Upper Mississippi River Restoration Program Coordinating Committee Quarterly Meeting

August 5, 2015

Highlights and Action Items

Program Management

- UMRR's FY 15 internal allocations under its $33.17 million budget are as follows:
  - Regional Administration and Programmatic Efforts – $861,000
  - Regional Science and Monitoring – $8,126,000
    - Long term resource monitoring – $5,495,000
    - Regional science in support of restoration – $1,907,000
    - Regional science staff support – $69,000
    - Habitat project evaluations – $655,000
  - Habitat Restoration – $24,183,000
    - Regional project sequencing – $70,000
    - MVP – $7,234,000
    - MVR – $9,645,000
    - MVS – $7,234,000
- The House's FY 16 energy and water appropriations bill matches the President's FY 16 budget request by including $19.787 million for UMRR. This funding level is the Corps' current planning amount for the program, and represents a decrease of $13.383 million from FY 15. The decrease is the result of increased competition from other USACE ecosystem restoration projects for construction funding, particularly the Everglades. The final FY 16 appropriation is unknown. The program's internal allocations under the $19.787 million scenario are as follows:
  - Regional Administration and Programmatic Efforts – $741,000
  - Regional Science and Monitoring – $6,567,000
    - Long term resource monitoring – $4,500,000
    - Regional science in support of restoration – $963,000
    - Regional science staff support – $129,000
    - Habitat project evaluations – $975,000
  - Habitat Restoration – $12,479,000
    - Regional project sequencing – $100,000
    - MVP – $3,425,000
    - MVR – $4,745,000
    - MVS – $4,209,000

  [Note: The District habitat restoration funds are not reflective of the historical split based on river mileage, and instead are reflective of the project priorities as identified in the budget process.]

- Corps Headquarters ecosystem budget lead, Mindy Simmons, toured the Upper Mississippi River on June 8-11, 2015. This included a helicopter tour of 15 habitat projects in three floodplain reaches, a boat tour of Lake Odessa, and site visits to Corps and partners' facilities. Brian Johnson, Marv Hubbell, Sabrina Chandler, Jeff Houser, Mike Griffin, Dan Stephenson, Gretchen Benjamin, and Dru Buntin joined the tour to provide partner perspectives and program knowledge. Simmons acknowledged the depth and breadth of the program, as well as the value of partner engagement.
- In response to direction from Headquarters, District staff are developing draft principles of efficient funding for UMRR's execution of its habitat projects. For example, a principle might describe the need for ensuring an appropriate, balanced stream of projects in planning, design, and construction in order to maintain staff and execution capacity. While District staff will continue to demonstrate that the program has the capacity to execute at its full annual authorized amount of $33.17 million, these principles will be communicated under reduced budgets and when the Corps is considering reallocations.
- Kirsten Mickelsen is currently working with partners in developing the first draft 2016 UMRR Report to Congress. **The first draft will be distributed to partners in late August/early September for a month-long review.**
- The 2015-2025 UMRR strategic operational planning team has completed a draft plan, but is still considering whether to use existing partnership groups or recommend a new habitat team to address restoration-related objectives. When the team has finalized those details, it plans to convene a partnership web-based conference call to roll out the draft plan and facilitate a dialogue regarding plan implementation.
- **UMRR Coordinating Committee members agreed to use Lean Six Sigma evaluation techniques to examine potential process improvements to the following four stages of habitat project development: initial feasibility planning, evaluation of the existing ecological condition, plan formulation, and draft environmental assessment report. Nicole Lynch will work with program partners to develop a fact sheet that explains these stages in greater detail, including partners' roles. At the UMRR Coordinating Committee's November 18 meeting, Lynch will present these fact sheets and outline a proposed process for undertaking the Lean Six Sigma evaluation.**
- District staff are evaluating a contract bid for the development of UMRR public outreach messages and images. It is anticipated that a contract award will occur in September.

<u>Long Term Resource Monitoring Element</u>

- Flooding on the Illinois River has impacted long term resource monitoring sampling in the La Grange Pool, Pool 26, and the open river. The field stations will follow UMRR's sampling protocols during flood events. The Big Rivers and Wetlands Field Station will use the flood conditions to sample fish communities in the floodplain and evaluate comparisons among the fish assemblages in the floodplain and main channel. The data will also be compared to similar monitoring done during the 1993 flood.
- A manuscript was published that models the effects of over-harvesting (commercial) silver carp populations as a management control. The research found that silver carp populations must be exploited at a small size (around 300-400 mm) in order to reduce spawning potential ratio to 0.2, which is identified as a threshold for recruitment overfishing.
- A manuscript was published that uses LiDAR data from Pool 9 to develop a suite of continuous surface metrics to quantify topographic diversity. A suite of four to five metrics captured most aspects of floodplain surface complexity. This research will be used in developing new landscape indicators of topographic variation that is important for a variety of ecological processes.

- LiDAR data in Pool 9 was compared with seven other floodplains around the world to examine environmental influences on floodplain topography, with the results published in a recent completion report. The comparison illustrates that there are important geomorphology characteristics that restoration practitioners could potentially modify to change floodplain surface complexity.
- The program's FY 16 science in support of restoration will include research, analysis, model development, and identification of resilience indicators. The Corps, UMESC, and the field stations are currently developing the FY 16 scope of work for long term resource monitoring and science in support of restoration.
- Corps and UMESC are planning for a winter 2016 science meeting. Travel expenses will be reimbursed for field station staff attending.
- The A-Team held a July 28, 2015 conference call to discuss UMRR's FY 16 budget as it relates to long term resource monitoring and science, status of FY 15 work, and an update on the resilience work group, as well as presentations about recent science publications on 1) ecological shifts in a large floodplain river transitioning from a turbid to a clear, stable state and 2) 50-year trends of common carp and sport fish in the Illinois River.
- Grace McCalla explained how UMRR could benefit from using NextGeneration Sequencing (i.e., eDNA) to validate its long term resource monitoring sampling methods, compare community compositions in study and non-study reaches, and evaluate biological responses to habitat projects.
- John Manier discussed research findings about the spatial and temporal dynamics of phytoplankton in Pools, 8, 13, and 26.

Habitat Rehabilitation and Enhancement Projects

- MVD is currently reviewing Rip Rap Landing's feasibility study, and MVS is anticipating initiating design work on the project in early FY 16. MVS staff have recently calibrated a physical model of Piasa and Eagles Nest Islands and will host a partnership meeting soon to review design alternatives using the model. The District will also soon host a partnership habitat evaluation workshop for Harlow and Wilkinson Islands. Design work continues on Clarence Cannon and Ted Shanks and construction on Ted Shanks and Pools 25 and 26 Islands is ongoing. Batchtown will likely be completed this summer.
- MVP anticipates finalizing construction on Capoli Slough this fall and hosting a dedication for the project in October coinciding with USFWS's refuge week. North and Sturgeon Lakes project is experiencing challenges due to its design showing potential minimal flood stage impacts and the lack of a project sponsor. MVP initiated construction on Harpers Slough spring 2015 and plans to finalize construction on Capoli Slough Islands Stages 1 and 2 this fall.
- MVR is maintaining an aggressive habitat project schedule, with five projects in planning, two in design, and six in construction. The District is also evaluating the performance of Bay Island, Andalusia, and Brown's Lake.
- USACE executed a contract with USGS to lead an interdisciplinary team that will define indicators of ecosystem health and resilience and link the indicators to the process of identifying habitat projects. **The team had its first conference call on July 14, and includes Jeff Houser, Jon Hendrickson, Andy Casper, Nate De Jager, Stephen Winter, and Kirsten Mickelsen. The team anticipates hosting a partnership workshop in December 2015 to brainstorm conceptual models for applying resilience concepts to the Upper Mississippi River System and consider fundamental questions. USGS is reviewing applications for a part time staff person to lead this effort.**
- **A team to identify the next generation of habitat projects will be convened in early winter 2016. This will include developing a new habitat needs assessment.**

