Two Rivers Watershed District

In Roseau, Kittson, & Marshall Counties

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Spring/Summer Newsletter
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New LiDAR Data Now Available

The Red River Watershed Management Board (RRWMB) has announced the availability of Quality Level (QL) 1 LiDAR data for the Red River Basin (RRB) of Minnesota. LiDAR stands for "Light Detection and Ranging" and it is a state of the art mapping technology that gives elevation data and maps the surface of the earth.

What is LIDAR? LiDAR = Light Detection and Ranging is anintegration of airborne laser and Global Position System technology. Laser pulses are directed at the earth's surface (early spring or late fall) from equipment on an aircraft flying a predetermined grid over an area of interest. The laser reflections are recorded, and the range is calculated from the instrument's orientation in space and the time required for the laser's light reflection to travel back to the aircraft.

The RRWMB contracted with The Sanborn Mapping Company Inc. (Sanborn) out of Colorado in 2021 to acquire LiDAR information over 20,034 square miles in Northwest Minnesota. LiDAR data collection began in October 2021 and was completed in early November 2021. The area mapped covers most of the Red River Basin on the Minnesota side of the river. LiDAR data collected by Sanborn was processed and submitted to the International Water Institute (IWI) in Fargo, North Dakota, also contracted with the RRWMB, to conduct quality control.

RRWMB partners and their stakeholders have been eagerly anticipating the roll-out of new LiDAR data. Robert Sip, Executive Director for the RRWMB said, "*This was a long process due to the sheer amount of data that had to be quality controlled by the IWI. Over 60 billion data points or roughly 21 terabytes of LiDAR data files were delivered and processed as part of this effort.*" More detailed information about project metrics is illustrated in the table below:

Item – Metric:	Result:
Number of Aircraft and Sensors Used	3 Terrain Mappers (91520, 91555, and 91559)
Number of Individual Missions	63 Separate "Lifts"
Total Square Miles Covered	20,034 Square Miles (51,888 Square Kilometers)
Size of Raw Data to Process	>800 Terabytes (0.8 Petabytes)
Size of LiDAR Files Delivered	~21.5 Terabytes
Number of Individual LAS Files Delivered	52,771 LAS Tiles (1 Square Kilometer Each)
Number of Total Project Files Delivered	960,536 Individual Project Files
Approximate Number of LAS Points (Project-wide)	**> 60 Billion Points**

Note: There are four QLs from 0 to 3 according to United States Geological Survey (USGS) standards, with 0 being the best.

PROJECT BENEFITS: QL1 LiDAR data will enhance resiliency, capacity, performance, and efficiency at every level of decision-making. Benefits from LiDAR data include:

- More accurate flood plain maps to mitigate flood damages and to work towards flood and drought resiliency.
- Enhanced emergency preparedness.
- Targeted wetland and wildlife habitat restoration.
- Enhanced planning and project development related to transportation infrastructure, land use management and human development.
- Enhanced understanding of river channel migration andslope stability.
- Detailed surface hydrologic and hydraulic modeling.
- Efficient/equitable natural resources management.
- Increased agricultural productivity.
- Innovative tools for conflict resolution.
- Problem identification.
- Major cost reduction in all civic projects.

What are the Deliverables of This Effort?

The IWI Map Portal allows users to access the LiDAR derived bare-earth DEM, 1-foot and 5-foot contours, and a number of other LiDAR products such as shaded relief and water flow pathways. *"A farmer or landowner can sit in their tractor using their smartphone or other electronic devices and can look at elevation data and contours in the fall while cleaning and maintaining ditches,"* said John Finney, RRWMB President and retired farmer from Humboldt, MN. Finney said that "*The IWI Map Portal is a point and click environment, is easy to maneuver around in, and you can't break it, plus spot elevation data can be found anywhere you click on a particular field or area of interest."*

