

**State of Maine
River Flow Advisory Commission
Report on Current Hydrologic Conditions
March 7, 2013**

Overview:

The spring meeting of the River Flow Advisory Commission took place Thursday, March 7, 2013. The Commission meets annually in late winter to share information, examine potential for spring flooding and to renew operational protocols. Such factors as stream flow, long-term weather forecasts, snowpack, river ice conditions and reservoir levels are reviewed. This report summarizes the information presented on current hydrologic conditions as of this date.

After reviewing all hydrologic conditions, the Commission found that risk factors including snowpack, groundwater, and stream flow are in the normal range for the time of year. Ice conditions are below normal. The Commission concluded that spring flood potential is therefore normal for the time of year.

The Commission also heard concerns about the effects of federal budget sequestration on the hydrologic monitoring network in the State of Maine.

Throughout this report, Internet addresses are listed for each category of information. The River Flow Advisory Commission web site provides a portal to all these different sites at: <http://www.maine.gov/rfac>.

This site provides a connection to the ever-changing information critical to monitoring flood potential in the state.

At the end of the report, additional sources are provided for further information. In addition, the presentations made by members of the Commission at this meeting are attached.

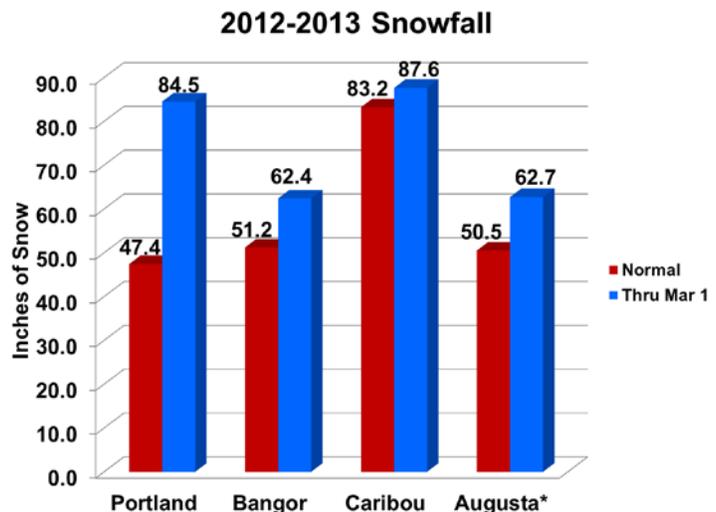
Background Climatology:

Globally, the average temperature in 2012 was 1°F warmer than normal, making it the 10th warmest year on record, and the 37th straight year with global temperatures above average. Precipitation was near normal. La Niña was present during the first 3 months of 2012, then transitioned to neutral conditions through the rest of the year. Maine has an average annual temperatures 2.8°F warmer than the long-term average. It was the 2nd warmest year on record for Caribou, 4th warmest for Bangor, and in Portland 2012 tied with 2010 for the warmest year on record.

Maine had an average of 47.90 inches of precipitation, 4.76 inches above the long-term average. Caribou and Bangor finished with 38.61 inches and 42.26 inches respectively, both of which are near normal. Portland received 54.47 inches, 7.22 inches more than normal.

During the winter of 2011-12, Caribou and Bangor had the 4th warmest winter on record, and Portland the 2nd warmest. Snowfall was much less than normal in Portland.

Bangor, Caribou and Portland all hit record or near-record highs in March. River ice breakup came 2 to 4 weeks early in northern Maine. Due to the sudden warm up,



northern Maine lost nearly the entire 1.5 to 2 foot snowpack in 3 to 5 days. A several ice jam flood occurred downstream from Aroostook County on the St. John in Perth-Andover, New Brunswick.

The winter of 2013 however, after a slow start, is exceeding snowfall averages in all location.

Current Conditions and Flood Potential:

Stream Flows

After a fairly wet fall, December was drier, January normal, and stream flows for February were in the "high normal" range in some areas due to some rain and melting events. However, levels are not dangerously high, and are not in themselves unusual risk factors for spring flooding.

