A long-range reservoir operating plan study.

Mississippi River Headwaters Reservoir Operating Plan Evaluation (ROPE)

UPPER MISSISSIPPI RIVER HEADWATERS
BEMIDJI TO ST. PAUL, MINNESOTA

DRAFT INTEGRATED RESERVOIR OPERATING PLAN EVALUATION AND ENVIRONMENTAL IMPACT STATEMENT

August 2008

LEAD AGENCY:

U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT,
ST. PAUL, MINNESOTA

COOPERATING AGENCY:

U.S. FOREST SERVICE, CHIPPEWA NATIONAL FOREST,
CASS LAKE, MINNESOTA

US Army Corps of Engineers
St. Paul District

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

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UPPER MISSISSIPPI RIVER HEADWATERS
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DRAFT INTEGRATED RESERVOIR OPERATING PLAN EVALUATION AND ENVIRONMENTAL IMPACT STATEMENT

The responsible lead agency is the U.S. Army Corps of Engineers; the St. Paul District has the lead in preparation of this Integrated Reservoir Operating Plan Evaluation and Environmental Impact Statement. The U.S. Forest Service is a cooperating agency.

This Draft Integrated Reevaluation Report and Environmental Impact Statement will be announced in the Federal Register for agency and public review on September 19, 2008. The end of the comment period will be November 3, 2008. **Please provide written comments by November 3, 2008,** to the St. Paul District, U.S. Army Corps of Engineers, ATTN: Mr. Steven Clark, CEMVP-PM-A, 190 Fifth Street East, Suite 401, St. Paul, Minnesota 55101, or by email: Steven.J.Clark@usace.army.mil .

The St. Paul District will compile the comments, prepare written responses, seriously consider changes to this draft report, and will prepare a final report and Environmental Impact Statement (EIS). The final report and EIS will be provided for agency and public review. We will compile comments received and transmit them along with the final Reservoir Operating Plan Evaluation and EIS to the St. Paul District Commander, U.S. Army Corps of Engineers in St. Paul Minnesota. Upon approval of the report, the St. Paul District Commander and Forest Supervisor of the U.S. Forest Service, Chippewa National Forest will take the recommendations in this report under consideration and will issue separate Records of Decision. The St. Paul District Commander will issue a Record of Decision for the Corps reservoirs and the Forest Supervisor will issue a Record of Decision for Knutson Dam on Cass Lake.

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DRAFT INTEGRATED RESERVOIR OPERATING PLAN EVALUATION AND ENVIRONMENTAL IMPACT STATEMENT

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SUMMARY

PURPOSE

This Draft Integrated Reservoir Operating Plan Evaluation (ROPE) Report and Environmental Impact Statement (EIS) is about a review of water control operations at the Mississippi River Headwaters federal reservoirs in north-central Minnesota. This report integrates the U.S. Army Corps of Engineers (hereafter also referred to as the "Corps") and U.S. Forest Service decision document and the National Environmental Policy Act (NEPA) documents to avoid duplication and to consolidate information for reviewers.

The primary purpose of the ROPE study is to evaluate alternative plans for these reservoirs and to improve the operation of the system to balance benefits in consideration of tribal trust, flood control, environmental, water quality, water supply, recreation, navigation, hydropower, and other public interests. A secondary purpose of the study is to facilitate better understanding of the system regarding reservoir management, water levels, and the related and interconnected impacts throughout the system.

NEED FOR ACTION

The current operating plans for the Federal dams in the headwaters of the Mississippi River (hereafter referred to as the "Headwaters"), were developed in most part during the period from the 1930s to the 1960s. Since then, only minor modifications have been made to the plans. However, there have been changes to the environment of the Headwaters, most noticeably through increased human development. These changes in the human use of the reservoirs, the age of the current operating plans, and an increasing awareness of the interactions between competing uses of the Headwaters resources led to the need to reevaluate and possibly modify the current operating plans.

STUDY PROCESS

This reevaluation study of an existing Corps project followed the standard Corps of Engineers six-step planning process:

1. Identify problems, needs, opportunities and constraints.

2. Inventory and forecast future conditions.

3. Formulate alternatives.

4. Evaluate alternatives.

5. Compare alternatives.

6. Select a recommended plan.

This study has also followed the substantive and procedural requirements of the NEPA guidelines for an EIS.

This draft report and EIS is being released for public review and comment. Following the review period, each comment will be reviewed and carefully considered for potential modifications to the draft report and EIS prior to the completion of the final report and EIS. The final report and EIS will then be released for another public review and comment period prior to the final selection of an alternative operating plan. This selection will be made through the public release of a Record of Decision (ROD). The U.S. Forest Service and the Corps of Engineers will each release separate RODs. The Forest Service will be selecting an operating plan for Knutson Dam, whereas the Corps will select an operating plan for Lake Winnibigoshish, Leech Lake, Pokegama Lake, Sandy Lake, Cross Lake (also referred to as the Whitefish Chain of Lakes), and Gull Lake.

The effects of each alternative considered in detail, including the proposed plan are summarized in Table 1.

Table 1. Comparative Direct Short-Term Effects of Operating Plan Alternatives Generalized for the Project Area.

