



## Mississippi River Headwaters ROPE Study Summary



### Cross Lake Proposed Operating Plan

Major components of the current and proposed operating plans for Cross Lake and the Whitefish Chain of Lakes are summarized in the tables and figure below. The most significant changes to the current operating plan are the late summer decline in reservoir water levels and the increase in minimum releases. More specific information regarding the proposed plan rules can be found in Section 5.5.

The effects of the proposed plan are discussed in detail in Section 7.6 and are summarized in Major Conclusions and Findings below. In general, the proposed plan is judged to have a minor positive effect on numerous natural resources on Cross Lake and the Whitefish Chain but a minor adverse effect on boat access during the last half of summer in areas of shallow water. The table below shows the differences between water levels under the current and proposed plan in inches to better help describe expected water levels under the proposed plan.

Under the proposed operating plan, a late summer decline would begin on July 15. However, the water level would not drop drastically on that date. Instead, water levels would gradually decline after July 15 so that they would be 1 inch lower than normal on August 1, 3 inches lower than normal on September 1, and just over 3 inches lower than normal on October 1. Also, if water levels are below the target in the proposed plan, we would attempt to raise water levels; in other words, we would not continue drawing water levels down if we are already low on July 15.

One common misconception is that the proposed decline in lake levels is being done to increase downstream flows to increase the water supply for municipalities such as Minneapolis. This is not the purpose for any proposed changes in the operating plan.

The primary purpose of lowering the lake beginning in mid-July is to benefit the aquatic plants and animals on the Whitefish Chain. Operating the lake in this manner would better approximate water levels that occur on a natural lake, which is beneficial to the lake's environment in general because the plants and animals evolved around a natural rise and fall of water levels. A couple of the more specific benefits are that the gradual decline is favorable to near-shore emergent vegetation such as cattail and bulrush, which benefits fish and birds by providing cover for nesting and rearing of young. More importantly, vegetation can help stabilize eroding banks, for which the Whitefish Chain is known. Furthermore, vegetation helps trap eroding sediment and keeps it from covering deeper spawning habitat for fish such as walleye. This gradual decline will not cause fish kills and, in general, will benefit the lake's fishery. It is our assessment that the proposed plan will not harm, but could benefit, stands of wild rice, although it may slightly impede harvest in some years. It is also our assessment that the proposed plan will benefit wetland habitat and the animals that inhabit them. Drawing down wetlands by a few inches late in summer mirrors a natural process and likely encourages reptiles, amphibians, and wetland mammals to overwinter in more stable areas, where winter freeze-out is less likely.

We do realize that this plan has a "cost," in that a decline in water levels does reduce accessibility for boaters. However, it is our assessment that this cost is outweighed by the long-term environmental benefits that will enhance all uses of the lake into the future.



