Alaska Sea Grant College Program

Project Directory
2004–2006

Science Serving Alaska's Coasts

Science serving

Alaska Sea Grant College Program

Project Directory 2004–2006

Sea Grant Alaska

Alaska Sea Grant College Program
University of Alaska Fairbanks

PO Box 755040
205 O'Neill Bldg.
Fairbanks, Alaska 99775-5040
phone (907) 474-7086
fax (907) 474-6285
http://www.uaf.edu/seagrant

The Alaska Sea Grant College Program is a marine research, education, and outreach service headquartered at the University of Alaska Fairbanks, School of Fisheries and Ocean Sciences. It is supported by the University of Alaska with state funds and by the U.S. Department of Commerce, NOAA's National Sea Grant Office. AK-ADMIN-47.

UAF UNIVERSITY OF ALASKA FAIRBANKS

UAF School of Fisheries and Ocean Sciences

NOAA

MARINE ADVISORY PROGRAM

Abbreviations

FITC Fishery Industrial Technology Center
SFOS School of Fisheries and Ocean Sciences
UAA University of Alaska Anchorage
UAF University of Alaska Fairbanks
UAS University of Alaska Southeast

Alaska's coasts

Director's Message


KURT BYERS

For thirty-three years, the Alaska Sea Grant College Program has helped fishermen, resource managers, visitors, and residents alike understand, conserve, and wisely use Alaska's remarkable marine resources. We've done this through a strategically integrated program that balances research, education, marine advisory activities, and information transfer to our constituents in Alaska and throughout the nation.

Today, our commitment is as strong as ever to help Alaska create a sustainable, productive, and diverse coastal economy while conserving its marine resources. In this directory of Alaska Sea Grant projects, we highlight new projects aimed at achieving this overarching mission during the next two years. These projects were selected following a process that involved many Alaskans, including input from resource managers, educators, and stakeholder groups representing an array of maritime interests. All research projects were then subject to rigorous review for scientific merit by peer and panel reviewers from outside Alaska. The process ensures that Alaska Sea Grant funds only those projects that address the program's strategic goals and meet criteria for relevance and importance to the state and the nation.

The activities described here address issues detailed in our current strategic plan. These issues are: **Education and Human Resources** aimed at producing a highly trained workforce and an informed citizenry; **Economic Leadership** in fishery resources, the seafood industry, and the sustainability of coastal communities; and **Coastal Ecosystem Health and Public Safety**.

Brian Allee, Ph.D.

Alaska Sea Grant Research, Education, Marine Advisory Program, and Information Services 2004–2006

Program Administration

M/170-01

Brian Allee, Ph.D., Director, Alaska Sea Grant, SFOS/UAF
Susan Sugai, Ph.D., Associate Director, Alaska Sea Grant, SFOS/UAF

Program administration oversees all of the activities of the Alaska Sea Grant College Program. In addition to ensuring the integrity of the research peer-review process, the administration allocates modest program development and rapid response funds (M/180-01) to address unforeseen opportunities and challenges that arise outside of the program's regular funding cycle. Often, such early support leads to highly competitive peer-reviewed projects that garner regular Alaska Sea Grant (ASG) support.

KURT BYERS

Alaska Sea Grant Director Brian Allee records ideas during a strategic planning session in Anchorage.

One of the key tasks for the administration during the current cycle is to steer the program on an ambitious new course to address the pressing needs of coastal Alaska. Toward this goal, ASG has formed a management team consisting of Brian Allee, Director; Susan Sugai, Associate Director; Paula Cullenberg, Program Leader for the Marine Advisory Program and Alaska Sea Grant Associate Director; Kurt Byers, Communications Manager; and Michele Frandsen, Program Manager. Together with a newly established advisory committee of prominent constituents from across the state, the administration will develop a new strategic plan that will focus and prioritize the program's resources through the rest of the decade.

With a new organizational infrastructure in place, program administration embraces the following objectives.

