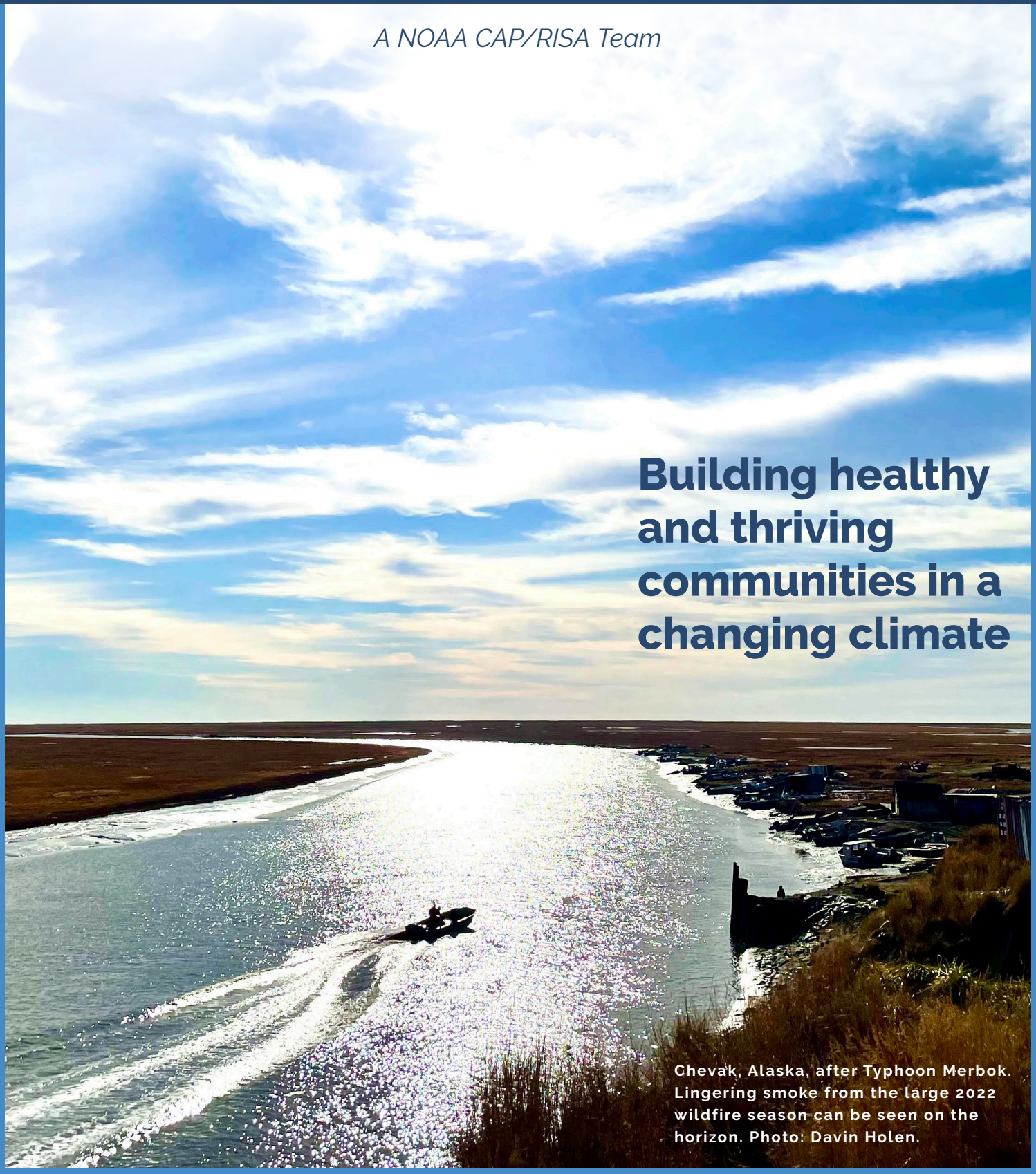
ACCAP

Alaska Center for Climate Assessment and Policy

A NOAA CAP/RISA Team

Building healthy and thriving communities in a changing climate



Chevak, Alaska, after Typhoon Merbok. Lingering smoke from the large 2022 wildfire season can be seen on the horizon. Photo: Davin Holen.

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ACCAP is a NOAA CAP/RISA program.

The NOAA Climate Adaptation Partnerships (CAP)/Regional Integrated Sciences and Assessments (RISA) program is an applied research and engagement program that expands society's regional capacity to adapt to climate impacts in the U.S.

ACCAP is part of the International Arctic Research Center at the University of Alaska Fairbanks.

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- **John Walsh,** CO-Investigator
- **Adelheid Herrmann,** CO-Investigator
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- **Danielle Meeker,** Sustained Assessment Specialist
- **Rick Thoman,** Alaska Climate Specialist
- **Delores Gregory,** Small Grants Coordinator
- **Davin Holen,** Alaska Sea Grant Coastal Community Resilience Specialist
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All photos by Alison Hayden except where noted.

Executive Summary

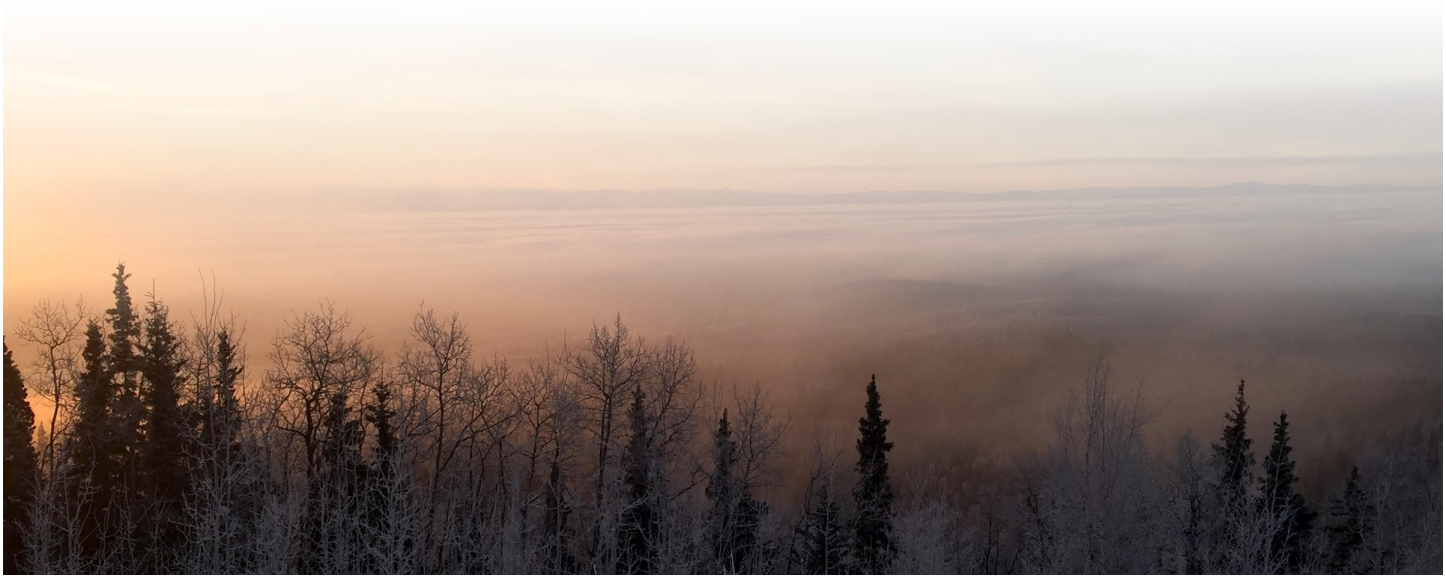
The Alaska Center for Climate Assessment and Policy (ACCAP) complements its research focal areas of extreme events and capacity-building for adaptation in rural and Alaska Native communities with extensive outreach and engagement. Supplemental sustained assessment and small grants projects round out our portfolio that is rooted in partnership to advance our vision of building healthy and thriving Alaskan communities, economies, and ecosystems in a changing climate.

