

Many Voices • One Horizon

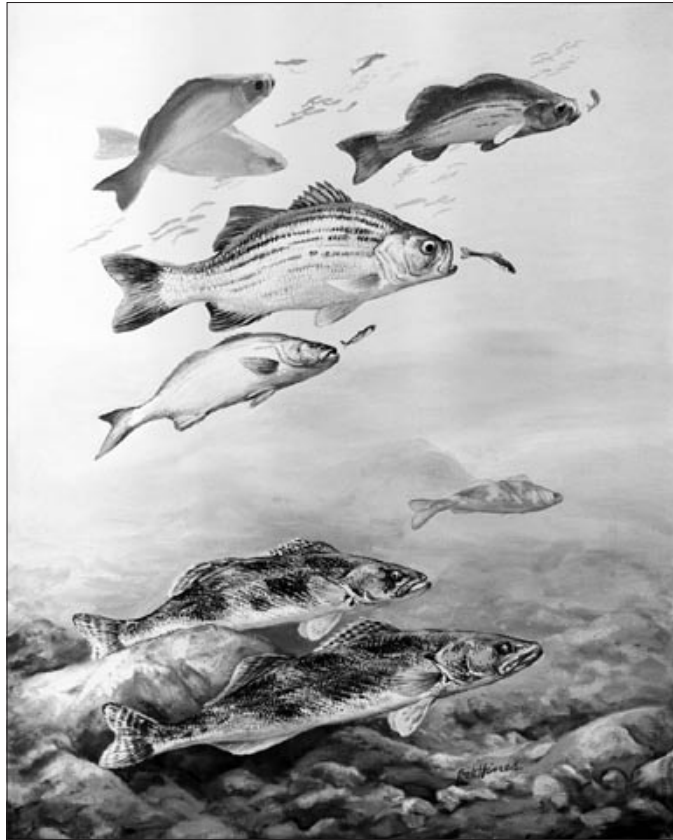
May 22-25 • 2005
Ramkota RiverCentre
Pierre • South Dakota



Program



"Wide Horizons" by Alfreda Beartrack, Lower Brule Sioux Tribe © St. Joseph Indian School, Chamberlain, SD



U.S. Fish and Wildlife Service: Robert W. Hines

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Many Voices • One Horizon

Welcome to the 9th Annual Missouri River Natural Resources Conference and thank you for coming to Pierre. I hope that some of you took advantage of South Dakota's free fishing weekend and landed some of my favorite fish, the white bass, which are biting right now. Anglers sometimes catch as many as 50,000 "great whites" in the spring in the Pierre-area demonstrating how important fishing is to the region.

The Missouri River means so much to the people living here, for many different reasons. We tried to reflect this diversity in the conference theme, *Many Voices • One Horizon*, suggesting that all our perspectives can come together as we seek a better future for the river. Even though the large size of this basin makes organizing scientists, resource managers, and other stakeholders difficult, it is our goal with the Missouri River Natural Resources Conference to bring people together, learn about new ideas, respect each other's interests, and find common ground.

This year, the conference focuses on how to share information between contemporary scientists and the original Missouri River inhabitants who have knowledge of the river gained over hundreds of years. Merging these two types of knowledge is crucial to understanding complex Missouri River natural resource issues. By learning from history and sharing our expertise, we can broaden our ability to protect and restore the Missouri River while continuing to utilize its resources.

My personal thanks to you for being involved in Many Voices • One Horizon. I hope the conference is informative, educational, and enjoyable for you!

Jim Riis, Conference Chairman

Missouri River Fisheries Program Administrator
Missouri River Fisheries Center
South Dakota Department of Game, Fish, and Parks
Ft. Pierre, South Dakota

South Dakota Delegate to the Missouri
River Natural Resources Committee



A FORUM
for Missouri River
stakeholders
to exchange
information,
share perspectives,
and solve problems.



Conference Organizers

Jim Riis, Conference Chairman
Darla Kusser and Leslie Petersen
South Dakota Department of Game,
Fish, and Parks
Pierre, South Dakota

Mike LeValley
Missouri River Natural
Resources Committee
Missouri Valley, Iowa

Scott Jones and
Roseanne (Mikki) LaRoche
Lower Brule Sioux Tribe
Lower Brule, South Dakota

Jeanne Heuser
U.S. Geological Survey
Columbia, Missouri

Gene Napier
U.S. Geological Survey
Sioux Falls, South Dakota

Jeff Turner
HDR Engineering, Inc.
Kansas City, Missouri

Joel Ames and **Maggie Oldham**
U.S. Army Corps of Engineers,
Omaha District
Omaha, Nebraska

Stan Schwellenback
City of Pierre
Pierre, South Dakota

Garland Erbele
Missouri River Basin Association and
South Dakota Department of
Environment and Natural Resources
Pierre, South Dakota

Brian Molyneux
Missouri River Institute
University of South Dakota
Vermillion, South Dakota

Myrna Leader Charge
Alliance of Tribal Tourism Advocates
Rapid City, South Dakota

Dawnette Owens
Mni Sose Intertribal Water Rights Coalition
Rapid City, South Dakota

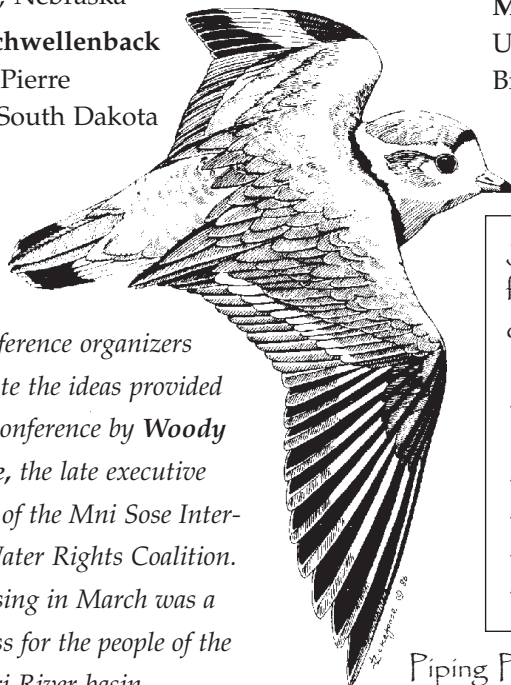
Chad Smith
American Rivers
Lincoln, Nebraska

Russell Somsen
U.S. Army Corps of Engineers,
Omaha District
Pierre, South Dakota

Jim Berkley
U.S. Environmental Protection Agency
Denver, Colorado

Mike Olson
U.S. Fish and Wildlife Service
Bismarck, North Dakota

*The conference organizers
appreciate the ideas provided
for the conference by **Woody
Corbine**, the late executive
director of the Mni Sose Inter-
tribal Water Rights Coalition.
His passing in March was a
great loss for the people of the
Missouri River basin.*

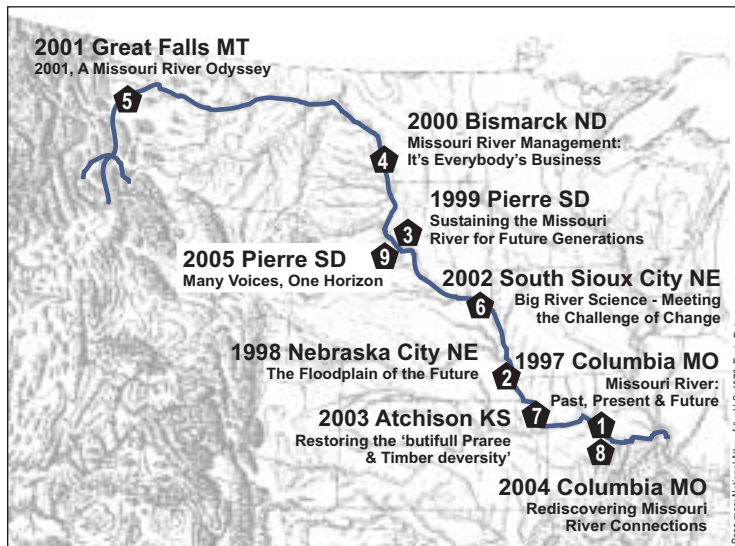


Piping Plover

Special appreciation to the
following financial supporters
of the conference:

- ◆ South Dakota Department of
Game, Fish, and Parks
- ◆ Lower Brule Sioux Tribe
- ◆ HDR Engineering, Inc.
- ◆ U.S. Geological Survey
- ◆ Western Area Power Administration

Previous Conferences



The Missouri River Natural Resources Committee (MRNRC) and the U.S. Geological Survey (USGS), Columbia Environmental Research Center founded the annual Missouri River Natural Resources Conference in 1997. Each year, an individual MRNRC state delegate sponsors and plans the conference and the USGS provides major organizational support.

The MRNRC is a non-profit corporation consisting of the seven-mainstem Missouri River state fish and wildlife agencies. Formed in 1987, the MRNRC mission is to promote and facilitate the preservation, conservation, and enhancement of the natural resources of the Missouri River system. Membership consists of seven voting delegates representing the state resource management agencies and eleven ex-officio members representing federal agencies with river management responsibilities or interests. The MRNRC sponsors three technical sections: Fish, Wildlife, and Tern and Plover.

The USGS, created in 1879, serves the Nation by providing reliable scientific information about the Earth. The Columbia Environmental Research Center, one of the eighteen USGS national science centers, addresses national and international environmental contaminant issues and assesses effects of habitat alterations on aquatic and terrestrial ecosystems in large-river floodplains, coastal habitats, wetlands, and lakes.

**10th Annual
Missouri River Natural Resources Conference
South Sioux City, Nebraska, May 9 - 12, 2006
See back cover of Program**



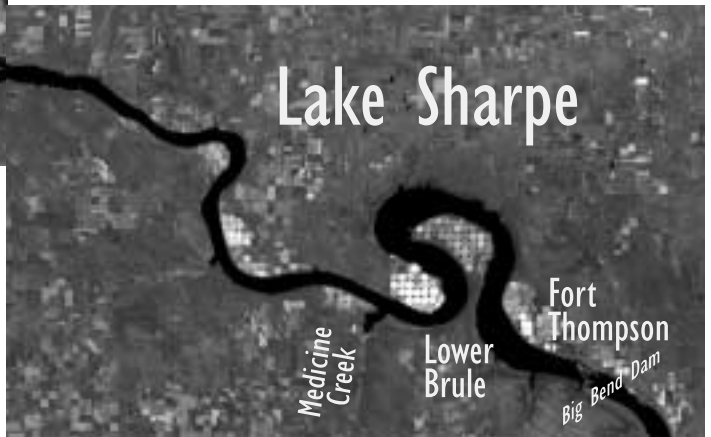
With this conference, we say farewell to Mike LeValley, Missouri River Natural Resources Committee (MRNRC) coordinator for the past eight years. Mike served as a major contributor to the conference since its beginning in 1997, always providing the business foundation for the annual event. Mike is transferring within the U.S. Fish and Wildlife Service to the ecological services field office in Manhattan, Kansas. His leadership both in the MRNRC and the annual conference will be sorely missed. Thanks Mike, and best wishes for your career move!

The Missouri River in Central South Dakota

Landsat 7 Image, July 14, 2002. USGS National Center for Earth Resources Observation and Science



Fifty years ago, the construction of four large dams flooded thousands of bottomland acres in South Dakota, turned the free flowing Missouri River into a series of reservoirs, and created a social and environmental transformation.



Pierre

Pierre, the state capital and home to 14,000 people, is located on the east bank of the Missouri River between two of the reservoirs built in the 1950s, Lake Oahe and Lake Sharpe. Across the river, the Bad River tributary enters at Fort Pierre where it deposits large quantities of sediment contributing to local flooding problems.



Lake Sharpe

Lake Sharpe extends 80 miles from Oahe Dam to Big Bend Dam at Fort Thompson. Completed in 1963, the dam derives its name from the big bend seven miles upstream where the Missouri River makes almost a complete loop, traveling 25 miles before returning to the "Narrows" where the land is only 1-1/2 miles wide.

Lake Oahe

Lake Oahe spans 231 miles from Pierre to Bismarck, the capital of North Dakota. Construction of Oahe Dam began in 1948; hydroelectric power generation began in 1962. Due to the ongoing drought, Lake Oahe is about 31 feet below normal elevation causing problems with water intakes, recreational boat ramp access, and fish spawning.





South Dakota

Missouri National Recreational River

The map shows tribal reservations within the state, the dams that transformed the Missouri River into a series of reservoirs, and the Missouri National Recreational River on the border with Nebraska, the only relatively free-flowing section of river remaining in South Dakota (see map on page 53).



Central South Dakota

The Tuesday trip to Lower Brule offers panoramic views of Lake Sharpe on the Native American Scenic Byway, Highways 1806 and 1804. The Lower Brule Sioux Tribe reservation is on the west side of the river and the Crow Creek Tribe is located on the east side.

Conference Schedule

May 22 • Sunday

Noon - 6:00 p.m.	Registration - Poster/exhibit setup for evening social: Poster Room
Noon, 2:00, 4:00 p.m.	Capital City Queen boat tours: Meet at the registration desk (page 8)
All day	<i>Save Our Stories</i> interviews: Lake Francis Case Room (page 9)
2:00 - 4:00 p.m.	<i>Enhancing Missouri River Paddling Recreational Opportunities</i> Workshop: Lake Sharpe Room (page 10)
2:00 - 6:00 p.m.	<i>Methods for River Habitat Assessment on Great Rivers</i> Short Course: Lewis and Clark Room (page 11)
6:00 - 7:30 p.m.	Welcome social; poster and exhibit session: Poster Room (page 12)
7:30 - 9:00 p.m.	Local Missouri River history: Amphitheater II (page 13)

May 23 • Monday

6:30 - 8:00 a.m.	Registration and breakfast: Meal Room
8:00 a.m. - Noon	Welcome and <i>Bridging the Gap</i> : Rooms B & C (page 14)
Noon - 2:00 p.m.	Lunch with Tribal Elders: Meal Room
2:00 - 5:00 p.m.	<i>Save Our Stories</i> interviews, Lake Francis Case Room
2:00 - 3:20 p.m.	<i>Changing Conditions</i> : Meeting Room B (page 18) <i>Biology and Habitat</i> : Meeting Room C (page 18)
3:20 - 3:40 p.m.	Break
3:40 - 5:00 p.m.	<i>Water and Historical Perspectives</i> : Meeting Room B (page 19) <i>Biology and Habitat</i> : Meeting Room C (page 19)
5:30 p.m. - 7:30 p.m.	Steamboat Park picnic: Meet at registration desk

May 24 • Tuesday

6:30 - 8:00 a.m.	Registration and breakfast: Meal Room
7:30 - 8:30 a.m.	Breakfast presentation: Meal Room (page 20)
9:00 a.m. - 5:00 p.m.	Trip to Lower Brule: Meet outside Amphitheater (page 20)
5:30 - 7:30 p.m.	Dinner/traditional entertainment: Lower Brule Sioux Powwow Grounds
7:30 p.m. - 8:30 p.m.	Return to Pierre

May 25 • Wednesday

6:30 - 8:00 a.m.	Breakfast: Meal Room
8:00 - Noon	<i>Save Our Stories</i> interviews, Lake Francis Case Room
8:20 - 9:40 a.m.	<i>Great Rivers Ecosystems</i> : Meeting Room B (page 22) <i>Wind Energy</i> : Meeting Room C (page 22)
9:40 - 10:10 a.m.	Break
10:10 - 11:50 a.m.	<i>Sediment</i> : Meeting Room B (page 23) <i>Missouri National Recreational River</i> : Meeting Room C (page 23)
Noon	Conference ends

Charles Schwartz, Wildlife Drawings, Missouri Conservation Commission

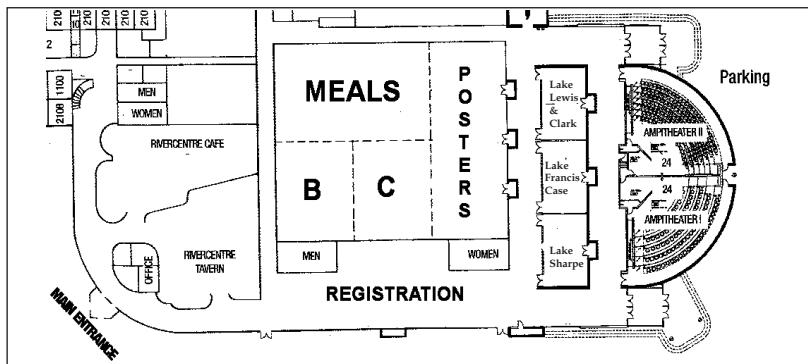
May 22 • Sunday registration

Noon - 6:00 p.m.

