Upper Mississippi River System

Environmental Management Program Workshop

20-21 February 2002,
St. Louis Missouri

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Implementing Lessons Learned

US Army Corps of Engineers
St. Louis District

SUMMARY

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM WORKSHOP

The St. Louis District sponsored the Upper Mississippi River System Environmental Management Program Workshop held on 20-21 February 2002, in St. Louis, Missouri. There were **79 people** in attendance from the following organizations:

Corps of Engineers: 50 (MVD 1, MVR 11, MVP 18 and MVS 20)

U. S. Fish and Wildlife Service: 9

U. S. Geological Survey: 4

State Departments of Natural Resources: 8 (WI 4, IA 1, IL 3)

Missouri Department of Conservation: 4

Upper Mississippi River Basin Association: 1

Lower Mississippi River Conservation Committee: 2

IIHR, University of Iowa: 1

The **workshop structure** allowed the Corps of Engineers division to give a perspective on EMP and each district to present details of specific planning, design and construction aspects of their habitat projects. It also provided an opportunity for the U. S. Fish and Wildlife Service and State natural resource agencies to present various topics of particular interest.

The **Mississippi Valley Division** presentation (**Greg Ruff**) provided a division perspective on EMP that included MVD accomplishments, EMP challenges and suggestions for meeting EMP challenges.

The **Rock Island District** presentations (Rick Nickel, Dean Cerny, Mark Cornish, Barb Kimler, Chuck Theiling, Dan Holmes and Scott Whitney) included information on water control structures, overflow structures, fish passage structures, construction issues, technology and models for restoration planning, project evaluation process and procedure, and integrated and adaptive management.

The **St. Paul District** presentations (**Michelle Schneider, Randy Urich, Jon Hendrickson and Dan Wilcox**) provided information on island protection and creation, re-vegetation and re-forestation, scope delineation/engineering criteria, and physical, baseline and bio-response monitoring.

The **St. Louis District** presentations (**Rob Davinroy, Pat Conroy and Gary Lee**) included side channel/secondary channels, soils/hydrology/underseepage, and innovative design and construction concepts.

The **U. S. Fish and Wildlife Service** presentation (**Dick Steinbach**) focused on operational concerns:

1. USFWS O&M Problem: USFWS system-wide formulas for allocation of funds which tend to be based on each region's or station's percentage of the overall system identified need, rather than the backlog of need.

2. Land Acquisition: Congress and the Administration's concern regarding the long-term O&M implications for the expanded boundary areas proposed in the Refuge System.

3. Corps Environmental Restoration Programming: Need to avoid maximizing the number of EMP projects constructed, and instead maximize the number of projects that can be maintained, with flexibility to utilize construction resources to rehabilitate earlier projects.

4. Sediment: Need to develop predictive knowledge of fine sediment transport and deposition for both in and out-of-bank flow conditions.

5. Post-project Evaluation Report: Need to establish a consistent review cycle for completed projects.

6. Phasing Projects Over Years: Need to do a better job of addressing O&M issues on projects that involve multi-year phasing.

The **Wisconsin Department of Natural Resources** presentation (**Jeff Janvrin**) on natural system design was a supplement to the presentation on island protection and creation.

1. Additional benefits of island projects are not always being taken into account during project formulation.

2. Successful implementation of island projects requires the same elements as successful planning for any project.

The **Iowa Department of Natural Resources** presentation (**Mike Griffin**) provided comments on O&M.

1. Managers should be involved early in the planning process for projects.

2. Managers need to have the ability to revisit projects to make them work better or to restore them to design purposes.

3. Modifications should be available to managers.

PROCEEDINGS
OF THE
UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
WORKSHOP

St. Louis, Missouri
20-21 February 2002

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1. Background. The EMP Workshop was held on 20-21 February 2002 in St. Louis, Missouri, hosted by the St. Louis District, Corps of Engineers. The purpose of the workshop was to provide a series of presentations on the engineering, design and construction of Habitat Rehabilitation and Enhancement Projects (HREPs) developed under the Upper Mississippi River System Environmental Management Program, and to permit open discussion on the presented topics.

2. Participants. There were 79 people in attendance at the workshop. Attendees included representatives from the following organizations:

Corps of Engineers
Mississippi Valley Division (1)
Rock Island District (11)
St. Paul District (18)
St. Louis District (20)

U.S. Fish and Wildlife Service (9)

U. S. Geological Survey (4)

State Departments of Natural Resources
Wisconsin (4)
Iowa (1)
Illinois (3)

Missouri Department of Conservation (4)

Upper Mississippi River Basin Association (1)

Lower Mississippi River Conservation Committee (2)

IIHR, University of Iowa (1)

A complete list of the participants is included as Attachment B.

3. Workshop Structure. The workshop was structured to allow Corps of Engineers Districts (Rock Island, St. Paul and St. Louis) to present details of specific planning, design and construction aspects of their HREPs, and to allow representatives from other agencies to express their thoughts and experiences with the EMP projects. The agenda for the workshop is included as Attachment A.

4. Welcoming Remarks. The workshop began at 8:00 A.M. on 20 February 2002 with a welcome by Major Ben Bigelow, Deputy District Engineer, St. Louis District, Corps of Engineers. His opening remarks recognized the partnering that has developed between the organizations involved with EMP projects and encouraged continuance of their coordination efforts to benefit the resources of the Upper Mississippi River.

5. Workshop Presentations. The workshop consisted of presentations on EMP Management Perspectives and Panel Discussions on Connectivity, Natural System Design, Construction and O&M Concerns, various miscellaneous topics which included Scope Delineation/Engineering Criteria, Technology and Models for Restoration Planning, and Innovation, and Project Evaluation. A copy of the powerpoint presentations is provided on the disk included as Attachment C.

a. <u>EMP Management Perspectives</u>.

(1) <u>Mississippi Valley Division</u>. The MVD presentation by Greg Ruff provided a division perspective on the Environmental Management Program. He discussed accomplishments since the last workshop, personnel and budetary challenges and suggestions for meeting the current challenges. MVD accomplishments included reauthorization of EMP by WRDA 99, completion of a Habitat Needs Assessment, continued development of quality HREP reports, design and construction of additional HREPs and further development of the long-term resource monitoring program. Challenges for EMP were identified as personnel changes and Corps budgetary cuts. Suggestions for meeting EMP challenges included continued focus on quality, marketing the success of EMP at both the local and national level and using the power of the people and organizations involved in EMP to request maximum funding for the program.

