Alaska Section

American Water Resources Association

2026 Annual Conference Program

Alaska Section American Water Resources Association

2026 Annual Conference

April 6th – 7th, 2026
Kincaid Chalet, Anchorage, Alaska (& virtual)

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Contents

Monday, April 6th

Welcome!

8:30 – 9:10 AM: Registration check-in and breakfast

Light breakfast will be provided at Kincaid.

9:10 – 9:10 AM: Introduction and welcome remarks

Session 1: Data Solutions: 9:10 – 10:40 AM

9:10 – 9:40	**AVIKTUAQATIGIIGÑIQ: Sharing Iñupiat Snow TEKnology** **Leanna Mack**, Research and Development Director, ARCTIC SOLNS
9:40 – 10:10	**Integrating Water Data to Empower Alaska's Rural Communities (Virtual)** **Rachel Lewis**, Graduate Research Assistant, University of Alaska Fairbanks
10:10 – 10:40	**Weather windows and unstable slopes: lidar at DGGS (Virtual)** **Jenna Zechmann**, GIS Analyst, State of Alaska DNR, DGGS

10:40 – 10:50 AM: Coffee break

Session 2: Hydro-Ecology: 10:50 – 12:20 PM

10:50 – 11:20	**Draft 2026 Water Quality Integrated Report** **Amber Crawford**, Water Quality Monitoring and Assessment, State of Alaska Department of DEC
11:20 – 11:50	**No Groundwater, No Fish: The Critical Role of Groundwater in Supporting Non-Glacial, Salmon-Bearing Rivers in South-Central AK** **Tyelyn Brigino**, Ecohydrologist, University of South Florida
11:50 – 12:20	**How we prioritized Alaska's almost 1 million Lakes and Ponds for Aquatic Invasive Species Monitoring** **Marcus Geist**, Research Geographer, University of Alaska Anchorage

12:20 – 1:00 PM: Lunch provided at Kincaid

Monday, April 6th

Session 3: Poster Lightning Talks: 1:00–1:25 PM

Quantifying Peatland Carbon Storage with High-resolution 3D Volumetric Modeling, **Leah Boccignone**, Graduate Research Assistant, University of Alaska Anchorage
Advancing Hydrographic Data for Alaska: Development of a Statewide Strahler Stream Order Layer, **Emily McDermott**, Hydrologist, State of Alaska DNR, DMLW
AKTEMP: Presenting a fully functional stream and lake temperature database for Alaska, **Marcus Geist**, Research Geographer, University of Alaksa Anchorage
Assessing Groundwater-Driven Advective Heat Transport and Its Influence on Permafrost Stability in Alaska, **Santosh Ranabhat**, Graduate Research Assistant, University of Alaska Fairbanks
Post-Wildfire Water Quality in the Kenai Lowlands: Six Years After the 2019 Swan Lake Fire, **Logan Wieland**, Graduate Research Assistant, University of Alaska Anchorage

1:25 – 1:30 AM: Coffee break

Session 4: Hydropower and Infrastructure: 1:30 – 3:30 PM

1:30 – 2:00	**Bradley Lake Expansion Project** **Ryan McLaughlin**, Chief Dam Safety Engineer, Alaska Energy Authority
2:00 – 2:30	**Hydropower in Alaska: Creating Energy and Mitigating Risks** **Ann Marie Larquier**, FERC Hydropower Coordinator, Alaska Department of Fish and Game
2:30 – 3:00	**Chugach Hydropower Decarbonization Effort** **Dustin Highers**, Vice President, Corporate Programs, Chugach Electric Association
3:00 – 3:30	**Preventing Overflow Conditions and Potential Spring Break-up Flooding on Nutirwik Creek on the Dalton Highway and the Importance of Maintenance and Operations (M&O) Staff Observations in Assessing Hydrologic Conditions on Transportation Corridors** **Michael Lilly**, CEO, Geo-Watersheds Scientific

Monday, April 6th

3:30 – 3:45 PM: First day closing remarks

3:45 - 4:00 PM: Poster viewing session with Q&A

4:00 – 6:00 PM: Evening social hour at Ship Creek Brewing Company

Ship Creek serves beer and pizza; we will provide NA beverages.

Tuesday, April 7th

Welcome back!

8:30 – 9:10 AM: Registration check-in and breakfast

Light breakfast will be provided at Kincaid.

Session 5: Flood Mitigation: 9:10 – 11:30 AM

9:10 – 9:40	**Designing Riverbank Armoring to Withstand Extreme Flows - A Case Study on the Mendenhall River in Juneau, Alaska** **Kaylin Pettijones**, PhD, EIT, RESPEC
9:40 – 10:10	**Evaluating Flood and Erosion Risk to Support Community Adaptation in Rural Alaska** **Dana Brunswick**, Climate Adaptation Engineering Project Manager, Alaska Native Tribal Health Consortium
10:10 – 10:30 AM: Coffee break	
10:30 – 11:00	**Accelerated Flood Mitigation: Interagency Collaboration, Rapid 2D Modeling, and Emergency Glacial Flood Response in Juneau, Alaska** **Garrett Yager**, PE, Michael Baker International
11:00– 11:30	**Applying Channel Migration Zone Analysis to Inform Resilient Wastewater Outfall Relocation on the Tanana River** **Jake Ciufo**, Alaska Stormwater Practice Leader, RESPEC

Tuesday, April 7th

11:30 – 12:45 PM: Lunch provided at Kincaid

12:00 – 12:45 PM: AWRA Alaska Section Membership & Board Meeting

We encourage all conference participants to attend.

