



From the Director
Peter Schweitzer

Spring has arrived and the snow is melting fast here in Fairbanks as we make the final preparations for two important EPSCoR meetings to be held in May.

On the evening of May 10, a welcome reception will kick off "Living on Earth," an NSF-sponsored workshop which will bring folks from across the country and Canada to Anchorage to discuss the emerging field of "social-ecological systems." (For a definition of SES, see the back of this newsletter.)

On May 13, the "Living on Earth" workshop will end and the annual Alaska EPSCoR All-Hands Meeting will begin. While the first meeting is national in scope, the all-hands meeting is first and foremost a state-wide event. These issues of scale bring to mind another recent event in which Alaska EPSCoR was prominently involved, namely the Second Western Alaska Interdisciplinary Science Conference (WAISC) in Nome. (See story, page 6.) WAISC is an excellent example of a regional science conference and we at EPSCoR are proud to support science activities at all these levels.

Phase III of Alaska EPSCoR is nearing the end of its second year. While the first year was devoted primarily to getting things started and implanting the idea of integration, year two has been focused on component-driven activities. The third and final year will be critical for the overall success of the enterprise. We will have to focus on a variety of

A Discovery of Glacial Proportions EPSCoR Researchers' Find is Millenia in the Making

A grounded airplane and a few sets of sharp eyes led four Alaska EPSCoR researchers to a serendipitous discovery that stands to rewrite the recent geologic history of Alaska's Arctic Coastal Plain.

In August 2008, EPSCoR-affiliated physical science researchers Torre Jorgensen, Yuri Shur, Misha Kanevskiy and Matt Dillon were stranded in the village of Kaktovik, on Barter Island off the Beaufort Sea coast. They had planned to catch a charter flight to study permafrost features of the isolated Jago River field site, but heavy fog



photo courtesy Misha Kanevskiy

EPSCoR-funded UAF researcher Yuri Shur is dwarfed by bluffs at the Kaktovik exposure in August 2008.

prevented them from leaving.

On the flight into Kaktovik, a massive bluff along the beach near the village had caught their eye, so they decided to use their unexpected free time to take a closer look. They discovered that a July 31 storm had torn off a huge chunk of shoreline, exposing a vertical cross-section of the material beneath – a gold mine for the quartet of permafrost scientists.

"We saw from the plane this perfectly exposed bluff," explained Kanevskiy, a research assistant professor in Alaska EPSCoR's Physical Science component, which is

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Trek of the Tundra Daisy

Taking Stock of a Cold War Legacy, by Canoe



Stacey Fritz

Stacey Fritz gives new meaning to the term ‘fieldwork.’

In order to study the legacy of the DEW line, a system of Cold War-era radar stations along the arctic coast, the EPSCoR-funded anthropology student decided she needed to see some of the line for herself. So she and a partner spent the summer of 2008 sailing and paddling a 19-foot expedition canoe 750 miles from Fort MacPherson in Canada’s Northwest Territories to Barrow, inspecting radar sites and interviewing local residents along the way.

“I couldn’t choose one place, because I didn’t think it would do justice to the story,” Fritz said. “So I thought just maybe doing a comparison of sites in the western Arctic would be doable ... the only way to do that is by boat.”

Fritz, a PhD student in Cultural Anthropology at the University of Alaska Fairbanks, traces her interest in the DEW line back to her time as a UAF Master’s student in Northern Studies. Researching Alaskan militarization, she learned about the DEW line and was stunned by its scale.

“I was just completely amazed at how huge of a project it was, what a massive effect it must have had on the environment and the people,” she said. “We have so much research done on other big military projects in Alaska, but not so much on this huge Cold War project which in my mind must have had a significant impact on arctic people and land.”

The Distant Early Warning Line was built by the U.S. and Canadian Air Forces from 1954-7 to provide early detection of Soviet bombers coming over the North Pole. The 63 sites, which stretch from Greenland to the Aleutians, were rendered obsolete almost immediately by the advent of the intercontinental ballistic missile. Most sites have since been shuttered, though the line still operates as a largely automated system.

Fritz’s research interest in the line stems from its psychological and economic repercussions for the Alaska Natives and First Nations peoples whom the DEW line sites influenced, employed and sometimes displaced. In particular, she wanted to see how the stations, staffed by civilian contractors and Air Force personnel and often built and maintained by Native laborers, had affected local people’s perceptions of the military. Fritz called the DEW Line a rare case in the modern world in which people had military ideas and values presented to them after growing up without preconceived notions on the subject.

“Americans in general, we just don’t see militarization because we’re so steeped in it,” she said. “So I think the opinions of people who had not been militarized, and did not know anything about global nuclear war and mutually assured destruction, should be relevant

to us.”

Fritz’s trip began in July 2008 with a drive up the Dempster Highway. She and her partner, Ryan Tinsley, put in their twin-sailed Kruger Cruiser canoe – named the “Tundra Daisy,” after a common term for the ubiquitous empty 55-gallon drums that



photo courtesy Stacey Fritz

Fritz poses atop some discarded oil drums, or “tundra daisies,” in the vicinity of the Flaxman Island DEW Line site. The drums were placed there as runway markers.

dot the arctic tundra – at the Peel River on July 6 and paddled north into the MacKenzie River Delta before bearing west along the arctic coast. The pair stuck close to shore, navigating by GPS, sometimes protected from the waves by barrier islands. They burned driftwood for fires at night, ate mostly homemade granola bars and other lightweight dried snacks, and made stops at places like Kaktovik and Herschel Island to interview residents. They also explored numerous DEW Line sites to examine their present state and to take photographs.

