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

# Kuigmek: one who watches the river

October 2021

## Please Note:

Observers, don't forget to send in your Freeze-up Forms! These can now be completed on the web at https://www.weather.gov/aprfc/freezeForm, or let us know if you need a paper copy. Also note that the web form can be submitted multiple times if you want to submit the timing of 'unsafe', 'freeze-up', and other events separately.

### In This Issue:



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## Focus on: Buckland Breakup Flooding

Alaska's most impactful ice jam flood this past spring occurred in Buckland (*Inupiaq: Kaniq*). The Buckland River is 67 miles long and flows northwest to the Chukchi Sea; the village is home to about 400 residents. In mid-May, 2021, an ice jam formed causing flood water to inundate more than 20 homes. Shortly after, the governor issued a disaster declaration. Since 1985, there have been eleven notable ice jams on the river that have resulted in minor to moderate flooding in the village. These floods tend to have: 1) daily high and low temperatures above freezing the day before flooding occurs; 2) above normal freezing degree days before and throughout the ice jam; 3) and high temperatures above freezing on the day of the ice jam and until the jam breaks. These general trends were noticed for the eleven recorded floods, however, there is no indication that these are the primary causes. Observation of precipitation, snow depth, and ice thickness are very limited in this region.

***Figure 1: Photo of Flood Conditions in Buckland in May, 2021 from Facebook.***

## August Atmospheric River hits Southeast

Heavy rainfall accounted for few flood events this summer, but mid August did see an atmospheric river (a narrow band of intense water vapor transported from the tropics) make landfall in Southeast, Alaska. We watch these extreme events closely, as climate change may make them increasingly common. In this case, small streams and the lakes in the Juneau rose to minor-to-moderate flood levels. Affected campgrounds were closed until water receded. Near Skagway, the Taiya River crested at 19.2 feet, its second highest stage on record. Stream levels dropped below flood stages soon after the 'firehose' was turned off.

## Staff Changes at the APRFC

We've had some changes around the office in recent months—even as much of our operations remain virtual. This spring, Jess Sanow joined our group. Arleen Lunsford went part time this summer and will retire in November. Ted Moran retired in September and Jessica Cherry moved from the APRFC to assume the position of NOAA's Regional Climate Services Director for Alaska. Crane Johnson was promoted to the APRFC Hydrologist-in-Charge in October.

Jess Sanow, our new Hydrologist, made the long drive to Anchorage from Colorado with her husband, dog, and 2 cats to join the team in February. Most recently, Jess was working as a Hydrologist for the BLM White River Field office in Western Colorado. Prior to that, Jess began her PhD at Colorado State University in Watershed Sciences, focusing on shallow, seasonal snowpack cover and is hoping to wrap up her degree this fall. Jess has also worked for the USGS in Fort Collins, CO; Moab, UT; and Columbia, SC. Although she has travelled and worked throughout the US, she always hoped one day she'd end up in Alaska. Growing up in Idaho near the Tetons she became accustomed to cold weather, deep snow, and big mountains and knew AK would be a good fit. In her spare time Jess can be found hiking, backpacking, figure skating, snowboarding, skiing, or cataloging her travels via scrapbook.

Arleen Lunsford, one of our most experienced hydrometeorologists, joined the APRFC in 1994. Arleen received her BS in Astronomy and Physics from the University of Maryland, College Park and her MS in Meteorology from the University of Oklahoma, Norman. After graduate school, she worked for Aeromet, a private company in Jenks, Oklahoma before joining the APRFC. Arleen recounts her funniest experience was back in the 1990s when (then Hydrologist-in-Charge) Jerry Nibler flew several staff members down to see the Bradley Lake area in his personal plane. Arleen said that Jerry didn't fore-warn them to dress appropriately, so Arleen made the trip in a summer dress and nylon stockings. That might explain why we haven't coaxed Arleen out on a Riverwatch flight in recent years! Arleen's hobbies include countless hours helping at the Adopt-a-Cat shelter run by the Alaska Humane Society. She anticipates continuing this volunteer work and getting back to sewing in her retirement.