	Current Plan - Existing Condition Compared to Future	R Plan	E Plan	T Plan	Proposed Plan (P)
Air Quality	0	-1	+1	+1	+1
Terrestrial Habitat	-1	-1	+1	+2	+1
Sedimentation and Bank Erosion	-1	-1	+1	+3	+1
Wetlands	-1	-1	+1	+1	+1
Aquatic Habitat	-1	-1	+1	+3	+1
Fishery	-1	-1	+1	+3	+1
Biological Productivity	-1	-1	+1	+2	+1
Biological Diversity	-1	-1	+1	+2	+1
Water Quality	-1	-1	+1	+2	+1
Threatened & Endangered Species	0	0	0	0	0
Recreational Opportunities	0	+1	-2	-3	-1
Public Health/Safety	0	0	-1	-1	0
Community Cohesion	0	0	-1	-2	0
Community Growth and Development	0	+1	-1	-1	0
Controversy	0	-1	-2	-3	-1
Property Values	0	+1	-1	-2	0
Regional Growth	0	0	0	0	0
Employment	0	0	-1	-1	0
Business Activity	0	+1	-1	-2	0
Flooding Effects	0	-1	+1	+2	+1
Historic Architectural	0	0	0	0	0
Archeological	-1	-1	+1	+1	+1

Key:

+3 = Significant Beneficial

+2 = Substantial Beneficial

+1 = Minor Beneficial

0 = No Effect

-1 = Minor Adverse

-2 = Substantial Adverse

-3 = Significant Adverse

PROPOSED ACTIONS

The recommended plan is to implement Plan P (also listed as the Proposed Plan) as described throughout this report. A detailed description of the proposed plan can be found in Section 5.5.5. A summary of the primary aspects of the proposed and current operating plans is provided below for each reservoir.

Implementation of the proposed plan would occur following the release of the Record of Decision (ROD). The ROD will be released following the public review of the final report. After release of the ROD, the Corps and Forest Service will each update their Water Control Manuals for the reservoirs. The revised operating plans are expected to remain in place over the next 25 years, with the potential for modifications as described in Section 6.2.

Implementation costs of the recommended plan are expected to be minor and will be included in the operation and maintenance budget for the reservoirs. Minor increased costs over the existing budget would be expected for additional coordination and monitoring of water levels.

Costs for updating the Water Control Manuals would also be included in operation and maintenance costs and are expected to be minor relative to study costs.

A benefit-cost ratio was not calculated for this study because there would be no construction costs. The adverse and beneficial effects as described in Section 7 and summarized in the Major Conclusions and Findings below were used in the plan selection process in place of a benefit-cost ratio.

Following the implementation of a new operating plan, an adaptive management process will be initiated to monitor and revise the new plan as needed into the future (see Section 6.2). Because of this, the risk of negative effects due to unforeseen performance deficiencies in the new operating plan is greatly reduced.

Cass Lake Proposed Plan

Major components of the current and proposed operating plans for Cass Lake are summarized in the tables and figure below. The most significant changes to the current operating plan are the lower water elevations in early summer and the increase in minimum releases. However, the proposed increases in minimum releases would not be implemented on Cass Lake until modifications are made to Knutson Dam to improve outflow adjustability. 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 beneficial effect on numerous natural resources on Cass Lake and a minor beneficial effect on boat access during the last half of summer most years 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 levels would not drop drastically on that date. Instead, water levels would gradually decline on Cass after July 15, less dramatically than what is prescribed by the existing operating plan. Water levels would not be held as high during the early spring to help reduce shoreline erosion on the lake.

It is important to note that during the summers of 2006 and 2007 water levels on Cass Lake were about 6 inches lower than the targeted water levels under the proposed plan. Also, if water levels are below the target in the proposed plan, the goal would be 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, Minnesota. This is not the purpose for any proposed changes in the operating plan.

It is our assessment that boat access would be improved in late summer under this plan on Cass Lake. We also believe that environmental resources will benefit through lower spring water levels and the maintenance of a gradual decline similar to those proposed for the other study reservoirs.

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.

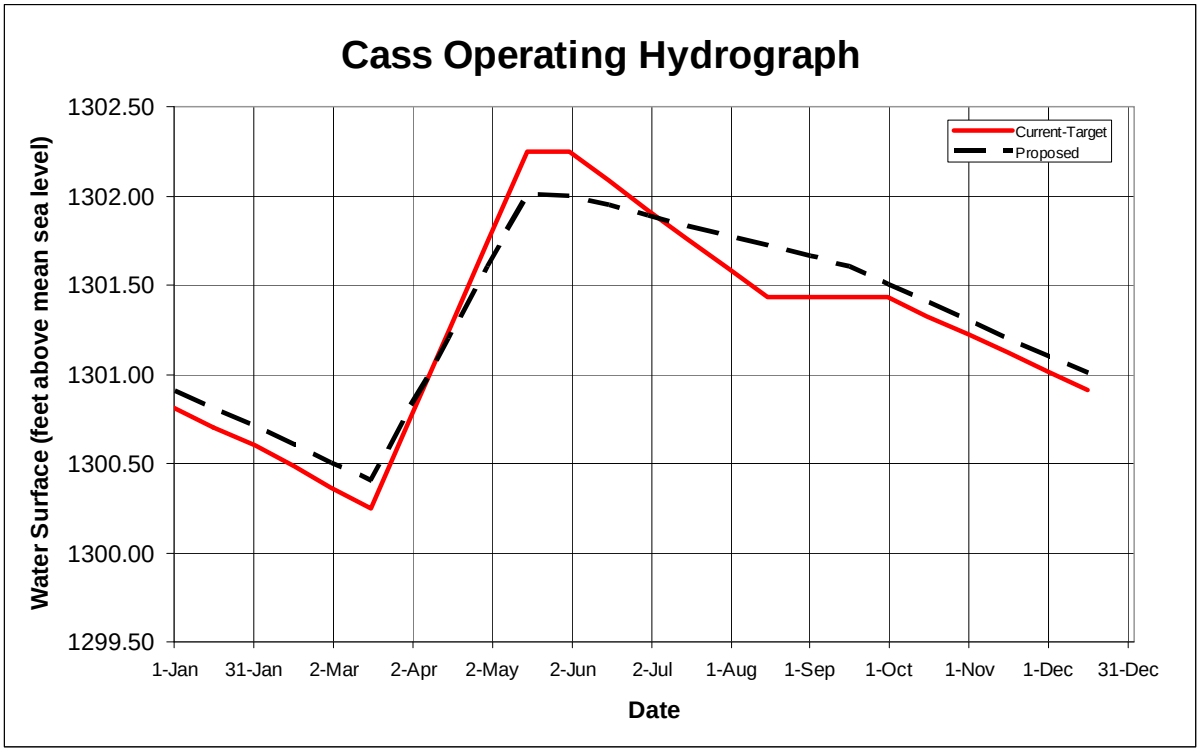
Finally, it is important to reiterate that the intent of the proposed plan is not to significantly impact one user group for the benefit of another; the intent is to balance the benefits and impacts for the improvement of the whole system for all current and future users. We believe that these reservoirs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

