

**Upper Mississippi River System
2019 Water Level Management Workshop
Grand River Center - Dubuque, Iowa
May 8-9, 2019**

2019 Water Level Management (WLM) Workshop

Lauren Salvato provided a brief summary of UMRBA's January 30, 2018 UMRS water level management (WLM) workshop. The workshop included presentations on the Pool 8 White Paper, the potential for WLM at Pool 10, facilitated discussions to develop a vision and mission for WLM, and priorities for the WLM Regional Coordinating Committee (RCC) in 2019.

Partner Reports on 2019 Activities

UMRBA – Salvato recapped activities of the WLM RCC since the January 30, 2018 WLM workshop. In September 25, 2018, the Committee met to discuss short- and mid-term planning assistance to the states (PAS) actions for priority areas: Illinois Waterway environmental pool management (EPM), ecological and monitoring objectives, and policy and planning. The September meeting led to the development of the 2019-2020 WLM action plan, which outlined tasks for four workgroups in each of the four priority areas. The ecological goals and monitoring objectives group met in February 15, 2019 to develop a survey of ecological goals and objectives for WLM on the Upper Mississippi River (UMR). The outreach and communications workgroup met in May 2, 2019 to brainstorm stakeholder groups affected by WLM activities.

In response to the September 4, 2018 letter to the Mississippi River Commission (MRC), UMRBA sent a November 16, 2018 letter requesting 1) approval of deviations within the authorized operating band to water control plans for Pools 9, 10, 12, 13, 18 and the entire length of the Illinois Waterway (IWW) and 2) FY 2019 workplan money to develop overarching master water control manuals for the UMR and the IWW to incorporate environmental principles. MRC's January 15, 2019 response stated that deviations requests for individual project water control plans (WCP) should be made through the districts, in accordance with existing authority and policy. On November 20, 2018, ILDNR sent a letter to the Rock Island District requesting EPM during the IWW navigation closures in 2020 and 2023. The Rock Island District's February 19, 2019 response also mentioned updating WCPs on an individual basis. An environmental assessment is required to make WCP updates and there is no current funding source, nor enough time to complete an EA before the IWW closures begin.

St. Louis District Report – Ben McGuire described 2018 the District's EPM activities. The District successfully implemented EPM in 2015-2018. Partners met in October 2018 to discuss annual adaptive management and benefits for fish and vegetation. This work was funded by Sustainable Rivers Program (SRP) and will continue into 2019.

McGuire and Ben Lubinski received funding for a UMRR long term resource monitoring (LTRM) proposal to continue monitoring vegetation in 2019 and 2020 in Pools 24-26, to develop standardized monitoring protocols to measure the use of aquatic vegetation by small bodied and juvenile fishes resulting from EPM, and to assess UMRR LTRM Pool 26 data for pool-wide relationships between EPM and fish abundance.

Finally, Joan Stemler, Chief of Water Control, received the 2018 Sustainability Hero Award for her innovative approach to EPM in the St. Louis District. Stemler has demonstrated outstanding performance and leadership implementing sustainable practices.

Rock Island District – Kevin Landwehr said the FWIC would like to reestablish the WLM subgroup created in the 1990's. The subgroup was formed to work with individuals and organizations regarding WLM.

WLM remains a project feature of the UMRR Lower Pool 13 HREP. MVR staff met with the project development team to share lessons learned from past WLM events. Marshall Plumley added that the Lower Pool 13 HREP kick off meeting is scheduled for mid-May 2019.

Finally, Rock Island District has been in coordination with Joey Wyndham, Mississippi Valley Division (MVD), to discuss authorities to support the types of efforts that Illinois DNR requested.

St. Paul District – Steve Clark reported that the St. Paul District continues to evaluate opportunities for EPM in Pool 10. The District is currently working on an EA and once complete, it will update the WCP and send to MVD for approval.

USFWS – Mary Stefanski provided a brief update of the St. Paul District's WLM Task Force (WLMTF). In June 2018, the Task Force visited Pool 5 and discussed plans to update the factsheet utilizing the HNA II. The Task Force also developed and distributed a survey to marina and business owners to seek input and identify obstacles to future WLM efforts.