Ted Moran, a Senior Hydrologist, who served more than nineteen years with the USGS and the APRFC, will enjoy spending time with his family, hunting, and playing his drumset in retirement. Ted earned his MS at Alaska Pacific University and continued to help advise students there on topics of hydrology.

Look for announcements of several new hires in our next issue! Josh Walston, a UAF graduate (MS), will join the APRFC in late October, and we are currently recruiting for two Senior Hydrologists.

## Summer Field Work: Highlights in Seward and Moose Pass

Summer is when we get a chance to do whatever necessary fieldwork we can, including resurveying of gages, making discharge measurements, and establishing new sites. Travel is still very limited on account of the COVID-19 pandemic, but we were able to get to a few sites this summer. Because of staff turnover, some of our hydrologists are unfamiliar with the location of various gages and how readings—either from observers or automated sensors—may be impacted by erosion, sand bars, backwater, and other effects. So getting forecasters out on gage visits is also important for giving them the level of familiarity that results in better forecasts.

One of our automated technologies, the ultrasonic igage, measures the distance between where it's attached to a bridge and the surface of the water. We use that to calculate water stage. Over time, small changes in the height of the Earth's surface and movements of the bridges can lead to changes in that difference. One good practice is for us to measure the vertical position of various reference marks on the bridge relative to a benchmark off the bridge. We are also moving toward conversion of these vertical datums (a reference height of an object or point on the Earth's surface) from arbitrary reference points to standards used across agencies. Slope gage sites measured by our observers also need these vertical surveys repeated when sites have experienced changes like erosion or sediment deposition.

***Figure 5: Johnse Ostman and Jess Sanow talk to National Park Service officials at Exit Creek explaining how the vertical surveys relate to observer measurements performed by NPS employees.***

A visit to the staff gage at Trail River near Moose Pass was also informative for forecasters. It took a phone call to our long time observer Celiene Turner to find the gage on the remains of a mid-river pier from a old bridge. Celiene uses binoculars to take the reading each morning. Any changes to this site would require boat access. It was great to meet Celiene and hear from her about past high water and flood events. We could not do this job without our reliable observers!

***Figure 6: Celiene Turner, Johnse Ostman, and Jess Sanow at the Trail River gage near Moose Pass.***

## New Gage at Emmonak

Emmonak is within the braided delta of the Yukon River on the North Fork, tidally affected, but not subject to coastal flooding. Emmonak has had multiple hazard declarations in the past four decades, primarily from river flooding, which prompted an impact assessment and development of their Local Hazard Mitigation Plan (City of Emmonak, 2008).

NWS APRFC (Crane Johnson, Johnse Ostman) visited Emmonak, AK in June, 2021 to introduce ourselves and our program to Village Tribal and City officials, establish a new river slope gage, setup a local river observer, tie past flood survey (2009) into current and common datums, and survey flood stages and flood inundation bounds. APRFC does not intend to develop a stage-discharge rating for this location; the USGS gage at Pilot Station is approximately 100 river miles upstream. We believe APRFC efforts in the region may contribute to early warning and better situational awareness for the community during flood events.

***Figure 7: Johnse Ostman and local leader and new river observer, Paul Andrews, in Emmonak.***

## The Last Measurement of JT Evans

In July we started noticing there were some missing measurements from the wire weight gage off the Talkeetna railroad bridge, which was unusual. John Thomas 'JT' Evans was our reliable observer for many years. He had an unforgettable laugh and friendly demeanor. Those who had met him in person in recent years surely got to learn about the reality TV coverage of JT's unique greenhouse home. In time we learned that JT passed on July 12, 2021 headed back home after taking his last measurement from the bridge. We appreciate his dedication and service to the APRFC. Rest in Peace, JT.