(2) <u>Regional</u>. Roger Perk (MVR) cited the national significance of the Upper Mississippi River System and pointed out that EMP is a program that provides a lot of things for a lot of people. EMP goals and objectives are restoration, protection and enhancement of critical habitat types throughout the UMRS; systemic resource monitoring, data analysis and applied research to gain a better understanding of the reaches of the UMRS; improved communication and expanded partnership among UMRS management agencies and local interests; and a model program that will be applicable to other river systems and water resources. EMP was established by Section 1103 in the 1986 WRDA and is funded through the Corps of Engineers construction general account. EMP has two main pieces - information (LTRMP) and action (HREPs) - with HNA tying them together. During the period 1988-2000, 26 projects have been completed, 16 projects were under construction and 13 projects were in design. These 55 projects provide over 97,000 acres of habitat. The average cost of the majority of completed projects is approximately $1.4 million. The EMP program has fostered a

Federal-State partnership that needs to be kept strong with good communication. Habitat is what everyone is working for, therefore, management must ask some tough questions and utilize current knowledge in conjunction with and LTRM program to formulate solutions to these questions. Everyone must continue to work towards diversity and realize that in the future projects will be selected differently. Performance monitoring is also very important and future goals have been identified in this area. A public involvement plan must be developed that will inform and educate the public on EMP, gather input and provide feedback and involve the public in planning for the future of the ecosystem. One opportunity to demonstrate the accomplishments and progression of EMP and the collaborative effort between the EMP partners is the Report to Congress. The schedule for the next Report to Congress identifies a draft report to be completed by Feb 03, report to MVD by Sep 03, final report to HQ by Dec 03 and Chief's Report to Congress in Feb 04. Information on FY02 and FY03 funding data was provided, and in conclusion everyone was reminded "in the end, our society will be defined not only by what we create, but by what we refuse to destroy."

(3) St. Paul District. Don Powell (MVP) the EMP program manager, pointed out that the St. Paul District has different physical characteristics than the Rock Island or St. Louis Districts. It includes Pools 1 through 10 and two rivers, the Minnesota and St. Croix. The upper impounded reach consists of a 1-3 mile wide valley, steep bluffs, extensive non-channel aquatic habitats and little floodplain development and few levees. Their average project costs approximately $1.5 million. He displayed a graph showing the number and cost of projects completed and in planning/design. They have completed approximately 23 projects with a total cost of approximately $33 million. Their project types have included island construction, control structures, water level management, bank stabilization and dredging. Their project teams consist of 7 to 10 people in the Corps office, but they meet periodically with representatives from Federal and state agencies to encourage public involvement. In 2000 they initiated pool planning efforts based on HNA and have developed a Planning Team with a Fish and Wildlife Work Group that is comprised of representatives from the Corps, various state DNRs and the Fish and Wildlife Service. Their pool planning process has consisted of this work group identifying actions to address HNA needs and UMRCC objectives, depicting existing and desired future potential results of actions on pool maps and coordinating with river managers and the public to develop a common vision. The pool maps were distributed to the public and over 600 comments were received. A draft report should be completed in the summer of 2002 which will be used to update HNA and for future project sequencing and selection. Recognition of projects is a way to make the public aware of EMP. An example is the Trempealeau project which has been selected for an award, it was selected as one of the 7 Wonders of Engineering awards given by Society of Professional Engineers.

(4) Rock Island District. Roger Perk (MVR) the EMP program manager, presented an overview of the Rock Island District Environmental Management Program. Their FY02 HREP allocation is $3443.0 million, of which $150,000 will be used for EMP management, $500,000 for project planning, $400,000 for design, $2120.0 million for construction, and $273,000 for project evaluation. They have completed 11 projects, have 5 projects under construction and 5 projects in planning/design. Slides were displayed which provided more detailed information on five of their current projects: Peoria Lake, Pool 11 Islands, Gardner Division, Lake Odessa and Smith Creek. The use of ecological sequencing is

necessary to ensure that the most important needs or objectives are addressed within pools and reaches. The purpose for development of the sequencing document is to assure that thorough, systematic and consistent water resource planning procedures are used in EMP. The use of HNA is also important and should be continually updated. Rock Island District's FY02 new start projects are Beaver Island, Huron Island, Henderson 3 Levee District, Fox Island, and Crow Creek/Weis Lake/Duck Ranch.

(5) St. Louis District. Mike Thompson (MVS) the EMP program manager, noted that he works with both the State of Illinois and the State of Missouri on EMP projects. The St. Louis District includes Pools 24, 25 and 26 and an open river area of approximately 200 miles that extends from St. Louis, MO, to Cairo, IL. St. Louis has completed 7 projects, has 3 projects in design and under construction and 5 projects in the planning phase. MVS program initiatives include utilization of River Resource Action Team (RRAT) for prioritized projects, initiating pool planning efforts in 2002 that will be compatible with HNA, completion of open river vision for side channels, smaller streamlined projects and including O&M and Regulating Works Project Managers as team members. MVS completed projects are Clarksville Refuge, Dresser Island, Pharrs Island, Stag Island, Stump Lake, Cuivre Island and Swan Lake. MVS current projects are Batchtown, Calhoun Point and Schenimann Chute Side Channel, which is the first open river project. MVS future projects are Pools 25/26 Islands, Stone Dike Alterations and Salt Lake/Ft. Chartres Side Channel. Future fact sheets are planned for Establishment Chute, Red's Landing, Turner Island/Chute, Ted Shanks Pool 24, Kaskaskia River Oxbows and Piasa/Eagles Nest Island. The open river (Mississippi River Miles 0-200) has great potential for future EMP projects and new project partners. MVS EMP POCs are Deborah Foley, Project Management Branch Chief for Navigation and Environmental; Mike Thompson, St. Louis District EMP Coordinator; Brian Markert, Project Manager; and Kathy Kornberger, Budget Analyst.

(6) Long Term Resource Monitoring Program (LTRMP). Scott Whitney (MVR) cited the LTRMP vision/purpose statement, which is "To provide resource managers and decision makers with information necessary to maintain the UMRS as a sustainable multi-use large river ecosystem." LTRMP goals are to develop a better understanding of the ecology of the UMRS and its resource problems, monitor resource change, develop alternatives to better manage the UMRS and provide the proper management of long-term resource monitoring program information. The LTRMP organizational structure consists of USGS/USACE Management Team, state operated field stations, an analysis team, coordinating committees and EMPCC. LTRMP can be used for monitoring, data analysis, applied research, mapping and as an information clearinghouse. Environmental issues include habitat loss and changes in land cover. HNA is the first step in the right direction. EMP is information (LTRMP) and action (HREPs) tied together by HNA. Critical information is needed, and models will become more and more important to layer data and show what can be accomplished. Bathymetry data can be used to create a 3D model and to help in visualizing and constructing a new topography. The use of visualization tools will enable us to perform "what if" scenarios and for such uses as comparative analyses on island layouts and potential waterfowl habitat. One of the new technologies available is Scanning Laser/LIDAR (Digital Airborne Topographic Imaging System), which can be used to produce topographic maps. The future is bright for LTRMP.

b. Panel Discussions.