This report highlights activities and projects during this reporting period that demonstrate our commitment to building trusted relationships with communities, providing climate research that can be used for planning and adaptation, convening practitioners to advance knowledge, and supporting capacity-building and resilience, especially in rural and/or underserved communities. The impacts of this work are represented throughout the report as testimonials.

Highlighted research and projects include the first comprehensive look at terrestrial and marine climate trends at the regional scale in Alaska, using the highly regarded ERA5 reanalysis. Our team also published an evaluation of coastal vulnerabilities to storms and a case study analysis of knowledge co-production in Kake, Alaska. Workshops were held to increase connectivity among climate adaptation practitioners, co-define the boundary spanning role in the context of climate research and Alaska Native communities, and introduce higher education participants to traditional Alaska Native ways of teaching, learning, and research.

While completing a Theory of Change workshop with Susi Moser, our team identified that our work has evolved over time to have a greater focus on people and relationships. Many of our project outcomes hinge on relationship building. We provide consistent engagement and communication at many levels throughout the state. Rick Thoman regularly communicates weather and climate information through radio, newspaper, and social media; we provide monthly webinars that highlight climate forecasts, research, and tools to a broad audience; our team regularly contributes to annual climate reports; and we convene workshops and meetings to network and share knowledge. Relationship building takes time but is based on a dependable trusted connection. These connections are vital for providing resources, information, and tools to various communities throughout Alaska.

During this reporting period, our team also continued to evolve and grow to meet the demand for climate services and science. Zav Grabinski has joined the team as a Geospatial Analyst and Data Visualization Specialist. We are happy to announce that Margaret Rudolf successfully defended her PhD and will be publishing her work in the next year. Elizabeth Figus completed her postdoctoral research and now collaborates with ACCAP as a contractor, and Davin Holen will move into an affiliate and advisory board role for ACCAP. This has been a good year and we look forward to all we can accomplish in the next year.



Celebrating the 100th NWS Climate Outlook Briefing

ACCAP Leads: *Rick Thoman and Alison Hayden*

Project Partner: *National Weather Service*

Rick Thoman and the ACCAP team held the 100th NWS Climate Outlook Briefing in August 2022. Presented monthly since 2014, the NWS Climate Outlook Briefings review recent climate conditions around the state, highlight interesting climate topics and anomalies, and share forecasts from the NOAA Climate Prediction Center for the next few months.

Over 80 people joined virtually and in-person to celebrate the 100th webinar milestone. Aimee Devaris, US Geological Survey Alaska Region Director, and John Walsh, ACCAP Co-Investigator, gave introductions. Devaris was the NWS Alaska Regional Director when the webinar series began and she highlighted how Thoman excels at working with the NWS, their partners, and Alaskans to improve scientific products and projections to meet community needs.

Devaris also pointed out that it is very difficult to communicate science, with the inherent uncertainties associated with the evolution of knowledge; yet, Thoman has established himself as a credible and trusted source of climate and weather information in Alaska. Walsh noted that Thoman has not missed a single month of Climate Outlook Briefings in over 8 years, even through the Covid-19 pandemic. Thoman builds relationships with Alaskans and works to deliver relevant, useful, and responsive weather and climate information. His continuous communication efforts make him a reliable source of climate information for Alaskan communities.

SOCIETAL IMPACTS

"Wow, 100 briefings! Alaska is so fortunate to have you Rick. Alaska National Park Service can't thank you enough for all your time over the years. And, a big thanks to all of you at ACCAP and UAF for making these possible. Keep them coming."

PAM SOUSANES, NATIONAL PARK SERVICE

"Thanks very much for your many years putting these presentations together. I definitely depend on them for guidance about what to expect for the next few months of weather."

ED BERG, HOMER, AK

Community of Practice Workshop

ACCAP Leads: *Davin Holen and Danielle Meeker*
Project Partners: *Alaska Sea Grant, Alaska Native Tribal Health Consortium, Kodiak Area Native Association, and Ristroph Law, Planning & Research*

The Alaska Climate Adaptation Community of Practice convened in Anchorage for a two-day workshop in September 2022. The goal of the workshop was to establish greater connectivity among climate adaptation practitioners working at the regional, state, and federal levels to reduce duplication of effort, identify synergies, and facilitate future collaborations. The event was open to all practitioners who work with and in communities across Alaska to provide climate change support.

Photo: Davin Holen

Workshop participants included representatives from agencies, universities, tribes, and local governments, including the Alaska Native Tribal Health Consortium, the US Army Corps of Engineers, Senator Lisa Murkowski's office, the Alaska Federation of Natives, and others. During the two-day event, there were panel and roundtable discussions about legislation and funding for climate adaptation, training, and assistance programs for Tribes and rural communities, and workforce development opportunities. Time was given to share ideas and process information in small groups and efforts were made to address funding, geography, project focus areas, and project priorities.

Post-workshop evaluations revealed that all respondents (n=14) reported a greater awareness of "on-the-ground" adaptation activities as a result of the workshop, and that the vast majority (85%) identified a new organization with which they would like to collaborate in the future. All respondents also reported that they had learned about a new resource (e.g., funding source, information source, program, or project) that they would like to use in the future to support their climate adaptation work.

SOCIETAL IMPACTS

"Please continue this workshop! I believe it will only become more valuable as a resource to learn from others in the field and reduce duplication of efforts."

WORKSHOP PARTICIPANT

Indigenous Self-Determination in Co-Production of Knowledge

ACCAP Leads: *Margaret Rudolf and Sarah Trainor*
Project Partners: *Sustaining Arctic Observing Networks Roadmap (SAON ROADS), Research Networking Activity for Sustained Coordinated Observations for Arctic Change (RNA CoObs), Alaska Climate Adaptation Science Center (AK CASC), Navigating the New Arctic Community Office, Aleut Community of St. Paul Island, Kawerak, Huntington Consulting, and Ikaaġun Engagement*

Margaret Rudolf successfully defended her Interdisciplinary PhD dissertation in April 2023 and she has been sharing her work with diverse audiences at conferences and in online formats over this past year.

The four chapters of her dissertation have been written as papers that will be submitted for publication in the next year.

