Alaska Section

American Water Resources Association

2024 Annual Conference

Program

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American Water Resources Association

2024 Annual Conference

April 1 – 3rd, 2024

Virtual & at Pike's Waterfront Lodge, Fairbanks, Alaska

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Contacts

- Felix Kristanovich, Alaska Section AWRA President-Elect: fkristanovich@ramboll.com
- Elizabeth Kubacki, Communications Committee Chair: ekubacki90@gmail.com
- Kristina Levine, Communications Committee Member: kglevine200@gmail.com

Thank You!

This conference would not have been possible without the work of these committees and the donations from our conference sponsors. Thank you everyone!

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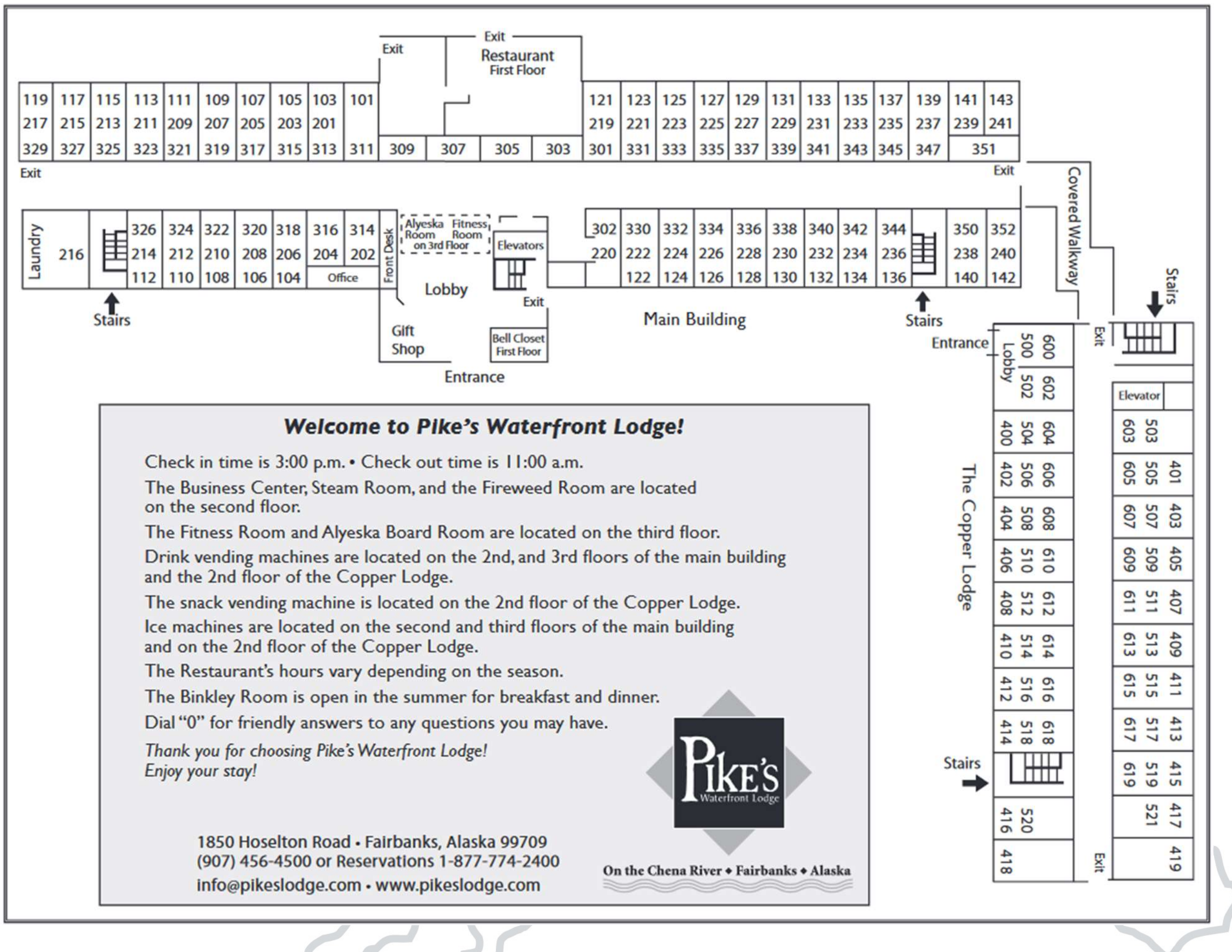
Pike's Waterfront Lodge Map



Earthquake Preparedness

Monday, April 1st

08:00-10:00	Registration Open	
Session 1 - Assorted Topics		
10:00 - 10:20	Maxine Dibert, Felix Kristanovich, & Michael Lilly	Opening Remarks/Land Acknowledgement
10:20 - 11:20	Bob Henszey (Keynote Speaker)	Chena Slough and River Changes Over the Past 100 Years
11:20 - 11:30	Short Break	
11:30 - 11:50	Edda Mutter	Indigenous Observation Network
11:50 - 12:10	Amy Jenson	Long-term evolution of outburst flood hazards and impacts from glacier-dammed lakes: A case study of Mendenhall Glacier (Áak'w T'áak Sít'), Alaska
12:10 - 13:20	Rapid Talks- Networking Break - Catered lunch	
Session 2 - Assorted Topics		
13:20 - 13:40	Caroline Brisbois	Geodetic and Glaciological Mass Balance of Eklutna Glacier, Alaska, from 2010 to 2023
13:40 - 14:00	Ronald McPherson	Homer Harbor Expansion - Baseline Coastal Hydrology
14:00 - 14:20	Paul Burger	Restoring Impacted Streams in Alaska National Parks
14:20 - 14:50	Amy Larsen	Cascading effects of climate change and wildfire on a subarctic lake
14:50 - 15:15	Rapid Talks/Break/Poster set up	
15:15 - 17:00	Poster Session	