Other Business

- **Upcoming quarterly meetings are as follows:**
  - **November 2015 — St. Paul**
    - UMRBA meeting — November 17
    - **UMRR Coordinating Committee — November 18**
  - **February 2016 — Rock Island**
    - UMRBA meeting — February 23
    - **UMRR Coordinating Committee — February 24**
  - **May 2016 — St. Louis**
    - UMRBA meeting — May 24
    - **UMRR Coordinating Committee — May 25**

UMRR CC Quarterly Meeting
August 5, 2015

Marvin E. Hubbell - MVR
UMRR Regional Program Manager

Mississippi Valley – Rock Island District (MVR)
Mississippi Valley – St. Louis District (MVS)
Mississippi Valley – St. Paul District (MVP)

US Army Corps of Engineers
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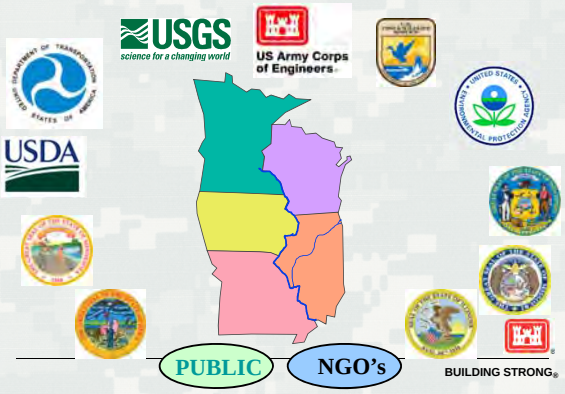
UMRR Program Partners



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FY15 Revised Work Plan

TOTAL FY15 Program	**$33,170,000**
Regional Administration and Program Efforts	**$ 861,000**
Regional Management	$ 534,000
Program Database	$ 116,000
UMRR Program Strategic Plan	$ 25,000
Program Support Contract (UMRBA)	$ 76,000
Public Outreach*	$ 35,000*(+$50 -$60)
2016 Report to Congress	$ 75,000
Regional Science and Monitoring	**$ 8,126,000**
LTRM (Base Monitoring)	$ 5,495,000
UMRR Regional Science In Support Rehabilitation/Mgmt. (MIPR's, Contracts, and Labor)	$ 1,907,000
UMRR Regional Science Staff Support (Integration)	$ 69,000
Habitat Evaluation (Including PER's)	$ 655,000
District Habitat Rehabilitation Efforts (Planning and Construction)	**$24,183,000**
Rock Island District	$ 9,645,000
St. Louis District	$ 7,234,000
St. Paul District	$ 7,234,000
Regional Project Sequencing	$ 70,000

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FY15 Funds Obligated (3/4 FY)

- UMRR Program – 65%
  - ►MVP – 95%
  - ►MVR – 41%*
  - ►MVS – 94%

* Adjustment in project objectives
* Bids below the IGE
* Always have contingency plans
* Cooperation between Dist. And Division

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FY 16 Budget Request (PBUD)

- President's Budget $19,787,000
- House $
- Senate $
- Presidents FY16 budget announced Feb.2
  - ►Reduction from FY15 - $13,383,000
- Developing FY16 Work plan

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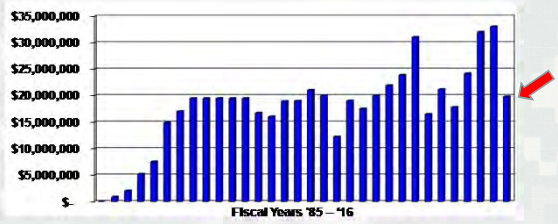
UMRR Program Appropriation/Budget History



Fiscal Years 1985 through 2016

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Tentative FY16 Work Plan

TOTAL FY16 Program	**$19,787,000**
Regional Administration and Program Efforts	**$ 741,000**
Regional Management	$ 495,000
Program Database	$ 95,000
Program Support Contract (UMRBA)	$ 76,000
Public Outreach	$ 60,000
2016 Report to Congress	$ 15,000
Regional Science and Monitoring	**$ 6,567,000**
LTRM (Base Monitoring)	$ 4,500,000
UMRR Regional Science In Support Rehabilitation/Mgmt. (MIPR's, Contracts, and Labor)	$ 963,000
UMRR Regional (Integration, Adapt. Mgmt, model cert.)	$ 129,000
Habitat Evaluation	$ 975,000
District Habitat Rehabilitation Efforts (Planning and Construction)	**$12,479,000**
Rock Island District	$ 4,745,000
St. Louis District	$ 4,209,000
St. Paul District	$ 3,425,000
Regional Project Sequencing	$ 100,000

FY 17 Budget Request

- President's Budget $
- House $
- Senate $
- FY17 budget request being developed
- Efficient Funding

Headquarters "Deep Dive"

- June 8 – 11
- Mindy Simmons
- Program Partners
  - ►UMRBA
  - ►Illinois
  - ►Iowa
  - ►TNC
  - ►FWS
  - ►USGS
  - ►Corps

Site Visit to Lake Odessa

How To Cover 3 Floodplain Reaches

Draft Principles of Efficient Funding

Each Dist. 2-4 projects in feasibility, P&S, and Const. at all times.

- Manage risk and continuous flow of work
- Feasibility Reports average 3 years
- P&S start right after Feasibility and take 12 – 18 mo.
- Construction starts right after P&S
- Minimize or eliminate project phases or stages
- O&M Manuals take a maximum of 12 months

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2016 Report to Congress

- 2015 Schedule
  - ►Feb. - Complete contract with UMRBA
  - ►**Feb. Quarterly Meeting**
    - **Initiate discussion on outline and identification of programmatic and policy issues (IIA issues)**
  - ►Feb. to Aug. - Prepare 1st Draft of RTC
  - ►Aug. - Submit 1st Draft RTC for review
  - ►Dec. – Submit 2nd Draft RTC for review

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2016 Report to Congress

- 2016 Schedule
  - ►Feb. – Send final draft to Partners for final review.
  - ►March to May – Official MVD and HQ review
  - ►Sept. to Nov. – Design and graphics
  - ►Nov. 15 – Submit final RTC to MVD and HQ

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2016 Report to Congress

- Progress since May meeting
  - ►Finalized contract with UMRBA to edit, write, and publish the 2016 RTC
  - ►Developed outlines for each of the major headings in the report.
  - ►Currently working on the Enhancing Knowledge Chapter.
    - Identifying key points and presenting data, processes, infra structure to demonstrate importance.

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2016 Report to Congress

- Outline
  - ►Forward
  - ►Executive Summary
  - ►Table of Contents
  - ►History and Background
  - ►Chapter 1 – Enhancing Habitat
  - ►Chapter 2 – Enhancing Knowledge
  - ►Chapter 3 – Interagency Partnership
  - ►Chapter 4 - Implementation Issues
  - ►Chapter 5 - Conclusions and Recommendations

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2016 Report to Congress

- Draft Policy Recommendation Statements
  (Pages B-7 to B-9)
  - ►Project Partnership Agreements (PPA)
  - ►UMRR-NESP Transition Plan

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UMRR Program Strategic Plan Key Points

- First formal Program Vision
- First formal Mission Statement
- Four Goal Statements
  - ►Enhance Habitat for Restoring and Maintaining a Healthier and More Resilient UMRS.
  - ►Advance Knowledge for Restoring and Maintaining a Healthier and More Resilient UMRS
  - ►Engage and Collaborate with Others
  - ►Utilize a Strong, Integrated Partnership

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Operational Plan

- Purpose
  - ►Make recommendations to the UMRR Program Coordinating Committee for implementing Strategic Plan.
  - ►Objectives:
    - Establish priorities
    - Identify key policy and technical issues
    - Integration of science and restoration efforts
    - Identifying challenges for implementation

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Operational Plan

- Challenges
  - ►Level of detail
  - ►How to clearly link to the Strategic Plan and budget.
- Some key recommendations being considered:
  - ►Communication Plan
  - ►Habitat Team
  - ►Update HNA
  - ►Transparency

