

# **OPERATIONS PLAN**

## **ROSEAU LAKE REHABILITATION PROJECT**

**MINNESOTA DEPT. OF NATURAL RESOURCES (DNR)  
ROSEAU RIVER WATERSHED DISTRICT (RRWD)**

**NOVEMBER 2021**

## EXECUTIVE SUMMARY

The Roseau Lake Rehabilitation Project will provide Natural Resources Enhancements (NRE) and Flood Damage Reduction (FDR) to the Roseau River and the Roseau Lake basin. This operating plan is seasonally-adjusted to provide for wildlife habitat needs in the basin and enhanced fish habitat in the river while providing significant FDR benefits both near-basin and downstream of the lake. The operating plan will balance habitat and flood management goals for more frequent ( $\leq 10$ -year) rain events such that the flood peak on the Roseau River at and downstream of Ross, MN, is moderated. Operation of the basin's inlet and outlet structures is guided by known surface water elevations at the USGS gauge located at Ross, MN, and the relationship of those water levels with land use near the Roseau River and Roseau Lake.

## PROJECT DESCRIPTION AND GOALS

(All elevations referenced in this document are presented in 1988 NAVD.)

Roseau Lake is a drained 6000-acre shallow lake basin located in north-central Roseau County. The Roseau Lake Rehabilitation Project will restore shallow lake ecological functions to a portion of the basin while improving management of flood water storage both near-basin and downstream of the project for the more frequent (i.e.,  $\leq 10$  year frequency of occurrence) flood events. A significant portion of the lake basin north of the Roseau River is owned and managed by the Minnesota Department of Natural Resources as the Roseau Lake Wildlife Management Area (RoLWMA) (Figure 1).

Water entering Roseau Lake comes from 2 sources: (1) upstream (east) of the lake via the Roseau River and Sprague Creek and (2) from south, west, and north of the basin via stream, ditch, and overland flow. This project focuses on managing flows from upstream while giving due consideration to flows from other sources.

The primary infrastructure of the project, which is located north of the river (Figure 2), is: (1) Levees to contain the lake north of the river; (2) Three new water control structures—a large structure on an inlet ditch located on the east side of the lake, another of moderate size in the middle of the basin to serve as the primary outlet structure, and a third, small structure on Pine Creek where it enters the basin that will assist in managing local water and maintain flow in a perennial stream; (3) A large, fixed-crest weir that allows passive flooding of the basin when the river exceeds 1034.0' elevation at Ross; (4) An exterior ditch along the Northwest Embankment to facilitate management of the basin for flood damage reduction; (5) A large, 1.1 mile-long inlet

ditch on the east side of the basin used for flooding the basin; and (6) Two stream diversions to steer primary flow of the Roseau River and Pine Creek, respectively, through their respective historic stream channels (i.e., as opposed to the channelized ditches where primary flows now occur).

The NRE goals of the project are to:

- Improve nesting and brood-rearing habitat for birds on and near the basin;
- Improve capability to manage for desirable vegetation and invertebrate populations in the basin;
- Improve spring and fall migratory waterfowl habitat;
- Improve fish habitat by restoring flow to historic portions of 2 streams;
- Reduce the incidence of occurrence and the abundance of invasive plant species in the lake basin;
- Moderate the frequency, duration, and depth of inundation of habitats in the Big Swamp area; and
- Increase and enhance compatible outdoor recreational opportunities.

The FDR goals of the project are to:

- Reduce peak flood flows on the Roseau River both near-basin and downstream by forcing more (in contrast to current conditions) water downstream of the basin early in a given flood event;
  - Allow lands adjacent to and upstream of the lake to drain first, then release water from the basin; and
  - Meter release of water from the basin so as not to exceed downstream channel capacity.
- Reduce the incidence of overflows of Roseau River Watershed flood flows into the Two Rivers Watershed, and
- Contribute to reduced peak flows on the Red River of the North.

