

Track 1 – Collaborative: The climate impacts on Alaskan and Yukon rivers, fish, and communities as told through co-produced scenarios

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Project investigators hold an artist's doodle sketch of our six-talk session at the 2020 Alaska Forum on the Environment.

Project Website Urls & Social Media Accounts:

Coming this June! Email: arcticrivers@colorado.edu

Project Objectives: Our goal is to converge indigenous knowledge and western science to strengthen collective understanding of terrestrial hydrologic change in the Arctic and the potential impacts on rivers, fish and Indigenous communities in Alaska and upstream western Canada. We use specific conductance and temperature measurements of major rivers to assess changes in groundwater contribution. The sensors innovate Indigenous community-based monitoring networks and the USGS AK gage network. Through ethnographic methods and a Arctic Rivers Summit (2022) we seek to collectively identify vulnerabilities of fish and river ice to climate change. Participatory mapping of fish habitat and river-transport corridors merges existing spatial information into a common geofabric of indigenous knowledge and western science. A physically based model chain consisting of the Regional Arctic System Model (RASM) and NCAR's Community Terrestrial Systems Model (CTSM), a dynamic streamflow routing model, a river ice and water temperature model, and a fish bioenergetics model are used to assess historical hydrologic conditions and possible future climate vulnerabilities of river ice and fish species. Guided by a Native Advisory Council consisting of Elders and indigenous community leaders, we co-develop descriptive and quantitative narratives, or storylines, of past and plausible future hydroclimatic, river ice, and fish conditions jointly based on Indigenous baseline knowledge and physical principles / western science. The project will support three Indigenous interns at the USGS Alaska Science Center and the Yukon River Inter-Tribal Watershed Council; a Ph.D. student, a postdoctoral associate, and numerous undergraduate researchers at CU Boulder; and one postdoctoral researcher at NCAR.

Keywords: Arctic rivers, Indigenous communities, Monitoring, Alaska, Yukon, Climate modeling, Groundwater, Hydrology, Fish, River ice

Progress to Date/Future Plans: We've successfully hired students and a postdoc despite the COVID-19 challenges. We convened a session of six project talks at the AFE in Feb., 2020 and 31 indigenous community members signed up for our new listserv: nna-arcticrivers@colorado.edu. We have successfully coupled RASM and CTSM models at the global scale and are preparing tests of high-resolution runs over Alaska and western Canada.

Highlights or Expected Outcomes: We expect to make important advances that include assessment of climate change impacts on river and groundwater transformation, the sustainability of arctic river fish populations, the reliability of winter river ice travel, and the integrated impacts on communities dependent upon the resources.

NNA Community Collaboration and Research Coordination: We seek to form a Native Advisory Council consisting of indigenous leaders and professionals over interior and northern Alaska and the Yukon.

Advice for Overcoming NNA Project Challenges: Tribal leadership requests compensation for their time.