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Operational Plan

- UMRR EMP-CC Adoption the Strategic Plan on Nov. 19
  - ►Amended the Plan by adding “an explicit intention to develop an implementation plan”.
- An 11 member Committee was created in response and held it’s first meeting on Jan. 20-22.
- Second meeting on April 9, 2015
- Anticipated completion Nov. 2015

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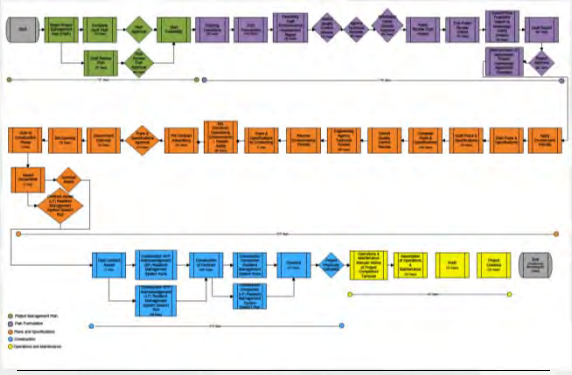
Lean Six Sigma

- Schedule:
  - ►Feb. - Overview of Lean Six Sigma
  - ►May – Identification of possible management issues to be addressed
  - ►May - July – Identify one or more key issues
  - ►August – Identify priority issues to be addressed.
  - ►September – Develop strategy to address priority issues then address key issues.
- Systematic process for continuous improvement of key business processes.

Lean Six Sigma

- General Topics
  - ►Regional Issues
    - Technical Management Coordination
  - ►Science
    - Monitoring Research Coordination Integration
  - ►Habitat Restoration
    - Plan formulation Construction Post Construction Integration



Strategic and Operational Plan Goal 3

- Goal 3 - Engage and collaborate with other organizations and individuals to accomplish the UMRR vision.
- Initial Recommendations
  - ►Establish a Communication Committee
  - ►Develop Communications Plan

Initial Staffing of the Communication Team

- Kevin Bluhm
- Randy Hines
- Karla Sparks
- FWS
- Volunteers

External Communications and Outreach Update

- Initial Contract for Branding & Messaging
  - ►SOW was refined and sent out for bid
  - ►Packet is back from contractor & being evaluated
  - ►Expect to Award in the next week
  - ►Initial start of contract to begin in September

Communications Contract Activities

- Initiate Communications Committee –Sept
- Launch Questionnaire – Oct.
  - ►Work thru results/build themes – Nov.
  - ►Begin Development of Communication tools
- Progress Update – Nov. UMRCC mtgs
- Refine messaging – Dec/Jan 2016
- Initial results – Feb. UMRCC mtgs

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Public Communications and Outreach

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Events

- International Society for River Science (Aug. 23-28)

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UMRRP Habitat Rehabilitation and Enhancement Projects

As of February 2015:
55 Projects Completed
8 Projects in Construction
27 Projects in Design

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ST. LOUIS DISTRICT (MVS)
FY15 HREP Work Plan (Aug. 2015)

PLANNING

Rip Rap Landing, IL $200K
- Final Draft Feasibility complete waiting on sponsor letter of support
- *Received letter seeking revised self certification*

Piasa and Eagles Nest Islands, Pool 26, IL
- Continue feasibility *$350k*
- Model constructed – start testing

Harlow MO /Wilkinson IL Islands, Middle River $400K
- Value Engineering/Planning Workshop
- *Habitat Evaluation Workshop Aug/Sept.*

Other studies in the Queue *$200k*
- Glades & Godar, IL River
- West Alton/Missouri Islands
- Open River

EVALUATION *$150k*
Baseline Monitoring
Post Project Monitoring
Performance Evaluation – Calhoun Pt.

DESIGN

Clarence Cannon Refuge, MO *$1100k*
- Berm Setback
- Pump Station
- South Unit water control & channels
- North Unit water control & berm degrades

Ted Shanks, MO *$500k*
- Pump Station
- Deadman Slough Enhancements

CONSTRUCTION

Ted Shanks, MO *$3950k*
- SR1 Water Control – completed
- HL1 Water Control
- Channel and Berm Earthwork
- CN & CS Water Control
- North Berm and Setback
- NS1,NS2, DS Water Control

Pools 25 & 26 Islands, MO
- Bolters Island *$100k*

Batchtown, IL – Punchlist *$100k*

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New MVS Commander HREP Site Visit

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ST. PAUL DISTRICT (MVP)
FY15 HREP Work Plan (5 Aug 2015)

PLANNING – in priority order…..

North & Sturgeon Lakes, Pool 3, MN – ($400k)
- Complete Feasibility

Conway Lake, Pool 9, IA – ($350k)
- Complete Draft Feasibility

McGregor Lake, Pool 10, WI – ($150k)
- Continue Draft Feasibility

Other studies in the Queue
- Pool 10 Islands
- Lake Winneshiek (Pool 9),
- Weaver Bottoms (Pool 5),
- Clear Lake (Pool 5),
- Bass Lake Ponds (Mn Valley),

CONSTRUCTION

Capoli Slough Islands, Pool 9, WI ($250k)
- Stage 1 - Newt Marine
- Stage 2 - McHugh/JF Brennan
- Project dedication in fall

Harpers Slough, Pool 9, IA ($12.3M)
- Stage 1 - Newt Marine
- Started work early April

EVALUATION
- Baseline Monitoring
- Post Project Monitoring
- Performance Evaluation
  - Lansing Big Lake
  - Ambrough Slough
  - Bank Stabilization

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Capoli Slough – Island L

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ROCK ISLAND DISTRICT (MVR)
FY15 HREP Work Plan (Aug. 2015)

PLANNING
- Beaver Island, Pool 14, IA **($540K)**
- Keithsburg Division, Pool 18, IL ($196K)
- Boston Bay, Pool 18, IL ($75K)

DESIGN
- Pool 12 Overwintering Stage II, Pool 12 IL **($280K)**

CONSTRUCTION
- Lake Odessa Flood Recovery, IA Pools 17 and 18, IA **($350K + L $410K)**
- Pool 12 Overwintering Stage I, Pool 12 IL **(L $140K)**
- Pool 12 Overwintering Stage II, Pool 12 IL **($4.6M)**

EVALUATION
- FWS **(L $154K)**
- Baseline Monitoring
- Adaptive Mgmt. Pool 12
- Snyder Slough Backwater, Pool 11, WI **($20K)***
- Emiquon East, LaGrange* Pool, IL **($10K)**
- Huron Island Stage II, Pool 18, IA **($220K)**
- Pool 12 Overwintering Stage II, Pool 12 IL **($280K)**
- Huron Island Stage I, Pool 18, IA **(L $360K**
- Fox Island, Pool 20, MO **(L $100K) CW450**
- Rice Lake Stage I, IL LaGrange Pool
  - **($130K + L $85K) CW450**
- Post Project Monitoring
- Performance Evaluations **($250K)**
  - Bay Island
  - Andalusia
  - Brown's Lake

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Pool 12 Sunfish Lake Reshaping

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Huron Island

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Huron Island

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Keithsburg Division

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Keithsburg Division

- Public Meeting July 28, 2015

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Pool 12

- Communications
- Decision Points
- Evolving Management Objectives

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Linking Indicators of Health and Resilience and Next Generation of Projects

- Strategic Mission and Vision Statement

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Indicators of Health and Resilience

- April 2015 Award MIPR for indicators of ecosystem health and resiliency.
  - ►Establish Interdisciplinary Team
  - ►Develop work plan

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Indicators of Ecosystem Health and Resilience

- Next Steps
  - ►Health and Resiliency Schedule
    - Formal start – 3rd Quarters FY15
      - ▷ Develop Outline
      - ▷ assemble key data sources
      - ▷ Conceptual linkage of indicators with the identification of the next generation of rehabilitation efforts
    - Completion – 4th Quarter FY17

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Work Group Members

- Jon Hendrickson
- Jeff Houser
- Andy Casper
- Nathan R DeJager
- Stephen Winter
- Kirsten Mickelsen

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Purpose

- To help frame the concept of resiliency for the UMRR Program.
- The goal is to operationalize the concepts of both ecosystem resiliency and health so that they can be used as tools to effectively implement the Strategic Plan.