There are ongoing discussions of incorporating HNA II to update the Pool 8 White Paper.

Wisconsin DNR – Jim Fischer explained Wisconsin's involvement with the WLM RCC and WLMTF. Over the last year, Wisconsin has had internal meetings to achieve one voice as an agency, and a result staff agree that:

- 1) Opportunistic drawdowns are a good tool to use (within band)
- 2) WLM outside of the band is also useful with caveats in terms of where and when to implement WLM. Minimum threshold criteria for species is suggested and will be discussed later in the workshop.

Minnesota DNR – Megan Moore said MNDNR has been involved on the RCC and WLMTF. The Lake City UMRR LTRM field station is partnering with McGuire and Lubinski on their EPM study in which Pool 4 will serve as a control. Moore initiates regular discussions with DNR staff and managers on WLM activities.

Iowa DNR – Randy Schultz has stayed involved in the WLM RCC and reported that Kyle Bales is involved in the 2020 Illinois Waterway vegetation monitoring.

Illinois DNR – Matt O'Hara mentioned that ILDNR will continue conversations regarding Illinois Waterway navigation closures.

Missouri DoC – Matt Vitello has participated with the RCC and noted that MODoC field staff have observed positive ecological response to WLM while conducting field work.

American Rivers – Eileen Shader recapped the Nicollet Island Coalition letter dated November 14, 2018 to Major General Richard Kaiser regarding creation of a UMR water control manual to support EPM, recommending a NEPA review to complete the action.

The Nature Conservancy – Gretchen Benjamin presented on behalf of the WLMTF on the history of WLM at the March 2019 UMRCC meeting and at the May 2019 TNC Emiquon Preserve meeting. She attended the high-water tour with the MRC and shared concerns with Joey Wyndham about WLM implementation. Wyndham seemed receptive and next steps are for Kirsten Wallace and Benjamin to continue the dialogue. Finally, Benjamin discussed ongoing UMRS WLM efforts with TNC headquarters in Washington D.C. in April 2019.

Ecological Elements

Ecological Goals Survey

Salvato reviewed the ecological goals survey results to provide impetus for the upcoming six ecological elements presentations. The WLM RCC ecological goals workgroup developed the survey. A total of 98 responses were collected by distributing the survey via the UMRCC email listserv.

Question one asked survey respondents to describe their current occupation. Eighty percent of respondents identified as biologists or ecologists. The remainder fell in the following categories: policy coordinator, planner, hydrologist, engineer, student or academia, economist or retired.

Question two asked respondents to choose up to five ecological elements that should be monitored to determine the effects of WLM. The top three selections included aquatic vegetation, freshwater mussels and fishes.

Question three asked respondents to select up to four goals for implementing WLM. In order, the top three selected goals were 1) mimic natural water level variability 2) consolidate sediment and reduce sediment resuspension and 3) increase the extent of aquatic vegetation.

Question four was developed to better understand concerns or constraints related to WLM implementation. Impacts to biota was the most frequently listed concern (52 percent listed fishes and 33 percent listed freshwater mussels). Additional listed concerns were the timing of WLM (22 percent), decision to implement WLM, navigation impacts (22 percent), and recreational impacts and public perception (22 percent).

Question five asked respondents to select the floodplains with which they have familiarity. Most respondents were familiar with the upper impounded reaches but there was good representation from the lower impounded, middle impounded, open river, lower Illinois, Pool 15 and upper Illinois.

Question six requested additional comments or considerations. Twenty-five responses were submitted, and Salvato quoted a few comments:

- “Results will vary in each geomorphic reach. Consider the effects of drawdowns on invasive species recruitment. Can drawdowns be applied as part of integrated pest management for the river (i.e. Swan Lake).”

- “Drought conditions and low water periods on large floodplain rivers are equally as important ecologically as flooding and periods of stable water levels, and need to be restored to sustain the health and resiliency of the UMR.”
- “As a partnership, we should fully develop ecological goals and objectives, with physical, chemical and biotic criteria, independent of a tool. Once this is completed, we can make data informed decisions regarding the needs and potential effectiveness of individual management actions and combinations of management actions. This would result in the most efficient use of limited time and financial resources.”