## Mississippi River Headwaters ROPE Study Summary



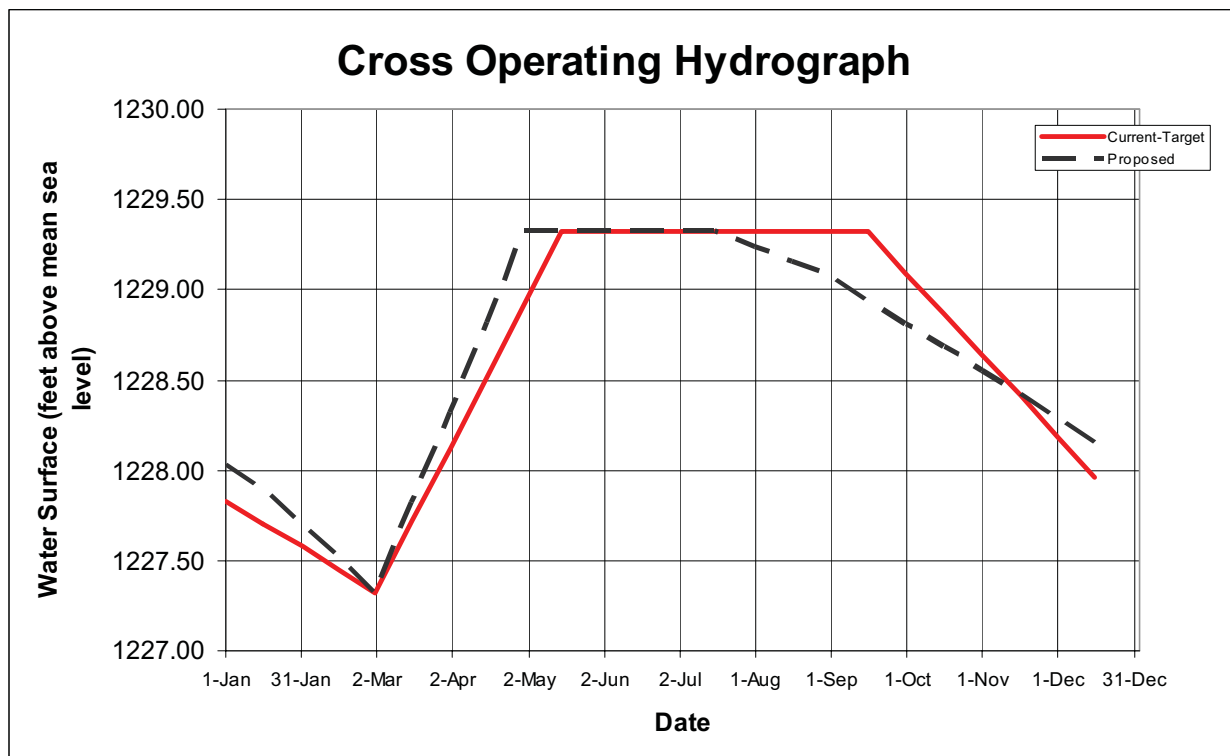
The proposed plan also includes increases in the minimum flow requirements for the benefit of downstream aquatic habitat. It is our assessment that during years with normal precipitation, these increases would not impact reservoir water levels. During drought years such as 2006 and 2007, it is our assessment that these increased minimums would further reduce lake levels by less than 2 inches.

If a new operating plan is implemented, we will still be open to modifying it quickly if we determine that it is not working as intended. We have described a process that will be implemented with a new operating plan that will enable us to easily modify the plan in the future if needed.

Finally, it is important to reiterate that the intent of the proposed plan is not to significantly impact one user group for the benefit of another; the intent is to balance the benefits and impacts for the improvement of the whole system for all current and future users. We believe that these reservoirs are valuable resources, and we wish to protect and enhance their health for future generations.

<b>CROSS LAKE OPERATING RULES</b>		
	<b>CURRENT</b>	<b>PROPOSED</b>
Summer Band (elev. - feet)	1229.07-1229.57	1229.07-1229.57
Summer Target (elev. - feet)	1229.32	1229.32 (May 1 – Jul 15)
Band Width (feet)	0.5	0.5
Normal Drawdown (elev. - feet)	1227.32	1227.32
Maximum Drawdown (elev. - feet)	1225.32	1225.32
Rate of Release (change/day)	60 cfs or 0.25 ft. of TW change	20-30%
Spring Pulse	NA	500 cfs
Minimum Flow Requirements April through September	$\geq(1225.32)$ : 30 cfs	$(\geq$ bottom of band): 50 cfs
		$<$ (bottom of band) $\geq$ (bottom of band – 15"): 30 cfs
	$<(1225.32)$ : 15 cfs	$<$ (bottom of band – 15"): 20 cfs
Minimum Flow Requirements October through March	$\geq(1225.32)$ : 30 cfs	$\geq$ (target - 6"): 30 cfs
	$<(1225.32)$ : 15 cfs	$<$ (target - 6"): 20 cfs

Cross Late Summer Elevations			
	Current (ft.)	Proposed (ft.)	Difference (in.)
<b>August 1</b>	1229.32	1229.24	-0.96
<b>September 1</b>	1229.32	1229.07	-3
<b>October 1</b>	1229.09	1228.81	-3.36



### Gull Lake Proposed Operating Plan

Major components of the current and proposed operating plans for Gull Lake are summarized in the tables and figure below. The most significant changes to the current operating plan are the increase in summer water levels, early fall/late summer decline in reservoir water levels, and the increase in minimum releases. More specific information regarding the proposed plan rules can be found in Section 5.5.

