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# **Mud Lake Drawdown Scoping Study**

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**Sustainable Rivers Program**

**September 2021**

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# Executive Summary

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The purpose of this effort is to conduct scoping of the opportunities and considerations for potential spring/early summer drawdown, minimum releases, and fall flooding at Mud Lake at the Lake Traverse Project in Traverse County, Minnesota and Roberts County, South Dakota. This scoping will be used to determine future funding and study of a Mud Lake drawdown, including a full analysis under the National Environmental Policy Act (NEPA), and other associated environmental laws and regulations. The Lake Traverse Flood Control Project lies on the boundaries of Minnesota and North and South Dakota. Construction on the Lake Traverse Flood Control Project was completed in 1941. The project primarily consists of two in-line natural and modified reservoirs: Lake Traverse and Mud Lake. 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 was designed as a multiple purpose project with a primary flood control purpose.

In 2020 (fiscal year 2021), the St. Paul District Army Corps of Engineers (Corps) held Multi-Reservoir Sustainable Rivers Program Workshops. During those internal workshops, the Corps discussed the potential for operational changes to St. Paul District dams that would be environmentally-beneficial (Mississippi River locks and dams were excluded from that discussion). The Sustainable Rivers Program (SRP) is a nation-wide initiative and partnership between the Corps and The Nature Conservancy focused on enhancing the environment through coordinated Corps-managed reservoir operations modifications. During the 2020 workshops, resource partner agency interest in minimum releases from Mud Lake to the Bois de Sioux River and potential habitat benefits were discussed. Following those workshops, the scoping effort covered in this report was funded.

Scoping efforts associated with this study included engaging partner resource agencies, tribes, and the affected public to gauge acceptability and potential for adverse effects. The communication objectives were focused on creating awareness and understanding of the Lake Traverse Project and providing opportunities for tribal, public and resource agency input on Mud Lake and Lake Traverse water level operations.

After initial scoping of opportunities and considerations, the Corps team working on this effort found the potential for shorebird habitat, waterfowl habitat, and native vegetation establishment is substantial enough to warrant future action. None of the identified considerations (Table ES 1) would alone or cumulatively make an annual drawdown of Mud Lake infeasible, although future analysis and evaluation to minimize adverse effects would be necessary. To varying degrees, those considerations would require both informal and formal consultation with State, Federal, and Tribal agencies, as appropriate.

As an outcome of this scoping report, the St. Paul District will request a deviation from the 1994 Water Control Manual from the Corps' Mississippi Valley Division (MVD) for a drawdown, fall flooding, and minimum releases at Mud Lake. To support a deviation request, an environmental assessment (including necessary Tribal, public and agency review), would be completed. Information collected in this scoping effort will be used to inform the environmental assessment and appropriate site analyses and coordination. Funding to update to the Lake Traverse Water Control Manual to facilitate future long-term operational changes at the Lake Traverse project has not been authorized as of the date of this report.

ES 1. Overview of Scoping Study Opportunities and Considerations.

Opportunities	Potential for Success	Considerations	Potential Future Level of Analysis
Shorebird Habitat	High	Water Quality	Low
Waterfowl Habitat	High	Quantity of Water Releases	High
Minimum Releases	High	Effects to Historic Properties	Unknown <sup>2</sup>
Invasive Species Management	Moderate	Effects to Downstream Fisheries	High
Earlier Crop Planting Date	Low <sup>1</sup>	Invasive Species Expansion	Moderate
Expansion of Traditionally Harvested Plants	Unknown <sup>2</sup>	Medicinal or Traditionally Harvested Plants	Unknown <sup>2</sup>
<sup>1</sup> This likely would only be achieved pending spring flood conditions <sup>2</sup> Effects to these items would need to be further discussed with Sisseton Wahpeton Oyate <sup>3</sup> Labeled as high only to denote level of public education and outreach necessary, Lake Traverse water levels would not be impacted to allow for a drawdown of Mud Lake <sup>4</sup> Based on preliminary analysis and habitat benefits to Federally listed species		Impacts to Lake Traverse Water Levels	High <sup>3</sup>
		Effects to Threatened or Endangered Species	Low <sup>4</sup>
		Existing Infrastructure (including bathymetry)	High

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# Mud Lake Drawdown Scoping Study

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Appendix A: Stakeholder and Tribal Coordination Documentation

Appendix B: Agency Coordination Documentation

# 1 Background

## 1.1 Scoping Report Purpose

The purpose of this effort is to conduct scoping of the opportunities and considerations for potential late summer drawdown, minimum releases, and fall flooding at Mud Lake at the Lake Traverse Project in Traverse County, Minnesota and Roberts County, South Dakota. This scoping effort will be used to determine the feasibility of a future study of a Mud Lake drawdown, including a full analysis under the National Environmental Policy Act (NEPA), and other associated environmental laws and regulations.

This scoping effort builds upon the St. Paul District Army Corps of Engineers (Corps or St. Paul District) Sustainable Rivers Program Multi-Reservoir workshops held in 2020. During those workshops, resource partner agencies requested minimum releases from Mud Lake to the Bois de Sioux River. Options for shorebird and waterfowl habitat management to improve upon the low-quality habitat of Mud Lake were also identified in the workshops. All these opportunities could be potentially undertaken while maintaining the flood control and recreational benefits of the Lake Traverse Project. However, those workshops also identified considerations on a drawdown, including water quality of releases, cultural resources, agricultural and native plants, and water quantity (lake levels and releases) impacts. Following the 2020 workshops, the scoping effort summarized in this report was funded.

## 1.2 Sustainable Rivers Program

The Sustainable Rivers Program (SRP) is a nation-wide initiative and partnership between the Corps and The Nature Conservancy (a global environmental nonprofit) that looks at various watersheds and is focused on enhancing the environment through coordinated Corps-managed reservoir operations modifications. The SRP began in 2002, as an effort to find more sustainable ways to manage river infrastructure to maximize benefits for people and nature. The focus of the SRP is determining unique flow requirements for rivers and then creating operating plans for dams that achieve environmental flows to revive and sustain critical ecological functions and habitat for species.

Science from SRP sites is proving that re-operating dams and modernizing other river infrastructure as part of whole-river system increases the benefits they provide, particularly when done in coordination with stakeholders and Tribal partners. The SRP currently invests in many rivers regulated by the Corps, see Figure 1.



Figure 1. Sustainable Rivers Program Status.

### 1.3 Lake Traverse Project

The Lake Traverse Flood Control Project lies on the boundaries of Minnesota and North and South Dakota, west-northwest of St. Paul, Minnesota. Construction on 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 2). The upper end of the project is at Browns Valley, Minnesota, and the lower end is about 6 miles south of Breckenridge, Minnesota, and Wahpeton, North Dakota. The total project length is just over 48 miles. At Wahpeton-Breckenridge, the Bois de Sioux River joins the Otter Tail River to form the Red River of the North.

The Bois de Sioux River channel was widened, straightened, and channelized for about 24 miles downstream to provide adequate capacity 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. At conservation levels (normal), the Project provides 112,500 acre-feet of conservation storage (Lake Traverse’s conservation level is 976.0 feet and Mud Lake’s conservation level is 972.0 feet).

