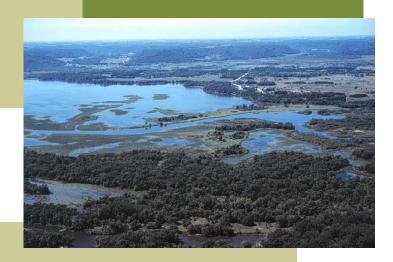UMRBA

Ecosystem Restoration and the Clean Water Act on the Upper Mississippi River:

Workshops to Explore Policy and Practice Interfaces

Final Project Report

September 2008

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Executive Summary

Background

The Upper Mississippi River Basin Association (UMRBA), with support from the United States Environmental Protection Agency (US EPA) and the United States Army Corps of Engineers (USACE), hosted workshops in April and June 2008 to explore the policy and practice interfaces between ecosystem restoration and Clean Water Act (CWA) programs on the Upper Mississippi River (UMR). These two workshops brought together key players in UMR water quality and ecosystem restoration work to:

1) exchange information about the current policies and practices in both areas of endeavor,

2) articulate the key assumptions and understandings about the UMR that underpin their work, and

3) identify and recommend opportunities for enhanced interaction and cooperation.

Workshop Approach and Outcomes

At the April workshop, participants were presented with background information regarding ecosystem restoration and CWA programs. Participants then broke into small groups to discuss potential opportunities and limitations to enhancing collaboration between these efforts on the UMR. These group discussions focused on the areas of:

- Assessment & Characterization: Examining potential connections between CWA research, standards, and monitoring and the research and monitoring done in support of river restoration; and

- Restoration & Remediation: Examining potential connections between habitat planning and projects and TMDL planning and remediation strategies within the CWA regulatory framework.

Five thematic areas of potential connection emerged from these discussions as follows:
1) Ecosystem Restoration Objectives and Water Quality Standards
2) Biological Indicators
3) Water Quality Monitoring
4) Watersheds, Tributaries, and TMDLs
5) Water Quality Considerations in Ecosystem Restoration Projects

The June workshop provided additional information via case studies and gave participants an opportunity to expand on the discussions from the first workshop. In facilitated breakout sessions, participants were asked to identify specific, valuable actions that could be taken within each of the five theme areas from the first workshop. Workshop participants identified the following collaboration opportunities as having the greatest promise.

Collaboration Opportunities Identified By Workshop Participants
As Having the Greatest Promise

Ecosystem Restoration Objectives and Water Quality Standards
    a. Include CWA program staff in ecosystem objective-setting process for geomorphic reaches.
    b. Continue efforts to discuss, harmonize, and refine state CWA water quality standards applicable to the UMR (including designated uses and water quality criteria), with input from ecosystem restoration staff.
    c. Include CWA program staff in work on the Upper Mississippi River Conservation Committee's Fisheries Plan.
    d. Establish a standing UMR Ecosystem Restoration-CWA committee to continue discussions initiated at workshops.
    e. Develop a UMR "Report Card" that is easily understood by the public and decision-makers, utilizing indicators from monitoring programs.

Biological Indicators
    a. Development of biological indicators for the UMR that serve both CWA and ecosystem restoration programs. This involves a number of elements, including:
        i.   An initial workshop on biological indicators/indices of biotic integrity, with additional workshops as needed.
        ii. A review of existing approaches/ uses of biological indicators on the UMR, including data and indices from US EPA's Environmental Monitoring and Assessment Program.
       iii. Identification of key target/indicator species.
       iv. Public input on indicators.
       v.   Use of conceptual models to make biota-water quality linkages.

Water Quality Monitoring
    a. Examine quality assurance and analytical methods requirements for CWA and restoration program sampling, analysis, and data management to identify opportunities for enhanced data sharing.
    b. Coordinate monitoring schedules across programs/agencies/states to maximize efficiency and minimize redundancies.
    c. Summarize and share data from US EPA's Environmental Monitoring and Assessment Program across programs.
    d. Use Long Term Resource Monitoring Program monitoring and data to assess biological response to nearby Habitat Rehabilitation and Enhancement Projects.
    e. Form a UMR Water Quality Monitoring Council.

Watersheds, Tributaries, and TMDLs
    a. Greater involvement of agriculture agencies in ongoing discussions regarding UMR ecosystem restoration and water quality protection.
    b. Hold joint meetings between those working on tributary Total Maximum Daily Loads and UMR ecosystem restoration projects.

Water Quality Considerations in Ecosystem Restoration Projects
    a. Include CWA program staff in ecosystem restoration project teams to engage in project planning and facilitate regulatory compliance.
    b. Include CWA program staff in ecosystem restoration project prioritization.
    c. Model and predict the cumulative water quality impacts of restoration projects.

Moving Forward

As demonstrated by the preceding list, the workshops served effectively as a way to identify opportunities for enhanced collaboration between ecosystem restoration and Clean Water Act programs on the UMR. In fact, more ideas were generated than can likely be implemented in the foreseeable future. However, a number of very promising and timely ideas do merit careful consideration by agencies and others engaged in restoration and water quality work on the river.

In the near term, opportunities exist in areas where there is considerable cross-program energy and interest, such as the application of biological indicators on the UMR. Other near-term opportunities exist where all that is required is adjustment to current structures and processes. Examples of this may be the inclusion of CWA staff in ecosystem restoration objective-setting efforts, or the engagement of restoration staff in discussions regarding CWA water quality standards applied to the river.

Other ideas may not be ripe for implementation at this time or may be beyond the ability of workshop participants to implement directly, but could benefit from further exploration and development of broader support. Such ideas include the creation of a comprehensive UMR "Report Card" and the establishment of a UMR Monitoring Council. More generally, the list of collaboration opportunities identified through these workshops can help inform the future discussions and deliberations of regional and national decision-makers.

Beyond the specific ideas identified, the workshops have also served as a forum for integrated communication, idea sharing, and networking. As such, the workshops have helped build a strong base for ongoing collaboration efforts on the UMR.

Through its two workshops, this project was designed to facilitate dialog and generate ideas. With completion of this report, the project has reached its conclusion. However, these efforts were just a first step in pursuing the goal of enhanced collaboration between water quality and ecosystem restoration work on the Upper Mississippi River.

As an essential next step, the UMRBA Board is committed to supporting communication between ecosystem restoration and Clean Water Act programs on the UMR, and to considering ways in which the Association might support further work on the opportunities identified through these workshops. At least as importantly, UMRBA will encourage other potential lead agencies and key participants to do the same.   This report is being provided to workshop participants, program managers, and key decision makers within various agencies and organizations, with the goal of helping to inform a collaborative discussion about potential next steps at the UMRBA's November 2008 quarterly meeting.

Introduction

The Upper Mississippi River (UMR) is central to the environment, economy, and overall quality of life in the Upper Midwest. Efforts to restore and protect this unique ecosystem have taken a variety of forms, including restoration efforts under the Environmental Management Program (EMP) and the recently authorized Navigation and Ecosystem Sustainability Program (NESP), as well as water quality protection efforts carried out under the Clean Water Act (CWA). These programs, as well as many others implemented at different scales and by different entities, all contribute to the ongoing protection and restoration of the UMR in support of its multiple uses.