High flows cause high water levels, and are principally caused by rain. Snowmelt, antecedent stream flow conditions, groundwater and soil moisture levels are contributing factors, but the overwhelming factor is rainfall.

Ice or debris in the water can cause anomalous high flows.

Headwater Storage Levels:

Storages on the Kennebec River are at 47%, with a projected drawdown of 27%. The long-term average (LTA) is 36%. Current flow is 6,000; this has been increase a little. Snow survey shows average levels of water in the Flagstaff drainage, above average in the Moosehead.

On the Androscoggin, storages are at 51%. LTA is 37%. Flows from Umbagog are 2700 cfs; storage is at 36%, LTA 31%.

The St. Croix storages are 50% full, and have 2.5 to 3 feet available.

On the Penobscot, storages are 32 billion cubic feet, with a projected drawdown to 20 bcf.

Brookfield Renewable Energy has recently acquired the former holdings of NextEra energy, River operations and personnel will remain unchanged.

Management of headwaters storage can reduce high flows. Ongoing cooperation between dam operators and the National Weather Service results in flows being managed and timed to reduce peak flows to the extent possible.

River basin managers draw down storage levels at this time of year to make room for spring rains and snowmelt. This allows them to "catch" excess runoff in regulated basins during spring flooding events, somewhat moderating river levels.

Small river basins in the state, such as the Mousam and Salmon Falls in York County, have little to no storage, and therefore little capability to manage flows. There is also less stream gaging on small basins than in the larger basins. In York County, for example, close coordination among county, river towns, and the State of New Hampshire and dam owners has helped with information sharing, but it is still necessary to pay close attention to weather forecasts and local conditions in order to anticipate flooding problems.

Ground Water

Groundwater statewide is generally in the normal range, with some stations a little above or a little below normal.

Ground water recharge usually peaks later in the spring, as snow melts, before slowly falling through the summer.

For further information on stream flow and ground water:

USGS New England Water Science Center/Maine Office	me.water.usgs.gov (Hydrologic Conditions Section)
--	--

Ice Conditions:

The USGS reports ice thicknesses statewide is below normal, with open fully open water or open channels on many rivers and streams in southern, central and eastern Maine.

Observed Ice conditions:

- Southern Maine (very thin to no ice), very little to no snow on the ice: Below normal ice
- Central Maine (less than 1' to no ice), very little snow on the ice: Below normal ice
- Eastern Maine (less than 1' to no ice), 5-10" snow on the ice: Below normal ice
- Northern Maine (less than 1.5' to no ice); 5-15" snow on the ice; several small jams frozen in place: Below normal ice

Although ice thicknesses may be below normal in many areas, the presence of any substantial ice creates a risk factor for ice jam flooding, especially if early rain lifts and moves the ice.

Ice jams can form and release rapidly during a rain or warm-up event. During an ice jam event on the Kennebec River in January of 2010, water levels in Augusta rose 3.2 feet in 30 minutes as the ice jam formed.

Emergency managers are urged to report observed ice jams or ice movement to the National Weather Service and MEMA. As was evidenced on the Kennebec in 2010, ice jam formation or movement can result in rapid water rise and necessitate quick action to protect life and safety.

Ice Breaking:

The US Coast Guard has been breaking ice in the Penobscot River throughout the winter to support commerce.

The Coast Guard and the USGS measured ice in the lower Kennebec River this week and found ice to be thin or nonexistent in many areas. As a result, the Coast Guard does not plan to break ice in the Kennebec this season.

The USGS maintains a live web camera on the Kennebec River in Augusta to provide remote "eyewitness" observation of ice and water movement. The web cam images are accessible on the Internet at <http://me.water.usgs.gov>.

For more information on ice conditions:

Northeast River Forecast Center	www.weather.gov/nerfc
USGS NE Water Science Center/Maine	me.water.usgs.gov

Snowpack:

A full statewide snow survey was conducted March 3rd through 6th.