CASS LAKE
OPERATING RULES

	CURRENT	PROPOSED
Summer Band (elev. - feet)	1301.4 - 1301.7	1302.25 - 1301.35
Summer Target (elev. - feet)	1301.43-1302.25	1301.6 -1302.0 (May 15- Sep 15)
Band Width (feet)	0.3	0.5
Normal Drawdown (elev. - feet)	1300.25	1300.4
Maximum Drawdown (elev. - feet)	1300.25	1300.25
Rate of Release (change/day)	20-30%	20-30%
Spring Pulse	NA	840 cfs
Minimum Flow Requirements April through September	all water levels: 100 cfs	>= (bottom of band): 130 cfs
		< (bottom of band) >= (bottom of band – 15"): 80 cfs
		< (bottom of band – 15"): 40 cfs
Minimum Flow Requirements October through March	all water levels: 100 cfs	>= (target - 6"): 80 cfs
		< (target - 6"): 40 cfs

Cass Lake
Late Summer Elevations

	Current (feet)	Proposed (feet)	Difference (inches)
August 1	1301.70	1301.77	+0.84
September 1	1301.43	1301.66	+2.76
October 1	1301.43	1301.50	+0.84


Cass Operating Hydrograph
Water Surface (feet above mean sea level)
1302.50
1302.00
1301.50
1301.00
1300.50
1300.00
1299.50
1-Jan
31-Jan
2-Mar
2-Apr
2-May
2-Jun
2-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
31-Dec
Date
Current-Target
Proposed

Lake Winnibigoshish Proposed Operating Plan

Major components of the current and proposed operating plans for Winnibigoshish 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 Lake Winnibigoshish 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 on Winnibigoshish after July 15 so that they would be about 1 inch lower than normal on August 1, 3 inches lower than normal on September 1, and just over 2 inches lower than normal on October 1. It is important to note that during the summers of 2006 and 2007 water levels on Winnibigoshish were about 6 inches lower than the targeted water levels under the proposed plan. 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 Winnibigoshish. 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 Winnibigoshish 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 Winnibigoshish into the future.

The proposed plan also includes increases in the minimum flow requirements for the benefit of downstream aquatic habitat. It is our assessment that these increases would not impact reservoir water levels, even in dry years such as 2006 and 2007.

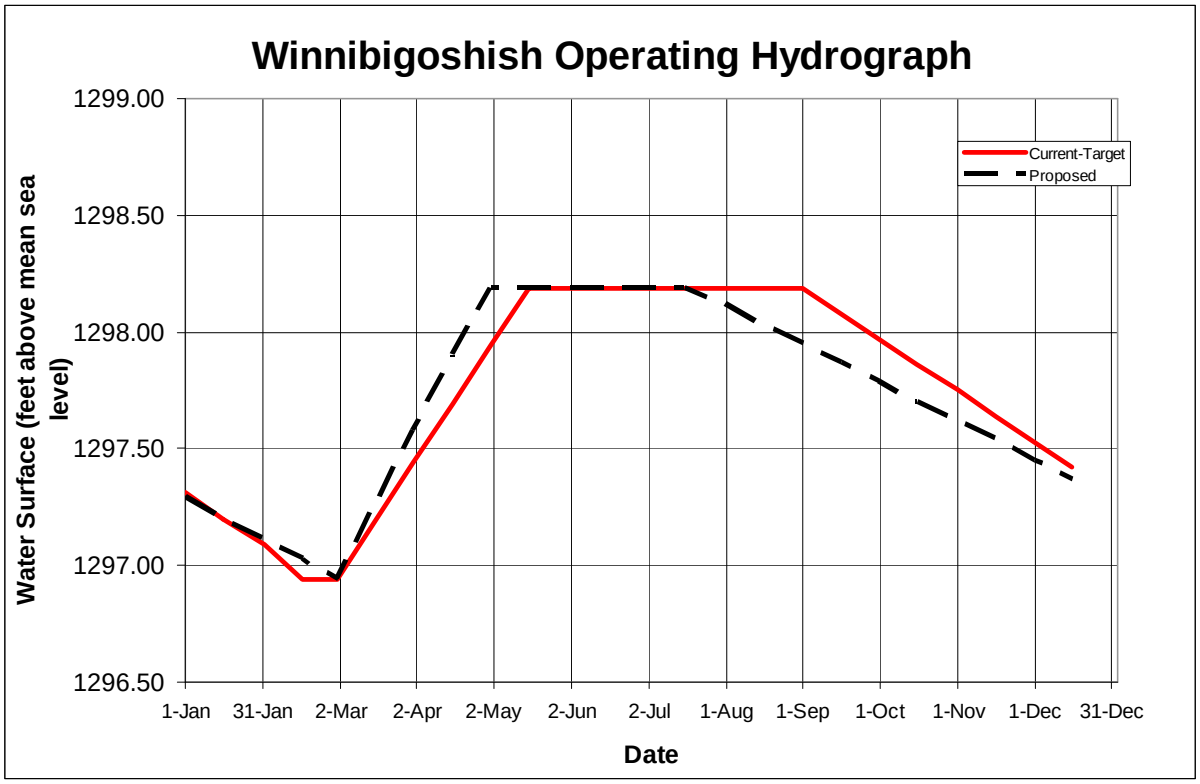
If a new operating plan is implemented, we will still be open to modifying it quickly if we determine that it is not working as intended. We have described a process that will be implemented with a new operating plan that will enable us to easily modify the plan in the future if needed.

