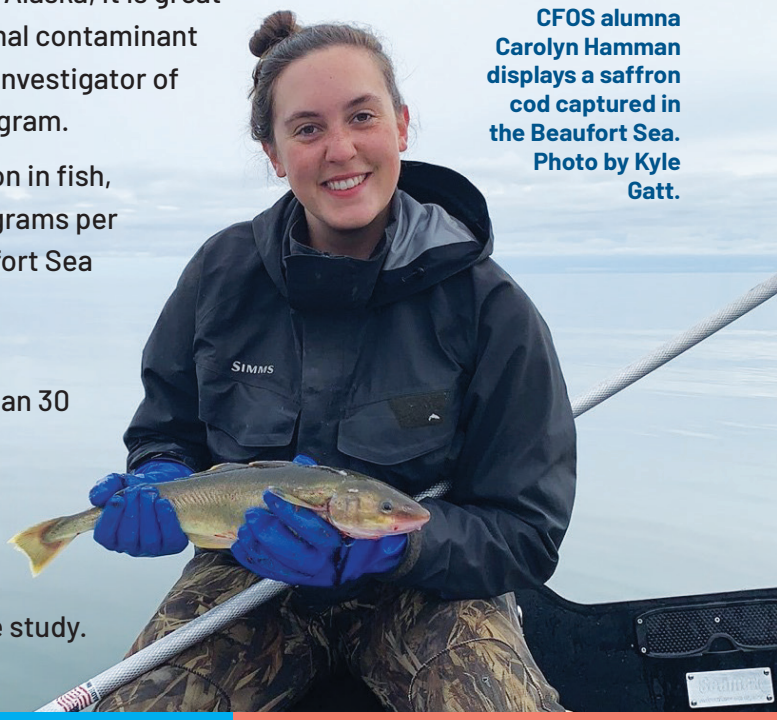
PFAS, short for per- and polyfluoroalkyl substances, is a broad category of harmful synthetic chemicals that don't naturally degrade. That characteristic has earned them the nickname "forever chemicals" as they persist and accumulate in the environment, contaminating sites across Alaska and throughout the world.

"Given the importance of subsistence fisheries resources in Alaska, it is great to see that the fish examined as part of this study had minimal contaminant levels," said Trent Sutton, who contributed samples as lead investigator of the Beaufort Sea Long-Term Nearshore Fish Monitoring Program.

Alaska doesn't have health guidelines for PFAS contamination in fish, but other states have set advisory levels from 9 to 27 micrograms per kilogram. All the fish tested from the Chukchi Sea and Beaufort Sea samples were far below those levels.

It's a significant contrast to some Arctic sites in Canada and Europe, where fish samples have had PFAS levels of more than 30 micrograms per kilogram at some locations.

Along with Sutton, the research team included UAF alumni Carolyn Hamman, who led sampling efforts for fish collections in Prudhoe Bay, and Kevin Fraley, a fisheries ecologist with the Wildlife Conservation Society who led the study.



CFOS alumna Carolyn Hamman displays a saffron cod captured in the Beaufort Sea. Photo by Kyle Gatt.

Complex ecosystem found among Alaska seaweed debris

A thriving ecosystem exists among the decomposing seaweed debris that covers many Alaska beaches, including nearly 100 different types of invertebrates found in surveys at a handful of sites on the Kenai Peninsula.

Postdoctoral fellow Brian Ulaski led the first Alaska-based survey of the marine algae, known as wrack, that washes up on beaches. It is being increasingly used for fertilizer and livestock feed globally, although harvests in Alaska remain limited.

Researchers focused on a dozen sites around Kachemak Bay near Homer, collecting sediment cores using a clam gun. After sieving the sediment through a fine mesh screen, thousands of samples were bagged and returned to the Kasitsna Bay Laboratory for identification and counting.

Ulaski and a team of undergraduate and graduate students found about 47,000 tiny invertebrates among specimens collected at the sites. Nearly 90 different taxa were identified, including tiny coastal centipedes and pseudoscorpions.

The findings could be valuable for the Alaska Department of Fish and Game, which manages wrack use in the state but previously knew little about the resource.

"When you don't know much about something and there's growing pressure to harvest it, obviously you want to know more," said Ted Otis, a Homer-based research biologist. "Partnering with the university to do research in that area is a great match."