Fritz said every site has its own unique history, depending on where it was situated and how staffers interacted with the local population. In Kaktovik, she noted, villagers were relocated three times to make way for the radar site, while the first school in the village (among many other buildings) was constructed out of DEW Line packing crates. Other sites sat in

inhospitable spots with no nearby inhabitants. All of the sites buried their own garbage, she noted, but coastal erosion has begun to expose some of the dumps – which often contain PCBs and other hazardous materials.

Even as Fritz worked to piece together years of history, her own trip took on epic proportions. Waves twice sheared off their portside outrigger. At Drew Point a lone polar bear noticed them and swam after the canoe for several alarming minutes before retreating.



The route of Stacey Fritz’s expedition. She and Ryan Tinsley set off from Fort MacPherson on, July 6, 2008 and reached Barrow on September 6.

EPSCoR Briefs

They were hosted and entertained at the Badami oil field, while at Prudhoe Bay, despite making advance arrangements, they were picked up late in the evening by a British Petroleum hovercraft and summarily ferried across to the other side of the main oil complex. And on the Alaskan-Canadian border, she and Tinsley found themselves closed out by bluffs with no landing spot in sight and immersed in a harrowing spell of bad weather.

“There’s no barrier island there, so you’re just out in the water, and the waves are getting bigger and bigger and the wind was getting stronger and stronger,” she said. “We actually only had one sail up and it was reefed in all the way, and I was watching the GPS, and



A typical DEW Line site.

at some points we were actually hitting speeds of 13 miles per hour, which is far, far too fast in a canoe.”

Fritz and Tinsley had planned to sail all the way to Point Lay, but by the time they arrived in Barrow, 150 miles short of their planned destination, it was September 6 and winter was coming fast. Fritz spent six weeks in Barrow, conducting interviews and immersing herself in local life, before heading back to Fairbanks.

Fritz was able to conduct many interviews along the way, but admits she did less than she would have liked, mostly because her attempts to record conversations led many people to clam up. While she’s unwilling to draw any conclusions at the moment, she said her findings pointed to a generational break in opinion: older people, who remember WWII and may have worked at DEW Line sites, are more supportive of the military than younger people who are more aware of modern warfare and of the DEW Line’s legacy of contaminants.

As for the ultimate legacies of the line, Fritz says they are too intricate to paint as positive or negative. It brought people health care, employment, modern airfields, building material and excitement, she noted, as well as PCB’S, lead paint, jobs that served to undermine subsistence lifestyles, and a huge supply of alcohol. “There’s so much good about it, and so much bad about it,” she said.

Fritz, an Alaska EPSCoR graduate fellow and a student in the IGERT/RAP program, plans to finish up her fieldwork this summer, likely in a more conventional manner: Her chief plans are to fly back to Kaktovik and to other sites such as Barrow, Wainwright, Point Lay and Tuktoyaktuk, N.T. to conduct more in-depth interviews. Though her canoeing may be done, Fritz said her decision to conduct her research in such an unorthodox manner last summer remains invaluable.

“The advantages of traveling by boat through the environment were just inestimable,” she said. “It was huge. I think people trusted us far more because we did that...I wasn’t a sole researcher who showed up on a plane and dropped in to ask somebody weird questions.”

We’ve Moved!

Alaska EPSCoR has relocated its main office to a location on the University of Alaska Fairbanks lower campus. Administrative operations for the organization are now based out of Room 305 in the Eielson Building. All office phone numbers and the office post office box will remain the same.

Sparrow wins Distinguished Service Award



Elena Sparrow

Elena Sparrow, who is in charge of Alaska EPSCoR’s K-12 education efforts, has been named the winner of the 2008 Emma Walton Distinguished Service Award, presented by the Alaska Science Teachers Association. The award recognizes Alaskan educators who make extraordinary contributions to the advancement of science education.

Walter Named Emerging Explorer



Katey Walter

2008 EPSCoR early-career grantee Katey Walter has been named a National Geographic Emerging Explorer for 2009.

The Emerging Explorer program each year recognizes 10 young scientists, photographers and storytellers who are making a difference early in their careers. Walter will receive \$10,000 for further research and will likely work with National Geographic to create educational material.

Walter is a researcher in the Water and Environmental Research Center at UAF. Her work focuses on methane bubbling in arctic lakes.

Sikes Secures Funding for Museum Collection



Derek Sikes

UAF entomologist Derek Sikes has spun his 2008 Alaska EPSCoR Early-Career award into an NSF grant to enlarge and upgrade the insect collection at the UA Museum of the North.

Sikes’ \$272,000 grant will replace the university’s aging storage equipment and increase the insect collection space. The grant will also pay a graduate assistant to assist him for a year and an undergrad for two years.

Sikes is an Assistant Professor of Entomology with the Institute of Arctic Biology and Curator of Insects at the museum.

Pete Chosen as Person of Year



Mary Pete

UAF Kuskokwim Campus Director and EPSCoR management team member Mary Pete has been honored as Person of the Year by the Tundra Women’s Coalition, a Bethel nonprofit group which promotes a healthy social environment for the women, children and men of the Yukon-Kuskokwim Delta. The award is given annually to someone who “exemplifies the values of commitment to self-respect, family, community, equality, peace, self-determination and the worth of every person.”

