



*Sustainable Rivers Program*



**US Army Corps  
of Engineers®**  
St. Paul District

# Avian responses to a reservoir drawdown at Mud Lake, Bois de Sioux River, 2023

May 2024

by

U.S. Army Corps of Engineers

St. Paul District

**MUD LAKE DRAWDOWN - 2023**  
**LAKE TRAVERSE PROJECT**  
**TRAVERSE COUNTY, MINNESOTA**  
**ROBERTS COUNTY, SOUTH DAKOTA**

**Introduction**

The Lake Traverse Flood Control Project lies on the boundaries of Minnesota and North and South Dakota. Construction of the Lake Traverse-Bois de Sioux River Flood Control Project (Lake Traverse Project or Project) began in 1936 and was completed in 1942. The project consists of two reservoirs, both modified natural lakes: Lake Traverse and Mud Lake (Figure 1).

The Bois de Sioux River channel was widened, straightened, and channelized for about 24 miles downstream to provide adequate capacity to release flows when lowering the reservoir to Project conservation levels (normal pool elevation). White Rock Dam, which forms Mud Lake, is located at the extreme north end of the site and controls water flowing north on the Bois de Sioux River. The Lake Traverse Project is designed to provide 249,500 acre-feet of flood control storage. The 1994 Water Control Manual guides all water control management activities related to the Lake Traverse Project.

The Lake Traverse Project was designed as a multi-purpose project as described below:

- Primary Purposes: Flood control and water conservation. Reduce flooding on reaches of the Bois de Sioux River and the lower Red River Valley.
- Secondary purposes: Preservation of fish and wildlife, water quality, and recreation.

