

2022 Spring Flood

14th Presidential Disaster Declaration in the Past 29 Years

This past spring's flood again produced historically high and extended flooding throughout the Red River Valley. The floodwaters reached a level of 43.15 on May 5th, 2022, the eighth highest ever recorded. Downstream in Pembina, the river crested at 52.26 on May 7th, 2022. This was the third highest ever recorded at that location. Not only were these top 10 floods, but the floods were exacerbated by the extremely long duration of the flood. At both locations the water remained above flood stage for approximately two and one-half month (75 days)! On the Two Rivers at Hallock, the river crested at 807.19 on May 1st, 2022, which is the 21st highest on record. However, of note is that the South Branch Two Rivers experienced 3 crests above flood stage between April 18th and May 25th, and a total of 6 crests between April 10th and June 5th!

This year was again declared a Presidential disaster, and FEMA is once again in the area doing damage assessments and working with local governments to reimburse them for damages, repairs, and replacements to public structures. Typical damages that result from these floods are massive amounts of debris that collect on and along roadways and in public ditches. Wind and water erosion cause damage to road shoulders, wash out gravel on roads, create enormous sloughing of ditch side slopes, and deposit trees, field straw, gravel, and eroded soil on the landscape. Each time a flood happens, millions of dollars are expended to clean up debris, repair public infrastructure, and mitigate damages by flood proofing for the future.

This year's disaster was the 14th disaster declaration in Kittson County in the past 29 years. Much progress has been made in that time to build projects in cities and in rural areas to help prevent flood damages, however overland flooding continues to wreak havoc on roads, farmsteads, bridges and culverts, and agricultural cropland areas. Several articles in this edition of the newsletter are meant to show the problem of flooding, what has been done, and what is left to do!



