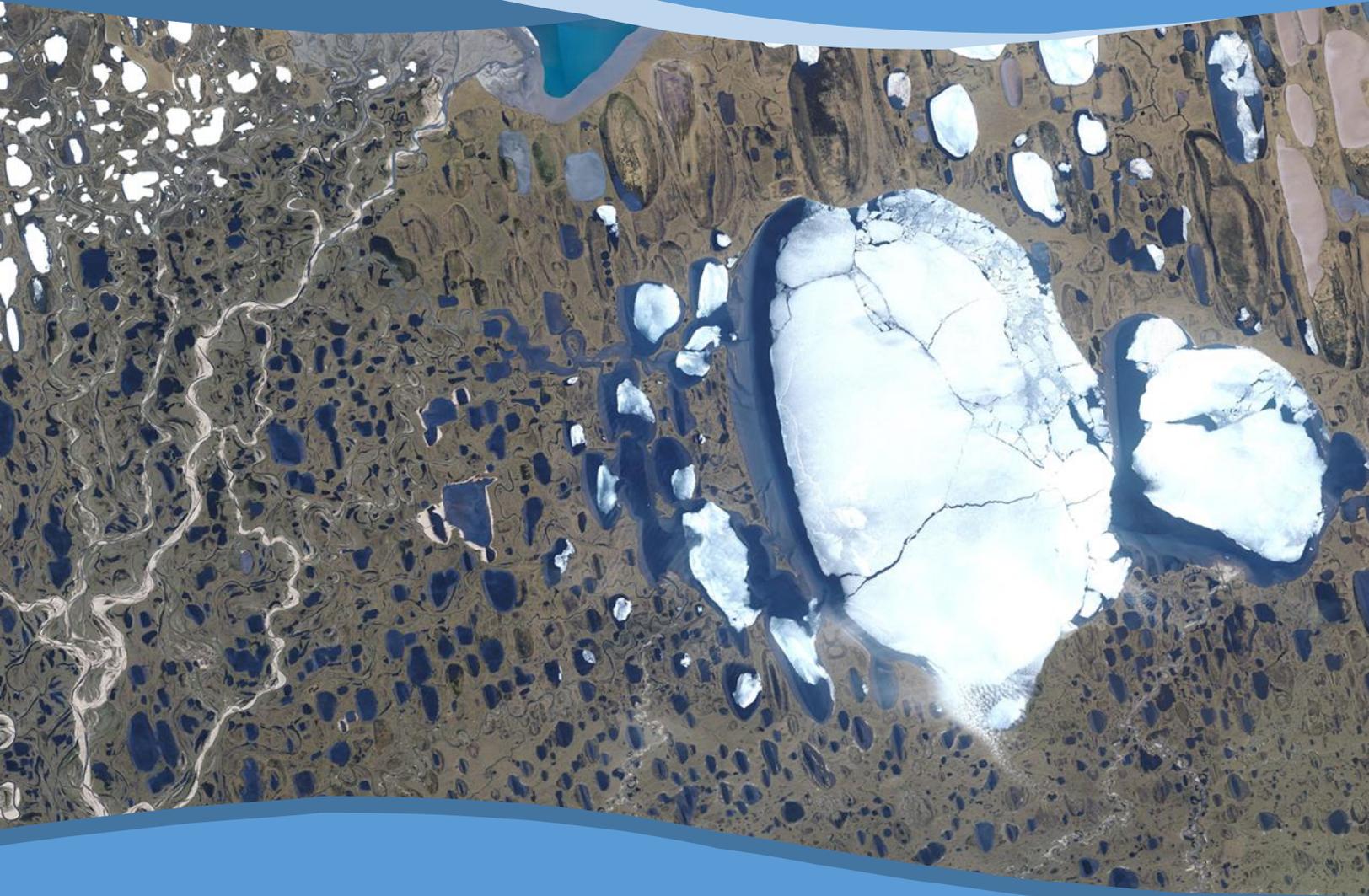


# Alaska Hydrography Strategic Plan



## Mapping Alaska's Water 2017-2021

Prepared by the Alaska Hydrography Technical Working Group and Alaska Hydrography Database

