MEMO FOR RECORD
FROM: Andrew Tuthill
DATE: 22 Dec. 2003
SUBJECT: Ice Jam Reconnaissance Flight, 19 Dec. 2003, NH and Central Maine

On 19 Dec. 2003, Andy Tuthill of CRREL inspected ice conditions on the Black River in Vermont, the Connecticut and Saco Rivers in NH, and the Kennebec, Sebasticook, Sandy and Androscoggin Rivers in Maine. Breakup ice jam floods had occurred the previous day on the Androscoggin River at Bethel, Rumford Point and Canton, and on the Sandy River at Farmington, ME. In New Hampshire, the Pemigewasset had flooded at Plymouth and less severe flooding had occurred along the Bearcamp and Saco Rivers in Conway and Ossippee, NH.

Black River and Connecticut Rivers, Charlestown, NH
The Black River was open from North Springfield Dam to within about 3/4 miles of the Connecticut River Confluence. The Connecticut River was sheet ice covered from Bellows Falls up to the Cheshire Bridge. Above Charleston, a several-mile-long jam filled the channel (Fig. 1). This jam had reportedly caused minor flooding of US Route 5 the previous day. Upstream of the jam, a frazil ice cover was actively forming in the bends just upstream of North Charlestown (Fig. 2). Above that, the Connecticut River was open as far as Wilder Dam. The White River was also open and carrying frazil ice.

Fig. 1. Connecticut River at Charleston, NH, looking upstream. The Black River enters from the left.

Fig. 2. Frazil ice accumulating at the upstream end of Connecticut River ice jam.

Bearcamp River, Ossippee, NH
The Bearcamp River was open from Tamworth to Ossippee Lake. Although there was evidence of ice jam flooding near the lake, no roads or structures appeared to have been affected. A local resident said that an excavator working at the NH Route 25 Bridge crossing had been trapped in the high water the previous day.

Saco River, Conway, NH
The Saco showed much evidence of past out-of-bank flow between Conway and North Conway. Reportedly, during the previous day, portions of the West Side Road had been flooded.

Kennebec River, Richmond to Madison, ME
The Kennebec River was open and running high from Madison on downstream. The water was turbid and carrying a light concentration of frazil ice.

Sebasticook River, Winslow to Pittsfield, ME
The Sebasticook was covered in gray sheet ice from the Fort Halifax Dam to within 3/4 miles of the dam at Benton (Figs. 3 and 4). It is surprising that that the high discharges did not break up the ice cover on this reach. With the exception of about 1.5 miles of sheet ice above the Benton Dam, the channel was mostly open up to Clinton, then alternating sheet ice and open up to Burnham Dam. From there to Pittsfield, the river was mainly sheet ice covered.

Sandy River, Madison to Farmington, ME
The Sandy River was mostly open from the mouth upstream through Farmington Falls. The recent ice run had left much evidence in the form of shear walls and ice-covered flood plains. From a point about 1.5 miles upstream of Farmington Falls to about 500 feet below the US Route 2 Bridge in Farmington, a frozen-in- place, 3.5-mile-long

Fig. 3. Sebasticook- Kennebec River Confluence and the Fort Halifax Dam.

Fig. 4. Sebasticook River looking upstream towards Benton.

ice jam filled the main river channel (Fig 5). Although stages had dropped significantly, waterlogged snow and ice debris in the floodplains indicated that that much out of bank flow had occurred during the previous few days. Stages had also dropped in Farmington since our visit there the previous day (Fig. 6) (Daly &Tuthill, trip Report 18 Dec. 2003). The businesses to the east of the US Route 2 Bridge were no longer flooded. During our 18 Dec. visit, local officials said that the lower jam had released at about 7:00 AM and had moved well below Farmington Falls. The air photos of 19 Dec. (Figs 5 and 6) indicate that the jam only shifted a short distance downstream however.

Fig. 5. Sandy River Looking upstream towards Farmington, ME. Note the 3-mile-long ice jam frozen in place in the river channel.

Fig. 6. Sandy River at Farmington, ME. The upstream end of the lower jam is about 500 ft downstream of the US Route 2 Bridge.

