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

Kuigmek: one who watches the river

Summer, 2019

Please Note:

Observers, thanks for all of your efforts this year so far. Please let us know if and when your measurement site needs maintenance, and we will work to get it on the schedule.

In This Issue:

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Anchor River Profile

Figure 1: Senior Service Hydrologist Celine van Breukelen installing an automated gage on the Anchor River. Picture: NWS staff.

River Profile: The Anchor River, the mouth of which is called *K'kaq' (river mouth)* in *Dena'ina* while the main reach is called *Kuinerraq (Young River)* in *Alutiiq,* flows about 30 miles along its main fork before emptying into Kachemak Bay, 14 miles north of Homer. The watershed is 143,073 acres in size with elevations ranging from sea level to 2,030 feet. The Anchor River is a rich habitat for Cook Inlet wild salmon and steelhead trout. Threats to the health of this environment led to portions of the watershed being designated as the Anchor River/Fritz Creek Critical Habitat area. Scientists at the Cook Inletkeeper organization have also determined that the Anchor River water quality is especially sensitive to change in air temperatures.

This summer, record heat and lack of precipitation have led to record low flows on the Anchor River. Water temperatures have been monitored for several years now and the summer of 2019 shows a marked increase. The impacts to fish and aquatic habitat are likely to be significant.

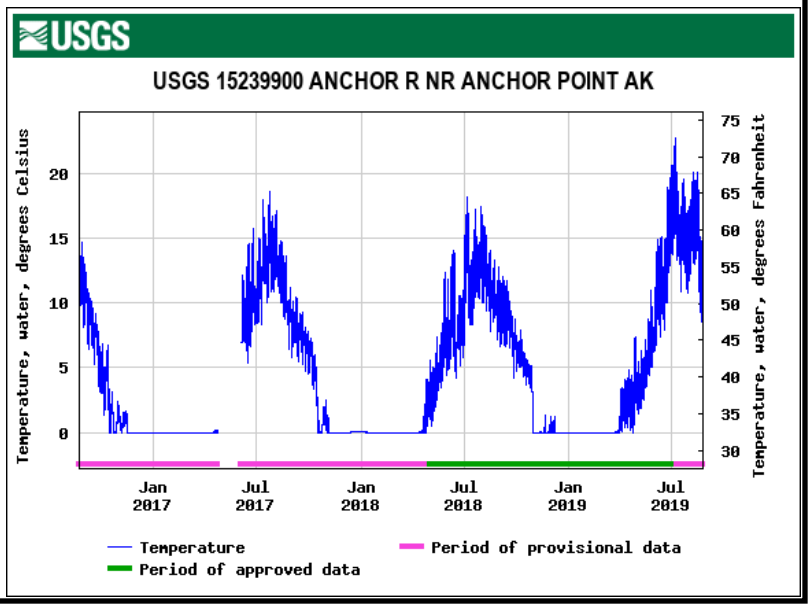

Figure 2: Water temperature data from Anchor River since 2016.

Spring Breakup and Community Coordination

Breakup was largely thermal at all locations this spring. Due to the warm winter, river ice was relatively thin--in fact it was record thin on the lower Kuskokwim--but the Koyukuk River experienced a surge of water from melting of the heavy snow pack in that basin. Allakaket, Huslia, and Hughes experienced minor flooding or erosion. Residents' photos, videos, social media posts, and phone calls were essential in reporting these impacts. Another new development this breakup season was a coordination call between many of communities on the Kuskokwim and Yukon Rivers. Participants included the APRFC, the service hydrologists, observers, community leaders, and interested citizens.

Figure 3: Paula Thorne measures the Koyukuk at Bettles. Picture: Rich Thorne.