The effects of the proposed plan are discussed in detail in Section 7.6 and are summarized in Major Conclusions and Findings below. In general, the proposed plan is judged to have a minor positive effect on numerous natural resources on Gull Lake and a very minor positive effect on boat access. The table below shows the differences between water levels under the current and proposed plan to better help describe expected water levels under the proposed plan.

Under the proposed plan the summer water level target would be raised to 1194.0. Most will not notice much change as water levels have been very near this level during the summer since about the mid-1980's. The proposed plan would also include a late summer decline that would begin on September 1. It is important to note that during the summers of 2006 and 2007 late summer water levels on Gull were about 6 inches lower than the targeted water levels under the proposed plan.

The proposed plan also includes increases in the minimum flow requirements for the benefit of downstream aquatic habitat. It is our assessment that during years with normal precipitation, these increases would not impact reservoir water levels. During drought years such as 2006 and 2007, it is our assessment that these increased minimums would further reduce lake levels by less than 2 inches.

One common misconception is that the proposed decline in lake levels is being done to increase downstream flows to increase the water supply for municipalities such as Minneapolis. This is not the purpose for any proposed changes in the operating plan.

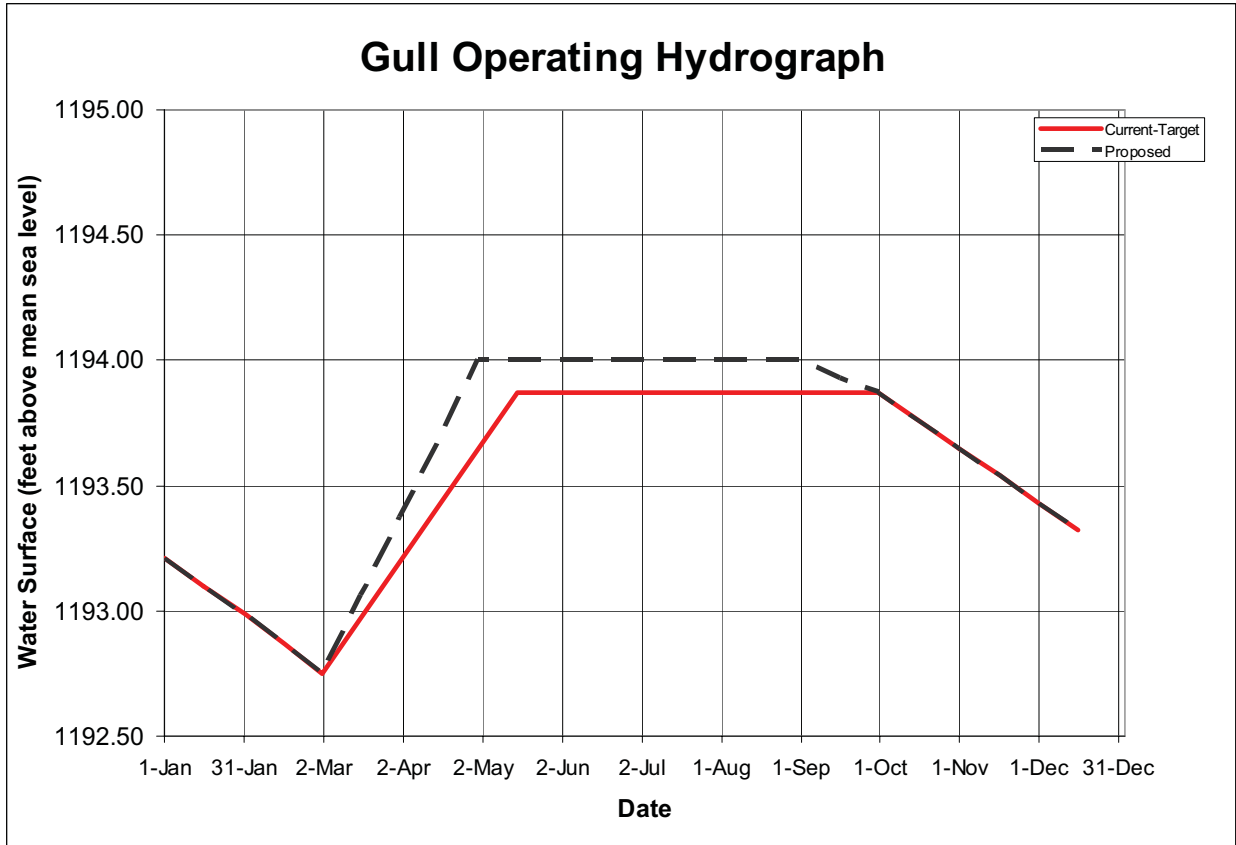
If a new operating plan is implemented, we will still be open to modifying it quickly if we determine that it is not working as intended. We have described a process that will be implemented with a new operating plan that will enable us to easily modify the plan in the future if needed.

