Newsletter of the Alaska-Pacific River Forecast Center and
Alaska's NWS Service Hydrologists

Kuigmek: from the river

(Yup'ik, pronounced "Kwig-mek")

January 2023

Please Note:

We know it's winter, but we're still interested in river conditions. Please let us know if there are any anomalous river events -- mid winter breakups, uncommon ice thickness, above/below average snowpack, etc. These observations let us better anticipate breakup issues. We can take observations through a partnership with UAF using the website Fresh Eyes on Ice (http://freshEyesonIce.org/) or to us directly:

nws.ar.aprfc@noaa.gov or 1-800-847-1739.

In This Issue:

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Focus on: 2022 Breakup Summary

By Celine van Breukelen and Kyle Van Peursem

Near record snowpack in interior Alaska led to significant ice jam and snowmelt flooding at several locations during the 2022 breakup season. Rapid snowmelt caused an ice jam on the Tanana River which led to moderate flooding in Manley Hot Springs from May 5th through the 8th. Snowmelt also led to ice jams on the Kuskokwim River which caused moderate flooding in the villages of Stony River and Red Devil from May 7th through the 9th, and in McGrath from May 10th through the 11th. Snowmelt from an all-time record high snowpack in the Copper River Basin led to moderate flooding in the town of Glenallen beginning on May 9th with flood impacts lasting through the end of the month. On the Yukon, an ice jam below Circle and an ice jam below Grayling caused minor flooding.

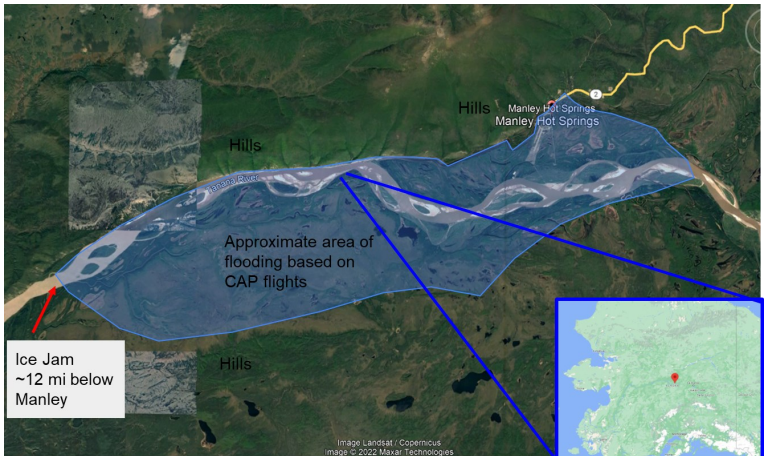


Figure 1:* *The ice jam occurred on the Tanana River, 12 miles down stream of the community.

Figure 2:* *Aerial imagery of the ice jam, looking upstream towards Manley Hot Springs. The floodwaters inundated lowlands several miles away from the river.

An ice jam 12 miles downstream of **Manley Hot Springs** on the Tanana River caused the second highest river stage on record, second only to the 1956 flood which was 2.5 feet higher. The jam held for 36 hours and caused widespread flooding in the community - many houses and buildings had water in or around them, many roads, including a portion of the Elliot Highway were inundated, and power outages caused the cellular, phone and internet networks to be down. Water dropped quickly after the ice jam released.

Focus on: 2022 Breakup Summary (cont.)

Fig 3: Many buildings in the community had water in or around them. The bridge over Manley Slough was within six inches of being overtopped.

Strong ice, combined with a robust snowpack caused ice jams and flooding on the Upper Kuskokwim communities of McGrath, Sleetmute and Red Devil. **McGrath** reached 26.38 ft, gage datum, just surpassing the previous high record of 23.12 ft set in 1972. An ice jam formed on an island just adjacent to the community, causing flood waters to impact 15-20 residences, and widespread damage to roads, the sewage lagoon and the landfill. Ice jams between Stony River and Crooked Creek caused flooding at **Sleetmute** and **Red Devil**. During the Riverwatch flights, this stretch of the river really stood out for its ice strength - the ice was bright white and created large pressure ridges as the ice sheet began to shift. Flooding was exacerbated when the Holitna River broke up while the main Kuskokwim ice was still jammed. In Sleetmute, 5 homes had water in the first floor. For the community of Red Devil, the airport was badly damaged, a residence was flooded and wells were contaminated.

