Kuigmek
One who watches river
May 2013
A newsletter for Alaska river and ice observers

Please Note. . . .

RFC is now staffed on weekends

Spring Breakup Outlook for Alaska

A Note About Breakup Information

September 2012 Rain and Floods - the Domino Effect

May 2013 Ice Thickness Data

Why is Breakup Late?

Alaska - Pacific
River Forecast Center
6930 Sand Lake Road
Anchorage, Alaska 99502-1845
http://aprfc.arh.noaa.gov
907-266-5160
1-800-847-1739

Spring Breakup Outlook for Alaska

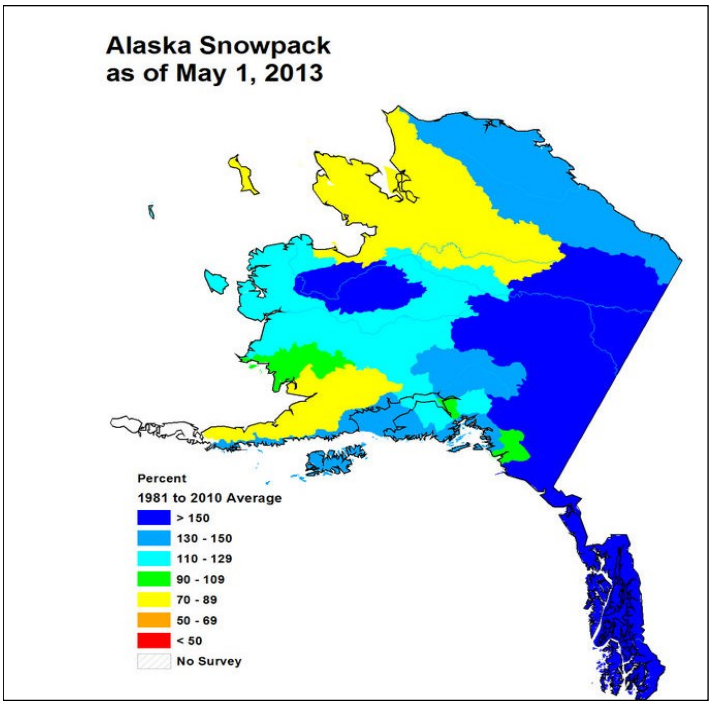
The Spring Breakup flood potential throughout Alaska is currently rated as moderate for most of the state. This forecast is based on observed snowpack, ice thickness reports, and long range temperature forecasts.

Ice **-** May 1 ice thickness measurements are available for a limited number of sites in Alaska. They indicate that ice thickness is generally between 100 and 150 percent of normal. Accumulated freezing degree days are above normal for most of mainland Alaska, with the highest percentages over the Southwest, Kodiak Island, and Southeast Alaska.

Snow **-** An analysis of the May 1 snowpack by the Natural Resources Conservation Service (NRCS) indicates a much above normal snowpack over much of the state. Significant April snow increased the snowpack across the state, which is highly unusual. The May 1 snowpack is 150% to 250% of normal across most of Interior Alaska, with only the Koyukuk River basin having less relative snow with 70% to 90% of normal. Southcentral Alaska and the Copper River basin all have between 100% to 150% of normal. Southeast Alaska snowpack is estimated to be greater than 150% of normal. Lastly, the upper Yukon River basin in Canada as of May 1 was between 120% to 150% of normal. There is enough snow anywhere across the state to produce significant snowmelt runoff peaks and potential flooding if subjected to a rapid warming pattern.

For more details on the snowpack, please refer to the various snow graph options on the APRFC website at: http://aprfc.arh.noaa.gov or on the NRCS website at:

The Susitna River at Sunshine begins the breakup process. Photo taken April 29, 2012, courtesy of Mark Occhipinti



http://www.ak.nrcs.usda.gov/snow/data/current.html

Weather **-** April temperatures were well below normal over almost all of Alaska, with significantly below normal temperatures over the Interior. Below normal temperatures continued to occur during the first several days of May across mainland Alaska. A relatively sharp increase in temperatures are expected over Southcentral and Interior Alaska during the next 2 to 3 days. The most important factor determining the severity of breakup remains the weather during the next 2 to 3 weeks. Dynamic breakups with a high potential of ice jam flooding typically require an abrupt transition to warm, summer-like temperatures sometime in May. Currently weather models are indicating an abrupt transition to near normal or slightly above normal temperatures over the Eastern Interior and Southcentral Alaska by the end of the week. Long range forecasts for the 6 to 14 day period indicate cooler than normal temperatures for the western half of Alaska and the North Slope, with normal temperatures elsewhere.

