

Addressing Nutrient-Related Water Quality Impacts on the Upper Mississippi River

Clean Water Act Approaches, Conservation Efforts,
and Collaboration Opportunities

Report on
Cross-Programmatic
Workshops



September 2011
Upper Mississippi River Basin Association

*Addressing Nutrient-Related Water Quality
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Cross-Programmatic Workshops**

September 2011

Upper Mississippi River Basin Association



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I. Executive Summary

In August and September 2011, the Upper Mississippi River Basin Association (UMRBA) hosted two workshops to examine issues regarding nutrients and water quality on the Upper Mississippi River (UMR). The workshops were designed to provide a unique contribution to regional nutrient conversations by focusing on the water quality issues most pertinent to the mainstem UMR and by bringing together policy makers and practitioners from Clean Water Act (CWA) and agricultural conservation programs. These workshops were one component of a UMRBA water quality project funded by the UMR states (Illinois, Iowa, Minnesota, Missouri, and Wisconsin) under CWA Section 604(b), using appropriations from the American Recovery and Reinvestment Act of 2009.

Workshops were held in La Crosse, Wisconsin on August 24, 2011 and in Hannibal, Missouri on September 7, 2011, with a total of 63 individuals attending. Participants represented a wide variety of agencies and organizations with roles related to nutrients, agricultural conservation, and/or water quality issues in the UMR basin. Presentations regarding water quality and agricultural conservation programs were combined with structured discussion time.

While the workshops were not designed to develop a consensus among participants, a number of common themes emerged from the discussions. The themes included the following:

- 1) **The general outlines of problems and solutions is clear, but there is less certainty regarding some of the specifics.** In general, the important sources of nitrogen and phosphorus in the UMR mainstem and basin are known, as are their major impacts. However, identifying particular parcels of land and facilities contributing the most to elevated nutrient levels is more challenging. Also, adverse impacts from nutrients on the UMR and in the basin have not been extensively or consistently tracked. Moreover, a given concentration of nitrogen or phosphorus can express itself differently in terms of impacts, depending on a variety of factors. Additionally, while we have gained important insights regarding agricultural best management practices, the success and cost effectiveness of these practices for an individual operation can be variable.
- 2) **Numerous factors make nutrient reduction efforts particularly challenging for the UMR and its basin.** These factors include the distance between nutrient sources and impacts, lag time in environmental response, the physical and institutional complexity of this highly altered system, and the scale of reductions needed and potential economic impacts.
- 3) **Engaging the public at large and specific stakeholder groups is essential for success.** This includes not only information sharing with these parties, but also a role in program and policy choices, hands-on activities such as water quality monitoring, and potentially carrying forward messages on behalf of the UMR. Statewide nutrient reduction strategy development offers a near-term opportunity for such engagement.
- 4) **Monitoring and data are critical components of successful nutrient reduction programs.** Developing effective and appropriate nutrient control efforts is data intensive, as is demonstrating results. Coordinating data collection and streamlining data sharing can enhance efficiency and effectiveness.
- 5) **The Mississippi River Healthy Watersheds Initiative (MRBI) has met with considerable initial success and should be built upon.** While there are certainly many successful approaches to conservation practices in the basin, MRBI incorporates several new components and represents an effective approach to addressing nutrients basinwide. As such, it should be supported and built upon.

- 6) **There is a need to identify a “voice” or “message” for the UMR in general, as well as regarding nutrients specifically, that can inform and influence policy and budget decisions at the national level.** A unified message is needed to direct attention and resources to the UMR and may most effectively be carried forward by UMR stakeholder groups, rather than by agencies.
- 7) **Partnerships will be critical for success.** To make the best use of available resources and to cultivate participation across multiple sectors, collaborative efforts involving government agencies, industry groups, NGOs, and individual producers/facilities will continue to be important in reducing UMR nutrient levels.
- 8) **Continuing the conversation is important.** Participants expressed an interest in continuing the conversations from these workshops. Whether this occurs in a UMRBA-facilitated venue or a different setting, the important element is that the conversation regarding this complex and challenging issue is continued across programs and perspectives.

These workshops were intended to support and work with other ongoing efforts and help identify new opportunities for collaboration and progress. While they were not scoped to identify any specific next steps, UMRBA and its water quality work groups will continue to provide a place for dialogue and planning related to UMR nutrients and water quality.

II. Introduction: Nutrients on the Upper Mississippi River

Effects of Elevated Nutrients

Phosphorus and nitrogen, collectively referred to as nutrients, have become an increasingly important water quality issue in the Upper Mississippi River Basin (UMRB). These nutrients are critical inputs for a wide range of activities and are inevitable outputs from others. Nutrients are also absolutely necessary for aquatic life. However, at concentrations significantly above natural background, they can adversely affect human and aquatic life uses of the River. As such, they are often cited as a leading water quality concern for the UMR.

Mississippi River nutrient concerns are often expressed in terms of nutrients' impact on Gulf of Mexico hypoxia. However, nutrients can also result in adverse impacts more locally, including on the mainstem UMR itself. Impacts include excessive algae blooms, particularly in slower-flowing, off-channel areas of the UMR. These can adversely affect aquatic life and are a deterrent to recreational uses. Additionally, excessive nutrients can create problems for drinking water suppliers along the UMR.