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.

LAKE WINNIBIGOSHISH OPERATING RULES

	CURRENT	PROPOSED
Summer Band (elev. - feet)	1297.94 -1298.44	1297.94 -1298.44
Summer Target (elev. - feet)	1298.19	1298.19 (May 1 – Jul 15)
Band Width (feet)	0.5	0.5
Normal Drawdown (elev. - feet)	1296.94	1296.94
Maximum Drawdown (elev. - feet)	1294.94	1294.94
Rate of Release (change/day)	200 cfs or 0.5 ft. of TW change	20-30%
Spring Pulse	NA	1060 cfs
Minimum Flow Requirements April through September	>=(1294.94): 100 cfs	(>= bottom of band): 160 cfs
		< (bottom of band) >= (bottom of band – 15"): 110 cfs
	<(1294.94): 50 cfs	< (bottom of band – 15"): 50 cfs
Minimum Flow Requirements October through March	>=(1294.94): 100 cfs	>= (target - 6"): 110 cfs
	<(1294.94): 50 cfs	< (target - 6"): 50 cfs

Winnibigoshish Late Summer Elevations			
	Current (feet)	**Proposed (feet)**	**Difference (inches)**
August 1	1298.19	1298.12	-0.84
September 1	1298.19	1297.95	-2.88
October 1	1297.97	1297.79	-2.16



Leech Lake Proposed Operating Plan

Major components of the current and proposed operating plans for Leech Lake 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 Leech Lake 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 on Leech after July 15 so that they would be about 1 inch lower than normal on August 1, just over 2 inches lower than normal on September 1, and about 1.5 inches lower than normal on October 1. It is important to note that during the summers of 2006 and 2007 water levels on Leech were about 6 inches lower than the targeted water levels under the proposed plan. 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 Leech Lake. 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. 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 Leech 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 Leech Lake into the future.

The proposed plan also includes increases in the minimum flow requirements for the benefit of downstream aquatic habitat. It is our assessment that these increases would not impact reservoir water levels, even in dry years such as 2006 and 2007.

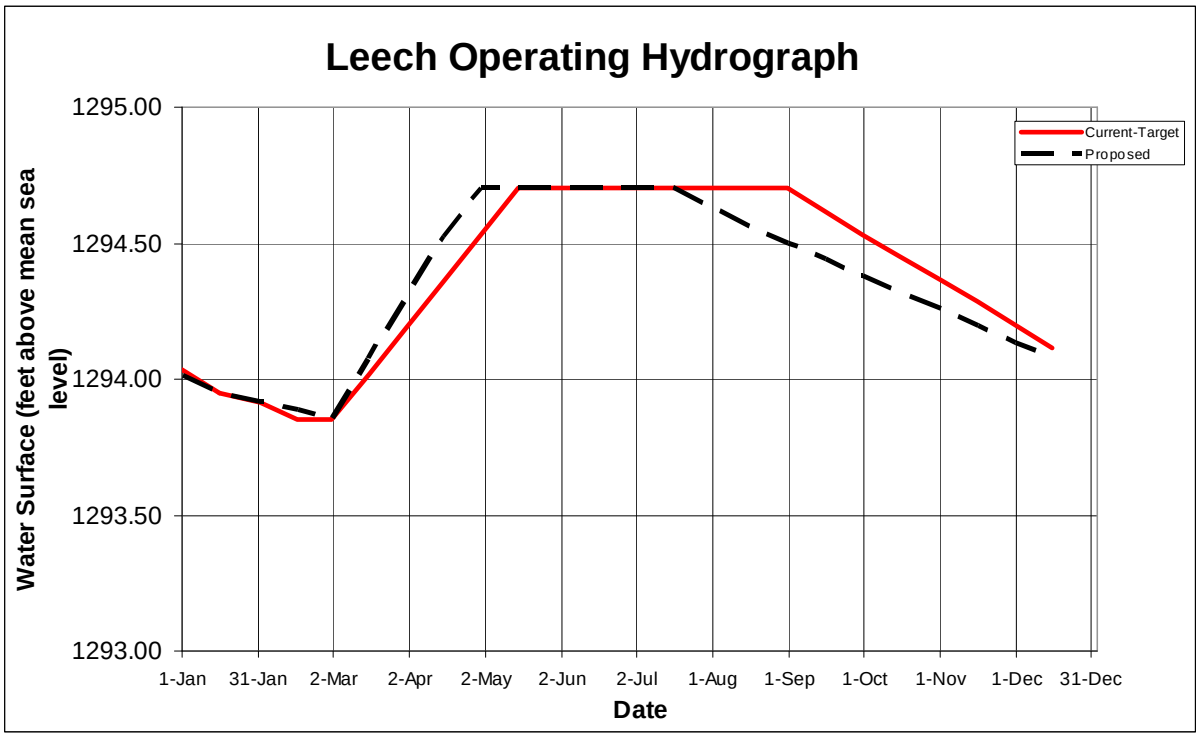
If a new operating plan is implemented, we will still be open to modifying it quickly if we determine that it is not working as intended. We have described a process that will be implemented with a new operating plan that will enable us to easily modify the plan in the future if needed.

