



# Project Status Report

Upper Mississippi River  
Long Term Resource Monitoring Program  
U.S. Geological Survey

## Predicting Areas Dewatered and the Likelihood of Success of a Water-level Drawdown in Pool 13

At the request of the Fish and Wildlife Interagency Committee, the Rock Island District of the U.S. Army Corps of Engineers (Corps) and the Environmental Management Technical Center are collaborating to estimate acreages that would be affected by a water-level drawdown in Mississippi River Pool 13 (see Figure 1). The potential drawdown is intended to increase moist soil plant production, sediment oxidation and compaction, and to expand the photic zone for submersed vegetation. Acreage estimates of dewatered areas are needed to help define benefits before the current operating plan for Pool 13 can be modified. The drawdown may occur as early as the summer of 1998 if hydrologic conditions are appropriate.

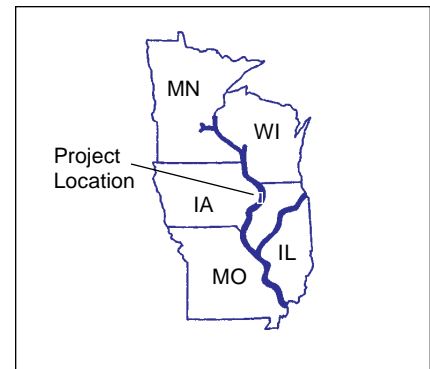
Because the river is used for multiple purposes, several constraints limit the maximum drawdown depth. Our study assumes the following: channel dimensions of 400 ft wide and 10.5 ft deep must be available for the entire pool at all discharges; the drawdown should not significantly affect commercial navigation or recreational craft; and no additional dredging should be required. These constraints limit the effective zone of influence and the chance of a successful drawdown. By investigating channel geometry, channel depths at a range of discharges throughout the pool, and discharge records, the Corps found

that a 1 ft drawdown at the dam would be possible at discharges between 50,000 cfs and 110,000 cfs. At discharges below 50,000 cfs, a 1 ft drawdown would violate the depth constraint without additional dredging. A drawdown at flows greater than 110,000 cfs would not be possible since open river conditions would prevail. The predicted success rate for discharges in this range is related to the length of the drawdown period and can be calculated from historical records. Based on an evaluation of historical flow records, success rates for a 1 ft drawdown, occurring between June 15 and August 15, are given in Table 1.

**Table 1. Predicted success rates for a 1 ft drawdown for various periods between June 15 and August 15 based on 122 years of discharge data collected at Clinton, Iowa.**

Drawdown Duration (weeks)	Success Rate (%)
1	72
2	61
3	49
4	35
5	21
6	15
7	9
8	5

A one-dimensional flow model (UNET) was used to predict water surface profiles and water velocities under steady flow conditions. The model pre-



**Figure 1. Location of the drawdown project.**

dicted that the effect of a 1ft drawdown at the dam decreases upriver and also decreases with an increase in discharge. The drawdown would be less than 0.3 ft at discharges between 50,000 cfs and 110,000 cfs at all points which are more than 11 mi upriver (river mile 534) of the dam. Eight miles upriver of the dam the drawdown would be about 0.6 ft at a discharge of 50,000 cfs and about 0.3 ft at a discharge of 110,000 cfs. Predicted increases in water velocities were under 0.2 ft/s except for the area within 3 mi of the dam. Near the dam water velocities would increase as much as 0.4 ft/s.

Water surfaces predicted by the UNET model at 50,000 cfs were then transformed into a map using a template with sections approximately 1 mi

(over)

long. Because the Spring Lake area in lower Pool 13 is protected by a levee, the model assumed that water levels there would be controlled by water levels at river mile 532. The water surface template was then overlaid with a bathymetric map. Data for the bathymetric map were collected between 1989 and 1993, and include only areas that are considered aquatic. The Rock Island District's Channel Maintenance Section is planning to conduct a complete channel survey in 1997 to update older bathymetric data. Once these data become available, critical channel locations limiting the maximum depth of drawdown will be recomputed.