The original (from 2008) RRB LiDAR data had accuracy of approximately 6 inches while the new LiDAR data is less than 4 inches. The new data were collected according to federal standards developed by the USGS, which did not exist at the time of the original LiDAR data collection. About 50,000 square miles was collected in the original LiDAR data acquisition effort that included both the RRB of Minnesota and North Dakota. Chuck Fritz, Executive Director of the IWI said that *"Todays computing power, software, and technology has been a game changer for us compared to when the IWI worked on the original 2009 LiDAR."* Fritz further stated that, "*In 2009 there were no QL Levels and no federal standards on quality control, data management, or data storage."* Fritz also indicated that the quality control process was quite involved and that the IWI needed to update their computer hardware to deal with the magnitude of the data. More information about the quality control process is available upon request to the RRWMB. The illustration on the next page compares the original 2009 data with the 2021 data.

LiDAR Website – LiDAR Portal Free to the Public

Product deliverables include:

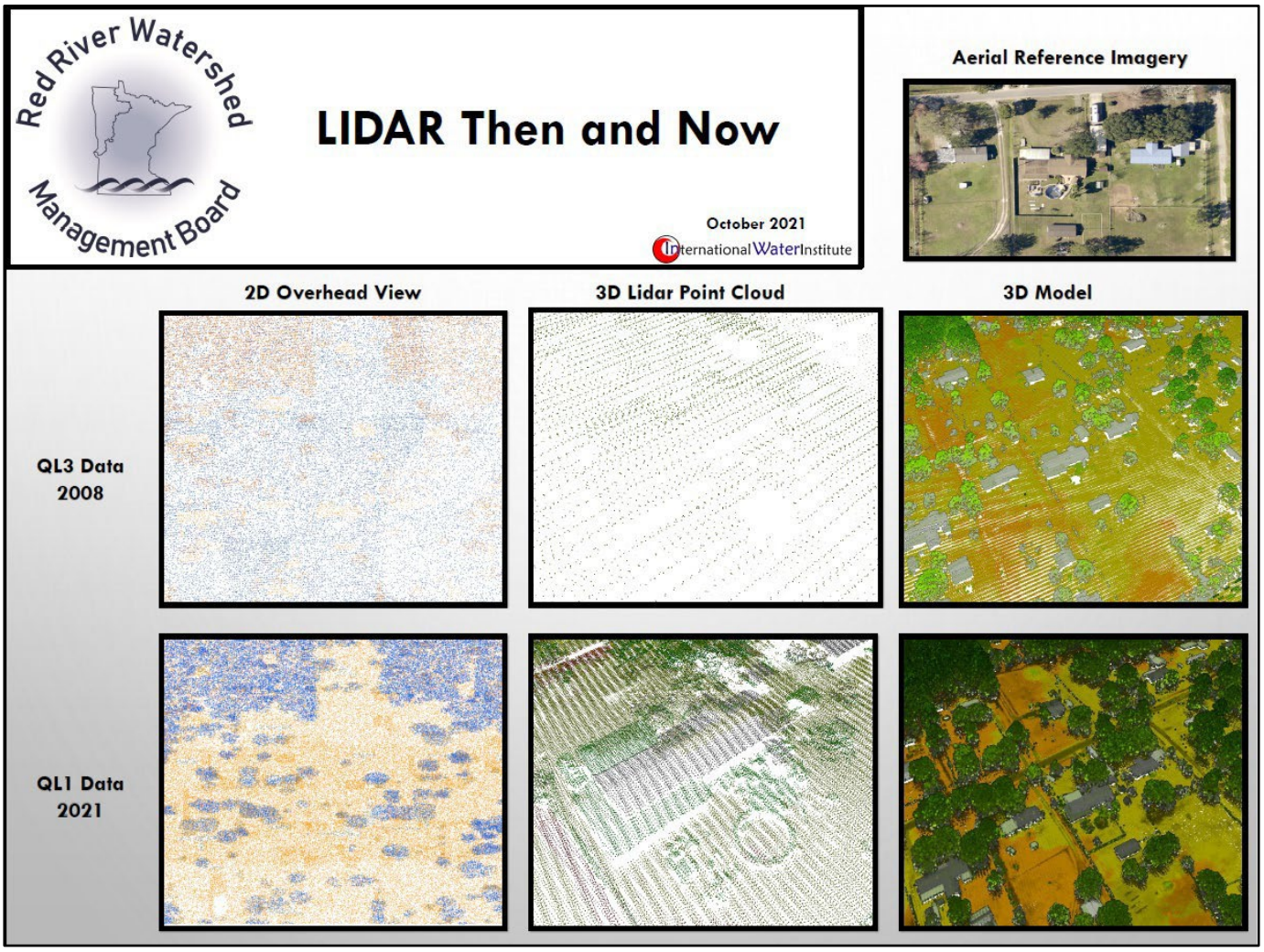
- the raw LiDAR point cloud,
- 0.5 meter Digital Elevation Model (DEM),
- building footprints,
- farmstead ring dikes,
- 1-foot contours,
- hydro-conditioned DEM,
- data storage for 4 years on the Sanborn Geodatabase Explorer
- **updated data layers displayed on the IWI Map Portal: https://gisapps.iwinst.org/map-portal/**