# Alaska Hydrography Strategic Plan

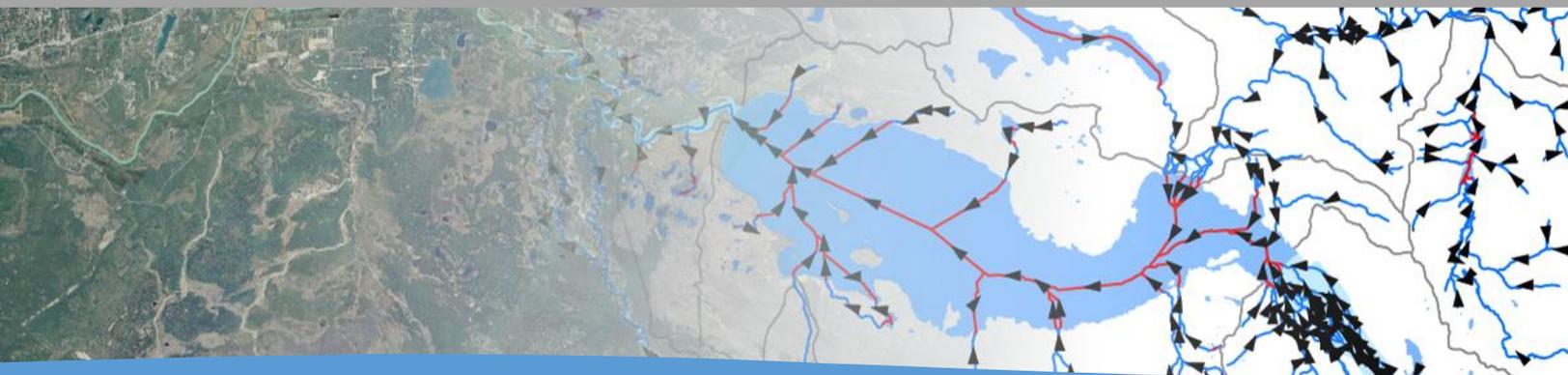
**A**laska is an expansive state with abundant water resources. Its rugged and complex landscape is defined by water and ice. To date, more than 12,000 named streams and rivers stretching more than 850,000 miles, over one million lakes and more than 600 named glaciers have been mapped. Alaska's mapped coastline measures more than 47,000 miles long. And the state's longest river, the Yukon, is the third longest river in the U.S. measuring nearly 2,000 miles from its headwaters in Canada to its massive delta that empties into the Bering Sea. Despite these abundant water resources, Alaska lacks quality surface water mapping, also known as hydrography.

While consistently mapped at a scale of 1:24,000 or better in the contiguous U.S, the National Hydrography Dataset (NHD) in Alaska was derived from 1950's era USGS Historical Topographic Maps at 1:63,360-scale. The NHD, a national dataset depicting the nation's surface waters, has seen few improvements or enhancements in Alaska since its completion in 2008. It contains many errors including streams mapped outside their actual channels, misrepresentations of flowlines, disconnected streams and omission of existing streams.

Many of these issues stem from a lack of statewide mapping coordination in the past.

Editors from different groups are scattered throughout the state, each working to fulfill their agency's needs, but not necessarily working towards statewide hydrography needs. These past practices resulted in the creation and use of numerous localized hydrography datasets over the years. Given this situation, numerous entities are engaged in an effort to update the mapping of surface waters in Alaska and improve NHD to meet national standards. Initial regional efforts began in 2010 and increased in 2013 with the formation of the Alaska Hydrography Technical Working Group (AHTWG) and establishment of the Alaska Hydrography Database (AK Hydro).