Areas of southcentral Alaska that received significant rainfall last Fall likely have higher than normal groundwater levels. These areas are more susceptible to minor flooding and drainage issues in the event of a rapid warmup.

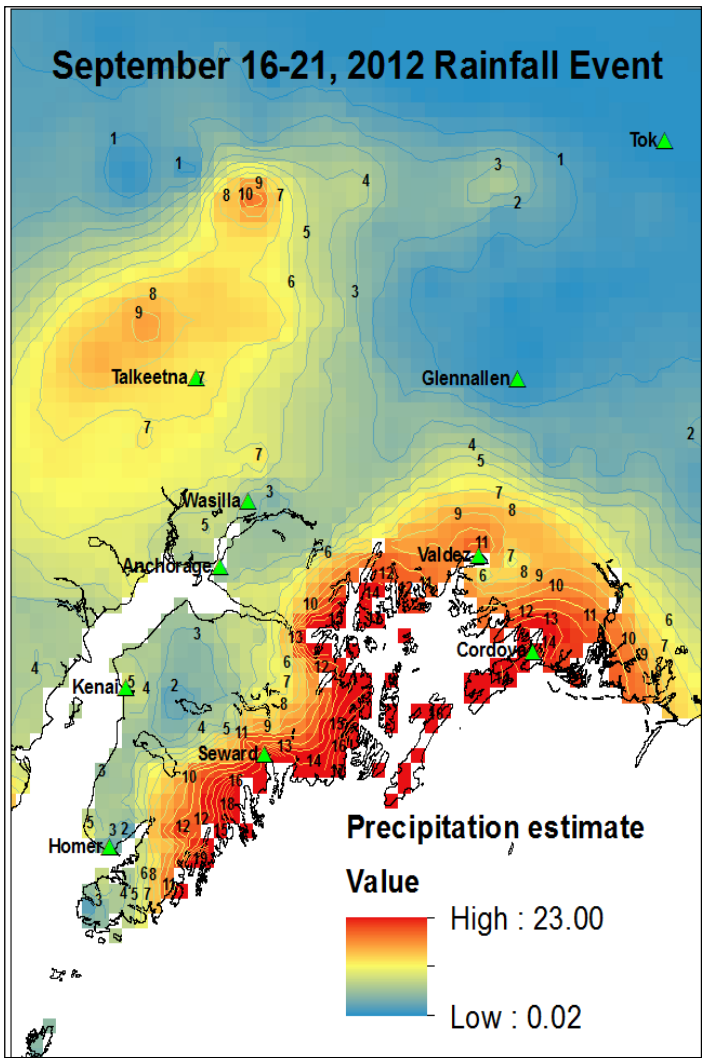
For more information on the outlooks for this spring, please refer to the Climate Prediction Center website at: http://www.cpc.ncep.noaa.gov/index.php

A Note About Breakup Information:

We request your assistance in obtaining information on breakup on rivers and lakes in your area for the 2013 season. We would appreciate it if you would complete our River and Lake Breakup Information Form to the best of your knowledge and return the form to us. If you have any comments, please include them in the remarks area. The information we receive from you helps contribute to a more complete record of breakup data for Alaska and is greatly appreciated.

Use the link below to view the progress of breakup on rivers across Alaska. The breakup map will be updated as information becomes available.

http://aprfc.arh.noaa.gov/data/maps/brkup_map.html



September 2012 Rain and Floods - the Domino Effect
Contributors: Arleen Lunsford, John Papineau, Ed Plumb, Celine van Breukelen

The September 14th-27th period will be remembered by many for its heavy rain and subsequent flooding. A look at the weather data shows that there were two heavy rain events embedded in a persistently wet period.

The weather pattern that led to all the rain and flooding had high pressure over the eastern Gulf of Alaska and western Canada with a low pressure system (storm) in the central and eastern Bering Sea, a pattern which persisted from the middle of September until late in the month. This pattern transported warm air and significant moisture from the sub-tropics/tropics through the Gulf of Alaska into southcentral Alaska. Strong winds in the lower 15,000 feet of the atmosphere were transporting this moisture, and when these winds encountered the coastal mountains, the air was forced upwards - resulting in very high rainfall rates. Moving inland, the rainfall diminished in comparison to the coast, but as these powerful winds transported moisture up Cook Inlet, significant rain also reached the Susitna basin and portions of the Alaska Range. Finally, the warm air rapidly raised freezing levels, which led to most of the precipita-

tion falling as rain, even high in the mountains.