R/V *Sikuliaq*

In its sixth year of operation, the research vessel *Sikuliaq* supported 12 science cruises led by researchers from UAF and other institutions, sailing about 29,000 nautical miles throughout the Pacific and Arctic oceans. UAF faculty, staff and students were involved in 45% of *Sikuliaq* science days at sea.

The ship provided a comfortable and effective platform for scientists and students to carry out a variety of research missions. *Sikuliaq* started the past year hosting the Northern Gulf of Alaska Long-Term Ecological Research project and ended the year sampling iron distributions in waters of the North Pacific Ocean. On a cruise led by UAF researchers, the ship traveled farther north than ever before (just shy of 80 degrees North latitude) and successfully navigated through heavy ice conditions.



R/V *Sikuliaq* travels through Resurrection Bay in April on its way to the Seward Marine Center. UAF photo by Eric Engman.

Sikuliaq project boosts harmful algal bloom monitoring in Western Alaska

Sikuliaq and its crew participated in an emergency effort in 2023 to passively collect data about potentially harmful algal blooms in the waters of the Bering and Chukchi seas. Equipment installed aboard the ship is providing an additional safeguard for coastal residents who could be exposed to dangerous toxins.

The response, funded by NOAA's National Centers for Coastal and Ocean Science, uses a shipboard Imaging FlowCytobot (IFCB) to process real-time data about harmful algal blooms, known as HABs. *Sikuliaq* was equipped with an IFCB from June to October, allowing scientists at Woods Hole Oceanographic Institute to remotely identify HAB species and their concentrations during four research cruises.

As part of the testing effort, *Sikuliaq*'s crew collects opportunistic water samples during its science cruises. Several of those samples triggered alerts in July during a project to study plankton in the Chukchi Sea. The IFCB detected high levels of the harmful algal species *Alexandrium catenella* near Diomede, with increasing concentrations found about 75 miles northeast of Savoonga. A risk advisory was sent to local communities and stakeholders in coordination with Alaska Sea Grant, the Norton Sound Health Corporation and other partners.



R/V *Sikuliaq*'s ship track from July 2022 through June 2023.

The effort is part of a larger collaborative response to HABs in the Bering Strait region, following documentation of the most significant and toxic levels of *Alexandrium catenella* ever discovered in the region in 2022. HABs have become increasingly common in Western Alaska as waters are warmed by climate change, making new detection methods important for subsistence users and commercial fishers in the Bering Strait region.

FY22 *Sikuliaq* Statistics

28,871 nautical miles traveled • 272 paid ship days • 247 days at sea • 230 days of science (not including mob/demob days) • 124 days in the Arctic (as defined by the Arctic Research and Policy Act of 1984) • 51 days in the ice
11 ice stations • 457 conductivity/temperature/depth casts • 31 trace metal CTD casts • 1 expendable bathythermograph cast • 900 net tows • 32 moorings deployed • 28 moorings recovered • 3 remotely operated vehicle dives • 11 gliders deployed • 7 gliders recovered • 162 corings collected • 12 buoys/floats deployed • 7 buoys/floats recovered • 9 towed cameras • 8 ocean-bottom seismometers recovered • 4 bottom samples collected
6 sediment traps deployed • 6 sediment traps recovered

Research Centers, Institutes and Facilities

Seward Marine Center

The Seward Marine Center is the homeport of two state-of-the-art research vessels, *Sikuliaq* and *Nanuq*. In the past year, research aboard *Nanuq* included plankton studies, bird surveys, fisheries assessments, and sea glider deployments and recoveries.

The seawater system in the D.W. Hood Laboratory was repaired and supported the Northern Gulf of Alaska Long-Term Ecological Research program, two sea glider projects, and modular power generation. A portion of the lab was also commissioned in May as a glider-servicing facility. The Seward Ocean Autonomous Research (SOAR) Lab includes a ballasting tank, electronics and communications test equipment, glider-specific tools, and an overhead lift.

The SMC Mooring Loft continues to be used to build and repair anchored systems of instruments used by a growing network of ocean observatories. The K.M. Rae Marine Education Building was used as classroom space this year during the Subarctic Oceanography Field Course, where students learned skills and techniques for modern oceanographic investigation.