Challenges in Addressing Nutrients on the UMR

While nutrient impacts are a national water quality issue, the characteristics of the UMR present some special challenges in addressing nutrients. These include:

- 1) **The scale of the resource.** The UMR mainstem runs approximately 1,300 miles through five states and the UMRB drains nearly 200,000 square miles, covering large portions of five states and small portions of three others. The basin encompasses much of the productive agricultural land of the Midwest, with over 60 percent of the basin in cropland or pasture.
- 2) **Diffuse sources of nutrients.** Nonpoint and point sources contribute nutrients both indirectly through tributaries and directly to the UMR mainstem. These nutrient sources are scattered throughout the basin and include croplands, livestock operations, wastewater treatment plants, industrial facilities, and urban stormwater runoff.
- 3) **Distance between source and impacts.** Due to nutrient transport through tributaries and along the mainstem, the deleterious effects of nutrients often occur many miles away from nutrient sources.
- 4) **Differential responses to nutrients.** Responses to nutrients vary throughout the basin depending on the characteristics of the receiving water, including its depth, flow, water clarity and temperature. This is true both among different waterbodies in the basin and within the mainstem UMR itself. Also, productivity is limited by different nutrients (i.e., phosphorus v. nitrogen) on different portions of the UMR mainstem and under different conditions.
- 5) **Interjurisdictional nature of the resource.** The UMR and its basin cut across multiple federal, state, and local jurisdictions. For example, the Clean Water Act (CWA) is implemented on the UMR by five state agencies and two US EPA regions.

These factors, among others, make addressing excessive nutrients on the UMR a complex and challenging task.

Ongoing Efforts to Address Nutrients and Water Quality on the UMR

The UMR states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin all have programs in place to address nutrients and water quality. These include Clean Water Act (CWA) programs, which are responsible for water quality protection on the UMR and throughout the basin. Agricultural

conservation programs administered at the federal, state, and local level are also in place across the basin. These programs seek to both support farmers in implementing improved practices and protect natural resources including water quality.

States are also currently working on statewide nutrient reduction strategies in response to the Gulf Hypoxia Action Plan (Action Plan). The Action Plan, most recently updated in 2008, is a product of the ongoing work of the Mississippi River Gulf of Mexico Watershed Nutrient Task Force (Hypoxia Task Force), a joint federal-state initiative to address hypoxia in the Gulf of Mexico. The efforts of the Hypoxia Task Force have also led to the creation of sub-basin committees, including the Upper Mississippi River Sub-basin Hypoxia Nutrient Committee (UMRSHNC).

Moreover, beyond the work described above, measures to reduce nutrient loss to surface waters are being implemented across the basin by individual agricultural producers, wastewater treatment plants, and others. Industry groups, non-governmental organizations, and many other entities also play a role in efforts to address nutrients in the UMRB.

Role of These Workshops

Two Upper Mississippi River Basin Association (UMRBA) work groups, the Water Quality Executive Committee (WQEC) and Water Quality Task Force (WQTF), work to coordinate CWA programs among the UMR states and US Environmental Protection Agency (US EPA) Regions. The nutrient-focused, cross-programmatic workshops discussed in this report are part of a project supported by these work groups to facilitate CWA implementation on the UMR, both to achieve greater interstate consistency and to enhance water quality protection.

These workshops were designed to provide a unique contribution to regional nutrient conversations by focusing on the water quality issues most pertinent to the mainstem UMR and by bringing together policy makers and practitioners from CWA and agricultural conservation programs. As such, these workshops were intended to support and work with other ongoing efforts and help identify new opportunities for collaboration and progress.

III. Workshops Overview

Purpose

The purpose of these workshops was to provide a unique contribution to regional nutrient conversations by:

- 1) focusing discussion on issues pertinent to nutrients and water quality on the Upper Mississippi River (UMR);
- 2) bringing together participants with an interest in the UMR from across states, agencies, programs, and constituencies;
- 3) sharing current information and perspectives about ongoing efforts to address nutrients on the UMR; and
- 4) identifying opportunities for Clean Water Act program success and cross-program collaboration on the UMR.

Structure and Process

The two workshop locations were selected to facilitate attendance and allow for greater focus on regional issues. The northern workshop focused on Iowa, Minnesota, and Wisconsin and was held August 24, 2011 in La Crosse, Wisconsin. The southern workshop, focused on Illinois and Missouri, was held September 7, 2011 in Hannibal, Missouri. The agenda for each workshop was similar, though specific presentations varied to reflect regional representation and issues. See Appendix A for workshop agendas.

Participants

A total of 63 individuals participated in the two workshops, including 18 invited guest speakers. Participants included representatives from state and federal CWA programs, state and federal agricultural conservation programs, state and federal natural resource agencies, agriculture industry groups, environmental and conservation non-governmental organizations (NGOs), water supply operators, and river scientists. See Appendix B for a complete list of participants.

Workshop Presentations/Panels

Presentations were similar in content at each workshop, though the speakers varied in order to engage those closest to the issues and address region-specific issues. ***All of the workshop presentations are included in the compact disc attached to this report.*** A brief description of the presentations follows:

Morning Presentations and Panels

Upper Mississippi River Nutrient Occurrence and Local Water Quality Impacts

At both workshops, UMRBA's Dave Hokanson briefly summarized the September 2011 report *Upper Mississippi River Nutrient Monitoring, Occurrence, and Local Impacts: A Clean Water Act Perspective*. This presentation was intended to provide background and context for the remainder of the day's presentations and discussions.

Clean Water Act Overview

State members of the UMRBA Water Quality Task Force presented an overview of the Clean Water Act (CWA) at each workshop. These presentations focused on aspects of the CWA most relevant to nutrients – i.e., water quality standards, monitoring, and permits. At the La Crosse workshop, this

presentation was given by Shannon Lotthammer of the Minnesota Pollution Control Agency. In Hannibal, Gregg Good of the Illinois Environmental Protection Agency gave this presentation.

