

#### **Biological Oceanographer**

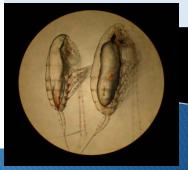
I am a biological oceanographer looking at the very small animals, or zooplankton, that float freely in the ocean and that are important prey for animals such as fish, jellyfish, seabirds, and the bowhead whale. I studied biology at Cornell University and oceanography at the University of Rhode Island. Before working at the Woods Hole Oceanographic Institution on Cape Cod, I lived and worked on Long Island, NY and in Miami, FL. My work has taken me to many different parts of the world, from the seas to the north of Norway to the Sea of Japan, from the Antarctic Ocean to the Arctic Ocean, and from the important fishery regions of Georges Bank, near Cape Cod, to the Bering Sea.

I am interested in how currents carry the small zooplankton between regions, in how the extreme seasonal cycles in polar regions influence these animals ability to grow and multiply, and how ongoing climate change might impact these animals. For the past eight years, I have been working near Barrow AK with my colleagues Bob Campbell and Steve Okkonen to understand why that region is a feeding "hotspot" for bowhead whales during their fall migration from Canada to the Bering Sea. We have identified the particular combination of wind speed and direction that bring the krill, a favorite prey of the bowhead whale near Barrow, onto the shelf to the NE of Point Barrow and produces dense clouds of krill on which the whales can feed easily and efficiently. To date, we do not believe that climate change has negatively affected the whales' ability to find abundant food near Barrow. We have benefited from our collaboration with and support from the community of Barrow, in particular with the North Slope Borough Department of Wildlife Management and the Barrow Whaling Captains. We have two more years of fieldwork funded in Barrow and are looking forward to our return this coming August.



My interest in PacMARS is to look at how the numbers and types of zooplankton may have changed from the 1960s to the present in the Chukchi Sea and how these changes, both long term and from year to year, might be tied to changes in the environment such as water temperature and ice cover. I am also interested in how much ice algae and phytoplankton (very small plants) are eaten by the zooplankton and how

much of this plant material falls to the seafloor to support the very abundant animals found there. Ultimately, these research areas are tied to understanding how the ecosystem works and how it might be modified under climate change, and thus perhaps impact the distributions and numbers of important animals at the top of the food chain such as walrus, seals, fish, birds, and whales.



PacMARS Pacific Marine Arctic Regional Synt

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### PacMARS Project Assistant / Biogeochemist

I was born in Niagara Falls, NY and lived there with my parents and younger brother. When I was 12 when we moved to rural southwest Virginia. After graduating from high school I went to Boston University and spent a year in Woods Hole, MA as part of the Boston University Marine Program. It was there that my interest in chemistry was sparked and my long-time love affair with nutrient (oxygen, carbon, nitrogen and phosphorus) cycling began.

I continued my education at the Virginia Institute of Marine Science (VIMS) studying nutrient cycling in seagrasses. After completing my masters degree I worked at VIMS as a research assistant managing the radiocarbon lab and research program. Radiocarbon is a term generally applied to radioactive carbon generated from nuclear bombs. We used this material to track movement of carbon through deep ocean currents to better understand how nutrients flow through the oceans.

My next job took me to Maryland where I continued as a research assistant working at the University of Maryland Center for Environmental Science. Here I continued to work on nutrient cycling and gained extensive expertise in SONE (sediment oxygen and nutrient exchange) experiments. I love these experiments because they help us understand how material in the oceans is recycled and used. This is much like leaf litter in a forest or composting except it is underwater. Pretty cool right?

I have been working for over 14 years studying nutrient cycling in the Chesapeake Bay, eastern coastal US, Antarctic and Arctic regions. My favorite parts of working as a marine scientist are sampling aboard large research vessels in remote locations and developing new laboratory methodologies.

As the project assistant for the PacMARS program I am responsible for our webpage (http://pacmars.cbl.umces.edu/), meeting planning, keeping up with reports and data synthesis. Please feel free to contact me with questions or general ideas. I am happy to pass along your thoughts and get you connected with the best scientist to answer your questions.