***Figure 8: JT Evans, Talkeenta.***

## CoCoRAHS: New Opportunities for Citizen Science

Are you a reader who is interested in getting involved in taking measurements for science research and forecasting? Consider joining the Community Collaborative Rain, Hail, and Snow Network (CoCoRAHS). You can go to the CoCoRAHS (https://www.cocorahs.org/) or in Alaska contact Douglas.Wesley@noaa.gov

## Water Year Summary

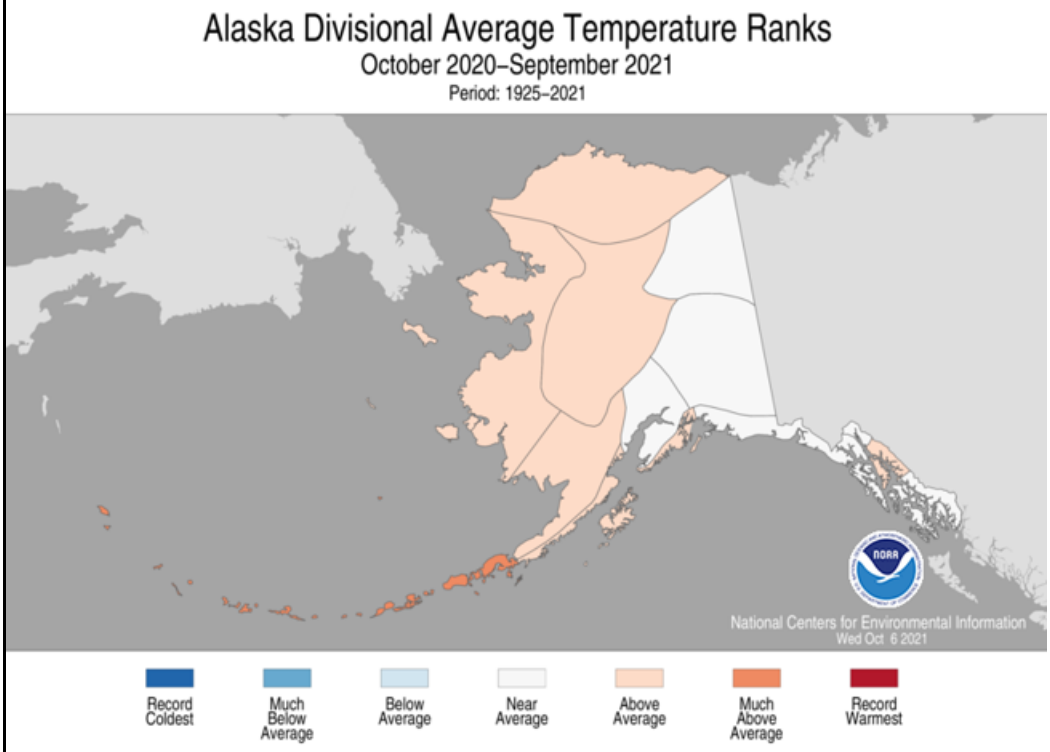


***Figure 9: Air temperature anomalies for water year 2021.***

Averaged over the whole year, much of the western half of the state had above average air temperatures this year, while Southcentral, the Gulf Coast, the Eastern Interior, and much of Southcentral was normal. This is calculated for the period of record back as far as 1925.