NHD updates in Alaska are now coordinated by AHTWG. AHTWG is an active group that addresses surface water mapping needs and issues in the state with representatives from federal, state, local, academic and non-profit entities. AHTWG successfully adopted AK Hydro as the stewardship model to coordinate, improve and move updated hydrography from partners into the NHD. AK Hydro serves Alaska through two goals: first, updating the NHD in Alaska to national high-resolution standards and second, meeting the needs of Alaska's agencies. Utilizing AK Hydro ensures that updates happening throughout the state make their way into the NHD in a timely and consistent manner. And the stewardship model al-



# Serve the Hydrography Needs of Alaska

lowers partners throughout the state to include important and necessary attributes with their hydrography datasets.

To date, AHTWG, AK Hydro and partners have successfully mapped and updated the surface waters in many parts of the state to national standards. In order to complete statewide hydrography updates and meet the needs of Alaska, AHTWG and AK Hydro produced the Alaska Hydrography Strategic Plan.

This strategic plan will promote and guide the core mission to efficiently serve the current and future hydrography needs of Alaska for the next 5 years (2017-2021).

AHTWG and AK Hydro are integral in implementing this strategic plan and meeting the hydrography needs of Alaska. AHTWG and its federal, state, local, non-profit, academic, tribal and industry partners across Alaska work to identify the hydrography needs of the state. The group does so by accurately mapping Alaska's surface waters, promoting the use of a standardized and common statewide hydrography dataset, coordinating agency needs and integrating the data with other datasets. AK Hydro helps its partners map and update the surface waters in Alaska and maintain necessary attributes with the most current and best

available data using a simple, familiar workflow and toolset.

This strategic plan is a guiding framework that lays out the objectives and goals for AHTWG and AK Hydro to accomplish high-resolution statewide hydrography updates that meet national mapping standards and local partners' needs.

The strategic plan identifies five key objectives: 1) **Map Alaska's Water** 2) **Support Alaska's Hydrography Needs** 3) provide **Hydrography Services** 4) establish a **Sustainable Hydrography** future and 5) allow for **Data Integration**. These strategic objectives will give AK Hydro and AHTWG success in meeting the mission to efficiently serve the hydrography needs of Alaska. The objectives assist in mapping the surface water of Alaska, meeting NHD standards, securing funding to complete hydrography updates, engaging partners, identifying needs and integrating with national and local datasets.



# Map Alaska's Water

**A**ccurately mapping Alaska's water is a key objective for both AHTWG and AK Hydro in meeting the State's hydrography needs. Current and accurately mapped streams, rivers and lakes are essential for countless applications ranging from solving public and private property issues, to managing natural resources, to effective fish habitat management and conservation. However, throughout Alaska, agencies and organizations use less-than-accurate and dated surface water mapping. In order to efficiently serve the hydrography needs of Alaska, AK Hydro, AHTWG and partners must first accurately map Alaska's water to modern national standards.

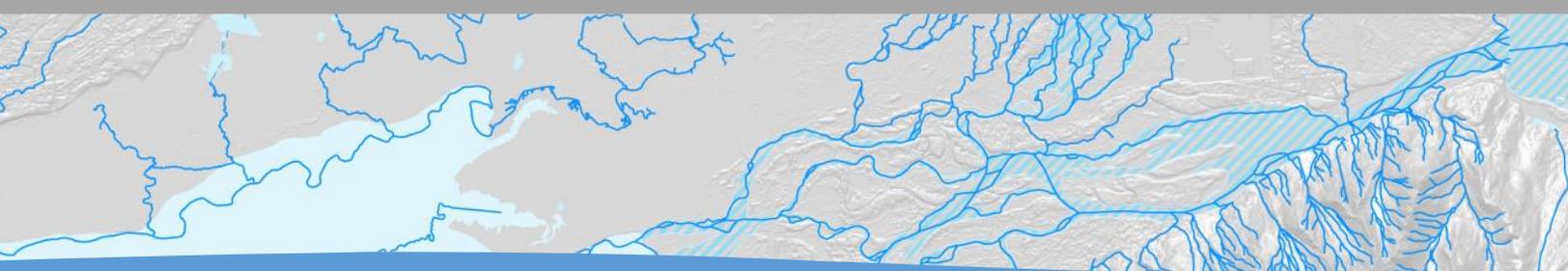
User demand for updated hydrography across the state is growing with increasing expectations for quality and performance. The existing hydrography in Alaska, including the NHD, contains many errors such as streams mapped outside their channels, misrepresentations of flow direction, missing streams and lakes, incorrect location of the coastline and poorly mapped lake shorelines.