- To focus ASG on priority issues that influence the economic well-being of coastal communities, the lifestyles of diverse constituencies, and the long-term management of the nation's coastal and marine resources off Alaska's shores.
- To execute the functional and operational responsibilities of the program consistent with the goals and procedures of the National Sea Grant Office in NOAA.

- To provide leadership and assistance to the University of Alaska and other state academic institutions to develop programs that are responsive to the need for research, education, and outreach in fisheries, ocean sciences, and other marine disciplines.
- To maintain liaison with state and federal agencies, municipal government, industry leaders, and marine users in order to understand their needs and goals and fashion a program that responds to those needs and goals.

Education and Human Resources

Create Scientifically and Environmentally Informed Citizens

Marine Advisory Program

A/152-20

Paula Cullenberg, M.S., Program Leader, Marine Advisory Program, SFOS/UAF

In a state as big as Alaska, it's critical that people have quick and easy access to knowledge, training, technology, and information about the state's marine resources. Agents and specialists of the Marine Advisory Program (MAP) live and work in the communities they serve, linking Alaska Sea Grant and the University of Alaska to its constituents.

MAP's major focus is on the economic well-being of the state's coastal communities, particularly the commercial fishing, mariculture, and seafood industries. Agents and specialists work closely with charter boat operations, Native groups, subsistence and recreational users, school teachers, and others with an interest in coastal and marine resources.

KURT BYERS

Marine Advisory agent Dolly Garza signs one of her books at a conference of the National Association of Environmental Educators.

Over the next two years, MAP will carry out numerous Alaska Sea Grant–supported activities, including continuing a highly successful industry training program aimed at boosting seafood quality and assisting the development of new seafood products and businesses. MAP agents and specialists will conduct community-based marine mammal and water quality studies, help to improve harbor water quality and develop watershed management plans, and assist the development of ecotourism and shellfish aquaculture, among many other projects. They'll also produce seafood training and awareness videos and public service video messages on important topics, and continue production of a public affairs television program series.

MAP offices are located in Anchorage, Bethel, Cordova, Dillingham, Homer, Ketchikan, Kodiak, Petersburg, and Unalaska. To learn more about the program, visit www.uaf.edu/map.

Information Services

A/161-01

Kurt Byers, B.S., Communications Manager, Alaska Sea Grant, SFOS/UAF

There's little point of funding research, offering marine advisory services, and educating students if their knowledge never makes it beyond academia. This is where Alaska Sea Grant's Information Services comes in. Partnering with the Marine Advisory Program and other agencies and experts, Sea Grant communicators write and publish award-winning books, produce videos, organize scientific conferences, and use other educational tools such as the Internet, magazine articles, and mass media to reach a broad public with information about marine resources.

Over the next two years, Information Services will organize two Lowell Wakefield Fisheries Symposia and plan a third symposium for 2006. Information Services also will publish the proceedings of two Lowell Wakefield Fisheries Symposia. In addition, Information Services will publish and distribute books, brochures, and posters on such subjects as seafood quality, clam mariculture, octopus fishing, clean marinas, and identification guides for flatfishes, marine mammals, intertidal life, and salmon. Education curricula for K-12 students also will be produced.

DOUG SCHNEIDER

MAP Instructional Media Specialist Deborah Mercy speaks with a visitor to the Sea Grant/ MAP exhibit at FishExpo 2003 in Seattle.

Information Services will work with state, national, and international news media to promote Alaska Sea Grant research to a broad public audience. Production of the award-winning radio series, Arctic Science Journeys Radio (ASJ), which covers science, culture, and the environment of the far north, will enter its ninth year on the air across the state. Finally, communicators will continue offering an array of services through the Alaska Sea Grant Web site, such as its online bookstore and ASJ Radio's multimedia site.