## PROPOSED PLAN

The project will enhance natural resources and reduce flood damages by balancing NRE and FDR uses of the basin at any given time based on local flood conditions. Hydrologic and hydraulic data indicate that the project will reduce downstream and near-basin peak flows for

more frequent (i.e., ≤10 year) flood events by timing the storage of flood waters in the basin to coincide with the crest of the Roseau River at Ross.

Water level management in the basin will favor NRE goals except during spring-through-fall flood events. During flood events, priority for management of stream flows at Ross and water levels in the basin will favor FDR. As a flood recedes, discharge of water from the basin below the 1034.0' elevation will be managed such that water on agricultural lands within and near the basin and downstream will drain with greater efficiency as compared to pre-project conditions. The basin will be drawn down in entirety (<1026.0' elevation) during winter to provide full storage capacity for the following spring. NRE management during spring and summer will emphasize shallow marsh management for a host of wildlife species that require such habitats for breeding, nesting, brood-rearing, and foraging. In fall, NRE management will allow for additional water on the basin to enhance availability of fall migration habitat for waterfowl and to increase opportunity for waterfowl hunting. Done in this way, shallow marsh management will curb the spread of invasive plant species (e.g., reed canary grass) and enable colonization of native species (e.g., softstem bulrush) within certain zones of water depth.

## OPERATION

### *Protocols of operation*

Most of the project infrastructure, with the exception of some of the levees, occurs on RoLWMA. As such, the DNR will operate the gates on the structures located at the inlet and outlet structures on the lake as well as at Pine Creek. (At the request of the DNR, RRWD may assist with operation of the structures.) In addition, the DNR will manage access to the project's primary infrastructure. The DNR wildlife manager will assume primary responsibility for reporting, by 31 January annually, to the Roseau River Watershed Board of Managers on activities that involve the infrastructure installed and operated as part of this project. (At a minimum, this report will contain a summary of the RoLWMA waterfowl breeding pairs survey, a summary of the RoLWMA waterfowl brood count survey, any changes from normal operations and the factors and reasoning that contributed to such actions, and Roseau Lake spring-through-fall water levels.) In addition, the DNR and RRWD will confer as operational issues arise so that necessary actions are implemented in a timely manner to meet project objectives.

RRWD staff will be granted access to restricted areas of the RoLWMA levee system for the purpose of inspection of the project's infrastructure. Such access will be granted upon notification of the DNR wildlife manager and will be limited to times and places that will not

disrupt management activities or disturb wildlife (as determined by the wildlife manager). The DNR and RRWD will develop an agreement for DNR access to RRWD properties for the purposes of project management, infrastructure inspection, and natural resources management.

The operating plan will be evaluated every 5 years for updates to the plan to address shortcomings and adjust the plan based on new data or experience in operating the project. Revisions to the operating plan may be considered at 5-year intervals or sooner as circumstances dictate. Modifications to the plan must be agreed to in writing by both (RRWD and DNR) parties.

Risk to the safety of the public, contractors hired by the project partners, and the project partners' operators will be a priority consideration when operating any of the project's water control structures.

Definitions of the seasons of the year as they relate to the project and as discussed in operational details that follow, are referenced in Table 1. The transition from one season to the next may entail a period of 0.5-4 weeks to achieve the new seasonal NRE target elevation. In particular, the transition from summer to fall will likely take some time to achieve in certain years; in other (i.e., dry) years, the target elevation will not be achieved.

Table 1. For purposes of this plan, seasons of operation for the Roseau Lake Rehabilitation Project.

