

Alaska NSF EPSCoR is a partnership dedicated to growing Alaska's scientific research capacity, funded by the National Science Foundation and the State of Alaska.

## Partners in the Sky

Tanana Chiefs Conference collaborates on aerial remote sensing

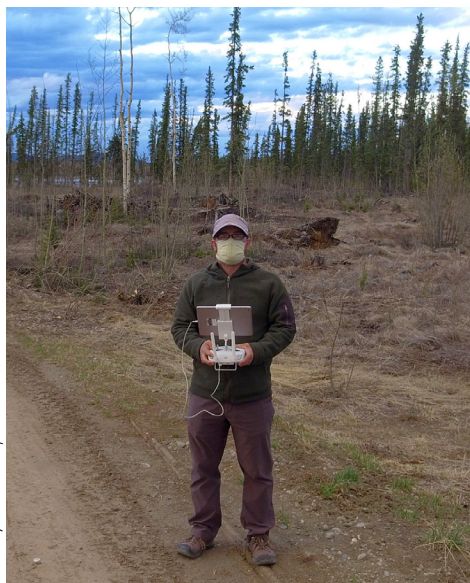


Photo by Fabian Keirn/TCC

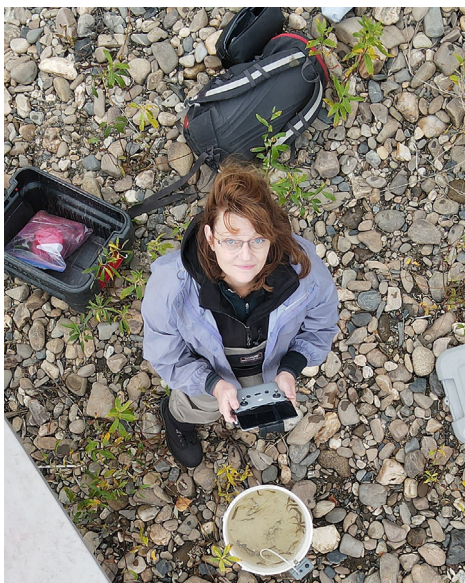


Photo by Debra Lynne/TCC

Left: Tanana Chiefs Conference Forester Fabian Keirn gathers sUAS footage of a firebreak in the village of Tanacross, May 12, 2020. Right: Tanana Chiefs Conference Natural Cultural Resources Specialist Debra Lynne gathers sUAS footage of the Chena River outside Fairbanks in summer 2020.

TCC + sUAS = an exciting pair of research projects for Alaska NSF EPSCoR.

Researchers with the Tanana Chiefs Conference, the regional non-profit organization representing 42 Alaska Native tribes scattered across the Interior, are collaborating with the EPSCoR Boreal Fires team on two projects studying wildfire-related impacts using small unmanned aircraft systems (sUAS) or drones. One study examines vegetation regrowth in village firebreaks, and the other looks at how fires along rivers could influence salmon habitat and growth rates.

"They've got a better handle on what's important to their communities than we do," Boreal Fires researcher Todd Brinkman said of TCC. "I want us to co-produce research that helps TCC advocate for the interests of their communities and helps them make smart, timely, and adaptive decisions with regards to wildfire and to resilience to wildfire."

### Firebreaks

In May 2020, TCC Forester Fabian Keirn traveled to the communities of Dot Lake, Tanacross and Tetlin, all of which had had preventative firebreaks put in at various times over the last 20 years. They are all "shaded fuelbreaks," in which crews had thinned stretches of woods rather than clear-cutting them. "That way when a fire is coming towards the community, the hope is that the



### From the PI

Pips Veazey,  
Principal Investigator

Hello everyone,

It's mid-December, and it feels odd not to be at the temporary center of the science universe, the American Geophysical Union Fall Meeting. Instead of its usual San Francisco (or New Orleans or D.C.) venue, this year's event has been entirely virtual. Researchers from across EPSCoR have been presenting and exhibiting posters (here's a list) and discovering the ups and downs of the virtual format – the most significant downside probably being all the presentations scheduled for three a.m. Alaska time!

