

**MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS**

TO: NATIONAL WEATHER SERVICE (W/OS31)  
HYDROMETEOROLOGICAL INFO CENTER  
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SILVER SPRING, MD 20910

SIGNATURE:  
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When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (WSOM E-41).

An X inside this box indicates that no significant flooding occurred within this Hydrologic Service Area.

**Summary**

Flooding in early January 2009 was the result of carryover from flooding near the end of December 2008. In mid-January a river flood warning was issued and later downgraded to a flood watch for the Muskegon River near Ewart, Michigan, as the result of backwater from “freeze up” ice jams in the area. Only minor flooding of low lying areas adjacent to the river occurred with this event and no significant impacts to life or property were reported.

**Flood Conditions**

The river flooding that started in December 2008 carried over into the New Year, and on Thursday, January 1<sup>st</sup>, we had river flood warnings still active for 3 forecast points on the Grand River, 1 forecast point on the Pere Marquette River, and 1 forecast point on the Maple River. The Grand River at Comstock Park crested early in the morning on January 1<sup>st</sup>, and by mid-morning all rivers in Southwest Lower Michigan were in a slow fall. River flood warnings were cancelled for the Thornapple River near Hastings and the Kalamazoo River near New Richmond, Michigan as they fell below flood stage.

On Friday, January 2<sup>nd</sup>, river flood warnings were cancelled for the Grand River at Ionia, and the Pere Marquette River near Scottville, Michigan. On Friday, we had river flood warnings still active for 2 forecast points on the Grand River, and 1 forecast point on the Maple River.

On Saturday, January 3<sup>rd</sup>, river flood warnings continued for the Grand River at Comstock Park and Robinson Township, and for the Maple River near Maple Rapids, Michigan.

On Sunday, January 4<sup>th</sup>, the river flood warning for the Grand River at Comstock Park was cancelled. River flood warnings continued for the Grand River at Robinson Township and for the Maple River near Maple Rapids, Michigan.

On Monday, January 5<sup>th</sup>, the final two river flood warnings were cancelled when the Grand River at Robinson Township and the Maple River near Maple Rapids, Michigan, fell below flood stage.

On Thursday, January 15<sup>th</sup>, a river flood warning was issued at 10:28 PM EST for the Muskegon River near Ewart, Michigan, when a “freeze up” ice jam formed in the area causing backwater and rapid rises in river levels, with flooding reported in low lying areas along the river.

On Friday, January 16<sup>th</sup>, a river flood warning was downgraded to a watch at 7:13 PM EST for the Muskegon River near Ewart, Michigan, when the “freeze up” ice jam stabilized in the area and river levels held steady below flood stage.

On Tuesday, January 20<sup>th</sup>, the river flood watch was cancelled when river levels fell back within banks with the ice jam still in place but stable. The river remained high, but continued a slow fall throughout the rest of the month as the river remained almost completely frozen over in the area. A write up of the ice jam event is attached to the end of this report.

### **Flood Stage Report**

#### **Rivers with moderate flooding in December 2008 that carried over into January:**

The Kalamazoo River near New Richmond, Michigan, with a flood stage of 11 feet, crested at 13.18 feet at 8:45 PM EST on December 29<sup>th</sup>, and fell back below flood stage on January 1<sup>st</sup>, at 00:30 AM EST. Ice jams impacted stage levels and resulted in rapid rises and significant backwater in the area.

The Grand River at Comstock Park, Michigan, with a flood stage of 12 feet, crested at 15.19 feet at 00:10 AM EST on January 1<sup>st</sup>, and fell back below flood stage on January 5<sup>th</sup>, at 10:00 PM EST. Ice jams impacted stage levels and resulted in significant and rapid fluctuations in river levels in the area.

#### **Rivers with minor flooding in December 2008 that carried over into January:**

The Grand River in Robinson Township, Michigan, with a flood stage of 13.3 feet, crested at 14.90 feet at 03:14 PM EST on December 28<sup>th</sup>, and fell back below flood stage on January 5<sup>th</sup>, at 09:00 AM EST. Ice Jams impacted stage levels and resulted in rapid rises and significant backwater in the area.

The Maple River near Maple Rapids, Michigan, with a flood stage of 9 feet, crested at 9.57 feet at 12:30 PM EST on December 30<sup>th</sup>, and fell back below flood stage on January 4<sup>th</sup>, at 03:00 PM EST.