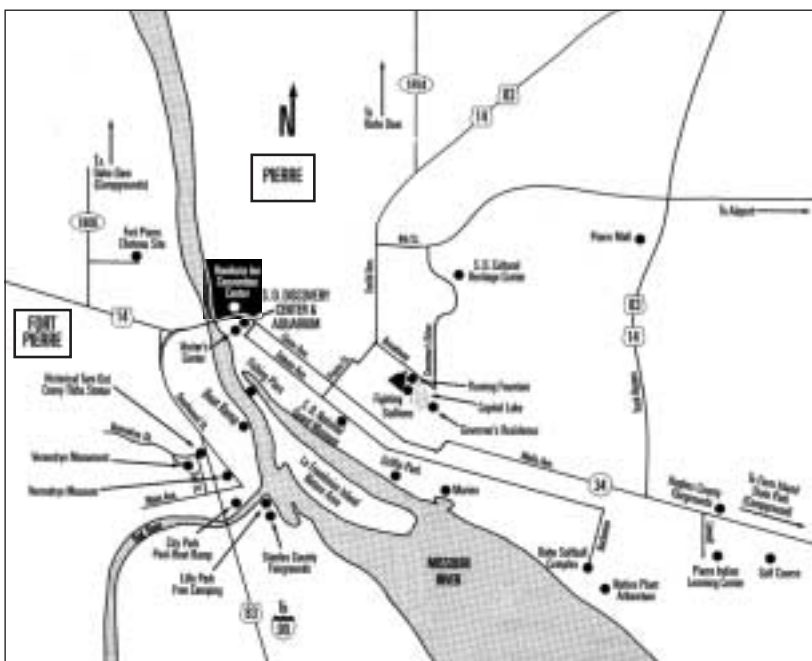
Poster and exhibit set-up - Poster Room

Ramkota RiverCentre

Sessions are in Rooms B and C; breaks, posters, and exhibits are in the POSTER room; special sessions and meetings are in the "Lake" rooms; meals are in the MEAL room. Guest rooms extend out from the upper left of the floor plan.



The conference hotel is across the street from Steamboat Park, which is adjacent to the Missouri River. You can walk to the park from the hotel and enjoy the fishing piers, walking paths, and LaFramboise Island. Only foot traffic is allowed on the Island and trails lead through the forest with beautiful views of the Missouri River. Steamboat Park is the site of Monday night's picnic.



South Dakota Department of Tourism

May 22 • Sunday

Noon, 2:00 and 4:00 p.m.

Meet at the registration desk

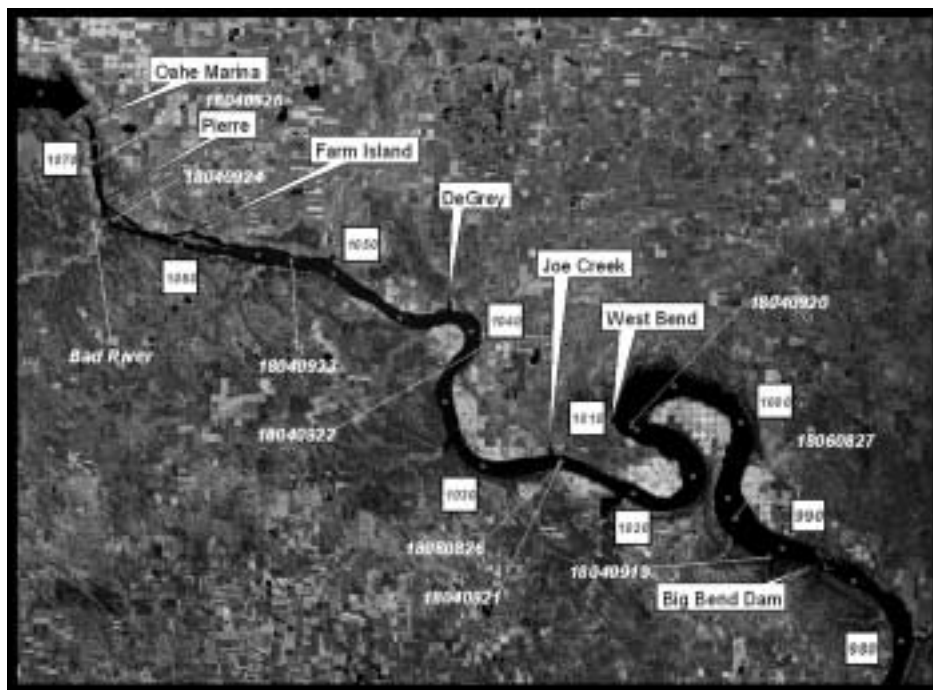
Capital City Queen boat tours



The two-hour Capital City Queen boat trip tours around Pierre, Fort Pierre, and LaFramboise Island Nature Area. Brad Lawrence, Fort Pierre public works director, provides facts and theories about Bad River sediment inflow problems in Lake Sharpe (see Sediment, page 23 and Poster, page 32).



The two-hour Capital City Queen boat tour passes by the mouth of the Bad River which enters the river from the west (on the right above). A \$35 million program relocated or flood-proofed homes in the area to help solve the flooding problems associated with Bad River sediment.



Sample map from "The Complete Paddler's Guide to the Missouri River: Three Forks to St. Louis" by David Miller. The map shows Lewis and Clark sites with white numbered dates (year first, followed by the month and day of their visit) and river miles within the squares. David is part of the Sunday Recreation workshop (page 10) and has a book signing that evening.

May 22 • Sunday afternoon
Lake Francis Case Room

Missouri River Folk History Project



SAVE OUR
STORIES



missouri river
folk history project

The water's edge holds the memories of a generation fast slipping away.

Understanding that our history holds information vital to our collective well being, Meredith Ludwig began the *Missouri River Folk History Project* to interview and videotape the oldest residents with a close connection to the river. Meredith and filmmaker, Kate Gorman, believe that a portrait of the Missouri River will emerge from these interviews that is useful in helping us, and future generations, understand our shared relationship to this great water.

If you are willing to share your story of the Missouri River, stop by the Lake Francis Case Room where Meredith and Kate are set up to record your remembrances. They have chosen the Missouri River Natural Resources Conference to offer this service because they believe *Many Voices • One Horizon* is a vital step toward understanding the many currents that run through this river.

Meredith and Kate will also record parts of the conference to archive the event for people unable to attend.

Meredith Ludwig lives on the Missouri River and is the Missouri River Folk History Project producer and interviewer. She has a background in radio, television and theatrical production and began collecting oral history five years ago while working for the Hoosier Grove Museum in Streamwood, Illinois. Meredith is a recipient of three radio production grants from the National Endowment for the Arts and currently writes a weekly commentary for community radio in Columbia, Missouri.

Kate Gorman is an AmeriCorps member and works with the non-profit Missouri River Communities Network, which has a mission of enhancing stewardship of the Missouri River. Kate received an M.A. in Media Production from Griffith University in Brisbane, Australia, where she wrote, directed, and edited documentaries and dramatic short films. Her B.A. in English is from the University of Missouri-Columbia.



May 22 • Sunday afternoon

2:00 -4:00 p.m.
Lewis and Clark Room

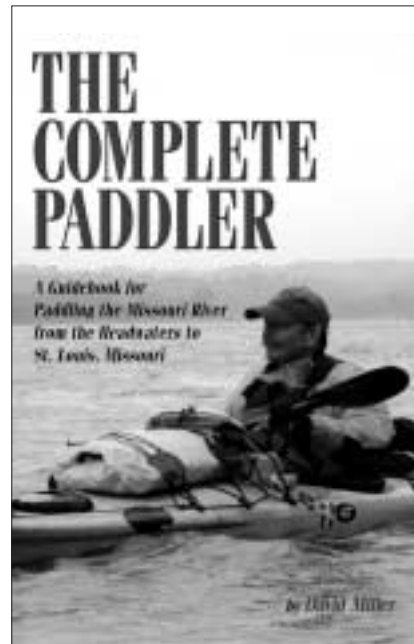
Enhancing Missouri River Paddling Recreational Opportunities

by Bryan Hopkins and David Miller

This workshop examines the potential of expanding Missouri River recreational opportunities to include an enhanced infrastructure for those people paddling the river in kayaks and canoes. We are in effect proposing the creation of America's river equivalent of the Appalachian Trail: the establishment of a 2,321 mile long Missouri River Trail. Already some businesses and communities along the river provide services; however, much more is needed as witnessed by David Miller when he took a three-summer kayak trip from Three Forks, MT to St. Louis, MO.

The workshop discusses the potential of this type of recreation, how it might benefit communities along the river, identifies issues that need to be addressed, and intends to facilitate an exchange of information related to developing a multi-state water trail on the Missouri River.

In addition, the workshop will examine how such a system would complement other programs that serve to promote active stewardship of the Missouri River.



HOT off the press: book signing by David Miller during the Sunday Social.

Bryan Hopkins

Missouri Department of Natural Resources
1659 East Elm St., Jefferson City, MO 65102
573-7512452; bryan.hopkins@dnr.mo.gov

Bio: Bryan Hopkins is an environmental education specialist with the Missouri Department of Natural Resources in Jefferson City, Missouri and an avid paddler. He has over ten years of teaching experience and established a successful big river educational program, focusing on both the Missouri and Mississippi Rivers.

Co-Author:

David L. Miller, State University of New York College at Cortland, Cortland, NY

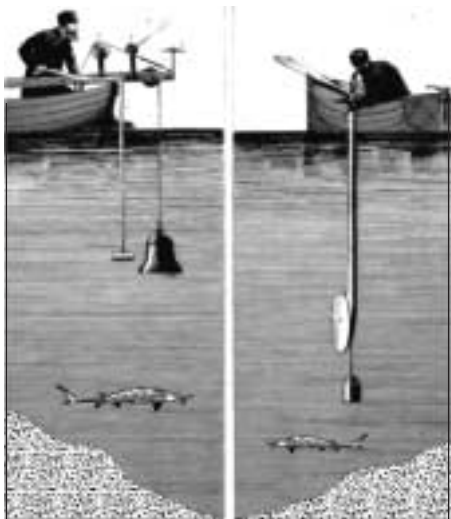
May 22 • Sunday afternoon

2:00-6:00 p.m.

Lake Sharpe Room

Methods for Riverine Habitat Assessment on Great Rivers

by Robert B. Jacobson, Richard Wilson, and
David Gaeuman



Evaluating habitats has improved significantly since the 18th Century as explained in this short course.

Image adapted from J.D. Colladon, Souvenirs et Memoires, Albert-Schuchardt, Geneva, 1893.

Robert B. Jacobson

U.S. Geological Survey
Columbia Environmental Research Center
4200 New Haven Road
Columbia, MO 65201
573-876-1844; rjacobson@usgs.gov

Bio: Robert Jacobson is a research hydrologist. He has conducted research on habitat dynamics in the Missouri River corridor since 1993. Robb has a Ph.D in Geography and Environmental Engineering from John Hopkins University.

Co-Authors: David A. Gaeuman, U.S. Geological Survey - National Research Council, Columbia, MO; Richard Wilson, U.S. Geological Survey, Lincoln, NE

This short course provides an overview of physical habitat, habitat classification and methods of habitat assessment. It introduces basic concepts, definitions, and assumptions, followed by specific examples from the Missouri River, including emergent sandbar habitat, shallow-water habitat, and side-channel chutes. The examples illustrate a continuum of costs and information content for methods ranging from indices to multidimensional hydraulic models, and from snapshots in time to long-term monitoring.

Physical habitat plays a fundamental role in structuring riverine ecosystems. At the same time, it is the most highly manageable component of the ecosystem. The ability to quantify physical habitat aids in understanding, rehabilitating, and managing rivers. On the Missouri River, habitat assessments are necessary for performance evaluations of rehabilitation projects, for evaluating habitat availability as a function of flow and channel form, and for documenting habitat use by biota. While many approaches to quantifying habitat have been developed for wadeable streams, there is much less guidance for large and great rivers.

