

**DRAFT**

**LETTER REPORT/  
ENVIRONMENTAL ASSESSMENT**

**POOL DRAWDOWN  
POOL 6, UPPER MISSISSIPPI RIVER**

**MINNESOTA AND WISCONSIN**

**ST. PAUL DISTRICT, CORPS OF ENGINEERS**

**MAY 2008**

**LETTER REPORT/  
ENVIRONMENTAL ASSESSMENT**

**POOL DRAWDOWN  
POOL 6, UPPER MISSISSIPPI RIVER**

TABLE OF CONTENTS

<b>1.0 BACKGROUND</b> .....	1
1.1 AUTHORITY .....	1
1.2 PROJECT PURPOSE .....	1
1.3 POOL SELECTION .....	1
<b>2.0 CURRENT POOL REGULATION</b> .....	2
<b>3.0 ALTERNATIVES</b> .....	5
<b>4.0 EVALUATION</b> .....	6
4.1 MAINTENANCE OF THE NAVIGATION CHANNEL .....	6
4.1.1 2.0-Foot Reduction (No Constraint) in the Primary Control Point Elevation ...	6
4.1.2 0.5-Foot Reduction in the Primary Control Point Elevation.....	7
4.1.3 No Change at the Primary Control Point .....	9
4.2 HABITAT BENEFITS .....	9
4.3 RECREATION .....	10
4.3.1 Trempealeau Marina .....	12
4.3.2 Sullivan’s .....	12
4.3.3 Perrot State Park Boat Landing.....	12
4.3.4 Playmor Park Boat Landing.....	12
4.3.5 Homer Boat Landing.....	13
4.3.6 Winona East 5 <sup>th</sup> St. Boat Landing.....	13
4.3.7 Winona St. Charles St. Boat Landing .....	13
4.3.8 Winona Yacht Club.....	13
4.3.9 Latsch Island Park Boat Landing .....	14
4.3.10 Latsch Island East Boat Landing .....	14
4.3.11 City Harbor Boat Landing .....	14
4.3.12 Dick’s Marina .....	14
4.3.13 Breezy Point Marina .....	14
4.3.14 Prairie Island Public Boat Ramp.....	14
4.3.15 Prairie Island Campground .....	14
4.3.16 Private Boat Docks and Other Access Areas.....	15
<b>6.0 IMPLEMENTATION OF THE RECOMMENDED PLAN</b> .....	17
<b>7.0 ENVIRONMENTAL ASSESSMENT</b> .....	18
7.1 RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS .....	18
7.2 PROPOSED ACTION AND ALTERNATIVES .....	18
7.3 EXISTING SETTING .....	20
7.3.1 Pool Description.....	20
7.3.2 Water Resources .....	20
7.3.3 Water Quality .....	22

## TABLE OF CONTENTS (cont)

7.3.4 Geology and Soil/Substrate.....	22
7.3.5 Vegetation.....	23
7.3.6 Habitat Types and Distribution.....	24
7.3.7 Fish and Wildlife.....	26
7.3.8 Native Mussels.....	27
7.3.9 Threatened and Endangered Species .....	29
7.3.10 Cultural Resources.....	30
7.3.11 Recreation and Aesthetic Resources.....	31
7.3.12 Socioeconomic Setting.....	32
<b>7.4 SOCIAL EFFECTS .....</b>	<b>32</b>
7.4.1 Effects on Transportation.....	32
7.4.2 Water Appropriations and Waste Assimilation .....	32
7.4.3 Real Estate .....	32
7.4.4 Aesthetics.....	32
7.4.5 Recreation .....	33
7.4.6 Controversy.....	33
<b>7.5 ECONOMIC EFFECTS .....</b>	<b>33</b>
7.5.1 Effects on Business.....	33
<b>7.6 EFFECTS ON NATURAL RESOURCES.....</b>	<b>34</b>
7.6.1 Physical and Water Quality Effects.....	34
7.6.2 Ecological Effects .....	35
7.6.3 Effects on Fish .....	36
7.6.4 Effects on Wildlife.....	36
7.6.5 Effects on Native Mussels .....	37
7.6.6 Effects on Habitat Diversity and Interspersion.....	38
7.6.7 Effects on Biological Productivity.....	38
7.6.8 Effects on Soils and Groundwater .....	38
7.6.9 Effects on Endangered Species.....	38
<b>7.7 EFFECTS ON CULTURAL RESOURCES.....</b>	<b>40</b>
<b>7.8 SUMMARY AND CUMULATIVE IMPACTS DISCUSSION.....</b>	<b>43</b>
<b>8.0 COORDINATION.....</b>	<b>43</b>
8.1 2003-04 COORDINATION.....	43
8.2 2007-08 COORDINATION.....	44
<b>9.0 RECOMMENDATION.....</b>	<b>45</b>
<b>10.0 FINDING OF NO SIGNIFICANT IMPACT.....</b>	<b>46</b>
<b>11.0 LITERATURE CITED .....</b>	<b>47</b>

## TABLE OF CONTENTS (cont)

### Tables

Table 1. Lowest Controlled Pool (LCP) Elevations for Recommended Plan.....	7
Table 2. Pool 6 Dredge Cuts .....	8
Table 3. Estimated Drawdown Windows .....	9
Table 4. Percent of Time Pool 6 Discharges Fall within the Specified Ranges during June through September.....	10
Table 5. Pool 6 Recreational Facilities and Drawdown Elevations.....	11
Table 6. Environmental Assessment Matrix for the Mississippi River Pool 6 Drawdown.....	19
Table 7. Mussel species found in Mississippi River Pool 6. ....	28
Table 8. State listed fish species from Mississippi River Pool 6. ....	30
Table 9. Summary of Sites Potentially Affected by the 1.0-foot Pool 6 Drawdown.....	42

### Figures

Figure 1. Pool 6 Water Surface Profiles – Routine Regulation. ....	4
Figure 2. Maximum Drawdown by River Mile. ....	11
Figure 3. Upper Mississippi River Pool 6.....	21

### Coordination Appendix

Memorandum from St. Paul District to Mississippi Valley Division  
(Request for Approval of a Minor Deviation from the Approved Water Control Plan on  
the Mississippi River, Pool No. 6.)

Cultural Resources Coordination Letters  
(Tribal, Minnesota and Wisconsin State Historic Preservation Offices)

# **LETTER REPORT/ ENVIRONMENTAL ASSESSMENT**

## **POOL DRAWDOWN POOL 6, UPPER MISSISSIPPI RIVER**

### **1.0 BACKGROUND**

#### **1.1 AUTHORITY**

The Nine-Foot Navigation Channel Project on the Upper Mississippi River was authorized by the River and Harbor Act of 1930, which approved construction of a series of locks and dams, supplemented with channel maintenance dredging. Regulation of the navigation pools is governed by a “Master Regulation Manual for Mississippi River Nine-Foot Channel Navigation Projects, St. Paul District.” By memorandum of 19 December 2002, Mississippi Valley Division approved a request for Deviation from Reservoir Regulation Plans, Upper Mississippi River Locks and Dams, subject to MVD approval for each specific pool drawdown. In the approval memorandum, MVD stated that it “...fully support(s) pool drawdowns where they are economically, environmentally and engineeringly feasible....”

#### **1.2 PROJECT PURPOSE**

A Pool 6 drawdown proposed during the 2008 growing season would provide environmental benefits by exposing substrates and enhancing conditions for the reproduction, growth, and survival of perennial emergent species of aquatic vegetation. A major objective is to maximize habitat benefits while minimizing adverse biological effects, as well as effects on commercial and recreational interests and river resources, and to minimize additional channel maintenance requirements. The purpose behind growing season drawdowns is to mimic the occurrence of low water conditions that would occur naturally on the Upper Mississippi River if it were not impounded and regulated to maintain adequate water depths for commercial navigation.

A pool drawdown would increase the level of knowledge regarding the effects of pool drawdown to support an adaptive management approach to future decisions concerning the use of this management measure. The proposed drawdown would begin mid June and termination of the drawdown would begin mid September with the goal to have regulation of Pool 6 return to normal operations by October 1, 2008.

#### **1.3 POOL SELECTION**

The St. Paul District, Corps of Engineers, in cooperation with the Water Level Management Task Force (WLMTF) of the River Resources Forum, has been evaluating

navigation pool drawdowns on the Upper Mississippi River for the purpose of improving fish and wildlife habitat since 1996. The River Resources Forum is a coordinating body made up of Federal and State agencies with independent regulatory and management responsibilities on the Upper Mississippi River within the St. Paul District.

Drawdowns of small isolated areas in pools 5 and 9 were accomplished during 1997-1999. During the summers of 2001 and 2002, a 1.5-foot drawdown (at the dam) of pool 8 was implemented. During the summers of 2005 and 2006, a 1.5-foot drawdown was conducted in Pool 5. In the spring of 2002, the question was raised as to whether it would be possible to implement minor drawdowns in certain St. Paul District navigation pools to benefit emergent aquatic vegetation and which would only have minimal costs and/or potential secondary effects. An initial investigation was conducted for all St. Paul District pools, except for Pools 5 and 8. At that time, Pool 8 was undergoing a drawdown, and implementation of a drawdown in Pool 5 was already under investigation.

The conclusion of the initial investigation was that Pools 6 and 9 appeared to offer the best opportunity for implementing a meaningful measure of drawdown with minimal additional channel maintenance dredging. At its July 2002 meeting, the WLMTF recommended that this concept be pursued in further detail for Pools 6 and 9, with an eye toward implementation in 2003.

Drawdowns (1.0 foot at Lock and Dam 6) were planned by the St. Paul District for summer 2003 and summer of 2004. However, recreational access issues could not be overcome, and these drawdowns were not implemented. Based on experiences during previous pool drawdowns and the monitoring of boat access critical depths in Pool 6 since 2003, the St. Paul District believes that a minor drawdown in Pool 6 is feasible for summer 2008.

## **2.0 CURRENT POOL REGULATION**

The current regulation plan for Pool 6 is as follows:

- a. Primary Control - Maintain a minimum pool elevation of  $645.5 \pm 0.2$  foot at the Winona, Minnesota, stream gage. Theoretically, at zero discharge, the pool would be flat at elevation 645.5 feet. As discharge increases, gates at the dam are opened to maintain elevation 645.5 feet at Winona.
- b. Secondary Control - At a discharge of approximately 26,000 cubic feet per second (cfs), the water surface elevation at the dam is drawn down to elevation 644.5 feet in an effort to maintain primary control. At this time, the control point switches to the dam.
- c. Open River - As discharge continues to increase, gates are opened at the dam to maintain elevation  $644.5 \pm 0.2$  foot at the dam. When discharge approaches 71,000 cfs, all the gates are raised clear of the water surface.

As discharge falls, the reverse order is followed.

Pool 6 is regulated in a manner typical for navigation pools in the St. Paul District. When river discharges are greater than approximately 71,000 cfs, the gates are removed from the water at Lock and Dam 6 and the pool is unregulated. When discharges are between approximately 26,000 and 71,000 cfs, the pool is in “secondary control,” i.e., a pool elevation of 644.5 is maintained at the dam. The pool upstream of the dam rises and falls with river discharge. Because of the slope on the pool, the range of fluctuation under secondary control is greater the farther upstream from the dam one progresses (Figure 1).

At a discharge of approximately 26,000 cfs, regulation of the pool shifts to “primary control” whereby a water surface elevation of 645.5 is maintained at the primary control point at river mile 725.5. As discharges decline below approximately 26,000 cfs, the water surface elevation at Lock and Dam 6 rises from elevation 644.5 toward 645.5. If river discharges were to decline to zero, the pool water surface would (in theory) be flat at elevation 645.5. (As a point of reference, elevation 645.5 at the Winona gage is approximately equal to a stage reading of 5.4 feet.)

Historically, a wider range of fluctuation was allowed at Lock and Dam 6. When the lock and dam went into operation in 1935, a 2.5-foot allowable fluctuation in water levels at the dam was allowed. This flexibility was reduced to the current 1.0 foot in 1960. The minimum water level permitted at the Winona gage has been 645.5 since 1960.

## Pool 6 Water Surface Profiles Routine Regulation

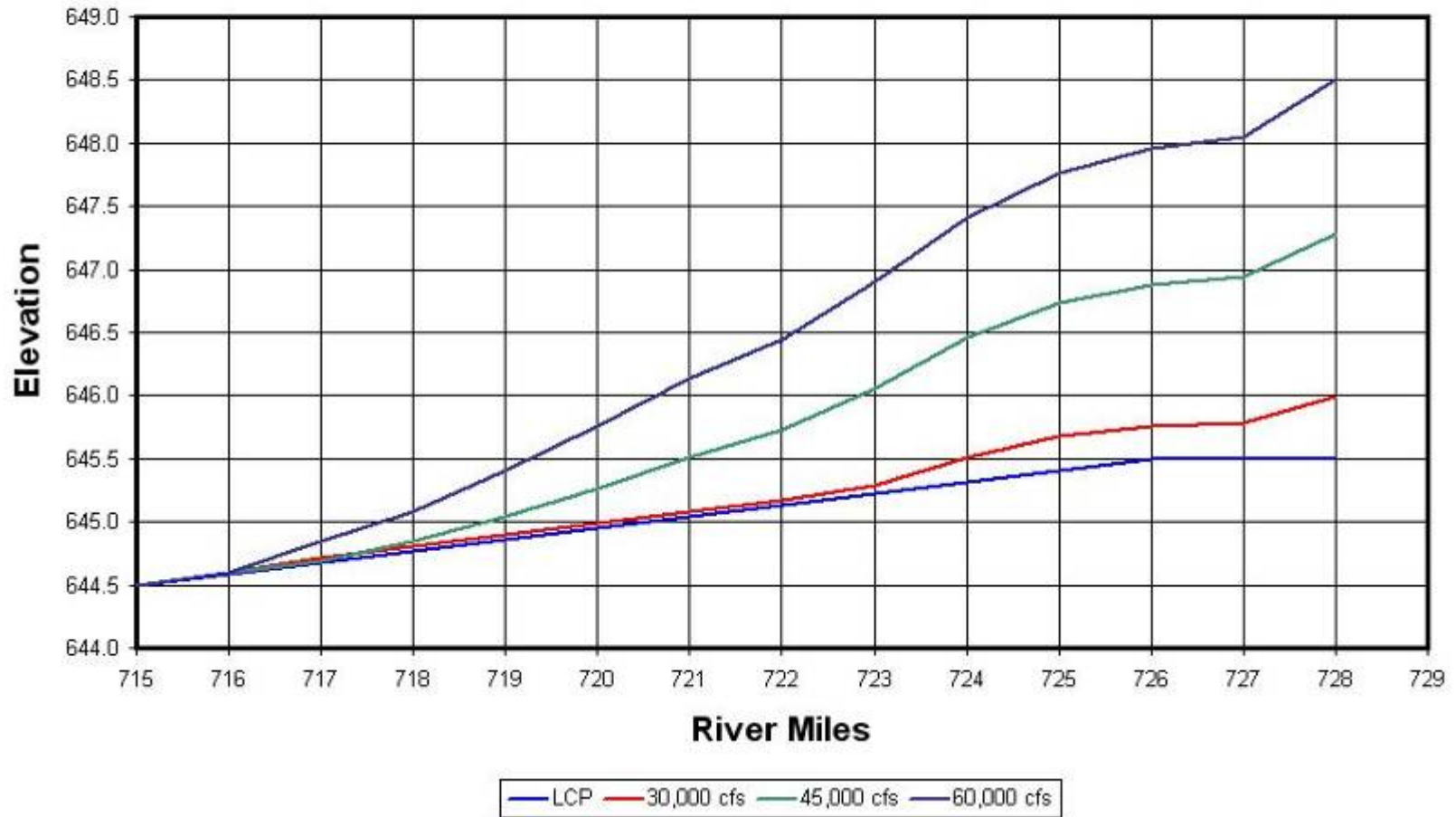


Figure 1. Pool 6 Water Surface Profiles – Routine Regulation.



### 3.0 ALTERNATIVES

Preliminary evaluations indicated that the amount of additional drawdown that could be accomplished at Lock and Dam 6 without requiring any advance navigation channel dredging was likely to be up to 1.0 foot at Lock and Dam 6. Four alternatives were evaluated. They are presented below, with brief summaries outlining the criteria for implementation, and are evaluated further in section 4.0. Detailed analyses regarding ecological effects and the selection of a preferred alternative are presented in Section 6.0 Environmental Assessment and Section 4.0 Plan Selection.

1. **No Action Alternative** – The no action alternative would not provide the desired ecological benefits. The deterioration of aquatic vegetation beds in Pool 6 over the last 60 years as a result of loss of natural water flows and increased sedimentation has reduced habitat quality in the pool. Habitat conditions would continue to decline as a result of continued routine regulation of Pool 6. Water level management was identified as one of several important techniques required to restore aquatic vegetation in lower Pool 6.
2. **1.0-Foot Drawdown with 2.0-Foot Reduction in the Primary Control Point Elevation** – A 1.0-foot drawdown at Lock and Dam 6 with a 2.0-foot reduction in the primary control point elevation could cause lower than acceptable water depths in the main channel and at the lower miter gate sill at Lock Dam 5A under lower river discharges. Because of the potential for the need for substantial channel maintenance dredging and, to a lesser degree, the constraint at the Lock and Dam 5A lower miter gate sill, the option of implementing a drawdown with a 2.0-foot reduction in the primary control point elevation was eliminated from further consideration.
3. **1.0-Foot Drawdown with a 0.5-Foot Reduction in the Primary Control Point Elevation**– A 1.0-foot drawdown at Lock and Dam 6 with a 0.5-foot reduction in the primary control elevation is the **selected alternative**. The St. Paul District regards this drawdown as the maximum possible without requiring advance maintenance navigation channel dredging or recreational access dredging that will still emulate periodic natural drought conditions and the associated positive ecological responses. This drawdown alternative has an excellent chance for success on the basis of historic hydrologic conditions, more so than deeper drawdown alternatives. It would probably provide a less desirable vegetation and habitat response but have fewer potential adverse impacts on cultural and other natural resources than deeper drawdowns. A drawdown to a 1.0-foot level at Lock and Dam 6 is justified as an Operation and Maintenance (O&M) supported initiative. Funds have been designated under the O&M, St. Paul District, Fiscal Year 2008 master program, for

routine maintenance dredging throughout St. Paul District. No funding is available for advance dredging in Pool 6.

4. **1.0-Foot Drawdown with No Change in the Primary Control Point Elevation** – A 1.0-foot drawdown at Lock and Dam 6 with no reduction in the primary control point elevation would reduce the river discharge window during which a drawdown could be maintained and reduce the positive ecological responses as compared to the selected alternative because fewer acres would be exposed. As a result, the environmental benefits would not justify the costs and this alternative was eliminated from further consideration.

## **4.0 EVALUATION**

### **4.1 MAINTENANCE OF THE NAVIGATION CHANNEL**

#### **4.1.1 2.0-Foot Reduction (No Constraint) in the Primary Control Point Elevation**

Low control pool (LCP) conditions are those water surface elevations that are the lowest that would be expected to occur under current pool regulation. LCP elevations change with location within the pool. For that portion of the pool between the primary control point at river mile 725.7 and Lock and Dam 6, LCP elevation is reached when river discharges are at 26,000 cfs. For that portion of the pool above the primary control point up to Lock and Dam 5A, LCP is the project pool elevation of 645.5. Because the primary constraint associated with the drawdowns under consideration in this evaluation would be navigation channel conditions, LCP elevations were used as the baseline for measuring potential effects of the drawdown alternatives upon the navigation channel (Table 1).

The effects of the drawdowns, relative to the LCP elevation, are much greater at low discharges, especially in the upper reaches of the pool, because at low discharges, the pool is operated under primary control, which in turn prevents the water surface elevation in the upper part of the pool from declining below 645.5. Based on this information, it is readily evident that implementation of even a minor drawdown in Pool 6 without maintaining some minimum elevation at the primary control point could require substantial channel maintenance dredging to ensure adequate navigation channel depths at low river discharges.

Another factor that must be considered is the lower miter gate sill at Lock and Dam 5A, which has an elevation of 633.0. A minimum of 11 feet of water is required over the sill for safe navigation. As an example, the water surface elevation at the upper end of Pool 6 would be at 644.0 for a 1.0-foot drawdown at 15,000 cfs. Thus, if no constraint was imposed at the primary control point, water depths over the lower miter gate sill at Lock and Dam 5A would require a 1.0-foot drawdown to be terminated if river discharges fell below 15,000 cfs.

