

## Summary of Water Year 2010 Ice Season

Winter 2009-2010 was marked by early freeze-up ice jams and mid and late season break-up ice jams

- Extreme cold and a major rain event in late December and early January produce freeze-up jams in Iowa, Illinois and Southern Wisconsin. Major flooding occurred along the Fox and Kankakee Rivers in Dayton and Momence, IL leading to water surrounding homes and road closures.
  - Extreme cold and high flows in late December and Early January led to a rash of freeze-up jams in the Midwest
  - From 23-28 Dec a major rainfall event of as much as 0.9 inches of rain per day caused high flows in rivers in Iowa, Northern Illinois and Southern Wisconsin. These high flows persisted in some controlled rivers until late January.
  - An extreme cold event occurred in the same region, with sub-freezing high temperatures from 1-10 Jan and overnight lows less than 15 F for the same period, setting up ideal conditions for frazil ice creation and freeze-up jams. Many jams froze in place and remained for much of the winter .
  - Major flooding occurred along the Fox and Kankakee Rivers in Dayton and Momence, IL which led to water surrounding homes and road closures.
- A mid-winter warm spell in January accompanied by heavy rains led to a mid-winter thaw and break-up of ice covers and jamming in in Iowa, New York and New England. Major flooding occurred in Augusta, IA and flooding along the Kennebec River near Augusta, ME. In Ft. Covington and Dolgeville NY ice jams led to evacuations and damages to homes and businesses. A historic covered bridge in Bath NH suffered ice jam damage.
  - A mid-winter warm spell in January accompanied by heavy rains led to a mid-winter thaw and break-up jamming
  - The warming temperatures and rainfall made there way from the North Central states to Northeastern regions of the US.
  - Weakened ice and rising rivers caused break-up of ice covers and jamming in in Iowa, New York and New England. .
  - Kennebec River, Maine (NAE)
    - Flooding of businesses in Hallowell
    - Coast guard icebreakers tried to loosen downstream
    - CRREL assisted in installing a motion detector to monitor the jam
  - Salmon River, Fort Covington, NY (LRB)
    - 1200 foot jam at location of sediment deposit following dam removal last summer
    - 5 homes were evacuated
    - Flooding damages at \$20-30,000

- Jam was solidly grounded in when cold weather set in.
- The spring break-up for the continental US occurred from about 8 to 23 March in Nebraska, North Dakota, South Dakota, Iowa and Minnesota. There were 9 events where major flooding occurred, 14 with moderate flooding, and 66 with minor, nuisance or no flooding. 25 families were evacuated due to rising floodwaters and many country roads were closed temporarily. Significant erosion damage occurred at the Highway 10 bridge in Little Falls, MN.
  - Jams occurred from South to North, starting in IA and NE, moving up to MN and SD with the last of the break-ups in ND.
  - There were no jams associated with the spring thaw in New England or NY due to a lack of cold temperatures to generate more ice after the early break-up in January
  - 9 events where major flooding occurred, 14 with moderate flooding, 33 with minor flooding and 33 with nuisance or no flooding.
  - There were a total of 25 families evacuated due to rising floodwaters and many country roads were closed temporarily. Significant erosion damage occurred at the Highway 10 bridge in Little Falls, MN
  - Break-up flooding along the Platte River may have been reduced as a result of dusting efforts.
- High ice production caused navigation problems, particularly in the St. Clair River and at Corps Locks on the Mississippi and Illinois Rivers.
  - Early and heavy ice was passed through projects on the Upper Mississippi River (MVS, MVR) where cold temperatures in upstream areas led to massive ice production
  - An unusual amount of ice on the St. Clair (LRE) river this year caused many problems: freighters were stuck in ice and delayed, water levels dropped in Lake St. Clair, and the US and Canadian coast guard icebreakers worked most of the season to relieve the ice accumulations that were up to nine miles long
  - At Starved Rock Lock and Dam on the Illinois River (MVR), Lock Manager Mark Witalka said this have been the toughest period for ice management in his memory
- Ice in the Missouri River at Pierre, SD impacted power reductions at Oahe Dam, the largest peaking power plant in the US.
  - A 100 MW minimum was put in place several times at the Oahe Dam (NWO) to keep enough flow to keep ice from moving upstream to the project and affecting power production
- **SUMMARY**
  - **185 events in 15 USACE districts**
    - 35 freeze-up jams, 10 combination jams, 123 break-up jams and 16 other types of river ice action.
  - **River ice related flooding**
    - 13 major, 25 moderate, 67 minor, 20 lowland and nuisance
  - **Minor damage in LRB, NAE, NAN, NWO, MVR and MVP**
  - Housing, businesses, bridges and docks.
  - **Technical assistance provided by CRREL to 12 districts and 8 state and local agencies.**

## River Ice Updates

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Below is the River Ice Update for 11Jan2010.

