The Weather and its Impact on Water Management
– By Gord Mountenay, MVC Water Management Supervisor

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The most important factor in trying to manage a river system is the one thing we have absolutely no control over: the weather.

Rain and snowmelt dictates whether we will have a flood, have water for recreation in the summer or simply be able to manage the river in a way residents have become accustomed. Yet, water managers can't make it rain when it's needed or where it's needed, nor can we stop it once there is enough, and only nature warms and cools temperature to affect the snowmelt. What we can do is recognize the changes in the weather and adapt our management practices where needed. This is essential for managing the Mississippi River system.

We all recognize changes in the weather no matter what we call it.

"It's never been like this before", is most often associated with either a lot of rain over a short period of time, or a complete lack of rain over an extended period of time, or severe rain at different times of the year.

Part of managing the river requires forecasting the weather two to three months in advance year round. The system is operated based on that forecast and then adapted to deal with unexpected weather events.

All of the dams in the system have a set of operating guidelines which defines how each dam is operated individually and as part of the overall system. Each lake has a rule curve and target range to establish where levels should be at any time of the year except during the spring because there is too much variability. These target ranges were established using water level, flow, and precipitation data collected over decades.

Proactive management of the system, such as the fall drawdown, is an effective way to moderate levels and create storage over the winter months. Every year from September through to January, water is released from the upper lakes to provide storage for spring rain and snowmelt. The water from those lakes is also used to refill Crotch Lake (the system's main reservoir) in order to augment flows in the lower river from January through March. The system is typically empty by the middle of March depending on what precipitation occurred over the winter.

High precipitation levels in the fall, such as those experienced in 2009 and 2010, result in much higher winter flows and levels throughout the system. When managing the river, MVC must decide how much of that water to store (if any) and how much to release. It is important to

understand that it takes a couple of weeks or more to pass water from the upper watershed through the system, longer if there is ice covering the lakes. Usually, lots of rain in the fall means a general lack of snow, which means less supply to fill the lakes/system in the spring when temperatures warm up.

What information influences our management decisions?

From January through to the spring melt we look at:

- How much water is in the system,
- How much potential is there for runoff from snow melt, and
- What history has shown we should expect to get (in precipitation) to determine what dams to operate, when, and to what degree.

Other factors considered:

- How wet the fall was to determine soil conditions prior to freeze up as this impacts the ability of the soil to store water once the snow melt begins,
- Ice thickness and levels from a recreational use perspective (ice fishing, snowmobiling, etc) where fluctuating levels could cause unsafe ice conditions as well as create potential shoreline damage,
- fish spawning seasons (Pike in March, Pickerel from early April through late May, Bass from late May through mid-June),
- Time of the year, as the later the snow pack remains the more likely the temperatures will warm up quickly creating a faster runoff.

Extreme changes in the weather effects the management decisions. For example: a cold snap in early April can dramatically change situations as runoff flows slow down and spawning may be delayed. Winds and temperatures just above freezing can cause snowpack to sublimate (be lost to evaporation) rather than melt which reduces the water available to fill the system.

Several times within the last 10 years the month of April has been very dry, resulting in the storage of virtually all runoff to ensure target levels are reached by the end of May. Heavy rainfall events (and usually several of them over a short period of time) in late May result in too much water in the system and subsequently late spring to early summer flooding has occurred. This trend appears to be something that will continue though each year is unique. While 2010 had a very wet summer with dams operating all summer, 2011 proved to be dryer and hotter and drought-like conditions persisted throughout much of the year.

So far in 2012, precipitation is down and temperatures are milder than what could be considered “normal” for the Mississippi watershed. Does this mean that another hot and dry summer with no water in the system is a possibility? Only nature knows for sure, but we will operate under that assumption and keep more water in the system than usual until conditions require a change in strategy.

Weather forecasts and water management

Weather forecasts, especially long range (5 day or more), are too unreliable to allow the system to be managed in a proactive manner based on those forecasts alone. To be truly proactive for any storm event, information such as where, how much, how large an area, and over what time frame the rain event will last and knowing at least two weeks before it occurs is ideal.

Take this for example: the effect of 100 mm of rainfall falling over Mississippi Lake and eastward is substantially different from 100 mm falling over the western portion of the watershed to both the whole watershed and dam operations.

That much rain over Mississippi Lake and eastward **might** require dam operations at the Carleton Place Dam and maybe at a couple of generating stations downstream, but would not require dams being operated west of Mississippi Lake. That rainfall would be out of the system very quickly.

Conversely, the same amount of rainfall in the western portion of the watershed would have a high probability of most if not all dams in the system having to be operated. It would require 2 weeks to a month to manage that water to make its way through the entire watershed and minimize its effect on flooding, wildlife, recreation etc. Any additional rainfall over that timeframe would obviously complicate the situation.

Quite often rain will be forecasted for many days in a row but very little actually falls or what falls doesn’t land in this watershed. Generally speaking, trying to proactively and aggressively operate dams based only on a forecasted rainfall event is not effective water management. Remember, once water is removed from a lake, it can’t be replaced without more rainfall.

“When is it safe to put my dock in?”

The above information suggests that there is no guaranteed time that your dock won’t be flooded. Generally speaking, putting a dock in before mid-May is not recommended. Water management from April through the end of May is focused on limiting high water and flooding and moderating levels for wildlife habitat. During the high recreational use summer months, docks become part of the flood management priority, but this is not the case in the spring.

Water levels information

MVC provides daily or weekly updates of water levels on Mississippi Lake and all other monitored lakes its website at *www.mvc.on.ca*. It also provides information on stream flows and rainfall collected at monitoring stations across the watershed. REMEMBER: if you are checking levels, it is not the rainfall falling on Mississippi Lake that influences levels on the lake but rather what is occurring upstream or west of the lake that will drive conditions on the it.

Any questions or concerns about water management on the Mississippi River can be directed to Gord Mountenay, C.E.T, Water Management Supervisor at gmountentay@mvc.on.ca or 613.259.2421 ext. 233.