In light of these complementary, but not formally coordinated, programs, increasing interest has been expressed regarding the relationship between ecosystem restoration and water quality protection efforts on the UMR. Specifically, participants in both restoration and water quality work have asked whether their efforts might be better coordinated to the benefit of all programs, with improved outcomes for the condition of the UMR.

Recognizing the emerging interest in cross-program coordination, two federal agencies with critical roles in ecosystem restoration and CWA programs, the US Army Corps of Engineers (USACE) and US Environmental Protection Agency (US EPA), respectively, provided support for the Upper Mississippi River Basin Association (UMRBA) to facilitate further examination of coordination opportunities. As a result, the UMRBA designed a set of two workshops that involved key representatives from both of these program areas and explored the policy and practice interfaces between ecosystem restoration and CWA programs on the UMR.

The specific goals of the workshops were established as follows:

1) to exchange information about current policies and practices in both areas of endeavor,

2) to articulate the key assumptions and understandings about the UMR that underpin work in both areas, and

3) to identify and recommend opportunities for enhanced interaction and cooperation.

Both workshops were held in Dubuque, Iowa, with the first workshop taking place on April 16-17, 2008, and the second workshop occurring on June 11-12, 2008.

This report presents an overview of the workshops, summarizes the workshop outcomes in terms of the ideas generated via breakout group discussions, and outlines potential avenues for moving forward in the implementation of ideas expressed at the workshops.

Overview of Workshops

Participation

Over 60 natural resource and water quality experts participated in the workshop series. These individuals came from state and federal agencies and nongovernmental organizations with a presence and role on the Upper Mississippi River. Participants were divided roughly equally between ecosystem restoration and Clean Water Act programs. See Appendix A for a list of the workshop participants.

April Workshop

The first workshop was held on April 16-17, 2008 (see Appendix B for the workshop agenda). A primary objective of this workshop was to establish a common set of baseline knowledge about the Clean Water Act and ecosystem restoration programs, and to share fundamental assumptions and understandings about the UMR made within each program area. Panel discussions and presentations from experts in each program area provided an overview of current work at a level of detail that allowed participants to understand of statutory and regulatory responsibilities, practical challenges, and operating practices.

Subsequent to the panel presentations, a series of small group discussions was employed to identify ways in which the relationship between ecosystem restoration activities and water quality protection efforts on the UMR could be enhanced. Each small group was composed of 8 to 10 participants who were pre-selected in order to ensure a diverse mix of expertise and interests. The composition of the small groups was held constant through the workshop's three discussion sessions.

The first discussion session was essentially a brainstorming activity to identify issues, questions, and topics for the following group discussions. The second session, *Assessment and Characterization*, focused on identifying opportunities and limitations in connecting research, water quality standards, and monitoring for the CWA with research and monitoring done in support of ecosystem restoration programs. The third group discussion topic, *Restoration and Remediation*, focused on making connections between restoration planning and projects and TMDL planning and remediation. Outcomes of these discussions were recorded and reported out to all participants (see Appendix C for small group reports). Five thematic areas of potential connection emerged from the workshop discussions as follows:

1) Ecosystem Restoration Objectives and Water Quality Standards

2) Biological Indicators

3) Water Quality Monitoring

4) Watersheds, Tributaries, and TMDLs

5) Water Quality Considerations in Ecosystem Restoration Projects

The emergence of these five thematic areas helped set the stage for further discussions at the June workshop.

June Workshop

The second workshop was held on June 11-12, 2008 (see Appendix B for the workshop agenda) and began with case studies describing water quality and ecosystem restoration efforts in the Chesapeake Bay and Florida Everglades. These two case studies offered lessons learned and possible strategies to be considered for application on the UMR. A case study of the Lake Pepin TMDL was also presented to highlight current efforts on the UMR to integrate across ecosystem restoration and CWA programs.

Building from the thoughts developed at the April workshop, small groups were tasked with developing actionable ideas that could serve as potential next steps in each of the five thematic "connection" areas. Participants engaged in a facilitated discussion and voting process to identify the most promising ideas, and then reported these back to the entire group of attendees. The ideas that emerged from these discussions are described in the next section of this report.

Workshop Outcomes: Opportunities for Collaboration

Participants in the June workshop were asked to identify specific, valuable actions that could be taken within each of the following five thematic "connection" areas:

1) Ecosystem Restoration Objectives and Water Quality Standards

2) Biological Indicators

3) Water Quality Monitoring

4) Watersheds, Tributaries, and TMDLs

5) Water Quality Considerations in Ecosystem Restoration Projects

Through a facilitated discussion and voting process, the small groups identified what they viewed as the most promising collaboration ideas. These ideas, as summarized by UMRBA staff, are outlined in the following tables. A comprehensive list of all the ideas brought forward during discussions, along with the votes received for each idea (see Appendix D).

In summarizing the ideas from the June workshop, UMRBA staff has also identified likely agency leads and other key participants, evaluated whether existing structures/processes can be used to support the action, and assessed whether the action can be initiated in the near term (i.e., < 18 months) or is a longer term action item. Possible lead agencies and participants were selected based on their respective program authorities and current responsibilities and interests.

Note that actions that are considered "near term" can likely be initiated within 18 months or are part of an ongoing process, but may need to be modified or enhanced. For example, involving agriculture agencies in UMR program discussions as described in Theme 4a is an ongoing effort that could be enhanced by making it a more formalized process. Whereas, developing biological indicators may be initiated within a year, but will require new structures and communication outreach among agencies. Examples of longer term efforts that will require more than 18 months to implement include developing a UMR "Report Card," forming a UMR Water Quality Monitoring Council, and modeling and predicting the cumulative water quality impacts of restoration projects.

The list of specific opportunities for collaboration, as reflected in the next four pages of this report, represents the primary outcome of the workshop series. The individual actions are grouped under the five thematic areas described above. Strategies for moving forward with the possible implementation of these ideas are discussed in the final section of this report.

Theme 1: Ecosystem Restoration Objectives and Water Quality Standards

Action	Likely Lead(s)	Other Key (or New) Participants	Does It Utilize Existing Structures & Processes or Require New Ones?	Can It Likely be Initiated in the Near Term (12-18 Months) or in the Longer Term?
a. Include CWA program staff in ecosystem objective-setting process for geomorphic reaches.	USACE-NESP & EMP Staff	State CWA Staff EPA CWA Staff	Utilize existing	Near term
b. Continue efforts to discuss, harmonize, and refine state CWA water quality standards applicable to the UMR (including designated uses and water quality criteria), with input from ecosystem restoration staff.	UMRBA-Water Quality Task Force	USGS-UMESC Staff State & Federal Restoration Program Staff	Utilize existing	Near term
c. Include CWA program staff in work on the Upper Mississippi River Conservation Committee's Fisheries Plan.	UMRCC	State CWA Staff EPA CWA Staff	Utilize existing	Near term
d. Establish a standing UMR Ecosystem Restoration-Clean Water Act committee to continue discussions initiated at workshops.	US EPA USACE UMRBA	State CWA Staff State & Federal Restoration Program Staff	Require new	Longer term
e. Develop a UMR "Report Card" that is easily understood by the public and decision-makers, utilizing indicators from monitoring programs.	US EPA USACE with USGS-UMSEC Staff	State CWA Staff State & Federal Restoration Program Staff	Require new	Longer term