- **Chapter 1** has been accepted within a book *Indigenous Voices: Critical Reflections on Traditional Ecological Knowledge* and critically analyzes the theory co-production of knowledge (CPK) and the challenges of genuinely accomplishing it in implementation utilizing the National Science Foundation's Navigating the New Arctic program as a case study.
- **Chapter 2** synthesizes the factors of creating a successful CPK project and explores how different research paradigms influence what is prioritized in projects and metrics of success.
- **Chapter 3** co-defines success for improving Arctic observing systems.
- **Chapter 4** explores the role of boundary spanners leading research projects with Alaska Native communities. Rudolf presented her work to various audiences including scientists at the American Geophysical Union Fall meeting, to pan-Arctic early career scientists in a podcast produced by the Association of Polar Early Career Scientists, and to Indigenous community members through the Shine the Light webinar series. As part of this chapter, Rudolf organized a workshop with the goal of co-defining the boundary spanning role with 13 participants in the context of climate research and Alaska Native communities. Within the CPK literature in the science-policy discipline, boundary spanners are often presented as a panacea.

SOCIETAL IMPACTS

"Amazing body of research Margaret and excellent presentation. You are at the forefront of this work, and I have learned so much from you. You are definitely advancing the fields of CPK and Indigenous self-determination. Many congrats!!"

DONNA HAUSER, UAF RESEARCH ASSISTANT PROFESSOR AND SCIENCE LEAD, ALASKA ARCTIC OBSERVATORY AND KNOWLEDGE HUB

"I just listened to your talk for the UAF Shine a Light Speaker Series. I would like to thank you for sharing your insights and knowledge with the group today. Researchers and governmental agency employees like me need to hear those messages again and again. Thank you for sharing your top five resources for coproduction of knowledge, too."

JEFFREY BROOKS, BUREAU OF OCEAN ENERGY MANAGEMENT

Given the current attention on climate change related research in Alaska Native communities, Rudolf's dissertation research is timely in highlighting the need for Indigenous self-determination and equitable research partnerships. While the boundary spanning role is important, the workshop revealed that participants experienced tokenization and felt undervalued. They considered the role to be unsustainable in that they were expected to take on too many duties and manage cross-cultural conflict without adequate support.

In comparison to the standard boundary spanner literature, the workshop also highlighted distinct differences in spanning boundaries of science, policy, and community in the Alaska Native context. Workshop participants collectively coined the term "Those in the In-Between" to describe their work. They felt the semantic meaning of boundary spanner did not fit because individuals often spanned many boundaries and in many ways enabled boundaries to continue to exist.

Attendees developed action steps to overcome these boundaries in regard to cultural division and funding barriers. Those in the In-Between have a crucial role in Arctic research in facilitating action between science, policy, and Alaska Native communities.

Rudolf, M., "Co-Production of Knowledge in Arctic Research: A Paradigm Shift or Another Cycle of Oppression?" In: Indigenous Voices: Critical Reflections on Traditional Ecological Knowledge, ed. Jacobs, Lara Alanna. Accepted.

Small Grants Program

ACCAP Leads: *Sarah Trainor, Adelheid Herrmann, Delores Gregory, Davin Holen, Danielle Meeker, and Rick Thoman*

Project Partners: *US Arctic Research Commission, Alaska Sea Grant*

The ACCAP Small Grants Program provides funding opportunities for statewide and regional non-profit organizations that serve Alaska Native Peoples. The objectives of the program are to enhance capacity for resilience and adaptation, develop leadership for addressing climate challenges, increase awareness of ACCAP products and services, build relationships and mutual learning, and provide access to the most relevant scientific information in an understandable format.

Four grantees were selected serving multiple regions throughout the state in the Southcentral, Interior, Prince William Sound, and Kodiak regions. "Champs" were designated to serve as the primary ACCAP contact person for each grantee and are central in our two-way information exchange and relationship-building strategy. A virtual meet and greet session was held in January 2023, which served as a great opportunity to get to know representatives from each grantee organization and for the grantees to learn more about each other.

As the program proceeds, the objective of building relationships and mutual learning stands out as a leading priority and an important requisite for accomplishing the other project goals. Additional webinars for grantees are planned with topics including health and wellness, the Alaska Tribal Resilience Learning Network, and tutorials on ACCAP's tool use and application.

SOCIETAL IMPACTS

"It has been great for us to be a part of this pilot project, it has helped us gain a lot of knowledge and helped us create plans to expand our sampling program".

RAVEN CUNNINGHAM, COPPER RIVER RESOURCES COMMISSION

"[I am] really excited to be a part of this program and for the networking connections. The [meet and greet] was a really exciting and reenergizing conversation to be in this morning. I really appreciated this meeting, and I look forward to working with you all to see how this [project] evolves and develops."

ANDIE WALL, KODIAK AREA NATIVE ASSOCIATION

We are actively seeking an external evaluator to document the societal impact of the program and inform future collaborations and support. Visit the **ACCAP Small Grants Program website** for more information about our program, including descriptions of grantee projects, shared resources, and recordings from our two webinars.

Fish wheels on the Copper River. (Photo: Mike Haggerty / Alaska.org)

Moving Diversity, Equity and Inclusion Forward Together

ACCAP Lead: *Sarah Trainor*
Project Partners: *Native Success Initiative, Alaska Arctic Observatory and Knowledge Hub, UAF Department of Equity and Compliance, and Faculty in the Geophysical Institute, Department of Geosciences, Department of Alaska Native Studies and Rural Development, and Cross-Cultural Studies*

ACCAP Director Sarah Trainor, is leading a collaborative team of University of Alaska Fairbanks (UAF) faculty and staff to build a supportive environment for Alaska Native, first generation, and other underrepresented graduate students in the geosciences, including atmospheric science.

The project "Moving Forward Together" was awarded as a 2.5 year planning grant from the new program at the National Science Foundation, Cultural Transformation in the Geosciences Community. Program activities will include training, workshops, dialogues, and establishing the basis and framework for a mentoring program and a culture camp.

ACCAP's Adelheid Herrmann and Margaret Rudolf are project advisors and Alison Hayden, Danielle Meeker and Zav Grabinski have been assisting with project coordination, communication, and evaluation. The team is partnering with organizations that prioritize equity and inclusion and are knowledgeable about Indigenous methodologies and principles of knowledge co-production.

During this reporting period, the first two-day workshop, Indigenous Ways and Western Science, was held for UAF faculty, staff and administrators. Presenters introduced participants to traditional Alaska Native ways of teaching, learning, and research. They discussed culturally responsible and responsive ways of engaging in research in and with Alaska Native communities. Participants had the opportunity to reflect on their current teaching and research practices and the possibilities for broadening them to include ancient approaches. Pre- and post- workshop surveys will be used to build additional training opportunities in the future.

Developing Tribal Climate Resilience Curriculum

ACCAP Lead: *Danielle Meeker and Adelheid Herrmann*
Project Partners: *Bureau of Indian Affairs and Alaska Climate Adaptation Science Center*

Danielle Meeker and Adelheid Herrmann were invited to serve on a Bureau of Indian Affairs Branch of Tribal Climate Resilience (BIA TCR) Curriculum Steering Committee. Between May and September 2022, Meeker and Herrmann collaborated with partners to review and finalize a curriculum for a 9-10 month BIA TCR training series for a new cohort of coordinators to work with Alaska Native communities pursuing relocation, managed retreat, and/or protection-in-place (RMP). They also worked with representatives from the Alaska Climate Adaptation Science Center (AK CASC), the Institute for Tribal Environmental Professionals (ITEP), the Alaska Division of Community and Regional Affairs (DCRA), the U.S. Department of Housing and Urban Development (HUD) and others on syllabus development, identifying potential guest speakers, and identifying sources of technical support for training modules. Meeker participated in the Community Planning Working Group (CPWG) of the Steering Committee, which focused on developing lesson plans for four community planning training sessions for the RMP Coordinator Cohort. The work of the Curriculum Steering Committee concluded in September 2022.