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Actions

- focus on developing a solid command of what is ecosystem and engineering resiliency,
- how are resiliency and health related to each, and
- how can we develop tools (such as indicators) to help evaluate changes in both resiliency and health.

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Next Generation of Projects

- 2st Quarter FY16 - Establish the team for the next generation of Projects.
- Next Steps
  - ►Schedule
  - ►Formal start – 2nd Quarter FY16
    - ▷ Develop Outline
    - ▷ assemble key data sources
    - ▷ Identify perspective members of SET
    - ▷ Link rehabilitation efforts updating the HNA (refined goals, objectives, indicators, and data from base monitoring)
  - • Completion – 4th Quarter FY17

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Implementation Issues Assessment

- RTC

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Mud Lake Pool 11 July 2006

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Completed Projects — Illinois

Project Name	Acres Restored	Federal Cost	Non-Federal Cost	Total Cost
Andalusia Refuge	393	$2,741,000	$0	$2,741,000
Banner Marsh	4,290	$5,339,000	$1,780,000	$7,119,000
Calhoun Point	2,135	$10,764,000	$0	$10,764,000
Chautauqua Refuge	3,940	$14,151,000	$0	$14,151,000
Gardner Division (Long Island Division)	6,300	$7,760,000	$0	$7,760,000
Peoria Lake	2,500	$3,235,000	$42,000	$3,277,000
Potters Marsh	2,305	$3,007,000	$0	$3,007,000
Spring Lake	3,300	$6,530,000	$0	$6,530,000
Stump Lake	2,960	$6,057,000	$0	$6,057,000
Total:	**37,218**	**$71,165,000**	**$3,644,000**	**$74,809,000**

Field Station	Total Cost
National Great Rivers Research & Education Center Biological Field Station	$ 8,783,000
Illinois River Biological Field Station	$ 8,783,000
Total Science & Monitoring	**$17,566,000**

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Future Projects — Illinois

Project Name	Acres Restored	Federal Cost	Non-Federal Cost	Total Cost
Batchtown	3,280	$17,091,000	$146,000	$17,237,000
Boston Bay	900	$6,337,000	$0	$6,337,000
Delair Division	1,685	$9,500,000	$0	$9,500,000
Glades Wetlands	2,650	$17,218,000	$0	$17,218,000
Godar Refuge	2,400	$8,202,000	$0	$8,202,000
Keithsburg Division	1,390	$6,350,000	$0	$6,350,000
Pool 12 Overwintering	7,990	$20,656,000	$0	$20,656,000
Red's Landing Wetlands	1,620	$4,484,000	$0	$4,484,000
Rip Rap Landing	2,300	$8,169,000	$231,000	$8,400,000
Salt Lake/Ft Chartres Side Channel	60	$2,000,000	$0	$2,000,000
Swan Lake	2,900	$15,623,000	$262,000	$15,885,000
Total:	**32,225**	**$132,881,000**	**$408,000**	**$133,289,000**

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Completed Projects — Iowa

Project Name	Acres Restored	Federal Cost	Non-Federal Cost	Total Cost
Big Timber	1,039	$851,000	$0	$851,000
Brown's Lake	453	$2,093,000	$0	$2,093,000
Bussey Lake	494	$3,432,000	$162,000	$3,594,000
Guttenberg Waterfowl Ponds	198	$327,000	$0	$327,000
Lake Odessa	6,788	$22,600,000	$0	$22,600,000
Lansing Big Lake	6,420	$2,090,000	$0	$2,090,000
Pleasant Creek	2,350	$1,312,000	$0	$1,312,000
Pool 11 Islands-Mud Lake	4,550	$4,597,920	$0	$4,597,920
Pool Slough	620	$518,000	$175,000	$693,000
Princeton Refuge	1,129	$4,006,000	$54,000	$4,060,000
Total:	**24,041**	**$41,826,920**	**$391,000**	**$42,217,920**

Field Station	Total Cost
Iowa DNR Mississippi River Biological Field Station	$9,786,000

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Future Projects — Iowa

Project Name	Acres Restored	Federal Cost	Non-Federal Cost	Total Cost
Beaver Island	1,750	$13,375,000	$0	$13,375,000
Conway Lake	1,043	$2,512,000	$0	$2,512,000
Harpers Slough	2,200	$12,150,000	$0	$12,150,000
Huron Island	2,000	$13,773,000	$0	$13,773,000
Lower Pool 10 Island and Backwater Complex	2,340	$6,000,000	$0	$6,000,000
Steamboat Island	1,280	$7,780,000	$0	$7,780,000
Turkey River Bottoms Delta and Backwater Complex	3,638	$18,700,000	$0	$18,700,000
Total:	**14,251**	**$74,290,000**	**$0**	**$74,290,000**

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Completed Projects — Minnesota

Project Name	Acres Restored	Federal Cost	Non-Federal Cost	Total Cost
East Channel	320	$559,000	$0	$559,000
Finger Lakes	530	$1,445,000	$0	$1,445,000
Island 42	420	$262,000	$0	$262,000
Long Meadow Lake	2,340	$750,000	$0	$750,000
Peterson Lake	614	$1,179,000	$0	$1,179,000
Polander Lake	790	$3,000,000	$0	$3,000,000
Pool 8 Islands Phase III	3,288	$19,650,000	$0	$19,650,000
Pool Slough	620	$518,000	$175,000	$693,000
Rice Lake-MN	807	$682,000	$0	$682,000
Total:	**9,729**	**$28,045,000**	**$175,000**	**$28,220,000**

Field Station	Total Cost
State of Minnesota, Lake City Biological Field Station	$ 10,170,000

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Future Projects — Minnesota

Project Name	Acres Restored	Federal Cost	Non-Federal Cost	Total Cost
Bass Ponds, Marsh, and Wetland	390	$3,000,000	$0	$3,000,000
Clear Lake (Finger Lake) Dredging	321	$2,500,000	$0	$2,500,000
North and Sturgeon Lakes	5,150	$8,000,000	$0	$8,000,000
Weaver Bottoms	4,883	$10,000,000	$0	$10,000,000
Total:	**11,134**	**$26,500,000**	**$0**	**$26,500,000**

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Completed Projects

Missouri

Project Name	Acres Restored	Federal Cost	Non-Federal Cost	Total Cost
Bay Island	650	$3,112,000	$0	$3,112,000
Clarksville Refuge	312	$454,000	$0	$454,000
Cuivre Island	2,180	$1,444,000	$479,000	$1,923,000
Dresser Island	940	$2,904,000	$0	$2,904,000
Monkey Chute	88	$56,000	$0	$56,000
Pharrs Island	525	$2,783,000	$0	$2,783,000
Stag and Keaton Islands	470	$471,000	$0	$471,000
Total:	**5,165**	**$11,224,000**	**$479,000**	**$11,703,000**

Field Station	Total Cost
Big Rivers & Wetlands Biological Field Station	$7,387,000

BUILDING STRONG®

Future Projects

Missouri

Project Name	Acres Restored	Federal Cost	Non-Federal Cost	Total Cost
Clarence Cannon	3,750	$25,800,000	$0	$25,800,000
Fox Island	2,033	$4,800,000	$0	$4,800,000
Harlow Island	1,300	$6,500,000	$0	$6,500,000
Piasa - Eagle's Nest Islands	1,600	$5,500,000	$0	$5,500,000
Pool 24 Islands	3,150	$9,492,000	$0	$9,492,000
Pool 25 and 26 Islands	2,026	$2,660,000	$0	$2,660,000
Ted Shanks	2,900	$29,506,000	$0	$29,506,000
West Alton Tract	610	$6,532,000	$0	$6,532,000
Wilkinson Island	2,700	$5,980,000	$0	$5,980,000
Total:	**27,271**	**$111,582,000**	**$**	**$111,582,000**

