

An underwater photograph showing three divers in silhouette against a blue background. They are positioned around a large, rectangular metal frame structure. One diver is at the top, another in the middle, and a third at the bottom. The scene is dimly lit, with light filtering through the water from above.

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

**Annual Report  
2017**



**COLLEGE OF FISHERIES  
AND OCEAN SCIENCES**

University of Alaska Fairbanks



## Message from the Dean

It is an honor and a pleasure to introduce this inaugural Annual Report of the College of Fisheries and Ocean Sciences. As described in the following pages, CFOS is truly defined by diverse programs and activities that address the most pressing issues in fisheries, marine biology and ocean sciences.

While it is not possible to comment in this report on all of the recent accomplishments at CFOS, a few important milestones merit special recognition. Over the past year, the research vessel *Sikuliaq* transitioned from construction to full operations. The former School underwent a major reorganization to form the College of Fisheries and Ocean Sciences. The College launched two new degree programs: a bachelor's in fisheries and ocean sciences, and a master's in marine studies. Regarding the many diverse research programs being led by CFOS, one notable example is the new Long-Term Ecological Research Program study of the northern Gulf of Alaska shelf ecosystem. And *Sikuliaq* is now part of a new international Arctic Research Icebreaker Consortium, a group of icebreaker operators spanning Europe, Canada and the United States. The membership enhances transnational scientific cooperation and places *Sikuliaq* firmly on the international stage of polar research vessels.

Most important are the people who collectively advance the mission of CFOS — over 300 students, staff, researchers and faculty who are the heart and soul of this exceptional organization. CFOS is a dedicated community of individuals who are responsible for our world-class research, outstanding education programs and public service efforts that extend across Alaska and beyond.

This is an exciting time for the College. I invite you to learn more about the CFOS activities described in this Annual Report. I hope you will engage with us as we work together to improve understanding of our oceans, coasts and inland aquatic ecosystems.

A handwritten signature in black ink that reads "S. Bradley Moran". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

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



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Front cover: Divers in Antarctica work on a rebreather testing project that involved a CFOS faculty member. Photo by Brenda Konar. This page: Research vessel *Sikuliaq* sails through Arctic waters in 2016. Photo by Kim Kenny. Back cover: Ice covers the Chukchi Sea during a U.S. Coast Guard Cutter *Healy* cruise led by CFOS. Photo by Caitlin Bailey.

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## ACADEMICS

The past year marked another successful academic term for CFOS. The College launched a new Bachelor of Science degree program in fisheries and ocean sciences. The new program expands options for undergraduates by allowing them to focus in one of two separate concentrations: one in fisheries science and one in ocean sciences. The number of undergraduate University of Alaska Fairbanks fisheries majors has tripled over the past decade, making it one of the largest undergraduate fisheries programs in the country. The new Bachelor of Science degree program will continue to strengthen these numbers.

At the graduate level, CFOS created a new Master of Marine Studies degree program. This non-thesis degree provides graduates with a broad knowledge base that will serve many stakeholders, including state and federal agencies, the private sector and Alaska Native organizations.

The College is home to a hardworking and dedicated student body. During the 2016–2017 academic year, CFOS graduated 10 baccalaureate, nine master's and three doctoral students. Graduate thesis topics ranged from the environmental effects of crude oil on sea ice to socioeconomic implications of reductions in chinook salmon run size in Interior Alaska.

Our current students continue to thrive in their research with fellowships and awards. Kirsten Ressel, Janessa Esquible, Leah Sloan, Cheryl Barnes, Amanda Blackburn, Maggie Chan and Julia McMahon each received awards from the Rasmuson Fisheries Research Center; Channing Bolt received a Science, Mathematics and Research for Transformation (SMART) scholarship; and Kelly Cates and Charlotte Regula-Whitefield received Sea Grant Knauss Marine Policy Fellowships, to name just a few. Research is being conducted by our students in the Gulf of Alaska; Bering, Chukchi and Beaufort seas; the Arctic Ocean; and in waters as far south as Mexico.