May 22 • Sunday evening
Welcome Social

6:00 ~ 7:30 p.m.
POSTER Room

Poster Session (see descriptions on pages 24 to 33)

Bankline Conditions of the Missouri National Recreational River. Stephen K. Wilson, National Park Service, Yankton SD

Conversion of a Multipurpose Missouri River Reservoir to a Sustainable System. Howard Coker, University of South Dakota, Vermillion, SD

Cottonwood Community Delineation. Amy A. Lee, U.S. Army Engineer Research and Development Center, Vicksburg MS

Current USACE Activities Designed to Increase Tern and Plover Nesting Habitat. Galen D. Jons, U.S. Army Corps of Engineers, Omaha District, Yankton SD

Dispersal of Hatchery Reared Pallid Sturgeon from a Stocking Site on the Lower Missouri River. Andrew Starostka, U.S. Fish and Wildlife Service, Columbia MO

Existing Habitat Assessment, Missouri River Fish and Wildlife Mitigation Project. Bob Dimmitt, U.S. Army Corps of Engineers, Kansas City District, Kansas City MO

GIS Triage and Archeological Site Protection in the Missouri River System. James Chatters, Tetra Tech ECI, Inc., Bothell WA

Introduced Fish in the Dakotas, Nebraska, Minnesota, and Montana before 1896. Bill Beacom, South Sioux City, IA

Missouri River Institute Water Quality Monitoring Project on the Missouri National Recreational River. Jim Novak, Missouri River Institute, University of South Dakota, Vermillion SD

Missouri River Public Use Assessment: The 2003 Lewis and Clark Expedition. Steven L. Sheriff, Missouri Department of Conservation, Columbia MO

Mussels of the Missouri National Recreational River. Jeff Shearer, South Dakota Department of Game, Fish, and Parks, Pierre SD

Planning for Biodiversity: Designing a Functional Network of Conservation Areas in the Lower Missouri River. Paula Gagnon, The Nature Conservancy, Berwyn IL

Planning for Biodiversity Conservation: Developing Strategies for the Missouri River Basin. Paula Gagnon, The Nature Conservancy, Berwyn IL

Redeposition of Sand in Oahe Project Tailrace. Brad Lawrence, City of Fort Pierre, Fort Pierre SD

Reproductive Development of Missouri River Chubs in Relation to Environmental Variables. Jennifer Johnson, U.S. Fish and Wildlife Service, Columbia MO

Shallow-water Sandbar Habitat Use by Small-bodied Fishes on the Lower Missouri River. Clayton J. Ridenour, Missouri Cooperative Fish and Wildlife Research Unit, Columbia MO



Book Signings

The Complete Paddler
by Dr. David Miller
(see page 10, map
page 8)

Rivers of Change
by Tom Mullen (see
pages 19 and 38)

Exhibitors

U.S. Geological Survey • HDR Engineering, Inc. • South Dakota Department of Game, Fish, and Parks

Sunday evening Local River History

7:30 - 9:00 p.m.
Amphitheater

Dam Takings - Talk

Warren May shares his memories of the time prior to building the Oahe and Big Bend dams when he tried some fifty cases in the United States District Court for the State of South Dakota on behalf of the Oahe Landowners Association and the Big Bend Landowners Association. Born in Rapid City, South Dakota in 1920, May practiced law in Pierre for fifty years before retiring in 1998.

Flood of 1952 - Film (45 min)

Introduced by Chelle Somsen
State Archivist
South Dakota Cultural Heritage Center
Pierre, South Dakota

An historical film showing the devastation wrought by the largest flood of record in South Dakota that submerged large parts of Ft. Pierre, Pierre, and Ft. Thompson.



DeGrey Bend today.



Warren May

The filling of Lake Sharpe submerged this farm at DeGrey Bend located between Pierre and the Big Bend north of Lower Brule.

Life on the Missouri River Bottoms - Film (30 min)

Introduced by Sheldon Fletcher
Lower Brule Sioux Tribe
Conservation Officer
Department of Wildlife Fish and Recreation

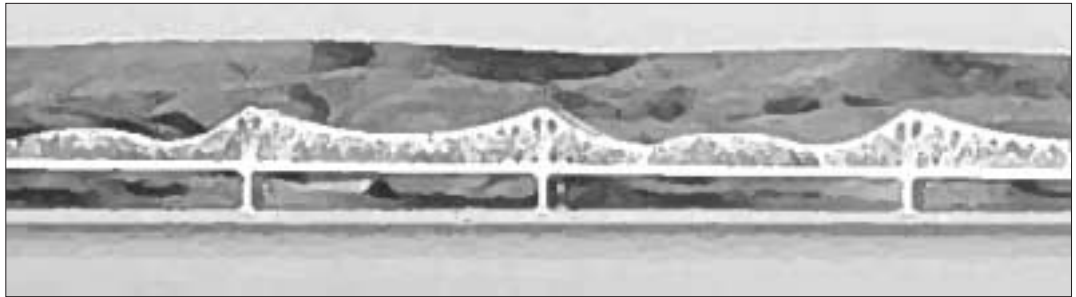
Harry DeSmet Thompson, Tribal Elder, is featured on this film about the changes on the Lower Brule Sioux reservation resulting from the construction of Big Bend Dam. Born in 1909, Elder Thompson lived ten miles north of Chamberlain on the west side of the river at Fort Hale Bottom. He shares memories of plants, foods, and animals prior to the loss of the 25,000 acres of bottomland, 10% of the reservation land. The Lower Brule Sioux Tribe lost 7,000 acres of forest, which was 90% of their forests when the bottomland was inundated.

The Lower Brule Sioux Tribe Department of Wildlife, Fish and Recreation produced the video with Vern-Herman Production. Sheldon Fletcher did the original filming of his uncle, Harry Thompson.

May 23 • Monday plenary

8:00 a.m. - Noon
Meeting Room B & C

Bridging the Gap



Welcome

Jim Riis, Conference Chairman
South Dakota Department of Game, Fish, and Parks

Missouri River Champion Award

Senator Thomas Daschle

Bridging the Gap Keynote Presenters

We have inherited a transformed Missouri River with piecemeal efforts underway to restore and preserve species. Contributing to this problem is a lack of cultural connection between traditional indigenous understanding and western scientific knowledge of the river's ecosystem needs.

There is little inclusive, coordinated discussion about what the Missouri River needs for its long-term vitality. The plenary session initiates a discussion about finding common ground and bridging the gap between perspectives.

Moderator: Jeanne Heuser

U.S. Geological Survey, Columbia, Missouri

Brian Molyneaux, Ph.D

Co-director, Missouri River Institute
Professor of Archaeology
University of South Dakota
Vermillion, South Dakota
Cultural resources consultant
for the Lower Brule Sioux Tribe
(See *Finding Common
Ground*, page 16)

Scott Jones

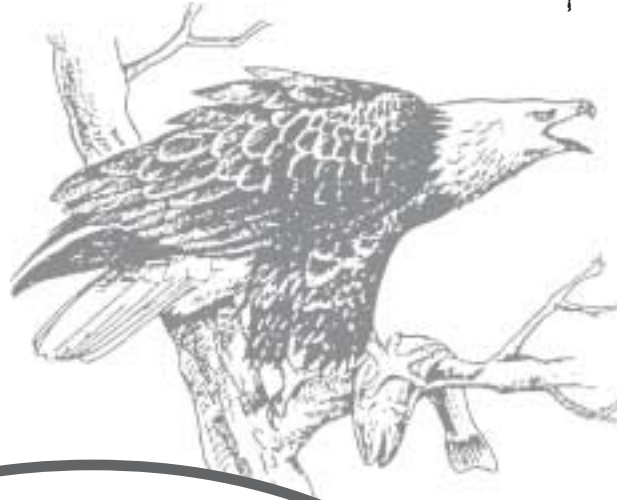
Director
Public Information and
Cultural Resources
Lower Brule Sioux Tribe
Lower Brule, South Dakota

May 23 • Monday lunch

Noon - 2:00 p.m.

Remembering

Distinguished Tribal Elders share memories and perspectives on the Missouri River's historical environment.



Bridging the Gap Discussion

Michael Jandreau
Chairman
Lower Brule Sioux Tribe
Lower Brule, South Dakota

Eugene Napier
Tribal Liaison
U.S. Geological Survey
Sioux Falls, South Dakota

Kent Keenlyne, Ph.D.
Biologist
Missouri River Natural
Resources Committee,
First Coordinator
Pierre, South Dakota

What are the
opportunities and
obstacles to
bridging the gap
between
traditional indigenous
understanding and
western scientific
knowledge of the
Missouri River's
ecosystem needs?

William Benjamin
Blackfeet Tribe of Montana
Regional Director
Bureau of Indian Affairs
Great Plains Regional Office
Aberdeen, South Dakota

Pemina Yellow Bird
Arikara Nation
Plaza, North Dakota

John Bartel
Lake Oahe Project Manager
U.S. Army Corps of Engineers
Pierre, South Dakota

Joel Ames
Osage Indian
Tribal Liaison
U.S. Army Corps of Engineers
Omaha, Nebraska

Finding Common Ground

By Brian Leigh Molyneaux, Ph.D
Keynote Speaker

Mni Sose, the Missouri River, is silent about its needs, but people who witnessed the tragic loss of vast cottonwood forests, grass-covered floodplains, thickets of plum and chokecherry and grapes that hung in garlands over the shores, who lost homesites and homelands, who now sees the cliffs of raw earth and gaunt drowned forests and the waters in an endless flood, know that something is deeply wrong. Since the federal government instructed the US Army Corps of Engineers to apply engineering science to the river, answering a political necessity for lower river flood protection and upper river employment, successive governments have been forced to confront the decades of environmental and cultural destruction and produce legislation mandating relevant agencies to identify those needs and undo the damage this society has wrought. Thus we visit the river with archaeology, biology, sedimentology, geology and other aspects of a western science tradition that has, for a thousand years, helped to fashion modern post-industrial society.

More than two generations since the building of the dams, however, efforts to help the river are piecemeal at best, with little consensus about the best way forward. The fundamental problem cannot be resolved: the needs of the river are always secondary to the immediate political and economic demands of the majority culture and its governments. This means that the traditional natural life, symbolized by the least tern, piping plover, and pallid sturgeon, must survive on this culture's terms – and on this culture's river. Efforts to restore some semblance of the traditional ecological balance are a struggle against powerful political forces beyond the river's horizons.

The Missouri River Natural Resource Conference is a meeting place for diverse natural resource specialists united by their devotion to the river and its survival. Most, directly or indirectly, encourage better science as a way of restoring the ecosystem. Many have their hands tied by political masters. Yet, science alone cannot heal the river. Public perceptions to the contrary, traditional western science only exists as a strictly controlled process of hypothesis and testing and positive or negative results. Positive results do not create 'truth' as faith does, but simply more experimentation, until negative results dash the original notion or continued positive results support it. As we know from cosmology, it may take hundreds of years for cherished ideas to be cast aside in this slow and deliberative process – but even then, we have only confidence, not truth.

Contrast this to public policy, as my USD colleague John Davidson has done with great insight in a recent Missouri River Institute lecture. Public policy demands immediacy and views scientific results as political values. Policy-makers, through their scientific agencies, can select research that best fits their agenda – the so-called 'best science'. Consider the 'Biological Opinion' that the Fish and Wildlife Service issued in 2000 pursuant to the requirements of the Endangered Species Act. Despite its support by a select panel of the National Academy of Sciences, the current federal government insisted on revisions to placate its own political constituency. This is the science of politicians, not the science of the river.



Three creeks that flow together into Mni Sose, in sight of Lower Brule territory, have always been common ground for tribal groups who wished to meet peacefully. Where is our common ground now?

I think the most immediate solution lies in a process that has developed in science since the construction of the dams: the visionary idea that nature – here, the river – is a complex of natural and cultural systems that can never be reduced to a set of physical causes and effects detected through experimentation. Science is the source of our understanding of the physical processes at work in the world, but science outside the data is a human, cultural, historical enterprise that takes the shape of the society in which it works. This must be so, because only in a cultural world, with its conceptual self-absorption, would a vast store of knowledge, accumulated over thousands of years, remain virtually unacknowledged and ignored to natural resource specialists.

It is indeed ironic that people celebrate the odd patchwork of eccentric observations and collections by Lewis and Clark when there are living people with the cumulative knowledge of hundreds of generations of gatherers, hunters and farmers who have literally occupied these lands for more than 10,000 years. Their traditional ecological

knowledge, gained through endless seasons of observation and practical experimentation and passed down through oral tradition, constitutes an indigenous science that is no less intricate and rich in detail than the traditions of the west. This ancient wisdom, expressed in a world-view with no boundary between physical and ideological or spiritual realms, may seem strange and impenetrable to some western minds, but it is science's challenge to join with traditional knowledge-keepers in creating new pathways to mutual understanding for the sake of the generations to come.

Acting as a host of this conference is not the first gesture towards science that the Lower Brule Sioux Tribe and many other North American Indian nations have made. It is time for science to live up to its modern holistic philosophy and work with indigenous cultures to save the Missouri River from the outside forces that now control its destiny.

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Meeting Room B

See abstracts pages 34-35

Changing Conditions

Moderator: Chad Smith, American Rivers, Lincoln, NE

2:00 - The Use of Independent Science Review Early in Program Development.

Craig Fleming, U.S. Army Corps of Engineers, Omaha District, Yankton SD

2:20 - Indigenous Mapping Along the Missouri River by the Cheyenne River Sioux Tribe.

Eric C. Wood, U.S. Geological Survey, Sioux Falls SD and Jennifer Carter, Cheyenne River Sioux Tribe, Eagle Butte SD

2:40 - Upper River Reservoir Recreation.

John Lott, South Dakota Department of Game, Fish, and Parks, Fort Pierre SD

3:00 - Drought in the Missouri River Basin: Impacts Related to Water Allocation Choices.

Wayne Nelson-Stastny, South Dakota Department of Game, Fish, and Parks, Ft. Pierre SD

3:20 - BREAK

Meeting Room C

See abstracts pages 39-41

Biology and Habitat

Moderator: Mike Olson, U.S. Fish and Wildlife Service, Bismarck, ND

2:00 - Missouri River Geospatial Decision Support Framework.

Joel D. Schlagel, U.S. Army Corps of Engineers RS/GIS Center of Hanover, Hanover NH

2:20 - Macroinvertebrate Drift Density in Relation to Abiotic Factors.

Chris Hay, University of Nebraska-Lincoln, Lincoln NE

2:40 - Biological Inventory of Newly Constructed Backwater and Sandbar Habitats.

Gerald Mestl, Nebraska Game and Parks Commission, Lincoln NE

3:00 - Availability of Lower Missouri River Sandbar Habitats in Relation to Discharge.

Emily K. Tracy, Missouri Cooperative Fish and Wildlife Research Unit, Columbia MO

3:20 - BREAK



Monday Papers

3:40 - 5:00 p.m.

These sessions may not run concurrently.

Meeting Room B

See abstracts pages 36-38

Water

Moderator: Garland Erbele, South Dakota Department of Environment and Natural Resources, Pierre, SD

3:40 - Water-quality Monitoring on the Missouri River, Yankton Sioux Reservation, South Dakota.

Cliff Johnson, Yankton Sioux Tribe, Marty SD and Roy C. Bartholomay, U.S. Geological Survey, Huron SD

4:00 - Water Use from the Missouri River Mainstem in South Dakota. Mark Rath, South Dakota Department of Environment and Natural Resources, Pierre SD

4:20 - Missouri River Impacts on a Public Power and Water Utility.