The Pere Marquette River near Scottville, Michigan, with a flood stage of 5.5 feet, crested at 6.18 feet at 10:15 AM EST on December 29<sup>th</sup>, and fell back below flood stage on January 2<sup>nd</sup>, at 10:30 AM EST.

The Thornapple River near Hastings, Michigan, with a flood stage of 7 feet, crested at 8.07 feet at 04:15 AM EST on December 30<sup>th</sup>, and fell back below flood stage on January 1<sup>st</sup>, at 06:15 AM EST.

The Grand River at Lowell, Michigan, with a flood stage of 15 feet, crested at 15.75 feet at 05:47 PM EST on December 30<sup>th</sup>, and fell back below flood stage on January 1<sup>st</sup>, at 11:39 AM EST.

Please refer to NWS Form E-3 "Flood Stage Report".

### **River Conditions**

River levels by the end of January were still above normal for our HSA. Significant ice had built up on Area Rivers. Ice jams occurred on the Muskegon and Flat Rivers.

### **General Hydrologic Information**

January 2009 will be remembered most for its below normal temperatures and corresponding above normal ice coverage on area rivers.

January precipitation totals at Grand Rapids, Lansing, and Muskegon, Michigan, were 1.74, 1.05, and 2.38 inches, respectively. Precipitation totals for the month at these three sites were 0.29 of an inch below normal at Grand Rapids, 0.56 of an inch below normal at Lansing, and 0.16 of an inch above normal at Muskegon, Michigan. Snowfall totals for the month at Grand Rapids, Lansing, and Muskegon were above normal with readings of 29.9 (+8.8), 18.7 (+4.7), and 41.7 (+7.3) inches, respectively. Snow depth during the month of January reached a high of 12 inches at Grand Rapids, 10 inches at Lansing, and 22 inches at Muskegon. Snow depths at the end of January at Grand Rapids, Lansing, and Muskegon, Michigan, were 11 inches, 10 inches, and 12 inches, respectively. Due to the significant snowpack for most of January, the frost depths across the HSA were typically less than 7 inches.

The daily mean temperature for the month was significantly cooler than average across Southwest Lower Michigan. Temperatures for the month of January were below normal at Grand Rapids, Lansing, and Muskegon, with average monthly departures of -4.9, -5.9 and -4.4 degrees Fahrenheit, respectively.

### **Hydrologic Products issued this month:**

- 5 River Flood Watches (ARBFFAGRR)
- 1 River Flood Warning (ARBFLWGRR)
- 15 River Flood Statements (ARBFLSGRR)
- 48 Hydrologic Statements (ARBRVSGRR)
- 31 Hydrologic Summaries (ARBRVAGRR)
- 1 Hydrologic Outlook (ARBESFGRR)

Attachment:

## Trip Report: Inspection of Freeze up in the Muskegon River at Evart, MI

On 16 January 2009, Mark Walton, Service Hydrologist with the NWS at Grand Rapids, MI and Steven Daly, Research Hydraulic Engineer with ERDC/CRREL, Hanover, NH, viewed freeze up in the Muskegon River at Evart, MI. The trip was initiated because of the rapid rise in the USGS gage at Evart (Figure 1). The gage had risen nearly 4 feet over the period from mid day on 15 January until the early morning hours on 16 January. The stage was very near to the flood stage of 12 feet. This rapid rise caused the NWS to issue a flood warning for Evart.

