Stoney Creek Hotel
Moline, Illinois

Upper Mississippi River Restoration Program Coordinating Committee

Quarterly Meeting

February 7, 2018

Agenda

with
Background
and
Supporting Materials

UPPER MISSISSIPPI RIVER RESTORATION PROGRAM
COORDINATING COMMITTEE

February 6-7, 2018

AGENDA

Tuesday, February 6 Partner Quarterly Pre-Meetings

4:15 – 5:00 p.m. **Corps of Engineers**

4:15 – 5:00 p.m. **Department of the Interior**

4:15 – 5:00 p.m. **States**

Wednesday, February 7 UMRR Coordinating Committee Quarterly Meeting

Time	Attachment	Topic	Presenter
8:00 a.m.		**Welcome and Introductions**	***Brian Chewning**, USACE*
8:05	**A1-9**	**Approval of Minutes of November 8, 2017 Meeting**	
8:10		**Regional Management and Partnership Collaboration** ▪ UMRR Program Manager Position ▪ FY 2018 Fiscal Update and FY 2019 Outlook	***Marv Hubbell**, USACE*
	B1	▪ UMRR External Communications Strategy ▪ Public Outreach and Activities	***Angie Freyermuth**, USACE* ***All***
8:45		**UMRR Showcase Presentations** ▪ Steamboat Island HREP ▪ TBD	 ***Julie Millhollin**, USACE* ***TBD***
9:15	**C1-25**	**Long Term Resource Monitoring and Science** ▪ LTRM FY 2018 1st Quarter Highlights ▪ 2018 Science Meeting ▪ USACE LTRM Update ▪ FY 2018 Science Proposals ▪ A-Team Report	 ***Jeff Houser**, USGS* ***Karen Hagerty**, USACE* ***LTRM Management Team*** ***Matt Vitello**, MO DoC*
10:30		**Break**	
10:45		**Habitat Restoration** ▪ District Reports ▪ Project Schedule Over Next 1-3 Years ▪ Habitat Needs Assessment II	 ***District HREP Managers*** ***Nate De Jager**, USGS* ***Sara Schmuecker**, USFWS* ***Kathryn McCain**, USACE*
	D1-2	▪ Potential for Pool-Scale WLM Projects ▪ November 2017 HREP Strategic Planning Meeting and Next Steps	***TBD*** ***Marv Hubbell**, USACE and* ***Kirsten Mickelsen**, UMRBA*
11:50		**Other Business**	
	E1	▪ Future Meeting Schedule	
12:00 noon		**Adjourn**	

[See Attachment E for frequently used acronyms,
UMRR authorization (as amended), and UMRR (EMP) operating approach.]

ATTACHMENT A

Minutes of the November 8, 2017
UMRR Coordinating Committee Quarterly Meeting

(A-1 to A-9)

DRAFT
Minutes of the
Upper Mississippi River Restoration Program
Coordinating Committee

November 8, 2017
Quarterly Meeting

Hampton Inn and Suites Downtown
St. Paul, Minnesota

Sabrina Chandler of the U.S. Fish and Wildlife Service called the meeting to order at 8:00 a.m. on November 8, 2017. Other UMRR Coordinating Committee representatives present were Brian Chewning (USACE), Mark Gaikowski (USGS), Dan Stephenson (IL DNR), Randy Schultz (IA DNR), Megan Moore (MN DNR), Matt Vitello (MO DoC), Jim Fischer (WI DNR), Marty Adkins (NRCS), and Ken Westlake (USEPA) via phone. A complete list of attendees follows these minutes.

Minutes of the August 9, 2017 Meeting

Renee Turner requested that the second sentence in the third full paragraph on page A-2 is revised to clarify that Headquarters is not providing any indication that UMRR may receive $33.17 million in out-years. Rather, Headquarters simply provided guidance to include full funding in its range of planning scenarios. Marty Adkins suggested that his statement in the second line on page 2 be edited to "…two similar tributary areas that have been restored…"

Randy Schultz moved and Matt Vitello seconded a motion to approve the draft minutes of the August 9, 2017 UMRR Coordinating Committee meeting as provided in the agenda packet with the two corrections. The motion carried unanimously.

Regional Management and Partnership Collaboration

Program Manager

Andy Barnes acknowledged that Marv Hubbell's retirement in early 2018 is quickly approaching. Barnes said the Corps gave substantial consideration to the position's status and location. Ultimately, the District leadership agreed that the position will remain within the Rock Island District and that the opportunity to apply for the position will be open to all external candidates. Barnes said he anticipates that the position announcement will be published in early December 2017 and that the Corps will have the position filled by the February 2018 UMRR Coordinating Committee quarterly meeting.

Jim Fischer said the UMRR program manager is a very critical position from the partnership's perspective given the amount of direct coordination that partners have with the individual. In response to a question from Fischer, Barnes said the interview panel will include one Corps staff from each District. There will not be an opportunity for partners to be involved in the interview panel. However, Barnes assured the Coordinating Committee that the Corps is taking this position hiring process very seriously and understands the importance of the candidate to partners.

Fiscal Report

Marv Hubbell reported that UMRR achieved an execution rate of 92 percent in FY 2017. Hubbell applauded the partnership for another successful year and thanked all those involved in program implementation.

Hubbell said that, on September 8, 2017, Congress passed a continuing resolution authority (CRA) for FY 2018 that expires on December 8. 2017. District staff are authorized to execute the program at $33.17 million until Congress passes a full-year appropriations measure. The House and Senate Appropriations Committees both approved $33.17 million for UMRR in their respective FY 2018 energy and water appropriations measures. At the $33.17 million planning scenario, UMRR's FY 2018 internal allocations are as follows:

- Regional Administration and Programmatic Efforts — $1,110,000
- Regional Science and Monitoring — $9,325,000
  - Long term resource monitoring — $4,725,000
  - Regional science in support of restoration — $3,175,000
  - Regional science staff support — $150,000
  - Habitat project evaluations — $975,000
  - Habitat Needs Assessment II — $300,000
- Habitat Restoration — $22,735,000
  - Regional project sequencing — $100,000
  - MVP — $10,922,000
  - MVR — $5,747,000
  - MVS — $5,966,500

Hubbell explained that the FY 2018 District HREP allocations above reflect repayment after transferring work among Districts in FY 2017. In response to a question from Kirsten Mickelsen, Hubbell explained that the Corps has developed contingency plans should any challenges arise to executing McGregor Lake. Sabrina Chandler expressed appreciation to District staff for flexibility in transferring money among Districts. Hubbell credited MVD staff for their involvement and responsiveness in ensuring that the FY 2017 execution rate was achieved.

As typical, District staff have provided spending plans associated with several funding scenarios to USACE Headquarters for its use in developing the agency's FY 2019 budget recommendations. Hubbell discussed revisions to the six-year plan for habitat projects using the diagram below, noting that many project schedules were advanced given the increased funding in FYs 2017 and 2018.

External Communications

Mickelsen recalled that, at its August 9, 2017 meeting, the UMRR Coordinating Committee reflected on the importance for UMRR to engage the public and other external audiences. The Committee recognized the priority given to external communications in the 2015-2025 UMRR Strategic Plan and agreed to develop a more detailed recommendation for implementing a communication strategy. This involved providing specific recommendations with assigned roles and responsibilities, including better utilizing the partnership's communications network. Since the August 2017 quarterly meeting, the UMRR *ad hoc* Communications Team agreed that more direction from the UMRR Coordinating Committee is needed regarding communications strategies over the long term and whether there should be a certain amount of dedicated funding.

Mickelsen said the *ad hoc* Communications Team is recommending that the UMRR Coordinating Committee task a group of partners to develop a more detailed implementation plan for external communications and identify any considerations that the Committee would need to address – e.g., annual resources.

Karen Hagerty recognized the Communications Team's accomplishments thus far, including folders of various communications materials for partners to distribute. The folders include a placeholder for business cards and fact sheets on LTRM and other matters.

Brian Chewning applauded the authors of the 2016 UMRR Report to Congress, noting that it includes many compelling messages about the program's achievements, partnership, and implementation effectiveness. Chewning said the major takeaway from the report is that UMRR has a significant value to the nation. Mickelsen agreed with Chewning's observation while pointing out that UMRR is not reaching key audiences to inform them of UMRR.

Bryan Hopkins recognized the value of a "friends" group to serve as a voice. Olivia Dorothy mentioned that McKnight Foundation is providing funding for the Mississippi River Network's 1 Mississippi campaign. Dorothy said she had talked with Hubbell and Hagerty about the potential to collaborate. Dorothy encouraged the UMRR Coordinating Committee to consider opportunities to leverage resources through the 1 Mississippi campaign. A potential opportunity could include surveying the public regarding values associated with the UMRS and how the river should be managed.

Dru Buntin recalled that a primary driver behind communications being a strong component of the UMRR's 2015-2025 Strategic Plan was the Administration's questioning to District staff regarding when restoration on the UMRS will be finished. Buntin said other large aquatic ecosystem programs like the Everglades and Chesapeake Bay do a much better job of telling their stories and emphasizing the value of their work. Those programs have staff dedicated to carrying out communications and education strategies. UMRR's *ad hoc* nature of doing communications has not been effective. The Corps had offered a dedicated staff person but that option does not appear to be feasible for a number of reasons, including competing with other Corps' communications needs. Buntin advised that UMRR develop more specific direction regarding external communications.

Sabrina Chandler recommended that communications professionals be involved in developing and carrying out UMRR's communications strategies. Chandler suggested that the UMRR Coordinating Committee convene via conference call to develop objectives for external communication with sufficient direction to contract out the execution. Marty Adkins recognized that institutional frameworks should also be considered – i.e., how can the partnership network be best utilized.

Mark Gaikowski offered the Asian Carp Regional Coordinating Committee as an example. The Committee has a sub-group that focuses specifically on internal and external communications. The

group developed an initial plan and then assigned responsibilities for various outreach strategies. Gaikowski encouraged the UMRR Coordinating Committee to consider a similar model. Chandler echoed Gaikowski's recommendation and advised that a single point-of-contact be responsible for organizing UMRR's external communications strategies.

Hubbell noted two take-aways from the discussion, including that 1) there is consensus around creating a focus group to develop more detailed operational tasks for external communication and 2) District staff will consider feasibility for allocating dedicated staff time.

Andy Barnes clarified that Col. Craig Baumgartner is not opposed to using a contractor to develop communications materials. However, Col. Baumgartner is cautious to have a non-federal partner implement the communications strategies when that partner may also advocate to Congress for federal funding to the program.

The UMRR Coordinating Committee agreed with Chandler's suggestions to convene a conference call.

Program Showcases

Peterson Lake HREP

Rob Burdis presented on proposed modifications to Peterson Lake HREP to better achieve the project's habitat goals and objectives. Peterson Lake HREP was completed in 1995 and a 2011 adaptive management evaluation was used to justify the improvement efforts.

Burdis described Peterson Lake as a 500-acre backwater lake located in Pool 4 between a string of main channel border islands on the Minnesota shoreline. There are 13 inflow channels to the lake along its northeast perimeter and one outflow channel located to the southeast. Peterson Lake includes a variety of habitat types, including deep water without aquatic vegetation, shallow water with and without vegetation, riparian islands, and areas with little and moderate flows.

Burdis explained that the area changed dramatically following the construction of L&D 4 with the substantial loss of marshes and islands as well as backwater habitat areas. General goals for Peterson Lake HREP were to reduce sedimentation into the project area, stabilize barrier islands, improve migratory waterfowl habitat, and improve fish habitat in winter. More specifically, the HREP intended to maintain Peterson Lake as a productive backwater resource, optimizing habitat conditions for migratory waterfowl and native fish species such as largemouth bass, northern pike, bluegill, crappie, and associated species. Burdis explained Peterson Lake HREP's features, which included a combination of channel closures, weirs, fish access channels, and rock bank and mound protection. Burdis overviewed the project evaluation monitoring scope and discussed the results related to temperature, dissolved oxygen, bathymetry, and turbidity.

In response to a question from Randy Schultz, Sabrina Chandler explained that Peterson Lake has voluntary avoidance with established corridors for boaters to limit disturbances to birds.

Habitat Needs Assessment

Information Summary Report – Existing State of the System

Nate De Jager presented on the results of the HNA II's inventory of habitat and ecosystem conditions within the UMRS and discussed how information can be used to make more meaningful assessments. This is the first major effort in a two-part process. De Jager reminded the UMRR Coordinating Committee that the HNA II purposes are to:

- Develop data sets and quantitative measures (i.e., indicators) for as many UMRS objectives as possible and for the entire system
- Focus on ecosystem structure, function, and resilience at a broad-scale (navigation pool and larger)
- Inform management targets and ranges for indicators

De Jager explained the explicit relationship of the HNA II to the Essential Ecosystem Characteristics and general ecosystem resilience. The HNA II report outline focuses on the three characteristics of general resilience: connectivity, diversity and redundancy, and slow variables and feedbacks. De Jager showcased illustrations depicting the habitat conditions as related to connectivity and water surface elevation fluctuations (a slow variable).

