NOAA's Northeast River Forecast Center

Spring 2008

(Schoharie Reservoir, New York. Courtesy of James Porter, NYCDEP)

Inside this issue:

"*All the water that will be is, right now.*"

National Geographic, 1993.

We're on the web at:

www.weather.gov/nerfc

NOAA's Northeast River Forecast Center

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From the Desk of the HIC

By David Vallee
Hydrologist-in-Charge

On March 30th, Edward J. Capone began his new job at the Northeast River Forecast Center as our Service Coordination Hydrologist. Ed brings a wealth of experience from the government and private sectors to this new position. In his 18 years in the private sector, Ed worked extensively on hydrologic and hydraulic design and management of hydroelectric dams both in the United States and abroad. He has worked on projects which have assisted FEMA on the development of the first 10-50-100 and 500 year inundation limits for communities across New England and New York State. Staying close to his local roots, Ed also provided hydrologic and hydraulic analyses and design assistance for structures along the Interstate 495 loop around Boston.

In the government sector, Ed was brought into the NWS at NERFC in February 1994. He held the position of Hydrometeorologic Analysis Support Forecaster and was promoted to Senior Hydrologist in 1997. During his time here at NERFC, Ed has help lead several unique forecast initiatives including the expansion of hydraulic modeling on tidal rivers and the expansion of flood forecast services into the Lake Champlain and Adirondack basins. He has worked on several International Joint Commission projects which have improved forecast services and greatly increased our collaboration with our neighbors in Canada. Ed has also been a tremendous resource to Weather Forecast Offices in Dam Break modeling and education.

Ed will be working on several major initiatives. These will include:

- Coordinating a workshop for our Service Hydrologists and Hydro Focal Points.
- Expanding our education and outreach efforts to the local media in the region.
- Establishing a customer advisory board for the NERFC to help us ensure our current and future services meet local needs and requirements.
- Coordinating NERFC's involvement in NOAA Collaboration activities.
- Coordinating NERFC's involvement in new forecasting and development activities with our local water resource partners and customers.

Gilboa Dam Tour

By Edward J. Capone, Service Coordination Hydrologist

On April 7, 2008, Tom Econopouly and Ed Capone from the Northeast River Forecast Center (NERFC) visited and toured the Gilboa Dam site as arranged with James Porter of the New York Department of Environmental Protection (NYCDEP).

The Gilboa Dam is part of New York City's Catskill Water Supply system and is located within Schoharie County at the northern point

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Typical Gilboa Operations before Stabilization

(Continued from page 1)

of the Schoharie Reservoir in the Town of Gilboa. Construction of the Dam was completed in 1926 with continuous operations for over 80 years. The 120-foot high Dam impounds the waters of the 314 square mile watershed of Schoharie Creek and in the National Inventory of Dams(NID) is characterized as an earth embankment structure with a masonry (stone/concrete) stepped spillway (MSRE).

The useable capacity of the Dam is considered to be 17.5 billion gallons of water. Visual observations at the Dam in the past years indicate age-related spillway surface deterioration. NYCDEP's review of the Gilboa Dam, in light of recent climatologic events including the record 1996 flooding that produced a historic 6.6 feet depth of flow over the 1000 ft spillway, indicated that the Dam's safety factor is less than the current design minimum recommended. In order to respond to this potential risk from the Dam, immediate, short term and long term remedial plans have been and continue to be implemented at the Dam site.

After these findings, the NYCDEP completed a project to make Gilboa Dam meet the New York State safety standards. The stabilization project consisted of four main stages:

1. A debris boom was placed across the Schoharie Reservoir to keep debris off the Dam.
2. The removal of a large notch from the top of the Dam, essentially creating a lower principal spillway with a length of 200 ft and 5.5 feet lower than the original spillway. This principal spillway will decrease pressure on the Dam and reduce the likelihood that water levels will rise to the point where the stability of the Dam would be threatened.
3. The installation of four large siphons over the Dam to increase the amount of water that can be released from the reservoir (maximum of 190 cfs each siphon).

