

# FIRE AND ICE

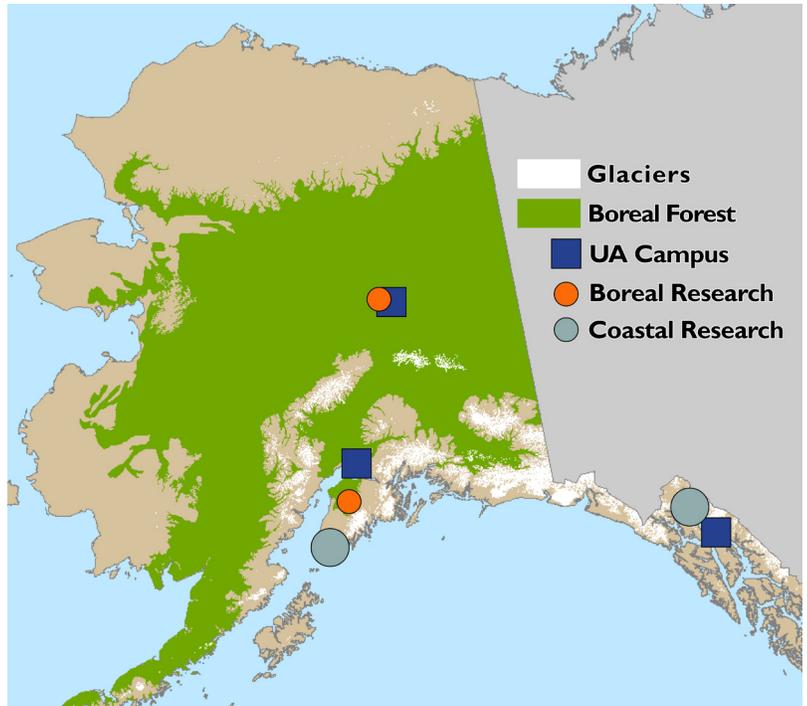
## NAVIGATING VARIABILITY IN BOREAL WILDFIRE REGIMES AND SUBARCTIC COASTAL ECOSYSTEMS

“Fire and Ice” is a 5-year (2018–23), \$20 million effort to investigate changes to fire behavior and risk in **Alaska’s boreal forest**, and changes to physical and chemical conditions impacting ecosystems and organisms in the nearshore **Gulf of Alaska**. Scientists across the University of Alaska (UA) will use remote sensing, fieldwork, lab experiments, and models to study these climate-driven changes to critical ecological systems.

A **Boreal Fires** team will identify large-scale climate factors impacting fire weather, and use advanced remote sensing to better map and measure fire fuels and active fire behavior. They’ll also conduct research into fire management in settled areas such as the Kenai Peninsula, and into the ways fire impacts rural subsistence resources. Researchers will develop new techniques for evaluating fire risk; better methods of processing remote sensing data; improved fire spread models; online fire forecast tools; and outreach products for fire managers.

A **Coastal Margins** team will determine how climate change is altering the volume and character of materials that flow from land and waterways into the Gulf of Alaska, and how this affects communities of organisms in the nearshore. The team will study how large-scale ocean processes impact the nearshore marine environment, and establish how different levels of upstream glaciation can change characteristics of communities of nearshore organisms. They’ll determine how organisms’ physiological responses to physical conditions vary along different levels of glaciation, and study how fishing communities respond to changes in the availability of key marine species. Researchers will generate biological, physical and chemical data, as well as vulnerability assessments that will aid in managing resources.

A **Diversity, Education and Workforce Development** (DEW) team will involve more than 1,500 Alaskans in Fire and Ice activities, including K-12 out-of-school programs and teacher workshops; scientific expeditions for high-school girls; and UA mentoring, courses and training. DEW will also conduct research into formation of a science identity in first-generation college students, who will be a focus of F&I diversity efforts, along with women and Alaska Natives.



Map of glaciers and forests, major Fire and Ice research sites and the three main University of Alaska campuses.



Fire and Ice is a project of **Alaska NSF EPSCoR** (National Science Foundation Established Program to Stimulate Competitive Research). EPSCoR builds research capacity in states and territories that have historically received below-average amounts of NSF funding. For more information visit [www.alaska.edu/epscor](http://www.alaska.edu/epscor).

# DIVERSITY, EDUCATION AND WORKFORCE DEVELOPMENT

The mission of the Fire and Ice **Diversity, Education and Workforce Development (DEW)** team is to increase five “key competencies” (see figure) essential for building capacity to address sustainability challenges, and to broaden participation by Alaskans in science, technology, engineering and math (STEM) fields. The DEW team will work to achieve three goals:

**Goal 1:** *Build key competencies among stakeholders to address ecological change.* In partnership with Fairbanks and Juneau school districts and the Kachemak Bay National Estuarine Research Reserve, DEW will develop games and activities for use in out-of-school contexts, which will enable students to work through current and future landscape scenarios related to F&I research. DEW will conduct key competencies workshops to help K-12 teachers develop new case studies and other scenario-based activities and integrate them into existing mandated school curricula. F&I will also enhance five UA courses with new content related to F&I themes.

**Goal 2:** *Build a diverse pool of STEM learners and workers in Alaska.* DEW will focus diversity efforts on female, first-generation and Alaska Native K-12 and UA students. The DEW team will initiate two programs modeled on the “Girls on Ice” program, which engages high-school-aged girls in STEM and science through extended field trips: a “Girls on Water” program in Kachemak Bay, and a “Girls in the Forest” program in the Alaskan boreal forest. DEW will partner with the federal TRIO programs to support peer tutoring and to hold difference-education interventions, in which senior UA students from underrepresented groups lead panel discussions for new underrepresented students about the challenges and opportunities they have encountered in college. The DEW team will also create “STEM success stories” highlighting UA alumni from diverse backgrounds who are succeeding in STEM careers, and collaborate to share these stories broadly across the university to increase a sense of belonging among underrepresented students. Finally, DEW will conduct an educational research project to learn more about how first-generation college students negotiate STEM pathways. The qualitative, multi-year study will track a cohort of 10-15 first-generation students and isolate factors leading to their identification, or lack of identification, with STEM fields.

**Goal 3:** *Increase capacity for F&I science and teaching among UA faculty and students.* DEW will work with UA provosts and the UAF Office of Faculty Development to assess mentoring needs for faculty and to offer workshops and other support as needed. DEW will provide mentoring for all F&I faculty hires and will offer a least one mentorship training workshop to all F&I faculty, focused on effective methods for mentoring students and making them feel more connected to F&I. DEW will also competitively award up to 40 faculty travel grants of up to \$2,000 each to support professional development through attendance at conferences and workshops. In addition, DEW will offer workshops focused on science communication and indigenous knowledge, as well as workshops teaching the values-affirmation intervention, in which students write about their values at the beginning of a course; the technique reduces stereotype threat, or the worry that one might confirm a stereotype about one’s own sociocultural group.

The DEW team is led by UAF Research Associate Professor Laura Conner. A UAF postdoc will be hired to assist in DEW’s out-of-school programs and its educational research.

The Five Key Competencies
<b>Systems thinking:</b> comprehending how systems are connected, and internal system dynamics
<b>Futures thinking:</b> envisioning how the past and present inform and influence the future
<b>Values thinking:</b> understanding the effects our values have on our decisions
<b>Strategic thinking:</b> developing strategies to achieve a vision
<b>Interpersonal competence:</b> communicating, deliberating, negotiating, collaborating, leading, and fostering empathy