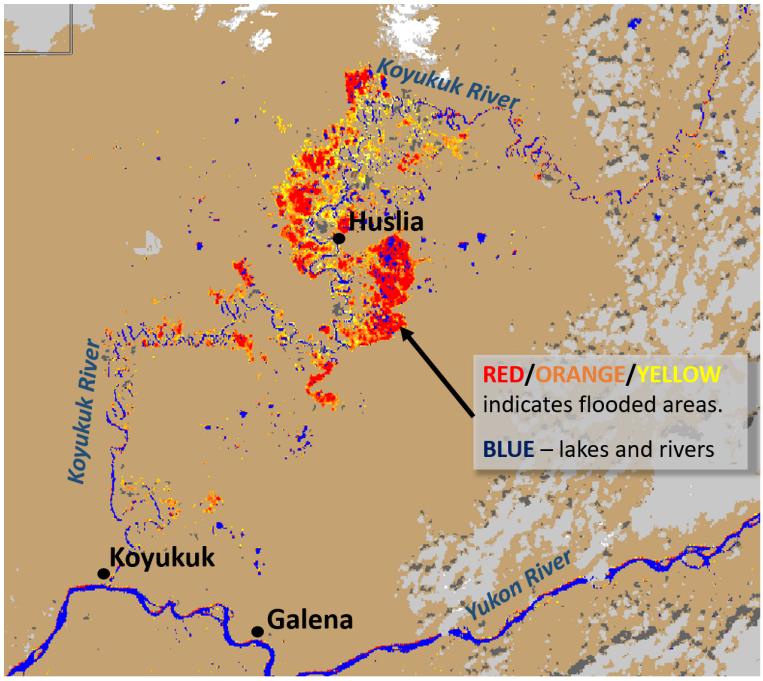

Figure 4: Satellite derived product showing snowmelt flooding in the Koyukuk basin during May, 2019.

Erosion

River channels naturally migrate over time, forming wide riverine plains and cutting valleys. These processes can accelerate with scouring by ice during spring breakup, and also at times of heavy water discharge, but are known to occur during low flow conditions as well. Unfortunately for homes and communities built next to rivers, erosion can have a costly impact on property and infrastructure.

This year, significant erosion occurred in Nikolai, Napakiak, Akiak on the Kuskokwim River; Huslia on the Koyukuk; and several areas along the Matanuska River. The APRFC does not forecast erosion, but we do work with core partners like the USGS, the US Army Corps of Engineers (USACE), the USDA, and tribal governments to exchange and document information during rapid erosion events. Erosion can impact the accuracy of our hydrologic measurements, so it is important for us to remain aware of where it is occurring near our automated gages and slope gage sites read by observers.

More information can be found in the Alaska Baseline Erosion Assessment, published by the USACE in 2009. Some particularly vulnerable communities also have their own individual erosion mitigation plans.

The National Weather Service has a webpage specifically focused on the Matanuska River erosion, based on studies by the USGS, which can be found here: https://www.weather.gov/afc/MatanuskaRiver

Figure 5: A new web-camera at the Snow Glacial Lake, installed by the USGS, was helpful in confirming the GDL release timing and volumes. Image from 9/7/19.

2019 Glacial Outbursts

Alaska had several glacial dammed lake outbursts again this summer. This occurs when a lake, typically at the side of a glacier, fills to the point that it releases the water downstream. As the released water comes down (often under the glacier), it may fill an intermediate lake or pour directly into a river or ocean. This summer saw confirmed releases at Snow Glacial Lake, Bear Glacier, Berg Lake, Hidden Lake, Salmon Lake, Nolake, Tazlione, Valdez, and the Suicide Basin near Juneau. Some of these systems release consistently every year or two; others release intermittently. Some we monitor closely with agency partners, others are so remote that we can only observe with aircraft or satellite imagery. With extreme air temperature anomalies this summer, several of these lakes released earlier than normal. The outburst of Snow Glacial Lake in August caused considerable damage to railroad infrastructure, as well as service cancelations and delays.

