

Center News

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Tailoring STEM education for Alaska Native schools

Alaska communities have a strong interest in providing culturally relevant education for their youth. But like schools everywhere, there's also a need to strengthen math and science education. That creates an opportunity for Precipitating Change, a collaborative project led by the Concord Consortium that develops place-based teaching tools for the 49th state.

With Precipitating Change, AERC is helping to bring Indigenous-led curricula to intermediate and middle school classrooms. The project is funded by the National Science Foundation Division of Research on Learning and awarded to Concord Consortium, an education nonprofit focused on equitable teaching and learning in STEM fields. AERC is part of the collaboration, providing real-time data to build tailor-made teaching tools for participating schools. Several Indigenous educators are part of the team, including Dr. Skyler Kern, UAA Professor of Mechanical Engineering. **Continued on page 3**



Evidence of erosion on the Arctic coast. Credit: Christopher Arp / USGS

AERC Student Combines Engineering with Education

When he enrolled at UAA, Walt Weidman wasn't sure whether to pursue engineering or education. Thankfully, as an SLA fellow, he doesn't have to choose.



Walt Weidman is a US Air Force veteran, college student, and ADAC-ARCTIC fellow with AERC.

SLA fellows receive a Scientific Leadership Award from the Department of Homeland Security. The fellowship was a perfect fit for Walt, who completed a 12-year career in the US Air Force, most recently as a staff sergeant.

He earned the SLA fellowship through a combination of initiative and timing. He asked Dr. Skyler Kern, a UAA professor of mechanical engineering, about possible research opportunities for undergraduates. Dr. Kern connected him with Precipitating Change, an AERC project eligible to host SLA fellows. Precipitating Change introduces rural Alaska students to coastal erosion. UAA AERC works in collaboration as a subaward on this project, which is led by the Concord Consortium.

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About the Applied Environmental Research Center

The UAA AERC provides public and private organizations with University of Alaska environmental expertise and research capabilities for optimal land management and conservation efforts. The Center provides the best research, data, and analytical tools for public land use and overall resource management.

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Staff Spotlight: Samantha Golden



Three summers, three different roles at AERC. That's the story so far for Samantha Golden, who's quickly climbed the research ranks at AERC. She first joined the Center as a participant in 2022, netted an apprenticeship for 2023, and continues to add research responsibilities in 2024.

Samantha joined the Center after graduating from Humboldt State University – now called California State Polytechnic University, Humboldt – with a bachelor's degree in wildlife biology. Her undergraduate program focused heavily on fieldwork and hands-on research, and she wanted a similar role after graduation.

As a participant in 2022, Samantha joined a team of students and recent college graduates who assist the Center's full-time staff with summer fieldwork. She ended up staying the longest of the participants, working through November until rising snow and falling temperatures forced the end of fieldwork. But before the season was over, AERC Director Jeff Libby had offered her an apprenticeship for the following year. She returned to California, packed up her stuff, and headed back north.

When she returned to Anchorage, she joined an AERC apprenticeship program supported by the US Department of Labor. Over roughly two years, apprentices take on increasing levels of responsibility at the Center. They start by helping with fieldwork and documentation, then move on to developing work

plans and helping to supervise project teams. After completing a lengthy checklist of professional responsibilities, apprentices earn a federally endorsed research technician certification made possible through the Center's federal connections.

In addition to professional growth at AERC, Samantha also appreciates the chance to engage in multiple projects. Research technicians rotate through assignments, assisting on everything from GIS land surveying to monitoring bat roosts. She recently returned from a trip to Oahu, where she helped AERC's Hawaii team with a complex wetland restoration project that supports several endangered species on Bellows Air Force Station. She studied wildlife biology in college in part for the opportunity to travel. "This job has definitely provided that," she said.

Now entering her third fieldwork season, Samantha will take the lead on one of the Center's salmon projects. That comes with additional responsibilities, such as drafting biweekly reports for funding agencies, generating graphs and charts of data, collecting and analyzing GIS data, and summarizing everything into a final report and public presentation. She'll also oversee a team of participants, the same role she held just two years earlier when she first joined AERC.



Samantha Golden, on right, helps install a sonar system on Eagle River.

AERC Student Combines Engineering with Education

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AERC's staff help tailor lesson plans to each participating school, meaning students explore age-appropriate scenarios using ArcGIS as well as local maps and other data. The curricula also provide students the space to talk about what their coastline means to their community.