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## Eva Machelor Bailey





Marine Ecologist

I grew up in Germany, when it was still split up in two countries, with my younger sister Ullvi, and my parents Monika and Wolfgang. After a year in Great Britain as a nanny for three children, and college and graduate school in northern Germany, my husband Rolf Gradinger and I moved to Alaska in 2001. We enjoy outdoor activities such as kayaking, skiing, fishing, and berry picking with our two young daughters who were born in Fairbanks. In the summer, we grow our own vegetables and share them with the local moose.

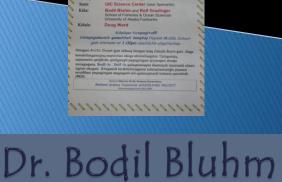
As a marine ecologist, I study the animals living at the sea floor such as crabs and sea urchins, and those living inside and under the sea ice such as small worms and beach hoppers. I am interesting in finding out more about who eats who, how many species there are, how fast they grow, how long they live, and how closely connected the animals and processes at the seafloor, in the water column and in the sea ice are. I also want to find out how the environment influences where certain animals occur in high numbers. All my current work is in the Pacific Arctic, primarily in the Chukchi and Beaufort Seas. I do most of my field work on ships, but I have also worked in a number of coastal villages in Alaska.

Within the Pacific Marine Arctic Synthesis (PacMARS) project, my tasks include collecting data on seafloor-inhabiting animals without bones to illustrate where they occur and how many they are by numbers and weight. Compiling this information on a regional scale should be useful, for example for those subsistence users wanting to know where the preferred prey of different marine mammals can be found. Also, I will make an effort to study if marine areas inhabited by many species are more productive than areas where few species live. Identifying the nature of such relationships is relevant if we want to make predictions about the responses of marine life to the ongoing changes in the Arctic. Observations by Alaska's coastal communities on animals washed up on shore or caught in fishing gear would be very helpful to this effort.

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Pacific Marine Arctic Regional Synthesis

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### **Biological Oceanographer**

I am a biological oceanographer from the University of Rhode Island. I study tiny microscopic animals called zooplankton that play a critical role in marine ecosystems because of their importance as food for many fish, birds and mammals. Early in my career, I worked mostly in estuarine and coastal waters of the northeastern U.S., including the formerly rich fishing grounds of Georges Bank and the Gulf of Maine, where my research focused on the importance of zooplankton to fish productivity and their role in the formation and control of harmful algal blooms.

More recently much of my work has focused in the Arctic and subarctic seas along the coast of Alaska from the Bering Sea to the Beaufort Sea and even to the central Arctic Ocean. In these efforts I have worked closely with PacMARS colleagues Carin Ashjian and Steve Okkonen to try to better understand the role of zooplankton in these cold, northern, marine environments. For my research I tend to ask questions about the biological rates of zooplankton, like: How much do they eat or how fast do they grow? To answer these questions, I use controlled laboratory experiments where I culture zooplankton so that I can precisely measure what and how much they eat and how fast they develop, grow and reproduce. I also try to make these same measurements from ships at sea, which is far more complicated because unlike the laboratory there are many variables that can't be controlled when undertaking experiments in the natural environment. Taken together, the laboratory and shipboard experiments allow me to better understand the role of zooplankton in marine ecosystems. Without knowledge of these important biological rates it would not be possible to understand how energy flows through the ecosystem, whether most food produced at the base of the food web goes to the fish, birds, and mammals that feed in the water column, or whether it goes to the bottom supporting the clams and crabs and animals that feed on them. Also, it would not be possible to predict how a changing environment, such as might be brought about by climate change, will impact how the ecosystem functions and how energy flows through it.

For the PacMARS project, I will be working closely with Carin Ashjian to try to bring together zooplankton data that have been collected in the Beaufort and Chukchi seas to see if we can detect patterns and changes that have occurred over time in the abundance and kinds of zooplankton in this region. In this analysis we hope to be able to be link the zooplankton data to environmental conditions including water temperature, currents, ice conditions, and amount of available food to try to determine the causes for the patterns and/or changes to the zooplankton communities that we observe. Hopefully, this analysis will shed light on any changes that may have already occurred, help us to predict future changes to the system, and guide recommendations for future research needs.