De Jager reported on the development of aquatic and floodplain function classes that collectively define the fundamental aspects of UMRS habitat conditions. About 50 metrics were developed to describe the physical attributes of more localized aquatic areas. Thirteen aquatic functional classes were created and mapped using 11 combinations of those 50 metrics. De Jager overviewed a map output of those aquatic functional classes in Pools 8 and 26. De Jager said the floodplain functional classes were defined by a flood inundation model that utilized multiple attributes, including frequency, depth, duration, timing, and timing variability of inundation. Both the aquatic and floodplain functional classes datasets will be available via shapefile. De Jager also discussed the development of a sedimentation model and how that will be used to better understand potential forest succession scenarios. The methodologies for defining the aquatic and floodplain functional classes as well as for developing the sedimentation and forest succession models will be provided in appendices to the HNA II report.

De Jager said next steps will include:

1. Finalizing the development of inundation and forest succession models and associated indicators
2. Drafting a "future directions" section in the HNA II report
3. Employing a peer-review of the HNA II report and associated data layers
4. Initiate discussions regarding establishing targets and criteria for various indicators

In response to a question from Megan Moore, Kat McCain said that Chuck Theiling had observed that the cluster analysis of habitat conditions in navigation pools matches fairly closely with the geomorphic reaches.

Tim Yager observed that the HNA II approach and information would be helpful at a landscape analysis across the Midwest. Kirsten Mickelsen observed that Yager's suggestion aligns with Goal 3 of the 2015-2025 UMRR Strategic Plan, which calls for more direct coordination and information sharing with related organizations in the watershed.

Management Response to Information – System Assessment

McCain explained that the HNA II Steering Committee is struggling with how to develop the system assessment using the information described by De Jager. The information provides a fundamental shift in how habitat needs can be assessed. McCain said the HNA II tri-chair leads would like to request input from the UMRR Coordinating Committee regarding the definition of acceptable ranges for the indicators. More specifically, McCain pointed to the specific questions on page B-3 of the agenda packet for the Coordinating Committee to consider. She noted the substantial complexity involved in determining a desired future and habitat needs for what and where. In response to a question from Moore, McCain explained that there would be a set of targets or acceptable ranges for each cluster or

geomorphic reach. Additional analyses may be required in order to determine thresholds or acceptable ranges. De Jager clarified that this will not require specific numbers for individual indicators. He said the HNA II should be thought of as a planning effort to move the indicators along a particular trajectory. The indicators should not be evaluated individually (e.g., surface water elevation) but as a collective of indicators that represent a habitat condition.

In response to a question from Chandler to answer McCain's questions from page B-3, Matt Vitello moved and Randy Schulz seconded a motion to:

1. Endorse the notion of using the HNA II aquatic and floodplain functional classes to represent broad habitat categories for the system.
2. Direct the HNA II Steering Committee to develop recommendations for acceptable ranges for the HNA II indicators for the UMRR Coordinating Committee's consideration.

In response to a request from Chandler, Mickelsen said she can work with McCain and Sara Schmuecker to develop a one- to two-page schedule and process outline for future work.

Karen Hagerty suggested that the A-Team be consulted and involved in the HNA II information and system assessment development.

Habitat Restoration

District Reports

St. Louis District

Brian Markert reported that Tim Eagan is no longer with the U.S. Army Corps of Engineers. Markert introduced Jasen Brown who is currently serving in a detail to fill the project management position. Markert explained that the St. Louis District is considering alternative designs for Rip Rap Landing to avoid existing constraints resulting from an existing WRP easement. MVS is undergoing a robust planning effort to maintain an adequate pipeline of habitat projects, including Piasa and Eagles Nest Islands, Crains Open River Island, Harlow Open River Islands, and Oakwood Bottoms. Markert said the District anticipates finalizing design work on Clarence Cannon's pump station this fiscal year and awarding a construction contract. Final punch list items are being completed on Ted Shanks.

St. Paul District

Tom Novak said MVP is aggressively advancing work on McGregor Lake Islands, anticipating finalizing plans and design work and awarding a construction contract this fiscal year. The District is also developing plans for Bass Lake Ponds and is working with the District's Fish and Wildlife Work Group to select the next two to three UMRR habitat projects. Novak reported that MVP anticipates awarding a construction contract for Conway Lake and finalizing construction on Harpers Slough this fiscal year and turning the project over to USFWS.

Rock Island District

Marv Hubbell said MVR is continuing planning work on Keithsburg and Steamboat Island habitat projects. Other projects previously in the planning queue have each encountered unique issues that prevent them from advancing. This has created a shortage of projects within the District. However, Hubbell said the District's Fish and Wildlife Work Group is evaluating 10 potential habitat projects to recommend for implementation. MVR is focusing its design work on Beaver Island and may begin

construction on the project this fiscal year. The District is also advancing construction on Pool 12 Overwintering, Huron Island Stages II and III, Rice Lake Stage I, and Beaver Island.

HREP Partnership Meeting

Hubbell reported that a UMRR HREP strategic planning meeting is scheduled for November 29-30, 2017 in Dubuque. A range of issues that are affecting UMRR implementation will be discussed. Hubbell said he will provide a summary of the discussion and any outcomes at the UMRR Coordinating Committee's February 7, 2018 quarterly meeting.

Long Term Resource Monitoring and Science

FY 2017 4th Quarter Report

Jeff Houser reported that accomplishments of the fourth quarter of FY 2017 include the publication of five manuscripts:

1. Hydrology controls recruitment of two invasive cyprinids: bigheaded carp reproduction in a navigable large river
2. Effects of flood inundation and invasion by Phalaris arundinacea on nitrogen cycling in an Upper Mississippi River floodplain forest
3. Lake sturgeon and shovelnose sturgeon environmental life history revealed using pectoral finray microchemistry: implications for interjurisdictional conservation through fishery closure zones
4. An interdisciplinary human-environmental examination of effects consistent with the anthropocene in the Lower Illinois River Valley
5. Evaluating the fish community in a rare backwater habitat in the Middle Mississippi River

Houser explained that UMESC staff are currently reviewing the results of new water quality testing equipment to ensure accuracy and consistency with existing equipment. Houser said such testing is standard practice when new equipment is acquired. Reports will be published that summarize the findings. UMESC is working with the equipment manufacturer to address issues regarding ammonia testing. Jim Fischer recalled that the existing equipment was used when it was originally purchased in 1993, noting the overall efficiency and low-cost of the UMESC LTRM laboratory. Fischer reflected on the UMRR Coordinating Committee's decision to bring the laboratory in-house and said move has paid tremendous dividends, especially when comparing to the cost of contracting to an external laboratory. Karen Hagerty said she appreciates this discussion as it highlights the importance of base monitoring and the value associated with the investment to keep it running.

FY 2018 Science Plan

Houser discussed plans for the January 16-18, 2018 UMRR LTRM science meeting. The meeting's purposes are to foster a collaborative approach for developing science in support of river management, to more effectively incorporate UMRR's LTRM strengths, and facilitate a more direct interaction between management and restoration practitioners and researchers as research proposals are being developed. The meeting will focus on 1) assessing current research needs to improve the understanding, management, and restoration of the UMRS; and 2) identifying specific research proposals with associated scopes of work for FY 2018. Participants will reference the UMRR LTRM research frameworks, reports and recommendations from the two previous workshops regarding sedimentation and geomorphology, as well as information needs and research opportunities discussed throughout the ecological resilience, HNA II, and 2009 reach planning effort.

Houser explained that participants will form working groups during the meeting to further develop and refine research proposals, including further specifying questions and identifying main tasks and resource needs. A lead and a few initial members for each working group will be determined in advance of the meeting so they have time to prepare. Summaries of the selected research proposals and associated scopes of work will be presented to the UMRR Coordinating Committee for its consideration of endorsement at its February 7, 2018 meeting.

USACE LTRM Report

Karen Hagerty reported that the anticipated FY 2018 UMRR budget for LTRM is $5.75 million, including $4.75 million for base monitoring and $1.025 million for science in support of restoration (i.e., analysis under base monitoring). Hagerty said an additional $2.15 million is available for science-related efforts.

A-Team Report

Matt Vitello reported that the A-Team held an in-person meeting on October 3, 2017 in conjunction with the UMRCC Fish and Wildlife Tech Section. The agenda included an updates on UMRR's budget, LTRM-related efforts, ecological resilience, and HNA II. In addition, the A-Team discussed planning for science research in FY 2018.

Other Business

Appreciation to Mike Griffin and Dan Stephenson

The UMRR Coordinating Committee recognized Mike Griffin and Dan Stephenson for their contributions to river management and UMRR. They have both announced their retirements in the near future. Griffin has been involved with UMRR since its first years, including building the program's foundation and fostering its partnership network.

Future Meetings

The upcoming quarterly meetings are as follows:

- **February 2018 — Moline**
  - UMRBA quarterly meeting — February 6
  - **UMRR Coordinating Committee quarterly meeting — February 7**
- **May 2018 — St. Louis**
  - UMRBA quarterly meeting — May 15
  - **UMRR Coordinating Committee quarterly meeting — May 16**
- **August 2018 — La Crosse**
  - UMRBA quarterly meeting — August 14
  - **UMRR Coordinating Committee quarterly meeting — August 15**

With no further business, the meeting adjourned at 12:20 p.m.

UMRR Coordinating Committee Attendance List
November 8, 2017

UMRR Coordinating Committee Members

Brian Chewning	U.S. Army Corps of Engineers, MVD
Sabrina Chandler	U.S. Fish and Wildlife Service, UMR Refuges
Mark Gaikowski	U.S. Geological Survey, UMESC
Dan Stephenson	Illinois Department of Natural Resources
Randy Shultz	Iowa Department of Natural Resources
Megan Moore	Minnesota Department of Natural Resources
Matt Vitello	Missouri Department of Conservation
Jim Fischer	Wisconsin Department of Natural Resources
Marty Adkins	Natural Resources Conservation Service
Ken Westlake	U.S. Environmental Protection Agency, Region 5 [On the phone]

Others In Attendance

Renee Turner	U.S. Army Corps of Engineers, MVD
Gary Young	U.S. Army Corps of Engineers, MVD
Kat McCain	U.S. Army Corps of Engineers, MVP
Tom Novak	U.S. Army Corps of Engineers, MVP
Aaron Snyder	U.S. Army Corps of Engineers, MVP
Andy Barnes	U.S. Army Corps of Engineers, MVR
Jody Creswell	U.S. Army Corps of Engineers, MVR
Marvin Hubbell	U.S. Army Corps of Engineers, MVR
Karen Hagerty	U.S. Army Corps of Engineers, MVR
Jasen Brown	U.S. Army Corps of Engineers, MVS
Brian Johnson	U.S. Army Corps of Engineers, MVS
Brian Markert	U.S. Army Corps of Engineers, MVS
Tim Yager	U.S. Fish and Wildlife Service, UMR Refuges
Sara Schmuecker	U.S. Fish and Wildlife Service, RIFO [On the phone]
Scott Morlock	U.S. Geological Survey, Missouri Water Science Center
Jeff Ziegeweid	U.S. Geological Survey, Iowa-Illinois Water Science Center
Jeff Houser	U.S. Geological Survey, UMESC
Jennie Sauer	U.S. Geological Survey, UMESC
Nate De Jager	U.S. Geological Survey, UMESC [On the phone]
Jessica Weis	Natural Resources Conservation Service, Minnesota
Sanjay Sofat	Iowa Environmental Protection Agency
Mike Griffin	Iowa Department of Natural Resources
Kirk Hansen	Iowa Department of Natural Resources
Rob Burdis	Minnesota Department of Natural Resources
Dru Buntin	Missouri Department of Natural Resources
Bryan Hopkins	Missouri Department of Natural Resources
Olivia Dorothy	American Rivers
Tim Schlagenhaft	Audubon, Minnesota
Mark Ellis	Upper Mississippi River Basin Association
Kirsten Mickelsen	Upper Mississippi River Basin Association

ATTACHMENT B

Excerpt of Goal 3 of the 2015-2025 UMRR Strategic Plan

(B-1)

GOAL 3 — ENGAGE AND COLLABORATE WITH OTHER ORGANIZATIONS AND INDIVIDUALS TO HELP ACCOMPLISH THE UPPER MISSISSIPPI RIVER RESTORATION VISION

The Upper Mississippi River is a large, complex, and dynamic ecosystem that is heavily influenced by human activity throughout its watershed. While UMRR makes significant contributions to enhancing the river ecosystem's health and resiliency, it cannot and should not attempt to meet all management needs for improving river's health. No one agency or program can solely manage this multi-use ecosystem. Rather, successful management of the UMR requires thoughtful and meaningful coordination among numerous agencies, organizations, and individuals with varying mandates and missions. This includes state and federal agencies with responsibilities related to natural resources, water quality, agriculture, transportation, and recreation; non-governmental organizations; industry representatives; academics; and the public. UMRR can aid other programs and projects that have influence on the Upper Mississippi River's condition. For example, UMRR's various datasets are readily available for broad use by Clean Water Act programs and other river managers and researchers. It will be increasingly important for UMRR to work within a watershed context and create synergies with programs and projects that will affect the Upper Mississippi River's health and resilience. In addition, interactions with other organizations and individuals that manage and conduct research nationally and internationally offer UMRR cost efficiencies and insights not otherwise available.

