Kuigmek

One who watches river

April 2009

A newsletter for Alaska river and ice observers

Please Note. . . .

RFC will be staffed weekends beginning April 25-26

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Breakup Links

Alaska - Pacific River Forecast Center
6930 Sand Lake Road
Anchorage, Alaska 99502-1845
http://aprfc.arh.noaa.gov

Observers: Please don't forget to mail in your 2009 Breakup Forms

A Note About Breakup Information:

We request your assistance in obtaining information on breakup on rivers and lakes in your area for the 2009 season. We would appreciate it if you would complete the 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

Observation Accounting System

We are in the process of developing software that will be able to scan our database and tally the number of observation entries for any gage location over a specified period of time. This new tool will be quite useful in preparing the pay authorizations for each observer. We are also aware that some of our observers have done an outstanding job of taking and reporting gage readings every day (including finding a substitute to fill in for them as needed), but we have not been able to quantify this. The new software will allow us to look back at the summer season each winter so that we can acknowledge these outstanding observers in the spring issue of the Kuigmek.

Ice Breakup and Freezeup Terminology

Most of our observers have filled out our breakup and freezeup date forms with dates that help us to build up a history of how the dates change from year to year. It has recently come to our attention that we have not defined the terms on these forms. We are providing a draft set of definitions as we interpret the dates, but would like feedback from you on how you choose the dates for these forms. We recognize that the assignment of the dates is quite subjective but want to capture the features that are used to assign the selected dates.

Breakup

The purpose of the breakup form is to document the timing of the various stages of the breakup process. We also ask our observers to report these different stages to our office as they occur.

Unsafe for Vehicle (type) - the date when it is no longer safe for a vehicle to safely travel anywhere on the ice. This assessment is more likely to be based on the quality of the ice rather than the ice thickness.

Unsafe for Man - the date when it is no longer safe for a person to safely travel anywhere on the ice. This assessment is more likely to be based on the quality of the ice rather than the ice thickness.

First Move - the date when the ice sheet first moves at least 10 feet downstream on rivers, or 10 feet in any direction on lakes. On lakes, wind will typically cause this movement once there are shore leads large enough for the sheet of ice to be able to move. On rivers, ice sheets may move once

they have broken free from the shore ice and once they have sufficient drag by the current to shift downstream.

Breakup date - the date when sheets of ice break down into smaller pieces and/or move a significant distance downstream.

- For lake ice, the breakup date is either when the ice sheet breaks into smaller pieces or when the coverage goes from greater than 50% to less than 50%.

- For a mechanical (dynamic) river breakup, where ice from up river is needed to push ice out from in front of a village, the arrival of the breakup front would be considered to be the breakup date. This also correlates with the greatest threat of flooding, since an ice jam could form downstream after the breakup front passes by the village.

- For a thermal (mush-out) river breakup, the ice in front of a village becomes very rotten (candled) and may "break up" in one of several ways... 1. melt in place, 2. break off in small pieces to drift away into open sections of river downstream, 3. be taken away by a small local ice run, or 4. other non-threatening process which removes the ice in front of the village. If a significant run of ice then passes by the village to flush out the remaining ice, the passage of this ice run would be the breakup date. However, often there is no significant breakup front during a thermal breakup, in which case one of the above four “breakup” processes would define the breakup date. Since these processes may extend over several days, it is much more difficult to define the date of breakup in this situation. In this case, the breakup date is the date that one or more of the above processes clears the channel sufficiently far downstream to reduce the threat of flooding.

Safe for Boat - the date when the ice has cleared sufficiently for safe operation of a boat. This will often correspond to the upper end of the ice run that causes breakup, but some rivers can have a second heavy run of ice associated with a tributary or other reach of the main stem breaking up. In this case, the end of the later ice run would be the date for safe for boat.

Freezeup

The purpose of the freezeup form is to document the timing of the various stages of the freezeup process. We have recently added the freezeup date term to the form.

First Ice - the date when the first significant **permanent** ice is seen on the lake or river. This will usually be shore ice that forms in the shallower areas of the lake or river.

Unsafe for Boat - the date when the ice coverage is sufficient to prevent safe operation of a boat.