The first heavy rain event occurred on Sept 15th & 16th, when 4-10 inches fell over the southern Kenai Peninsula, 15-18 inches fell in Cordova, 1.5-3.5 inches fell in the Susitna basin, and up to 1.5 inches fell on the Anchorage Hillside. These rainfall amounts are not rare in southcentral Alaska, similar amounts occur roughly every four to six years. Recent events include August and October of 2006, October 1986, September 1995, and October 2002.

Prior to the rain of the 15th & 16th, southcentral river and stream levels were pretty low overall - freezing levels had been fairly low, which in turn had reduced glacier melt. The rain on September 15th & 16th brought river levels up to bankfull, with some isolated minor flooding - setting the stage (hence the 'domino effect') for more significant flooding when additional heavy rain fell on the 19th & 20th. This second heavy rainfall produced amounts along the southern Kenai Peninsula comparable to the first event, but the main difference was the intensity. For example, at the Seward airport 5.62 inches was recorded for the 24 hour period ending early on the morning of the 20th. This is not that much rain compared to several previous events; however, 4.88 inches of that amount fell in a 9 hour period, a lot of rain for the smaller rivers and creeks to handle - which of course they could not.

Further to the north, considerable rain fell in the Susitna basin on the 20th as well. Both sides of the basin were hit hard: almost 3 inches was recorded at Hatcher Pass over a 24 hour period ending on the morning of the 21st, while nearly 4.5 inches were reported at Skwentna over a 48 hour period ending on the afternoon of the 21st. This followed persistent rains that had already fallen across the basin in the previous days. Soils were saturated, so this additional rain ran directly into the rivers and streams, and flooding quickly followed.

Flood waters from Gold Creek near the Susitna River leave railroad tracks hanging
Photo courtesy of Alaska Railroad

The band of heaviest rain did shift over Prince William Sound toward the latter part of the event, and some minor flooding and mud slides were noted in the Valdez and Cordova areas, but fortunately for these communities they were not in the cross-hairs of this second event.

In Seward, the rainfall caused road, school, and airport closures. The Resurrection River peaked three times; (at minor flood levels on September 17th and 23rd, and at major flood levels on September 20th). Salmon Creek jumped its banks and caused Grouse Creek to flood Grouse Creek Road. Lowell Point Road was closed due

Flood waters from Salmon Creek
caused road closures in Seward

to water and gravel from Lowell Creek.
Heavy rain caused flash flooding in Wasilla on September 20th. Water rose several feet in a matter of hours, and residents in a neighborhood off of Lucille Street and Marilyn Circle had to be rescued by boat.

The Yentna River experienced major flooding September 20th-25th, and the Skwentna River remained at flood stage during the same period. On the eastern side of the Susitna basin, rises on many of the small creeks caused properties to flood and roads to close. Along the Parks Highway, the Little Susitna River flooded several residences, and Moose Creek closed Oilwell Road. The Matanuska-Susitna Borough suggested evacuations of people living close to Willow and Montana Creeks. Willow Creek exceeded major flood stage and Montana Creek crested twice, causing damage to the Yoder Road Bridge. The Talkeetna River crested at four feet above flood levels, and a levee protecting the town breached in several places. According to a Borough spokesperson, water covered 35% of the town.

The Kenai River sustained high water from September 22nd to October 4th, with water flooding properties in low-

Flooded streets from the Talkeetna River

lying areas; Kenai Keys and the Big Eddy area of Soldotna were especially hard hit. Water was flowing under houses, flooding outbuildings, and making roads impassable. The precipitation also raised the ground-water table, flooding several basements.

Heavy rain in the Alaska Range caused the Nenana River to rise above flood stage on Friday morning, September 21st. The high water flooded several buildings at Denali National Park, inundated the road to the Usibelli Coal Mine near Healy, and flooded several roads adjacent to the river in the community of Nenana. The high water on the Nenana River also resulted in significant bank erosion. At Milepost 239 of the Parks Highway, just north of Denali National Park, the Nenana River scoured away the southbound lane of the highway and the road was limited to one-lane traffic for several days. Whitewater rafting companies based in Denali saw the record high water levels as a rare chance to run the Nenana River canyon when the water was a chaotic class V rapid for much of its length, with 10-15 foot standing waves. After several hours of scouting, three rafts successfully navigated the whitewater from the park entrance to Nenana.