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.

LEECH LAKE OPERATING RULES

	CURRENT	PROPOSED
Summer Band (elev. - feet)	1294.50-1294.90	1294.45-1294.95
Summer Target (elev. - feet)	1294.70	1294.70 (May 1 – Jul 15)
Band Width (feet)	0.4	0.5
Normal Drawdown (elev. - feet)	1293.80	1293.80
Maximum Drawdown (elev. - feet)	1292.70	1292.70
Rate of Release (change/day)	100 cfs or 0.25 ft. of TW change	20-30%
Spring Pulse	NA	790 cfs
Minimum Flow Requirements April through September	>=(1292.70): 100 cfs	(>= bottom of band): 120 cfs
		< (bottom of band) >= (bottom of band – 15"): 80 cfs
	<(1292.70): 50 cfs	< (bottom of band – 15"): 40 cfs
Minimum Flow Requirements October through March	>=(1292.70): 100 cfs	>= (target - 6"): 80 cfs
	<(1292.70): 50 cfs	< (target - 6"): 40 cfs

Leech Lake Late Summer Elevations			
	Current (feet)	**Proposed (feet)**	**Difference (inches)**
August 1	1294.70	1294.63	-0.84
September 1	1294.70	1294.50	-2.4
October 1	1294.53	1294.40	-1.56



Pokegama Lake Proposed Operating Plan

Major components of the current and proposed operating plans for Pokegama Lake 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 Pokegama Lake 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 on Pokegama 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 2 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 Pokegama. 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. 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 Pokegama'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 Pokegama into the future.

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.

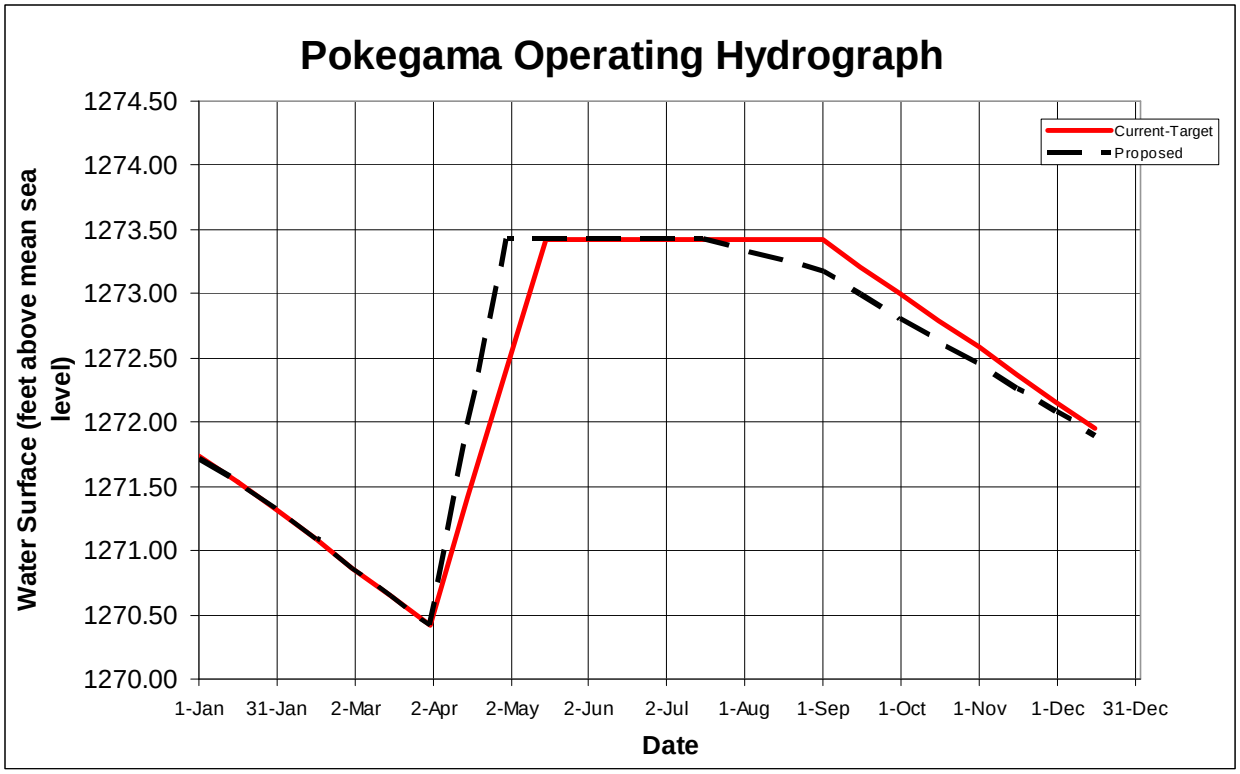
Finally, it is important to reiterate that the intent of the proposed plan is not to significantly impact one user group for the benefit of another; the intent is to balance the benefits and impacts for the improvement of the whole system for all current and future users. We believe that these reservoirs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