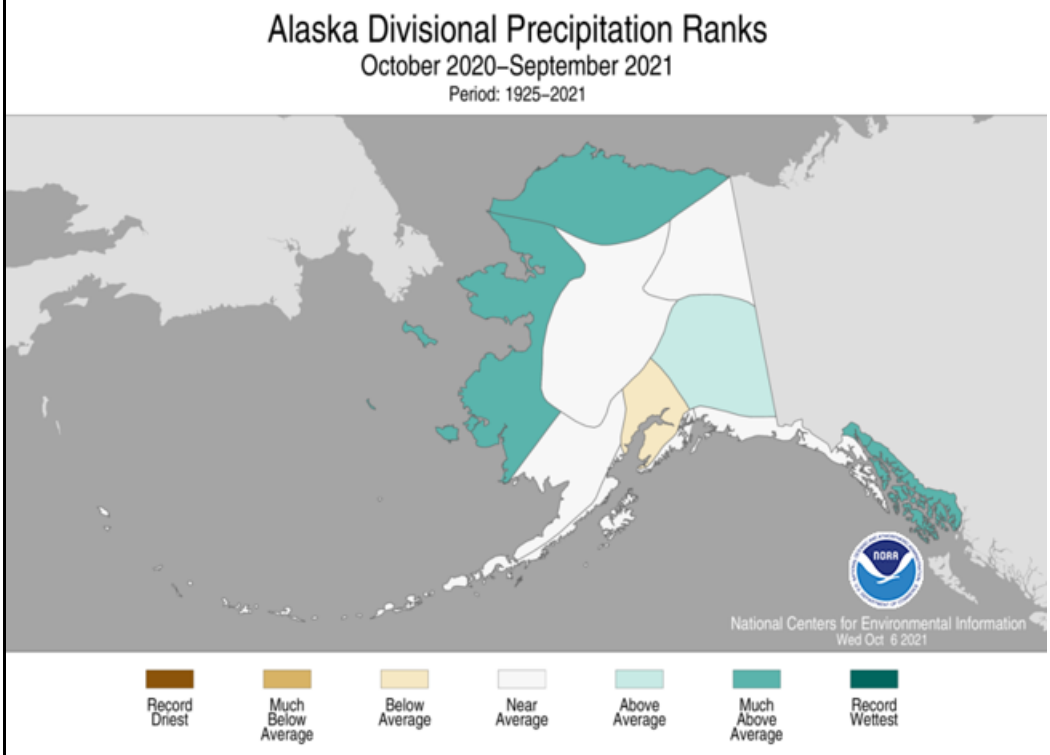


***Figure 10: Precipitation anomalies for water year 2021.***

The precipitation anomalies showed a different pattern with Western Alaska, the Arctic, and Southeast showing much above average; Southcentral having below average; the Eastern Interior having above average; with the remaining parts of the state having near average precipitation.

In the spring, we were particularly concerned with the heavy snowpack in the upper Kuskokwim River Basin going into break up. Figure 11 shows that area of the state with approximately 175% normal snow loads. The weather warmed up enough to burn off some of that snow in late April and early May, which helped alleviate the hydrologic pressure on the rivers during breakup on the Kuskokwim. Aniak saw some minor flooding, but most communities were spared the worse.

(Water Year Summary Continued)