Season	Dates
Spring	16 March-30 April
Growing season	1 May-Labor Day
Fall	Labor Day-late November
Winter	Late November-15 March

*General operations*

Roseau Lake drains from a large subwatershed characterized by varying land use. For any given localized event within the watershed, runoff will behave differently. No two floods are alike in how they fill the watershed's streams and ditches, and thus, the combinations of circumstances that result in flooding of the Roseau Lake basin are countless. Operation of the project must remain flexible in order to react to a given flood and meet NRE and FDR objectives. The operational guidelines discussed below, therefore, emphasize achievement of targets and do not delve into specifics of how to achieve those targets through manipulation of water control

structures. The operator for any given event must have the necessary information (e.g., stream gauge data) and be granted sufficient flexibility in the plan to allow for sound, timely decisions.

The seasonality of flooding along the Roseau River and within Roseau Lake follows a general pattern that will govern water management at Roseau Lake. In general, spring floods of varying degrees of severity occur annually followed by a decreasing occurrence of flooding from the growing season through fall. For NRE, this means that availability of water to meet spring management targets elevations in the basin is good, whereas fall opportunities to meet water level targets are much less reliable. Flooding anytime during the growing season is of concern for FDR.

Appendix I provides surface water elevations and the corresponding volume of flow for USGS staff gauge readings at Ross, MN.

A general description (Table 2) of project operation is as follows:

- **Spring:** The basin, which was empty overwinter, will flood to  $\leq 1028.0'$  for NRE and be maintained at this level unless needed for FDR. For FDR, flooding may occur up to  $1034.0'$  of gated storage. Any water in the basin above  $1034.0'$  would be considered ungated storage.
- **Growing season:** Maintain the basin at  $\leq 1028.0'$  unless needed for FDR. For FDR, flooding may occur up to  $1034.0'$  of gated storage. Any water in the basin above  $1034.0'$  would be considered ungated storage.
- **Fall:** Flood the basin to  $1028.0$ - $1030.0'$  for NRE. If needed for FDR, flooding may occur up to  $1034.0'$  of gated storage. Any water in the basin above  $1034.0'$  would be considered ungated storage.
- **Winter:** Drawdown the basin to  $\leq 1026.0'$  for NRE and FDR. Maintain overwinter at this level.

Table 2. Summary of management targets by season for NRE and FDR, Roseau Lake Rehabilitation project.

MANAGEMENT FOR:	SPRING	GROWING SEASON	FALL	WINTER
<b>Natural Resources Enhancement</b>	<p>*Capture runoff to <math>\leq 1028.0'</math>;</p> <p>*Maintain Pine Creek flow;</p> <p>*Manage discharge to moderate flooding in Big Swamp and achieve waterbird breeding and nesting within the basin</p>	<p>*Maintain basin at <math>\leq 1028.0'</math>;</p> <p>*Maintain Pine Creek flow;</p> <p>*Manage discharge to moderate flooding in Big Swamp, maintain stream flow, and achieve waterbird nesting and brood-rearing</p>	<p>*Flood basin to 1028.0-1030.0' to promote hunting and attract fall migrants;</p> <p>*Maintain Pine Creek flow;</p> <p>*Manage discharge to moderate flooding in the Big Swamp, maintain stream flow, and promote hunting</p>	<p>*Draw basin down to <math>&lt; 1026.0'</math>; maintain at this level during late November-spring</p> <p>*Maintain Pine Creek flow;</p>
<b>Flood Damage Reduction</b>	<p>*Divert Roseau River past basin up to 1032.0';</p> <p>*Above 1032.0', flood basin;</p> <p>*Manage discharge to moderate flooding on ag lands</p>	<p>*Divert Roseau River past basin up to 1032.0';<sup>a</sup></p> <p>*Above 1032.0', flood basin;<sup>a</sup></p> <p>*Limit discharge to moderate flooding on ag lands</p>	<p>*Divert Roseau River past basin up to 1032.0';</p> <p>*Above 1032.0', flood basin;</p> <p>*Limit discharge to moderate flooding on ag lands</p>	<p>*Draw basin down to <math>&lt; 1026.0'</math>; maintain at this level during late November-spring</p>

<sup>a</sup> See Table 3 for provisions to inlet water to the basin when water levels at the Ross USGS gauge are between 1030.0' and 1032.0' during the growing season.