POKEGAMA LAKE OPERATING RULES

	CURRENT	PROPOSED
Summer Band (elev. - feet)	1273.17-1273.67	1273.17-1273.67
Summer Target (elev. - feet)	1273.42	1273.42 (May 1 – Jul 15)
Band Width (feet)	0.5	0.5
Normal Drawdown (elev. - feet)	1270.42	1270.42
Maximum Drawdown (elev. - feet)	1270.42	1270.42
Rate of Release (change/day)	20-30%	20-30%
Spring Pulse	NA	2410 cfs
Minimum Flow Requirements April through September	>=(1273.17): 200 cfs	(>= bottom of band): W+L+50 or 240 cfs
		< (bottom of band) >= (bottom of band – 15"): W+L+10 or 200 cfs
	<(1273.17): Winni + Leech	< (bottom of band – 15"): 120 cfs
Minimum Flow Requirements October through March	>=(1273.17): 200 cfs	>= (target - 6"): W+L+10 or 200 cfs
	<(1273.17): Winni + Leech	< (target - 6"): 120 cfs

Note: For proposed minimum releases, "W+L+10 or 200 cfs", for example, is interpreted as the lesser of the combined outflow from Winnibigoshish and Leech, or 200 cfs.

Pokegama Late Summer Elevations			
	Current (feet)	**Proposed (feet)**	**Difference (inches)**
August 1	1273.42	1273.34	-0.96
September 1	1273.42	1273.17	-3
October 1	1273.0	1272.81	-2.28



Sandy Lake Proposed Operating Plan

Major components of the current and proposed operating plans for Sandy Lake 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 Sandy Lake 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 on Big Sandy 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 5 inches lower than normal on October 1. It is important to note that during the summers of 2006 and 2007 water levels on Big Sandy were about 6 inches lower than the targeted water levels under the proposed plan. 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 Big Sandy. 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 Big Sandy 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 Big Sandy'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 Big Sandy into the future.

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.

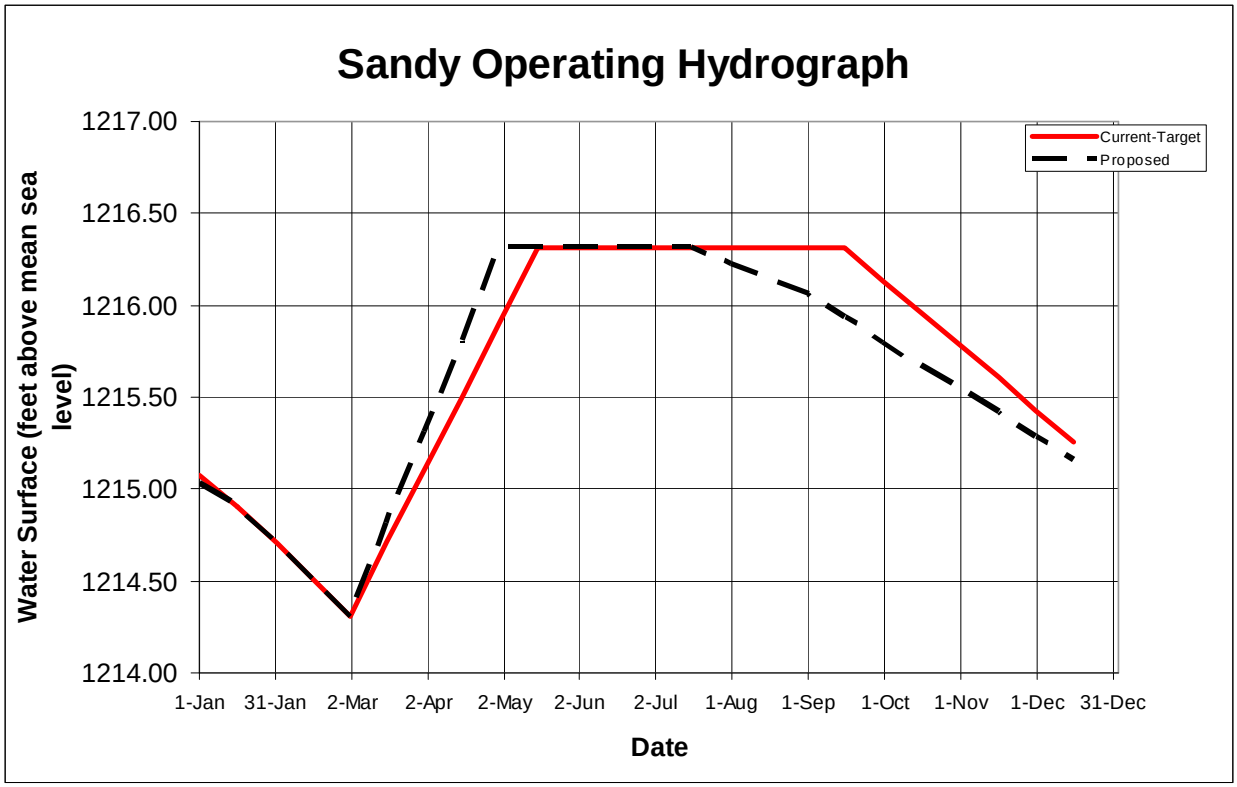
If a new operating plan is implemented, we will still be open to modifying it quickly if we determine that it is not working as intended. We have described a process that will be implemented with a new operating plan that will enable us to easily modify the plan in the future if needed.