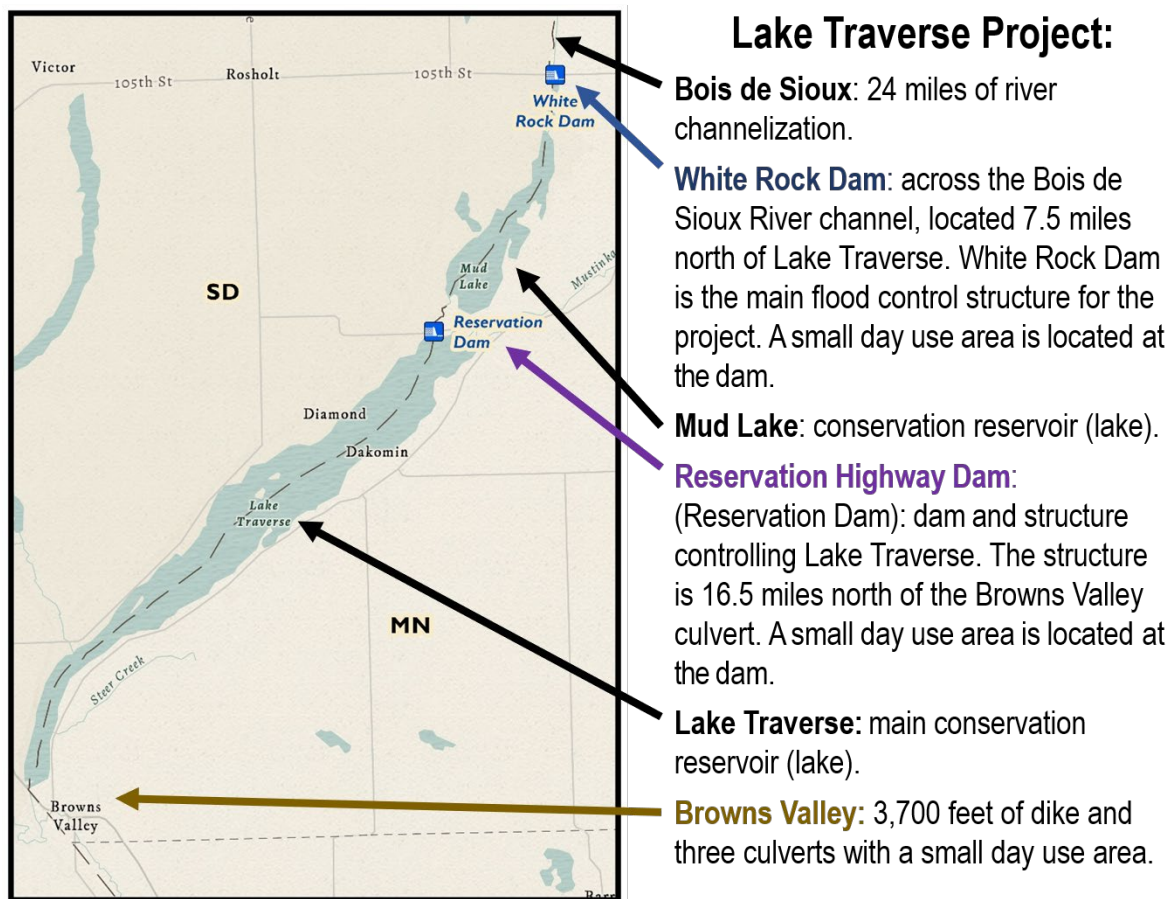


Figure 2. Lake Traverse-Bois de Sioux River Flood Control Project.

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

**Primary Purpose:** Flood Control and Water Conservation. Reduces flooding on reaches of the Bois de Sioux River and the lower Red River Valley. The Browns Valley dike at the south end of Lake Traverse was originally constructed to prevent the lake from overflowing southward, down the Little Minnesota River into Big Stone Lake and onward into the Minnesota River<sup>1</sup>.

**Secondary purpose:** The preservation of fish and wildlife, water quality and recreation.

Federal authorization for the Lake Traverse-Bois de Sioux River Flood Control Project was provided by Public Law 74-738, the Flood Control and Water Conservation Act of 22 June 1936, and by the formation of the Tri-State Waters Commission. That commission provided for local cooperation by Minnesota, North Dakota, and South Dakota. In the 1970s, the three states repealed their statutes that created the Tri-State Waters Commission, effectively abolishing it. The Federal Water Project Recreation Act of 1965 required consideration of both recreation and fish and wildlife habitat enhancement in planning water

<sup>1</sup> In 1945, culverts were installed to allow overbank flows from the Little Minnesota River to flow into Lake Traverse to reduce flooding in the village of Brown's Valley, Minnesota.



resource projects and establishing cost-sharing principles for development of recreational facilities

## 1.4 Mud Lake Existing Conditions

### 1.4.1 Description of the Reservoir and Watershed

Mud Lake is about 7.5 miles long, measured from White Rock Dam to Reservation Dam. The conservation pool (normal pool elevation) per the 1994 Water Control Manual is 972.0 feet Mean Sea Level 1912 (MSL 1912). The conservation pool has a maximum width of 2.5 miles, an average depth of 1.7 feet, and storage capacity of 6,500 acre-feet. At full pool (top of flood control), elevation 981.0 feet above MSL 1912, the capacity is 85,500 acre-feet.

The Bois de Sioux River and its source, Lake Traverse, form the boundary between Minnesota and South and North Dakota. The Bois de Sioux River flows north from Lake Traverse to Breckenridge where it joins with the Otter Tail River to form the Red River of the North. The Bois de Sioux River watershed (Figure 3) includes approximately 356,000 acres (556 square miles) in the extreme southern portion of the larger Upper Red River of the North Watershed. The Bois de Sioux River watershed drains portions of the North Dakota County of Richland, the South Dakota County of Roberts, and the Minnesota counties of Traverse, Big Stone, Stevens, Grant, Otter Tail, and Wilkin. Approximately 87% of the watershed area is in row crop production of corn, soybeans, sugar beets, and wheat. Historically, the Bois de Sioux River watershed had approximately 106,000 acres of wetlands. Current wetland acreage is approximately 8,700 acres, representing a 92 percent loss in wetlands over time.

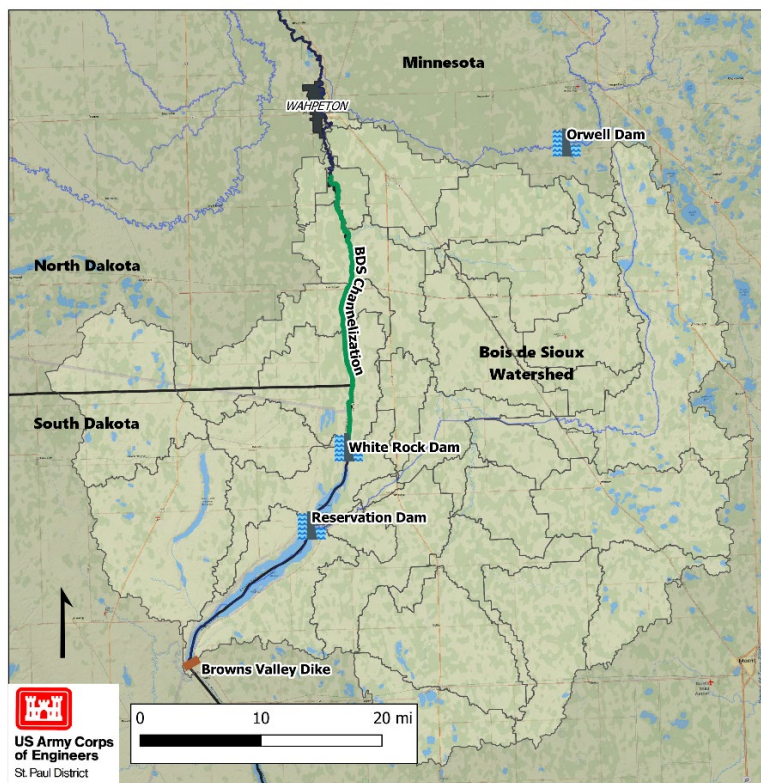


Figure 3. Bois de Sioux Watershed.

### 1.4.2 Wildlife

Mud Lake has long been an important breeding and migration staging area for waterfowl, but land use changes in the watershed and water level management have reduced its value as waterfowl habitat. Primary changes affecting waterfowl production and use at Mud Lake include (1) intensive grazing in and around the marsh by domestic cattle, (2) replacement of native plant species by introduced plant species, especially narrowleaf cattail (*Typha angustifolia*) and reed canarygrass (*Phalaris arundinacea*), (3) introduction of carp, (4) fire suppression, (5) alteration of runoff patterns resulting in increased siltation and concentration of nutrients and chemical residues in the marsh, and (5) water level stabilization resulting in a lack of submergent aquatic vegetation and associated invertebrate communities.