SOCIETAL IMPACTS

"This was a wonderful program, I was able to meet more folks from around the state and it was a pleasure listening to others' experiences".

WORKSHOP PARTICIPANT

"The workshop felt very inclusive. It was great to have the keynote speakers [UAF Chancellor Dan White and UAF Provost Anupma Prakash] in the morning to show support from UAF leadership. Libby and Ilarion did a great job making us feel comfortable, seen, and respected. I appreciated their personal stories as well as the material. I liked breaking out into small discussion groups. I appreciated learning about Ilarion's collaborations on seabird research in the Bering Sea."

WORKSHOP PARTICIPANT

Photo: Margaret Rudolf

Climate Knowledge Co-Production with the Community of Kake, Alaska

ACCAP Leads: *Elizabeth Figus and Sarah Trainor*
Project Partner: *Kake Climate Partnership*

A case study analysis of knowledge co-production in Kake, Alaska, was conducted using two years of text analysis of written research logs, monthly project briefings, and structured discussions.

The objectives of the study were to:

- describe an application of a theoretical framework that is specific to co-production among Indigenous and non-Indigenous partners, and
- reflect on the ways in which this application supports relevance and use of climate services in an Indigenous community.

The Kake Climate Partnership was formed in 2020 between the Organized Village of Kake, Kake Tribal Corporation, the City of Kake, and ACCAP. Kake is situated in the heart of Southeast Alaska and are concerned about the impacts of climate change and pollution on the saltwater and freshwater environments surrounding their traditional food harvesting areas.

The published research found that a co-production model where leadership of the research was placed in the hands of the community, helped define a collective vision among partners. The role of the university researcher shifted from a focus on personal research interests to a focus on supporting local needs and priorities. When the climate services process is centered on Tribal and community priorities and locally identified science needs, climate science becomes just one element in the implementation of a larger local vision.

We recommend that future efforts to co-produce climate services through research, adaptation planning, and mitigation be institutionalized and maintained over decadal, rather than annual, timescales.

Figus, E., B. Ki'yee Jackson, and S.F. Trainor, 2022. The Kake Climate Partnership: Implementing a knowledge co-production framework to provide climate services in Southeast Alaska. Front. Clim. 4:885494. doi: 10.3389/fclim.2022.885494

Community-Based Observations of Coastal Erosion and Harmful Algal Blooms across Alaska

ACCAP Lead: *Nathan Kettle*
Project Partners: *Exchange for Local Observations and Knowledge of the Arctic (ELOKA) and National Snow and Ice Data Center (NSIDC)*

ACCAP and partners are investigating the role of community-based observations of coastal erosion and harmful algal blooms in responding to environmental risks across coastal Alaska, from Utqiaġvik to southeast Alaska. These hazards were selected as they represent significant risks to health and safety and have several active monitoring programs.

Community-based observing programs provide an opportunity to harness a holistic breadth of knowledge and experience in communities, track Arctic environmental change, and support community needs.

The specific goals of the project are to:

- understand if and how community-based monitoring (CBM) information is used in short and long-term decisions and planning for coastal risks and hazards, and
- understand the role of standardization in connecting community observations with decision processes, and the benefits and drawbacks of greater standardization for different actors.

The research was based on a document analysis, interviews with CBM program leads, and focus groups. We found that CBM information informs development of a wide variety of products that are used at different scales of decision-making, from community-level to federal agencies. Participants saw advantages in development of shared training programs, data sovereignty recommendations and practices, and metadata formats.

The diversity of CBM programs and program needs in Alaska creates challenges to standardization. Participants were supportive of increased coordination, which would require sustained resourcing but could also help distribute and share staffing and other resources.

Johnson, N., N. Kettle, N. Haycock-Chavez, and O. Lee, 2023. Sharing and Use of Information from Community-Based Monitoring of Coastal Hazards in Alaska: Focus Groups Report. Boulder, CO: National Snow and Ice Data Center, University of Colorado Boulder. 18 p.

Sea Ice for Walrus Outlook (SIWO): Increasing Information Flow in the Bering Strait

ACCAP Leads: *Amy Hendricks, Nathan Kettle, and Rick Thoman*
Project Partners: *Eskimo Walrus Commission (EWC), Alaska Sea Grant, and Arctic Research Consortium of the US (ARCUS)*

During this reporting period, ACCAP provided information and evaluation findings to the Sea Ice for Walrus Outlook (SIWO) and our team presented project updates at regional conferences, meetings and webinars. The SIWO is a resource for Alaska Native subsistence hunters and others interested in sea ice and walrus in the Bering Strait region of Alaska. It is a collaboration among the Arctic Research Consortium of the United States (ARCUS), Eskimo Walrus Commission, University of Alaska Fairbanks, and National Weather Service.

The SIWO provides weekly reports during the spring hunting season, with information on weather and sea ice conditions relevant to walrus hunting. In recent years, Rick Thoman has contributed valuable information to the SIWO in the form of annotated sea ice imagery and descriptions of weather and ice conditions. In addition, Nathan Kettle and Amy Hendricks conducted an evaluation to provide insights into the kinds of information useful for rural and Indigenous communities and to record the significant importance of local observations.

Their research highlighted the need for adequate funding to support equitable engagement and compensation of observers, the use of multiple channels to disseminate information, and evaluations that align with funding cycles. Hendricks and Thoman presented their work at the first in-person SIWO workshop held in the community of Nome in March 2023. Hendricks also presented evaluation findings at the Eskimo Walrus Commission Annual Meeting in December 2022, the Alaska Marine Science Symposium in January 2023, and a UAF NW Campus Strait Science Series webinar in February 2023.

Hendricks, A., N. Kettle, L. Sheffield Guy, O. Lee, V. Metcalf, and D. Holen, 2023. Reviewing the Sea Ice for Walrus Outlook to Increase Resilience in Coastal Alaska. International Arctic Research Center, University of Alaska Fairbanks. Fairbanks, Alaska.

SOCIETAL IMPACTS

"In a recent evaluation of the SIWO, users were polled about the value of ACCAP contributions to SIWO reports. A majority of respondents found this information to be very valuable or extremely valuable."

LISA SHEFFIELD GUY, SEA ICE FOR WALRUS OUTLOOK PROJECT MANAGER.