Session 6: Special Topics: 12:45 – 4:00 PM

12:45 – 1:15	**From Mountaintops to Streams: How High-Elevation, Low-Power Advanced RWIS Stations are Improving Alaska's Weather Forecasting (Virtual)** **Kristina Levine**, Geoscientist, Geo-Watersheds Scientific
1:15 – 1:45	**Making sense of Alaska's 2025/2026 cold winter in a warming world (Virtual)** **Rick Thoman**, Alaska Climate Specialist, Alaska Center for Climate Assessment and Preparedness
1:45 – 2:00 PM: Coffee break	
2:00 – 2:30	**Instream Flow & Water Level Conservation (IFWLC) Training Center Project: Establishing a National Center for Ecologically Sustainable Water Conservation & Management (Center) (Virtual)** **Christopher Estes**, Aquatic Resources & Habitat Scientist, Instream Flow Council Director at Large (1998-2026)
2:30 – 3:00	**Stream hydrology controls on melt and surface morphology of debris-covered glaciers** **Eric Peterson**, Geophysicist, State of Alaska Department of Natural Resources, DGGS
3:00 – 3:30	**2026 AKPRFC Snowpack Summary and Flood Outlook** **Michael Ottenweller**, Meteorologist, Alaska-Pacific River Forecast Center
3:30 – 4:00	**Lessons from the Arctic - The Need for Environmental Observations** **Larry Hinzman**, President's Arctic Professor, U of the Arctic, UAF

4:00 – 4:15 PM: Second day closing remarks

Thank You!

This conference would not have been possible without the work of these individuals and the donations from our conference sponsors.

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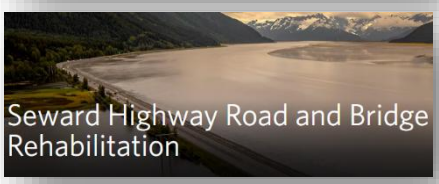

Geo-Watersheds Scientific (GW Scientific) works with research partners from universities, industry, and agencies to improve the understanding and management of water resources.

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Our research projects in sustainable development include improvements in Northern communities and environmental resource development technologies. We also provide technical consulting, investigations, training, and other professional geohydrology, hydrology, environmental, data networks and instrumentation services. We pride ourselves in leading the way in establishing large remote data acquisition systems across the state of Alaska.

Left: the Alaska Avalanche Information Center Gulkana Glacier Station, right: Glenn Highway MP 106 Mini-RWIS station for Alaska Department of Transportation & Public Facilities.

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Michael Baker International's first Alaskan office opened in 1942. Since then, we have played a key role in some of Alaska's most renowned infrastructure projects including an award-winning horizontal directional drilled (HDD) crossing of a major arctic river in continuous permafrost as well as the Trans-Alaska Pipeline System (TAPS), one of the largest pipeline systems in the world.

We continue to focus on cold regions engineering, specializing in pipelines, civil/transportation, architecture, hydrology, geotechnical and permafrost. We also support our clients with environmental permitting, regulatory compliance, wetlands delineation, GIS and Unmanned Aerial Surveys. Our Alaskan professionals in Anchorage and Fairbanks are dedicated to meeting the most demanding and complex challenges with innovative and cost-effective solutions, inspired by nearly 80 years of cold regions experience.

Presentation Abstracts

Session 1: Data Solutions

AVIKTUAQATIGIIGÑIQ: Sharing Iñupiat Snow TEKnology

Presenter: Leanna Mack, ARCTIC SOLNS

The increasing uncertainty in hydrology is the shifting from interconnectedness to splicing the last drop of water into the three individual atoms eliminating the very molecule being studied. Precipitation is a component of the greater water cycle ("What Is Precipitation," 2026). Relatively, Iñupiat are an integral element to the Arctic cryosphere and who hold terminology for all states of water. In fact, coastal Iñupiat are called Taġiuġmuit, people of the ocean. Excluding the Traditional Ecological Knowledge (TEK) of the Iñupiat references for snow is the implication in poor water management flowing from western research methodologies ("Iñupiaq Online," 2026). Imagine using a word only 36 years older than the State of Alaska, the scientific word "cryosphere" to describe

the Arctic ecology instead of the terminologies that have existed for millennia (Oxford English Dictionary, 2025). The TEK for snow correlates to past, present, and future inflections. Using the complex and comprehensive traditional Iñupiat survival tactics is the only solution to manage conservation and development. These proven methods in adapting to any circumstances as they account for aspects in every decision because in the Arctic, one mistake can be fatal. Static practices, like creating permanent settlements, accumulating excess energy shocking the Earth.

Integrating Water Data to Empower Alaska's Rural Communities

Presenter: Rachel Lewis, University of Alaska Fairbanks

Co-Authors: Noah Tsigonis, Arghya Kusum Das

Alaska's fragmented water and wastewater sector creates significant challenges for residents and professionals, limiting access to critical resources, support networks, and opportunities for skill development—ultimately affecting safety and efficiency. To address this, we developed a unified hydroinformatics platform designed to serve remote and underserved regions of Alaska by providing essential information, education, and tools that foster safer, healthier communities. This platform integrates water, wastewater, and solid waste data from 11 disparate silos maintained by various government and private entities, each with unique formats and structures. Using Selenium-based web scraping, we automate data collection to ensure real-time updates with minimal manual input. Key features include a user-friendly file upload interface, an intuitive query tool accessible to non-technical users, and a MongoDB backend for efficient data storage and management. Our solution streamlines the organization and dissemination of up-to-date sanitation systems information, supporting informed decision-making. Currently, the platform consolidates data from over 2,000 water operators, 1,500 drinking water systems, 180 wastewater profiles, and 900 solid waste profiles, impacting more than 200 communities statewide.