Water Quality Standards Panel: Current State and Federal Activities to Address Nutrients

This panel included both state and federal representatives discussing current efforts to address nutrients through CWA water quality standards. These presentations touched on science and research, as well as policy components. At the La Crosse workshop, presentations were given by Steve Heiskary (Minnesota Pollution Control Agency), Jim Baumann (Wisconsin Department of Natural Resources), John Olson (Iowa Department of Natural Resources), and Brian Thompson (US EPA Region 5). In Hannibal, presentations were given by Bob Mosher (Illinois Environmental Protection Agency), Mark Osborn (Missouri Department of Natural Resources), Jim Baumann (Wisconsin Department of Natural Resources) and Gary Welker (US EPA Region 7). These presentations highlighted the similarities and differences among the states both in terms of their approaches and the status of their efforts.

Afternoon Presentations and Panels

Statewide Nutrient Reduction Strategies Panel

This panel addressed ongoing state efforts to develop statewide nutrient reduction strategies in keeping with the Gulf Hypoxia Action Plan, as well as the states' nutrient- and conservation-focused programs more generally. Presenters in La Crosse were Tom Davenport (US EPA Region 5), Wayne Anderson (Minnesota Pollution Control Agency), Jim Baumann (Wisconsin Department of Natural Resources), and Jim VandenBrook (Wisconsin Department of Agriculture, Trade, and Consumer Protection). Hannibal presenters were Tom Davenport (US EPA Region 5), Marcia Willhite (Illinois Environmental Protection Agency), and Bryan Hopkins (Missouri Department of Natural Resources).

Voluntary and Incentive-Based Nonpoint Source Controls Panel

The workshop's final panel focused on voluntary and incentive-based nonpoint source pollution controls for the agricultural sector. This included presentations from both USDA Natural Resource Conservation Service (NRCS) staff emphasizing the Mississippi River Basin Healthy Watersheds Initiative (MRBI) and representatives of agricultural industry groups describing collaborative conservation efforts in which they are engaged. Steve Bertjens (USDA NRCS) and Roger Wolf (Iowa Soybean Association) gave these presentations at the La Crosse workshop. Karen Brinkman (USDA NRCS) and Jean Payne (Illinois Fertilizer and Chemical Association) presented in Hannibal.

Note: Question and answer periods were held at the end of the morning and afternoon presentation segments. A summary of these discussions is provided in the "Themes Emerging from Workshops" section of this report.

Small Group Discussions

Following the presentations and panel discussions, workshop participants broke into small groups (three groups at each workshop). These small groups addressed the following questions:

- 1) What are the most important knowns and unknowns about nutrients on the UMR?
- 2) What are the special considerations in addressing nutrients on the UMR? How should we respond to these river-specific challenges?
- 3) What are our successes and where are we falling short in addressing the problem through Clean Water Act and agricultural conservation programs?
- 4) Looking ahead, what are the most promising opportunities to enhance collaborative nutrient reduction efforts on the UMR?

Report-outs from each group followed the small group discussion. The outcomes of these discussions are one of the primary outputs of these workshops and are captured in detail in the “Themes Emerging from Workshops” section of this report.

Comments and Suggestions Received

While formal workshop evaluations were not completed, a request was made at the conclusion of the first workshop for suggestions that might improve the second workshop. Comments and suggestions received in response to this request not only provided insight regarding the second workshop, but also pointed to potential future activities and topics to be addressed. As such, these comments and suggestions are also summarized in the “Themes Emerging from Workshops” section of this report.

IV. Themes Emerging from Workshops

The workshops included several opportunities for participants to share their thoughts and reactions, including question and answer sessions, small group discussions, and comments received following the first workshop. A number of themes emerged from these input opportunities and are summarized below. While the themes expressed in the northern and southern workshops varied somewhat, there was considerable overlap and no fundamental differences. Therefore, no distinctions between workshops are made in the summaries below.

Note: The themes presented reflect a distillation and organization by UMRBA staff of the ideas expressed by workshop participants. The order of presentation of ideas is not intended to reflect relative priority, nor are the comments of participants reported verbatim.

Presenter Questions and Answers

The following ideas were expressed in questions asked of presenters and in their responses, both during the workshop presentations themselves and in question and answer sessions that followed presentations.

- 1) Morning Presentations and Panels: Upper Mississippi River Nutrient Occurrence and Impacts; Clean Water Act Overview; Water Quality Standards Panel
 - a) **Public/stakeholder engagement and support.** The importance of public engagement and support for action regarding nutrients was highlighted in a number of questions and responses. Tourism and recreation industries were noted as being particularly important in this context. Participants also emphasized opportunities to engage the public directly, including via monitoring efforts, and identified monitoring results as a means to demonstrate success to stakeholders and the public at large.
 - b) **Monitoring and data.** In response to questions, speakers emphasized the importance of having sufficient data to support regulatory decisions. They noted that this may require the accumulation of long term data sets that can serve multiple purposes, including diagnosing relationships between nutrients and response, tracking long term trends, and making CWA 303(d) impairment decisions.
 - c) **Different expectations and approaches among states.** Numerous questions focused on why states are taking different approaches to nutrients under the CWA, why some have or are in the process of establishing numeric nutrient criteria while others are not, and why some states have been able to identify meaningful relationships between nutrient levels and response, while others have not.

Presenters noted that differences in the landscapes and the landforms among UMR states may contribute to different expectations. For example, landscape differences between ecoregions such as northern forests (e.g., in Minnesota and Wisconsin) and corn belt plains (e.g., in Illinois and Iowa) can lead to different expectations for nutrient concentrations in these areas. Also, presenters noted that a state needs to have a range of conditions in its waters to apply the statistical techniques that can diagnose differences and relationships. As such, states with less diversity in their water quality conditions may face more difficulty in identifying relationships. The desirability of locally applicable standards vs. the extensive data requirements for developing such tailored approaches was also discussed.

Additionally, it was observed that the states may simply be at different points in the process of developing approaches to nutrients, even if they are following similar paths, and that CWA water quality standards are only one part of states' efforts to address nutrients. While stressing that the states need not take identical approaches, speakers underscored the value of communication and some level of consistency among that states.