(1) Connectivity. The focus of this panel discussion was connectivity within the Upper Mississippi River System. This deals with how different projects and features interact with the rivers connectivity to backwater complexes, isolated floodplains, island and channel border, and side channels within the system.

(a) Water Control Structures. Rick Nickel (MVR) provided a presentation on water control structures. He stated that the goals of water control structures are to enhance both wetland habitat for migratory waterfowl and aquatic habitat. Thus the objectives are to increase reliable food source and resting areas and provide water level control. There are various types of water control structures, such as stoplogs, sluice gates, tainter gates, overflow weirs and fuse plugs. Mr. Nickel's presentation focused on one type: stoplogs. Stoplog structures can be constructed of concrete, CMP, a combination of concrete and CMP, PVC or steel. Bay Island HREP has a multiple-bay concrete stoplog structure with four 5-foot weirs. Princeton Refuge HREP has a single-bay concrete stoplog structure with two 5-foot weirs. Spring Lake HREP has a single-bay concrete stoplog structure with one 5-foot weir. Potters Marsh HREP has a stoplog structure constructed of both concrete and CMP. Banner Marsh HREP has CMP stoplog structures. Andalusia Small Boat Harbor has a steel stoplog structure. Each type of stoplog construction has associated construction, maintenance and operation issues. Construction issues include cast-in-place concrete, precast concrete, CMP and PVC and associated construction costs. Maintenance issues include sills, inlets and outlets filling with sediment; degrading concrete or steel; erosion, seepage, encroachments occurring adjacent to the structure; displaced or missing riprap; and trash and other debris accumulating around the structure. Operation issues include installation and removal, stoplog material, lifting devices, storage, security and safety.

(b) Overflow Structures. Dean Cerny (MVR) discussed overflow structures. He stated that overflow structures are required for habitat restoration projects that utilize levees to control water levels. The purpose of an overflow structure is to allow rapid infill (or outflow) to minimize head differential before levee overtop for the purpose of minimizing or controlling erosion. Structures that perform this function include stoplogs, sluice gates, tainter gates, overflow weirs and fuse plugs. Before selecting a structure type to control over-top erosion, the structure function and key characteristics should be considered. Most structures perform several functions and have various advantages and disadvantages. Design procedures should include the design purpose, hydraulic studies to determine structure capacity requirements, development and analysis of alternatives and recommendation of the best alternative. Each type of overflow structure has key characteristics. Stoplog structures can physically pull 3 feet of stop logs under head, are difficult to operate, are good for water level control and good for fish passage. Sluice gates are easy to open or close under head, water level control is difficult and consider fish passage requirements. Tainter gates have higher capacity than sluice gates, are more expensive, submersible tainter will allow water control, can be ordered or custom designed and may require more elaborate energy dissipation. Overflow

weirs are self-operating, limit the level of protection or require excessive levee overbuild, the structure plus levee overbuild can be costly, block access along levee during operation and do not allow fish passage until overtop. Examples of structures used at various projects:

- Chautauqua project has sheet pile cells, sluice gates/stoplog combination
- Andalusia has clay levee, concrete cutoff and stop protection
- Lake Chautauqua USFWS consultant design uses gabion construction, flat side slopes, double sheet pile cutoff, filled surface with clay, rock, concrete and overbuilt levee
- Lake Chautauqua USFWS has sheet pile dam with combination stoplog/overflow, stone protection below sheet pile and gabions
- Saylorville Lake, Pneumatic Dam has concrete spillway with pneumatic crest gates

Innovative ideas for gates include fuse gates, sand plugs, barricades, and breakaway posts. Innovative ideas for base include riprap, gabion, erosion mat and concrete stabilization.

(c) <u>Fish Passage Structures.</u> Mark Cornish (MVR) gave a presentation on fish passage structures. He began by pointing out that it would be made from a biologist's point of view, rather than consist of engineering aspects of fish passage structures. He raised the question "Why is fish passage important?" In evolutionary terms the Upper Mississippi River basin is still relatively young. After 20,000 years of relatively stable systems, a tremendous amount changes have occurred in the last 300 years. In addition to the construction of dams throughout the watershed, native fish species have had to survive excessive siltation from sod busting of the prairies and the felling of the Midwest's forests; modifications to the river to facilitate navigation; pollution from industrial, urban and agricultural sources; levee construction; and exotic species introductions. These changes led to a fragmentation of lateral and temporal connectivity for many lotic species and forever changed the aquatic community of the Upper Mississippi River. The construction of dams has certainly affected fish passage; they interrupt fish passage both upstream and downstream. There are 143 native fish species in the Upper Mississippi River and a number of these are endangered and at-risk fish. There are several methods, however, by which fish can migrate through most Upper Mississippi dams. During high water they can pass under lifted gates or over the fixed crest of dam spillways. During low water the only possibility for fish passage is through the locks. The success of fish passage is dependent upon four things: hydraulic conditions at dams, fish behavior, the timing of fish movement and fish swimming ability. There are three general designs for fish passageways: small scale, semi-natural bypass channels and large scale. Small-scale fishways include eel paths, fish locks and weir troughs; they are ineffective at passing warmwater fish or have limited success at passing a significant variety of species or large proportion of the migratory population. Semi-natural bypass channels are widely used in Europe and are being considered at Lock and Dam 3, Lock and Dam 18 and Lock and Dam 19. They have proven to be effective for a wide range of fish species with varying swimming abilities and can be

relatively inexpensive to construct. A disadvantage of semi-natural fishways is poor downstream passage because of their relatively small size. Twenty criteria have been developed for semi-natural fishways on the Upper Mississippi River. There are two types of large-scale fish passageways: dam removal and applying the semi-natural bypass channel to the entire width of the river. Both large-scale methods have been implemented successfully in rivers of the Upper Midwest. The rationale for large-scale fish passageways is that smaller-scale measures are inadequate to sustain the ecosystem; therefore barriers have to be removed. Cost is often an important issue when considering large-scale fish passageways. Thus, the answer to the question is that fish passage is important because it expands access to habitat and restores diversity. Fish populations and diversity serve as a barometer of the health of an aquatic environment. Disconnectivity of our river systems has contributed to a decline in diversity. Engineering in combination with biology can result in a true success story.