The 1-mile-long jam upstream of Farmington remained frozen in the river channel (Fig. 7). We observed this jam and much out of bank flow during our visit the previous day.

Fig. 7. Ice jam upstream of Farmington Maine.

Androscoggin River

Discharge alone was sufficient to exceed flood stage on the Androscoggin River on 18-19 Dec. 2003 (Fig. 8). The addition of an ice cover and ice jams resulted in localized severe flooding at Canton, Rumford Point, and Bethel, Maine. With the exception of some sheet ice above the Gulf Island Dam (north of Lewiston), the Androscoggin was ice free from Livermore Falls to its mouth.

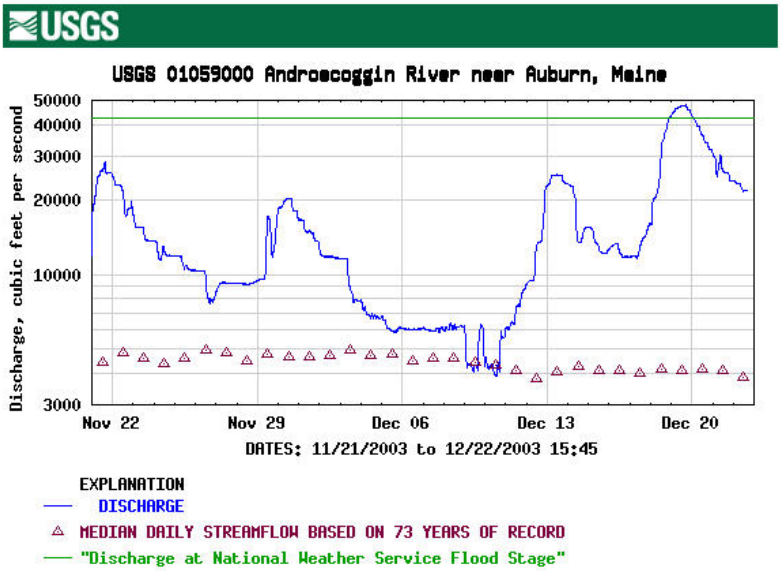

Fig. 8. Discharge Hydrograph for the Androscoggin River at Auburn, Maine.

Fig. 9. Ice jam at Canton Point, looking downstream.

Upstream of Livermore Falls, a number of ice jams remained in place. A 1-mile-long jam in the sharp bend downstream of *Canton Point* flooded a large area including sections of Route 14 and the Dixfield Road. A number of farms and houses were also inundated, which had resulted in the evacuation of some 30 families the previous day.

Fig. 10. Flooded area upstream of Canton Point ice jam.

Fig. 11. Flooded houses at Canton Point.

The 2-mile long jam downstream of *Rumford Point* remained in place (Fig. 12). The previous day this jam had reportedly flooded US Route 2 to a depth of 3-5 ft at a location known as the animal farm. On 19 Dec. stage had dropped sufficiently to allow cars to pass this location.

Fig. 12. Rumford Point ice jam, looking downstream

A 2-mile-long jam filled the channel in a reach about 1.5 miles upstream of *Hanover*, flooding a large area in the right over bank (Fig. 13).

Fig. 13. Ice jam upstream of Hanover, ME, looking downstream.

Although water levels had dropped, the Bethel ice jam was similar in appearance to the previous day. The jam consisted of a 0.6-mile long section upstream of the US Route 2 Bridge, and a 0.5-mile-long lower section lodged in the sharp bend just north of the village. This jam had forced the closure of sections of US Routes and Maine Routes 26 and 5 the previous day.

Fig. 14. Ice jam at Bethel, looking downstream.

Conclusions

Breakup ice jam flooding in northern New England in the month of December is relatively unusual. As indicated by the hydrograph for the Androscoggin River at Auburn (Fig. 8), during the last month, river flows in the region have been 2-5 times higher than the long-term averages. At the same time, regional air temperatures during the last month have been well below average, with the exception of the thaws of Dec. 11 and Dec. 17 (Fig. 15). The low temperatures and high discharges resulted in above average frazil ice production and thicker-than-normal ice covers on the rivers. When the ice covers broke up on Dec 11 and again on Dec 17, discharge was sufficiently high that the added resistance to flow due to ice jams was enough to cause flooding at many locations. The moderate temperatures forecast for the next week, will help erode and melt the existing ice jams and, reduce the severity of ice jam floods later this winter and spring.