Fisheries Extension Enhancement for Alaska: Fisheries in Transition and Capacity Building for Environmental Monitors

A/152-22

Brian Allee, Ph.D., Director, Alaska Sea Grant, SFOS/UAF
Paula Cullenberg, M.S., Program Leader, Marine Advisory Program, SFOS/UAF

Recognizing the myriad changes occurring in the nation's commercial fisheries and the need for additional assistance to fishermen, seafood processors, and coastal communities, the National Sea Grant College Program issued a call for proposals to enhance fisheries extension activities around the nation. Alaska, with the nation's largest fisheries, is experiencing dramatic changes in its salmon industry and faces other pressing issues such as marine

mammal declines, lack of adequate support infrastructure, and the need for additional training to improve fisheries quality and value. In view of this, a proposal submitted by Alaska Sea Grant was one of 18 projects awarded federal funds under the Fisheries Extension Enhancement program (FEE). With the FEE grant, together with 20% reprogrammed funds, the Marine Advisory Program hired two agents to serve the needs of the Prince William Sound and central Southeast Alaska regions. The agents, one based in Cordova and one in Petersburg, are joining forces with MAP's ten other agents to work with coastal fisheries, regional economic bodies, and state and federal fisheries agencies to address economic declines through technical assistance in business, marketing, processing, and regulatory processes. The agents will also partner with fishermen and Alaska Native organizations to increase capacity for local involvement in habitat monitoring, marine mammal assessment, and fisheries technician work.

Combining Traditional Ecological Knowledge with Fisheries Science to Facilitate and Guide Partnered Management and Studies on Anadromous Whitefish

R/72-01

Gordon Haas, Ph.D., Fisheries Division, SFOS/UAF
David Runfola, M.S. student, SFOS/UAF

Other Strategic Goals Addressed: Produce a Highly Trained Workforce

Whitefish are an important subsistence food for many rural Alaskans. Alaska has eight species of whitefish, from the large sheefish, which can reach several feet in length and weigh 60 pounds, to the pygmy whitefish, which rarely exceeds eight inches in length and weighs just a few ounces. As a group, whitefish are not well understood by fisheries managers. However, Alaska's Native people know a great deal about whitefish, if only scientists would ask them.

That's just what Alaska Sea Grant–funded researchers will do. Graduate student David Runfola will work directly with Native subsistence fishermen on the Yukon River delta to gather local traditional ecological knowledge of whitefish. Traditional knowledge will help scientists identify whitefish stocks, distribution, life history, and migration patterns. Runfola will record the traditional knowledge so that local communities as well as biologists and managers can make use of the information.

Runfola will then use the knowledge to identify locations for sampling and further research on such issues as stock identification, distribution, and seasonal habitat preferences.

Runfola's efforts will lead to working relationships in and between the Native communities and the fisheries biologists and managers. If Native people and their communities continue to work with fisheries biologists, both the users and managers of the resource, and also the whitefish, will be better understood and served.

Education and Human Resources
Produce a Highly Trained Workforce

Traineeships
E/142-01

Susan Sugai, Ph.D., Associate Director, Alaska Sea Grant, SFOS/UAF

One of Alaska Sea Grant's central missions is to educate the next generation of scientists, resource managers, policy makers, and citizens. Fully 25% of the program's core federal appropriation is devoted to graduate education through our Traineeship Program. Over the next two years, we'll support nine graduate students conducting peer-reviewed research projects in fisheries, marine science, and seafood science. These projects are described in this directory.

In addition, three new or continuing graduate students will be supported by Alaska Sea Grant development funds in partnership with the North Pacific Research Board, the National Park Service, the U.S. Geological Survey, and National Marine Fisheries Service.

We'll also partner with the University of Alaska Fairbanks Center for Global Change and Arctic System Research to support two awards from the annual Global Change Student Research Grant Competitions. Student proposals to this competition are for up to two years, and up to $5,000 is awarded per year. Proposals are peer reviewed by UAF faculty, and a review panel selects successful projects for funding. Alaska Sea Grant has provided a representative to the review panel and support each year for up to two projects that address Alaska Sea Grant strategic goals.