Focused Presentations

Climate Change

Megan Moore discussed climate change impacts to the UMR utilizing UMRR LTRM data. Documented climate change impacts include shorter winters, warmer temperatures, and higher discharge. Discharge is the master variable and has impacts to algae, zooplankton, aquatic vegetation and fish. LTRM data shows that consecutive years of lower water discharge resulted in an ecological shift in Pool 4 from a turbid, less vegetated condition to a clearer, more vegetated condition with a corresponding response in high quality, native fisheries. Under recent higher discharge conditions, Moore questioned how long the ecosystem can be resilient. Moore put forward that WLM could be utilized to mimic the lower water years needed to maintain ecosystem resilience.

Andy Barnes asked if there are comparisons with other UMRR LTRM trend pools. Moore responded that a similar shift occurred in Pool 8 and 13 but would suggest a research proposal to continue exploration of LTRM data.

Floodplain Forests

Ben Vandermyde highlighted that both natural and anthropogenic drivers influence forested wetland conditions and management actions for natural regeneration and tree planting. Constraints include low light levels in the understory and flooding impacting seedling growth and soil moisture, herbivory, and invasive species. There are concerns for the vitality of mature and aging forests due to overstocking. When individual tree growth is reduced, the result is an overall reduction in stand health and resilience. Inadequate tree reduction allows for non-forested cover to crowd the forest floor and block saplings from maturing.

Tools available to manage forests include LiDAR datasets, USDA forest management guide, and forest successional models. These resources are used to inform data driven decisions, evaluate the landscape and drivers of forest conditions, and make recommendations for silvicultural prescriptions to target a specified forest condition.

Moore asked if there is a sense of timing of what trees need and where. Vandermyde said there are seasonal triggers — e.g., ice damage from winter, when trees leaf out, water levels for seedlings and saplings. Vandermyde concluded that timing is critical and offered to develop an explanation of the various components and considerations.

Benjamin inquired if proactive measures to plant trees on higher ground are occurring to prevent the collapse of stands. Vandermyde said he has observed the collapse of large tracks of trees or piece meal degradation within a canopy system when invasives overrun the area and when additive effects of non-regular season changes (e.g., flooding) occur. Higher water levels are one component of tree stand

decline and Vandermyde cautioned against only planting trees on higher ground. During normal discharge years, tree roots may not be able to reach the water table.

TSS, Aquatic Vegetation, and Common Carp

Deanne Drake provided initial suggestions for threshold ecological criteria for evaluating when and where to implement WLM as developed by WIDNR staff. The impetus for ecological criteria development is to justify the “appropriate circumstances” for WLM and to avoid incurring costs where the ecosystem is good or unlikely to improve. Drake emphasized that the ecological criteria as provided below are independent and directly linked to WLM:

- SAV: 55 percent frequency of occurrence over the course of two years
- TSS (water clarity): median TSS equals 21 mg/L for three consecutive years
- Common carp abundance: 8,000 mass per unit effort
- Freshwater mussels: 1) a limit of two times the natural mortality rate in the year of WLM and 2) to exclude WLM if more than 25 percent of the pool’s total mussel population is found in the shallow area that will be exposed
- Areas of sediment exposure or improved light conditions

Benjamin suggested further discussion, noting that sediment and substrate type criteria would eliminate Pools 3, 5, 6, and 18 from WLM consideration. Moore expressed appreciation for WIDNR’s effort to develop and initiate the objective criteria conversation. She cautioned against setting criteria are too low that the trigger for action is too late and there becomes a risk of losing the ecosystem. Drake replied that there is more information to gather to assess Moore’s question.

Dan Dieterman voiced his concern that the emphasis is on acknowledging that stable water levels are the preferred option. From the ecological standpoint, he suggested that the goal be to mimic water level variation and to evaluate objectives and criteria after that. Drake responded that the costs should influence WLM action in a modified system. Andrew Stephenson asked if the RCC considered using habitat units to quantify improvements in WLM action and as a tool for decision making. He added that it may be beneficial to use Corps guidelines for measuring the benefits of HREPs. Drake replied that she has looked at habitat units that show increased emergent vegetation and moist soil units and no change in fish or nitrogen cycling.