No special software is needed to view data in the IWI Map Portal, there is no fee, and no login and password required. "*You don't need to be a GIS or computer expert to use the IWI Map Portal, view or download data, or print maps*," said Sip.

For power GIS users that have specialized GIS software and are wanting to work with the new LiDAR data, download imagery and other products, the data is housed at the Sanborn Geodatabase Explorer website. The data is free at this website but permission to access the data is granted by the RRWMB. The RRWMB requires a license agreement for accessing the Sanborn Geodatabase Explorer website, which requires a login and password. The RRWMB reserves the right to refuse access to the system.

Who Paid for This Effort? The RRWMB, non-member watershed districts, and counties paid for this project using local taxpayer dollars from the RRB of Minnesota. No state or federal funds were used and the total project cost was approximately $2.4 million or $135/square mile. Current state/federal managed LiDAR projects can be over $300/square mile. The RRWMB plan is to share the RRB LiDAR data with the USGS for inclusion in the national LiDAR dataset and the State of Minnesota.

What if I Want LiDAR Data on a Hard Drive? If data is requested to be placed on portable hard drives, there will be fees for the cost of hard drives, staff time from the IWI to place data on hard drives, postage, supplies, and processing fees. Contact the RRWMB for more information.



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KCWRP Update

The Two Rivers Watershed District's "Klondike Clean Water Retention Project" is getting closer to becoming a reality. The project has been in the feasibility, planning, permitting and design phases since around 2009. Over the years, several versions of the project have been considered and numerous alternatives have been looked at.

This project will drastically reduce flooding that occurs in western Roseau County and Eastern Kittson County along the State Ditch 95 system. It will also help to manage flooding in the State Ditch #72 system. Currently large flood events inundate these ditches and water spills out of their banks, causing large scale overland flooding, crop loss, damage to farmsteads, road-bridge-culvert washouts, and danger to the travelling public.

A group of citizens and landowners approached the TRWD seeking possible solutions to these recurring problems. After 3-4 years of project team meetings amongst local, state and federal agencies, landowners and other groups, a series of alternatives were considered and a plan to not only reduce flooding but also to benefit natural resources like habitat and fisheries was agreed upon. Once the plan was in place, the project concept was developed to construct an impoundment to hold floodwaters during a flood and then slowly release them once the flood has passed and downstream channels can take the water.