The Nenana River erodes away the Parks Highway at Milepost 239

The storm caused high water as far west as the Kuskokwim River. Water levels at the village of Crooked Creek on the Kuskokwim River rose over 6 feet between September 16th and 25th due to heavy rain in the Alaska Range.

This was an incredibly widespread event, affecting all of southcentral and significant parts of Interior Alaska. The RFC had a flood warning, watch, or advisory out every day from September 14th to September 30th. Governor Parnell declared a state of emergency for the Matanuska -Susitna and Kenai Peninsula Boroughs. The flooding was significant enough to close the railroad for 6 days, the longest it has been out of commission since 1986.

Citations:

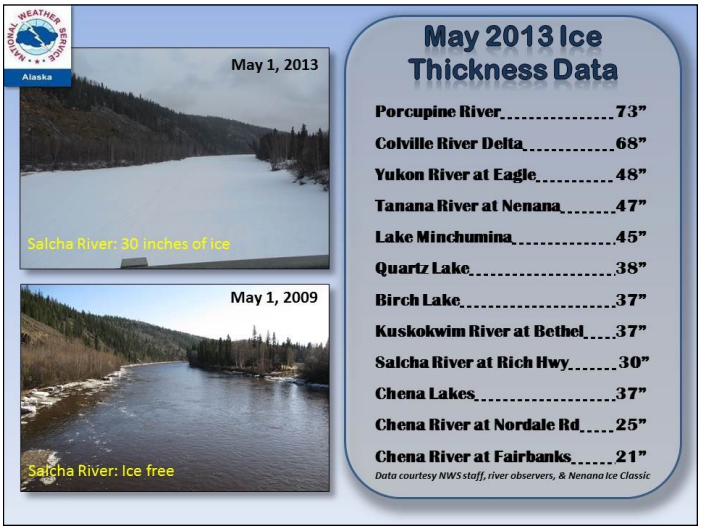
http://gov.alaska.gov/parnell/press-room/full-press-release.html?pr=6270 (accessed 10/31/2012)
http://www.nytimes.com/2012/09/23/us/talkeetna-alaska-faces-flooding.html?_r=0 (accessed 10/31/2012)
http://www.alaskadispatch.com/article/talkeetna-evacuation-under-way-face-rising-water-video (accessed 10/31/2012)

High water on the Kenai River at Cooper Landing

Flooding from the Nenana River near the Denali Park employee housing

May 2013 Ice Thickness Data

May arrived and most of Alaska's rivers remained locked in ice and snow. NWS staff and river observers collect ice thickness data around the 1st day of each month during the winter. However, except on the North Slope and western Alaska, by the start of May ice is typically gone or unsafe for measurements. Not so this remarkably backwards spring. Ice thickness and snow on the ice at nearly all measured locations was THICKER than at the start of April.



Why is Breakup Late?
By Celine van Breukelen and Richard Thomas

This has been a long, cold, spring. Like all Alaskans, we at the RFC are ready to get on with breakup and let summer come through! Breakup around the state is at least two weeks behind schedule, but why?

The persistent pattern throughout April and early May has been a ridge (high) over the Bering Sea and a trough (low) centered over the mainland. This configuration has forced colder, arctic air in from the north, bringing below normal temperatures for most of Alaska. This is typical for a negative PDO pattern; however its stability is not. (More on PDO later). One of the factors playing into this stability was the lack of deep tropical convection in the western Pacific. Deep thunderstorms in that part of the world enhance storm formation over the Pacific Ocean east of Japan, often they move into the Bering Sea and impact Alaska.

What is the PDO? PDO, or Pacific Decadal Oscillation is a broad, global pattern effecting the surface waters in the Pacific ocean. A negative PDO is characterized by a warming of the western Pacific and a cooling of the eastern Pacific. For Alaska, a negative PDO generally means cooler waters in southeast and the Gulf of Alaska and cold winds from the north. Below, is an image of sea surface temperatures and winds in both positive (warm phase) and negative (cold phase) PDO patterns, Figure 2.

