Kuigmek

One who watches river

October 2009

A newsletter for Alaska river and ice observers

Please Note. . . .

Observers...
Don't forget to send in your Freeze-up Forms.

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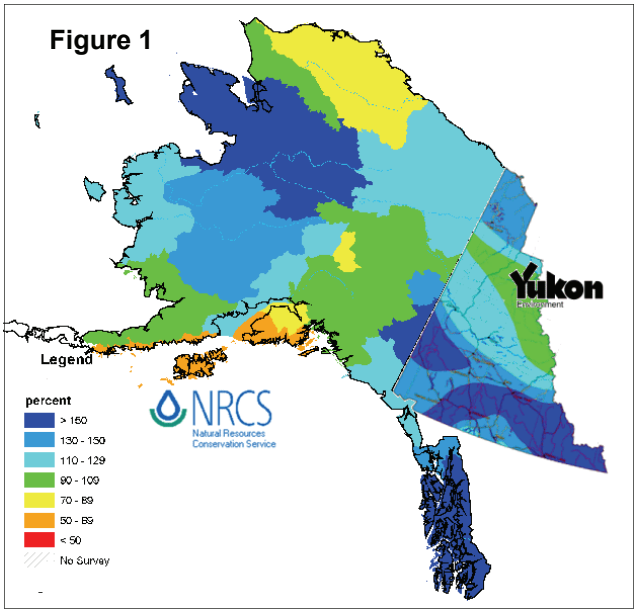
Our last weekend staffing is scheduled to be 10/31 - 11/01. **For those of you continuing to take measurements in November or beyond, please hold your weekend measurements and give them to us on Mondays, or enter them on-line at http://aprfc.arh.noaa.gov. Web entry requires a password. Instructions and password can be obtained from any APRFC staff member.**

Ice Breakup Flooding in May 2009
by Larry Rundquist

Conditions Before Breakup Began:

The snowpack was average to well above average in most of Alaska and in the upper Yukon River basin in Canada at the end of the winter accumulation season, as illustrated by the NRCS and Environment Yukon snowpack maps for April 1st (see figure 1). The ice thickness on Alaska rivers and lakes was thinner than average at some locations and thicker than average at others (see figure 2). However, most of the key river ice thicknesses were thicker than normal on April 1st. At Eagle, the ice thickness was 138 percent of normal at 55 inches. There was also a report down river from Eagle that someone drilled through 7 feet (84 inches) of ice to reach water.

Figure 1



Weather Event:

During the last week of April 2009, a high pressure system developed over Alaska, which resulted in clear weather and well above normal temperatures and freezing levels across the state and the upper Yukon River basin in Canada. This weather system persisted for more than a week and set many temperature records. The long duration of the record-setting high temperatures and high freezing levels caused the snow pack at low to moderately high elevations to ripen quickly and produce a significant amount of snow melt runoff into the ice covered rivers. The river ice did not have sufficient time to decay and lose its strength before the snow melt runoff caused sufficient drag on the ice sheets to initiate movement. The resulting strong ice sheets are very prone to jam at constrictions or bends in the river. Ice jams formed at many ***cont'd on Page 3***

End of 2009 Open Water Season

The 2009 open water season is coming to a close and we would like to thank you for your assistance in taking water level readings and ask that you stop taking readings when ice actually prevents you from making an accurate reading safely.

We would appreciate any information on the condition of the river and the formation of river ice. Please complete the enclosed Freeze-up Form and return to us. Your help contributes to a more complete record of freeze-up data for Alaska and is greatly appreciated.

Welcome New Observers

Jim Jolin
Kenai River at Kenai Keys
June 2009

Joseph Matesi
Porcupine River near the mouth of Coleen River
June 2009

Carol Thomas
Black River at Chalkyitsik
June 2009

Stephen Mark
Naknek River at Lake Camp
August 2009

Kathy Chase
Yukon River at Holy Cross
August 2009

Mari Jenkins
Klutina River at Copper Center
September 2009

The Alaska-Pacific River Forecast Center staff thanks you for your river and weather observations this season, and looks forward to working with you again next year.