Complicating factors that could cause operation to be adjusted from the above may include (but are not limited to):

- Public safety threats due to localized flooding;
- Potential for damage to public infrastructure and private property;

- Extreme weather events;
- Potential for damage to project infrastructure;
- Consecutive flood events where the crest of one flood has only recently passed at Roseau Lake prior to the crest from the next significant event arriving; and
- Unintended accumulation of water along stretches of the exterior ditches (e.g., intersection of Pine Creek with the exterior ditch and intersection of exterior ditches with the river).

In an instance where a deviation is made from standard operating protocol, the operator (DNR) will file a report with the RRWD within 1 month of the event that describes the circumstances that led to the adjustment in operation. The partners will review the report on the specifics that instigated the action. Appendix II provides guidelines for emergency actions that result in modification of the project's standard operating procedures.

Details of inflow and outflow management of the basin are presented below.

### *Operational details—Inflows*

Inflows to the basin via stream or ditch will occur from 5 sources (Figure 3):

- East inlet
- Pine Creek
- Lat. 7 of Judicial Ditch 61
- Unorganized township road ditch (360<sup>th</sup> Ave.)
- Fixed crest weir (only when river water levels exceed 1034.0')

The east inlet will provide the vast majority of inflows to the basin. **The trigger for inletting water is dependent on the predicted crest at the City of Roseau. The 4 categories of inlet operation, based on the predicted crest at the City of Roseau, are:**

- **Predicted crest = <12.0' (<1032.0' in elevation) at Ross;**
- **Predicted crest = 12.0-13.0' (1032.0-1033.0' in elevation or 1700-1800 cfs at Ross;**
- **Predicted crest = 13.0-14.0 (1033.0-1034.0' in elevation or 1800-2150 cfs) at Ross;**  
**and**
- **Predicted crest = >14.0 (>1034.0') at Ross.**

Inlet structure operations are summarized in Table 3 below.



TABLE 3. Operations plan for the inlet structure, Roseau Lake Rehabilitation project, based on predicted crests of a flood at the City of Roseau resulting in a crest of: (A) <12.0' [<1032.0' elevation] at the Ross USGS gauge; (B) 12.0-13.0' [1032.0-1033.0' elevation]; (C) 13.0-14.0' [1033.0-1034.0' elevation]; and (D) ≥14.0' [≥1034.0' elevation] at Ross.

Predicted crest at Ross	<b><u>OPERATIONAL PERIOD</u></b>			
	Spring	Growing Season	Fall	Winter
<12.0'	Gates closed	Gates closed at ≤10.0; from 10.0-12.0', scale up inletting of water to moderate rise at Ross	Gates closed	Gates closed
12.0-13.0'	4 gates <sup>a</sup> open	4 gates open	4 gates open	Gates open
13.0-14.0'	8 gates open	8 gates open	8 gates open	Gates open
>14.0'	Gates closed (if safe to do so)	Gates closed (if safe to do so)	Gates closed (if safe to do so)	Gates open

<sup>a</sup> The inlet structure has 8 gates. Each gate is 6 foot tall X 8 foot wide.

(Each flood event is different in how water flows toward and into the basin. Additional water level data from nearby sources may be useful in fine-tuning inlet operation to conform to conditions on the ground. To that end, river flow data from another location, the observed elevation at the Trangrud Bridge, which crosses County Road 113 in the NWNW Sec 27 T163N R42W (Pohlitz Township) of Roseau County, MN are being collected and will be analyzed for use in managing the primary trigger at Ross (see above). The DNR and RRWD will collect data in an attempt to characterize the relationship between flows at the Trangrud Bridge and Ross. At least 5 years of data will be required to understand the relationship of flows at Ross to that of the Trangrud Bridge. Furthermore, data from USGS gauges at Malung and Sprague Creek, as well as local precipitation and runoff information and other localized gauging of, e.g., ditches, will inform operation of the project's inlet structure.)