"Essentially, what we're trying to find out is what's the best way to incorporate the importance of Indigenous traditional values and knowledge, as well as western science education, to make them work together in the best way possible," Walt explained of the project.

The project team includes engineers, researchers, and educators. Walt's role involves consolidating responses from students and teachers to determine what worked, what could be improved, and how teaching tools can serve each community.

His responsibilities as an SLA fellow enhance the project. Each fellow publicly presents their research through poster presentations

and oral interviews. Fellows also complete a 10-week summer internship, which Walt will spend fully focused on consolidating the project's data. In exchange for their work, fellows receive a stipend, partial tuition and fees, as well as professional connections.

While Walt ultimately majored in mechanical engineering, Precipitating Change lets him further his academic interests in education. Likewise, the undergraduate research brings him closer to his ultimate goal of graduate school. He credits Dr. Kern and AERC Director Jeff Libby for encouraging his next steps. Their mentorship has had "an enormous impact," he said, and pointed him to future opportunities he might have missed. He also thanked Heather Paulsen, Director for Research Operations, and Vanessa Allen, Education and Workforce Manager at UAA's Center for Strategic Partnerships and Research. "I want to make sure they know they're appreciated for the work they do," he said.

The fellowship offers more than just personal growth. Walt also values the opportunity to apply engineering for the direct benefit of others. "Some of the things that are most important to me are being able to make my community a better place," he said. "I don't know of another program that offers more availability to do that than AERC or ADAC."

Tailoring STEM education

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The lesson plans focus on coastal erosion. Coastlines are always changing, but rates of erosion are increasing due to climate change and human development. That places Alaska Native communities at risk of not only losing homes and infrastructure, but also their culture and ways of life. Precipitating Change aims to address those concerns, bridging Indigenous and western knowledge with age-appropriate math and science solutions.



Precipitating Change aims to bridge Indigenous and western knowledge, encouraging Alaska Native students to pursue STEM careers.
Credit: M. Torre Jorgenson / University of Alaska Fairbanks

Several schools are participating in the pilot project, representing Bristol Bay, Kodiak, and the Yukon-Kuskokwim Delta. Each school receives a custom-made teaching unit that addresses mitigating the effects of erosion. Simulations use local maps and historical data provided in part by UAA AERC, so students solve environmental problems from their own coastal community. Importantly, the project includes an online glossary of Alaska Native and English words so students can engage with the topic in their own language. The project emphasizes both Alaska Native and Western knowledge equitably, producing STEM-based instructional activities with a multi-perspective approach.

Precipitating Change is starting with a handful of schools, but hundreds of Indigenous communities in Alaska, Hawaii, and around the Pacific face the threat of erosion. Indigenous educators will evaluate the first phase of the project with an aim to bring local lessons to even more coastal communities. By pairing top-notch technology with a place-based cultural approach, Precipitating Change and the Concord Consortium will introduce a generation of future scientists to the value of their cultural knowledge in STEM careers.



Coastal erosion in Naknek, one of several communities participating in AERC's Precipitating Change project.

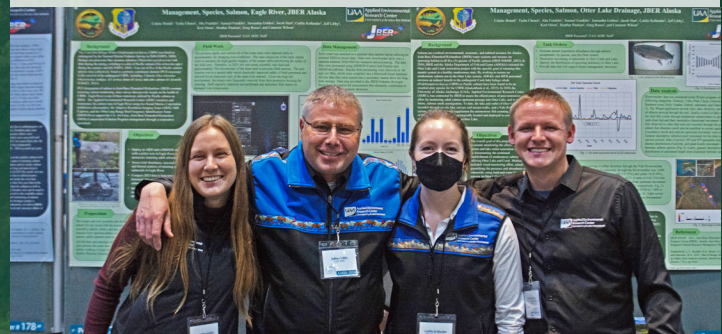
Symposium summaries of the summer salmon season

UAA AERC staff counted nearly 25,000 salmon on Joint Base Elmendorf-Richardson (JBER) last summer, then condensed all that information into three succinct salmon summaries. A trio of research technicians presented the Center's salmon results this January at the Alaska Marine Science Symposium (AMSS).

AMSS is the state's premier marine research conference. Held each winter since 1993, the Symposium gathers more than 700 scientists, educators, land managers, and more for a four-day conference on Alaska's marine ecosystems. The annual event provides a forum for universities and research centers like AERC to share their results with the public.