## Goals:

- Update existing hydrography from the current condition to 1:24,000-scale accuracy and density standards.
- Generate a complete flow network that supports upstream/downstream analysis.
- Uplift updated hydrography to the NHD.
- Publicly distribute the data in the National Hydrography Dataset and Alaska Hydrography Database.

Since 2010, partners throughout the state have collaboratively worked towards updating the NHD and establishing a single, consistent, and accurate statewide hydrography dataset. To date (2016), less than 20% of the state's hydrography meets national 1:24,000 scale (high-resolution) standards. Significant work remains to bring hydrography data across the entire state in-line with national high-resolution mapping standards for the NHD and Alaska specific standards developed by AHTWG.

Under this objective, AK Hydro, AHTWG and their partners will continue updating existing surface water mapping from their current condition to 1: 24,000-scale accuracy and density standards. Updates will be consistent across the state and meet national and statewide standards. The hydrography data collected through this effort will be made publicly available in both the NHD and Alaska Hydrography Database.



# Support Alaska's Hydrography Needs

In order to provide value to Alaska, hydrography data must meet, and continually adapt, to Alaska's needs. AHTWG and partners have identified that a successful statewide hydrography model should store a rich suite of attributes tied to mapped features. AK Hydro was created to meet the need for Alaska's agency-specific attributes to be included with hydrography data.

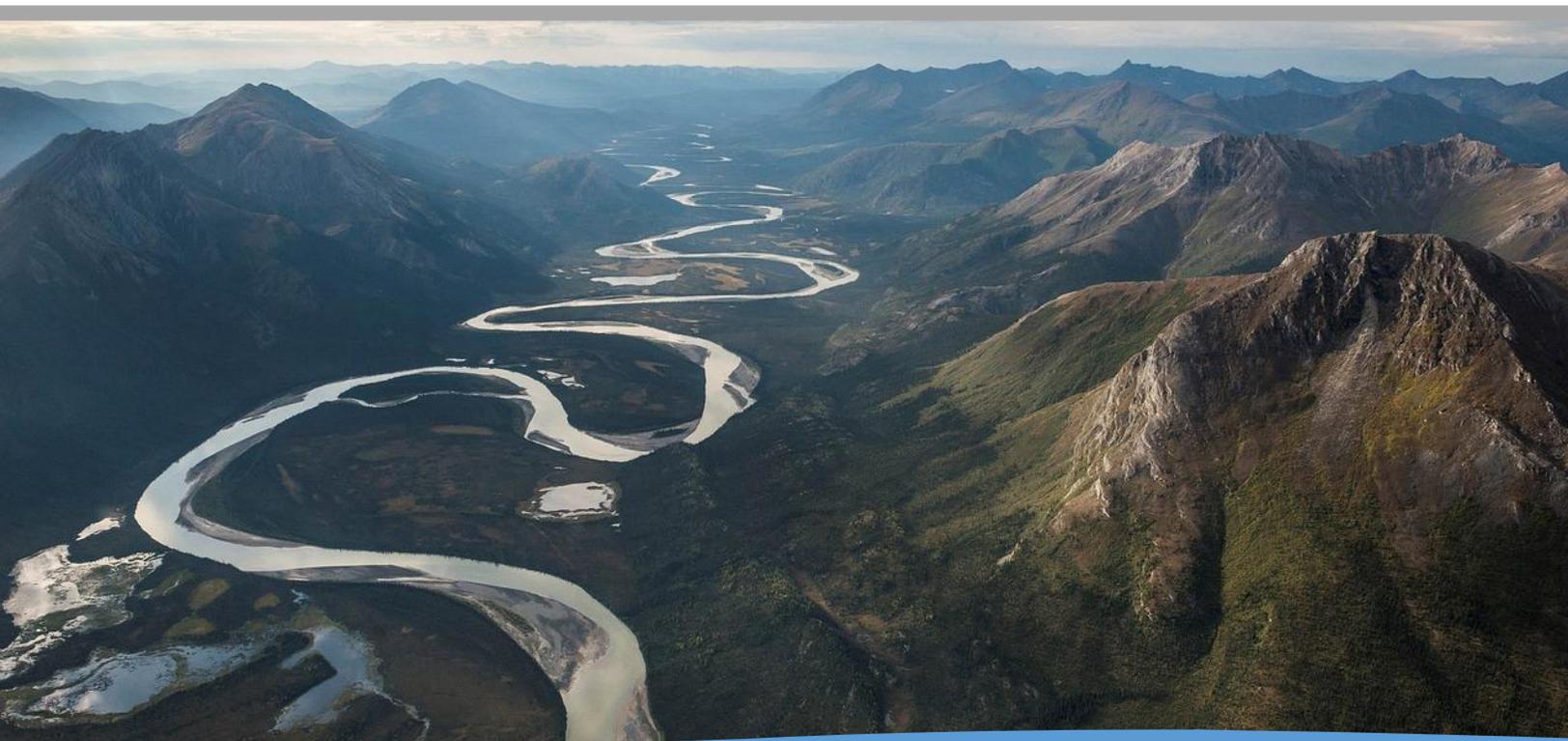
Attributes such as bio-geographical information, fish observations, aquatic species habitat, potential barriers to fish passage, anadromous fish habitat, intertidal areas, estuaries, multiple coastlines, stream geomorphology,