Tuesday, April 2nd

08:30-09:00	Registration and coffee	
Session 3 - Water Resources Community		
08:30 - 09:00	Larry Hinzman (Keynote Speaker)	Coordination of U.S. Arctic Research
09:00 - 09:20	Cynthia Nelson	Who is TVWA?
09:20 - 10:20	Panel Discussion - Water Resources Discussion/Water Community	
10:20 - 10:50	Rapid Talks/Break	
Session 4 - Habitat & Stream Restoration		
10:50 - 11:10	Katherine Prussian	Working Better Through Forest Partnerships
11:10 - 11:30	Jessica Johnson & Chandra McGee	Streambank Rehabilitation & Habitat Protection Cost-Share Program
11:30 - 11:50	Christina Buffington	Connecting Habitat and Learning in Cripple Creek and across the Yukon River Watershed
11:50 - 13:20	Membership/Board Meeting - lunch provided for all participants	
Session 5 - Water Quality		
13:20 - 14:05	Dyani Chapman	Microplastics presentation and Q&A - Southcentral Alaska's Water and Microplastics: A Survey of Water Bodies in Southcentral Alaska
14:05 - 14:30	Panel Discusion - Microplastics	
14:30 - 14:40	Short Break	
Session 6 - River Ice Processes & Floods		
14:40 - 15:00	Chris Arp	Fresh insights into river ice processes in Alaska from remote sensing, field studies, and citizen science
15:00 - 15:20	Matthew Scragg	Open flow at forty below: Hydrogeomorphic processes influencing open water zones on the Tanana River
15:20 - 15:40	Horacio Toniolo	Aufeis area and breakup characteristics on the Sagavanirktok River under El Niño and La Niña conditions
15:40 - 16:00	Rapid Talks/Break	
Session 7 - Snow Hydrology		
16:00 - 16:20	Kelsey Stockert	Sublimation measurements of tundra and taiga snowpack in Alaska
16:20 - 16:40	Lora May	Analyzing vegetation effects on snow depth variability in Alaska with airborne lidar
16:40 - 17:00	Ann Marie Larquier & Felix Kristanovich	National AWRA Resources and 2025 National Conference
18:00 - 20:00	Banquet and Film Festival	

Wednesday, April 3rd

08:30-09:00	Registration and coffee
09:00 - 11:00	***Conference Workshop***- International Arctic Research Center (IARC) and Arctic & Earth Stem Integrating Globe & NASA (Arctic & Earth SIGNs): **Land Cover Protocol Utilizing the GLOBE Observer App**
11:00 - 13:30	Field Trip Moose Dam

Post-Conference Activities

Interagency Hydrology Committee for Alaska (IHCA) Spring 2024 Meeting

- When: April 4th – 5th
- Where: International Arctic Research Center (IACR)

Monday, April 1st – Talks

Conference Land Acknowledgement

Dibert, Maxine. District 31 Alaska House of Representative, Koyukon Athabascan Elementary School, Interior Alaska Native Educators Association, and Arctic & Earth SIGNs project at IARC

Representative Maxine Dibert is a Koyukon Athabascan who was born and raised in Fairbanks. She is currently the only Alaska Native woman serving in the Alaska Legislature. Representative Dibert taught school in Fairbanks at Denali Elementary for 21 years. Maxine has an undergraduate degree in elementary education from UAF, and she also earned a Master's degree in Curriculum Development from Lesley University. She is a contributing member of Women in Science Alaska. Representative Dibert continues to be involved in designing a science curriculum that braids indigenous knowledge with Western science and education. Maxine has a great passion for learning, and she is eager to instill the power and excitement of life-long learning in others. When Maxine has a moment outside of her work representing the people of Fairbanks, she enjoys running, skiing, hiking, gardening, and being active, especially in the outdoors.

Chena Slough and River Changes Over the Past 100 Years

Henszey, Bob. U.S. Fish and Wildlife Service (Retired)

The Chena Slough was once a side channel of the Tanana River, carrying sediment-laden glacial meltwater through what we now know as North Pole and Fairbanks before returning to the Tanana River. Originating upstream near Eielson Air Force Base from a number of small contributing channels flowing from the Tanana River into a single channel now known as Piledriver Slough, the Chena Slough was large enough to attract turn-of-the-century steamboats laden with prospectors seeking gold, and to support the founding of Fairbanks. A series of historical maps and aerial photographs at select locations along the Slough show how increasing flow into the Slough was once considered to improve steamboat traffic, but ultimately the upstream connection to the Tanana River was severed by the Moose Creek Dike, and later by the Moose Creek Dam, to control flooding in Fairbanks. Once severed, the Chena Slough became a clear-water tributary to the Chena River at their confluence near North Pole, so what was once called a slough in Fairbanks is now known as the Chena River.

Indigenous Observation Network

Mutter, Edda. Yukon River Inter-Tribal Watershed Council; Alexander Kholodov,. University of Alaska Fairbanks

The Yukon River basin, underlain by discontinuous permafrost, has experienced a warming climate over the last century that has altered air temperature, precipitation, and permafrost. A collaborative effort between the Alaska Native Tribes and First Nations, the Yukon River Inter-Tribal Watershed Council, the United States Geological Survey, and the University of Alaska Fairbanks has developed two projects that focus on water quality, hydrology and active layer research. Combined with historical data from the United States Geological Survey, the Indigenous Observation Network database now covers over 30 years of historical water quality data in key locations. This presentation will explore and interpret the long-term data that has been collected through this network, water quality and active layer changes observed in the Yukon River basin, and the importance of community driven monitoring efforts to address climate change impacts to water resources.

Long-term evolution of outburst flood hazards and impacts from glacier-dammed lakes: A case study of Mendenhall Glacier (Áak'w T'áak Sít'), Alaska

Jenson, Amy University of Alaska Fairbanks; Amundson, Jason University of Alaska Southeast; Kienholz, Christian GEOTEST AG; Kingslake, Jonathan Lamont-Doherty Earth Observatory; Hood, Eran University of Alaska Southeast

Glacier outburst floods are a common hazard in glacierized landscapes. These floods can threaten infrastructure and cause semi-regular but short-lived perturbations to downstream ecosystems. Outburst flood theory dictates that flood characteristics, such as event timing and peak discharge, depend on glacier and basin geometry, both of which evolve as glaciers advance or retreat. Consequently, outburst floods can be viewed as semi-periodic disturbances to glaciated landscapes that switch on/off and evolve in response to climate change. We use observations from Mendenhall Glacier, a maritime glacier that drains from the Juneau Icefield and terminates in Mendenhall Lake, to motivate a theoretical investigation of decadal-scale variations in outburst floods from glacier-dammed basins. Mendenhall Glacier has retreated over 4 km from its Little Ice Age maximum. A significant impact of this retreat was the formation of Suicide Basin along the glacier's margin, which resulted from the thinning and detachment of a tributary glacier. The geometry of the basin continues to evolve as remnant ice from the tributary glacier melts, icebergs calve into the basin, and the adjacent glacier continues to thin. Outburst floods originating in Suicide Basin have occurred annually since 2011. We have monitored the basin since 2012, and since 2018 we have conducted several UAV surveys each summer in order to quantify changes in basin storage capacity and volume of remnant ice in the basin. Our observations have allowed us to develop a framework for outburst flood evolution, which suggests that outburst flood magnitude will increase as long as there is remnant ice in a basin that is wasting away faster than the adjacent trunk glacier. Other marginal basins appear to be forming around the Juneau Icefield as the icefield continues to thin and retreat, motivating further research into the impacts of these floods on landscape and ecosystem evolution.