Objective 3.1	**Work with key organizations and individuals in the Upper Mississippi River watershed**
Strategy 1	Ensure rich collaboration with key organizations and individuals in the Upper Mississippi River watershed in advancing complementary visions, missions, and goals
Strategy 2	With key watershed programs and projects, jointly develop and communicate common messages about the restoration and knowledge needs of the Upper Mississippi River
Strategy 3	Seek knowledge from other organizations and individuals for the purposes of being aware of activities that may influence UMRR's work and enhancing programmatic efforts
Strategy 4	Directly engage relevant organizations or individuals in implementing UMRR's efforts, as appropriate
Objective 3.2	**Provide information to organizations and individuals whose actions and decisions affect the Upper Mississippi River ecosystem**
Strategy 1	Enhance the delivery and utility of UMRR's knowledge in order to increase understanding of the Upper Mississippi River's ecosystem drivers and means to achieve the UMRR vision
Strategy 2	Provide decision makers with timely, relevant, understandable, and usable knowledge about the needs and tools available to advance the UMRR's vision
Objective 3.3	**Exchange knowledge with other organizations and individuals nationally and internationally**
Strategy 1	Serve as a resource for similar programs nationally and internationally
Strategy 2	Seek knowledge from other organizations and individuals nationally and internationally to enhance UMRR's efforts in advancing its vision

ATTACHMENT C

Long Term Resource Monitoring and Science

- **FY 2014-FY 2015 UMRR Science Activities in Support of Restoration and Management (1/19/2018)** *(C-1)*
- **FY 2017 UMRR Science Activities in Support of Restoration and Management (1/19/2018)** *(C-2)*
- **Base Monitoring Scope of Work thru 2nd Quarter of FY 2018 (1/23/2018)** *(C-3 to C-5)*
- **FY 2018 UMRR Science Activities in Support of Restoration and Management (1/23/2018)** *(C-6 to C-11)*
- **2018 UMRR Science Meeting**
  - **Work Group Descriptions** *(C-12 to C-17)*
  - **Meeting Attendees** *(C-18 to C-19)*
- **FY 2018 Science Proposals (12/18/2017)** *(C-20 to C-25)*

UMRR Science in Support of Restoration and Management
FY2014 and FY2015 Scopes of Work
January 2018 Status

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
Development of Mussel Vital Rates						
2014MVR1	Brief summary report	30-Sep-15		30-Sep-15	completed, in UMESC review	Newton, Zigler, Davis
2014MVR2	Progress update	30-Sep-16		30-Sep-16		Newton, Zigler, Davis
2014MVR3	Completion report on a vital rates of native mussels at West Newton Chute, UMRS	30-Sep-17	30-Oct-17	24-Oct-17	in final review	Newton, Zigler, Davis
Effects of Nutrient Concentrations on Zoo- and Phytoplankton						
2014NC1	Counting of phytoplankton samples	13-Mar-15		2-Mar-15		Giblin, Campbell, Houser, Manier
2014NC2	Database completed and analysis completed	13-Mar-16	28-Feb-18		Working With UWL staff. Analysis partally complete.	Giblin, Campbell, Houser, Manier
2014NC3	Full manuscript completed	13-Mar-18				Giblin, Campbell, Houser, Manier
Plankton community dynamics in Lake Pepin						
2015LPP1	Phytoplankton processing; species composition, biovolume	30-Dec-15		22-Oct-15		Burdis
2015LPP2	draft manuscript: Plankton community dynamics in Lake Pepin	30-Sep-16	30-Mar-18		delayed due to field station staffing shortages and will also include data from 2015D15	Burdis
Predictive Aquative Cover Type Model - Phase 2						
2015AQ1	Develop 2-D hydraulic model of upper Pool 4	30-Sep-15		30-Sep-15		Libbey (MVP H&H)
2015AQ2	Apply model to Pool 4 and resolve discrepancies	31-Dec-15	31-Mar-16	31-Mar-16		Yin, Rogala
2015AQ3	Detailed summary of work for Phases I & II	31-Dec-15	31-Dec-17		Resolving model discrepancy took longer than anticipated. Last extension.	Yin, Rogala, Ingvalson

UMRR Science in Support of Restoration and Management
FY2017 Workplan Scope of Work
January 2018 Status

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
Extrinsic and intrinsic control of water clarity in Pool 8 of the UMR						
2018BX1	Draft manuscript: Extrinsic vs Intrinsic Control of Water Clarity in the UMR	30-Mar-18				Drake, Weeks. Kalas, Fischer, Houser and Jankowski
Developing methods of estimating SAV biomass in the UMR to expand the capabilities within the UMRR program and improve the utility of the long-term vegetation data						
2018BIO1	Completion of USFWS collaborative field work, data entry, laboratory work and LTRM additional field data collection	30-Aug-17		30-Aug-17		Drake, Holman, Lund
2018BIO2	Draft LTRM Completion Report: Estimating biomass of submersed aquatic vegetation in the UMR	30-Mar-18				Drake, Holman, Lund
2018BIO3	Final LTRM Completion report: Estimating biomass of submersed aquatic vegetation in the UMR	30-Oct-18				Drake, Holman, Lund
Plankton community dynamics in Lake Pepin - the role of curstacean zooplankton						
2018PLK1	Three year (2012-2014) data set of Lake Pepin crustacean zooplankton data. Crustacean zooplankton samples collected at four fixed sites in Lake Pepin will be processed to obtain species composition and biomass estimates	30-Mar-18				Burdis
2018PLK2	Analysis: Data would be paired with existing rotifer (2015D15) and phytoplankton (2015LPP2)	31-Dec-18				Burdis
Smallmouth buffalo population demographics of the UMRS						
2018MMBF1	Collection of smallmouth buffalo for otoliths	31-Oct-17		31-Oct-17		Field Stations Fish Component Staff
2018MMBF2	Transfer of fish to IRBS	30-Nov-17		29-Nov-17		Solomon, Maxson
2018MMBF3	Processing of otoliths	30-May-18				Solomon, Maxson
2018MMBF4	Analysis: Mixed modeling approach to separate growth responses into	30-Jun-18				Ickes, Solomon, Maxson
2018MMBF5	Draft analysis methods and results write-up	30-Sep-18				Ickes
2018MMBF6	Draft LTRM Completion Report	30-May-19				Solomon, Maxson, et al.
4-Band aerial camera acquisistion, integration, and testing for the 2020 LCU mission						
2018CAM1	Collection of test 4-band imagery, evaluation of image quality and image processing using HT Condor distributed processing software.	Summer 2018				Robinson
2018CAM2	Collection and evaluation of sample floodplain at various resolutions above and below Lock and Dam 13 (where the Upper Mississippi River transitions from a floodplain composed complex aquatic vegetation above to a more channelized system that is largely agrarian in nature below).	Summer 2019				Robinson
2018CAM3	Draft LTRM Completion report detailing integration and testing procedures and recommendations of optimal image resolution for the 2020 systemic imagery collection.	Fall 2019				Robinson
2018CAM4	Final LTRM Completion report with sample images detailing integration and testing procedures and recommendations of optimal image resolution and final flight plan for the 2020 systemic imagery collection.	Winter 2019				Robinson
UMRR LTRM WQ lab modernization						
2018LM1	Contract design work	30-Sep-18				Goede, Yuan, Sauer
2018LM2	Purchase of walk-in refrigerator/freezer	30-Sep-18				Yuan
2018LM3	Construction complete	30-Sep-20				Goede, Yuan, Sauer

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
Aquatic Vegetation Component						
2018A1	Complete data entry and QA/QC of 2017 data; 1250 observations.					
	a. Data entry completed and submission of data to USGS	30-Nov-17		30-Nov-17		Lund, Drake, Bales
	b. Data loaded on level 2 browsers	15-Dec-17		15-Dec-17		Schlifer
	c. QA/QC scripts run and data corrections sent to Field Stations	28-Dec-17		28-Dec-17		Sauer, Schlifer
	d. Field Station QA/QC with corrections to USGS	15-Jan-18		15-Jan-18		Lund, Drake, Bales
	e. Corrections made and data moved to public Web Browser	30-Jan-18		30-Jan-18		Yin, Sauer, Schlifer, Caucutt
2018A2	Web-based: Creating surface distribution maps for aquatic plant species in Pools 4, 8, and 13; 2017 data	31-Jul-18				Yin, Rogala, Schlifer
2018A3	Wisconsin DNR annual summary report 2017 that combines current year observations from LTRM with previous years' data, for the fish, aquatic vegetation, and water quality components.	30-Sep-18				Drake, Bartels, Hoff, Kalas
2018A4	Complete aquatic vegetation sampling for Pools 4, 8, and 13 (Table 1)	31-Aug-18				Yin, Lund, Drake, Bales
2018A5	Pool 4: Graphical summary and maps of aquatic vegetation current status and long-term trends.	30-Dec-17		12-Sep-17		Lund
2018A6	Pool 8: Graphical summary and maps of aquatic vegetation current status and long-term trends.	30-Dec-17				Drake, Weeks
Intended for distribution						
LTRM Technical Report: Ecological Assessment of High Quality UMRS Floodplain Forests (2007APE12; Chick, Guyon, Battaglia) (in final edits with author)						
LTRM Technical Report; Experimental and Comparative Approaches to Determine Factors Supporting or Limiting Submersed Aquatic Vegetation in the Illinois River and its Backwaters (2008APE5, Sass) (Completed)						
LTRM completion report: FY05-07 data--Analysis and support of aquatic vegetation sampling data in Pools 6, 9, 18, and 19 (2008APE4a; Yin) (in USGS review) (With author for revision)						
Manuscript: Have the recent increases in aquatic vegetation in Pools 5 and 8 been the result of water level management drawdowns, HREPs, or natural fluctuations? (2009APE1a; Yin) (in USGS review) (With author for revision)						
Manuscript: A statistical model of species occupancy using the LTRM aquatic vegetation data (2013A7; Yin) (in USGS review) (With author for revision)						
Fisheries Component						
2018B1	Complete data entry, QA/QC of 2017 fish data; ~1,590 observations					
	a. Data entry completed and submission of data to USGS	31-Jan-18				DeLain, Bartels, Bowler, Ratcliff, Gittinger, West, Solomon, Maxson
	b. Data loaded on level 2 browsers; QA/QC scripts run and data corrections sent to Field Stations	15-Feb-18				Ickes, Schlifer
	c. Field Station QA/QC with corrections to USGS	15-Mar-18				DeLain, Bartels, Bowler, Ratcliff, Gittinger, West, Solomon, Maxson
	d. Corrections made and data moved to public Web Browser	30-Mar-18				Ickes, Sauer, and Schlifer
2018B2	Update Graphical Browser with 2017 data on Public Web Server.	31-May-18				Ickes, Sauer, and Schlifer
2018B3	Complete fisheries sampling for Pools 4, 8, 13, 26, the Open River Reach, and La Grange Pool (Table 1)	31-Oct-18				Ickes, Sauer, DeLain, Bartels, Bowler, Ratcliff, Gittinger, West, Solomon, Maxson, Schlifer
2018B4	Summary Letter: Floodplain fisheries sampling	31-Oct-18				West, Sobotka
2018B5	IDNR Fisheries Management State Report: Fisheries Monitoring in Pool 13, Upper Mississippi River, 2017	30-Jun-18				Bowler

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
2018B6	Sample collection, database increment, Summary letter on Asian carp age and growth: collection of cleithral bones	31-Jan-18				Solomon, Maxson, Casper
2018B8(D)	Database increment: Stratified random day electrofishing samples collected in Pools 9–11	30-Sep-18				Bowler
2018B9(D)	Database increment: Stratified random day electrofishing samples collected in Pools 16–18	30-Sep-18				Bowler
2018B10	Summary Letter: Open River Chevron Dike monitoring	31-Oct-18				West, Sobotka
2018B11	Summary Letter: Evaluating the Fish Community in a rare Backwater Habitat in the Middle Mississippi River 2017	30-Sep-18				West
2017B4	Summary Letter: Floodplain fisheries sampling	31-Oct-17		31-Oct-17		West, Sobotka
2017B10	Summary Letter: Open River Chevron Dike monitoring	31-Oct-17		31-Oct-17		West
Intended for distribution						
Completion report: LTRM Fisheries Component collection of six darter species from 1989–2004. (2006B13; Ridings) (in USGS review)						
LTRM technical report; Setting quantitative fish management targets for LTRM monitoring (2008APE2; Sass) (Completed)						
LTRM Completion report, compilation of 3 years of sampling: Fisheries (2009R1Fish; Chick et al.) (in USGS review)						
LTRM Fact Sheet: Tree map tool for visualizing fish data, with example of native versus non-native fish biomass (2013B16) (Programming code for TreeMap being re-written; once completed Fact Sheet will be edited)						
Manuscript: Determining environmental history of three sturgeon species in the Upper, Middle, and Lower Mississippi Rivers. (2013B22; Phelps) (Phelps, Q. E., Hupfeld, R. N. and Whitledge, G. W. 2017. Lake sturgeon *Acipenser fulvescens* and shovelnose sturgeon *Scaphirhynchus platorynchus* environmental life history revealed using pectoral fin-ray microchemistry: implications for interjurisdictional conservation through fishery closure zones. J Fish Biol, 90: 626–639. doi:10.1111/jfb.13242)						
Manuscript: Age-0 sturgeon habitat associations in the free flowing portion of the Upper Mississippi River (2012B5; Tripp, Phelps, Herzog) (Sechler, D. R., Q. E. Phelps, S. J. Tripp, J. E. Garvey, D. P. Herzog, D. E. Ostendorf, J. W. Ridings, J. W. Crites & R. A. Hrabik. 2012. Habitat for Age-0 Shovelnose Sturgeon and Pallid Sturgeon in a Large River: Interactions among Abiotic Factors, Food, and Energy Intake. North American Journal of Fisheries Management Vol. 32 , Iss. 1, Pages 24-31, 2012 http://dx.doi.org/10.1080/02755947.2012.655848)						
Water Quality Component						
2018D1	Complete calendar year 2017 fixed-site and SRS water quality sampling	31-Dec-17		31-Dec-17		Jankowski, Burdis, Kalas, Kueter, L. Gittinger, Kellerhals, Sobotka
2018D2	Complete laboratory sample analysis of 2017 fixed site and SRS data; Laboratory data loaded to Oracle data base.	15-Mar-18				Yuan, Schlifer
2018D3	1st Quarter of laboratory sample analysis (~12,600)	30-Dec-18				Yuan, Manier, Burdis, Kalas, Kueter, L. Gittinger, Cook, Sobotka
2018D4	2nd Quarter of laboratory sample analysis (~12,600)	30-Mar-18				Yuan, Manier, Burdis, Kalas, Kueter, L. Gittinger, Kellerhals, Sobotka
2018D5	3rd Quarter of laboratory sample analysis (~12,600)	29-Jun-18				Yuan, Manier, Burdis, Kalas, Kueter, L. Gittinger, Kellerhals, Sobotka
2018D6	4th Quarter of laboratory sample analysis (~12,600)	28-Sep-18				Yuan, Manier, Burdis, Kalas, Kueter, L. Gittinger, Kellerhals, Sobotka