Lake Traverse and Mud Lake serve as resting areas for migratory birds and as a loafing area for local breeding birds. Mud Lake has excellent potential as a waterfowl production area with its vast acreage of emergent vegetation intermingled with open water. Mallard (*Anas platyrhynchos*), pintail (*A. acuta*), blue-winged teal (*A. discors*), gadwall (*Mareca strepera*), lesser scaup (*Aythya affinis*), northern shoveler (*Spatula clypeata*), redhead (*A. americana*), ruddy duck (*Oxyura jamaicensis*) and common coots (*Fulica atra*) are known to nest in the area.

Canada geese (*Branta canadensis*) were reestablished by the Traverse County Sportsman's Club and Minnesota Department of Natural Resources (MDNR) in 1990. The local sportsman's club transplanted giant Canada geese to the Mud Lake area to establish a resident flock and to attract migrating geese.

Mud Lake does not support a consistent fishery because it is shallow and prone to winterkill and is not preferred by anglers due to the difficulty in accessing and navigating the lake.

#### 1.4.2.1 Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) website was consulted on July 2, 2021 to identify potential presence of federally listed threatened and endangered species within the Lake Traverse Project area. Five species listed as threatened or endangered by USFWS may be found in the area, including red knot which is a shorebird (Table 1).

Table 1. Federally listed species.

Common Name	Scientific Name	Minnesota	South Dakota
Northern long-eared bat	<i>Myotis septentrionalis</i>	X	X
Red knot	<i>Calidris canutus rufa</i>		X
Dakota skipper	<i>Hesperia dacotae</i>		X
Poweshiek skipperling	<i>Oarisma poweshiek</i>		X
Western prairie fringed orchid	<i>Platanthera praeclara</i>		X

The USFWS also lists eight bird species as migratory or Birds of Conservation Concern, including four species of shorebirds (Table 2). Shorebird species include dunlin, lesser yellowlegs, ruddy turnstone, and semipalmated sandpiper.

Table 2. Birds of Conservation Concern (BCC) and Migratory bird species. Shorebird species are identified in blue.

Common Name	Scientific Name
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Black Tern*	<i>Chlidonias niger</i>
Bobolink*	<i>Dolichonyx oryzivorus</i>
Dunlin*	<i>Calidris alpine arctica</i>
Franklin's Gull*	<i>Leucophaeus pipixcan</i>
Lesser Yellowlegs*	<i>Tringa flavipes</i>
Ruddy Turnstone*	<i>Arenaria interpres morinella</i>
Semipalmated Sandpiper*	<i>Calidris pusilla</i>
Smith's Longspur*	<i>Calcarius pictus</i>

\*Denotes BCC status

The state of South Dakota lists six species as endangered or threatened within Roberts County and the State of Minnesota lists five species as threatened, endangered or of special concern for the Lake Traverse Project area (Table 3). Piping plover is a shorebird listed in South Dakota.

Table 3. State-listed species.

State	Common Name	Scientific Name
Minnesota	Dakota skipper	<i>Hesperia dacotae</i>
	Poweshiek skipperling	<i>Oarisma poweshiek</i>
	Blacknose shiner	<i>Notropis heterolepis</i>
	Osprey	<i>Pandion haliaetus</i>
	Whooping crane	<i>Grus americana</i>
	Northern river otter	<i>Lontra canadensis</i>
South Dakota	Cutleaf Ironplant	<i>Xanthisma spinulosum var. spinulosum</i>
	Forster's Tern	<i>Sterna forsteri</i>
	Franklin's Gull	<i>Leucophaeus pipixcan</i>
	Great Plains Toad	<i>Anaxyrus cognatus</i>
	Piping Plover	<i>Charadrius melodus</i>
	Forster's Tern	<i>Sterna forsteri</i>

### 1.4.3 Vegetation

Water level stabilization, due to normal project operations, has resulted in a decrease of aquatic macrophyte growth (both submerged and emergent) and a reduction in the invertebrate communities present in Mud Lake. A vegetation survey completed in 2011 found open water and mudflats represented the greatest portion of Mud Lake at approximately 59% of the total acreage. Cattail (*Typha angustifolia*, *T. X glauca* and *T. latifolia*) mixed with phragmites (*Phragmites australis*) represented the second largest vegetated percentage of the total acreage at 12.5%. Cattail and river bulrush (*Schoenoplectus fluviatilis*) represent the third largest percentage at 8% of the total acreage. All other species contributed less than 5% cover each and represent a small portion of the total acreage.

#### 1.4.4 Water Quality

Water quality of Lake Traverse and Mud Lake is poor. The eutrophication in Lake Traverse and Mud Lake has advanced to the point where both lakes have hypereutrophic characteristics, and algae blooms regularly occur in summer and early fall. Causative factors of eutrophication identified in a 2020 Minnesota Pollution Control Agency - Bois de Sioux River Watershed Restoration and Protection Strategy Report (WRAPS), include overland runoff, failing septic systems and high internal loading as contributing nonpoint pollutant sources along with the effects of altered hydrology (MPCA 2020).

Because they are shallow, the two lakes also suffer from high turbidity generated by wind, wave action, and carp induced re-suspension. In winter, both lakes experience decreased dissolved oxygen concentrations when there are restricted inflows combined with decomposition of accumulated organic matter and limited photosynthesis due to ice cover with snow.

### 1.5 Mud Lake Drawdown Opportunities

#### 1.5.1 Past Drawdowns

In 1988, a drawdown of Mud Lake was conducted that resulted in an increase in aquatic vegetation, meeting the objectives at that time of improving the attractiveness of the marsh to waterfowl. Prior to the drawdown the approach channel was dredged, and the dredged material was used to construct nesting islands within the lake. However, by 2000 Mud Lake had reverted to a more open-water condition, and a vegetation survey identified an overall lack of submerged vegetation in deep water zones, thus limiting the value of Mud Lake to waterfowl. A second drawdown was then conducted in 2002 which resulted in a positive vegetation response; however, the response was short-lived as vegetation was killed because of holding floodwaters. High numbers of shorebirds were noted during the drawdown.

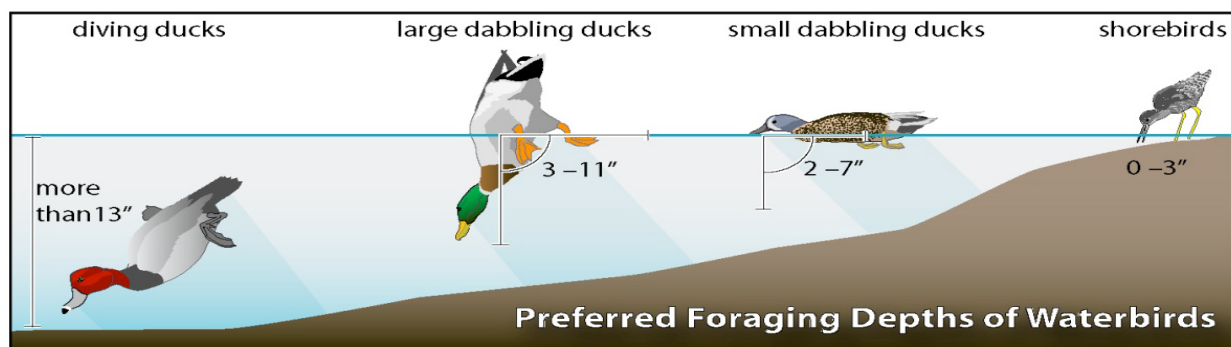
#### 1.5.2 Moist Soil Management

Wetlands are dynamic, highly productive systems. The availability and rapid turnover of nutrients in shallow wetland basins are the basis of their high primary productivity. High biomass production and rapid decomposition of aquatic macrophytes fuel secondary production in the form of aquatic invertebrates. However, according to Norrgard (2010), the wetland types experiencing the greatest loss in Minnesota are seasonal and temporary wetlands. Due to their small size and shallow depth, they are easily converted to agriculture. The loss in both quantity and quality of these wetlands in Minnesota has been detrimental to both waterfowl and shorebirds that depend on them for survival. Conducting moist soil management on Mud Lake would simulate seasonal wetland hydrology and maximize food production for waterfowl and shorebirds.