## Goals:

- Develop statewide data standards that meet Alaska's needs and national requirements.
- Provide capacity for partners to add necessary attributes that meet their hydrography needs.
- Regularly address the hydrography needs of Alaska entities by engaging with the water community.

stream channel gradient, patterns and erosion, and others are not captured in the current NHD data model.

Efforts to update hydrography in Alaska should seek to leverage additional resources and datasets that are currently available, or being collected, and include attributes from the data with hydrography updates. Providing Alaska-specific attributes within a simplified and localized database, and ensuring that the attributes are linked to an accurate NHD allows partners to fully utilize hydrography data to meet their needs.



# Hydrography Services

One of the fundamental hydrography needs in Alaska is a simplified editing workflow for mapping the state's water. AK Hydro was developed in 2010 to meet this need. By working together and sharing knowledge, data and resources, agencies in Alaska are better able to manage and meet Alaska's hydrography needs.

AK Hydro streamlines the task of updating the NHD by centralizing NHD maintenance services within a single group for all of Alaska. In doing so, the numerous agencies participating in surface water mapping across the state no longer need to run the complex NHD update tools. Instead, partners and editors provide updated hydrography that meet statewide and national standards to AK Hydro. AK Hydro then uses

the NHD GeoConflation and NHD Update Toolset to update the NHD. This workflow ensures that the updates that are happening throughout the state make their way into the NHD in a timely and consistent manner.

This stewardship model encourages partners to collaboratively edit, manage and maintain hydrography data that is ultimately uplifted into the NHD. AK Hydro makes editing hydrography data simple, affordable and accessible to GIS users in Alaska who may not have the resources to learn or maintain the skills that are necessary to be proficient in the use of NHD editing tools. And in doing so, improves the efficiency and coordination between agencies in Alaska.

## Goals:

- Provide a simple and straightforward hydrography editing process to partners in Alaska.
- Work with the USGS and NHD program to address and improve hydrography data model issues particular to Alaska.
- Support services that foster coordination and collaboration amongst hydrography editors and users in Alaska.



# Sustainable Hydrography

**S**ustainable hydrography ensures that hydrography updates, maintenance and coordination persist through the next five years and beyond. The future of hydrography updates in Alaska requires retaining and growing experienced leadership and staff, securing financial resources to complete updates, and providing a stable technical infrastructure.