(2) Natural System Design. The topic of Natural System Design seeks to reflect engineering design that takes advantage of the physical forces that are produced from the riverine ecosystem. By utilizing these forces and concepts projects may reflect a more natural system that maintains itself from a functional and biological perspective.

(a) Island Protection and Creation.

(1) Michelle Schneider (MVP) provided a presentation on island protection and creation. She pointed out that the loss of islands has important impacts such as excessive sedimentation of side channels and backwaters, reduced diversity of flows and currents, excessive wave action and resuspension of sediments and reduced forest and terrestrial habitat diversity. Thus, island layout is a big concern. Islands provide a natural barrier to wave action; they break down wave action that can cause island erosion and the breakup of islands. An example of a typical island is one made up of fine material (sand) with a vegetation cover and using Willow plantings along the shoreline and a rock groin to dissipate wave action. Islands have proven to be very stable and did well in surviving the 1993 flood. There are various forms of islands, such as rock/sand composite islands, rock/log composite islands and rock islands. Stone dikes, seed islands and chevron dikes can be used for island protection. Available resources for additional information are digital data from The Upper Midwest Environmental Sciences Center website and the Mississippi River Shoreline Stabilization Report prepared by the St. Paul District.

(2) Jeff Janvrin (WI DNR) supplemented the presentation on island protection and creation by discussing natural system design. The physical and environmental responses of island projects in the Mississippi and Illinois Rivers have met or exceeded many of the project objectives. Additional benefits of island projects have also been noted or documented. These additional habitat benefits have rarely been taken into account during project formulation, justification or cost-benefit analysis. This is due to a lack of appropriate techniques to quantify the additional benefits. Successful implementation of island projects requires the same elements as successful planning for any project. These elements are good pre-project monitoring, detailed goals and objectives, design criteria, post-project monitoring and communication among the various agencies and biologists and engineers involved. Managing

for habitat goals and objectives requires implementation at "small" scales so we can understand how all of the factors interrelate. Over time, these "small-scale" projects will cumulatively have systemic impacts on the UMRS floodplain habitat.

(b) Side Channel/Secondary Channels. Rob Davinroy (MVS) provided a presentation on side channel/secondary channels. He stated that the goal is to design and maintain a safe and dependable inland waterway transportation system in large rivers in an environmentally sensitive manner. Environmental river engineering is doing things smart, quick, and in the most economical manner. Creating or preserving side channels means managing sediment, which is a definite challenge. So the question is how do we manage sediment transport. Also, we must be able to calculate sediment transportation. There are many tools now available, such as numerical models and physical models; however, model output is not always easily understood. Traditional river modeling took a long time and was expensive. Micro modeling is a newer tool that can be used. It is extremely small scale physical sediment transport modeling of a river or stream. It is table top size, relatively inexpensive and results can be obtained in a few months. Sinuous canaliform and sinuous braided channels were cited as trends in rivers and stream of the midwest. Rivers widened over time. Steamboats greatly affected the river due to it's need for fuel and access. Forests were cut and agriculture land increased. Development of side channels on the Middle Mississippi River occurred, Schenimann Chute, river miles 63 to 57, was cited as an example. In 1932 the Corps began building pile dikes and by 1965 a continuous side channel developed. A new goal is to create projects that seek to enhance old pile structures. The Santa Fe chute, river miles 40 to 35, and Jefferson Barracks micro model studies were also cited.

(c) Re-vegetation and Re-forestation. Randy Urich (MVP) presented a collection of comments and lessons learned regarding establishment of vegetation on HREPs from resource managers working along the Upper Mississippi River from the Twin Cities to St. Louis. Many practical insights have been gained through past experience on soils, elevation, grass and forbs, trees, establishment techniques, long-term maintenance and other miscellaneous considerations. The key point regarding soils is that good soil makes the difference. Add fine material to a site to get better results. Use plenty of topsoil for trees and turf; a soil depth of 8-12 inches is recommended; adjust species mix; proper site preparation is important; nutrients and erosion considerations must be taken into account. Where elevation is a concern, match plant species to island elevations; use a simple planting mix on low, frequently flooded areas; consider flood frequency and current velocity before using tree shelters on low areas; tree mats can be used on high and low elevation sites; islands and other project features can be built at elevations suitable for mast-producing trees. For grass and forbs, use a diverse mix; add wildflowers to enhance appearance. For trees, natural regeneration may be a good option at lower elevations; unrooted cuttings provide satisfactory and economical means of planting; willow cuttings provide fast and effective shoreline protection; root production method seedlings are better than bare-root seedling. On establishment techniques, spring planting is better in the north and fall planting is better in the south. For long-term maintenance, trees need weed control for a minimum of 3 years; tree shelters require regular maintenance. Other considerations: tree shelter size; tree shelters in low elevations during flood events can collect sediment, causing seedling mortality; fire susceptible seedlings and shelters make it difficult to maintain the native prairie using

prescribed fire; avoid row planting to make site appear more natural; quality control helps ensure planting success; proper installation of tree shelters is important. Vegetation is a key habitat component and should be given thorough consideration in the design of HREPs.

(d) Soils/Hydrology/Underseepage. Pat Conroy (MVS) presented information on soils/hydrology/underseepage by discussing experiences with the Cuivre Island HREP. He stated that the project DPR was approved in 1994. The project is surrounded by the Cuivre Island Slough and the Mississippi River (Pool 26). Also, there are several existing lakes on the island. Project features included the installation of permanent pumping capability, installation/replacement of water control structures and ditching to improve surface flow. Pumping facilities were installed; plastic stoplog gatewell water control structures were used; typical ditching was done. The well design was based on the results of borings and well analyses. Wells were drilled using 24-inch drill bit. A mud pit was created and a stainless steel well screen was installed, which came in 30-foot sections. The wells will be in water 98 percent of the time. The first season was successful; however, the second season had less success. Missouri DNR was unable to fill the island to elevation 426; the river was much lower than the first season. A search of construction records showed the existence of sand lenses in certain ditch excavations. MVS performed additional soils exploration to search for sand lenses and attempted to fix the problem by putting a clay cap over ditches where sand lenses were found. However, this fix has had limited success; Missouri DNR only able to fill to 426+ during last season. Problem may be a physical leak from in-situ lakes. Lessons learned: deep wells viable alternative to surface pumping station when aquifer can deliver adequate volumes without excessive drawdown; additional exploration to find sand lenses not costly; should have done this exploration during design; clay cap would have been part of original contract and cheaper to build.

(3) Construction and O&M Concerns. This panel discussion focused on construction activities and related Operation and Maintenance issues that result from Habitat Restoration, and Enhancement Projects.