- d) **Phosphorus v. nitrogen.** Participants asked why states seem to have made relatively more progress in identifying eutrophication-related limits for phosphorus than for nitrogen. Presenters indicated that relationships and thresholds for phosphorus have been more apparent in their data analyses, while these relationships have been more difficult to identify for nitrogen.
- 2) Afternoon Presentations and Panels: Statewide Nutrient Reduction Strategies and Voluntary/Incentive-Based Nonpoint Source Controls
- a) **Public/stakeholder engagement and support.** As in the morning sessions, the importance of public/stakeholder engagement and support was highlighted in the afternoon question and answer sessions. In this context, stakeholder engagement in statewide nutrient reduction strategy development was emphasized, with a particular focus on the need to consider agricultural producers' perspectives. Participants also stressed the need to communicate the complexity of nutrient issues effectively, so that the public understands the challenges of addressing nutrients.
- b) **Monitoring and data.** The role of monitoring and data was also emphasized in the afternoon question and answer session, with both questioners and speakers describing monitoring as critical in demonstrating the outcomes of conservation efforts and communicating quantifiable progress to various stakeholder groups. Participants noted that privacy-related limits on the release of specific information regarding conservation practices makes tracking and measuring success more difficult.
- c) **Targeting.** In response to questions, presenters noted that targeting agricultural conservation efforts to watersheds and producers that contribute the most to nutrient loading continues to be critical to success.
- d) **Mississippi River Basin Healthy Watersheds Initiative (MRBI).** MRBI was highlighted by a number of questioners and presenters as an important step forward in addressing nutrients in the UMRB. Participants viewed MRBI as a meaningful shift by NRCS toward water quality outcomes, targeting of conservation practices, and regionally-focused initiatives. Monitoring was highlighted again in the specific context of MRBI, as being both a challenge and a means by which to demonstrate program success.
- e) **Drainage water management.** Both questioners and presenters highlighted the increasing importance of drainage water management in addressing nutrient issues, particularly nitrogen loss, on the UMR and in the basin. NRCS' Drainage Water Management Initiative was identified as one effort to address this issue, along with various demonstration projects.
- f) **Partnerships and leadership.** The importance of industry leadership, such as that exhibited by the Iowa Soybean Association, was highlighted in comments and questions. The important role of NGOs in facilitating partnerships was noted. Also discussed was the challenge of organizing across multiple agencies and jurisdictions while being able to clearly communicate to the public and producers about programs and opportunities available.

Small Group Discussions

The small groups at each workshop addressed a set of four questions related to nutrients and water quality on the UMR. The groups' responses to these questions are summarized below:

- 1) What are the most important knowns and unknowns about nutrients on the UMR?
- a) **Knowns**
- i) Generally, the sources of nutrients are known, both in terms of the relative contributions of point and nonpoint sources, as well as the land uses and watersheds that contribute most to nutrient loading in the UMRB.

- ii) In general, we know which agricultural best management practices have been most effective in the basin and what additional agricultural conservation work would be most helpful in further reducing phosphorus and nitrate loading.
- iii) Both phosphorus and nitrogen play roles in eutrophication on the UMR.
- iv) Much of the work to address nutrient concentrations in the mainstem will need to focus on tributaries and land in key parts of the basin.
- v) Some watersheds contribute significantly more than others to UMR nutrient loading.

b) Unknowns

- i) Specifically, the contributions of nutrients from individual point and non-point sources in individual watersheds are often not known.
- ii) We often know less about which agricultural best management practices work best for individual producers to limit loss of nutrients, how cost-effective these are on a site-specific basis, and whether these practices can be maintained over time. In particular, it is not yet clear how to best address tile drainage issues.
- iii) The specific relationships between nutrient levels and adverse impacts on the UMR, particularly in regard to biota, are not fully understood.
- iv) Lag times involved between the implementation of reduction of efforts and water quality improvements are not well established.
- v) The institutional structures and policy provisions (including the optimal mix of voluntary and mandatory approaches) that will support successful nutrient reduction efforts have not been thoroughly examined.

2) What are the special considerations in addressing nutrients on the UMR? How should we respond to these river-specific challenges?

- a) **Scale of the resource.** A recurrent theme in the small group discussions was the challenge of dealing with the UMR's scale. Specific challenges related to scale (and responses to these challenges, where identified) were as follows:
 - i) **Distance between nutrient sources and impacts.** This challenge was discussed not only in the context of Gulf Hypoxia, where impacts from nutrient enrichment occur far from the sources, but also in regard to tributaries vs. the mainstem, and upstream vs. downstream on the mainstem. In all these contexts, participants described how it can be difficult to motivate action when nutrient sources are far removed from resulting nutrient-related problems.
 - ii) **Scale of reduction required.** The scale and scope of nutrient reductions sought (e.g., as laid out in the Hypoxia Action Plan) were discussed. Specifically, the challenges of not only reducing inputs by large percentages but also working with the number of individual point and nonpoint sources that would be impacted were noted. The economic impacts of such large scale efforts were also discussed. Targeting was suggested as one means of effectively pursuing reductions in the most critical watersheds and from the most critical facilities. Participants identified MRBI as a strong example of targeting at the basin scale.
 - iii) **Lag time in response.** A challenge related to the previous two points is that, even if substantial reductions in nutrient loss to surface waters in the basin are achieved, benefits will not only be separated spatially (as noted above), but also temporally as there is likely to be a long lag time before water quality and biological improvements are

observed. This lag effect is due to both the time needed for a system to recover and because of the retention of residual amounts of nutrients in soils and sediments that will continue to be released even if new nutrient inputs are reduced or eliminated. While this lag time phenomenon is not unique to the UMR, it is likely to be even more pronounced in such a large system.