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Completed Projects

Wisconsin

Project Name	Acres Restored	Federal Cost	Non-Federal Cost	Total Cost
Ambrough Slough	2,746	$2,461,000	$166,000	$2,627,000
Bertom Mccartney Lakes	2,000	$2,440,000	$0	$2,440,000
Blackhawk Park	82	$232,000	$77,000	$309,000
Cold Springs	30	$463,000	$0	$463,000
East Channel	320	$559,000	$0	$559,000
Indian Slough	825	$988,000	$0	$988,000
Lake Onalaska	2,750	$2,064,000	$0	$2,064,000
Long Lake	40	$649,000	$0	$649,000
Pool 11 Islands-Sunfish Lake	4,000	$5,247,228	$0	$5,247,228
Pool 8 Islands Phase I	643	$2,314,000	$0	$2,314,000
Pool 8 Islands Phase II	1,268	$3,482,000	$0	$3,482,000
Pool 8 Islands Phase III	3,288	$19,650,000	$0	$19,650,000
Pool 9 Islands	410	$1,266,000	$0	$1,266,000
Small Scale Drawdown	80	$97,000	$0	$97,000
Spring Lake Islands	530	$3,895,000	$0	$3,895,000
Spring Lake Peninsula	30	$448,000	$0	$448,000
Trempeleau	5,487	$5,835,000	$0	$5,835,000
Total:	**30,056**	**$58,574,228**	**$243,000**	**$58,817,228**

Field Station	Total Cost
USGS – Upper Mississippi River Environmental Science Center	$95,154,000
State of Wisconsin, La Crosse Biological Field Station	$10,293,000

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Future Projects

Wisconsin

Project Name	Acres Restored	Federal Cost	Non-Federal Cost	Total Cost
Capoli Slough	820	$9,450,000	$0	$9,450,000
Lake Winneshiek	5,170	$5,000,000	$0	$5,000,000
Lock & Dam 3	660	$9,100,000	$0	$9,100,000
Lower Pool 10 Island and Backwater Complex	2,340	$6,000,000	$0	$6,000,000
McGregor Lake	1,000	$6,500,000	$0	$6,500,000
Snyder Slough Backwater Complex	2,064	$16,800,000	$0	$16,800,000
Turkey River Bottoms Delta and Backwater Complex	3,638	$18,700,000	$0	$18,700,000
Total:	**15,692**	**$71,550,000**	**$0**	**$71,550,000**

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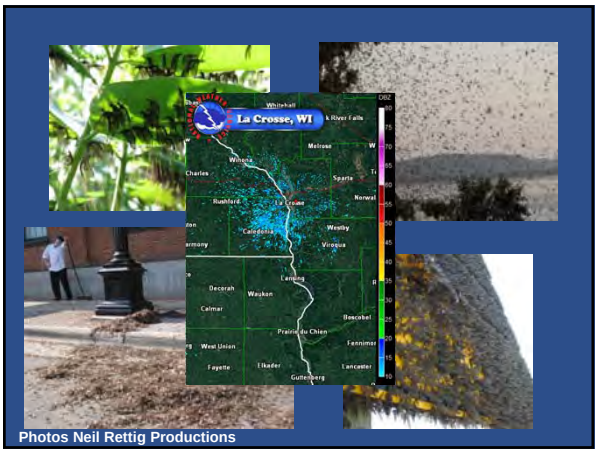
UMRR LTRM Report



Photos Neil Rettig Productions

Illinois River Biological Station
Havana, Illinois

Impacted sampling at:
- Pool 26
- Open River Reach
- La Grange Pool

Doyn Kellerhals

Use of exploitation simulation models for silver carp (*Hypophthalmichthys molitrix*) populations in several Midwestern U.S. rivers

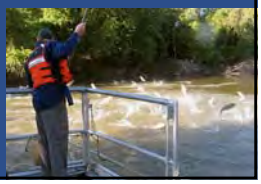
Justin Seibert, Quinton Phelps, Kasey Yallaly, Sara Tripp, Levi Solomon, Tom Stefanavage , David Herzog, and Michael Taylor

- Management of silver carp is a growing concern
- Commercial fishing may have the greatest potential to control silver carp
- To be successful, the level of exploitation required to reduce silver carp populations must be quantified

Management of Biological Invasions (2015) Volume 6

Use of exploitation simulation models for silver carp (*Hypophthalmichthys molitrix*) populations in several Midwestern U.S. rivers

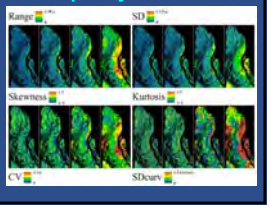
- Silver carp were collected from several Midwestern U.S. rivers
- Parameters were used to simulate exploitation levels using a spawning potential ratio approach to determine target size and needed amount of exploitation
- Silver carp populations must be exploited at a small size
- Need an understanding of the impacts of small mesh sizes on native species and an incentive program for commercial fisherman



Measuring floodplain spatial patterns using continuous surface metrics at multiple scales.

Scown, Thoms, and De Jager

- Lidar data from Pool 9 used to develop a suite of continuous surface metrics to quantity topographic diversity
- A suite of four to five metrics were capable of capturing most aspects of floodplain surface complexity
- First-step toward developing new landscape indicators of topographic variation
- Identify areas, scales, and degrees of topographic variability important for a variety of ecological processes.

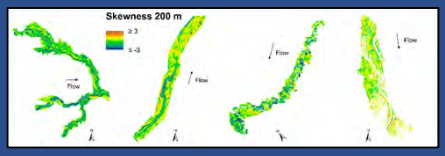


Geomorphology 245:87-101

Floodplain complexity and surface metrics: influences of scale and geomorphology.

Scown, Thoms, and De Jager

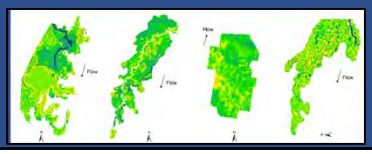
- Eight floodplains from different geographic settings were selected to examine environmental influences on floodplain topography.
- Variability became stronger at larger measurement scales
- Organization varied from gradient-like, to patchy, to random, depending on the floodplain.



Floodplain complexity and surface metrics: influences of scale and geomorphology.

Scown, Thoms, and De Jager

- Sediment yield and flow variability were associated with differences in surface variability
- Floodplain width and valley slope were associated with differences in spatial organization
- Study helps to identify important aspects of geomorphology that management agencies could modify to potentially change floodplain surface complexity



Delivering High Quality Data Behind the scenes

Xiaoli Yuan, John Manier, Derek Craig, Alisha Saley

Consistent Precise Accurate Completeness

UMRR Monitoring & Science for 2016

- **2 SOWs in FY16**
  - SOW for base data collection **$4.5M**
  - SOW for science in support of restoration **$.963M**

Both SOWs together are equivalent to a fully funded UMRR LTRM element

Sequestration (5%) possible but unlikely

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Milestones

- **May 8:** 2 SOW skeletons for review & feedback
- **June 1:** call for budgets
- **June 22:** draft budgets due
- **July 1**: call for analysis under base items
- **July 22:** analysis under base items due
- **Sept 9:** final SOWs and budgets due

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Communications

Conference Calls

- Feb 19, 2015
- March 24
- Hubbell via conference call at A-Team and LTRM component meetings in April
- August 10, 2:00-3:30 (tentative)

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FY16 Budget Summary

(draft)

MN	$511,766
WI	$523,176
IA	$453,463
IRBS	$385,618
NGREEC	$364,886
BRWFS	$379,786
States sub total	$2,618,694
equip	$184,163
field meetings	$6,834
science meeting travel	$4,791
added state travel	$3,502
statistics workshop	$5,941
STATES TOTAL	**$2,823,925**
UMESC sub total	$2,680,697
field meetings	$815
added UMESC travel	$5,791
statistics workshop	$15,550
UMESC TOTAL	**$2,702,853**
Corps tech reps	**$68,250**
TOTAL FY16 BUDGET	**$5,595,028**