Dr. Robert Campbell, Ph.D. University of Rhode Island



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## Dr. Robert Campbell

### Pacific Marine Arctic Regional Synthesis



#### **Descriptive Physical Oceanographer**

I grew up in the hot dry climate of Arizona and first met the ocean through diving trips down to the Sea of Cortez. I then nudged northward Seattle to attend graduate school at the University of Washington, where two loves entered my life: the first was Carole, my Canadian-born wife to be, and the second was the mystic Arctic, via a field trip to Kane Basin in 1969. I finished my PhD on water mass formation under the very special mentorship of Knut Aagaard in 1972, and then shipped south as a postdoc to the Scripps Institution to research Antarctic Bottom Water formation.

In 1974, we moved Canada, where I took a posting with the Canadian government (and actually got paid) to study the beautiful intermontaine lakes of British Columbia and the Yukon with a multi-disciplinary team. Finally, in 1986, we moved (now with three kids in tow) to Vancouver Island and a return to Arctic research at the Institute of Ocean Sciences. In 2007 I undertook a position as Sydney Chapman Chair at the University of Alaska, Fairbanks. In 2011 I retired from government work, assuming an Emeritus position, and now divide my time chasing unfinished ideas and trying to keep up with a small chunk of land with a horse, six chickens, two cats and a dog. Like many my age I'm learning that grandkids are great!

As a long-time observer of water I have participated in about 90 field trips to rivers, lakes and seas spanning from the Antarctic to the Arctic and from the Yukon to Siberia, and published articles on circulation in high-latitude oceans, climate change in arctic waters, dynamics of lakes and rivers, and physical-biological coupling in marine systems. I was Chief Canadian scientist for the 1994 Canada/US icebreaker expedition to the North Pole, and led the 'Canada's Three Oceans' project for the International Polar Year. Too maintain personal perspective, I am the 'Captain' of my own little 34' troller conversion, the R/V Wicklow, with which I hope to demonstrate that monitoring of the coastal ocean can be done cheaply and at the community level.

In recent years I have grown an interest in the dynamics of complex systems in general, and in social-ecological systems in particular. To be a senior advisor for the Pacific Marine Arctic Synthesis (PacMARS) project is thus a terrific opportunity to contribute in some small way to an effort that aims to bridge environmental, economic and cultural linkages between people and place in a rapidly changing (and unpredictable) system. I am especially proud to be part of a team that recognizes the needs, talents and skills of local residents in project planning, so please contact me by phone, email, or mail with any observations, questions or suggestions you may have regarding change and development in your region. Having first gone to the Arctic the same year as the Woodstock concert, 1969, I am totally convinced – to borrow from Dylan – that 'things are a-changing!'

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Dr. Eddy Carmack



#### Marine Biogeochemist

I live now in Maryland, near the Chesapeake Bay, which historically was an important provider of subsistence wealth through seafood to local harvesters of crabs, fish, and oysters. Now because so many tens of millions of people live in the watershed of Chesapeake Bay, from New York to Virginia, there are other concerns such as pollution, and the flow of nutrients from agriculture and major cities into the Bay, degrading water quality. Changed cycles of elements such as carbon and nitrogen have occurred and it is proving difficult to restore the Bay to its former productivity.

Some of the same problems with changed element (or "biogeochemical") cycles may be occurring in the Arctic as climate warms, sea ice declines and biological communities adjust. My specialty is studying the flow of biologically important materials, including contaminants and tracers that can be radioactive or stable, so there is a bit of biology, chemistry, and geology in what I do scientifically. So to make it simple, I just say that I am a biogeochemist, in order to incorporate all those disciplines.

I have been working in the Alaskan Arctic for about 30 years, mostly from ships and I had the opportunity to undertake graduate work at the University of Alaska Fairbanks. So despite the great distance I have to travel to come to Alaskan waters, I come every year, and know many parts of the state. I have visited a number of local communities, from Unalaska to St. Paul, to Nome, Diomede, Gambell, Savoonga and Barrow. I hope we can use this research "synthesis" project to learn more from local subsistence users of food resources in the Bering, Chukchi and Beaufort Seas about the knowledge you have, as well as how you think scientists might be able to better use this knowledge as new research programs are designed. As my part of the project, I am working to link all of the knowledge that is available to understand better how ecosystems, including local residents, are adjusting to changing conditions.