Our commitment to education extends into Alaska's elementary and high schools. Each year, Alaska Sea Grant staff and associated scientists visit public schools with displays, publications, slide shows, science games, and hands-on activities. And each spring, as we have for the past seven years, Alaska Sea Grant is a key sponsor of the Alaska Region National Ocean Sciences Bowl. The statewide competition draws teams of students from high schools across the state to Seward for three days of head-to-head competition that includes a knowledge quiz, oral presentations of research projects, and a juried art show. The winning team goes on to represent Alaska at the National Ocean Sciences Bowl final competition.

HANK PENNINGTON

Teams of high school students from around Alaska compete in the regionals of the National Ocean Sciences Bowl each year.

Economic Leadership
Increasing the Value of the Seafood Industry

Quality Inspection of Alaska Salmon Using Two Portable Odor Detection Devices
R/51-03

Alexandra Oliveira, Ph.D., FITC, SFOS/UAF
Charles Crapo, Ph.D., FITC, SFOS/UAF
Brian Himelbloom, Ph.D., FITC, SFOS/UAF
Jiraporn Chantarachoti, M.S. student, SFOS/UAF

Other Strategic Goals Addressed: Produce a Highly Trained Workforce

The best way to tell if the seafood you're about to buy from your local fishmonger is fresh is to give it a sniff. If it smells, well, fishy, then it's not fresh. It's low-tech, but it works.

New technology may soon make the sniff a thing of the past. In the near future the electronic nose may tirelessly, faithfully, and effortlessly put the kibosh on bad seafood.

Alaska Sea Grant–supported scientists, together with Kodiak seafood processors, will test two electronic noses to see how they might be used to boost seafood quality going into and out of Alaska's processing plants. The portable devices are similar in some respects to breathalyzer machines used by police to detect alcohol on the breath of a suspected drunk driver. Initially the devices will be used to detect ethanol, the alcohol associated with spoiled canned salmon. Later, the devices will be used to test for other chemicals associated with spoilage and to evaluate the freshness of salmon being delivered by fishermen to the processing plant. One day, these portable fish sniffers may even be in the supermarket, lending a helpful nose to consumers.

Developing Protein Powder and Edible Coating for Salmon from Underutilized Arrowtooth Flounder
R/54-01

Subramaniam Sathivel, Ph.D., FITC, SFOS/UAF
Charles Crapo, Ph.D., FITC, SFOS/UAF
Brian Himelbloom, Ph.D., FITC, SFOS/UAF
M.S. student to be named, SFOS/UAF

Other Strategic Goals Addressed: Produce a Highly Trained Workforce

There are more than 2.8 million tons of arrowtooth flounder in the Gulf of Alaska, but almost none of it is used for food because the flesh turns to mush when cooked. Sea Grant–supported scientists are working to utilize a lot of that protein by turning the flounder flesh into a

ALASKA FISHERIES SCIENCE CENTER

Arrowtooth flounder are especially abundant in the Gulf of Alaska and have significant economic potential.

powder that can be used to make tasty breadings and other coatings for salmon. And since Alaska's salmon markets are in the doldrums of late, making new, more valuable products from salmon using arrowtooth flounder could be a win-win combination.

Scientists in this study will first produce a protein powder from arrowtooth flounder and evaluate attributes such as appearance, function, nutrition, and shelf life. Next, they'll prepare an edible coating using the powder and then further evaluate the coating's properties. Finally, researchers will cover salmon fillets with the arrowtooth flounder protein–enriched coatings and evaluate the final product.

Paralytic Shellfish Poisoning: Bacteria as Regulators of *Alexandrium* Growth and Toxin Synthesis

R/95-04

F. Gerald Plumley, Ph.D., Bermuda Biological Station
Andrew Lang, Ph.D., Institute of Marine Science, SFOS/UAF
Renee Raudonis, M.S. student, SFOS/UAF

Other Strategic Goals Addressed: Produce a Highly Trained Workforce

With 54% of the U.S. coastline and clean, nutrient-rich waters, Alaska's maritime environment provides plenty of opportunities for algal blooms. Some of these algal blooms carry toxins that pose risks both to marine species and to humans. One major risk involves paralytic shellfish poison (PSP). Shellfish contaminated with PSP have caused sickness and even death to people who unknowingly ate infected shellfish. PSP has become a significant concern as Alaska Sea Grant and its partners seek to diversify coastal community economic development through expansion of the shellfish aquaculture industry.