The Natural Resource Conservation Service (Nelms 2007) defines moist soil management as the “drawdown of water to promote germination of native plants on exposed mudflats and the subsequent reflooding of same areas.” Mud Lake could be gradually drawn down in late spring/early summer, allowing the lake to be drier during the summer thus encouraging the growth of seed-producing annual wetland plants. Mud Lake would then be re-flooded in late summer/early fall. Management of water levels in this fashion would increase the establishment of moist-soil wetland plants and provide water depth attractive to feeding waterfowl and shorebirds (Norrgard 2010).

Managing Mud Lake as a moist soil unit would re-establish a wetland plant community. The long- and short-term fluctuations in water levels would influence plant succession and maintain wetland productivity. Moist soil management provides high energy food resources for both shorebirds and waterfowl. Decomposing plants can provide habitat for aquatic invertebrates, particularly in the spring when shorebirds and waterfowl require this important source of nutrition. Seed producing annual plants growing during the summer dry period provide excellent brood habitat for pheasants as well as food for other bird species. When flooded in early fall, seeds would be available for migrating birds. Reflooding vegetation established during the drawdown would also create an abundant food base that would stimulate the production of invertebrates (Norrgard 2010).

Moist soil management units provide sanctuary for shorebirds, waterfowl, and other wildlife. Many species, including shorebirds and dabbling ducks, prefer shallow water depths (Figure 4). Shorebirds typically utilize mud flats created during a drawdown and prefer water depths of less than three inches. Reflooding in the fall can also provide hunting opportunities for waterfowl as dabbling ducks prefer water depths of less than six inches and as little as two to three inches (Norrgard 2010).



Fredrickson, L.H., & Dugger, B.D. 1993. Management of Wetlands at high altitudes in the Southwest. U.S. Department of Agriculture, Forest Service, Southwest Region, Washington, D.C.

Figure 4. Foraging Depth of Waterbirds.

### 1.5.3 Minimum Releases

Minimum releases from the White Rock Dam could be explored to provide base flows to the Bois de Sioux River. The current water control manual recommends implementing in-stream flows of 5 to 50 cubic feet per second (cfs) depending on water elevations in Lake Traverse once the downstream water treatment plants are upgraded. However, due to limitation of dam infrastructure, flows below 100 cfs (1/2 ft opening of one tainter gate) are very difficult to control and sustain because the precision of the tainter gate opening is limited. A sustainable minimum flow with the current dam infrastructure is around 100 cfs. Releases below 100 are possible, but precision is limited, and the opening can only be maintained for short periods of time before it is clogged with weeds and debris. Additional information regarding infrastructure limitations can be found in Section 3.1.2.1.

Future minimum releases are preferred to be gradually reduced to minimize stranding of fish and invertebrates in the river. The rate of discharge decreases outlined in the 1994 Water Control Manual (WCM) is shown in Table 4. Historically, reductions in flow have followed the top suggestion bracket in Table 4, but for the lower flows, reductions cannot follow the plan. The lower flow reductions occur at least 4 hours apart (often 8-24 hours) and follow the following

steps down from ~100 cfs to ~50 cfs to gate closed. There is a ditch that enters the river near White Rock Dam which often provides flow to the USGS gage downstream of White Rock Dam. Table 5 is provided as a suggestion for minimum flow once the water treatment plants are updated and has not been implemented.

Table 4. Reducing Outflows from White Rock Dam, from 1994 Water Control Manual. Note, due to infrastructure limitation, outflows less than 40 cfs are not possible.

<b>Table 7-2 Reducing Outflows, White Rock Dam Suggested Rates of Change<sup>1</sup></b>	
<b>Flow Range</b>	<b>Rate of Change</b>
From 1000+ cfs to 100 cfs	Reduce outflows over at least 2 days in approximately equal increments
From 100 cfs to 20 cfs	Reduce outflows over at least 3 days in at least 3 equal-ratio increments
From 20 cfs to 0 cfs	Reduce outflows over at least 4 days in approximately equal increments

1. Emergency conditions, including flood control operation, may warrant a substantial deviation from the values shown.

Table 5. Low Flow Agreement from 1994 Water Control Manual. Notes, due to infrastructure limitations, minimum flows under 40 cfs are not possible. Municipal water treatment plants at Fargo and Moorhead have been upgraded.

<b>Table D-2 Lake Traverse Project Low Flow Agreement<sup>1</sup> With the Minnesota Dept. of Natural Resources</b>			
<b>Lake Traverse Elevation, feet</b>	<b>April 1-June 15</b>	<b>June 15-Sept. 30</b>	<b>Oct. 1 - March 31</b>
Above 976.8	50	50	40
976.8 - 976.0	25	15	10
976.0 - 975.5	15	10	5
Below - 975.5	10	5	5

Low flow releases from the project should not be made until the municipal water treatment plants at Fargo and Moorhead are upgraded, and low flow releases from the project no longer cause water supply problems.

A low flow release gate was installed in a bulkhead of White Rock dam when the project was constructed. It was placed in the center tainter gate bay to meter low flows up to 40 cfs. This release gate has not been operated by the Corps in at least the last 30 years (if ever) and is no longer functional.

## 2 Study Outreach

### 2.1 Outreach Overview

Scoping efforts included engaging partner resource agencies, tribes, and the affected public to gauge acceptability and potential for adverse effects. The communication objectives were as follows:

- Create awareness and understanding of the project within the local communities.
- Provide opportunities for tribal, public and resource agency input on Mud Lake and Lake Traverse water level operations.
- Ensure visitors and persons who recreate or reside near Mud Lake and Lake Traverse are informed of the opportunity to provide input.
- Create opportunities to build long-term partnerships with local community leaders, influencers, tribes and establish a path forward for continued dialogue.

To accomplish those objectives, the PDT created tools and products to help target audiences understand two key elements: (1) Corps is soliciting input on operational changes to Lake Traverse and Mud Lake and (2) how potential drawdowns of Mud Lake could result in improved habitat. First, the team set up a St. Paul District webpage for the project and connected it to the district's recreation and the Institute for Water Resources Sustainable Rivers Program websites. After initial outreach and discussions, it was determined that outreach to resource agencies would occur via web meeting and public outreach would occur via an in person public meeting (streamed and saved via Facebook Live). Tribal outreach was first conducted independently via email but followed up with phone conversations. Various outreach and communication efforts are documented in the following sections.

### 2.2 Stakeholders and Outreach Methods

#### 2.2.1 Agency

Agency outreach was focused on connecting with resource agency staff of various levels of government including, federal, state (Minnesota, South Dakota, and North Dakota), county, soil water conservation districts, watershed districts, and tribal natural resource staff. Coordination was conducted via a web meeting. Prior to the web meeting, the PDT shared a short poll with agency persons to better design engagement sessions and understand considerations and areas of interest.

The 2.5-hour agency web meeting was held on 14 July 2021 and 23 individual agency representatives attended (with an additional six Corps attendees). During the meeting, the PDT presented information on the purpose and operation of the Lake Traverse project, an overview of the Sustainable Rivers Program and the Mud Lake study, existing Mud Lake and Lake Traverse environmental conditions, and Mud Lake drawdown considerations and potential impacts. The Corps then facilitated a discussion on the considerations and opportunities for a Mud Lake drawdown covering shorebird habitat, waterfowl habitat, water quality, agency-specific areas of interest and current operations of the Lake Traverse project. Following the

meeting, the Corps shared a post-meeting poll to gauge responses in the potential drawdown of Mud Lake and solicit additional input and post-meeting thoughts. Pre and post meeting agency polls are included in Appendix B.

Follow-up email and phone discussions with various resource agencies were then conducted by the Corps to better understand information shared during the web meeting and to clarify various comments and state and local regulations or permits.

### 2.2.2 Tribal

The Corps reached out to 19 Tribal Historic Preservation Officers (THPO) by email to inform them of the public and agency meetings and their opportunity to comment on the potential for a Mud Lake Drawdown (Appendix A). No comments by any tribe were received.

The PDT then specifically reached out to the Sisseton Wahpeton Oyate tribe to ensure they were aware of the scoping effort. The Sisseton Wahpeton Oyate of the Lake Traverse Reservation is a federally recognized tribe comprising two bands and two subdivisions of the Isanti or Santee Dakota people. They are on the Lake Traverse Reservation in northeast South Dakota immediately adjacent to the project location. Their expertise of the area's resources and the known importance of the land to the Tribe is recognized by the PDT.