Speaking of virtual meetings, we held our first EPSCoR all-Zoom All-Hands Meeting November 4-5. The event went off without a hitch and more than 100 people attended to share in conversations and presentations

# TCC partnership

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fire will hit the break and move the fire out of the crowns of the trees and drop it down until there could be some direct suppression efforts,” explained Keirn.

Keirn’s job was to gather remotely sensed photos of the firebreaks using sUAS, working at dusk or dawn to min-

plots of the firebreaks stationed roughly 200 feet apart. He then shipped the data to UAF, where Brinkman, fellow Boreal Fires researcher Santosh Panda and undergrad Irina Sweedler have been studying the imagery to see how successfully it can be used to correctly classify vegetation types.

Keirn said the data could enable researchers to examine whether firebreaks have grown back to the point where they may no longer serve their purpose, and also to look at how effective these types of fuel breaks are in the first place. “I don’t think too many people have done too many studies on these shaded fuelbreaks,” he noted. “Whether or not that (strategy) is working hasn’t really been followed up on.”

Brinkman said the project is also a proof-of-concept of the sUAS technique, which could provide organizations with a rapid, simple tool for the currently time-consuming process of evaluating firebreaks. He said the UAF researchers are concluding their evaluation of the technique and they’ve been generally pleased with the results, and that the next step is to share their findings with TCC and decide whether to further pursue the study.

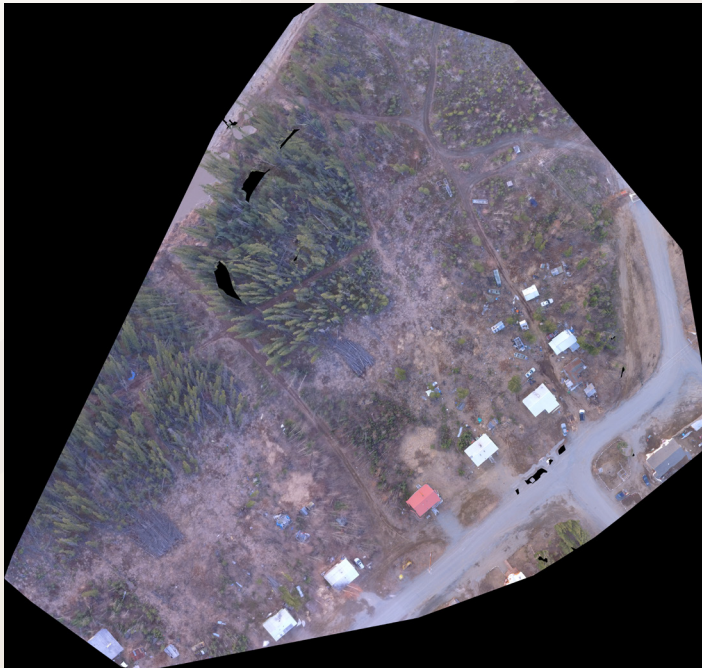
“I’d love to put together some sort of training workshop for rural communities where they can assess their fuelbreaks themselves,” Brinkman noted. “This is something that they could probably do from start to finish without us. It would be great.”

## Turbulence

Remotely sensed sUAS imagery collected by TCC also plays a major role in a Boreal Fires project to study the impacts of forest fires on juvenile Chinook salmon in the Upper Chena River outside of Fairbanks. A research team led by UAF research scientist Erik Schoen spent summer 2020 taking measurements of fish, aquatic invertebrates, and water quality in the Chena River and tributaries to see whether portions of the river upstream and downstream of recent fire sites exhibit different characteristics that could impact juvenile salmon growth rates. Schoen said fires could affect salmon in a number of ways: for example, they can result in warmer water temperatures, which may increase growth rates; they may increase the amount of fine-scale debris in the river, which salmon mistake for insects and waste energy by chasing; conversely, vegetation like fireweed that appear after fires may produce more insects for fish to eat. “We’re not sure how all these different interacting facts play out, whether it’s a net positive or a net negative for juvenile salmon,” Schoen said. “We’re studying the river at a couple different scales here trying to understand how.”