Patrick J. Cassidy, Kansas City Board of Public Utilities, Kansas City KS

Historical Perspectives

4:40 - Rivers of Change - Variety, Voices and Two Centuries of Altering our Rivers and Lives. Tom Mullen, Laguna Beach CA

Meeting Room C

See abstracts pages 41-43

Biology and Habitat

Moderator: Mike Olson, U.S. Fish and Wildlife Service, Bismarck, ND

3:40 - Diel Patterns in Habitat Use by Larval Fishes in the Lower Missouri River. Kerry Reeves, Cooperative Fisheries and Wildlife Research Unit, Columbia MO

4:00 - Microhabitat Use of Shovelnose and Pallid Sturgeon in the Lower Missouri River. Wyatt Doyle, U.S. Fish and Wildlife Service, Columbia MO

4:20 - Macroinvertebrate Communities as Food for Shorebirds on Sandbars within the Missouri River. Jessica Lee, South Dakota State University and Big Muddy National Fish and Wildlife Refuge, Brookings SD

4:40 - An Assessment of Reservoir Habitat for Breeding Piping Plovers on Lake Sakakawea, North Dakota.

Coral Huber, U.S. Army Corps of Engineers, Omaha District, Yankton SD

Monday Picnic
Steamboat Park
5:30 p.m.



May 24 • Tuesday Field Trip

Lower Brule Sioux Tribe Kul Wicasa Oyate

Breakfast talk

Pemina Yellow Bird, Arikara Nation, and Scott Jones, Lower Brule Sioux Tribe, discuss the 2004 agreement that constitutes a paradigm shift in the way resources are managed on the Missouri River.

The Buffalo Interpretive Center overlooks 3,000 acres where the Lower Brule Sioux Tribe pastures a buffalo herd. The Center includes a museum that depicts traditional life living in tipis and utilizing the buffalo for sustenance, and a gift shop with local art and products.



Buffalo Interpretive Center
10 miles south of Fort Pierre on Highway 1806

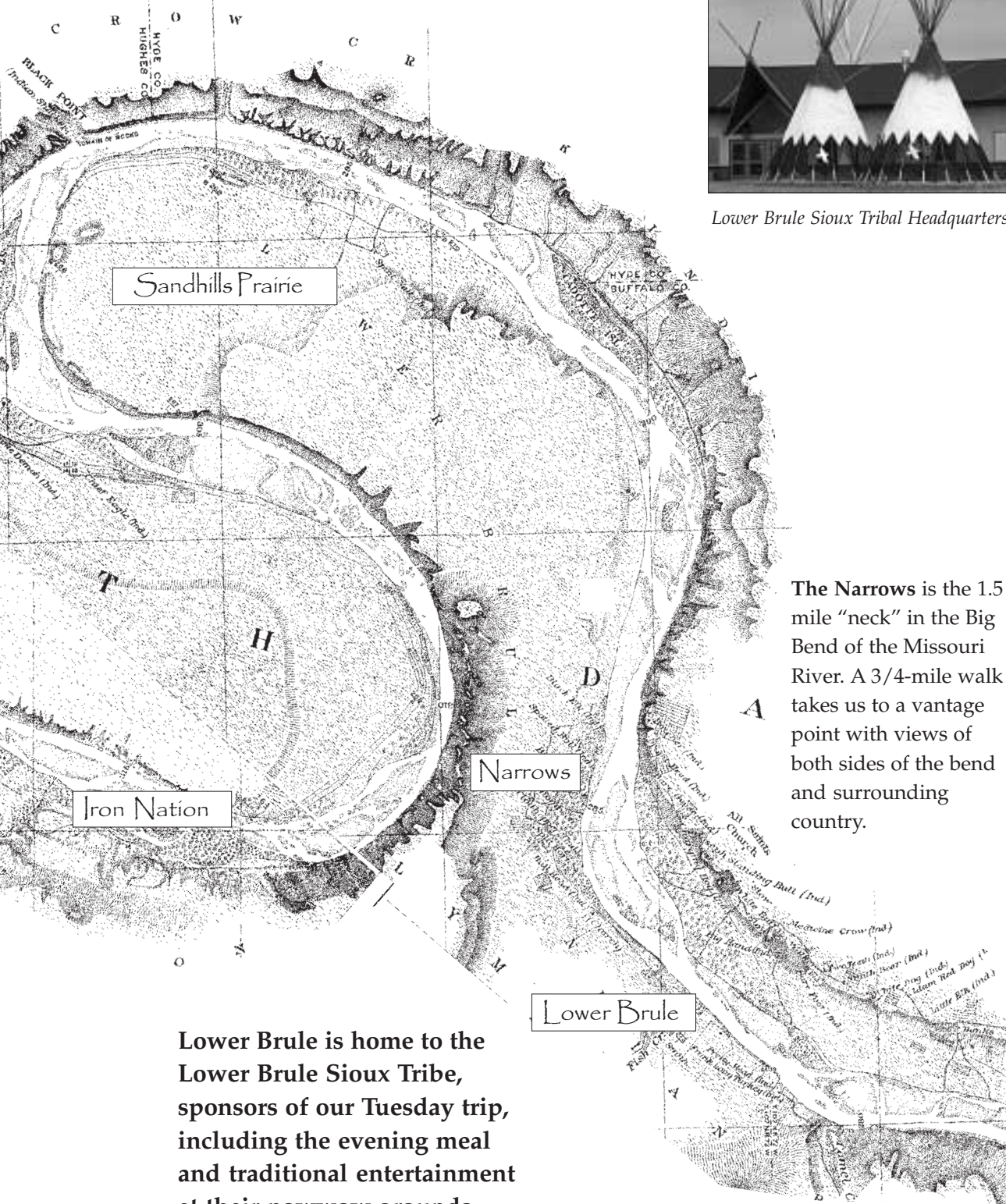
Iron Nation, named after Lower Brule Sioux Chief Iron Nation who lived from 1815 to 1894, is located at the mouth of Medicine Creek on Lake Sharpe.

- ◆ South side trip shows the vegetative bank stabilization project recently built to increase habitat while protecting cultural resource sites from further lake erosion.
- ◆ North side trip shows a restoration project where original bottomland species of trees, shrubs, and vines are regenerating and recreating natural habitat. The area is irrigated by flood waters.

The Sandhills Prairie is a remnant of a unique type of prairie usually found only in western Nebraska, but located within the Missouri River's Big Bend. We learn about the efforts underway to preserve and expand this special prairie.



Lower Brule Sioux Tribal Headquarters



The Narrows is the 1.5 mile "neck" in the Big Bend of the Missouri River. A 3/4-mile walk takes us to a vantage point with views of both sides of the bend and surrounding country.

Lower Brule is home to the Lower Brule Sioux Tribe, sponsors of our Tuesday trip, including the evening meal and traditional entertainment at their powwow grounds.

1893 Missouri River Commission Map
Courtesy U.S. Army Corps of Engineers

Meeting Room B

See abstracts pages 44-46

Great Rivers Ecosystems

Moderator: Terri Jicha, U.S. Environmental Protection Agency, Duluth, MN

A program of the U.S. Environmental Protection Agency, the Environmental Assessment and Monitoring Program (EMAP) Great Rivers Ecosystems (GRE) program is a unified approach for monitoring and assessing ecological conditions of the Missouri, Upper Mississippi, and Ohio Rivers. The session introduces the EMAP-GRE and the first year of the planned three-year monitoring effort.

Program Overview. Terri M. Jicha, U.S. Environmental Protection Agency, Duluth MN

2004 Field Data Collection

by the U.S. Geological Survey

- *Upper Missouri River.*
Kathleen M. Rowland
Bismarck ND
- *Middle Missouri River.*
Brenda Woodward
Lincoln NE
- *Lower Missouri River.*
Suzanne R. Femmer
Rolla MO

Fish Community Monitoring

Lower Missouri River.
Jason Crites
Missouri Department of Conservation
Jackson MO

9:40 a.m. - BREAK

Meeting Room C

See abstracts pages 47-48

Wind Energy

Moderator: Jeanne Heuser, U.S. Geological Survey, Columbia, MO

The Great Plains wind might serve as an alternative energy source that provides economic development for the tribes and augments Missouri River hydropower.

8:20 - Wind Integration into the Federal Transmission System. Ed Weber, Western Area Power Administration, Billings MT

8:40 - The Economics of Wind Energy. Ron Rebenitsch, Basin Electric Power Cooperative, Bismarck ND

9:00 - Effects of Wind Energy on the Missouri River Environment. Nick Stas, Western Area Power Administration, Billings MT

9:20 - The Potential of Wind Energy in South Dakota. Tony Rogers, Rosebud Sioux Tribe, Rosebud SD

9:40 - BREAK



The big winds of South Dakota

Wednesday papers

10:10 ~ 11:50 a.m.

These sessions will not run concurrently.

Meeting Room B

See abstracts pages 49-51

Sediment

Moderator: Stan Schwellenbach,
City of Pierre, Pierre, SD

Large quantities of sediment and organic materials flow into the reservoirs and are trapped behind the dams reducing reservoir storage capacity and sediment transport. Deltas form at reservoir headwaters from upstream tributaries and sediment mobilized in the inter-reservoir reaches.

10:10 - Missouri River Main Stem System of Dams: Sedimentation

Problems. John Garrison, U.S. Army Corps of Engineers, Omaha District, Omaha NE

10:30 - Sediment Effects in the Missouri River Main Stem Reservoirs. Howard Paul, Missouri Sedimentation Action Coalition (MSAC), Canton SD

10:50 - River Planform Assessment on Four Open Reaches of the Missouri River. Patrick J. Engelbert, HDR Engineering, Inc., Omaha NE

11:10 - Bad River Water Quality Project. Jerry Thelen, Bad River Water Quality Project, Pierre SD

11:30 - Lewis and Clark Watershed Assessment. Kris Dozark, Randall Resource Conservation and Development, Lake Andes SD

Meeting Room C

See abstracts pages 52-54 and map page 53

Missouri National Recreational River

Moderator: Stephen Wilson, National Park Service, Yankton, SD

The Missouri National Recreational River is made up of two segments of the Missouri River on the border between South Dakota and Nebraska: the 39-mile unit downstream of Ft. Randall Dam, and the 59-mile unit below Gavins Point Dam. It is the only remaining relatively free-flowing Missouri River in South Dakota.

10:10 - River Morphology and the Dynamic Missouri River.

Tim Cowman, South Dakota Department of Environment and Natural Resources, Vermillion SD

10:40 - Developing a Geomorphic Classification for the Missouri National Recreational River. Caroline M. Elliott, U.S. Geological Survey, Columbia MO

11:00 - Ponca State Park Habitat Restoration Project. Luke Wallace, U.S. Army Corps of Engineers, Omaha District, Omaha NE

11:20 - Least Tern & Piping Plover Productivity on Created Habitat, Ponca State Park. Gregory A. Pavelka, U.S. Army Corps of Engineers, Omaha District, Yankton SD

*Posters listed alphabetically by title***Bankline Conditions of the Missouri National Recreational River**

Stephen K. Wilson
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The Missouri National Recreational River (MNRR) is a component of the National Wild and Scenic Rivers System and administered by the National Park Service. The MNRR Draft General Management Plan/ Environmental Impact Statements were completed in the late 1990's and set forth the basic management philosophy for the Recreational River.

The National Park Service is now commencing a more detailed planning effort referred to as a Resource Stewardship Plan (RSP). This RSP will detail the desired future conditions of the MNRR, as related to the outstandingly remarkable values for which the riverway was designated, and guide management activities to meet these conditions. Due to the unique nature of this Park and its multiple management partners much resource information is available to serve as the backbone of this planning effort. However, bankline conditions data with desired attributes is not available and thus the objective of this study is to identify the spatial location and describe the existing bank stabilization, developments (isolated and cluster), and other artificial features such as boat ramps, water intakes, and garbage piles.

The MNRR banklines were surveyed from land and water during summer 2004 and all artificial features were described and referenced using global positioning system units. These data were then incorporated into a GIS where bankline condition indices

were calculated (e.g., percent bankline stabilized). Preliminary bank stabilization calculations suggest that approximately 32% of the MNRR from Gavins Point Dam to Ponca, NE is stabilized and approximately 73% of the stabilization is federally sponsored bank stabilization.

Bio: Stephen Wilson is a resource management/GIS specialist with the National Park Service working on the Missouri National Recreational River since 2001. He received a B.S. and M.S. in Wildlife and Fisheries Sciences from South Dakota State University.

Conversion of a Multipurpose Missouri River Reservoir to a Sustainable System

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Co-Author: Dennis Johnson, School of Business, University of South Dakota, Vermillion, SD

Lewis and Clark Lake, the most downstream of the six Missouri River mainstem reservoirs, can be converted to a sustainable system with benefits exceeding costs by more than a factor of two. To achieve sustainability, the sediment that would eventually fill the reservoir will be returned to the Missouri River channel removing the unnatural blockage of normal sediment flow. The proposed strategy involves several phases that will take about 50 years to complete. The project will serve as a model for achieving the sustainability of many other reservoirs.

Bio: Howard Coker is emeritus professor of Physical Chemistry and director of the University of South Dakota Research Compliance Office. He has been at USD since 1961 and served as director of the USD Office of Research from 1983 to 1996. He received his Ph.D from Oregon State University.

Cottonwood Community Delineation

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 Engineer Research and Development
 Center, Waterways Experiment Station
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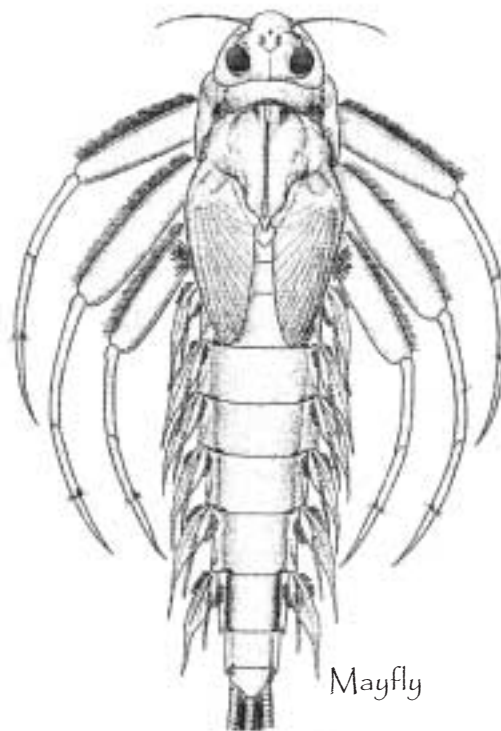
Co-Authors: Stephen K. Wilson, National
 Park Service, Yankton, SD; Kristine Nemeck,
 U.S. Army Corps of Engineers, Omaha
 District, Omaha, NE; and Dr. Carter
 Johnson, South Dakota State University,
 Brookings, SD.

In 2000 and 2003, the U.S. Fish and Wildlife
 Service (USFWS) released *Biological Opin-*
ions that advised the U.S. Army Corps of
 Engineers, Omaha District, that current
 Missouri River operations would harm the
 bald eagle, a Federally listed threatened and
 endangered species, due to loss of critical
 habitat, cottonwood forests. The USFWS
 recommended three reasonable and pru-
 dent measures (RPMs) to reduce bald eagle
 take. RPM 1 recommended: map and
 evaluate the current health of cottonwood
 forests that could provide habitat for bald
 eagles.