Alaska Terrestrial and Marine Climate Trends, 1957–2021

ACCAP Leads: *Rick Thoman and John Walsh*
Project Partner: *International Arctic Research Center*

Some of the largest climatic changes in the Arctic have been observed in Alaska and the surrounding seas. This study produces an updated, long-term trend analysis (1957–2021) of key Alaska climate parameters, including air temperature, precipitation (eg. snowfall equivalent), and sea ice, to inform upcoming climate assessment reports such as the Fifth National Climate Assessment (NCA5) scheduled for publication in 2023. Key findings include widespread annual and seasonal warming with increased precipitation across much of the state. Winter snowfall has broadly increased, but spring and autumn snowfalls have decreased as rainfall increased. Autumn warming and precipitation increases over the North Slope, in particular, are correlated with decreased sea ice coverage in the Beaufort Sea and Chukchi Seas. Alaska's climatic changes, placed in context against regional and contiguous U.S. air temperature trends, show 50% greater warming in Alaska relative to the lower-48 states. Alaska air temperature increases also exceed those of any contiguous U.S. subregion, positioning Alaska at the forefront of U.S. climate warming.

Ballinger, T.J., U.S. Bhatt, P.A. Bieniek, B. Brettschneider, R.T. Lader, J.S. Littell, R.L. Thoman, C.F Waigl, J.E. Walsh, and M.A. Webster, 2023. Alaska terrestrial and marine climate trends, 1957-2021. Journal of Climate 1-41, https://doi.org/10.1175/JCLI-D-22-0434.1

Photo: Romy Vreeswijk/Unsplash

How Accurately does ERA5 Model Alaskan Snow Water Equivalent?

ACCAP Leads: *Jesse Robinett, John Walsh, and Rick Thoman*
Project Partners: *National Environmental Satellite, Data, and Information Service (NESDIS), National Centers for Environmental Information (NCEI), and Ernest F. Hollings Scholarship Program*

Throughout Alaska, sparse snow observations hamper studies of the changing climate, water management, flood forecasting, fire prevention and control, and more. The European Centre for Medium-Range Weather Forecasts (ECMWF) Reanalysis v5 (ERA5) models snowpack parameters such as snow water equivalent (SWE) at 31 km resolution. There is also a companion product ERA5 Land that models SWE at 9km.

These products could fill gaps in observations; however, their performance modeling SWE has not yet been quantitatively scrutinized in Alaska. This project evaluates how accurately ERA5 captures SWE measured at NRCS Snow Course and SNOTEL Stations.

Calculations indicate that ERA5's raw modeled SWE usually has lower predictive skill than climatology; however, using statistics such as percent of median (POM) or anomaly improves performance significantly and removes notable biases.

Trends in Coastal Vulnerability to Storms

ACCAP Lead: *John Walsh*
Project Partners: *UAF Department of Atmospheric Sciences and Sandia National Laboratory (DOE)*

A key component of ACCAP's work on extreme events has been an evaluation of coastal vulnerability to storms. During the past year we addressed this vulnerability through:

- an evaluation of trends in Arctic storminess and
- an evaluation of trends in the break-up and freeze-up of coastal sea ice, which serves to protect coastlines and coastal communities from flooding and erosion.

In the latter study, Walsh et al. (2022) designed sea ice indicators specifically for coastal locations, including the Beaufort, Chukchi, and Bering Sea coastal villages. The indicators show a lengthening of the open water season by 1 to 2 months since 1979.

During this same period, storm activity has also increased, as shown by our evaluation of trends in a cyclone activity index evaluated for the Arctic (Zhang et al., 2023). The increased storm activity is consistent with warmer ocean waters such as those during ex-typhoon Merbok in the autumn of 2022. ACCAP's work on this topic is continuing through a UAF climate scholar's study of increasing high-wind events at specific Alaska coastal communities (Nome, Point Lay) during the seasons of reduced sea ice cover.

Walsh, J. E., H. Eicken, K. Redilla, and M. Johnson, 2022: Sea ice breakup and freeze-up indicators for users of the Arctic coastal environment. The Cryosphere, 16, 4617-4635, https://doi.org/10.5194/tc-16-4617-2022.

Zhang, X., H. Tan, J. Zhang, J. E. Walsh, E.L. Rosler, B, Hillman, T.J. Ballinger, and W. Weijer, 2023: Intensification of Arctic cyclone activity. Communications Earth & Environment, submitted.

Alaska communities experienced extensive damage from Typhoon Merbok in 2022. Boats, which are the main form of transportation, were destroyed in Chevak (photo: Davin Holen) and the community of Golovin was flooded (photo: Josephine Daniels).

Webinars and Media Contributions

Webinar outreach

ACCAP hosts three webinar series each month to help communicate current research, useful tools and products, and community activities related to climate change to a broad audience. All past and upcoming webinars can be found on the **ACCAP website**. The series are:

- **ACCAP Topical Webinar Series.** This series covers a wide range of Alaska climate-related topics that are directed at a broad audience. These webinars have been held monthly since 2007 and include annual favorites such as the Alaska River Breakup and the Boreal Forest Green-up webinars. *There were 13 webinars and 765 participants this reporting period.*
- **National Weather Service Alaska Climate Outlook Briefing.** Rick Thoman, the ACCAP Alaska Climate Specialist, reviews recent climate conditions around the state, highlights interesting climate topics or anomalies, and shares the NOAA Climate Prediction Center's forecast for the upcoming months. These webinars have been held monthly since 2014. *There were 12 webinars and 507 participants in this reporting period.*
- **Virtual Alaska Weather Symposium.** This series brings cutting edge satellite-based information to a statewide audience. It has been held monthly since 2017 and is a collaboration between ACCAP, the Geographic Information Network of Alaska, and the NOAA National Weather Service. *There were 10 webinars and 412 participants in this reporting period.*

Special webinars

ACCAP hosted three special webinars to present these reports, which were co-authored by ACCAP scientists.

- **Arctic Report Card 2022**
- **Southeast Alaska Drought**
- **Bering Science Spring 2022 – Communicating Science in and Around the Bering Sea**

ACCAP by the numbers

Webinars

3 series
35 webinars
1,684 participants

News and Social Media

8,798 direct news media mentions
224 Mastodon followers

Publications

7 peer reviewed
5 not peer reviewed

Website Statistics

26,130 views
12,859 visitors

Photo: U.S. Fish & Wildlife Service

SOCIETAL IMPACTS

"Rick Thoman's efforts to improve the Green-up Index forecasts have helped hundreds of K12 students and teachers understand the birch sap season and answer the question: "how do plants and animals tell time?" Thanks to the inimitable Rick Thoman for sharing his expertise and community-mindedness with so many of us!"

JAN DAWE, DIRECTOR OF ONE TREE ALASKA AND CO-HOST OF THE ANNUAL ACCAP GREENUP WEBINAR

National Newspaper and Radio Contributions

Rick Thoman has established himself as a trusted source of climate and weather information in Alaska by providing regular radio, newspaper, and social media reports. During extreme events, communities turn to Thoman for climate and weather information that can help them prepare and respond. For example, during the East Fork wildfire in June 2022 and Typhoon Merbok in September 2022, Thoman continually provided updated information to local communities responding to the crises. He also provided climate change context and an Alaskan perspective to national news organizations such as the *Washington Post, The New York Times*, and National Public Radio.