Our students have excelled in broadly communicating their research. At the 2017 Alaska Marine Science Symposium, Jenell Larsen and Sarah Traiger won the first place awards for master's- and doctoral-level oral presentations respectively, and Tessa Minicucci won the first place award for a master's-level poster.

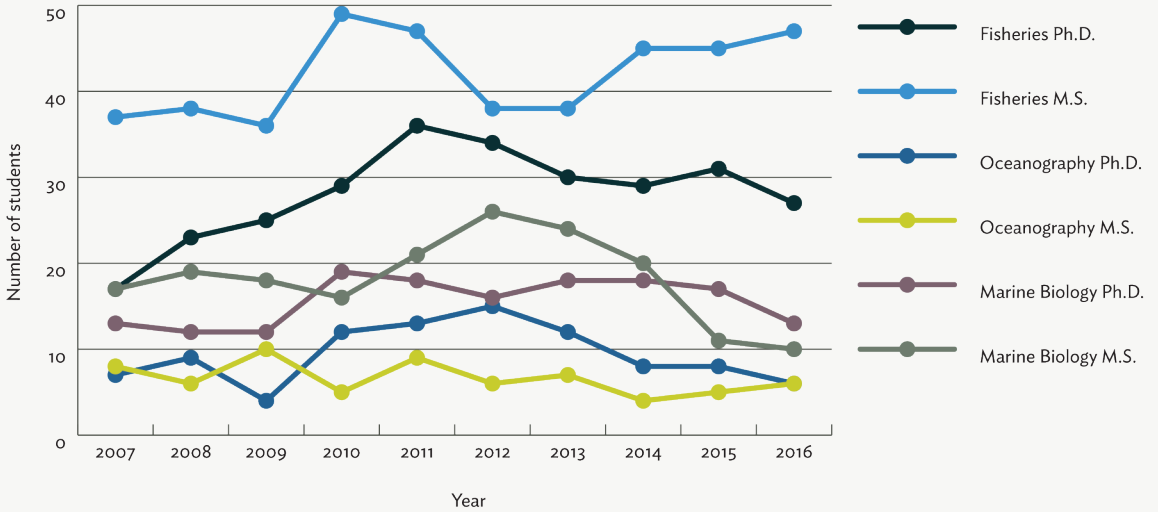
These and other accomplishments exemplify the College's high-quality academic instruction and associated research activities in fisheries, marine biology and oceanography.



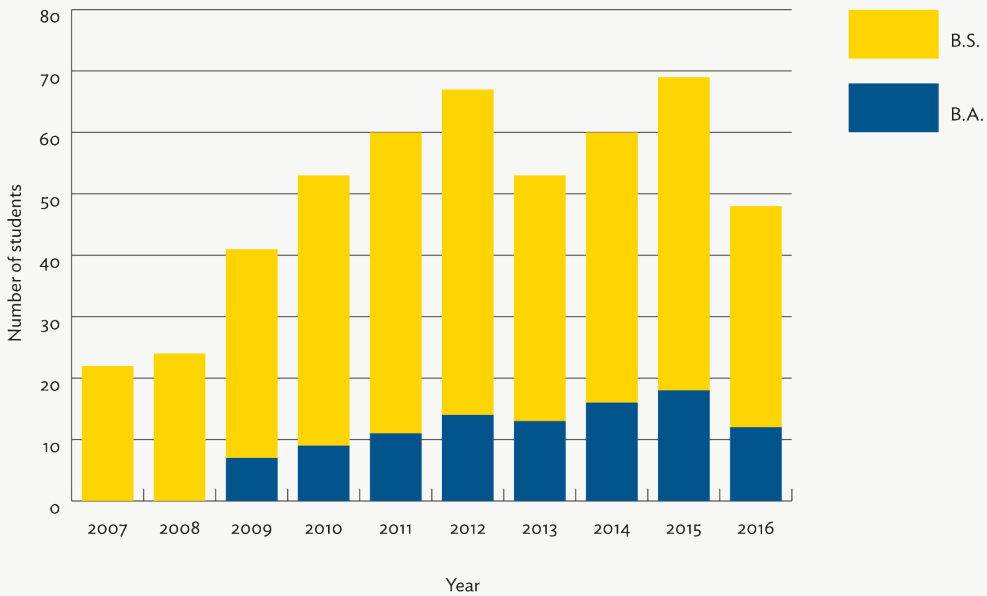
CFOS graduate student Justin Priest holds a Dolly Varden in Prudhoe Bay. Photo by Duncan Green.