In an effort to address RPM 1, the *Cotton-*
wood Community Delineation was undertaken
 on a 5-mile reach of the Missouri River. An
 interagency team developed rules for
 delineation. Using the rules, DOQQs, and
 stereo-paired aerial photography, a field
 map was developed. The map was field-
 verified, corrected, and justified. The

advantages of using this method for
 delineation include: 1) the wise use of
 resources, 2) input from interagency team,
 3) development of delineation protocols,
 and, 4) a product appropriate for multiple
 applications.

Bio: Amy A. Lee is an ecologist at the U.S.
 Army Corps of Engineers Research and
 Development Center (ERDC), Environmen-
 tal Laboratory in Vicksburg, MS. In addi-
 tion to work on the Bald Eagle/Cottonwood
 Community model she has been involved in
 development of the Watershed Notebook,
 Lower Mississippi River Conceptual Model,
 planning level delineations of wetlands on
 National Guard installations, surveys of
 threatened and endangered species on
 military installations, information portal
 development, and state, regional, and
 national brochures of Corps of Engineers
 properties.



*Aquatic macroinvertebrates are the primary
 food supply for many fish, birds, reptiles,
 and amphibians. Their diversity and abundance
 provide indicators of water quality, habitat loss,
 and substrate quality.*

Current USACE Activities Designed to Increase Tern and Plover Nesting Habitat

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Co-Author: Craig A. Fleming, U.S. Army
Corps of Engineers, Yankton, SD.

The U.S. Army Corps of Engineers is actively pursuing methods of increasing critical nesting habitat for the interior least tern and piping plover on the Missouri River. Two of the methodologies involve controlling vegetation that has encroached upon historically successful nesting areas and construction of man-made sandbars to create new nesting habitat. While evaluation of these methodologies is ongoing, this paper illustrates some lessons learned that may help guide future management activities.

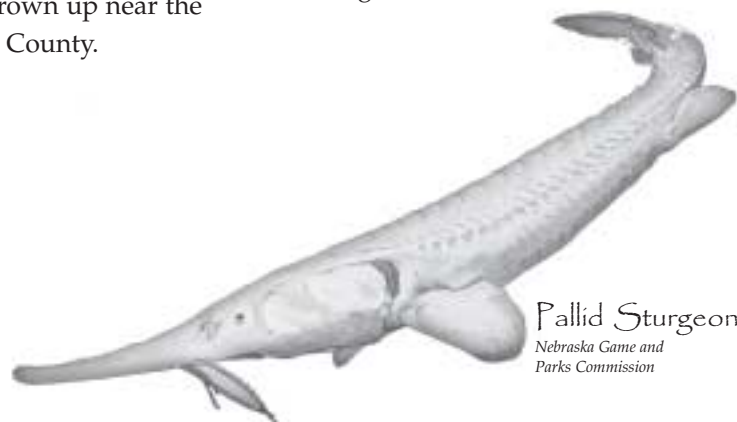
Bio: Galen is a biologist with the U.S. Army Corps of Engineers and is stationed at the Gavins Point Project near Yankton, SD. Galen was a fisheries biologist with the Texas Parks and Wildlife Department prior to joining the Corps. He holds an M.S. in Wildlife Ecology: Fisheries Management from Mississippi State University and a B.S. in Wildlife and Fisheries Sciences from South Dakota State University. Despite his time in the southern states, Galen is a native of South Dakota, having grown up near the Missouri River in Gregory County.

Dispersal of Hatchery Reared Pallid Sturgeon from a Stocking Site on the Lower Missouri River

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Co-Author: Wyatt Doyle, U.S. Fish and
Wildlife Service, Columbia, MO

The U.S. Fish and Wildlife Service in conjunction with the Army Corps of Engineers have stocked hatchery reared pallid sturgeon in the lower Missouri River annually for the last three years. Hatchery managers and river biologist need to know if these stocked pallid sturgeon are surviving and adapting to the rigors of the riverine environment. This information is critical to determine appropriate stocking strategies of this endangered species. Columbia Fishery Resources Office recaptured hatchery stocked pallid sturgeon as part of the *Missouri River Pallid Sturgeon Monitoring Program*. We investigated movements of these recaptured hatchery pallids to determine total distance traveled from stocking site, movement up or down stream from stocking site, and distance traveled over time between stocking site and capture site. Growth of hatchery stocked pallids was determined by comparing stocked and recapture lengths and weights.



Pallid Sturgeon
Nebraska Game and
Parks Commission

Existing Habitat Assessment, Missouri River Fish and Wildlife Mitigation Project

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Co-Author: Mike Barnes, U.S. Army Corps
of Engineers, Omaha, NE

The purpose of the *Missouri River Fish and Wildlife Mitigation Project* is to mitigate for the fish and wildlife habitat losses that occurred from channelization of the Missouri River below Sioux City, IA. The project acquires lands to restore and/or preserve native aquatic and terrestrial habitats on individual sites found along the lower 735 river miles. Restoration efforts have included dredging filled in areas, reopening of closed off side channels and chutes, modifying existing river control structures, wetland development, vegetative plantings, local drainage control, and land management. This poster and associated handouts will display the Corps of Engineers GIS mapping and digital photos of the various native habitats created on the 36 existing mitigation sites created to date and the classification system used.

Bio: Bob Dimmitt is the project manager for the Mitigation/Recovery program for the U.S. Army Corps of Engineers, Kansas City District. He has worked for the COE for over 33 years in the geotechnical area and project management. Bob was the project manager of the *Missouri River Mitigation Project* from 1995 to 2000. He has a B.S. in Civil Engineering from the University of Missouri at Rolla.

GIS Triage and Archeological Site Protection in the Missouri River System

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Co-Authors: Andrew Bury, TtECI, Bothell,
WA; Pamela Martin, TtECI, Bothell, WA

The Upper Missouri is rich in archaeological and cultural sites, and these resources are in peril. Shoreline erosion at bankfull, re-channelization and deflation at low water, and unauthorized artifact collection are diminishing the quality of this record at a rapid pace. Cultural resource protection has become a priority of the Corps of Engineers and regional Tribes, funds and manpower for monitoring and construction are limited, and managers need tools that will enable them to effectively focus their site protection efforts.

Our approach combines archaeological knowledge, the predictive power of GIS, and a kit of alternative engineering solutions to remotely identify the most at-risk cultural sites and couple them with protective measures most suitable to their individual characteristics. The illustrated example uses a segment of Lake Sakakawea, inputs data such as reservoir shape, surface topography, soils, seasonal wind direction and intensity, and stream flow, then applies an algorithm that outputs an image of the probable severity of bank erosion at any point on the reservoir shoreline. This image is then overlain with a hypothetical archaeological site distribution to identify the most at risk cultural sites.

A second GIS model, which incorporates aspect, bathymetry, and reservoir shape, matches an engineering solution to the

erosion of each of the most at-risk sites. The result is a form of triage that zeroes in on the localities most in need of protection and offers a remedy with the highest probability of success. Armed with this information, resource managers can develop long-term plans for resource stewardship.

Bio: Dr. James C. Chatters assumed his present role as Tetra Tech ECI's western cultural resources lead after operating his own consulting firm and directing cultural resources management programs for the University of Washington, Central Washington University, and Battelle, Northwest. He is an archaeologist and paleoecologist who has spent 37 years working on archaeological/cultural resources projects in California, the Great Basin, Pacific Northwest, Great Plains, Alaska, and Hawaii. His work for federal, state, and local governments and private corporations has ranged from literature surveys, overviews, and cultural resources management plans to large-scale, multi-site data recovery on both prehistoric and historic archaeological sites and districts. That work entailed interaction and consultation with more than a dozen American Indian Tribes and a wide range of federal, state, and local regulators. He has disseminated results of his archaeological and paleoecological research in more than 50 project reports, over 40 journal articles and book chapters, and one book.

Introduced Fish in the Dakotas, Nebraska, Minnesota, and Montana before 1896

Bill Beacom
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An historical look at fish introductions prior to 1900 and current data regarding the native versus non-native status of black bass, crappie, yellow perch, and walleye in North Dakota, South Dakota, Montana, and Southwestern Minnesota.

Bio: For 46 years, William Beacom has been a Missouri River captain. He conducts personal research on many river issues and serves in a variety of capacities, including participation on the Middle Basin Pallid Sturgeon working group. He has made presentations at multiple venues, including the Missouri River Natural Resources Conference, Midwest Area River Coalition annual meeting, National Waterways Conference, and the Universities of Colorado, South Dakota, and Nebraska river symposiums.

Lewis and Clark Watershed Assessment

Kris Dozark
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Co-Authors: Sam Stukel, Randall RC&D, Armour, SD; Les Labahn, Randall RC&D, Pickstown, SD; Sue Schultz, Randall RC&D, Pickstown, SD

The Lewis and Clark Watershed Assessment is studying the sediment sources entering Lewis and Clark Lake. We have been using different resources to locate sources of sediment including the use of AnnAGNPS, a GIS based modeling program, water sampling and a few other resources. Since the watershed drains more than 10 million acres of land, the use of computer modeling is essential. We are working with multiple partners, from conservation districts to Nebraska Natural Resource Districts, to complete the project.

Bio: Kris Dozark and Sam Stukel are the watershed project coordinators. Kris Dozark received his B.S. in Environmental Management from South Dakota State University. Sam Stukel received his B.S. in Biology from Mount Marty College and an M.S. in Wildlife and Fisheries Management from South Dakota State University.

Missouri River Institute Water Quality Monitoring Project on the Missouri National Recreational River

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This water quality monitoring project begins in 2005. It is part of the Ecological Health Assessment as requested and funded by EPA, Region 8. The Missouri River Institute (MRI) is setting up long-term water quality monitoring on the lower 59-mile stretch of the Missouri National Recreational River with 12 stations/2 sensors per station and real time data collected every 5 minutes. Parameters include DO (& oxidation reduction potential), conductivity, temperature, pH, depth, chlorophyll A, turbidity, open channel flow, DDS, meteorological measurements (every other station). The MRI plans to use the data to develop hydrological and sediment transport models to aid in decision making on such things as endangered species recovery. After conducting the initial investigations in this area, MRI hopes to expand into additional reaches in the upper river. They are developing an indicator species list of mammals, amphibians/reptiles, and plants in a 28 county area within SD, NE, MN, and IA.

Missouri River Public Use Assessment: The 2003 Lewis and Clark Expedition

Steven L. Sheriff
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Co-Author: Rochelle Ranken, Missouri Department of Conservation, Columbia, MO

In 1804, the Lewis and Clark expedition entered the Missouri River and started upstream. They left St. Charles, Missouri in May of that year and passed present-day Yankton, South Dakota near the end of August of that summer. Their journals speak of finding few other river users along this stretch of the Missouri River. Two hundred years later, this is not the case.

During the summer of 2004, we estimated the number of people attending public Lewis and Clark Commemoration events along the banks of the Missouri River from St. Louis to Gavins Point Dam near Yankton, South Dakota. Thirty-two such events were targeted in this effort. Purposes for targeting these events as part of the Missouri River Public Use Assessment were to 1) estimate the attendance at these events separate from the normal Missouri River public use, 2) estimate how people attending these events differed from those who used these same Missouri River access sites during other periods of the year, and 3) help predict how these Lewis and Clark events might affect future public use of the Missouri River.

During this presentation, we will provide estimates of the number of people and their characteristics who attended these 32 Lewis and Clark events. We will also provide a comparison of how these Missouri River users differed from other usual river users.

Bio: Steve Sheriff is a biometrician with the Missouri Department of Conservation at the Resource Science Center in Columbia, MO. He has over 20 years of experience conducting public use and attitude surveys. Steve's and Rochelle's efforts for the past three years have been focused on development and implementing the Missouri River Public Use Assessment.

Mussels of the Missouri National Recreational River

Jeff Shearer
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Fish, and Parks
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605-773-2743; Jeff.Shearer@state.sd.us

Co-Authors: Doug Backlund, South Dakota Department of Game, Fish and Parks, Pierre, SD; Stephen Wilson, National Park Service, Yankton, SD; Keith Perkins III, University of Sioux Falls, Sioux Falls, SD

Mussel (*Bivalvia:Unionoida*) surveys of the 59- and 39-mile districts of the Missouri National Recreational River (MNRR) were completed in 1999 and 2004. A total of 1709 dead shells (16 species) and 355 live mussels (8 species) were collected at 47 sites on the 59-mile district. One hundred seventy-one dead shells (7 species) and 51 live mussels (5 species) were collected at 19 sites on the 39-mile district. Mussel beds immediately below Gavins Point Dam had the highest abundance and diversity within the MNRR. Conversely, no mussel beds were present immediately below Ft. Randall Dam. Gravel substrates within the main channel and silt / clay substrates in back-water and side channel areas provided the best areas for mussel colonization. Shifting sand substrates, such as those found at the Niobrara River delta, were devoid of mussels. Management actions that alter habitat and flow conditions have the

potential to impact South Dakota's most diversity mussel community.

Bio: Jeff Shearer is an aquatic ecologist for the Wildlife Diversity and Natural Heritage Programs, South Dakota Department of Game, Fish and Parks. He holds a B.S. in Environmental Sciences from Allegheny College, PA and an M.S. in Wildlife and Fisheries Sciences from South Dakota State University, SD.

Planning for Conservation of the Biodiversity of the Lower Missouri River Basin: Designing a Functional Network of Conservation Areas

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Berwyn, IL 60402
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Co-Author: Jason Skold, The Nature Conservancy, Omaha, NE

In a highly fragmented landscape such as that of the lower Missouri River basin, effective conservation efforts must be grounded in strategic regional conservation planning. The Nature Conservancy, in partnership with over 15 public agencies and organizations, is working toward this goal, using a carefully designed ecoregional planning methodology to identify a network of stream, river and lake systems that, with appropriate conservation action, may protect the entire range of native aquatic biodiversity of the ecoregion. The first step in the planning process is choosing coarse and fine filter targets – a select group of species, assemblages and aquatic ecological system types that serve as umbrellas for the full range of native aquatic biodiversity in the region. We then identify our conservation goals for each target, map the locations where targets occur, and rate the viability of and stressors to each target occurrence. A

final “conservation portfolio” – a map of the network of sites critical to protecting the lower Missouri basin’s aquatic biodiversity – is assembled from highest viability target occurrence locations using principles of representation, redundancy, resiliency and restorativeness. This conservation portfolio may serve to geographically focus and galvanize conservation activities for numerous conservation partners in the basin.

Bio: Paula Gagnon is an aquatic ecologist with The Nature Conservancy's (TNC) Missouri River Program. Paula has been with TNC since 2002 with TNC's Freshwater Initiative, and most recently with the Central United States Region working on ecoregional and aquatic conservation plans for the Northern Tallgrass Prairie and Dakota Mixed-Grass Prairie ecoregions. She holds a B.A. in Environmental Studies from Gustavus Adolphus College in St. Peter, MN and an M.S. in Ecology from the University of Georgia, Institute of Ecology in Athens, GA.