Geodetic and Glaciological Mass Balance of Eklutna Glacier, Alaska, from 2010 to 2023

Brisbois, Caroline M. Alaska Pacific University

Eklutna Glacier meltwater provides drinking water and hydroelectric power generation via downstream Eklutna Lake to Anchorage, Alaska's largest city, but is rapidly thinning and retreating. Monitoring glacier mass loss is critical for water resources management and planning. Alaska Pacific University (APU) has been monitoring Eklutna Glacier since 2008 with bi-annual field studies to collect traditional glaciological mass balance measurements (e.g. ablation stakes and snow density pits/cores). While this method is necessary for seasonal measurements and general understanding of the glacier's dynamics, geodetic mass balance methods using repeat digital elevation models (DEMs) have become more common to quantify long-term mass change trends. Therefore, acquiring high resolution elevation data for Eklutna Glacier has become an important part of APU's glacier monitoring program. This study incorporates multiple remote sensing techniques to calculate geodetic mass balance from 2010 to 2023. Utilizing LiDAR, Structure from Motion (SfM) methods, and satellite stereo pairs, we compare geodetic methods with traditional glaciological methods. We will show that Eklutna Glacier mass balance is accelerating at a negative rate, on trend with other Alaskan glaciers. This research has direct implications for Eklutna Lake water utilities who rely on predictions of quantity and timing of discharge fluctuations for managing the lake's water budget, as the glacier has finite mass to lose before it can no longer sustain the same rate of melt.

Homer Harbor Expansion - Baseline Coastal Hydrology

McPherson, Ronald L. HDR; Kent, Kristie C. HDR; Hawkins, Bryan V. City of Homer

The City of Homer is partnering with the U.S. Army Corps of Engineers (USACE) to perform a feasibility study for improving navigation within the Homer Harbor through expansion of the harbor itself. The Homer Harbor Expansion project is in its infancy of development where both the City of Homer and USACE are working through a federal feasibility study. Currently the City of Homer and USACE team are advancing the feasibility study through developing baseline coastal hydrodynamic conditions. Through this effort, three coastal numerical models have been developed including a tidal/circulation model, regional spectral wave model, and local boussinesq wave model. Collectively these models provide coastal conditions relating to circulation inside and outside of the harbor, wave conditions within Kachemak Bay, and tranquility of the harbor. These same models will be used when preliminary designs of harbor expansion are developed to determine changes in circulation, waves, and sediment transport due to the presence of the expanded harbor. This presentation will focus on the development of the baseline coastal conditions models and their uses.

Restoring Impacted Streams in Alaska National Parks

Burger, Paul A. National Park Service; Coykendall, Shannon National Park Service; Hults, Chad National Park Service; Simmons, Trey National Park Service

While generally unaltered, there are many rivers and streams in Alaska National Parks that have been impacted by past mining, off-road vehicle use, and other activities. For more than a decade, the National Park Service has been working to identify and characterize these sites to develop statewide restoration priorities. Over the past several years, the Park Service in collaboration with the Bureau of Land Management, have focused on collecting physical, chemical, and biological data from unimpacted reference streams and those that have been impacted by past actions. These data are used to characterize how altered impacted streams are and which ones have the most potential for functional uplift. Restoration potential is being used by Park managers and resource staff to identify what projects may provide the best return on investment as funding becomes available.

Two streams in Denali National Park, Friday and Eureka Creeks in the Kantishna Hills area, and Coal Creek in Yukon Charley National Preserve have been targeted for restoration funds under the recently-passed Inflation Reduction Act and Bipartisan Infrastructure Act. Both areas have their own unique logistical and management challenges and the Park Service is working with outside groups, design experts, and restoration professionals to evaluate a range of design alternatives. The long-term goals are to restore habitat, reduce flooding and erosion hazards, and to build resiliency into these systems.

Cascading effects of climate change and wildfire on a subarctic lake

Larsen, Amy S.; Knapp, Daniell L.; David K. Swanson; Kenneth R. Hill National Park Service

Mean annual air temperature has been increasing in Alaska since the 1970s and is expected to continue to increase through the current century, resulting in significant environmental changes (e.g., permafrost thaw, shifts in vegetation community composition and distribution, increased wildfire frequency and severity). Because there is little long-term monitoring data available on lake ecosystems in the subarctic it is difficult to predict how lakes will respond. Here we present data from an ~20-year long-term lake and climate monitoring program in Interior Alaska. A significant portion of the lake catchment was burned by wildfires in 1986 and again in 2004. As a result, much of the vegetation in the lake catchment was converted from spruce-dominated forest to deciduous forest, indicating likely permafrost degradation. At a nearby monitoring site absent of fire effects, mean annual ground temperatures at 50 and 90 cm warmed significantly from about −2°C to about −1°C over the 20-year monitoring period. Warming of similar or greater magnitude is inferred at the study site due to fire effects. Lake water analyses before and after the 2004 fire show a significant postfire increase in dissolved organic carbon, total nitrogen, and total phosphorous that persisted for a short period (~3 years) and was followed by small, but significant, increases in specific conductance and ion concentrations. Approximately 15 years postfire sulfate and cation concentrations in the lake increased exponentially due to the development of a groundwater seep near the lake. The seep likely formed as a result of permafrost thaw creating new subsurface flowpaths in response to long-term climate warming and fire effects. In 2021, specific conductance and sulfate concentrations reached 657 µS/cm and 71 mg/L respectively, exceeding tolerance thresholds of the water lily Nuphar lutea. In 2021, N. lutea beds that had occupied the lake since 1981 were no longer visible. Depending on local catchment characteristics, source waters and flow paths contributing to small subarctic lakes will continue to evolve uniquely in response to climate change and thawing permafrost. This case study shows the cascading effects of warming soil and wildfires on catchment characteristics as well as terrestrial and aquatic vegetation and lake water chemistry.