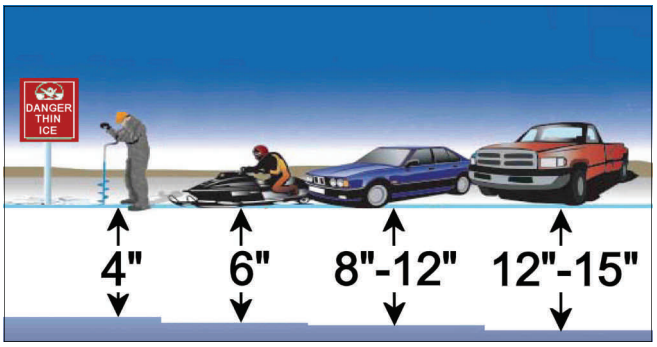
Freezeup Date - the date when a complete ice cover forms on the lake or river. Long lasting or permanent open holes are not included in this assessment. On rivers, it is the date when the slush ice pans stop moving.

Safe for Man - the date when the ice is safe for a person on foot to travel anywhere (except near obvious long lasting or permanent open holes) on the ice. Objectively, ice is considered safe for foot traffic when it is 2 - 4 inches thick. Currents under the ice make this assessment even more difficult on rivers than on lakes.

Safe for Vehicle (type) - the date when the ice is safe for a vehicle to safely travel anywhere (except near obvious long lasting or permanent open holes) on the ice. Objectively, ice is considered safe for a snowmobile or ATV when it is 5 - 6 inches thick and car or small truck when it is 8 - 12 inches thick. Currents under the ice make this assessment more difficult on rivers than on lakes.

The general rule of thumb for ice:

- **2 inches or less - STAY OFF**



- **4 inches of good ice for a walking individual**
- **6 inches of good ice for a snowmobile or ATV**
- **8-12 inches of good ice for a car or small pickup**
- **12-15 inches of good ice for a medium pickup truck.**

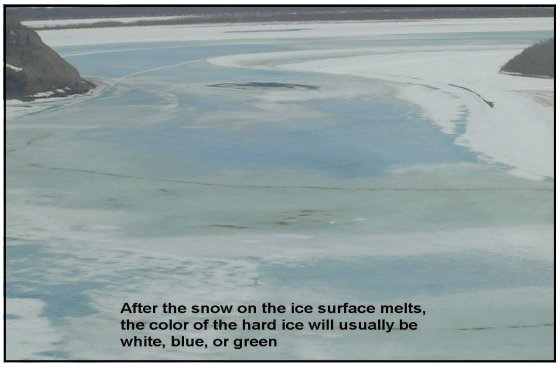
Instructions for Observing River Ice Breakup

1. **Location of observation** - this will often be your reporting station, but if conditions are different up-stream and downstream, please note the difference.

2. **Amount of shore ice along the banks** - note the width of the band of shore ice in feet or percent of river width (e.g. 5% of river width on left bank and 15% of river width on right bank.)

3. **Amount of ice in the open channel** - note the estimated percent coverage of the moving ice in the river to the nearest 10% (e.g. estimated 60% coverage of moving ice; the estimate is most accurate if you can look down from a high view point).

4. **Size and color of ice observed** - note the size and color of the ice; generally colors green, blue, or white ice indicate relatively strong ice, while gray or black ice indicate relatively weak ice.



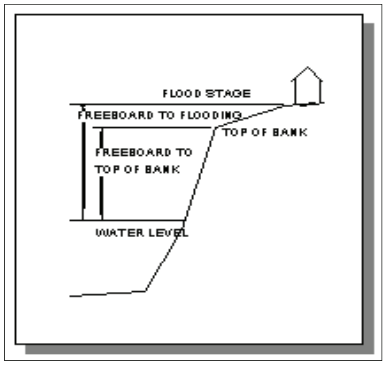
5. **Ice movement** - note whether ice is moving very slowly, slowly, average, or fast; compare to speed of normal river flow.

6. **River level trend** - note whether river level is rising, steady, or falling.

7. **Remarks** - any other observations concerning ice characteristics should be noted.

Terminology

Freeboard - The vertical distance from the water surface up to the top of the bank (freeboard to top of bank) or to a level that will cause flooding of structures (freeboard to flooding).



Left and Right Bank - Relative river bank location as you would see it as you stand looking downstream.

Lifted Ice - Early in the breakup process, sheets of ice may be floated by the rising water level in the river, lifting the ice up from its winter level; the ice may be in-place if it does not move after being lifted or shifted if it drifts to a new position in the wider river channel.