Weather windows and unstable slopes: lidar at DGGS

Presenter: Jenna Zechmann, State of Alaska Department of Natural Resources,

Division of Geological & Geophysical Surveys

The Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys (DGGS) conducts lidar surveys in accordance with our mission to study potential geologic hazards to infrastructure. We use our in-house lidar system to perform medium-scale, often repeat surveys of landslide hazard areas, avalanche hazard areas, permafrost evolution areas, and areas of incompletely surveyed tectonic fault systems. Oftentimes we partner with other agencies or universities. Our data published prior to 2022 can be found at the DGGS Elevation Portal, and publications since 2022 are available on our publications page.

Session 2: Hydro-Ecology

Draft 2026 Water Quality Integrated Report

Presenter: Amber Crawford, Water Quality Monitoring and Assessment, State of Alaska DEC

Every two years DEC reviews readily available water quality data to determine if waterbodies meet Alaska's water quality standards. This is known as the Integrated Report, and it fulfills Clean Water Act Section 305(b) and Section 303(d) federal requirements. The Integrated Water Quality Monitoring and Assessment Report is used by the State to prioritize waterbodies for data gathering, watershed protection, and restoration of impaired waters. The 2026 Integrated Report proposes to add two new waterbodies to the impaired waters list, Ketchikan Creek and the Port Valdez Small Boat Harbor. Two previously impaired waters are now attaining water quality standards, and an additional 191 waters are or continue to attain standards. This talk will summarize the draft 2026 Integrated Report.

No Groundwater, No Fish: The Critical Role of Groundwater in Supporting Non-Glacial, Salmon-Bearing Rivers in South-Central Alaska

Presenter: Tyelyn Brigino, University of South Florida

Co-Authors: Kai Rains, Edgar Guerron-Orejuela, Jacob Argueta, Syverine Bentz, Mark Rains

Groundwater discharge plays a critical role in the hydrologic and ecologic functioning of rivers, including modulation of stream flows and stream temperatures. This becomes increasingly important in the Kenai Peninsula Lowlands, Alaska, where salmonids must overwinter in freshwater streams and rely on groundwater inputs for cold water refugia in the summer and warm water refugia in the winter. Simultaneously, groundwater supports the increasing demands of people as population continues to grow in south-central Alaska. Balancing the needs of users becomes increasingly important as climate change introduces greater uncertainty in water resources and fisheries, especially for economically important anadromous species that depend on freshwater resources. We used a geochemical approach to determine the relative contribution of groundwater to streamflow. Over six years, we collected 287 samples of precipitation (i.e., both rain and snow), ephemeral overland flow (i.e., snowmelt and rainfall runoff), groundwater (i.e., seeps, springs, and wells), and streamflow in six non-glacial mainstem salmon-bearing rivers. We analyzed these samples for major ion chemistry and stable isotopes and then used a mass-balance mixing model to calculate the relative contribution of groundwater to instantaneous and annual streamflow. Our results show that groundwater discharge is the dominant source of streamflow, with an annual relative contribution of 70%. Groundwater contribution to streamflow varies seasonally, ranging from approximately 50%–70% during peak flow to 70%–80% during low flow. Groundwater contribution to streamflow also varies spatially, with maximum differences in groundwater contribution ranging ±20 percentage points between the six major watersheds. However, all rivers in the study area followed similar trends, with higher groundwater contributions in summer and winter and lower contributions in spring and fall. Our work is incorporated into ongoing local and regional decision making and engagement, helping to translate science into management outcomes regarding groundwater source protection.

How we prioritized Alaska's almost 1 million Lakes and Ponds for Aquatic Invasive Species Monitoring

Presenter: Marcus Geist, University of Alaska Anchorage

Invasive dreissenid mussels both quagga (Dreissena bugensis) and zebra (Dreissena polymorpha) have drastically impacted freshwater ecosystems and economies across many US states and Canadian provinces. Fortunately, dreissenids have not been discovered in Alaska to date and a partnership has assembled to fend off these invaders. The Alaska Department of Fish and Game (ADF&G) and the US Fish and Wildlife Service (USFWS) aquatic invasive species programs needed a tool to prioritize monitoring among Alaska's nearly one million lakes and ponds. Agency managers had been referencing many different web maps and data portals and sought a comprehensive, "one stop, shop" for information about Alaska's waterbodies. The Alaska Center for Conservation Science at the University of Alaska Anchorage has created a public, multi-function web map to display lake vulnerability and prioritize sampling efforts collecting water quality data to characterize habitat suitability and monitoring for mussel veligers as well as benthic sampling. Each lake is attributed with a suite of factors from multiple agencies. Web map users can filter lakes by road access, boat launches, floatplane use, hydrologic connectivity, elodea, non-native pike presence, ADF&G fish stocking, and known fish species. Additionally, the project team adapted an ArcGIS Survey 123 mobile application to collect standardized monitoring data that automatically populates a layer on the web map when returning from the field. This approach allows other partners such as Soil and Water Conservation Districts, local watershed groups, and Alaska Native groups to join ADF&G and USFWS in a coordinated monitoring effort. This talk will introduce and demonstrate these geospatial tools that partners can use to prioritize and track aquatic invasive species monitoring efforts across Alaska. Similar compilations of disparate data from multiple agencies could be created to inform other aspects of Alaskan water resource management.