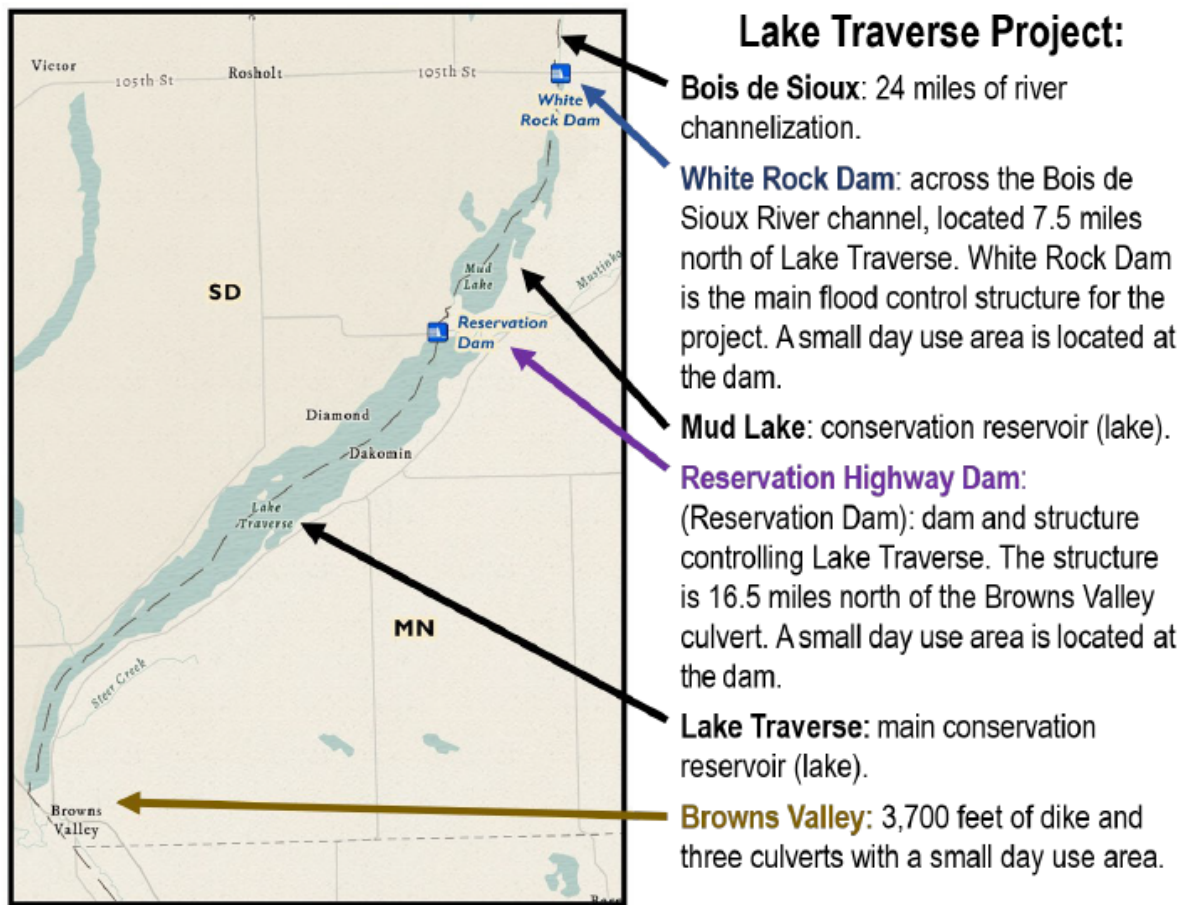


Figure 1. Features of the Lake Traverse Project.

### **2021 Scoping Study**

The St. Paul District conducted a scoping study in 2021 to determine the feasibility of conducting yearly drawdowns on Mud Lake. A copy of the scoping document can be found here: <https://usace.contentdm.oclc.org/digital/collection/p16021coll7/id/19691>.

As part of the scoping study, the Corps had to determine if a drawdown could be accomplished on Mud Lake and if agency partners would support the effort. It was determined that a gradual growing season drawdown is challenging given limitations of the current dam infrastructure but could be achieved one of two ways. The drawdown could be accomplished by a continual low flow release; however, a sustainable minimum flow with the current dam infrastructure is around 100 cubic feet per second (cfs). Releases below 100 cfs (0.3 feet (ft) opening of one tainter gate) are possible, but not only is precision-limited, but the opening can only be maintained for short periods of time before it is clogged with weeds and debris. The drawdown could also be accomplished by opening and closing the tainter gates every few days; however, the start and stop of flows to the Bois de Sioux River is detrimental to fish, mussels and other aquatic organisms. Agency partners expressed concern over these detrimental environmental effects.

## **2023 Environmental Assessment**

With feedback from agency partners, the Corps proposed two drawdown scenarios which addressed the limitations of the current dam infrastructure and flows to the Bois de Sioux River. An environmental assessment (EA) was completed to evaluate the effects of the two drawdown scenarios. The first drawdown scenario was a passive drawdown utilizing the existing dam infrastructure. The 2023 drawdown which is described below is based on the first scenario. The second drawdown scenario would only occur if and when gate modifications are made to White Rock Dam allowing for a workable low-flow system. With the ability to release water at a slower rate, the drawdown would be able to capture the whole shorebird migration period, approximately July 15 to September 30. The EA was finalized and the FONSI was signed on July 27, 2023.

## **2023 Drawdown**

A passive drawdown began on September 1 and the final drawdown elevation of 966 feet was reached on October 3. The drawdown occurred at a rate of about 2.76 inches per day and was timed to capture the majority, but not all of the shorebird migration period in Minnesota. Water elevations at White Rock and Reservation dams throughout the drawdown are shown in Figure 3. Water elevations for the same timeframe in 2022 are shown in Figure 2.