- iv) **Institutional complexity.** Due to the scale of the resource, multiple agencies and jurisdictions are involved in nutrient reduction efforts. This can lead to fragmentation and inconsistencies among programs, and can impede communication with the public and stakeholders.
 - b) **Hydrologic modifications.** Participants also discussed how hydrologic modifications on both the mainstem and throughout the basin have an impact on nutrient loading, cycling, and effects. On the mainstem, the creation of lake-like pools (and hence lake-like nutrient behavior) due to locks and dams was highlighted, as were changes in floodplain connectivity. In the basin, alteration to hydrology via subsurface tiling was noted as having important effects on nutrient loading, particularly for nitrogen. Modification of tributary hydrology was also identified as an important consideration.
 - c) **Mainstem complexity.** In addition to the existence of lake-like pools, participants discussed how different river strata (e.g., main channel, side channels, and backwaters) process nutrients differently, express impacts differently, and may have different nutrient thresholds for eutrophication.
 - d) **Recreational use of the river.** Recreational use was highlighted as particularly unique asset of the UMR, as compared to some of the country's other great rivers. Participants pointed to this as a possible avenue to explore in establishing a voice/message for the UMR (see below).
 - e) **Finding a "voice" for the UMR.** A number of participants commented that, while the UMR is a prominent national resource, it does not have the same kind of clout at a national level as other large aquatic ecosystems such as the Everglades and Chesapeake Bay. Participants said that having an overarching "voice" or "message" could be very advantageous in attracting resources for water quality and restoration work on the UMR. As noted above, a strong recreational constituency was seen as possible advantage in this regard. Participants also identified the history of partnership on the UMR as an asset in developing a voice or message for the UMR.
- 3) What are our successes and where are we falling short in addressing the problem through Clean Water Act and agricultural conservation programs?
- a) **Successes**
 - i) **Reductions achieved through improved wastewater treatment.** Several of the discussion groups pointed to successes achieved in reducing nutrients, and phosphorus in particular, through the implementation of improved wastewater treatment. This point source control approach was credited as a primary driver in reduced phosphorus concentrations throughout the basin. Another success related to point source controls mentioned by participants was the overall reduction in level of toxic and organic "legacy" pollutants.
 - ii) **Conservation programs and best management practices.** The groups highlighted success achieved to date through agricultural conservation practices, particularly in limiting soil loss and phosphorus loading. Participants noted that successful best management practices have been identified and are in place throughout the basin, crediting Soil and Water Conservation District infrastructure for much of the success and identifying MRBI as a promising approach to implementing targeted conservation at

a basinwide scale. The Conservation Reserve Enhancement Program (CREP) and a shift toward spring fertilizer application where feasible were also identified as important tools.

- iii) **Holding ground despite increasing pressures.** A number of groups noted that, given pressures of growing population and increased agricultural production, the fact that nutrient concentrations in the UMR have largely held constant, been reduced, or rates of increase slowed can be seen as an indication that conservation measures have been successful.
- iv) **Total maximum daily load (TMDL) process as a means of focusing effort.** Participants observed that the process of developing TMDLs has frequently helped identify and investigate nutrient-related water quality issues on specific water bodies. The Lake Pepin TMDL was noted as an example of this. At the same time, participants acknowledged that it remains to be seen how successful some of these TMDLs will be in actually reducing nutrients.

b) **Falling Short**

- i) **Challenges in implementing targeting and limits of voluntary programs.** Agricultural conservation programs generally, and MRBI in particular, were identified as success stories. However, participants questioned whether such voluntary efforts can ensure that the individual producers contributing the most in terms of nutrients can be induced to participate. They also asked whether best management practices will remain in place over the long term, particularly in the face of market pressures. Participants noted that, unless conservation practices pay for themselves through increased efficiency, any ongoing success depends on continued conservation program funding. Given the current fiscal climate, such funding was viewed as far from assured.
- ii) **Demonstrating the success of conservation efforts.** Echoing earlier discussion regarding the importance of monitoring and data, participants noted that an ongoing challenge is to be able to show progress resulting from conservation practices, in terms of specific improvements in water quality and biological conditions.

4) Looking ahead, what are the most promising opportunities to enhance collaborative nutrient reduction efforts on the UMR?

- a) **Public/stakeholder engagement and support.** As was true during the question and answer periods, the theme of public engagement and support emerged strongly from the small group discussions. Several of the discussion groups noted the importance of informing the public, keeping stakeholders engaged in the development of plans and approaches, and communicating results back to the public. Participants observed that engaging the public is likely to result in greater support for the programs, projects, and funding needed to address nutrients. Public engagement in the development statewide nutrient reduction strategies was seen as a particularly important and timely opportunity.
- b) **Monitoring and data.** Another recurring theme was the important role of monitoring and data. In the context of collaborative opportunities, participants emphasized the importance of a systemwide approach to data collection, better coordinated monitoring, and integrating monitoring results into planning and implementation of nutrient reduction efforts.
- c) **Build on and expand partnerships.** Several groups highlighted the value of existing partnerships in addressing UMRB nutrient issues. Collaborative work in implementing MRBI, as well as Discovery Farms and the work of Iowa Soybean Association and the Illinois Fertilizer & Chemical Association, were all noted as opportunities to build upon. More generally, the importance of engaging agriculture industry groups and NGOs in partnerships was emphasized. Additionally, participants observed that the UMR has a long history of collaboration that should be capitalized upon.