Monday, April 1st – Posters

Water Temperature and pH Measurements on Gulkana Glacier and Phelan Creek, Alaska

Brannan, Teslin R. North Star College

Brought together on the Gulkana Glacier through the Inspiring Girls Expeditions: Girls on Ice Alaska, three students examined how the physical location of glacial meltwater affects water temperature and pH. Their objective: to measure and compare pH and water temperature of glacial meltwater in various locations on and near the Gulkana Glacier. Four locations on the Gulkana Glacier and one on Phelan Creek were sampled over two days with a Hanna Meter probe utilizing GLOBE Hydrosphere water temperature and pH protocols. It was hypothesized that the water temperatures would be highest at a pond at the base of the glacier, and lowest at the most elevated site. A higher pH further up the glacier and lower pH towards the bottom was also hypothesized. The highest elevation sites recorded the lowest temperatures. The single, standing water site (Glacier Pond) recorded the highest temperature and lowest pH. Measurements suggest that downstream flow and aquifer recharge for local Coho Salmon habitat are mostly within the preferred salmon range for pH (7-8). Physical location (elevation, ice formation, type of sediment/rock) affected the pH and water temperature of the meltwater sample. Exposure to solar radiation, friction, and kinetic energy from flow are also possible factors. Measuring pH in glacial meltwaters is challenging due to cold, slow response of equipment, and the remoteness of fieldwork. Continued and additional research is needed to determine the effect of Gulkana Glacier's meltwater on salmon dependent on the rivers and aquifers it replenishes.

Keywords: Gulkana Glacier, water temperature, pH

Overview of NASA SnowEx field campaign in Northern Alaska

Stuefer, Svetlana L. University of Alaska Fairbanks; Vuyovich, Carrie NASA Goddard Space Flight Center; Marshall, HP Boise State University; Durand, Mike Ohio State University; Vas, Dragos Cold Regions Research Engineering Laboratory; Osmanoglu, Batu NASA Goddard Space Flight Center; Elder, Kelly US Forest Service; Mason, Megan NASA Goddard Space Flight Center

Snow depth, snow water equivalent (SWE), and precipitation data are notably sparse in cold regions. This presentation provides an overview of field activities and snow datasets collected during SnowEx campaigns in Northern Alaska in 2022–2023. Snow Experiment (SnowEx) was initiated by NASA's Terrestrial Hydrology Program in 2017 to "enable trade studies for a snow satellite mission design." The focus of SnowEx is on testing and maturing technology for satellite remote sensing of global snow water equivalent (SWE). A suite of airborne and ground-based validation measurements was collected in fall 2022, spring 2023, and fall 2023 in northern Alaska to quantify and compare the capabilities of radar and altimetry sensors to address SWE and snow depth measurement questions unique to taiga and tundra snowpacks. Three SnowEx sites were selected in Interior Alaska, a boreal forest environment with discontinuous permafrost and seasonal taiga snowpack. Two SnowEx sites were located on the North Slope of Alaska, a region dominated by low-stature land cover, tundra snowpack, and continuous permafrost. In March 2023, snow characteristics (microstructure, depth, density, SWE, hardness) were measured at 169 study plots distributed across five SnowEx sites. These ground-based snow measurements were accompanied by two concurrent airborne missions (lidar and SWESARR) at all five sites. A similar set of instruments was tested by the SnowEx team in mountain ranges and temperate forests of the Western U.S. in 2017–2021. When taken together, the SnowEx field campaigns provide snow datasets in support of testing and advancement of remote sensing, modeling, and measurements techniques needed for the development of global SWE products. This presentation focuses on the objectives of the boreal forest and tundra SnowEx campaign and presents an overview of SnowEx March 2023 field activities in Alaska.

Assessing Salmon Habitats on the Banks of the Chena River in Fairbanks, Alaska

Krauss, Theodore K. University of Alaska Fairbanks; Buffington, Christina University of Alaska Fairbanks; Whiteley, Cory Tanana Valley Watershed Association

Alaska's salmon population is hugely invaluable to the economy, culture, and history of those living there. The Yukon River serves as a primary waterway for Chinook salmon O. tshawytscha through Alaska, but according to the Alaska Department of Fish and Game, salmon counts are declining and the state is not reaching its minimum biological escapement goals. The Chena River is a vital pathway for these salmon and is the second largest contributor of Chinook Salmon to the Yukon. Unfortunately for the salmon, much of the natural riparian buffer along the Chena's banks has been stripped away or altered in favor of urbanization and infrastructure, cutting down on typical salmon habitat extensively. In 2013, the Tanana Valley Watershed Association (TVWA) conducted a riparian assessment of both natural and unnatural banks after a University of Alaska Fairbanks (UAF) student mapped and inventoried them using GIS. The TVWA then used the knowledge gained from that undertaking to inform their Chena Watershed Restoration Action Plan (WRAP) which in turn inspired some locals to switch from rock piles known as riprap to green bank alternatives such as root wads. Now, with a grant from the office of Undergraduate Research and Scholarly Activity (URSA) through UAF, we plan to reassess and determine if there has been a positive change in relation to juvenile salmon habitat so as to inform future decisions impacting the watershed. When the ice begins to break up on the Chena River, we will sample different bank types for macroinvertebrates, dissolved oxygen content, water temperature, and visual juvenile salmon presence or absence. Collecting and comparing this data will help to paint a picture of how our banks are influencing salmon welfare, and hopefully provide information on how we can better facilitate salmon habitat.

Effects of Watercraft Wakes on Shoreline Erosion, and Potential Impacts for Salmon at Big Lake, Alaska.