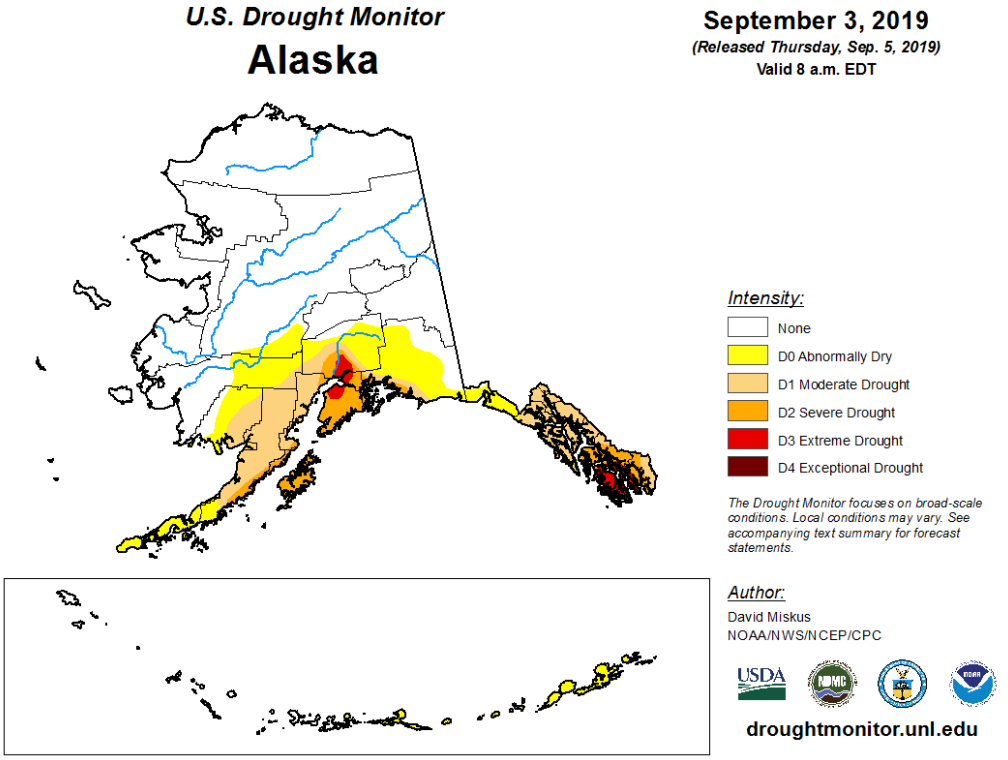

Figure 6: Statewide drought conditions at the end of the summer.

Ongoing Drought

The southern half of Alaska has been incredibly dry in recent months. While Southeast slipped into its second year of moderate to extreme drought, Southcentral joined its ranks this summer. The Anchorage area and Prince of Wales Island have had the most extreme precipitation deficits. Impacts on water supply and power generation in Southeast include the communities of Haines, Juneau, Petersburg, Wrangell, Ketchikan, and Metlakatla. Water supply problems have expanded to Southcentral, including the communities of Chignik Lagoon, Chignik Lake, Seldovia, Tatitlek, Nanwalek, and Cordova. Several of these communities are relying on bottled water to drink and diesel generated power, while they wait for fall rains to return. Lack of rain has contributed to large scale forest fires, invasive insect damage to trees, poor salmon habitat, and countless other ecosystem impacts. Despite dry skies, glacial fed streams and reservoirs have been running high due to record high air temperatures over the summer. As of this writing, Bradley Lake, the reservoir which supplies hydropower to Homer and the Railbelt, is at capacity and preparing to spill, because melt from the nearby Nuka Glacier has filled the lake in the absence of rain.

NWS Alaska Forms the AESSIC and the ROC

Before announcing his retirement in October, NWS Alaska Regional Director Carven Scott completed two of his strategic goals: creating the Alaska Environmental Science and Services Integration (AESSIC) and the Alaska Regional Operations Center (ROC), and restructuring existing regional NWS entities. The APRFC now shares an affiliation with both the AESSIC as well as the National Water Center, of which all the regional RFC's are a part. The AESSIC also houses the Alaska Aviation Weather Unit, the Sea Ice Program, and the TV Program because, like the APRFC, these entities serve communities statewide. According to Scott's announcement, the AESSIC and ROC are created to 'meet the goals and objectives of a Weather Ready Nation and the emerging requirements in Alaska. Meeting these goals will improve NWS weather, water, ocean and sea ice forecasts and warnings to reduce loss of life, property; mitigate disruption from high-impact events, improve transportation efficiency and safety in Alaska; and better position NOAA to collaborate with other federal and state agencies, and handle future environmental events and disasters of a changing Arctic.'

