



## Lessard-Sams Outdoor Heritage Council

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### Laws of Minnesota 2012 Final Report

#### General Information

**Date:** 09/08/2020

**Project Title:** Marsh Lake Enhancement

**Funds Recommended:** \$2,630,000

**Legislative Citation:** ML 2012, Ch. 264, Art. 1, Sec. 2, Subd. 4(f)

**Appropriation Language:** \$2,630,000 in the second year is to the commissioner of natural resources to complete design and construction to modify the dam at Marsh Lake and return the historic outlet of the Pomme de Terre River to Lac Qui Parle.

#### Manager Information

**Manager's Name:** Ricky Lien

**Title:** Wetland Habitat Team Supervisor

**Organization:** MN DNR Div. of Fish and Wildlife

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#### Location Information

**County Location(s):** Lac qui Parle.

**Eco regions in which work will take place:**

- Prairie

**Activity types:**

- Enhance

**Priority resources addressed by activity:**

- Wetlands

## Narrative

### Summary of Accomplishments

The primary goal of the Marsh Lake Ecosystem Restoration Project is, “To return the Marsh Lake area ecosystem to a less degraded and more natural condition by restoring ecosystem structure and functions.” Work was completed on this project in March 2020 and consisted of a new water control structure to allow for water level management, restoration of the Pomme de Terre River to its original channel, and establishment of a fishway to allow for movement of native fish.

### Process & Methods

Marsh Lake is an impoundment of the Minnesota River in west-central Minnesota near Appleton. Marsh Lake was created in the late 1930s by construction of a dam which resulted in a shallow lake that measured approximately 5,000 acres. The lower Pomme de Terre River was rerouted into the reservoir at that time to facilitate construction of a two mile long earthen dike that was required to impound the lake. The Marsh Lake Dam is owned and maintained by the U.S. Army Corps of Engineers as part of the Lac qui Parle Flood Risk Management project. Marsh Lake lies within the State of Minnesota Department of Natural Resources Lac qui Parle Wildlife Management Area. Marsh Lake is the border between Big Stone and Lac qui Parle Counties, while most of the outlet area of Marsh Lake is located in Swift County. The original construction of the Marsh Lake Dam was intended to serve as a flood damage reduction measure and to provide a recreational feature to the region by creating a static pool on the river. The intended flood damage reduction benefits provided by the Marsh Lake Dam were minor due to effectiveness of the downstream Lac qui Parle Dam. Since the time of impoundment, Marsh Lake has undergone significant degradation of aquatic habitat due to stressors including high sediment and nutrient loading, a fixed crest dam that prevents low seasonal water levels, high turbidity from wind-driven sediment resuspension, and abundant common carp that increase turbidity and consume submersed aquatic vegetation and macroinvertebrates. Degradation of the Marsh Lake aquatic ecosystem limited habitat suitability for many species of fish and wildlife. The overall habitat conditions were poor with turbid water conditions. Concerns by stakeholders over the habitat conditions eventually resulted in the Marsh Lake Ecosystem Restoration Project with a primary goal of improving fish and wildlife habitat by returning the Marsh Lake to a less degraded and more natural condition with natural functions and processes. Major project features include construction of a drawdown water control structure, restoring the Pomme de Terre River to its original channel, modifying the existing low-head dam into a notched weir/rock arch rapids fishway, and construction of one mile of new roadway/earthen dike. The project also restores 1.3 miles of natural stream habitat and provides complete fish passage from the Minnesota River into Marsh Lake. .Water Control Structure - The drawdown structure was constructed west of the existing emergency spillway. Excavation for the structure’s outflow channel extended about 650 feet downstream of the embankment. The intake for the structure required excavation to deepen the approach and placement of new rip-rap to protect the structure. Sheetpile was buried under the concrete structure to minimize seepage. A 60-ft long section of the channel bed immediately downstream of the concrete spillway was lined with a 33-inch layer of rip-rap over 12-inch bedding. A 100-ft long dredge maintenance access ramp was built from the top of the west embankment into Marsh Lake. The new water control structure will allow for water levels to be manipulated between and within years to promote habitat benefits, as has been successfully done on numerous shallow lakes across Minnesota and on Mississippi River pools. Variability in water levels has resulted in increased extent, diversity, and abundance of aquatic vegetation, increased food for waterfowl, and improved water quality conditions. Re-routing of the Pomme de Terre River - The Pomme de Terre River was successfully re-routed into its historic channel. Two rock riffle structures were utilized to prevent head-cutting in the river channel. Riffles were placed to traverse the entire river channel and were constructed with boulders, rip-rap, and gravel. This provides a drop in the water surface elevation of about 8 inches. The 1,000 feet of the bank of the Pomme de Terre River has been stabilized using toe wood sod mats. Large trees were placed in an interlocking matrix and anchored with boulders. Topsoil or soil mats were placed to fill the areas between trees and branches