Miller Receives Goldwater Scholarship

Alaska EPSCoR undergraduate grantee Celia Miller has been named a Goldwater Scholar by the Barry M. Goldwater Scholarship and Excellence in Education Foundation. The scholarships, worth up to \$7,500 annually, are awarded to students planning on careers in science, math and engineering. Miller, a Natural Resource Management major at UAF, received an EPSCoR grant this year to study the makeup of a common boreal lichen, *Ramalina dilacerata*, and use the results to make inferences about Interior Alaska’s historic forestation.

Alaska EPSCoR Awards 2009 Early-Career, Undergrad Grants

From mercury to microbes, the research topics of Alaska EPSCoR's 2009 Early-Career and Undergraduate Award recipients run the scientific gamut. Eight University of Alaska researchers were selected for this year's early-career awards, which provide up to \$30,000 in funding, while seven UA undergraduates received up to \$8,000 each for research projects of their own.

A total of almost \$210,000 was awarded to this year's early-career winners:

- Ana Aguilar-Islas, a post-doctoral researcher at UAF's International Arctic Research Center, received \$20,000. Aguilar-Islas is collecting and compiling baseline data on the presence of trace metals (such as iron, copper, cadmium and mercury) in the Kuparuk and Sagavanirktok river watersheds on the North Slope.
- Courtney Carothers, an Assistant Professor of Fisheries at UAF, received \$30,000. Carothers is exploring the sustain-



Early-Career Award Winner David Tallmon on the arctic sea ice near Oliktok Point on a research trip.

ability and resilience of fishing communities and small-scale fishers in the Gulf of Alaska in light of increasing privatization of fishing rights.

- Margaret Darrow, an Assistant Professor in the Institute of Northern Engineering at UAF, received \$20,000. Darrow is using nuclear magnetic resonance methods to determine the mass and mobility of liquid water within frozen soils.

- Mary Beth Leigh, an Assistant Professor of Microbiology with UAF's Institute of Arctic Biology, received \$29,980. Leigh is using a DNA labeling device to examine the microorganisms in an array of Alaskan soil samples, enabling a cataloging of the quantity and diversity of soil microbial genes in different vegetation types.

- Stephanie Martin, an Assistant Professor of Economics and Public Policy with the Institute of Social and Economic Research at UAA, received \$29,594. Martin will compile

Charging Ahead

EPSCoR undergraduate grantee continues work on electric vehicles

Michael Golub's enthusiasm for gasoline-free transportation is, well, electric.

The UAF Civil Engineering Student, the recipient of two Alaska EPSCoR undergraduate research grants (and the subject of a profile in the summer 2008 newsletter), continues to make great strides in his efforts to document and draw attention to the viability of electric cars in Alaska's Interior. In addition to using his current EPSCoR grant to refine his studies of electric car emissions, he's also running electric car conversion classes throughout Alaska and recently helped build an electric snowmachine which placed second in a nationwide competition.

And he keeps on converting vehicles to electric, from the snowmachine to compact cars to his own riding mower. "I'm up to eight right now," he noted.

Golub's first EPSCoR grant, in 2008, financed a preliminary study of the pollutants created by electric cars versus gasoline ones in Fairbanks, as well as their economic efficiency. As

Golub notes, Fairbanks is in many ways a fertile ground for electric cars, thanks to winter air quality problems and the availability of outlets normally used to power car heaters in the winter. "We're already wired up," he noted. "We have plug-ins all over town."

Golub had already built his first electric car, a 1986 Toyota pickup, when he received a \$3,000 EPSCoR grant in 2008. The grant went toward fitting the car with sensors and devices to study its energy consumption and to compare it to an equivalent gas-powered car.

"What I was trying to do was get both theoretical and experimental data and show that driving an electric vehicle is a benefit to the environment because it uses less energy and pollutes less," he said. "I was

able to do that, but not to the extent that I wanted to." Golub is using his \$8,000 2009 grant to refine his findings with improved measuring equipment, and also to fit the test vehicles with lithium batteries, which are both lighter and more efficient in cold weather than the lead batteries he used



Golub and his latest project, an electric snowmachine which fared well in a national competition in April.

and analyze statistics of human migrations in Alaska over the last 25 years.

- Robert Pattison, a post-doctoral fellow with the Environmental and Natural Resources Institute at the University of Alaska Anchorage, received \$30,000. Pattison will examine the reasons behind increases in shrub abundance and spread in the Arctic, using measurements of shrub density and spectral compositions as well as direct biomass harvests.

- Sanjay Pyare, a professor of Environmental Science at the University of Alaska Southeast, received \$30,000. Pyare is spearheading a fledgling UAS integrative research team; establishing a joint Alaska-Hawaii cyberinfrastructure-based research and outreach network; and working to develop the field of landscape genetics.

- Brian Rasley, an Assistant Professor in UAF's Department of Chemistry and Biochemistry, received \$20,208. Rasley is establishing baseline numbers of toxic contaminant amounts in the fish and water of the Nushagak River in southwest Alaska.

- David Tallmon, an Assistant Professor of Biology in the Department of Natural Sciences at the University of Alaska Southeast, received \$30,000. Tallmon is examining the origins and ramifications of the ability of coastrange sculpin in Glacier Bay National Park to adapt to different streambed colorations.

previously.