Planning for Conservation of the Biodiversity of the Missouri River Basin: Developing Strategies

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Co-Author: Jason Skold, The Nature Conservancy, Omaha, NE

Effective aquatic conservation strategies in the Missouri River Basin must be anchored in a sound assessment of the critical threats facing a selected set of priority conservation targets. During the summer and fall of 2005, The Nature Conservancy, in company with conservation partners, will undertake

the “E 5-S” approach, a straightforward and proven approach for planning for the conservation of ecological systems. In the first step of the conservation planning process, the planning team will identify conservation targets: the species, communities or systems that will serve as the focal elements for strategy development. Next, planners will identify the key ecological attributes and indicators of condition for each target. Then, we determine the suite of stressors and sources of stress facing the targets. Based on this assessment, we identify specific conservation strategies that can abate the primary stressors and/or sources of stress to each of the targets, as well as a monitoring plan that will evaluate the success of these strategies. The E 5-S process concludes with implementation of the conservation actions and monitoring plan. In an adaptive management style, lessons learned from the conservation actions and monitoring results will then feed back to the next iteration of the E 5-S planning process.

Bio: See previous poster



U.S. Fish and Wildlife Service: Robert W. Hines

Redeposition of Sand in Oahe Project Tailrace

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“The Muddy MO” - “too thick to drink, too thin to plow,” “a half mile wide and two foot deep.” All these adages were used to describe this vessel of life. The current status of the river is a far cry from the muddy mess that created the literary stir over the ages.

In the current form the river seems kind of innocuous. With six main stem dams and other tributary control measures, man has tamed this monster of a river. It is obvious that the current control measures are only a temporary reprieve however. Nature will exact its revenge over time; filling the reservoirs with sedimentation. Once this sedimentation has reduced the flood control volume available in the reservoirs, the dams will no longer be capable of performing their main duty, controlling minor flood events along the Missouri River Basin.

This once lazy river with its average flows ranging of about 11,000 cubic feet per second (CFS) is now stopped intermittently and then cut loose at over 50,000 CFS. Locally, this practice has created sediment transport of the base sands that make up so much of the river bed. This transport has re-deposited the sands in the tail waters of Lake Sharpe. This deposition has created high water levels in the Pierre and Fort Pierre areas. This deposition is compounded by the constant elevation of Lake Sharpe, which keeps the sand from flowing into the deeper portions of the reservoir.

Bio: Brad Lawrence is the public works director for the City of Pierre where he has worked for the past six years. Previously he was a project engineer with Brosz Engineering. Brad served in the South Dakota National Guard for twenty-three years and received a mechanical engineering degree from the South Dakota School of Mines and Technology in Rapid City, South Dakota.

Reproductive Development of Missouri River Chubs in Relation to Environmental Variables

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Alterations in water temperature, turbidity, channel morphology, and flow patterns resulted in major changes in fish habitat and fish assemblages along many large rivers, including the Missouri River. Sicklefin (*Macrhybopsis meeki*) and sturgeon chubs (*M. gelida*) are small-bodied, short-lived, turbid river Cyprinids that have experienced over a 50% reduction in their former distribution along the Missouri River mainstem. They are currently listed as imperiled by >2 mainstem states, although recent collections indicate numbers may be larger than previously reported.

Our objective is to describe reproductive development of *M. meeki*, *M. gelida*, and the more common *M. aestivalis* (speckled chub)

using histological analysis. We will relate reproductive development to four environmental variables: photoperiod, lunar cycle, water temperature, and river discharge, and also evaluate differences between two segments in the lower Missouri River, Missouri. Sampling will occur between March and November 2005 to ensure collection of chubs before and after reproduction.

Characterizing reproductive development of the relatively common speckled chub may enable us to generalize about development of the less common sicklefin chub, and even rarer sturgeon chub. Knowledge of spawning modes and patterns of reproductive development is essential for conservation and management of the Missouri River's small-bodied, short-lived fishes, information on their reproductive requirements can aid design of flow and habitat modifications to benefit imperiled chubs along with the endangered pallid sturgeon (*Scaphirhynchus albus*).

Bio: Jennifer Johnson is a biological technician at the U.S. Fish and Wildlife Service Columbia Fishery Resources Office and a graduate student at the University of Missouri-Columbia where she received a B.S. in Fisheries and Wildlife with a minor in Biological Sciences.

Shallow-water Sandbar Habitat Use by Small-bodied Fishes on the Lower Missouri River

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Co-Author: Dr. David L. Galat, U. S. Geological Survey Cooperative Fish and Wildlife Research Unit, Department of Fisheries & Wildlife Sciences University of Missouri-Columbia, Columbia, MO

No longer supporting a dynamic free-ranging, braided channel network, channelization of the lower Missouri River has contributed to reduced availability of low velocity, shallow-water areas. Existing and newly constructed sandbars along the navigation channel today represent an opportunity to provide shallow-water refugia and nursery for imperiled fishes. Our goal is to characterize the small-bodied fish community from shallow waters adjacent to existing inside bend and wing dike sandbars and relate differences in species composition to selected physical habitat variables.

Prepositioned areal electrofishing devices (PAEDs) are used to collect fishes in shallow waters around sandbars and microhabitat variables are measured for the defined sample area. Samples are collected during day and night to provide a more complete temporal picture of fish use. Collections from early summer to late fall 2005 will allow us to better understand when during the growing season sandbars are likely to be important to young fishes. Key physical habitat variables related to distribution and abundance of small fishes will be identified in a temporal framework and management recommendations made to guide sandbar conservation and rehabilitation on the lower Missouri River.

Bio: Clayton Ridenour is a graduate research assistant pursuing an M.S. in the Cooperative Research Unit at the University of Missouri-Columbia.

Monday 2:00-3:20
Meeting Room B

The Use of Independent Science Review Early in Program Development

Craig Fleming
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The US Army Corps of Engineers has used Independent Science Review (ISR) as a means of verifying and validating program underpinnings. This type of review provides strong program guidance and direction. ISR provides the opportunity to evaluate if program goals and objectives are valid and attainable; and equally important, if strategies, methods and data collected are pertinent and specific enough to address goals and objectives.

Bio: Craig Fleming is a fishery biologist in the Threatened & Endangered Species Section, U.S. Army Corps of Engineers. He spent the previous ten years with the U.S. Fish and Wildlife Service in California working with salmon in the areas of monitoring and habitat restoration. He has a B.S. in Biology from California State University, Chico, CA.

Indigenous Mapping Along the Missouri River by the Cheyenne River Sioux Tribe

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Co-Authors: Jennifer Carter, GIS Specialist, Cheyenne River Sioux Tribe Prairie Management Program, Eagle Butte, SD.

Major manipulations of the Missouri River system have impacted Native American communities in countless ways. In order for these changes to be fully understood by both Native and non-Native communities, there is need for them to be mapped in the context in which they took place by the people who were impacted, an approach coming to be known as "Indigenous Mapping." As on many reservations, practitioners within the Cheyenne River Sioux Tribe are now utilizing "accessible" mapping technologies to aid in their interpretation and documentation of these changes that have occurred on their lands along the River.

Bio: Eric Wood is a senior scientist with the Native American Activities Program at the USGS EROS Data Center, Sioux Falls, SD.

Upper River Reservoir Recreation

John Lott
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Co-Authors: Jeff Hendrickson, North Dakota Game and Fish, Riverdale, ND; Mike Ruggles, Montana Fish, Wildlife, and Parks, Fort Peck, MT; Jason Sorensen, South Dakota Department of Game, Fish, and Parks, Chamberlain, SD

Recreational fisheries in the six reservoirs in the upper portion of the Missouri River system provide anglers with many fishing opportunities and contribute substantially to state and local economies in Montana, North Dakota, and South Dakota. Since 1990, angler use and harvest surveys have

been conducted intermittently on Lakes Fort Peck, Sakakawea, and Lewis and Clark and annually on Lakes Oahe, Sharpe, and Francis Case.

During the 1990-2004 period, the Missouri River system has experienced two periods of low water yield and system storage (1988-1992 and 2000-2004), with a period of high water yield and system storage in between (1993-1999). Water management and environmental conditions in the Missouri River system affect fish community dynamics, susceptibility of fish to anglers, and availability of fishing access. Water elevations in Lakes Fort Peck, Sakakawea, and Oahe (large storage reservoirs) greatly affect access, and therefore angler use of these reservoirs. Total boat angler days for the open-water fishing season were significantly lower during 1990, 1991, and 2004 than during 1997, largely because of access issues.

Seasonal water management and environmental conditions in the Missouri River system affect fish population dynamics such as annual recruitment of young fish to the population, and abundance of fish, throughout the entire Missouri River system. This paper will provide a summary of survey results, in terms of angler days, fish harvest, and economic value of fisheries resources and relate changes in the status of upper Missouri Basin fisheries to fishing access availability and changes in fish community status.

Bio: John Lott is a senior fisheries biologist. He conducts fish population and angler use and harvest surveys on Missouri River reservoirs and relating changes in fisheries characteristics to environmental variables, patterns in angler harvest, and fisheries management practices (i.e. stocking and regulations). John has an M.S. in Fisheries Management from South Dakota State University and a B.S. in Fish and Wildlife Sciences from Michigan State University.

Drought in the Missouri River Basin: Impacts Related to Water Allocation Choices

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The Missouri River Basin is entering into what will likely be the sixth consecutive year of below normal runoff above Sioux City, Iowa. Because of the wide array of authorized uses of water in the basin, choices must be made that allocate lower than normal runoff and ever-shrinking storage during a drought. This presentation will examine the impacts of the drought and decisions made during the drought, during which time mainstem system storage was brought to record lows.

It also examines the impacts of seasonal and annual declines of reservoir levels to rainbow smelt production and boating access, primarily in Lake Oahe. Before and after images of portions of the mainstem reservoirs will provide a more thorough understanding of the impacts to the reservoir and boating access. Authorized use impacts related to the drought, water allocation decisions and record low storage in mainstem Missouri River reservoirs will also be addressed.

Bio: Wayne Nelson-Stastny is a senior fishery biologist. He grew up in southeast South Dakota around Fort Randall Dam and attended the University of South Dakota. There he obtained his B.S. and M.A. studying paddlefish in the riverine stretch from Fort Randall Dam to Gavins Point Dam. Being in the midst of paddlefish spawning runs below the mouth of the Niobrara River, left Wayne with an indelible understanding of the importance of natural form and function to these ancient survivors.

Monday 3:40 - 5:00 p.m.
Meeting Room B

Water-quality Monitoring on the Missouri River, Yankton Sioux Reservation, South Dakota

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Co-Authors: Steve Sando, Hydrologist, U.S. Geological Survey, Huron, South Dakota

A water-quality monitoring program on the Missouri River was initiated in April 2002 as a cooperative effort between the Yankton Sioux Tribe and the U.S. Geological Survey (USGS). The Missouri River constitutes the southern boundary of the Yankton Sioux Reservation (YSR) in southeastern South Dakota. Within the boundaries of the YSR, the Missouri River is both impounded as well as free flowing, which results in a diversity of habitat critical to numerous fish and wildlife species. The unique characteristics of the Missouri River in this reach offer an excellent opportunity to obtain a better understanding of water-quality conditions and interactions of the river.

Two river sites and one reservoir site are sampled six times per year for a variety of water-quality constituents including major ions, trace elements, nutrients, suspended sediment, and pesticides. Samples are collected to characterize the Missouri River water quality in the vicinity of the YSR and to evaluate temporal and spatial variability of water quality.

Long-term water-quality monitoring and trend analysis of the Missouri River will provide valuable information that will aid federal, state, Tribal, and local agencies in the management of the Missouri River. A summary of results from the first three years of the sampling program will be presented and data from the three monitoring sites will be compared with data from another site on the Missouri River where the USGS collects water-quality information.

Bio: Cliff Johnson has served as the water quality coordinator for the Yankton Sioux Tribe for the past six years. Cliff has a B.S. from the University of South Dakota and oversees and implements many of the Tribal environmental programs for the Yankton Sioux Tribe.

Roy Bartholomay has served as the subdistrict chief of the U.S. Geological Survey office in Huron, South Dakota for the past three years. Prior to 2002, Roy worked at the USGS Idaho National Laboratory Project Office for 15 years on several water quality studies. Roy has a B.S. in Geology from North Dakota State University and an M.S. in Geology from Idaho State University.

Water Use from the Missouri River Mainstem in South Dakota

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The Missouri River is a valuable source of water for the residents of the state of South Dakota. The South Dakota Department of Environment and Natural Resources' Water Rights Program regulates the beneficial use of water from the Missouri river in the state. However, some uses of water on land defined as Indian Country may fall outside the state's jurisdiction. The state's residents can apply and be granted a water right to beneficially use water for multiple purposes. Beneficial uses include: irrigation, commercial, industrial, recreation, fish and wildlife propagation, municipal, rural water systems, recreational, suburban housing development and domestic uses.

Currently there are 371 active water rights authorized to divert up to 2,053 cubic feet of water per second from the Missouri River which includes the mainstem reservoirs in South Dakota. The domestic use of water with a diversion rate of up 18 gallons per minute (0.04 cubic feet per second) does not require a water right for the use. Domestic use includes livestock watering in addition to personal use.

Bio: Mark Rath has worked for the South Dakota Department of Environment and Natural Resources since 1990 as a natural resources engineer. He received his B.S. and M.S. in Agricultural Engineering from South Dakota State University.

Missouri River Impacts on a Public Power and Water Utility

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The Kansas City Board of Public Utilities (BPU) is a municipal utility owned by the Unified Government of Wyandotte County/Kansas City, Kansas. BPU makes and distributes both electricity and drinking water in Wyandotte County Kansas and beyond. We operate two power stations and two drinking water plants on the Missouri River to serve more than 65,000 electrical customers and 55,000 water customers. Water drawn from the Missouri River is critical to BPU and our community because it is the raw water source for drinking water and for cooling water at our power stations. Our community and our utility have grown up, in part, because of the consistent, dependable controls the Corps has methodically applied to the Missouri River. This presentation will discuss the consequences of unpredictable river levels and the actions BPU is taking to ensure cost effective, on-demand power and water for our community.

Bio: Patrick J. Cassidy is director of the Environmental Services Department at the Kansas City Board of Public Utilities. He holds an M.S. in Environmental Health Science from the University of Kansas.

Historical Perspectives

Rivers of Change - Variety, Voices and Two Centuries of Altering our Rivers and Lives

Tom Mullen

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If he was reincarnated today, Captain Meriwether Lewis could retrace the journey that his Lewis & Clark expedition made two centuries ago. Within hours he would shake his head in confusion and surprise. What became of the Missouri, Yellowstone and Columbia rivers that his group traveled along? The answers come alive when told by those who live and work along these waterways.