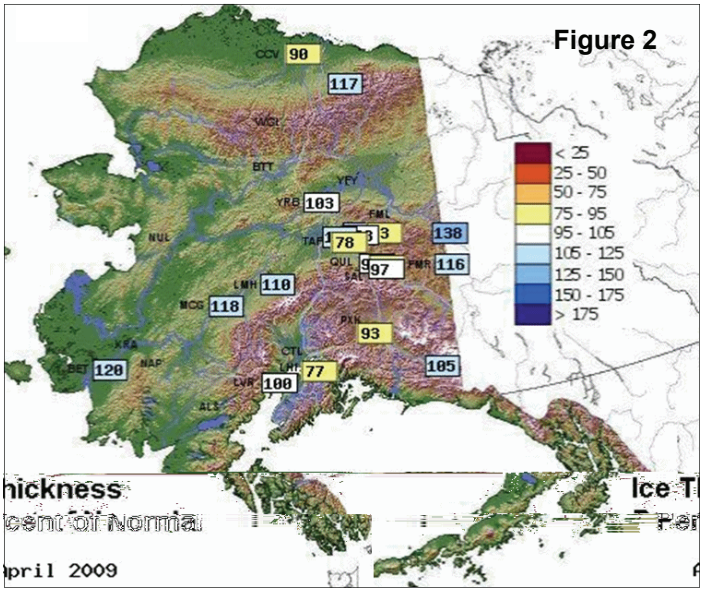
John Borg and his wife Betty have been residents of Eagle since 1966. John has served as both river and cooperative weather observer since 1971.

New observer Kathy Chase from the village of Holy Cross on the Yukon River

Joe Matesi (left) and Fairbanks Forecast Office Observation Program Leader Brad Sipperly (right) finish the installation of a temperature sensor shelter. Joe came onboard in June as both a river and cooperative weather observer. Joe takes river readings on the Porcupine River, near the mouth of the Coleen River.

Linda Captain takes daily river readings on the Yukon River at Ruby. She has been a river observer at her location for over 10 years.

locations along Alaskan rivers, resulting in flooding of upstream villages. Ice jams on rivers with high flow due to excessive amounts of snow melt are more likely to create thicker jams, which can cause more significant flooding upstream. These factors all contributed to severe flooding in many locations in Alaska during the 2009 ice breakup process. The substantial amount of flow due to snow melt in the rivers also contributed to minor flooding at many other villages.