Welcome to our New Staff Members

Sven Walsted, our new information technology support staff member, has worked in IT for over twenty years, with most of that time being focused as a Java enterprise developer writing distributed web-based applications. Sven comes most recently from the Dept. of Veterans Affairs. Other Government experience includes more that twelve years at the Bureau of Land Management – Alaska's state office, where he developed software and maintained associated systems for the wide range of disciplines needed to support the BLM's diverse mission. Sven also worked as a Java developer for the USDA. Prior to becoming a Federal employee, Sven worked in various roles from system administration to professional services providing software solutions to Fortune 500 companies. Sven is married with eight children and enjoys the year-round outdoor opportunities that Alaska has to offer, especially cross country skiing and fishing for 'reds'. He can be found on many summer weekends camped with his RV at the beach in Seward, throwing stones into the sea with his children.

Figure 7: Here, Sven revisits the track in Logan Utah where he ran in the PCAA championships for SJSU back in 1987.

Kyle Van Peursem, our new Senior Hydrometeorologist, comes to the APRFC from the Anchorage WFO, where he was a general forecaster for two years. He also served as the office's Avalanche Program focal point, where he organized weather support for the numerous avalanche forecasting operations throughout Southcentral Alaska while building strong relationships with the office's core partners. Prior to coming to Alaska in 2017, Kyle was a graduate student in Montana State University's Snow and Avalanche Lab, where he received his M.S. in Snow Science in 2016. There his work focused on evaluating coupled weather and snowpack models in complex terrain. During and after grad school, Kyle worked as an avalanche forecaster in Glacier National Park for the spring opening of the Going to the Sun Road as well as a forecaster with the Forest Service in Bridgeport, California. Prior to grad school, Kyle served for over 6 years in the U.S. Air Force as a Weather Officer, with assignments in Germany, Alaska, and Kyrgyzstan. Kyle received his B.S. in Meteorology from the University of Utah and was born and raised in Rochester, NY.

Figure 8: Kyle and his dog Holly.

2019 Hollings Scholars at the APRFC and Fairbanks WFO

Figure 9: Summer Hollings Scholars Charlotte Dungan and Alexa Yeo help APRFC measure levels at Eagle River.

NOAA's Hollings Scholarship Program is a highly competitive opportunity for undergraduates to get not just tuition assistance at their home institution, but support for a 10 week summer internship at a NOAA facility. The APRFC and Alaska WFOs have had the pleasure to host several outstanding Hollings Scholars over the years, and this summer's students continued that tradition of excellence.

Alexa Yeo will be starting her senior year at the University of Illinois at Urbana-Champaign in August where she studies civil and environmental engineering with a focus in water resources engineering. Her project this summer focused on comparing two ways of driving the CHPS system, which the RFC uses to predict hydrologic processes throughout the state. The two inputs, gauge-weighted and grid-derived, were compared using three different metrics commonly used in hydrology. Alexa is looking forward to taking what she has learned this summer and applying it in her studies as well as her future career.

Charlotte Dungan is a senior environmental engineering major at Mercer University in Macon, Georgia. She plans to attend graduate school to study water resource engineering. She is a Goldwater, Hollings, and Stamps scholar. Charlotte has done research in mountain hydrology since her freshmen year. This summer, Charlotte has been helping the APRFC identify which hydrological parameters are the best indicators of flood occurrence and severity in Seward, Alaska. She is analyzing historical precipitation/intensity, discharge, and gauge height data in comparison to state declared flood events. The APRFC can then use these results to predict a flood before there is a major impact.

True Furrh is an environmental sciences and civil engineering dual-degree student from the University of Houston. He has research experience in both groundwater quality and hurricane evacuation at the University of Houston and National Institute of Standards and Technology, respectively. This summer, he has modeled flooding at the confluence of the Chena and Tanana rivers in Fairbanks, Alaska using ArcGIS and HEC-RAS.

Figure 10: True Furrh helping the Fairbanks Service Hydrologist set up flood gages in Denali National Park.

Pacific Sector

Meteorologists and the Senior Service Hydrologist in the Juneau Weather Forecast Office have provided ongoing weekly situation reports to stakeholders in the drought-ridden community of Metlakatla, Alaska. This includes monitoring patterns of moisture transport and low pressure systems across the entire Northern Pacific. This has helped the Metlakatka Indian Tribe and its state and Federal partners make decisions about managing water resources for drinking and power generation.

