

**State of Maine  
River Flow Advisory Commission  
Report on Current Hydrologic Conditions  
March 3, 2011**

**Overview:**

The spring meeting of the River Flow Advisory Commission took place Thursday, March 3, 2011. 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 despite snowpack, ice conditions, stream flows and headwater storages that are in the normal range for the time of year, *flood potential is elevated in the short term*, as warmer weather and rain are expected in many parts of the State this weekend.

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.

**Background Climatology:**

2010 was the 24th wettest year on record in Maine, though this was driven by fall precipitation which was much above normal.

Temperatures were much above normal in Maine for 2010. The winter of 2009-2010 saw much below-normal snowfall, although nationally it was a much above-normal year for snow.

The winter of 2010-2011 is on pace to be an above normal snow year, especially in the south. However, in the north, snow measurements at Caribou indicate a below-normal snow year so far.

**Current Conditions and Flood Potential:**

***Stream Flows***

Stream flows were elevated during a very wet fall. Flows were above normal in December for the entire state. However, flows are now in the normal range (25th to 75th percentile).

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

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

**Headwater Storage Levels:**

On the West Branch of the Penobscot, snow water content is slightly above long-term averages (LTA). Inflows are slightly below normal. Storage is at 50%, with a target of 40%.

On the Kennebec, storages are 50% full (LTA is 43%) with a target of 36%. Inflows are at 80% of normal.

On the Androscoggin, storages are at 51% (LTA 37%). The target is 40%.

Sebago lake levels are normal.

Management of headwaters storage can reduce high flows. Analysis of last December's flood event on the St. Croix demonstrates the large degree to which storage behind upstream dams mitigated the peak flood 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, close coordination among county, river towns, 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 remains in a very regular normal pattern. There was some drop last summer and some extra recharge last December, but levels are in the normal range now.

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 Maine Water Science Center	<a href="http://me.water.usgs.gov">me.water.usgs.gov</a> (Hydrologic Conditions Section)
---------------------------------	------------------------------------------------------------------------------------------

**Ice Conditions:**

Statewide ice thickness is somewhat below normal with thin ice and some open channels on many rivers and streams in southern, central, and eastern Maine.

Observed Ice conditions:

- Southern Maine (less than 0.5' to no ice)
- Central Maine (less than 1' to 2')
- Eastern Maine (less than 1' to no ice)
- Northern Maine (slightly below normal 1'-3')

One measurement of 3 feet was recorded in far northern Maine, but that is in the normal range for the site. No current ice jams were reported.

Although ice thicknesses may be below normal in many areas, the presence of 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 the 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.

The U. S. Coast Guard is in the process of planning ice-breaking in the lower Kennebec River. USCG has one 140 foot ice-breaking tug, and three 65-foot cutters. The 140 footer can come up the river only as far as Richmond. The 65-footers can come up to Gardiner. The USCG and the USGS will conduct ice measurements Friday March 4. USCG will then coordinate with the Maine Marine Patrol, Maine DOT and MEMA to determine the ice-breaking schedule.

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	<a href="http://www.weather.gov/nerfc">www.weather.gov/nerfc</a>
USGS Maine Water Science Center	<a href="http://me.water.usgs.gov">me.water.usgs.gov</a>

### ***Snowpack:***

A full statewide snow survey was conducted February 28 through March 2.

There are 2 to 3 feet of snow across the state, a little less to the south and north, and the most in a band across the central part of the State.

Water content in the snow averages 6 to 9 inches around most of the state. Again, southern and northern areas have a little less, the central band the most.

Snowpack density is a measurement of water as compared to depth of snow. Snowpack densities in this current range indicate the snowpack can absorb additional water from melting or rainfall. Snowpack density in the 35% to 45% range would indicate the snowpack is “ripe”, or ready to release water when it rains, or temperatures warm up.

The snow is fairly dry at this time, measuring mostly less than 25%. This indicates the snowpack can absorb some amount of additional water.

When comparing current snow water content to historical values, most northern and western areas are in the normal range (in the middle 50% of historical measurements). South central and coastal areas from the midcoast to downeast are in the top 25% of historical measurements. Far eastern Maine ranks in the highest 10% of historical values.

Several inches of water were added to the snowpack with the snow in the past month. 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	<a href="http://www.maine.gov/rfac/rfac_snow.shtml">www.maine.gov/rfac/rfac_snow.shtml</a>
-------------------------------	--------------------------------------------------------------------------------------------

### ***Weather Outlook:***

We are beginning an active pattern, with the chance for warmer temperatures. The cold snaps we are experiencing are short in duration, with warmer temperatures returning quickly.