Current Gilboa Dam configuration – lowered principal spillway and 2 siphons working

4. The installation of 80 anchoring cables through the top and front of the Dam. The cables were placed through holes drilled in the Dam and down into solid bedrock beneath. These 80 post-tensioned anchoring cables will help to hold the Dam in place during extreme hydrometeorological events

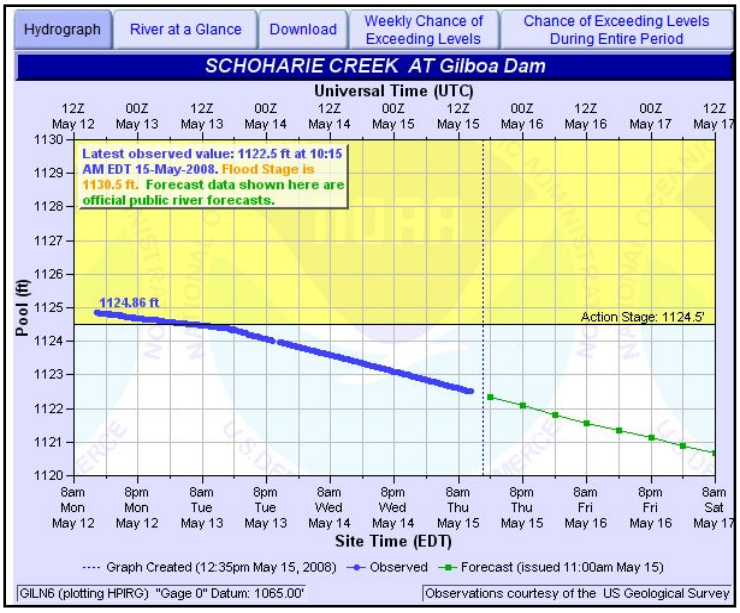
NYCDEP has proposed to reconstruct the spillway and face of the Dam, install crest gates to control the flow over the Dam, construct a new low-level outlet as well as conduct general improvements to appurtenances in and around the Dam to extend its service life and to comply with New York State Department of Environmental Conservation.

The NERFC forecasts at least daily for locations above the Dam, at the Dam, and below the Dam on Schoharie Creek. The modifications at the Dam that influence the movement of water in the impoundment to Schoharie Creek and Esopus Creek have been incorporated in the NERFC modeling. Inflows and routed outflows, whether through the new principal spillway, the siphons, the low-level diversion to Esopus Creek, or additional spilling over the old spillway are all accounted for in the NERFC modeling. Additional Gilboa Dam and Schoharie Creek forecast data can be obtained from the National Weather Service (NWS) Advanced Hydrologic Prediction System (AHPS) website at:

http://newweb.erh.noaa.gov/ahps2/index.php?wfo=aly

The NERFC is also ready to support emergency operations should a potential breach of a structure occur.

The Emergency Action Plan (EAP) dambreak files using BOSS Dambreak (GUI version of NWS DAMBRK) are maintained on NERFC computers. The NERFC is in close coordination with the NYCDEP concerning the changing conditions of Gilboa Dam during the upgrading and modernization of the facility.



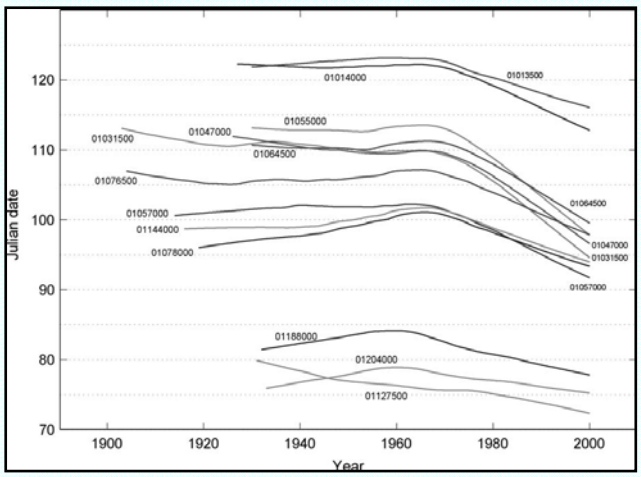
Recent Gilboa Dam pool level forecast prepared by the NERFC

Effects of Climate Change on Streamflow and River/Lake Ice in the NERFC Service Area

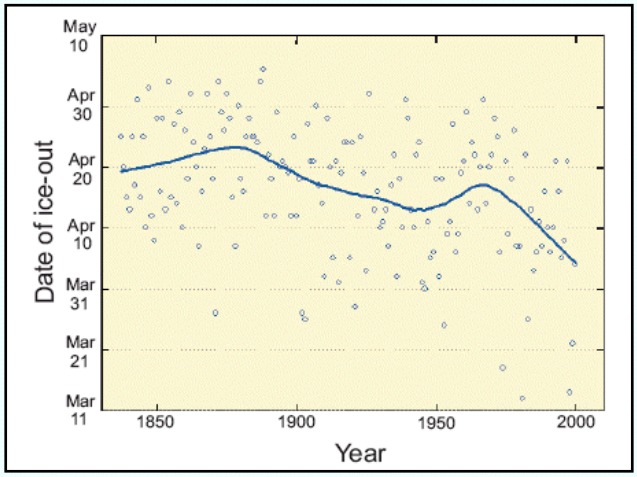
By Jeane Wallace, Senior Hydrologist

According to the 2006 report by the Northeast Climate Impacts Assessment, average winter temperatures in the northeastern United States have risen by 1.3 degrees Fahrenheit, per decade, since 1970. Several studies by the United States Geological Survey (USGS) in Maine have pointed to the connection between warming temperatures in the Northeast in the past century and corresponding pattern changes in the region's hydrologic characteristics. These characteristics include: the winter/spring center of volume, the number of days of ice-affected flows, and the date of lake ice-out.