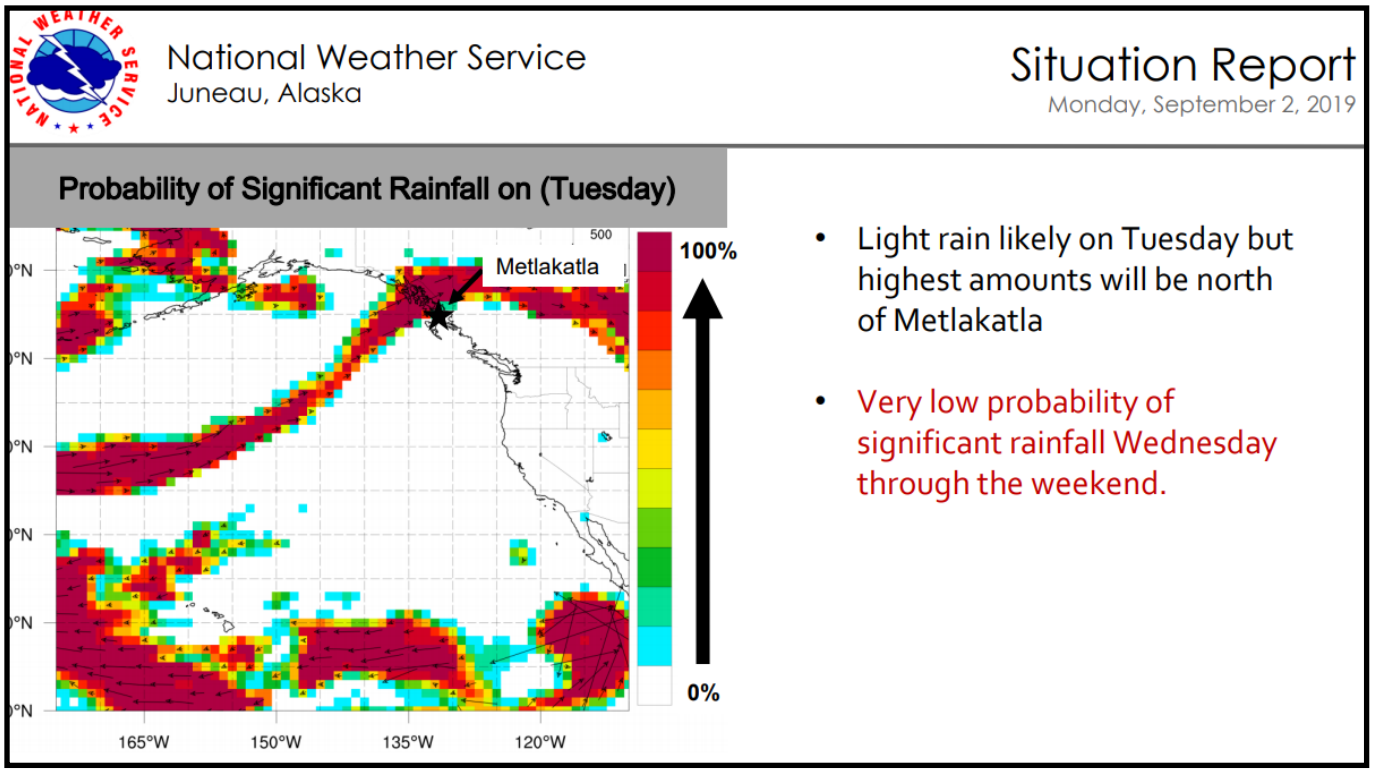

Figure 11: Example of a Situation Report from the Juneau WFO.

Current APRFC Staff and NWS Service Hydrologists

Scott Lindsey, Hydrologist-In-Charge
David Streubel, Development and Operations Hydrologist
Crane Johnson, Service Coordination Hydrologist
Jessica Cherry, Senior Hydrologist, Newsletter editor
Edward Moran, Senior Hydrologist
Vacant, Hydrologist
Kyle Van Peursem, Senior Hydrometeorologist
Eric Holloway, Hydrometeorologist
Arleen Lunsford, Hydrometeorologist
Rebecca Leighton (formerly Perry), Hydro Tech and Administrative Support
Sven Walsted, Computer Programming and Administration

WFO Service Hydrologists: Celine van Breukelen (Anchorage), Karen Endres (Fairbanks), Aaron Jacobs (Juneau)