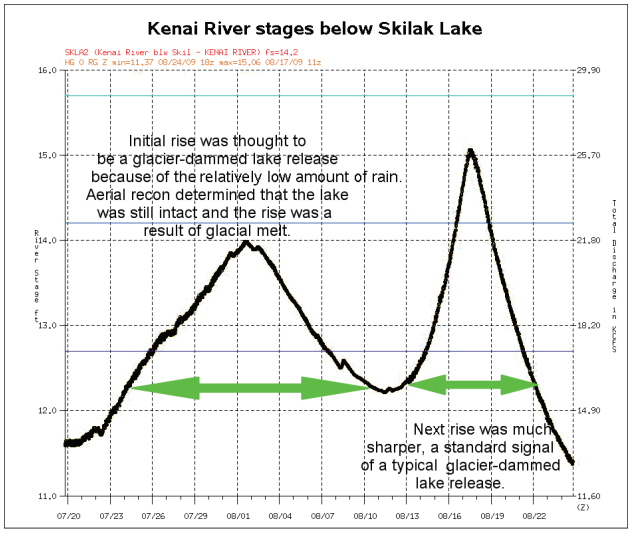
Images from Breakup 2009

Yukon River

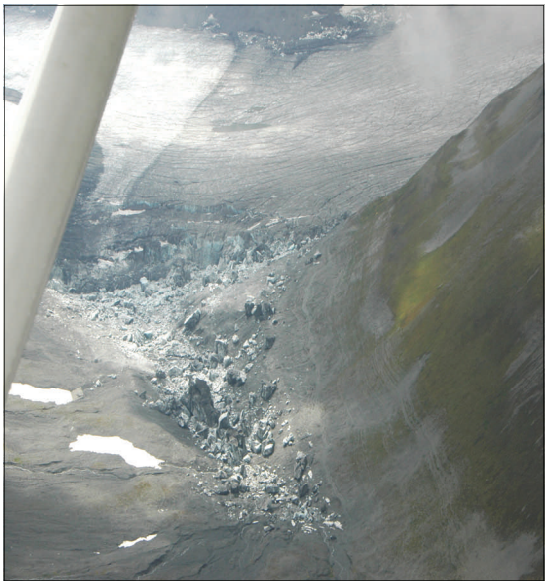
Kuskokwim River

Skilak Glacier Dammed Lake Release
by Jamie Montesi

Skilak Glacier Dammed Lake (GDL) drained earlier in the year than normal when it began releasing on or around August 8, 2009. Skilak GDL typically releases later in the fall, but it had not emptied since January 2007, when approximately 90,000 acre-ft of water was released mid-winter. This year, approximately 102,000 acre-ft of water drained from Skilak GDL and caused water levels on the Kenai River below Skilak Lake to rise above minor flood stage. River levels crested on August 17th, about 10 days after the release began. The gage below Skilak Lake recorded an increase of 2.5 ft and crested at 15.0 ft; the water levels crested at 12.5 ft in the Kenai Keys, and 12.0 ft in Soldotna. Minor flooding occurred in the Kenai Keys and Big Eddy areas. Roads were inundated with water, and yards and several garages were flooded, but no significant damage to household structures was reported. A special thanks to our observer in the Kenai Keys, Jim Jolin. We greatly appreciate all the information and extra river observations that Jim provided to us during and after the flooding.



Skilak GDL; full of ice and water before release.
Photo taken August 1, 2009 by Seward CAP.



Skilak GDL; completely empty ten days after release.
Photo taken August 17, 2009 by Seward CAP.

Start of Ice Thickness Measurements

Those of you who measured ice thickness last year are requested to do so again this year. Please let us know if you need more forms or envelopes for this season. For those of you who have measured in the past but do not intend to this year, please contact us to get instructions on sending the valuable equipment back to us so that we can use it at another location.

We will enter your data into a database and use the data in a monthly analysis of snow and ice for forecasting breakup characteristics next spring. We would like you to make the measurement as close to the last day of each month as possible and mail the results to us. Be sure to include the date and location on the form. A phone call to our 800 number would also aid in the analysis process, or use the NWS Observers form on the Forms menu on the APRFC website to enter the information at:

http://aprfc.arh.noaa.gov

The ice thickness measurements should be made in the same locations as in the past, preferably far enough from the shore line to prevent drilling in mud and not so far as to encounter strong currents. Before drilling the ice, measure the depth of the snow on top of the ice at that point and record the snow depth in inches. It is preferable to drill a new hole each time rather than use the previously drilled hole. Inaccuracies due to differences in heat transfer can occur at previously drilled holes.

Record Warm and Dry July in Interior Alaska
by Ed Plumb and Rick Thoman

July 2009 will go down as an outlier in the weather record books. Fairbanks experienced the longest sustained stretch of warm weather ever recorded and almost a complete lack of rainfall. Similar weather was reported elsewhere around the interior. July is typically a month of transition when the winds across the state become more southwesterly and mark the beginning of the "monsoon" season. This pattern shift allows moisture from the Bering Sea to filter into the interior. This was not the case in July 2009 when warm high pressure remained anchored over interior Alaska and blocked any weather systems from moving into the state until the second week of August.