- d) **Hold further workshops.** Some groups expressed interest in further workshops to build on the discussions in these workshops. UMRBA was suggested as one possible entity to support such an ongoing discussion.
- e) **Engage more entities.** Numerous suggestions were made regarding entities to include in future UMRB nutrient discussions. Specific suggestions included the U.S. Army Corps of Engineers, U.S. Forest Service, Soil and Water Conservation Districts, universities and research centers, additional agriculture organizations, commercial fishing entities, recreational fishing groups, state tourism offices, private sector crop consultants, and UMR water suppliers. It was also noted that private groups may be more successful carrying a message regarding the UMR to policy makers and funders than state regulatory personnel.
- f) **Further examine conservation programs and practices.** Some groups suggested taking more time to examine Farm Bill programs and policies, and their relationship to UMR nutrients. Additionally, some participants expressed an interest in the economic impacts of implementing further conservation measures and called for cost-benefit analyses of various practices.
- g) **Be patient.** A final theme expressed was that environmental improvements associated with reduced nutrient loading are not likely to occur quickly. Moreover, institutional change and developing program infrastructure takes time, particularly on a system as large as the UMR. As such, those engaged in nutrient reduction efforts were encouraged to be patient.

Comments and Suggestions Received

Participants in the La Crosse workshop were asked to provide comments to help improve the second workshop. As some of these comments actually point toward potential future efforts, including possible follow-on workshops, they are included here as additional themes emerging from the workshop:

Note: These comments came from individuals and should be considered as such rather than as outputs of the workshop discussions per se.

- 1) Future workshops might address:
 - a) more detailed descriptions of nutrient impacts on the UMR,
 - b) information on the science and economics of solutions,
 - c) discussion of critical roles such as education,
 - d) pollutant trading approaches for nutrients, and
 - e) contributions from bluff and streambank erosion to nutrient loading.
- 2) Spend more time on achieving the workshop's fourth goal (i.e., identifying most promising opportunities to enhance collaborative nutrient reduction efforts on the UMR). Spend more time discussing collaboration and "what's next."
- 3) Allow more time for speakers to present information in this type of workshop.
- 4) Participation was diverse, but presentations were dominated by state and federal employees. Would be desirable to engage more individuals and perspectives from the agricultural community.
- 5) Future discussions should include more focus on the Farm Bill with regard to addressing non-point sources and measuring outcomes, which would include ways to determine whether targeting and funding approaches are successful.
- 6) More discussion of the pros and cons of voluntary and regulatory approaches would have been beneficial. Also, could have dedicated more time to discussion of US EPA's recently proposed "framework" to address nutrients.

V. Outcomes and Next Steps

These cross-programmatic workshops were designed primarily to facilitate the exchange of ideas and discussion among various groups with an interest in nutrients on the UMR. The workshops were not structured to build a consensus around certain ideas or come up with a specific list of findings and recommendations. However, a number of common themes emerged from the workshop discussions, and these themes can be considered a primary outcome of the workshops. The themes include the following:

- 1) **The general outline of problems and solutions is clear, but there is less certainty regarding some of the specifics.** In general, the important sources for nitrogen and phosphorus in the UMR mainstem and basin are known, as are their impacts. However, identifying particular land areas and facilities contributing the most to elevated nutrient levels is more challenging. Also, adverse impacts from nutrients on the UMR and in the basin have not been extensively tracked, nor are nutrient concentrations alone always predictive of impacts. Additionally, while the basic types of effective agricultural best management practices are generally known, the success and cost effectiveness of these practices for an individual producer is often highly dependent on specific circumstances.
- 2) **Numerous factors make nutrient reduction efforts particularly challenging for the UMR and its basin.** Many of these factors are driven by the scale of the resource, including: the distance between nutrient sources and impacts, the lag time to see environmental response, institutional complexity, the scale of reductions needed and potential economic impacts, hydrological modifications of the mainstem and basin, and the spatial complexity of the mainstem.
- 3) **Engaging the public at large and specific stakeholder groups is essential for success.** This includes not only informing the public and stakeholders, but also in seeking their participation in policy/program development, engaging them in hands-on efforts such as water quality monitoring, and encouraging them to communicate with national policy and budget makers about the UMR's needs. The development of statewide nutrient strategies offers a near-term opportunity for public and stakeholder engagement.
- 4) **Monitoring and data are critical components of successful nutrient reduction programs.** Experience has shown that extensive monitoring and resultant data sets are often needed to detect relationships between nutrient concentrations and environmental response, establish meaningful water quality standards, make CWA assessments, and measure results from agricultural conservation efforts and wastewater treatment. Monitoring is needed range from the system scale to individual facilities and parcels. Additionally, coordinating monitoring activities and efforts to streamline data sharing is important in meeting these needs.
- 5) **The Mississippi River Healthy Watersheds Initiative (MRBI) has met with considerable initial success and should be built upon.** Numerous participants praised both the specifics of the program and the willingness of USDA NRCS to incorporate new approaches (e.g., targeting, regionally-focused initiatives, and emphasis on water quality outcomes) via this initiative. While there are certainly many successful approaches to conservation practices in the basin, MRBI incorporates several new components and represents an effective approach to addressing nutrients basinwide. As such, it should be supported and built upon.
- 6) **There is a need to identify a “voice” or “message” for the UMR in general, as well as regarding nutrients specifically, that can inform and influence policy and budget decisions at the national level.** A unified message is more likely to be effective in attracting resources to the UMR than disparate messages from individual entities. A communication strategy such as this is likely best implemented primarily by UMR stakeholders including industry groups,

citizens groups, and NGO, rather than agency staff. Thus, including these groups in further conversations regarding UMR nutrients will be essential.

- 7) **Partnerships will be critical for success.** In order to maximize the effectiveness of initiatives and build participation in various sectors, collaborative partnerships will continue to be critical in achieving nutrient reductions throughout the basin. This will require leadership and participation from federal, state, and local agencies, agricultural groups, wastewater treatment plants/municipalities, individual producers, and NGOs.
- 8) **Continuing the conversation is important.** Participants emphasized the importance of information exchange in encouraging and supporting successful programs throughout the basin. They suggested future workshops of similar forums to continue the dialogue and identified specific topics that might be explored.