Pollock Conservation Cooperative Research Center

The Pollock Conservation Cooperative Research Center supports research projects and graduate student fellowships that focus on pollock biology and resource utilization, fisheries management and incidental catch, habitat and ecosystems, and protected species. In 2022–2023, PCCRC supported 10 research projects, eight of which are ongoing. In addition, the PCCRC Advisory Board contributed to the support of a research proposal submitted to the North Pacific Research Board, which is the first project co-funded under a memorandum of agreement between PCCRC and the North Pacific Research Board.

Ocean Acidification Research Center

Founded in 2008, the Ocean Acidification Research Center continues to observe the marine carbonate system around Alaska. OARC data are collected during research cruises and autonomously at shoreside stations, at moored platforms, and with remotely operated vehicles such as gliders and drones.

In 2023, OARC marked a decade of continuous observations at long-term monitoring sites in the Gulf of Alaska and the southeastern Bering Sea. Carbon cycling in the coastal oceans has a higher magnitude and variability than the open ocean and OARC has observed daily, seasonal and interannual variance. With 10 years of data, this effort is entering the period where researchers can begin to detect the anthropogenic trend of seawater carbon dioxide. The high-frequency monitoring buoys in Alaska are part of a global network of carbon dioxide time-series observations.



Coastal Marine Institute

The Coastal Marine Institute is a cooperative program between the federal Bureau of Ocean Energy Management and the University of Alaska, with participation by the Alaska Department of Fish and Game. CMI operates as a competitive scientific research program with an emphasis on topics associated with natural resource development in Alaska's outer continental shelf. Barbara Wadlinger has joined CMI as the new program manager.

Two new research projects are underway this year. The first uses satellite ocean color to track water mass dynamics in Cook Inlet. The second is defining communication networks along Alaska's north coast that could be activated when environmental risks occur from increased Arctic ship traffic and offshore oil spills. Other CMI research projects are studying fish distributions in Alaska waters and effects of hydrocarbons on Alaska marine environments. Graduate student projects included field work on orca and beluga whale behavior in southcentral Alaska and on ecology of fishes in Beaufort Sea lagoons.

Kasitsna Bay Laboratory

Located in Kachemak Bay in the southcentral Gulf of Alaska, the Kasitsna Bay Laboratory provides a unique coastal research, teaching and outreach facility. The lab is operated as a partnership between NOAA's National Centers for Coastal Ocean Science and UAF's College of Fisheries and Ocean Sciences.

After a hiatus due to the COVID pandemic, 2023 saw the return of many outreach groups using the facility to educate youths from grade school to pre-college level about Alaska's marine ecosystems. CFOS faculty also taught a variety of field courses at the lab, including scientific diving at several proficiency levels and a general ecology field class offered to both undergraduate and graduate students.

Research has also been active at the lab in the past year. The Gulf Watch Alaska long-term monitoring program performs annual surveys of intertidal ecology and ongoing carbon chemistry monitoring, and studies the effects of mariculture farms and applications of environmental DNA measurements. The K-Bay lab also provided space for CFOS graduate students to conduct field observations and lab experiments as part of their thesis work.

A wintry scene at the Kasitsna Bay Laboratory near Seldovia. Photo by Hannah Kepner.

Lena Point Fisheries Facility

The CFOS Department of Fisheries in Juneau is housed at the Lena Point Fisheries Facility, which is co-located with the NOAA Ted Stevens Marine Research Institute. Lena Point is also the homeport for the R/V *Ishkeen*, which supports fisheries and diving research throughout Southeast Alaska. The 26-foot vessel's work in 2023 included surveys of the region's Dungeness crab, sea otter and humpback whale populations.

During the past year, the Lena Point mariculture lab embarked on ambitious renovations to its wet lab areas. Initially designed for fish and crab projects, the modifications helped accommodate red seaweed and abalone cultivation. The facility also hosted annual meetings for the CFOS Advisory Council and Pollock Conservation Cooperative Research Center, as well as visits from UA and UAF leadership.

Rasmuson Fisheries Research Center

The mission of the Rasmuson Fisheries Research Center is to promote excellence in research related to fisheries and to develop young fisheries scientists. The center generously supported four CFOS graduate students this year, who are studying pinto abalone; Pacific sleeper and Pacific spiny dogfish sharks; northern fur seals; and Arctic, Alaskan brook and Pacific lampreys.