Wilson, Elias E. College of Fisheries and Ocean Sciences, University of Alaska Fairbanks; Muehlbauer, Jeff D. College of Fisheries and Ocean Sciences, University of Alaska Fairbanks, U.S. Geological Survey, Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska Fairbanks; Dekker Franklin J. U.S. Fish and Wildlife Service, Southern Alaska Fish and Wildlife Field Office; Keith Kevin D. Alaska Department of Fish and Game, Division of Sport Fish; LaBarre Amy L. Alaska Department of Fish and Game, Division of Sport Fish; Mazzacavallo Michael G. Alaska Department of Fish and Game, Division of Sport Fish

This poster will describe the initial stages of a study that aims to quantify boat wake-caused erosion in Big Lake, Alaska. The study arose from concerns raised by community members and resources managers about large boat wakes affecting shorelines around the lake. Starting in summer 2023 and continuing into summer 2024, we are measuring the rate of erosion, boat wake frequency and boat wake size at various sites around the lake, in addition to collecting an array of water quality data. Sediments suspended in the water column during the erosion process, by boat wakes or otherwise, can settle on top of spawning gravel and can smother incubating eggs and reduce access to that habitat in the future. Thus, this study will also look to supplement past sockeye salmon (Oncorhynchus nerka) spawning survey data with new surveys to provide an accurate picture of current habitat use and provide stakeholders with knowledge of areas where erosion may be impacting spawning habitat. Our goal is to provide information to better manage erosion at Big Lake and to identify key areas where human impacts may be impacting sockeye spawning and incubation.

Long-term stream chemistry patterns in a boreal watershed underlain with discontinuous permafrost

Olson, Kristin L. University of Alaska Fairbanks; Jones, Jeremy B. University of Alaska Fairbanks

The consequences of climate change on boreal ecosystems are evident in declining permafrost extent, amplifying positive climate feedback loops, and altering the timing and intensity of hydrologic events. Interior Alaska is in the zone of discontinuous permafrost, and the thaw of permafrost could affect carbon cycling in stream ecosystems. We examined stream chemistry over a 20-year period in the Caribou-Poker Creeks Research Watershed (CPCRW) in interior Alaska. Sub-catchments vary in underlying permafrost extent (4-53%) and drainage size. The goal of the study was to evaluate patterns in stream solute concentrations to determine how permafrost thaw and climate change-related trends in temperature alter carbon cycling in high-latitude watersheds. The study aimed to evaluate patterns in dissolved inorganic and organic carbon and nitrogen (DIC, pCO_2, DOC, DON, and NO_3^-), geochemical solutes (Ca^{2+}, Mg^{2+}, SO_4^{2-}), and discharge to determine how permafrost thaw and climate change-related trends in temperature and precipitation have altered carbon cycling in high-latitude watersheds. We analyzed long-term trends in stream chemistry using Thiel-Sen analysis and mixed effects model to determine the influence of abiotic factors on carbon concentrations. Results indicate significant negative trends for DOC (7.8 to 13.7 µM year-1) and pCO_2 (19.0 to 24.9 ppmv year-1), while DIC has significantly increased (6.6 µM year-1). There was no significant trend for weathering solutes such as Ca^{2+} and Mg^{2+}; however, SO_4¬2- concentration decreased across all catchments. Model results indicate that carbon concentration is influenced by temperature, precipitation, Standardized Precipitation Evapotranspiration Index (SPEI), and discharge ($p<0.05$). However, there was no significant relationship with permafrost extent. In conclusion, changes in temperature and precipitation regimes are altering solute dynamics in boreal headwater streams, with consequences for in-stream communities and downstream exports.

Under the Ice: Winter Conditions of Happy Creek following Restoration

Veenstra, Grace. University of Alaska Fairbanks; Buffington, Christi. University of Alaska Fairbanks, International Arctic Research Center; Peterson, Emily. University of Alaska Fairbanks, Department of Chemistry and Biochemistry; Kehoe, Paige. University of Alaska Fairbanks, Department of Chemistry and Biochemistry; Johnston, Sarah Ellen. University of Alaska Fairbanks, Department of Chemistry and Biochemistry

Located in Fairbanks, Alaska, Cripple Creek, a tributary to the Chena River near its confluence with the Tanana River, is undergoing restoration to provide habitat for juvenile chum and Chinook salmon. Like many tributaries in the Yukon River Watershed, Cripple Creek was affected by hydraulic mining which cut off habitat for juvenile salmon for over half a century. With years of dedicated work alongside many partners, the Interior Alaska Land Trust and the US Fish and Wildlife Service replaced and retrofitted culverts for fish passage and diverted Cripple Creek into its historic channel. In December, researchers from the University of Alaska Fairbanks were drilling through the ice at Happy Creek, which intersects the Cripple Creek restoration site, when they detected a sulfurous odor. This prompted a preliminary investigation into the water quality beneath the ice, the findings of which are documented here. For this project, we drilled into the ice at two separate sites, taking measurements of water quality (dissolved oxygen, temperature, pH, and conductivity) and collecting surface water samples which were analyzed for dissolved organic carbon, fluorescence, and absorbance. A noxious sulfurous smell was detected by all individuals in attendance at both sites. We assume this sulfurous gas came from decomposition by bacteria, as the area where the odor was detected overlies vegetation that was submerged during the restoration project. We found the conditions beneath the ice were very detrimental to fish survival. The water was depleted of oxygen, and based on the human odor threshold of common bacteriasourced sulfurous gases, it is highly likely that the concentration of sulfur compounds was to the point of lethality for fish. In light of this, we suggest a more intensive study to sample water consistently and at depth to understand water quality and sulfurous gas concentrations and how they may be changing.

AKFlow - A WebGage Mapping Tool

Geist, M., University of Alaska, Anchorage

Alaska's vast size, sparse human population, and access challenges often result in the state's relatively thin data coverage compared to the other 49 US States for a number of key datasets. This deficiency exists in the US Geological Survey's stream gauging network. Forty-one other states have more than the 114 active USGS gages in Alaska's inventory as listed in a 2020 report to Congress1. While we cannot alter Alaska's geography, nor can we instantly overcome its logistical challenges; we can improve interagency data sharing through modern technologies like web mapping services. AKFlow is a web mapping site based upon ESRI's ArcGIS Online platform which combines the current and historic UGSS steam gauging sites as well as stream gauging sites operated by: Alaska Department of Fish and Game (ADF&G), Alaska Department of Natural Resources (ADNR), National Weather Service's Alaska Pacific River Forecast Center (APRFC), US Bureau of Land Management (BLM), and US Fish and Wildlife Service (USFWS). AKFlow is an interactive web map with sites depicted by data collecting agency and include basic site metadata such as site name, waterbody name, years of operation, site type, hyperlinks to online data (if available), and agency contacts. Over 1,000 sites are included in this initial inventory. Using the USGS Watershed Boundary Dataset (WBD) at the HUC12 level along with a 5meter IfSAR digital elevation data, and the National Hydrographic Dataset (NHD) stream flowlines; 300 upstream polygon drainages have been generated. AKFlow allows users to interact with the data in a web browser via the ArcGIS Online web map or they can use the data (points and polygons) directly in their desktop GIS via a web mapping service. Generation of additional drainage polygons will continue throughout 2024. AKFlow is hosted by the Alaska Center for Conservation Science at the University of Alaska Anchorage. 1https://sgp.fas.org/crs/misc/R45695.pdf