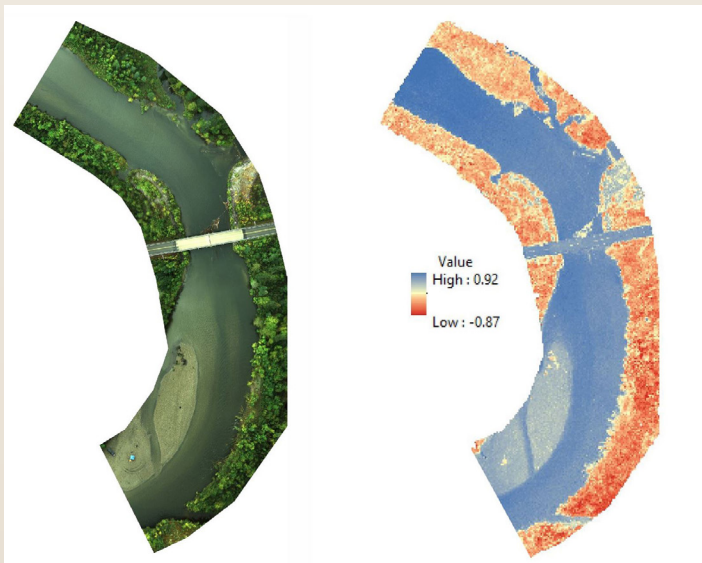
Another significant way that fires may impact juvenile salmon is by flushing more sediment into the water and thus increasing river turbidity, which may inhibit feeding and growth. To study turbidity, TCC Natural Cultural Re-

Image courtesy Fabian Keirn/TCC and Todd Brinkman/Alaska EPSCoR



Top: An orthomosaic of 2020 sUAS imagery of the village of Tanacross, including a firebreak running through the center of the photo. Bottom: Orthomosaic (left) and Normalized Difference Water Index (right) maps of a Chena River study site at mile 37.7 Chena Hot Springs Road. The legend shows the NDWI value for each pixel in the NDWI index map.

Image courtesy Brian McKenna/TCC



imize shadows - which can create artifacts in the imagery that interfere with analysis. He ground-truthed the data by measuring the size and number of trees, as well as the percent cover of grasses, at a set of small circular

# TCC partnership

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Photo by Seth Adams/Seth Adams Photography

sources Specialist Debra Lynne used a sUAS equipped with a multi-spectral sensor to gather both visual and multi-spectral imagery of the stretches of the Chena River where sampling was taking place. The multi-spectral imagery was then sent to TCC Fisheries Biologist Brian McKenna, who has been post-processing the data sets and combining spectral bands from the imagery to create maps displaying the Normalized Difference Water Index (NDWI) - an optical measure that prior studies have used to estimate turbidity. Much like the firebreak project, McKenna's next task is to compare the imagery to measurements taken directly from the river to see how well NDWI can be used to track turbidity.

"We're going to be comparing and analyzing the relationship between the in-river turbidity measurements and the NDWI values from the index maps," he explained. "We're trying to build a relationship between those two."

Also like the firebreak project, McKenna and Schoen said a major goal of the research is to test the effectiveness of the sUAS as a rapid deployment tool, especially in re-



UAF researcher Michelle Quillin examines a juvenile Chinook salmon sampled from the Chena River, August 21, 2020.

mote environments. "If there's a new forest fire on a salmon stream, you might be able to deploy a drone and collect some rapid assessment imagery and have some idea of whether that fire is going to be beneficial or harmful or maybe neutral to juvenile Chinook production," Schoen said.

All the researchers pointed to the mutually beneficial aspects of the TCC partnership. In the case of the firebreaks, TCC was able to use EPSCoR image processing equipment and expertise, while TCC's

involvement facilitated access to villages during the early days of the COVID pandemic. And the salmon study will enable both UAF and TCC researchers to gain knowledge about potential impacts to a significant natural resource.