### CFOS Graduate Student Enrollment by Year



### Fisheries Undergraduate Student Enrollment



We have more than 50 undergraduate students, and 71 percent of them come from Alaska. Of our more than 100 graduate students, 37 percent are Alaskans.

# RESEARCH

The College continues to excel as a regional and world-class research organization. While research conducted within CFOS focuses on Arctic- and Alaska-specific issues, our researchers work worldwide, from rivers and lakes to coastal habitats and deep ocean regions. Current CFOS research addresses the most pressing issues in fisheries, marine biology and oceanography.

CFOS also works collaboratively with agencies to fund a variety of research programs. Over the past year, UA researchers received approximately \$2 million from Alaska Sea Grant, \$500,000 from the Pollock Conservation Research Center, \$500,000 from the Coastal Marine Institute (funded by the Bureau of Ocean and Energy Management) and \$200,000 from the Rasmuson Fisheries Research Center.

Active grant totals for CFOS as of June 30, 2017

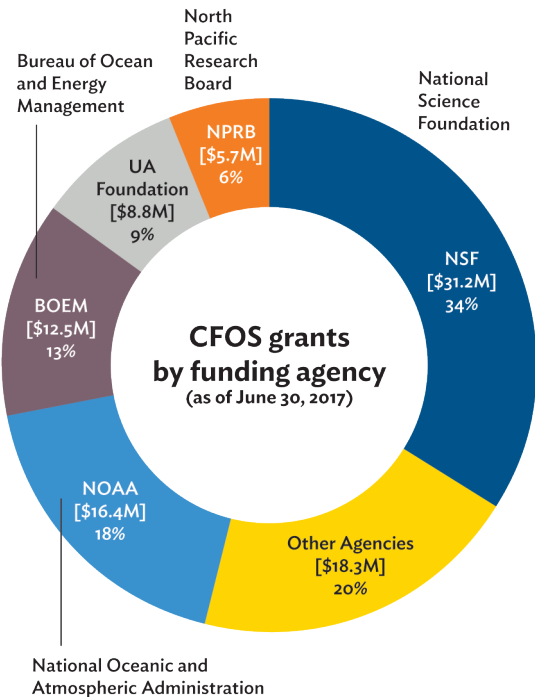
- Total grants: 190
- Total awarded: \$93 million
- Total active National Science Foundation-funded grants: 25, for a total of \$31 million



Eric Collins, Kyle Dilliaine and Brian Ulaski use a corer to collect sea ice samples. Photo courtesy of Caitlin Bailey.



Ben Weitzman and Yosty Storms count species along a transect line in Kachemak Bay. Photo by Katrin Iken.



## Understanding oil spill impacts through long-term monitoring

In the two decades since the *Exxon Valdez* oil spill, and after extensive restoration, research and monitoring efforts, it is now recognized that a full recovery from the spill is far from complete. In fact, it may take decades to fully recover from the environmental impacts. Oil still lingers on beaches and continues to affect the environment. As part of the Gulf Watch Alaska Program, CFOS researchers and colleagues are conducting long-term ecosystem monitoring of three related components: physical environmental drivers, lingering oil, nearshore ecosystems and pelagic ecosystems. This program, which began in 2012, is expected to span a 20-year period.





Thomas Farrugia measures and tags a big skate.  
Photo by Thomas Farrugia.