Watershed Resource Action Planning in the Tanana Valley

Geist, Marcus A. Artesian Knowledge LLC; Everett, Christy, Tanana Valley Watershed Association; Henszey, Bob, US Fish and Wildlife Service, Fairbanks

The Tanana Valley Watershed Association and US Fish Wildlife Service engaged stakeholders from municipal, state, federal, and tribal organizations as well as local groups and interested private citizens to deliberately map and plan for five Tanana River sub-basins. These drainages have historically contributed significant numbers of chinook salmon to the Yukon River system. This effort was known as watershed resource action planning (WRAP). The group developed a data-driven, objective methodology for evaluating and prioritizing area within watersheds by mapping conservation values and limiting factors. Data from 8-10 conservation values and 8-10 limiting factors were summarized in hexagons (320 acres or one-half square mile) across each of the five sub-basins. Maps were generated in layered pdf formats at various scales (HUC8, HUC10, and in some cases at HUC12). Uses of data include future site selection for watershed restoration projects, informing permit decisions by regulatory agencies, and identifying areas for enhanced monitoring. Data and maps are available via the Tanana Valley Watershed Association and US Fish and Wildlife Service's Fairbanks office of Conservation Planning.

Tuesday, April 2nd – Talks

Coordination of U.S. Arctic Research

Hinzman, Larry Office of Science and Technology Policy

The Interagency Arctic Research Policy Committee (IARPC) brings together leaders from 18 agencies, departments, and offices across the U.S. Federal government to enhance research in the Arctic. IARPC creates and implements the five-year U.S. Arctic Research Plan, which identifies ways in which Federal agencies can better work together to conduct and fund research in the Arctic. The plan is developed in consultation with the U.S. Arctic Research Commission, the state of Alaska, residents of the Arctic, the private sector, and public interest groups.

IARPC was created in 1984 under the Arctic Research and Policy Act (ARPA). The act called for a comprehensive national policy focused on research needs and objectives in the Arctic. IARPC, along with the U.S. Arctic Research Commission, was created to implement the act. IARPC seeks to facilitate and encourage collaboration in Arctic research, both among Federal agencies and offices, and among the broader Arctic community.

We are now soliciting input as we update the Implementation Plan for the Arctic Research Plan 2022-2026. Federal agencies and the IARPC Collaborations community are successfully meeting many of the deliverables of the Arctic Research Plan's first implementation plan, and are now beginning to craft the next two-year plan (2025-2026) which will be released in November 2024. This implementation plan will be an update of the first one, rather than a completely new plan. IARPC is asking the Arctic research community to help celebrate the successes and accomplishments, highlight where organizers need to shift their attention, and suggest where new research deliverables may be needed.

Who is TVWA?

Nelson, Cynthia B. Tanana Valley Watershed Association; Everett, Christy TVWA Board Chair

Tanana Valley Watershed Association grew out of the Noyes Slough Action Committee and was formally established as a non-profit in 2006, with the mission to promote and improve the health of the Tanana Valley watershed through education, restoration, collaborative research, and diverse community involvement. Since then, it has collaborated with the members of the Fairbanks Stormwater Advisory Committee, the Alaska Railroad Corporation, the Alaska Departments of Environmental Conservation, Fish and Game, and Natural Resources, and the US Fish and Wildlife Service on education, citizen science, research, planning and restoration projects in the Tanana River watershed. This presentation will describe many of the past and present programs and projects, as well as plans for the future. We are particularly proud of our work to detect Chinook salmon in tributaries of the Chena River where they had not previously been known to occur, and our ten-year collaboration with Salcha Elementary School and Alaska Railroad Corporation to monitor changes in Piledriver Slough resulting from the railroad extension and flood control levee.

Working Better Through Forest Partnerships

Prussian, Katherine Tongass National Forest; Johnson, Ian Hoonah Indian Association

The Hoonah Native Forest Partnership has been effective at leveraging technical skills, diversifying funding, and incorporating both community and cultural values to restore habitats, provide jobs, and increase resilience for communities and resources. The Partnership started in 2015 and consists of NGO, Native Alaskan, Federal, and State entities. It has succeeded as a multi-partner, interdisciplinary partnership by implementing a community-focused approach to watershed management. A collaboratively developed restoration plan was developed which identified restoration opportunities to improve fish passage, forest health, water quality, wildlife habitats, and overall watershed function and condition on northern Chichagof Island. The Plan identified projects and priorities which have been designed and implemented collaboratively with partners including Sealaska Corporation, Huna Totem Corporation, Hoonah Indian Association, Natural Resource Conservation Service, The Nature Conservancy, U.S. Fish and Wildlife Service, Alaska Department of Fish and Game, and the Forest Service. This has resulted in learning around workforce development, getting projects on the ground, and how to structure a working partnership. Our presentation will offer anecdotes on what has worked for accelerating project implementation timelines, engaging diverse stakeholders, and making community partnerships work for all.

Streambank Rehabilitation & Habitat Protection Cost-Share Program

Johnson, Jessica J. Alaska Department of Fish and Game; McGee, Chandra U.S. Fish and Wildlife Service

The Streambank Rehabilitation and Habitat Protection Cost-Share Program (Rehabilitation Program) is a proactive financial incentive and educational program that provides funding and technical project design assistance for public land managers and private landowners. The Rehabilitation Program has a long history on the Kenai Peninsula and was developed on the Kenai Peninsula in the mid to late 1990's. In 2008 and 2009 the Mat-Su Valley and Fairbanks area started their own projects. Since the development of the Kenai Rehabilitation Project and the addition of the Mat-Su Valley and Fairbanks area, ADF&G has partnered with USFWS on over 900 projects.