Red River Flooding West and South West of Hallock, MN; May 2022



Red River Flooding West/North West of Hallock, MN; May 2022

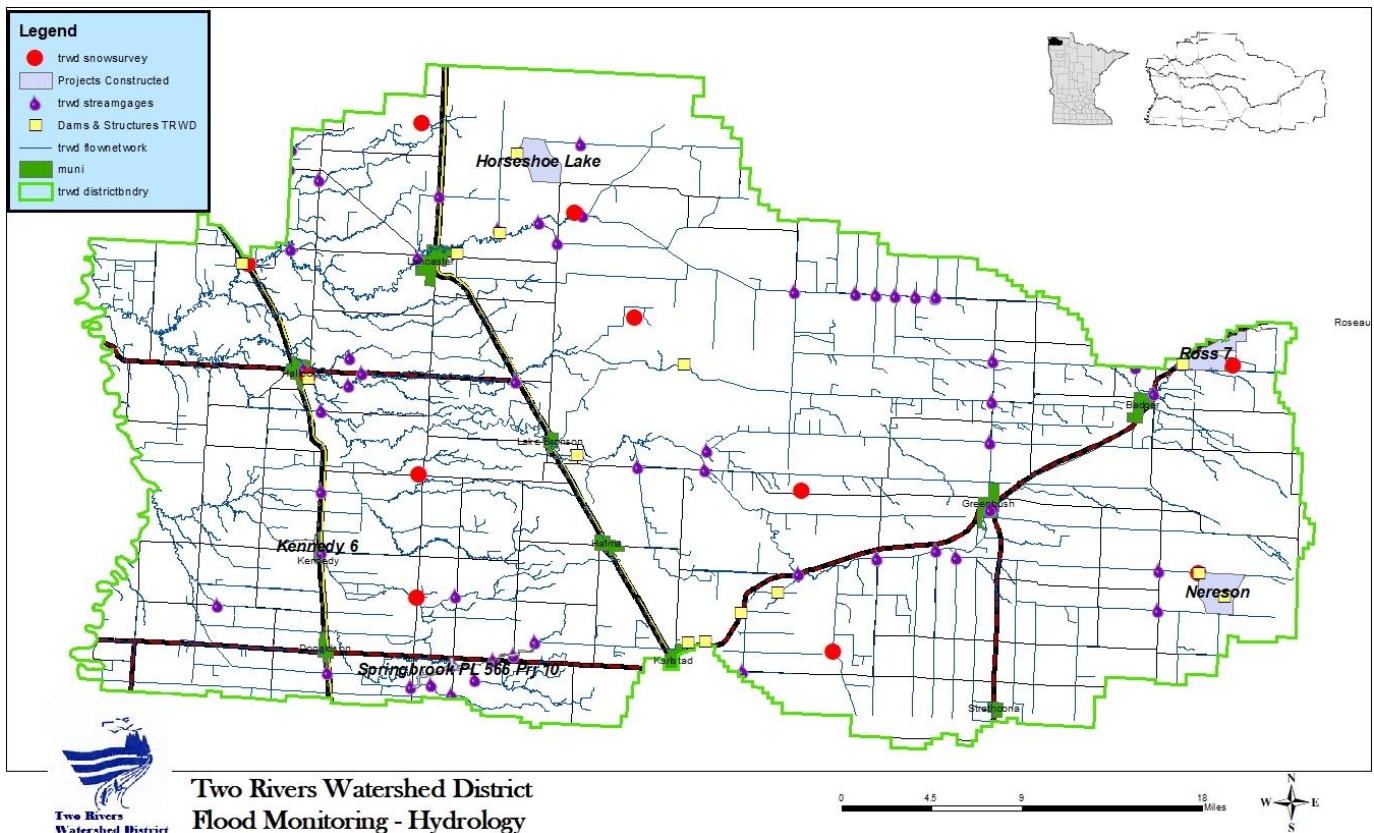


Measuring a Flood

Stream Flow Monitoring Provides Data & Aids in Forecast Predictions

Prior to and during times of flooding, a network of Federal, State, and Local agencies are called to action to monitor snow pack, melting snow and the resulting spring runoff and operate flood control structures to reduce and prevent flood impacts. These agencies work closely together to get information out to emergency responders and the general public in a timely manner.

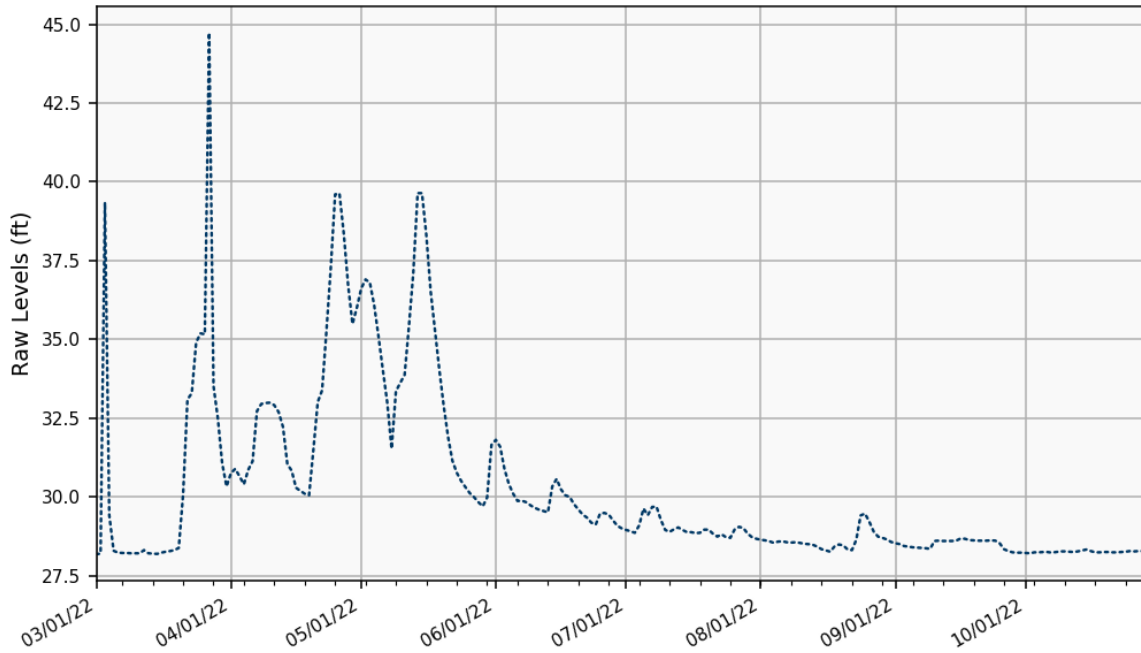
Agencies that measure and monitor flood flows and provide forecasts include the U.S. Geological Survey and the National Weather Service on the Federal level, the MN DNR on State level, and Watershed Districts on the local level. These agencies work closely together to collect data and provide it to forecasters who then make flood crest predictions and disseminate the information to the media and the public.