Respectfully Submitted,

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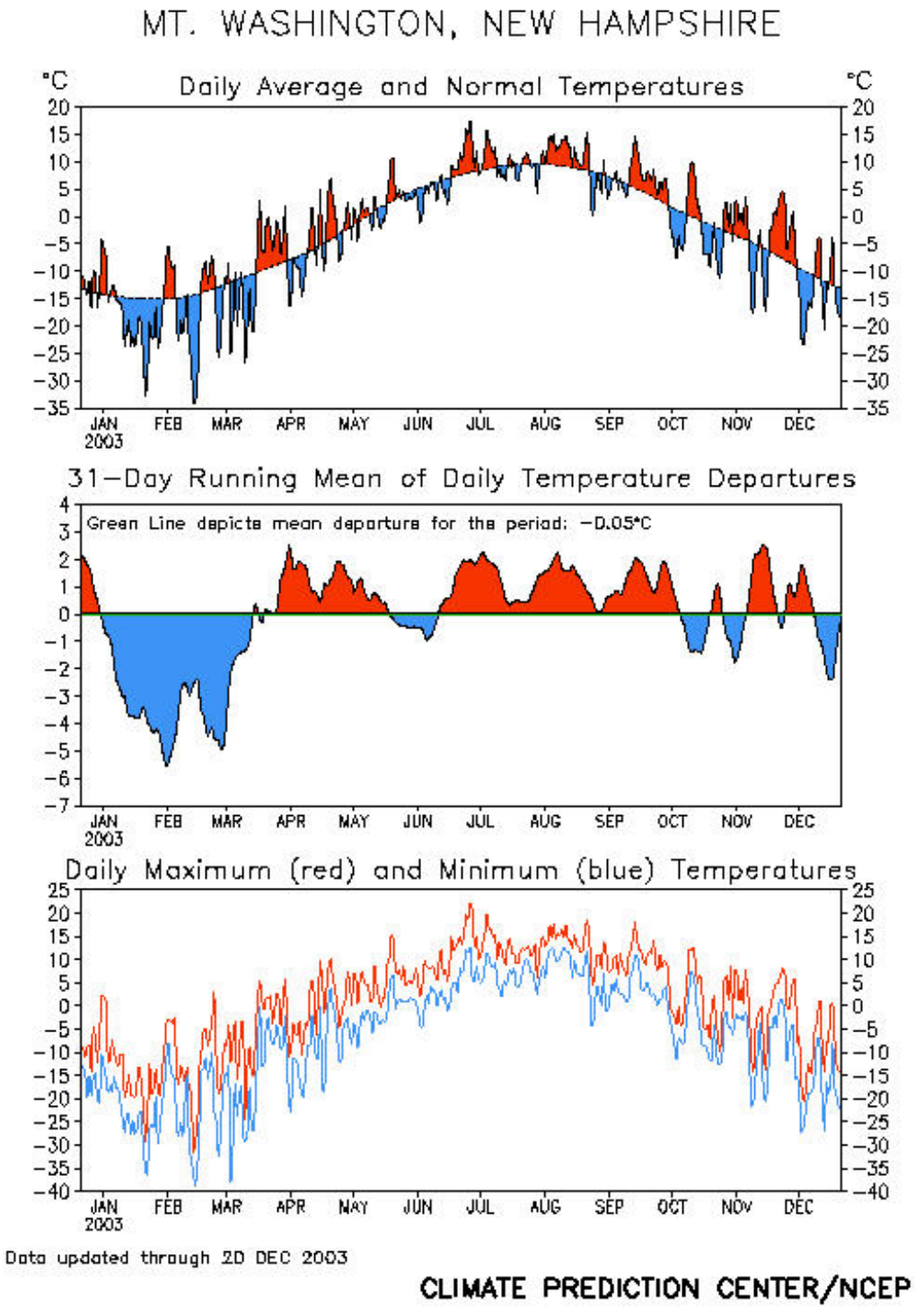

Fig 15 Recent air temperatures compared to long-term averages, for Mt. Washington, NH.