Funding

Total FY16 Budget	**$5,595,028**
Carryover	
FY14 States (WI, IA, MO)	$ 53,560
FY15 States (WI)*	$ 103,000
FY15 UMESC	$ 70,513
Total Carryover	**$ 227,073**
Total Need (budget-carryover)	$5,367,955
FY16 Funding	**$5,463,000**
extra	$ 95,045

BUILDING STRONG®

Funding

Total FY16 Budget	**$5,595,028**
Carryover	
FY14 States (WI, IA, MO)	$ 53,560
FY15 States (WI)	$ 103,000
FY15 UMESC	$ 70,513
Total Carryover	**$ 227,073**
Total Need (budget - carryover)	**$5,367,955**
FY16 Funding	**$5,463,000**
extra	$ 95,045
FY16 w/ 5% sequestration	$5,189,851
shortfall	-$ 178,104

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Use of NextGeneration Sequencing (eDNA) *to Inform Ecosystem Monitoring Efforts*

S. Grace McCalla, Jon Amberg, Bridget Ladell, Jenna Malinauskas, Mark Gaikowski

USGS

eDNA

DNA shed from an organism into the environment detected from non-biological sources

- Soil
- Air
- Water

USGS

eDNA Applications

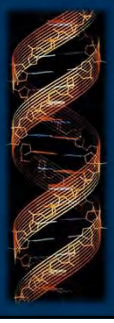
Targeted detections of a few species:

- Monitor movement and spawning events
- Identify new populations
- Habitat modeling

USGS

Next Generation Sequencing (NGS)

Determine the sequences of DNA:



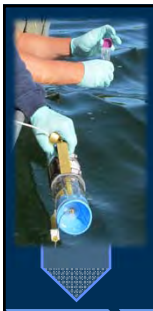
USGS

Next Generation Sequencing (NGS)

Determine the sequences of DNA:

- "Shotgun" – all DNA for a diverse array of organisms
  - Simultaneously targets all genetic regions of the DNA sample
- "Targeted" – specific regions of interest for multiple taxons
  - Barcode of Life - genetic fingerprinting

USGS



Overview of Sample Workflow

DNA extraction → Prepare sample for sequencing → DNA Sequencing → Data Analysis → Data products

USGS

Next Generation Sequencing

NGS Data (120 GB)

Reference Database (19 GB)

Next Generation Sequencing

NGS Data (120 GB)

Reference Database (19 GB)

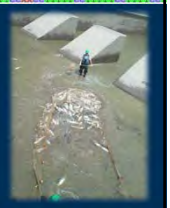
Next Generation Sequencing Applications

Molecular surveillance:

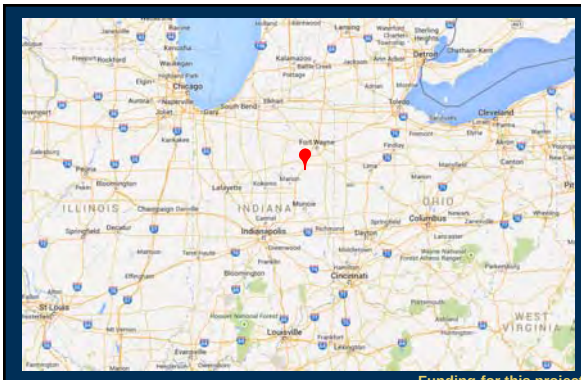
- Determine community composition
  - Detect rare taxons
  - Assess relative abundance
  - Analyze data by taxa of interest: bacteria, algae, fish, invertebrates, etc.
  - Sample types: water, ichthyoplankton/plankton tow, digestive system, fish gills, etc.

Complex ecological questions:

- Assess the health of aquatic ecosystems
  - Identify food web relationships – who's eating who?
  - How does a system change over time?
    - Detect presence/abundance of bio-indicator species in response to land use change, contaminants, etc.



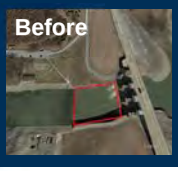
USGS

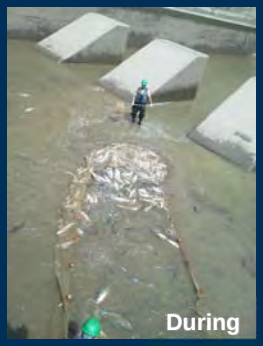


USGS

Funding for this project provided by Great Lakes Restoration Initiative and USGS appropriated funds

Roush Lake Drawdown





USGS

Family	Percent Pounds	Percent 16S Barcode	Percent 12S5 Barcode
Catostomidae	41.2	25.0	42.2
Sciaenidae	27.8	55.2	0.3
Cyprinidae	21.6	9.7	39.8
Ictaluridae	6.9	3.0	1.7
Clupeidae	0.7	2.2	1.6
Percidae	0.7	0.0	0.0
Centrarchidae	0.5	0.0	0.0
Lepisosteidae	0.3	0.0	0.0
Moronidae	0.2	0.0	0.0
Hiodontidae	0.1	0.0	0.0
Polyodontidae	0.0	0.0	0.0

USGS

Example of NGS Application

Sample between reaches:

- Validate method in conjunction with traditional sampling

USGS

Long Term Resource Monitoring Program
Fisheries Data - Graphical Fish Database Browser

LTRMP Fish Total Catches

Pool: Pool 08 | Year: 2014 | submit

Total catches, by gear type, of fish collected in Pool 08 of the Upper Mississippi River during 2014. The table is sorted from the species with the largest catch to the lowest catch.

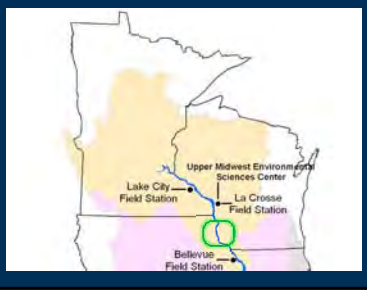
Common name	Scientific name	Day electrofishing	Fyke netting	Hoop netting, large net	Hoop netting, small net	Mini fyke netting	Trawling	Total
Bluegill	*Lepomis macrochirus*	1714	940	89	16	1651	5	**4415**
Unidentified Centrarchidae (sunfishes)	*Centrarchidae sp.*	453	-	-	-	2337	-	**2790**
Weed shiner	*Notropis texanus*	502	-	-	-	1755	-	**2257**
Mimic shiner	*Notropis volucellus*	959	-	-	-	953	5	**1917**
Spottin shiner	*Cyprinella spiloptera*	1176	-	-	-	282	-	**1458**
Emerald shiner	*Notropis atherinoides*	1009	-	-	-	170	-	**1179**
Largemouth bass	*Micropterus salmoides*	921	21	-	-	167	-	**1109**

USGS

Example of NGS Application

Sample between reaches:

- Validate method in conjunction with traditional sampling
- Expand to other under-sampled reaches



USGS

Applications with LTRM

How do restoration projects affect community composition?