LOU BARR

Although geoduck clams hold great economic potential in Alaska, the fishery cannot fulfill its potential until testing for PSP contamination is streamlined.

Before efforts can be made to control or prevent outbreaks of algal blooms that carry PSP, scientists must first fully understand exactly how PSP is produced in the marine environment. There's firm evidence that bacteria act either directly or indirectly with algae to synthesize the saxitoxin that causes PSP. But the mechanics of this relationship remain a mystery.

Scientists, with support from Alaska Sea Grant, hope to solve the mystery. In this study, they'll examine the molecular interactions that occur between bacteria and marine algae associated with PSP. They'll study *Alexandrium* spp., a group of single-celled marine plankton known to synthesize PSP saxitoxin, and the bacterium *Pseudomonas stutzeri.* Specifically, they'll develop a model system for studying interactions between bacteria and a toxic alga. With this model system they hope to determine which bacterial species, and specifically which genes, affect toxin synthesis.

Economic Leadership

Sustainable and Competitive Fishery Resources

Humpback Whale Entanglement Rates in Fishing Gear in Southeast Alaska

R/33-02

Susan Hills, Ph.D., Institute of Marine Science, SFOS/UAF
Janice Straley, M.S., Department of Natural Sciences, UAS
Janet Doherty, M.S. student, SFOS/UAF

Other Strategic Goals Addressed: Produce a Highly Trained Workforce

Humpback whales in Southeast Alaska increasingly share their environment with large cruise ships, recreational boats, fishermen, float-equipped airplanes, and other craft. In recent years, interactions between people and whales have become more common. In particular, an increasing number of humpback whales have been reported entangled in commercial fishing nets and other types of fishing gear. Yet no one has accurately quantified the number of entanglements or the rate at which Southeast Alaska's humpback whales become entangled.

KURT BYERS

A humpback whale breaks the surface in Resurrection Bay near Seward.

In 2003, Alaska Sea Grant supported UAF graduate student Janet Doherty with tuition as she worked with the National Park Service to photograph humpback whales in Glacier Bay National Park, one of the nation's most treasured places. The photos provided a baseline to identify individual whales and look for scars from entanglement in fishing gear.

In 2004, Alaska Sea Grant formalized this effort by joining with the Park Service to fully fund Doherty's research as she continues to estimate the rate of nonlethal entanglement. In conjunction with existing information on whale demographics, this will allow her to identify vulnerable segments of the humpback population. Doherty also will describe the location

of scarred and unscarred whales in relation to fishing activities. Ultimately, Doherty will determine if the reporting rate of whale entanglements to the National Marine Fisheries Service's Alaska Stranding Data Base reflects the rate of entanglement seen in the study.

Overall entanglement of humpback and other whale species in Alaska is believed to be low compared to other parts of the country. However, this study may help fishermen avoid additional restrictions or increased costs that could result from measures imposed to reduce humpback entanglements. Doherty's information also will be used in a ten-nation collaborative study run by the National Oceanic and Atmospheric Administration to assess the abundance and health status of humpbacks throughout the Pacific.

Multispecies Assessment Models for Fisheries Management

R/31-11

Terrance Quinn II, Ph.D., Fisheries Division, SFOS/UAF
Kray Van Kirk, M.S. student, SFOS/UAF

Other Strategic Goals Addressed: Produce a Highly Trained Workforce

Commercial fisheries managers around the world find themselves in a crisis as fish stocks and the health of the oceans continue to decline. A growing voice is calling for fisheries scientists to manage not just economically important fish stocks, but also to protect the marine ecosystem that makes healthy fish stocks possible. To do this, fisheries managers need new multispecies ecosystem models.