At >14.0' (1034.0' elevation) at the Ross gauge, gates will remain fully open until the river crests, after which gates will be closed (if such action can be performed safely). At times of low flow, the inlet structure may be operated to replenish water in the basin to seasonal target levels.

However, in order to maintain stream flows on the Roseau River, no such inflows may be allowed through the structure when the Ross gauge is at <1026.0' elevation (6.0 on the Ross gauge).

A small inlet structure is located on Pine Creek, which flows into the northwestern portion of the basin (Figure 3). Pine Creek is a perennial stream, and flow must be maintained at all times. The project also seeks to maintain available flood storage by diverting flows around the basin. The tension between these competing goals requires management of the structure to mimic natural flow of the stream while minimizing use of flood storage above the seasonal NRE targets established for the basin. There are no triggers for operation of this structure as local flows in this area have proven to be ephemeral and very flashy.

There are no structures to operate on Lat. 7 of Judicial Ditch 61 or on 360<sup>th</sup> Avenue.

#### *Operational details—Outflows*

Outflows from the basin will occur primarily from an outlet structure located in the center of the basin (Figure 2). During all seasons, water will be released only when levels in the basin are in excess of seasonal NRE target elevations. Operations for outflow from the basin are summarized in Table 4 below. **During the growing season, (1 May-Labor Day), discharge from the basin may not cause river stage at Ross to exceed 11.5' on the gauge (1031.5' in elevation or 1400 cfs). Prior to 1 May and after 30 September, discharge may not cause river stage at Ross to exceed 13.0' (1033.0' in elevation or 1700 cfs).** Releases during spring-through-fall are to proceed as efficiently as possible in order to provide flood storage for the next flood event and to meet NRE habitat management goals for the basin (i.e., which are established at  $\leq 1028.0'$  for spring and the growing season and at 1028.0-1030.0' for fall). Note: There may be instances when holding water above 1030.0' elevation in fall is desirable in the short term to facilitate crop harvest on near-basin and downstream farm lands. In this case, the RRWD will request that the DNR vary from standard operating procedures; the request must be in writing (e-mail is acceptable) to the DNR Wildlife Manager or Assistant Manager.

Outflows may also occur over the project's fixed weirs (Figure 2). Such outflows will occur when water in the basin exceeds 1034.0' in elevation (and when the river at Ross is at  $\leq 1034.0'$ ). In late November, the basin will be drawn down to <1026.0' in elevation. The drawdown must not cause flows to exceed 1032.0' in elevation at the Ross gauge. No accumulation of water above 1026.0' should occur until spring runoff commences.

There are limited instances when the east inlet structure (Figure 2) may be used to discharge water from the basin. Regardless of which structure or combination of structures is used to manage basin outflows, seasonal river stages will be managed to avoid exceeding seasonal water level targets.

Table 4. Operations plan for managing outflow of water from the Roseau Lake basin, Roseau Lake Rehabilitation project, based on river stage and season of the year. Elevations shown are target elevations for operation such that discharge from the basin would not result in water levels above these threshold stages at Ross.

<i>OPERATIONAL PERIOD</i>			
Spring	Growing season	Fall	Winter
13.0'	11.5'	11.5'	Draw basin down to $\leq 6.0'$

*Managing inflow/outflow while river rising from 1028.0 to 1032.0 elevation*

A nuance of managing inflow and outflow at Roseau Lake is that, to force water downstream during the early stages of a given flood, water at the inlet and outlet structures will effectively need to be walled off from the basin early in the flood hydrograph by closing gates at both structures. In doing so, water entering the basin from the west and north will be captured in the basin, thus creating a temporary condition where waters may rise above the seasonal target elevation (e.g., 1028.0' in June) in the lake. Such a rise will not affect private land near the basin. This condition is likely to occur during most spring runoff events.