- Monitor taxons of interest before and after restoration project to monitor community resilience
- Assess the effects of water quality on microbiome

Monitoring of macroinvertebrates:

- Mayflies, fingernail clams, midges, Asiatic clams and zebra mussels

Microbial ecology

- Fecal contamination: microbial source tracking
- What environmental drivers influence bacterial communities

Pathogen detection

USGS

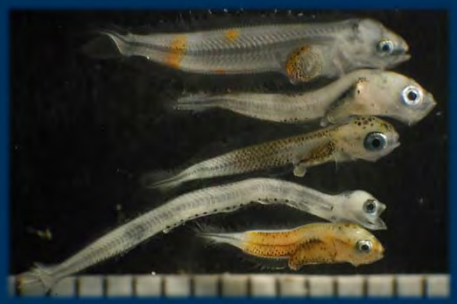
Complement existing methodologies

Community Dynamics:

- Analysis of biotic and abiotic life cycle events and how these are influenced by seasonal variations

USGS

Thank you

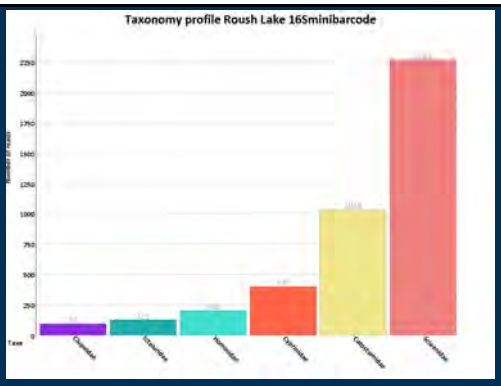


USGS

Operational Expenses

1-12 hr /sample	8-16 hr /sample	30 hr /sample	Variable	Variable
DNA extraction	Prepare sample for sequencing	DNA Sequencing	Data Analysis	Data products
$2-10 /sample + Personnel	~$150 /sample + Personnel	$400-4,000 /sample + Personnel	Personnel only	Data Storage + Personnel

USGS



USGS

USGS science for a changing world

University of Wisconsin La Crosse

SPATIAL AND TEMPORAL DYNAMICS OF PHYTOPLANKTON ASSEMBLAGES IN THE UPPER MISSISSIPPI RIVER, POOLS 8, 13, 26

John Manier

USGS- Upper Midwest Environmental Sciences Center
2630 Fanta Reed Rd, La Crosse, WI 54603

Why Study Phytoplankton of Large Rivers?

- Originally thought to be unimportant
- Primary energy drivers (Delong and Thorp 2006):
  - Caddisflies
  - Mayflies
  - Snails
  - Mussels

Photo courtesy of USFWS

http://www.lifeinfreshwater.org.uk

USGS

Why Study Phytoplankton of Large Rivers?

- Harmful algal blooms
  - Drinking water contamination
  - Human health concerns
  - Fish and wildlife kills
- Trempealeau National Wildlife Refuge
- Lake Pepin

Photos courtesy of Trempealeau National Wildlife Refuge

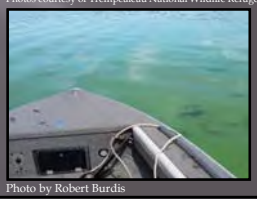


Photo by Robert Burdis

USGS

Past Research

- Limited Studies on the UMR
  - Reinhardt (1931)
  - Baker and Baker (1979)
  - Huff (1986)
  - Lange and Rada (1988)
  - Maurer (1994)
  - Reavie et al. (2010)- EMAP- GRE
- Multiple pools, aquatic areas, and years.

USGS

Methods

- USACE- Upper Mississippi River Restoration program
  - Navigation pools 8, 13, 26
    - P8 and P13- MC, BW, IMP
    - P26- Main channel
  - Years sampled: 2006-09
  - Months sampled: June-August

Image courtesy of USGS

USGS

Methods

Photo courtesy of USGS

- Physical measurements
  - Secchi, temp, current velocity
- Water quality samples
  - TN, TP, NH_4, NO_3, SRP, Si

Image courtesy of USGS

USGS

Methods

- Sub-surface (0.2 m)
- Whole-water samples
- Identify to genus
- Count 100 individuals/units
- Biovolume calculations

Photo courtesy of WI DNR

Photo by John Manier

USGS

Samples Analyzed

	Pool 8			Pool 13			Pool 26
Year	MC	BW	IMP	MC	BW	IMP	MC
2006	7	10	3	7	10	7	7
2007	7	10	6	6	10	6	7
2008	7	9	7	7	10	5	7
2009	11	10	6	7	21	7	7

N = 224

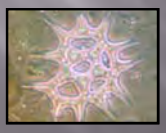
Photo by Patrick Kelly

= 1,792 hours

USGS

Diversity of Phytoplankton

Diatoms	Green Algae	Cyanobacteria	Euglenoids/ Golden
20	*15*	*8*	*3*



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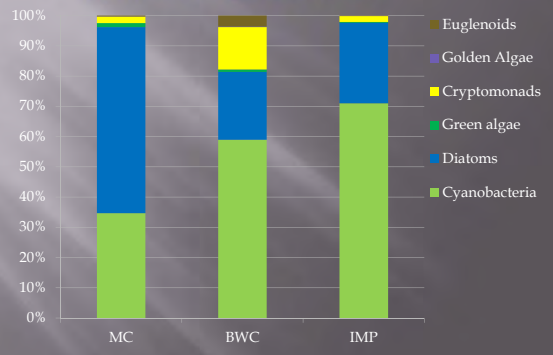
Spatial Differences



USGS

Bray Curtis Analysis

- Similarity Index
- Comparison of phytoplankton communities

Year-Pool	Main channel vs. backwaters	Main channel vs. impounded	Backwaters vs. impounded
2006-P8	X		
2006-P13	X		
2007-P8	X		
2007-P13	X		
2008-P8	X		
2008-P13	X		
2009-P8		X	
2009-P13			X

USGS

Most Common Genera

Aulacoseira, Aphanizomenon, Microcystis

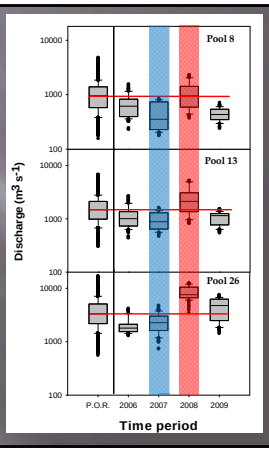
Main channel	Backwaters	Impounded
Aulacoseira	*Aphanizomenon*	*Microcystis*
Aphanizomenon	*Aulacoseira*	*Aulacoseira*
Microcystis	*Cryptomonad*	*Aphanizomenon*
Cryptomonad	*Euglena*	*Cryptomonad*
Stephanodiscus	*Anabaena*	*Navicula*

Ranked according to biovolume

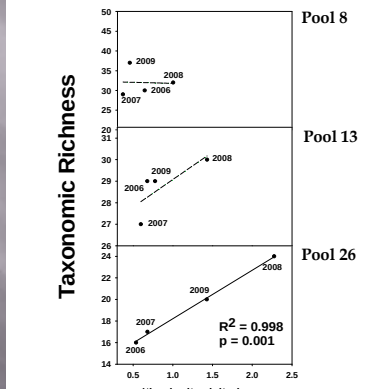
USGS

Discharge

- Period of record 1950-2010
- Classified years as low or high
- Lowest discharge: 2007
- Highest discharge: 2008



USGS



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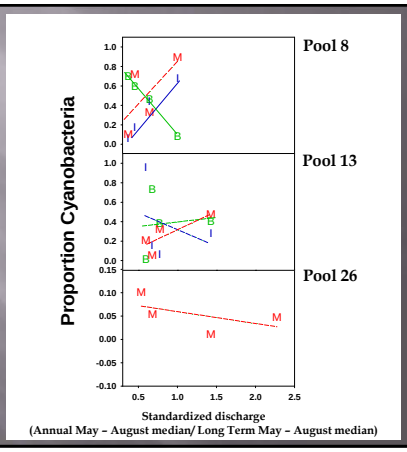
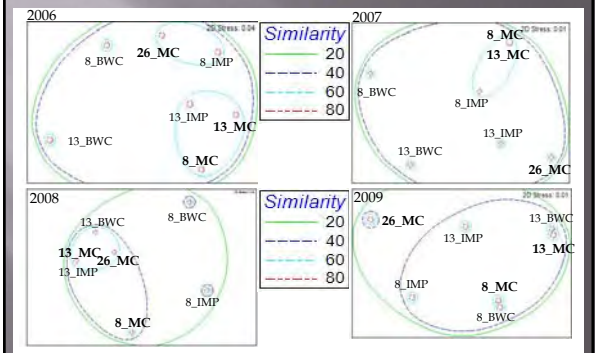


USGS

Nonmetric Mulitdimensional Scaling



USGS

Cyanobacteria

- Prominence of cyanobacteria in UMR
- Cyanobacteria observed in 96% of samples
- Definition of blooms (Ohio EPA):