Ice Sheet - Unbroken ice sheet that is nearly as wide as the winter river channel and longer than it is wide; an ice sheet will easily jam in bends or will jam if it rotates sideways in the channel.

Ice Pan - Ice that is less than the width of the river in width and length; large pans are roughly greater than 1/2 the width of the open channel and small pans are less than 1/2 the width of the open channel.

Ice Chunk - A piece of ice smaller than the size of an automobile.

Welcome Aboard Jamie!

We would like to introduce you to our new hydrologist, Jamie Montesi. Jamie is an east coast transplant who grew up outside of Boston, MA fishing on Cape Cod and exploring the Northeast. After completing his undergraduate degree in Geology at Colgate University in upstate NY, his love for the outdoors including skiing and fly fishing, led him out west. Jamie attended Colorado State University and received his M.S. in Hydrology, and shortly thereafter started working as a hydrologist for the NRCS Snow Survey program in Boise, ID. After two years he transferred to the Anchorage office where he worked for another three years until accepting a position with the NWS. Jamie lives in Anchorage with his wife and two dogs. He enjoys fly fishing, skiing, traveling, backpacking and mountain biking. He is only 34 years old, but already he can't wait to retire to fish and travel full time.

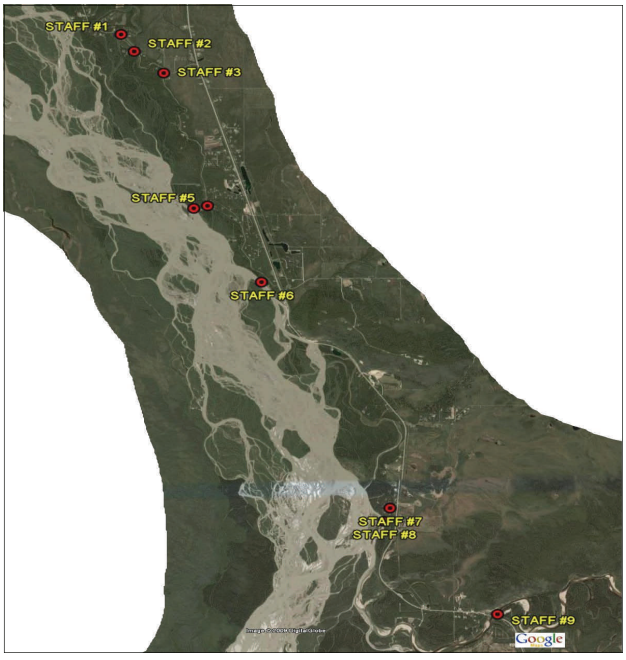
At right: Jamie performing field snow surveys on Resurrection Pass in the Kenai Mountains, Alaska

Meet Tyler King

Tyler is a junior hydrology major at the University of New Hampshire, in Durham. He is interested in water resource management, with a specific focus on arid regions. Tyler will be joining the team at the River Forecast Center this summer through a fellowship program put forth by the NOAA Office of Education. In this program, he will conduct research while at the center. Working under the direction of Scott Lindsey and Larry Rundquist, he will be applying a river temperature forecast model to one or two Alaskan rivers. Tyler's current aspirations are "to work in the hydrology field overseas, possibly as a Fulbright scholar, to gain experience in the global water resources arena before returning to take up a position in a domestic organization; perhaps at NOAA's Office of Hydrologic Development." Welcome Tyler!