Theme 2: Biological Indicators

Action	Likely Lead(s)	Other Key (or New) Participants	Does It Utilize Existing Structures & Processes or Require New Ones?	Can It Likely be Initiated in the Near Term (12-18 Months) or in the Longer Term?
a. Develop biological indicators for the UMR that serve both CWA and ecosystem restoration programs.* This involves number of elements, including: i. An initial workshop on biological indicators/indices of biotic integrity, with additional workshops as needed. ii. A review of existing approaches/use of biological indicators on the UMR, including data and indices from US EPA's Environmental Monitoring and Assessment Program. iii. Identification of key target/indicator species. iv. Public input on indicators. v. Use of conceptual models to make biota-water quality linkages.	US EPA USACE	UMRBA UGSG-UMSEC Staff State CWA Staff State & Federal Restoration Program Staff Outside Experts	Require new	Near term

*Note: This action was also identified in groups that discussed "Ecosystem Restoration Objectives and Water Quality Standards" and "Water Quality Considerations in Ecosystem Restoration Projects."

Theme 3: Water Quality Monitoring

Action	Likely Lead(s)	Other Key (or New) Participants	Does It Utilize Existing Structures & Processes or Require New Ones?	Can It Likely be Initiated in the Near Term (12-18 Months) or in the Longer Term?
a. Examine quality assurance and analytical methods requirements for CWA and restoration program sampling, analysis, and data management to identify opportunities for enhanced data sharing.	UMRBA-Water Quality Task Force	USGS-UMESC Staff EPA-EMAP Staff	Utilize existing	Near term
b. Coordinate monitoring schedules across programs/agencies/states to maximize efficiency and minimize redundancies.	UMRBA-Water Quality Task Force USGS-UMESC Staff	State CWA Monitoring Staff LTRMP Field Station Staff	Utilize existing	Near term
c. Summarize and share data from US EPA's Environmental Monitoring and Assessment Program across programs.	US EPA-EMAP Staff	UMRBA-Water Quality Task Force USGS-UMESC Staff	Utilize existing	Near term
d. Use Long Term Resource Monitoring Program monitoring and data to assess biological response to nearby Habitat Rehabilitation and Enhancement Projects.**	USGS-UMESC USACE	LTRMP Strategic Planning Group	Utilize existing	Near term
e. Form a UMR Water Quality Monitoring Council.	US EPA USGS	State CWA Staff UMRBA	Require new	Longer term

** This action was initially suggested under "Ecosystem Restoration Objectives and Water Quality Standards" but seems to fit better here.

Theme 4: Watersheds, Tributaries, and TMDLs

Action	Likely Lead(s)	Other Key (or New) Participants	Does It Utilize Existing Structures & Processes or Require New Ones?	Can It Likely be Initiated in the Near Term (12-18 Months) or in the Longer Term?
a. Greater involvement of agriculture agencies in ongoing discussions regarding UMR ecosystem restoration and water quality protection.	USDA-NRCS	US EPA USACE	Utilize existing	Near term
b. Hold joint meetings between those working on tributary Total Maximum Daily Loads and UMR ecosystem restoration projects.	US EPA USACE	State CWA Staff State & Federal Restoration Program Staff	Require new	Longer term

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Theme 5: Water Quality Considerations in Ecosystem Restoration Projects

Action	Likely Lead(s)	Other Key (or New) Participants	Does It Utilize Existing Structures & Processes or Require New Ones?	Can It Likely be Initiated in the Near Term (12-18 Months) or in the Longer Term?
a. Include CWA program staff in ecosystem restoration project teams to engage in project planning and facilitate regulatory compliance.	USACE-Project Delivery Teams	State CWA Staff EPA CWA Staff	Utilize existing	Near term
b. Include CWA program staff in ecosystem restoration project prioritization.	USACE	State CWA Staff EPA CWA Staff	Utilize existing	Near term
c. Model and predict the cumulative water quality impacts of restoration projects.	USGS-UMESC Staff USACE	State & Federal Restoration Program Staff	Utilize existing	Longer term

Moving Forward: Strategies and Considerations for Implementing Ideas

The April and June workshops served effectively as a way to identify opportunities for enhanced collaboration between ecosystem restoration and Clean Water Act programs on the UMR. Moving forward on the workshop ideas requires consideration of what is realistically actionable at the present time, identification of areas where more development or support is needed, communication of needs to decision-makers, and leadership from key agencies.

Prioritize and Proceed

Clearly, more ideas were generated than can likely be implemented in the foreseeable future. However, a number of very promising and timely ideas do merit careful consideration and prioritization by agencies and others engaged in restoration and water quality work on the river. Indeed, success may ultimately be defined as significant progress on one or a few action areas, rather than attempting to address all the ideas.

Near Term Opportunities

In the near term, opportunities exist in areas where there is considerable cross-program energy and interest, such as the application of biological indicators on the UMR. In an effort to build from interest expressed at the workshops and other venues (such as the LTRMP Analysis Team and UMRBA Water Quality Task Force), the USACE, US EPA, and UMRBA have initiated an interagency work group to move forward on the recommendations made in Theme 2. Although a new structure (the work group) was needed, the interest in and support for work in this area, along with the relatively informal and time-limited nature of the group, made relatively quick action in this area possible.

Importantly, many of the recommended action items can utilize and build from current structures and ongoing processes. These actions have high associated potential returns because the ideas will require relatively few new resources as the projects and components are already in place. For example, the Upper Mississippi River Conservation Committee has a draft Fisheries Plan that, as a result of the workshop discussions and follow-ups, will be shared with the UMRBA Water Quality Task Force for review. Other near-term work may focus on areas where a simple adjustment in invitees or membership may achieve a workshop-identified action. Examples of this may be the inclusion of CWA staff in ecosystem restoration objective-setting, or the engagement of restoration staff in discussions regarding CWA water quality standards for the river.

Explore, Examine, and Build Support

Other ideas may not be ripe for implementation at this time or may be beyond the ability of workshop participants to implement, but could benefit from further exploration and development of broader support. Exploration of these ideas may bring forward important questions and open up areas of meaningful dialog. Such ideas include the creation of a comprehensive UMR "Report Card," the establishment of a UMR Monitoring Council, and the initiation of joint meetings between those involved in tributary TMDLs and nearby ecosystem restoration projects. This last idea is a potential means to address longstanding challenges in better connecting tributary and main stem activities.

Communicate the Needs

Even if specific action or active exploration is not possible for all the ideas developed at the workshops, the full list of collaboration opportunities identified by participants can help inform the future discussions and deliberations of regional and national decision-makers.

Continue to Look for Opportunities to Collaborate

These two workshops can be used as an important stepping stone in enhancing cooperation and communication among programs and agencies involved in water quality and ecosystem restoration on the UMR. The recommended ideas can help establish a working relationship and awareness of programmatic goals and needs. Looking forward, as program goals and needs evolve and new opportunities arise, it will be important for these relationships to evolve as well, with agencies and stakeholders forging new ways of working together.