The severe dip around September 23, 2023, is likely a strong wind blowing water away from the dam. Although the drawdown was successful in exposing large areas of mud flats as shown in Figure 4, the target elevation of 965 (sill elevation of the dam) feet was not achieved likely due to sedimentation in the approach channel to White Rock Dam. Inspecting the graph below, the tailwater of Reservation Dam sustained an elevation above 970.0 ft above mean sea level (1912 datum, 4<sup>th</sup> General Adjustment of the U.S. Coast and Geodetic Survey), suggesting that the obstruction in the approach channel helped to evacuate the pool below the obstruction, while the pool above the obstruction did not see as stark of a drawdown. In the future, the drawdown will track both the pool behind White Rock Dam as well as the tailwater from Reservation Dam to get a better idea of the success, or not, of the drawdown to expose low laying areas during the drawdown.

Comparing figures 2 and 3 show that water levels in September 2022 (no drawdown) fluctuated around 972 ft at White Rock Dam and the tailwater of Reservation Dam and in September 2023 (with drawdown), water levels began around 972 ft, dropped to roughly 970 ft by September 22, and then continued to drop at White Rock Dam after the likely wind effects abated.

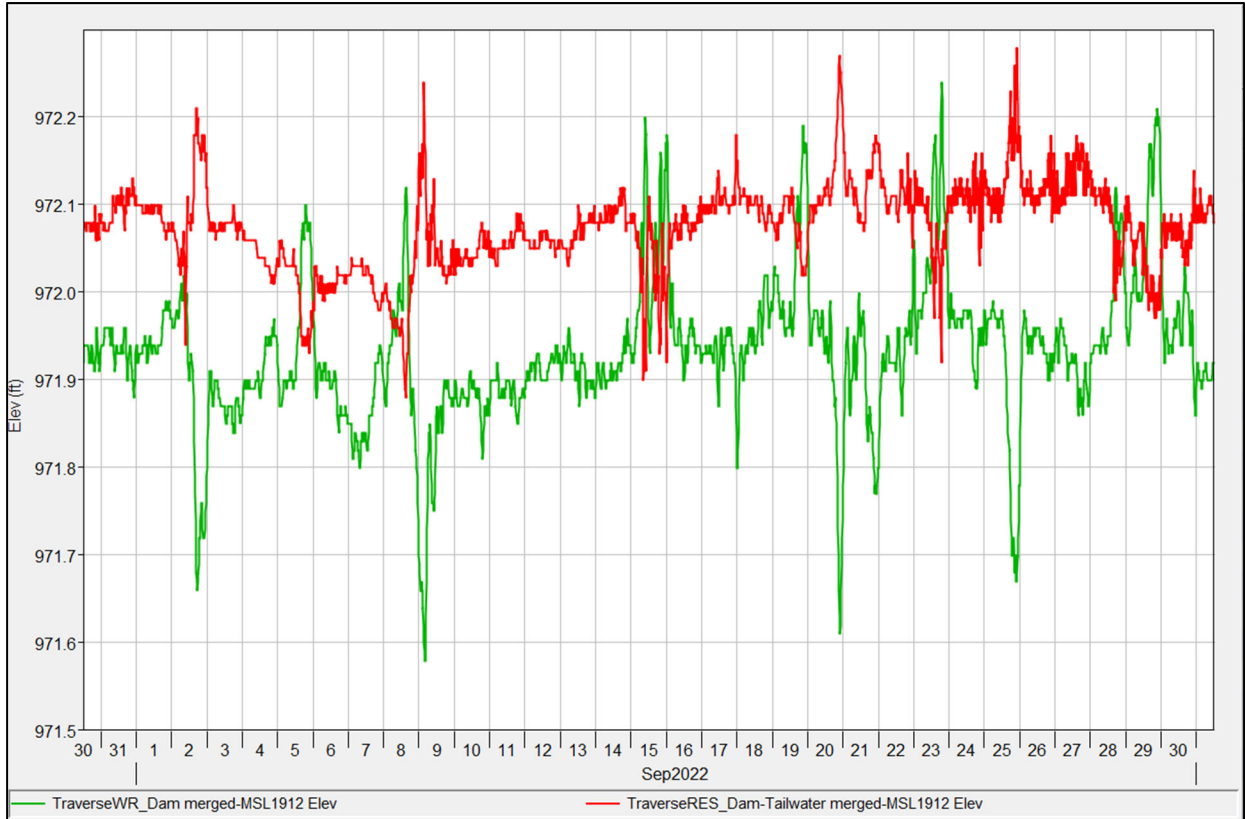


Figure 2. Mud Lake elevations in September 2022. Crossing lines are from wind effects.