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.

SANDY LAKE OPERATING RULES

	CURRENT	PROPOSED
Summer Band (elev. - feet)	1216.06-1216.56	1216.06-1216.56
Summer Target (elev. - feet)	1216.31	1216.31 (May 1 – Jul 15)
Band Width (ft.)	0.5	0.5
Normal Drawdown (elev. - feet)	1214.31	1214.31
Maximum Drawdown (elev. - feet)	1214.31	1214.31
Rate of Release (change/day)	20-30%	20-30%
Spring Pulse	NA	490 cfs
Minimum Flow Requirements April through September	>=(1214.31): 20 cfs	(>= bottom of band): 40 cfs
		< (bottom of band) >= (bottom of band – 15"): 20 cfs
	<(1214.31): 10 cfs	< (bottom of band – 15"): 10 cfs
Minimum Flow Requirements October through March	>=(1214.31): 20 cfs	>= (target - 6"): 20 cfs
	<(1214.31): 10 cfs	< (target - 6"): 10 cfs

Sandy Lake Late Summer Elevations			
	Current (feet)	**Proposed (feet)**	**Difference (inches)**
August 1	1216.31	1216.23	-0.96
September 1	1216.31	1216.06	-3
October 1	1216.13	1215.80	-3.96



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.

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.

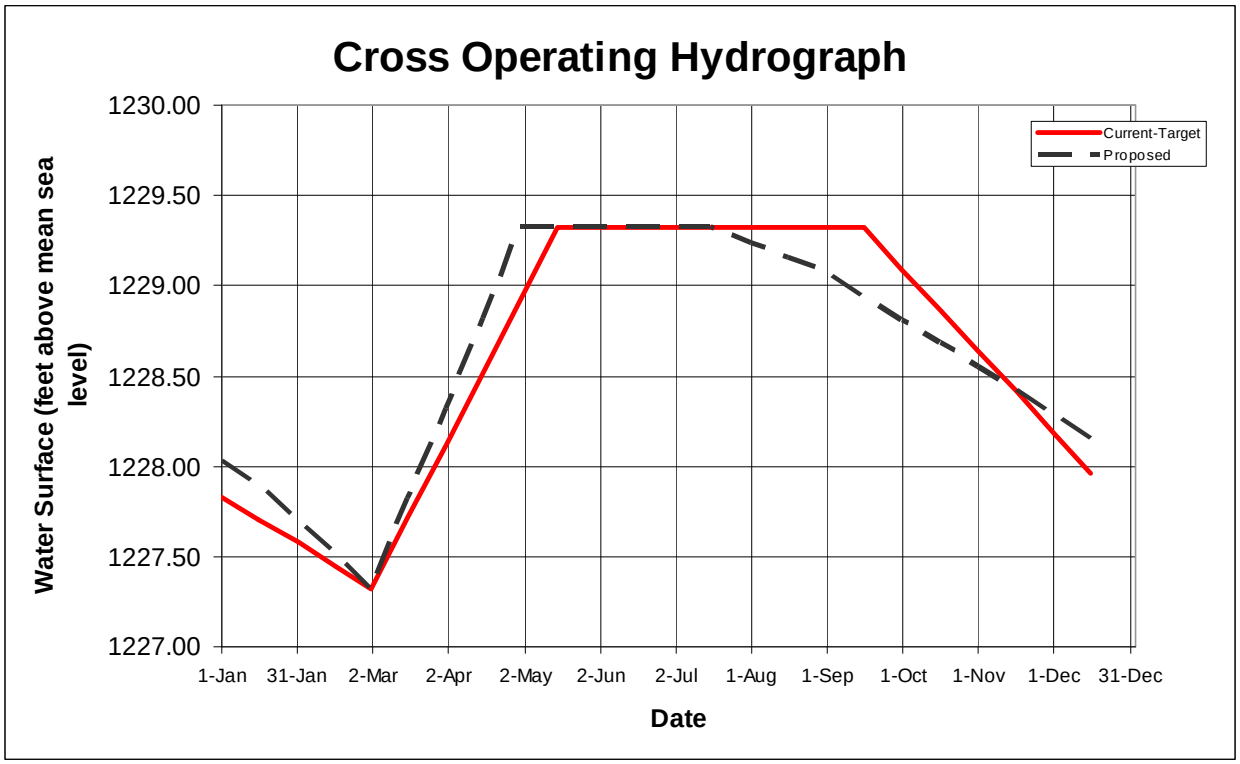
If a new operating plan is implemented, we will still be open to modifying it quickly if we determine that it is not working as intended. We have described a process that will be implemented with a new operating plan that will enable us to easily modify the plan in the future if needed.