Session 4: Hydropower and Infrastructure

Bradley Lake Expansion Project

Presenter: Ryan McLaughlin, Alaska Energy Authority

The Bradley Lake Hydroelectric Project is a 120-megawatt (MW) hydroelectric facility located approximately 25 miles northeast of Homer. In operation since 1991, the project supplies roughly 10 percent of the Railbelt electrical grid demand, serving approximately 75 percent of Alaska's population. Owned by the Alaska Energy Authority (AEA), Bradley Lake represents a cornerstone of the state's renewable energy portfolio. AEA is advancing the Bradley Lake Expansion Project, which aims to increase annual energy production by up to 50 percent through the diversion of glacial meltwater from the Dixon Glacier into the existing Bradley Lake Reservoir. Key infrastructure components include construction of a diversion dam near the toe of the Dixon Glacier, development of a 4.6-mile-long, 16-foot-diameter tunnel to convey flows into the reservoir, approximately one mile of new access road, and modifications to the existing dam and spillway to raise the maximum operating pool elevation by 16 feet. To support project development, AEA has conducted several years of technical studies focused on hydrology and aquatic resources within the Martin River watershed. These efforts have been critical in quantifying the available energy resource while ensuring that project design minimizes potential impacts to fish and wildlife. The project is being developed within a rigorous regulatory framework, including review and approval by the Federal

Energy Regulatory Commission. In February 2026, AEA submitted a Draft License Amendment Application to FERC, marking a major milestone in the project's progression. Pending regulatory approvals, construction is anticipated to begin in 2028, with completion targeted for 2031. The Bradley Lake Expansion Project represents a significant opportunity to enhance renewable energy generation in Alaska, improve grid reliability, and increase the availability of dispatchable hydropower across the Railbelt.

Hydropower in Alaska: Creating Energy and Mitigating Risks

Presenter: Ann Marie Larquier, Alaska Department of Game and Fish

The demand for water is increasing and continued wise management of water resources is essential to the overall economic and social well-being of Alaskans. The mission of Alaska Department of Fish & Game's (ADF&G) Instream Flow Program is to ensure that aquatic-dependent species have sufficient amounts of good quality water to thrive in Alaska's rivers, lakes, estuaries, and wetlands. One way this program helps protect aquatic habitats is through serving as ADF&G's lead in the Federal Energy Regulatory Commission (FERC) hydropower licensing processes. This includes coordinating with hydropower developers on environmental study plans, reviewing project study results, and recommending post-operational monitoring and mitigation to FERC for the protection and management of fish and wildlife resources.

Chugach Hydropower Decarbonization Effort

Presenter: Dustin Highers, Chugach Electric Association

Chugach Electric Association is looking to develop new hydroelectric assets within the region to help decarbonize the Chugach Electric grid. Chugach identified 158 potential sites in Southcentral Alaska. In 2025, Chugach hosted initial agency and stakeholder meetings to solicit feedback. Chugach selected the most feasible sites to continue evaluating new hydroelectric assets. Next steps include submitting preliminary permits to FERC for preferred sites, conducting site-specific stakeholder engagement, developing Pre-Application Documents (PADs), advancing projects to 30% design, and starting the FERC licensing process and final design.

Preventing Overflow Conditions and Potential Spring Break-up Flooding on Nutirwik Creek on the Dalton Highway and the Importance of Maintenance and Operation (M&O) Staff Observations in Assessing Hydrologic Conditions on Transportation Corridors

Presenter: Michael R. Lilly, Geo-Watersheds Scientific

Co-Authors: Ken Monzulla, Tim Fickus, Gordon Scott

Nutirwik Creek is located along the Dalton Highway, Alaska. It drains a significant watershed and has bridge crossing structure. Nutirwik Creek flows into the Dietrich River downstream of a bridge crossing. During winter months, groundwater discharge to Nutirwik Creek supports winter baseflow

conditions. Previous summer rainfall in the Nutirwik Creek watershed, early-winter snow cover condition and low temperature conditions will influence how overflow icing, or aufeis, is formed in streams and drainage structures along the Dalton Highway. This is also an area of very limited basic weather (including rainfall) and stream flow data and information. Similar to remote village elders in Alaska, seasoned M&O operators can provide important observations to help better understand hydrological trends and conditions. This information can help inform design efforts for hydrologic structures, future weather and hydrologic monitoring locations and other aspects of maintaining transportation corridors in the remote regions typical in Alaska. The presentation will show examples of current conditions and runoff control activities for Spring 2026.

Session 5: Flood Mitigation

Designing Riverbank Armoring to Withstand Extreme Flows - A Case Study on the Mendenhall River in Juneau

Presenter: Kaylin Pettijones, RESPEC

Co-Authors: Jake Ciufo

Many riverine and coastal communities today are impacted by accelerating erosion and frequent flooding. In Juneau, properties adjacent to the Mendenhall River are threatened by annual Glacial Lake Outburst Flooding (GLOF). GLOF is a phenomenon in which a glacial lake forces the damming glacier to uplift, instantaneously releasing the dammed lake. In recent years, Juneau has seen GLOF cause extremely large flows on the Mendenhall, surpassing the 500-year flood and causing a FEMA major disaster declaration. To combat future property loss associated with GLOF events, various forms of armoring have been deployed along this riverbank; however, GLOF flow regimes are unique, evolving, and severe, making the design of bank stabilization to withstand such events challenging. Through a case study on the Mendenhall, this talk presents the decision-making process, analysis, and design methods required when engineering riverbanks to be resilient against extreme flow regimes and hydraulic conditions. To accurately account for the high GLOF flowrates during design and permitting, nonstandard hydrologic methods were required and both 1D and 2D HEC-RAS modeling approaches were applied in tandem. The final design was developed to adhere to physical constraints requested by the client and to withstand the severe flowrates now regularly experienced on the Mendenhall River.