Through jointly funded projects by the Alaska and Rhode Island Sea Grant Programs, Alaska's Terry Quinn and Rhode Island's Jeremy Collie plan to determine whether their new multispecies ecosystem model is superior to existing single-species models and to previous multispecies models.

JCSFOS

University of Alaska Fairbanks fisheries scientists collect data in Southeast Alaska.

To test their model, researchers will conduct a series of simulations. Ecosystem models containing three to ten species will be evaluated. For realism, predation mechanisms will be explored. Next, Quinn and graduate student Kray Van Kirk will work with researchers at the Alaska Fisheries Science Center to test the model using data from commercial fish stocks in the Gulf of Alaska. Collie will apply the model to species of New England's Georges Bank in a collaborative effort with colleagues at the Northeast Fisheries Science Center. Finally, both research groups will collaborate with colleagues in Denmark to test the model using fish species in the Atlantic's North Sea.

Effects of Hybridization between Seasonally Distinct Pink Salmon Subpopulations: A Model for Outbreeding Depression in Pacific Salmon (Phase 1)

R/31-10

Anthony Gharrett, Ph.D., Fisheries Division, SFOS/UAF
William Smoker, Ph.D., Fisheries Division, SFOS/UAF
M.S. student to be named, SFOS/UAF

Other Strategic Goals Addressed: Produce a Highly Trained Workforce

Salmon, like all of us, have evolved unique genetic traits that allow them to survive and prosper within a particular ecosystem niche. Salmon that breed with salmon outside their own distinct population may be less likely to pass on the traits that allowed them to survive. Instead, such traits may become "depressed," or be less likely to occur in their offspring. The result may be that such salmon will be less able to survive in the wild.

There is concern that salmon translocated from one region to another, or that salmon released from hatcheries into the wild, may breed with local wild salmon populations and depress the traits in wild salmon that ensured their survival. This tendency is called outbreeding depression. But scientists understand little about the effects of outbreeding depression.

In this study, Alaska Sea Grant–supported scientists will examine the extent of outbreeding depression in hybrids between related populations of early and late-run pink salmon in Alaska's Auke Creek in both even and odd brood years. They'll look for traits likely to be depressed by outbreeding—primarily reduced marine survival—but also changes in variance of return dates, differences in development rate and embryo survival, and changes in the distributions of family sizes.

Since some of outbreeding's depressive effects are not expected until the second generation, this experiment will be carried out through two generations. The results will help resource managers better understand the effects of interbreeding in salmon populations, and help guide fisheries management and policy.

Larval Ecology and Settlement Dynamics of Dungeness Crab in an Alaskan Marine Reserve

RR/04-01

Ginny Eckert, Ph.D., Department of Natural Sciences, UAS, and SFOS/UAF
Heidi Herter, M.S. student, SFOS/UAF

Other Strategic Goals Addressed: Produce a Highly Trained Workforce

Scientists have long believed that certain areas of the sea and coastal zone produce most of the fish in the ocean. Increasingly, the public is demanding that these nursery areas or areas of critical habitat receive special protections to ensure the sustainability of commercial, sport, and subsistence fisheries as well as to maintain a healthy coastal ecosystem.

One such area is Glacier Bay in Southeast Alaska, where a number of studies are under way to determine whether the bay has been effective as a marine reserve since receiving the classification in 1999.

Alaska Sea Grant–funded scientists will study whether the bay provides habitat important for the production of Dungeness crabs. Specifically, they'll examine where and when Dungeness crab larvae settle onto the bay's seabed.

Understanding how marine reserves protect the next generation of species with dispersive larvae is one of the major needs within marine ecology and marine fisheries. This study will provide valuable information about Glacier Bay, one of the largest temperate marine reserves in the United States. It will also provide valuable information on marine reserves as a fishery management tool in Alaska.