Fig 4: Looking downstream. Ice became trapped on the small island in the middle of the channel. Photo from local pilot, as accessed via the McGrath Community Message Board.

Fig 5: Photo of the flooding in McGrath, taken by a local pilot and accessed via the McGrath Community Message Board. Flooding impacted 15-20 residences as well as city infrastructure and roads.

Focus on: 2022 Breakup Summary (cont.)

The Copper River Basin had a record setting snowpack this spring, with the SNOTEL sites reporting 2-3 times the normal April snowpack. During spring melt, Moose Creek which is typically a small creek flowing through downtown **Glennallen** exceeded its banks, flooded several roads and businesses in the community. Additionally, the Gulkana River, reached its fourth highest crest on record.

Fig 6: Glenallen Legislative Information Office and Library surrounded by Moose Creek (Photo, Country Journal)

There were two ice jams on the Yukon River. Despite a large ice jam 6 miles downstream of ***Circle****, the community only experienced minor flooding, mainly in the form of road damage. On the lower Yukon, an ice jam formed 7 miles upstream of Grayling. This large jam caused water to flow overland and into the neighboring Innoko River basin. The village of* ***Shageluk*** *on the Innoko River experienced minor flooding, with flood waters cutting off the road to the airport for several days. Flood waters took several weeks to recede due to the sheer volume of water that was redirected from the Yukon down into the Innoko River due to the ice jam.*