Fishes

Kjetil Henderson discussed fisheries considerations for the timing of WLM events including during migration, spawning and rearing periods, and possible fish population changes. Fish population changes are species- and life-stage specific and habitat changes may influence fish abundance and growth rates. There are many sampling considerations to measure the changes in fish population, but one resource is the EPM protocol currently in development by Lubinski and coauthors.

Brian Johnson said that MVS’ philosophy is to do no known harm, and the District works with MODoC on the timing of EPM — i.e., water levels are not lowered when fish are spawning. Salvato asked if there are data on grass carp benefiting from increased aquatic vegetation. Henderson said that WLM provides structure, but does not believe increased vegetation is a driver of grass carp population. Instead, it is important to focus on larger ecosystem benefits. O’Hara posed that WLM could inadvertently promote

spawning for invasive species, or on the other hand, discourage spawning for native species. Henderson noted that it is an important consideration, citing recent increases in invasive species correlated with increased discharge. Johnson added that there is limited influence to affect flows pool to pool under increased discharge.

Birds

Eileen Kirsch discussed the WLM considerations for major groups of birds (i.e., waterfowl, shorebirds, marsh birds and tree nesting birds), including typical abundance on the UMR, use of created or enhanced habitat and food resources, and the timing of resources with bird abundance. Kirsch noted observed and possible WLM effects include:

- One year
 - Flood moist soil annuals for dabblers
 - Exposed sand and mud for shorebirds if timed well
 - Shallow water for heron and egret foraging
- Consecutive years
 - Perennial marsh plants, tuber production for divers and swans
 - Potential increases in emergent wetlands to host marsh birds during breeding and migration season
- Long term
 - Enhance forest health and diversity, mast tree survival and regeneration, maple seeding and sapling survival

Luis Ramirez asked if the increased flooding should prompt the opening of floodplains on tributaries or by wetland creation. Kirsch noted that tributaries may be very flashy and that it would be challenging to scale up what the UMR offers in terms of habitat. She offered that changes in the management of the UMR are needed.

Freshwater Mussels

Teresa Newton provided an overview of mussel surveys and population estimates to date in the UMR. Pools 3, 5, 6, and 18 are complete, and Newton overviewed plans to survey Pools 8 and 13 during summer 2019. A study conducted in 2009-2010 was designed to understand the movement of two common species, *A. plicata* and *L. cardium*. Researchers found that survival and movement are a function of slope and substrate stability. While drawdowns can influence mortality in the short term, a more stable substrate that WLM provides may benefit mussel assemblages in the long term.

Brenda Kelly suggested tapping into the UMRCC to collect mussel population data on other pools. Marshall Plumley asked about the available data for Pool 13 to inform the Lower Pool 13 HREP. Newton estimated that the data will be available at the end of 2019. Johnson wondered whether the mussel data on Pool 18 was published in advance of the proposed drawdown. Newton completed the survey one year

prior and acknowledged that one of many factors that cancelled the drawdown was the presence of state listed species.

In response to a question from Kelly, Newton said there are a variety of mortality causes, including invasive species and contaminants. Not enough is known on baseline mortality rates to compare to WLM compensatory mortality. Chuck Theiling suggested looking at other streams to estimate natural mortality. Newton noted it is complicated because some species can move in response to drawdown but other species have not been studied. If WLM does cause additional mortality, it is likely in the shallower areas. Dense mussel populations may be able to sustain a drawdown but more research is needed.

Kirk Hansen asked if fluctuating water levels are causing natural mortality. Newton said mussels move to shallow water to breed and feed. How and when those dynamics change is still relatively unknown. Sara Schmuecker asked if there has been research on impacts to mussels from the rate of drawdown. Newton has not yet conducted experiments, but believes rate and slope information would be very informative. In response to Jodi Creswell's question about future plans to study other mussel species with PIT tags, Newton replied that the experiment is costly and does not have plans for future studies at this time.