Connecting Habitat and Learning in Cripple Creek and across the Yukon River Watershed

Buffington, Christina L. University of Alaska Fairbanks International Arctic Research Center; Elena Sparrow, University of Alaska Fairbanks International

Arctic Research Center; Malinda Chase, University of Alaska Fairbanks International Arctic Research Center and Association of Interior Native Educators; Grace Veenstra, University of Alaska Fairbanks; Maggie House, University of Alaska Fairbanks; Theodore Krauss, University of Alaska Fairbanks; Scott Faulkner, Fairbanks Soil and Water Conservation District; Joni Scharfenberg, Fairbanks Soil and Water Conservation District

Cripple Creek in Fairbanks, Alaska, a tributary to the Chena River near its confluence with the Tanana River, is undergoing restoration to provide habitat for juvenile chum and Chinook salmon. Like many small tributaries in the Yukon River Watershed, Cripple Creek was impacted by hydraulic mining, cutting off habitat for juvenile salmon for over half a century. After years of dedicated work with many partners, the Interior Alaska Land Trust and the US Fish and Wildlife Service replaced and retrofitted culverts for fish passage and engaged interns and volunteers to monitor for water quality and fish in Cripple Creek. The University of Alaska Fairbanks “Introduction to Watershed Management” class and the Fairbanks Soil and Water Conservation District “Youth for Habitat” program engaged undergraduate and middle school youth in learning about urban stream restoration. Youth for Habitat participants planted riparian vegetation and monitored water quality at the junction of Happy Creek and Cripple Creek near the “Welcome to Fairbanks” sign. Watershed management students planted over 130 birch trees at this same location and conducted research investigations on permafrost, soil temperature, relative humidity, temperature, and water quality parameters (dissolved oxygen, temperature, pH, conductivity, and transparency). The undergraduate students utilized Global Learning and Observations to Benefit the Environment (GLOBE) protocols to design their investigations and present and publish their posters. Four undergraduates were awarded funding to study stream restoration and communicate the story of Cripple Creek. They have monitored conditions for overwintering fish, recently finding anoxic conditions in Happy Creek. This presentation highlights their work and findings. We also share how we utilize GLOBE as a youth-led and scientifically robust monitoring program in both summer camps and classroom contexts. Next steps include connecting our work in Cripple Creek to restoration and monitoring priorities in Yukon River Indigenous communities that are affected by mining.

Southcentral Alaska’s Water and Microplastics: A Survey of Water Bodies in Southcentral Alaska

Chapman, Dyani Alaska Environment Research & Policy Center; Gross, Joi University of Alaska Juneau

Our waterways are a prime location to test for microplastics. Alaska’s watersheds are largely geographically isolated, with the exception of parts of Southeast which are downstream of Canada. They provide drinking water, habitat for aquatic life, and are both economically and culturally vital to the state. Southcentral Alaska is home to less than half a million people (the majority of the state’s population) and hosts a little under two million visitors annually. Microplastic testing in

Southcentral Alaska provides additional insight into atmospheric redistribution of microplastics, key fishery exposure, and local information about drinking water.

To better understand the scope of the microplastic problem in Alaska, Alaska Environment Research and Policy Center staff and volunteers sampled 39 water bodies in Southcentral Alaska. We found microplastics in 100% of our samples.

Our project took samples from waterways between June and September 0f 2023 and tested them for four types of microplastic pollution:

- Fibers: primarily from clothing, textiles, and fishing line;
- Film: primarily from bags and flexible plastic packaging;
- Fragments: primarily from harder plastics or plastic feedstock;
- Beads: primarily from facial scrubs and other cosmetic products.

Microfibers were by far the most prevalent microplastic found in samples, and were found in 100% of samples. Micro fragments and films showed up in fewer locations, but were present in 20.5% and 33.3% respectively. Alaskans and tourists are almost certainly responsible for some of the microplastic pollution, but distribution patterns indicate some of the microplastic pollution is being swept in from other places as well.

It’s clear that the scope of plastic pollution in Southcentral Alaska is extensive. In order to address the environmental and waste crisis being caused by our overreliance on plastics, our leaders at the federal, state, local, and corporate levels should implement policies that will address this problem.

Fresh insights into river ice processes in Alaska from remote sensing, field studies, and citizen science

Arp, Chris D. University of Alaska Fairbanks; Brown, Dana N. University of Alaska Fairbanks; Engram, Melanie. University of Alaska Fairbanks; Bondurant, Allen C. University of Alaska Fairbanks; Clement, Sarah. University of Alaska Fairbanks; Scragg, Matt. University of Alaska Fairbanks; Bodony, Karin. U.S. Fish and Wildlife Service; Spellman, Katie V. University of Alaska Fairbanks

Over the course of four winters, the Fresh Eyes on Ice research team has had the opportunity to explore ice-covered rivers through satellite observations, snowmachine traverses, and collaborations with observers in Alaska schools and communities. In this presentation we will share some of these findings and discoveries including: 1) methods for detection open-water zones using synthetic aperture radar, 2) long-term ice trends and patterns on the Copper River, 3) processes causing open-water zones on the Yukon and Kuskokwim rivers, and 4) observations of high sediment entrainment in ice. Pending successful completion of March fieldwork, we’ll share results hot off the ice from the Yukon and Tanana rivers as well. Discussion of these results and plans for future freshwater ice observing and education in Alaska will be encouraged.

Open flow at forty below: Hydrogeomorphic processes influencing open water zones on the Tanana River

Scragg, Matthew. University of Alaska Fairbanks; Arp, Christopher. WERC, UAF; Bondurant, Allen. WERC, UAF. Brown, Dana. IARC, UAF. Toniolo, Horacio. WERC, UAF; Sullivan, Taylor. CRREL; Engram, Melanie. WERC, UAF.