## Arctic explorations

Our researchers joined forces with international colleagues to study the Chukchi Borderlands region. This oceanographically complex region is being impacted by climate change in a variety of ways; however, little is known about the region's ecosystem. A 2016 research cruise on U.S. Coast Guard Cutter *Healy*, funded by the National Oceanic and Atmospheric Administration (NOAA) Ocean Exploration program, examined biodiversity and related process drivers. Researchers investigated numerous organisms, including bacteria in sea ice; zooplankton in the water column; invertebrates on the seafloor; and fish, seabirds and large marine mammals. Key goals of this study were to better categorize known and unknown Arctic life-forms and to investigate how these organisms interact with the surrounding environment. For example, one team anticipates identifying six new species of comb jellies, which would double the number of documented Arctic comb jellies. The results of this cruise contribute important information to our understanding of biodiversity in the region.

## Big skates are a potential new fishery

CFOS is working to determine whether there may be a sustainable and profitable fishery for big skates (*Beringraja binoculata*) in the Gulf of Alaska. Because little is known about big skates, the first step was to determine where big skates live and assess their regional distribution. CFOS researchers learned that big skates are capable of traveling thousands of kilometers and do not have the sedentary lives thought to be associated with this species. This new information has implications for how a potential fishery should be managed on local to regional scales. It is now clear that the Gulf of Alaska should be considered as a single big skate population. These results are currently being used to evaluate the population dynamics and management strategies of big skates in the Gulf of Alaska.

## Investigating Bering Sea blue king crab dynamics

The 2017 field season marked the beginning of a multiyear research project focused on the Pribilof Islands blue king crab, *Paralithodes platypus*. The population crash and lack of recovery of this economically important crab species in the middle of the Bering Sea has left managers perplexed for decades. A CFOS research team is working with tribal and NOAA scientists on St. Paul Island to identify population bottlenecks that may be limiting the recovery of this species. Using a variety of field sampling techniques, including scuba diving, the researchers hope to determine whether young crab abundance and survival is associated primarily with available larval supply and settlement, seafloor habitat or fish predation.

# ALASKA SEA GRANT

Based at CFOS and jointly funded by NOAA and the State of Alaska, Alaska Sea Grant, the statewide research, education and outreach program, leveraged its federal funds threefold in 2017 with university funds, external grants, donations and program income. This money was used to support students, fund research and provide outreach and education around the state.

## Promoting education and careers

Thirteen graduate students were supported through Alaska Sea Grant-funded research projects. Additionally, Alaska Sea Grant supported five State Fellows in partnership with state and federal agencies. Two CFOS alumni with Sea Grant Knauss Marine Policy Fellowships are working in Washington, D.C. — Kelly Cates at NOAA and Charlotte Regula-Whitefield at U.S. Senator Lisa Murkowski’s office.



Researchers check a kelp longline outplanting. Photo by Michael Stekoll.



Daisy Tada! eagerly anticipates a fish skin treat. Photo by Lauren Frisch.

## Kodiak specialist trains seafood leaders and creates new products

Seafood technology specialist Chris Sannito trained new seafood industry leaders and supported emerging businesses in product development. Sannito also turned 500 pounds of pollock skins into dog treats. The skins were sent to a facility in Florida that produced a protein-rich semisoft paste with little odor. So far, the treats have been a big hit with all the dogs that have tried them.

## Supporting aquaculture

Alaska Sea Grant, CFOS and the University of Alaska Southeast are helping shellfish and kelp farmers grow and expand their businesses through a study that addresses seaweed cultivation in ocean waters at higher latitudes.

## Whales feast on hatchery salmon

One of Alaska Sea Grant’s most widely publicized research projects over the past year was CFOS graduate student Ellen Chenoweth’s work on humpback whales feeding on hatchery salmon in Southeast Alaska. The study suggests that humpbacks have the ability to capitalize on alternative sources of food. This flexibility in feeding behavior is beneficial to whales as ocean conditions continue to change.