Bloom Category	Biovolume (mm³/L)	Number of samples during my study
Minor	0.4 – 1	37/224 = 17%
Moderate	1 - 10	22/224 = 10%
Severe	> 10	3/224 = 1%

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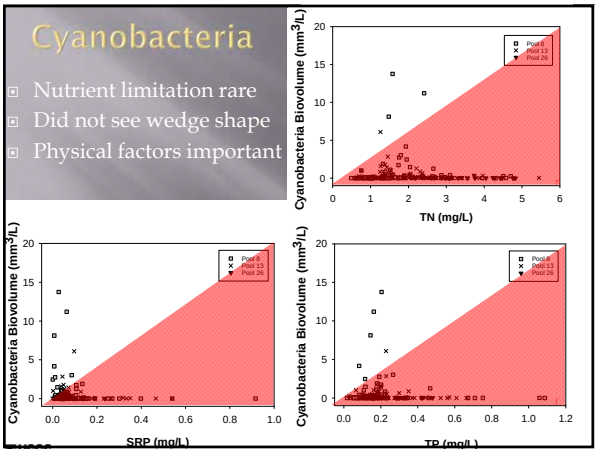
Cyanobacteria

- Nutrient limitation rare
- Did not see wedge shape
- Physical factors important



Cyanobacteria

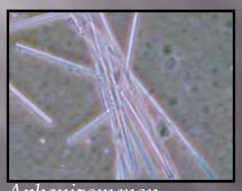
- Not a nutrient limitation experiment
- Isolate a sample, nutrient additions
- Jillian Decker (2012): N,P, and colimitation
- Temporary, dependent on discharge, location, etc.

https://www.wageningenur.nl/upload_mm

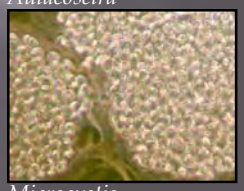
Discussion

- Top three genera common indicators
- Generally used as indicators of nutrient pollution
- High phosphorus

Aulacoseira



Aphanizomenon



Microcystis

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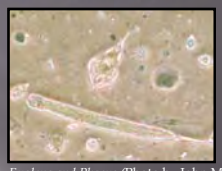
Discussion: Lateral Variation

- MC versus BW communities
- Backwaters
  - Flagellated
  - Tychoplanktonic
  - Areas high in organic matter
- Main channel
  - Specialized
  - Large surface areas and spines
  - Rimportulae, "jelly pores"



Euglena and Phacus (Photo by John Manier)

Stephanodiscus (photo by R. Klee)

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Discussion: Cyanobacteria

- Prominence of cyanobacteria:
  - Main channel, "high" discharge years
- Possible reasons:
  - Limiting nutrient (Fe)
  - Biotic interactions
  - Recruitment, collect in off-channel areas
- Things to consider
  - Discharge (annual scale)
  - Blooms (hours to days)
  - Difficult to describe patterns using "Low" and "High"

Photo by John Manier (*Aphanizomenon*)

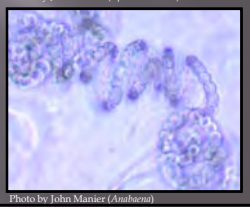

Photo by John Manier (*Anabaena*)

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Discussion: Cyanobacteria

- Jillian Decker (2012), noticed that a decline of green algae during the last 40-50 years.
  - Important because high energy
  - *Ulothrix* (Cary 1972)
  - Jillian found very few
  - Not found during my study
- Are cyanobacteria replacing green algae in the UMR?
- Tipping point? (pers. comm. R. Haro)

http://protist.i.hosei.ac.jp/

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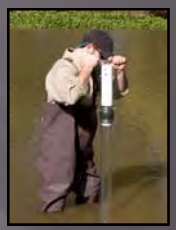
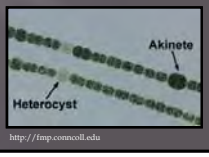
Future Work

- Paleo studies: cyanobacterial indicators
  - Akinetes (resting stages)
  - Heterocysts (N fixation)
  - Phytopigments
- Reconstruct ecological history
- eDNA analysis
  - Identify and quantify the groups
  - 20 year record of samples
  - Relationships to WQ, exotic species
    - Zebra mussels
    - Asian carp



http://www.forestry-suppliers



http://fmp.conncoll.edu

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Acknowledgements

- U.S. Army Corps of Engineers- Upper Mississippi River Restoration program
- UW- La Crosse – River Studies Center
- Dr. Roger Haro- Study Design and Equipment
- Dr. Jeff Houser- Study Design and Equipment
- Dr. Ronald Rada- Assistance with methods development and phytoplankton identification
- Dr. Eric Strauss- Assistance with proofreading and editing of the manuscript
- Dr. William Richardson-Assistance with proofreading and editing of the manuscript

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Questions?

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Extra- Stratification Criteria

- Stratification Criteria
  - Depth greater than 1 meter
  - CV greater than 0.01 m/s
- If stratification is possible:
  - Take pH, temp, conductivity readings from surface, mid, and bottom depths.
- All sites with stratification cut from analysis

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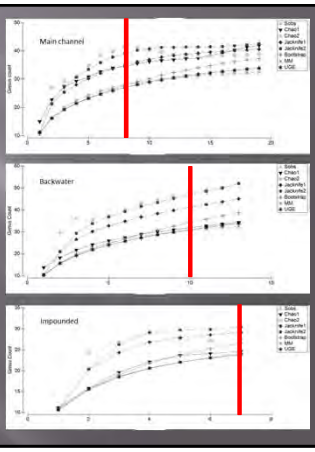
Extra- Sample Sizes

- Rarefaction- 100 individuals/units sufficient
- Generic Accumulation Curves
  - 7 MC
  - 10 BWC
  - 7 IMP



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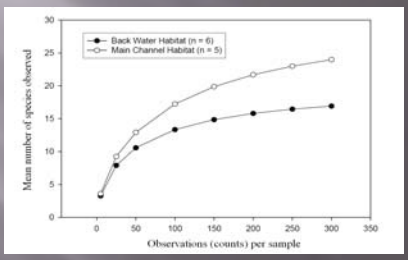
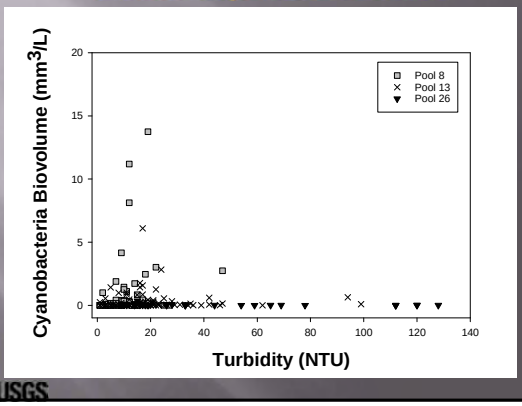
Extra- Rarefaction Analysis



Extra- Cyanobacteria



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Extra- Sampling Strategies

- Sampling Strategies
  - Fixed Site Sampling
    - Once per month (winter)
    - Every other week (summer)
  - Randomized Sampling
    - Quarterly
    - Spring, Summer, Fall, Winter
- Needed to use both to get the required sample size.

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Extra- Pool selection

- Available Pools:
  - P4 (Lake City Field Station- Lake City, MN)
  - *P8 (La Crosse Field Station- La Crosse, WI)
  - *P13 (Bellevue Field Station- Bellevue, IA)
  - *P26 (Great Rivers Field Station- East Alton, IL)
  - Open River (Open Rivers and Wetlands Field Station- Jackson, MO)
  - La Grange Pool (Illinois Natural History Survey- Havana, Illinois)

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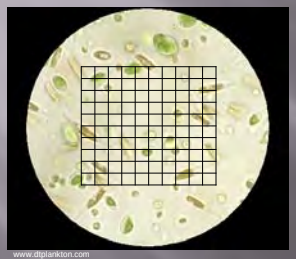
Extra- Phytoplankton Counting



- Whipple grid = 1 field
- Count 100 ind/units
  - As transects
  - Avoided edges
- Biovolume first five individuals of each genera

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