Finally, it is important to reiterate that the intent of the proposed plan is not to significantly impact one user group for the benefit of another; the intent is to balance the benefits and impacts for the improvement of the whole system for all current and future users. We believe that these reservoirs are valuable resources, and we wish to protect and enhance their health for future generations.

<b>GULL LAKE OPERATING RULES</b>		
	<b>CURRENT</b>	<b>PROPOSED</b>
Summer Band (elev. - feet)	1193.75-1194.0	1193.85-1194.15
Summer Target (elev. - feet)	1193.87	1194.0 (May 1 – Sep 1)
Band Width (feet)	0.25	0.3
Normal Drawdown (elev. - feet)	1192.75	1192.75
Maximum Drawdown (elev. - feet)	1192.75	1192.75
Rate of Release (change/day)	20-30%	20-30%
Spring Pulse	NA	250 cfs
Minimum Flow Requirements April through September	$\geq(1192.75)$ : 20 cfs	$(\geq$ bottom of band): 40 cfs
		$<$ (bottom of band) $\geq$ (bottom of band – 15"): 20 cfs
	$<(1192.75)$ : 10 cfs	$<$ (bottom of band – 15"): 10 cfs
Minimum Flow Requirements October through March	$\geq(1192.75)$ : 20 cfs	$\geq$ (target - 6"): 20 cfs
	$<(1192.75)$ : 10 cfs	$<$ (target - 6"): 10 cfs

<b>Gull Late Summer Elevations</b>			
	<b>Current (feet)</b>	<b>Proposed (feet)</b>	<b>Difference (inches)</b>
<b>August 1</b>	1193.87	1194.0	+1.56
<b>September 1</b>	1193.87	1194.0	+1.56
<b>October 1</b>	1193.87	1193.87	0

Note: The difference was calculated from the target in the current operating plan (1193.87), rather than the top of the band (1194).





## Mississippi River Headwaters ROPE Study Summary



### Flood Operating Rules Under the Proposed Plan

The proposed plan includes minor revisions to the flood operating rules that are expected to have very little to a minor beneficial effect of reducing flooding impacts over the impacts experienced under the current plan. Details regarding the proposed flood operating rules can be found in Section 5.3.6.