Some areas of western Maine have 2 to 3 feet of snow on the ground, but the depth drops off toward the coast, where there is less than a foot in many locations. Northern Maine has 1 to 2 feet on average.

Snowpack water content ranged from 9 to 11 inches in the western mountains (with a couple of “bull’s-eyes” of over 12 inches), to just 2 to 3 inches along the coast. Northern Maine has 6 to 8 inches of water in the snow.

These levels put water content in the middle 50% of recorded data across most of the state compared to historical averages. There are small pockets in the far west and east where readings are in the top 25% of historical averages, and isolated areas in the bottom 25%.

Snowpack density is a measurement of water as compared to depth of snow.

The snow in western, central and northern areas is fairly dry at this time, measuring around 25%. This indicates the snowpack can absorb some amount of additional water, essentially acting like a sponge during initial melting and winter rain events. However, closer to the south and coastal areas, densities of over 30% were measured, meaning the snow is “ripening”. An area around Moosehead, which recently received rain, shows higher snow density, 35% to 40%

Snowpack densities in the 35% to 45% range indicate the snowpack is “ripening”, and may release water when it rains, or temperatures warm up.

The weather outlook for the next two weeks will likely support the snowpack remaining at current levels, or water levels may potentially rise slightly higher. Weekly snow surveys will be conducted from this point onward until measurable snow is gone.

The Maine Cooperative Snow Survey conducts surveys at sites across Maine from January until the snowpack is gone from the headwaters of our major rivers. Cooperators measure snow depth and water content at specific sites. The critical measurement “snow water equivalent” quantifies the amount of water that could potentially run off into the river basins. Snowmelt alone does not generally cause flooding in Maine, but can add to the runoff caused by rainfall.

Contributors to the Maine Cooperative Snow Survey include Federal and State agencies, hydroelectric power and paper companies and Canadian and New Hampshire environmental agencies.

For more information on snow survey data, updated weekly with every survey through the spring:

Maine Cooperative Snow Survey	http://www.maine.gov/rfac/rfac_snow.shtml
Sign up to receive e-mail notification of map postings	http://www.maine.gov/mema/mema_subscribe.shtml

Weather Outlook:

For the next two weeks, temperatures are expected to be slightly below normal, and precipitation slightly above normal. This could add slightly to the snowpack already on the ground. However, if days are above freezing, with temperatures falling below freezing at night, this would contribute to a gradual, safe loss of water from the snowpack.

No major storms are expected during this time period.

There are no strong indicators of weather trends beyond this time frame. All interests should monitor both weather forecasts and hydrologic factors as the spring progresses.

Flood Potential:

Rainfall is the most significant risk factor in Maine flooding. Additional risk factors present in the spring include snowpack, frozen or saturated ground, absence of growing plants (which use up large amounts of water) and river ice.

As of March 7, flood potential in Maine is essentially normal for the time of year.

The National Weather Service in Gray, Maine reports that the flood potential is near normal in western and southern Maine. The potential flooding due to ice jams is near normal.

National Weather Service in Caribou likewise reports that the winter/spring flood potential across northern and eastern Maine is near normal, including the risk of ice jam flooding.

The most important single factor in determining the severity of flooding is **rainfall**, how much and in how short a period of time. Major flooding on Maine rivers does not generally occur from snowmelt alone.

Ice jam flooding cannot be forecast. Local observation is critical as ice begins to break up and move. Ice jams can cause sudden flooding above the jam, as the water backs up, and below the jam if it breaks and releases a large amount of water.

The National Weather Service Forecast Offices in Caribou and Gray will issue Flood Potential Statements every two weeks throughout the spring. These reports will examine all current hydrologic factors and give an overall assessment of flood potential.