FLOOD DAMAGE REDUCTION

- *Store 35,250 acre feet of floodwaters on the land*
- *Reduce downstream peak flows and flood duration*
  - *- Reduce Two Rivers contribution to Red River peak flows by 15-20%*
  - *Reduce peak flows on Two Rivers at Lake Bronson State Park by 13%*
- *Provide adequate outlet for Lat 1 State Ditch #95*
- *Store a portion of Roseau River overflow flooding*
- *Prevent flooding on over 25 square miles*
- *Reduce damages to roads, bridges, culverts, farmsteads, and ag lands*

The TRWD has obtained a 12 square mile area where this project will be built. Project designs are nearly completed, and most of the permits have been obtained. Work continues on a federal wetland permit and with obtaining right of way that is needed along the proposed inlet channel. So far $6 million has been secured for construction, and with this funding it is possible that construction will begin on Phase 1A in 2025. The project has been broken into 3 separate phases, and is located about 6 miles northeast of Lake Bronson State Park at the Kittson and Roseau County line. The project will not only benefit the local area, but is will also contribute to regional flood control as part of a larger Red River Basin plan to reduce peak flows on the Red River by 20%.

Natural Resources Enhancements

- ***Fish Habitat***
  - **Provide 10-20 cfs flow in Two Rivers during dry periods**
- ***Prairie Rich Fen***
  - **Protect and enhance a large Fen**
  - **Implement a fen protection plan**
- ***Water Quality Improvements***
  - **Reduce sediment loads to Two Rivers by 62%**
  - **Reduce Phosphorous & Nitrogen loads by 77% & 81%**
  - **Reduce duration and peaks of annual algae blooms at Lake Bronson**
  - **Increase dissolved oxygen levels**
  - **Address water quality impairments on Two Rivers**

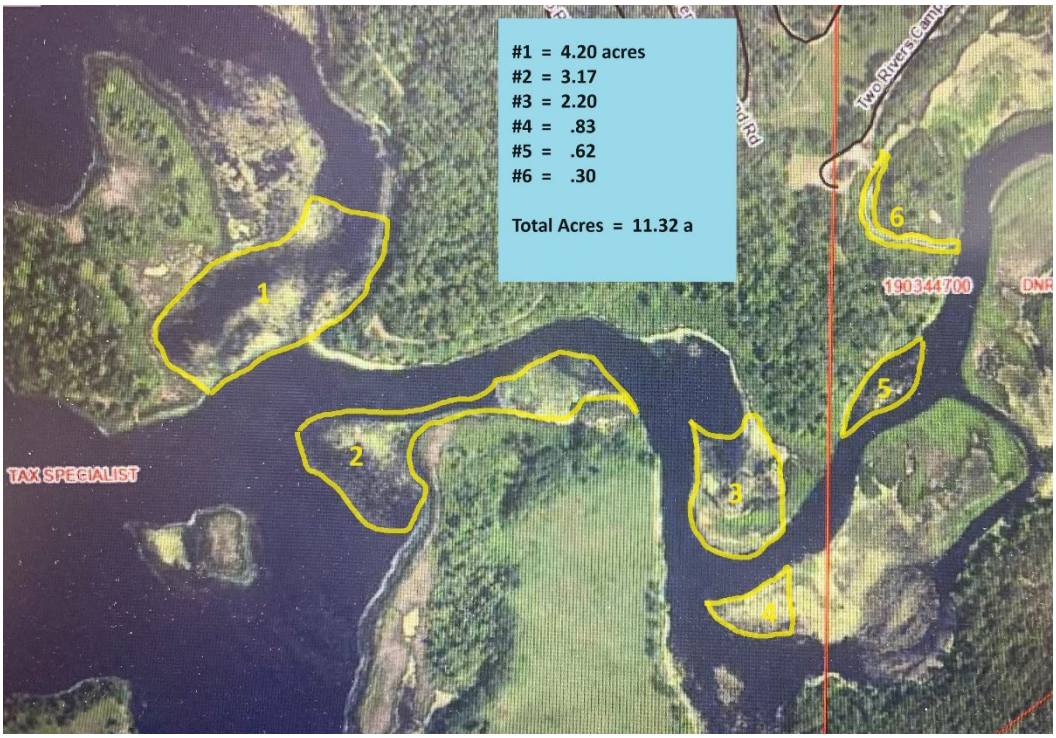
More information can be found on the World Wide Web at: http://tworiverswd.com/Klondike.html

Lake Bronson Sediment Study

Is the upstream end of Lake Bronson filling in with sediment? Does the amount of sediment also bring in and deposit nutrients that contribute to summer algae blooms? How can water quality impairments be fixed?