Highlighted national news articles include:

- **Alaska's June Wildfires Break Records, Fueled by Hot, Dry Weather** (Washington Post)
- **As Alaska Warms, Fires Burn Over (and Under) More Wild Land** (New York Times)
- **The Yup'ik People of St. Mary's, Alaska, are Working to Save their Village from Fire** (National Public Radio)
- **Western Alaska Confronts Damage After Historic Storm** (Washington Post)
- **Climate Change Comes for the Freezers, a Key Tool for Alaska Natives** (New York Times)

SOCIETAL IMPACTS

"ACCAP has been vital to KDLG's reporting on the weather and climate of Bristol Bay. Rick Thoman's expertise, willingness to talk to our reporters and availability throughout the year has allowed us to keep listeners informed on both breaking weather events and deep dives into long-term patterns in our changing climate. For the past few summers we've interviewed Rick every week during the 'Weather Wednesday' segment on our flagship show, the Bristol Bay Fisheries Report. He's also helped us parse through everything from major winter storms to record-breaking wildfires. All this has helped us provide critical information on weather and climate to the Bristol Bay region."

SAMUEL D. GARDNER, GENERAL MANAGER, KDLG PUBLIC RADIO

Local Media, Radio, and Print Outreach

ACCAP Lead: *Rick Thoman*

Rick Thoman uses social media posts, media interviews and webinars to communicate climatological data in an easy-to-understand format. He has been an important resource for communities, the media, and policymakers when there are extreme weather events, such as rain in December, record high levels of snow, and dry conditions in the spring and summer that could lead to a more severe wildfire season. This information helps communities prepare and respond to extreme events. A sampling of these products are detailed below:

- **Alaska and Arctic Climate Newsletter** - Weekly Substack newsletter providing analysis and context for Alaska and Arctic weather, climate, climate change, and extreme events. Thoman started this newsletter during this reporting period and currently has 430 subscribers.
- **Alaska and Northwest Canada Quarterly Climate Outlook** - Co-produced with NOAA-Environment and Climate Change Canada and providing Alaska specific climate information and relevant stories.
- **Beyond the Weather (KUAC radio, Fairbanks and Interior Alaska)** - Weekly 90 second interview on a range of climate-related topics, including historical events, climate drivers, and climate models, with a focus on Alaska's Interior region.
- **Climate Highlights (KNOM radio in Nome, KYUK in Bethel, and KDLG in Dillingham)** - 90 second spots on a range of climate-related topics that are relevant to west and southwest Alaska, including sea ice, ocean temperatures and monthly and seasonal outlooks, all tailored for the radio station's listening area.
- **Fish Reports (KDLG radio, Dillingham)** - Weekly interviews on climate and weather conditions, which air during the multi-million dollar commercial salmon fishing season in early summer (June-July) in Bristol Bay.
- **Iditarod Radio Weather** - Providing weather and historical content for Alaska's Iditarod sled dog race to augment KNOM's 40+ years of Iditarod race coverage.
- **Nome Nugget (print)** - Weekly column covering a range of weather and climate concerns relevant to the Seward Peninsula and the Bering Strait region, including sea ice conditions and outlooks with a focus on Western Alaska stakeholders. The Nome Nugget is a regional newspaper for the city of Nome and the surrounding communities on Alaska's northwest coast. These communities include a significant population of Alaska Native Peoples.
- **OneHealth Outlook Series and Local Environmental Observer (LEO) Network Presentations** - Produced by the Alaska Native Tribal Health Consortium. Thoman has been contributing to the OneHealth Outlook Series since 2019 and he has contributed to the LEO Network presentations since joining ACCAP in 2018.

Highlighted International and National Contributions

Bulletin of the American Meteorological Society (BAMS) - State of the Climate

ACCAP Leads: *Rick Thoman and John Walsh*

The BAMS State of the Climate report is an international, peer-reviewed publication released each summer to provide an authoritative and comprehensive annual summary of the global climate system within a historical context. Rick Thoman was lead editor of the 2021 Arctic Chapter (published late summer 2022) and Thoman and John Walsh were co-authors on the section related to Surface air temperature. The Arctic chapter reported that environmental change in the Arctic continued in 2021 and the ongoing trends illustrate how the region is a very different place than the Arctic of the twentieth century.

> **Thoman, R., M. L. Druckenmiller, and T. Moon, Eds., 2022: "State of the Climate in 2021". Bull. Amer. Meteor. Soc., 103 (8), S257–S306, https://doi.org/10.1175/BAMS-D-22-0082.1.**

Arctic Report Card

ACCAP Leads: *Rick Thoman and John Walsh*

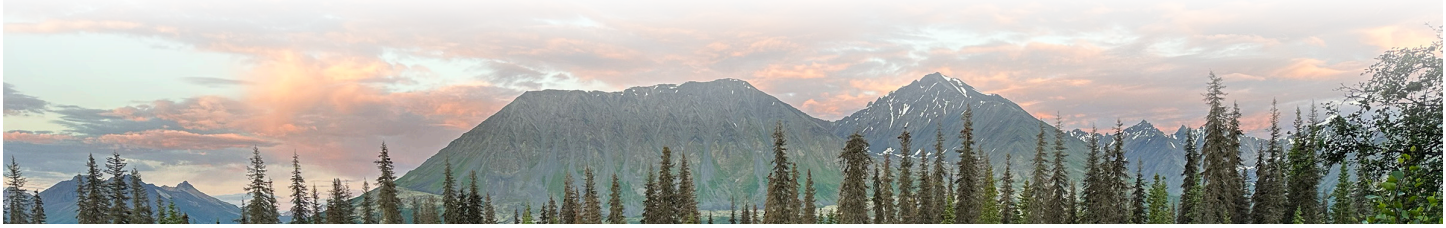
NOAA's Arctic Report Card has been issued annually since 2006 and provides timely, peer-reviewed environmental information on the current state of the Arctic system. It has an emphasis on observations and perspectives about the impacts of the rapidly changing Arctic environment. Rick Thoman joined the Arctic Report card editorial team in 2020. John Walsh was the lead author of the precipitation chapter and Thoman and Walsh were coauthors of the surface air temperature chapter. The 2022 report was released in conjunction with the American Geophysical Union (AGU) meeting in San Francisco in December 2022.

> **Druckenmiller, M. L., R. L. Thoman, and T. A. Moon, Eds., 2022: Arctic Report Card 2022, https://doi.org/10.25923/yjx6-r184.**

Alaska Chapter of the Fifth National Climate Assessment

ACCAP Leads: *Danielle Meeker, Sarah Trainor, and Adelheid Herrmann*

Danielle Meeker is spearheading ACCAP's involvement in the Fifth National Climate Assessment (NCA5) as part of her Sustained Assessment role. Sarah Trainor, Adelheid Herrmann and Meeker are all co-authors of the Alaska chapter, contributing specifically to the section titled "Our Just and Prosperous Future Starts with Adaptation". ACCAP has promoted public participation in the chapter development and assisted with the planning and facilitation of the virtual public engagement session held in January 2022. Herrmann and Meeker traveled to Washington, DC in April 2023 to participate in the NCA All-Author's Meeting, where they further revised the Alaska chapter and participated in a breakout session on the inclusion of Indigenous knowledge systems in the NCA.



Sustained Assessment

Sustained Assessment CAP/RISA-wide Workshop

ACCAP Lead: *Danielle Meeker*
Project Partners: *CAP/RISA Sustained Assessment Specialists Network and the Science for Climate Action Network (SCAN)*

ACCAP Sustained Assessment Specialist, Danielle Meeker, organized and jointly hosted a 2.5 hour virtual workshop on sustained assessment in June 2022.