Jan 11, 2010

### Overview:

Continued cold temperatures in the mid-section of the US have led to the formation of more freeze-up jams and flooding is expected to continue, particularly at the Fox River in Dayton and on the Lower Rock River in IL. Though high flows have been receding, temperatures are predicted to rise to near freezing in some parts of the region near mid-week, which may lead to break-up jams. Minor and nuisance flooding has been reported on the Kankakee, IL and Mississippi Rivers in IL, the Salmon River in ID and the Gallatin River in MT. Heavy ice conditions are causing vessel delays on the St. Clair River at Algonac, MI in the Great Lakes System.

### Corps Projects:

Extensive ice cover in the Missouri River downstream of Pierre, SD is being monitored to assess possible impacts on power production from Oahe Dam. A one-unit minimum outflow has been in place since 11Jan2010.

### Illinois:

**Fox River:** Major flooding continues to occur at Dayton which is still over 10' above flood stage. Stages at Dayton are dropping slowly due to declining discharge, no additional accumulation of frazil ice (due to limited remaining open water) and smoothing of the jam underside. Temperatures are predicted to stay cold with little snowfall. With water levels dropping the jam can be expected to remain solidly in place until a major thaw. Minor flooding was also reported due to another jam upstream at East Dundee.

**Rock River:** Minor flooding continues at Moline and Joslin, though levels crested at both locations and are receding slowly. Levels had dropped below flood stage at Byron, but were erratically dropping late in the weekend. A new jam was noted over the weekend at Latham Park and caused a sudden rise in water levels, but is not expected to cause flooding.

**Kankakee River:** Stages remain steady at Momence, where an ice jam causing flooding is expected to keep stages above flood stage until midweek.

**Mississippi River:** At Grafton water levels are predicted to drop, but an ice jam is still causing minor flooding and water levels are still rising. A jam above Lock and Dam 26 near Alton has led to minor flooding upstream on the Illinois River. Water levels have dropped below flood stage at Hannibal, where ice action had been causing minor flooding last week.

### Montana:

Gallatin River: Ice jams have been in place near Logan and Big Sky, MT since 12/31/09.

At Logan, the river rose just above flood stage on Friday and Sunday night, but has dropped below flood stage overnight. Minor flooding is still occurring and expected.

Idaho:

Salmon River: Minor flooding was reported due to an ice jam 8-9 miles North of Salmon in the Big Flat area. On Saturday, water had risen enough to surround a residence and on Sunday, voluntary evacuations were occurring in lowland areas. This is the third time this season that jams have been reported on the Salmon River.

ERDC/CRREL Personnel:

Andy Tuthill was in communication with the Illinois Department of Natural Resources to discuss their concerns of the release of the Dayton jam and the consequences downstream in Ottawa. IDNR also reported that the ice boom at East Dunned is no longer deployed as the town did not want to take over responsibility and the IDNR does not have the equipment of install them. Steven Daly was in contact with the Missouri River Division Reservoir Control Center in Omaha, NE to discuss ice problems at Pierre, SD.

Images:



Fox River jam looking upstream from Dayton Road towards Dayton Dam, Bill Morris, NOAA,



05Jan2010 Rock River at Moline, Larry Fisher, Quad City Times, 08Jan2010

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Below is the River Ice Update for 13Jan2010.

Jan 13, 2010

Overview:

A warm-up is expected in the coming days in the mid-section of the US which will result in the melting of ice and the snowpack. In areas where the temperatures warm gradually, there may be no sharp increases in flow from the melting of the snowpack, reducing the likelihood of major ice jam issues. However, if the warm-up occurs quickly in some areas, development of break-up jams is possible. Moderate flooding due to existing freeze-up jams is expected to continue, particularly at the Fox River in Dayton and on the Lower Rock River in IL. Minor and nuisance flooding has been reported on the Kankakee, IL and Mississippi Rivers in IL, the Salmon River in ID and the Gallatin River in MT. Heavy ice conditions are causing vessel delays on the St. Clair River at Algonac, MI in the Great Lakes System.

Corps Projects:

The ice cover in the Missouri River downstream of Pierre has retreated downstream and is not an issue with regard to peaking power levels at Oahe Dam. However, the one-unit minimum is still in effect.

Illinois:

Fox River: Moderate flooding continues at Dayton which is still above flood stage, but dropping slowly. Tuesday afternoon, water levels between Sheridan and Wedron (about 10 miles upstream of Dayton) were reported rising at a rate of about 3 inches per hour due to an ice jam, but appeared to be stabilizing Wednesday morning.

Rock River: Minor flooding continues at Moline, where stages are steady just above flood level, with a drop below flood level expected by Saturday. Minor flooding continues at Joslin, where stage has been steady at 2' above flood level since Saturday.

Kankakee River: Stages have been gradually falling at Momence, where minor ice jam related flooding is still occurring.

Mississippi River: Minor flooding due to an ice jam is occurring at Grafton where water levels are remaining steady about 1.5' above flood stage. The jam continues to cause to minor flooding upstream on the Illinois River at Hardin.

Michigan:

St Clair River: An extensive ice cover has formed on the lower end of the St Clair River due to brash ice moving out of Lake Huron into the river. Vessel traffic has required active assistance from Coast Guard ice breaker. There is a low potential for flooding due to ice at this time because of the relatively low water levels in the Great Lakes.