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
2018D7	Complete QA/QC of calendar year 2017 fixed-site and SRS data.					
	a. Data loaded on level 2 browsers; QA/QC scripts run; SAS QA/QC programs updated and sent to Field Stations with data.	30-Mar-18				Schlifer, Rogala, Jankowski
	b. Field Station QA/QC; USGS QA/QC.	15-Apr-18				Jankowski, Rogala, Burdis, Kalas, Kueter, L. Gittinger, Kellerhals, Sobotka
	c. Corrections made and data moved to public Web Browser	30-Apr-18				Rogala, Schlifer, Jankowski
2018D8	Complete FY2018 fixed site and SRS sampling for Pools 4, 8, 13, 26, Open River Reach, and La Grange Pool	30-Sep-18				Jankowski, Burdis, Kalas, Kueter, L. Gittinger, Kellerhals, Sobotka
2018D9	WEB-based annual Water Quality Component Update w/ 2016 data on Server.	30-May-18				Rogala
2018D10	Final LTRM Completion report: Evaluation of water quality data from automated sampling platforms	30-Sep-17	30-Sep-18			Soeken-Gittinger, Lubinski, Chick, Houser
2018D11	Operational Support to the UMRR LTRM Element. Serve as in-house Field Station for USGS for consultation and support on various LTRM-wide topics	30-Sep-18				Kalas, Hoff, Bartel, Drake
2015D12	Final report/manuscript: Developing continuous water quality monitoring methods in the UMR	1-Sep-17	1-Sep-18			Chick, Houser
Intended for distribution						
Completion report: Examining nitrogen and phosphorus ratios N:P in the unimpounded portion of the Upper Mississippi River (2006D9; Hrabik & Crites) (in USGS review)						
Completion report, compilation of 3 years of sampling: Water Quality (2009R1WQ; Giblin, Burdis) (in USGS review)						
Manuscript: Nutrients and dissolved oxygen in the UMRS: improving our understanding of winter conditions and their implications for structure and function of the river (2014D12; Houser) (in USGS review)						
Land Cover/Land Use with GIS Support						
2018LC1	Maintenance ArcGIS server	30-Sep-18				Hlavacek, Fox, Rohweder
2018LC2	Aerial Photo scanning (Pools 11-12; 14-22; 24-25)	30-Sep-18				Hlavacek
2018LC4	Updates on progress for land cover products listed.	New progress reported in the quarterly activities. Percent complete updated 30 Sept 2018.				Robinson
Data Management						
2018M1	Update vegetation, fisheries, and water quality component field data entry and correction applications.	30-May-18				Schlifer
2018M2	Load 2017 component sampling data into Oracle tables and make data available on Level 2 browsers for field stations to QA/QC.	30-Jun-18				Schlifer
Quarterly Activities						
2018QR1	Submittal of quarterly activities	30-Jan-18		30-Jan-18		All LTRM staff
2018QR2	Submittal of quarterly activities	13-Apr-18				All LTRM staff
2018QR3	Submittal of quarterly activities	13-Jul-18				All LTRM staff
2018QR4	Submittal of quarterly activities	12-Oct-18				All LTRM staff
Equipment Inventory						
2018ER1	Property inventory and tracking	15-Nov-18				LTRM staff as needed

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
Developing and Applying Indicators of Ecosystem Resilience to the UMRS						
2018R1	Updates provided at each quarterly UMRR CC meeting and A team meeting	Various				Bouska, Houser
2018R2	Submit General resilience manuscript for peer-reviewed publication. Bouska, K. L., J. N. Houser, N. R. De Jager, J. Rogala, and M. Van Appledorn. Applying concepts of general resilience to large river ecosystems: case studies from the Upper Mississippi and Illinois rivers.	30-Jan-18				Bouska, Houser
2018R3	Draft report summarizing trends in controlling variables and research framework for specified resilience	15-Sep-18				Bouska, Houser
Intended for Distribution						
Manuscript: Bouska, K.B., J.N. Houser, and N. De Jager. Developing a shared understanding of the Upper Mississippi River: the foundation of a resilience assessment. (Accepted with revisions by Ecology and Society)						
Modelling and mapping current and projected future habitats of the Upper Mississippi River System (HNA-II)						
2018HNA1	Draft HNA-II chapter documenting informational content for HNA-II	30-Dec-17		5-Dec-17	In USGS review	De Jager, Rogala, Bouska, Houser, Van Appledorn, Rohweder, Fox, Ruhser
2017AH8	Draft Appendix A in 2018 HNA1-Summarize methods used to develop Aquatic Areas	30-Dec-17		5-Dec-17		Jim Rogala, Janis Ruhser, Jason Rohweder, Jeff Houser
2017AH9	Complete Aquatic Areas Geodatabase	30-Dec-17		5-Dec-17		Jason Rohweder and Jim Rogala
2017FAH3	Complete Appendix C in 2018 HNA1-Summarize methods used to develop sedimentation model	30-Dec-17		5-Dec-17		Jim Rogala
2017FH4	Complete Appendix B in 2018 HNA1-Summarize methods used to develop flood inundation model	30-Dec-17		5-Dec-17		Molly Van Appledorn
2017FH5	Complete Floodplain Areas Geodatabase	30-Dec-17		5-Dec-17		Jason Rohweder, Tim Fox, and Molly Van Appledorn
2017FFH3	Complete Forest Succession Modelling work and Appendix D in 2018 HNA1-Summarize methods used to develop forest simulation model	30-Dec-17		5-Dec-17		Nathan De Jager
2017GEO1	Compile any remaining data used in HNA-II into geodatabase	30-Dec-17		5-Dec-17	In USGS review	Tim Fox and Jason Rohweder

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
Assessing recent rates of sedimentation in the backwaters of Pools 4, 8, and 13 to support river restoration and the Habitat Needs Assessment-II						
2018ST1	Reestablishment of horizontal and vertical temporary benchmarks, and a data base for horizontal and vertical benchmarks (Continuation of 2017ST1)	30-Mar-18				Rogala, Moore, Kalas, Bierman
2018ST2	Open-water nearshore surveys completed and a database (Continuation of 2017ST2)	31-Dec-18				Rogala, Moore, Kalas, Bierman
2018ST3	Over-ice surveys completed and a database (Continuation of 2017ST3)	30-Mar-18				Rogala, Moore, Kalas, Bierman
2018ST4	Data analysis and completion report on sedimentation rates along transects (Continuation of 2017ST4)	30-Sep-18				Rogala, Moore, Kalas, Bierman
Landscape Pattern Research and Application						
2018L1	Draft Manuscript: Modelling Forest succession in the UMRS.	30-Sep-18				De Jager
On-Going						
2016L3	Draft Manuscript: Review of Landscape Ecology on the UMR	30-Sep-18				De Jager
Intended for distribution						
Manuscript: Swanson, W., De Jager, N.R., Strauss, E.A., Thomsen, M. In Review. Effects of flood inundation and invasion by *Phalaris arundinacea* on nitrogen cycling in an Upper Mississippi River floodplain forest. (2016L2) (Ecohydrology. 2017;10:e1877. https://doi.org/10.1002/eco.1877)						
Manuscript: De Jager, N.R., Swanson, W., Hernandez, D.L., Reich, J., Erickson, R., Strauss, E.A. Effects of flood inundation, invasion by *Phalaris arundinacea* , and nitrogen deposition on extracellular enzyme activity in an Upper Mississippi River floodplain forest. (2015L5) Ecohydrology, Volume 10, Issue 7 October 2017						
Manuscript: Van Appledorn, M., De Jager, N.R., Johnson, K. Considerations for improving floodplain research and management by integrating inundation modeling, ecosystem studies, and ecosystem services (2016L5)						
Map Set: Reed Canarygrass abundance and distribution in the UMR (Pools 3-13) (2017L2) (Completed; LTRM Completion Report)						
Manuscript: De Jager, Rohweder, and Hoy. 2017. Mapping areas invaded by *Phalaris arundinacea* in Navigation Pools 2-13 of the UMRS. LTRM Completion Report (2016L4). (Completed)						
Eco-hydrologic Research						
2018EH01	Draft manuscript describing inundation process zones across the UMRS	30-Sep-18				Van Appledorn, De Jager, Rohweder
2018EH02	Inundation and Vegetation Data Analysis	30-Sep-18				Van Appledorn, De Jager
2018EH03	Draft inundation model curation plan	30-Sep-18				Van Appledorn, Fox, Rohweder, De Jager

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
Evaluation of a System-Wide Floodplain Inundation Model for Ecological Applications						
2017FH11	Post-processing and analysis of logger data and water-edge mapping	29-Dec-17		29-Dec-17		Van Appledorn
2017FH12	A written summary of validation results will be submitted as a supplement to the Habitat Needs Assessment II that identifies potential sources of UMRS inundation model error, discusses the validity of the model's assumptions, and provides guidance on appropriate model use.	30-Sep-18				Van Appledorn
Aquatic Vegetation, Fisheries, and Water Quality Research						
Aquatic Vegetation						
2015A7	Data compilation and analysis: Aquatic macrophyte communities and their potential lag time in response to changes in physical and chemical variables	30-Dec-17			Delayed due to planning for the UMRR Science Meeting	Lund
2015A8	Draft completion report or manuscript: Aquatic macrophyte communities and their potential lag time response to changes in physical and chemical variables in the LTRM vegetation pools	30-Jun-18				Lund
2016A7	Draft completion report: How many years did the effects of the 2001-2002 Pool 8 drawdown on arrowheads (*Sagittaria latifolia* and *S. rigida*) last?	30-Sep-18				Yin
Fisheries						
2018B12	Draft fish framework for research and applied management technical support in the Fish Component of the UMRR LTRM	30-May-18				Ickes
2018b13	Coordination of draft fish framework with A-Team	1-Aug-18				Ickes
2018B14	Final draft fish research framework	30-Sep-18				Ickes
2018B15	Technical support for USACE	30-Sep-18				Ickes
2015B17	Draft Manuscript: Fish Trajectory Analysis	28-Oct-17			Will be submitting 2015B17 and 2016B17 simultaneously to Journal	Ickes, Minchin
2016B17	Draft Manuscript: Developing and applying trajectory analysis methods for UMRR Status and Trends indicators – Year 2	28-Oct-17	30-May-18			Ickes, Minchin

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
2016B14	Draft completion report: Exploring Years with Low Total Catch of Fishes in Pool 26	30-Dec-17	30-Mar-18		Under review by Team Leader	Gittinger, Ratcliff, Lubinski, Chick
Water Quality						
2015D16	Draft manuscript: Trends in water quality and biota in segments of Pool 4, above and below Lake Pepin	29-Dec-17				Burdis
2018D12	Draft White Paper on UMRR LTRM's interactions with programs for other large rivers, nationally and internationally	30-Sep-18				Jankowski
2018D13	Using physical landscape metrics of hydrological connectivity to understand limnnological conditions in backwaters of the Upper Mississippi River	30-Sep-18				Jankowski, Rogala, Houser
Intended for Distribution						
Manuscript: An Assessment of Long Term Changes in Fish Communities within Large Rivers of the United States (Environmental Monitoring journal) Counihan, Ickes, Casper, Sauer 2016B13 (Acceptance for publication by PLOS One)						
Manuscript: Aquatic Plant Response to Large-Scale Island Construction in the Upper Mississippi River. Drake and Gray; 2016A6a. (Submitted to journal)						
Statistical Evaluation						
On-Going						
2016E2	Draft manuscript: How well do trends in LTRM percent frequency of occurrence SAV statistics track trends in true occurrence?	30-Sep-17	30-Mar-18			Gray
Intended for distribution						
Draft manuscript: Inferring decreases in among- backwater heterogeneity in large rivers using among-backwater variation in limnological variables (2010E1)						
Investigation of metabolism, nutrient processing, and fish community in floodplain water bodies of the Middle Mississippi River						
2017MMF2	Draft report completed - will detail differences between the floodplain habitats and the main channel and associations between fish community and water quality attributes with connectivity of the water body to floodwaters or the main channel	30-Dec-17	30-Mar-18		Author took new position, will continue work on this project. Also, author continuing to assist LTRM WQ component	Sobotka
2017MMF3	Final Report	30-Jun-18				Sobotka
Advancing our understanding of habitat requirements of fish assemblages using multi-species models						
2017FA1	Draft LTRM Completion report on period-specific inferences on environmental gradients and species-environment associations by period	15-Feb-18				Bouska, Gray
2017FA2	Final LTRM Completion Report	15-Sep-18				Bouska, Gray