The lithium batteries also came in handy for the electric snow-machine Golub built with other students for the senior design project. Golub and fellow students Malcolm Deighton, Peter Morris, Mark Nelson and Lisa Stowell entered the vehicle in the 2009 Society of Automobile Engineers Clean Snowmobile Challenge, held in April in Houghton, Michigan. The team was second out of five teams in the "Zero Emissions" category, behind the University of Wisconsin-Madison. Golub said the rookie team's finish was impressive given the experience of the other entrants. "We're David and they're Goliath," he said.

Alaska EPSCoR has also helped Golub's projects in another fashion: At the 2008 EPSCoR All-Hands meeting he met Todd Radenbaugh of the UAF Bristol Bay campus, which led to Golub agreeing to run an electric car conversion class at the campus in Dillingham. "Dillingham was because of EPSCoR," he said.

In addition to Dillingham, Golub has run the course twice at UAF and once at Ilisagvik College in Barrow and will do one in the Matanuska-Susitna Valley in May. He's started a company, RevUP (The Rural Electric Vehicle Utilization Project) to run the courses and to look for funding to improve them. He's a finalist in this year's Alaska Federation of Natives Marketplace Competition, which would award him about \$15,000. "It's basically start-up money to get parts for several cars," he said.

Golub is set to graduate this year but hopes to stick around, as he has applied to grad school at UAF for Mechanical Engineering. "I want to go back to Michigan next year," he joked, "and beat Madison." ❧



Early-Career Award Winner Ana Aguilar-Islas (left) coring ice in the Bering Sea in 2008 with Megan Bernhardt of the University of Washington.

Undergraduate grantees for 2009 have been awarded upwards of \$54,000:

- John Cable, a Biology major at UAF, received \$8,000. Cable is tracking the plant polymer lignocellulose in soil samples to determine which microbes are responsible for lignocellulose decomposition.

- Kari Dammerman, a Marine Biology major at UAS, received \$8,000. Dammerman is studying genetic diversity and gene flow within populations of coastrange sculpin in Glacier Bay National Park.

- Michael Golub, a Mechanical Engineering major at UAF and a 2008 undergraduate EPSCoR grantee, received \$8,000. Golub is logging data from measuring devices in electric cars to test hypotheses about the cars' relative contributions to greenhouse gases and their economic viability.

- Tyson Hansen, a Broadcast Journalism major at UAF, and Molly Wilson, a Theatre major at UAF, received \$8,000 each. They will collaborate on a documentary on the prospect of oil exploration in the Arctic National Wildlife Refuge.

- Elizabeth Kunibe, a Social Science Major at UAS and a 2008 undergraduate EPSCoR grantee, received \$7,027. Kunibe is experimenting with different varieties of seed potatoes to determine which strains are appropriate for different regions; examining historic trade routes between Yukon First Nation peoples and Alaskan Tlingits; and sharing and disseminating gardening information throughout Southeast communities.

- Celia Miller, a Natural Resource Management major at UAF, received \$7,656. Miller will study the makeup of a common boreal lichen, *Ramalina dilacerate*, and use the results to attempt to infer whether or not unglaciated areas of Interior Alaska were forested during the Pleistocene epoch. ❧

Nome-Based Education WAISC Conference Draws Researchers to Seward Peninsula Community



At one end of Pioneer Hall a large white screen was set up for powerpoints; at the other sat a spread of bagel halves and cream cheese. In between were orderly rows of tables and chairs and a few dozen people mingling and chatting amiably about water resources, solar power,



UAA Assistant Biology Professor Andy Kliskey, an Alaska EPSCoR faculty affiliate, addresses a WAISC plenary session on April 8.

or wildlife management - the energetic, focused banter like that found at science conferences the world over. It could have been almost anywhere.

But then you look out the window. At the melting six-foot snowdrifts, at the ATV's rumbling down Front Street, and at the last mile of the Iditarod Trail, running along the icy edge of Norton Sound a block away. This is Nome, where about 100 people gathered from April 7-9 for the Western Alaska Interdisciplinary Science Conference (WAISC) - a rare chance for researchers in the remote Seward Peninsula area to share their work on issues of regional importance with locals and with each other.

"I think living in rural Alaska we are obviously isolated, and often you feel very isolated in your job working on these types of issues, whether it's energy, fisheries, or distance education, and yet there are people around the state doing a wonderful job on these things," said Heidi Herter, one of the primary organizers of the 2009 conference. "A real benefit of this conference has been to bring together all of these isolated individuals who are working on the same sorts of issues, so that we can share ideas and compare notes and learn how to do some of these things better."

2009 marked the second year of WAISC, which kicked off in Dillingham in 2008 and is turning into an annual event. Alaska EPSCoR has helped fund travel costs for rural attendees at both WAISC conferences, and many

EPSCoR-funded faculty and students have been present at both gatherings.

The 2009 event drew about 100 attendees from Nome and the Seward Peninsula, from the University of Alaska, from numerous federal and state agencies and private organizations, and from as far away as Wisconsin and North Carolina. Sessions focused on topics of special interest to the region, such as fisheries, distance education, reindeer herding, climate change and rural energy. Since content was based on local interest, not discipline, it led to a wider diversity of subject matter than one might expect from a typical science conference.