"Chinook salmon are an important source of food for the residents of the TCC region within the Yukon and Kuskokwim rivers, and also provide an important cultural role in fish camps," noted McKenna. "We were excited about the projects because we want to better understand how climate change is impacting wild food resources, so we can better manage these resources."•

## Letter from the PI

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about the progress we've made in the last year. We preceded the meeting with a pair of well-attended sessions on the topic of philanthropic giving in research; we plan to follow that up in 2021 with three more in-depth sessions on the same subject for teams of 3-6 people. Please contact [Tara Borland](#) if you are interested in attending these smaller, invitation-only group sessions.

Those of you who were at All-Hands had the opportunity to see some of our new visual projects, and for those who didn't get a chance, please check out our [video](#) on the McKinley Fire, which has drawn statewide media coverage and was nominated for a UAF "Learnie" award. I'm also ex-

cited to note that we're participating in the latest "In a Time of Change" project, which will create a traveling public art and science exhibition around the theme of "Boreal Forest Stories." I'm excited to see our team innovating to develop new and exciting ways of communicating our science.

Happy Holidays to all, and bring on 2021!

Sincerely,

Pips

# Research Seed Grant awardees

In November, Alaska NSF EPSCoR announced the recipients of seed grants of up to \$20,000 each for UA faculty members and up to \$4,000 each to UA graduate students.

## Coastal Margins faculty seed grants

Eric Klein, an Assistant Professor of Geological Sciences in the UAA Department of Geological Sciences, was funded for “High-resolution water isotope samples reveal changing water sources in proglacial streams feeding Kachemak Bay, Alaska.” Klein will deploy high-frequency water samplers on two Kachemak Bay waterways to better understand the dominant water sources in glacially fed streams and how these sources vary daily, monthly, and seasonally.



Photo by Brenda Konar/UAF

Coastal Margins seed awardee Lindsey Stadler (r) beach seines at Tutka Bay, off of Kachemak Bay, with fellow graduate student Jim Schloemer.

Schery Umanzor, a Research Assistant Professor in the UAF College of Fisheries and Ocean Sciences, was funded for “Ecophysiological responses of *Fucus distichus* to varying physical and chemical conditions along a glacial to non-glacial gradient.” Umanzor will conduct lab experiments on *Fucus* seaweed to study its physiological responses to environmental factors linked to glacial inputs.

## Coastal Margins student seed grants

Josianne Haag, an M.S. student at the UAF College of Fisheries and Ocean Sciences, was funded for “Characterizing groundwater discharge and bay connectivity in Kachemak Bay by constraining radium sources.” Haag will use isotope tracing to study the contribution of submarine groundwater discharge to water flux in Kachemak Bay.

Courtney Hart, a Ph.D student at the UAF College of Fisheries and Ocean Sciences, was funded for “Using harmful algal bloom monitoring to understand PSP risks and mitigate testing burdens at a shellfish farm in Southeast Alaska.” Hart will establish a water monitoring site at a Juneau oyster farm, to determine whether such sites can be used as an early-warning system for the accumulation of paralytic shellfish toxins.

Jordan Jenckes, a Ph.D student in the UAA Department of Geological Sciences, was funded for “Trace metal mi-

cronutrient sources and transport to the intertidal waters of Kachemak Bay, Gulf of Alaska.” Jenckes will study the seasonal origins of trace metals in Kachemak Bay to determine the relative amount of materials deposited from snow and ice versus those deposited from bedrock weathering and soils.

Lindsey Stadler, an M.S. student at the UAF College of Fisheries and Ocean Sciences, was funded for “Food web ecology of nearshore fishes along a gradient of glacially influenced watersheds.” Stadler will conduct stomach content analysis of nearshore Kachemak Bay fishes to investigate if and how glacial coverage affects their diet composition.

Brian Ulaski, a Ph.D student at the UAF College of Fisheries and Ocean Sciences, was funded for “Associations between drifting and beach-cast macroalgal communities along a glacial gradient.” Ulaski will gather data from beach seines to investigate relationships between near-subtidal drift algae, beach wrack, and their associated macroinvertebrate communities along a glacial gradient.

## Boreal Fires faculty seed grants

Thomas Ballinger, a Research Assistant Professor at the UAF International Arctic Research Center, was funded for “Alaska wildfire activity and atmospheric blocking: An evaluation of subseasonal-to-seasonal linkages.” Ballinger will assess and quantify subseasonal-to-seasonal connections between the Alaska Blocking Index – a measure of air circulation in the middle troposphere – and wildfire activity.