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
Mapping the thermal landscape of the Upper Mississippi River: A Pilot Study						
2017TL1	Draft LTRM Completion report on feasibility and utility of surface water temperature map	30-Dec-17	30-Mar-18		Delayed due to planning for the UMRR Science Meeting	Jankowski, Robinson, Ruhser
2017TL2	Final LTRM Completion report and data distribution	30-Mar-18	30-Sep-18			Jankowski, Robinson, Ruhser
Estimating backwater sedimentation resulting from alluvial fan formation						
2017SED2	Draft LTRM Completion report summarizing findings and providing recommendations for expanding the project system-wide	31-Dec-17	30-Mar-18		Delayed due to planning for the UMRR Science Meeting	Rogala, Hansen, Nelson
2017SED3	Final LTRM Completion Report	30-Jun-18				Rogala, Hansen, Nelson
Pool 12 Overwintering HREP Adaptive Management Fisheries Response Monitoring						
Fisheries Population Monitoring						
2018P13a	Collect annual increment of pool-wide electrofishing data	1-Nov-17		1-Nov-17		Bierman and Bowler
2018P13b	Collect annual increment of fyke netting data from backwater lakes	15-Nov-17		15-Nov-17		Bierman and Bowler
2018P13c	Perform otolith extraction from bluegills for aging	1-Dec-17		1-Dec-17		Bierman and Bowler
2018P13d	Age determination of bluegills collected in Fall 2014	1-Feb-18				Bierman and Bowler
2018P13e	In-house project databases updated	31-Mar-18				Bierman and Bowler
2018P13f	Summary letter compiled and made available to program partners	30-Sep-18				Bierman and Bowler
Pre-project Biological Response Monitoring; Crappie Telemetry –Kehough Lake						
2017AM5	Summary letter Analysis of tracking data and quantification of 80% UDs for Kehough lake	30-Sep-18				Hansen, Bierman, Bowler, Theiling
Spatial Patterns of native mussels in the UMRS						
2016MRF2	Final completions report: Spatial patterns of native mussels in the UMRS	15-Nov-17		6-Oct-17	In final USGS review	Ries, Newton, De Jager, Zigler

Tracking number	Milestone	Original Target Date	Modified Target Date	Date Completed	Comments	Lead
Pool 4 - Peterson Lake HREP Water Quality Monitoring – Pre and Post-Adaptive Management Evaluation						
2017PL3	Collection of post-construction winter water quality data	February 2018 – 2019(?) Dependent on construction date				Burdis, Moore, DeLain, Lund
2017PL4	Collection of post-construction summer water quality data	August 2018 – 2019(?) Dependent on construction date				Burdis, Moore, DeLain, Lund
2017PL5	Summary letter: Tabular and graphical summary of water quality data	December 2018 - 2019 (?) Dependent on construction date				Burdis, Moore
USACE UMRR LTRM Technical Support						
2018COE1	Quarterly update submitted to the LTRM Management Team	31-Dec-17				McCain, Cornish, Potter
2018COE2	Quarterly update submitted to the LTRM	30-Mar-18				McCain, Cornish, Potter
2018COE3	Quarterly update submitted to the LTRM Management Team	30-Jun-18				McCain, Cornish, Potter
2018COE4	Quarterly update submitted to the LTRM Management Team	30-Sep-18				McCain, Cornish, Potter
UMRR Science Coordination Meeting						
2018N1	Science Planning Meeting	Winter 2018		16-Jan-18		Houser, Sauer, Hubbell, and Hagerty, all LTRM staff, UMRR Partners
A-Team and UMRR-CC Participation						

2018 UMRR Science Meeting Working Groups

Introduction

This document provides a brief description of each of the working groups which met during the 2018 UMRR Science Meeting at the Upper Midwest Environmental Sciences Center in La Crosse, Wisconsin 16 – 18 January 2018. The primary goal of the meeting was to develop initial outlines of proposals that will be considered for funding in FY2018. This work was done within the 6 working groups formed for this meeting. The following description of each working group includes the name of each group, the working group leaders, the focal areas they considered (see following Focal Areas document for additional information regarding focal areas), and the specific questions the proposals being developed by each group will address.

WORKING GROUP 1. GEOMORPHIC CHANGE IN THE UMRS

Leaders: Jim Rogala (UMESC) and Jon Hendrickson (USACE)

Focal areas and subareas considered:

Focal area 1: Understanding changes in geomorphology

- *Subarea 1.1.* Critical sedimentation and erosional processes which need to be better understood and quantified.
- *Subarea 1.2.* The likely effects of processes identified in Subarea 1.1 on physical and chemical properties of substrates.
- *Subarea 1.3.* Better understand current status, recent changes and projected changes in flows within and among aquatic areas (i.e., hydrologic connectivity).

Proposal

Draft proposal title: Geomorphic change in the UMRS

Research questions

1. What are the causes/patterns of geomorphic and hydraulic changes within the UMRS in each reach?
2. What is the rate of geomorphic and hydraulic change in the UMRS and how does this affect diversity and resiliency?
3. What is occurring systematically within the UMRS with water and sediment movement and changes into the future?

WORKING GROUP 2. INTERACTIONS AMONG WATER QUALITY, AQUATIC VEGETATION AND WILDLIFE

Leaders: Deanne Drake (WDNR), Eric Lund (MNDNR), Stephen Winter (USFWS)

Focal areas and subareas considered:

Focal area 3: Interactions and associations of hydrogeomorphology with biota and water quality.

Subarea 3.1: Interactions between aquatic vegetation and hydrogeomorphology

Focal area 6. Critical biogeochemical rates.

Subarea 6.1 Nutrient cycling

Proposal 1a

Draft title**:** Internal and external drivers of water clarity in the UMRS

Research questions

1. Is water clarity in UMRS key pools driven by inputs from the watershed or biological drivers within the pools?
2. Does this change across pools?

Proposal 1b

Draft title: Specific mechanistic role that nutrient supply might play in the UMRS

Research questions

1. In lakes and shallow coastal areas, nutrient availability is the controlling factor of water clarity. Is this also the case in the UMRS?

Proposal 2

Draft title: Effectiveness of LTRM aquatic vegetation data for quantifying waterfowl habitat quality

Research questions

1. How well do LTRM SAV rake scores and biomass data (ongoing project) predict bio-energetic values for waterfowl?

Proposal 3

Draft title**:** Are fluctuations in water level and water clarity driving distribution of SAV in the UMRS?

Research questions

1. To what extent do water level fluctuations vary among/within pools?
2. To what extent do photic zones vary among/within pools?
3. Does water level fluctuation in the context of photic zone explain SAV distribution?

WORKING GROUP 3. NATIVE FRESHWATER MUSSELS IN THE UMRS: IDENTIFICATION OF ASSOCIATIONS AMONG CRITICAL BIOLOGICAL PROCESSES AND HYDROGEOMORPHOLOGY

Leaders: Teresa Newton (UMESC); Steve Zigler (UMESC)

Focal areas and subareas considered:

Focal area 3: Interactions and associations of hydrogeomorphology with biota and water quality.

Subarea 3.3 Associations between hydrogeomorphology and mussels

Focal area 5: Vital rates of biotic communities

Subarea 5.3 Assess the dominant factors affecting recruitment, growth, mortality of mussels.

Proposal

Draft title: Systemic analysis of hydrogeomorphic influences on native freshwater mussels

Research questions:

1. Estimate the number, species abundance, and distribution of mussels in two reaches (Pools 8 and 26) of the UMR
2. Identify geomorphic gradients in physical habitat conditions across seven navigation pools of the UMR
3. Assess if geomorphic metrics are predictive of the distribution, abundance, diversity, and recruitment of native mussels in the UMR

WORKING GROUP 4 UNDERSTANDING RELATIONSHIPS AMONG FLOODPLAIN HYDROGEOMORPHIC PATTERNS, VEGETATION AND SOIL PROCESSES, AND EFFECTS ON WILDLIFE HABITAT AND NUTRIENT EXPORT IN THE CONTEXT OF ALTERNATIVE MANAGEMENT AND ENVIRONMENTAL SCENARIOS

Leader: Nathan De Jager (UMESC)

Focal areas and subareas considered:

Focal area 4: Understanding relationships among floodplain hydrogeomorphic patterns, vegetation and soil processes, and effects on wildlife habitat and nutrient export

Subarea 4.1 Quantify patterns of floodplain inundation in the UMRS

Subarea 4.2 Understand and quantify floodplain vegetation dynamics

Proposal 1

Draft title: Forest canopy gap dynamics: quantifying forest gaps and understanding gap-level forest regeneration

Research questions:

1. What is the current abundance and distribution of forest canopy gaps in the UMRS?
2. What proportion of canopy gaps have naturally regenerated to woody species vs herbaceous invasive species?
3. What site and landscape level variables are associated with invasion vs recolonization (e.g., gap size, soils, pool/hydrogeomorphic position, surrounding forest patch size)?
4. Are there associations between gap formation and the health of surrounding forests?
5. Is there an association between recolonization and the degree of advanced regeneration and/or seed supply in the surrounding forest?
6. What management techniques can be used to facilitate natural regeneration in canopy gaps?

Proposal 2

Draft title: Using dendrochronology to understand historical forest growth, stand development, and gap dynamics

Research questions

1. What are the trends in forest growth that have occurred over the past 150 + years within UMRS floodplain forests and how do those trends relate to forest health?
2. How are past trends in flood, drought, and sedimentation associated with forest recruitment and growth patterns?
3. What are the most appropriate stocking densities required for sustainable forest growth and overall forest resilience for multiple floodplain forest communities?
4. Where will the current UMRS floodplain support hard mast forest communities and resilient stand dynamics for other wetland forest communities?

Proposal 3

Draft title: Reforesting canopy gaps occupied by invasive species

Research questions

1. Can artificial reforestation be a technique to close canopy gaps and reduce the abundance of invasive species?
2. What is the most cost effective planting density to achieve expedient canopy closure with minimal maintenance?
3. Can early successional species be used as a green ash replacement species following emerald ash borer?

WORKING GROUP 5: WOODY DEBRIS IN THE UMRS: QUANTITY, DISTRIBUTION, AND ROLE IN THE HYDROGEOMORPHOLOGY AND ECOLOGY OF THE UMRS

Leaders: KathiJo Janksowski (UMESC), Molly Van Appledorn (UMESC)

Focal areas and subareas considered:

Focal area 3 Interactions and associations of hydrogeomorphology with biota and water quality

Subarea 3.4. Associations between hydrogeomorphology and the quantity, distribution and biophysical role of woody debris in the UMR

Proposal

Draft title: Woody debris in the UMRS: Quantity, Distribution, and role in the hydrogeomorphology and ecology of the UMRS

Research questions

1. What are the patterns of woody debris distribution, recruitment and transport in the UMR?
2. What are the important drivers and constraints of woody debris distribution, recruitment and transport?
3. What is the biophysical role of woody debris in the UMR (including habitat characteristics such as velocity, channel bedforms, temperature and primary/secondary production), and how does its biophysical role vary across hydrogeomorphic settings?

WORKING GROUP 6: UNDERSTANDING CRITICAL BIOLOGICAL RATES FOR SELECT FISHES OF THE UMRS AND HOW THEY VARY ACROSS HYDROGEOMORPHIC, CLIMATIC, AND BIOLOGICAL GRADIENTS.

Leaders: Andy Bartels (WDNR), Kristen Bouska (UMESC), Quinton Phelps (West Virginia University)

Focal areas and Subareas considered

Focal area 3 Interactions and associations of hydrogeomorphology with biota and water quality.

Subarea 3.2 Associations between hydrogeomorphology and fisheries

Focal area 5 Vital rates of biotic communities

Subarea 5.1 Better quantify rates of recruitment, growth, and mortality of fishes of the UMRS

Proposal

Draft title: Understanding critical biological rates for select fishes of the UMRS and how they vary across hydrogeomorphic, climatic, and biological gradients.

Research questions (1-4 are for the vital rates component, 5-6 for microchemistry component, and 7-8 for genetics component):

1. Are there patterns of vital rates within and among fish species across the LTRM landscape?
2. Can we use vital rates to characterize short-term (3-5 years) population status using existing LTRM database?
3. Do variations in vital rates within species correspond with abiotic and biotic drivers and hydrogeomorphology in any of the LTRM reaches?
4. Do variations in recruitment across species with similar life history strategies correspond with abiotic and biotic drivers and hydrogeomorphology across LTRM reaches?
5. To what extent are spatial and temporal patterns in recruitment/year class strength driven by "local" recruits vs. immigrants?
6. Are strong year classes associated with particular natal environments, and are these patterns consistent among river reaches?
7. Can we define distinct genetic stocks in the UMRS?
8. Is genetic structure a driver of vital rates?