and shrubs and live willow cuttings were added. An estimated 1.1 miles of existing roadway was removed as part of re-storing the Pomme de Terre River and its floodplain. Successful re-routing of the river now means the sediment and nutrients carried by the Pomme de Terre River no longer are emptied into Marsh Lake, but are instead diverted into the Minnesota River below the water control structure. Fishway - The fishway was constructed from the current spillway and extends about 300 feet downstream at a 3% slope. Boulder weirs were spaced 20 feet apart, with each achieving individual 10-inch drops. The fishway ranges in width from 150 feet at the dam to 200 feet wide at the downstream edge. Approximately 1,579 cubic yards of large (1.6 ft diameter and larger boulders for weirs) were used in the fishway channel. The goal of the components listed above is to partially or fully reestablish the attributes of a naturally functioning and self-regulating system. The expected outcomes of the Marsh Lake project are to: (1) reduce sediment loading to Marsh Lake; (2) restore natural fluctuations to the hydrologic regime of Marsh Lake; (3) restore geomorphic and floodplain processes to the Pomme de Terre River; (4) reduce sediment resuspension within Marsh Lake; (5) increase extent, diversity, and abundance of emergent and submersed aquatic plant growth in Marsh Lake; (6) increase the availability of waterfowl and native fish habitat; (7) restore aquatic habitat connectivity between Marsh Lake, the Pomme de Terre River, and Lac qui Parle Lake; (8) reduce the abundance of aquatic invasive fish species in Marsh Lake; and (9) increase diversity and abundance of native fishes within Marsh Lake and the Pomme de Terre River. This project is designed to restore a more natural and variable hydrologic regime which is important to restoring freshwater aquatic ecosystems within Marsh Lake. On a river floodplain lake like Marsh Lake, a more natural hydrologic regime includes lower lake levels in some years to provide conditions conducive for aquatic vegetation to establish. In the event the goals in the Marsh Lake Ecosystem Restoration Plan are not achieved through the passive water control structure (i.e., fishway), a water level drawdown structure has been incorporated into the project where water levels could be drawn down according to recommendations and implementation by the adaptive management team. Annual and intra-annual variations in water levels are extremely important to maintain ecosystem functions in these shallow water systems. In other areas, (e.g., the pools in the Upper Mississippi River), variability in water levels has resulted in increased extent, diversity, and abundance of aquatic vegetation, increased food for waterfowl, and improved water quality conditions. The DNR Section of Wildlife has completed other projects to enhance habitat and water quality conditions within shallow lake systems through active water level drawdowns. A clear water system with more aquatic plants would favor native fishes over the non-native Common carp, as well as favor many other native plant and wildlife species. The proposed project will provide habitat improvement and improve water quality conditions in Marsh Lake. This restoration of ecosystem functions would improve fish and wildlife habitat, water quality, and provide more public use opportunities. Specific beneficiaries include sport anglers, waterfowl hunters, wildlife viewers, and downstream users who benefit from increased water quality downstream through the Minnesota River. Water quality benefits will result from the completed work and from the future management that is now possible. Rerouting of the Pomme de Terre into a meandering channel with adjacent floodplain habitat can provide some limited ability for sediment reduction as it flows into the Minnesota River. Significant water quality benefits will result from the current ongoing drawdown of Marsh Lake, along with any future drawdowns. Past experience with drawdowns of shallow lakes shows that the bottom-sediment consolidation and increased submergent vegetation provide significant water quality benefits both in the shallow lake and in downstream waters. Note that the "Performance Monitoring and Adaptive Management Plan" is attached to this Final Report and details the extensive monitoring that will be conducted on this project to determine progress towards goals. While COVID-19 restrictions have limited some initial monitoring, anecdotal reports from local staff reveal exciting developments related to the water level drawdown that was immediately initiated following completion of project construction -- From Walt Gessler (Lac qui Parle Area Wildlife Supervisor) - "I was able to remotely recruit several experienced birders earlier this year to make observations of shorebird use of Marsh Lake this spring and summer and thought you be interested in some recent counts that were made. 7/19/20 Louisburg Grade: 150 Killdeer, 4 Semipalmated Plovers, 40 Stilt Sandpipers, 30 Bairds Sandpipers, 100 Least Sandpiper, 460 Pectoral Sanpiper, 10 semipalmated Sandpipers, 20 Short-billed Dowitcher, 30 Spotted Sandpiper, 1450 Lesser Yellowlegs, 15 Greater Yellowlegs, 15 Wilsons Phalaropes. 2324 Total; Correll Access: 2