The temperature climbed above 70 degrees every single day of the month in the Fairbanks area. The only other time this has happened was in July 1927. Temperatures also shot up into the 90's during the first part of July. This was the first time since August 1994 that the temperature in Fairbanks had busted the 90 degree mark. The average high temperature of 78.6 degrees in Fairbanks was the warmest on record for the month of July…and tied with June 1969 for the warmest average high temperature of any month ever observed in Fairbanks. Along with the heat…the meager 0.06 inches of rain that fell in Fairbanks resulted in the driest summer month ever seen in over 100 years of records. The warm and bone dry weather also helped fuel forest fires which brought heavy smoke that was reminiscent of the summers of 2004 and 2005.

The sparse rainfall allowed many interior rivers to fall to near record low levels. This posed navigation problems for some people traveling to residences or remote cabins along some rivers. In sharp contrast, glacially fed rivers such as the Tanana and Chisana were running high or near bankfull during the month of July. This was due to the warm temperatures melting high altitude snow and glaciers in the Alaska Range. As would be expected, no flooding was reported during July 2009. **Read on for more Alaska weather highlights from our Weather Service Offices across the state…**

Salcha Flood Monitoring Network
by Ed Plumb

Salcha, Alaska: this small community situated along the Tanana River about 30 miles southeast of Fairbanks has experienced chronic flooding in recent years. In 2008, the area was hit by significant ice jam flooding during breakup, and then again by heavy summer rains that brought near record flooding to the Tanana River. The complete lack of river gages on the Tanana River in Salcha has made it difficult to forecast, document, and compare the recurring floods. In the spring of 2009, the National Weather Service (NWS) in Fairbanks installed a handful of staff gages in the flood prone areas. Immediately after the installation, ice jams formed on the Tanana River, and Salcha was flooded once again. The usefulness of the new river gages became very obvious as the river began to rise. The gages served as an invaluable tool for monitoring the fluctuating flood waters by the NWS, emergency managers, Salcha Fire and Rescue, and local residents. The gages allowed many people to view and report changes in water levels from specific points within the community, which was extremely important for emergency response and evacuations. The addition of these gages will help to forecast and prepare for future floods in the Salcha area.

A new flood staff gage on Piledriver Slough in Salcha helped emergency personnel and NWS forecasters respond to the 2009 spring breakup flooding.

- King Salmon recorded a new record high temperature of 81 degrees on June 10th. The previous record high was 70 degrees set back in 1956.

- On July 25th Kodiak set a new daily precipitation record with 2.53 inches of precipitation. The previous record was 2.44 inches set in 2007.

- On July 6th the high temperature was 87 degrees in McGrath, setting a new record high temperature. The previous record was 86 degrees set in 1975.

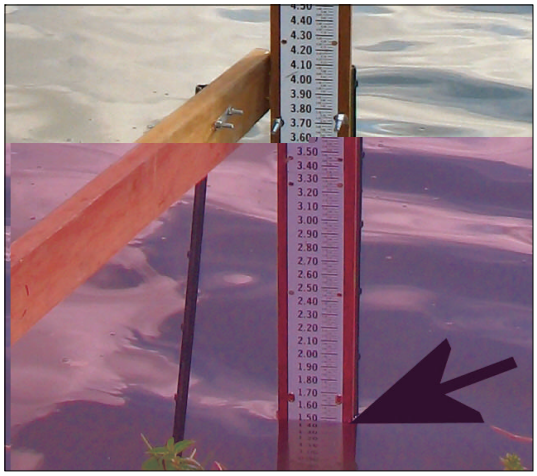
- Valdez recorded 1.96 inches of precipitation on August 16th. This total breaks the previous daily precipitation record of 1.33 inches set in 1998.

- On August 26th King Salmon recorded a record low temperature of 30 degrees. This tied the record set in 1984. The average low temperature for this day is 46 degrees.

- A record high temperature of 68 degrees was recorded on September 17th in McGrath. The previous record high on this date was 66, set in 1969.