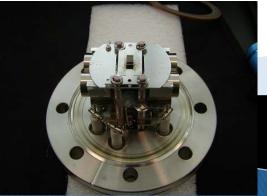
Oh, and this picture to the right. That is just a mass spectrometer source we use in the lab for analysis of carbon and nitrogen.

#### Dr. Lee W. Cooper, Ph.D.

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Dr. Lee Cooper



#### Estuarine and Coastal Ecologist

I have been in or under the water most of my life, from the Antarctic to the Arctic. I began my marine science career at three years old when I was stung by a jellyfish. I started diving in high school in New England and now have over 3000 dives under the ice in the Beaufort Sea. My favorite dive was with a playful ring seal who chased my bubbles for an hour one day under six feet of ice in Stefansson Sound near Narwhal Island.

My specialty is marine plants, and the eventual consumption of these plants in marine food webs. I study everything, from worms to seals, using stable isotopes to look at diet. From these measurements and observations I can construct food webs. My current work is in the Chukchi and Beaufort Seas and in the Gulf of Mexico. One of my favorite places to visit is the village of Kaktovik. I first visited there in 1980 and have gone back frequently ever since. I've conducted summer science camps for the kids in Kaktovik, and they help me by collecting samples and data (and keeping our field team safe from polar bears).

Within the Pacific Marine Arctic Synthesis (PacMARS) project, my task is to construct food webs of the lagoons, the nearshore shelf and coast, and the shelves. I am very interested in any information the hunters might have on the relationships between animals, particularly what they eat. This includes fish, birds, marine mammals, toe biters, etc.

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### Dr. Kenneth Dunton





**Biological Oceanographer** 

I grew up in northern California, where I went to school before moving to Fairbanks, Alaska for my Ph.D. work. I have one brother and five sisters. After postdoctoral studies in California within a Russian–US oceanographic program, I moved with my husband, Lee Cooper, to Tennessee and then to near the Chesapeake Bay in Maryland about 5 years ago. We have one daughter. We enjoy outdoor activities such as hiking, cross-country skiing, and traveling.

As a biological oceanographer with an interest in benthic (bottom) organisms, I study the animals living in the sediments, such as clams, worms, and amphipods that are important food for walrus, bearded seals, gray whales, and diving sea ducks. I am interesting in understanding the connection of organic carbon produced in the water column and its impacts on the underlying sediments and bottom animals. All my current work occurs in the Pacific Arctic, primarily in the northern Bering and Chukchi Seas. My field work is shipbased, although I visit a number of Alaskan coastal villages to discuss science and community interests in the changing marine system. I am also active in international science programs and planning efforts within the Pacific Arctic Group and International Arctic Science Committee.

Within PacMARS, I am accumulating data on the abundance and biomass of all types of benthic animals, along with data on sediment carbon content, grain size, and other environmental parameters important to understand the ecosystem. Since clams, worms, amphipods, and other benthic animals are important prey for subsistence animals, such as walrus, I am interested in how environmental and human-induced changes in the region can impact these larger animals. I am very interested in discussing local community needs for science information through this effort.

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### Dr. Jacqueline Grebmeier





Data Manager

I became interested in meteorology as a young lad after overcoming my fear of lightning. Now after all these years, I have studied everything from big winter snowstorms to tornadoes and tropical cyclones with never a dull moment. I provide advice, support and problem-solving to the science community as they plan and conduct multi-disciplinary field projects around the world, including in Alaska and other Arctic nations. I also work with the science investigators to plan and

support the data management of all the observations coming from the projects. I have worked at the National Center for Atmospheric Research (NCAR) for the last 30 years and have been involved in more than 60 projects from several disciplines including mesoscale meteorology, chemistry, oceanography and biology.

For the past 15 years I have had responsibility for working with other scientists from many disciplines to manage the unique data coming from several different projects in the Arctic. The projects included the Surface Heat Budget of the Arctic (SHEBA) Project where observations were made out on the Arctic icepack in the Beaufort and Chukchi Seas for full year, and the Western Arctic Shelf-Basin Interactions (SBI) Project where multiple cruises on icebreakers produced multi-year sampling in the Beaufort and Chukchi Seas, and now PacMARS. I am part of a team of computer programmers, scientists and students that work to keep the data safe and available to anyone interested in analyzing it.