American Avocets, 200 Killdeer, 172 Stilt Sandpipers, 15 Baird's Sandpipers, 1280 Least Sandpipers, 340 Pectoral Sandpipers, 30 semi-palmated Sandpipers, 25 Short-billed Dowitcher, 30 spotted Sandpipers, 1800 Lesser Yellowlegs, 20 Greater Yellowlegs, 14 Wilson Phalaropes. 3928 total"- From Ray Norrgard (DNR Wetland Specialist, retired) 08/21/2020 - "Walt gave me a tour yesterday, the drawdown looks good with extensive mudflats; thousands of shorebirds and teal. Lots of bulrush and smartweed, rumex and some spartina." "He [Walt] is justifiably proud of the accomplishments. Even the upstream end north of the Louisville grade looked great."The Minnesota Department of Natural Resources will be responsible for all active water level management, with consultation provided by an Adaptive Management Team that will include members from the Minnesota DNR, US Army Corps of Engineers, US Fish and Wildlife Service and Upper Minnesota River Watershed District. A Citizen Advisory Committee has also been formed to help guide future operations and to provide better communication with the public regarding this high-profile project. Note that two separate OHF appropriations were approved for Marsh Lake - Marsh Lake and Marsh Lake Phase II. All enhanced acres will be reported in the Final Report for Marsh Lake. To avoid double-counting of acres, no acres will be reported in the Final Report for Marsh Lake Phase II.

### **Explain Partners, Supporters, & Opposition**

Significant partners in the Marsh Lake project with the US Army Corps of Engineers, the Upper Mississippi River Watershed District (District) and the Minnesota DNR. The US Army Corps of Engineers owns and maintains the Marsh Lake Dam and federal funds obtained by the USACE provided 65% of the needed funding. The Minnesota DNR manages the 31,000-acre Lac qui Parle Wildlife Management Area and led the securing of non-federal funding. The Minnesota DNR will responsible for all active water level management. The Watershed District provided support for the project and became the conduit by which Outdoor Heritage Funds could be transferred to the project. Besides playing roles in the design and construction of the Marsh Lake project, the three partners sit on the Marsh Lake Adaptive Management Team that guides assessment and management activities related to Marsh lake.

### **Exceptional challenges, expectations, failures, opportunities, or unique aspects of program**

The engineering complexities of the interrelated project components had to be overcome for the project to move to construction. This was also a complex and large project being undertaken by a relatively inexperienced contractor that necessitate a high level of supervision by the US Army Corps of Engineers. Finally, all of this was being done in a ecological system that by its nature was the focal point of flooding and, of course, there were a number of extreme flood events throughout throughout the project. All of these are challenges faced in various wetland/shallow lake projects, but the size of this specific project magnified their impacts.

### **What other funds that may contribute to this program?**

- Other : Federal funds for this project were appropriated to the US Army Corps of Engineers.

### **How were the funds used to advance the program?**

The total project cost according to a US Army Corps of Engineers' spreadsheet was \$13.4 million, which includes both design and construction. Federal funding accounted for \$8.478 million of this total amount.

### **What is the plan to sustain and/or maintain this work after the Outdoor Heritage Funds are expended?**

Vegetation will be monitored by conducting shallow lake surveys, using systematic point sampling, calculating aquatic plant distribution, diversity and frequency of occurrence. Surveys will be considered every three years or when degradation is suspected. Water clarity and water quality parameters will be monitored periodically using an approved water quality sampling regime and fish population composition will be verified by periodic test netting.