For more information on flood potential and for flood watches and warning should they arise:

NWS Gray	www.weather.gov/gray
NWS Caribou	www.weather.gov/caribou
NWS Flood Forecasts/MEMA site	www.maine.gov/mema/weather/flood.shtml
Sign up to receive weather alerts and other news	www.maine.gov/mema/mema_subscribe.shtml

Potential Effects of Budget Sequestration:

Federal budget cuts due to sequestration could cause the USGS to discontinue a number of stream gages, between 7 and 12 sites (out of approximately 70 the agency currently maintains). Gage shutdowns would likely be in effect from April 1 until at least October 1, and possibly beyond. The data collected by the stream gage network is critical to accurate flood forecasting. No gages necessary to flood forecasting will be discontinued during spring flood season.

The stream gage network supplies critical data to a number of cooperating agencies, communities and industries. All of these gages are important, for scientific or environmental reasons in addition to flood forecasting. USGS and MEMA will be working with cooperators in the next few weeks to determine a final plan if gage shutdown is necessary. The USGS will be posting online (by Monday tMarch 11th) at:

<http://streamstatsags.cr.usgs.gov/ThreatenedGages/ThreatenedGages.html>

Preparedness and Mitigation:

Flood Insurance and Floodplain Management:

The Maine Floodplain Management Program (MFMP) of the Department of Conservation, Agriculture and Forestry stresses that flooding is always a threat to properties located within a floodplain, but even more so during winter's river ice and spring rains. Many people believe that their homeowner's or

business owner's insurance policy will cover any flood related losses but unfortunately, these insurance policies DO NOT cover flood related damages.

In order to receive insurance protection related to flood damage, property owners and renters are urged to purchase flood insurance. For more details on the policies available, contact your insurance agent. There is a **30-day waiting period** before the policy goes into effect.

As long as a community participates in the National Flood Insurance Program, residents, renters and business owners can buy flood insurance no matter where in the community they are located.

Additional assistance is available through the Maine Floodplain Management Program at the State Planning Office by calling 287-8063. In addition, FEMA maintains an excellent website for consumers at <http://www.floodsmart.gov>

The MFMP and the Maine Emergency Management Agency (MEMA), in partnership with the Federal Emergency Management Agency (FEMA) have ongoing programs stressing "mitigation", or the reduction of risk from disasters. Flood mitigation can be as simple as moving perishable items out of a basement, elevating a furnace or improving drainage for a road that always floods. It can be as far-reaching as moving entire neighborhoods out of the floodplain.

Flooding is Maine's most costly hazard, affecting some community in the state every year, sometimes with disastrous results. Mitigation measures can not only save repair dollars in the long term, but may even make a community more attractive to development and business investment.

For more information on floodplain management and mitigation:

Maine Floodplain Management Program, Department of Agriculture, Conservation and Forestry	http://www.maine.gov/doc/commissioner/flood
FEMA's "Floodsmart" website	http://www.floodsmart.gov

Preparedness and Safety:

Preparedness is key to minimizing the impact of flooding or any emergency. Individuals and families, businesses, schools and communities benefit from reviewing their vulnerability to flooding and ensuring that they have workable plans for dealing with the event. Everyone should stay aware of National Weather Service forecasts as the spring progresses, and talk to local officials and County Emergency Management Agencies if they have questions about flood preparedness in their communities, or how to build an emergency plan for family, business or school.

It is also critical during a flood event that all residents heed official warnings. The primary public safety concern during flood events is people driving through flooded roadways. During a flood no one should drive on submerged roads, as the stability of the road may have been severely damaged by flood waters. Highway crews will place signs and barricades to warn of flooded sections of road. Motorists who ignore these warnings and drive through flooded areas are gambling with their own safety and that of their passengers.

Nationwide, most flooding deaths occur when vehicles are caught in flood water. According to the National Weather Service, even 6 inches of fast-moving flood water can knock a person off his feet, and a depth of two feet will float a car.

The National Weather Service Forecast Offices in Caribou and Gray will incorporate this information, along with other preparedness tips, in statements issued during the New England flood awareness week later in March.