I am providing support to the PacMARS Project to help manage the rich and diverse datasets collected by the team of scientists that will be the legacy of this project for years to come. My team at NCAR is also provided display capabilities using Geographic Information System (GIS) tools to help the scientists more easily discover and visualize new information hidden in the data from several different sources. These GIS tools can be used by the Alaska coastal citizens to see the data and perhaps make their own discoveries to help in our understanding this complex ecological system in which we live.

Dr. James Moore, Ph.D.

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### Dr. James Moore





I live on the Kenai Peninsula with my wife Joann. Our kids are grown and have moved out of the house. I have two jobs. For the past 35 years, I have spent the summer months as a commercial salmon fisherman in Cook Inlet

During the past 20 years, I have spent the fall, winter, and spring months as a physical oceanographer. As a physical oceanographer, I study ocean currents, mostly in Alaskan waters. Recently, I have worked with other oceanographers and whale biologists to find out why the Barrow area is a feeding hotspot for bowhead whales and beluga whales. We now are expanding our study to identifying relationships between ocean currents and the migration of bowhead whales.

**Physical Oceanographer** 

With respect to the PacMARS project, I am collecting ocean temperature, salinity, and current measurements from the Chukchi and Beaufort Seas dating back to 1970 to see how ocean conditions are different from one place to another and how these conditions might have changed over the past 40 years.



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### Dr. Steve Okkenon



#### Biologist / Bering Strait Agent

I was born and raised on Aquidneck Island which, being a small island among several islands within the State of Rhode Island, has a long standing maritime culture. After graduating from the University of New Hampshire, I moved to southwestern Alaska during 1988. Studying walrus diet (for a MS degree) under the direction of Dr. Bud Fay at the University of Alaska Fairbanks brought me to the Bering Strait region during 1992. My introduction to rural communities and the subsistence way of life began the start of an incredible education that continues every day – taught by true regional experts.

For over 20 years I have been blessed to have worked on marine mammal projects in rural Alaskan communities and on research vessels throughout western and northern Alaska. These research and/or management related projects have contributed to health assessments, distribution/movements, and general ecology such as diet, etc. This research has included several different animal species such as walruses, the four species of ice seals (bearded, ringed, spotted, ribbon), as well as beluga, and bowhead whales. I continue to work closely with subsistence communities as well as other researchers in my relatively new role as the Bering Strait agent for the University of Alaska's Marine Advisory Program. I strongly encourage cooperation and collaboration among the varied user groups and cultures that utilize the marine resources of the Bering, Chukchi, and Beaufort seas.

Within this Pacific Marine Arctic Synthesis (PacMARS) project, my primary task is to hold regional meetings (Nome, Kotzebue, and Barrow) that include a representative from your selected rural coastal community in order to:

- Provide a summary of regional science research
- Provide the PacMARS project goals
- Listen to your comments on the ways the results of science should be provided to rural communities
- Listen to your perspective/ideas as to what information would be useful to you and your community that science can either begin, or continue, to examine.

**Gay Sheffield** 

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### Marine Chemist

Although we have lived in Florida for many years, my wife Susan and I have deep roots in New England and eastern Canada. I attended college in upstate New York and graduate school in Texas where both our son and daughter were born. We now have three beautiful grandchildren who bring us great joy combined with a genuine concern for the future health of our planet. My first research adventure in Alaska was in 1997 and my work has focused on the Arctic since 1999. Even as a relative newcomer, I have a passion for the clean water and unspoiled lands of Alaska. I love to travel and hike with my wife to new places on Earth and to be a scientist to folks of all ages.

As a marine chemist, I study trace metals such as mercury, cadmium and lead in the ocean with an interest in metals as natural resources and as potential pollutants. For many years I studied metals in deep-sea ore deposits around high-temperature (~700°F) hot springs in the Pacific and Atlantic Oceans. I had many opportunities to sample these hot springs at 2 miles down in the ocean using the submersible ALVIN. Much of my research in Alaska has been related to developing techniques for determining when the environment has been impacted by potential pollutants. My work also seeks to identify any contaminants released during human activity, including exploration and production of oil and gas offshore of Alaska.