Montana:

Gallatin River: Ice jams have been in place near Logan and Big Sky since 31Dec2009. Stages continue to fluctuate near flood stage, with minor local flooding reported. Warmer temperatures coming later this week may cause snow pack melting which will increase flows and may affect the stability of the jam.

Idaho:

Salmon River: Minor flooding was reported due to a freeze-up ice jam North of Salmon where water is backing up into residential areas and onto country roads.

CRREL Personnel:

Roger Kay of the H&H Branch of the Omaha District is a SME in river ice and has had a long association with CRREL. In response to the State of Nebraska's request for technical assistance, he is providing assistance to the State of Nebraska regarding assessment and monitoring of current ice jams and flood planning. He is tracking the freezing degree days at a few sites within the District, and continues to monitor reports of ice jams throughout the District.

Image:



11Jan2010 U.S. Coast Guard Cutter Penobscot Bay cuts through the ice around a freighter in the St. Clair River near Algonac, Mark R. Rummel, Times Herald

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Jan 20, 2010

Overview:

Milder temperatures were observed over much of the Midwest in recent days. Precipitation is expected into Wednesday over the Midwest and in Maine. Based on this forecast, it is unlikely that new ice will form, though warming temperatures and rain can lead to an increase in ice breakup and jamming. Ice jams on the Fox and Rock Rivers are still causing flooding in southwestern Wisconsin and western Illinois. Minor flooding was reported on the Gunnison River in Colorado. All other ice jams have either released in recent days or remain in place without flooding. Coast Guard ice breakers spent most of last week clearing ice from the St. Clair River, allowing approximately \$80 million worth of cargo to reach its destination (SooToday.com)

Illinois:

Fox River: Moderate flooding continues due to an ice jam at Dayton, though the stage is slowly receding.

Rock River: Ice jams are causing moderate flooding at Joslin and minor flooding at Moline. Stages are expected to recede in upcoming days.

Montana:

Gallatin River: Ice jams have been in place near Big Sky, MT since 31Dec2009. Currently there is no flooding, though warm temperatures may

cause the ice to breakup and send significant amounts of water and ice downstream.

Colorado:

Gunnison River: Several jams have been reported on the Gunnison River and tributaries. Minor flooding is occurring. City officials are anxious about the potential for greater flooding.

Maine:

Carrabassatt River: An ice jam has formed on the Carrabassatt River in Kingfield, ME. Ice is currently "eye-to-eye" with several residences, though no flooding has been reported.

CRREL Personnel:

Andy Tuthill and Meredith Carr were at the Mel Price Dam Tuesday 19 Jan to observe a controlled passage of ice through the dam to reduce the heavy ice accumulation on the Mississippi River. Later this week they will travel to ice jams along the Fox River.

On Tuesday 19 Jan, CRREL was contacted by the State of Maine regarding an ice jam on the Carrabassett River in Kingfield, ME; and also by the Sacramento District concerning ice problems on the Gunnison River in Colorado. In both instances, CRREL provided ice jam information and offered additional support if necessary.

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Subject: 27Jan2010 River Ice Update

Overview:

Multiple break-up jams have formed in the Northeast over the past two days due to rising water levels and near record high temperatures, particularly across upper NY, NH, VT and ME. The risk of new break-up jams should be reduced in the second half of the week with stages receding and colder temperatures predicted. In the Midwest, ice jam flooding has continued on several rivers and a significant new jam has formed on the Skunk River at Augusta IA. New ice production is likely over the remainder of the week as expected colder than normal temperatures set in, most notably on the Mississippi River where open water resulting from last week's flush will likely result in significantly increased frazil ice production.

Road closures were reported due to ice jam flooding on the Sugar and Gale Rivers in NH, the Mohawk River in NY, the Saco River in ME, the Winooski River in VT and the Platte and 102 Rivers in MO. Moderate flooding is occurring on the Skunk River in IA and continued on the Fox River and the lower Rock River in IL. Ice jams and related flooding caused damages on the Ammonoosuc River in NH, East Canada Creek in NY, and the Kennebec River in ME. Minor and nuisance flooding as a result of ice has

been reported on the North Skunk River in IA, the Grand River in OH, Cazenovia and Lake Creeks in NY and the Missiquoi River in VT.

#### Illinois:

Fox River: At Dayton, runoff over the weekend allowed the existing freeze-up ice jam to begin breaking up and moving in the channel, moving ice from Dayton Dam downstream to near the Interstate 80 Bridge. Stages have receded somewhat, but are still well above flood stage and moderate flooding is continuing.

Rock River: Moderate flooding is occurring at Moline and forecast at Joslin related to ice jams that have been in place for several weeks.

#### Iowa and Missouri:

Skunk River: Ice jam flooding at Augusta led to a record stage on Monday, resulting in the evacuation of 6 homes. Moderate flooding continues and a levee breach downstream of the jam is causing flooding of surrounding farmland.

Platte and 102 Rivers: Stages peaked on Monday at ice jams near Agency and Rosendale, causing lowland agricultural flooding and several road closures including portions of MO Highway 48 and South U.S. Highway 71.