Author Tom Mullen spent five months traveling along the Missouri, Yellowstone and Columbia rivers – interviewing tribal historians, engineers, wildlife biologists, farmers, barge pilots and others to learn how changing the course of a river impacts the lives of those who live along its bank. The story is told in the book *Rivers of Change – Trailing the Waterways of Lewis and Clark*. This travelogue weaves interviews, anecdotes and research that highlight how three rivers changed since Lewis and Clark explored them between 1804 and 1806.

The theme of variety is essential to the book. Just as variety of life forms and landscape is critical to maintaining the balance of ecosystems, soliciting a variety of viewpoints from those who live along riverbanks is crucial to deciding how we manage rivers. The Lewis and Clark expedition transformed Western geography from a myth into documented reality. The time has come to celebrate these explorers' achievements, and to use the event as a springboard for reconsidering how we manage Western rivers.

Bio: Tom Mullen spent over a decade working as a water resources consultant while living in Africa, Asia, Europe, the Middle East, Latin America and in the U.S. He has a M.S. in Water Resource Systems Engineering.

Papers: Water



Charles Schwartz, Wildlife Drawings, Missouri Conservation Commission

Monday 2:00 - 3:20 p.m.
Meeting Room C

Missouri River Geospatial Decision Support Framework

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The U.S. Army Corps of Engineers is developing a comprehensive computational framework and decision support software for system-wide collection, management, and distribution of geospatial information along the Missouri River. The foundation for the framework is a service-oriented architecture upon which data collection, evaluation, storage, analysis, modeling, and distribution capabilities are built for the Corps and other agencies. Having system-wide data and analyses available through a consistent basinwide framework will foster communication and enable efficient interoperability between Corps Districts and public and private stakeholders, minimize costs for collection of new data and promote continuity of data over time.

To distribute data to users and to help users make informed resource management decisions, a worldwide web accessible geospatial decision support portal is being developed. This portal will provide users with tools to upload and download spatial datasets, parameterize and run models,

visualize and store model results in a geospatial context, generate reports, and formulate system management approaches. The database structure and decision support applications are consistent with Federal and Corps Enterprise Architecture guidance with support for both service-oriented and database driven geo-spatial and geo-temporal data access and analysis.

This system will easily interface with other Corps databases and information systems, and can deliver data and analyses to users in a variety of formats (including portals and portlets, XML Web Services, OGC services, GIS applications, and via an open platform independent API).

Bio: Joel Schlagel has been with the U.S. Army Corps of Engineers Remote Sensing/GIS Center since 1995. Prior to that he was at the Vermont Cooperative Fish & Wildlife Research Unit and U.S. Environmental Protection Agency 1987-1989. Joel has an M.S. from the University of Vermont and a B.A. from State University of New York at Binghamton.

Macroinvertebrate Drift Density in Relation to Abiotic Factors in the Middle Missouri River

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Co-Authors: Thomas G. Franti and David B. Marx, University of Nebraska-Lincoln, Lincoln, NE

There are several abiotic factors that influence the density of macroinvertebrates in the drift. Among these factors are discharge, temperature, and turbidity. Data from drift net samples in the Missouri River Historical

Database were used to investigate relationships between spring drift density and abiotic factors in the Missouri River from Fort Randall Dam to Rulo, Nebraska. The objective was to develop statistical models relating macroinvertebrate drift density to discharge, temperature, and turbidity. Model averaged estimates of the parameters and relative importance of the predictor variables were developed using a generalized linear mixed models approach. The results, to date, suggest that temperature and turbidity are important predictors of drift density and that discharge variables have varying levels of importance depending on location. The rationale for this research is to suggest important variables for experimentation in an adaptive management system for operation of the Missouri River Mainstem Reservoir System.

Bio: Chris Hay is a doctoral candidate in Biological Systems Engineering at the University of Nebraska-Lincoln. He received his B.S. and M.S. in Bioresource and Agricultural Engineering from Colorado State University and has several years of experience in the private sector as an environmental specialist and water resources consulting engineer.

Biological Inventory of Newly Constructed Backwater and Sandbar Habitats

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Co-Authors: Cory Read and Kirk Steffensen, Nebraska Game and Parks Commission, Lincoln, NE

In the spring of 2004, a new backwater complex was constructed using a hydraulic dredge on the unchannelized Missouri River at Ponca State Park, Nebraska.

Dredge spoil from the project was used to create an in-channel sandbar complex adjacent to the site. We inventoried the biota of these newly created backwater and sandbar habitats using a variety of sampling gears during a seven-week period from 8 July through 17 August 2004. This period corresponded to peak nesting and fledging activity for least terns and piping plovers on this reach of the Missouri River. A total of 34 species of fish and five species of turtles were sampled from the backwater complex while 27 species of fish were collected from the sandbar habitat. Total catch per unit of effort for seining was higher from the backwater habitat. The density of suitable size prey typically used by fledgling and adult least terns peaked in the backwater complex on 4 August and in the sandbar habitat on 11 August. These new backwater and sandbar habitats provided highly productive fish habitat in 2004.

Bio: Gerald Mestl is currently the Missouri River program manager with the Nebraska Game and Parks Commission. He has an M.S. in Zoology from Oklahoma State University.

Availability of Lower Missouri River Sandbar Habitats in Relation to Discharge

Emily K. Tracy
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Co-Authors: David L. Galat, USGS Cooperative Fish and Wildlife Research Unit, University of Missouri, Columbia, MO and Robert B. Jacobson, U.S. Geological Survey, Columbia, MO

Sandbars on the lower Missouri River provide a variety of aquatic and terrestrial habitats important to resident and migratory fishes, invertebrates, turtles and birds. Channel modification and flow regulation have reduced sandbars and the habitats they provide by over 90%. Federal and state agencies have identified the need to increase sandbars and their associated shallow, low-velocity, aquatic habitat as one of their highest priorities. Our research examines effects of river discharge on shallow water area, sandbar area, shoreline perimeter, and sandbar height above water for select sites along the lower Missouri River.

Primary study sites include 10 sandbars classified into two categories; five point sandbars (formed on the inside of bends) and five wing-dike sandbars (formed behind wing-dikes). Exposed sandbars were mapped using conventional technologies (RTK, Total Station) beginning summer 2002 over a range of river discharges. ArcView and ArcGIS were used to develop topographic maps for each sandbar and to quantify physical variables at multiple river discharges. We illustrate how available shallow water habitat, turtle nesting habitat, and shorebird foraging habitat change with discharge. Models of available shallow water habitat are defined according to the Fish and Wildlife Service classification of depths <5 ft. Our predictions of habitat availability are applied to hydrographs of multiple water-control plans to determine when during the year and how frequently availability occurs in conjunction with timing of species use (i.e., migrating shorebirds, nesting turtles).

Bio: Emily Tracy is currently a graduate student in Fisheries and Wildlife at the University of Missouri. She received her undergraduate degree in Environmental Science from the University of Florida and worked as an intern for the U.S. Geological Survey in Reston, VA before coming to Columbia.

Monday 3:40 - 5:00 p.m.
Meeting Room C

Diel Patterns in Habitat Use by Larval Fishes in the Lower Missouri River

Kerry Reeves
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Co-Authors: Greg Gelwicks and David Galat, U. S. Geological Survey, Missouri Cooperative Fish and Wildlife Research Unit, University of Missouri-Columbia, Columbia, MO

Larval fishes exhibit a complex diel cycle of habitat use which can differ by river, species, and developmental stage. Larvae of riverine fishes often have a nocturnal peak in abundance that may be much higher than during the day. However, this pattern may not be consistent throughout the larval period. It is further unclear whether increases in larval fish abundance within the primary channel are associated with decreases in abundance along channel margins.

Increasing understanding of diel habitat use patterns by riverine fishes is necessary for accurately quantifying species composition and abundance and ensuring habitat restoration projects provide a diversity of habitats necessary for a complex life history. We investigated larval fish abundance among primary and secondary channels,

connected scours, and along sandbar margins within the lower Missouri River, Missouri. Samples were collected every four hours over a 24-hour period within the upper 30-cm of the water column in 1996-97, and 2002-03. Larval fishes exhibited a nocturnal peak in abundance regardless of developmental stage in all four habitats sampled. This nocturnal increase in abundance may reflect a diel vertical migration.

Bio: Kerry Reeves is a Ph.D. candidate at the University of Missouri-Columbia, Columbia, MO.

Microhabitat Use of Shovelnose and Pallid Sturgeon in the Lower Missouri River

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Co-Authors: Dr. Craig Paukert, Kansas Cooperative Fish and Wildlife Research Unit, USGS/Kansas State University, Manhattan, KS

There is an increasing need by state and federal agencies to detect reproduction and recruitment of sturgeon in the Missouri River. Due to the expansive nature of the river, it is pertinent to these agencies that techniques be developed to maximize our efficiency, by using appropriate gears within preferred habitats to detect seasonal spawning events and recruitment. There is also a need to evaluate modified dike structures in the lower Missouri River for their contribution to sturgeon habitat seasonally. We analyzed seasonal catch rates of juvenile (<500mm) shovelnose and pallid sturgeon in gill nets, otter trawls and drifted trammel nets. Preliminary analyses show a positive correlation between juvenile and adult shovelnose caught in winter pool

habitat. Relationships were not as clear for the other seasonal relationships. However, additional 2004 data will be available soon which will enhance our ability to detect differences in habitat use, including use of modified dike structures by pallid and shovelnose sturgeon.

Bio: Wyatt Doyle is a fishery biologist for the U.S. Fish and Wildlife Service, Columbia Missouri Fishery Resources Office and has managed pallid sturgeon recovery efforts on the lower Missouri River for the last four years. Doyle holds an M.S. from Oklahoma State University.

Macroinvertebrates Communities as Food for Shorebirds on Sandbars within the Missouri River

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Co-Authors: Leigh Fredrickson, South Dakota State University, Brookings, SD and Maureen Gallagher, U.S. Fish and Wildlife Service, Big Muddy National Fish and Wildlife Refuge, Columbia, MO

The Missouri River and its floodplains have historically been a stopping ground for fall and spring migrating shorebirds. Use of the river has fallen over the past years due to changes in hydrologic regime and geomorphic conditions. A multimillion dollar effort is underway to recreate historic Missouri River habitat for fish, birds, mammals, invertebrates and others biota. This effort is necessary to improve shorebird populations and ensure a successful migration along the lower Missouri River.

The purposes of this study are to quantify macroinvertebrates and their microhabitats on sandbars during shorebird migration seasons and compare macroinvertebrate communities to areas of shorebird usage to find niche overlaps. Sampling occurred every three weeks during the months of June through September 2004 and will continue in April through June 2005. Three sandbars were sampled that cover river miles 171-213. Five different areas of each sandbar were sampled during each sampling period. Benthic and pelagic aquatic invertebrates as well as burrowing and aerial terrestrial invertebrates were collected using sweep nets, core samplers, and sticky traps in sand and mud substrates.

This information is vital to the development of the Big Muddy Refuge comprehensive conservation plan and will contribute to the body of knowledge considered in the Shorebird Conservation Plan and other planning efforts under the North American Bird Conservation Initiative.

Bio: Jessica Lee is a master's student at South Dakota State University in Wildlife and Fisheries Sciences and a SCEP student at Big Muddy National Fish and Wildlife Refuge. She received her B.S. from SDSU in Wildlife and Fisheries Sciences.

An Assessment of Reservoir Habitat for Breeding Piping Plovers on Lake Sakakawea, ND

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Co-Authors: Bruce VanderLee, The Nature Conservancy, Flagstaff, AZ and Jane Austin, USGS Northern Prairie Wildlife Research Center, Jamestown, ND

The Piping Plover (*Charadrius melodus*) and Least Tern (*Sterna antillarum*) have adapted to changes in habitat structure for decades. The construction and operation of dams along the Missouri River mainstem has led to the shift of a significant portion of river habitat into reservoir shoreline. There is much research on riverine, alkali wetland and coastal habitat characteristics but little on reservoir shorelines. Due to increased use of Missouri River reservoirs by piping plovers and least terns, we assessed habitat use and availability to increase our understanding of the effects of management actions and water management on reservoir habitat on Lake Sakakawea, ND.

Habitat characteristics including vegetation, substrate, and slope were measured at nests to quantify the range of site characteristics. We measured these same characteristics along transects within historic nesting sites to 1) evaluate habitat conditions in these areas, 2) assess whether these areas qualify as suitable for nesting, and 3) demonstrate the effects of reservoir fluctuation on habitat availability. Nest site characteristics reflected those in the literature having little vegetation, flat slope, and a consolidated mix of substrate particles. Habitat availability in historic areas varied with elevation, and relatively small proportions of the shoreline possessed suitable slope and substrate. Additionally, vegetation has encroached in areas that have not been recently inundated.

Bio: Coral Huber is a biological science technician. She received a B.S. from North Dakota State University in Zoology/Wildlife and Fisheries and a B.S. from the University of Montana in Natural Resources Conservation. Following graduation, Coral began work with the T&E section focusing on Geographic Information System (GIS) work for a Reservoir Habitat Model and in 2003 began the reservoir habitat assessment of Lake Sakakawea.

Wednesday 8:20-9:40 a.m.
Meeting Room B

Environmental Monitoring and Assessment Program:
Great Rivers Ecosystems (EMAP-GRE)

**Demonstrating a Consistent and Unified Approach for
Monitoring and Assessing Ecological Conditions of the
Missouri, Upper Mississippi and Ohio Rivers**

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Discrepancies between the spirit and letter of the Clean Water Act can be as wide as the Big Muddy. Our current understanding of river condition is largely dependent on data that are available, rather than data that are most appropriate. This has motivated EPA to develop and demonstrate a probability-based sampling program for Great Rivers. The EMAP-Great Rivers program has located about 400 main-channel sampling sites on the Upper Mississippi, Missouri, and Ohio Rivers. Over 75 people from 11 state agencies and the USGS were trained to collect water chemistry, physical habitat, and biological (e.g. fish, benthic macroinvertebrates, phytoplankton, periphyton, and zooplankton) samples.

Crews successfully sampled about half the sites in 2004. A web-based sample tracking and information management system facilitates the flow of data and samples from

the field to the labs, and through data analyses. Statistically robust and unbiased estimates of summer conditions were made at state and river scales. Analyses of EMAP data is done in partnership with state and federal agencies and emphasizes novel and complementary uses of monitoring data.

Future research priorities include:

- 1) defining regional reference conditions so that condition reports may be used as assessments, and
- 2) determining how EMAP data can complement and supplement existing monitoring programs through improved indicators, survey designs, and statistical analyses.

Ultimately, the program will increase the data available for bioassessments, but more importantly, it will demonstrate an approach to collect data most appropriate for better bioassessments.

Bio: Terri Jicha is a physical scientist with the EPA's Office of Research and Development. She received her B.S. in water and soil resources from the University of Wisconsin-Stevens Point and is currently working on an M.S. in Landscape Ecology at the University of Minnesota-Duluth.