Evaluating Flood and Erosion Risk to Support Community Adaptation in Rural Alaska

Presenter: Dana Brunswick, Alaska Native Tribal Health Consortium

The Alaska Native Tribal Health Consortium (ANTHC), through its Climate Initiatives Program, is working to address the growing challenges that climate change poses to rural Alaska communities. Across the state, 144 communities face increasing threats to infrastructure from erosion, flooding, and permafrost degradation. Within this Climate Initiatives program, the Center for Environmentally Threatened Communities (CETC) provides free technical support to address these hazards. CETC and its partners assist communities by providing risk assessments, planning and development services, identification of funding opportunities, grant writing, project management, and capacity

building. Understanding community vulnerability requires both site-specific analysis of historical flood and erosion magnitude and frequency, as well as evaluation of future conditions. These analyses support informed, long-term decision-making around adaptation strategies such as mitigation, managed retreat, relocation, or site expansion. This presentation will describe key environmental threats facing the communities CETC supports and highlight community-specific examples of erosion and flood impacts, along with approaches that have been used to address them.

Accelerated Flood Mitigation: Interagency Collaboration, Rapid 2D Modeling, and Emergency Glacial Flood Response in Juneau, Alaska

Presenter: Garrett Yager, Michael Baker International

Co-Authors: Mark McBroom

Recurring glacial lake outburst floods (GLOFs) from Suicide Basin have become a major hazard for the Mendenhall Valley in Juneau, Alaska, with the 2023 and 2024 events producing record flows that far exceeded FEMA's 100-year flood estimates. In response, the City and Borough of Juneau (CBJ) launched an accelerated, multi-agency effort to deliver interim flood protections and updated flood risk mapping products while federal partners pursued long term solutions. By implementing a flexible on-call term contract, CBJ rapidly engaged Michael Baker International to complete hydraulic analyses and develop new community flood maps within six months. A calibrated HEC-RAS 2D model was developed to simulate complex riverine–coastal interactions across historic and theoretical GLOF scenarios. Model results informed the design and placement of the Phase I HESCO barrier system, which successfully reduced impacts during the maximum historic 2025 GLOF, nearly triple the FEMA 100-year estimate. Publicly released inundation maps improved community understanding and emergency planning. Subsequent model updates support a Phase II extension and revised flood mapping. This presentation highlights interagency coordination, rapid modeling workflows, infrastructure considerations, and lessons learned, demonstrating how agile contracting and accelerated hydraulic analysis can support emergency flood mitigation decisions in rapidly evolving, high risk environments.

Applying Channel Migration Zone Analysis to Inform Resilient Wastewater Outfall Relocation on the Tanana River

Presenter: Jake Ciufo, RESPEC

Co-Authors: Kacy Grundhauser

A Channel Migration Zone (CMZ) study was completed for an 8-mile reach of the Tanana River to evaluate long-term hydraulic feasibility at a proposed relocation site for the City of North Pole's (CNP) wastewater effluent outfall. The Tanana River is a dynamic, glacier-fed, heavily braided river that flows from eastern Alaska, forms the southern border of CNP, and flows into the Yukon River. CNP uses a passive lagoon system to treat an average of 150,000 gallons of wastewater per day for approximately 1,700 residential, commercial, and industrial customers. To meet Alaska Department of Conservation regulations, CNP uses a mixing zone which is a region where

discharge is diluted with river flow to lower pollutant concentrations. Reductions in flow conveyance near the existing outfall have reduced dilution within the permitted mixing zone, leading to noncompliance with the Alaska Department of Conservation regulations. CNP contracted RESPEC to conduct a CMZ study to investigate the feasibility of a proposed outfall location. A CMZ analysis, adapted from Washington state guidance, was conducted for an 8 mile reach of the Tanana River. Historical aerial imagery from 1938–2025 was used to delineate the Active Channel, Restricted Migration Area, and Erosion Hazard Zones based on channel geometry, flow rate/distribution, sediment, vegetation, and human modifications. Particular attention was given to the hydraulic influence of the U.S. Army Corps of Engineers' Tanana River Levee and associated structures constructed from 1973–1987. Historical channel planform change was used to predict future movement and bank erosion for the proposed design life of 20 years. This presentation will summarize the CMZ process, analysis, and results, and show how CMZ analyses can inform infrastructure feasibility. Project recommendations for sustainable and resilient planning and operation will be discussed.

Session 6: Special Topics

From Mountaintops to Streams: How High-Elevation, Low-Power Advanced RWIS Stations are Improving Alaska's Weather Forecasting

Presenter: Kristina Levine, Geoscientist, Geo-Watersheds Scientific

Co-Authors: Chris Stinson, Kyle Sobek, Ron Paetzold, and George "Bub" Mueller

Weather stations at high elevations are notoriously difficult to install and maintain due to high winds, blowing snow, ice accumulation, and rugged mountainous terrain. However, the data they provide is essential for improving meteorological forecasts. In a combined effort between the Alaska Department of Transportation & Public Facilities Avalanche Program and Geo-Watershed Scientific, the challenge to design, install, and upgrade existing high-elevation stations was successfully met. The group provided Winter Hazards Advanced RWIS (Winter Hazards) Stations at seven locations within the Kenai and Chugach mountain ranges. Each station was designed with a focus on low power, robust hardware, and improved data standards. Low power usage enables stations to survive long Alaskan winters, which can quickly drain and damage batteries at solar powered sites. This was achieved by utilizing a Campbell Scientific data acquisition system. A Campbell Scientific power budget spreadsheet was used to plan out all sensors and device current use to optimize station power performance. Sensors were chosen based on quality, power requirements, and durability against cold temperatures. Backup anchoring and cable protections were installed to ensure station resilience. Remote power monitoring and control equipment (a smart charge controller, CH201) was added to minimize data outages by facilitating preventative maintenance. Additionally, multiple data standards were met by providing various data files. This allows diverse end users like the DOT RWIS Network, NOAA, MesoWest, Federal Highways, and avalanche forecasters to easily ingest and utilize the data in their forecasts and other applications. Thorough documentation (metadata) was developed to guide station operations and maintenance. It is the hope of the group that these stations will serve as examples for future high-elevation stations throughout Alaska.