Role of Potential Lead Agencies and UMRBA's Role

Through its two workshops, this project was designed to facilitate dialog and generate ideas. With completion of this report, the project has reached its conclusion. However, these efforts were just a first step in pursuing the goal of enhanced collaboration between water quality and ecosystem restoration work on the Upper Mississippi River. In order for the ideas generated at the workshops to result in meaningful progress, it will be critical for each potential lead agency to review these possible actions and take ownership of those ideas that it wishes to see implemented.

As an essential next step, the UMRBA Board is committed to supporting communication between ecosystem restoration and Clean Water Act programs on the UMR, and to considering ways in which the Association might support further work on the opportunities identified through these workshops. At least as importantly, UMRBA will encourage other potential lead agencies and key participants to do the same. This report is being provided to workshop participants, program managers, and key decision makers within various agencies and organizations, with the goal of helping inform a collaborative discussion about potential next steps at the UMRBA's November 2008 quarterly meeting.

APPENDIX A

Workshop Participants

List of Participants

Name	Organization
Stuart Appelbaum[2]	U.S. Army Corps of Engineers
Holly Arrigoni[1]	U.S. Environmental Protection Agency
Ken Barr	U.S. Army Corps of Engineers
Richard Batiuk[2]	U.S. Environmental Protection Agency
James Baumann	Wisconsin Department of Natural Resources
Sharonne Baylor	U.S. Fish and Wildlife Service
Clint Beckert[1]	U.S. Army Corps of Engineers
Dave Bierman	Iowa Department of Natural Resources
Doug Blodgett	The Nature Conservancy
Sandra Brewer	U.S. Army Corps of Engineers
Dru Buntin[1]	Missouri Department of Natural Resources
Mohsen Dkhili	Missouri Department of Natural Resources
Jon Duyvejonck[2]	U.S. Fish and Wildlife Service
Jim Fischer	Wisconsin Department of Natural Resources
Bill Franz	U.S. Environmental Protection Agency
Shannan Garretson[1]	Iowa Environmental Council
Catherine Garra[2]	U.S. Environmental Protection Agency
Gregg Good	Illinois Environmental Protection Agency
Mike Griffin	Iowa Department of Natural Resources
Jon Hendrickson	U.S. Army Corps of Engineers
Tim Henry	U.S. Environmental Protection Agency
Dave Hokanson	Upper Mississippi River Basin Association
Jeff Houser[1]	U.S. Geological Survey
Bob Hrabik[1]	Missouri Department of Conservation
Marvin Hubbell	U.S. Army Corps of Engineers
Jeffrey Janvrin	Wisconsin Department of Natural Resources
Barry Johnson	U.S. Geological Survey
Brian Johnson	U.S. Army Corps of Engineers
Gary Johnson	USGS Illinois Water Science Center
Scot Johnson	Minnesota Department of Natural Resources
Kathy Kowal	U.S. Environmental Protection Agency
Betsy Lawton	Midwest Environmental Advocates, Inc.
Ken Lubinski[2]	U.S. Geological Survey
Dean Maraldo[1]	U.S. Environmental Protection Agency
Howard Markus	Minnesota Pollution Control Agency
Kat McCain[2]	Missouri Department of Conservation
Kirsten Mickelsen[2]	Upper Mississippi River Basin Association
Richard Mollahan	Illinois Department of Natural Resources
Robert Morrison	Missouri Department of Natural Resources

Name	Organization
Barb Naramore	Upper Mississippi River Basin Association
John Olson	Iowa Department of Natural Resources
Jennifer Ostermeier[2]	U.S. Environmental Protection Agency
Charles Peters	USGS, Wisconsin Water Science Center
Don Powell	U.S. Army Corps of Engineers
Dale Robertson[1]	USGS, Wisconsin Water Science Center
Tim Schlagenhaft[2]	Minnesota Department of Natural Resources
Bernie Schonhoff	Iowa Department of Natural Resources
Norman Senjem[2]	Minnesota Department of Natural Resources
Larry Shepard[1]	U.S. Environmental Protection Agency
Matt Short[1]	Illinois Environmental Protection Agency
Kevin Slattery	U.S. Army Corps of Engineers
Chuck Spitzack	U.S. Army Corps of Engineers
James Stark[1]	USGS Minnesota Water Science Center
Janet Sternburg	Missouri Department of Conservation
Holly Stoerker	Upper Mississippi River Basin Association
Jeff Stoner[2]	USGS North Central Area
John Sullivan	Wisconsin Department of Natural Resources
Chris Urban[1]	U.S. Environmental Protection Agency
Brad Walker	Prairie Rivers Network
Dan Wilcox[1]	U.S. Army Corps of Engineers

[1] Denotes participants who only attended the April 16-17, 2008 workshop.
[2] Denotes participants who only attended the June 11-12, 2008 workshop.

APPENDIX B

Workshop Agendas

Ecosystem Restoration & the Clean Water Act
On the Upper Mississippi River:

Workshops to Explore Policy and Practice Interfaces

Workshop #1
April 16-17, 2008
AGENDA

Purpose:
  a) Learn and exchange information abut current policies, programs, and practices in the areas of both river restoration and water quality protection
  b) Identify and recommend opportunities for enhanced interaction and cooperation

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Wednesday, April 16

Time	Attachment	Topic

1:00 p.m.   **Welcome**
Holly Stoerker, UMRBA
Bill Franz, US EPA
Chuck Spitzack, USACE

A   **Workshop Purpose and Agenda**
Holly Stoerker, UMRBA

B   **Introductions**

1:30   **C**   **Clean Water Act Overview Panel**
Moderator: Dave Hokanson, UMRBA
Presentations:
- Overview of the Clean Water Act (CWA)
  Larry Shepard, US EPA, Region 7
- States' Implementation: Designated uses, criteria, monitoring, and impairment listings on the UMR
  Gregg Good, Illinois EPA
- What is a TMDL and how is it developed? What TMDLs are in place or under development on UMR?
  Dean Maraldo, US EPA, Region 5

Questions for panel consideration:
In the world of the CWA, what is distinctive about the UMR? What are the key assumptions and understandings about the river?

What is the current status and future direction of Clean Water Act policies and programs? What are the forces that will shape water quality management in the future?

What do you see as the potential connections between, or outstanding questions about, the Clean Water Act and ecosystem restoration activities on the UMR?

2:45   **Break**

(Continued)

Time	Attachment	Topic
3:00 p.m.	**D**	**River Restoration Overview Panel**

Moderator: Barb Naramore, UMRBA

Presentations:
- Overview of Environmental Management Program (EMP) and Navigation & Ecosystem Sustainability Program (NESP)
  Chuck Spitzack, USACE
- River Restoration Projects: Purposes, types, design, and function
  Don Powell, USACE
- Long Term Resource Monitoring Program (LTRMP)
  Barry Johnson, USGS

Questions for panel consideration:

In the world of ecosystem restoration, what is distinctive about the UMR? What are the key assumptions and understandings about the river?

What is the current status and future direction of EMP and NESP? What are the forces that will shape river restoration in the future?

What do you see as the potential connections between, or outstanding questions about, the Clean Water Act and ecosystem restoration activities on the UMR?