A geographic information system was used to predict areas dewatered by a 1 ft drawdown. The only aquatic areas predicted to be dewatered occur between river miles 523 and 532 because the river is severely constricted at mile 533, limiting the effect of drawdowns upriver of this point. The total aquatic area dewatered with a 1 ft drawdown, 443 acres, are presented in Table 2 and shown in Figure 2. We also estimated that 1070 acres of aquatic areas would be dewatered if a 2 ft drawdown could be achieved. Dewatered acreage estimates for areas that are not considered aquatic could not be obtained because accurate elevation data for terrestrial areas are not available. Thus the total area affected by a 1 ft drawdown at the dam will be greater than 443 acres. □

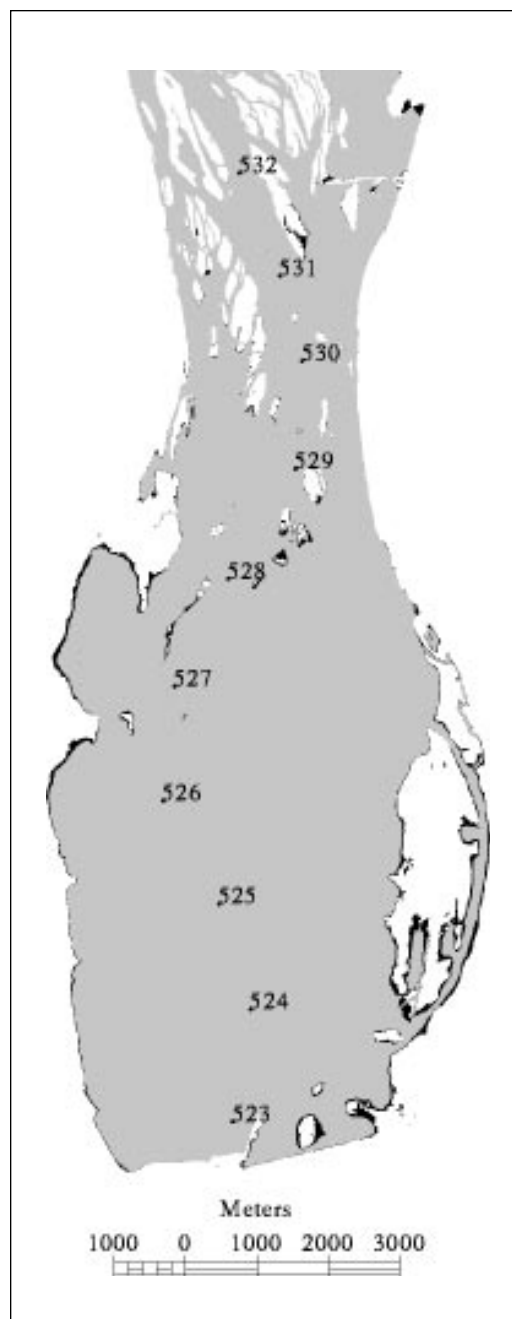
**Table 2. Predicted aquatic areas dewatered (acres) with a 1 ft drawdown at Dam 13.**

River Mile	Dewatered Acres
523	62
524	93
525	45
526	47
527	61
528	30
529	18
530	07
531	16
532	64

**For further information, contact**

Joseph H. Wlosinski or James T. Rogala  
 U.S. Geological Survey  
 Environmental Management Technical Center  
 575 Lester Avenue  
 Onalaska, Wisconsin 54650  
 Phone: 608/783-7550, ext. 56  
 E-Mail: Joe\_Wlosinski@nbs.gov  
 E-Mail: Jim\_Rogala@nbs.gov

Kevin J. Landwehr, ED-HH  
 U.S. Army Corps of Engineers  
 Rock Island District  
 P.O. Box 2004  
 Rock Island, IL 61204-2004  
 Phone: 309/794-5578  
 E-Mail: Kevin.J.Landwehr@usace.army.mil



**Figure 2. Predicted dewatered areas (in black) caused by a 1 ft drawdown at Dam 13 at a discharge rate of 50,000 cfs.**

*Project Status Reports (PSRs) are internal Long Term Resource Monitoring Program documents whose purpose is to provide information on Program activities. Because PSRs are not subject to peer review, they may not be cited. Use of trade names does not imply U.S. Government endorsement of commercial products.*

May 1997

PSR 97-04

**BULK RATE**  
 Postage and Fees Paid  
 U.S. Geological Survey  
 Permit No. G-790

**United States Department of the Interior**  
 U.S. Geological Survey  
 Environmental Management Technical Center  
 575 Lester Avenue  
 Onalaska, WI 54650-8552  
 608/783-7550