Within the Pacific Marine Arctic Synthesis (PacMARS) project, my tasks include collecting and understanding concentrations of contaminants such as metals, hydrocarbons and PCBs (polychlorinated biphenyls) in seafloor sediments and marine animals. I am interested in potential pollutants in plankton as well as seals, walrus, birds and whales. With the assembled data, my colleagues and I will focus on the following three important contaminants: mercury (including methylmercury), cadmium and PCBs. Our study will consider sources of contaminants and the pathways by which these contaminants enter the food chain. Contributions from members of Alaska's coastal communities about other contaminants of concern to them, possible sources of contaminants to Alaskan waters not previously identified by scientists, and specific instances of toxicity in marine mammals and birds they have observed would be very helpful to this effort.

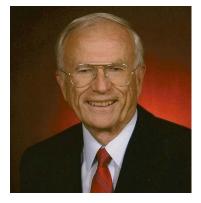
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Systems Ecologist

I am a native of Baltimore, Maryland, and have spent all of my life in the Southeast. I retired from the University of Maryland and moved to Gainesville, Florida, where I live with my wife, Marijka, who was born in Ukraine. We have three grown children, Anastasia, Peter and Vera. My passion is swimming, and I devote significant time to gardening and raising citrus. My wife and I enjoy exploring backwoods Florida and engaging in church and charitable activities.

I was trained as a Chemical Engineer, but spent 38 years as an ecosystems scientist with the Chesapeake Biological Laboratory. My research interest was ecosystem networks – the pattern of connections describing who eats whom. I developed mathematical ways of examining the pathways among species to locate weak points in the system and how they might affect the way that the ecological community could respond to damaging events. I have studied ecosystems in the Chesapeake region, the Florida Everglades and mangrove islands off the coast of Belize.

I am totally new to Arctic ecosystems, but am being taught much about them by my colleagues on the Pacific Marine Arctic Synthesis (PacMARS) project. My role is as a Senior Advisor to PacMARS, and I am being asked to emphasize how the information we are assembling can be used to initiate research on the ecosystem of the Western Arctic Ocean as a whole. I am urging that PacMARS be used as a springboard to making a full description of the Arctic marine ecosystem and the connections by which various species affect one another both directly and indirectly.

I am impressed by how PacMARS is making sincere efforts to engage the entire citizenry of coastal Alaska in their data-gathering project. They attempt to inform citizens of what they are doing and how PacMARS work does or does not affect ongoing public and private activities. In return they invite the public to teach PacMARS scientists what the citizens know about the environment in which they daily live, work, hunt or fish. I look forward to possibly participating in some of the "hub" meetings at which such exchanges take place.

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### Dr. Robert Vlanowicz





Cultural Anthropologist

I grew up in the Republic of Belarus, when it was still Soviet Union. My parents Eva and Gregory, sister Rita, and I came to the United States in 1989. We settled in Chicago, where I met my husband Igor Pasternak. Since 1998 Igor and I have been living in the forest near Fairbanks, Alaska. We spend time on the trails walking with our dogs, pick lots of berries and mushrooms in the summer, trap, hunt, and fish. We feel at home in the forest but love visiting friends in the tundra regions.

As a cultural anthropologist, I study ways in which people harvest, process, preserve, prepare, and share food. My most valuable learning has been through lived experience and person-to-person interactions. Much of my work is in Chukotka, on the Russian side of the Bering Strait, where many of the local recipes are similar to the ways people cook in northern coastal Alaska. I have come to understand local food as a way of sharing the knowledge of the land, sea, animals, plants, and the spiritual world.

The Pacific Marine Arctic Synthesis (PacMARS) project is helping me become more aware of the continuity and change in the subsistence livelihoods in the Arctic regions of Alaska. My role on the PacMARS project is to assemble and share as many sources of information as I can find, about the linkages between the changing climate, animals, subsistence practices, and local ways of life. It is a big and challenging task, as ways of knowing vary as much between human individuals and groups as they do among animals and other creatures.

Our team believes that improving access to information will be of help to everyone affected by the rapid change in the Arctic. Your perspective on the kinds of information that people living in your region need will help scientists make useful impact through their research. Thank you so much for your interest and please contact me by phone, email, or mail with any questions and suggestions.



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### Dr. Sveta Yamin-Pasternak