"The real focus of this meeting is the region," said Herter, who works as an extension agent for the UAF Marine Advisory Program. "That's not something that I've ever experienced before. Normally you go to a conference and every third talk is of interest, and right now for me every single talk is of interest because every single talk is about our region. That's been really exciting."

Subject matter at the conference, which was hosted by the UAF Northwest Campus, truly ran the gamut. On the afternoon of April 9, for example, conference participants could choose between a field trip with Northwest Campus Professor Claudia Ihl to view wild musk oxen, or a

visit to private Nome homes fitted with

solar panels and windmills. Earlier that afternoon, some people attended a session held at the Northwest Campus to learn about distance education work done by the Seward Sealife Center, while a few blocks down Front Street, attendees at Pioneer Hall heard presentations on the hydrology and water resources of the Seward Peninsula.



UAF Northwest Campus Biology Professor Claudia Ihl peers through a spotting scope at a herd of musk oxen on the outskirts of Nome. Ihl led attendees on an April 9 field trip to observe local wildlife.



photo by Carol Gales

Sue Steinacher of the Alaska Department of Fish and Game addresses a plenary session of the Western Alaska Interdisciplinary Science Conference in Nome's Pioneer Hall on April 8.

“What I was most interested in with this conference was how it was conducted in an interdisciplinary manner, with all sorts of idea-sharing between agency people, researchers, community members and business partners,” said UAF Ph.D. student (and '09-'10 Alaska EPSCoR Graduate Fellow) Kimberly Maher. “I think it's really great to have other people listening to your ideas and what you're doing, and seeing how it could apply to what they're doing, when those bridges aren't usually connected.”

Ihl, a professor of biology and one of the other chief organizers of the conference, said the reason for holding the conference in Nome was not just to facilitate interaction between researchers in various disciplines, but to involve local residents. “The primary purpose of WAISC is to present what is done scientifically in this region and to make the information accessible in general to everyone in the region - so everyone is invited,” she said. “Sure you could have it in Anchorage or Fairbanks, and all of the scientists from Anchorage or Fairbanks would be there, but we probably wouldn't have the local people, we wouldn't have the Native elders who have come to some of the sessions.”

Attendance by locals at the conference was mixed. Most people at the morning panels were researchers, but Native elders and other local residents were in evidence at several events, like the reindeer herding sessions. A number of local residents interested in energy conservation attended the energy talks, while Nome residents heavily outnumbered researchers at an evening workshop on reindeer meat-cutting. Many Nome locals were also present at the closing banquet, which featured a Native dance performance and a keynote speech by George Noongwook of the Alaska Eskimo Whaling Commission. And even at the times when the conference consisted of researchers talking to researchers, the subject matter often encompassed ways to disseminate information better. Several education sessions dealt with better ways of educating students in rural areas. At one plenary session, Sue Steinacher of the Alaska Department of Fish and Game

gave a lively presentation on ways to improve communication of scientific results to rural residents.

“Our whole mission is about serving our villages,” said Lee Haugen, director of the UAF Northwest Campus. “The researchers are out in those villages doing the research. Don't the residents deserve a summary, at least, of what's been going on and what's been

found out so they can make some decisions about their own lives?”

Organizers and attendees judged the conference a success, and the event certainly made an impact on Nome, with scientists clogging the tiny Northwest Campus main building and mingling in Front Street's restaurants and hotels. Sea ice researcher Jessica Cherry, a 2008 EPSCoR Early-Career grantee, said the conference gave her a chance to get a perspective on the area not colored by the dramatic demands of research. “WAISC is totally unique,” she said. “Usually if I'm out here I'm totally stressed because I have a million things to do, to go into



UAF Reindeer Research Program Manager Greg Finstad demonstrates reindeer meat-cutting techniques in a WAISC evening workshop on April 8.

the field, and this is giving me more of a chance to explore town, to get to know the people here a little better.”

Next year's WAISC conference is set to be hosted by the UAF Interior-Aleutians campus (possibly in Unalaska), while the 2011 event is slated for the UAF Kuskokwin campus in Bethel.☞

A Moving Combination

Class Combines Climate Change Study with Dance

Krista Katalenich's dance instructions seem a bit esoteric at first.

"Now imagine you're a glacier melting," she tells the small group of middle-schoolers spread out in a cavernous Fairbanks gym, who proceed to imitate the concept through varying states of bodily disarray.

"Imagine you're a chunk of ice floating in the ocean... now you're going to be a stream," she continues, and the students slink low to the floor and crouch, then slither over the wood. "Now come together as another forming glacier." The 7th, 8th and 9th graders right themselves, returning to stable and upright poses and awaiting further instructions.

The group of students at Fairbanks' Effie Kokrine Middle School, a charter school aimed at Alaska Natives, are part of a novel experiment: a semester-long class which fuses climate change study with creative expression through dance and writing. The EPSCoR-funded class is the brainchild of Katalenich, who is using it as her thesis project for her Master's in Northern Studies at UAF.

"I was originally interested in doing a project involving Alaska Native dance, which often deals with the environment," Katalenich said. "The project evolved as a way for Alaska Native students to further their exploration of environmental themes through movement."