The RFRC also welcomed a new group of advisory board members in 2023, which includes Jessica Black, Lisa Busch, Adam Gibbons, Lara Horstmann and Stephanie Madsen. Trent Sutton continues to serve as RFRC director.



A kayaker navigates Kasitsna Bay while researchers test models for passive eDNA collection. Photo by Jessica Glass.

Development

During fiscal year 2023, CFOS received $536,676 in charitable gifts. We thank our donors for their continued help to fulfill our mission of teaching, research and service. These donations provide scholarships, fellowships and support for student and faculty research.

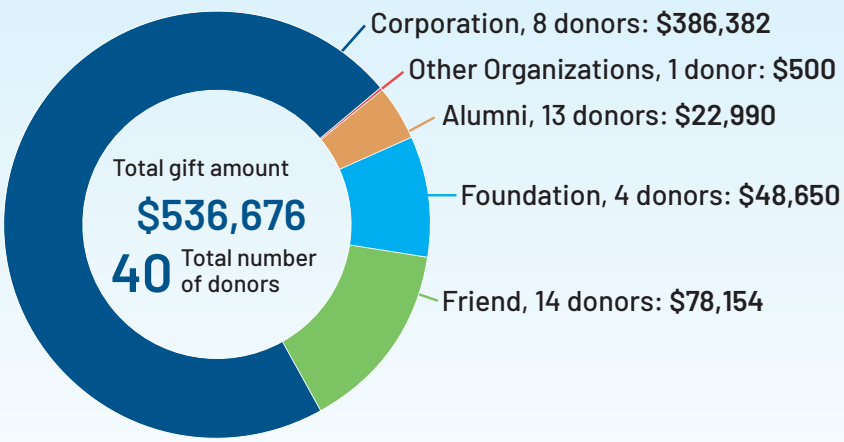
Through the generosity of our donors, CFOS again hosted the Tsunami Bowl in Seward in March 2023. The Tsunami Bowl, a regional ocean sciences competition, brings together high school students, coaches and scientific experts for a weekend filled with ocean science learning and camaraderie. For over two decades this competition has also strengthened relationships between researchers, students and Alaska teachers. Contributions to this event help to foster the next generation of ocean leaders in Alaska and cultivate young students' interest in science, technology, engineering and mathematics.

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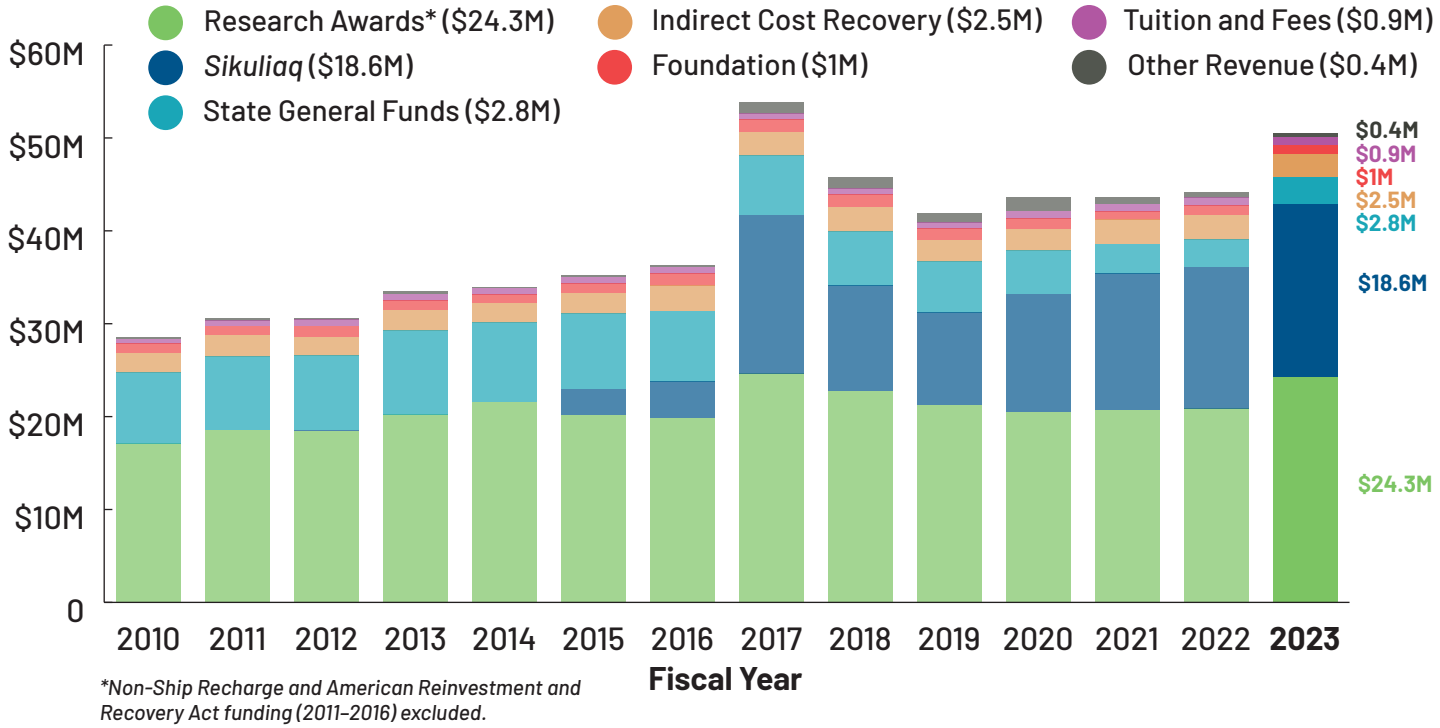
FY23 CFOS Fundraising