## APPROVALS

The Minnesota Department of Natural Resources and the Roseau River Watershed District agree to operate and maintain the Roseau Lake Rehabilitation project as outlined in this plan until such time that, by the mutual consent of both parties, alterations to this plan are agreed to in writing.

### Minnesota Department of Natural Resources

By (Print): Dave Olfelt

Kelly Straka, **Kelly Straka**  
Wildlife Section Manager

Digitally signed by Kelly  
Straka  
Date: 2022.01.18 23:09:14  
-06'00'

Signature: David Olfelt  
Digitally signed by David  
Olfelt  
Date: 2022.02.24  
15:49:12 -06'00'

Title: Director, Division of Fish and Wildlife

Date: \_\_\_\_\_

### Roseau River Watershed District

By (Print): Carter Diesen

Signature: 

Title: Board Chair

Date: March 2, 2022

APPENDIX I. Relevant topographical elevations and flow volumes of the Roseau River at Ross, Minnesota, from corresponding USGS gauge readings.

River Stage @ Ross, MN (feet)	River Water Surface Elevation NAVD88 (feet)	Flow (in cfs)
6.0	1026.0	300
7.0	1027.0	450
8.0	1028.0	700
9.0	1029.0	950
10.0	1030.0	1200
11.0	1031.0	1450
11.5	1031.5	1550
12.0	1032.0	1700
13.0	1033.0	1800
14.0	1034.0	2150

## APPENDIX II. Emergency protocols for operation of the Roseau Lake Rehabilitation project.

### *Definition of an emergency*

An emergency for project operation may be declared when one of more of the following conditions exist within the project footprint or in the near-basin or downstream portion of the Roseau River that the project affects:

- Public safety threats due to localized flooding;
- Potential for damage to public infrastructure and private property;
- Extreme weather events that will likely result in severe flooding; and
- Potential for damage to project infrastructure.

Emergency actions may include:

- Notification of affected parties;
- Coordination with state and local government authorities to protect safety and mitigate the effects of flooding;
- On-the-ground actions employed to reduce the chance of catastrophic failure of project infrastructure, damage to public infrastructure, and damage to primary residences.

### *Emergency protocols*

When the potential for an emergency occurs, the DNR and RRWD will consult. Either party may take emergency action to guard public safety that is of immediate consequence. Otherwise, the partners are expected to consult with one another, agree to a course of action, and implement the action(s). Upon request of the DNR, the RRWD may assist in carrying out emergency measures.

Notifications will be provided via:

- Phone or text message;
- E-mail;
- RRWD website; or
- Local radio.

All notifications should be documented by the RRWD (upon request, the DNR may assist with documentation).