Salcha Flood Hydro Mesonet

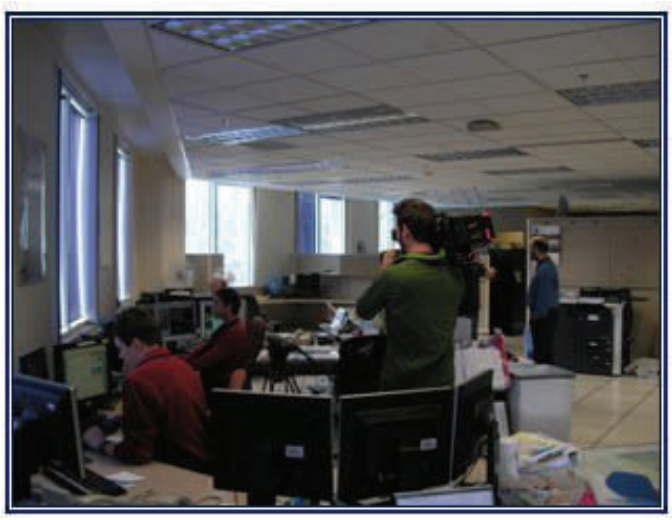
The Salcha area has experienced chronic flooding from the Tanana River in recent years. This includes Spring breakup flooding associated with ice jams as well as summer flooding from heavy rainfall. Due to the increased flooding, the National Weather Service (NWS) has coordinated with Fairbanks North Star Borough (FNSB) Emergency Management and Salcha Rescue to identify potential locations for flood staff gages in the community of Salcha. Nine staff gages will be located in the flood prone areas of Salcha in order to provide quantitative information about water level changes during future flood events. The gages will be located outside of the river channel and are expected to only be used during future flood events when water flows over bank and inundates the area. The NWS plans to install the staff gages in mid-April. In cooperation with Salcha Rescue, the NWS will also be setting up a flood "spotter" network where local Salcha residents will be trained in taking water level readings and reporting these to the NWS, FNSB, and Salcha Rescue. This will be the first time flood levels will be collected, documented, and archived for this area.



Making History at the Weather Forecast Office In Fairbanks by Kelly Songster

The History Channel film crew came to Northern Alaska's Dalton Highway this year to film the third season of "Ice Road Truckers." Dangerous weather along the Dalton Highway is unavoidable, and the winter of 2009 has been no exception. The weather this year is certainly making it easy for *The History Channel* to tell a compelling story. Since weather is such an important part of this season of "Ice Road Truckers", the crew has frequented the National Weather Service Forecast Office (WFO) in Fairbanks to farm for sound bites.

First, a little background on the star of next season's show - the "Haul Road." One of the most critical features within the Fairbanks forecast area is the James Dalton Highway. The highway spans 400 miles across northern Alaska from the Elliott Highway at Livengood in forecast Zone 221 to Deadhorse and the oilfields of Prudhoe Bay in Zone 203. The Dalton, also known as the "Haul Road", stretches through six WFO Fairbanks forecast zones and four distinct climate zones. Built during construction of the trans-Alaska oil pipeline in the 1970's, this mostly gravel highway travels through



A film crew from *The History Channel* films forecasters at work in the Fairbanks Weather Forecast Office. Photo courtesy of Kelly Songster

rolling, forested hills, across the Yukon River and Arctic Circle, through the rugged Brooks Range and the dangerous Atigun Pass, and over the North Slope to the Arctic Ocean. Along most of its length, you'll see no restaurants, no gift shops, no service stations, no cell phone towers - just forest, tundra, and mountains, crossed by a double ribbon of road and pipeline. This stretch of highway provides plenty of challenges for those who must travel its length, making it a prime subject for a television series about truck driving in extreme climates.

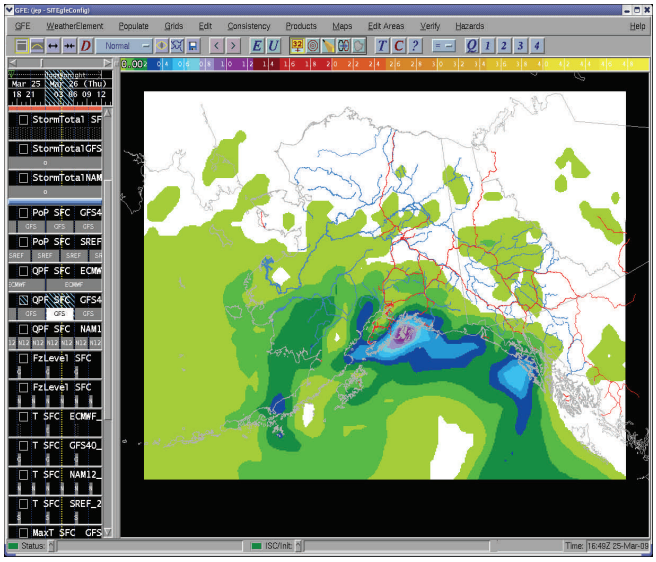
For those who do not know what "Ice Road Truckers" is about, it is a show on *The History Channel* about trucking in the arctic over roads made of ice that disappear every spring and return every winter. For the past two seasons, *The History Channel* has profiled several truckers that supply the mineral and oil industry in the Canadian Arctic. The first season took place in Yellowknife, and the second season took place in Inuvik. According to *The History Channel* website: "It is a job only a few would dare." This year (season 2), four ice road truckers return from last season to join Arctic veterans as they venture 200 miles north of the Arctic Circle to drive the most isolated and dangerous ice roads in North America. They will be gunning their rigs, carrying up to 88,000 pounds over a highway made entirely of ice onto the Arctic Ocean - delivering vital material to natural gas and mineral exploration sites. Although the latest innovations in technology have made it possible to search for the natural gas in the environment, the truckers will once again tackle titanic forces of nature. They will endure brutal minus 60-degree temperatures, white-outs, mechanical failures, and blizzards to make it through the season."