AERC participated in the Monday night poster session that helped kick off the conference. Printed posters lined the Egan Center, while researchers stood by to field questions from the crowd of nationwide attendees. AERC's posters detailed its three ongoing JBER salmon projects, covering the Eagle River, Sixmile Creek, and Otter Lake drainages.

JBER borders Cook Inlet, a significant marine ecosystem for all five Pacific salmon species. These salmon are integral to Alaska's environment, economy, and culture, but also provide crucial sustenance for the endangered Cook Inlet beluga whale population that relies on the Inlet for food resources.



AERC staff presented their 2023 salmon research at the Alaska Marine Science Symposium in January.

The three posters detailed unique findings from 2023 and compared results against baseline data. AERC staff actively monitor fish across the installation's watershed to understand the year-to-year health and variability of local salmon populations. The posters presented these trends, timelines, and more in easy-to-read summaries of the busy summer season. In addition, AERC researchers also prepared final reports specifically tailored to the funding agencies.

The team is now focused on 2024, where they'll monitor another salmon run using sonar, cameras, and various surveying techniques. Multi-year monitoring helps land managers assess the health of Cook Inlet's salmon and influence management decisions on base. Public poster sessions, like the one at AMSS this January, lets AERC share their work with the wider research community working in Alaska waters.

Message from the Director

The snow is melting, the trees are budding, and we are working on gathering permits for the upcoming summer, meaning it must be spring at the UAA Applied Environmental Research Center.



As always, I'm happy to celebrate our stellar team and our diverse projects in this issue of the newsletter. In the following pages we spotlight our subaward to help the Concord Consortium with their NSF-funded Precipitating Change project.

This is one of our more unique collaborative programs and well deserving of a spotlight for building the next generation of STEM students. The program brings tailor-made environmental teaching tools to Alaska classrooms. Participating schools receive coastal erosion scenarios specifically based on their own community's concerns. It's a high-value project and, in my opinion, this subaward was absolutely a perfect scenario for AERC to carry out.

It hits all aspects of the excellent research we conduct as well as our commitment to education. As a university research center, we were perfectly positioned to connect our network of academic collaborators with participating students and provide the physical data and analysis for our partners and the schools. I'm proud to share a brief update of our project on the following pages.

I am also honored to announce news from ADAC-ARCTIC, our fellow research center at UAA. The Department of Homeland Security recently committed \$46 million over the next 10 years to fund a variety of research and education projects to help the Homeland Security Enterprise across the Arctic region. AERC is similarly focused on federal partnerships, and the new DHS ADAC-ARCTIC cooperative agreement is another testament to the valuable role UAA plays in the federal research landscape.

If you see our team in the field this season, stop and say hi. We're looking forward to another season of productivity and collaboration in 2024.

Warm regards,

Jeff Libby, UAA AERC Director

Update from the Alaska Forum on the Environment

This February, AERC staff joined with ADAC-ARCTIC, UAA's new Department of Homeland Security Center of Excellence, to share their Alaska-focused research and provide public awareness at the state's largest environmental conference, the Alaska Forum on the Environment.

Each year, the Forum welcomes more than 1,200 participants to the Dena'ina Center for workshops, panels, sessions, and keynotes regarding the preservation and protection of Alaska's lands. The Forum aims to promote effective cooperation, communication, and education among environmental agencies in Alaska.

AERC and ADAC-ARCTIC staff helmed a booth at the conference, providing a base camp to network with other environmental professionals and share current work from the UAA research centers. Located near the conference's breakout

rooms, the booth provided a popular stopover spot between sessions where students and professionals could learn more about UAA's involvement in environmental research.

In addition to the booth, ADAC-ARCTIC Executive Director Leanne Lusk represented both research centers while moderating a panel session at the Forum titled "New Horizons: Assessing the

Rules for Large Vessels in Alaska." As a retired US Coast Guard Captain and Sector Commander, Lusk was asked to lead the discussion on oil spill response planning in western Alaska. The session provided an opportunity for community input and a chance to discuss the shared challenges of protecting Alaska's coastline amid increased vessel traffic. Panelists included partners from the US Coast Guard and Alaska Department of Environmental Conservation.

Four days and dozens of business cards later, AERC and ADAC-ARCTIC staff returned to campus to foster the new connections made at the Forum and focus on the projects they'll present next year.



AERC's booth at the 2024 Alaska Forum.

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