Budget and Finance

CFOS Revenue Trend

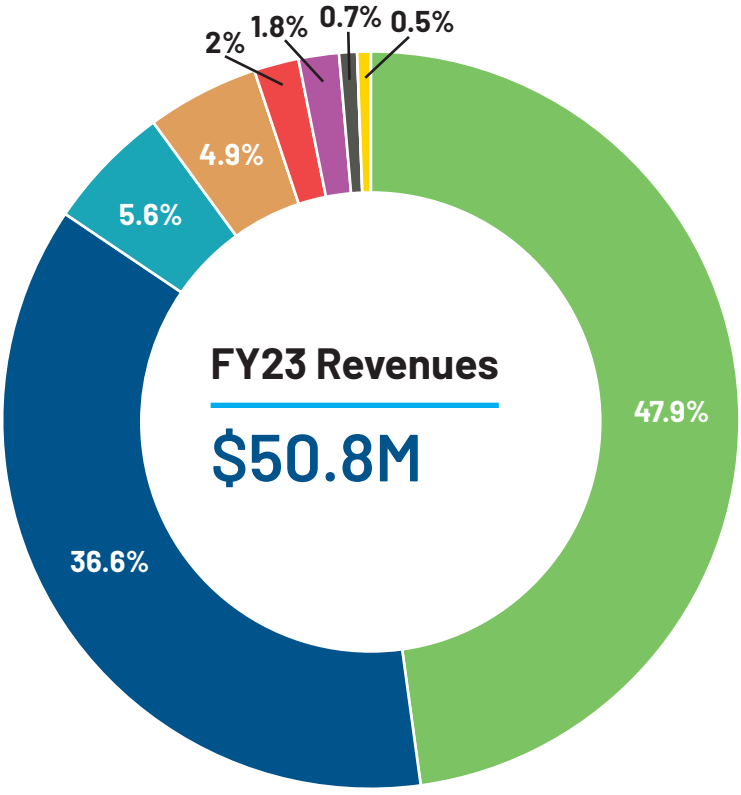


Non-Ship Recharge and American Reinvestment and Recovery Act funding (2011–2016) excluded.



Photo by David J. Ruck/NOAA.

- Research Awards* ($24.3M)
- *Sikuliaq* ($18.6M)
- State General Funds ($2.8M)
- Indirect Cost Recovery ($2.5M)
- Foundation ($1M)
- Tuition and Fees ($0.9M)
- Other Revenue ($0.4M)
- Non-Ship Recharge ($0.3M)





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R/V *Sikuliaq* stops against an ice floe in the Chukchi Sea, allowing researchers to collect data from within and beneath the ice. Photo by Lexi Arlen via drone.

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