## Protecting Alaskans from toxins

Kodiak Marine Advisory agent Julie Matweyou is dedicated to informing Alaskans about the health risks of paralytic shellfish poisoning. Matweyou studied shellfish toxicity levels, set up citizen monitoring programs and developed a new electrochemical field test for toxins. Her efforts in educating Alaskans about harmful algal blooms contributed to the creation of the Alaska Harmful Algal Bloom (HAB) Network. In December 2016, Alaska Sea Grant co-hosted a workshop to develop an HAB action plan.



## Climate change adaptation

Coastal resilience specialist Davin Holen held workshops in Western Alaska and Southeast Alaska to provide information and assist communities in developing climate change adaptation plans. These workshops were held in collaboration with coastal tribes, NOAA and landscape conservation cooperatives.

## Connecting with CFOS

Alaska Sea Grant Marine Advisory faculty served as recruiters for CFOS programs while teaching marine units to students and participating in career fairs in their communities. Marine Advisory faculty also hosted local science talks for the public featuring CFOS researchers.

CFOS researchers presented their work at the Wakefield Fisheries Symposium, Kodiak Area Marine Science Symposium, Western Alaska Interdisciplinary Science Conference and Aleutian Life Forum, all organized by Alaska Sea Grant and partners.

Marine Advisory faculty also supported researchers working on R/V *Sikuliaq*.

## Connecting students with seas and watersheds

To increase marine literacy among Alaska K-12 students, Alaska Sea Grant committed over \$100,000 to 10 school districts for marine and aquatic education programs in 19 communities. Marine education specialist Marilyn Sigman partnered with the Anchorage School District to develop a fourth-grade teaching kit on watersheds and the salmon life cycle. This effort has led to an aquatic environmental teaching unit that is now required throughout the Anchorage School District.



Anchorage fourth-graders learn about salmon habitat at Chester Creek. Photo by Paula Dobbyn.

## R/V SIKULIAQ

With the completion of construction in 2016, calendar year 2017 marked the first full year of science operations for R/V *Sikuliaq*. Over the past year, *Sikuliaq* traveled more than the circumference of the Earth while conducting science in the eastern Pacific and Arctic oceans. She went south to Manzanillo, Mexico, north to 74 degrees north latitude (literally “off the charts” of the United States), west to the international date line and east to the edge of North America.

*Sikuliaq* facilitated 13 research expeditions during the year, with chief and co-chief scientists from 10 different universities and institutions — including CFOS. She hosted the remotely operated vehicle Jason and spent over a quarter of the year in Arctic waters. In addition, *Sikuliaq* became the first university-operated vessel with a compliance protocol for working with Alaska coastal communities: the Community and Environmental Compliance Standard Operating Procedures.

Overall, *Sikuliaq* has quickly become known as an outstanding ocean science research platform, with a superb crew and bragging rights for the best food in the University–National Oceanographic Laboratory System fleet.

### Arctic Shelf Growth, Advection, Respiration and Deposition Rate Measurements project

One of the highlights for R/V *Sikuliaq* operations in 2017 was the Arctic Shelf Growth, Advection, Respiration and Deposition Rate Measurements project (ASGARD). In June, CFOS researchers successfully completed a major cruise aboard *Sikuliaq* as part of this new comprehensive program to study late-spring ecosystem dynamics in the Bering and Chukchi seas. The focus was to investigate variables that influence spring productivity and the food web in an effort to better understand how declining sea ice cover may influence Arctic ecosystems. By comparison, most ocean-based Arctic studies have taken place in summer and fall, when lower ice concentrations make it easier to conduct sampling. However, biological processes in the spring exert a major control over energy and food availability during the summer, implying that understanding spring processes is critically important. This was the first of two expeditions for the North Pacific Research Board’s new Arctic Integrated Ecosystem Research Program.

**33,257** nautical miles traveled

**226** days of science (not including mobilization and demobilization days)

**96** days in the Arctic (as defined by the Arctic Research and Policy Act of 1984)

**12** days in the ice

**605** casts of conductivity, temperature and depth sensors

**277** nets

**49** moorings deployed

**43** remotely operated vehicle dives

**66** buoys and floats deployed

**96** corings taken

**121** items of specialty equipment towed or set over the side for a period of time (single hydrophone receiving units, wirewalker vertical sampling instrument packages, cameras, etc.)