For season 3, *The History Channel* has made the decision to chronicle the experiences of Alaska's brave truckers who battle similar conditions along the Haul Road. This year, Alaska's weather has given the truckers a run for their money. Storm after storm has been closing sections of the Haul Road, and the film crew has visited the Forecast Office in Fairbanks to interview several members of the staff about conditions that close the road, and what to expect next.

In early February, John Dragomir (Meteorologist-in-Charge of the Fairbanks WFO) received a phone call from Adam Martin (supervising producer of "Original Productions" at *The History Channel).* John was asked if a crew could come by and interview a Meteorologist about climate and weather along the Dalton Highway. WFO Fairbanks Science and Operations Officer, Eric Stevens, gave the first interview. Eric was asked a variety of questions ranging from the National Weather Service mission statement, to Alaska climatology and forecast challenges, to product dissemination. After his interview, WFO staff were told that the crew would be in the area for the next 10 weeks, and that they would drop by the office from time to time to gain perspective on current weather affecting the truckers. Due to the very active pattern occurring over northern Alaska this winter, the crew has been back to the WFO a couple of times to interview forecasters on duty. To date, forecasters Mike Richmond, Corey Bogel, and myself have been interviewed about the current forecast. Brad Sipperly, (Observing Program Leader) and Mike Richmond were accompanied by the film crew for 12 hours as Brad and Mike took ice thickness measurements on local lakes and rivers for the Alaska-Pacific River Forecast Center. Look for all of us this spring when "Ice Road Truckers" season 3 airs on *The History Channel.*

GFE Comes to the RFC
by Eric Holloway

During the winter months here at Alaska Pacific River Forecast Center (APRFC), a significant amount of time was devoted to implementing a national program called Graphical Forecast Editor (GFE). GFE is a piece of a larger program, called Interactive Forecast Preparation System (IFPS), that allows forecasters to prepare forecasts and products more efficiently than writing all the products "by hand." Essentially, with IFPS/GFE, the forecaster creates and manipulates gridded numerical fields of forecast variables, all forecast products are then made automatically from these "grids." IFPS/GFE produced forecast products can be in text, tables, grids, graphics, and voice, and can be tailored for different users' locations and needs. The base forecast grids are selected from among the many forecast models which are available. Forecasters then use GFE to refine/adjust the forecast by interpolating to shorter time periods, creating other associated weather element grids, modifying grids, and checking consistency among weather elements. After the forecast is prepared, GFE is used to publish grids to a national data base, generate graphical products for the web, and produce routinely scheduled text products for public, marine, and fire weather services. GFE is the actual graphical on-screen editor that allows forecasts to create detailed graphical depictions of coming weather, while at the same time creating a numerical database of weather information or "grids" representing the same forecast. Below is a sample display of the GFE software.

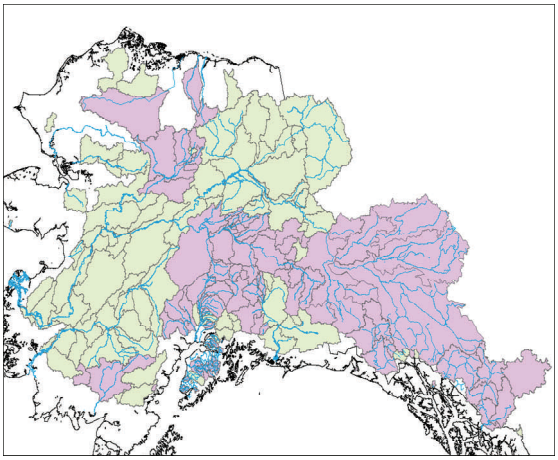


The IFPS/GFE should provide the following advantages for the APRFC:

- The IFP approach ensures consistency among all forecasts supporting different services for the same area and time.
- The existence of a gridded database of forecast weather elements will permit automatic monitoring of incoming weather observations, alerting the forecaster to observations which differ significantly from the current forecast.
- The forecast database will support enhanced verification procedures, and resolution of differences in forecasts at the boundaries between offices.