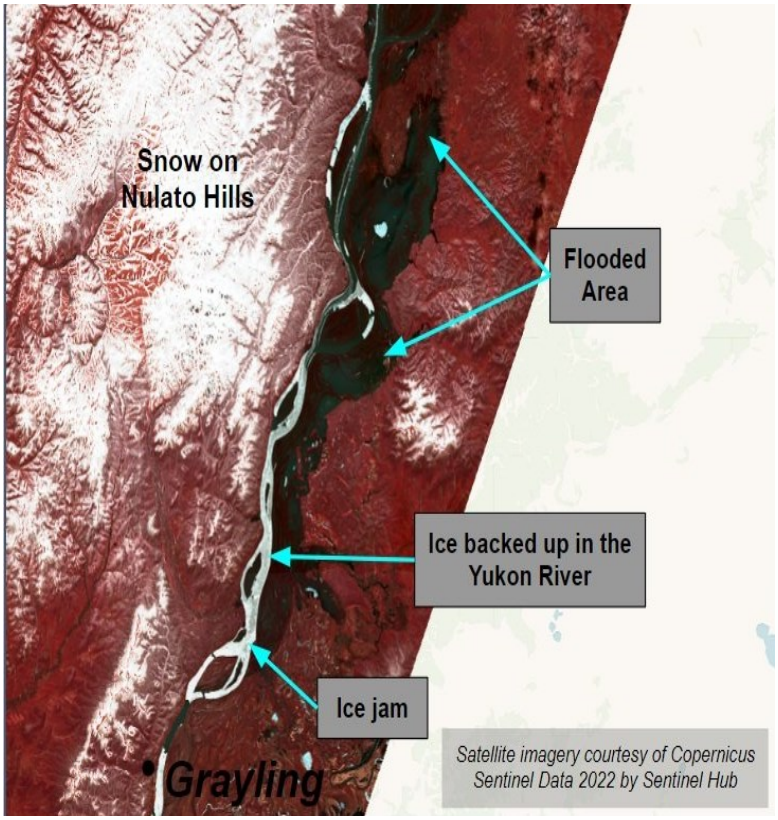


Fig 7: Sentinel-2 Satellite imagery showing an ice jam on the Yukon River

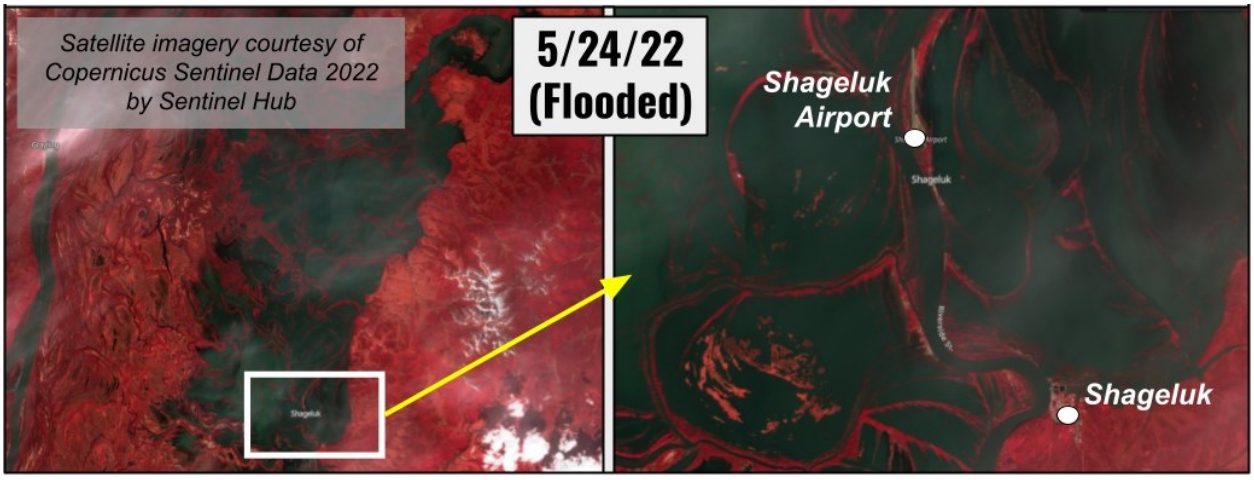


Fig 8: Sentinel-2 Satellite imagery showing the resultant flooded areas on the Innoko River near Shageluk a week later.

Another Year of Precipitation Records in Juneau

By Johnse Ostman

2022 was a year for the record books in Juneau! Warm temperatures and atmospheric rivers deluged the Capital City from the get-go, with double the normal amount of precipitation in January. Precipitation records began to fall in February when 10.53 inches of liquid precipitation beat the previous record of 8.48 inches set in 1964. With 22.90 inches of total accumulated precipitation from January to March, Juneau surpassed their previous 3-month record set in 1992. Residents were thankful that supply chain delays weren't affecting xtratuf and rubber suit inventories! NWS Juneau Forecast Office lead meteorologist Ed Liske noted the precipitation was caused by weather systems originating in the South Pacific… "so we had more wet systems, more warm systems, and most of that precipitation started falling as rain instead of snow." For the remainder of 2022, Juneau received near normal rainfall with a few exceptions including an intense September storm which caused a damaging landslide in downtown Juneau. Finally, on 7 December 2022 at 2am, Juneau had officially surpassed their annual precipitation record set in 1991 with 85.31 inches recorded at the Juneau International Airport- that's two feet more precipitation than normal! NWS meteorologist Grant Smith remarked, "previously in Juneau, we have been getting wetter and wetter over the years, but this year we really had a spike in January." Over the past century, annual rainfall in Juneau has increased by about 20 inches, and each of the past three years have broken into the top ten wettest years on record: 2020 (6th), 2021 (7th), and now 2022. Rick Thoman, Alaska climate scientist for the Alaska Center for Climate Assessment and Policy at the University of Alaska Fairbanks, attributes the warming of ocean waters as a major contributing factor to this year's record and the overall increase seen in the past few years, but warns "year-to-year and decade-to-decade variability will continue in the future even as the long-term trend of precipitation continues to increase." Now with 87.19 inches on the books and CPC outlooks suggesting above normal temperatures and precipitation for Southeast Alaska in the waning days of 2022, Juneau's new record may grow further out of reach for future contenders.