During phone conversations, the THPO shared information on the historic, cultural, and religious importance of the area to their community. Specifically, low water levels may expose cultural resources or burial sites at the Lake Traverse Project. Although there is a record of burials on islands and higher elevation locations at Lake Traverse, elder interviews would be necessary to understand potential historic, cultural, or religious use of the Mud Lake area. In addition, current gathering and prevalence of traditional and medicinal plants may also be affected by a drawdown but without detailed lake level operation and timing information, it would be impossible to provide additional determination of potential effects or if the effects may be positive or negative.

Following various phone conversations, the Sisseton Wahpeton Oyate requested government to government consultation on any future changes in operations at Lake Traverse or Mud Lake. It was noted that consultation for future efforts should include both the THPO office and Natural Resource staff. During that consultation, the Tribe would need more information on water level changes. For any future study, the Corps would complete an environmental assessment and consult with Sisseton-Wahpeton at that time under NEPA, Federal Trust Responsibilities, and under Section 106 of the NHPA. While recognizing these concerns and need for future consultation, the Sisseton Wahpeton Oyate THPO stated that opportunities to operate Mud Lake to benefit the environment is a positive effort they would like to discuss further.

### 2.2.3 Public

For outreach to the public, the PDT relied on three forms of communication. First, the Corps website with scoping study and SRP information was developed to serve as an accurate project information source using plain language. Second, the project office at Lake Traverse provided current information on the scoping study, potential effects of Mud Lake drawdown, and Lake Traverse operations. Lastly, the PDT staged an open house on the Mud Lake Drawdown SRP study.



Although the purpose of the meeting was a potential drawdown of Mud Lake, the PDT understood that the public would primarily be interested in water levels at Lake Traverse which was the lowest it has been in decades due to drought. However, the PDT felt that the benefits of sharing project information and the potential to provide input on the scoping study would best be provided in an open house in-person meeting. The open house was held 15 July 2021 in Wheaton, MN from 5:30-8:00pm. The presentation portion of the meeting was live-streamed via Facebook and could be viewed live and after-the-fact with or without a Facebook account.

The Corps informed the public of the open house and website via a public notice, press release, Facebook postings, and yard signs placed at all the Lake Traverse project boat launches, see Figure 5. The yard signs helped ensure day-users of the project would be informed. Further, many persons who live, farm, or recreate, near Mud Lake may live across a three-state area. With COVID, posting in community gathering areas, may have less impact than previous years. The yard signs had the project website and a scannable QR code that directed persons to the project website.



Figure 5. Yard sign at one of Lake Traverse's public-access boat launches (USACE photo).

The public meeting format was planned as a 15-minute presentation on Lake Traverse Operations and Mud Lake Drawdown opportunities with an open house session following a short question and answer session. That format would be repeated twice.

The level of Lake Traverse at the time of the meeting was the conservation level, approximately 976.0 ft MSL 1912, which is also the level the lake fluctuated around before the dam was constructed in 1942. However, the lake had not been that low at that time of year since 1990.

Because of a wetter climate that has been experienced since the early 1990s, the lake level has been maintained at the spring conservation target of 978.8 ft MSL 1912 or higher for much of the recreation season in recent decades. There was negligible runoff from snowmelt in 2021 and a deviation from the WCM was obtained to forego the standard drawdown at Lake Traverse in anticipation of this. Spring rain events produced runoff and releases were made to maintain the lake level at the spring target level of 976.8 ft MSL 1912. These releases were stopped in early June when inflow ceased.

Largely due to the relatively low water levels at Lake Traverse, the public meeting was much more heavily attended than the PDT had planned for. Specially, the team identified a meeting space near the project site that accommodated up to 66 persons. At the time of the start of the first presentation, over 100 people were in attendance. By the end of the meeting, the PDT estimates there were 150-180 people who attended at least part of the open house.

Corps shared information on the Project operations, who to contact for additional information, funding and authority appropriations, live lake levels, and the Mud Lake drawdown. After a 30-minute presentation and question and answer session, the Corps completed an immediate second presentation to ensure persons waiting outside could hear the presentation after a wait. An open house was held after both presentations. The question-and-answer sessions were not recorded via Facebook live due to audio constraints (the small room and numbers of persons in attendance resulted in lots of background noise which made it impossible to hear the public's comments).

The public in attendance were frustrated by the impacts of relatively low water levels at Lake Traverse. Some of the impacts shared by persons in attendance included:

- Reduced boater access
  - Most public boat launches were unusable
  - Many private docks and boat lifts were unusable
- Regional impacts to resorts and community businesses due to low water levels of Lake Traverse
- Exposed rocks in the lake bottom due to water levels
- Inability to recreate on the lake due to water levels and aquatic vegetation
- Negative impacts to important regional fishery because of Lake Traverse water levels
- Prevalence of aquatic invasive species
- Poor water quality of Lake Traverse
- Sedimentation of Lake Traverse and Mud Lake

Many in attendance were concerned at the timing and volume of Reservation Dam and White Rock Dam releases in Spring and Summer 2021. There was a common opinion that the level of Lake Traverse should have been allowed to rise above the spring conservation target of 976.8 ft MSL 1912 in anticipation of the lack of inflow, so that the level would remain higher during the recreation season as it has typically been in the past three decades. There were questions on how and why the Corps currently manages water levels at the Lake Traverse Project and the authority of Corps staff to make changes to the 1994 Water Control Manual. Further, some questioned the drought and evapotranspiration's effects on Lake Traverse's water levels and

the accuracy of lake level monitoring. There were many more detailed questions and concerns shared by the public during the meeting that have been recorded for the Corps Water Management section for future incorporation into decision making of a possible update to the Lake Traverse Water Control Manual (an effort not funded at the time of this study).

Input provided by the public specifically related to the drawdown of Mud Lake is included in Appendix A and described in Section 3.

### 3 Identified Opportunities and Considerations

Opportunities and considerations were identified by the Corps, agencies, tribes, and the public during outreach efforts. Table 6 shows the identified concerns or considerations. More information is described by each specific concern or consideration following the table.

Table 6. Concerns or considerations of a Mud Lake drawdown identified during the scoping process.

<b>Consideration</b>	<b>Corps</b>	<b>Agency</b>	<b>Tribe</b>	<b>Public</b>
Operation of Mud Lake as flood control reservoir	X			
Infrastructure	X			
Water control manual	X			
Water quality	X			
Impacts to permit holders	X	X		
Water levels on Lake Traverse	X			X
Minimum releases to Bois de Sioux	X	X		
Impacts to farmland	X	X		X
Avian botulism	X			
Fisheries	X	X		
Invasive species		X		X
Impacts to medicinal or traditionally harvested plants			X	
Public value of shorebird and duck habitat				X
Exposed burial sites or cultural resources			X	

#### 3.1.1 Operation of Mud Lake as a flood control reservoir

Management practices aimed at improving Mud Lake for shorebird and duck habitat may ultimately be limited by flood control needs. Summer precipitation events could require water levels to be raised in Mud Lake for flood storage. The length of time needed to store flood waters could prevent a successful drawdown (likely in the event of a more extreme spring flood event or higher than normal summer and fall precipitation). The primary purpose of the Lake Traverse Project would not be compromised to accommodate a drawdown of Mud Lake. Although some members of the public were critical of Corps flood control management, the majority of persons consulted with locally and within agencies were supportive with the flood control benefits provided by the Lake Traverse Project.

### 3.1.2 Infrastructure

#### 3.1.2.1 *Discharge Limitations*

The top width of White Rock Dam is 26 feet and carries a roadway connecting US Highway 81 in South Dakota and Traverse County Highway No. 10 in Minnesota. The roadway has guardrails, but no shoulder and narrows across the dam. Routine changes to the settings of the 16' by 13' tainter gates are done manually or with a drill attachment and requires a lane closure of the relatively busy roadway. A near miss occurred on March 24, 2020 during the spring drawdown when an eastbound truck broke through the guard rail and crashed into the Bois De Sioux river while the dam was discharging 800 cfs. Luckily, staff were not making any gate changes at the time and there were no fatalities. The safety risk of these gate changes to staff and others is considerably higher than other Corps projects because of the volume and speed of traffic and the lack of working space.