The inspiration for the project came in March 2008, when Katalenich attended "In a Time of Change," a presentation of creative responses to wildfire and climate change put on by UAF's Bonanza Creek Long-Term Ecological Research Station and partially funded by Alaska EPSCoR. One performer that night was UAF Assistant Professor of Microbiology Mary Beth Leigh, a former professional dancer (and a 2009 EPSCoR Early-Career Grantee) who led a unique dance routine based



Effie Kokrine Middle School students perform a dance exercise as part of "Climate Change and Creative Expression," an elective class which combines climate change study with writing and dance.

on boreal forest plant succession data. Katalenich, who also has a dance background, was intrigued by the concept.

She approached Leigh with the idea of an Effie Kokrine class combining climate change science with dance. Leigh noted that the Alaska Native-focused charter school seemed a natural fit.

"The kids at Effie Kokrine, a fairly high percentage of them have Native backgrounds, and so dance is still an inherent part of their culture and upbringing," Leigh said.

"Krista and I were interested in using that as a way to help students integrate things they're learning about the natural world with a variety of ways of cultural expression."

Leigh agreed to work as a thesis advisor and applied for a \$20,000 Alaska EPSCoR Native Engagement Mini-Grant to fund the project. Leigh was one of four recipients of the one-time grants, which were awarded to projects designed to increase Alaska Natives' interest in science and research.

The result is 'Climate Change and Creative Expression,' a twice-a-week elective class which 17 boys and girls in the 7th-9th grades at Effie Kokrine have been attending since January. The science education portion of the class has been provided largely through an impressive succession of guest speakers and field trips.

One week Kenji Yoshikawa of the International Arctic Research Center came and spoke about permafrost; another class saw Dave Runfola of the UAF School of Fisheries and Ocean Sciences drop goldfish into dishes of warm and cool water, graphically demonstrating how higher temperatures can increase their stress. The students learned about how musk oxen cope with higher temperatures at the UAF Large Animal Research Station; visited the Bonanza Creek Experimental Forest; and heard stories of climate change firsthand from Native elder Wally Carlo.



(l to r) Mary Beth Leigh, Cindy Hardy and Krista Katalenich.

“They’ve been exposed to real scientific research from real scientific researchers,” noted Leigh, “which I think is inherently more engaging typically than a middle school science class where you’re reading from a textbook.”

As the semester has unfolded, students have been encouraged to record their thoughts and impressions in writing under the guidance of Cindy Hardy, an associate professor of Developmental English at UAF. The plan is to conclude the semester with a student-run performance



Effie Kokrine Middle School students examine a pair of goldfish dropped in different temperatures of water. Dave Runfola of the UAF School of Fisheries used the goldfish to demonstrate the effects of heat stress.

featuring both dance and spoken-word elements. “The idea is that the writing will complement and be interwoven with the motion,” explained Hardy. “What (the writing) seems to have done is give them something to tie everything together with.”

The science classes have gradually been supplanted by lessons in dance form and movement, which mostly refer back to scientific concepts learned earlier in the semester. Katalenich said the dancing seems to help students to absorb the science lessons by referring to them in a different context. “I think it helps with the movement to have images from nature,” she said. “It’s kind of reviewing in a new way.”

Often the fields dovetail with one another in surprising ways. The class on glaciers was also a lecture on ‘levels,’ teaching the students how to dance fully upright, or low to the ground, or in an intermediate position. These levels were then used to represent different segments of the water cycle.

While the class was inspired by Leigh’s dance performance based on hard data, Leigh said the methods used to develop dances for the class’ final performance, scheduled for May 15 at Fairbanks’ Morris Thompson Cultural and Visitor’s Center, will be entirely up to the students. “We’re really trying to emphasize that the creative output comes from the kids themselves.”

Whether the class will spur students’ long-term interest in science, dance or writing, or all of the above, remains to be seen. But all three instructors are pleased with the level of engagement of the students, who are receiving early college credit for the class.

“They’re really bright kids, and they seem to be very engaged so far and they’re getting deeper and deeper into it,” Leigh said. “Each kid of course is very unique and they take to some things more than others ... but they all seem to be really enjoying it as a whole.” ❧

EPSCoR Awards Native Engagement Mini-Grants

In addition to Mary Beth Leigh and Krista Katalenich’s dance project, Alaska EPSCoR has also awarded Alaska Native Engagement Mini-Grants to three other UA researchers. The grants are to be used for educational projects directed at getting Alaska Natives involved in science and research.

The three other awardees were Anita Hartmann and Kenji Yoshikawa of UAF and Claudia Ihl of the UAF Northwest Campus in Nome. Each researcher received \$20,000 towards their education and outreach efforts as part of the one-time grant program.

Hartmann, Associate Dean of UAF’s College of Liberal Arts, will create a series of brief videos about UAF undergraduate research opportunities targeted at Alaska Natives. The videos will be sent, along with a new brochure and digital media detailing undergraduate research opportunities, to the counselors in Alaska’s rural high schools. In addition, Hartmann’s project will support at least two high school-aged paid summer research interns at UAF in 2009.

Ihl, an Assistant Professor of Biology on the Nome campus, will use the grant to begin a project on the subsistence use of musk oxen in Native Alaska and their place in local Native tradition and hunting lore. The project will chiefly revolve around surveys handed out to 10 Seward Peninsula musk ox hunters and 5-10 hunters in the Canadian Arctic. Most of these hunters will then be brought to Nome for a workshop in May or June, where their findings and opinions will be discussed with local wildlife managers.