**Table 1. Lowest Controlled Pool (LCP) Elevations for Recommended Plan.**  
 (1.0 foot at dam, 0.5 foot at Primary Control Point) Difference

	River Mile	Normal LCP	WLM Drawdown LCP	Difference
Tail waters 5A	728.28	645.50	645.00	0.50
PCP Winona Gauge	725.69	645.50	645.00	0.50
	725.00	645.44	644.91	0.53
	724.00	645.35	644.77	0.58
	723.00	645.26	644.64	0.62
	722.00	645.17	644.51	0.66
	721.00	645.08	644.37	0.71
	720.00	644.99	644.24	0.75
	719.00	644.91	644.11	0.80
	718.00	644.82	643.97	0.84
	717.00	644.73	643.84	0.89
	716.00	644.64	643.71	0.93
	715.00	644.55	643.57	0.98
Lock and Dam 6	714.44	644.50	643.50	1.00

Because of the potential for the need for substantial channel maintenance dredging and, to a lesser degree, the constraint at the Lock and Dam 5A lower miter gate sill, the option of implementing a drawdown with no limit on the drawdown at the primary control point was eliminated from further consideration.

**4.1.2 0.5-Foot Reduction in the Primary Control Point Elevation**

Based on the previous discussion, the reduction in water surface elevation at the primary control point would be limited to 0.5 foot (elevation 645.0). The point at which declining river discharges would become the constraint under this scenario would be 32,000 cfs for the 1.0-foot drawdowns.

Assuming the above constraint at the primary control point, the drawdown elevations depicted for 32,000 cfs in Table 1 were used to assess potential effects at Pool 6 dredge cuts. Pool 6 contains six dredge cuts as shown in Table 2.

**Table 2. Pool 6 Dredge Cuts**

<u>Dredge Cut</u>	<u>River Miles</u>
Lower Approach to Lock and Dam 5A	728.5
Below Winona RR Bridge	723.4-723.8
Gravel Point	721.8-722.9
Homer	720.4-721.1
Blacksmith Slough	719.1-719.3
Upper Approach to Lock and Dam 6	714.5-714.6

The Upper Approach to Lock and Dam 6 dredge cut is a low frequency (3-percent annual recurrence), small cut, last dredged in 2000 when 1,466 cubic yards were excavated. For purposes of this evaluation it was assumed that this cut would not be a limiting cost factor affecting drawdown; i.e., if dredging were required at this location to facilitate a drawdown, it would likely be minimal.

The next lowest frequency dredge cut in Pool 6 is the Blacksmith Slough cut at river miles 719.1-719.3. Last dredged in 2005, 11,800 cubic yards of material was removed. This cut has a dredging frequency of 5 percent. A short distance upstream is the Homer cut at river miles 720.4-721.1. This dredge cut has a dredging frequency of 13 percent. Dredging at this cut was last performed in 1997. Because of their low dredging frequencies and recent dredging, neither of these dredge cuts, are expected to pose any channel maintenance problems during a minor drawdown.

The next dredge cut is the Gravel Point cut. This cut has a relatively low frequency of dredging (5 percent); however, it was last dredged in 2007 at which time 9,400 cubic yards was removed. The constraint in this reach is primarily a point bar on the inside of the bend that constricts the navigation channel. The recent dredging helped to alleviate this constriction.

The Below Winona RR Bridge Cut is a relatively high frequency dredge cut (37 percent annual recurrence). This cut, too, was dredged in 2007 at which time 6,000 cubic yards was removed. Dredging at this cut has increased in frequency in the recent past, having been required 6 times in the last 10 years. However, because of the dredging in 2007, channel maintenance problems are not anticipated for a minor drawdown in 2008.

### **4.1.3 No Change at the Primary Control Point**

The alternative of not allowing any drawdown at the primary control point (PCP) below elevation 645.5 was evaluated. Not allowing any drawdown at the primary control point would reduce the window during which a drawdown could be maintained (Table 3).

**Table 3. Estimated Drawdown Windows**

<u>Condition</u>	<u>1.0-foot Drawdown</u>
0.5-foot drawdown at PCP	32,000 to 61,000 cfs
No drawdown at PCP	36,000 to 61,000 cfs

## **4.2 HABITAT BENEFITS**

The purpose behind growing season drawdowns is to mimic the occurrence of low water conditions that would occur naturally on the Upper Mississippi River if it were not impounded and regulated to maintain adequate water depths for commercial navigation. The specific objective of growing season drawdown is to expose substrates and enhance conditions for the reproduction, growth, and survival of perennial emergent species of aquatic vegetation.

The role of aquatic vegetation in ecosystem function and health and its value to fish and wildlife has been well documented and need not be repeated here. Also, drawdown to expose aquatic substrate and promote the growth of emergent vegetation is a proven wildlife habitat management measure. Results observed with the previous drawdowns in Pools 5 and 8 confirm the response of emergent vegetation to a drawdown (River Resource Forum WLMF 2007a, 2007b).

The relative habitat benefits of a drawdown are related to the amount of aquatic substrate that would become exposed by the lowering of water levels. About 4,450 acres of Pool 6 are contained within the Trempealeau National Wildlife Refuge (NWR). Water levels within the refuge are managed somewhat independently of Pool 6. While drawdown in Pool 6 would enhance the capabilities of managers to lower water levels within the Trempealeau NWR, the minor drawdowns being considered as part of this evaluation would not appreciably affect water level management capabilities within the refuge. Therefore, for purposes of this evaluation, potential benefits to the Trempealeau NWR were considered negligible.

Land cover analysis conducted for the Habitat Needs Assessment classified about 10,150 acres of Pool 6 as aquatic habitat. Sufficient bathymetric data are not available for Pool 6 to quantify the amount of aquatic substrate that would be exposed with a drawdown. Analyses conducted for Pools 5, 7, 8, and 9 indicated that a 1-foot drawdown would expose 5 to 15 percent of the aquatic substrate in these pools. During the Pools 5 and 8

1.5-foot drawdowns, approximately 10 percent and 8 percent of the aquatic areas were exposed, respectively. Pool 6 differs from Pools 5, 7, 8, and 9 in that it does not have a large open water area in the lower end of the pool. Thus, it is likely that the number of acres of aquatic substrate that would be exposed by a 1-foot drawdown in Pool 6 would tend toward the lower end of this range. Applying this reasoning to Pool 6 would indicate that a 1-foot drawdown could possibly expose 200 to 500 acres of aquatic substrate.

The effectiveness of a drawdown in providing conditions desirable for the growth of emergent aquatic vegetation is related to the amount of time the drawdown is in effect. Table 4 shows the percentage of time during the June through September period that Pool 6 discharges have fallen within the range under which the drawdown could be maintained (period of record 1960 to 2001).

**Table 4. Percent of Time Pool 6 Discharges Fall within the Specified Ranges during June through September**

<u>Condition</u>	<u>1.0-foot Drawdown</u>
0.5-foot drawdown at PCP	32,000 – 61,000 cfs 41 percent
No drawdown at PCP	36,000 – 61,000 cfs 33 percent

What this information shows is that not allowing any drawdown at the primary control point would likely reduce the length of time a drawdown could be maintained by 20 to 25 percent, which in turn would reduce the potential for achieving a positive vegetative response.

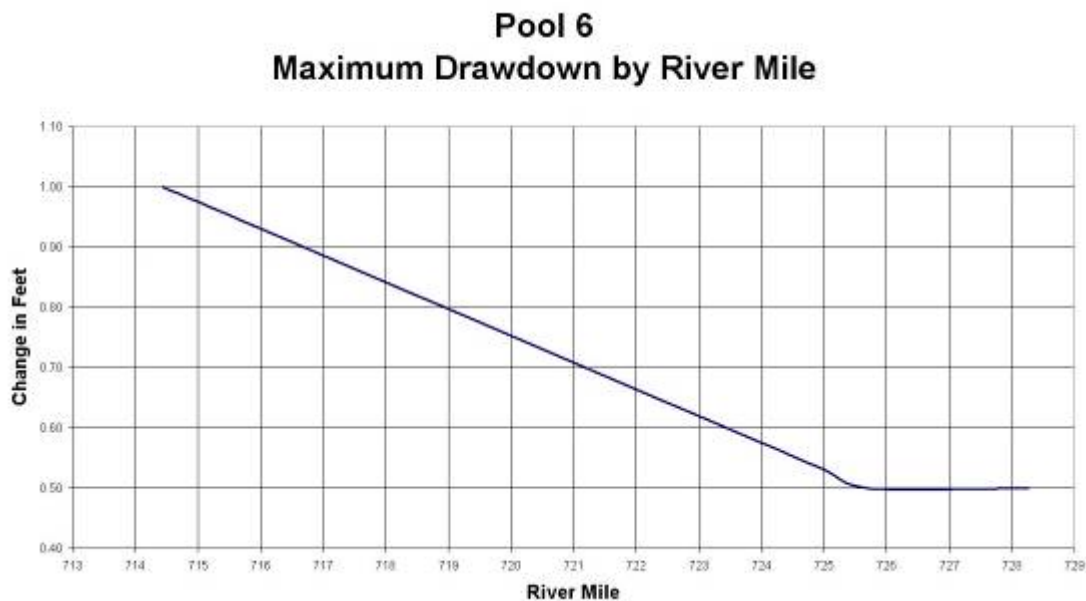
### **4.3 RECREATION**

Recreation facilities in Pool 6 that could potentially be affected by a drawdown are shown in Table 5, along with the estimated maximum drawdown that would occur at each facility. The effects on recreation facilities were assessed against the LCP elevation for those facilities located downriver of the primary control point at river mile 725.5, because this low water condition is experienced at these locations during most summers. For those facilities located above the primary control point, the low water condition is the estimated water surface elevation that occurs during typical low discharge conditions (between 10,000 and 20,000 cfs) (Figure 2, Table 5).

Minnesota and Wisconsin Department of Natural Resources staff surveyed recreational boat access in Pool 6 in late September and early October 2002. Water levels at Lock and Dam 6 were at elevation 644.6 (approximately 33,000 cfs). Ramp type, general condition, number of lanes, depth to end of ramp, and substrates were determined for each boat access site. In addition, the number, location, and depth of private boat docks

**Table 5. Pool 6 Recreational Facilities and Drawdown Elevations**

Facility	River Mile/Bank	Normal Low Water	1.0-foot Drawdown	
			Elevation	Difference
Trempealeau Marina	714.3 LB	644.5	643.5	-1.0
Sullivan's	715.6 LB	644.6	643.6	-1.0
Perrot State Park Boat Landing	717.5 LB	644.6	643.6	-1.0
KOA Riverside Park Boat Landing	718.0 RB	644.6	643.7	-0.9
Homer Boat Landing	720.8 RB	644.8	644.1	-0.7
Winona East 5th St. Boat Landing	723.6 RB	645.2	644.7	-0.5
Winona St. Charles St. Boat Landing	724.6 RB	645.3	644.9	-0.4
Winona Yacht Club	724.9 RB	645.4	645.0	-0.4
Latsch Island Park Boat Landing	725.6 LB	645.5	645.1	-0.4
Latsch Island East Boat Landing	725.8 LB	645.5	645.1	-0.4
City Harbor Boat Landing	725.9 LB	645.5	645.1	-0.4
Dick's Marina	726.1 LB	645.5	645.1	-0.4
Breezy Point Marina	728.1 LB	645.7	645.3	-0.4



**Figure 2. Maximum Drawdown by River Mile.**

were determined throughout the pool, as well as channel depths at various areas where boaters typically access the main channel.

#### **4.3.1 Trempealeau Marina**

The Trempealeau Marina is a publicly-owned facility leased to a private concessionaire. This facility has a two-lane boat ramp and mooring docks. Water depth at the end of the ramp was 4.6 feet. Depths from the access to the main channel and around nearby docks within the marina range from 4.2 to 12.0 feet.

A 1.0-foot drawdown at this facility would reduce these depths to 3.6 feet at the end of the ramp and 3.2 feet at the high spot in the access to the main channel. Reducing depths at the ramp should not appreciably affect the ability to launch and load boats.

Reducing water depths to 3.2 feet in the access channel could create problems for the large recreational craft that use this facility. The primary constraint would appear to be a shoal located on the landward side of the Lock and Dam 6 upper guide wall. Boaters with large craft would need to exercise additional caution in this area.

#### **4.3.2 Sullivan's**

Sullivan's is a restaurant that caters to recreational river boaters. The shallowest water depth in the access to this facility is about 7 feet. Thus, a 1.0-foot drawdown at this facility would reduce these depths to 6 feet. This reduction should have no effect on recreational boats accessing this facility.

#### **4.3.3 Perrot State Park Boat Landing**

This Wisconsin Department of Natural Resources' ramp has two lanes consisting of concrete planks and a loading dock. Water depth at the end of the planks was 2.8 feet and 4.1 feet. at the end of the dock. The bottom slopes gradually out from the boat landing. To reach deep water near the main channel, boaters must travel through an area with depths ranging from 3.9 to 5.0 feet.

A 1.0-foot drawdown at this facility would reduce minimum access depths to about 2.5 feet. For small boats using this landing, water depths of 2.5 feet should be sufficient for their access needs. Larger deeper drafting boats may have difficulty using this access.

#### **4.3.4 Playmor Park Boat Landing**

This access is privately-owned with poured concrete only to water's edge, then sand and cobble. Depths approximately 30 feet and 50 feet from the shore are 3.5 and 5.0 feet, respectively. The ramp is in poor shape.

Boaters must travel downstream several hundred yards before accessing the main channel, because deposition has created a long sandbar (water is less than or equal to 2



feet deep) out from the access. Depths through the access channel range from 6 to 12 feet. The campground owner indicated that the problem is getting worse as sand deposition continues to occur near the boat ramp. Several large docks were present just downstream of the access, with depths ranging from 4 to 8 feet at the end of the docks.

The substrate remains sand and cobble for some distance out from the ramp, which would likely be useable during a drawdown of up to 1.0 feet at Lock and Dam 6 (0.9 foot at this facility). Depths in the access channel would also remain adequate.

#### **4.3.5 Homer Boat Landing**

This Minnesota Department of Natural Resources' access is one lane, consisting of sand and gravel substrates. Water depth 25 feet from the waters edge was 6 feet. Access is directly into the main channel. Parking is limited at this site, and the access gets light use.

A 1.0-foot drawdown at Lock and Dam 6 would reduce water depths at this location about 0.7 foot, which should have no appreciable effect at this boat ramp because trailers could be backed in as far as necessary to load/unload a boat.

#### **4.3.6 Winona East 5<sup>th</sup> St. Boat Landing**

This city of Winona owned access has two lanes consisting of concrete planks. A boat dock was present preventing use of the south lane. Planks extend 30 feet into the water to a depth of 5.5 feet. Access is directly into the main channel. A drawdown of 1.0 foot at Lock and Dam 6 (0.5 foot in this location) would have no practical effect on this ramp.

#### **4.3.7 Winona St. Charles St. Boat Landing**

This city of Winona owned access has two, two-lane ramps consisting of concrete planks and boat docks. The downstream ramp extends approximately 25 feet into the water to a depth of 7 feet. The upstream ramp extends approximately 25 feet into the water to a depth of 8 feet. Access from both ramps is directly into the main channel, with a breakwater on the upstream side to reduce flow.

A drawdown of 1.0 foot at Lock and Dam 6 (0.4 foot in this location) would have no practical effect on this ramp.

#### **4.3.8 Winona Yacht Club**

This privately owned facility consists of multiple docks with no boat ramp. Depths along the docks range from 3 to 8 feet, with only one small area on the southeast corner of the bay less than 4 feet deep.

A drawdown of 1.0 foot at Lock and Dam 6 (0.4 foot in this location) would have no practical effect on this facility.

#### **4.3.9 Latsch Island Park Boat Landing**

This public access consists of a single ramp with a mostly gravel bottom and some concrete planks. Water depth 20 feet from shore is approximately 4 feet.

A drawdown of 1.0 foot at Lock and Dam 6 (0.4 foot in this location) would have no practical effect on this facility.

#### **4.3.10 Latsch Island East Boat Landing**

This access was closed for repair at the time of the survey so no data were collected. However, it is unlikely that a drawdown of 0.4 foot in this location would have any practical effect on this facility.

#### **4.3.11 City Harbor Boat Landing**

This public access has a two-lane concrete plank ramp extending 30 feet into the water. Water depth at the end of the ramp is 5 feet. At the end of the ramp is an abrupt drop from 5 to 7 feet.

A drawdown of 1.0 foot at Lock and Dam 6 (0.4 foot in this location) would have no practical effect on this facility.

#### **4.3.12 Dick's Marina**

This private marina relies on the City Harbor Boat Ramp for water access. Docks are in 5 to 10 feet of water. A drawdown of 1.0 foot at Lock and Dam 6 (0.4 foot in this location) would have no practical effect on this facility.

#### **4.3.13 Breezy Point Marina**

This marina was not surveyed so no data were gathered. However, it is very unlikely that a 0.3-foot reduction in water levels would have any practical effect on use of this facility.

#### **4.3.14 Prairie Island Public Boat Ramp**

This public access is a single lane, concrete plank ramp extending 25 feet into the water to a depth of 4 feet. Substrates beyond the end of the ramp are rocky with depths ranging from 4 to 5 feet. A single dock is on the downstream side of the ramp. A 0.3-foot reduction in water levels would not have any practical effect on use of this facility.

#### **4.3.15 Prairie Island Campground**

This private campground landing has a single-lane, concrete plank ramp. The intact planks end at water's edge, with some broken planks in the water on the upstream side of

the access. Substrates are gravel, with water depths 20 feet from shore 5 feet or greater. A 0.3-foot reduction in water levels would not have any practical effect on use of this ramp.

Access to the main channel from both the Prairie Island Public Boat Ramp and Prairie Island Campground is through Straight Slough. Water depths in Straight Slough are 8 to 12 feet, except near the mouth where a sand plug has water depths of 2 to 3 feet. A 1.0-foot drawdown at Lock and Dam 6 would reduce water levels in this area by 3 to 4 inches. Boaters would need to exercise additional caution when passing through this reach. The placing of marker buoys by the Minnesota Department of Natural Resources may be done and would assist boaters in this area.

#### **4.3.16 Private Boat Docks and Other Access Areas**

##### **4.3.16.1 Winona Boat Harbor (on Wisconsin side of Main Channel)**

Numerous docks and boathouses are located throughout the Winona Boat Harbor. Depths range from 6 to 25 feet. A drawdown of 1.0-foot at Lock and Dam 6 would reduce water depths in this area by about 0.4 foot, which should have little or no effect on access to these boat houses.

##### **4.3.16.2 Latsch Island**

The east side of Latsch Island is lined with about 100 boathouses and docks. From the railroad bridge downstream to the abandoned walking bridge, water depths range from 8 to 20 feet. Downstream of the walking bridge depths gradually become shallower, with some small bays in this area less than 2 feet deep. Depths begin to increase as you get closer to the south end of the island. The usability of approximately 10 boathouses and docks could be adversely affected by a drawdown.

##### **4.3.16.3 Latsch Island Park Boat Landing Area**

Six boat houses are present between the access site and highway bridge, all in 4 to 5 feet of water. These would be minimally affected by a drawdown of 0.4 foot in this reach.

##### **4.3.16.4 Homer**

A few homes and private docks are present above and below the Homer access site. Water depths range from 2 to 15 feet. The usability of two docks could be adversely affected by drawdown of 1.0 foot at Lock and Dam 6 (0.7 foot in this location).

## 5.0 RECOMMENDED PLAN

A 1.0-foot drawdown at Lock and Dam 6 with a 0.5-foot drawdown constraint at the primary control point can be implemented with minimal potential effect on commercial navigation, subject to spring channel surveys to be conducted prior to the summer implementation

The effects on commercial navigation facilities in Pool 6 are expected to be minimal because this type of development is all located in the upper portion of the pool, where the drawdown should have no significant impact.

A drawdown in this range is expected to expose between 200 and 500 acres of substrate in Pool 6, providing improved conditions for the regeneration and growth of emergent aquatic vegetation. Because no advance dredging is required to implement this plan, the expected benefits can be gained at minimal cost.

The effects on recreation and recreation access are expected to be minor and manageable. Access to a small number of private docks and boathouses may be affected, resulting in some inconveniences for the owners during a drawdown.

In summary, a 1.0-foot drawdown at Lock and Dam 6 would not require any advance main channel dredging, would be expected to have no appreciable effect on commercial navigation facilities, would provide the opportunity for improved conditions for the regeneration and growth of emergent vegetation, and would have only minor effects on recreation facilities and accesses.

**Therefore, the recommended plan is to implement a drawdown at Lock and Dam 6 during the summer of 2008.** The parameters of the drawdown would be as follows.

- a. The drawdown at Lock and Dam 6 would be 1.0 foot below the secondary control elevation of 644.5. The decision to implement the drawdown would be made following completion of navigation channel surveys in Pool 6 in spring 2008.
- b. A minimum elevation of 645.0 (0.5-foot drawdown) would be maintained at the primary control point at Winona (river mile 725.5).
- c. The drawdown would commence on or about June 16, 2008, and would extend to on or about September 30, 2008.
- d. The drawdown would be reduced or terminated if unacceptable impacts are experienced on commercial navigation, recreational access, or natural or cultural resources.

## **6.0 IMPLEMENTATION OF THE RECOMMENDED PLAN**

Following recession of spring high water, channel surveys will be taken in Pool 6 to ensure that channel dimensions would remain suitable during the drawdown.