Hydrography mapping efforts in Alaska have received funding from various entities since 2010. Support has come in the form of both financial awards and in-kind contributions.

However, to continue working towards a goal of efficiently serving the hydrography needs of Alaska through 2021, additional support is required from partners and benefactors of the work. Financial support is required for two components of the work. First, to support 1:24,000-scale mapping of water resources in the state and second, to support the stewardship model and staff that move updates from partners into the NHD. At the conclusion of this strategic plan, options for funding the remaining work, and ensuring the sustainability of hydrography updates, are presented.

## Goals:

- Secure funding to complete high-resolution hydrography updates statewide.
- Develop long-term sustainable funding stream for AK Hydro.
- Develop and retain full staffing for AK Hydro (including: coordinator, technical steward, database administrator and editors) who are familiar with the NHD Update Toolset.
- Develop an Annual Work Plan to guide the efforts of AK Hydro staff and complete hydrography updates.



# Data Integration

**A** key benefit of having current and accurate statewide hydrography is the ability to integrate, align and correlate the data with other datasets. Hydrography data in Alaska has the potential to integrate with numerous other data including elevation, watershed boundaries, wetlands, coastline, land cover, land use, imagery, climate, fisheries data (Anadromous Waters Catalog), and others. Integrating these datasets ensures that the different data work hand-in-hand and provide additional value to the water community.

Data integration in Alaska utilizing hydrography data is already planned through NHDPlus.

## Goals:

- Map hydrography based on the best available high-resolution source data (elevation and imagery) to aid with future integration efforts.
- Work with the USGS NHD program on national hydrography integration efforts.
- Coordinate with partners to identify data integration opportunities (such as elevation, wetlands, coastline) and ensure that data quality meets both hydrography and integration needs.

NHDPlus is a suite of GIS products that are derived from and integrates the NHD, Watershed Boundary Dataset (WBD), and elevation data (3DEP). The first high-resolution NHDPlus in Alaska is in production for a small part of the state, with additional production regions planned in the future. Having accurate, high-resolution hydrography that integrates with the elevation and WBD will help create a robust product that is already used broadly by other states. AK Hydro and AHTWG support, and will continue to encourage, these and other efforts to integrate hydrography with other key datasets, including integration with statewide and regional elevation datasets (ifsar/lidar).



# Funding Strategies

**A**ccomplishing statewide high-resolution hydrography mapping and supporting hydrography needs for all of Alaska will require a substantial investment for the next five or more years. Funds directed to hydrography updates will be used to complete high-resolution statewide updates to the NHD that include modifying and adding streams, lakes, coastline, wetlands, etc., adding associated attributes and coordinating and supporting the update efforts.

Successful statewide hydrography stewardship requires that the various groups participating collaborate on meeting hydrography needs and completing updates. Some management agencies are limited to the extent that they can develop data projects based on management boundaries. Land managers or programs with unrestricted jurisdiction would be able to assist with data collection and project management within project regions without being limited to management boundaries.

The options below explore different funding structures that will ensure the sustainability of hydrography updates and accomplish the core mission of AHTWG and AK Hydro, which is to efficiently serve the hydrography needs of Alaska. These strategies are meant only as possible funding options to accomplish the mission of AHTWG and AK Hydro. The proposed funding options should be further discussed and planned by AHTWG, the Alaska Geospatial Council, the Alaska Mapping Executive Committee, partner agencies, and other groups involved with the mapping and maintenance of hydrography in Alaska.

## Option 1: Voluntary Collaborative Funding

The first option is a voluntary collaborative funding option. This option has funded regional

hydrography update projects throughout the state, and has funded AK Hydro since 2010. Through it, agencies fund both hydrography updates and the management of hydrography data for the state through AK Hydro to move updates into the NHD.

Under this option, different entities fund hydrography updates based on agency needs in project regions. Updates originate from edits made by individual agencies, or are completed through partnerships and cooperative agreements. Funding for coordination, support and moving the data to the NHD through AK Hydro also originated from various agencies based on need and available funds.