The winter/spring center of volume (WSCV) is the date by which 50% of the winter and spring streamflow has passed a particular river gauge. In northern New England, this date is strongly correlated to the size of the snow pack and the timing of its melt. During the study period (which included most of the 20th century), the WSCV became earlier by 1 to 2 weeks in northern New Hampshire and Maine, with the most significant change showing up from the late 1960's onward. This change is highly correlated to the March/April temperatures in this region, which increased over the second half of the 20th century.



LOESS smooths of winter/spring center of volume dates for the 13 longest-record rural, unregulated rivers in New England. Numbers are USGS gaging station numbers. (From Hodgkins et al., 2003)



Ice-out dates over time for Damariscotta Lake, Maine, and a smoothed line through the dates. (From USGS Fact Sheet 2005-3002)

Measurements of river flow are often affected by ice in the channel during the winter. It has been shown (USGS FS 2005-3002) that the number of days where ice affects river flow measurement in New England can also be correlated to winter/spring temperatures in that region. Over the study period from 1930 to 2000, the number of days of ice-affected flows decreased by an average of 20 days. Again, the bulk of the change was seen in the latter half of the study period, from the 1960's through 2000, with the months of March and April showing the largest decrease in number of days of ice-affected flow.

Lake "ice-out" is the date on which ice cover is gone from a lake. Analysis of historical records of lake ice-out in New England has shown that the ice-out date has become earlier by 9 to 16 days, with the largest change seen in southern New England. Snow cover on lakes may account for the smaller change in northern parts of the region.

Increasing temperatures, especially over the second half of the 20th century, have contributed to changes in the hydrologic patterns in New England. These changes have been documented by the USGS in Maine and include an earlier winter/spring center of volume, less days of ice-affected river flows and earlier lake ice-out dates.

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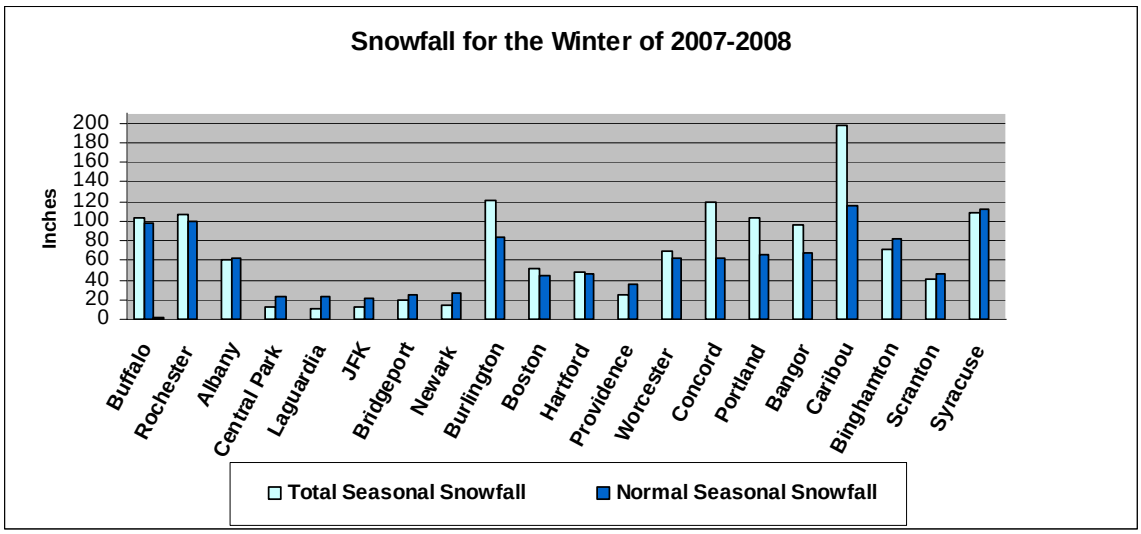


Winter of 2007-2008

By Steven Nogueira, HAS Forecaster

The Northeast experienced quite an unusual winter for the 2007 to 2008 season. Snowfall across the NERFC service area varied dramatically from the southernmost part of the service area to the far northern sections.