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This document is an abbreviated version of the full 2018 UMRR Science Focal Areas document, and was created as a read-ahead for the February 2018 UMRR Coordinating Committee Quarterly Meeting. The full document was distributed to all 2018 UMRR Science Meeting invitees and is available upon request (Jeff Houser, jhouser@usgs.gov). Date of abbreviated version is 22 January 2018.

Focal Areas for UMRR FY 2018 Science in Support of Management

Date of this version: 18 December 2017

NOTE: The 2018 focal areas described in this document were presented for discussion and critique as a UMRR partnership webinar (19 November 2017). A draft description of the focal areas was provided to all webinar participants as a read-ahead; written comments on that draft were requested as part of the webinar. The working draft that follows reflects webinar input and subsequent written comments.

Introduction

There exists a substantial body of work identifying information needed to inform and improve the restoration and management of the UMRS. The following were consulted in assembling the Focal Areas:

- Upper Mississippi River Restoration (UMRR) Program's Long Term Resource Monitoring (LTRM) research frameworks (Ickes 2005; Newton et al. 2010; De Jager 2011; Kreiling et al.; Ickes In review)
- Reports and recommendations from previous sedimentation and geomorphology workshops (Gaugush and Wilcox 1994; Gaugush and Wilcox 2002)
- Syntheses of previous studies on the UMRS (Hydrobiologia 2010 Special Issue-- e.g., Sparks 2010 and references therein).
- The 2009 Reach Objectives publication (USACE 2011) from which information needs may be inferred
- The 2015-2025 UMRR Strategic plan (UMRR 2015) which clearly identifies the main objectives of river restoration efforts and the knowledge needed to do so under the broad vision of maintaining a "healthier and more resilient Upper Mississippi River Ecosystem that sustains the river's multiple uses"
- Conceptual models derived from several previous and ongoing efforts (USACE 2011; Nestler et al. 2016; Bouska et al. *Submitted*)

Additional information for establishing focal areas has been gained through the extensive partnership discussions that have been part of the ongoing, second Habitat Needs Assessment (HNA II) and UMRS Resilience assessment. HNA II, and to a lesser extent, the UMRS Resilience Assessment, have emphasized the role of the hydrogeomorphology of the river. A frequent topic in partner meetings and workshops related to both of these projects has been the need for better predictions of future conditions of the UMRS. In that context, "predicting the future" has two primary components: 1) understanding the physical processes that determine changes in hydrogeomorphology, and 2) understanding and projecting changes in the river's hydrograph and basin land use. Theme 1 emphasizes on the former; substantial work on the latter has

been done elsewhere (e.g., Theiling and Nestler 2010; Wu et al. 2012; USACE 2015; Krysonova et al. 2017. Rajib and Merwade 2017).

The focal areas represent topics that are fundamental to river management and restoration. Much of the habitat restoration work done through the UMRR focuses on modification/restoration of geomorphic characteristics of the river (e.g., Table 2.4 in USACE 2012). Often the proximate goal of these projects is to alter or restore hydrogeomorphic processes, and the ultimate goal is rehabilitating various physical, chemical, and biological conditions (e.g., Table ES1 in USACE 2011) to restore and maintain a healthier and more resilient Upper Mississippi River Ecosystem (UMRR 2015). Many of these restoration projects are responses to slow, ongoing changes in the geomorphology of the river. These slow, ongoing changes include: island loss and secondary channel formation and expansion which cause increased hydraulic connectivity, sediment deposition, and floodplain forest degradation. Thus, restoration and management actions will be better informed and more effective if we:

- Better understand the likely long term changes in geomorphology and hydrology of the river, and consider these potential changes in selecting, designing and assessing restoration projects (Theme 1).

- Better understand the current associations among biota, hydrology, and geomorphology and use that understanding to better forecast future conditions, and inform the selection, design and assessment of restoration projects (Theme 2).

- Better understand the physical, chemical, and biological mechanism that underlie the long term and spatial patterns observed in the LTRM long term data sets, and use that understanding to inform selection, design and assessment of HREPs (Theme 3).

UMRR LTRM is unusually well-equipped to address questions regarding the interactions among hydrology, geomorphometry, biota, and biogeochemical processes. Programmatic resources include:

- Systemic data sets (i.e., topobathy, land cover).
- Detailed biotic, and biogeochemical data that span a broad, informative gradient of hydrogeomorphological conditions (i.e., LTRM vegetation, fisheries, and water quality data from the 6 study reaches).
- The infrastructure and expertise to strategically and efficiently collect additional data regarding important biotic and biogeochemical rates.

The focal areas proposed below substantially make use of these strengths of UMRR-LTRM.

The geomorphic and floodplain reach structure is a fundamental aspect of the UMRS (USACE 2011). The consistencies within, and contrasts among, reaches (either floodplain, geomorphic, or otherwise) should be considered and incorporated into proposed work; where appropriate the work should improve our understanding of what those consistencies and contrasts are. It is important that collectively the work developed as part of the 2018 process be systematic in its extent. However, the diversity of the hydrology, geomorphology, ecology,

and restoration/management concerns across the multiple reaches are such that some studies may only cover a subset of the system where the topic of the study is most relevant.

Proposed Themes and Focal areas

THEME 1: UNDERSTANDING CHANGES IN GEOMORPHOLOGY AND THEIR IMPLICATIONS FOR THE STRUCTURE AND FUNCTION OF THE UMRS. The geomorphology of the Upper Mississippi River and its floodplain is the physical template on which biotic and abiotic processes occur. The combination of that physical template and those processes determine the distribution and abundance of habitat and rates of critical biological processes. Those biological processes include population and community dynamics of the diverse biota supported by the river and biogeochemical processes such as nutrient cycling and oxygen demand/production.

1. **Focal area 1: Understanding changes in geomorphology.**
    a. **Subarea 1.1** Critical sedimentation and erosional processes which need to be better understood and quantified.
    b. **Subarea 1.2** The likely effects of processes identified in Subarea 1.1 on physical and chemical properties of substrates (river-bottom sediments).
    c. **Subarea 1.3**. Better understand current status, recent changes and projected changes in flows within and among aquatic areas (i.e., hydraulic connectivity).

2. **Focal Area 2: Qualitative assessment of effects of recent (i.e., relatively wet conditions from early 1980s to the present) and projected changes in land use and climate on the processes included in Focal Area 1.** The work for this focal area may largely consist of applying the findings of work done elsewhere (e.g., Theiling and Nestler 2010; Wu et al. 2012; USACE 2015, Krysanova et al. 2017. Rajib and Merwade 2017) regarding long-term changes in climate, land use, and river hydrology to estimate the implications for the processes and rates investigated in Focal Area 1.

    a. **Subarea** 2.1. Historic hydrologic changes and effects on hydrologic parameters important to habitat and biota.
    b. **Subarea** 2.2. Projected range of hydrologic changes and effects on hydrologic parameters important to habitat and biota.

THEME 2: UNDERSTANDING ASSOCIATIONS BETWEEN HYDROLOGIC AND GEOMORPHIC CONDITIONS AND THE DISTRIBUTION/ABUNDANCE OF BIOTA IN THE RIVER AND ON THE FLOODPLAIN. A better understanding of the existing associations between hydrogeomorphic conditions and riverine biota and biogeochemistry can provide insight into how ongoing and future hydrogeomorphic changes (Theme 1) are likely to affect river and floodplain biota and biogeochemistry.

3. **Focal area 3: Interactions and associations of hydrogeomorphology with biota and water quality.** A useful approach to this topic is to ask "What can we infer from existing LTRM data regarding the associations between fundamental hydrogeomorphic drivers and UMRS biota and water quality?". A great deal of work has been done on this topic using LTRM data, but substantial work remains to be done.

The conceptual models developed as part of the resilience assessment identified "major resources" (including water quality; aquatic vegetation; and fish, mussel, and waterfowl communities) and "controlling variables" such as depth, velocity, hydraulic connectivity, and fetch (Bouska et al., *Submitted*). The understanding gained from quantifying the associations among these major resources and controlling variables will provide insights regarding likely responses of biota to potential hydrogeomorphic changes in the river indicated under Theme 1. From a resilience perspective, the existence of potential thresholds in these relationships is of particular interest; such thresholds indicate points that should be avoided (to maintain current conditions) or need to be crossed (to change restore to a more desirable condition). Substantial work on this topic can be done using existing data. The results of that work may indicate additional focused field data collection is needed to fill in critical gaps in our understanding.

a. **Subarea 3.1** Interactions between aquatic vegetation and hydrogeomorphology.
b. **Subarea 3.2** Associations between hydrogeomorphology and fisheries.
c. **Subarea 3.3** Associations between hydrogeomorphology and native mussels
d. **Subarea 3.4**: Associations between hydrogeomorphology and the quantity, distribution and biophysical role of woody debris in the UMRS

4. **Focal area 4: Understanding relationships among floodplain hydrogeomorphic patterns, vegetation and soil processes, and effects on wildlife habitat and nutrient export** (Note that any topic or question that has a name associated has at least one ongoing, funded project associated with it)**.**

a. **Subarea 4.1:** Quantify patterns of floodplain inundation in the UMRS
b. **Subarea 4.2:** Understand and quantify floodplain vegetation dynamics
c. **Subarea 4.3:** Understand relationships among flood inundation, vegetation patterns, and soil nutrient dynamics
d. **Subarea 4.4:** Understand effects of vegetation dynamics on wildlife use of the UMRS floodplain.

THEME 3: PHYSICAL, CHEMICAL AND BIOLOGICAL PROCESSES BEHIND THE OBSERVED SPATIAL AND TEMPORAL PATTERNS IN LTRM DATA. Geomorphology provides the physical template that structures, interacts with, and responds to the physical, chemical, and biological processes that occur in the river ecosystem. Many aspects of rates and magnitudes of these biological and biogeochemical processes poorly understood. LTRM data provides critical information regarding spatial and temporal patterns in water quality and biota for the UMRS and its floodplain. These patterns suggest hypotheses regarding dominant processes that produce them. There remains a need for studies that complement, and can be combined with, existing LTRM data to improve our understanding of the rates of critical processes that produce the broad scale patterns observed in the data and the implications for future restoration projects.

5. **Focal area 5: Vital rates of biotic communities**

a. **Subarea 5.1**: Better quantify rates of recruitment, growth, and mortality of fishes of the UMRS

b. **Subarea 5.2** Better understand the mechanisms behind observed changes in fish populations and implications for UMRS ecosystem and management (from Ickes, In Review)

c. **Subarea 5.3** Assess the dominant factors affecting recruitment, growth, mortality of mussels. Specific, relevant question from the UMRR LTRM Freshwater Mussel Research Framework (Newton et al. 2010) include the following:

6. **Focal area 6: Critical biogeochemical rates**

a. **Subarea 6.1** Nutrient cycling

b. **Subarea 6.2** Drivers of dissolved oxygen dynamics

7. Focal area 7: The effects of sustained high nutrient inputs (eutrophication) on the biota of the UMRS. The UMRS continues to experience high rates of nutrient input from its catchment (e.g., Sprague et al. 2011). Hilton et al. (2006) provides an extensive overview of the likely consequences of eutrophication to rivers including excessive growth of planktonic (suspended), benthic and filamentous algae, and aquatic macrophytes; reductions in number of species of macrophytes present; frequent occurrence of low dissolved oxygen events (especially at night); and blue-green algal blooms. The temporal and spatial extent of occurrence of these consequences of eutrophication in the UMRS remains poorly understood, as do the implications for the selection, design, and assessment of restoration projects. As the effects of eutrophication can be exacerbated or mitigated by local conditions such as residence time and water velocity, a better understanding of these topics may reduce the probability of eutrophication related problems in restored areas.

a. **Subarea 7.1** Effects on biota (aquatic vegetation, fish, mussels, waterfowl)

b. **Subarea 7.2** Effects on biogeochemistry (dissolved oxygen dynamics, nutrient cycling / processing)

c. **Subarea 7.3** Harmful algal blooms

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ATTACHMENT D

WLMTF Letter to UMRR Coordinating Committee re Pool-Wide Drawdowns as an HREP (12/28/2017)

(D-1 to D-2)

To: Upper Mississippi River Restoration Coordinating Committee

From: Water Level Management Task Force

Through: River Resources Forum

Subject: Use of UMRR Funds for Pool-wide Water Level Drawdowns

The Water Level Management Task Force (WLMTF) was formed by the River Resources Forum (RRF) in 1996 and has since been instrumental in coordinating and implementing pool-wide drawdowns on Pool 8 (2001 and 2002), Pool 5 (2005 and 2006), and Pool 6 (2010). Seasonal variation in water levels was reduced by construction of the lock and dam system in the 1930's. Pool-wide drawdowns have provided the opportunity for research scientists, engineers, and biologists to observe and document environmental changes resulting from the return of more natural water level variability to the pools. A compilation of these observations and studies can be found in the May 2014 document "*Habitat Enhancement using Water Level Management on the Upper Mississippi River*."