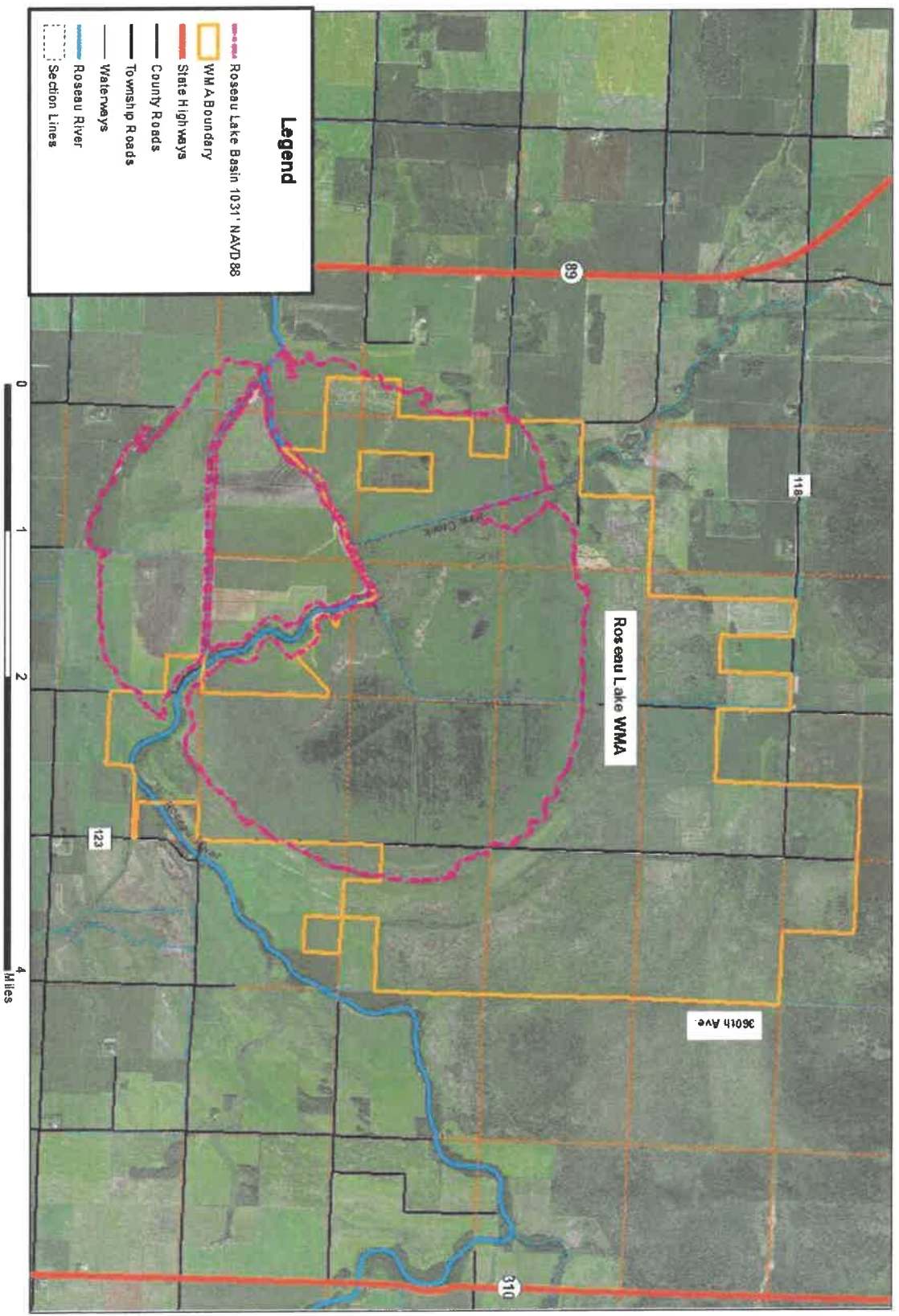
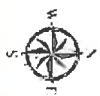
Coordination with other government authorities will be the primary responsibility of the RRWD. DNR will assist the RRWD in coordination, including but not limited to, providing critical operational information to authorities.

The DNR will take the lead in emergencies that require a deviation from standard operating procedures at water control structures. Threats to infrastructure where timely intervention with heavy equipment is required is generally best handled by the RRWD; the DNR and RRWD will develop a protocol for handling these specific situations.

Emergency actions for a given event will be documented by both partners. An after-action review of emergency incidents is required; the RRWD will take the lead in conducting the review and reporting outcomes of the incident and the review to the appropriate entities.