The bottom line is that IFPS/GFE gives the forecaster more time for forecasting, while the computers do what they do best - make numerous calculations, and produce different products for multiple use from a single database.

On a more local scale, GFE at the APRFC means that the HAS Forecaster will be generating Quantitative Precipitation Forecast (QPF) (the expected amount of precipitation accumulated over a specified time period) grids, instead of point QPF forecasts. The QPF's are used within hydrologic forecast models to simulate runoff impacts on rivers. The QPF grids will be used to generate basin average precipitation estimates to drive the hydrologic models this summer. This is a change from the past, when point QPF values where created for 23 sites, which were used to generate basin averages. Limiting factors for the GFE QPF include the grid size and required computer power to run this scheme. In theory, a greater number of grid points contained within a basin boundary leads to a better estimate of the average precipitation within the basin, but a greater number of grid points (smaller grid size) requires greater computer power. Even more importantly the basin must be modeled for use of GFE QPF, and as the figure below shows, …..only the purple regions are currently modeled (large additions are expected in southeast for the 2009 open water season).



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GFE Comes to the RFC cont'd...

In the future, we will use GFE to forecast freezing level, (to help predict the rain/snow line) and surface temperatures (used to generate snowmelt runoff), among other things.

An example of the IFPS/GFE derived forecast coming from APRFC can be viewed at:
http://aprfc.arh.noaa.gov/data/maps/gfe/rhall_plus.html

For a more national scale of the gridded forecast please view:
http://www.weather.gov/forecasts/graphical/sectors/

Reference:
http://www-md.fsl.noaa.gov/eft/publications/brochure/brochure.html

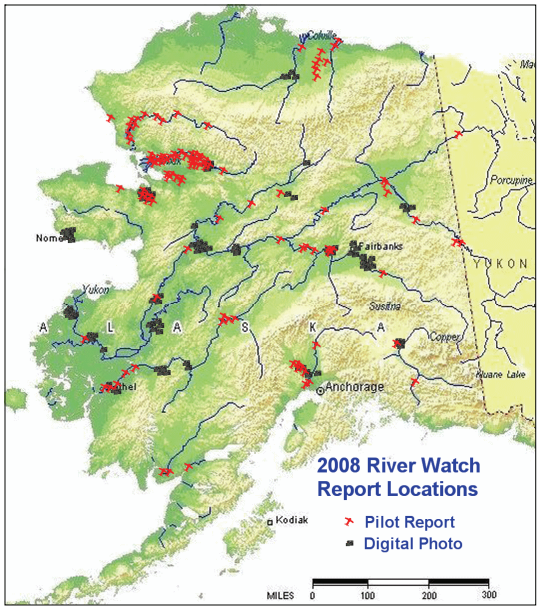
River Watch: Pilots providing eyes to monitor spring breakup

The National Weather Service (NWS) monitors ice breakup conditions throughout Alaska to assess flood threats and navigational hazards. For the past few years, pilots have provided assistance to river forecasters by reporting changes in the river ice during the ice breakup process in the spring. These observations significantly enhance the information available to hydrologists forecasting breakup. Since river ice conditions can change rapidly, many observations are needed to document these changes. Some pilots have also emailed digital photographs.

To participate in this volunteer program, pilots received training on the mechanics of river ice break up and were provided a set of terms to use to describe different ice conditions. Armed with this information, they are able to file Pilot Reports (PIREPs) as they witness different stages of breakup.

The FAA Flight Service Station captured the reports and entered them into the normal PIREP system. Information technology staff at the National Weather Service devised a filter to capture the PIREPs that contain ice reports, and make them available to the forecasters at the River Forecast Center in Anchorage. Air taxi operators, government pilots, and, in some cases, private pilots are taking advantage of their ability to observe as they make their routine flights along a number of Alaska's rivers.