These workshops were intended to aid, support, and work with the many efforts already ongoing to address UMR nutrients and water quality, and to help identify new opportunities for collaboration and progress in this regard. However, these workshops were not designed to document any specific next steps. Rather, the intent is that these workshops and the themes they drew out will provide a catalyst for ongoing conversations across programs and perspectives regarding nutrients and water quality on the UMR. Along with other potential venues, UMRBA and its Water Quality Executive Committee and Water Quality Task Force will provide forums for further discussion and action on these issues. This workshop report will provide important input to that work.

Appendix A: Workshop Agendas



Upper Mississippi River Basin Association Cross-Programmatic Workshops

Addressing Nutrient-Related Water Quality Impacts on the Upper Mississippi River: Clean Water Act Approaches, Conservation Efforts, and Collaboration Opportunities

Northern Workshop

(Iowa, Minnesota, Wisconsin focus)

August 24, 2011

**Stoney Creek Inn
La Crosse, Wisconsin**

Workshop Purpose

The purpose of this workshop is to provide a unique contribution to regional nutrient conversations by:

- 1) focusing discussion on issues pertinent to nutrients and water quality on the Upper Mississippi River (UMR);
- 2) bringing together participants with an interest in the UMR from across states, agencies, programs, and constituencies;
- 3) sharing current information and perspectives about ongoing efforts to address nutrients on the UMR; and
- 4) identifying opportunities for Clean Water Act program success and cross-program collaboration on the UMR.

AGENDA

Time	Topic	Speaker(s)
9:30 a.m.	Workshop Origin and Purpose	Barb Naramore , Upper Mississippi River Basin Association
9:35	Welcome	State Agriculture and Environmental Agency Representatives
9:40	Introductions	All participants
9:45	Upper Mississippi River Nutrient Occurrence & Local Water Quality Impacts	Dave Hokanson , Upper Mississippi River Basin Association
10:00	Clean Water Act Overview (including point and non-point source tools)	Shannon Lotthammer , Minnesota Pollution Control Agency
10:15	PANEL Water Quality Standards: Current State and Federal Activities to Address Nutrients	Steve Heiskary , Minnesota Pollution Control Agency Jim Baumann , Wisconsin Department of Natural Resources Tom Wilton , Iowa Department of Natural Resources Brian Thompson , United States Environmental Protection Agency, Region 5

Time	Topic	Speaker(s)
11:00	Comments and questions	All morning presenters/panelists and participants
11:30	LUNCH (provided on site)	
12:15 p.m.	PANEL Statewide Nutrient Reduction Strategies	Tom Davenport , United States Environmental Protection Agency, Region 5 Wayne Anderson , Minnesota Pollution Control Agency Jim Baumann , Wisconsin Department of Natural Resources Jim VandenBrook , Wisconsin Department of Agriculture, Trade, and Consumer Protection
1:00	PANEL Voluntary/Incentive-Based Nonpoint Source Controls	Steve Bertjens , USDA Natural Resources Conservation Service Roger Wolf , Iowa Soybean Association
1:30	Comments and questions	All afternoon presenters/panelists and participants.
2:00	BREAK	
2:15	Small Group Discussions Addressing: 1) What are the most important knowns and unknowns about nutrients on the UMR? 2) What are the special considerations in addressing nutrients on the UMR? How should we respond to these river-specific challenges? 3) What are our successes and where are we falling short in addressing the problem through Clean Water Act and conservation programs? 4) Looking ahead, what are the most promising opportunities to enhance collaborative nutrient reduction efforts on the UMR?	
3:30	Small Group Report-Outs: Opportunities for Collaboration, Coordination, and Improving Success on the UMR	
3:50	Next Steps and Workshop Report	Dave Hokanson , Upper Mississippi River Basin Association
4:00 p.m.	ADJOURN	



Upper Mississippi River Basin Association Cross-Programmatic Workshops

**Addressing Nutrient-Related Water Quality Impacts on the Upper Mississippi River:
Clean Water Act Approaches, Conservation Efforts, and Collaboration Opportunities**

Southern Workshop
(Illinois and Missouri focus)

September 7, 2011

**Quality Inn and Suites
Hannibal, Missouri**

Workshop Purpose

The purpose of this workshop is to provide a unique contribution to regional nutrient conversations by:

- 5) focusing discussion on issues pertinent to nutrients and water quality on the Upper Mississippi River (UMR);
- 6) bringing together participants with an interest in the UMR from across states, agencies, programs, and constituencies;
- 7) sharing current information and perspectives about ongoing efforts to address nutrients on the UMR; and
- 8) identifying opportunities for Clean Water Act program success and cross-program collaboration on the UMR.

AGENDA

Time	Topic	Speaker(s)
9:30 a.m.	Workshop Origin and Purpose	Barb Naramore , Upper Mississippi River Basin Association
9:35	Welcome and Introductions	Agriculture and environmental agency representatives
9:40	Introductions	All participants
9:45	Upper Mississippi River Nutrient Occurrence & Local Water Quality Impacts	Dave Hokanson , Upper Mississippi River Basin Association
10:00	Clean Water Act Overview (including point and non-point source tools)	Gregg Good , Illinois Environmental Protection Agency
10:15	PANEL Water Quality Standards: State and Federal Activities to Address Nutrients	Bob Mosher , Illinois Environmental Protection Agency Mark Osborn , Missouri Department of Natural Resources Jim Baumann , Wisconsin Department of Natural Resources Gary Welker , United States Environmental Protection Agency, Region 7
11:00	Comments and Questions	All morning presenters/panelists and participants