Flood damage curves are used in the current and proposed plans to help guide operations during a flood. The curves are graphical relationships showing the water stages at chosen locations that would result in equal flood damages and are used to guide reservoir regulation decisions during floods. The proposed rules retain the basic flood damage curve relationships that are found in the existing plan with the exception that Big Sandy Lake will no longer be included in the curves. As a result, under any given flood, the relative targeted water levels between the city of Aitkin, Minnesota, and Pokegama would remain the same as under the existing plan. Flood levels experienced at Pokegama and Aitkin are expected to be about the same for most events under the proposed plan. Even though Sandy Lake would be removed from the flood curves, flood levels on Sandy Lake are also expected to remain the same under the proposed rules.

Since the guide curves were published in 1956, it has proven very difficult if not impossible to operate Big Sandy Lake Dam in accordance with its water elevations required by the guide curves. This is due to the fact that the Big Sandy Lake Dam tailwater is affected by backwater from the Mississippi River up to the dam. During flood events, it submerges the Big Sandy Lake Dam gates, restricting the outflow due to reduced head across the dam. As a result, for a large portion of the existing guide curves for Aitkin stages above the 13-foot flood elevation at Aitkin, a water control regulator cannot proactively operate Big Sandy Dam for flood control because the Mississippi River controls the dam's outflow.

Following the spring drawdown, the Corps releases inflow from Big Sandy Lake Dam to maintain the target drawdown level. Experience has shown that, as the snow melts and stages at Aitkin rise, the maximum flood damage reduction benefit for both Big Sandy Lake and Aitkin is obtained by releasing as much water as possible through the dam prior to the backwater effect from the Mississippi River restricting the outflow through the gates. Even though the gates are often wide open by this time, the outflow approaches zero as the tailwater level below the dam rises with very little flow from the Sandy River making its way to Aitkin. By releasing as much water as possible early on, Big Sandy Lake retains as much storage as possible to assist Aitkin while keeping its ultimate peak lake elevation as low as possible. In summary, the flood control operation at Big Sandy Lake Dam is driven by the characteristics of the runoff and geomorphology of the river and its watershed. The Corps does not have enough control to actively follow the Sandy Lake portion of a guide curve.

However, Pokegama Lake, with the assistance of Lake Winnibigoshish and Leech Lake, can provide flood damage reduction for Aitkin for a wide range of flood events. As a result, curves were developed that retain the existing relationship between Pokegama's reservoir levels and Aitkin's stages while eliminating Big Sandy Lake from the curves. Additionally, guidance has been added to the proposed plan to help the Corps regulator better understand the capabilities and limitations of the system in the event of a flood.



## Mississippi River Headwaters ROPE Study Summary



These proposed changes to the flood operating rules will enhance the clarity of flood operating procedures for the Corps regulator and for the general public. They will also provide a minor benefit by enhancing the consistent and efficient management of flood waters.

## MAJOR CONCLUSIONS AND FINDINGS

Overall, the proposed plan would have a beneficial effect on the human environment in the project area. The majority of this effect would occur in the upper half of the project area from approximately Little Falls, Minnesota, upstream to Lake Bemidji.

In general, the proposed plan is expected to have a minor negative short-term and a minor beneficial long-term effect on socioeconomic resources in the study area. No serious long-term negative economic impacts are expected as a result of the implementation of the proposed plan. Instead, long-term overall positive socioeconomic impacts of the plan should result from a healthier lake and river ecosystems that both residents and visitors can use and enjoy now and into the future. The primary contributing factor to these effects is the proposed late summer decline in water levels on the reservoirs. Starting on July 15 on all reservoirs but Gull, water levels would be allowed to fall at a rate of about 2 inches per month. This decline would make navigation through some connecting channels more difficult for larger boats in late summer and early fall. In most cases, this decline in water levels is not expected to have a substantial impact on recreation on the reservoirs.