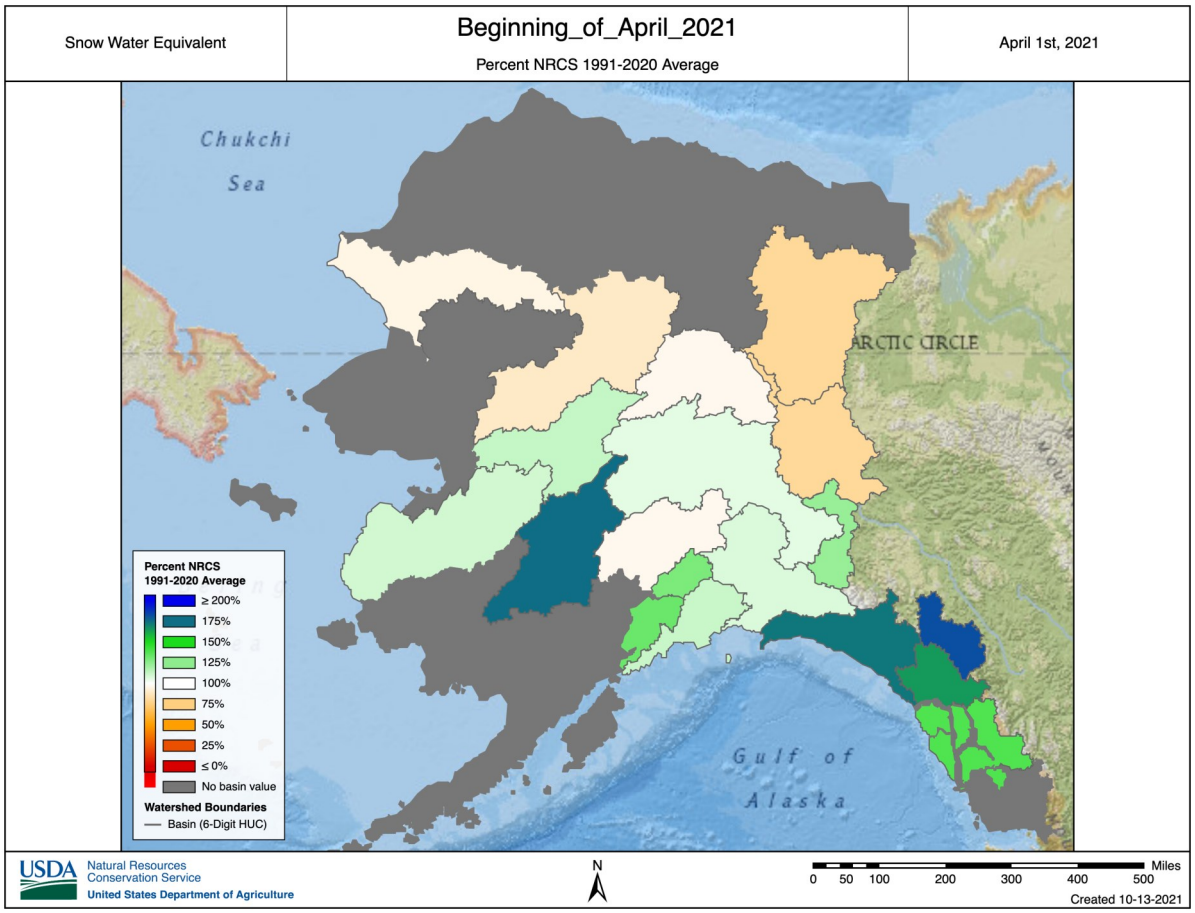


***Figure 11: Snowpack conditions at the start of April, 2021 from snow courses and Snotel sensors.***

Much of the state had a near normal snowpack last winter, otherwise, and Southeast was richer in snow than in other recent years.

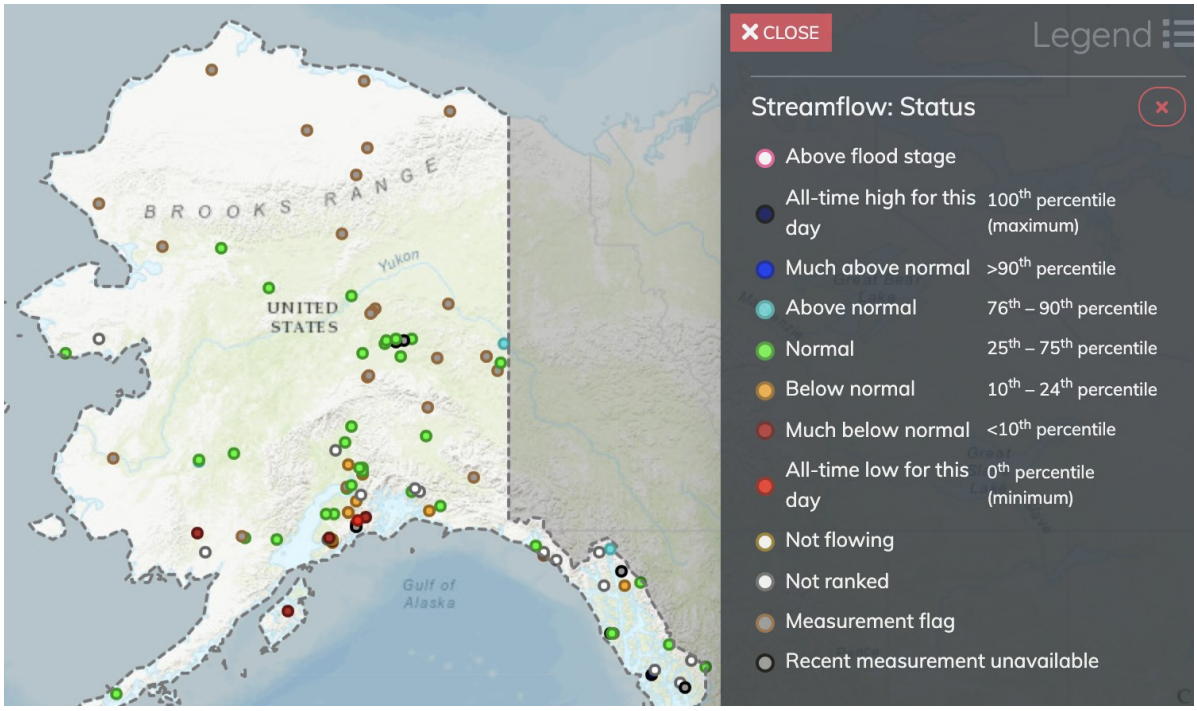


***Figure 12: USGS Gage Status as of early October, 2021***

Despite normal river flows in the Anchorage area, parts of the Kenai are going into freezeup in a very dry condition. The Arctic rivers are also going into freeze up below normal. Most of the rest of the state is normal.