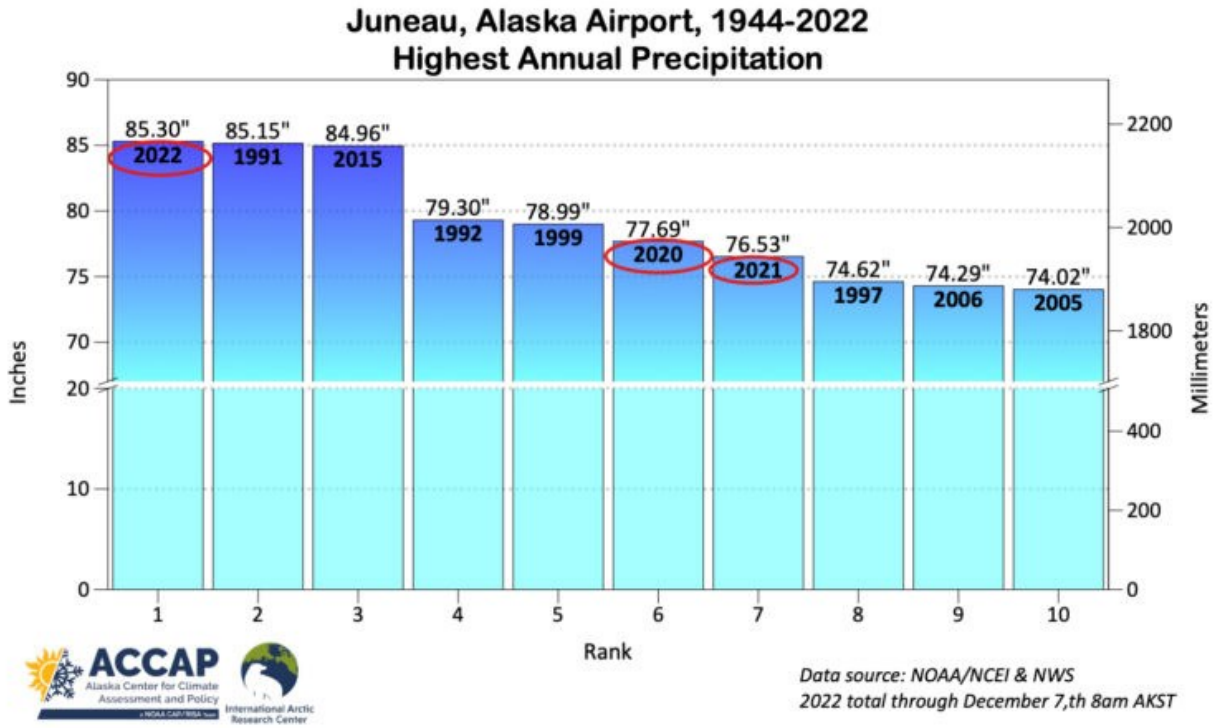
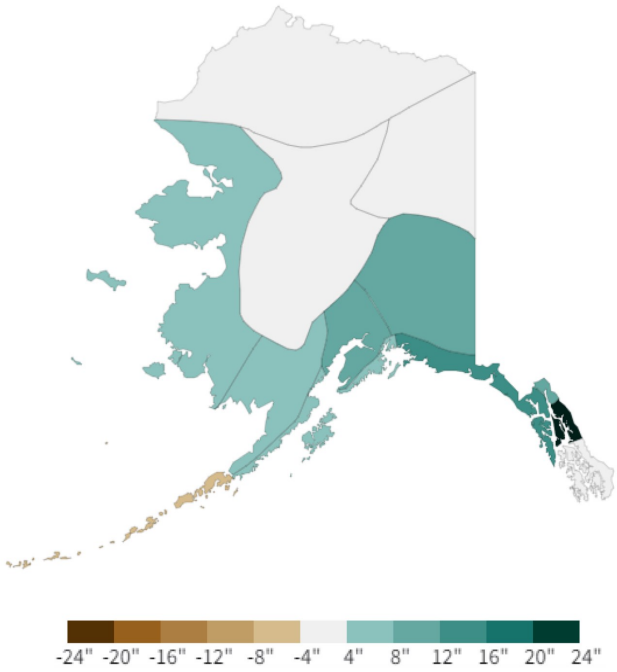


Fig 9: Highest precipitation years at Juneau Airport.

Water Year Summary (Oct, 2021– Sept, 30 2022)

By Bob Busey and Mike Ottenweller

Many people will recall June 2022 as the driest June on record for the state and may be curious about how the rest of the year compares to the data record. Significantly different. This past hydrologic year was the 37th wettest on record with most of the perimeter of the state driving significantly wetter than normal status. The three interesting exceptions are the North Slope and Interior which experienced about the same amount of precipitation as prior years. Unexpectedly, the Aleutians received less rain than typical.