While the benefits of water level management (WLM) have been documented in wetlands, lakes, and impoundments across the country, implementation on a pool-wide scale on the Upper Mississippi River is challenging. A drawdown requires extensive coordination with state and federal interests, the navigation industry, and extensive outreach to the public including privately owned marinas, municipalities, and general river users. There is a relatively high cost associated with conducting drawdowns, the majority of which is incurred by the U.S. Army Corps of Engineers (USACE) to complete the necessary planning, coordination with higher authority, and additional dredging of the navigation channel. The planning process often takes five years, or longer, to implement a single pool-wide drawdown. A summary of the process utilized to plan and implement these drawdowns can be found in the attached document "*Process, Policy, and Implementation of Pool-Wide Drawdowns on the Upper Mississippi River: A Promising Approach for Ecological Restoration of Large Impounded Rivers*" (Kenow et al., 2016).

It has long been the goal of the WLMTF to implement drawdowns on a programmatic level, potentially alleviating a portion of the work load and costs associated with conducting an individual pool-wide drawdown. In 2008, the RRF endorsed the following WLMTF recommendation: *"The River Resources Forum recommends the St. Paul District include pool-wide water level reductions (drawdowns) and other water management options as ecosystem restoration components of their Water Management Program."*

A step in that direction was achieved in the May 2017 Preliminary Informational Assessment (PIA) "*Recurring Operational Drawdown Pool 8, Upper Mississippi River, LaCrosse and Vernon Counties, Wisconsin, Houston and Winona Counties, Minnesota*" (attached). This report was compiled by a diverse team of USACE, St Paul District staff, with input from other state, federal, and non-government organizations, to evaluate the feasibility of conducting regular and recurring drawdowns on Pool 8. Pool 8 was selected for a multitude of reasons including, availability of historic monitoring data, high beneficial use of dredge material, and relatively high probability of success. The PIA considered two alternatives that would require additional dredging of the navigation channel every three or five years and then implement a drawdown when channel conditions allowed.

The PIA provides a preliminary evaluation that offers justification for a recurring drawdown in Pool 8 and represents an opportunity to restore natural low water variability on a recurring basis. However, to move this project forward, the WLMTF requests the UMRRCC's response to two questions:

1) Which portions of a pool-wide water level reduction (drawdown) are the UMRR program able to fund? Portions to consider could include project planning (feasibility, NEPA), pre-drawdown dredging and disposal, and/or stakeholder outreach.
2) Since traditionally funded UMRR projects are designed with a 50-year life, what mechanisms are in place, or could be developed, for the UMRR program to regularly fund a project over a 50 year period? For example from the Pool 8 PIA: dredging in anticipation of a drawdown would occur every five years with a drawdown occurring when channel conditions allow. Could funding be provided for the five-year dredging cycle (10 dredging events) over a 50-year period?

The WLMTF is available to answer any questions that may arise from discussions regarding past and future drawdowns within the USACE St. Paul District. If additional information is required, please contact the WLMTF Chair Mary Stefanski at mary_stefanski@fws.gov or 507-494-6229.

December 28, 2017

ATTACHMENT E

Additional Items

- **Future Meeting Schedule** *(E-1)*
- **Frequently Used Acronyms (12/21/2017)** *(E-2 to E-7)*
- **UMRR Authorization, As Amended (1/27/15)** *(E-8 to E-11)*
- **UMRR (EMP) Operating Approach (5/06)** *(E-12)*

QUARTERLY MEETINGS
FUTURE MEETING SCHEDULE

MAY 2018	
St. Louis, Missouri	
May 15	UMRBA Quarterly Meeting
May 16	UMRR Coordinating Committee Quarterly Meeting

AUGUST 2018	
La Crosse, Wisconsin	
August 14	UMRBA Quarterly Meeting
August 15	UMRR Coordinating Committee Quarterly Meeting

Acronyms Frequently Used on the Upper Mississippi River System

AAR	After Action Report
A&E	Architecture and Engineering
ACRCC	Asian Carp Regional Coordinating Committee
AFB	Alternative Formulation Briefing
AHAG	Aquatic Habitat Appraisal Guide
AHRI	American Heritage Rivers Initiative
AIS	Aquatic Invasive Species
ALC	American Lands Conservancy
ALDU	Aquatic Life Designated Use(s)
AM	Adaptive Management
ANS	Aquatic Nuisance Species
AP	Advisory Panel
APE	Additional Program Element
ARRA	American Recovery and Reinvestment Act
ASA(CW)	Assistant Secretary of the Army for Civil Works
A-Team	Analysis Team
ATR	Agency Technical Review
AWI	America's Watershed Initiative
AWO	American Waterways Operators
AWQMN	Ambient Water Quality Monitoring Network
BA	Biological Assessment
BATIC	Build America Transportation Investment Center
BCR	Benefit-Cost Ratio
BMPs	Best Management Practices
BO	Biological Opinion
CAP	Continuing Authorities Program
CAWS	Chicago Area Waterways System
CCC	Commodity Credit Corporation
CCP	Comprehensive Conservation Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CG	Construction General
CIA	Computerized Inventory and Analysis
CMMP	Channel Maintenance Management Plan
COE	Corps of Engineers
COPT	Captain of the Port
CPUE	Catch Per Unit Effort
CRA	Continuing Resolution Authority
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSP	Conservation Security Program
CUA	Cooperative Use Agreement
CWA	Clean Water Act
DALS	Department of Agriculture and Land Stewardship
DED	Department of Economic Development
DEM	Digital Elevation Model

DET	District Ecological Team
DEWS	Drought Early Warning System
DMMP	Dredged Material Management Plan
DNR	Department of Natural Resources
DO	Dissolved Oxygen
DOA	Department of Agriculture
DOC	Department of Conservation
DOER	Dredging Operations and Environmental Research
DOT	Department of Transportation
DPR	Definite Project Report
DQC	District Quality Control/Quality Assurance
DSS	Decision Support System
EA	Environmental Assessment
ECC	Economics Coordinating Committee
EEC	Essential Ecosystem Characteristic
EIS	Environmental Impact Statement
EMAP	Environmental Monitoring and Assessment Program
EMAP-GRE	Environmental Monitoring and Assessment Program-Great Rivers Ecosystem
EMP	Environmental Management Program [Note: Former name of Upper Mississippi River Restoration Program.]
EMP-CC	Environmental Management Program Coordinating Committee
EO	Executive Order
EPA	Environmental Protection Agency
EPR	External Peer Review
EQIP	Environmental Quality Incentives Program
ER	Engineering Regulation
ERDC	Engineering Research & Development Center
ESA	Endangered Species Act
EWMN	Early Warning Monitoring Network
EWP	Emergency Watershed Protection Program
FACA	Federal Advisory Committee Act
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FDR	Flood Damage Reduction
FFS	Flow Frequency Study
FONSI	Finding of No Significant Impact
FRM	Flood Risk Management
FRST	Floodplain Restoration System Team
FSA	Farm Services Agency
FTE	Full Time Equivalent
FWCA	Fish & Wildlife Coordination Act
FWIC	Fish and Wildlife Interagency Committee
FWS	Fish and Wildlife Service
FWWG	Fish and Wildlife Work Group
FY	Fiscal Year
GAO	Government Accountability Office
GEIS	Generic Environmental Impact Statement
GI	General Investigations

GIS	Geographic Information System
GLC	Governors Liaison Committee
GLC	Great Lakes Commission
GLMRIS	Great Lakes and Mississippi River Interbasin Study
GPS	Global Positioning System
GREAT	Great River Environmental Action Team
GRP	Geographic Response Plan
HAB	Harmful Algal Bloom
HEL	Highly Erodible Land
HEP	Habitat Evaluation Procedure
HNA	Habitat Needs Assessment
HPSF	HREP Planning and Sequencing Framework
HQUSACE	Headquarters, USACE
H.R.	House of Representatives
HREP	Habitat Rehabilitation and Enhancement Project
HU	Habitat Unit
HUC	Hydrologic Unit Code
IBA	Important Bird Area
IBI	Index of Biological (Biotic) Integrity
IC	Incident Commander
ICS	Incident Command System
ICWP	Interstate Council on Water Policy
IDIQ	Indefinite Delivery/Indefinite Quantity
IEPR	Independent External Peer Review
IIA	Implementation Issues Assessment
IIFO	Illinois-Iowa Field Office (formerly RIFO - Rock Island Field Office)
ILP	Integrated License Process
IMTS	Inland Marine Transportation System
IRCC	Illinois River Coordinating Council
IRPT	Inland Rivers, Ports & Terminals
IRTC	Implementation Report to Congress
IRWG	Illinois River Work Group
ISA	Inland Sensitivity Atlas
IWR	Institute for Water Resources
IWRM	Integrated Water Resources Management
IWTF	Inland Waterways Trust Fund
IWUB	Inland Waterways Users Board
IWW	Illinois Waterway
L&D	Lock(s) and Dam
LC/LU	Land Cover/Land Use
LDB	Left Descending Bank
LERRD	Lands, Easements, Rights-of-Way, Relocation of Utilities or Other Existing Structures, and Disposal Areas
LiDAR	Light Detection and Ranging
LMR	Lower Mississippi River
LMRCC	Lower Mississippi River Conservation Committee
LOI	Letter of Intent
LTRM	Long Term Resource Monitoring

M-35	Marine Highway 35
MAFC	Mid-America Freight Coalition
MARAD	U.S. Maritime Administration
MARC 2000	Midwest Area River Coalition 2000
MICRA	Mississippi Interstate Cooperative Resource Association
MIPR	Military Interdepartmental Purchase Request
MMR	Middle Mississippi River
MMRP	Middle Mississippi River Partnership
MNRG	Midwest Natural Resources Group
MOA	Memorandum of Agreement
MoRAST	Missouri River Association of States and Tribes
MOU	Memorandum of Understanding
MRAPS	Missouri River Authorized Purposes Study
MRBI	Mississippi River Basin (Healthy Watersheds) Initiative
MRC	Mississippi River Commission
MRCC	Mississippi River Connections Collaborative
MRCTI	Mississippi River Cities and Towns Initiative
MRRC	Mississippi River Research Consortium
MR&T	Mississippi River and Tributaries (project)
MSP	Minimum Sustainable Program
MVD	Mississippi Valley Division
MVP	St. Paul District
MVR	Rock Island District
MVS	St. Louis District
NAS	National Academies of Science
NAWQA	National Water Quality Assessment
NCP	National Contingency Plan
NIDIS	National Integrated Drought Information System (NOAA)
NEBA	Net Environmental Benefit Analysis
NECC	Navigation Environmental Coordination Committee
NED	National Economic Development
NEPA	National Environmental Policy Act
NESP	Navigation and Ecosystem Sustainability Program
NETS	Navigation Economic Technologies Program
NGO	Non-Governmental Organization
NGRREC	National Great Rivers Research and Education Center
NICC	Navigation Interests Coordinating Committee
NPDES	National Pollution Discharge Elimination System
NPS	Non-Point Source
NPS	National Park Service
NRC	National Research Council
NRCS	Natural Resources Conservation Service
NRDAR	Natural Resources Damage Assessment and Restoration
NRT	National Response Team
NSIP	National Streamflow Information Program
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
O&M	Operation and Maintenance

OHWM	Ordinary High Water Mark
OMB	Office of Management and Budget
OMRR&R	Operation, Maintenance, Repair, Rehabilitation, and Replacement
OPA	Oil Pollution Act of 1990
ORSANCO	Ohio River Valley Water Sanitation Commission
OSC	On-Scene Coordinator
OSE	Other Social Effects
OSIT	On Site Inspection Team
P3	Public-Private Partnerships
PA	Programmatic Agreement
PAS	Planning Assistance to States
P&G	Principles and Guidelines
P&R	Principles and Requirements
P&S	Plans and Specifications
P&S	Principles and Standards
PCA	Pollution Control Agency
PCA	Project Cooperation Agreement
PCX	Planning Center of Expertise
PDT	Project Delivery Team
PED	Preliminary Engineering and Design
PgMP	Program Management Plan
PILT	Payments In Lieu of Taxes
PIR	Project Implementation Report
PL	Public Law
PMP	Project Management Plan
PORT	Public Outreach Team
PPA	Project Partnership Agreement
PPT	Program Planning Team
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RCP	Regional Contingency Plan
RCPP	Regional Conservation Partnership Program
RDB	Right Descending Bank
RED	Regional Economic Development
RIFO	Rock Island Field Office (now IIFO - Illinois-Iowa Field Office)
RM	River Mile
RP	Responsible Party
RPT	Reach Planning Team
RRAT	River Resources Action Team
RRCT	River Resources Coordinating Team
RRF	River Resources Forum
RRT	Regional Response Team
RST	Regional Support Team
RTC	Report to Congress
S.	Senate
SAV	Submersed Aquatic Vegetation
SDWA	Safe Drinking Water Act
SEMA	State Emergency Management Agency

SET	System Ecological Team
SONS	Spill of National Significance
SOW	Scope of Work
SRF	State Revolving Fund
SWCD	Soil and Water Conservation District
T&E	Threatened and Endangered
TEUs	twenty-foot equivalent units
TIGER	Transportation Investment Generating Economic Recovery
TLP	Traditional License Process
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TSP	Tentatively selected plan
TSS	Total Suspended Solids
TVA	Tennessee Valley Authority
TWG	Technical Work Group
UMESC	Upper Midwest Environmental Sciences Center
UMIMRA	Upper Mississippi, Illinois, and Missouri Rivers Association
UMR	Upper Mississippi River
UMRBA	Upper Mississippi River Basin Association
UMRBC	Upper Mississippi River Basin Commission
UMRCC	Upper Mississippi River Conservation Committee
UMRCP	Upper Mississippi River Comprehensive Plan
UMR-IWW	Upper Mississippi River-Illinois Waterway
UMRNWFR	Upper Mississippi River National Wildlife and Fish Refuge
UMRR	Upper Mississippi River Restoration Program [Note: Formerly known as Environmental Management Program.]
UMRR CC	Upper Mississippi River Restoration Program Coordinating Committee
UMRS	Upper Mississippi River System
UMWA	Upper Mississippi Waterway Association
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VTC	Video Teleconference
WCI	Waterways Council, Inc.
WES	Waterways Experiment Station (replaced by ERDC)
WHAG	Wildlife Habitat Appraisal Guide
WHIP	Wildlife Habitat Incentives Program
WIIN	Water Infrastructure Improvements for the Nation Act
WLMTF	Water Level Management Task Force
WQ	Water Quality
WQEC	Water Quality Executive Committee
WQTF	Water Quality Task Force
WQS	Water Quality Standard
WRDA	Water Resources Development Act
WRP	Wetlands Reserve Program
WRRDA	Water Resources Reform and Development Act

Upper Mississippi River Restoration Program Authorization

Section 1103 of the Water Resources Development Act of 1986 (P.L. 99-662) as amended by
Section 405 of the Water Resources Development Act of 1990 (P.L. 101-640),
Section 107 of the Water Resources Development Act of 1992 (P.L. 102-580),
Section 509 of the Water Resources Development Act of 1999 (P.L. 106-53),
Section 2 of the Water Resources Development Technical Corrections of 1999 (P.L. 106-109), and
Section 3177 of the Water Resources Development Act of 2007 (P.L. 110-114).