Making sense of Alaska's 2025/2026 cold winter in a warming world

Presenter: Rick Thoman, Alaska Center for Climate Assessment and Preparedness

Much of Alaska saw persistently cold weather from early December right through March; in some places this was the coldest four-months on record. At the same time, excessive warmth dominated globally. This presentation will put the regional extremes into context and provide some insights into how regional cold happen in a warming world.

Instream Flow & Water Level Conservation (IFWLC) Training Center Project: Establishing a National Center for Ecologically Sustainable Water Conservation & Management (Center)

Presenter: Christopher Estes, Instream Flow Council Director at Large (1998-2026)

The Instream Flow Council (IFC) in partnership with the American Fisheries Society (AFS) are establishing a Instream Flow & Water Level Conservation (IFWLC) Training Center. The IFWLC Center will help serve the nation in improving the following objectives. Provide an equivalent full-time centralized, integrative interdisciplinary IFWLC - relating science, legal, institutional, & public involvement training & instruction. Reduce the loss in expertise and fragmentation of interdisciplinary applications. Provide credible full-time continuing education training & instruction for Water Stakeholders (EXISTING & NEW). Updates on the current process and progress will be provided, followed by a question answer session.

Stream hydrology controls on melt and surface morphology of debris-covered glaciers

Presenter: Eric Peterson, Geophysicist, Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys

Co-Authors: Regine Hock, Michael Loso

In this study of debris-covered Kennicott Glacier, Alaska, we investigate the influence of supraglacial stream hydrology on ice cliffs (which are melt hot spots) using in situ and remote sensed observations, streamflow measurements, and a conceptual geomorphic model. We found that 33% of ice cliffs (accounting for 69% of the total ice cliff area) are actively influenced by streams. Supraglacial streams contribute to ice cliff formation and maintenance by horizontal meandering, vertical incision, and debris transport. These processes produce an undercut lip at the ice cliff base and transport clasts up to tens of centimeters in diameter, preventing reburial of ice cliffs by debris. Stream meander morphology reminiscent of sedimentary river channel meanders and oxbow lakes produces sinuous and crescent ice cliff shapes. Stream avulsions result in rapid ice cliff collapse and local channel abandonment. Ice cliffs abandoned by streams are observed to be reburied by supraglacial debris, indicating a strong role played by streams in ice cliff persistence. The development of landscape evolution models may assist in quantifying the total net effect of these processes on ice cliff prevalence and melt from debris-covered glaciers, enhancing our ability to predict runoff from glacierized catchments.

2026 AKPRFC Snowpack Summary and Breakup Outlook

Presenter: Michael Ottenweller, Meteorologist, Alaska-Pacific River Forecast Center

This presentation provides an overview of the a 2026 river breakup outlook from the Alaska-Pacific River Forecast Center (APRFC). APRFC is part of the National Weather Service's Alaska Region. APRFC provides operational hydrologic services for three Weather Forecast Offices located in Anchorage, Fairbanks, and Juneau. Operational products generated by the APRFC include flood forecasts, general river forecasts, recreational forecasts, navigation forecasts, reservoir inflow forecasts, water supply outlooks, spring flood outlooks, and various types of flash flood guidance. APRFC also provide hydrologic development support for both the Alaska and Pacific Regions. This includes a variety of other services, such as developing and implementing new procedures, forecast techniques, computer systems, data handling techniques, and hydrologic-related hardware. The APRFC also provides hydrologic expertise on a wide range of hydrologic activities for NWS and other federal, state, and local agencies

Lessons from the Arctic - The Need for Environmental Observations

Presenter: Larry Hinzman, President's Arctic Professor, U of the Arctic, University of Alaska Fairbanks

In the United States, the processes of responding to natural emergencies or managing our natural resources evolved from a long history of awareness and understanding derived from observations and monitoring, combined with assessment through established and accepted analytical methods. From weather forecasts to managing fisheries, our nation has relied on expert knowledge of historical norms and understanding the consequences of deviating from those norms. Management of traffic, water usage, industrial emissions, food additives, and nearly every other aspect of life in today’s society is regulated based upon society’s concurrence that population health, sustainable resources and a civil society are maintained through environmental measurement and analysis. In light of our nation’s dependence upon environmental monitoring to enhance safety, security, and resource allocations, it is contrary to our collective consciousness to eliminate essential sources of information that are critical to enable informed decisions. Environmental observations are essential for awareness and responding to changes, threats, and sustainable use. In order to highlight the importance of, and need for, environmental observations, the Arctic provides a compelling focus through past examples of societal responses driven by federally-supported monitoring while illustrating the vulnerabilities arising from the loss of environmental observations.

Poster Abstracts

Quantifying Peatland Carbon Storage with High-resolution 3D Volumetric Modeling

Presenter: Leah Boccignone, University of Alaska Anchorage

Co-Authors: Eric S. Klein, Caixia Wang, Nathan D. Stansell

Peatlands are hydrologically sensitive ecosystems that serve as critical global carbon sinks, sequestering approximately 30% of global soil carbon despite covering only 3% of the Earth's land surface. In the warming Arctic, peatlands are increasingly vulnerable to hydrologic changes, which impacts their carbon dynamics. However, largely due to methods that focus on carbon change through time, the current carbon storage estimations vary widely at local, regional, and global scales. To help bridge this knowledge gap, this study quantifies the carbon stock of the Välisuo peatland in northern Finland—a site currently undergoing hydrologic restoration—using a novel multi-method approach that integrates hydrology, geophysics, and remote sensing. This study combined high-density manual probing measurements, ground penetrating radar (GPR), and drone-derived digital elevation models (DEMs) into a high-resolution 3D subsurface model via Ordinary Kriging interpolation, allowing for volumetric calculations that account for subsurface structure and surface topography. Peat sediment core and stable water isotope analyses were employed to complete the carbon stock estimation and characterize regional hydrology. The results yield a carbon mass estimate of 9,338.50 ± 1,585.17 t C, a value approximately five times higher than previously predicted. This finding, along with the notable differences in performance between the high-resolution GPR data compared to the manual probing data, suggests that traditional methods may significantly underestimate the carbon stored in peatland reservoirs. As the Arctic regions face accelerating hydroclimate shifts, this multi-method workflow offers a scalable framework for refining regional carbon budgets and improving the management of northern water-carbon reservoirs.