Small Group Exercise

Meeting participants were divided into five groups and each were assigned an ecological element: freshwater mussels, fishes, floodplain forests, aquatic vegetation, or birds. Small groups were tasked with brainstorming an ecological goals statement and thinking about the statement in terms of what makes a drawdown successful for their particular ecological element.

Freshwater mussels - Implement WLM in a way that minimizes negative impacts while optimizing long-term benefits, to native freshwater mussels.

Newton added that her group discussed the long-term benefit of increased habitat quantity and quality to improve species abundance and diversity. More research is needed to understand desired future conditions. Long-term benefits may outweigh short-term impacts — e.g., zebra mussels may not survive drawdowns.

Fishes - Opportunistic drawdowns to improve fish habitat in the lower third of pools.

Henderson added that fish habitat improvements can be evaluated through vegetation and fish community changes, and the ideal WLM timeframe for fish is June to September depending on the species.

Floodplain Forests - WLM implemented on regular intervals (decadal) to reintroduce natural patterns of wet/dry cycles that provide optimal conditions for species (forestry) to thrive and adjust to climate change

Vandermyde noted that the ideal WLM timing for forests is between March and November.

Aquatic Vegetation - Improve conditions for the growth of aquatic vegetation with emphasis on perennial emergent (≥ 50 percent) or moist soils species.

Birds - Use WLM to promote habitat variability for multiple bird species.

Kirsch explained her group's discussion to develop the statement on birds. An immediate response to WLM action will be evident in waterfowl and shorebirds, and in the longer-term floodplain forests. She emphasized that natural water level variability is important and should not be the same year to year. And,

birds should not be monitored to determine the effects of WLM because many factors can affect bird populations.

Given the similarities among ecological components, meeting participants agreed that one ecological goals statement for WLM is appropriate and to develop objectives specific to each component considering reach and pool level characteristics.

NESP 53 Report Updates

Clark reviewed the purpose and goals of the Navigation and Ecosystem Sustainability Program (NESP) Environmental Report 53 (Report 53) written in 2004. The portions of the report on benefits and costs of drawdowns in the MVP and MVR are under consideration to update. Clark would like feedback on which sections are the highest priority. Section E1 includes dredging required, dredging costs, and costs per acre. A costly way to update dredging required is to calculate dredge cuts based on channel condition and recent surveys. The less expensive option is to make calculations based on assumptions, deriving ratios based on the advanced dredging to routine annual dredging.

Clark provided an overview of section E2, the success rate determined in Report 53, and the proposed additional categories: successful = 60+days, partially successful = 30-60 days, and unsuccessful = <30 days. Participants acknowledged that a 30-day drawdown can derive ecological benefits and implementing a 90-day drawdown would be even more beneficial. Ultimately the group agreed for simplicity on the measure of success as a 60-day continuous drawdown.

For section E3 acres exposed, the Report 53 published results using water surface profiles created from one dimensional steady flow models and GIS bathymetric data. Clark observed that the same general process would be used for the update. Results from calculating the water surface grid are not expected to be different from 2004. There may be additional datasets to update the topobathy data. Plumley asked if dredging costs consider the use of facilities and if there is enough space for additional dredge material at management sites. Clark replied no and recited MVP's challenges with finding disposal sites. He added that it is an important consideration but not insurmountable.

The new components to add to the Report 53 are section ecosystem benefits scoping (section N1) and authorities and policy (section N2). Section N1 assesses average annual habitat units to allow for a cost/benefit comparison to UMRR projects. Theiling added that O&M does not need to account for environmental benefits, which may improve the benefit cost ratio.

Section N2 includes looking into implementation authorities, water control plans, non-federal sponsor potential, channel maintenance cost-sharing and accounting, and long-term management costs.

Vitello asked participants if all pools should be considered in the report update. Participants agreed to consider all pools and use the success rate to screen options. There was discussion on whether to include 3- and 4-foot drawdowns for reasons of realistic opportunities to implement at those depths, impediments from the public and recreational users, and for the cost to update the Report 53. Additional suggestions were to include 6- and 18-inch depths and a line for the bottom of the operating band.