For more information on flood preparedness and safety:

Maine Prepares	www.maineprepares.com
NWS Caribou	www.weather.gov/caribou
NWS Gray	www.weather.gov/gray
County Emergency Management Agencies	www.maine.gov/mema/about/mema_county.shtml
Sign up to receive weather alerts and emergency news	www.maine.gov/mema/mema_subscribe.shtml

Important Factors for Springtime Floods (in order of relative importance):

RAINFALL: This is the most important factor in determining the magnitude of significant floods in Maine. If precipitation during April and May are normal and evenly distributed, then streamflow will be in the normal range. However, if significant rainfall occurs over a short period of time, flooding could result.

SNOW COVER: This is a secondary factor and can add to rainfall events. As the snow pack becomes more “ripe” (nearly saturated), it can melt quickly and significantly add to a flood peak. The most accurate measurement of snow cover is “snow water equivalent”. Snow water equivalent is the amount of liquid water contained in the snow. Snowmelt alone should not produce major floods.

RIVER ICE: Ice jams can cause increased damage by temporarily blocking rivers and streams and causing higher water levels behind the jam. Peak flows downstream increase when jams break up and quickly release stored water.

TEMPERATURE: Warm days with freezing night temperatures allow a gradual melting and runoff of the snowpack. A sudden warm up, especially when coupled with significant rainfall, can send large amounts of runoff into rivers and streams.

RESERVOIR STORAGE: Maine’s headwater storage reservoirs typically reach their annual low water levels in March. These reservoirs can moderate downstream flood peaks if rainfall occurs above the storage dams while the reservoir’s water levels are down. The reservoir systems have limited ability to moderate flood peaks in the lower parts of the river basins if large amounts of rain fall or if heavy rains fall downstream of the storage dams.

Conclusion:

The current conditions information in this report represents a “snapshot” of conditions throughout the state as of March 1, 2012. Many new factors will influence the flood potential in Maine as the spring progresses. These factors will be monitored closely.

National Weather Service and emergency management reports should be watched throughout the spring, and local officials should monitor the flood-prone areas for each community. In particular, rivers should be monitored closely as ice begins to break up and move, as ice-jam related flooding can arise quickly and have locally devastating impact. Property owners, business owners and renters in flood-prone areas should check their insurance coverage to be sure that they are protected against flooding damages.

The Maine River Flow Advisory Commission is composed of representatives from major river basin management operations, state agencies, federal agencies and the University of Maine. The Commission was originally formed after the spring floods of 1983 to improve the exchange of hydrologic information collected by the members, to review the data, and to provide information to emergency action agencies and the public. It was created in statute by the Legislature in 1997.

No additional spring meetings for the Commission are planned. Commission members will continue to share information through the spring, and will meet again if conditions warrant. Members will also work with the USGS in determining network priorities if budget sequestration requires gages to be shut down.

Information Resources:

For additional information on particular aspects of this report, please contact:

Rob McAleer/Lynette Miller , Maine Emergency Management Agency	Flood preparedness and mitigation	207-624-4400
Bob Lent/Greg Stewart , USGS	Stream flow, ice conditions, snow survey	207-622-8201
Tom Hawley/John Jensenius , National Weather Service, Gray, Maine	Flood potential for central and southern Maine; flood forecasting	207-688-3216
Maureen Hastings/Noelle Runyan , National Weather Service, Caribou, Maine	Flood potential for northern and eastern Maine; flood forecasting	207-492-0180
Robert Marvinney , Maine Department of Conservation, Maine Geological Survey	Snow survey	207-287-2801
Sue Baker , Department of Agriculture, Conservation and Forestry, Floodplain Management Program	Floodplain management, flood insurance and mitigation	207-287-8063

Links to further information on all sections of the report, updated as conditions change:

<http://www.maine.gov/rfac>

G:\PROGRAMS\River Flow Advisory Commission\RFAC Report 03_07_2013.doc