This workshop included presentations and panel discussions from CAP/RISA team members engaged in sustained assessment, current and former directors of the National Climate Assessment (NCA), a senior manager from the U.S. Global Change Research Program, and the former chair of the Sustained Assessment Federal Advisory Committee.

Over 40 participants from CAP/RISA teams, the U.S. Global Change Research Program, and the federal Sustained Assessment Working Group met to discuss topics including:

- the relationship among sustained assessment, adaptation, and decision support
- contextualizing actionable science for specific audiences,
- opportunities for integrating strategic pilot assessments into a broader assessment program
- the role of citizen science, regional/sectoral networks and communities of practice.

Meeker and the other members of the CAP/RISA Sustained Assessment Network intend to use the next in-person CAP/RISA meeting as an opportunity to solicit ideas from teams for potential cross-CAP projects related to sustained assessment.

Challenges

ACCAP experienced several challenges during this reporting period that stand out as causing delays and disruptions.

The first is a staffing loss in business and grants and contracts offices at the University of Alaska Fairbanks. There was a complete turnover of staff in the two offices with whom ACCAP works most closely to manage grants, contracts, budgets, and other administrative functions. This led to serious delays in administering funds, completing grant requirements, creating planned contracts, planning new positions, and meeting budget projections. The ACCAP team spent more time on administrative tasks than expected. This caused delays in most of ACCAPs projects. New people have been hired to fill most of the needed administrative positions but they are still being trained. There will likely continue to be delays in the near future but the hope is that we will have a fully trained administrative team in the next year.

The second challenge that ACCAP experienced was a limited capacity at the community and regional levels. There were delays in coordinating projects such as the in-person Alaska Climate Adaptation Community of Practice (CoP) workshop and the Small Grants meetings because there are not enough people to coordinate with groups like ACCAP that can provide resources and training for community members. Although individuals and organizations may be interested in participating in ACCAP-led efforts (such as the CoP), their ability to engage as partners and take on more leadership or administrative duties is often constrained by limited capacity. As federal support for climate research and adaptation efforts in Alaska increases, community-level and regional entities may be challenged by additional requests for their time and resources, and may lack the ability to meaningfully engage in equitable collaboration with ACCAP. This issue will continue to grow as more efforts are made to support underserved communities.

It is also worth noting that as ACCAP has increased its emphasis on diversity, equity, and inclusion (DEI) in this funding period, we have a goal to bring more diversity onto our Advisory Board. We are working to actualize this goal, yet the process has been challenging in several ways.

As we work to identify new advisory board members, we have found that many of the most attractive candidates are in high demand due to increasing attention on climate change in Alaska and the Arctic and the DEI emphasis of many federal agencies. In addition, while we are working to diversify our Advisory Board, the relationships and contributions of existing board members remain valuable to ACCAP. We are working to identify a manageable size for an Advisory Board and are also considering alternative models that can simultaneously build new relationships, maintain existing relationships, and meet ACCAP needs.

Next Steps

National Weather Service S2S Sea Ice Information Needs

ACCAP Leads: *Nathan Kettle, John Walsh, Rick Thoman, Danielle Meeker, and Roberta Glenn*

Project Partners: *NWS Arctic Test Bed, NOAA Environmental Sciences and Services Integration Center, Alaska Arctic Observatory and Knowledge Hub (AAOKH), and Experimental Arctic Prediction Initiative (EAPI)*

Seasonal to subseasonal (S2S) sea ice forecasts offer significant potential to support risk-management decisions for food security, search and rescue, and transportation in northern Alaska coastal communities.

In partnership with the Alaska Region National Weather Service (NWS), Alaska Arctic Observatory Knowledge Hub (AAOKH), and the Experimental Arctic Prediction Initiative (EAPI), this project seeks to improve NWS communication of S2S information on sea ice for coastal communities in Alaska.

The project will consist of two phases. First, we will conduct an archival analysis of AAOKH observations and other documents to assess community S2S sea ice information needs, previous engagement activities, and important sea ice conditions for travel decisions.

Second, we will conduct a series of community meetings in three regional hub communities (Nome, Kotzebue, Utqiaġvik) to develop a deeper understanding of decision contexts, preferences, and priorities as well as NWS capacities. This includes:

- identifying important ice freezing, thaw, and intra-seasonal evolution that impact activities
- understanding locally-relevant environmental factors and time frames related to ice evolution
- identifying accessible means of communicating S2S information
- assessing understanding and use of S2S information
- tolerances for uncertainty in S2S predictions

This assessment will lead to a report to the NWS that outlines guidance for better communicating information in Alaska regional hub communities, including potential prototype products that can be developed that address community needs with sufficient forecast skill.

Climate Adaptation Landscape Assessment

ACCAP Leads: *Danielle Meeker and Sarah Trainor*
Project Partner: *CNC North Consulting*

Previous research projects have attempted to compile, synthesize, and/or assess climate adaptation actions to provide a snapshot of adaptation progress at any given time; however, this type of literature-based research is limited in its ability to enable a comprehensive assessment of adaptation. The need to better understand the larger "landscape" of organizations and networks working on climate adaptation in Alaska is compounded by the recent influx of funding opportunities and the imperative to reduce duplication of effort.

Beginning in Summer 2023, Sustained Assessment Specialist Danielle Meeker will be leading an effort to build upon previous research and better understand the larger landscape of climate adaptation in Alaska. With assistance from external project advisor Dr. Nikoosh Carlo, this project will aim to engage climate adaptation practitioners working at the regional, state, and federal level in a participant-guided assessment of adaptation work in Alaska.

By supplementing a literature review and in-depth web search with interviews, surveys, and in-person and/or virtual engagement, this research will identify key organizations and their functions, map ongoing adaptation efforts and relevant support services, and summarize key partnerships and networks that enable this work.

This project also aims to lay the foundation for a sustained assessment process in Alaska. By identifying the existing socio-institutional landscape and feedback processes of climate research and adaptation, this research will endeavor to create opportunities for social learning and accelerate the development of more equitable and actionable pathways for adaptation.

We hope that results of this research will also assist our partners and others in identifying how their areas of expertise can best contribute to the larger, collective climate resilience effort.

Fiscal Pathways

ACCAP Leads: *Adelheid Herrmann, Sarah Trainor, Danielle Meeker, and Roberta Glenn*

Project Partners: *Headwaters Economics, Bristol Bay Native Association, Alaska Federation of Natives, and Alaska Arctic Observatory Knowledge Hub*

The fiscal pathways for federal funding of Tribal climate adaptation and mitigation are complex and bureaucratic, and significant obstacles exist for Tribes and rural Indigenous peoples in accessing and effectively implementing these funds.

The fiscal pathways team is assessing available funding and technical assistance options, as well as the effectiveness of government programs in assisting Tribes in Alaska with climate resilience. The project will also identify strategies for increasing the effectiveness of funding and assistance options and develop reciprocal networks of information exchange and engagement.