This option encourages collaboration and participation in the process. It allows for cost savings through collaborative agreements between agencies and vendors. However, funding levels vary greatly from year to year and shortages in the past have postponed updates and caused stoppages in work. In order to efficiently serve the hydrography needs of Alaska, this voluntary collaborative funding option would need additional funding partners or increased contributions from existing partners to keep the work moving forward and accomplish statewide hydrography updates.

## Option 2: Land Management Area Funding

The second option would be to approach hydrography funding proportionally based on land management area. Funding for this option could be based on statewide or regional updates, but would likely benefit from regional coordination efforts. Regional efforts would allow for agencies to fund their priorities, bring costs down and complete updates as funding became available.

Funding would originate from the various entities with management interests in the proposed update region(s), and would support all hydrography work from inception to completion in the region. Funds from the numerous agencies in the proposed region(s) would be pooled together to “purchase” the hydrography updates in the given region. The amount contributed by each entity would vary based on the amount of land management interests that each agency has in the proposed update area.

This option would foster collaboration and ensure that regional hydrography updates are seamless and consistent. However, this funding option may put financial burdens on agencies with little to no interest in hydrography updates in a given area, or may leave certain regions of the state without hydrography updates for a number of years due to a lack of available funds or interest in hydrography updates in the region.

### **Option 3: Agency Responsibility**

A third option returns full financial, maintenance and services responsibility of hydrogra-

phy updates to the individual agencies that manage land in the state of Alaska. Each entity that owns or manages land in the state would be responsible for funding and completing updates to the hydrography within their own jurisdictional boundaries or interest areas.

There would be no statewide funding effort or support for statewide collaboration or coordination. Instead, individual agencies would work towards funding and completing their own hydrography updates within their own respective areas based on their perceived need and funding levels. Statewide hydrography coordination and updates that fall outside of agencies land management responsibilities would instead remain in their current state or fall on the USGS NHD program to manage and update the NHD.

This option would not likely lead to a complete statewide high-resolution hydrography dataset. Data attributes would likely vary widely and degrade the ability to draw correlations statewide or across regions. Instead, it would allow each agency to meet their specific hydrography needs and timeline. ■



# Thank You

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## Figures and Photographs

**Cover Page** Teshekpuk Lake on the Arctic coast courtesy of USGS.

**Page 2** Skilak Lake and Kenai River by Kacy Krieger.

**Page 3** Left: Kayak on Nancy Lake by Becci Anderson, Right: Kenai River Bridge by Kacy Krieger.

**Page 4** Knik Arm and Knik/Matanuska River delta map by Kacy Krieger.

**Page 5** Gates of the Arctic National Park and Preserve courtesy of Pixabay.com.

**Page 6** Left: Sockeye Salmon courtesy of Pixabay.com, Middle: Portage Glacier by Becci Anderson, Right: Nenana River from above by Becci Anderson.

**Page 7** Eagle River in winter by Becci Anderson.

**Page 8** Shaktoolik, Alaska by Karin Ohman.

**Page 10** Susitna River with Denali in the background by Wendy Steinberger.

## AHTWG Steering Committee

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Alaska Department of Fish and Game  
Alaska Department of Natural Resources  
Bureau of Land Management  
National Park Service  
National Oceanic and Atmospheric Administration  
University of Alaska  
U.S. Forest Service  
U.S. Fish and Wildlife Service  
U.S. Geological Survey

For more information, or to participate in hydrography updates in Alaska, please visit our website: <http://akhydro.uaa.alaska.edu>.

Or, contact the AK Hydro Coordinator:

Kacy Krieger  
Alaska Hydrography Database Coordinator  
Alaska Center for Conservation Science  
University of Alaska Anchorage  
3211 Providence Dr.  
Anchorage, AK 99508  
(907) 786-7749  
[kekrieger2@alaska.edu](mailto:kekrieger2@alaska.edu)