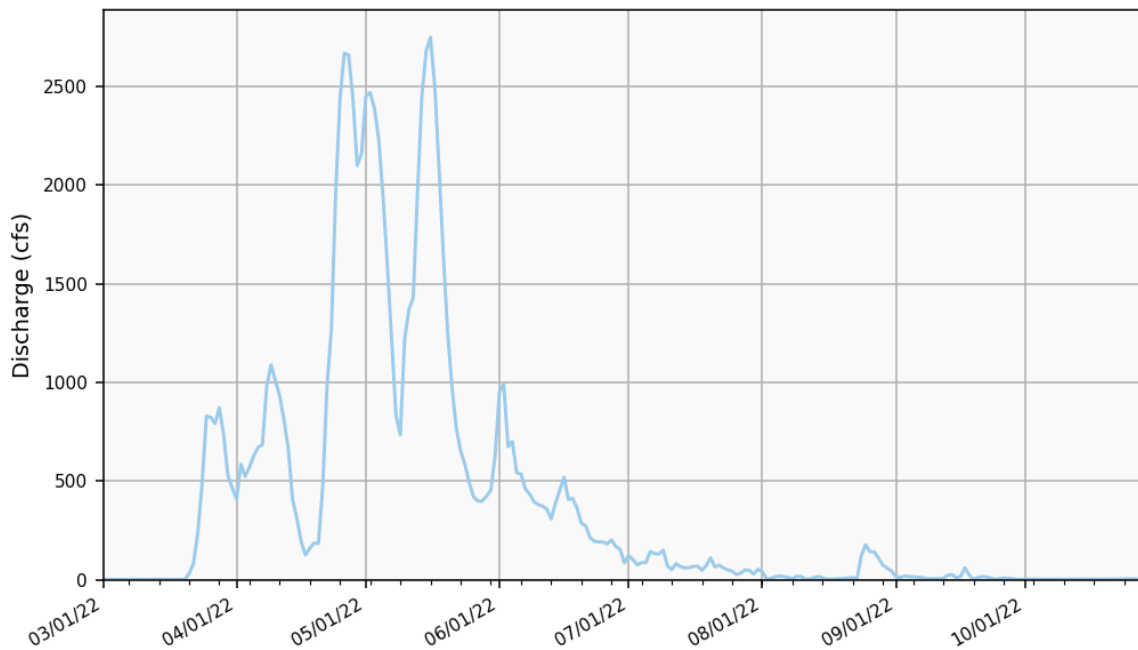
Measurements are taken along ditches, streams, and rivers at various locations. Flow is measured in ‘feet per second’ and volume is converted to ‘cubic feet per second’. One cubic foot = 7.48 gallons, and 1 cubic foot per second = 448.8 gallons per minute. The Red River at Drayton at its peak this spring was flowing at 79,600 cfs, which is nearly 36 million gallons per minute! These numbers are put into computer models by the forecasters and the models are used to determine estimates of how high rivers will get and for how long. These measurements are used in flood fighting operations, whether that is operating flood control gates, sandbagging, diking, or other activities.