4:15   **Small Group Session A: *Issue Identification***
Assignment:
- Introduce all group members
- Identify the issues, questions, and topics you want to discuss tomorrow in your small group

5:00   **Adjourn for the Day**

5:30 p.m.   **Reception at the National Mississippi River Museum and Aquarium**

Thursday, April 17

8:00 a.m.   **Welcome Back and Overview of Today's Plan**
As you explore the topics you identified yesterday, please organize your discussion around the following:

Session B: *Assessment & Characterization*: Research, water quality standards, and monitoring

Session C: *Restoration & Remediation*: Habitat projects, river restoration planning, and CWA-driven remediation

8:15   **Small Group Session B: *Assessment & Characterization***
Identify opportunities for enhancing connections between 1) CWA research, standards, and monitoring and 2) the research and monitoring done in support of river restoration

9:30   **Break**

9:45   **Small Group Session C: *Restoration & Remediation***
Identify opportunities for enhancing connections between 1) habitat planning and projects and 2) TMDL planning and remediation strategies within the CWA regulatory framework

11:00   **Report Back from Small Groups**
Next Steps & Preview of June 11-12 Workshop

12:00 noon   **Adjourn**

Ecosystem Restoration & the Clean Water Act
On the Upper Mississippi River:

Workshops to Explore Policy and Practice Interfaces

Workshop #2
June 11-12, 2008
AGENDA

Purpose:
a) Learn how aquatic ecosystem restoration efforts and water quality considerations are being integrated in other parts of the United States
b) Identify and recommend opportunities for enhanced interaction and cooperation on the UMR in five thematic areas that emerged from the April 2008 workshop

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Wednesday, June 11

Time	Attachment	Topic
1:00 p.m.	**A**	**Welcome** **Introductions**
1:15		**Overview of Workshop Purpose and Agenda**
	B	**Report from April 2008 Workshop** "Connection" themes and associated questions
		Case Studies from Other Regions
1:30	**C**	▪ Chesapeake Bay *Rich Batiuk, U.S. Environmental Protection Agency*
2:15	**D**	▪ Florida Everglades *Stuart Appelbaum, U.S. Army Corps of Engineers*
3:00		**Questions and Discussion**
3:15		**Break**
3:30		**Concurrent Group Discussions** **Group A:** Ecosystem Restoration Objectives and Water Quality Standards **Group B:** Ecosystem Restoration Objectives and Water Quality Standards
4:30		**Reconvene in Plenary Session** ▪ Reports from Groups ▪ Selection of Discussion Groups for Next Day
5:00		**Adjourn for the Day**

(Continued)

Thursday, June 12

Time	Attachment	Topic
8:00 a.m.		**Welcome Back and Reconvene**
8:15	**E**	**Case Study from the Upper Mississippi River: Lake Pepin** *Norman Senjem, Minnesota Pollution Control Agency* *Tim Schlagenhaft, Minnesota Department of Natural Resources*
9:00		**Break**
9:10		**Concurrent Group Discussions** **Group A:** Biological Indicators **Group B:** Watersheds, Tributaries, & TMDLs
10:05		**Break**
10:20		**Concurrent Group Discussions** **Group A:** Water Quality Monitoring **Group B:** Water Quality Considerations in Ecosystem Restoration Projects
11:15		**Reconvene in Plenary Session** ▪ Report-Out from Groups ▪ Are there consensus conclusions or recommendations? ▪ Wrap-up and Next Steps
12:00 noon		**Adjourn**

APPENDIX C

Workshop #1: Small Group Reports and Rosters

Assessment and Characterization Report-Out (*indicates highest priorities or greatest limitations, if identified)

	Group 1 Reporter: Gregg Good, Illinois EPA	Group 2 Reporter: Jeff Janvrin, Wisconsin DNR	Group 3 Reporter: Dean Maraldo, US EPA-R5	Group 4 Reporter: Marvin Hubbell, USACE-MVR	Group 5 Reporter: John Olson, Iowa DNR
Opportunities	Comparison of CWA assessment reaches with reaches to be used by EMP/NESP in setting goals & objectives. Relationship between CWA standards (uses & criteria) and EMP/NESP goals & objectives. Reach-specific determination of each. Inclusion of water quality staff in setting EMP/NESP goals and objectives. Increased focus, in both program areas, on "social indicators" of success (such as increased fishing & recreation).	Revising CWA water quality standards (uses and criteria) to reflect the diversity of the river and its different habitat types (e.g. backwaters, isolated wetlands, side channels). Improved communication regarding "criteria" across programs (i.e. water quality criteria and design criteria) and possible linkages. Standardized habitat categories that are of use for both program areas. Development of a gross-scale, system-wide metric that is easily understood by the public (e.g. white tennis shoes in the Chesapeake Bay).	*Indicator development should be a priority. Opportunities exist to take advantage of the ongoing work of both UMRBA Water Quality Task Force (on water quality standards) and NESP Science Panel (on restoration goals and objectives) to have the program areas in closer consultation regarding indicators and indicator development.	*Coordination of upcoming ecosystem restoration goal setting process with reconsideration of CWA designated uses. Coordination of monitoring. Institutionalizing relationships between restoration programs (EMP-NESP-LTRMP) and CWA programs. Developing linkages between inputs from the tributaries and effects on the mainstem.	*Coordination between program areas in goal-setting, with the presumed mutual overall goal of maintaining viable populations of aquatic life. Better utilization of LTRMP data (e.g. for IBI development). Pre- and post-project monitoring to help identify impairments, measure success and learn lessons. Impairment listings for side channels and/or backwaters could help prioritize restoration projects (and resources).
Limitations	Limits to collaboration: too many meetings, too much travel, limited time overall. Site specific needs of ecosystem restoration vs. reach-level CWA needs. CWA "pollutant" problems not addressed via restoration efforts. Funding decisions can be politically, not ecologically, based. Limited funding for monitoring.	*Diversity of the River, particularly north to south, as well as dynamic nature of the River. TMDLs may not be feasible for the River. TMDL were primarily developed for small streams and the metrics they rely on are more appropriate for small streams. Perhaps use the LTRMP to develop appropriate system-wide metrics.	Lack of appropriate indicators, for both CWA and ecosystem restoration. Without indicators, cannot assess under CWA and cannot evaluate project success under EMP/NESP. Not all the right parties may be at the table for the discussion (e.g. NRCS) and the parties are different for the main stem vs. the basin/watershed.	*Communication, including the reporting and evaluation of monitoring data. There is a need to establish a feedback loop in the reporting and use of monitoring data. Difficulty in describing desired condition for the River and adjusting that expectation over time as knowledge improves. Need unified procedures for data collection, improved water quality standards, and IBI. Sheer number of agencies to coordinate is a challenge.	*Lack of funding, particularly for monitoring. Lack of an IBI (to use with habitat projects). Lack of water quality standards tailored to the UMR and its lateral & longitudinal variability. In particular, lack of sediment and nutrient criteria. Addressing tributary effects on the mainstem, addressing watershed relationship to mainstem impairments. Differences in scale: project (ecosystem restoration) vs. assessment reach (CWA).
Other	None	None	Consider large river IBI development, with recent ORSANCO work a possible reference (comment made by Bill Franz, US EPA Region 5).	Need to examine a "mass balance" resulting from projects (i.e. What would be the net effect on water quality – and for nutrients specifically – from project implementation?).	None