The drawdown would start in mid-June, probably on June 16, 2008 (a Monday). This projection assumes river discharges are within the range under which a drawdown can be implemented. If river discharges are greater than 61,000 cfs, the drawdown would not start until discharges fall below 61,000 cfs.

If river discharges have fallen below 36,000 cfs, water levels at the dam will be allowed to rise to elevation 645.5. As discharges reach about 25,000 cfs, water levels at both the primary control point and the dam will be allowed to rise as necessary until the pool is back into normal regulation. The St. Paul District will make this decision in consultation with the WLMTF.

At the beginning of the drawdown, the water surface elevation at the dam will be reduced by approximately 0.2 foot per day. Experience with drawdowns in Pools 8 and 5 indicates that it will not be possible to draw the pool down exactly 0.2 foot per day, but that this rate can be accomplished as an average over the drawdown period.

The drawdown will be terminated on or about September 30, 2008. Beginning on approximately September 15, 2008, the water surface elevation at the dam will be raised at an approximate rate of 0.1 foot per day.

The St. Paul District will monitor conditions in the navigation channel to assess whether the drawdown is having any effect on the usability of the main channel.

In addition to the Corps of Engineers, river resource management agencies such as the U.S. Fish and Wildlife Service, the U.S. Geological Survey, and the Minnesota and Wisconsin Departments of Natural Resources will monitor conditions during the drawdown to assess potential benefits and adverse effects on river resources.

## **7.0 ENVIRONMENTAL ASSESSMENT**

An environmental assessment has been prepared to identify the effects of the selected plan. As specified by Section 122 of the 1970 River and Harbor Act, the categories of impacts listed in the impact assessment matrix (Table 6) were reviewed and considered.

The Final Environmental Impact Statement for the 9-Foot Channel Navigation Project (Corps of Engineers 1974) describes effects of the St. Paul District's operations and maintenance activities. This water level management study for Pool 6 is part of the District's Mississippi River operations and maintenance program. The Final Environmental Impact Statement for the 9-Foot Channel Maintenance Management Plan (Corps of Engineers 1997) addresses navigation channel maintenance activities, some of which relate to the proposed water level management actions.

This environmental assessment discusses the effects of the proposed minor drawdown of Pool 6 scheduled for the year 2008.

### **7.1 RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS**

The proposed action would comply with all applicable Federal environmental laws, executive orders, and policies and State and local laws and policies including the Clean Air Act, as amended; the Clean Water Act of 1977, as amended; the Endangered Species Act of 1973, as amended; the Land and Water Conservation Fund Act of 1956, as amended; the National Environmental Policy Act of 1969, as amended; the Fish and Wildlife Coordination Act of 1958, as amended; Executive Order 11988 - Floodplain Management; and Executive Order 11990 - Protection of Wetlands. The proposed action would not result in the conversion of farmland to nonagricultural uses. Therefore, the Farmland Protection Policy Act of 1981 does not apply.

### **7.2 PROPOSED ACTION AND ALTERNATIVES**

See previous Section 3.0 Alternatives and Section 6.0 Implementation of the Recommended Plan for the proposed action.

Preliminary evaluations indicated that the amount of additional drawdown that could be accomplished at Lock and Dam 6 without requiring advance navigation channel dredging was likely to be a maximum of 1.0 foot. Four alternatives were evaluated: (1) no action, and three 1.0-foot drawdown scenarios at Lock and Dam 6 with (2) no constraint, (3) 0.5-foot drawdown, and (4) no drawdown at the primary control point at Winona. A 1.0-foot drawdown with a 0.5-foot limit at the primary control point was selected to maximize habitat benefits while not requiring advance dredging. The no-action alternative would not achieve the desired ecological objectives.

**Table 6. Environmental Assessment Matrix for the Mississippi River Pool 6 Drawdown**  
(Section 122 of the River and Harbor and Flood Control Act of 1970 (Public Law 91-611))

PARAMETER	MAGNITUDE OF PROBABLE EFFECTS*						
	BENEFICIAL			NO EFFECT	ADVERSE		
	SIGNIFICANT	SUBSTANTIAL	MINOR		MINOR	SUBSTANTIAL	SIGNIFICANT
<b>A. SOCIAL EFFECTS</b>							
1. Noise Levels				X			
2. Aesthetic Values			LT		ST		
3. Recreational Opportunities			LT		ST		
4. Transportation					X		
5. Public Health and Safety				X			
6. Community Cohesion (Sense of Unity)				X			
7. Community Growth and Development				X			
8. Business and Home Relocations				X			
9. Existing/Potential Land Use				X			
10. Controversy					X		
<b>B. ECONOMIC EFFECTS</b>							
1. Property Values				X			
2. Tax Revenue				X			
3. Public Facilities and Services				X			
4. Regional Growth				X			
5. Employment				X			
6. Business Activity				X			
7. Farmland/Food Supply				X			
8. Commercial Navigation					X		
9. Flooding Effects				X			
10. Energy Needs and Resources				X			
<b>C. NATURAL RESOURCE EFFECTS</b>							
1. Air Quality				X			
2. Terrestrial Habitat			X				
3. Wetlands			X				
4. Aquatic Habitat			X				
5. Habitat Diversity and Interspersion			X				
6. Biological Productivity			X				
7. Surface Water Quality			X				
8. Water Supply			X				
9. Groundwater			X				
10. Soils				X			
11. Threatened or Endangered Species				X			
<b>D. CULTURAL RESOURCE EFFECTS</b>							
1. Historic Architectural Values			X				
2. Prehistoric and Historic Archeological Values				X			

\*ST=Short term effects. LT=Long term effects.

The mid-June initiation of the drawdown was chosen to minimize the impacts on earlier fish spawning while maximizing the duration of the drawdown for habitat benefits. Alternative earlier or later start dates would not satisfy these criteria.

## **7.3 EXISTING SETTING**

### **7.3.1 Pool Description**

Lock and Dam 6 is part of the 9-foot navigation channel project on the Upper Mississippi River, 714.2 river miles above the mouth of the Ohio River and 14.3 river miles below Lock and Dam 5A. Lock and Dam 6 is located at the city of Trempealeau, Wisconsin, and approximately 10 miles below the City of Winona, Minnesota. Lock and Dam 5A is located immediately above Winona. Pool 6 is bordered by Wisconsin along the left descending bank and Minnesota along the right descending bank (Figure 3).

The valley of Pool 6 varies in width from about 1 mile at Trempealeau, Wisconsin, to over 5 miles midpool. The bluffs are steep on both sides and highly dissected, with a maximum relief of less than 700 feet. Trempealeau National Wildlife Refuge (NWR) comprises much of the pool (4,450 acres or approximately 20 percent of the floodplain acreage). The main channel parallels the high Wisconsin shoreline at Lock and Dam 5A but angles across the valley to the city limits of Winona where it parallels the Minnesota shoreline to Lock and Dam 6. Several small tributaries enter the pool. The largest tributary is the Trempealeau River, entering from Wisconsin into the Trempealeau NWR.

### **7.3.2 Water Resources**

#### **7.3.2.1 Hydrology**

The Mississippi River at Lock and Dam 6 drains an area of approximately 60,000 square miles. The drainage basin above Lock and Dam 6 includes large portions of Minnesota and Wisconsin and a small portion of eastern South Dakota. Approximately two-thirds of the watershed is agricultural use; the rest is primarily forested lands and urban areas. Annual precipitation in the area is about 32 inches per year.

Since 1959, the average annual discharge at Lock and Dam 6 has been 34,008 cfs. Over the same time frame, the lowest recorded discharge was 2,500 cfs in December 1980 and the highest recorded discharge was 267,000 in April 1965. Early summer (June) discharges at Lock and Dam 6 generally range from 30,000 to 50,000 cubic feet per second (cfs). By late summer, discharges usually decrease to a range of 20,000 to 35,000 cfs. Winter low flows are usually in the range of 10,000 to 20,000 cfs.



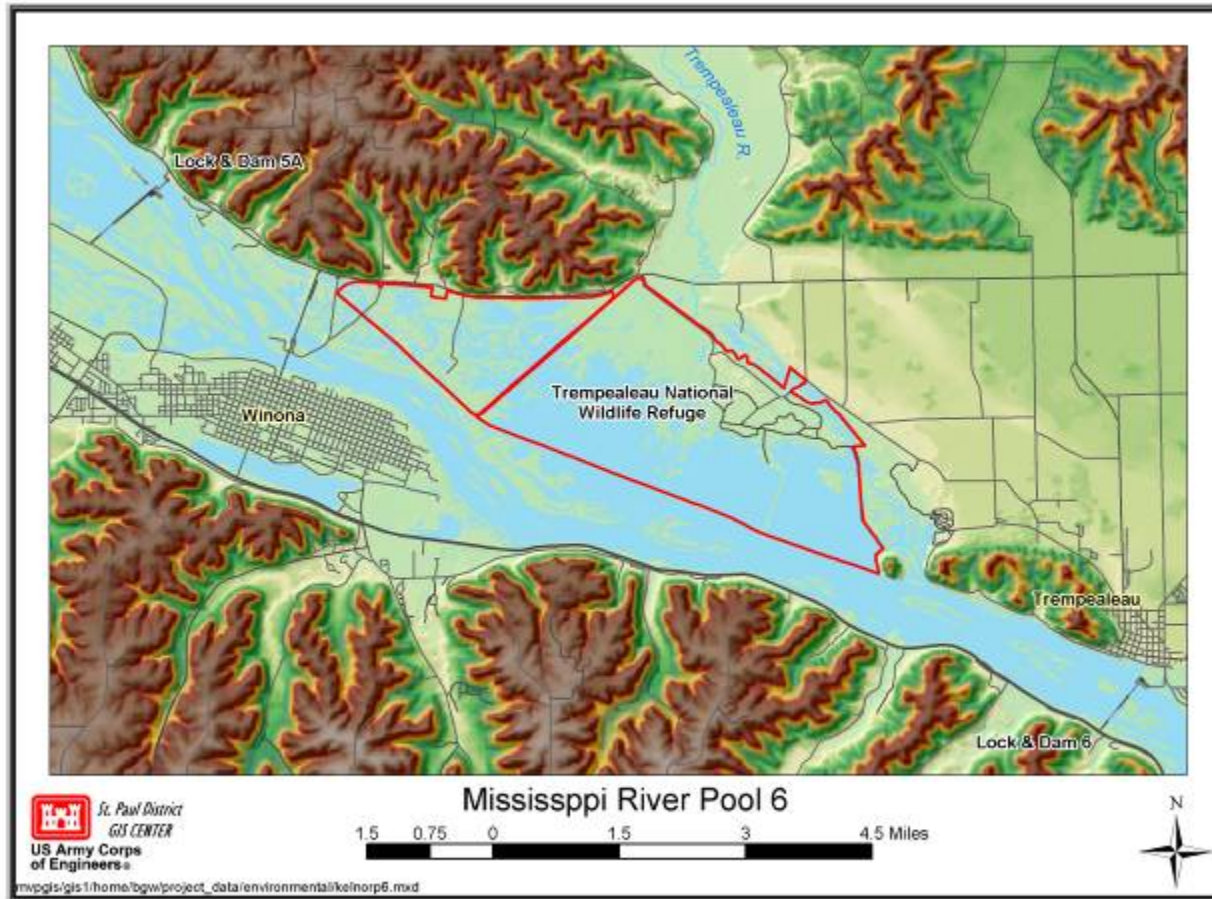


Figure 3. Upper Mississippi River Pool 6.

### **7.3.2.2 Tributaries – Trempealeau River**

The Trempealeau River enters Pool 6 in the Trempealeau NWR approximately midpool. Its watershed encompasses approximately 650 square miles, and it has an average annual discharge of approximately 400 cfs, but flows can range from approximately 100 to more than 17,000 cfs. The Trempealeau River has a steeper gradient and higher sediment concentrations than those of the Mississippi River and water quality is not as good as that of the Mississippi River.

### **7.3.2.3 Groundwater**

Large quantities of groundwater are present in the highly permeable, surficial sand deposits. The most important aquifers in the region are sand, gravel, limestone, dolomite, and sandstone. Massive deposits of clean gravel were deposited by swift glacial streams during the Pleistocene Epoch. Such deposits are commonly found in valleys now occupied by streams that provide rapid recharge during time of high streamflow. Groundwater is considerably harder than the Mississippi River in Pool 6. The dolomite strata of the area are generally cavernous, and they give rise to large springs. The sandstone strata, which underlie the Oneota dolomite, serve as excellent aquifers.

### **7.3.3 Water Quality**

Pool 6 of the Mississippi River has generally good water quality. Except isolated sloughs and backwater lakes, the dissolved oxygen content of the water remains high year round and above levels required to sustain a quality fishery. Because of its turbulent nature, the river is well aerated and it can assimilate a considerable biochemical oxygen demand (BOD) loading. Fertility levels (nitrogen, phosphorus, potassium, calcium, etc.) are ample to support luxuriant growth of rooted aquatics and algae.

Mead (1995) in their investigations of contaminants in the Mississippi River from 1987 to 1992 found water quality to be generally better in this reach of the river than above Lake Pepin and in the reach downstream where tributaries that drain the Corn Belt begin to enter the Mississippi River. However, the tributaries, which drain predominately agricultural areas, have higher sediment concentrations than those of the Mississippi River and water quality is not as good as that of the Mississippi River.

### **7.3.4 Geology and Soil/Substrate**

The most significant geologic event explaining the nature of the Mississippi River within Pool 6 occurred at the end of the Pleistocene glaciation approximately 10,000 years ago. Tremendous volumes of glacial meltwater, primarily from the Red River Valley's glacial Lake Agassiz, eroded the preglacial Minnesota and Mississippi River valleys. As meltwaters diminished, the deeply eroded river valleys aggraded substantially to about the present levels. Prior to impoundment, the broad floodplain of the river was composed of depressions, sloughs, natural levees, islands, and shallow lakes. Since impoundment, a relatively thin veneer of silts, clays, or sands has been deposited over most of the river bottom within the pool. The depth of

sedimentation is generally greater in the slow moving backwater areas than in the major side channels and main channel portions of the impounded area.

In the bluffs of the Upper Mississippi valley along Pool 6 are exposed Lower Paleozoic sedimentary rocks, dominantly carbonates (limestones and dolomites) and sandstones, overlain by unconsolidated materials of Quaternary (Upper Cenozoic) age, largely tills and loess of the earlier glacial advances. This stretch is part of the so-called Driftless Area that was not covered by the Wisconsin advances of the ice sheet.

The soils of the floodplain are alluvial, and they vary in texture from silty clay to sand. The composition of the soil depends on the manner in which the soil was laid down. The strata are composed of clay, silt, sand and gravel and are very irregular. Streambanks plainly show the varying thickness of the different materials and in many places the lack of continuity of the sand and gravel layers above low water levels.

Sediment quality is generally good in Pool 6. Main channel sediments are primarily medium to coarse sands with only trace amounts (generally less than 3 percent by weight) of silts and clays. Sand, silt, and clay sediments are found within defined sloughs, while finer silt and clay materials are found in marshy backwater areas. Levels of pesticides and other chlorinated hydrocarbons are generally below detection limits in all main channel sediments and detected at low levels in backwaters. Sullivan and Moody (1996) conducted a pre- and post-1993 flood (1991 and 1994) longitudinal (Pools 1 through 11) survey of contaminants. In this study, a comparison of the data to the Ontario Ministry of Environment and Energy's Sediment Quality Guidelines was made. Nitrogen was found above Ontario's lowest effect level guideline both pre- and post-flood, but was typical of concentrations in adjacent pools. Polychlorinated Biphenyls (PCBs) and chlorinated pesticides were found at low levels, below Ontario's lowest effect level guideline. Metals concentrations were found at concentrations within the expected ranges for backwater sediments on the Upper Mississippi River.

### **7.3.5 Vegetation**

Impoundment resulted in an increase in development of aquatic and marsh vegetation in Pool 6. Prior to flooding, a coontail-elodea plant association was most common in ponds and lakes throughout the floodplain. Taxa from this plant group remained dominant in the Upper Mississippi River for some time after flooding. However, with continued stabilization of water levels, pondweeds such as American pondweed, sago, leafy pondweed, small pondweed, flat-stemmed pondweed, bush pondweed and curly muckweed are now much more common throughout much of Pool 6. Despite the overall changes in the plant community since impoundment, coontail, elodea, water stargrass, wild celery and the pond lilies remain established in certain areas. The lentic, open water portions of the pool have a relatively productive planktonic community dominated by diatoms and green algae.

The wide variety of floodplain and riverine habitats within Pool 6 has allowed the development of a diverse vegetative assemblage. River birch and swamp oak are dominant species at the

upland edge of the floodplain. Areas with mature floodplain forest usually consist of an overstory dominated by green ash, silver and red maple, cottonwood and river birch. The understory in these areas consists primarily of tree seedlings, alder, wood nettle, poison ivy, wild grape and woodbine.

### **7.3.6 Habitat Types and Distribution**

Pool 6 has a variety of high quality terrestrial and aquatic habitats. These habitats support a diverse and productive fishery and provide important waterfowl nesting, feeding, and resting areas. Aquatic habitat types present in Pool 6 include most of the classifications of Wilcox (1993). The most prevalent aquatic habitats in Pool 6 include main channel, channel border, slough, river lakes, and tail water. Terrestrial habitat is predominately bottomland forest. The important characteristics of these habitat types, relative to fish and wildlife uses, are described below.

#### **7.3.6.1 Aquatic Habitat**

Main Channel - The main channel conveys the majority of the river discharge and, in most reaches, includes the navigation channel. It has a minimum depth of 9 feet and a minimum width of 400 feet. A current always exists, varying in velocity with water stages. The bottom type is mostly a function of current. The upper section usually has a sand bottom, changing to silt over sand in the lower section. Occasional patches of gravel are present in a few areas. No rooted vegetation is present. Pool 6 contains 696 acres of main channel habitat.

Main Channel Border - Main channel borders are the areas between the navigation channel and the riverbank. Channel borders contain the channel training structures (wing dams, closing dams, revetted banks) and, thus, a diversity of depths, substrates, and velocities can be found in this habitat type. The bottom is sand in the upper section of the pool and silt in the lower. Definable plant beds are frequently absent, but single species submersed plant clusters are sparsely scattered in areas of reduced current. Pool 6 contains 1,637 acres of main channel border habitat.

Secondary Channels - Secondary channels are large channels that carry less flow than the main channel. In some reaches, the navigation channel is located in the secondary channel. Unless they are former main channels, the banks are usually protected. Undercut or eroded banks are common along the channel departures from the main channel. The bottom type usually varies from sand in the upper reaches to silt in the lower. In the swifter current, no rooted vegetation is present, but vegetation is common in the shallower areas having silty bottoms and moderate to slight current. Pool 6 contains 1,004 acres of secondary channel habitat.

Sloughs - Sloughs are characterized by having no current at normal water stage, mud bottoms, and an abundance of submerged and emergent aquatic vegetation. Pool 6 includes 2,568 acres of slough. These areas provide excellent spawning, nesting, and rearing areas although

sedimentation, loss of vegetation, and periodic strong water currents are causing a decline in the fish and wildlife habitat values of these areas.

River Lakes and Ponds - River lakes and ponds are distinct lakes formed by fluvial processes or are artificial (excavated or impounded). They may or may not have a slight current, depending on their location. Most of the bottoms are mud or silt, often consisting of a layer 2 or more feet thick. These waters have an abundance of rooted aquatic vegetation, both submerged and emergent. Pool 6 contains 792 acres of river lakes and pond habitat.

Tail Waters – Tail waters include the main channel, main channel border, and areas immediately below the navigation dams where turbulence is caused by the passage of water through the gates of the dams and out of the locks. Because these areas change in size according to water stage, an arbitrary lower boundary for fishery purposes has been set at a distance of 1/2 mile below the dams. The bottom is sand to cobble, and no rooted aquatic vegetation is present. With the exception of scour holes immediately below the locks and dams, tail water habitat is very similar to natural river rapids. Tail waters provide food and fast, highly oxygenated water and are used by species such as walleye, sauger, paddlefish, and white bass. Tail waters are primarily used by predatory species like gulls, eagles, and osprey. These areas generally remain open during the winter providing feeding areas for raptors that overwinter in the area. Pool 6 contains 85 acres of tail water habitat.

### **7.3.6.2 Terrestrial Habitat**

Terrestrial habitats within the floodplain of Pool 6 include areas of forest, brush and shrub areas, wet and upland meadows, areas disturbed by commercial or residential development and agricultural land. Areas previously disturbed by past dredged material placement (approximately 246 acres) are prevalent along the reach. Each of these areas can support a diversity of species and are important parts of the overall ecosystem.