#### New Hampshire:

Sugar River: In West Claremont, a break-up jam led to moderate road flooding on Tuesday. Waters were expected to drop below flood stage by late Wednesday, though stages have remained higher than expected Wednesday morning.

Gale River: Repeated break-up and then re-jamming at Sugar Hill resulted in flooding over a local road, of some residence's basements and first floors, barns, and a local preschool. The jam released and waters have now receded.

Ammonoosuc River: An ice jam in Bath seriously damaged New Hampshire's oldest covered bridge, washing away several timber and floor supports.

#### New York:

East Canada Creek: Ice and water resulting from a jam that moved through Dolgeville caused some evacuations and damage to buildings and cars and has left behind large shear walls of ice along the banks.

Mohawk River: A large jam near the Interstate 890 bridge near Schenectady led to closure of Route 5S.

#### Maine:

11 break-up jams have formed since Monday, most releasing quickly and only causing nuisance flooding. Jams on Kingsbury Stream and Wilson Stream were causing flooding on Tuesday.

Saco River: A jam 8-10 feet thick and about a ½ mile long has led to the closure of Route 113 and the Weston Bridge in Fryeburg.

Kennebec River: A serious jam has developed in Augusta at the Memorial Bridge. Parking lots and cars along the west side of the river are flooded. Stages had peaked Tuesday afternoon about 6 feet above flood stage and are expected to drop below flood stage by early Thursday.

Vermont:

Winooski River: A jam threatened to flood downtown Montpelier Monday night, but started breaking up just as local authorities were notifying businesses of possible flooding. As of late afternoon Tuesday, another jam was still causing some flooding on Vermont 78 in Highgate, and along and near sections of Vermont 105 between Sheldon and East Berkshire. High water from a jam in Richmond and Essex was receding on Tuesday, where flooding had closed a solid waste drop-off center and led to road closures.

CRREL Personnel:

Andy Tuthill has been in communication with the weather service in Gray, ME, the ME USGS, NH Department of Environmental Services, a local contact in Kingfield, ME, and the road agent in Sugar Hill, NH regarding ice jams in the region. Mr. Tuthill plans an aerial recon of the area later this week to assess ice problem areas.

Images:

WinooskiRiv\_26Jan2010.jpeg: Winooski River at North Williston Road between Essex and Williston, 26Jan2010, Glenn Russell, Burlington Free Press



Kennebec River at Augusta, 26Jan2010



Des Moines County emergency responders 25Jan2010, about a mile east of Augusta on Skunk River Road, Matt Ryerson, The Hawk Eye



Ice on the Lock and Dam 22 spillway on the Mississippi River, courtesy of the Rock Island District

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29Jan2010 River Ice Update

Overview:

Temperatures in the upper Midwest and Northeast have fallen since midweek, reducing the threat of new break-up jams. However, cold temperatures and abundant open water will set the stage for heavy frazil ice production, which may strengthen existing jams and increase the chance of forming new freeze-up jams. Flooding is occurring on the Salmon River in NY and continues on the Kennebec River in ME, while all other jams reported in the Northeast earlier this week have either released or stages have returned to normal levels. In the Midwest, a few freeze-up jams have begun to form in WI and are expected in IL. Moderate flooding continues on the Fox River in IL and the Skunk River in IA. Minor flooding is occurring on the Rock River in IL and on the White River in CO.

Maine:

Kennebec River: The break-up ice jam which formed on Monday in Augusta has moved downstream to just north of the Gardener Bridge and is causing flooding in Gardener, Farmingdale, Hallowell, and Augusta. Many businesses have been without heat and electricity and owners, who are accustomed to flooding in spring, are concerned about dealing with the clean up at cold temperatures. Plans are underway to break out a channel up to the Gardener Bridge Thursday or Friday using a 65-ft Coast Guard ice breaking tug.

New York:

Salmon River: 15 homes were evacuated Tuesday night due flooding from an ice jam that formed in Fort Covington. A state of emergency was declared by Fort Covington officials Tuesday night and by Franklin County on Wednesday, in effect until 31Jan. Homes on a nearby street were surrounded by water and large chunks of ice. The river ice came to within 18 inches of a railroad bridge.

Illinois:

Fox River: Moderate flooding continues due to the ice jam that has been in place since early January. The river is projected to stay above flood stage for about another week.

Rock River: Minor flooding is occurring at Joslin. However, moderate flooding is forecast due to additional ice development as the cold sets in.

Wisconsin:

Fox River: Freeze-up ice jams caused minor flooding near New Munster and Burlington at sites where freeze-up jams had already occurred early this

season. River levels are below flood stage, but expected to fluctuate over the next few days.

Iowa:

Skunk River: Flooding due to the ice jams around Augusta has gradually receded. The rate of decline of stages slowed somewhat, likely due to new ice formation at the now cold temperatures.

Colorado:

White River: Periodic minor flooding has been reported due to ice jams in Meeker. A riverside park area was flooded and several homes were threatened with flooding. The situation is expected to be aggravated by the new ice production during the next few cold nights.