Micah Hahn, an Assistant Professor of Environmental Health at the UAA Institute for Circumpolar Health Studies, was partially funded for “Assessing the role of preparedness, social supports, and trust in leadership in reducing mental health problems associated with a recent Alaskan wildfire.” Hahn will deliver a survey to people impacted by the 2019 Swan Lake Fire to better identify who is most likely to experience distress during a wildfire, and to pinpoint adaptation strategies.

Jessie Young-Robertson, a Research Assistant Professor with the UAF Institute of Agriculture, Natural Resources, and Extension, was funded for “Tree water content: A multi-year dataset of live fuel moisture for Interior Alaska.” Young-Robertson will process and share data on the live fuel moisture content of multiple species of boreal trees and shrubs over variable environmental conditions.

## Boreal Fires student seed grant

Elizabeth Hinkle, a Ph.D student in the UAF College of Fisheries and Ocean Science, was funded for “Arctic grayling movement and genetic relatedness in response to wildfire.” Hinkle will use DNA sequencing techniques to study how wildfires impact the dispersal patterns of Arctic grayling in the Chena River basin. •

# New EPSCoR faculty hires

The Alaska NSF EPSCoR family has grown in recent weeks, with the addition of two new Coastal Margins tenure-track faculty hires.

Jessica Glass has accepted a position as an assistant professor in the UAF College of Fisheries and Ocean Sciences based in Fairbanks. Glass completed her B.S. and Ph.D at Yale University and her M.S. at UAF, and currently works as a postdoctoral researcher at the South African Institute for Aquatic Biodiversity. Her research interests are the biological and physical drivers of evolution and sustainable management practices of commercially and recreationally important marine fishes. Glass will work with the Coastal Margins component and begin work in May 2021.



Jessica Glass



Julie Schram

Julie Schram will work as an Assistant Professor of Biology in

the School of Arts and Sciences at UAS. Schram holds an M.S. and Ph.D in Biology from the University of Alabama at Birmingham and a B.S. from Western Washington University. She comes to UAS from a postdoctoral position at the University of Washington and has also done postdoctoral work at the University of Oregon, where her research has focused on polar marine food webs. Schram will play a major role in Coastal Margins efforts in Lynn Canal and will also serve as a co-PI of the Fire & Ice project.

The two hires join UAF Assistant Professor of Oceanography Gwenn Hennon, who joined the Coastal Margins component in 2019. Two more hires are planned for the Fire & Ice project: the hire of a Remote Sensing faculty who will work with the Boreal Fires team is nearly complete, and interviews are being scheduled for a final tenure-track faculty position, a UAA Earth Surface Processes faculty who will work with both the Boreal Fires and Coastal Margins components. •

## EPSCoR in Brief

**STEM success stories:** Alaska NSF EPSCoR is showcasing the unique characteristics that Alaskans bring to STEM by sharing a series of interviews with former University of Alaska students in successful STEM careers. The first interviews are with Liz Dennett, who works for Amazon Web Services; Thomas Hughes, an engineer for the Alaska DOT; and Fairbanks pediatrician Carla Cartagena De Jesus.

**All-Hands Meeting:** The 2020 Alaska NSF EPSCoR All-Hands Meeting was held Nov. 4-5 via Zoom. All of the slideshows from the meeting are available online as PDFs, and the Boreal Fires presentation is also viewable online.

**Axiom how-to videos:** There are 17 videos posted on the Alaska NSF EPSCoR YouTube channel that explain how to use various facets of the Research Workspace, the depository for Fire and Ice data. Topics include uploading files, using templates, managing users, and more. •



This material is based upon work supported by the National Science Foundation under award #OIA-1757348 and by the State of Alaska.

If you wish to be added to (or removed from) the EPSCoR newsletter mailing list or listserv, please contact Tom Moran at [tmoran3@alaska.edu](mailto:tmoran3@alaska.edu) or (907) 474-5581.