Advancing Hydrographic Data for Alaska: Development of a Statewide Strahler Stream-Order Layer

Presenter: Emily McDermott, Alaska Department of Natural Resources, Division of Mining, Land, and Water

Co-Authors: Wendy Steinberger

The Alaska Department of Natural Resources, Division of Mining, Land and Water has developed a new statewide map layer depicting Strahler stream order classification across Alaska to support hydrologic analysis and water resource management. Strahler stream order is a hierarchical network classification system in which each stream segment is assigned an integer value derived from the number and order of its contributing upstream tributaries. A stream order layer provides a standardized fluvial classification applied on a consistent basis for evaluating watershed characteristics. This dataset was produced using the 2018 and 2024 USGS National Hydrography Dataset for the flowline geometry and RIVEX (v. 1.14) within ArcGIS Pro to perform network

analysis and order assignment. For transboundary drainage systems, classification was supplemented with the Canada1Water hydrologic model to ensure continuity and alignment across the Alaska–Canada border. HUC 6 flowlines are currently excluded from the map. The resulting stream order layer enables a consistent comparison of drainage systems across diverse regions of Alaska and facilitates integration of stream order information into hydrologic modeling and natural resource assessments. By standardizing stream network hierarchy at a statewide scale, this dataset addresses a long-standing data gap and provides a broadly applicable tool for agency staff, researchers, and resource managers. The dataset is publicly accessible through the Alaska DNR ArcGIS Online platform: https://soa-dnr.maps.arcgis.com/home/item.html?id=2cdb9356a39e44f78432e74a6d90f7bc

AKTEMP: Presenting a fully functional stream and lake temperature database for Alaska

Presenter: Marcus Geist, University of Alaska Anchorage

Co-Authors: Erin Larson, Dustin Merrigan, Jeff Walker

AKTEMP is a cloud-based database platform for storing and accessing stream and lake temperature monitoring data across Alaska. The website allows users to upload, review, explore, and download data. Data can be uploaded either as a single file or as multiple files, which can be uploaded simultaneously as a single batch. After uploading, an interactive QA/QC tool can be used to review and flag data representing erroneous or abnormal measurements (e.g., out of water). Users can explore available data at all sites statewide or within specific hydrologic basins (i.e. HUC4, 6, or 8) using spatial filters. Additionally, users can download both the raw and daily-aggregated timeseries at one or more sites along with the accompanying station metadata. The project team has developed instructional videos, decision tree flowcharts, and a user guide to aid data providers and public users. The system architecture for AKTEMP was based on the Spatial Hydro-Ecological Decision System (SHEDS) northeast stream temperature database, which was developed by Walker Environmental Research in collaboration with USGS. AKTEMP was released in early 2023 and currently serves freshwater temperature data at nearly 900 sites across Alaska. Use of AKTEMP is free and open and will continue to be supported by staff at UAA's Alaska Center for Conservation Science. We invite the community to take advantage of this database by uploading your own data, and/or exploring data uploaded by others to meet your needs.

Assessing Groundwater-Driven Advective Heat Transport and Its Influence on Permafrost Stability in Alaska

Presenter: Santosh Ranabhat, University of Alaska Fairbanks

Co-Authors: Debasmita Misra, Sudhansu Panda, Il Sang Ahn

Subsurface thermal and hydrological processes have a significant impact on permafrost deterioration in cold climates; traditional geotechnical modeling techniques mainly take into consideration conductive heat transfer and frequently ignore advective heat transport related to groundwater movement. The objective of this study is to assess the amount of influence of groundwater movement on permafrost degradation. A statewide DRASTIC Index is developed to