Most of the Upper Mississippi River is contained within an ecotone between prairie vegetation types and mixed deciduous-coniferous forests. Plant life in the Upper Mississippi River valley shows an overlapping of eastern and western species. Several high "sand prairie" areas are scattered along the river valley, offering habitat conditions normally found much farther west. The climate moderation also allows more southern plant species to extend their ranges up the river valley. Forested areas in the region are of two types; upland xeric southern forests and lowland forests of the floodplain. Dominant tree species in the floodplain forest type are silver maple, slippery elm, black willow, cottonwood, American elm, green ash, and river birch. Species dominant in the better drained areas are American elm, silver maple, green ash, basswood, and black ash.

Wet meadows cover approximately 550 acres of the floodplain in Pool 6, and willows/shrubs cover approximately 800 acres. These habitat types showed significant declines when the pool was inundated. These habitat types are important to a variety of wildlife.

Terrestrial areas dominated by industrial, commercial or residential use are prevalent in the floodplain of Pool 6 (approximately 3,500 acres). The majority of these areas are located near or within Winona. These areas typically show signs of earth-moving activities including roads and highways, gravel pits, barge loading facilities, marinas, industrial buildings, and family residences.

Agricultural areas (approximately 300 acres) include areas devoted to production of annual crops, pastures or landscape nurseries. Agricultural lands are generally in private ownership and are not normally saturated with water except during spring flooding in low-lying areas.

### **7.3.7 Fish and Wildlife**

#### **7.3.7.1 Fish**

Approximately 75 species of fish are reported from Pool 6 (Pitlo et al. 1995). Common game and panfish species include the walleye, sauger, northern pike, channel catfish, largemouth bass, white bass, bluegill, and white and black crappie. Common nongame fish include the freshwater drum, carp, redhorse, buffalo, and a wide variety of minnows. Catfish, buffalo, and carp are the primary fish of commercial interest.

Gamefish, which use main channel habitat, include walleye, sauger, smallmouth bass and white bass. Also, freshwater drum and channel catfish are common commercial fish that use this habitat type. Commercial species found in backwaters include carp, bigmouth buffalo and catfish, while typical sport fish include northern pike, largemouth bass, crappies and bluegill. Largemouth bass, smallmouth bass, bluegill, crappie and walleye use side channels and sloughs for all life functions. Rearing, wintering and spawning habitat is provided by sloughs and side channels for northern pike, white bass, carp and buffalo. Tail waters are particularly important areas for species like paddlefish and sturgeon, which were largely displaced by inundation of the natural river. Tail waters provide spawning, rearing and wintering areas for walleye, sauger, yellow perch, catfish, freshwater drum and white bass.

#### **7.3.7.2 Wildlife**

Pool 6 contains an abundance of wildlife. The area contains a rich mixture of vertebrate animals from the northern and southern United States, as well as an overlapping of eastern and western species. The great variety of bird species that use the Pool 6 area can be attributed to its location with the Mississippi flyway.

Pool 6 and, in particular, the Trempealeau NWR provide critical nesting, resting, and foraging habitat for a host of migratory birds. Major breeding waterfowl use is by wood duck. Other breeding waterfowl include the blue-winged teal, mallard, hooded merganser, and Canada goose. Pool 6 is an important resting and feeding area for waterfowl passerine bird species during migration. Some of these species spend the entire year in the area, while others migrate into the area at various times of the year. Many varieties of raptors use the river valley as a flyway, and a

number of these species, such as eagles, hawks, and owls, overwinter in these floodplain areas. It currently receives approximately 750,000 use-days per year by migratory birds. A bird census in 1981 recorded a total of 167 species of birds using the refuge.

Several bird species occur in Pool 6 that are of special interest because of their status as rare or endangered species. Foremost among these is the bald eagle, of which there is a sizable winter population. Other species known to occur in Pool 6 that are of special interest include the osprey, double-breasted cormorant, and pileated woodpecker.

Pool 6 provides habitat to a wide variety of mammals. White-tailed deer use the area as a food source and a wintering area. Many small- and medium-sized carnivores such as red and gray fox, raccoon, and weasel also use the area. Many other mammals such as mink, otter, beaver, muskrat, shrews, moles, bats, rabbits, and squirrels and numerous varieties of mice are common in the area.

The floodplain of Pool 6 provides habitat for a wide variety of amphibians and reptiles. Common species typically found along and in sloughs of the floodplain may include fox snake, tiger salamander, American toad, gray tree frog, green frog, snapping turtle, painted turtle, common map turtle, and northern leopard frog.

### **7.3.7.3 Aquatic Invertebrates**

A large assemblage of invertebrate species is within the pool. The varied invertebrate fauna results from the wide variety of habitats in the area. Lake forms of invertebrates find suitable habitat in the lentic portions of the pools. Organisms that require running water find a wide range of water velocities in the tail waters, main channel, along the wing dams, and in side channels. The rocks associated with wing dams and shoreline protection provide a suitable habitat for specialized invertebrates.

Fingernail clams (*Musculium transversum*) thrive in areas of Pool 6 that have adequate oxygen and silt bottoms. They are important food items for both waterfowl, especially diving ducks, and several species of fish.

Pool 6 insect fauna is dominated by immature stages of mayflies, midges, and caddisflies, indicative of high dissolved oxygen levels. Being efficient converters of detritus, aquatic insects are an important link in the food web, providing food for fish and waterfowl.

### **7.3.8 Native Mussels**

The pool presently supports 28 native mussel species and historically approximately 36 species (Table 7). A total of 11 species listed for protection in Minnesota and/or Wisconsin including the federally endangered Higgins' eye pearl mussel (*Lampsilis higginsii*) are present in the pool. A recent exotic introduction, the zebra mussel (*Dreissena polymorpha*), has been observed in

**Table 7. Mussel species found in Mississippi River Pool 6.**

Common name	Scientific name	Status <sup>1</sup>	Abundance <sup>2</sup>
Mucket	<i>Actinonaias ligamentina</i>	MT	H
Elktoe	<i>Alasmodonta marginata</i>	MT	R
Threeridge	<i>Amblema plicata</i>		A
Flat floater	<i>Anodonta suborbiculata</i>		R
Rock pocketbook	<i>Arcidens confragosus</i>	ME, WT	R
Purple wartback	<i>Cyclonaias tuberculata</i>	MT, WE	H
Butterfly	<i>Ellipsaria lineolata</i>	MT, WE	R
Elephant ear	<i>Elliptio crassidens</i>	ME, WE	H
Spike	<i>Elliptio dilatata</i>	MSC	R
Ebony shell	<i>Fusconaia ebena</i>	ME, WE	H
Wabash pigtoe	<i>Fusconaia flava</i>		C
Plain pocketbook	<i>Lampsilis cardium</i>		C
Higgins' eye pearly mussel	<i>Lampsilis higginsii</i>	FE, ME, WE	R
Fat mucket	<i>Lampsilis siliquoidea</i>		R
Yellow sandshell	<i>Lampsilis teres</i>	ME, WE	H
White heelsplitter	<i>Lasmigona complanata</i>		R
Fluted shell	<i>Lasmigona costata</i>	MSC	H
Fragile papershell	<i>Leptodea fragilis</i>		R
Black sandshell	<i>Ligumia recta</i>	MSC	R
Washboard	<i>Megalonaias nervosa</i>	MT	R
Threehorn wartback	<i>Obliquaria reflexa</i>		A
Hickorynut	<i>Obovaria olivaria</i>	MSC	C
Sheepnose	<i>Plethobasus cyphus</i>	FC, ME, WE	H
Round pigtoe	<i>Pleurobema sintoxia</i>	MSC	R
Pink heelsplitter	<i>Potamilus alatus</i>		R
Pink papershell	<i>Potamilus ohioensis</i>		R
Giant floater	<i>Pyganodon grandis</i>		R
Monkeyface	<i>Quadrula metanevra</i>	MT, WT	R
Pimpleback	<i>Quadrula pustulosa</i>		C
Mapleleaf	<i>Quadrula quadrula</i>		R
Strange floater	<i>Strophitus undulatus</i>		R
Lilliput	<i>Toxolasma parvus</i>		C
Pistolgrip	<i>Tritogonia verrucosa</i>	MT, WT	H
Fawnsfoot	<i>Truncilla donaciformis</i>		C
Deertoe	<i>Truncilla truncata</i>		R
Paper pondshell	<i>Utterbackia imbecillis</i>		R

<sup>1</sup>ME, WE = Minnesota, Wisconsin Endangered; MT, WT = Minnesota, Wisconsin Threatened. MSC = Minnesota Special Concern; FE = Federally Endangered, FC = Federal Candidate.

<sup>2</sup>H = Historic, R = Rare, C = Common, A = Abundant.



very high numbers in the pool in the past; however, very few zebra mussels were observed during 2007 mussel surveys to estimate pool-wide mussel population size (Davis 2008). This species has adversely affected freshwater mussel populations. However, the ultimate and long-term effect of this exotic species on the native freshwater mussel resource is unclear at this time.

Results from the pool-wide mussel population study during 2007 estimated overall density of mussels as 2.85 per square meter ( $/m^2$ ) ( $\pm 0.71$ ) and a total mussel population size of 61 ( $\pm 16$ ) million mussels (Davis 2008). To better quantify any impacts on mussels from a drawdown, another study during 2007 was conducted to estimate shallow water and drawdown zone mussel population sizes (UMESC, unpublished data). Densities were considerably lower than pool-wide estimates in water depths less than or equal to 0.5m (1.64 feet.) at  $0.92/m^2$  ( $\pm 0.57$ ) with an estimated population size of 1.1 ( $\pm 0.7$ ) million in this shallow zone. A subset of these samples was within the projected dewatered drawdown zone and density averaged  $0.49/m^2$  ( $\pm 0.3$ ) with an estimated population size of 330,000 mussels.

For comparison, during 2006, a very similar study design was used in Pool 5 1 year after the 1.5-foot drawdown (Davis 2007). Overall mean density in Pool 5 was slightly higher than in Pool 6 at  $4.34/m^2$  ( $\pm 0.83$ ), this higher density, accompanied with more aquatic area in Pool 5, resulted in a considerably larger population estimate of 190 ( $\pm 37$ ) million mussels in Pool 5 as compared to Pool 6. Shallow zone density in Pool 5, however, was lower ( $0.22/m^2 \pm 0.12$ ) than the Pool 6 shallow zone possibly because of the mortality of mussels exposed and movement of mussels to deeper water during the drawdown the previous year, but also because more aquatic area resulted in a shallow zone population size twice that (2.3 million [ $\pm 1.3$ ]) of Pool 6.

### **7.3.9 Threatened and Endangered Species**

The only federally threatened or endangered species in Pool 6 has been the collection of a single live Higgins' eye pearl mussel (*Lampsilis higginsii*) specimen during the pool-wide mussel survey in 2007 (Davis 2008). Higgins' eye was once extant throughout the entire Upper Mississippi River proper below St. Anthony Falls, and, until recently, was thought to be extirpated from Pools 1 through 6. The recent collection of live a Higgins' eye in Pool 6 effectively extends the species' Upper Mississippi River range north by a pool.

The pool has 13 species of fish listed by Minnesota and Wisconsin as endangered, threatened, or special concern (Table 8). Many plants, birds, mammals, and others are listed for protection by the two States as well.

**Table 8. State listed fish species from Mississippi River Pool 6.**

Common name	Scientific name	Status <sup>1</sup>
Black buffalo	<i>Ictiobus niger</i>	MSC, WT
Blue sucker	<i>Cycleptus elongatus</i>	MSC, WT
Bluntnose darter	<i>Etheostoma chlorosomum</i>	WE
Goldeye	<i>Hiodon alosoides</i>	WE
Greater redhorse	<i>Moxostoma valenciennesi</i>	WT
Lake sturgeon	<i>Acipenser fulvescens</i>	MSC
Mud darter	<i>Etheostoma asprigene</i>	WSC
Paddlefish	<i>Polyodon spathula</i>	MT, WT
Pallid shiner	<i>Notropis exilis</i>	MSC, WE
River redhorse	<i>Moxostoma carinatum</i>	WT
Skipjack herring	<i>Alosa chrysochloris</i>	MSC, WE
Speckled chub	<i>Machybopsis aestivalis</i>	WT
Yellow bass	<i>Morone mississippiensis</i>	MSC

<sup>1</sup>ME, WE = Minnesota, Wisconsin Endangered; MT, WT = Minnesota, Wisconsin Threatened.

MSC, WSC = Minnesota, Wisconsin Special Concern species

### **7.3.10 Cultural Resources**

The Pool 6 locality contains numerous cultural resources indicating continual human occupation for approximately 12,000 years. A variety of precontact and historic cultural resources are located throughout the pool and across a wide variety of landforms. The proposed drawdown has the potential to affect cultural resources.

Archaeological investigations have been ongoing in the Pool 6 locality for more than a century (e.g., Lane 1976; Pleger 1997; Thomas 1894, Winchell 1911). Early research in the area centered on the contents of burial mounds and who built them (e.g., Arzigian and Stevenson 2003). By the early twentieth century most practitioners rejected the popular notion that a race of non-American Indians constructed the mounds and non-scientific investigations gave way to systematic mapping and excavation (e.g., McKern 1931). Despite an awareness of cultural resources in the pool, no comprehensive preimpoundment survey was completed prior to construction and subsequent operation of Lock and Dam 6 in 1936 (e.g., Dunn 1996). However, archaeological work continued in the area, including the excavation of mounds near Trempealeau and at the La Moille rock shelter (e.g., Stoltman 1979; Wilford 1954). Modern archaeological research within the pool began during the 1970s, with a Corps sponsored survey of dredged material placement sites (Johnson and Hudak 1975), followed by an expansive terrestrial investigation along the Great River Road in Wisconsin in 1979 (Penman 1981, 1984).

Other studies included site identification surveys, site evaluations, data recoveries, experimental archaeology and field schools (e.g., Theler and Boszhardt 2003). Many of these investigations have occurred within the Trempealeau NWR and nearby areas (e.g., Boszhardt et. al. 1996). The Corps has sponsored several surveys within the pool, including dredged material placement sites, shoreline surveys, flood control projects and several literature based overviews, such as site inventories, geomorphic mapping and shipwreck locations (e.g., Hudak 1975; Jalbert et. al. 1996; Jensen 1992; Madigan and Shermer 2001; Overstreet et. al. 1983). Despite greater awareness of cultural resources situated within floodplain settings (e.g., deeply buried sites), no areas within the pool floodplain have been subjected to deep site testing. In addition, relatively few cultural resources within the pool have undergone evaluative testing to determine their eligibility for listing on the National Register of Historic Places.

Within the Pool 6 locality, nearly 150 cultural resource sites have been recorded. Cultural resource sites exist on a variety of landforms, including uplands, terraces, islands, the river floodplain, and within the river channel. Precontact cultural resources include lithic and artifacts scatters, village sites, rock shelters, caves, petroglyphs, burials and burial mounds. Most of the precontact sites are recorded in upland or terrace settings, especially around the Trempealeau NWR area. Historic cultural resources include artifact scatters, fur trade sites, early town sites, farmsteads, mills, a variety of historic standing structures, historic districts (e.g., Winona Commercial Historic District), shipwrecks and river navigation structures. The majority of the historic sites constitute historic standing structures within Winona. Several cultural resource sites within Pool 6 have been listed on the National Register of Historic Places or are eligible to be listed on it, such as the Winona County Courthouse, the Willard Bunnell House and Lock and Dam 6.

However, of the nearly 150 recorded cultural resource sites, seven sites are situated along or near the shoreline of Pool 6 that may potentially be affected by a drawdown. Potential effects on cultural resources from the proposed drawdown are discussed in Section 7.7 below.

### **7.3.11 Recreation and Aesthetic Resources**

The natural character of this portion of the river, proximity to Winona, and the relatively good water quality in Pool 6 contribute to its recreational and aesthetic desirability. A large amount of Federal land is in Pool 6; most of this land is managed for wildlife as part of the Trempealeau NWR. Annual visits to the refuge average about 20,000 with more than 60,000 visitors in 1991. Perrot State Park is located along the Wisconsin shoreline just below the refuge. The pool receives heavy recreational boat traffic, and a number of high quality recreational beaches, public day-use and camping recreation facilities, and private marina facilities are available to recreationists in the pool. Other public recreation facilities in Pool 6 include several boat landing/parking areas that are scattered throughout the pool. In the summer months, the public and private access facilities adequately serve the public. These boat access points also facilitate winter hunting, trapping, snowmobiling, and ice fishing. As result of past channel maintenance activities, a number of sand-covered island beach sites currently exist in Pool 6; most of them receive extensive recreational use.

### **7.3.12 Socioeconomic Setting**

The cities of Winona and Trempealeau have populations of approximately 27, 000 and 1,300, respectively. The cities of La Crosse and Onalaska, Wisconsin, are located about 20 miles south of Lock and Dam 6 and have a combined population of more than 65,000. The city of Fountain City, Wisconsin, is located approximately 3 miles above Lock and Dam 5A has a population of approximately 800.

Transportation corridors bound both sides of the floodplain in Pool 6. Railroad tracks border both sides of the river. A railroad track also runs up the through the pool along a levee on the southwestern edge of the refuge to near Winona where it angles back towards the Wisconsin bank. On the Wisconsin side, State Highway 35 parallels the river in the upper parts of the pool, whereas gravel and smaller paved roads parallel the lower end of the pool. In Minnesota, U.S. Highway 61 parallels the river the entire length of the pool. A single bridge, Minnesota State Highway 43/Wisconsin State Highway 54 crosses the pool from downtown Winona to the Wisconsin side.

## **7.4 SOCIAL EFFECTS**

### **7.4.1 Effects on Transportation**

The proposed drawdown would have no effect on highway or railroad bridges in Pool 6. Towboat pilots in the lower pool may have to exercise caution and operate at somewhat lower speeds. If this situation occurs, it will be of short duration and may result in some added transportation costs, which will be borne by the towing industry.

### **7.4.2 Water Appropriations and Waste Assimilation**

The proposed drawdown and alternatives would have no effects on water withdrawals from Pool 6. All municipalities and industries obtain water from groundwater wells. The National Pollutant Discharge Elimination System municipal waste discharge permits issued in Wisconsin (city of Trempealeau) and Minnesota (city of Winona and several industrial sources) in Pool 6 are not conditional on river stage.

### **7.4.3 Real Estate**

The Government would not have to acquire any additional real estate rights to draw the pool down.

### **7.4.4 Aesthetics**

A Pool 6 drawdown will probably be met by a combination of curiosity and concern by the general public. Exposed river bottom and stranded mussels will initially raise concern. Odor from the initially exposed sediments may be objectionable but should be a short-term inconvenience. Growing vegetation in the drawdown zone may become attractive. Curious members of the public will visit the drawdown zone to examine the exposed river bottom.

Over the long term, if the drawdown results in greater extent and abundance of aquatic vegetation, the general appearance of Pool 6 will be improved.

#### **7.4.5 Recreation**

The drawdown may limit recreational boating activities in the lower end of the pool. Boaters may be restricted from some backwater areas, and they will need to exercise caution near structures that would typically be sufficiently below the water surface (i.e., wing dams, stumps, and sand bars). Some fishing areas may be difficult to access, thus reducing the amount of area anglers can use. Some access facilities will be affected by the drawdown and may be difficult to use for larger or deeper drafting boats. The overall impacts to recreation should be minimal, however, because of the minor nature of this drawdown (1 foot at Lock and Dam 6).

#### **7.4.6 Controversy**

Several public meetings, conducted between 2002 and 2007, numerous news releases, and several editions of the Water Level Management Update newsletter have informed the public in the vicinity of Pool 6 about the proposed drawdowns. Many members of the general public support the efforts to restore Mississippi River habitats. Some people voiced concern about recreational boating access during a drawdown. Owners of businesses associated with recreational boating are most concerned about the potential for a pool drawdown to limit boat access to their facilities.

### **7.5 ECONOMIC EFFECTS**

The proposed drawdown should have no appreciable effects on property values, tax revenues, regional growth, employment, farmland and food supply, flooding, or energy use.

The proposed drawdown will permit continued commercial navigation and recreational boating on Pool 6. Deeper drawdown alternatives could significantly restrict these activities. The proposed 1.0-foot drawdown may require towboat pilots to operate more slowly than usual, potentially increasing transit time and operating costs. Recreational boating activity and expenditures in the Pool 6 area will probably not be significantly reduced during the drawdown. An increase in recreational boating activity may occur as people investigate Pool 6 in a drawdown condition. Commercial fishing activity may be slightly disrupted by the drawdown because of the reduced area of aquatic habitat and increased current velocities during the drawdown.

#### **7.5.1 Effects on Business**

The proposed 1.0-foot Pool 6 drawdown may have some limited adverse effects on businesses involved with recreational boating. Water depths should remain adequate for recreational boating access at all public landings, private landings, and commercial marinas. Alternative drawdowns to a greater depth would significantly disrupt recreational boating and associated business. The areas affected by the drawdown are listed and described in the Section 4.3. Boat

accesses that pose the greatest chance of being adversely impacted were surveyed in 2002 (Playmor Park Boat Landing, Trempealeau Marina, and Straight Slough) and will again be surveyed before the 2008 drawdown to determine the level of access during the drawdown.