It is important to mention that we are not having a later than normal breakup exclusively because this is a negative PDO year. In fact, all the years since 2005-2006 have been negative except for 2009-2010. The abnormality is the *stability* of this weather pattern.

Snow: How have the temperatures impacted the snowpack? With colder weather, we have had a longer than normal snow accumulation period. The number of storms we have had in the past few weeks is very typical for Alaska in the spring. What is different is that storms which would have normally brought precipitation as rain are bringing snow instead. So, for some of the sites which were affected by the mainland low, there was much above normal late season snowfall accumulation.

Table 1: Accumulated late season snowfall measured in inches for locations throughout the state.

	Snowfall since March 1, 2013	Normal snowfall (March 1-present)	Percent difference
Bethel	6.2	15.2	-59.2%
Anchorage	37.5	14.2	164.1%
Valdez	148	70.7	109.3%
Fairbanks	17.8	8.4	111.9%
McGrath	9.1	17	-46.5%
Yakutat	63.3	37.7	67.9%

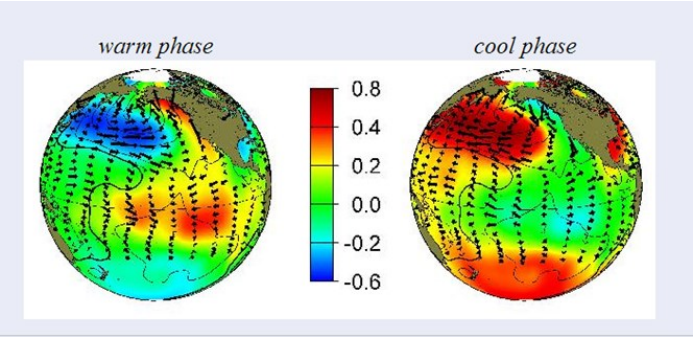


Figure 2: Positive ("warm") and negative ("cool") PDO patterns. Colors indicate difference in ocean-surface temperature, arrows indicate prevailing wind direction. Image credit: University of Washington, http://jisao.washington.edu/pdo/.

Just how late is breakup? As of this writing on May 14, 2013, only three of the river locations we monitor have broken up. "Normally", 39 of the 54 sites we forecast would have broken up by now. Here is a summary of average breakup dates and our current predictions for a selection of communities. "Days late" was calculated by finding the difference between the average breakup date and the midpoint of the forecast date range. On average we are running about two weeks late across the state.

	Average Breakup Date	Forecast Date Range†	Days "late"
Skwentna River at Skwentna	3-May	May 13**	10
Tanana River at Fairbanks	29-Apr	May 16-19	18.5
Tanana River at Nenana	4-May	May 16-19	13.5
Chisana River at Northway	21-Apr	May 8**	17
Gakona River at Highway	2-May	May 16-19	15.5
Kuskokwim River at Nikolai	24-Apr	May 9**	15
Kuskokwim River at McGrath	7-May	May 16-21	11.5
Kuskokwim River at Aniak	8-May	May 18-23	12.5
Kuskokwim River at Bethel	12-May	May 22-27	12.5
Yukon River at Eagle	5-May	May 16-19	12.5
Yukon River at Ft. Yukon	10-May	May 18-22	10
Yukon River at Tanana	10-May	May 21-25	13
Yukon River at Ruby	11-May	May 22-26	13
Yukon River at Anvik	16-May	May 26-30	12
Yukon River at Pilot Station	17-May	May 27-June 1	12.5
Yukon River at Emmonak	23-May	May 29-June 3	8.5
Koyukuk at Bettles	9-May	May 20-25	13.5

**Breakup has already occurred. † Dates may change. Be sure to check http://aprfc.arh.noaa.gov/products/fcst.php?product=SRAK48PACR for the latest forecast.

How long will this cold weather pattern last? After another shot of cold and precipitation this weekend (May 18-19), a ridge will build in the Bering Sea and progress eastward, bringing markedly warm and "climatologically normal" temperatures the week of May 20th. In the words of our Alaska Region Climatologist: "Spring is really coming." Finally.

Additional Breakup links:
View the Spring Breakup Outlook,
Spring Flood Potential Map for Alaska,
and more:
http://aprfc.arh.noaa.gov/products/productmenu.php

Search our River Notes database for
breakup information on rivers and lakes:
http://aprfc.arh.noaa.gov/php/rivnotes/searchnotes.php