Frozen rivers provide a crucial transportation corridor for residents of interior Alaska throughout the winter. Some observations have indicated a shorter ice season and decrease in overall river ice thickness on interior Alaskan rivers in recent decades, which impacts subsistence, recreational, and commercial activities. Open water zones (OWZs) in an otherwise frozen river (i.e., open leads) are common and unpredictable, and may occur at any time throughout the winter, but are more common in early and late winter. The temporal and spatial occurrence of OWZs are poorly understood, as well as the climatic, hydrologic, and geomorphic factors that influence their occurrence. One persistent late freezing open water zone on the Tanana River near Fairbanks, Alaska, provides an opportunity to increase our understanding of the processes contributing to the formation of OWZs. We measured channel geometry, ice thickness, and hydraulic conditions at this site throughout the 2023-2024 winter season to identify the physical properties and related mechanisms that control the occurrence of this OWZ. We used cameras to monitor ice conditions throughout the ‘23/24’ season and to validate optical and microwave remote sensing data.

Aufeis area and breakup characteristics on the Sagavanirktok River under El Niño and La Niña conditions

Toniolo, Horacio. UAF; Lai, Alex. Alyeska; Stutzke, Jeff. AKDOT

Nearly a decade ago, the Dalton Highway was flooded by the Sagavanirktok waters during late winter and spring breakup. As a consequence of these flooding events, transportation along the only road connecting Fairbanks and Prudhoe Bay was interrupted for almost 3 weeks. Since that year (2015) we are collecting hydro-meteorological data along a 150 km river reach, south of Prudhoe Bay. Recently, we explored the correlations between aufeis area, breakup characteristics, and temperature anomalies over a three-month period. Temperature anomalies above 0.5 C and below - 0.5 C define, in principle, El Niño and La Niña scenarios. Available data indicate that, in general, under El Niño, the aufeis area increases, breakups are dynamic, with discharge peaks happening in early Spring. Under La Niña, breakups are thermal and the discharge peaks occur further into the Spring. Consequently, we speculate that under strong El Niño, engineers dealing with infrastructure in the vicinity of the river should be prepared for hydrological events that could pose increased risks, and potentially damage the infrastructure.

Sublimation measurements of tundra and taiga snowpack in Alaska

Stockert, Kelsey A. Kuna Engineering; Euskirchen, Eugenie S. University of Alaska Fairbanks; Stuefer, Svetlana L. University of Alaska Fairbanks

Snow sublimation plays a fundamental role in the winter water balance. Continuous latent heat data collected with eddy covariance (EC) measurements from 2010 to 2021 were used to calculate snow sublimation at six locations in northern Alaska: three Arctic tundra sites on the North Slope and three lowland boreal forest/taiga sites near Fairbanks. Mean surface sublimation rates range from 0.08–0.15 mm/day and 15–27 mm/year at the six sites, representing, on average, 21% of the measured solid precipitation and 8–16% of the cumulative annual water vapor flux to the atmosphere (evaporation plus sublimation). We examined the potential drivers and trends of the sublimation rates by using meteorological data collected in conjunction with EC measurements. This research improves understanding of how site conditions affect sublimation rates, highlights the fact that sublimation is a substantial component of the winter hydrologic cycle, and contributes to the sparse literature on tundra and boreal sublimation measurements.

Analyzing vegetation effects on snow depth variability in Alaska with airborne lidar

May, Lora D. University of Alaska Fairbanks; Stuefer, Svetlana L. University of Alaska Fairbanks; Goddard, Scott D. University of Alaska Fairbanks; Larsen, Christopher F. University of Alaska Fairbanks

Seasonal snowpack plays a critical role in hydrologic and ecologic processes, water budget estimation, weather prediction, and climate change studies. In boreal forest regions snow distribution is shaped by canopy-induced processes that are strongly controlled by the structure of the forest canopy at small spatial scales. Identifying the vegetation metrics responsible for snow depth spatial variability continues to be a challenge in boreal forests where land cover is highly heterogeneous and studies are limited. Airborne lidar has advanced our understanding of links between forest snow distribution and vegetation impacts. This study analyzes high resolution (0.5 m) lidar data sets acquired during NASA's SnowEx field campaign in Alaska and compares them statistically with the vegetation metrics of land cover class and canopy height. Airborne lidar data was collected for a boreal forest site during snow-off and peak snow-on accumulation in 2022 and 2023. Lidar snow depth (98 ∓ 15 cm) and canopy height maps were created from lidar data sets. A total of 85.9 million lidar snow depth and canopy height values were available for this study. Three subsets totaling 6.1 million of the total snow depths and canopy heights were used in the analysis. Extensive in situ field snow depth measurements were collected concurrently with the peak snow-on lidar survey and were used to validate lidar accuracy. Results showed statistically significant differences in mean snow depths between all land cover and canopy height classes ($p < 2.2e-16$), with the greatest significant difference between shrub and deciduous forest (6-15 cm) and shrub

and wetlands (7-14 cm). For canopy height classes, forest and treeless (12-14 cm) had the greatest significant mean snow depth difference. This presentation will further summarize results on quantifying snow depth variability between vegetation metrics within boreal forests using NASA SnowEx Alaska data.

2025 National AWRA Spring Specialty Conference and Other Parent Organization Opportunities

Larquier, Ann Marie; Kristanovich, Felix. American Water Resources Association - National Board

Anchorage, Alaska has been selected as the location to host the American Water Resources Association (AWRA) 2025 National Spring Specialty Conference April 28-30, 2025. Tune in to this presentation to learn more about how you can be involved and this chapters relationship to the parent organization. You'll also learn about the many other opportunities that National AWRA has to offer including student scholarships and professional development programs.

Workshop

Land Cover Protocol Utilizing the GLOBE Observer App

Hosted by the International Arctic Research Center (IARC) and Arctic & Earth Stem Integrating Globe & Nasa (Arctic & Earth SIGNs)

GLOBE Land Cover is an app-based tool that will help you document what is on the land (land cover). Once you have downloaded the GLOBE Observer app and created an account, the Land Cover tool will guide you through the observation process. You will report on current surface conditions, then take photographs in all four cardinal directions, up and down. Optionally, you can classify the land cover in your photographs, telling us if it is grassland, a forest or an urban area, as well as compare your classification to a satellite land cover observation and note any differences. Even a basic observation without optional elements is valuable!

The above excerpt was taken from The GLOBE Observer Land Cover webpage. For more information, please visit The GLOBE Program website:

- https://observer.globe.gov/do-globe-observer/land-cover

Field Trip

Moose Creek Dam

Enjoy the end of the conference with a trip to see Moose Creek Dam with your Alaska Water Resources Community. Transport or carpool will be provided to the location.