## **7.6 EFFECTS ON NATURAL RESOURCES**

The significant natural resources are described in this Environmental Assessment (7.3 Existing Setting) and the habitat benefits associated with the drawdown are described in Section 4.2.

### **7.6.1 Physical and Water Quality Effects**

The drawdown will impose a number of physical changes to the aquatic habitat in Pool 6. Bathymetric data available for Pool 6 are not sufficient to quantify the amount of aquatic substrate that would be exposed with a drawdown. Analyses conducted for pools 5, 7, 8, and 9 indicated that a 1-foot drawdown would expose 5 to 15 percent of the aquatic substrate in these pools. During the pools 5 and 8 1.5-foot drawdowns, approximately 10 percent and 8 percent of the aquatic area were exposed, respectively. Pool 6 differs from pools 5, 7, 8, and 9 in that it does not have a large open water area in the lower end of the pool. Thus, it is likely that the number of acres of aquatic substrate that would be exposed by a 1-foot drawdown in Pool 6 would tend toward the lower end of this range. Applying this reasoning to Pool 6 would indicate that a 1-foot drawdown could possibly expose 200 to 500 acres of aquatic substrate. The dewatered and reduced depth areas would be most prevalent in the lower half of the pool. Few aquatic areas would become isolated by the proposed 1.0-foot drawdown. Alternative drawdowns would affect different areas, depending on the depth of drawdown.

Water levels within the Trempealeau NWR are managed somewhat independently of Pool 6. While a drawdown in Pool 6 would slightly enhance the capabilities of managers to lower water levels within the Trempealeau NWR, the minor drawdowns being considered as part of this evaluation would not appreciably affect water level management capabilities within the refuge. Therefore, for purposes of this evaluation, potential benefits to the Trempealeau NWR were considered negligible.

During the initial phase of the drawdown, sediment will be mobilized by advective flow, as water drains from shallow areas. Wind-driven sediment resuspension will occur, as shear stresses are exerted on sediment at lower elevations as the drawdown progresses. Sediment mobilized by the drawdown will be generally focused into deeper areas within Pool 6. Some increase in sediment transport may occur at the mouth of tributaries, as the base elevation of the rivers is temporarily reduced by the drawdown. Because the Trempealeau River empties into the Trempealeau NWR, this effect is not expected to result in significant downcutting of the tributary river beds or mobilization of much sediment.

The lower water surface profile during the drawdown will increase the effectiveness of channel training structures in concentrating flow in the navigation channel. Current velocities will increase slightly in the main channel and channel border areas. Additional sediment transport along the main channel will occur during drawdown, but response of the main channel is expected to be slow.

Water temperature in the shallow portions of the pool will be slightly higher and will have greater day to night changes because of the reduced water volume.

Underwater light may be reduced by the increase in wave-resuspended sediment described above, at least during the first part of the drawdown period. However, the drawdown will ultimately increase the area of river bottom receiving light by as much as 500 acres, assuming that the ambient turbidity level does not change.

Sediment water content in the drawdown zone will decrease, depending on the initial water content of the sediment, position in the drawdown zone, length of the drawdown period, rainfall during the drawdown, air temperature, wind, humidity, and groundwater seepage. Limited consolidation of sediment will occur, given that most of the drawdown zone is silty sand. Organic materials in the drawdown zone sediments will oxidize, increasing available plant nutrient concentrations. Some surface crusting and cracking of the dewatered sediment may occur, especially in the more isolated backwater sediments containing higher concentrations of clay and marl (calcium carbonate).

### **7.6.2 Ecological Effects**

The proposed drawdown will have the initial effect of dewatering as many as 500 acres. Nonmobile aquatic macroinvertebrates, submersed aquatic plants, and benthic algae in the drawdown zone will be killed. The 0.2-foot-per-day drawdown rate should allow most fish, mobile macroinvertebrates, and mussels to escape the drawdown zone and avoid stranding. Most emergent aquatic plants in the drawdown zone will survive.

Plant seeds in the drawdown zone will germinate, if the drawdown zone remains sufficiently dewatered. In addition to the perennial emergent aquatic plants such as cattail (*Typha* spp.), softstem bulrush (*Scirpus validus*), and arrowhead (*Sagittaria latifolia*), annual plants such as smartweed (*Polygonium* spp.), lovegrass (*Eragrostis hypnoides*), rice cut-grass (*Leersia oryzoides*), pigweed (*Amaranthus* spp.), and seedling trees of willows (*Salix* spp.) and cottonwood (*Populus deltoides*) will germinate and grow in the drawdown zone.

If seedling plants are not killed by reflooding during the drawdown period, vegetation in the drawdown zone should become fairly dense. Following reflooding in late September, annual plants and seedling trees will die, leaving viable propagules (roots, tubers) of perennial emergent aquatic plants in the drawdown zone. The flooded vegetation in the drawdown zone should provide good cover for young-of-year and small fish and good foraging habitat for migrating waterfowl.

The drawdown should encourage the growth of submersed aquatic plants in shallow areas just outside the initial drawdown zone where they do not presently occur.

The combination of consolidated and oxidized sediment in the drawdown zone and more extensive areas of emergent and submersed aquatic plants should reduce sediment resuspension by wave action in the lower portion of Pool 6, increasing water clarity and available underwater

light. The persistence of these effects may extend for a number of years following the drawdown.

### **7.6.3 Effects on Fish**

The proposed drawdown could affect a maximum of about 500 acres of the total aquatic habitat area of 5,700 acres of Pool 6, reducing the available aquatic habitat by less than 10 percent by area. The minor drawdown will not isolate many, if any, backwater areas where fish could become trapped. Most fish should be able to escape the drawdown zone without stranding or entrapment. The proposed 0.2-foot-per-day drawdown rate should prevent most stranding and entrapment of fish. Any areas that do become isolated during the drawdown may trap some fish, which would become subject to stress by high water temperature, low dissolved oxygen, bioturbation of sediment, and predation by birds and furbearers.

The proposed June drawdown may affect some nest spawning fish like bluegills if their nests become dewatered or are in water too shallow for egg survival. The drawdown may also force some young-of-year and smaller fishes out of vegetated areas into open water, making them more vulnerable to predation. As a result, some minor reductions in recruitment of these species may occur. However, these one-time minor reductions will be largely offset by improved spawning and nursery habitat for these species in future years.

Fish will rapidly reoccupy the drawdown zone following reflooding. The standing vegetation should provide good cover for young-of-year and small fishes. Smaller macroinvertebrates and zooplankton will thrive in the flooded vegetation, an effect that may last into the first part of the growing season in the year following the initial drawdown. Increased extent and density of emergent and submersed aquatic plants that may result from the drawdown could have a positive effect on fish in future years, by providing more cover, shelter from current, and a more abundant macroinvertebrate forage base.

Because the drawdown is relatively small, no effects on sport and commercial fishing patterns are anticipated.

### **7.6.4 Effects on Wildlife**

The bald eagle (formerly threatened) has recently been delisted and occurs in the Pool 6 area. Bald eagles are commonly seen in the area, roosting in trees along the main channel and feeding on fish. Higher numbers of eagles occur in Pool 6 during the spring and fall migrations. Four active bald eagle nests occur in Pool 6. Depending on the severity of the winter, some eagles spend the winter along the river in Pool 6. The drawdown and associated conditions should have no adverse effects on bald eagles.

The drawdown zone will be initially attractive to killdeers, sandpipers, eagles, crows, herons, raccoons, skunks, muskrats, and other birds and mammals that will feed on stranded aquatic organisms. Nesting shorebird reproduction (particularly the black tern) may be affected because of the timing of the start of the drawdown of mid-June. Nest building is usually complete and incubation has commenced by mid-June, and a drop in water levels may leave their nests



vulnerable to predation. Black terns are not known to nest outside the Trempealeau NWR, though. However, the mid-June timeline was chosen after careful consideration and an earlier start date would adversely affect fish spawning whereas a later date would cut further into the vegetative growing season. Frogs, turtles, and other animals adapted to marsh vegetation will be forced from the drawdown zone into areas where they may become more vulnerable to predation. The drawdown zone may provide attractive grazing for whitetail deer, and other herbivores, as the sediment dries out and vegetation develops. The mudflat areas of the drawdown zone could harbor bacteria, which can cause avian botulism. The drawdown is scheduled to be discontinued in late September, prior to arrival of large numbers of migrating waterfowl. The reflooded vegetation following the drawdown will provide food and cover for migrating waterfowl. Any increase in emergent aquatic and submersed vegetation in lower Pool 6 resulting from the drawdown would benefit many wildlife species.

Macroinvertebrates in the drawdown zone will be killed by stranding and desiccation. Some mobile species will escape to deeper water. Some types of macroinvertebrates will thrive in the flooded vegetation following the drawdown, and most species presently existing in the drawdown zone should recolonize in the first year following the drawdown. Any increase in the extent of submersed and emergent aquatic vegetation should have a positive effect on future abundance of macroinvertebrates. Sediment consolidation in the drawdown zone should persist for some time following the drawdown, also improving conditions for burrowing macroinvertebrates such as *Hexagenia* mayflies.

#### **7.6.5 Effects on Native Mussels**

The proposed 1.0-foot drawdown would generally not result in long-term adverse impacts on the Pool 6 mussel community. Mussels have evolved and adapted accordingly with fluctuating water levels; they have the ability to move and retreat to deeper water with slow retreating water levels. However, some mortality of mussels from thermal stress and desiccation is likely in dewatered and shallow areas. In addition, predation on mussels by raccoons, muskrats, eagles, etc., may increase as well during the drawdown because of the shallower water depths and easier access by predators.

It is estimated from the Pool 6 shallow water mussel survey that as many as 330,000 mussels ( $\pm 200,000$ ) could be exposed in the dewatered drawdown zone (UMESC, unpublished data). This percentage (0.5 percent [0.2 percent to 1.2 percent]) is a relatively small portion of the estimated Pool 6 mussel population of 61 million mussels. Not all exposed mussels will die. Wisconsin Department of Natural Resources et al. (2006) estimated approximately 30-percent survival of recovered mussels intentionally placed in areas dewatered during the Pool 5 1.5-foot drawdown. Some mussels escaped to deeper water and survived and some stranded mussels buried themselves in the substrate and survived the drawdown. Survival was better along sloping banks that allowed mussels easier access to receding water as opposed to exposed mud flats. A study is proposed to better assess mortality of mussels that become exposed during the drawdown. In addition, mussel rescue efforts will be conducted by searching dewatered areas for concentrations of mussels and placing them in deeper water. Both efforts will depend on funds and volunteers available.

Mussels outside the drawdown zone will probably not be significantly affected by the drawdown. Although current velocities will be generally higher during the drawdown, the increased current velocities should not cause scouring and displacement of mussels from the substrate, or cause behavioral inhibition to feeding. The drawdown will kill some zebra mussels (*Dreissena polymorpha*) by desiccation, but this should not have a substantial effect on the abundance of zebra mussels or their infestation of native mussels. Overall, the drawdown is not expected to significantly affect the mussel community.

#### **7.6.6 Effects on Habitat Diversity and Interspersion**

Pool-scale growing season drawdowns would to an extent simulate the natural low-water period of an unregulated Mississippi River. Many species of perennial emergent aquatic plants are especially adapted for seasonally fluctuating water levels and regenerate from seed only in dewatered mudflat conditions. The continuous minimum water level in Pool 6 has prevented reestablishment of stands of perennial emergent aquatic plants and has resulted in accumulation of fine sediments that are readily resuspended by wave action. A drawdown that allows reestablishment of perennial emergent aquatic plants and consolidation of sediment should result in improved diversity and interspersion of shallow aquatic habitat. Such a drawdown may also encourage the expansion of submersed aquatic plants into areas of Pool 6 where they presently do not occur.

#### **7.6.7 Effects on Biological Productivity**

The proposed drawdown will kill most macroinvertebrates in the drawdown zone, resulting in a loss of secondary production during a portion of the drawdown year. Macroinvertebrates should rapidly recolonize the drawdown zone in the year following drawdown. Fish reproduction, particularly nesting species like bluegill and largemouth bass, may be reduced during the drawdown. The drawdown should result in an increase in vegetated area and an increase in secondary production in years following the drawdown, potentially increasing the abundance of fish and wildlife in lower Pool 6.

#### **7.6.8 Effects on Soils and Groundwater**

A Pool 6 drawdown would reduce the groundwater level in island and floodplain soils, allowing oxidation and aeration to a greater depth. This effect would generally benefit riparian vegetation adapted to floodplain conditions.

#### **7.6.9 Effects on Endangered Species**

##### **7.6.9.1 Effects on Federally Listed Species**

The federally endangered Higgins' eye pearlymussel has been recently recorded live in Pool 6 (Davis 2008), which now extends the species northern range in the Upper Mississippi River. However, only one live older individual was observed and the species probably neither is self-sustaining nor distributed throughout the pool. This individual was collected in water depths greater than 2 meters, and no impacts are expected to Higgins' eye.

### **7.6.9.2 Effects on State listed mussels**

Although Pool 6 supports a fairly diverse and abundant mussel community including 11 species either listed for protection in Minnesota or Wisconsin (see Table 6), most mussels occur in areas deeper than the proposed 1.0- foot drawdown. The chance of significant numbers of mussels inhabiting very shallow water (less than 1.5 feet) during normal pool elevations is unlikely because of the extreme environmental conditions associated with these areas (i.e., freezing, ice damage, wave action, extreme heat). Some State listed species will, however, as previously stated, die from thermal stress, desiccation, and predation during the drawdown.

### **7.6.9.3 Effects on State listed fish species**

Thirteen Minnesota and/or Wisconsin State listed endangered, threatened, and special concern fish species occur in Pool 6 (Pitlo et al. 1995) (Table 7). All the State listed fish species except possibly pallid shiner are lotic species, which occur in rivers with higher current velocity and coarser substrates. The proposed drawdown would generally increase current velocity in lower Pool 6 during the drawdown period but should not otherwise disrupt habitat conditions for these species.

### **7.6.9.4 Effects on other State listed species**

Both Minnesota and Wisconsin list the Blanding's turtle (*Lemydoidea blandingii*) as a threatened species, and Minnesota lists the smooth softshell turtle (*Apalone mutica*) and the snapping turtle (*Chelydra serpentina*) as special concern species. These turtle species may occur in Pool 6. Turtles may nest in the drawdown zone, leaving their eggs vulnerable to reflooding.

The northern cricket frog (*Acris crepitans*) is listed as an endangered species by Minnesota and Wisconsin. Northern cricket frogs may occur in Pool 6, inhabiting marsh areas. The proposed drawdown would dewater existing stands of emergent aquatic plants, possibly forcing cricket frogs from their preferred habitats. The increased extent of emergent aquatic plants that may result from the drawdown could expand suitable habitat for cricket frogs in years following the drawdown.

The Caspian tern (*Sterna capsia*) is listed as an endangered species by Minnesota. Caspian terns migrate through the Pool 6 area in the spring and fall. The drawdown may provide some easy foraging for Caspian terns in shallower areas during the drawdown.

The great egret (*Casmerodius albus*) is listed as a threatened species by Minnesota. Great egrets occur and nest in Pool 6. Egrets may forage in the drawdown zone and in any shallow areas that become isolated by the drawdown.

The osprey (*Pandion haliaetus*) is listed as a threatened species in Minnesota. Ospreys occur and nest in the Pool 6 area. Ospreys may also feed in areas that become isolated by the drawdown.

## 7.7 EFFECTS ON CULTURAL RESOURCES

Predicting potential effects of a pool drawdown on cultural resources is complicated and includes a number of idiosyncratic variables. Some factors include the proposed scale of the drawdown (e.g., 1.0 foot versus 4.0 feet), the hydrologic nature of the pool in general (e.g., upstream noninundated areas versus downstream “lakes”), stretch specific flow regimes (e.g., thalweg of main channel, slack water sloughs and side channels, etc), bank geometry (slope), shoreline sediment type (e.g., clay, sand), amount of shoreline vegetation and a variety of other natural and artificial aspects unique to each pool and cultural resource.

In general, a series of historic activities, such as cultivation, the construction of transportation features and structures and alteration and inundation of portions of the Mississippi River valley after placement of the lock and dam system have negatively affected or completely destroyed a number of known and presumably unknown cultural resources. Subsequently, normal operations of the navigation pools continue to afford potential adverse effects on a variety of cultural resources, principally through erosion (e.g., Dunn 1996). For example, normal pool operation frequently results in fluctuating water levels within 1 foot of the project pool elevation. Thus, drawdowns of up to 1 foot may not have significant negative impacts on cultural resources beyond what may be occurring during normal operation (Kolb and Jalbert 2007). Conversely, minor drawdowns (i.e., 1.0 foot or less) may have positive effects on cultural resources by temporarily diminishing the river’s erosive action from cultural deposits and allow vegetation growth that may stabilize shorelines and concomitant cultural deposits. The success of drawdowns with increasing aquatic and shoreline vegetation is apparent from the recent Pools 5 and 8 drawdowns (River Resource Forum WLMTF 2007a, 2007b). The establishment of vegetation along shorelines serves to stabilize banklines, thereby protecting cultural deposits (e.g., Benn and Lee 2005; Dunn 1996).

However, drawdowns greater than 1 foot appear to have increased potential to affect cultural resources. For instance, results from a cultural resources monitoring study for the Pool 8 drawdown determined that the probable impacts from the 1.5-foot drawdown were high at 16 of 33 (48 percent) cultural resource sites (Kolb and Jalbert 2004). However, the Upper Mississippi River flood of 2001, which may have skewed the results, hampered the Pool 8 study. Importantly, the quantity and character of the cultural resources in Pool 8 are substantially different than those in Pool 6. Research along large reservoirs in other areas of the country details a variety of negative impacts on cultural resources that generally increase as the scale, or depth, of a drawdown increases. For example, not only may the risk of shoreline sites increase, more peripheral areas may be affected, such as down cutting along tributaries and exposure of greater surface areas of a site that impart looting (e.g., Dunn 1996).

For cultural resource purposes, the Area of Potential Effect (APE) for the Pool 6 drawdown is considered to be the river shoreline areas between the elevations of 644.5 and 643.5 in those areas south and west of the Burlington Northern-Santa Fe Railroad causeway between Locks and Dams 5A and 6 (the Trempealeau NWR is not included in the drawdown because it is isolated by railroad causeways and manages its own water levels). Based on the results of the 1996 cultural resources survey of the Pool 6 drawdown and on results of a monitoring survey completed in

2003 in anticipation of the Pool 6 drawdown, seven cultural resources sites are recorded within or close to the APE (Florin 2003; Pleger 1996) (Table 9).

Of the seven cultural resource sites located within or close to the APE, none will be adversely affected by the drawdown. For example, the historic shell midden could not be relocated and, it is likely no longer extant. It is unlikely that the two shipwrecks will be exposed by the drawdown. The historic boathouse foundation is unlikely to suffer any negative effects from the drawdown. The two precontact artifact scatters are poorly defined in areal and vertical extent. Neither was identified through shoreline surveys (e.g., eroding artifacts). Although it is possible that cultural deposits extend to the shoreline in both cases, no artifacts were observed along the shoreline adjacent to these sites during last year's survey. In addition, the shoreline areas adjacent to these sites are well vegetated. It is important to note that the one-foot minor drawdown is within the range of the natural fluctuation of the pool level. Maintaining a lower water level for a short duration will allow the formation of additional vegetation and will ultimately benefit shoreline archaeological sites by reducing the effects of erosion.

Although it is believed that none of the seven sites within the Drawdown APE will be affected, the potential exists that unidentified cultural resources may have been exposed since the 2003 survey. Therefore, the Corps will complete a shoreline survey for the Pool 6 drawdown. The survey will focus on identifying newly exposed cultural sites along eroding shorelines as well as re-visiting the known sites within the APE in order to assess their current condition and determine the effect of the drawdown. The survey will consist of three phases: recording the conditions of the sites before the Drawdown occurs, recording conditions at maximum extent of the drawdown, and then recording conditions after the pool is returned to normal levels. Any unrecorded cultural resources incidentally identified during the monitoring study will be recorded and monitored in the same manner described above. Also, the Corps will coordinate with the US Fish and Wildlife Service regarding the implementation of measures to prevent unauthorized artifact collecting that may occur as a result of the Drawdown (e.g., increased patrols).