CRREL Personnel:

Andy Tuthill has been in discussion with Tom Hawley at the Gray ME National Weather Forecast Office and Sean Goodwin of Kennebec County regarding the Kennebec River ice jam. Mr. Tuthill also was in communication Pat Manchester, Town Manager at Ft. Covington regarding the ice jam on the Salmon River and the effect of excess sediment accumulation resulting from the removal of an old hydro dam last summer.

Images:



Ice jam at Kennebec River, ME, 28Jan2010, courtesy Maine Emergency Management Agency



On 27Jan2010 a man from Fort Covington looks at the ice chunks in the Salmon River where it passes behind his house. Water has flooded his pool and is threatening his deck. Denise Raymo, PressRepublican.com



An ice jam on the Skunk River causing historic flood levels in Augusta, Iowa. Matt Ryerson, The Hawk Eye

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05Feb2010 River Ice Update

Overview:

Highs near or below freezing are expected to continue through the weekend in most of the northern regions of the US. Continual decline in river flow, lack of snow melt and no predicted liquid precipitation will limit the potential for ice jams, though cold temperatures will still provide capacity for frazil ice growth in rivers. Many break-up jams that developed last week in the Northeast are frozen solidly in place and do not pose a significant threat of flooding until temperatures warm and flows increase. Flooding continues, though stages are slowly receding at the freeze-up jams on the Fox River in Dayton and the Rock River in Joslin, IL.

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10Feb2010 River Ice Update

Overview:

Highs are expected to remain near or below freezing in the north central and eastern part of the US in the latter half of this week, while national attention is focused primarily on the major snowstorm affecting much of the country Tuesday through Wednesday. Since all precipitation will be in the form of snow, river flows will continue to decline or remain steady. Ice will continue to thicken on rivers and streams, increasing faster in places where snow does not cover the ice. Ice jam flooding continues on the Fox River at Dayton and on the Rock River at Joslin, IL, though water levels continue to slowly decline. US and Canadian Coast guard cutters are on the St. Clair River in MI assisting with ice jam problems.

#### Corps Projects:

Due to ice cover in the Missouri River at Pierre, SD, a 100 MW minimum is mandated again at Oahe Dam to prevent the ice cover from progressing too far upstream.

#### Michigan:

St. Clair River: Ice jamming has increased on the St. Clair River after strong North winds pushed ice from Lake Huron into the river. Though the ice often jams near Lake St. Clair this time of year, ice is stationary as far upstream as Port Huron, about 20-25 miles North. This severity of jamming has not been reported since 1984. A forecast of continued Northern winds has led to concerns of flooding in St. Clair. U.S. Coast Guard Cutter Bristol Bay and Canadian Coast Guard ice breaker Samuel Risley are on the scene.

#### Image:



Canadian Coast Guard icebreaker Samuel Risley moves through the south

channel of the St. Clair River around Harsens Island. (Elizabeth Conley / The Detroit News)

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12Feb2010 River Ice Update

Overview:

Temperatures will remain near or below freezing in the upper Midwest, Northeast and New England, so river ice will slowly continue to form and thicken. No liquid precipitation is expected, so river flows will continue to fall slowly. Ice jams remain in place at the Salmon River at Fort Covington NY, the Kennebec River near Augusta ME and the Skunk River at Augusta IA, although no flooding is reported at this time. Extensive ice remains on the St. Clair River. There is no flooding reported and navigation, assisted by Coast Guard ice breakers, is ongoing. Flooding is still occurring on the Fox River at Dayton IL and water levels are remaining steady at well above flood levels due to an ice jam in place since early January.

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17Feb2010 River Ice Update

Overview:

Conditions have been favorable for ice formation for the last few days as temperatures remained below freezing at night and highs were near or slightly above freezing in most of the upper Midwest and Northeast. Ice will continue to thicken as cold temperatures persist. A slight warming of temperatures expected near the end of the week in some areas may slow down ice formation, but temperatures are not expected to increase enough to melt ice or break-up existing ice covers and jams. All precipitation will continue to be in the form of snow, so river flow should remain stable.

Ice jam flooding continues on the Fox River at Dayton IL due to an ice jam in place since early January. An ice jam raised water levels briefly over the weekend at Louisiana, MO on the Mississippi River, though the river peaked on Tuesday and flood stage was never exceeded. Ice jams of concern remain in place at the Salmon River at Fort Covington NY, the Kennebec River near Augusta ME and the Skunk River at Augusta, IA. The state of Nebraska will drop coal ash from crop dusters on Thursday to in an effort

to absorb the sun's energy and help "rot" the ice on the Platte River with hopes of reducing the threat of ice jams and flooding. Much of the ice on the St. Clair River in MI has been cleared and regular navigation has resumed.

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19Feb2010 River Ice Update

Overview:

Near freezing high temperatures in the upper Midwest and colder lows will provide favorable conditions for ice formation through the weekend. In the Northeast and New England expected highs this weekend range from the upper 30s to low 40s and lows will be in the 20s. These milder daytime temperatures may allow for some rotting in place of existing river ice. Mild overnight lows and warmer water temperatures will reduce frazil ice production in those regions. In the central plains, expected heavy snowfall and significantly below normal temperatures will thicken the already slightly above normal snowpack and strengthen river ice, increasing flood risk later this season when the snowpack melts. All expected precipitation in the Northern part of the US will continue to be in the form of snow, so river flows should continue around baseflow. Major ice jams remain in place at the Salmon River at Fort Covington NY, the Kennebec River near Augusta ME and the Skunk River at Augusta, IA. Flooding continues on the Fox River at Dayton IL due to an ice jam. The state of Nebraska began dusting the Platte River in an attempt to reduce the threat of ice jams.