These are some of the questions that a Project Work Team (PWT) has been asking and trying to answer. The PWT was assembled by the Two Rivers Watershed District when the sediment issue was brought to a monthly board meeting by the Lake Bronson Cabin Owners Association and the Friends of Lake Bronson State Park. TRWD Board of Managers has pledged $5,000 to the PWT to try and come up with solutions to these problems at Lake Bronson State Park. The Red River Flood Damage Reduction Work Group matched that amount for a total of $10,000 to study the problem and come up with a range of alternatives to solve it.

The PWT is made up of cabin owners, citizens and representatives of TRWD DNR, MN Board of Water & Soil Resources, Kittson SWCD, MN Pollution Control Agency and other interested parties.



A bathymetric map of the lake has been done using side scanning equipment and 6 potential areas have been identified where sediment removal could possibly be considered. The next step in the process will be to collect sediment samples and have them analyzed for parameters like nitrogen, phosphorous, lead, mercury, and other potential contaminants. Based upon the findings of the sampling, the magnitude of the issue will be identified and a plan will be developed to determine how to best solve the sediment and water quality problems. The group will be looking at the scope of the project, if it can be done, where to excavate and where to dispose of the sediment. Some of the next steps will also be to look at what environmental, construction and other permits would need to be obtained. The PWT will also be looking at whether the project is feasible, cost estimates, and a timeline of how and when to proceed. Further information can be obtained by contacting the TRWD.

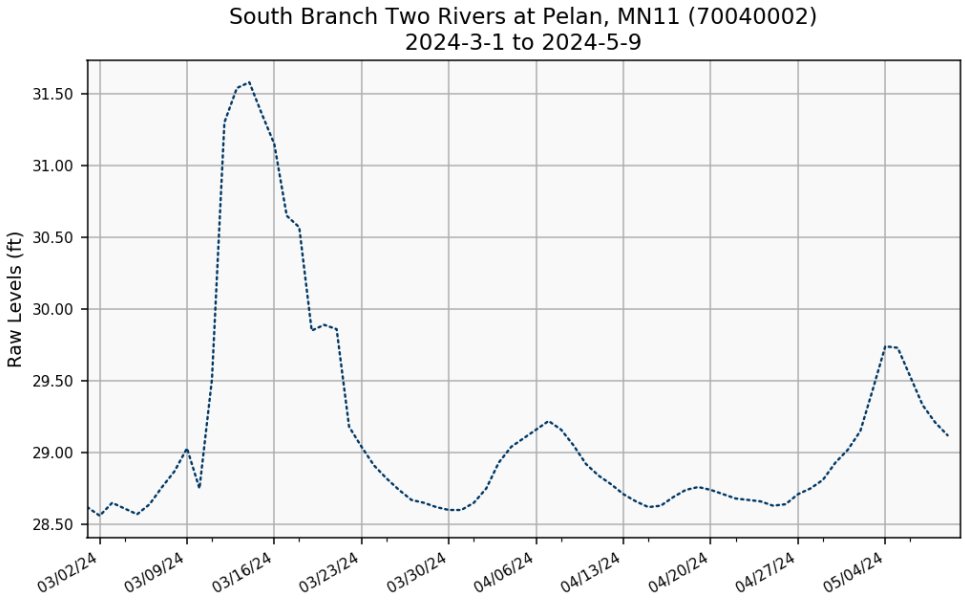
Water Quality & Streamflow Monitoring Programs

Since 1991, the Two Rivers Watershed has been involved with monitoring water quality and stream flows within the watershed district from east of Badger, MN to the Red River and from the Canadian Border south to Marshall County.