The 6 to 10 day forecast indicates below normal temperatures but above normal precipitation. The 8 to 14 day outlook indicates a warming trend, and continued above normal precipitation.

In particular, the National Weather Service is monitoring a storm expected March 6<sup>th</sup> and 7<sup>th</sup> in Maine. This storm may bring snow to the mountains and north, especially in the beginning and end of the event. However, some heavy rain may be experienced, especially in southern, central and coastal sections.

The potential exists for urban street flooding, and possible river and stream flooding as well. Rising stream flows could lift river ice which could contribute to ice jams.

### ***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 3, flood potential in Maine is *elevated in the short term*, because of the storm expected March 6<sup>th</sup> and 7<sup>th</sup>. However, the additional risk factors that affect spring flood potential are for the most part in the normal range. Ice thicknesses in all but northern Maine are slightly below normal, but ice is still present in many areas, creating a risk factor for ice jams.

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. Both offices are scheduled to issue Flood Potential Statements on Friday, March 4.

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

NWS Gray	<a href="http://www.weather.gov/gray">www.weather.gov/gray</a>
NWS Caribou	<a href="http://www.weather.gov/caribou">www.weather.gov/caribou</a>
NWS Flood Forecasts/MEMA site	<a href="http://www.maine.gov/mema/weather/flood.shtml">www.maine.gov/mema/weather/flood.shtml</a>

### **Preparedness and Mitigation:**

***Flood Insurance and Floodplain Management:***

The Maine Floodplain Management Program (MFMP) of the State Planning Office 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.

March and April are historically when flooding occurs in Maine, but heavy rains can cause flooding any time of the year. Those who are worried about potential flooding should not wait to buy flood insurance. Those who wait may be left without any flood coverage when it is needed most. It is estimated that up to 75% of homes and businesses in floodplains in Maine are NOT covered by flood insurance.

There are 8,902 flood insurance policies in effect in Maine as of the end of February, 2011. There is over \$1.8 billion in flood coverage in Maine. The average annual premium is \$865.

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 624-6200.

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, State Planning Office	<a href="http://www.state.me.us/spo/flood">http://www.state.me.us/spo/flood</a>
------------------------------------------------------------	---------------------------------------------------------------------------------

***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	<a href="http://www.maineprepares.com">www.maineprepares.com</a>
NWS Caribou	<a href="http://www.weather.gov/caribou">www.weather.gov/caribou</a>
NWS Gray	<a href="http://www.weather.gov/gray">www.weather.gov/gray</a>
County Emergency Management Agencies	<a href="http://www.maine.gov/mema/about/mema_county.shtml">www.maine.gov/mema/about/mema_county.shtml</a>

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

- 1) **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.
- 2) **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.
- 3) **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.
- 4) **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.
- 5) **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.

#### **Other Business:**

The Commission received an update from DEP on the Penobscot River Restoration Project. Between 2011 and 2014, three dams on the Penobscot River will be decommissioned and removed, and power production and fishways will be enhanced at other sites. This will greatly increase the range of sea-run fish.

The dams slated for removal are run-of-river dams, and have no flood control function. In addition, as part of the studies conducted for the project, the US Army Cold Regions Research and Environmental Laboratory (CRREL) modeled the impact of dam removal on ice jam formation. The study found that although river sheet ice may increase in some areas, there is no appreciable effect on the potential for ice jam formation and flooding.

#### **Conclusion:**

The River Flow Advisory Commission found that as of March 3, 2011, short-term flood potential is elevated due to an expected storm and warmer temperatures for southern and coastal Maine. However, the factors that influence spring flood potential are near normal for the time of year, taking into account snowpack, river flows, reservoir storages and ice conditions.

**The current conditions information in this report represents a “snapshot” of conditions throughout the state as of March 3, 2011.** 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 meetings for the Commission are planned. Commission members will continue to share information through the spring, and will meet again if conditions warrant.

#### Information Resources:

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

<b>Rob McAleer/Lynette Miller</b> , Maine Emergency Management Agency	Flood preparedness and mitigation	207-624-4400
<b>Bob Lent/Greg Stewart</b> , USGS	Stream flow, ice conditions, snow survey	207-622-8201
<b>Tom Hawley</b> , National Weather Service, Gray, Maine	Flood potential for central and southern Maine; flood forecasting	207-688-3216
<b>Maureen Hastings</b> , National Weather Service, Caribou, Maine	Flood potential for northern and eastern Maine; flood forecasting	207-492-0180
<b>Robert Marvinney</b> , Maine Department of Conservation, Maine Geological Survey	Snow survey	207-287-2801
<b>Sue Baker</b> , State Planning Office, Floodplain Management Program	Floodplain management, flood insurance and mitigation	207-624-4200

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

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