A case study for this project is being conducted in the Bristol Bay region, where PI Adelheid Herrmann has existing relationships and is building trusted partnerships among researchers, practitioners, regional non-profits, communities, and Tribes. Next steps will be interviewing key informants, planning and implementing a workshop to bring people in the case study region together, and communicating findings in easily accessible formats.

Roberta Glenn, Project Coordinator and Community Liaison for AAOKH, has joined the project team to assist with the case study workshop and relationship building, as well as other project goals. We will also be contracting with Bristol Bay Native Association to assist with the workshop organization and Headwater Economics to provide advice, research, data analysis, and outreach strategies.

Co-producing Climate Research and Adaptation through Partnerships with Alaska Native Communities

ACCAP Leads: *Elizabeth Figus and Sarah Trainor*

Project Partners: *Alaska Climate Adaptation Science Center, Kake Climate Partnership*

This project builds on the existing Kake Climate Partnership, which includes ACCAP, the Organized Village of Kake, Kake Tribal Corporation, and the City of Kake. Our work will support critical research in tribal communities through co-production methodologies and partnership development. We will report on the effectiveness of doing science in this way for both scientific and community audiences.

With leveraged funding from USGS, BIA, and EPA, the project addresses local subsistence food resource management issues identified as long-term priorities by our partners and stakeholders. Our objectives are to:

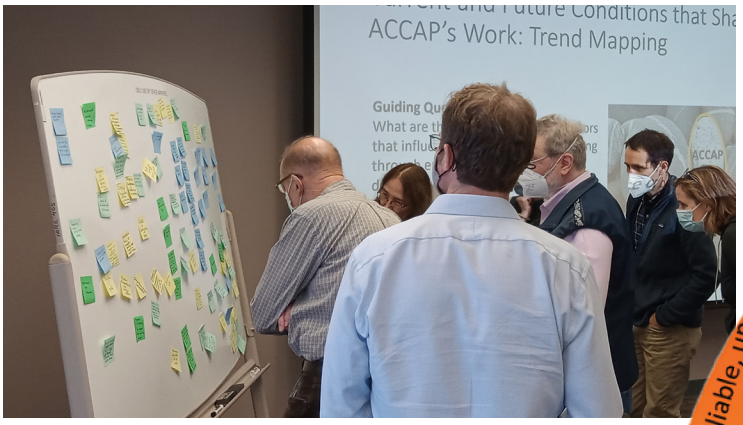
- continue the work in Kake and use the Kake Climate Partnership as a model to establish a new partnership for research in climate resilience and adaptation in a second community in Southeast Alaska
- assess these partnerships as case studies of co-production with Indigenous communities, and
- advance the science of co-production evaluation with specific attention to Indigenous evaluation methods.

Partner communities will benefit by acquiring data that can be used to develop capacity for locally based resource management. Our work will also support stronger science partnerships and provide local workforce development.

Over the past year, our team began a new partnership with the Hoonah Indian Association and deepened our evaluative work in the Kake Climate Partnership. Our team is currently preparing a manuscript for peer-review regarding our evaluations in Kake and the role of evaluation in co-produced climate research with Indigenous communities.

Village of Naknek, AK (Photo: Adelheid Herrmann).

Evaluation



Participants at the ACCAP Theory of Change workshop (Photo: Susanne Moser).

During this reporting period, ACCAP completed a Theory of Change workshop with external evaluator, Susi Moser. The goals of the workshop were to foster a coordinated, aligned sense of the team and work, define what motivates ACCAP, and develop a shared understanding of how everyone's individual work feeds into that larger goal.

To achieve this, our team met in person for three days and discussed influences, envisioned outcomes of our work, described steps to achieve our vision, and defined ACCAP at its best (see illustration, above). Many outcomes hinged on relationship building. The team identified that our work has evolved over time to have a greater focus on people and relationships rather than specific products.

Since the workshop, our team has continued to meet to discuss strengths, goals, and steps forward. We have started defining two new positions, and activities within ACCAP, that would further our goals and objectives and help us achieve our vision. Next, we will be working with our Advisory Board to better define their role and the needed representation for our new vision.

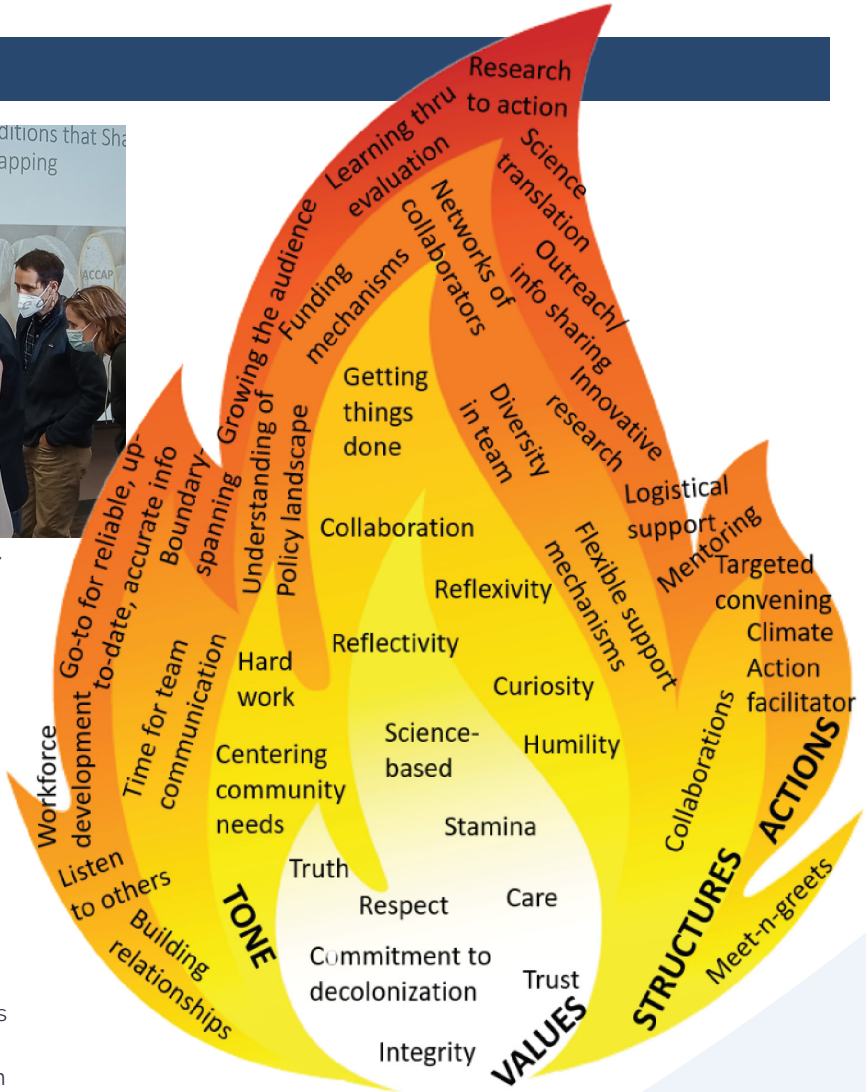


Figure: ACCAP visioning of values, tone, structures, and actions.

Societal Impact

We have noted ACCAP's societal impacts throughout this report. Contributions to scientific knowledge have been listed as publications and impacts to individuals and communities have been listed as testimonials.