(a) Operational Topics.

(1) Dick Steinbach (USFWS) provided comments on several operational topics. He stated that EMP began in 1986; at that time it did not address operation and maintenance. In the 1992 WRDA, the language changed and stated that the managing agency was responsible for O&M. Even though many projects have been completed, there are still many project proposals which were identified on the original lists of 1986. We have improved our approach during the past 15 years to be a bit more flood friendly regarding infrastructure and O&M concerns.

(a) FWS O&M Problem: Mr. Steinbach pointed out that there are two main funding categories on refuges (existing facilities operation and existing facilities maintenance). Another category exists for new facilities and program expansions, but since the EMP program provides the facilities this source is only important for additional refuge staff. All of these categories are divided for the whole Refuge system at the Washington Office by regions, where they are divided again and sent to the stations. There is a huge backlog of need at all levels and

allocations tend to be based on each region's or station's percentage of that overall system identified need, or backlog. So, even if a Congressman expresses support in a way that results in additional dollars being added to the Service budget, it gets diluted by the system-wide formulas for allocation since it is not a line item to our stations.

(b) Land Acquisition: Mr. Steinbach indicated that land acquisition is viewed as a necessary component for many or our proposed restoration projects. Land acquisition funds do come to Refuge station as line item in budget. However, Congress and the Administration have concerns about the long-term O&M implications for all the expanded boundary areas now being proposed in the Refuge System.

(c) Mr. Steinbach referenced a draft paper relating to EMP projects written by Lt. Col. Torkild Brunso from Rock Island District which he shared with Mr. Steinbach on Corps environmental restoration programming. One of the major points of the paper is the need for the Corps and its partners to avoid maximizing the number of projects constructed. Instead, we need to maximize the number of projects that can be maintained with the flexibility to use construction resources to go back to earlier projects and rehabilitate them. Lt. Col. Brunso also made the point that normal life cycle analysis, as defined in Stewardship of Federal Facilities, is based on a 30-year life. EMP life cycle management has been identified over a 50-year period. A 50-year life cycle for a biological based project is an extremely long period to predict and conduct "scheduled" maintenance in such an unpredictable river setting. The life cycle analysis is a good tool for setting goals, projecting desired conditions and creating a database containing both traditional construction information as well as linkages to unique environmental problems, design fix and actual costs. Major rehab should be viewed in the same light as a new project start in competing for program HREP funds.

(d) Sediment: Mr. Steinbach stated that the Corps is excellent at working with coarse material, such as riverbed load. However, there is a need to develop further predictive knowledge of fine sediment transport and deposition for both in and out of bank flow conditions (i.e., Batchtown). FWS realizes that the subject is too complex to think substantial progress will be made on this topic in the near future. In general, the FWS prefers sediment be removed from the floodway, except where it can truly be utilized as a beneficial material for habitat or at the very least contained in place to reduce further transport. Projects which include a dredged area as a component of the habitat features must include design for the placement of future material placement if maintenance dredging is anticipated.

(e) Post-project Evaluation Report: Mr. Steinbach pointed out that there was some concern expressed that as the number of completed projects grows, we will be spending too much of our time on laborious, and worse yet, redundant review reports. FWS would like a consistent review cycle for projects to be set up (same District to District) with enough time passage between reviews to make the possibility of meaningful chance results. Since many projects contain a particular type of feature or concept, it would be desirable to post the project review schedule in advance enough for personnel from one District or partner agency to visit the review of that topic of interest for future project development or construction. This would provide a means for discussing "lessons learned" right in the field with those most interested in applying the topic at another location. On another post-project evaluation topic, also related to

the life cycle analysis, not many projects are perfect designs that function as "turn key operations." Engineers should expect a little sponsor "hand-holding" when projects go operational and expect that some adjustments will be necessary. Although this is not institutionalized in the program, the Corps has done a very good job with this in all three Districts.

(f) Phasing Projects Over Years: Mr. Steinbach indicated that the Corps has done quite well regarding the constructability elements of multi-year phasing. We need to do a little better job of addressing the O&M issues on these kinds of projects from beginning to end. At times we have experienced an expectation gap between sponsor, Corps and occasionally the contractor. This O&M issue needs to be revisited throughout all project phases, especially if weather, funding or bid problems result in a longer than anticipated interim period.

(2) Mike Griffin (Iowa DNR) provided additional comments on O&M. He noted that there are times and circumstances where they need to have the ability to revisit projects to make them work better or to bring them back to what they were designed for. There are different types of O&M; they range from mowing lawns, fixing parking lots, pumping plants and stoplogs to "Acts of God." When a near record flood or other "Act of God" disables a project they have to be able to learn from it and rehabilitate the project or the features. For example, at the Princeton HREP a levee blew out in the flood of 01. There needs to be more communication between the Corps and the state agencies. Managers should be brought in early in the planning process; someone should be responsible for determining if what is proposed has been done successfully before; they should be given what they want in a project; costs should be kept down; they need a way to come back to completed projects, especially dredging projects; they need modifications available to them.

(b) Construction Issues. Barb Kimler (MVR) provided a presentation on construction issues. She provided explanations and what can be done type answers to two important construction concerns: "Why are these environmental projects so expensive" and "Why are contract changes so difficult and expensive."

(1) Ms. Kimler stated that environmental projects are expensive because environmental work is technically challenging. Embankment materials are hard to work with, foundations are soft and access is difficult. Also, the work requires specialized, expensive construction equipment and methods, such as specialized dredges, barge staging, floating excavators and swamp buggies, timber mats, cofferdams and dewatering and winter work. In addition, environmental project work objectives and requirements are unusual. Actual construction requirements are non-traditional. For example, dredgers construct islands rather than focusing on excavating channels; there are fine grained cover requirements on island disposal sites; and levees and dikes are constructed for impounding water rather than for flood protection. Finally, environmental contracts have time and scheduling restrictions and/or limitations. Work in a floodplain requires scheduling work around natural riverine cycles, and endangered species and refuge operating requirements often further restrict scheduling of work. All of these requirements result in impacts to contractors. Bidders either underbid because they do not fully understand the requirements or they bid higher than standard construction as needed to successfully meet the requirements. Contractors also incur additional mobilization

and demobilization costs; they lose the best construction season; they cannot continually schedule work crews causing them to lose equipment and skilled labor to other jobs; field office overhead costs have to be covered; and long-duration impacts the contractor's ability to bid other work because it ties up their resources and bonding capacity. However, solutions to higher expenses are possible. During contract development phase, work with resource agencies regarding endangered species restrictions and refuge management requirements; communicate/define actual construction requirements with resource agencies early in the design development; use contracting methods that do not require selection of the lowest bidder; and communicate the risks in the contract bid documents to the greatest extent possible. During the construction phase, communicate and reinforce the overall goals of the project; utilize partnering to foster communication and joint ownership; keep open communications; document lessons learned; and share successes.