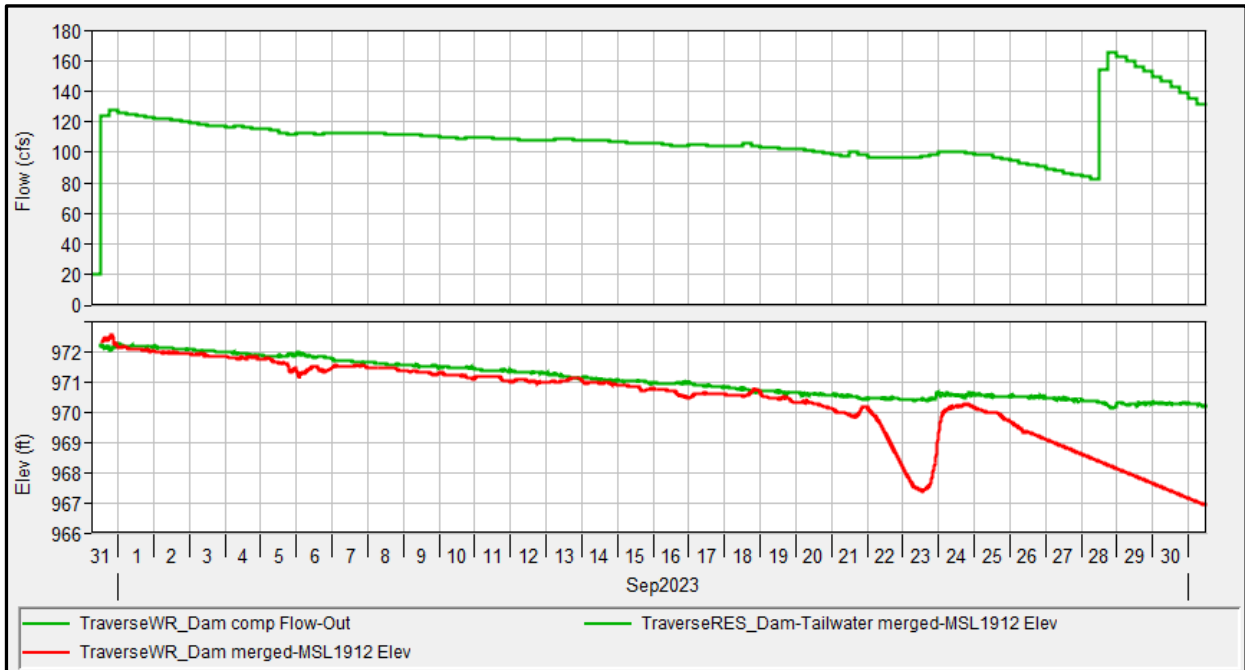


Figure 3. Mud Lake elevations (bottom) and outflows (top) during the 2023 drawdown.



*Figure 4. Exposed mud flats on Mud Lake on September 28, 2023 (USACE photo).*

### **Shorebird Monitoring**

Three trail cameras were set up around Mud Lake to record shorebird activities in September 2022 (no drawdown) and September 2023 (during the drawdown). In 2022, only waterbird species were captured by the trail cams, likely due to elevated water levels in Mud Lake which did not provide suitable shorebird habitat. Species included great blue heron, great egret, cormorant, wood duck and eagle. No shorebirds were reported via late summer birding checklists either.

BirdCast, which is compiled by the Cornell Lab of Ornithology, was consulted to determine trends in bird movement through the project area during September and early October 2023 (Figure 5). Large numbers of birds passed through Lac qui Parle County during the drawdown. Although these numbers represent all bird groups, it is an indication that birds were migrating through the project area.