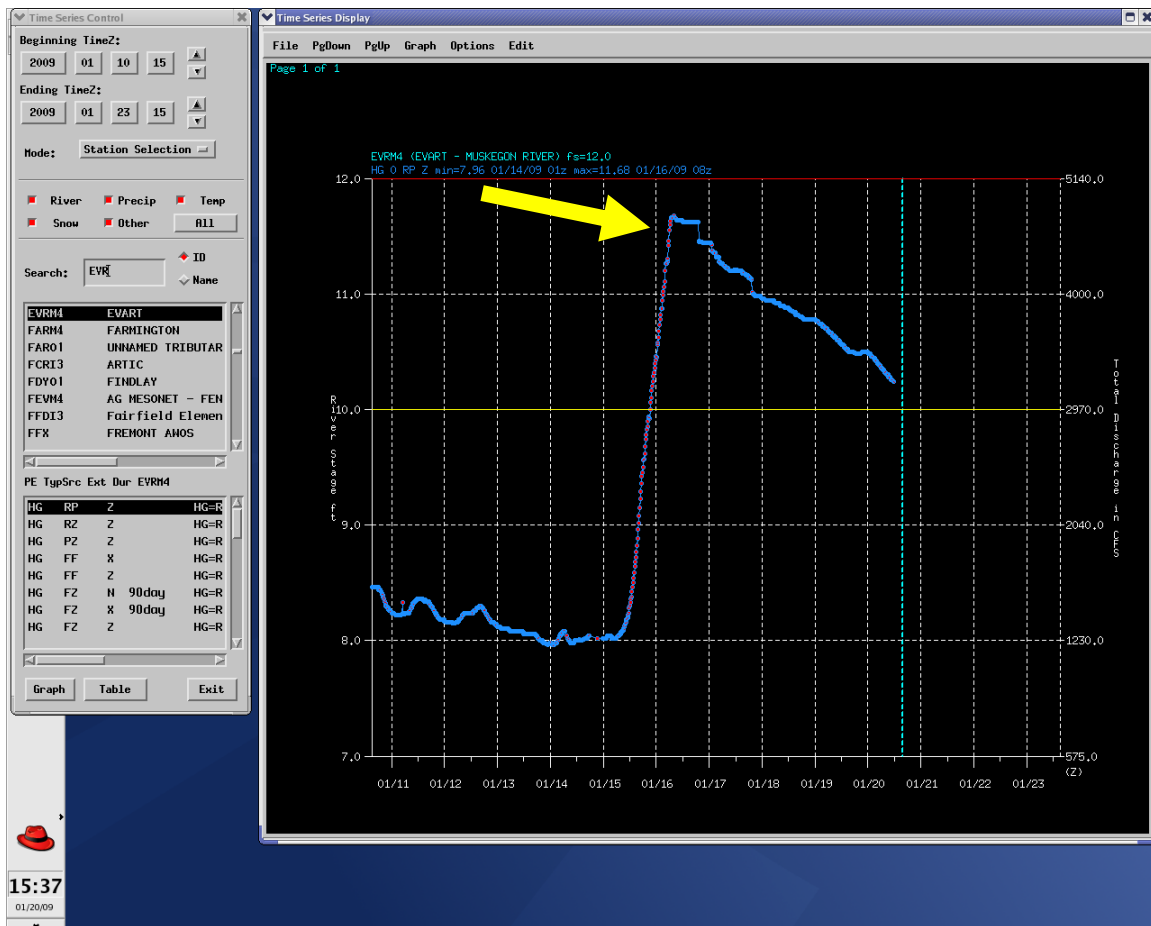
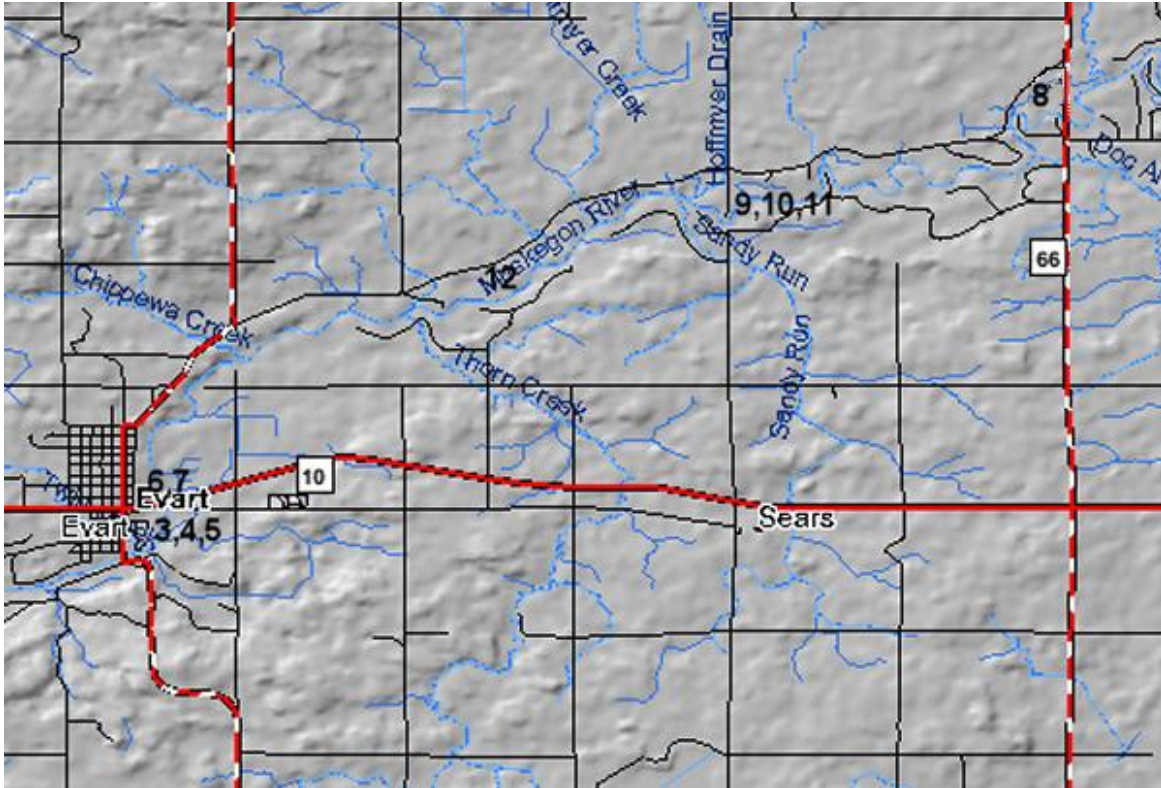