Restoration and Remediation Report-Out (*indicates highest priorities or greatest limitations, if identified)

	Group 1 Reporter: Jim Fischer, WI DNR	Group 2 Reporter: Jeff Janvrin, Wisconsin DNR	Group 3 Reporter: Dean Maraldo, US EPA-R5	Group 4 Reporter: Marvin Hubbell, USACE-MVR	Group 5 Reporter: John Olson, Iowa DNR
Opportunities	Opportunity to "tweak" restoration projects to utilize natural processes such as backwater denitrification. While recognizing that many issues originate in the watershed, this would provide at least some benefit. Evaluation of trade-offs on a systemic scale. CWA's anti-degradation policy might be useful in an exotic species context.	Farm Bill and watershed prioritization relationship to the CWA, including linkages between watershed priorities and TMDLs. The opportunity to better communicate about River priorities generally. Possibility of employing CWA provisions for protection [editor' note: presumably antidegradation policies] to support and maintain ecosystems. Use restoration (NESP/EMP) goals and objectives to help set priorities for CWA program activities; linkages of restoration goals & objectives to CWA standards.	Resources are available to do TMDLs on tributaries.	Participation of CWA program staff in restoration planning activities and project development. Use of modeling to improve efficiency.	Enhancing EPA participation in restoration planning process, possibly through EPA Region 5 NEPA position. Examine other large river systems (e.g. Ohio River, Missouri River) to determine how they are addressing relationship between ecosystem restoration and the CWA.
Limitations	The challenge of integrating "natural process" (such as meandering and naturalized hydrograph) in restoration work under NESP, due to navigation issues and impact to some species. Identification of CWA impairments due to exotic species (such as Asian carp) could be in conflict with some restoration projects (such as fish passage).	Historically, the potential relationship between restoration goals & objectives and CWA priorities has not been emphasized or examined to a great extent.	None identified.	Difficulty in defining the relationship of TMDLs to: tributary contributions to the main stem, project selection, cumulative loading (for downstream states in particular), restoration objectives, and agency roles.	Lack of CWA program coordination with restoration project planning. Need CWA staff person in each state assigned to work on UMR who could participate. The need to involve others agencies (e.g. NRCS) and coordinate with watershed work. The need to better communicate the water quality results of restoration projects and incorporate these results into CWA assessments & listings. The lack of use of LTRMP data by state CWA programs; need to improve utilization of this data.
Other	None	None	Group used this report-out to re-emphasize that its priority issues were "How to assess the UMR" and "How do we determine impairment on the UMR?"	None	None

Recommendations for Next Workshop

Group 1	Group 2	Group 3	Group 4	Group 5
Example of TMDL implementation (as opposed to TMDL development). One possibility could be the SE Minnesota fecal TMDL.	None.	Examine IBI development in Ohio. Look at Lake Pepin TMDL process, especially social indicators and economic valuation. Duck Creek TMDL as an example.	Develop a consensus plan for next steps as a large group.	Report back from the upcoming restoration goals & objectives-setting workshop.

Small Group Rosters

Group 1	Group 2	Group 3	Group 4	Group 5
Holly Arrigoni, US EPA Region 5	Larry Shepard, US EPA Region 7	Dean Maraldo, US EPA Region 5	Bill Franz, US EPA Region 5	Tim Henry, US EPA Region 5
Gregg Good, Illinois EPA	Chris Urban, US EPA Region 5	Kathy Kowal, US EPA Region 5	Rob Morrison, Missouri DNR	John Olson, Iowa DNR
Howard Markus, Minnesota PCA	Jim Baumann, Wisconsin DNR	Matt Short, Illinois EPA	John Sullivan, Wisconsin DNR	Mohsen Dkhili, Missouri DNR
Janet Sternburg, Missouri DOC	Jeff Janvrin, Wisconsin DNR	Dru Buntin, Missouri DNR	Bernie Schonoff, Iowa DNR	Rick Mollahan, Illinois DNR
Jim Fischer, Wisconsin DNR	Bob Hrabik, Missouri DOC	Mike Griffin, Iowa DNR	Barry Johnson, USGS, USMESC	Dave Bierman, Iowa DNR
Clint Beckert, USACE, MVR	James Stark, USGS	Scot Johnson, Minnesota DNR	Gary Johnson, USGS, IL WSC	Charlie Peters, USGS WI WSC
Chuck Spitzack, USACE, MVR	Sandra Brewer, USACE, MVR	Jeff Houser, USGS, UMESC	Marvin Hubbell, USACE, MVR	Sharonne Baylor, US FWS
Don Powell, USACE, MVP	Dan Wilcox, USACE, MVP	Dale Robertson, USGS, WI WSC	Jon Hendrickson, USACE, MVP	Kevin Slattery, USACE, MVS
Doug Blodgett, The Nature Conservancy		Brian Johnson, USACE, MVS	Brad Walker, Prairie Rivers Network	Ken Barr, USACE, MVR
		Shannan Garretson, Iowa Environmental Council		Betsy Lawson, Midwest Environmental Advocates, Inc.

Note: UMRBA Staff (Dave Hokanson, Barb Naramore, and Holly Stoerker) were in attendance, but not assigned to groups.

APPENDIX D

Workshop # 2: List of Actionable Ideas for Implementation

At the June workshop, facilitated breakout discussion sessions asked participants to generate two to five actionable ideas related to the five thematic areas generated in the first workshop. Below is a cumulative list of those ideas. The ideas in bold text indicate the actionable items that had the highest ranking. The number in the parentheses represents votes received in the small breakout groups. The ideas listed below were based on the following working assumptions:

1. It is likely that any ideas we implement will use existing staff and funding resources.
2. While existing structures may serve us well, new alliances, meetings and awareness for sharing may be created to get the activity done if needed.
3. The action can be completed within the next year or two.
4. The action must have a useful and practical outcome.
5. The most doable ideas will be prioritized first. Only a few ideas per topic area are necessary to implement.
6. It is okay to decide no further actions would be useful or appropriate. But explain why.

Theme 1: Ecosystem Restoration Objectives and Water Quality Standards
What specific, valuable, activities can we do together to build connections between:
  a) the ecosystem restoration objectives that are being developed for geomorphic reaches of the river and
  b) water quality standards, based on designated uses and criteria for river reaches?