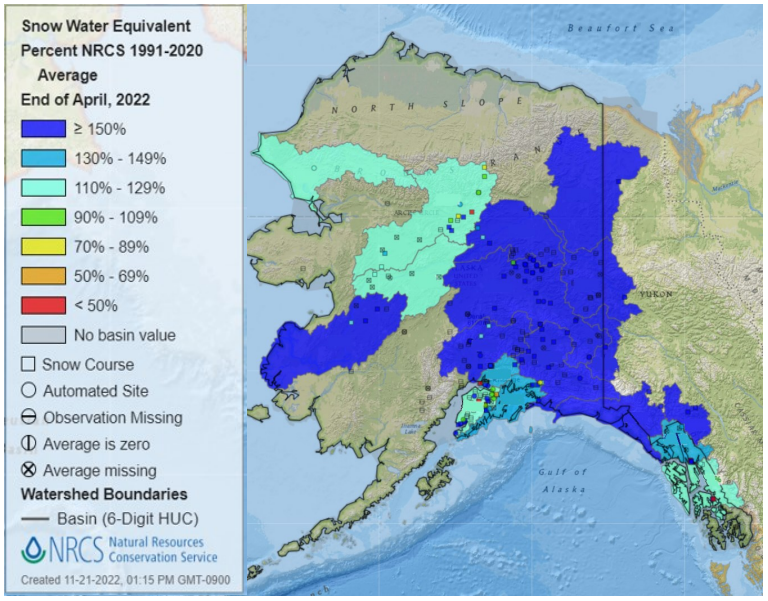
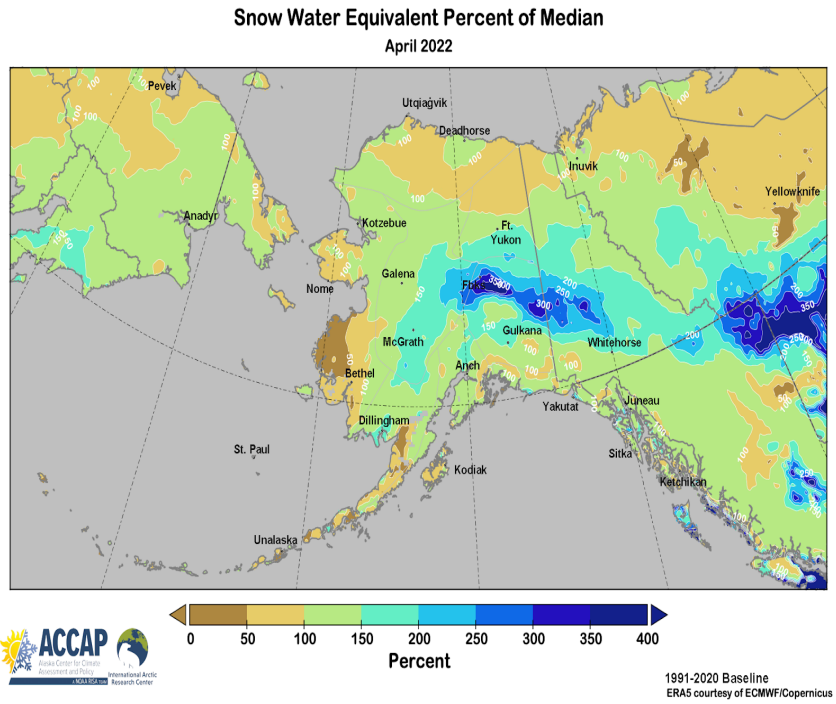


Fig 11: NRCS Snow Water Equivalent Percent of Average as of April 1, 2022

Fig 10: Alaska Precipitation Anomaly (departure from normal)

Oct '21-Sept '22 Period of Record: 1925-2022



Even with such a dry June, a snowy winter helped make the water year wetter than normal. The series of winter storms that marked the heart of winter 2021/2022 played a significant role in this. Some areas such as the eastern Tanana watershed received almost three times the normal amount of snow water equivalent. Everywhere but the tundra of the Yukon Kuskokwim delta to the west and the North Slope Coastal plain to the north received over 100% the long-term average amount of snow.