CRREL Personnel:

Steven Daly traveled to MI and observed ice conditions on the St. Clair River, which has been experiencing an above average volume of ice this year. Dr. Daly observed the Hollyhock, a US Coast Guard cutter, transiting the ice. Meredith Carr is attending weekly conference calls sponsored by the US Coast Guard regarding the Kennebec River jam conditions and ice breaking efforts.

Image:



A plane dumps coal ash on the Platte River north of U.S. 6 on Thursday morning, Robert Becker, Lincoln Journal Star

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22 Feb 2010 River Ice Update

Overview:

Ice production in the upper Midwest and Northeast was low over the weekend because of milder temperatures near or slightly above freezing. Mild weather, increasing sun angle and warmer water temperatures are helping to “rot” and weaken existing jams, particularly in New England. Precipitation in the areas of the U.S. where river ice is a concern will continue to primarily be in the form of snow, so river flows should stay near base flow but may increase slightly where snowpack melting has begun to occur. Major ice jams remain in place on the Fox River at Dayton, IL, the Salmon River at Fort Covington, NY, the Kennebec River near Augusta, ME, and the Skunk River at Augusta, IA. The threat of ice jam flooding in locations where jams are frozen in place is still high until the ice breaks up. The U.S. Coast Guard is conducting ice breaking operations again on the St. Clair River in MI, where flow has been so reduced by the ice build-up that water levels have dropped over 2 feet downstream in Lake St. Clair.

Michigan:

St. Clair River: Three U.S. Coast Guard cutters and a Canadian Coast Guard cutter are assembling Monday to renew the effort to break ice in the Algonac, Harsens Island area where ice has accumulated along 9 miles of

the river. U.S. Rep. Candice Miller issued a press release Friday in which she stated that immediate assistance is needed and commended the Coast Guard's effort to bring resources together quickly. Lt. Dixon Whitley of the USCG expressed concern about the potential for more ice to enter the river and aggravate the situation if an ice "bridge" in place upstream in Lake Huron breaks up. The drop in water levels has already caused damage downstream, notably in Harrison Township, where one marina has reported expected repair costs in excess of \$100,000.

Image:



Ice in the St. Clair River in Algonac, Sunday, Feb. 21, 2010. Susan Tusa, Detroit Free Press.

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24 Feb 2010 River Ice Update

Overview:

Ice production has been and will continue to be relatively low, with mild temperatures and normal baseflow continuing in most of the northern part of the country. Most precipitation will be in the form of snow, so only snowmelt should cause any small increase in flow. Heavy rain expected in coastal parts of New England will have little effect since most ice in the area has melted out or is very weak. Mild temperatures are providing opportunity for slow melt out in much of New England and the Northeast. Major ice jams remain in place on the Fox River at Dayton, IL, the Salmon

River at Fort Covington, NY, and the Skunk River at Augusta, IA. The U.S. Coast Guard is continuing ice breaking on the St. Clair River in MI.

CRREL Personnel:

Andy Tuthill traveled to Augusta, ME and assisted in installing an ice motion detector on the Garden jam. Andy Tuthill has been in communication with authorities in Fort Covington, NY, and has provided technical assistance in developing a plan for mechanical weakening of the jam on the Salmon River.

Images:



Ice motion detector installed on the Kennebec River Jam on 22 Feb 2010



Ice on the Kennebec River near Gardner, ME, 22 Feb 2010

Images courtesy Greg Stewart, USGS

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26 Feb 2010 River Ice Update

Overview:

Mild temperatures are allowing for slow melt out in much of New England. In the upper Midwest, where daytime highs are barely reaching freezing, river ice should remain stable and ice production will be low. Major ice jams remain in place on the Fox River at Dayton, IL, the Skunk River at Augusta, IA and the Salmon River at Fort Covington, NY. Authorities in Fort Covington have started mechanical weakening of the Salmon River ice jam by removing ice using an excavator in hopes of reducing the threat of further flooding.



Image:

An excavator lifts ice chunk from the banks of the Salmon River on Thursday, by WPTZ.

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01 Mar 2010 River Ice Update

Overview:

No changes to report since the 26FEB10 update. Major ice jams remain in place on the Fox River at Dayton, IL, the Skunk River at Augusta, IA and the Salmon River at Fort Covington, NY. No flooding is reported at these sites at this time. Precipitation is expected in New England over the next couple days, though much of the river ice has eroded due to mild temperatures.