In addition to pre-drawdown sampling, these efforts will be duplicated and tracked following all drawdowns to determine success. A Marsh Lake Adaptive Management Team is in place to provide guidance for current and future management and maintenance of Marsh Lake. Note that the "Performance Monitoring and Adaptive Management Plan" has been attached to reflect the level of monitoring that will be focused on Marsh Lake.

## Budget

### Totals

Item	Request	Spent	Antic. Leverage	Received Leverage	Leverage Source	Original Total	Final Total
Personnel	-	-	-	-	-	-	-
Contracts	\$2,630,000	\$2,630,000	\$6,000,000	\$8,478,000	Federal	\$8,630,000	\$11,108,000
Fee Acquisition w/ PILT	-	-	-	-	-	-	-
Fee Acquisition w/o PILT	-	-	-	-	-	-	-
Easement Acquisition	-	-	-	-	-	-	-
Easement Stewardship	-	-	-	-	-	-	-
Travel	-	-	-	-	-	-	-
Professional Services	-	-	-	-	-	-	-
Direct Support Services	-	-	-	-	-	-	-
DNR Land Acquisition Costs	-	-	-	-	-	-	-
Capital Equipment	-	-	-	-	-	-	-
Other Equipment/Tools	-	-	-	-	-	-	-
Supplies/Materials	-	-	-	-	-	-	-
DNR IDP	-	-	-	-	-	-	-
<b>Grand Total</b>	<b>\$2,630,000</b>	<b>\$2,630,000</b>	<b>\$6,000,000</b>	<b>\$8,478,000</b>	<b>-</b>	<b>\$8,630,000</b>	<b>\$11,108,000</b>

### Explain any budget challenges or successes:

This project represents a strong partnership that produced significant federal leveraging of OHF dollars. Requiring a 65/35 federal/non-federal split, OHF funding was secured by the Minnesota DNR to provide the needed non-federal match. The Upper Minnesota River Watershed District provided the mechanism to move the OHF appropriation from the Minnesota DNR to be used by the US Army Corps of Engineers.

**Total Revenue:** \$0

**Revenue Spent:** \$0

**Revenue Balance:** \$0

### Of the money disclosed above, what are the appropriate uses of the money:

- E. This is not applicable as there was no revenue generated.

## Output Tables

### Acres by Resource Type (Table 1)

Type	Wetland (AP)	Wetland (Final)	Prairie (AP)	Prairie (Final)	Forest (AP)	Forest (Final)	Habitat (AP)	Habitat (Final)	Total Acres (AP)	Total Acres (Final)
Restore	0	0	0	0	0	0	0	0	0	0
Protect in Fee with State PILT Liability	0	0	0	0	0	0	0	0	0	0
Protect in Fee w/o State PILT Liability	0	0	0	0	0	0	0	0	0	0
Protect in Easement	0	0	0	0	0	0	0	0	0	0
Enhance	5,100	5,100	0	0	0	0	0	0	5,100	5,100
<b>Total</b>	<b>5,100</b>	<b>5,100</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5,100</b>	<b>5,100</b>

### Total Requested Funding by Resource Type (Table 2)

Type	Wetland (AP)	Wetland (Final)	Prairie (AP)	Prairie (Final)	Forest (AP)	Forest (Final)	Habitat (AP)	Habitat (Final)	Total Funding (AP)	Total Funding (Final)
Restore	-	-	-	-	-	-	-	-	-	-
Protect in Fee with State PILT Liability	-	-	-	-	-	-	-	-	-	-
Protect in Fee w/o State PILT Liability	-	-	-	-	-	-	-	-	-	-
Protect in Easement	-	-	-	-	-	-	-	-	-	-
Enhance	\$2,630,000	\$2,630,000	-	-	-	-	-	-	\$2,630,000	\$2,630,000
<b>Total</b>	<b>\$2,630,000</b>	<b>\$2,630,000</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>\$2,630,000</b>	<b>\$2,630,000</b>