Yoshikawa, an Associate Professor with UAF’s Institute of Northern Engineering, will use the funding to continue a program to establish and maintain permafrost monitoring stations in local schools throughout Alaska and the Yukon Territory. He began the program in 2005 and monitoring devices are now in place at 80 different schools. The program will also develop science education packages and lesson plans for the schools involved in the project.



Kenji Yoshikawa and a pair of students from Randy Smith Middle School in Fairbanks examine a frost tube, April 2008.

Williams headlines EPSCoR grads



Paula Williams

The path to Paula Williams' dream job led right through Alaska EPSCoR.

"The EPSCoR fellowship allowed me to complete an incredible amount of work in a relatively short period of time," said Williams, a former EPSCoR graduate fellow who

now works as Sustainability Director for the University of Alaska Anchorage. "I would never have been at this point without the funding that was provided by EPSCoR, and probably would not have been competitive for this job."

Williams isn't your average grad student: she practiced law in Alaska for two decades before she committed to a dramatic career change. "I hated being an attorney," she said bluntly. "It wasn't anything that was a core value... for many, many years I just struggled with what it was that I could do that could make me feel like my work was important."

Williams started taking UAA biology courses and ended up in an ecology course taught by Alaska EPSCoR co-PI Lil Alessa, who encouraged Williams to consider grad school and later served as Williams' advisor. Williams enrolled in UAA/UAF's interdisciplinary Ph.D. program, focusing on psychology, environmental science, geography and complexity theory. For her dissertation, she examined how the dominant social paradigm of Western culture influences people's abilities to perceive and respond to environmental change.

The topic fits well with Williams' position as Sustainability Director. Her far-ranging task is to oversee all green efforts at UAA, from crafting a campus-wide strategic plan for carbon reduction, to encouraging recycling and alternative transport to campus, to just urging people to turn off computers at night. She said her Ph.D. study gave her a better understanding of the context in which others view environmental concerns, and makes it easier to speak to people on their level.

"Philosophically, the position dovetails with the degree because I have a perspective on how our culture influences us to think about things," she said. "It allows me to have a better perspective on how to approach people as far as educating them as to how we need more sustainable practices."

Though Williams has already begun her new job, she's still a student and is set to graduate in May. She was an Alaska EPSCoR graduate fellow in 2007-08 and again in fall 2008, and directly credits the graduate funding with allowing her to become a full-time student and complete the degree.

"Within a year and a half of getting that EPSCoR fellowship, I was able to complete my comprehensive exams, to complete getting the data together to analyze for my dissertation, to do the analysis and to do the dissertation," she said. "When I graduate in May, I will have completed my dissertation in three and a half years."

Williams may be a prominent graduating Alaska EPSCoR

student, but she's far from the only one. Since Phase III of Alaska EPSCoR began in 2007, six EPSCoR-funded grad students have graduated from the University of Alaska, with an additional 11 grad students and one undergrad grantee on track to finish their degrees this calendar year. Among the highlights:

-2007-08 EPSCoR graduate fellow Jianfeng Xu graduated from UAF in May 2008 with a Ph.D. in Mechanical Engineering. He relocated to Houston, Tex. to take a modeling and analysis job with the Advanced Engineering Group of J P Kenny Houston, a consulting company for builders of undersea oil and gas pipelines.

-Colin Shanley, a 2007-08 and fall 2008 EPSCoR graduate fellow, received his M.S. in Wildlife Biology from UAS in December. He works in Juneau as a Conservation Planner/GIS Analyst for the Nature Conservancy.

-UAA Biology grad student James Sowerwine, an 2007-09



Colin Shanley defends his thesis at UAF, November 17, 2008.

EPSCoR fellow, will receive his Master's in May. Sowerwine has signed up for an internship with the Chicago Botanic Garden, which is likely to send him to the BLM office in Arcata, Calif., to mainly work monitoring rare and invasive plants.

-Alison Meadow, a spring 2008 EPSCoR graduate fellow, will graduate in May. Meadow, a UAF Environmental Anthropology student, is now in Tucson completing a Master's in Urban Planning at the University of Arizona. She plans to pursue a career in urban planning in Tucson.☘

Director

Continued from page 1

tasks and plan to undertake a number of EPSCoR-wide initiatives. Each component will be busy completing its disciplinary goals, as well as contributing to integration, one of the hallmarks of phase III of Alaska EPSCoR. Finally, we want to increase our outreach and education efforts in year three, to continue to make our research relevant and accessible to all Alaskans.

In the meantime, I hope to see many of you at the upcoming meetings in Anchorage. I wish you all a pleasant and productive Alaskan summer.☘

Glacier

Continued from page 1

headed by Shur, a UAF professor. “We were there in 2006, and at that time this bluff was not exposed, so we were just very lucky.”

The storm had exposed a panorama of frozen soil and ice more than a mile and a half long and ranging from around 20 to 35 feet high. Interspersed within it were numerous deformed ice masses, some as large as 20 feet thick and 45 wide. The scientists quickly realized the exposed ice was out of place: First, it was far too wide to have originated from ice wedges, which are typically ten feet wide or less. Second, it was brown and dirty, a result of being loaded with silt and gravel – a contrast to the relatively clear white ice formed by wedges. Third, it was highly deformed.

The researchers suspected they were looking at basal glacier ice, but were hesitant to reach any conclusions, as glacial remnants had never been found this far north in Alaska. Current maps show historic glaciers petering out at the northern foothills of the Brooks mountains range, 50 miles or more south of the scientists’ discovery.