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03 Mar 2010 River Ice Update

Overview:

With highs above freezing but overnight lows dipping well below freezing, ice conditions are likely to remain steady in the North central part of the country for the next few days. Following the storm event last weekend, Buffalo NWS increased the risk for spring ice jam flooding as a result of the increased snow pack depth. No significant precipitation is expected in ice jam prone areas, but some minor increase in stream flow may occur due to modest snowmelt. Major ice jams remain in place on the Salmon River at Fort Covington, NY (LRD/LRB) and on the Skunk River at Augusta, IA (MVD/MVR), though no flooding is reported at these sites at this time. Ice conditions on the St. Clair River in MI (LRD/LRE) have improved considerably over the past week and the ice bridge that is retaining Lake Huron ice is still holding.

Image:



A crack in the Lake Huron ice bridge on 01 Mar 2010. The ice bridge is retaining lake ice from flowing downstream into the St. Clair River. Courtesy USCG aerial flight.

Meredith Carr PhD  
Research Hydraulic Engineer

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12 March 2010 River Ice Update

Overview:

Temperatures well above freezing and increasing run-off have led to many break-up jams over the past week, primarily in southern IA (14), NE (13) and SD (4). Ice jam potential is expected to shift northward over the next few days and risks of ice jam flooding into the weekend have been reported in Northern IL, IA, WI, MN and SD.

One quarter of all the jams so far this year occurred in the past week. There were 4 jams on the Platte River, 3 jams on the Loup River and 4 jams on the Elkhorn River in NE as well as 3 jams on the White River in SD. 13 of the jams have released and 5 are still causing flooding. Major flooding is occurring on the Skunk River in Augusta, IA, and moderate flooding and road closures are occurring on the Des Moines River in Fort

Dodge, IA. Minor flooding is occurring on the Elkhorn River in West Point, NE, the Platte River near Waterloo, NE, and Beaver Creek near New Hartford, IA. Evacuations occurred on Wednesday night due to a jam on the Platte River near Vencil's island West of Omaha, NE.

#### Nebraska:

Platte River: A jam occurred near Waterloo on Tuesday, at North Bend and Fremont on Wednesday and on Vencil's Island on Thursday. All of these jams have released. The jam on Vencil's Island led to evacuations which is a common event there during the spring breakup of the Platte River.

Elkhorn River: The Elkhorn River began jamming on Monday at Clearwater. Jams have occurred at Pilger, Scribner, Winser and a jam that formed Tuesday is still in place in West Point and causing moderate flooding. Highway 32 west of West Point and Highway 275 were still closed as of early Friday.

Loup River: Serious jams occurred on Wednesday and have since broken up near Fullerton, Genoa and Lake Oconee. Minor flooding and road closures occurred in Lake Oconee and Fullerton. In Genoa, flood water approached record stages on Tuesday and flood waters were running across Rte. 39 on Wednesday.

#### South Dakota:

White River: A series of break-up jams and increasing flows led to flooding from Interior to Oacoma through the week. Jams formed and released in Interior and Murdo and a final large jam occurred near Rt. 47 in Reliance, upstream of Oacoma. Further jamming of the White River is not expected.

#### Iowa:

Raccoon River: The break-up jamming of the Raccoon River began with a jam near Van Meter which broke-up early Wednesday, sending ice towards West Des Moines. Flash flooding in Des Moines caused local authorities to quickly move homeless camps by the river to higher ground. Several road closings also occurred before the jam broke-up on around noon on Wednesday.

#### Images:

Aerial view of the Loup River shows ice build-up near Highway 39 Bridge near Genoa, NE.  
Photo courtesy Kim Wolfe  
10 Mar 2010



Aerial view of the Loup River near the Highway 39 Bridge near Genoa, NE on 10 Mar 2010. Photograph courtesy Kim Wolfe.



First Street Bridge on the Raccoon River on Wednesday in Des Moines, IA. Photograph by John Gaps III, the Des Moines Register.



Ice jam on the White River near Highway 47 in Reliance, NE, 9 March 2010.

Meredith Carr PhD  
Research Hydraulic Engineer

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15 March 2010 River Ice Update

Overview:

The ice jam potential will continue to slowly shift northward as the spring season comes on. With a shift from below normal to above normal temperatures, snowmelt and runoff from recent precipitation is resulting in significant water level rise in rivers and streams. Additionally, the warmer temperatures loosen sheet ice still present on the rivers. This combination of factors will cause river ice to jam and break up. As this cycle continues, river bends and bridges will be locations of potential ice jamming, flooding and subsequent ice jam break up. Rapid fluctuations in river levels are possible as ice jams break free and redevelop quickly. The threat of widespread flash flooding or minor to major flooding continues. Many of these rivers and streams will be slower than normal to recede post-crest and fall below flood stage as the runoff from snowmelt as well as excess soil moisture takes a while to find its way into the rivers and

streams. The risks of ice jam flooding of the nature specified will continue in the near future for Northern Iowa, Minnesota, Wisconsin and the Dakotas.

North Dakota:

The Minnesota tributaries and the main stem Red River along with the Wild Rice River in North Dakota have responded to snow melt and rainfall runoff.

Ice jams continue to be the major issue as the sheet ice breaks up and the rivers transition to open water. Locations along these rivers could see rapid fluctuations due to ice jams. Water levels could rise and fall as much as 1 to 3 feet.