(2) Ms. Kimler pointed out that contract changes are difficult and expensive because a contract binds the contractor to fulfill the contract requirements as prescribed in the contract; it binds the Government to pay a firm, fixed price for successful completion of the contract requirements in accordance with the contract terms and conditions; and it can only be changed via contract modification. Thus contract changes or modifications are often necessary. There are many common reasons for changes issued within the standard contract clauses; they can be user-originated changes or field-originated changes. Changes to avoid are constructive changes and cardinal changes. Contract modifications are costly due to lack of price competition; assumption of contractor risk for forward priced modifications; lack of cost incentive for "two-part" modifications; lost efficiencies due to unplanned nature of the work; adverse impacts to other contract work; disruption of schedule due to added work and interface with ongoing work; and increased overhead associated with time extensions. To minimize the need for modifications ensure that plans and specifications capture all technical requirements, site conditions and site operations requirements; avoid ambiguities and conflicts between drawings and specifications; increase field explorations to reduce risks and frequency of differing site condition changes; ensure only authorized contracting representatives give direction to contractors; consider new procurements versus modification; and maintain open communications between Corps construction staff, designers and sponsors.

(4) Miscellaneous Topics. This panel discussion took into account various areas of concern on EMP projects. These topics force EMP participant to look outside the standard operating procedure for their organizations and question goals, operations, methods, and criteria we currently implement within the EMP program.

(a) Scope Delineation/Engineering Criteria. Jon Hendrickson (MVP) provided a presentation on scope delineation/engineering criteria. He explained past practices versus present practices regarding island creation. Initially engineering criteria was extracted from flood control and navigation manuals and adapted to HREPs to achieve biologic goals developed by planning teams. As our knowledge has grown, engineering criteria has changed to achieve optimum habitat benefits for the least cost. In addition, the science of river restoration and river biology has advanced significantly over the last 20 years resulting in better definition of the physical requirements needed to improve habitat. For example, in the past islands were created to reduce sediment load to backwaters, reduce wave action and create

waterfowl and fish habitat. Now we are attempting to partially restore riverine conditions, have wind fetch less than 4000 ft. in shallow areas less than 4 feet deep, and have velocity less than .01 feet per second and depth greater than 4 feet for fish and create visual barriers and mudflats for ducks. We construct islands to change sediment transport and habitat. We now construct islands lower than in the past to maintain floodplain flow during floods and to improve growth of woody vegetation. The width of earth islands has also changed; top width is smaller and they now have wider berms. Rock is still used, but composites of earth/rock and logs/rock are being considered. Topsoil now has percent fines between 40 and 70; sand is required to provide optimum substrate for plants; vegetation and topsoil with cohesive properties stabilizes earth structure during floods. In the past riprap was used for stabilization; now inert material such as rock and logs combined with vegetation is being used. Then someone said "This is too stable;" they wanted mudflats, sandbars and beaches. Designing is done for controlled erosion and stable water flows. Groin spacing has been increased and rock slopes are flatter to allow for ice. Secondary channels are also being modified. In the past they were designed to keep sediment out and to reduce flow velocities to create sheltered habitat for fish. Now they are being modified to restore a riverine flow and sediment transport regime that includes sheltered habitat during low flow and results in floodplain conveyance during floods. Secondary channel closure elevation has been changed from 5-10 year flood elevation and earth closures to closure elevation set slightly below bankfull elevation and rock closures. These changes show that habitat project design will continue to improve in the future. However, given the turnover of personnel in the HREP program, an effort should be made to create a "Large River Restoration Manual" describing the lessons learned and engineering criteria developed to date in this program. This manual would improve communication between the agencies that work on HREPs and it would ensure that future innovation involves making the best designs even better.

(b) Technology and Models for Restoration Planning. Chuck Theiling (MVR) provided a presentation on technology and models for restoration planning. He discussed the utility of models, technology of models, and various types of models. Models can be used as planning aids, to define existing state of knowledge, for alternative evaluation, education, simulation analysis, as a forecasting tool and to identify data/information needs. Types of models vary from intuitive, verbal, conceptual, physical and mathematical. Conceptual models can be symbolic, verbal, intuitive and narrative. Physical models range from large scale to small scale micro models. Mathematical models are available for sediment and flow. Technology for modeling mathematical models includes Fortran, Visual Basic and C++ among others. There are Stella models and GIS models. Available models include various H&H Models and Habitat Models. He suggested that a UMRS modeling system be developed to expand on pool planning efforts underway, in a collaborative Adaptive Environmental Assessment framework. This model system should be used to pose hypotheticals about system response to management activities, to forecast future conditions, to set measurable objectives for condition of the river ecosystem, to examine management alternatives, and to aid in monitoring the effectiveness of management actions. It should be part of a Decision Support System to enable informed management decision-making.

(c) Innovation. Gary Lee (MVS) discussed innovative concepts for the design and construction phases of EMP HREPs. These include such items as articulated concrete mats, new erosion protection techniques for sediment reduction in small streams and scour

protection, alternative design elements for stoplog structures, water control structures and pump stations, and alternative shoring methods to minimize excavation areas during construction of structures. Articulated concrete mats provide an alternative to rock riprap, cast-in-place concrete, and other conventional means of erosion control. EMP applications for these mats include embankment overtopping, localized scour protection, channel lining, boat ramps and low-water crossings, bank stabilization and Armortec. Advantages of these mats are they are cost competitive with reinforced concrete, can be used for underwater placement and at remote sites, have flexible system, provide ease of installation and allow for vegetation maintenance. Another new item is A-Jacks. They can be used for bed, bank and toe stabilization; a 2-foot unit only costs $10 per unit; matrix is equivalent to 6-foot diameter topsize riprap; they can be used for localized scour protection; and Armortec is interested in creating islands in the Mississippi River. Plastic stoplog structures are another new item. They are an inexpensive alternative to steel and concrete and they are easy to obtain and build, but there are limits on pipe diameter and height. Lessons learned on plastic stoplog structures include agri-drain type pvc sheeting experiences excessive deflection under large soil loads; need to backfill with granular materials instead of native soils; and need to consider using trash rack on pipe inlets if expecting excessive drift/debris. Innovative ideas for EMP water control structures include investigation of alternatives to steel sheet pile and cast-in-place concrete, alternatives such as mass stabilized earth, concrete block units for vertical wall systems, need to find system suitability to site conditions, and precast units for main component of structures. The Swan Lake HREP lower compartment pump station was cited as an example of a project where operational requirements were changed after design was completed; a lower drawdown elevation was preferred. Alternatives were investigated to achieve this with the existing design. They included a lower pump sump, altering speed of pump to lower submergence requirements and use of a suction umbrella for pump bell. A suction umbrella was the most attractive alternative.