Low flow openings at the dam were designed to be made with a bulkhead equipped with a low flow sluice gate in place. The sluice gate is designed to be operated with a valve stem from a platform attached to the bulkhead. There are no records of operation of the low flow outlet within the bulkhead. In recent years, the bulkhead was determined unsafe to work behind by Corps structural engineers due to corroded welds. Additionally, the valve stem has also broken off over time making it unfunctional. The bulkhead is currently used in the winter to allow one gate to be left in an open position, ensuring it will not be frozen shut during spring runoff. The water overtopping the bulkhead is allowed in these low head situations. The bulkhead installation and removal require contracting a crane and takes roughly an hour.

Low flow openings in practice have been made with the tainter gates. However, this was not the intended function of the tainter gates and there is not a brass dial gage to indicate the opening. A staff gage along the side of the dam is used to measure the gate opening with limited precision. The smallest gate opening at the White Rock Dam in practice is 0.1 foot which would release water at roughly 40 cfs. Sediment, vegetation, and debris clogs the opening which limits the control and duration of flow achievable at this opening.

The Corps is evaluating if the bulkhead could be in place year-round except for spring runoff and flooding situations. This would allow a more gradual transition to low flow and no discharge but would not allow for control of low flow rates. To allow for minimum releases, a physical change to the dam or associated infrastructure would be needed.

#### 3.1.2.2 *Approach Channel*

The ability to drawdown Mud Lake (except for a channel to facilitate flow-through) is essential for restoration. Therefore, the drawdown capabilities for the reservoir need to be determined through a survey, especially of the channel leading up to White Rock Dam where sedimentation is suspected. Dredging may be needed to facilitate a complete drawdown of Mud Lake, if it is determined that this action is cost beneficial. Dredge material could be used to create new nesting islands and/or to rebuild existing ones.

#### 3.1.2.3 *Operational Changes*

In a letter dated 10 August 2021, the MDNR indicated their interest in future work with the Corps to change operations of the Lake Traverse project for enhanced ecological function and more “natural riverine and wetland conditions at the site” (Appendix B). While an effort of that nature

is a possibility, there are infrastructure, environmental, authority, and funding considerations that would need to be addressed which are beyond the scope of this effort. Section 1135 of the Water Resources Development Act of 1986, as amended, authorizes the Corps to make modifications to operations or structures of civil works projects previously constructed for the purpose of improving the quality of the environment. In most cases, it must be demonstrated that the operation or construction of a civil works project has degraded the quality of the environment. The primary objective of Section 1135 is to modify existing USACE projects to restore ecosystem habitats. A local sponsor (a public agency or a non-profit environmental organization) would need to approach the Corps with a written request in participating in a Continuing Authorities Program Section 1135 Project. No local sponsor has expressed interest in a Section 1135 project.

### 3.1.3 Water Control Manual

A water control manual covers the physical manipulation of spillway gates, outlets, or instrumentation associated with projects. The 1994 Water Control Manual for the Lake Traverse Project would need to be updated and approved.

The effort to update a water control manual requires funding and completion of an intensive study called a reservoir operation plan evaluation (ROPES) that includes a historical hydrologic, hydraulic, and reservoir analyses. These analyses would cover a wide range of hydrologic conditions. The resulting data would represent normal, high, or low flows and a range of operations to respond to those conditions. Operations within the range contemplated or prescribed by a water control plan allow operational flexibility for a project, for example, completing spring drawdown of Mud Lake, minimum releases, and fall flooding of Mud Lake, and under what conditions. An approved water control manual would contain an approved water control plan.

Per ER 1110-2-1400 Reservoir/Water Control Management, the development of new water control manuals must comply with NEPA (completing an environmental assessment or environmental impact statement) and involve the public, Tribes, and agencies. The Corps must also engage our Headquarters and receive final water control manual approval from the Mississippi Valley Division Commander, located in Vicksburg, MS.

It is possible that the Mississippi Valley Division office would allow for a deviation for a short period to allow a drawdown and fall flooding of Mud Lake and minimum releases from the White Rock Dam. This could be an option for the Corps to pursue in the short-term. However, long-term operations of all three actions would require funding and completion of a ROPES study and new Water Control Manual.

### 3.1.4 Water Quality of Releases

Water from the Lake Traverse project is high in dissolved solids, sulfates, and dissolved organics. Geomorphic characteristics, long hydraulic retention times, and high annual evaporation rates have resulted in a lake with an extremely high mineral content (dissolved solids, especially sulfate). Its mineral characteristics render the water almost useless as a source of municipal and industrial supply because softening is too expensive and often ineffective. In addition, nutrient-laden runoff into Lake Traverse and Mud Lake from their mostly agricultural watersheds promotes the excessive growth of blue-green algae and high levels of dissolved organics. The algae, or substances produced by the algae, and vegetation in Mud

Lake, are thought to cause taste and odor problems, and may contribute to the production of trihalomethanes in chlorinated water supplies.

On 6 July 2021, Minnesota adopted new specific water quality standards for class 4B waters of the state (agriculture and wildlife). The quality of class 4B waters must be such as to permit their use by livestock and wildlife without inhibition or injurious effects. The sulfate standard of 600 mg/L must not be exceeded as a 30-day average (State of Minnesota 2021). Because some waters in the area are close to exceeding this standard, MPCA identified this as the biggest concern for downstream permittees. However, after providing additional details on the rate of drawdown, slowly over time versus a rapid release, MPCA believes there may not be a concern. Additional coordination on this topic will occur if the project moves forward.

The sulfate standard for Class III streams in North Dakota is 750 mg/L as a 30-day average. The quality of water in Class III streams must be suitable for agricultural and industrial uses. Streams in this class generally have low average flows with prolonged periods of no flow. During periods of no flow, they are of limited value for recreation and fish and aquatic biota. The quality of these waters must be maintained to protect secondary contact recreation uses (e.g., wading), fish and aquatic biota, and wildlife uses (State of North Dakota 2019).

### 3.1.5 Impacts to Permit Holders

Two NPDES permit holders were identified that have historically been affected by water releases from White Rock Dam: Cargill and Minn-Dak Farmers' Cooperative. In a conversation with representatives from both permit holders, it was determined there would be minimal to no effects on the timing or quality/quantity of releases from those point sources in response to Mud Lake drawdown changes. Specifically, North Dakota permits do not have Total Dissolved Solids (TDS) limits within those permitted individual permits, and the sulfate/chloride limits noted would be achievable with any likely changes of timing of releases from White Rock Dam.

### 3.1.6 Water Levels on Lake Traverse

The main topic of discussion at the public meeting was water levels on Lake Traverse. Lake Traverse supports a productive and popular sport fishery that is economically important to the area. Citizens had significant concerns that the Corps would drawdown Lake Traverse or that water from Lake Traverse would be used to reflood Mud Lake.

During summer 2021, lake home or cabin owners, businesses, day use anglers and recreational boaters had difficulty accessing the lake. Lake Traverse is currently at an elevation lower than any experienced in decades, and as such, dock lengths which have allowed access in previous normal years are ineffective in many locations. Local users also reported exposed boulders and lake bottom hazards and a high prevalence of aquatic invasive species. The public in attendance at the public meeting also noted a poor fishery during summer 2021 and the resulting negative effects on the local economy. These adverse effects are the result of a drought preceded by a minimal spring runoff and have negatively impacted the multi-use benefits of Lake Traverse. If the Corps receives funding for a new water control manual, the normal lake levels and releases from Reservation Dam would be studied and coordinated with the public.

The Corps is not proposing to lower water levels at Lake Traverse to drawdown or reflood Mud Lake in the fall.