Additional Cost Sharing Provisions

Section 906(e) of the Water Resources Development Act of 1986 (P.L. 99-662) as amended by
Section 221 of the Water Resources Development Act of 1999 (P.L. 106-53).

SEC. 1103. UPPER MISSISSIPPI RIVER PLAN.

(a)(1) This section may be cited as the "Upper Mississippi River Management Act of 1986".

(2) To ensure the coordinated development and enhancement of the Upper Mississippi River system, it is hereby declared to be the intent of Congress to recognize that system as a nationally significant ecosystem and a nationally significant commercial navigation system. Congress further recognizes that the system provides a diversity of opportunities and experiences. The system shall be administered and regulated in recognition of its several purposes.

(b) For purposes of this section --

(1) the terms "Upper Mississippi River system" and "system" mean those river reaches having commercial navigation channels on the Mississippi River main stem north of Cairo, Illinois; the Minnesota River, Minnesota; Black River, Wisconsin; Saint Croix River, Minnesota and Wisconsin; Illinois River and Waterway, Illinois; and Kaskaskia River, Illinois;

(2) the term "Master Plan" means the comprehensive master plan for the management of the Upper Mississippi River system, dated January 1, 1982, prepared by the Upper Mississippi River Basin Commission and submitted to Congress pursuant to Public Law 95-502;

(3) the term "GREAT I, GREAT II, and GRRM studies" means the studies entitled "GREAT Environmental Action Team--GREAT I--A Study of the Upper Mississippi River", dated September 1980, "GREAT River Environmental Action Team--GREAT II--A Study of the Upper Mississippi River", dated December 1980, and "GREAT River Resource Management Study", dated September 1982; and

(4) the term "Upper Mississippi River Basin Association" means an association of the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, formed for the purposes of cooperative effort and united assistance in the comprehensive planning for the use, protection, growth, and development of the Upper Mississippi River System.

(c)(1) Congress hereby approves the Master Plan as a guide for future water policy on the Upper Mississippi River system. Such approval shall not constitute authorization of any recommendation contained in the Master Plan.

(2) Section 101 of Public Law 95-502 is amended by striking out the last two sentences of subsection (b), striking out subsection (i), striking out the final sentence of subsection (j), and redesignating subsection "(j)" as subsection "(i)".

(d)(1) The consent of the Congress is hereby given to the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, or any two or more of such States, to enter into negotiations for agreements, not in conflict with any law of the United States, for cooperative effort and mutual assistance in the comprehensive planning for the use, protection, growth, and development of the Upper Mississippi River system, and to establish such agencies, joint or otherwise, or designate an existing multi-State entity, as they may deem desirable for making effective such

agreements. To the extent required by Article I, section 10 of the Constitution, such agreements shall become final only after ratification by an Act of Congress.

(2) The Secretary is authorized to enter into cooperative agreements with the Upper Mississippi River Basin Association or any other agency established under paragraph (1) of this subsection to promote and facilitate active State government participation in the river system management, development, and protection.

(3) For the purpose of ensuring the coordinated planning and implementation of programs authorized in subsections (e) and (h)(2) of this section, the Secretary shall enter into an interagency agreement with the Secretary of the Interior to provide for the direct participation of, and transfer of funds to, the Fish and Wildlife Service and any other agency or bureau of the Department of the Interior for the planning, design, implementation, and evaluation of such programs.

(4) The Upper Mississippi River Basin Association or any other agency established under paragraph (1) of this subsection is hereby designated by Congress as the caretaker of the master plan. Any changes to the master plan recommended by the Secretary shall be submitted to such association or agency for review. Such association or agency may make such comments with respect to such recommendations and offer other recommended changes to the master plan as such association or agency deems appropriate and shall transmit such comments and other recommended changes to the Secretary. The Secretary shall transmit such recommendations along with the comments and other recommended changes of such association or agency to the Congress for approval within 90 days of the receipt of such comments or recommended changes.

(e) Program Authority

(1) Authority

(A) In general. The Secretary, in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, may undertake, as identified in the master plan

(i) a program for the planning, construction, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement; and

(ii) implementation of a long-term resource monitoring, computerized data inventory and analysis, and applied research program, including research on water quality issues affecting the Mississippi River (including elevated nutrient levels) and the development of remediation strategies.

(B) Advisory committee. In carrying out subparagraph (A)(i), the Secretary shall establish an independent technical advisory committee to review projects, monitoring plans, and habitat and natural resource needs assessments.

(2) REPORTS. — Not later than December 31, 2004, and not later than December 31 of every sixth year thereafter, the Secretary, in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, shall submit to Congress a report that —

(A) contains an evaluation of the programs described in paragraph (1);

(B) describes the accomplishments of each of the programs;

(C) provides updates of a systemic habitat needs assessment; and

(D) identifies any needed adjustments in the authorization of the programs.

(3) For purposes of carrying out paragraph (1)(A)(i) of this subsection, there is authorized to be appropriated to the Secretary $22,750,000 for fiscal year 1999 and each fiscal year thereafter.

(4) For purposes of carrying out paragraph (1)(A)(ii) of this subsection, there is authorized to be appropriated to the Secretary $10,420,000 for fiscal year 1999 and each fiscal year thereafter.

(5) Authorization of appropriations.—There is authorized to be appropriated to carry out paragraph (1)(B) $350,000 for each of fiscal years 1999 through 2009.

(6) Transfer of amounts.—For fiscal year 1999 and each fiscal year thereafter, the Secretary, in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, may transfer not to exceed 20 percent of the amounts appropriated to carry out clause (i) or (ii) of paragraph (1)(A) to the amounts appropriated to carry out the other of those clauses.

(7)(A) Notwithstanding the provisions of subsection (a)(2) of this section, the costs of each project carried out pursuant to paragraph (1)(A)(i) of this subsection shall be allocated between the Secretary and the appropriate non-Federal sponsor in accordance with the provisions of section 906(e) of this Act; except that the costs of operation and maintenance of projects located on Federal lands or lands owned or operated by a State or local government shall be borne by the Federal, State, or local agency that is responsible for management activities for fish and wildlife on such lands and, in the case of any project requiring non-Federal cost sharing, the non-Federal share of the cost of the project shall be 35 percent.

(B) Notwithstanding the provisions of subsection (a)(2) of this section, the cost of implementing the activities authorized by paragraph (1)(A)(ii) of this subsection shall be allocated in accordance with the provisions of section 906 of this Act, as if such activity was required to mitigate losses to fish and wildlife.

(8) None of the funds appropriated pursuant to any authorization contained in this subsection shall be considered to be chargeable to navigation.

(f) (1) The Secretary, in consultation with any agency established under subsection (d)(1) of this section, is authorized to implement a program of recreational projects for the system substantially in accordance with the recommendations of the GREAT I, GREAT II, and GRRM studies and the master plan reports. In addition, the Secretary, in consultation with any such agency, shall, at Federal expense, conduct an assessment of the economic benefits generated by recreational activities in the system. The cost of each such project shall be allocated between the Secretary and the appropriate non-Federal sponsor in accordance with title I of this Act.

(2) For purposes of carrying out the program of recreational projects authorized in paragraph (1) of this subsection, there is authorized to be appropriated to the Secretary not to exceed $500,000 per fiscal year for each of the first 15 fiscal years beginning after the effective date of this section.

(g) The Secretary shall, in his budget request, identify those measures developed by the Secretary, in consultation with the Secretary of Transportation and any agency established under subsection (d)(1) of this section, to be undertaken to increase the capacity of specific locks throughout the system by employing nonstructural measures and making minor structural improvements.

(h)(1) The Secretary, in consultation with any agency established under subsection (d)(1) of this section, shall monitor traffic movements on the system for the purpose of verifying lock capacity, updating traffic projections, and refining the economic evaluation so as to verify the need for future capacity expansion of the system.

(2) Determination.

(A) In general. The Secretary in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, shall determine the need for river rehabilitation and environmental enhancement and protection based on the condition of the environment, project developments, and projected environmental impacts from implementing any proposals resulting from recommendations made under subsection (g) and paragraph (1) of this subsection.

(B) Requirements. The Secretary shall

(i) complete the ongoing habitat needs assessment conducted under this paragraph not later than September 30, 2000; and

(ii) include in each report under subsection (e)(2) the most recent habitat needs assessment conducted under this paragraph.

(3) There is authorized to be appropriated to the Secretary such sums as may be necessary to carry out this subsection.

(i) (1) The Secretary shall, as he determines feasible, dispose of dredged material from the system pursuant to the recommendations of the GREAT I, GREAT II, and GRRM studies.

(2) The Secretary shall establish and request appropriate Federal funding for a program to facilitate productive uses of dredged material. The Secretary shall work with the States which have, within their boundaries, any part of the system to identify potential users of dredged material.

(j) The Secretary is authorized to provide for the engineering, design, and construction of a second lock at locks and dam 26, Mississippi River, Alton, Illinois and Missouri, at a total cost of $220,000,000, with a first Federal cost of $220,000,000. Such second lock shall be constructed at or in the vicinity of the location of the replacement lock authorized by section 102 of Public Law 95-502. Section 102 of this Act shall apply to the project authorized by this subsection.

SEC. 906(e). COST SHARING.

(e) In those cases when the Secretary, as part of any report to Congress, recommends activities to enhance fish and wildlife resources, the first costs of such enhancement shall be a Federal cost when--

(1) such enhancement provides benefits that are determined to be national, including benefits to species that are identified by the National Marine Fisheries Service as of national economic importance, species that are subject to treaties or international convention to which the United States is a party, and anadromous fish;

(2) such enhancement is designed to benefit species that have been listed as threatened or endangered by the Secretary of the Interior under the terms of the Endangered Species Act, as amended (16 U.S.C. 1531, et seq.), or

(3) such activities are located on lands managed as a national wildlife refuge.

When benefits of enhancement do not qualify under the preceding sentence, 25 percent of such first costs of enhancement shall be provided by non-Federal interests under a schedule of reimbursement determined by the Secretary. Not more than 80 percent of the non-Federal share of such first costs may be satisfied through in-kind contributions, including facilities, supplies, and services that are necessary to carry out the enhancement project. The non-Federal share of operation, maintenance, and rehabilitation of activities to enhance fish and wildlife resources shall be 25 percent.

EMP OPERATING APPROACH

2006 marks the 20th anniversary of the Environmental Management Program (EMP). During that time, the Program pioneered many new ideas to help deliver efficient and effective natural resource programs to the Upper Mississippi River System (UMRS). These included the creation of an effective partnership of five states, five federal agencies, and numerous NGOs; a network of six field stations monitoring the natural resources of the UMRS; and the administrative structure to encourage river managers to use both new and proven environmental restoration techniques.

EMP has a history of identifying and dealing with both natural resource and administrative challenges. The next several years represent new opportunities and challenges as Congress considers authorization of the Navigation and Environmental Sustainability Program (NESP), possible integration or merger of EMP with NESP, and changing standards for program management and execution.

We will continue to learn from both the history of EMP and experience of other programs. Charting a course for EMP over the next several years is important to the continued success of the Program. EMP will focus on the key elements of partnership, regional administration and coordination, LTRMP, and HREPs.

The fundamental focus of EMP will not change, however the way we deliver our services must change and adapt. This will include:

- further refinements in regional coordination and management,
- refinement of program goals and objectives,
- increased public outreach efforts,
- development and use of tools such as the regional HREP database and HREP Handbook,
- exploring new delivery mechanisms for contracting,
- continued refinement of the interface between LTRMP and the HREP program components, and
- scientific and management application of LTRMP information and data.

The focus of these efforts must benefit the resources of the UMRS through efficient and effective management.