When measurements are taken in upstream, middle and downstream locations, they can be plotted as hydrographs and help to show how a flood moves through an area or an entire system. On the Two Rivers, it helps with operation of impoundments and also the operation of the dam at Lake Bronson State Park. Below are several hydrographs depicting the height and duration of flooding at various locations for the 2022 flood.

South Branch Two Rivers at Pelan, MN11 (70040002)
2022-3-1 to 2022-10-28



South Branch Two Rivers at Lake Bronson, MN (70033001)
2022-3-1 to 2022-10-28



Please contact our office if you would like more information on the anatomy of our flooding, information on crests, or to be put on our contact list during future floods.

Fighting a Flood

Watershed District Impoundments and Projects

The Two Rivers Watershed District operates 3 flood control impoundments. These are diked-in areas on the landscape consisting of a dam and a water control structure at the outlet. An operable gate controls the flow out of the impoundment. Typically, the gates are closed at the onset of flooding to divert and hold floodwaters. After a flood they are gradually drained dry.

The 'Nereson', 'Ross #7' and 'Horseshoe Lake' impoundments together are utilized to reduce the peak and duration of floods. The amount of water they can hold is measured in acre-feet of water. One acre foot of water is one foot deep and covers one acre of land. It is equal to 325,829 gallons. The Nereson Impoundment can hold up to 3,500 acre feet. The Ross #7 Impoundment can hold up to 3,611 acre feet, and the Horseshoe Lake Impoundment can hold 2,130 acre feet for a combined total of 9,241 acre feet, or just over 3 billion gallons!



Horseshoe Lake Outlet Structure



Nereson Sub-Impoundment



Ross Impoundment

10/04/2019

The TRWD has constructed nine projects (3 impoundments and 6 channel projects) to help prevent flooding. One of these, the 'Springbrook' project, consists of 9



Springbrook Project - set back levees

miles of levees / dikes alongside an existing coulee. The dikes are set back about 300' and are parallel to and along the watercourse. They are designed to prevent water from breaking out of the coulee and flooding overland. This project was completed in 2013 and has proven to be a big help in preventing damage to cropland and infrastructure during both spring and summer flooding. Another channel project was constructed in

the mid 2000's through the City of Kennedy to alleviate flooding in town by creating a channel deep enough and wide enough to carry floodwaters through the city without causing damages.

Ring dikes around farmsteads are another way to prevent flood damages. Over the years over 24 ring dikes have been constructed and have proven themselves in preventing damages to farmsteads time and time again. These were constructed using local, state, and federal cost share programs.

Many other types of flood control activities have been identified. These include the



Ring Dikes near the Red River

following measures:

- 1) Reduce Flood Volume and consist of projects like restoring wetlands, increase grasslands and forests on the landscape, and cropland best management practices. These generally work best if the furthest areas upstream from the river.

- 2) Increase conveyance capacity includes things like ditching, diversions, and set back levies. These generally work best in areas very close to the river.
- 3) Increase temporary flood storage, which is impoundments, certain types of drainage, and restored or created wetlands. These work best when constructed in the middle or upper areas of a watershed.
- 4) Protection and avoidance are projects like both rural and urban ring dikes, buy outs of flood prone land, and flood proofing. These can work in all areas of a watershed depending on their siting and local conditions.

Even though many projects have been constructed over the years, there are still many areas within the watershed district that are affected by flooding. The TRWD is currently working on another impoundment project to address flooding in western Roseau County and Eastern Kittson County. The project is known as the 'Klondike Clean Water Retention Project' and will address flooding in the State Ditch #72 and State Ditch #95 areas.

Other known areas of flooding exist, and the TRWD is interested in meeting with landowners, local and state officials to determine the problems, look at possible alternatives to reduce flooding, and pick the best project that is cost effective and reduces flooding. Studies have shown that for every \$1 spent on flood control, there is a \$6 return on investment.