Group A:

Standards development
- Develop consistent water quality criteria that incorporates ecosystem impacts within each reach
- Help reach concurrence between agencies that share boundaries
- Have the ecosystem restoration staff assist in the development of beneficial uses under CWA, including criteria
- Identify water quality features most likely to offset attainment of ecosystem reach objectives
- Develop a list of CWA standards to apply to UMR
- Incorporate water quality standards into designated use criteria
- Evaluation of existing water quality standards with regard to "natural" resource conditions that are realistic and achievable
- Reach agreement on shared designated uses for the UMR
- Develop water quality standards by geomorphic reach and all UMR assessment segments
- Establish consistent designated uses that incorporate ecosystem impacts within each reach
- Educate ecosystem restoration staff about the regional water quality goals
- **Identify and define seasonal water quality driver "limits" that must be met within a reach (or smaller scale) that must be met to attain biotic and habitat indicators with consideration/ limitations of background (tributaries)**
- Align border states water quality standards
- **Integrate resources into watershed planning that reflect the complexity of the river system**
- Determine appropriate standards for major reaches
- Identify applicable/ appropriate water quality criteria for restored backwater areas (e.g. wetlands)
- Develop consensus between the science community and the public on biotic and habitat indicators that are applicable at multiple scales and incorporate unique attributes (e.g. watershed, geomorphic, etc)

Outcomes/ Progress
- Use existing LTRMP field stations to assess biological response to nearby HREPs
- Clearly illustrate that restoration efforts are successful (basin- or project-wide)
- Create long-term assessment/ performance measures that can be used to gauge progress (e.g. acres of SAV within specific segments)

Continue ongoing efforts
- No specific comments were made

Modeling
- Develop Mississippi River model hydrograph using 1946 as the baseline
- Submit joint U.S. EPA and USACE budget requests for practices serving mutual benefits
- Create a body similar to ORSANCO for the Upper Mississippi River

Communication
- **Bring managers from the two programs together to identify the questions they want answered and find commonalities**
- Have managers and staff exchange positions to gain better understanding of other programs
- Tour HREP/ NESP projects
- **Create communication forum between watershed and UMR main stem organizations**
- Develop and prioritize ecosystem restoration projects that will improve water quality in impaired reaches and prevent future impairment
- Make the definitions of geomorphic reaches equivalent to assessment reaches
- Identify, to the extent meaningful, water quality criteria (chemical, physical and biological) applicable to priority ecosystem goals and objectives
- Identify and agree on key resource and water quality problems impacting habitat or use
- Have ecosystem restoration staff identify their potential actions and goals with water quality staff who can respond with ways to incorporate water quality considerations
- Identify and prioritize watersheds and tributaries most likely to affect success of reach objective
- **Involve CWA staff in ecosystem restoration planning activities**
- Be part of the objective setting process
- As we develop ecosystem restoration objectives make sure water quality staff are involved
- Participate in NESP reach planning
- Increase participation by water quality staff on reach planning goals and objectives and individual project planning efforts

Group B:

Committee
- **Establish a joint CWA and Ecosystem Restoration Committee to continue discussions/ coordination** (13)

Use same language for ecosystem restoration and water quality
- Use similar language and terms (0)
- Focus on one objective and 'normalize' across programs (e.g. definition of healthy aquatic community) (0)
- **Use common language in terms of objectives and standards** (8)

Common water quality standards among states
- Develop standardized water quality standards (8)
- **Standardize water quality standards across states and geomorphic reaches** (8)
- Adopt UMRCC water quality standards for reaches (3)
- Identify an agreed-upon set of designated uses for each geomorphic reach (1)

Objective setting
- **Identify existing water quality standards that could be an equivalent ecosystem objective** (13)
- Use water quality indicators as objective to restoration projects (7)
- Express ecosystem objectives in terms of water quality standards (3)
- Water quality experts help create ecosystem objectives (4)
- Evaluate desired future conditions (restorations) for water quality (3)
- Water quality criteria for ecosystem objectives (2)
- List ecosystem restoration objectives and water quality standards (1)
- Develop nutrient standard that reduces blue-green algal blooms (0)

Adaptive management and models
- Incorporate adaptive management (8)
- Use conceptual models to link biochemistry parameters through ecosystem goals (5)
- Develop linkages between water quality and ecosystem models (7)

Zoning
- **Establish zones of varying water quality standards so that ecosystem restoration objectives are more effective** (18)
- Habitat (3)
- Water zoning by reach (2)
- Use Chesapeake Bay as a model for zoning (0)

Public outreach and education
- **Develop a report card for indicator status for the public and decision-makers** (29)
- Continue explaining the connection between the Upper Mississippi River transport to effects in the Gulf of Mexico (0)
- Start non-technical discussions about a UMR report card (0)
- Develop a clear statement or alert of why the UMR is in need of ecosystem help (3)
- Hold meetings to gauge the public's perspective of ecosystem restoration on the UMRS (0)

Other
- Develop a framework for the basin (1)
- Identify probable functions and roles of agencies and organizations
- Study the connection between nutrient sediment in the river to biological health (5)
- Increase funding (2)

Theme 2: Biological Indicators

What specific, valuable, activities can we do together to build connections between:
  a) *biological indicators to assess water quality and identify impairments for Clean Water Act purposes and*
  b) *biological indicators to assess habitat status and measure ecosystem restoration project outcomes for EMP and NESP purposes?*

Criteria for species
- **Develop seasonally based physical and chemical criteria for important recreational, commercial and trust fish, wildlife, invert species** (6)

Identification and evaluation of existing information
- Review LTRMP Sampling Components and identify which parameters would be suitable for identifying water quality impairments (9)
- Determine how existing sampling can be used for CWA measurements (0)

Link IBI to physical and chemical characteristics
- IBI link to chemical and physical characteristics of habitats (4)
- Link IBI to physical and chemical characteristics (0)

Objectives
- Develop objectives for SAV diversity, abundance, and distribution for Geomorphic Reach 1 (6)
- Clearly define restoration objectives for geomorphic reaches and projects (5)
- Identify zones with expected biological response (e.g. where SAV has potential to grow) (0)
- Set reach performance indicators based on biology and hydrology (2)
- **Use conceptual models to identify relationships between water quality & biota/ habitat in a framework of essential ecosystem characteristics**
- **Evaluate the use of EMAP indicators for water quality and habitat assessment on the UMR**

Key Species Targeting
- Identify biological species of interest/ concern for the UMR and develop relevant water quality drivers (0)
- Identify a suite of biological indicators that address both CWA water quality and ecosystem restoration needs (1)
  - Form a committee or hold a workshop
- Identify the indicator species that could represent each geomorphic reach (0)

IBI/ Other Biological Indices
- Develop SAV criteria for CWA assessments and ecosystem health evaluations by HUC or NESP Reaches (7)
- Develop Mississippi River macroinvertebrate IBI (7)
- **Hold a meeting/ conference on IBI indicator development for different portions of UMR** (3)
- Start great river fish/ bug IBI (3)
- Standardize biological indicators for assessing water quality (2)
- Determine which indicators can be used for entire reach of UMRS (1)
- Develop Mississippi River diatom IBI (0)
- Define the distribution of mussels in the Mississippi River of UMR and relate to TSS(0)
  - Develop TSS criteria that protect mussels
- Tie water clarity to SAV distribution (0)
- Initiate working sessions on development of biological indices (0)
- Establish a working group to develop IBI based on river zones (0)
- Develop a common metric for assessment (e.g. large river IBI) (0)
- Develop Mississippi River fish IBI (0)

Theme 3: Watersheds, Tributaries, and TMDLs
What specific, valuable, activities can we do together to build connections between ecosystem restoration activities on the main stem river and activities on tributaries and their watersheds, especially TMDLs?