A rather unusual storm track was the reason for the significant variations in the seasonal snowfall. In most winters, we see several dominant tracks. One track heading from the Ohio Valley northeastward to the St Lawrence Valley brings warm air and mainly rain or snow changing to rain to the area. Another track is northeastward along the eastern seaboard. Depending how close this track is to the coastline we may see snow, or the storm may track out sea with little effect on the northeast.

What was unusual about much of this past season is that a number of storms tracked right through New England. This track brought snow to northern New England and part of western and upstate New York. Across the southern part of the area, mild air was drawn northward, and resulted in mainly rain or a wintry mix that changed to rain. Across northern New England and upstate New York, several of these storms brought very heavy snow. As a result, the unusual track brought far more snow to the north than we might expect in an average winter.

"Central and northern New England had snowfall that ranged from 150% to nearly 200% of normal"

The graph above shows snowfall for 2007-2008 winter season in light blue, with normal snowfall in dark blue. Along the coast, the season's snowfall was below to near normal. In upstate New York and central and northern New England amounts were all greater than normal. Central and northern New England had snowfall that ranged from 150% to nearly 200% of normal.

There was a price to pay for all the snow. River flooding occurred in many locations due to rain and melting snow, with some of the flooding reaching moderate and even major levels. In fact, record flooding occurred on the St John River at Fort Kent, Maine.

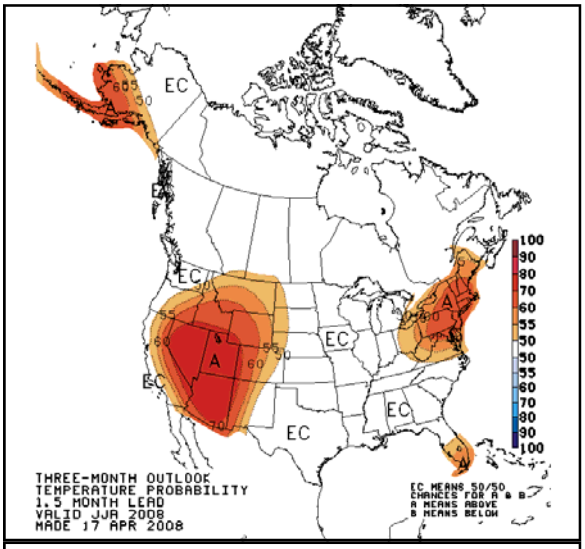
Late Spring-Mid-Summer Hydrometeorologic Outlook

By Steven Nogueira, HAS Forecaster

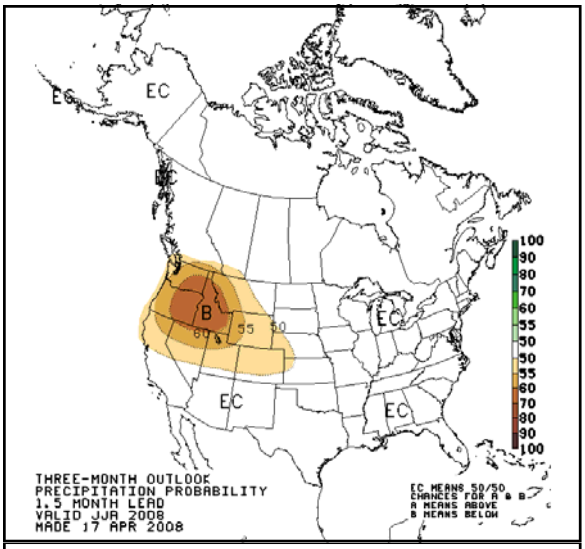
Spring arrived with big changes from the late winter. After the very snowy second half of the winter and early spring, we saw temperatures warm rapidly with a few rainy periods. The melting snow and heavy rain across the far north caused moderate and major flooding, with even historic flooding on the St John River in northern Maine.

For the next three months, the Climatic Prediction Center is confident that temperatures will be warmer than normal in the northeast. Rainfall is much less certain. A "Bermuda high pressure area" in the east may deflect cold fronts and thunderstorms toward the Canadian border, keeping our weather warm and dry.

Hydrologic conditions with the pattern described above would allow for lower river flows and lessening of ground water. Lessening river flows could impact recreation, reduce ground water levels and limit the quantity of water available for irrigation.



Three month temperature outlook issued by NOAA's Climate Prediction Center



Three month precipitation outlook issued by NOAA's Climate Prediction Center

We're on the web at:

www.weather.gov/nerfc

The NERFC Nor'easter is a quarterly publication of the Northeast River Forecast Center which is part of NOAA's National Weather Service. Your comments are welcome.