**Table 9. Summary of Sites Potentially Affected by the 1.0-foot Pool 6 Drawdown.**

Site	Site Type	Location	Status	Potential Affect
47BF208	Historic shell midden	Along cut bank and buried below one meter of PSA	Not able to relocate; very eroded in some areas, likely destroyed	No
47TR34	Prehistoric campsite	On peninsula in Trempealeau Bay; site limits not conclusively determined	Ongoing erosion west of site along cut bank; in-filling south and east of site. No artifacts observed, well vegetated	No
47TR303	Prehistoric campsite	Site ca. 30 meters back from channel, but its extent not conclusively defined and may extend closer to bank	Future erosion could extend to site. No artifacts observed, well vegetated	No
21WN58	Boat house	Along river bank	Foundation at water edge	No
<i>Argo</i>	Shipwreck	In river	Not observed	No
<i>Van Gorder</i>	Shipwreck	In river	Not observed	No
Lock and Dam 6	Historic Structure	Lock and Dam 6 at Trempealeau	No Effect	No

## **7.8 SUMMARY AND CUMULATIVE IMPACTS DISCUSSION**

Overall, the proposed Pool 6 drawdown project should have minor to substantial positive long-term impacts on shallow aquatic and wetland habitat, terrestrial habitat, recreational opportunities, aesthetic values, biological productivity, and water quality. Minor adverse impacts on recreational boating and boating facilities are expected during the drawdown. Impacts of a Mississippi River pool drawdown to commercial navigation will be minimal. Short-term adverse effects on suspended sediment and macroinvertebrates in the drawdown zone will be alleviated upon reflooding. Endangered species should not be adversely impacted.

A drawdown zone of up to about 500 acres will provide an opportunity for reestablishment of emergent aquatic plants and consolidation of sediment. Submersed aquatic plants may receive additional light and become more abundant in an additional 500 acres. The consolidated sediment should have greater shear strength and resist resuspension by wave action upon reflooding. Increased vegetation and water clarity in lower Pool 6 would improve habitat conditions for a variety of fish and wildlife. If river discharge conditions allow the proposed drawdown to be maintained through most of the growing season with limited reflooding, these ecological benefits could persist for a number of years.

Monitoring and evaluation of the drawdown will provide valuable information on application of this method of river regulation for habitat management.

## **8.0 COORDINATION**

The recommended drawdown was planned and coordinated in conjunction with the WLMTF of the River Resources Forum. Thus, all of the key river resource management agencies, especially the U.S. Fish and Wildlife Service and the various State Departments of Natural Resources were involved in the planning process. Mississippi Valley Division (MVD) approved St. Paul District's request for deviation from the reservoir regulation manual for Pool 6 by email dated April 15, 2008.

### **8.1 2003-04 COORDINATION**

Water Level Management Update newsletters that discussed the Pool 6 drawdown were published in January 2003, April 2003, and April 2004. A public meeting was held on February 12, 2003, in Winona. The meeting was attended by 20 members of the public, including representatives of the Mississippi River Citizen Commission and the Nature Conservancy. Meeting attendees were generally supportive of the drawdown or neutral. An additional public meeting was held in Trempealeau on April 8, 2003. Meeting attendees were supportive of the proposed drawdown.

A few individuals expressed concern with the potential for the drawdown to affect boat access in the lower end of Straight Slough at about river mile 726.5. The Minnesota Department of Natural Resources investigated this site in fall 2002 and found about 2.5 feet of water present,

which would be reduced to 2.0 feet with a 1.0-foot drawdown at Lock and Dam 6. The Minnesota Department of Natural Resources believes this area will still be passable by recreational craft provided the operators exercise caution in navigating this reach. The Minnesota Department of Natural Resources will work with local interests in considering buoying for this area to assist boaters in finding sufficient water for safe passage.

An individual voiced concerns for black terns nesting in that pool. He asked that we consider beginning the drawdown on or before June 1 so that they do not establish their nests in deeper waters that will then become shallow and allow predators to easily access the nests. The mid-June date to initiate the drawdown was to minimize the impacts to fish spawning in late May to early June. The concern was particularly directed towards the species within the Trempealeau NWR, which harbors a significant black tern population. However, water levels within the refuge will be maintained because the refuge will be operated independently of the drawdown. In addition, if the drawdown were begun earlier, nests built near the drawdown water level could become inundated if the drawdown plan is not implemented due to unexpected high water.

## **8.2 2007-08 COORDINATION**

A Water Level Management Update newsletter that discussed the Pool 6 drawdown was published in August 2007. The Water Level Management Update newsletter is sent to more than 1,000 interested parties. Two public meetings were held in September 2007 to present plans for a 2008 minor drawdown of Pool 6. The first meeting was held in Winona on September 25, 2007, and a second meeting was held in Trempealeau on September 26, 2007. These meetings were sparsely attended, with no members of the public attending in Winona, and one member of the public attending in Trempealeau. The person in attendance was supportive of the drawdown plans and had no concerns or adverse comments about the drawdown.

Two additional public meetings will be held in May 2008 to solicit additional comment on the drawdown plans for Pool 6. The meetings will again be held in Winona and Trempealeau. In addition, information concerning the project, as well as general information on the water level management program, is posted on the St. Paul District Water Level Management Web Page, which can be accessed at the following web address:

<http://www.mvp.usace.army.mil/environment/default.asp?pageid=122> .

Press releases and media interviews regarding the drawdown will occur beginning in May and will continue as needed or requested during the drawdown. The proposed Pool 6 minor drawdown is expected to be endorsed by the River Resources Forum on April 30, 2008.

Because of the potential impact pool-wide drawdowns can have on the navigation industry; it is imperative that the navigation industry be fully informed and has the opportunity to provide input and feedback on the Pool 6 minor drawdown. To address this concern, the Pool 6 drawdown, as well as drawdowns in general, was discussed with the navigation industry on the following occasions:

- Wednesday, February 6, 2008: Mississippi River Conference, Rochester, Minnesota. Navigation industry attendees included the River Industry Action Committee (RIAC), the



St. Paul (MSD) and St. Louis (District 8) offices of the U. S. Coast Guard (USCG), Upper Mississippi River Waterways Association (UMWA), and Upper River Services (URS).

- Tuesday, February 12, 2008: Navigation Work Group, Lock & Dam 3, Red Wing, Minnesota. Navigation industry attendees included representatives of the towing industry, USCG, UMWA, Minnesota Department. of Transportation (MnDOT), and the Wisconsin Department of Transportation (WisDOT).
- Friday, March 14, 2008: Corps sponsored Upper River Navigation Industry Meeting in St. Paul, Minnesota. Navigation Industry attendees included USCG St. Paul (MSD) and St. Louis (District 8), Upper Mississippi River Waterways Association (UMWA), Upper River Services (URS) and numerous harbor and towboat pilots.
- Thursday, April 17, 2008: Upper Mississippi Waterways Association (UMWA) Executive Committee Meeting, St. Paul, Minnesota. Navigation Industry attendees included the St. Paul District, Corps of Engineers, District, USCG St. Paul (MSD) and St. Louis (District 8), Upper River Services (URS) and numerous harbor and towboat operator and pilots.

No comments in opposition to the proposed Pool 6 drawdown have been received from the navigation industry.

## **9.0 RECOMMENDATION**

I determine the proposed minor drawdown for Pool 6 in the summer of 2008 as described in this letter report/environmental assessment. A drawdown of 1.0 foot at Lock and Dam 6 and 0.5 foot at the primary control point would not require any advance main channel dredging, would be expected to have no appreciable effect on commercial navigation facilities, would provide the opportunity for improved conditions for the regeneration and growth of emergent vegetation, and would have only minor effects on recreation facilities and accesses. No significant adverse impacts on natural or cultural resources are anticipated. Because no advance dredging is required, this drawdown could produce significant habitat benefits at minimal cost.

Jon L. Christensen  
Colonel, Corps of Engineers  
District Engineer

## 10.0 FINDING OF NO SIGNIFICANT IMPACT

Planning, Programs and Project Management Division  
Environmental and Economic Analysis Branch

### FINDING OF NO SIGNIFICANT IMPACT

In accordance with the National Environmental Policy Act of 1969, the St. Paul District, Corps of Engineers, has assessed the environmental impacts of the following project:

#### MISSISSIPPI RIVER POOL 6 MINOR DRAWDOWN, 2008

The St. Paul District proposes a minor (1.0-foot) drawdown at Lock and Dam 6 for the 2008 growing season with a 0.5-foot drawdown constraint at the primary control point at Winona, Minnesota. The specific objective of the proposed growing season drawdown is to expose substrates and enhance conditions for the reproduction, growth, and survival of perennial emergent species of aquatic vegetation.

This Finding of No Significant Impact is based on the following factors:

The proposed drawdown should have positive effects on aquatic plants, sediment physical conditions, and water quality that may persist for years following the drawdown. Towboat operators may have to reduce speed to navigate through Pool 6 because of the shallower depths in the navigation. Most recreational access points should remain functional with the drawdown. Short-term and minor adverse effects on water quality, macroinvertebrates, fish, and mussels will occur. The drawdown should not adversely affect populations of federally threatened or endangered species. Short-term and minor adverse effects on the aesthetic appearance and odor may occur during the initial drawdown period. Recreational boating, sport fishing, and commercial fishing activities will continue on Pool 6 during the drawdown, but access to shallow areas may be restricted. No impacts to cultural resources are expected.

The environmental review process indicates that the proposed action does not constitute a major Federal action significantly affecting the quality of the environment. Therefore, an environmental impact statement will not be prepared.

---

Date

Jon L. Christensen  
Colonel, Corps of Engineers  
District Engineer

## 11.0 LITERATURE CITED

- Arzigian, C. and K. Stevenson. 2003. *Minnesota's Indian Mounds and Burial Sites: A Synthesis of Prehistoric and Early Historic Archaeological Data*. Publication No. 1. The Minnesota Office of the State Archaeologist, St. Paul.
- Benn, D. and D. Lee. 2005. *Erosion Monitoring Program on Archaeological Sites Along the Upper Mississippi River on U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers St. Paul District Lands Pools 3 and 7-10*. Bear Creek Archaeology Reports of Investigations No. 1279, Cresco.
- Boszhardt, R., R. Rodel, J. Nienow and B. Christensen. 1996 *Public Archaeology at Trempealeau*. Reports of Investigations No. 257. Mississippi Valley Archaeology Center at the University of Wisconsin, La Crosse.
- Corps of Engineers. 1974. Final Environmental Impact Statement. Upper Mississippi River 9-Foot Channel Navigation Project. St. Paul District, U.S. Army Corps of Engineers. St. Paul, Minnesota.
- Corps of Engineers. 1996. Channel Maintenance Management Plan. Upper Mississippi River Navigation System, St. Paul District. St. Paul District, U.S. Army Corps of Engineers. St. Paul, Minnesota.
- Corps of Engineers. 1997. Final Environmental Impact Statement. 9-Foot Navigation Channel Project. Channel Maintenance Management Plan. Upper Mississippi River, Head of Navigation to Guttenberg Iowa. St. Paul District, U.S. Army Corps of Engineers. St. Paul, Minnesota.
- Davis, M. 2007. Population estimates of Native Freshwater Mussels in Pool 5 of the Upper Mississippi River, 2006. Prepared for U.S. Army Corps of Engineers, St. Paul District, St. Paul, Minnesota.
- Davis, M. 2008. Population estimates of Native Freshwater Mussels in Pool 6 of the Upper Mississippi River, 2007. Prepared for U.S. Army Corps of Engineers, St. Paul District, St. Paul, Minnesota.
- Dunn, R. 1996. *Impacts to Historic Properties in Drawdown Zones at Corps of Engineers Reservoirs*. Technical Report EL-96-7, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg.
- Farr, M.D., A. C. Miller and B. S. Payne. 2002. *Draft Report: Ecological aspects of native and non-native bivalves at selected sites in the Upper Mississippi River, 2001 studies*. U.S. Army Corps of Engineers, Aquatic Ecology Branch, Engineering Research and Development Center, Vicksburg, Mississippi. 14 pp w/appendixes.

- Florin, F. 2003. *Field Report for Monitoring Sites in Connection with Drawdown of Mississippi River Navigation Pool 6*. Copy on file with the, St. Paul District, Corps of Engineers.
- Hudak, G. 1975. *Archaeological Survey of the Proposed Winona Levee Flood Control Project-Stage II*. The Science Museum of Minnesota, St. Paul.
- Jalbert, Andrew, D. Overstreet and J. Richards. 1996. *Cultural Resources Inventory of the Upper Mississippi River, St. Anthony Falls to Pool 10, Wisconsin, Iowa and Minnesota*. Reports of Investigations No. 384, Great Lakes Archaeological Research Center, Inc, Milwaukee.
- Jensen, J. 1992. *Gently Down the Stream: An Inquiry Into the History of Transportation on the Northern Mississippi River and the Potential for Submerged Cultural Resources*. State Underwater Archeology Program, Division of Historic Preservation, State Historical Society of Wisconsin, Madison.
- Johnson, E. and G. J. Hudak. 1975. *Archaeological Survey of 1975 Season Dredge Spoil Deposit Sites in Mississippi River Pools USAF, 1, 2, 3, 4, and 5*. The Science Museum of Minnesota, St. Paul.
- Kolb, M and A. Jalbert. 2007. *Archaeological Monitoring of Pool 5 Shoreline Sites, Wabasha and Winona Counties, Minnesota and Buffalo County, Wisconsin*. Stata Morph Geoexploration Reports of Investigations No. 136, Sun Prairie.
- Lane, R. 1976. *An Archaeological Survey of the Mississippi River 9" Channel 1975 Dredge Disposal Sites, pools 5A, 6, 7 and 8*. Department of Sociology and Anthropology, Saint Cloud State University, Saint Cloud.
- Madigan, Thomas and R. Shermer. 2001. *Geomorphological Mapping and Archaeological Sites of the Upper Mississippi River Valley, Navigation pools 1-10, Minneapolis, Minnesota to Guttenberg, Iowa*. Reports of Investigations No. 522, Hemisphere Field Services, Inc, Minneapolis.
- Mead, R. H. 1995. *Contaminants in the Mississippi River, 1987-92*. U.S. Geological Survey Circular 1133.
- McKern, W. C. 1931. A Wisconsin Variant of the Hopewell Culture. *Bulletin of the Public Museum of the City of Milwaukee*, 10(2):185-328.
- Overstreet, David, R. Fay, C. Mason and R. Boszhardt. 1983. Literature Search and Records Review of the Upper Mississippi Basin: St. Anthony Falls to Lock and Dam 10. Reports of Investigations No. 116, Great Lakes Archaeological Research Center, Inc, Milwaukee.
- Penman, J. T. 1981. *Archaeology of the Great River Road: Survey and Testing in Buffalo, Pepin, and Pierce Counties*. Wisconsin Department of Transportation, Archaeological Report No. 5. Madison.

- Penman, J.T. 1984. *Archaeology of the Great River Road: Summary Report*. Wisconsin Department of Transportation, Archaeology Report 10, Madison.
- Pitlo, J. Jr. , A. Van Vooren, and J. Rasmussen. 1995. Distribution and relative abundance of Upper Mississippi River fishes. Upper Mississippi River Conservation Committee Fish Technical Section. Rock Island, Illinois. 20 pp.
- Pleger, T. 1997. A Phase I Archaeological Survey of the Floodplain of Pool Nos. 5, 5A, and 6 of the Upper Mississippi River Valley. Reports of Investigations No. 248. Mississippi Valley Archaeology Center at the University of Wisconsin, La Crosse.
- River Resources Forum Water Level Management Task Force (RRFWLMTF). 2007a. *Summary Results of the Pool 5 and Pool 8 Drawdowns on the Upper Mississippi River*. Joint publication by the Corps of Engineers, Wisconsin Department of Natural Resources, U.S. Fish and Wildlife Service, and Minnesota Department of Natural Resources.
- River Resources Forum Water Level Management Task Force (RRFWLMTF). 2007b *Upper Mississippi River Pool 8 Drawdown Results: A Summary of the Research and Monitoring Results from the 2001 and 2002 Experimental Drawdowns of Pool 8*. Joint publication by the Corps of Engineers, Wisconsin Department of Natural Resources, U.S. Fish and Wildlife Service, and Minnesota Department of Natural Resources.
- Stoltman, J. 1979. Middle Woodland Stage Communities of Southwestern Wisconsin. In *Hopewell Archaeology: The Chillicothe Conference*, edited by N. Greber and D. Brose, pp 122-139. Special Paper 3, Midcontinental Journal of Archaeology. 1980.
- Sullivan, J. and J. Moody. 1996. Contaminants in Mississippi River bed sediments collected before and after the 1993 summer flood in navigation pools 1 to 11. Wisconsin Department of Natural Resources, La Crosse, Wisconsin. 50 pp.
- Theler, J. and R. Boszhardt. 2003. *Twelve Millennia: Archaeology of the Upper Mississippi River*. University of Iowa Press, Iowa City. 2003.
- Thomas, C. 1894. *Report on the Mound Explorations of the Bureau of American Ethnology*. Twelfth Annual Report of the Bureau of American Ethnology 1890-1891. Smithsonian Institution, Washington D.C.
- Wilcox, Daniel B. 1993. *An aquatic habitat classification system for the upper Mississippi River system*. U.S. Fish and Wildlife Service, Environmental Management Technical Center, Onalaska, Wisconsin. EMTC 93-T003.
- Wilford, L. 1954 The La Moille Rockshelter. *The Minnesota Archaeologist* 19.
- Winchell, N.H. 1911. *The Aborigines of Minnesota*. The Minnesota Historical Society, St. Paul.

Wisconsin Department of Natural Resources, Minnesota Department of Natural Resources,  
U.S. Army Corps of Engineers. 2006. Preliminary Report on the Effects of the 2005  
Pool 5 Mississippi River Drawdown on Shallow-water Native Mussels. 24 pp.  
w/appendixes.

## **COORDINATION APPENDIX**

### **Memorandum from St. Paul District to Mississippi Valley Division**

(Request for Approval of a Minor Deviation from the Approved Water Control Plan on the Mississippi River, Pool No. 6.)

### **Cultural Resources Coordination Letters**

(Tribal, Minnesota and Wisconsin State Historic Preservation Offices)

MEMORANDUM FOR Commander, Mississippi Valley Division, P.O. Box 80, Vicksburg, MS 39181-0080,  
Attn: CEMVD-PD-WW, Eddie Brooks

SUBJECT: Request for Approval of a Minor Deviation from the Approved Water Control Plan on the Mississippi River, Pool No. 6.

1. **Reference:** CEMVD-TD-TW memorandum dated 19 December 2002, Subject: Request for Deviation from Reservoir Regulation Plans, Upper Mississippi River Locks and Dams. Essentially this memorandum paved the way for efficiently requesting temporary drawdowns of the Upper Mississippi River lock and dam pools.

A Letter Report and Environmental Assessment were drafted in 2003 when the drawdown of Pool No. 6 was originally scheduled. Difficulties with affected entities within the pool resulted in postponement of the plan. Since then the difficulties have been overcome and the Letter Report/Environmental Assessment is being updated. Main channel surveys and recreational access surveys have not been completed. Should these surveys prove to be unfavorable; the drawdown will again be postponed. A Finding of No Significant Impacts (FONSI) is expected to be signed by the end of May. The deviation will not proceed until a signed FONSI is in hand.

2. **Purpose of Deviation.** In 2002, St. Paul District completed a pilot study of drawdown impacts in Pool No. 8. The increased drawdown exposed areas of the pool that were previously inundated and enhanced conditions for growth of aquatic vegetation. Based on this, it was determined that increased drawdown at the locks and dams serves as a means of enhancing the condition of the river ecosystem in the Upper Mississippi River. The success experienced in Pool No. 8 led to a continuation of the program. This memorandum initiates the request for drawdown of Pool No. 6 in hopes of similar success as in Pool No. 8.

3. **Background.** Pool No. 6 is operated as a hinge pool. The Primary Control Point is located at Winona, MN. A minimum elevation of 645.5 feet is maintained at Winona stream gage. Theoretically, at zero discharge, the pool would be flat at elevation 645.5 feet. As flow increases, the gates at the dam are opened to maintain Primary Control. Opening of the gates causes a drawdown in the water surface at the dam. When drawdown reaches elevation 645.5 feet, control of the pool switches to the dam. This occurs at an approximate discharge of 26,000 cfs. We are now in Secondary Control. As discharge continues to increase, gates are opened to maintain elevation 644.5 feet at the dam. At about 71,000 cfs, all the gates are raised clear of the water surface and we are in open river conditions.

4. **Deviation.** The selected drawdown plan calls for lowering the Primary Control Point by 0.5 feet (i.e. from elevation 645.5 feet to 645.0 feet) and allowing additional drawdown at the dam (i.e. from elevation 644.5 feet to 643.5 feet). The following table shows the standard operating plan in comparison to the proposed deviation.

<u>Operating Plan</u>	<u>Approximate Discharge (cfs)</u>	<u>Primary Control</u>	<u>Secondary Control</u>
Standard	0 to 26,000	645.5 feet	



	26,000	645.5 feet	644.5 feet
	26,000 to 71,000		644.5 feet
Deviated	0 to 30,000	645.0 feet	
	30,000	645.0 feet	643.5 feet
	30,000 to 65,000		643.5 feet

At the primary-secondary switch point, note that the slope of the water surface profile is steeper for the deviation; therefore a higher discharge is required. Also note that the lower secondary control requires gates to be pulled sooner. The deviation is scheduled to begin on 16 June 2008 and to be completed on 30 September 2008. Should insufficient discharge occur during the time period, the plan will be reassessed and may be discontinued.

5. **Consequences of Regulating with the Approved Plan.** None; however, no environmental enhancement of the pool will occur.