Small Group Exercise

Small groups were tasked with prioritizing Report 53 sections first without considering costs and a second time considering costs. The results were influenced by underlying assumptions made among groups.

Group 1

Without Cost	With Cost
1) Acres exposed	1) Acres exposed
2) Ecosystem benefits scoping	2) Success rate
3) Success rate	3) Dredging required, costs, and cost/acre
4) Dredging required, costs, and cost/acre	4) Ecosystems benefit scoping
5) Authorities and policy	5) Authorities and policy

Group 2

Without Cost	With Cost
1) Acres exposed	1) Acres exposed
2) Success rate	2) Success rate
3) Ecosystem benefits scoping	3) Dredging required, costs, and cost/acre
4) Dredging required, costs, and cost/acre	4) Ecosystem benefits scoping
5) Authorities and policy	5) Authorities and policy

Group 3

1) Success rate
2) Acres exposed
3) Ecosystem benefits scoping
4) Dredging required, costs, and cost/acre
5) Authorities and policy

Group 4

1) Success rate
2) Dredging required, costs, and cost/acre
3) Acres exposed, Ecosystem benefits scoping, and Authorities and policy

Group 5

1) Ecosystem benefits scoping
2) Success rate
3) Authorities and policy
4) Dredging required, costs, and cost/acre
5) Acres exposed

Participant observations were as follows:

- Authorities and policy was consistently ranked the lowest
- Non-federal sponsors can work on the ecosystem benefits scoping and authorities and policy sections

UMRBA will convene the RCC to develop a sequence of work to update Report 53, using these results to inform its evaluation.

Attendance List

Matt O'Hara	Illinois Department of Natural Resources
Kyle Bales	Iowa Department of Natural Resources
Kirk Hansen	Iowa Department of Natural Resources
Randy Schultz	Iowa Department of Natural Resources
Dan Dieterman	Minnesota Department of Natural Resources
Megan Moore	Minnesota Department of Natural Resources
Matt Vitello	Missouri Department of Conservation
Deanne Drake	Wisconsin Department of Natural Resources
Jim Fischer	Wisconsin Department of Natural Resources
Brenda Kelly	Wisconsin Department of Natural Resources
Madeline Magee	Wisconsin Department of Natural Resources
Matt Afflerbaugh	U.S. Army Corps of Engineers
Andy Barnes	U.S. Army Corps of Engineers
Steve Clark	U.S. Army Corps of Engineers
Jodi Creswell	U.S. Army Corps of Engineers
Kjetil Henderson	U.S. Army Corps of Engineers
Brian Johnson	U.S. Army Corps of Engineers
Dillan Laaker	U.S. Army Corps of Engineers
Kevin Landwehr	U.S. Army Corps of Engineers
Patrick Loch*	U.S. Army Corps of Engineers
Aaron McFarlane*	U.S. Army Corps of Engineers
Ben McGuire	U.S. Army Corps of Engineers
Marshall Plumley	U.S. Army Corps of Engineers
Dave Reynolds	U.S. Army Corps of Engineers
Chuck Theiling	U.S. Army Corps of Engineers
Ben Vandermyde	U.S. Army Corps of Engineers
Kim Warshaw*	U.S. Army Corps of Engineers
Neal Jackson	U.S. Fish and Wildlife Service
Sara Schmuecker	U.S. Fish and Wildlife Service
Mary Stefanski	U.S. Fish and Wildlife Service
Tim Yager	U.S. Fish and Wildlife Service
Jeff Houser	U.S. Geological Survey
Eileen Kirsch	U.S. Geological Survey
Teresa Newton	U.S. Geological Survey
Marty Adkins*	USDA-NRCS
Eileen Shader	American Rivers
Luis Ramirez	Audubon
Gretchen Benjamin	The Nature Conservancy
Kirsten Wallace	Upper Mississippi River Basin Association
Lauren Salvato	Upper Mississippi River Basin Association
Andrew Stephenson	Upper Mississippi River Basin Association

*Remote participant