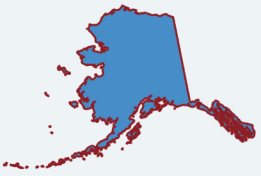
ALASKA CASC RESEARCH 2024

This year, the AK CASC funded **seven new research projects** prioritizing climate adaptation and resilience throughout Alaska. Learn more about all of these projects at the CASC Project Explorer: **https://cascprojects.org/#/casc/alaska**

Developing high-resolution CMIP6 climate scenarios for Alaska

PI: Peter Bieniek (UAF) | Co-PIs: Uma Bhatt, Rick Lader, John Walsh (UAF); Jeremy Littell (USGS); and Gabe Wolken (Alaska DGGS) | **Contact: pbieniek@alaska.edu**

Global climate models, such as those that make up CMIP6, generally have coarse spatial and temporal resolutions that are unable to capture local climate features and extremes within Alaska's complex topography. The primary goal of this study is to produce multiple high-resolution, downscaled CMIP6 scenarios that can be used by land managers and planners in Alaska. The dynamically downscaled data produced for this project will be made publicly available, in its entirety, through an online data access system.

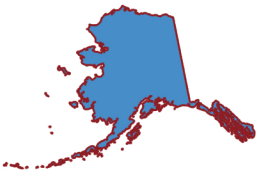


State-wide Focus

Emergent threats from the interactions of heat extremes and wildland fire across Alaska

PI: Rick Lader (UAF) | Co-PIs: Uma Bhatt, Peter Bieniek, Mike DeLue, Chris Waigl (UAF) | Partners: Micah Hahn (UAA) | **Contact: rtladerjr@alaska.edu**

The frequency of severe, one-million-acre-plus wildfire seasons in Alaska is increasing. These events are being accompanied by an increasing trend in the number of smoky days. This project's objectives are to raise climate awareness in the context of recent severe wildfire seasons in Alaska, enhance resilience to future fire seasons by collaborating with fire management to create new forecast tools, and facilitate climate adaptation by assessing future extreme scenarios.



State-wide Focus

Research to action for Yukon River salmon: adapting to climatic, food-web, and habitat change

PI: Erik Schoen (UAF) | Co-PIs: Erin Larson (UAA); Andrés López and Peter Westley (UAF); Jeff Muehlbauer (USGS)| Partners: Yukon River Drainage Fisheries Association and agency and Tribal partners. | **Contact: eschoen@alaska.edu**

Salmon declines during a period of rapid change in the Yukon River Basin (YRB) have led to the lowest spawning abundances on record, unprecedented fisheries closures, and devastating impacts on subsistence communities. This study's objectives are to 1) co-develop a place-based conceptual model of cumulative impacts on salmon in the YRB and 2) improve this model with new information from local and traditional knowledge, field sampling, and environmental DNA analysis, leveraging models of stream temperature, species distributions, wildfire, and human impacts.

Yukon River Basin

Quantifying and projecting the effects of climate change on the summer behavior and distribution of the Porcupine Caribou Herd in Arctic Alaska

PI: Heather Johnson (USGS) | Co-PIs: USFWS Arctic National Wildlife Refuge, Alaska Department of Fish and Game, Yukon Government, and Parks Canada. | **Contact: heatherjohnson@usgs.gov**

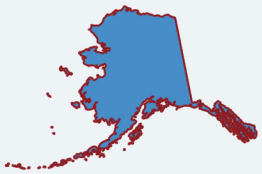
Synchronous declines in many barren-ground caribou herds across North America have coincided with the greening of the Arctic, raising concerns about the influence of climate change on caribou populations and the subsequent effects on Indigenous communities that rely on caribou for subsistence. This postdoctoral project will leverage that field data to 1) identify the influence of climatic variation on caribou summer forage and insect conditions and predict how they will be altered in the future, 2) determine how these climate-mediated summer conditions influence caribou behavior and distributions, and 3) project future shifts in summer caribou distributions.

Porcupine Caribou Herd Range

Building community-based monitoring partnerships between rural schools and wildlife refuges in Alaska: focus on freshwater ice, climate change, and beyond

PI: Christopher Arp (UAF)| Co-PIs: Katie Spellman (UAF); Michael Winfree and Karin Bodony (USFWS) | **Contact: cdarp@alaska.edu**

This project will focus on improving observations of lake and river ice in Alaska to 1) understand responses to and feedbacks with climate change and variability, 2) inform public safety with regard to winter subsistence and inter-village travel, and 3) foster community engagement in science and climate adaptation. This project's objectives are twofold: 1) expand freshwater ice observation and ice science education in Alaska and 2) provide a model for community-based monitoring partnerships between federal agencies and schools. These project objectives will be underpinned by an initial assessment study to more carefully identify and evaluate community, agency and other stakeholder data and decision support needs to guide and refine project implementation and scope.



Rural Alaska and National Wildlife Refuge Focus

Ecological and fisheries impacts of "rusting rivers" in Northwest Alaska

PI: Jeff Muehlbauer (USGS) | Co-PIs: Mike Carey (USGS); Chelsea Clawson and Lauren Yancy (ADFG) | Partners: Joe Spencer (ADFG); Jessica Garron and Arlo Davis (UAF); and Morag Clinton (Sitka Sound Science Center). | **Contact: jdmuehlbauer@alaska.edu**

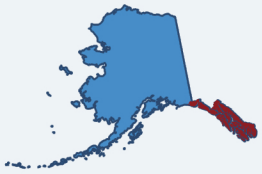
In Northwest Alaska, climate change is causing the melting of permafrost, leading to the emergence of seep flow paths that are inputting heavy metals, turbidity, and other constituents into streams and rivers. There are likely food web and fisheries impacts of this phenomenon. Over the next year the research team will have at least one (ideally two) meetings with community members in Kivalina to guide potential research in subsequent years. To better understand the implications of rusting rivers regionally for management, the team proposes to begin establishing a network of researchers, community members, and managers working in this arena that will guide further research and hopefully yield eventual synthesis efforts in future years.

Kivalina Community and NW Alaska

Effects and catchment hydrologic heterogeneity and extreme events on riverine ecosystems and salmon in southeast Alaska

PI: Ryan Bellmore (USFS) | Co-PIs: Jason Fellman (UAS) | **Contact: james.r.bellmore@usda.gov**

Glacier and snowmelt contributions to rivers are decreasing and will eventually disappear from many coastal Alaskan watersheds. In southeast Alaska (SEAK), ongoing climate change is expected to deliver more rain and less snow at sea level and make high streamflow events more common and dry periods more severe. These changes are reshaping watershed hydrology in a region that supports one of the world's more productive salmon fisheries. The research team proposes three overarching studies: 1) synthesize current knowledge of how shifting hydrologic conditions in SEAK impacts stream food webs and salmon, 2) study how periods of extreme high and low flow impact juvenile salmon behavior, and 3) quantify how juvenile salmonid growth rates differ in streams with distinct flow regimes (glacier, snow, rain).



Southeast Alaska

Visit the Alaska Climate Adaptation Science Center at akcasc.org

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