Sarah Hardy, Jessica Pretty, Brittany Jones and Sarah Seabrook filter out a multicore sample during the ASGARD cruise on R/V Sikuliaq. Photo by Brendan Smith.



## RESEARCH FACILITIES UPDATE

### Coastal Marine Institute

Research funded by the Coastal Marine Institute focused on monitoring ocean conditions, testing and developing new sensor technologies, and studying issues related to oil spill impacts and responses. Two current projects examine oil movement in and around sea ice and the associated impacts on sea ice biota. Developmental projects include attaching new oceanographic sensors to autonomous underwater gliders and testing a low-cost satellite-tracked ice drifter.

### Kasitsna Bay Laboratory

The Kasitsna Bay Laboratory continued its long-term monitoring of intertidal and shallow subtidal communities in Kachemak Bay in an effort to understand environmental drivers of these communities in the estuary. This work was instrumental in detecting and assessing the effects of sea star wasting disease in the central Gulf of Alaska as well as other community effects that might be related to the recent strong ocean-warming event in the Gulf of Alaska.

### Kodiak Seafood and Marine Science Center

Researchers at the Kodiak Seafood and Marine Science Center studied seafood science, seafood marketing, harmful algal blooms, paralytic shellfish poisoning, ecosystem impacts from climate change and marine mammal interactions. One current project focuses on the processing of seal oil to serve Alaska Native elders in coastal senior facilities. This research study was sponsored by both industry and state of Alaska stakeholders.



### Lena Point Fisheries Facility

The Lena Point Fisheries Facility in Juneau continued to promote collaboration between fisheries and marine science research, instruction and outreach. Among the many projects being conducted at Lena Point, researchers are examining climate and other factors affecting estuarine food webs, the cause of chinook salmon declines throughout Alaska, factors affecting decline in halibut size, and the status of fish and shellfish resources in the Chukchi Sea.

### Ocean Acidification Research Center

The Ocean Acidification Research Center (OARC) continued to focus on understanding broader climate drivers that are leading to decreases in ocean pH and evaluating the impacts of these changes on marine life. This fall, OARC investigators completed installation of five new SeaFET pH sensors that will be used to continuously monitor changes in ocean pH in Kachemak Bay.







## Pollock Conservation Cooperative Research Center

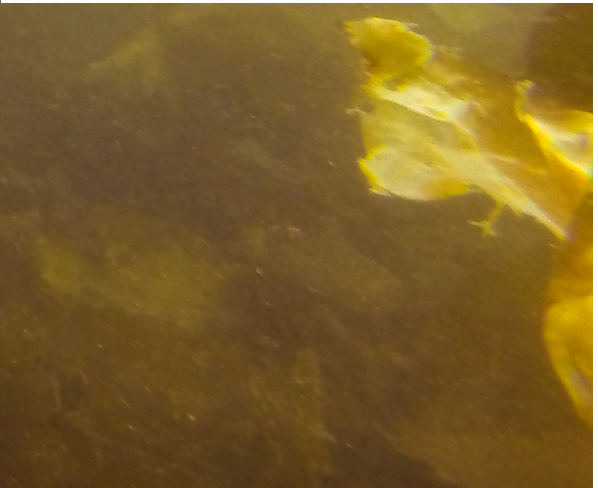
In 2017, the Pollock Conservation Cooperative Research Center supported 15 new and ongoing research projects and graduate fellowships. These projects address the biology, ecology, management and utilization of groundfish fisheries as well as ecological and technical interactions between groundfish, groundfish fisheries, other related fisheries and marine mammals.

## Rasmuson Fisheries Research Center

The Rasmuson Fisheries Research Center funded seven CFOS graduate students in 2017. These students are studying topics including ecological and economic importance of fisheries species, predator prey relationships, spatial and temporal change in commercial species, and food web dynamics. The Center has remained one of the most important supporters of our College.