# Roseau Lake Rehabilitation Project

## Operations Plan - Figure 1: Roseau Lake WMA and Vicinity



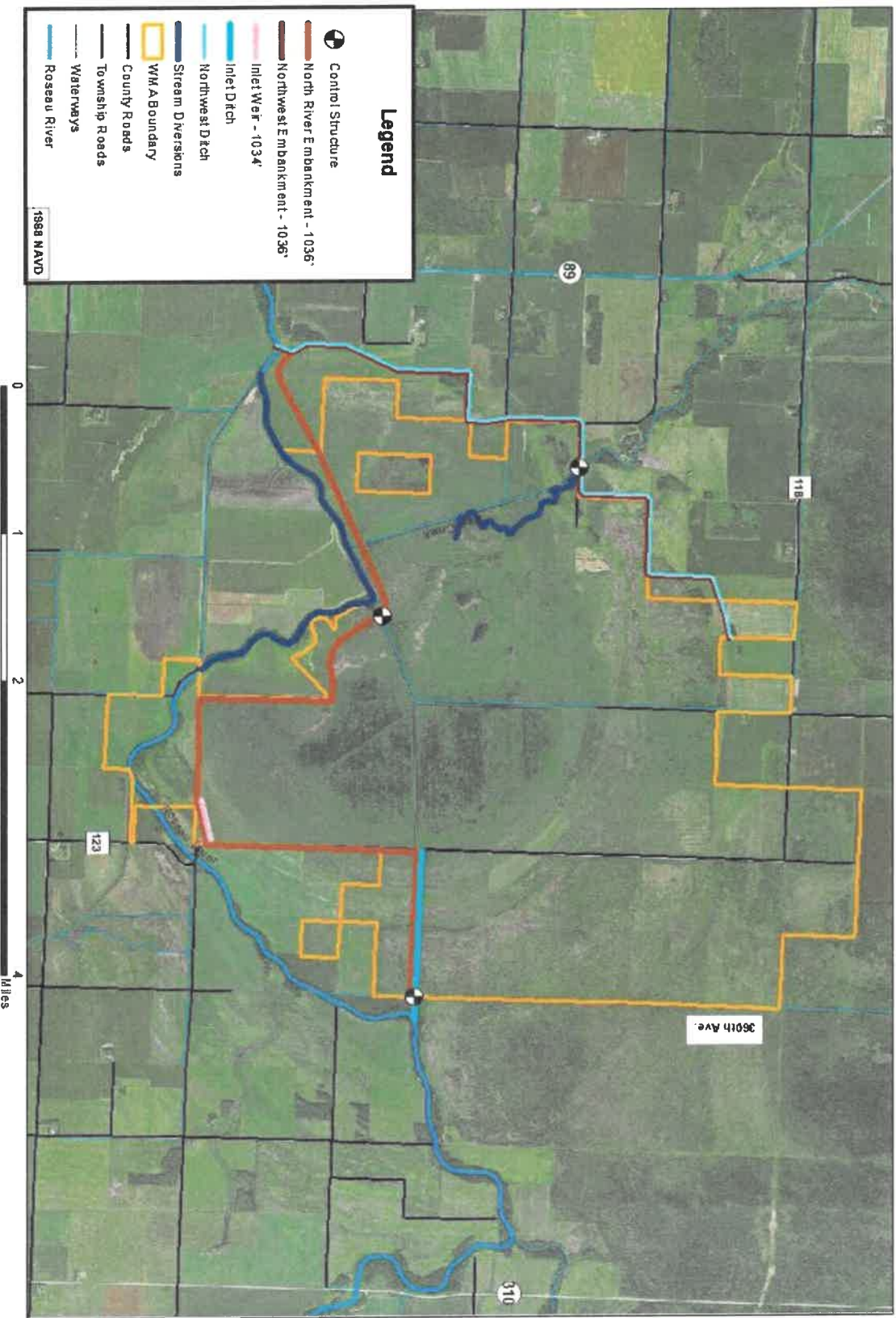
**Legend**

- - - Roseau Lake Basin 1031' NAD83
- WMA Boundary
- State Highways
- County Roads
- Township Roads
- Waterways
- Roseau River
- Section Lines



# Roseau Lake Rehabilitation Project

## Operations Plan - Figure 2: Project Infrastructure



**Roseau Lake Rehabilitation Project**  
 Operations Plan - Figure 3: Sources of Water Inflow to the Basin