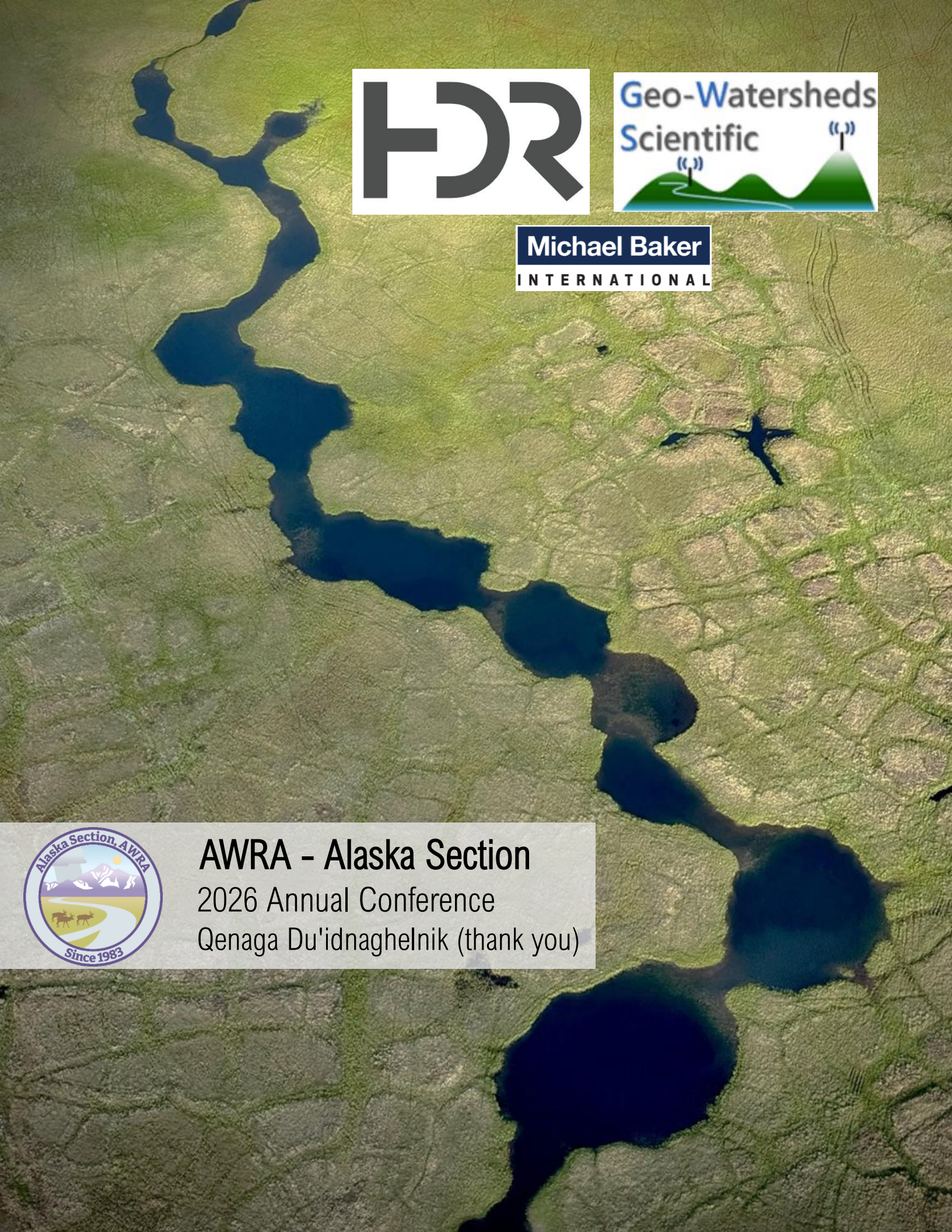
quantify the potential for groundwater infiltration and associated advective heat flux into the subsurface. The index incorporates key parameters, including depth to groundwater, recharge, aquifer characteristics, soil properties, topography, vadose zone conditions, and hydraulic conductivity. To evaluate the relationship between groundwater-driven processes and permafrost dynamics, the DRASTIC index is compared with long-term observations from Circumpolar Active Layer Monitoring (CALM) stations distributed across Alaska. These stations provide multi-decadal measurements of ground temperature and active layer thickness, enabling assessment of permafrost response to varying hydrogeological conditions. Statistical and spatial analyses are employed to examine correlations between DRASTIC-derived vulnerability and observed active layer changes. The results highlight the significance of groundwater-mediated heat transport in influencing permafrost stability and demonstrate the applicability of hydrogeological indices as proxies for advective thermal processes.

Post-Wildfire Water Quality in the Kenai Lowlands: Six Years After the 2019 Swan Lake Fire

Presenter: Logan Wieland, University of Alaska Anchorage

Co-Authors: Eric Klein, Cameron Kuhle, Leah Boccignone, Kaylen Hall, Blake Hausman, Naomi Krause, Athena Turner

The Kenai Peninsula is experiencing a warming and drying climate trend that is increasing the frequency and severity of boreal wildfires, threatening the quantity and quality of regional surface water resources and the communities they supply. As part of a broader investigation into wildfire-driven carbon mobilization across Kenai lowland wetland systems, we incorporated the first comprehensive post-burn aqueous geochemical assessment for the region, examining the aquatic legacy of the 2019 Swan Lake Fire (SLF) to evaluate mid- and long-term surface water quality following wildfire containment. Here we focus on the East Fork Moose River subwatershed (73% burned during the SLF), which feeds into the Kenai River above the communities of Sterling, Soldotna, and Kenai. In 2025, six years post-disturbance, we sampled five waterbodies across burned (Peterson Lake, Egumen Lake, Egumen Wetland, Watson Lake) and unburned (Lily Lake) catchments during three field campaigns (June, August, November), analyzing major ions, trace metals, and dissolved organic carbon (DOC). Egumen Wetland showed progressive geochemical deterioration through the 2025 season, with dissolved iron increasing 21-fold and arsenic 19-fold from June to November. These trends coincided with near-anoxic conditions consistent with reductive dissolution of metal-oxyhydroxide minerals driven by currently unknown local/regional mechanisms in this shallow, poorly flushed system. Egumen and Watson Lakes (positioned above and below the wetland complex, respectively) reflect their relative isolation from Egumen Wetland through nominal solute content, though whether this isolation persists during wetter seasons remains unclear. Peterson Lake exhibited the lowest DOC of all sites, suggesting either an advanced DOC flush stage or a buffered hydrological regime. Differences between Lily Lake and burned sites likely reflect pre-existing catchment geology and ecology rather than fire effects alone, complicating simple burned/unburned comparisons. Taken together, these results indicate that waterbody type, particularly the susceptibility of shallow wetlands to sustained anoxic metal and carbon mobilization is a stronger predictor of ongoing fire impact than burn history alone. As climate-driven fire regimes intensify across southcentral Alaska, understanding these divergent recovery trajectories will be essential for anticipating downstream water quality impacts.



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Qenaga Du'idnaghelnik (thank you)