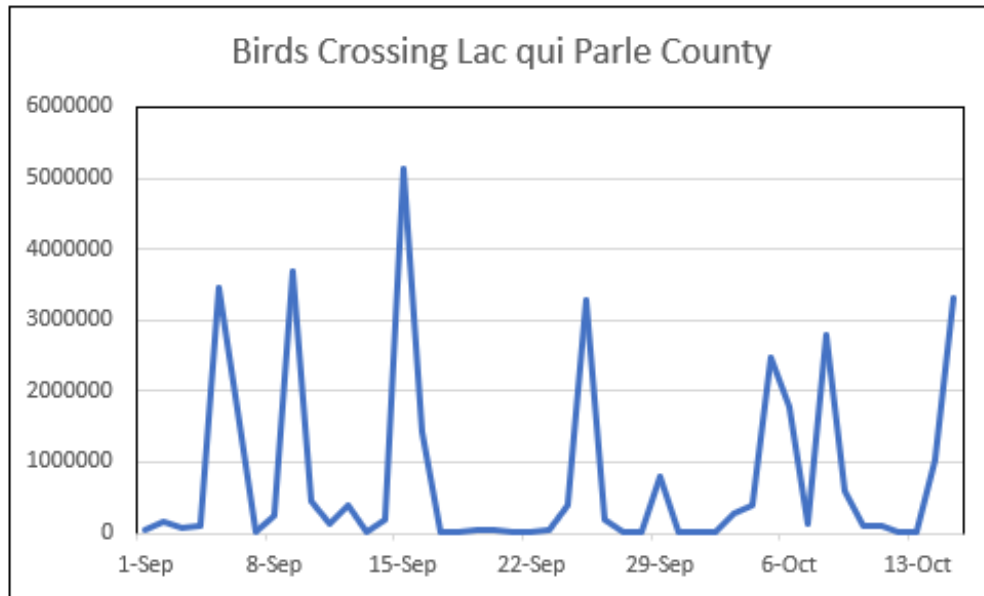


Figure 5. Number of birds crossing Lac qui Parle County during the 2023 drawdown.

The drawdown was successful at providing exposed mud flats which shorebirds were captured utilizing (Figure 6). The project resulted in continual development of fresh mudflats throughout peak migration in September. The number of shorebirds was less than anticipated but shorebird numbers do vary depending on conditions. Shorebirds can either stay in the area for a time to build up reserves or they can stop and move on quickly. They are also known for long-distance non-stop flights which can result in them flying over otherwise suitable habitat. A combination of fat reserve status, weather patterns, habitat conditions, and other factors can lead to them hopscotching around on their migration.



Figure 6. Shorebirds on exposed mud flat (USACE photo).

Although shorebirds were the targeted bird group for the Mud Lake drawdown, there was increased use of other birds during the drawdown (Figures 7 and 8). Species such as egrets, herons and pelicans benefited from shallow water to strand or at least reduce the escape capability of fish or other prey.



*Figure 7. Egret use in 2022 (no drawdown) versus 2023 (during drawdown; USACE photos).*



*Figure 8. Pelican use in 2022 (no drawdown) versus 2023 (during drawdown; USACE photos).*

### **Future Actions**

The next drawdown is planned for September 2024. The drawdown could be impacted by heavy rainfall when water would need to be held in Mud Lake. The drawdown would start over once water could be released. Because the drawdown is focused on shorebirds and not plants, this temporary holding of water would not substantially hurt the effort to increase shorebird use.

The Lake Traverse Water Control Manual is currently being updated to include drawdowns on Mud Lake.

In the future, if gate modifications to allow for a workable low-flow system were installed at the White Rock Dam, water could be released at a slower rate which would allow the drawdown to capture the whole shorebird migration period, approximately July 15 to September 30.