“It looked very unusual and odd to us,” said Jorgensen, a UAF-affiliated professor who is involved in Alaska EPS-CoR’s Physical Science component “But the bluff itself is really complex and distorted, and we were hesitant to really say what it was (at first).”

But the researchers were well-equipped to make a diagnosis. All four had extensively studied the ice at the base of Matanuska Glacier northeast of Anchorage, while Kanevskiy and Jorgensen had also examined Muldrow Glacier in Denali National Park. “All of us were familiar with this kind of ice,” said Kanevskiy. “We had almost no doubts that it was real basal glacial ice.”

By the second day of study, the four EPSCoR scientists – Dillon is an EPSCoR-funded Master’s student – were convinced it was a glacial remnant. They cancelled their Jago River plans and continued to examine the find. Ice samples and hundreds of photos accompanied them when they returned to Fairbanks.

While the find was unprecedented, it wasn’t unexpected: Jorgensen said he and other scientists had long observed evidence which suggested possible glaciation on the Arctic Coastal Plain, such as glacial landforms and sediment patterns, gouge marks in the ocean floor, and sediment deposits on the continental shelf. The Coastal Plain also lacks yedoma – a form of Pleistocene permafrost with huge ice wedges – which should have been present had the region never been glaciated, a point Shur, Jorgensen, and Romanovsky had made in a paper they presented back in 2001. “We thought that the absence of such sediment on the Arctic Coastal Plain is evidence of its glaciation, but without the glacial ice it was difficult to prove,” noted Jorgensen.

Jorgensen believes the Kaktovik glacier was part of an ice sheet which extended from the Canadian Arctic to Alaska’s Northwest Arctic during the Late Pleistocene epoch,

reaching its fullest extent around 20,000 years ago before rapidly retreating 8,000 to 13,000 years ago. He said there is evidence the sheet stretched as far west as Barrow on land and even farther to the west off the coast.

The implications of the discovery stretch beyond glaciology, he noted. It means the distribution of sediments and permafrost characteristics across the North Slope will have to be reinterpreted, which may have implications for oil development. In addition, it will necessitate a re-examination



photo by Tom Moran
Matt Dillon, left, and Misha Kanevskiy display ice samples from the Kaktovik exposure in January 2009. Dillon holds a sample of clear ice from an ice wedge while Kanevskiy exhibits sedimented glacial ice.

of the prehistoric distributions of animal and human populations in the area. “It may lead us to radically reinterpret the paleoecology of Northern Alaska,” Jorgensen said.

The window for examining the Kaktovik exposure closed rapidly; Dillon said the bluffs had already begun to slump and collapse before the scientists left. There are still tentative plans to return to the site for further research sometime this year. In the meantime, Dillon will be subjecting ice samples from the find to CAT scans, which will establish their composition and enable comparisons with ice from other glaciers. “This is going to be a component later on in this Kaktovik study,” he said. “Continuing what we started.”

If the glacial ice revealed Alaska’s geologic past, the bluff it came from may hold a portent about its future. Jorgensen said the fierce storm that exposed it was a result of the summertime retreat of the Beaufort Sea ice pack, which led to a massive stretch of open water over which the storm’s waves built up strength. The ferocity of the storm resulted in enormous chunks of shoreline eroding all at once, a dramatic shift from traditional gradual erosion patterns. “It’s kind of a regime change in how the coast is eroding.” ❧

About Social-Ecological Systems by Peter Schweitzer

Alaska EPSCoR is bringing together researchers and other interested people from across the United States and Canada for its Social-Ecological Systems (SES) workshop in May. But what are social-ecological systems, and why do we want to study them?

We are used to the idea that there exist discrete social and ecological systems, which are governed by their own sets of rules. While it is true that human behavior is different from that of animals, plants, or rocks, it has nonetheless proven counterproductive to study these systems as separate entities. If we consider ecosystems to be devoid of humans, no attempt of linking them to human systems will be successful. Instead, we need to acknowledge the human presence within ecosystems and conceptualize humans as one class of agents within them.

Science is a way of conceptually simplifying the complexities of life and matter

in order to make sense of the world. The tremendous successes of science over the last few centuries have come at a price: an underestimation of the complexities of the feedback processes of phenomena ranging from climate trends to landscape dynamics to consumer behavior. One of the major challenges ahead is to tackle complexity scientifically - that is, to find new ways in which complex interactions within systems can be better captured and conceptualized.

One of the novel methods by which complexity can be addressed is through new cyber and modeling tools, agent-based modeling (ABM) being one of them. The



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behaviors of human and other individuals – that is, agents – within an SES can form a complex system in which any given state of the system is the result of interactions and feedbacks between its system components. In an ABM, social agents can thus perceive, interact with and learn from their environments.

So, why should politicians and managers care about SES? Because SES is not just a theoretical construct but a way of expressing fundamental and complex connections among the different aspects of the world we live in. The workshop title “Living on Earth” was chosen to reflect the ubiquity of SES: we are all part of “social-ecological systems,” in the same way that we are all “living on earth.” As the world moves toward an uncertain future, the importance of social-ecological thinking and modeling cannot be overstated. Policies and regulations will have to incorporate complexity if we want to successfully address the challenges ahead.

Alaska EPSCoR Newsletter Spring 2009
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