A Primer on Alaska River Gages

Here in Alaska, our observers use a number of different measurement methods to obtain water levels for use by the Hydrologists at the River Forecast Center. There are also many automated water level gages, most of which are operated by the U.S. Geological Survey. All river gages are designed to read the water level in feet and hundreds of a foot above an arbitrary datum. Below is a summary of manual gage types with some things to remember for each type.



Staff Gages

For Staff gages, the water level is read directly from the gage. If there are windy conditions and the level is moving up and down quite a bit, the best strategy is to record a reading that is about the average of the high and the low.

Wire Weight Gages

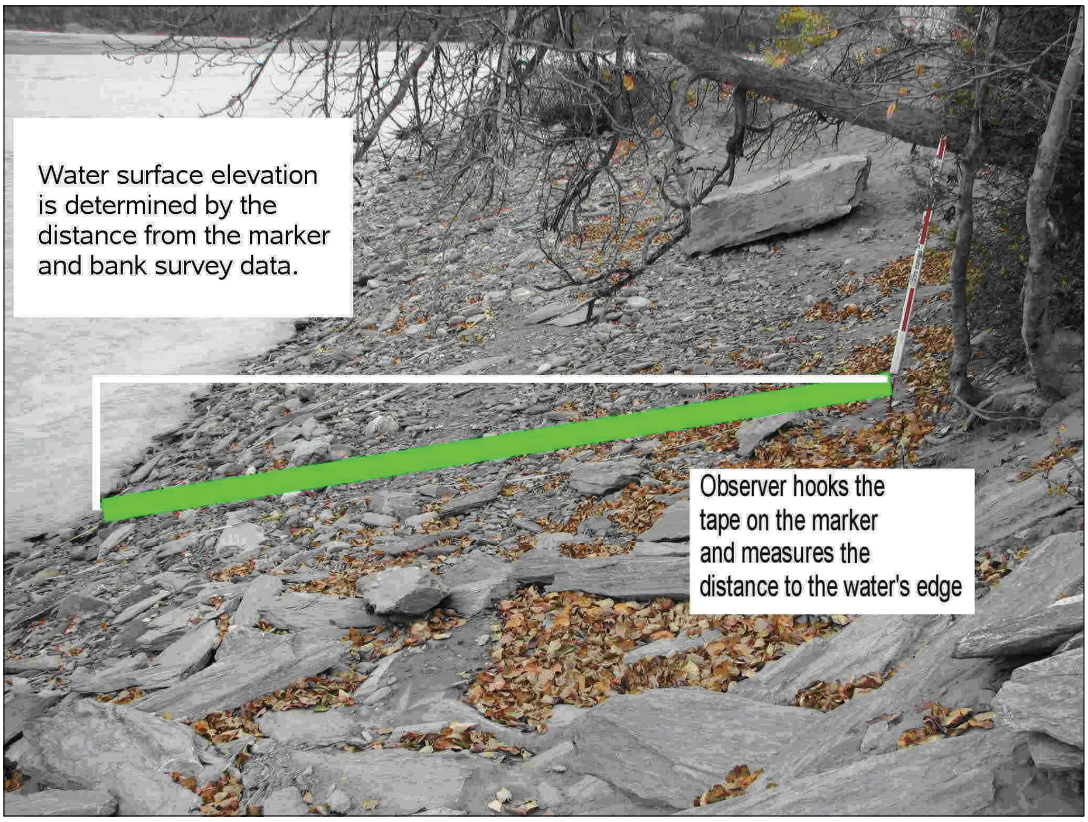
This gage involves a brass weight that is lowered down until it touches the water surface. The water level is read from a counter on the left end of the drum to the even foot, with hundredths of a foot read from the left end of the drum. Taking weekly or bi-weekly readings on the check bar ensures that the gage continues to operate properly. Remember to lock your gage up when done to help prevent vandalism.

Poor Man's Wire Weight Gages

This gage involves a weighted tape measure that is lowered down from a surveyed point on the bridge until the end of the tape touches the water surface. The distance from that surveyed point to the surface is read from the tape and when that value is called in or entered online, it is converted to a river level or stage value. It is important to use the same designated measurement location for all readings.