The TRWD has established up to 12 sites on the River and its tributaries to monitor water quality, and up to 20 sites to monitor stream flows. The water quality data helps to determine if the river is impaired with regard to dissolved oxygen, nitrogen, phosphorous and other items and whether it is trending over time for the better or for worse. The MN Pollution Control Agency and the MN DNR are continually assessing

whether waterbodies are at, above or below recommended levels. However, these state agencies typically only to their assessments once every 10 years. The TRWD monitors most every year, and that way changes in the system can be detected. The data can also be used to determine whether the system can support healthy populations of fish and macro invertebrates.

Stream flow monitoring equipment is used to measure the velocity and the volume of water that passes through a monitoring site. This information is extremely valuable to the TRWD, MN DNR, MPCA, US Geological Survey, and the National Weather Service for a variety of applications, including flood forecasting,



planning-design-construction of flood damage reduction project, determining water quality problems like how nutrients and pollutants enter a stream and are transported downstream, and for determining biological conditions and health of a watershed. Long term trends can be monitored and studied to help with projects to regulate stream flows to benefit aquatic organisms and to help reduce erosion and sedimentation.

Please contact the District if you are interested in more information about our monitoring programs!

New Red River Basin Flood Damage Reduction Work Group Videos

The Red River Basin Flood Damage Reduction Work Group (FDRWG) is a multi-agency/stakeholder group that collaborates to plan and fund projects providing flood resiliency and natural resource enhancements in Minnesota's portion of the Red River Basin.

In April 2024 the FDRWG released **two five-minute videos** that provide an overview of its purposes and activities as well as information on projects developed using the Project Team process.

The two videos can be viewed on the FDRWG web site: **www.rrwmb.us/fdrwg**

Scroll below the FDRWG header and see the following videos that you can view on the site or in the full screen format:

- FDRWG Overview (5:23 minutes)
- FDRWG Projects (4:15 minutes)

New Red River Watershed Management Board Videos

The Red River Watershed Management Board (RRWMB) is a regional water management organization. Its membership consists of seven watershed districts on the Minnesota portion of the Red River Valley (Bois De Sioux, Wild Rice, Red Lake, Middle-Snake-Tamarac, Roseau, Two Rivers, and Joe River Watershed Districts). The RRWMB focuses on funding for construction of flood control projects, data and information collection such as Lidar and stream flows, and water quality projects to reduce sediment and nutrient loading into waterways.

The RRWMB has released two short videos that provide an overview of its purposes and activities as well as information on projects developed and constructed.

The videos and other information can be found on the RRWMB's website: **www.rrwmb.us**

- RRWMB Overview (5:29 minutes)
- Water Quality (5:39 minutes)

'RIFFLES & RUNS'

- News Briefs from Around the Watershed District-

- TRWD construction projects slated for 2024:
  - Replacement of the dam/control structure at Skull Lake. Estimated cost is $220,000
  - Grade Stabilization Project for erosion control on Judicial Ditch 31 – estimated cost $42,000
  - Grade Stabilization Project for erosion control on State Ditch 84 – estimated cost $101,000
  - Side Water Inlets on Kennedy #6 Project – estimated cost $12,000
  - Repair of bank sloughing on Judicial ditch 10 Branch B – estimated cost $6,000k

- The **MN DNR** is progressing with plans and specifications to replace the aging **dam at Lake Bronson** State Park. Construction is slated over 2 construction seasons to begin in 2024 with the draining of the lake. More information can be found on the World Wide Web at: **https://www.dnr.state.mn.us/state_parks/lake-bronson-dam-replacement-project.html**

- **Cost Share For Erosion Control**: The TRWD is partnering with Kittson SWCD to provide cost share for repair and prevention of severe erosion. This funding will provide up to 87.5% of the funds to fix washouts, gullies, head cutting, and other types of erosion along ditches, coulees and other watercourses. Sign up at the Kittson SWCD office.