The proposed plan would have a minor beneficial effect on natural resources in the project area in the short-term and long-term caused by hydrologic conditions that more closely resemble natural conditions relative to the existing operating plan. The beneficial effects to natural resources would be the result of seasonal changes in reservoir levels and river flows that better coincide with those experienced in unregulated (without dams) systems. The native plants, reptiles, amphibians, fish, insects, birds, and mammals that use aquatic habitats in the headwaters evolved over time to match their life histories and seasonal movements to the natural rise and fall of water levels. Disruptions, or variability, in water levels are common in natural systems, but on average the basic rise and fall of water levels follow a predictable seasonal pattern that begins with high water levels immediately after snowmelt in the spring, gradually declining water levels through the summer, and steady low water levels and flows in the winter. While the proposed operating plan would not result in seasonal water level changes identical to those that would occur without the dams in place, it would produce seasonal changes that are more similar to a natural pattern and, therefore, would be beneficial to a variety of species. This improvement and protection of aquatic plants and animals would help ensure that the natural qualities for which the Headwaters are appreciated will be protected into the future more so than which they would under the existing operating plan. A secondary minor beneficial effect of this change in hydrology would be a minor reduction in shoreline erosion due to increased emergent vegetation and a reduction in the length of time water is held high and eroding shorelines.

The proposed plan would have no measurable effect on flooding over the existing plan because proposed changes in the flood operating rules are minor, are being proposed to better reflect the existing physical constraints of the system, and would provide more clarity and detail for future operation.

The proposed plan would have minimal effects on air quality, hydropower production, property values, employment, public health and safety, community growth and development, archeological resources, and threatened and endangered species.

## **AREAS OF CONTROVERSY**

There is controversy regarding the gradual summer decline in reservoir water levels in the proposed plan. Most members of the public who have commented on changes to the existing operating plan question whether the tradeoff between the recreational effects and the natural resource benefits is worthwhile.

There is also controversy regarding the operation of Stump Lake Dam by Otter Tail Power. While the operation of this dam was reviewed in the ROPE, the Corps and the Forest Service do not have authority over the operation of the dam; therefore, a new operation plan for the Stump Lake Dam is not presented in, nor will the operation of Stump Lake Dam be modified as a direct result of, the ROPE Study. If the operation of the dam is modified, a separate review process would be completed by Otter Tail Power and the Minnesota Department of Natural Resources.

There is controversy regarding the regulation of the reservoirs for “recreational” purposes in opposition to tribal uses of the reservoirs. The tribes feel that recreational uses should be secondary to regulation for tribal purposes. Nontribal reservoir users feel that recreational interests should be paramount.

There is controversy regarding the perceived conflicting interests in flood operations between residents of Pokegama Lake, Sandy Lake and Aitkin. All groups tend to believe that the other groups are benefiting at their expense.

There is controversy in that most Headwaters residents tend to believe that during drought conditions the minimum releases are being provided to maintain a water supply to Minneapolis. Furthermore, they also tend to believe that the increases in the revised plan are being included for this same reason; however, this is not the case.

## **UNRESOLVED ISSUES**

There are no unresolved issues at this time related to the environmental effects of the proposed plan.

## **RELATIONSHIP TO ENVIRONMENTAL LAWS AND REGULATIONS**

This reevaluation of an existing project has been conducted according to Corps of Engineers planning guidance (ER 1105-2-100) and NEPA regulation (ER 200-2-2) in compliance with applicable Federal and State laws and regulations. Section 7 of this report and EIS provides a detailed description of the relationship of the planning process and proposed action to environmental protection laws and regulations.

## **PARTICIPATING AGENCIES AND ORGANIZATIONS**

A number of agencies and organizations have participated in the reevaluation study, including:

Minnesota Department of Natural Resources (MDNR)  
Minnesota Pollution Control Agency (MPCA)  
U.S. Forest Service (USFS)  
U.S. Geological Survey (USGS)  
Mille Lacs Band of Ojibwe  
Leech Lake Band of Ojibwe  
Mississippi Headwaters Board

The U.S. Forest Service is an official cooperating agency in preparing this report and EIS.