Slope Profile Gages

When there are no bridges and no good place to put a staff gage, we use geometry to determine the river level. We survey the river bank, install several markers and determine the elevation of those markers, and survey the slope of the bank as far down into the river as we can reach. Our observers measure the distance from the marker down to the river's edge, following the same path that was surveyed. We use our survey information to calculate the elevation of the bank at the edge of the water. This type of gage works well if the bank is stable, but if the bank is eroding, it will need to be resurveyed frequently or the gage may need to be moved to another location. Most of the remote sites in the state have this type of river gage.



Each of these types of gages can be used to help us monitor the water levels of the rivers and lakes around the state. The most important ingredient to the successful use of these gages is our wonderful network of observers. Without them, we would not have the means to do our job here at the River Forecast Center!

In Search of High Water Marks – Stevens Village, Alaska
by Ed Plumb

I stood there amongst the massive chunks of ice trying to imagine the moment they were placed here. It was hard to comprehend the powerful force that had tossed them high up on the shore. Today, the Yukon River was more than 20 feet below me. This was not the scene three days before when the river was a raging torrent choked with a winters worth of ice that was plowing a path towards the Bering Sea. Anything near the riverbank was a potential victim of the catastrophe. The destruction was unbelievable; utility poles had been split apart like match sticks; cabins were lifted from their foundations; all that was left of some structures was a chaotic pile of logs; the belongings of people's lives were scattered about throughout the village. It was a sad situation and my thoughts went out to the residents that call this place home.

Stevens Village was essentially a ghost town. All women, children and elders had been evacuated before the floodwaters hit. Only a few men had remained to protect what they could and were now here cleaning up the aftermath. It was uncertain when it would be safe for the bulk of the population to return to their homes perched above the mighty Yukon River. I was here to record and document the crest of the high water. I carefully maneuvered around the debris laden village in search of clues that would indicate how deep the flood waters were just a few days ago. Some signs were obvious, like a moist water line still visible on a cabin wall or a debris line of leaves and silt on the few remaining utility poles. In other places it was impossible to find any mark left behind by the high water. It is important to mark, photograph, and later survey the crest of the floodwaters in order to compare this event to past floods, as well as determine a safe building height for any future development. The flooding along the Yukon River during breakup 2009 was some of the worst in recorded history at some locations. Here in Stevens Village, it is estimated that this flood will go down in the record books as the 2nd highest on record.

Documenting high water marks in Stevens Village on the Yukon River

Documenting High Water Levels for All Events

Since it can be difficult to find high water marks after the flood is all over, we encourage our observers to document the highest water level reached during each event that occurs during the open water season. High water events may be due to breakup ice jams, snow melt runoff, or heavy rainfall and we would like for each event to be documented since it is not known what level will be the highest until the end of the season. Peak water levels should be documented whether it reaches flood levels or not, but it is desirable to have the peak level of all events that go above flood stage.

The reason for asking for your support on documenting peak water levels is that it is easiest to do by measuring the level on your gage at the time of the peak level. This is why we often ask for additional readings from you when the water level gets high in an attempt to get an observation at or near the highest level. Evidence of peak water levels begins to diminish within hours of the crest time and much of the evidence is gone within a few days. Thus, getting a reading at or near the peak is the easiest and most accurate way to document the peak water level. If you are taking a reading and you see that the water level has already dropped based on higher wetted area not caused by wave action, try to get a reading at the high water level or an estimate of how much the water level has dropped vertically from the peak level.

Getting an estimated peak level during breakup at slope profile gages can be very difficult due to ice on the banks at the gage location. If you can see the high water line on the bank anywhere near your gage site and can mark that location with a spike, this mark can be measured after the ice melts away or surveyed by NWS staff during a field visit.

Dick Hutchinson of Circle points out a high water mark caused by flooding during this year's breakup