(5) Project Evaluation.

(a) Process and Procedure. Dan Holmes (MVR) provided a presentation on process and procedure. He pointed out that the authority to monitor projects is provided by the language of Section 1103 of WRDA. Project evaluations are important because they can be used to establish goals and objectives, develop a resource management plan and a monitoring plan, indicate operation and maintenance needs, as well as provide a basis for design, lessons learned and public successes. Lessons learned cover planning/design, construction, management and project improvements areas. Monitoring plans are the key component of project evaluation. They should consist of project goals and objectives, monitoring concepts and types, drawings and data specifications. Monitoring can be physical/chemical, biological or consist of observations and inspections. Physical/chemical is the most cost-effective method. It can be used to gather hydrology and hydraulics, water quality, geotechnical and spatial monitoring data. Biological monitoring can be used for measurement and evaluation of target species. Biological response monitoring can be used for obtaining waterfowl, fish and planted vegetation data. It can be qualitative or quantitative. Monitoring frequency should be project specific. Observations/inspections can be performed by the site manager or be joint inspections involving necessary disciplines. If site managers are not involved in the actual inspections, it is important to involve them in some way. This type of monitoring can identify

successes and challenges. Complete performance evaluation reports should be scheduled every few years over the 50-year period after construction completion, and abbreviated reports should be scheduled for all other years. Performance evaluation reports should answer certain questions: Is the project meeting its goals and objectives; is the resource management plan valid; is O&M being performed; are the project design criteria valid; how can improvements be made; and is this a successful project. In years when funds are limited, monitor by types of features or types of projects and reduce monitoring frequency. It is also important to review and revise monitoring plans so they are consistent with project goals and objectives. All MVR project performance evaluations are located at www.mvr.usace.army.mil/EMP/default.htm. Finally, effective monitoring at projects should be continued and LTRMP and other resource agencies should be used to assess success of projects, to document results and to communicate to the public.

(b) Physical, Baseline and Bio-Response. Dan Wilcox (MVP) gave a presentation on physical, baseline and bio-response monitoring. He discussed monitoring biological response to EMP HREPs. Is it true that "If you build it, they will come?" It is most difficult to foresee bio-response to river habitat. We are trying to protect both scenic beauty and biodiversity, but we are really trying to increase the abundance of river life. Thus, it is important to monitor projects for physical habitat conditions. Project objectives for accomplishing this include modification of the hydrologic regime, modification of hydraulic conditions, modification of the geometry of channels and floodplain, improvement of water quality and restoring of connectivity between the river and the floodplain, the river and backwater and restoring secondary channels. It is also important to monitor projects for biological habitat conditions. Project objectives for biological habitat conditions include managing vegetation and providing habitat for selected species guilds. Physical habitat conditions routine monitored at HREPs include discharge, current velocity, water level and temperature, dissolved oxygen, suspended solids, substrate type, bathymetry, floodplain elevation, wind fetch and sediment accumulation. Biological conditions routinely monitored at HREPs include submersed, emergent and terrestrial herbaceous vegetation, floodplain forest, waterfowl and fish use, invertebrates, mussels and other wildlife. Monitoring results reveal such things as high concentration of fish in a project area and increased waterfowl use, among others. However, the questions remains "what evidence is there that such changes are the result of a project." Measuring abundance of vegetation, fish, macroinvertebrates and waterfowl **can be done** ?????. Data from a bio-response study performed at Finger Lakes, Pool 5, was displayed as an example. This study began in 1991 and a report was published in 1999. Conclusions reached regarding monitoring biological response are that measuring real change in abundance is challenging; habitat availability may not be the limiting factor; we must be careful in attributing change in abundance to habitat projects; curiosity, monitoring and research lead to increased understanding; habitat projects are grand experiments; focus on increasing the abundance and diversity of river life; and appreciate and strive to maintain the beauty of the river.

(c) Integrated and Adaptive Management. Scott Whitney (MVR) provided a presentation on integrated and adaptive management. He stated that ecosystem management is a structured process for society to define what ecological condition is desirable at each part of a region, and to develop and implement management policies designed to achieve that mosaic of

desired sustainable ecological condition. However, one size does not fit all. So we are tasked to get the ecosystem back to an acceptable point. Our upper limitations are human and economic resources and our state of knowledge. We can aim for somewhere between our upper limits and our lower limit. Three considerations must be addressed to affect change in the ecosystem: economic, socio-political and environmental. Five keys allow us to open doors of opportunity: information, collaboration, integration, adaptation and evaluation. We need information on vision, goals and objectives, uncertainties, risks or obstacles, temporal and spatial scale, and structural and functional elements. We must have a vision on where we are going or where we wish to go, with defined goals and objectives. We must deal with and minimize to the best of our ability the uncertainties, identify the obstacles, recognize the temporal and spatial scale and identify the structural and functional elements that we hope to understand, modify or change. Our goal must be to manage, protect, remediate and restore the nation's water and land resources within watersheds and coastal zones through an integrated application of Corps programs and authorities that balance human needs with those of nature. We have input to modeling efforts and it is important to use models. Environmental modeling has come a long way in recent years. It can provide us with more intelligent management, help us spend funds more effectively and efficiently, assist us in manipulating a complex array of variables, focus on the key variables or processes, and develop "what-if" scenarios. Coordination and collaboration among all involved agencies must occur at local, regional and national levels and should involve many disciplines. Visions provide the first step in integrating social values, scientific knowledge and management experience in a multi-party system. We have a collective vision with different perspectives and frames of reference by discipline. We must be adaptive; adaptation is a continuous process of checking and adjusting various aspects of management to ensure progress towards the desired ecosystem condition. Adaptive management is a continuous process with no beginning or end. It is a constant cycle of information, planning, implementation, monitoring and assessment of projects. It is important to evaluate, continually asking ourselves is it acceptable, is it complete, is it effective, and is it efficient. We must survey the public to determine if projects meet their expectation. Finally, we must aim for sustainability.

6. Closing Remarks. Bobby Hughey (MVS), workshop facilitator, encouraged workshop participants to continue sending their message out to the public regarding the benefits of EMP and to seek their help in obtaining funding for the program. He also requested the attendees to take time to quantify to Congress the impact of a possible reduction in EMP funding in FY03.