6. **Consequences of Regulating with the Deviation.** Because the plan does not call for additional dredging, the potential for barge grounding is increased. Should barge bumping occur, the pool will be raised to accommodate barge traffic.

7. **Affected Entities.** The towing industry is certainly an affected entity. Our Project Management office and Operations Division coordinated with the barge industry through the Water Level Management Task Force and the River Resources Forum. Announcement of the drawdown plan was made to the barge industry via the Coast Guard, signage, handouts at Lock and Dam sites upstream and downstream, and a user survey to tow boat pilots. There were also press releases. During the drawdown period, pool levels will be monitored daily to ensure navigation depths. Should depths become inadequate, the pool will be immediately raised.

In addition to the towing industry, there are several marinas and private boat docks within the pool that are affected entities. The impact of drawdown varies from little or no impact to increased caution. The situation will be monitored throughout the drawdown period.

8. **District Office Coordination.** The planned deviation has been coordinated with Operations Division, and Project Management, Environmental and H&H Branches. Outside coordination included both the Minnesota and Wisconsin Department of Natural Resources and the US Fish and Wildlife Service. In addition, public meetings were held at Winona, MN and Trempealeau, WI on 25 September 2007 and 26 September 2007 respectively. Future meetings will be held at these two locations on 6 and 7 May 2008.

Any questions regarding the deviation can be addressed to Scott Jutila at 651-290-5631 (Hydraulics) or Ferris Chamberlin at 651-290-5619 (Water Control).

FERRIS W. CHAMBERLIN, P.E.  
Chief, Water Control and Hydrology Section



## DEPARTMENT OF THE ARMY

ST. PAUL DISTRICT, CORPS OF ENGINEERS  
ARMY CORPS OF ENGINEERS CENTRE  
190 FIFTH STREET EAST  
ST. PAUL, MN 55101-1638

31 MAY 2003

REPLY TO  
ATTENTION OF

Environmental and Economic Analysis Branch  
Planning, Programs and Project Management Division

SUBJECT: Initiating Consultation for implementing a minor drawdown of Mississippi River Navigation Pool 6, Buffalo and Trempealeau Counties, Wisconsin, and Winona County, Minnesota

Mr. Alan Olsen  
Upper Sioux Indian Community  
P.O. Box 147  
Granite Falls, Minnesota 56241

Dear Mr. Olsen:

The St. Paul District, U.S. Army Corps of Engineers (Corps) is planning to implement a minor drawdown (Drawdown) of Mississippi River Navigation Pool 6, Buffalo and Trempealeau Counties, Wisconsin, and Winona County, Minnesota (Figure 1). The implementation of the Drawdown (1 foot at Lock and Dam 6 and 0.5 foot at Winona) of Mississippi River Navigation Pool 6 is part of a water level management program that seeks to restore and enhance ecological conditions. The effects of a drawdown to cultural resource sites are largely unknown. While there has been little systematic study of the effect of river action on cultural resource sites, current understanding indicates that inundation and wave action are detrimental to cultural resources and that some resources are more susceptible to adverse impacts than others. Although the Drawdown is not expected to have adverse impacts to cultural resources, the potential exists that it may have effects on cultural resources. Therefore, in compliance with Section 106 of the National Historic Preservation Act, potential effects to cultural resources as a result of the Drawdown will be assessed through a monitoring study.

The Corps has identified your tribe as having historical and cultural associations with the geographic location in question. Per 36CFR800.3(f)(2) of the Advisory Council on Historic Preservation's revised regulation implementing Section 106 of the National Historic Preservation Act, as amended, the Corps is hereby inquiring if your tribe is interested in being a consulting party for Section 106 purposes on the proposed Drawdown monitoring study.

The Drawdown will be initiated in June 2003, provided the river discharge is within 25,000 to 71,000 cubic feet per second (cfs). The Drawdown will proceed at a rate of about 0.2 foot per day, as measured at Lock and Dam 6, until elevation 643.5 feet above mean sea level (fasl) (1.0 foot below the normal regulated elevation when the discharge is between 26,000 and 71,000 cfs). The water surface elevation at the Winona primary control point (river mile 725.5)

will be limited to 0.5 foot below the current low control elevation of 645.5 fasl. It is expected that water levels will drop only a few inches at the northern end of the pool. The Drawdown will be maintained (as river discharge allows) through mid-September 2003, when the pool will be allowed to rise at about 0.1 foot per day. Routine regulation will resume at the beginning of October 2003. The Pool 6 Drawdown area is provided on Figures 2 through 4.

The Drawdown's area of potential effects (APE), as defined in 36 CFR § 800.2(c), is determined to be the river shoreline areas between the elevations of 644.5 fasl and 643.5 fasl in those areas south and west of the Burlington Northern-Santa Fe Railroad causeway between Locks and Dams 5A and 6. Approximately 17 cultural resources sites have been recorded within the APE (Table 1 and Figures 2 through 6). These include precontact artifact scatters and burial mounds and historic shipwrecks and artifact scatters. Several cultural resources within Pool 6 are listed on the National Register of Historic Places (e.g., Locks and Dams 5A and 6), or are eligible or potentially eligible (e.g., wing dams) for listing. However, it is not expected that these properties will be affected by the Drawdown, and aside from Locks and Dams 5A and 6, none are within the APE.

The monitoring plan for determining the effect of the Drawdown will consist of three phases: recording the conditions of the sites before drawdown occurs, recording conditions at maximum drawdown, and then recording conditions after the pool is returned to normal levels. No subsurface testing or excavation of any kind will take place and no materials will be collected during the Drawdown monitoring study. Any unrecorded cultural resources incidentally identified during the monitoring study will be recorded in the same manner described above. A Programmatic Agreement between the Corps and the Minnesota State Historic Preservation Office is currently being developed.

If your tribe is interested in consulting on the project, please provide the Corps with a letter to that effect by June 16, 2003. Please also provide the Corps with a point of contact for future consultation on the project. If you have any questions, please contact me at 651-290-5300 or Mr. Bradley Perkl, Corps archaeologist, at 651-290-5370.

Sincerely,



Robert L. Ball  
Colonel, Corps of Engineers  
District Engineer

Enclosures

Identical letters with enclosures to:

Honorable Ann Larson  
Chairperson  
Lower Sioux Indian Community of  
Minnesota Mdewakanton Sioux Indians  
RR 1, Box 308  
Morton, Minnesota 56270

Honorable Audrey Kohnen  
Chairperson  
Prairie Island Indian Community of  
Minnesota Mdewakanton Sioux Indians  
Prairie Island Community Council  
1158 Island Boulevard  
Welch, Minnesota 55089-9540

Honorable Stanley R. Crooks  
Chairman  
Shakopee Mdewakanton Sioux Community  
2330 Sioux Trail NW  
Prior Lake, Minnesota 55372

Mr. George Garvin  
Cultural Resources Department  
Ho-Chunk Nation - Box 667  
405 Airport Road  
Black River Falls, Wisconsin 54615



**DEPARTMENT OF THE ARMY**

ST. PAUL DISTRICT, CORPS OF ENGINEERS  
ARMY CORPS OF ENGINEERS CENTRE  
190 FIFTH STREET EAST  
ST. PAUL, MN 55101-1638

21 MAY 2003

REPLY TO  
ATTENTION OF

Environmental and Economic Analysis Branch  
Planning, Programs and Project Management Division

**SUBJECT:** Initiating Consultation for implementing a minor drawdown of Mississippi River Navigation Pool 6, Buffalo and Trempealeau Counties, Wisconsin, and Winona County, Minnesota

Honorable Ann Larson  
Chairperson  
Lower Sioux Indian Community of  
Minnesota Mdewakanton Sioux Indians  
RR 1, Box 308  
Morton, Minnesota 56270

Dear Chairperson Larson:

The St. Paul District, U.S. Army Corps of Engineers (Corps) is planning to implement a minor drawdown (Drawdown) of Mississippi River Navigation Pool 6, Buffalo and Trempealeau Counties, Wisconsin, and Winona County, Minnesota (Figure 1). The implementation of the Drawdown (1 foot at Lock and Dam 6 and 0.5 foot at Winona) of Mississippi River Navigation Pool 6 is part of a water level management program that seeks to restore and enhance ecological conditions. The effects of a drawdown to cultural resource sites are largely unknown. While there has been little systematic study of the effect of river action on cultural resource sites, current understanding indicates that inundation and wave action are detrimental to cultural resources and that some resources are more susceptible to adverse impacts than others. Although the Drawdown is not expected to have adverse impacts to cultural resources, the potential exists that it may have effects on cultural resources. Therefore, in compliance with Section 106 of the National Historic Preservation Act, potential effects to cultural resources as a result of the Drawdown will be assessed through a monitoring study.

The Corps has identified your tribe as having historical and cultural associations with the geographic location in question. Per 36CFR800.3(f)(2) of the Advisory Council on Historic Preservation's revised regulation implementing Section 106 of the National Historic Preservation Act, as amended, the Corps is hereby inquiring if your tribe is interested in being a consulting party for Section 106 purposes on the proposed Drawdown monitoring study.

The Drawdown will be initiated in June 2003, provided the river discharge is within 25,000 to 71,000 cubic feet per second (cfs). The Drawdown will proceed at a rate of about 0.2 foot per day, as measured at Lock and Dam 6, until elevation 643.5 feet above mean sea level

(fasl) (1.0 foot below the normal regulated elevation when the discharge is between 26,000 and 71,000 cfs). The water surface elevation at the Winona primary control point (river mile 725.5) will be limited to 0.5 foot below the current low control elevation of 645.5 fasl. It is expected that water levels will drop only a few inches at the northern end of the pool. The Drawdown will be maintained (as river discharge allows) through mid-September 2003, when the pool will be allowed to rise at about 0.1 foot per day. Routine regulation will resume at the beginning of October 2003. The Pool 6 Drawdown area is provided on Figures 2 through 4.

The Drawdown's area of potential effects (APE), as defined in 36 CFR § 800.2(c), is determined to be the river shoreline areas between the elevations of 644.5 fasl and 643.5 fasl in those areas south and west of the Burlington Northern-Santa Fe Railroad causeway between Locks and Dams 5A and 6. Approximately 17 cultural resources sites have been recorded within the APE (Table 1 and Figures 2 through 6). These include precontact artifact scatters and burial mounds and historic shipwrecks and artifact scatters. Several cultural resources within Pool 6 are listed on the National Register of Historic Places (e.g., Locks and Dams 5A and 6), or are eligible or potentially eligible (e.g., wing dams) for listing. However, it is not expected that these properties will be affected by the Drawdown, and aside from Locks and Dams 5A and 6, none are within the APE.

The monitoring plan for determining the effect of the Drawdown will consist of three phases: recording the conditions of the sites before drawdown occurs, recording conditions at maximum drawdown, and then recording conditions after the pool is returned to normal levels. No subsurface testing or excavation of any kind will take place and no materials will be collected during the Drawdown monitoring study. Any unrecorded cultural resources incidentally identified during the monitoring study will be recorded in the same manner described above. A Programmatic Agreement between the Corps and the Minnesota State Historic Preservation Office is currently being developed.

If your tribe is interested in consulting on the project, please provide the Corps with a letter to that effect by June 16, 2003. Please also provide the Corps with a point of contact for future consultation on the project. If you have any questions, please contact me at 651-290-5300 or Mr. Bradley Perkl, Corps archaeologist, at 651-290-5370.

Sincerely,



Robert L. Ball  
Colonel, Corps of Engineers  
District Engineer

Enclosures

Identical letters with enclosures to:

Honorable Audrey Kohnen  
Chairperson  
Prairie Island Indian Community of  
Minnesota Mdewakanton Sioux Indians  
Prairie Island Community Council  
1158 Island Boulevard  
Welch, Minnesota 55089-9540

Honorable Stanley R. Crooks  
Chairman  
Shakopee Mdewakanton Sioux Community  
2330 Sioux Trail NW  
Prior Lake, Minnesota 55372

Mr. George Garvin  
Cultural Resources Department  
Ho-Chunk Nation - Box 667  
405 Airport Road  
Black River Falls, Wisconsin 54615

Mr. Alan Olsen  
Upper Sioux Indian Community  
P.O. Box 147  
Granite Falls, Minnesota 56241



## DEPARTMENT OF THE ARMY

ST. PAUL DISTRICT, CORPS OF ENGINEERS  
ARMY CORPS OF ENGINEERS CENTRE  
190 FIFTH STREET EAST  
ST. PAUL, MN 55101-1638

21 MAY 2003

REPLY TO  
ATTENTION OF

Environmental and Economic Analysis Branch  
Planning, Programs and Project Management Division

SUBJECT: Initiating Consultation for implementing a minor drawdown of Mississippi River Navigation Pool 6, Buffalo and Trempealeau Counties, Wisconsin, and Winona County, Minnesota

Honorable Audrey Kohnen  
Chairperson  
Prairie Island Indian Community of  
Minnesota Mdewakanton Sioux Indians  
Prairie Island Community Council  
1158 Island Boulevard  
Welch, Minnesota 55089-9540

Dear Chairperson Kohnen:

The St. Paul District, U.S. Army Corps of Engineers (Corps) is planning to implement a minor drawdown (Drawdown) of Mississippi River Navigation Pool 6, Buffalo and Trempealeau Counties, Wisconsin, and Winona County, Minnesota (Figure 1). The implementation of the Drawdown (1 foot at Lock and Dam 6 and 0.5 foot at Winona) of Mississippi River Navigation Pool 6 is part of a water level management program that seeks to restore and enhance ecological conditions. The effects of a drawdown to cultural resource sites are largely unknown. While there has been little systematic study of the effect of river action on cultural resource sites, current understanding indicates that inundation and wave action are detrimental to cultural resources and that some resources are more susceptible to adverse impacts than others. Although the Drawdown is not expected to have adverse impacts to cultural resources, the potential exists that it may have effects on cultural resources. Therefore, in compliance with Section 106 of the National Historic Preservation Act, potential effects to cultural resources as a result of the Drawdown will be assessed through a monitoring study.

The Corps has identified your tribe as having historical and cultural associations with the geographic location in question. Per 36CFR800.3(f)(2) of the Advisory Council on Historic Preservation's revised regulation implementing Section 106 of the National Historic Preservation Act, as amended, the Corps is hereby inquiring if your tribe is interested in being a consulting party for Section 106 purposes on the proposed Drawdown monitoring study.

The Drawdown will be initiated in June 2003, provided the river discharge is within 25,000 to 71,000 cubic feet per second (cfs). The Drawdown will proceed at a rate of about 0.2 foot per day, as measured at Lock and Dam 6, until elevation 643.5 feet above mean sea level



(fasl) (1.0 foot below the normal regulated elevation when the discharge is between 26,000 and 71,000 cfs). The water surface elevation at the Winona primary control point (river mile 725.5) will be limited to 0.5 foot below the current low control elevation of 645.5 fasl. It is expected that water levels will drop only a few inches at the northern end of the pool. The Drawdown will be maintained (as river discharge allows) through mid-September 2003, when the pool will be allowed to rise at about 0.1 foot per day. Routine regulation will resume at the beginning of October 2003. The Pool 6 Drawdown area is provided on Figures 2 through 4.

The Drawdown's area of potential effects (APE), as defined in 36 CFR § 800.2(c), is determined to be the river shoreline areas between the elevations of 644.5 fasl and 643.5 fasl in those areas south and west of the Burlington Northern-Santa Fe Railroad causeway between Locks and Dams 5A and 6. Approximately 17 cultural resources sites have been recorded within the APE (Table 1 and Figures 2 through 6). These include precontact artifact scatters and burial mounds and historic shipwrecks and artifact scatters. Several cultural resources within Pool 6 are listed on the National Register of Historic Places (e.g., Locks and Dams 5A and 6), or are eligible or potentially eligible (e.g., wing dams) for listing. However, it is not expected that these properties will be affected by the Drawdown, and aside from Locks and Dams 5A and 6, none are within the APE.

The monitoring plan for determining the effect of the Drawdown will consist of three phases: recording the conditions of the sites before drawdown occurs, recording conditions at maximum drawdown, and then recording conditions after the pool is returned to normal levels. No subsurface testing or excavation of any kind will take place and no materials will be collected during the Drawdown monitoring study. Any unrecorded cultural resources incidentally identified during the monitoring study will be recorded in the same manner described above. A Programmatic Agreement between the Corps and the Minnesota State Historic Preservation Office is currently being developed.

If your tribe is interested in consulting on the project, please provide the Corps with a letter to that effect by June 16, 2003. Please also provide the Corps with a point of contact for future consultation on the project. If you have any questions, please contact me at 651-290-5300 or Mr. Bradley Perkl, Corps archaeologist, at 651-290-5370.

Sincerely,



Robert L. Ball  
Colonel, Corps of Engineers  
District Engineer

Enclosures

Identical letters with enclosures to:

Honorable Stanley R. Crooks  
Chairman  
Shakopee Mdewakanton Sioux Community  
2330 Sioux Trail NW  
Prior Lake, Minnesota 55372

Mr. George Garvin  
Cultural Resources Department  
Ho-Chunk Nation - Box 667  
405 Airport Road  
Black River Falls, Wisconsin 54615

Mr. Alan Olsen  
Upper Sioux Indian Community  
P.O. Box 147  
Granite Falls, Minnesota 56241

Honorable Ann Larson  
Chairperson  
Lower Sioux Indian Community of  
Minnesota Mdewakanton Sioux Indians  
RR 1, Box 308  
Morton, Minnesota 56270



**DEPARTMENT OF THE ARMY**

ST. PAUL DISTRICT, CORPS OF ENGINEERS  
ARMY CORPS OF ENGINEERS CENTRE  
190 FIFTH STREET EAST  
ST. PAUL, MN 55101-1638

21 MAY 2003

REPLY TO  
ATTENTION OF

Environmental and Economic Analysis Branch  
Planning, Programs and Project Management Division

**SUBJECT:** Initiating Consultation for implementing a minor drawdown of Mississippi River Navigation Pool 6, Buffalo and Trempealeau Counties, Wisconsin, and Winona County, Minnesota

Honorable Stanley R. Crooks  
Chairman  
Shakopee Mdewakanton Sioux Community  
2330 Sioux Trail NW  
Prior Lake, Minnesota 55372

Dear Chairman Crooks:

The St. Paul District, U.S. Army Corps of Engineers (Corps) is planning to implement a minor drawdown (Drawdown) of Mississippi River Navigation Pool 6, Buffalo and Trempealeau Counties, Wisconsin, and Winona County, Minnesota (Figure 1). The implementation of the Drawdown (1 foot at Lock and Dam 6 and 0.5 foot at Winona) of Mississippi River Navigation Pool 6 is part of a water level management program that seeks to restore and enhance ecological conditions. The effects of a drawdown to cultural resource sites are largely unknown. While there has been little systematic study of the effect of river action on cultural resource sites, current understanding indicates that inundation and wave action are detrimental to cultural resources and that some resources are more susceptible to adverse impacts than others. Although the Drawdown is not expected to have adverse impacts to cultural resources, the potential exists that it may have effects on cultural resources. Therefore, in compliance with Section 106 of the National Historic Preservation Act, potential effects to cultural resources as a result of the Drawdown will be assessed through a monitoring study.

The Corps has identified your tribe as having historical and cultural associations with the geographic location in question. Per 36CFR800.3(f)(2) of the Advisory Council on Historic Preservation's revised regulation implementing Section 106 of the National Historic Preservation Act, as amended, the Corps is hereby inquiring if your tribe is interested in being a consulting party for Section 106 purposes on the proposed Drawdown monitoring study.

The Drawdown will be initiated in June 2003, provided the river discharge is within 25,000 to 71,000 cubic feet per second (cfs). The Drawdown will proceed at a rate of about 0.2 foot per day, as measured at Lock and Dam 6, until elevation 643.5 feet above mean sea level (fasl) (1.0 foot below the normal regulated elevation when the discharge is between 26,000 and

71,000 cfs). The water surface elevation at the Winona primary control point (river mile 725.5) will be limited to 0.5 foot below the current low control elevation of 645.5 fasl. It is expected that water levels will drop only a few inches at the northern end of the pool. The Drawdown will be maintained (as river discharge allows) through mid-September 2003, when the pool will be allowed to rise at about 0.1 foot per day. Routine regulation will resume at the beginning of October 2003. The Pool 6 Drawdown area is provided on Figures 2 through 4.

The Drawdown's area of potential effects (APE), as defined in 36 CFR § 800.2(c), is determined to be the river shoreline areas between the elevations of 644.5 fasl and 643.5 fasl in those areas south and west of the Burlington Northern-Santa Fe Railroad causeway between Locks and Dams 5A and 6. Approximately 17 cultural resources sites have been recorded within the APE (Table 1 and Figures 2 through 6). These include precontact artifact scatters and burial mounds and historic shipwrecks and artifact scatters. Several cultural resources within Pool 6 are listed on the National Register of Historic Places (e.g., Locks and Dams 5A and 6), or are eligible or potentially eligible (e.g., wing dams) for listing. However, it is not expected that these properties will be affected by the Drawdown, and aside from Locks and Dams 5A and 6, none are within the APE.