### 3.1.7 Minimum Releases to the Bois de Sioux

Due to limited inflow, water releases were stopped at both the Reservation and White Rock Dams on 7 and 8 June 2021, respectively. At that time both Lake Traverse and Mud Lake were at their target operating levels in accordance with the water management plan. On 10 June 2021 a fish and mussel kill was reported in the Bois de Sioux River downstream of the White Rock Dam. At that time MDNR requested minimum flows be released to the Bois de Sioux; however, given water levels in Mud Lake and drought conditions, gates remained closed to prevent fish moving back up to the White Rock Dam and causing a second fish kill when flows would go back to zero.

Minimum releases were a major topic at the agency meeting. Agencies expressed concern about current operations at the White Rock Dam and the recent fish kill. MDNR requested the Corps investigate utilizing the low flow gate. As discussed in Section 3.1.2.1, the low flow gate is not functional at this time. Overall, agencies thought it was possible to operate the dam in a way that would benefit both shorebirds and fisheries. This could be done by identifying minimum flows and managing ramping rates. There was also an interest in design conversions to the dam to allow for lower flows or passive releases. Agencies want to avoid managing Mud Lake for shorebird habitat at the expense of baseflows to the Bois de Sioux. The Corps believes managing Mud Lake as a moist soil unit and minimum releases to the Bois de Sioux are compatible opportunities.

In a letter dated 1 September 2021, the MDNR indicated their interest and support in near-term solutions for increasing a more natural hydrologic regime in the Bois De Sioux River and enhanced wetland habitat in Mud Lake, see Appendix B. They also have indicated their support in extensions to the efforts addressed in this report, an effort that would require coordination, study, and funding, as discussed in Section 2.2.1.

### 3.1.8 Impacts to Farmland

Agricultural damages occur both upstream and downstream of the Project due to high reservoir levels and high outflows. Most of the agricultural damages upstream of the Project occur around Mud Lake, which has a much flatter shoreline than Lake Traverse. Approximately 5,000 acres adjacent to Mud Lake are within the elevation range of 972 to 981 feet. Most of this land is being used for pasture or cropland (Figure 6).

# Sustainable Rivers Program: Mud Lake Drawdown Scoping Study

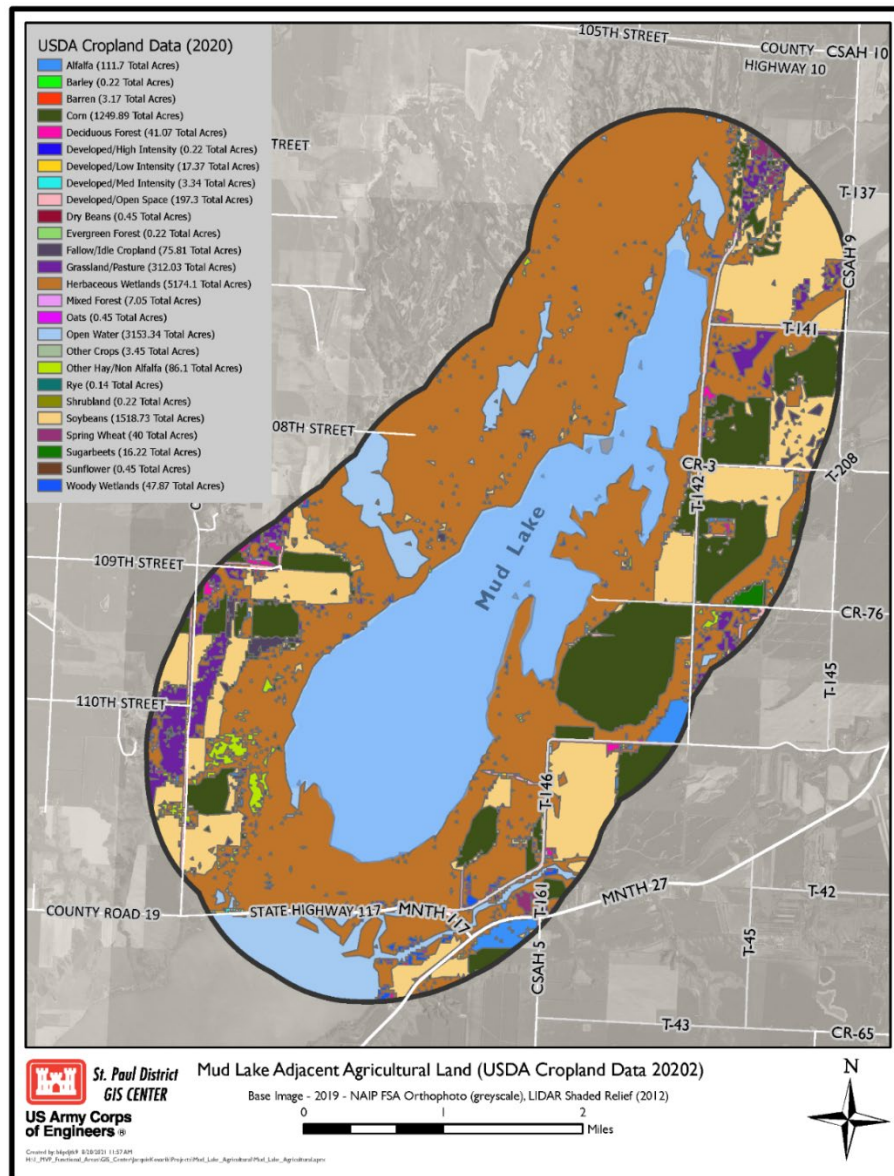


Figure 6. Agricultural land use surrounding Mud Lake.

Agricultural flood damages include stranding of debris, introduction of weed seeds, damage to fences, wet soils which prevent planting or pasturage, and damage to crops. The Corps flowage easement extends to elevation 983 feet. Agricultural damages downstream of the dam occur when local inflows plus releases from the dam exceed channel capacity. These damages also include crop losses and the inability to use the land.

In discussions with two persons who farm areas around Mud Lake, there was general support for a spring drawdown. Currently, the water levels at Mud in a normal water year sometimes prohibit ideal spring planting timelines. A drawdown could facilitate earlier planting, increasing crop success. This benefit would only be achieved pending spring flood conditions.



### 3.1.9 Avian Botulism

Botulism is a natural toxin produced by a bacterium (*Clostridium botulinum*) commonly found in the soil. The type of botulism toxin that birds can contract does not affect humans. Botulism is concentrated in aquatic invertebrates that filter feed sediments or water. When birds eat the invertebrates, they get a concentrated amount of toxin. A bird-to-bird cycle can also exist where maggots feeding on dead birds can concentrate the toxin and can then be eaten by and poison other birds. Typical signs of botulism in birds include lethargy, weakness, inability to hold up the head or to fly. For waterfowl, this can be deadly because the inability to hold up the head can lead to drowning.

Avian botulism is a serious concern on Mud Lake. In August 1992 and again in August 1993, significant botulism outbreaks occurred at Mud Lake resulting in the loss of over 2,600 and 7,300 ducks, geese, and shorebirds, respectively. The outbreaks coincided with water level declines in Mud Lake. Environmental factors which contribute to botulism outbreaks in birds include the presence of large numbers of birds, warm temperatures, decaying vegetation and bird carcasses, and declining water levels that expose anoxic soils. The severity of botulism outbreaks can be lessened and even controlled on reservoirs such as Mud Lake through properly timed water level manipulations. If there were signs of an outbreak water levels would be stabilized or the lake would be refilled to control the outbreak.

### 3.1.10 Mud Lake Fisheries

Mud Lake does not support a consistent fishery due to winterkill and recurring drawdowns would further limit fisheries. Currently, MDNR stocks Mud Lake with walleye fry. Walleye are stocked to help the overall ecosystem and not to create a Mud Lake fishery. MDNR indicated their stocking efforts were compatible with managing Mud Lake as a moist soil unit.

### 3.1.11 Shorebird and Waterfowl Habitat and Public Value

Within the Lake Traverse Project area, several species of shorebirds are listed as threatened or endangered at both the federal and state level while others are listed as Birds of Conservation Concern (see Section 1.4.2.1). Managing Mud Lake as a moist soil unit would be beneficial by providing much needed shorebird habitat in the area as well as duck habitat. Attracting shorebirds and waterfowl to Mud Lake would provide recreational opportunities such as bird watching and hunting. Local duck hunters and hunting groups have expressed support for the proposed drawdown. Some locals anecdotally remember Mud Lake providing better waterfowl habitat historically than it currently does.