Figure 1. Gage reading for the Muskegon River at Evart, MI



**Figure 2. Map with location of Figures**

Walton and Daly viewed the Muskegon River at the location of the gage at about 1330. The locations of the following figures are shown on the map of the area (Figure 2). The leading edge of an ice cover was visible immediately downstream (Figure 3 and Figure 4). The upstream advance of the ice cover to this location was unusual. The local fire chief could not recall an ice cover reaching this location before. The weather had been especially frigid in the days leading up to this event. A thin film of frazil slush was barely visible on the water surface (Figure 5) but no ice floes were arriving at the leading edge. The fire chief informed us that an ice cover had formed at the Route 10 Bridge upstream of the gage in the hours before we arrived. This stopped ice from reaching the leading edge of the ice cover immediately downstream of the gage. The frazil slush was ice that had been carried under the existing upstream ice cover or had formed in the approximately ¼ mile reach of open water upstream of the leading edge. The ice cover had stopped advancing upstream. It was evident that the stage would stop rising as long as no more significant quantities of ice arrived at the leading edge.



**Figure 3. Leading edge downstream of gage**



**Figure 4. Leading edge downstream of gage**



**Figure 5. Thin layer of frazil slush on water surface**

Walton and Daly next viewed the downstream toe of the ice cover that had formed at the Route 10 Bridge. The ice covered extended upstream and no ice was issuing from beneath the ice cover (Figure 6). The leading edge of the ice cover downstream of the gage was visible from the bridge (Figure 7). They then traveled upstream to a small development near the County Route 66 Bridge where the river was partially open and frazil slush and small floes were carried downstream (Figure 8). Next they traveled downstream to the 50<sup>th</sup> Avenue Bridge where the river was also open and frazil slush and small floes were carried downstream (Figure 9, Figure 10 and Figure 11). Finally they viewed the river from the County Supervisor's home, from a location downstream of the 50<sup>th</sup> Avenue Bridge where the river was completely ice covered (Figure 12).



**Figure 6. Looking upstream at the downstream extent of ice cover at the Route 10 Bridge**



**Figure 7. Looking downstream from Route 10 Bridge at the leading edge of the ice cover immediately downstream of gage. The gage is on the right bank in this view.**



**Figure 8. Frazil slush upstream**





**Figure 9. Frazil slush and small floes**



**Figure 10. Frazil Slush and small floes**



**Figure 11. View of floes**



**Figure 12. View from County Supervisor's home. River was completely ice covered.**

**Discussion:** The area around Ewart, MI has abundant ground water reserves as seen in the many flowing artesian wells in the area. The large influx of ground water impacts the Muskegon River water temperature and reduces the ice production in the river. Freeze up is an unusual occurrence in Ewart. The frigid, sub-zero air temperatures in Ewart in the days preceding the observed freeze up were apparently cold enough to generate sufficient ice to cause the river to freeze up. The impact of freeze up was to cause the river stage to rise. Once freeze up had occurred the stages stop rising. This can be seen in the gage results shown in Figure 1. Following freeze up, the influx of warmer ground water caused the underside of the ice cover to smooth and the natural decrease in flow lead to the slow decline of stages, as also seen in Figure 1.