Fig 12: Image courtesy of Rick Thoman (UAF)

National Water Model—Coming to Alaska in 2023!

By Crane Johnson

The National Water Model (NWM) is a hydrologic model that simulates observed and forecast streamflow over the entire continental United States (CONUS). The NWM simulates the water cycle with mathematical representations of the different processes and how they fit together. This complex representation of physical processes such as snowmelt and infiltration and movement of water through the soil layers varies significantly with changing elevations, soils, vegetation types and a host of other variables. Extreme variability in precipitation over short distances and times can cause the response on rivers and streams to change very quickly.

The NWM produces hydrologic guidance at a very fine spatial and temporal scale. When it becomes operational in Alaska it will complement the official NWS river forecasts that are issued daily throughout South Central Alaska.

The NWM in Alaska will run in three configurations:

- Analysis and assimilation provides a snapshot of current hydrologic conditions
- Short-Range produces forecasts every hour of streamflow and hydrologic states that go out 13 to 45 hours (variable forecast lengths) into the future
- Medium-Range produces forecasts every 6 hours that go out to 10 days into the future

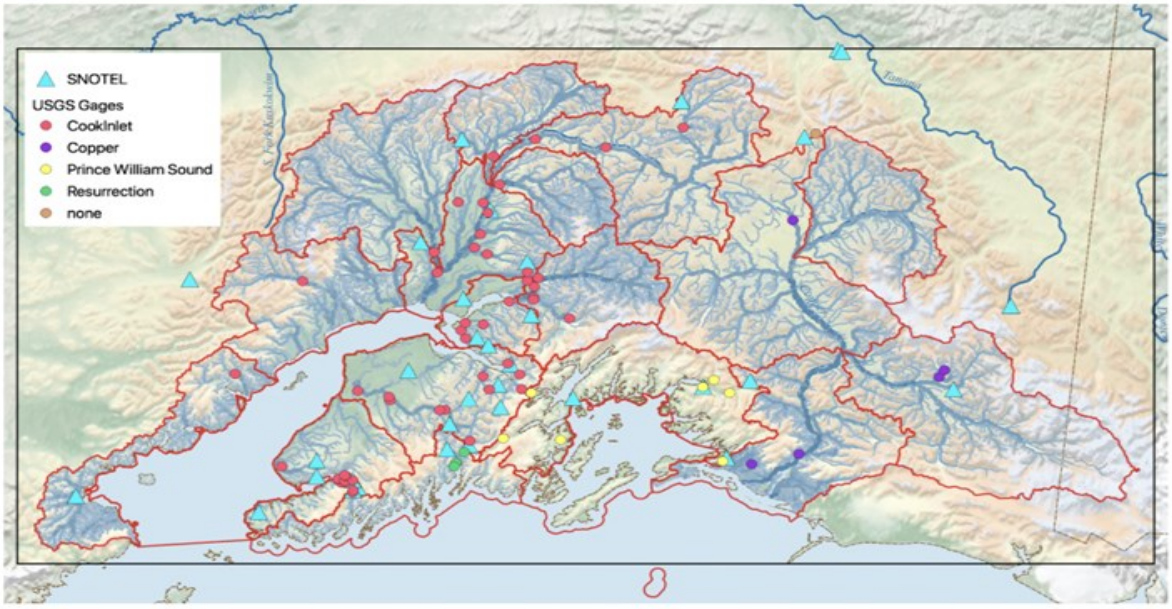


***Fig 13**: This map shows where the National Water Model will be running in Alaska. Every stream segment within Cook Inlet, Cooper River Watershed and Prince William Sound will be modeled.*

Replacing Derogatory Names on Natural Features across Alaska

by Mike Ottenweller

Alaska celebrated a step towards becoming more welcoming to all people groups with the names it gives to geographic features. The Department of Interior had received hundreds of proposals over the past 20 years to change any landmark using the term “sq_ _ _.” One of these proposals even originated with three remarkable 5th graders from Dillingham. The Department of Interior heard these requests and took action on that matter issuing Executive Order 3404 in November, 2021. Secretary Deb Haaland ordered the formation of the Derogatory Geographic Names Task Force to recommend replacement names for more than 660 geographic features nationally. Alaska will update the names for over two dozen various geographic features, including rivers and creeks.