The monitoring plan for determining the effect of the Drawdown will consist of three phases: recording the conditions of the sites before drawdown occurs, recording conditions at maximum drawdown, and then recording conditions after the pool is returned to normal levels. No subsurface testing or excavation of any kind will take place and no materials will be collected during the Drawdown monitoring study. Any unrecorded cultural resources incidentally identified during the monitoring study will be recorded in the same manner described above. A Programmatic Agreement between the Corps and the Minnesota State Historic Preservation Office is currently being developed.

If your tribe is interested in consulting on the project, please provide the Corps with a letter to that effect by June 16, 2003. Please also provide the Corps with a point of contact for future consultation on the project. If you have any questions, please contact me at 651-290-5300 or Mr. Bradley Perkl, Corps archaeologist, at 651-290-5370.

Sincerely,



Robert L. Ball  
Colonel, Corps of Engineers  
District Engineer

Enclosures

Identical letters with enclosures to:

Mr. George Garvin  
Cultural Resources Department  
Ho-Chunk Nation - Box 667  
405 Airport Road  
Black River Falls, Wisconsin 54615

Mr. Alan Olsen  
Upper Sioux Indian Community  
P.O. Box 147  
Granite Falls, Minnesota 56241

Honorable Ann Larson  
Chairperson  
Lower Sioux Indian Community of  
Minnesota Mdewakanton Sioux Indians  
RR 1, Box 308  
Morton, Minnesota 56270

Honorable Audrey Kohnen  
Chairperson  
Prairie Island Indian Community of  
Minnesota Mdewakanton Sioux Indians  
Prairie Island Community Council  
1158 Island Boulevard  
Welch, Minnesota 55089-9540



**DEPARTMENT OF THE ARMY**  
ST. PAUL DISTRICT, CORPS OF ENGINEERS  
SIBLEY SQUARE AT MEARS PARK  
190 FIFTH STREET EAST, SUITE 401  
ST. PAUL MN 55101-1638

April 28, 2008

Planning, Programs and Project Management Division  
Environmental and Economic Analysis Branch

**SUBJECT:** Minor Drawdown of Mississippi River Navigation Pool 6, Buffalo and  
Trempealeau Counties, Wisconsin, and Winona County, Minnesota  
SHPO No. 2003-1780

Mr. Dennis Gimmestad  
State Historic Preservation Office  
Minnesota Historical Society  
345 Kellogg Boulevard West  
St. Paul, Minnesota 55102

Dear Mr. Gimmestad:

The St. Paul District, U.S. Army Corps of Engineers (Corps), is planning to implement a minor drawdown of Mississippi River Navigation Pool 6, Buffalo and Trempealeau Counties, Wisconsin, and Winona County, Minnesota (Figure 1). The implementation of a minor drawdown of Pool 6 is part of a water level management program that seeks to restore and enhance ecological conditions. The drawdown was initially planned to take place in 2003. It was cancelled because of landowner concerns over access dredging. In 2004, the drawdown was again contemplated; however, river discharge levels were not sufficient to initiate the drawdown. The Corps will again attempt a drawdown of Pool 6 in June 2008. The Corps has determined that the drawdown will have no adverse effects on cultural resources. However, the Corps will conduct a monitoring study designed to assess the effects of the drawdown on cultural resources and recommend appropriate management strategies. The results of the cultural resources monitoring study will be provided to your office for review.

In 2003, your office received a draft letter report/environmental assessment. In addition, a programmatic agreement was being formulated. In 2004, consultation was reinitiated and revised based on the results of the first phase of a shoreline cultural resources monitoring study. Because the 2004 drawdown was cancelled, the agreement was not finalized and the Corps did not receive comments from your office. However, various notes regarding the incomplete consultation process indicate that your office was set to concur with the finding of No Adverse Effect if the Corps implemented the shoreline monitoring study and that a programmatic agreement would not be necessary. The Corps reiterates its determination of No Adverse Effect for the drawdown as explained below.

The minor drawdown will be initiated in June 2008 provided river discharge is within 25,000 to 71,000 cubic feet per second (cfs). The drawdown (1 foot below normal elevations at Lock and Dam 6, 0.5 foot at Winona and a few inches at the northern end of the pool) will proceed at a rate of about 0.2 foot per day. The drawdown will be maintained (as river discharge allows) through mid-September, when the pool will be allowed to rise at about 0.1 foot per day. Routine regulation will resume at the beginning of October.

The drawdown's area of potential effects (APE), as defined in 36 CFR § 800.2(c), is considered to be the river shoreline areas between the elevations of 644.5 feet above mean sea level (msl) and 643.5 feet msl in those areas south and west of the Burlington Northern-Santa Fe Railroad causeway between Locks and Dams 5A and 6. Six cultural resources sites are recorded within or close to the APE (Figures 2, 3; Table 1). These sites are two precontact artifact scatters, a historic shell midden, two historic shipwrecks and a historic structure. Several cultural resources within Pool 6 are listed on the National Register of Historic Places (e.g., the Lock and Dam 5A and 6 structures) or are eligible or potentially eligible for listing. However, these properties will not be affected by the drawdown and, aside from Lock and Dam 5A and 6, none are within the APE.

Prior to the cancellation of the 2003 drawdown, the first phase of the monitoring plan was completed. Based on the information collected, the scope for the monitoring plan has been revised. Of the six cultural resource sites located within or close to the APE, none will be adversely affected by the drawdown. For example, the historic shell midden could not be relocated and it is likely no longer extant. It is unlikely that the drawdown will expose the two shipwrecks. The historic boathouse foundation is unlikely to suffer any negative effects from the Drawdown. The two precontact artifact scatters are poorly defined in areal and vertical extent. Neither was identified through shoreline surveys (e.g., eroding artifacts). Although it is possible that cultural deposits extend to the shoreline in both cases, no artifacts were observed along the shoreline adjacent to these sites during the 2003 survey. In addition, the shoreline areas adjacent to these sites are well vegetated. It is important to note that the 1-foot minor drawdown is within the range of the natural fluctuation of the pool level. Maintaining a lower water level for a short duration will allow the formation of additional vegetation and will ultimately benefit shoreline archaeological sites by reducing the effects of erosion.

Because of the river dynamics and site characteristics outlined above, the Corps believes that a 1-foot drawdown would have no adverse effect to cultural resources. Rather than deciding to eliminate any cultural resource work for the project, the Corps recognizes that the drawdown is a research and management opportunity. Thus, the Corps has proposed to monitor the effects of the drawdown on cultural resources. Because last year's monitoring plan for the drawdown was not completed, the monitoring plan will be reinitiated. The monitoring plan for determining the effect of the drawdown will consist of three phases: recording the conditions of the sites before the drawdown occurs, recording conditions at maximum extent of the drawdown, and recording conditions after the pool is returned to normal levels. Any unrecorded cultural resources incidentally identified during the monitoring study will be recorded and monitored (a

shoreline survey for archaeological sites was completed in 1996). Results of the monitoring study will be documented and will include recommendations for appropriate short and long-term management plans. No sub-surface testing or excavation of any kind will take place, and no materials will be collected during the drawdown monitoring study. The Corps has coordinated with the U.S. Fish and Wildlife Service regarding the implementation of measures to prevent unauthorized artifact collecting that may occur as a result of the drawdown (e.g., increased patrols). Finally, the Shakopee Mdewakanton Sioux Community asked to be a consulting party on the project. The Corps has kept the Shakopee Mdewakanton Sioux Community apprised of this year's drawdown project and the monitoring study.

To summarize, the Corps has determined that the drawdown will have no adverse effects on cultural resources. However, the Corps will conduct a monitoring study designed to systematically understand the effects of the drawdown on cultural resources and recommend appropriate management strategies.

Please review the above and provide your comments as soon as possible. If you have any questions, please contact Mr. Bradley Perkl, Corps archaeologist, at 651-290-5370.

Sincerely,

A handwritten signature in black ink, appearing to read "Terry J. Birkenstock". The signature is fluid and cursive, with a large initial "T" and "B".

Terry J. Birkenstock  
Chief, Environmental and Economic  
Analysis Branch

4 Enclosures

Copy furnished:

Mr. Leonard Wabasha  
Shakopee Mdewakanton Sioux Community  
2330 Sioux Trail NW  
Prior Lake, Minnesota 55372



**Table 1. Summary of Pool 6 Sites.**

<b>Site</b>	<b>Site Type</b>	<b>Location</b>	<b>Status</b>	<b>Potential Affect</b>
47BF208	Historic shell midden	Along cut bank and buried below 1 meter of PSA	Not able to relocate; very eroded in some areas, likely destroyed	No
47TR34	Prehistoric campsite	On peninsula in Trempealeau Bay; site limits not conclusively determined	Ongoing erosion west of site along cut bank; in-filling south and east of site. No artifacts observed, well vegetated	No
47TR303	Prehistoric campsite	Site about 30 meters back from channel, but its extent not conclusively defined and may extend closer to bank	Future erosion could extend to site. No artifacts observed, well vegetated	No
21WN58	Boat house	Along river bank	Foundation at water edge	No
<i>Argo</i>	Shipwreck	In river	Not observed	No
<i>Van Gorder</i>	Shipwreck	In river	Not observed	No
Lock and Dam 6	Historic Structure	Lock and Dam 6 at Trempealeau	No Effect	No

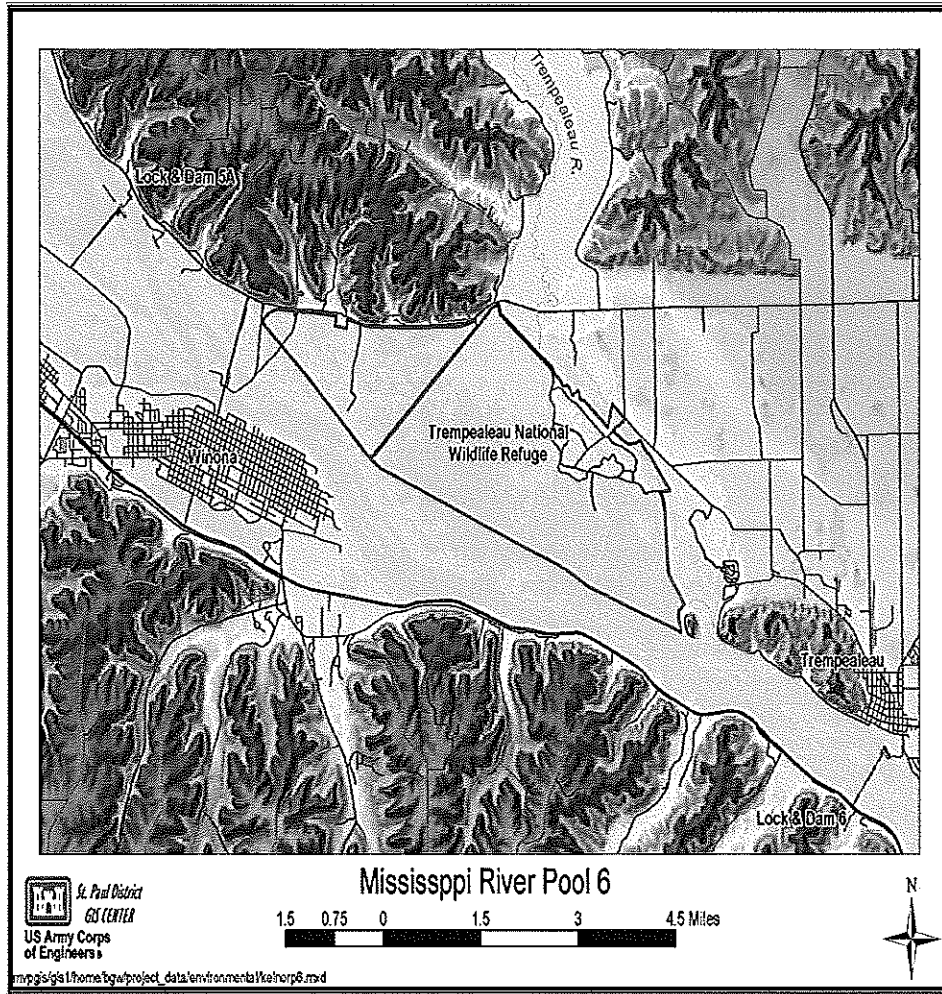


Figure 1. Pool 6 Locality

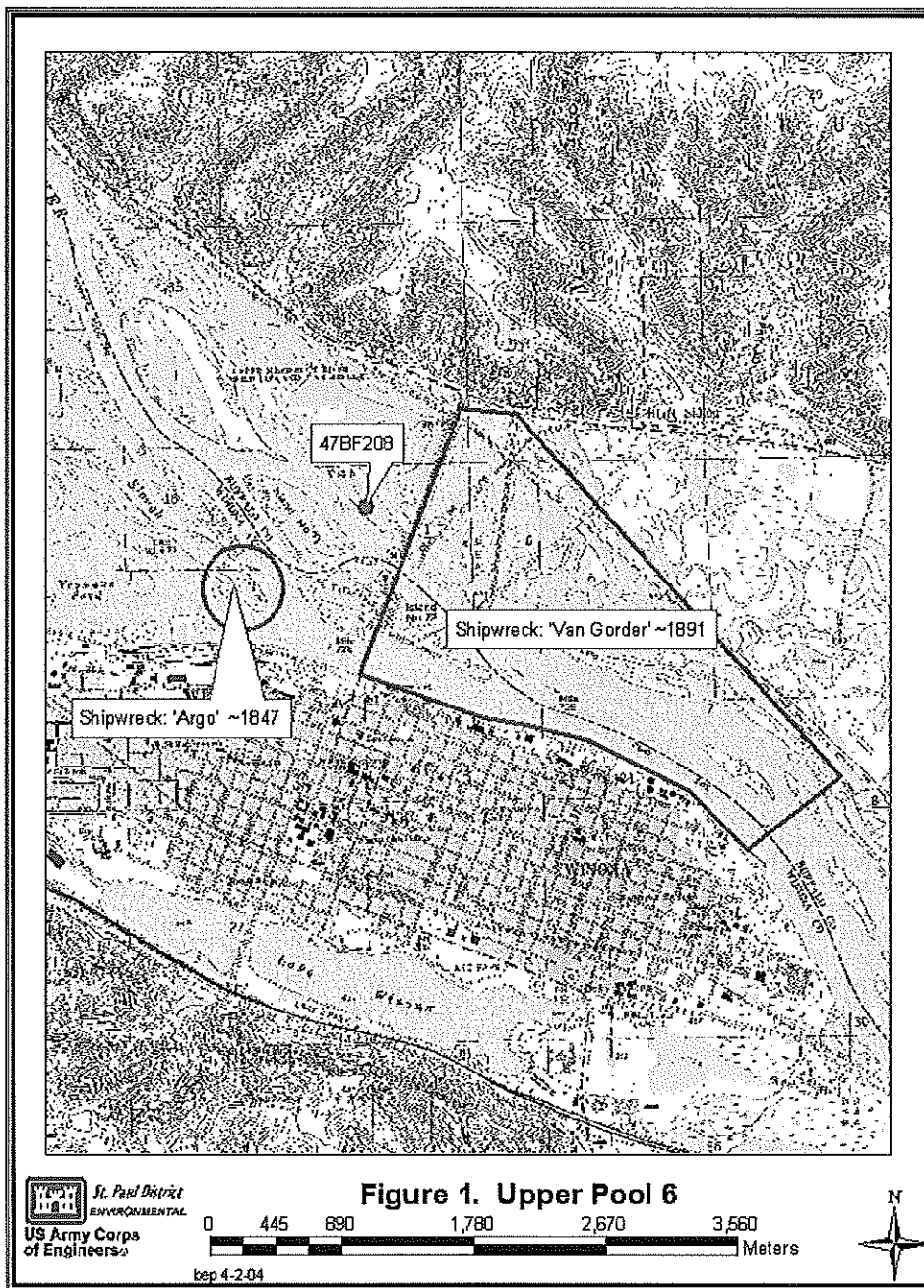


Figure 2. Upper Pool 6 Cultural Resource Sites

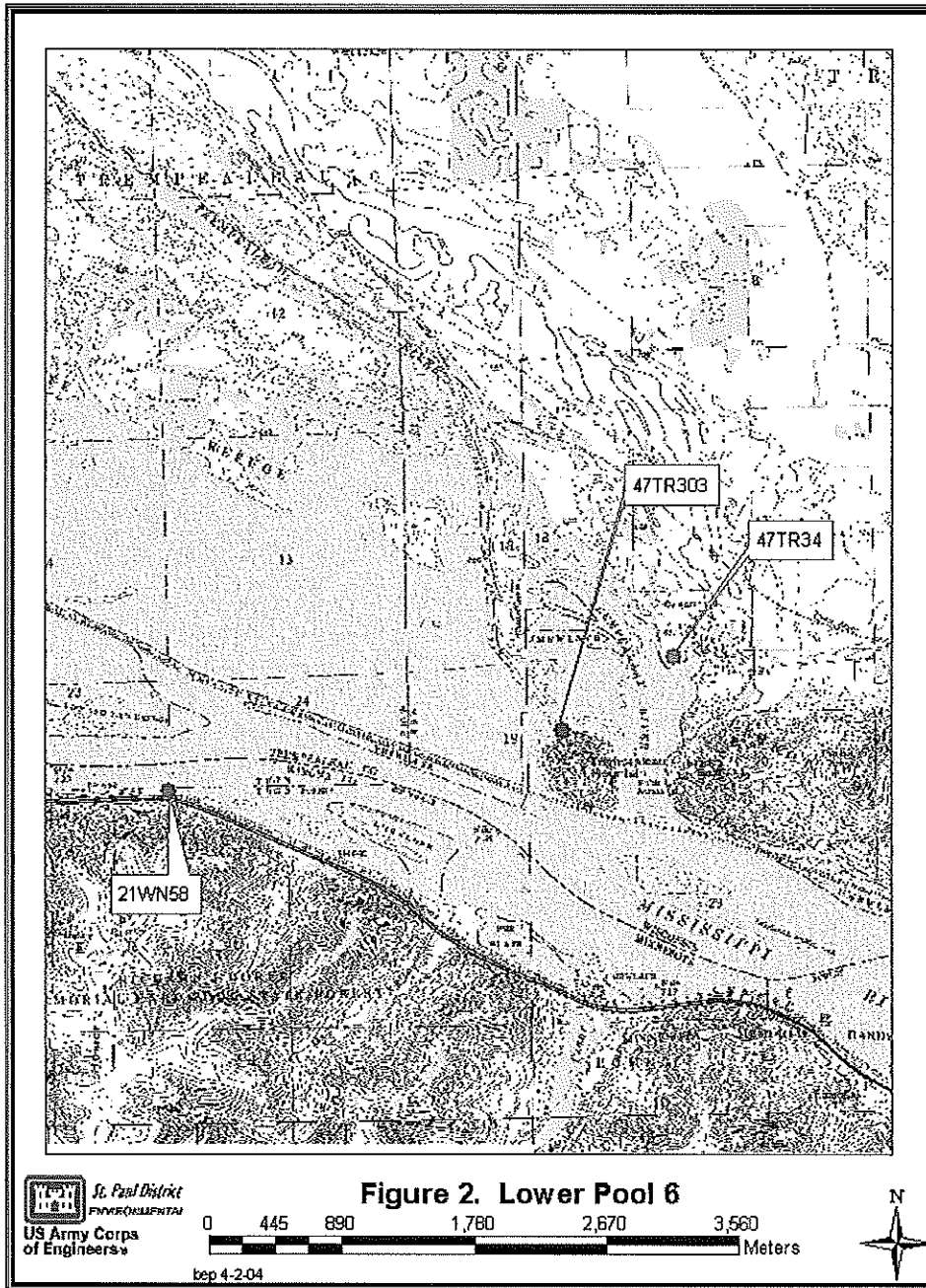


Figure 3. Lower Pool 6 Cultural Resource Sites

Muraski PM-B MM  
Kelner PM-E DA  
Perkl PM-E BBB  
Birkenstock PM-E JR

File name: Pool 6 drawdownMNSHPOletterApril2009.doc

WISCONSIN



WISCONSIN  
HISTORICAL  
SOCIETY

Headquarters Building  
816 State Street  
Madison, WI 53706-1482  
608-264-6400

April 23, 2004

Mr. Bradley Perkl  
U.S. Army Corps of Engineers  
190 Fifth Street East  
St. Paul MN 55101-1638

SHSW#: 03-0217/BF/TR  
RE: Pool 6 Drawdown, Mississippi River

Dear Mr. Perkl,

We have reviewed your submittal of April 5, 2004 regarding the above referenced project. Based on the information provided, we concur with your assessment that the proposed undertaking will result in no adverse effect to historic properties pursuant to 36 CFR 800.5(b).

If you have any questions concerning these matters, please call me at (608) 264-6507.

Sincerely,

Sherman Banker  
Office of Preservation Planning