### 3.1.12 Invasive Species Management

The spread and management of invasive species was discussed at the agency meeting. Hybrid cattail was of note as it is present in the lake and a drawdown has the potential to further spread the species. However, bringing water levels up with spring runoff, which is part of the current water management plan, can help prevent the expansion of hybrid cattail.

Another species of concern is poison hemlock (*Conium maculatum*). Although not an aquatic species, poison hemlock has been found in several fields adjacent to the Bois de Sioux River, directly south of the White Rock Dam. Traverse County, Minnesota is currently working to eradicate this plant.

Curlyleaf pondweed (*Potamogeton crispus*) in Lake Traverse was a concern from many home and cabin owners on the lake. Dense infestations of curlyleaf pondweed have made boating difficult on the lake. Low waters brought on by the current drought have exacerbated the issue by allowing the plant to further spread on the lake.

There is currently no vegetation management occurring at Mud Lake. It is possible that additional invasive species management could benefit native species or traditional or medically harvested species (Section 3.1.13). If a drawdown were to occur, an invasive species monitoring, and management plan would need to be developed and implemented.

### 3.1.13 Impacts to Medicinal or Traditionally Harvested Plants

Native Americans used plants for food, shelter, medicine, ceremonies, and clothing. As described in Section 1.4.3, there is little diversity in the vegetation community on Mud Lake and vegetation consists mainly of invasive species (hybrid cattail, phragmites, reed canarygrass). Small acreages of two culturally significant plants, cottonwood (*Populus deltoides*), and black willow (*Salix nigra*) were present in 2011. A drawdown on Mud Lake would result in a more diverse wetland plant community over time and it is possible that additional medicinal or traditionally harvested plants would become present.

### 3.1.14 Exposed Burial or Cultural Resources

There are no known sites identified within Mud Lake, it is possible a drawdown could reveal unknown burial or cultural resources. Consultation would occur with interested Tribes prior to drawdown to minimize the potential of these effects. If an unexpected discovery did occur, the Corps would follow the appropriate procedures outlined in the NHPA.

### 3.1.15 Government to Government Consultation

The Sisseton Wahpeton Oyate tribe requested government to government consultation on the changes to Lake Traverse Project operations, including a potential Mud Lake drawdown. The Federal Government has a unique relationship with Indian tribes derived from the United States Constitution, treaties, Supreme Court doctrine, and Federal statutes. Indian tribes are sovereign nations with inherent powers of self-governance and as such, the Corps will protect and allow access to protected tribal resources under US Army Corps of Engineers jurisdiction to the extent practicable and will work to develop and implement access policies as needed. Further, the Corps, to the extent allowed by law, will protect the location of historic properties, properties of religious and cultural significance, and archaeological resources, in consultation with affected Tribes.

As the Corps has not developed more detailed operation plans for a Mud Lake drawdown, fall flooding, or possible minimum releases to the Bois de Sioux River. Future government to government consultation with the Sisseton Wahpeton Oyate tribe will be necessary to fully understand the potential for effects to historic properties and tribal resources.

## 4 Summary of Scoping Effort

After initial scoping of opportunities and considerations including stakeholder and tribal outreach, the team working on this effort determined there is potential to drawdown Mud Lake annually. There are six resource considerations associated with limits on current knowledge or expertise, data, information, money, or time that would need future analysis including: water

quality and quantity of releases from White Rock Dam to the Bois de Sioux River, potential effects to medicinal or traditionally harvested plants, effects to downstream fisheries, and invasive species expansion. To varying degrees, these considerations would require consultation with State, Federal, and Tribal agencies, as appropriate. In addition, the Corps would need to investigate the operational status of the low flow bulkhead at White Rock Dam and potential sedimentation of Mud Lake to determine any necessary repairs or dredging.

Impacts to Lake Traverse water levels was identified as a notable consideration, although the Corps team believes a drawdown could be conducted with no effects to Lake Traverse water levels during the recreational season. Despite that, the Corps would need to improve public communication on management of water levels, as it remains the primary concern of many local stakeholders.

There are three legal and policy considerations for a Mud Lake drawdown. The first is the current 1994 Water Control Manual and the flood control purpose of the Lake Traverse Project. The Corps St. Paul District legally cannot operate the Lake Traverse Project outside of the procedures outlined in the Water Control Manual without Mississippi Valley Division (MVD) approval. An update to the Lake Traverse Water Control Manual or variance by MVD would be necessary for an alternative project operation. The other two legal and policy considerations or potential constraints would be identified through future study compliance with the National Historic Preservation Act and the Endangered Species Act. With the level of information collected at this time, the Corps is not aware of any specific Historic Property or endangered or threatened species that would make a drawdown of Mud Lake impossible.

The potential for shorebird and waterfowl habitat, native vegetation establishment is substantial enough to warrant future study. None of the identified considerations would alone or cumulatively make an annual drawdown of Mud Lake infeasible, although future analysis and evaluation to minimize adverse effects would be necessary. Table 7 illustrates a summary of the final conclusion of study opportunities and considerations and the estimated level of success or further investigation necessary.

Table 7. Overview of Scoping Study Opportunities and Considerations.

Opportunities	Potential for Success	Considerations	Potential Future Level of Analysis
Shorebird Habitat	High	Water Quality	Low
Waterfowl Habitat	High	Quantity of Water Releases	High
Minimum Releases	High	Effects to Historic Properties	Unknown <sup>2</sup>
Invasive Species Management	Moderate	Effects to Downstream Fisheries	High
Earlier Crop Planting Date	Low <sup>1</sup>	Invasive Species Expansion	Moderate
Expansion of Traditionally Harvested Plants	Unknown <sup>2</sup>	Medicinal or Traditionally Harvested Plants	Unknown <sup>2</sup>
		Impacts to Lake Traverse Water Levels	High <sup>3</sup>
		Effects to Threatened or Endangered Species	Low <sup>4</sup>
		Existing Infrastructure (including bathometry)	High

<sup>1</sup>This likely would only be achieved pending spring flood conditions

<sup>2</sup>Effects to these items would need to be further discussed with Sisseton Wahpeton Oyate

<sup>3</sup>Labeled as high only to denote level of public education and outreach necessary, Lake Traverse water levels would not be impacted to allow for a drawdown of Mud Lake

<sup>4</sup>Based on preliminary analysis and habitat benefits to Federally listed species

## 5 Mud Lake Drawdown: Next Steps

To facilitate changes in the management and operations of Mud Lake and the larger Lake Traverse Project, two potential paths could be taken.

**Path 1:** The Corps obtains funding for a reservoir operation plan evaluation study and an environment assessment (or environmental impact statement, if determined necessary). Following those analyses, the Lake Traverse water control manual would be updated and seek approval from the Corps Mississippi Valley Division.

**Path 2:** The Corps requests a deviation from the 1994 Water Control Manual for a drawdown, fall flood, or minimum release from the Corps' Mississippi Valley Division. Along with a deviation request, an environmental assessment on potential effects of a drawdown, fall flooding and

minimum releases to the affected environment would be necessary. New operations implementation would occur following necessary Water Control Manual deviation request approval from the Division office.

In any path, Tribes, the public, and agencies would be consulted on any future lake level or dam operation changes at the Lake Traverse Project and be given opportunity to review and provide comments. Government to government tribal consultation would be completed, as needed, and requested.

After preliminary discussions with the Mississippi Valley division office, the Corps determined that Path 2: a deviation from the 1994 Water Control Manual for a drawdown, fall flood, and minimum release would be pursued. The Corps will pursue funding to complete an environmental assessment and a drawdown study for a deviation request during calendar year 2022. As currently planned, that effort would target completion of the study and environmental assessment in time for a summer drawdown, if a deviation is approved.

Future funding for an update to the Lake Traverse Water Control Manual has not been authorized as of the date of this report. Any changes in operations to the Lake Traverse project would be communicated as draft proposals to Tribes, the public, and resource agencies, building off the communication list and relationships developed for this effort.

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