## Seward Marine Center

The Seward Marine Center continued to enhance its ability to support R/V *Sikuliaq* operations and host a variety of research activities, including the Seward Line, a long-term observation program developed in 1998 to understand marine ecosystem response to climate variability in the Gulf of Alaska. Over this past year, CFOS researchers and collaborators were awarded a highly competitive grant from the National Science Foundation Long-Term Ecological Research Program to expand on the legacy of important research conducted on the Seward Line.



A student practices using lift bags during a scientific diving course in Kasitsna Bay. Photo by Brenda Konar.



Students from the Science, Technology, Engineering and Math Student Experiences Aboard Ships (STEMSEAS) program attend an R/V *Sikuliaq* event in Seattle before boarding the ship. UAF photo by Todd Paris.

## Major donors

Vera Alexander  
 American Seafoods  
 Robert Byrd  
 Shirley Carlson  
 CoBank  
 Crowley Maritime Corporation  
 Douglas Island Pink and Chum  
 Elmer and Mary Louise Rasmuson  
 E. R. Dolly Dieter  
 Ardella Follmann  
 Glacier Fish Company  
 The Glostén Associates  
 Hilcorp Alaska, LLC  
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 Icicle Seafoods  
 M.J. Murdock Charitable Trust  
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 Prince William Sound Science Center  
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 Shell  
 Starbound LLC  
 Trident Seafoods  
 Usibelli Coal Mine  
 Frankie Wakefield Estate  
 Ward's Cove Packing Company  
 W.F. Meek Estate

## DEVELOPMENT

Over the past year, the College has worked to maintain formal and informal partnerships, while fostering new relationships to expand our research, teaching and service for mutual benefit. For example, the Dieter Family Marine Science Research Scholarship continues to support graduate students conducting marine research at the Seward Marine Center. And a new donation by Blue Evolution is contributing to the entrepreneurial effort of seaweed cultivation in Alaska. In addition, former CFOS faculty members, staff and alumni established named funds and endowments for the benefit of the College.

Overall, CFOS received nearly \$1.1 million in charitable gifts last year, an almost \$325,000 increase compared to the prior year. These generous gifts help the College create scholarships and fellowships, and support new students and faculty research.

The College greatly appreciates the many donors who support our work. 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.