## Low Levels at Bradley Lake

The dry summer on the Kenai impacted the lake levels even with the new Battle Creek Diversion. Bradley Lake is the hydropower facility that provides electricity to the railbelt. The operators shared the following graphic about lake levels with a few facts and caveats. Usable lake elevation begins at 1,080' elevation. In 2016, levels were intentionally dropped below 1,080' for maintenance. In 2019, the ability for Bradley energy to leave the Kenai Peninsula was limited due to scheduled maintenance and the Swan Lake fire impacting the transmission system through a significant portion of the year.The spillway elevation is at 1,180'. Lake level is a representation of the total water being stored by all of the project participants, i.e. the Railbelt utilities; thus elevation is dependent upon both inflows and utility use.

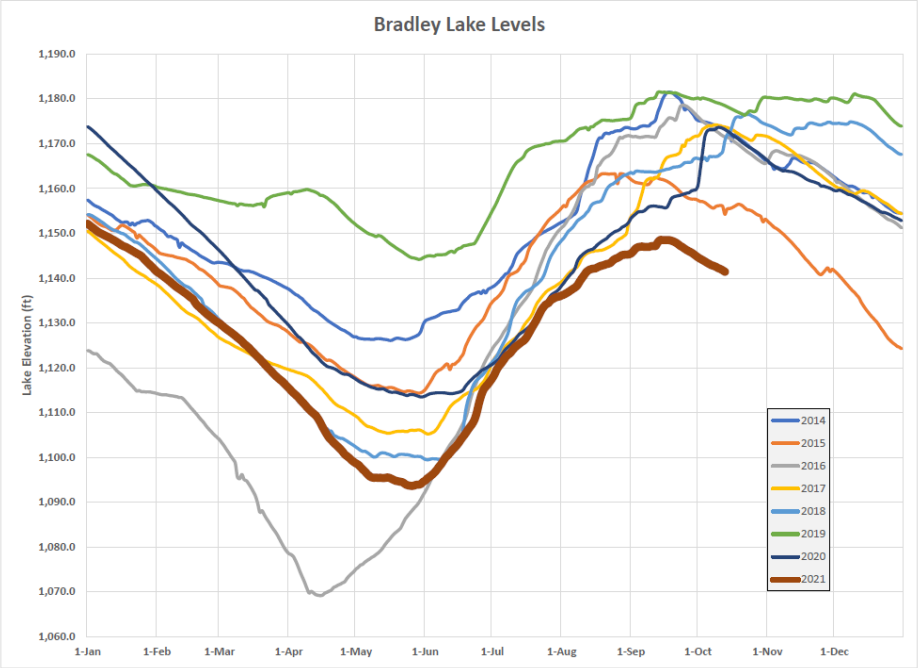


***Figure 13: Bradley Lake Levels courtesy of Homer Electric Association.***

## Drone Projects

The APRFC got a few opportunities to fly this summer. Stay tuned for future films and other products from these efforts. This season included flights in Seward, Juneau, and Cordova, as training and currency flights in the Anchorage area.

***Figure 14: Jessica Cherry flies the APRFC's Uncrewed Aerial System near Cordova in August.***

## Pacific Sector: March Flooding

We never forget about our responsibilities in Hawaii, though the climate could not be more different. This spring, Hawaii saw devastating floods in March from heavy rain on the islands. Multiple homes were destroyed and one person was killed. Landslides, power outages, and road and bridge damage were widespread. The Kaupakalua Dam was compromised and scheduled to be removed. Thousands of people were ordered evacuated from their homes. Freshwater supplies were impacted and public officials ordered water boiling requirements and conservation. No stranger to heavy rain, this March 2021 was more extreme than usual in its intensity and devastation. This occurred on top of the stress of the COVID-19 pandemic and economic disruptions. We wish our Hawaiian friends plenty of Aloha this year.

***Figure 15: Flooding photo by HawaiiNews on Instagram.***

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