Time	Topic	Speaker(s)
11:30	LUNCH (provided on site)	
12:15 p.m.	PANEL: Statewide Nutrient Reduction Strategies	Tom Davenport , United States Environmental Protection Agency, Region 5 Marcia Willhite , Illinois Environmental Protection Agency Bryan Hopkins , Missouri Department of Natural Resources
12:50	PANEL: Voluntary/Incentive-Based Nonpoint Source Controls	Karen Brinkman , USDA Natural Resources Conservation Service Jean Payne , Illinois Fertilizer and Chemical Association
1:30	Comments and Questions	All afternoon presenters/panelists and participants.
2:00	BREAK	
2:15	Small Group Discussions Addressing: 1) What are the most important knowns and unknowns about nutrients on the UMR? 2) What are the special considerations in addressing nutrients on the UMR? How should we respond to these river-specific challenges? 3) What are our successes and where are we falling short in addressing the problem through Clean Water Act and conservation programs? 4) Looking ahead, what are the most promising opportunities to enhance collaborative nutrient reduction efforts on the UMR?	
3:30	Small Group Report-Outs: Opportunities for Collaboration, Coordination, and Improving Success on the UMR	
3:50	Next Steps and Workshop Report	Dave Hokanson , Upper Mississippi River Basin Association
4:00 p.m.	ADJOURN	

Appendix B: Workshop Participants

Participants in La Crosse, Wisconsin Workshop August 24, 2011

Wayne Anderson

Minnesota Pollution Control Agency

Jim Baumann

Wisconsin Department of Natural Resources

Marilyn Bayerl

Upper Mississippi River Source Water Protection Project

Gretchen Benjamin

The Nature Conservancy

Steve Bertjens

USDA Natural Resources Conservation Service

Adam Birr

Minnesota Department of Agriculture

Rob Burdis

Minnesota Department of Natural Resources

Tom Davenport

U.S. Environmental Protection Agency

Josh Eash

U.S. Fish and Wildlife Service

Gary Edwards

Iowa Corn Growers Association

Albert Ettinger

Mississippi River Collaborative

Warren Formo

Minnesota Ag Water Resources

Brad Foss

Dairyland Power Cooperative

Shawn Giblin

Wisconsin Department of Natural Resources

Tex Hawkins

U.S. Fish and Wildlife Service

Susan Heathcote

Iowa Environmental Council

Steve Heiskary

Minnesota Pollution Control Agency

Dave Hokanson

Upper Mississippi River Basin Association

Jeff Houser

U.S. Geological Survey

Mike Jawson

U.S. Geological Survey

Linda Kinman

Des Moines Water Works

Shannon Lotthammer

Minnesota Pollution Control Agency

Mike McKay

Lake Pepin Legacy Alliance

Barb Naramore

Upper Mississippi River Basin Association

Steve Nyhus

Minnesota Environmental Science and Economic Review Board

John Olson

Iowa Department of Natural Resources

Kevin Richards

U.S. Geological Survey

Chuck Spitzack

U.S. Army Corps of Engineers

Dan Stoddard

Minnesota Department of Agriculture

Dan Sullivan

U.S. Geological Survey

John Sullivan

Wisconsin Department of Natural Resources

Brian Thompson

U.S. Environmental Protection Agency

Jim VandenBrook

Wisconsin Department of Agriculture, Trade, and Consumer Protection

Doug Wetzstein

Minnesota Pollution Control Agency

Tom Wilton

Iowa Department of Natural Resources

Roger Wolf

Iowa Soybean Association

**Participants in Hannibal, Missouri Workshop
September 7, 2011**

Jim Baumann

Wisconsin Department of Natural Resources

Karen Brinkman

USDA Natural Resources Conservation Service

Jason Crites

Missouri Department of Conservation

Tom Davenport

United States Environmental Protection Agency

Dave De Geus

The Nature Conservancy

Karen Flournoy

U.S. Environmental Protection Agency

Gregg Good

Illinois Environmental Protection Agency

Judy Grundler

Missouri Department of Agriculture

Heath Hall

Hannibal Board of Public Works

Dave Hokanson

Upper Mississippi River Basin Association

Bryan Hopkins

Missouri Department of Natural Resources

Stacy James

Prairie Rivers Network

Dave Knuth

Missouri Department of Conservation

Bob Mosher

Illinois Environmental Protection Agency

Mathew Munzlinger

Hannibal Board of Public Works

Barbara Naramore

Upper Mississippi River Basin Association

Mark Osborn

Missouri Department of Natural Resources

Jean Payne

Illinois Fertilizer & Chemical Association

Brian Schweiss

Missouri Department of Conservation

Cindy Skrukrud

Sierra Club

Chad Smith

Missouri Department of Conservation

Robert Stevenson

Hannibal Board of Public Works

Brad Walker

Missouri Coalition for the Environment

Steven R. Walker

Missouri Department of Natural Resources

Gary Welker

U.S. Environmental Protection Agency

Marcia Willhite

Illinois Environmental Protection Agency

Douglas Yeskis

U.S. Geological Survey

Appendix C: List of Acronyms Used in this Report

CEAP	(USDA) Conservation Effects Assessment Project
CREP	Conservation Reserve Enhancement Program
CWA	Clean Water Act
DNR	Department of Natural Resources
EPA	Environmental Protection Agency
HUC	Hydrologic Unit Code
MRBI	Mississippi River Basin Healthy Watersheds Initiative
NGOs	Non-Governmental Organizations
NRCS	(USDA) Natural Resources Conservation Service
TMDL	Total Maximum Daily Load
UMR	Upper Mississippi River
UMRB	Upper Mississippi River Basin
UMRBA	Upper Mississippi River Basin Association
UMRCC	Upper Mississippi River Conservation Committee
UMRSHNC	Upper Mississippi River Sub-basin Hypoxia Nutrient Committee
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
US EPA	United States Environmental Protection Agency
WQEC	(UMRBA) Water Quality Executive Committee
WQTF	(UMRBA) Water Quality Task Force