Early Life History of Eulachon, *Thaleichthys pacificus:* Age Validation and Growth in Berners Bay, Alaska

RR/04-02

Nicola Hillgruber, Ph.D., Fisheries Division, SFOS/UAF
Andrew Eller, M.S. student, SFOS/UAF

Other Strategic Goals Addressed: Produce a Highly Trained Workforce

In 1806, explorers Meriwether Lewis and William Clark reached the headwaters of the Columbia River. There they tasted for the first time a slender, blue-hued fish about ten inches long. Lewis remarked, "I think them superior to any fish I ever tasted. . . ."

The fish Lewis had eaten was undoubtedly a eulachon, a species of smelt that each year migrates in great numbers from the sea to freshwater to spawn.

This pint-size fish returns to spawn along the Pacific Coast as far north as Alaska. In places like Southeast Alaska's Berners Bay, millions of returning eulachon attract hordes of marine mammals and seabirds, and throngs of fishermen. This makes Berners Bay the ideal location to learn more about the under-studied eulachon and its importance to the marine ecosystem.

Beginning in summer 2004, Alaska Sea Grant–supported scientists will study the timing of emigration, duration of residence, and growth of larval eulachon in Berners Bay. This is the first study of larval eulachon upon their entry from freshwater to estuaries in Alaska. Surveys of eulachon in British Columbia suggest that estuaries may offer habitat critical for larvae and juvenile eulachon. In addition, eulachon might imprint on their home estuary rather than their home stream.

The study provides an excellent opportunity to expand on existing and ongoing eulachon studies within Berners Bay estuary. The project will fill essential information gaps in the early life history of eulachon, including age validation, growth rates, timing of outmigration, and length of eulachon larvae residency in the estuary.

Coastal Ecosystem Health and Public Safety
Prepare for Coastal Hazards and Climate Change

Sea Ice Biota off Barrow, Alaska: An Important Food Source for Higher Trophic Levels in Coastal Alaskan Waters?

R/101-04

Rolf Gradinger, Ph.D., Institute of Marine Science, SFOS/UAF
Bodil Bluhm, Ph.D., Institute of Marine Science, SFOS/UAF
Mette Nielson, M.S. student, SFOS/UAF

Other Strategic Goals Addressed: Produce a Highly Trained Workforce

In the Arctic, all life is inextricably connected to and reliant upon sea ice. Each spring, as the sun's warmth returns to the far north, specialized algae that live only within and beneath the sea ice begin to photosynthesize and grow. This explosion of algal growth fuels a food web that is both complex and fragile. Algae, like plant life everywhere, is the first and most important strand in the arctic food web. But this web is threatened as never before. Global climate warming has already dramatically reduced the ice cover over the Arctic. One day, perhaps within a few decades, the Arctic may have no ice at all.

R. GRADINGER / B. BLUHM

Alaska Sea Grant–supported grad student Mette Nielson cuts an ice core sample.

Before that scenario plays out, scientists want to learn as much as they can about the role played by coastal fast ice—that's ice that stays all year—in nurturing marine life along Alaska's arctic coast. It's believed that sea ice supplies the nutrient needs of algae that form the basis of the marine food web.

But scientists don't fully understand the intricacies of this ice-based food web. To learn more, scientists funded by Alaska Sea Grant will collect amphipods and algae off the coast of Barrow, Alaska. Scientists will then follow the isotopic signatures ($\delta^{13}C$, $\delta^{15}N$) of the food sources and those of the amphipods themselves. From this information, they will construct models that show the relative contribution of ice-derived carbon to the nutrition of amphipods and the overall health of the environment.

Ultimately, scientists believe they'll better understand how the arctic sea-ice food web works, an understanding that will lead to more accurate predictions of how this fragile environment may change in the face of an ever-warmer climate. The researchers will present seminars and lectures on their progress and findings to residents of Barrow, a predominantly Native community keenly interested in science and their environment.

Sea Grant
Alaska

Alaska Sea Grant College Program
University of Alaska Fairbanks
PO Box 755040
Fairbanks, AK 99775-5040

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