Pilot reports are received at the Alaska-Pacific River Forecast Center (APRFC) in the form of PIREPs from FAA, emailed reports, telephone reports, and emailed aerial photographs. These reports are used in conjunction with aerial observations from the Emergency Services/APRFC reconnaissance flights, ground observations by village residents, satellite images, weather analyses, ground photographs, and other sources of information to enhance the forecasters understanding of the status of the breakup process on dozens of major rivers in Alaska. It is important to note that each piece of information is valid for a short duration in time and only for the point or reach of river that it describes. This is why having as many observations in as many locations as possible during the entire breakup process is important to the forecasters at the APRFC.



Each pilot report is used by the forecaster, along with other information, to do one or more of the following tasks:

- Issue flood watches or warnings to threatened villages.
- Update the graphical breakup map that depicts the status of breakup on major rivers in Alaska.
- Update the text breakup summary that is produced each day.
- Assess the breakup date for most villages along Alaskan rivers.
- Post the information into a searchable database that is accessible on the internet.
- Post selected photographs on our photo gallery on the internet.

Additional information about the program and training opportunities are available from the following NWS contacts or website:

Anchorage - Larry Rundquist 266-5152

Fairbanks - Brad Sipperly 458-3713

http://aprfc.arh.noaa.gov/rivwatch.php

Alaska Center for Climate Assessment and Policy

The Alaska Center for Climate Assessment and Policy (ACCAP) has as its mission to assess the socio-economic and biophysical impacts of climate variability in Alaska, make this information available to local and regional decision-makers, and improve the ability of Alaskans to adapt to a changing climate. Climate changes affect us in Alaska more significantly than other places, and ACCAP is striving to study and present information on how those impacts will change our lives. The Center organizes a regular Climate Teleconference that is broadcast on the internet dealing with various aspects of Climate in Alaska. The topic for this month's teleconference may be of interest to our observers.

Tuesday, April 14, 2009
10:00-11:00am Alaska Local Time
CLIMATE INFLUENCE ON ICE BREAKUP IN ALASKA
Larry Rundquist, NOAA National Weather Service

The National Weather Service Alaska-Pacific River Forecast Center has monitored river ice breakup on major rivers in Alaska for decades. The breakup process for large rivers in Interior Alaska can range from dynamic to thermal. The timing and severity of breakup is controlled by both weather and climate. Climate variability influences each of the elements of breakup, but weather patterns control the process. Join us to learn about trends in ice breakup conditions over the past decades, to hear expectations for breakup in 2009, and to discuss implications of variability in breakup conditions.

All interested parties are welcome to attend. Information on how to view the internet broadcast is available on the ACCAP web page at:
http://www.uaf.edu/accap/teleconference.htm

The Alaska Weather and Climate Highlights website is collaboratively produced by ACCAP, the Alaska Climate Research Center and NOAA, National Weather Service, Alaska Region.
The web site also has information on climate highlights throughout the state for each month at:
http://www.uaf.edu/accap/awch/index.htm

We hope that any of our observers who have an interest in the climate of Alaska will take advantage of these resources.

A few winter highlights from around the state:

- The average temperature in McGrath was 14.9°F this past October, and that ranks as second coldest on record.
- Nome had a record daily snowfall event on the 26th of November, with 4.5 inches for the day. This breaks the old record of 4.1 inches set just two years ago in 2006. Incidentally, this event doubled the November snowfall total in one day.
- On the 16th and 17th of December, Cold Bay tied the record high minimum temperature of 40°F, set in 1983 and 1984 respectively.
- In Juneau, new snow fall records were set on four days in January:

January 4th - 5.9 inches

January 8th - 12.4 inches

January 10th - 6.1 inches

January 26th - 9.1 inches

Breakup Links

View the Spring Breakup Outlook, Spring Flood Potential Map for Alaska, Breakup Map, and more:

http://aprfc.arh.noaa.gov/products/productmenu.php

Search our River Notes database for breakup information on rivers and lakes, provided by river observers, pilots, NWS field offices, FAA Flight Service Stations, and more:

http://aprfc.arh.noaa.gov/php/rivnotes/searchnotes.php

Ice jam at Bishop Rock - 05/12/08
Photo courtesy of Brad Scotton - USFWS