ATTACHMENT A

AGENDA

AGENDA

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
WORKSHOP

St. Louis, Missouri
20-21 February 2002

20 February 2002

8:00	Welcome	MAJ Ben Bigelow
8:15	Introductions	Bobby Hughey

EMP Management Perspectives

8:20	Division	Greg Ruff
8:40	Regional	Roger Perk
9:00	St. Paul District	Don Powell
9:15	Rock Island District	Roger Perk
9:30	St. Louis District	Mike Thompson
9:45	Long Term Resource Monitoring Program	Scott Whitney
10:00	Break	

Panel Discussions

Connectivity

10:15	Water Control Structures	Rick Nickel
10:50	Overflow Structures	Dean Cerny
11:05	Fish Passage Structures	Mark Cornish
11:30	Open Discussion	
12:00	Lunch	

Natural System Design

1:00	Island Protection & Creation	Speaker 1	Michelle Schneider
1:15		Speaker 2	Jeff Janvrin
1:30	Side Channel/Secondary Channels		Rob Davinroy
1:45	Re-vegetation & Re-forestation		Randy Urich
2:05	Soils/Hydrology/Underseepage		Pat Conroy
2:30	Open Discussion		
2:45	Break		

20 February 2002 (continued)

Construction and O&M Concerns

3:00	Operational Topics	Speaker 1	Dick Steinbach
3:25		Speaker 2	Mike Griffin
3:50	Construction Issues		Barbara Kimler
4:15	Open Discussion		
4:30	Adjourn for Evening		

21 February 2002

Miscellaneous Topics

8:00	Scope Delineation/Engineering Criteria	Jon Hendrickson
8:20	Technology & Models for Restoration Planning	Chuck Theiling
8:40	Innovation	Gary Lee
9:05	Open Discussion	
9:30	Break	

Project Evaluation

9:45	Process and Procedure	Dan Holmes
10:05	Physical, Baseline, Bio-Response	Dan Wilcox
10:30	Integrated & Adaptive Management	Scott Whitney
11:00	Closing Remarks	Bobby Hughey
11:30	Wrap-up and Adjourn Workshop	Mike Thompson

LIST OF ATTENDEES

UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
WORKSHOP

St. Louis, Missouri
20-21 February 2002

Organization	City/State	Number of Attendees	Attendees
Corps of Engineers, Mississippi Valley Division (MVD)	Vicksburg, MS	1	Greg Ruff
Corps of Engineers, Rock Island District (MVR)	Rock Island, IL	11	Roger Perk Scott Whitney Rick Nickel Dean Cerny Mark Cornish Barbara Kimler Chuck Theiling Dan Holmes Rachel Fellman Steve Johnson Darron Niles
Corps of Engineers, St. Paul District (MVP)	St. Paul, MN	18	Don Powell Michelle Schneider Randy Urich Jon Hendrickson Dan Wilcox Sharonne Baylor Jeff Hansen Lisa Brantner Paul Machajewski Tom Novak Edith Pang Lori Taylor Terri Williams Kevin Nelson Jeff Gulan Tony Fares Steve Clark Joel Face

Organization	City/State	Number of Attendees	Attendees
Corps of Engineers, St. Louis District (MVS)	St. Louis, MO	20	Major Ben Bigelow Bobby Hughey Mike Thompson Deborah Foley Brian Markert Gary Lee Rob Davinroy Pat Conroy Duane Atchley Ken Dalrymple Charlie Deutsch Dan Erickson Steve Farkas Janice Hitchcock Katy Manar T. Miller Tom Quigley Teri Allen Dave Gordon Kathy Kornberger
U. S. Fish and Wildlife Svc (USFWS)	Quincy, IL Quincy, IL Marion, IL Marion, IL Brussels, IL Brussels, IL Annada, MO	9	Dick Steinbach Karen Westphal Joyce Collins Chuck Surprenant John Mabery Russell Engelke Dave Ellis Keith Beseke Jon Duyvejonck
U. S. Geological Survey (USGS)		4	Randy Burkhardt Barry Johnson Ickes Yao, Yin

Organization	City/State	Number of Attendees	Attendees
Wisconsin Department of Natural Resources (WIDNR)	La Crosse, WI	4	Mark Andersen Jeff Janvrin David Heath Patrick Short
Iowa Department of Natural Resources (IADNR)		1	Mike Griffin
Illinois Department of Natural Resources (IDNR)	Springfield, IL	3	Scott Stuewe Butch Atwood Neil Booth
Missouri Department of Conservation (MDOC)	Jefferson City, MO	4	Gary Christoff Ken Brummett Bob Hrabik Mark Boone
Upper Mississippi River Basin Assoc. (UMRBA)		1	Holly Stoerker
Lower Mississippi River Conservation Committee		2	Bill Box Ron Nassan
IIHR, The University of Iowa		1	Tatsuaki Nakato

PRESENTATIONS
OF THE
UPPER MISSISSIPPI RIVER SYSTEM
ENVIRONMENTAL MANAGEMENT PROGRAM
WORKSHOP

St. Louis, Missouri
20-21 February 2002

Click on a Presentation to view it

EMP Management Perspectives:

Mississippi Valley Division - Greg Ruff, MVD

Regional - Roger Perk, MVR

St. Paul District - Don Powell, MVP

Rock Island District - Roger Perk, MVR

St. Louis District - Mike Thompson, MVS

Long-Term Resource Monitoring Program (LTRMP) - Scott Whitney, MVR

Connectivity:

Water Control Structures - Rick Nickel, MVR

Overflow Structures - Dean Cerny, MVR

Fish Passage Structures - Mark Cornish, MVR

Natural System Design:

Island Protection and Creation - Michelle Schneider, MVP, and Jeff Janvrin, WI DNR

Side Channel/Secondary Channels - Rob Davinroy, MVS

Re-vegetation and Re-forestation - Randy Urich, MVP

Soils/Hydrology/Underseepage - Pat Conroy, MVS

Construction and O&M Concerns:

Operational Topics - Dick Steinbach, USFWS, and Mike Griffin, Iowa DNR

Construction Issues - Barb Kimler, MVR

Miscellaneous Topics:

Scope Delineation/Engineering Criteria - Jon Hendrickson, MVP

Technology and Models for Restoration Planning - Chuck Theiling, MVR

Innovation - Gary Lee, MVS

Project Evaluation:

Process and Procedure - Dan Holmes, MVR

Physical, Baseline and Bio-Response - Dan Wilcox, MVP

Integrated and Adaptive Management - Scott Whitney, MVR