South Dakota:

Runoff from snow melt has caused a significant water level increase along the Big Sioux River in the southern part of Sioux Falls, SD. At Cliff Street and Interstate 229, a ice jam is causing significant flooding in Tuthill and Spencer Parks. In addition, the Big Sioux River ice jam is causing flooding at Western Avenue. Ice jam action can cause river stage fluctuations of 1 to 2 feet which is significant for the park system along the river. Several ice jams located along Battle Creek from southwest to northeast of Rutland, South Dakota are producing flooding of County Roads 23 and 29.

Iowa:

Ice jams continue to be problematic with the leading edge of the activity migrating from the south to the north. Ice jam activity has been somewhat predictable with the majority of the events occurring within 12 to 24 hours

after streams begin to rise. Ice jam development has been more prolific than normal due to the colder than normal winter where ice thicknesses exceeded 12 to 18 inches in some locations. The widespread moderate to major flooding continues where basins of most concern are first the Des Moines and Raccoon followed by the Cedar and Iowa then the Skunk. Ice jam problems have decreased but there still are ice jam problems on the Des Moines River in the Fort Dodge area. River ice action continues north of US

Highway 20. Rivers across the far northern areas continue to experience significant water level increases and flash floods due to the ice jams. Watches will continue through the early part of this week. Specifically, along the upper reaches and tributaries of the Des Moines River, the Iowa River near Rowan, Winnebago River at Mason City, Shell Rock River near Shell

Rock, Beaver Creek upstream of New Hartford and the Cedar River north of Janesville.

Wisconsin:

The Sheboygan River at Sheboygan, WI is experiencing minor flooding and high

water levels due to a combination of rain, snow melt and minor ice jamming.

Minnesota:

Local emergency management agencies have reported high water, ice jams and some flooding along the Sand Creek and Credit River. The ice jam along the Sand Creek near 173rd Street north of Jordan, Minnesota grew larger over the weekend but water was flowing around the jam. Along the Credit River south of County Road 42, the residential areas of Savage, Minnesota continue to experience flooding. Ice jams are affecting minor to moderate flooding along the Red Lake River in Crookston, Minnesota. The ice jam is forecasted to break up by mid-week due to warming temperatures. Another reported ice jam on the Minnesota River approximately a mile downstream from the town of Henderson, Minnesota is causing flooding on State Highway 19, Sibley County Highway 6 and State Highway 93 in the Henderson area. Other rivers farther upstream in the Minnesota Basin are mainly still ice covered. As the ice continues to melt and break up, the headwaters of the Minnesota River will become more prone to ice and debris jams.

Jeffrey P. Niehaus, P.E.  
Hydraulic Engineer CRREL

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26 March 2010 River Ice Update

Overview:

Ice jam flooding continues in North Dakota. Ice is causing elevated stages on the Cannonball River southwest of Breien, and flooding may result. Stages were also impacted by ice on the Heart, Knife and Green Rivers. Ice is causing moderate flooding on the Pipestem Creek at Pingree, and the Beaver Creek at Linton. Many other locations are showing ice impacted gage readings.

Ice continued to be a problem on the St Clair River this week. Navigation was substantially reduced and the Coast Guard has required that tugs and icebreakers escort ships through the river. Coast Guard cutters Mackinaw, Neah Bay, Bristol Bay, Biscayne Bay and the Canadian Coast Guard ship Griffon worked in the St Clair River this week. No flooding due to ice is reported.



Ice in the St Clair River at Port Huron. (Image taken looking north into Lake Huron) (Kevin Drake, Detroit District).

Steven F. Daly Ph.D., P.E., D.WRE

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29 March 2010 River Ice Update

Overview:

Some flooding continues in North Dakota. Ice is not causing any significant flooding at this time but forecasted increases in discharge due to snowmelt and precipitation may form ice jams in the coming days.

Steven F. Daly Ph.D., P.E., D.WRE

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30 Apr 2010

Alaska:

The Alaska break-up is slowly beginning, marked by the ice-out on the Tanana River Thursday morning at 9:06 a.m. AST. See the attached image

for a glance at flooding during last year's Alaska break-up. Look for detailed updates of river ice problems in Alaska in the coming days.

Image:



Eagle Village on the Yukon River in Alaska in May 2009, Photo by Carl Stapler, National Park Service.

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#### 5 May 2010 River Ice Update

##### Overview:

In the early part of the week minor concerns regarding the break-up in Alaska have been due to ice jams on the Chatanika River at the Elliot Highway Bridge near Fairbanks and at the Yukon River above Circle. Flooding has been limited to lowland areas.

An ice jam below the Elliot Highway Bridge on the Chatanika River released Sunday night. The jam and about  $\frac{3}{4}$  in of rain led to lowland flooding. The break-up on the Yukon River has not caused problems as the front moved past villages like Eagle, Tanana and Stevens, where last year's jams led to more than \$40 million in flooding damages. The ice has jammed downstream in a location about 20-25 miles above Circle. When the jam

breaks it may cause a rise in water levels and minor flooding. The ice downstream of the jam has been rotting and developing open leads and the jam is expected to release soon.

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