Agriculture connections
- **Get agriculture agencies into the discussion** (14)
- Connect with the Farm Bureau and watershed groups on NESP goals (3)
- Work with NRCS and others to increase funding for CRP, WRP, EQIP, etc (6)
- Engage NRCS and the agriculture community to implement programs to reduce nutrient and suspended solids loading in subwatersheds (1)
- Send letters from UMRBA, UMRCC and states on the need to tie BMP implementation to farm subsidy programs (1)

Financial
- Conduct preliminary cost-benefit analysis comparing river engineering to watershed nonpoint sediment reductions (3)
- Utilize Section 319 funds and revolving loan funds to fully implement and enforce TMDL recommendations (4)

Indicators
- Use biologic indicators for impaired waters listing (4)
- Establish outcome targets for indicators (1)
- Consider use of biological (fish, invertebrates, vegetation) as TMDL targets (10)

Communication
- **Hold joint meetings between those working on tributary TMDLs and UMR ecosystem projects (12)**
- Establish one to three percent shared funding between main stem and tributary programs (1)

Water quality restoration
- Establish uses and criteria that are consistent with ecosystem restoration projects (0)
- Link ecosystem goals to water quality standards (1)
- Consider impacts on current and future restoration activities when developing TMDLs (1)
- Collaborate to address TMDL goals in the design of ecosystem restoration projects (0)
- Use Lake Pepin TMDL as an example and develop similar TMDLs for NESP geomorphic reaches on UMR
- Plan and prioritize ecosystem projects to coordinate with watershed work (2)
- Use TMDLs to combine load allocations and river restoration (3)
- Restore natural river processes such as more natural hydrograph from tributaries (1)
- Set benchmarks in the TMDL that link to habitat development (4)
- Conduct pilot TMDL exercise for UMRB subwatershed (0)

Tributary restoration
- Begin moving ecosystem restoration into the tributaries within NESP authority (1)
- **Identify floodplain restoration opportunities in the lower reaches of tributaries (12)**

Data and information needs
- Determine cause and effect for impairments (1)
- Identify and list state and federal programs and contacts for watershed and tributary efforts, including program goals, objectives and funding opportunities (0)
- Link watershed quality and main stem vegetation databases (0)
- Develop geospatial layers of existing and planned watershed/ tributary work, and also floodplain and backwater efforts, seeking synergistic opportunities (2)
- Complete IHA on tributary gauges (2)
- Rank watersheds for sediment reduction efforts (10)
- **Develop and compile sediment budgets for tributaries**

Other
- Hold public meetings to explain the relationship of turbidity to vegetation to illustrate why it is important to river ecosystem improvement (7)
- Send letters to EPA stating the need to require TMDL implementation (0)

Theme 4: Water Quality Monitoring
What specific, valuable, activities can we do together to build connections between:
  a) *systemic water quality monitoring under ecosystem restoration programs (e.g. EMP, NESP) and*
  b) *water quality monitoring for Clean Water Act purposes?*

Sampling coordination
- **Coordinate LTRM/ NESP efforts with non-LTRMP state staff on data collection schedules** (10)
- Make a collaborative effort to monitor and assess waterbodies (0)

Create database
- Create a master database to include both CWA and ecosystem restoration monitoring (6)
- Compile water quality and biological data on main stem and tributaries and qualify usefulness
- Collect information regarding what, why and purpose. Store the information in a common database, collect in a standard manner, and share information (0)
- Maintain citizen monitoring data in a database (0)

Systemic approach
- **Form a UMR water quality monitoring council** (15)
- Develop a 'nested' monitoring design that can be used to evaluate at several spatial scales (project to system) (4)
- Coordinate watershed and main stem water quantity/ quality network (1)
- Have an external review of ongoing monitoring programs (are we meeting management needs?) (0)
- Integrate monitoring and research efforts (0)
- Identify monitoring protocols for measuring and tracking indicators (0)
- Initiate monitoring on tributary networks of historic constituent transport, bathymetry and LiDAR (0)
- Encourage and support citizen-based monitoring activities (0)

Gap identification
- Update list of UMR current and historic monitoring stations and identify gaps (1)
- Water quality monitoring under NESP needs to have greater spatial coverage on UMR (1)

Use existing data
- **Summarize and share EMAP data** (7)
- Access and use existing data (LTRMP, EMAP, etc.) (0)
- Compare fixed station to continuous data and design future monitoring needs (0)
- Greater sharing of data among UMR water quality entities (0)
- Standardize water quality assessment on the Mississippi (4)
- Include states water quality parameters in data collection and provide data for 305b Reports (0)
- Use LTRMP data to see if projects have been successful (0)

Parameter selection and quality assessment
- **Compare quality assurance procedures for ecosystem restoration and the CWA** (7)
- Monitor parameters that can be used in ecosystem restoration and water quality programs (1)
- Develop criteria to assess ecosystem restoration projects (3)

Theme 5: Water Quality Considerations in Ecosystem Restoration Projects
What specific, valuable, activities can we do together to incorporate water quality considerations into the planning, design, construction and evaluation of EMP and NESP ecosystem restoration projects?

Monitor water quality at projects
- Measure water quality parameters pre- and post-project (10)
- Conduct pre-project water quality monitoring (0)
- Conduct turbidity monitoring transects within restored SAV project areas (2)
- Conduct 7-day continuous dissolved oxygen sampling and collect nutrient, pH samples in selected restored backwater project areas (2)
- Examine how have projects affected water quality by project type and pull together data
- **Model and predict the cumulative project impacts to water quality** (20)

Water criteria for projects
- Determine water criteria and management (2)
- Develop specific CWA criteria for ER projects (0)
- Clearly state (and document) desired water quality attributes for each objective (15)
- **Use biological metrics that have joint value for Clean Water Act assessments and ecosystem health evaluation (e.g. biological indices for fish, invertebrates and vegetation)** (23)

Specific project ideas
- Plan and design a landscape scale project (i.e. levee district) that can demonstrate main stem UMR benefits from reduced sediment input from tributaries (15)
- Compare nutrient retention/ water quality in main and side channels (2)
- Coordinate restoration projects in areas with water quality problems that are compatible (1)
- Complete Wetlands Reserve Program projects since they serve as sinks for nutrients (0)
- Make project water quality data available (STORET) (15)

Adaptive management of habitat projects based on water quality
- Better understanding of water quality impacts of restoration projects may allow us to modify restoration projects to get even more water quality benefits (5)
- Evaluate water quality benefits of restoration to garner more funding for restoration (2)
- Form workgroup to identify how ecosystem restoration contributes to CWA goals, and use this information to effect more and better ecosystem restoration projects (1)

Baseline conditions
- Determine a baseline water quality condition for the different habitat types associated with the NESP reaches (3)
- Use current water quality data to aid restoration design (15)

Include CWA experts in project teams
- **Insure that those responsible for water quality standards are involved in design of restoration projects** (34)
- Water quality expert participate in project formulation (0)
- Involve CWA water quality staff in ERP planning activities (0)
- Include an EPA or CWA representative on project delivery teams (0)
- Incorporate state and federal water quality experts into planning, design, etc. (0)
- NESP/ EMP needs to outline project types and features with water quality staff and collectively identify ways water quality can be included (6)