### Donors by category:

Alumni: **21**

Corporate: **15**

Foundation: **3**

Friend: **26**

Total giving: **\$1.1M**

Total donors: **65**

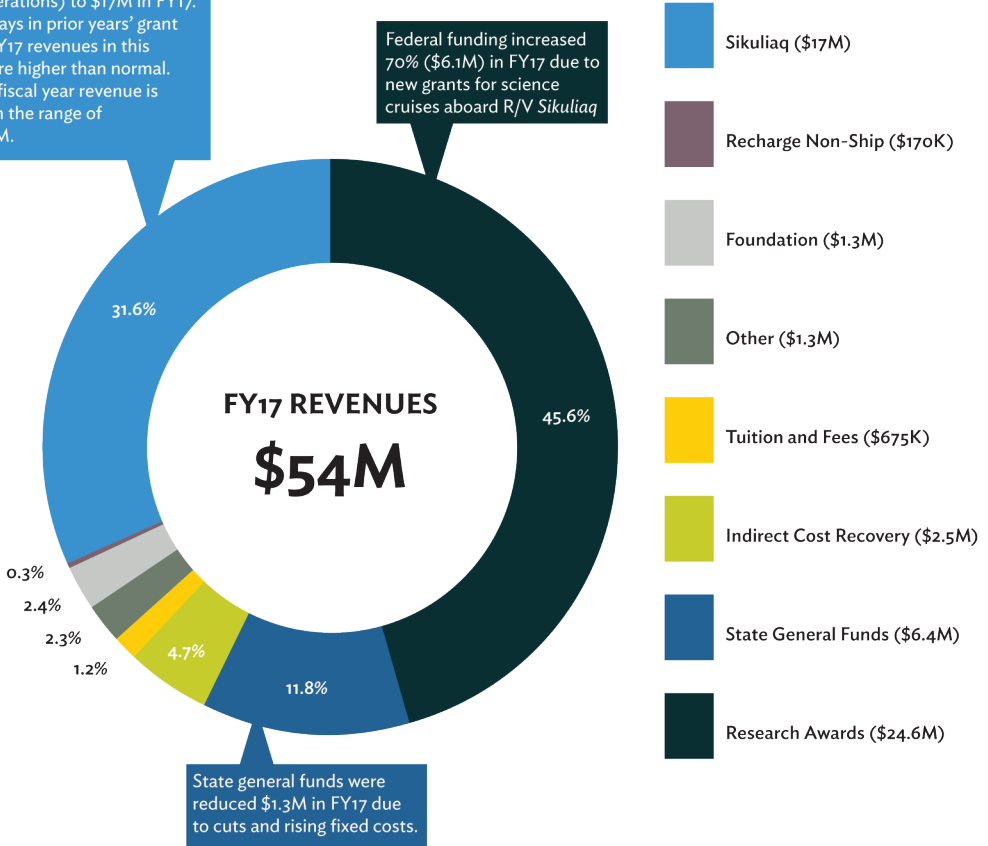
New donors: **20**



# BUDGET AND FINANCE

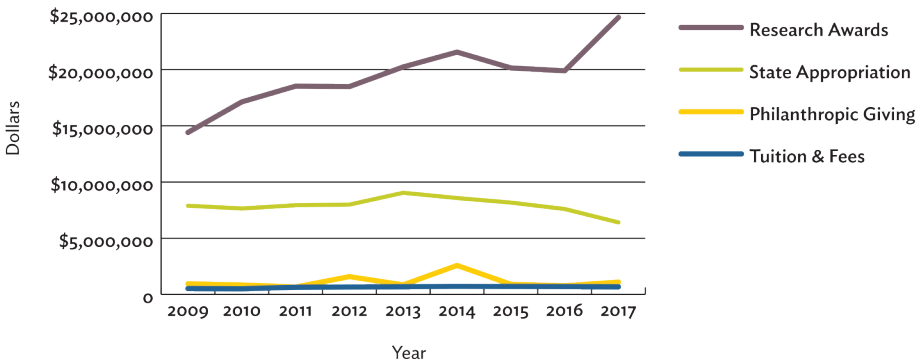
R/V *Sikuliaq* revenue increased from \$2.8M in FY15 (the first fiscal year of operations) to \$17M in FY17. Due to delays in prior years' grant funding, FY17 revenues in this category are higher than normal. Projected fiscal year revenue is normally in the range of \$12M-\$13M.

Federal funding increased 70% (\$6.1M) in FY17 due to new grants for science cruises aboard R/V *Sikuliaq*



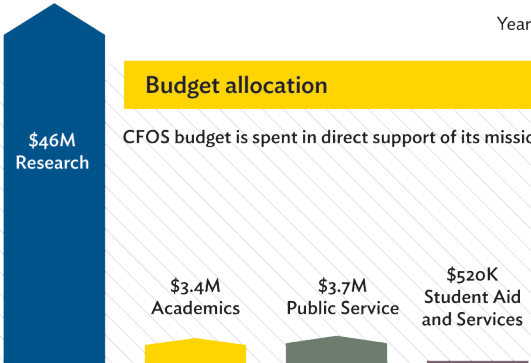
State general funds were reduced \$1.3M in FY17 due to cuts and rising fixed costs.

## CFOS Revenue Trend



## Budget allocation

CFOS budget is spent in direct support of its mission.





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University of Alaska Fairbanks

[www.uaf.edu/cfos/](http://www.uaf.edu/cfos/)

2150 Koyukuk Drive  
245 O'Neill Building  
Fairbanks, AK 99775-7220

Ph: (907) 474-7210

Fax: (907) 474-7204