### Acres within each Ecological Section (Table 3)

Type	Metro / Urban (AP)	Metro / Urban (Final)	Forest / Prairie (AP)	Forest / Prairie (Final)	SE Forest (AP)	SE Forest (Final)	Prairie (AP)	Prairie (Final)	N. Forest (AP)	N. Forest (Final)	Total (AP)	Total (Final)
Restore	0	0	0	0	0	0	0	0	0	0	0	0
Protect in Fee with State PILT Liability	0	0	0	0	0	0	0	0	0	0	0	0
Protect in Fee w/o	0	0	0	0	0	0	0	0	0	0	0	0

State PILT Liability												
Protect in Easement	0	0	0	0	0	0	0	0	0	0	0	0
Enhance	0	0	0	0	0	0	5,100	5,100	0	0	5,100	5,100
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5,100</b>	<b>5,100</b>	<b>0</b>	<b>0</b>	<b>5,100</b>	<b>5,100</b>

**Total Requested Funding within each Ecological Section (Table 4)**

Type	Metro / Urban (AP)	Metro / Urban (Final)	Forest / Prairie (AP)	Forest / Prairie (Final)	SE Forest (AP)	SE Forest (Final)	Prairie (AP)	Prairie (Final)	N. Forest (AP)	N. Forest (Final)	Total (AP)	Total (Final)
Restore	-	-	-	-	-	-	-	-	-	-	-	-
Protect in Fee with State PILT Liability	-	-	-	-	-	-	-	-	-	-	-	-
Protect in Fee w/o State PILT Liability	-	-	-	-	-	-	-	-	-	-	-	-
Protect in Easement	-	-	-	-	-	-	-	-	-	-	-	-
Enhance	-	-	-	-	-	-	\$2,630,000	\$2,630,000	-	-	\$2,630,000	\$2,630,000
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>\$2,630,000</b>	<b>\$2,630,000</b>	<b>-</b>	<b>-</b>	<b>\$2,630,000</b>	<b>\$2,630,000</b>

**Average Cost per Acre by Resource Type (Table 5)**

Type	Wetland (AP)	Wetland (Final)	Prairie (AP)	Prairie (Final)	Forest (AP)	Forest (Final)	Habitat (AP)	Habitat (Final)
Restore	-	-	-	-	-	-	-	-
Protect in Fee with State PILT Liability	-	-	-	-	-	-	-	-
Protect in Fee w/o State PILT Liability	-	-	-	-	-	-	-	-
Protect in Easement	-	-	-	-	-	-	-	-
Enhance	\$515	\$515	-	-	-	-	-	-

**Average Cost per Acre by Ecological Section (Table 6)**

Type	Metro / Urban (AP)	Metro / Urban (Final)	Forest / Prairie (AP)	Forest / Prairie (Final)	SE Forest (AP)	SE Forest (Final)	Prairie (AP)	Prairie (Final)	N. Forest (AP)	N. Forest (Final)
Restore	-	-	-	-	-	-	-	-	-	-
Protect in Fee with State	-	-	-	-	-	-	-	-	-	-



PILT Liability										
Protect in Fee w/o State PILT Liability	-	-	-	-	-	-	-	-	-	-
Protect in Easement	-	-	-	-	-	-	-	-	-	-
Enhance	-	-	-	-	-	-	\$515	\$515	-	-

**Target Lake/Stream/River Feet or Miles**

**Outcomes**

**Programs in prairie region:**

- Other ~ *Goals of the Marsh Lake project were: Reduced sediment loading to Marsh Lake; Restored natural fluctuations to the hydrologic regime; Restored geomorphic and floodplain processes; Reduced sediment resuspension within Marsh Lake; Increased extent, diversity and abundance of emergent and submersed aquatic plants; Increased availability of waterfowl habitat within Marsh Lake; Restored aquatic habitat connectivity between Marsh Lake, the Pomme de Terre River and Lac Qui Parle; Reduced abundance of aquatic invasive fish species; and Increased diversity and abundance of native fish. Monitoring, as laid out in the attached plans will document progress towards these stated goals.*

## Parcels

### Sign-up Criteria?

No

### Restore / Enhance Parcels

Name	County	TRDS	Acres	Est Cost	Existing Protection
Marsh Lake	Lac qui Parle	12043230	5,100	\$2,630,000	Yes



- Protect in Easement
- ▲ Protect in Fee with PILT
- Protect in Fee W/O PILT
- ★ Restore
- ✕ Enhance
- ⊕ Other

**Parcel Map**  
**Marsh Lake Enhancement**  
 (Data Generated From Parcel List)