Modernizing How We Share River Information on the Web

By Crane Johnson

"Improving the access and user experience of NWS hydrologic web and data services!"

The National Weather Service (NWS) river observations and forecast display, the Advanced Hydrologic Prediction Service (AHPS), has been in use since the late 1990s, and it has served many users well. But a lot has changed in web technology over the years, and it's time for an update. Not just an update, but a whole new system.

In 2023, we will unveil a greatly improved display of water resources information, and include new tools to help our partners and the American public make critical water decisions. Welcome to the National Water Prediction Service (NWPS)!

NWPS will be the primary source of NWS water resources information, and combines the functionality of two websites: AHPS (water.weather.gov) and the National Water Center website (water.noaa.gov). When implemented, NWPS will be located at water.noaa.gov.

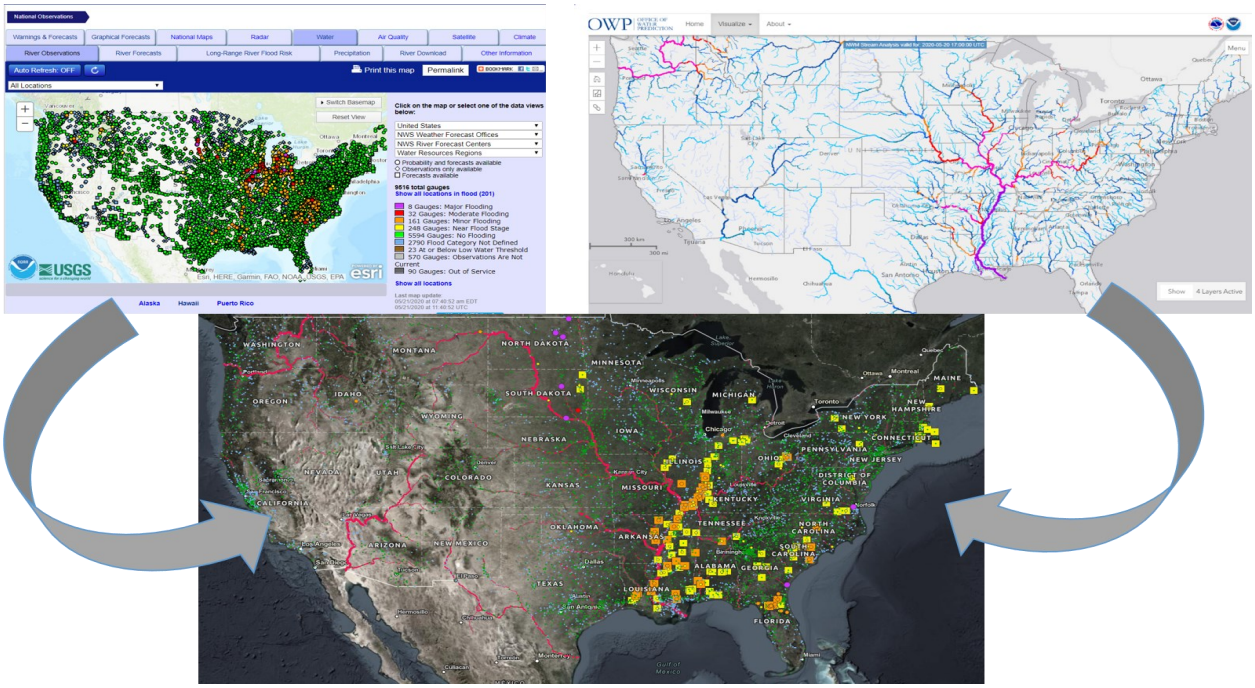


Fig 14: NWPS combines current AHPS data and introduces the National Water Model

Key Features that users will experience on the new site:

- Updated Map Interface - simple navigation for our Alaskan river gages
- Updated Hydrographs - Improved format and features with the data updated dynamically which will provide faster data to our users.
- National Water Model - Once implemented for Southcentral Alaska (expected in August 2023), National Water Model guidance will be available alongside the NWS official river forecast points.
- Mobile Enhanced - the new website will be optimized for mobile devices.
- Application Programming Interface (API) - all data will be available via a new API

Take a look at the our story map highlighting the new website: https://www.weather.gov/aprfc/NWPS

Watch for upcoming announcements on our website to get a sneak preview of the new National Water Prediction Service website. We are expecting a preview version to be available in early 2023 with the new National Water Prediction Service website up and running by the middle of 2023.