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.

CROSS LAKE
OPERATING RULES

	CURRENT	PROPOSED
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	>=(1225.32): 30 cfs	(>= bottom of band): 50 cfs
		< (bottom of band) >= (bottom of band – 15"): 30 cfs
	<(1225.32): 15 cfs	< (bottom of band – 15"): 20 cfs
Minimum Flow Requirements October through March	>=(1225.32): 30 cfs	>= (target - 6"): 30 cfs
	<(1225.32): 15 cfs	< (target - 6"): 20 cfs

Cross Late Summer Elevations			
	Current (ft.)	**Proposed (ft.)**	**Difference (in.)**
August 1	1229.32	1229.24	-0.96
September 1	1229.32	1229.07	-3
October 1	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.

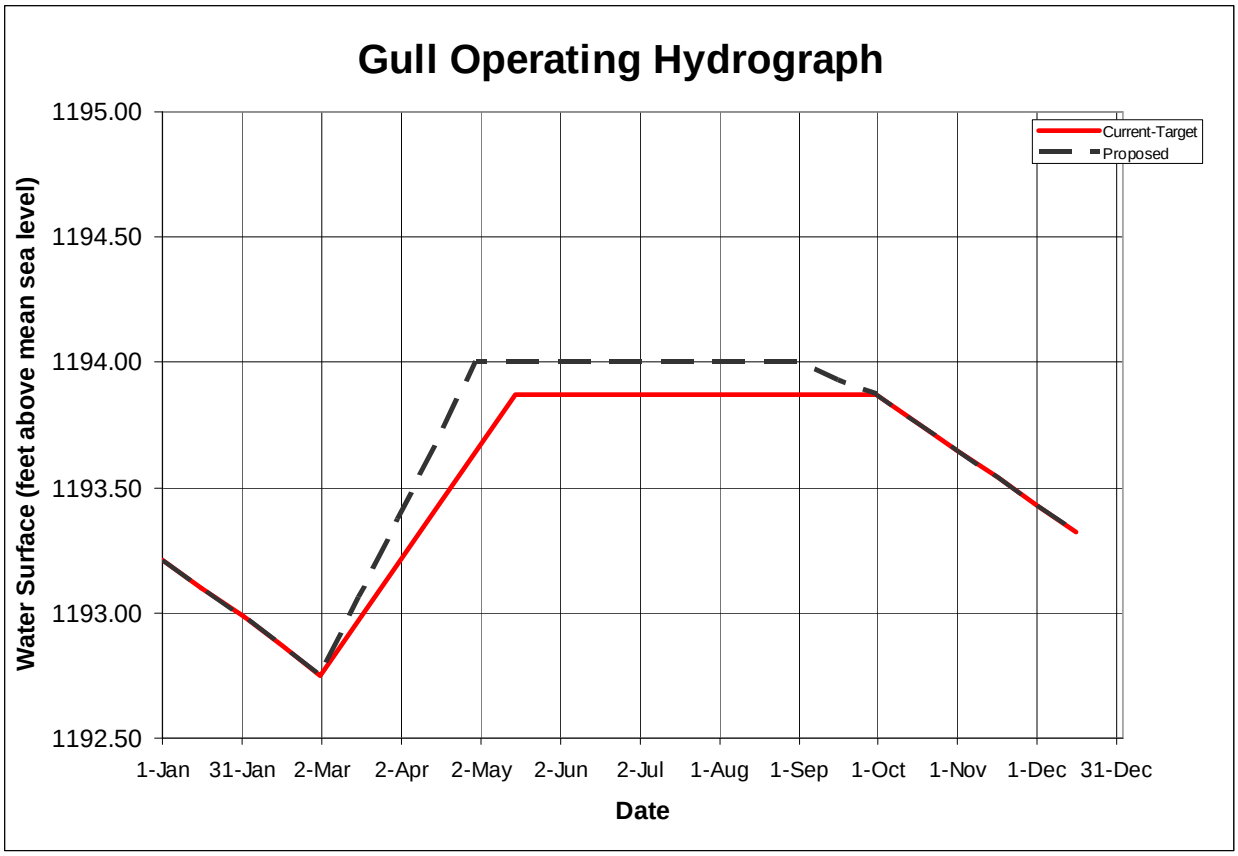
GULL LAKE
OPERATING RULES

	CURRENT	PROPOSED
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	>=(1192.75): 20 cfs	(>= bottom of band): 40 cfs
		< (bottom of band) >= (bottom of band – 15"): 20 cfs
	<(1192.75): 10 cfs	< (bottom of band – 15"): 10 cfs
Minimum Flow Requirements October through March	>=(1192.75): 20 cfs	>= (target - 6"): 20 cfs
	<(1192.75): 10 cfs	< (target - 6"): 10 cfs

Gull
Late Summer Elevations

	Current (feet)	Proposed (feet)	Difference (inches)
August 1	1193.87	1194.0	+1.56
September 1	1193.87	1194.0	+1.56
October 1	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).


Gull Operating Hydrograph
Water Surface (feet above mean sea level)
1195.00
1194.50
1194.00
1193.50
1193.00
1192.50
1-Jan
31-Jan
2-Mar
2-Apr
2-May
2-Jun
2-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
31-Dec
Date
Current-Target
Proposed

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 the13-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.

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 in 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 (UWFS)
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.