More Staff Changes at the APRFC

By Mike Ottenweller

In 2022, we continued to welcome some new faces to the RFC, while saying “goodbye” to other members. Last summer, Jess Sanow departed our group to join her husband with a new job in Colorado. Last spring, we had two on-station promotions! Johnse Ostman and Michelle McAuley were both promoted to Senior Hydrologist. We were all very thankful to be able to move back towards working together in person at the office in 2022.

Justin Fisher, grew up on a farm in Illinois and spent his summers at the family's lake house in northern Wisconsin. After high school, he received a Bachelor's Degree in Hydrology from the University of Wisconsin - Stevens Point. From there he spent a year working at Southeast RFC before moving up to Minnesota and working at Northcentral RFC. Since his time as an NWS Pathways Student, Justin has been trying to get to APRFC, and is thrilled to be moving to Alaska to join the team.

Bob Busey, has lived in Alaska since he was about one years old. He was raised in Sitka before heading to Fairbanks, where he earned an engineering degree at the University of Alaska Fairbanks. Bob has served at UAF as a staff engineer for the past eighteen years and completed graduate coursework. Bob worked exclusively in research, supporting hydrologic and meteorological field measurements and modeling, first, for the Water and Environmental Research Center and later at the International Arctic Research Center. He has spent 12 springs intensively measuring snow and rivers ranging from small watersheds on the Seward Peninsula to large river basins like the Anaktuvuk and Itkillik on the North Slope.

Bob doesn’t just work in the water, he loves recreating on it as well, and has fished or canoed a number of interior rivers in Alaska and Canada. Since moving to Anchorage in 2017 with his wife Jessica Cherry, he’s spent more time fishing on the Kenai and looks forward to more exploring in Southcentral.

Mike Ottenweller, joined the RFC as a HAS Forecaster in November. While originally from Michigan, Mike moved to Alaska to serve in the Air Force in 2004. After a few other assignments out of state, Mike returned to AK with the NWS in 2013. Over the last nine years weather forecasting, he has grown to appreciate all the complexity Alaska weather has to offer and how “spiteful” (challenging) it can be. Mike and his wife Karen have 3 young boys. They enjoy hiking, running, fishing, hunting, skiing, and just being as wild as Alaska offers. You will often find Mike high in the Chugach Mountains or way off the grid calling for moose. He is very excited to join the RFC team and get to dive deeper into the world of hydrology.

Heavy Rains Wash Out the Richardson Highway in the Eastern Alaska Range

By Ed Plumb and Johnse Ostman

Intense rainfall in the eastern Alaska Range south of Delta Junction resulted in flash flooding on several small drainages that cross the Richardson Highway. A stationary weather front along with a very moist air mass caused showers and thunderstorms to move southward into the Alaska Range. The combination of upslope flow, rapid rain rates, and heavy showers tracking into the same area for more than 24 hours caused significant rises on many creeks. Data is very limited in this area but based on information from rain gauges and NWS Doppler radar, it is estimated that 3 to 5 inches of rain fell across the region July 10-11th, 2022. This amount of rainfall in this area indicates this was a likely 25 to 50 year rainfall event. The flooding caused multiple washouts and damage along a 25 mile stretch of the Richardson Highway with the road being closed for over 48 hours. The Bear Creek bridge received significant damage with the approach to the south side of the bridge being completely washed out. Flooding also damaged a fiber optic cable which resulted in communications disruptions across the Interior.

Fig 15: Washout at Bear Creek at Milepost 223 on the Richardson Highway (courtesy Alyeska Pipeline)

Happy 2023 and Thank You!

And lastly, from all of us at the APRFC, THANK YOU! We truly appreciate all of our observers and partners throughout the state, we couldn't do this without you. Happy New Year, and we are looking forward to working with you in the coming months!

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