EMAP-GRE 2004 Field Data

The objective of the EMAP-GRE program is to use field collected data to provide a benchmark of current health of the rivers that can be used in the future to make data-driven management decisions. Standardized sampling protocols are used for river velocity and substrate; channel and riparian habitats; aquatic vegetation, large woody debris, invasive plants; macroinvertebrates, phytoplankton, zooplankton, periphyton; water quality, including specific conductance, pH, dissolved oxygen, secchi disk, temperature, and turbidity. Samples are being analyzed by several EPA and contract laboratories, and field data are being managed by EPA. The following presenters report on the 2004 field results.

Upper Missouri River - North Dakota and Montana

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Co-Authors: Robert F. Lundgren, U.S. Geological Survey, Bismarck, ND; Neil J. Haugerud, North Dakota Department of Health, Bismarck, ND; James S. Meek, North Dakota Department of Health, Bismarck, ND.

The data collection effort by the USGS North Dakota Water Science Center and the North Dakota Department of Health began in 2004 in the upper Missouri River. Samples and data were collected at 21 sites located in the Fort Peck, Williston, and Garrison reaches. These reaches represent some of the last of the unconstrained and unchannelized portions of the upper Missouri River.

Bio: Kathleen M. Rowland is a hydrologist with the U.S. Geological Survey, Bismarck, ND and has been with the USGS for 25 years. She graduated from Wright State University in Dayton, Ohio.

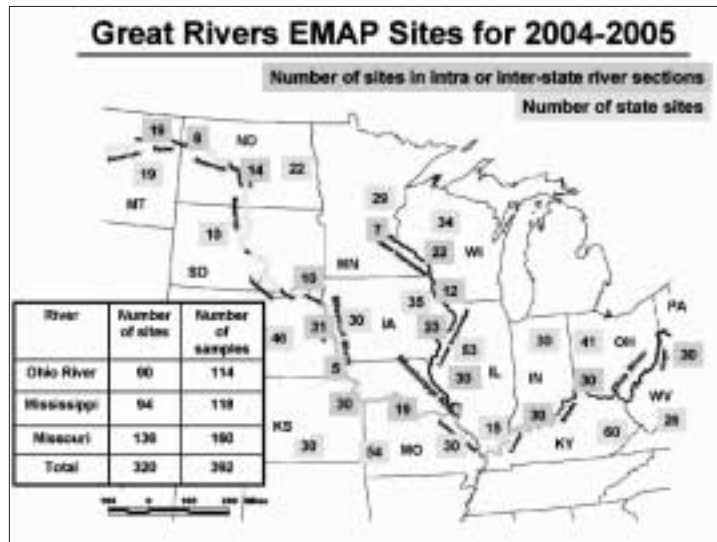
Middle Missouri River - Nebraska

Brenda Woodward
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Co-Author: Ronald B. Zelt, U.S. Geological Survey, Lincoln, NE

Sampling of the Missouri River along the Nebraska border was conducted by multi-agency teams from the USGS Nebraska Water Science Center, the University of Iowa Hygienics Laboratory, and the Nebraska Game and Parks Commission. From August 1, through September 22, 2004, a total of 24 sites were sampled; three of these were sampled twice and three others included additional quality-assurance sampling. The initial season of sampling has resulted in minor revisions to the EMAP-GRE protocols and produced the beginnings of an important set of consistent monitoring data to facilitate comparisons and analysis of ecosystem health.

Bio: Brenda Woodward is a hydrologist in the Studies Section of the Lincoln USGS Water Resources District office. She received her B.S. from the University of Nebraska-Lincoln in Fisheries and Wildlife and is now working on her masters degree.



Lower Missouri River - Missouri and Kansas

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The USGS Missouri Water Science Center worked in cooperation with the Missouri Department of Conservation to collect samples on the lower Missouri River. Diverse river use was observed from St. Louis to north of St. Joseph, Missouri, from areas of agricultural to urban. Samples were collected at 24 sites between the Mississippi River and the Nebraska state border, a distance of more than 480 river miles, between July 20 and September 29, 2004. Revisits were conducted at four sites with additional quality-assurance samples collected at 10 percent of the sites.

Bio: Suzanne Femmer is a hydrologist with the U.S. Geological Survey. She began work with the USGS 24 years ago in the water chemistry and biological fields. Her main interests are landuse effects on stream ecology. She has studied surface and ground-water effects of gravel mining, lead mining, and viruses. For 14 years, Suzanne has contributed to the Ozark NAWQA program. She graduated from Southwest Missouri State University with a B.S. in Biology and additional work in chemistry and mathematics.

Lower Missouri River - Fish Community Monitoring

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Co-Authors: Vince Travnichek, Missouri Department of Conservation, St. Joseph, MO

The Missouri Department of Conservation is monitoring fish communities via electrofishing at randomly selected sampling locations along the Missouri and Mississippi rivers in conjunction with the other biological, chemical, and physical monitoring. The presentation describes the fish sampling protocols, provides insights from fish survey first year results, and the relevance of these findings in relation to the other monitoring occurring at the same sites along the lower Missouri River.

Bio: Jason Crites is a resource science assistant with the Missouri Department of Conservation. For five years, he has conducted various fish/water quality studies. His B.S. is from Southeast Missouri State University.

Wednesday 8:20-9:40 a.m.
Meeting Room C

Wind Integration into the Federal Transmission System

Ed Weber
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Upper Great Plains Region
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This presentation discusses operational issues associated with connecting wind generation to the Federal transmission system, including interconnection request process, operational control of the generation, regulation, metering, voltage control, interaction with Western's hydro generation, and system reliability performance. A brief description of Control Area operations and potential impacts on system operations of a wind park will also be provided.

Bio: Ed Weber is the planning manager of the Upper Great Plains Region of Western Area Power Administration (WAPA) and is actively involved with the American Wind Energy Association and the National Wind Coordinating Committee. He has 25 years experience in power system planning and reliability in the Western Electricity Coordinating Council and Mid-Continent Area Power Pool Region, where he is currently serving as the chair of the Regional Transmission Committee. Ed is a senior member of the Institute of Electrical and Electronic Engineers. He has published numerous articles and papers on transmission system analysis and reliability and received a B.S. in Electrical Engineering from Montana State University.

The Economics of Wind Energy

Ron Rebenitsch
Basin Electric Power Cooperative
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This talk provides an overview of the technical and economic issues relating to wind energy in the Dakotas. Discussion includes two of the major hurdles to wind energy: transmission constraints and the intermittent nature of wind generation. The presentation provides general cost information on large and small wind farms as compared to wholesale market prices for the region and a breakdown of the cost components making up the consumer's electric bill.

Bio: Ron Rebenitsch is member marketing manager for Basin Electric where he has worked for 28 years. He manages two 2.6 MW projects in Chamberlain, SD and Minot, ND and the power purchase agreements for two 40 MW FPL energy wind projects near Edgeley, ND and Highmore, SD. Ron is responsible for Basin Electric's distributed generation program and the renewable energy marketing program. Ron started as a construction management engineer, then worked as design engineer and civil engineering manager before assuming his current position 8 years ago. He holds a civil engineering degree from North Dakota State University and a MBA from the University of North Dakota, where he did graduate work in environmental engineering. He is licensed as a Professional Engineer in the states of North Dakota, Colorado, and Wyoming.

Effects of Wind Energy on the Missouri River Environment

Nick Stas
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(WAPA), Upper Great Plains Region
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A summary overview of environmental issues related to the development of windpower. The issues will include federal and state consultation and review requirements and concerns that the public has expressed when Western has prepared National Environmental Policy Act documents for wind power projects that connected to the Western transmission grid.

Bio: Nick Stas is the environmental manager for WAPA. Prior to coming to WAPA in 1991, Nick was an environmental professional for 12 years with the Bonneville Power Administration. Nick received a B.S. from the University of Nebraska and a M.S. in Public Administration from Portland State University.

The Potential of Wind Energy in South Dakota

Tony Rogers
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The Rosebud Sioux Tribe built their first 750 kw wind turbine in April 2003. The Phase 1 turbine is located near the town of St. Francis, on the reservation in south-central South Dakota. Tribal officials see this first turbine as a start of an economic development initiative that will bring a vital industry to the reservation - a "show horse" with an educational mission.

Bio: Tony Rogers is the director of the Rosebud Sioux Tribal Utility Commission.



Wind turbine construction at the Rosebud Sioux Tribal Reservation in 2003.

Photo courtesy Intertribal Council on Utility Policy and NativeEnergy.

Wednesday 10:10-11:50 a.m.
Meeting Room B

Missouri River Main Stem System of Dams - Sedimentation Problems

John Garrison
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This paper will discuss sedimentation problems found in the Missouri River Main Stem System of Dams and Reservoirs. It will start with a brief description of the Main Stem System, capacity changes in the reservoirs, changes in the flow and sedimentation pattern and Corps historic sediment data. Known aggradation areas, the causes of the aggradation, and the problems associated with these areas will be discussed. Aggradation areas covered will include the Lewis and Clark delta area, the confluence of the Niobrara and Missouri Rivers, and the headwaters of Lake Sharpe. A brief discussion on possible solutions to the sediment problems will be given along with the results of a few reconnaissance level studies that have been conducted in an effort to find a solution that is both physically and economically viable.

Bio: John Garrison is currently working for the U.S. Army Corps of Engineers, Omaha District, Hydrologic Engineering Branch. He graduated from Lake Superior State University with a B.S. in Geology. John has been working on the Missouri River for over 20 years, spending much of that time conducting hydrographic surveys and sediment investigations.

Sediment Effects in the Missouri River Main Stem Reservoirs

Howard Paul
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The presentations discuss the origination and amount of sediment entering the Missouri River mainstem reservoirs, and what the current and long term effects are and will be on those reservoirs and the many benefits they provide. Many of these benefits affect people and property from Fort Peck Dam in Montana to the Gulf of Mexico, and the accumulation of sediment in the reservoirs has, and will continue to have a severe detrimental effect on those benefits.

Bio: Howard A. Paul is a registered professional engineer in North Dakota, South Dakota, and Colorado and a registered land surveyor in South Dakota and Colorado. He was an owner/partner of a consulting engineering firm for 38 years and served the city engineering and public works field for 5 years. Since his retirement, he has served as the executive director of the Missouri Sedimentation Action Committee, a non-profit corporation dedicated to resolving the problems, past, present, and future, of sediment in reservoirs. Howard received a B.S. in Civil Engineering from North Dakota Agricultural College, now North Dakota State University.

Papers: Sediment

River Planform Assessment on Four Open Reaches of the Missouri River

Patrick J. Engelbert
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Co-Authors: Martin J. Teal, WEST Consultants, Inc., San Diego, CA and Deborah J. Anthony, Mussetter Engineering, Inc., Fort Collins, CO

Since closure of the Missouri River mainstem dams, certain river characteristics within the open reaches have changed. The reaches downstream of the dam have experienced severe degradation, while in the vicinity of the headwaters of the downstream dam, the reaches have experienced aggradation. The river planform within the degradation zones of the open reaches downstream of Fort Peck, Garrison, Fort Randall, and Gavins Point Dam were analyzed. Historic stream gage data, hydrographic surveys and one dimensional computer models were utilized to analyze change, if any, of the river planforms since the completion of the dams. This presentation will discuss the magnitude of any changes and identify present trends.

Bio: Patrick J. Engelbert is a water resources engineer with HDR in Omaha, Nebraska. He has over 11 years experience in the areas of hydrology, hydraulics, and socio-economics. Patrick has worked on several Missouri River projects including the "Cumulative Environmental Impact Statement for Bank Stabilization, Overton Bottoms and Lower Hamburg Bend." He is a registered professional civil engineer in Nebraska and earned a B.S. and M.S. in Civil Engineering from the University of Nebraska.

Bad River Water Quality Project

Jerry Thelen
Bad River Water Quality Project
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The Bad River watershed includes 3,107 sq. mi. (1,988,480 ac.) of land and is one of four major watersheds of highly erodible croplands and fragile, clayey rangeland that drain into the Missouri River in South Dakota. The Bad River empties into the Missouri River five miles downstream from the Oahe Dam into Lake Sharpe, which separates the towns of Pierre and Fort Pierre. The Bad River sediment load became a major concern in the mid-1980's when it was determined sedimentation was reducing reservoir storage and impairing beneficial uses of hydropower generation and recreation. Raised bed elevation led to flooding in Pierre and Fort Pierre resulting in a \$35,000,000 buy-out of endangered and damaged homes by the U.S. Corps of Engineers.

In 1989, a watershed assessment conducted as part of the "Bad River Phase I Project" identified the major sources of sediment entering Lake Sharpe. By 1990, the "Bad River Phase II Project" began to apply cost effective land treatments directed to providing long lasting erosion control and reduction of sediment load without jeopardizing the financial viability of the cooperating landowners. The project targeted a 183,000 acre sub-watershed in Stanley County. Initially landowners were concerned with loss of rights if they accepted financial assistance from the Project. By 1994, the Natural Resources Conservation Service published the results of their "Lower River Basin Study" that determined two-thirds of the sedimentation

entering Lake Sharpe from the Bad River was generated in the lower one-third of the watershed. This information recommended land treatment activities and the "Bad River Phase III Project" began in 1995.

The South Dakota Department of Environment and Natural Resources called for a 30% reduction of sediment into Lake Sharpe in their April 2000 TMDL impaired listing. The goal was to reduce the 3.25 million tons of sediment historically delivered annually to Lake Sharpe by the Bad River. The recommended means to attain this goal was applying the most cost-efficient practices previously demonstrated by the Project, primarily grazing management of riparian areas and construction of associated infrastructure to facilitate the management scheme. The TMDL goal was achieved by 2004 with a 40% reduction of sediment delivered.

Bio: Jerry Thelen was the Bad River Water Quality project coordinator for a period of 14 ½ years since Phase II began. Before that he was a manufacturing engineer, teacher and South Dakota Cooperative Extension Service Agent.



Delta formation at the headwaters of Lewis and Clark Lake from Niobrara River sediment inflows.

Lewis and Clark Watershed Assessment

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Co-Authors: Sam Stukel, Randall RC&D, Armour, SD; Les Labahn, Randall RC&D and Sue Schultz, Randall RC&D, Pickstown, SD

The Lewis and Clark Watershed Assessment has been studying the sediment sources entering Lewis and Clark Lake for about 18 months. We have been using different resources to locate sources of sediment including the use of AnnAGNPS, a GIS based modeling program, water sampling and a few other resources. Since the watershed drains more than 10 million acres of land, the use of computer modeling is essential. We are working with multiple partners, from conservation districts to Nebraska Natural Resource Districts, to complete the project.

Bio: Kris Dozark and Sam Stukel are the watershed project coordinators. Kris Dozark received his B.S. in Environmental Management from South Dakota State University. Sam Stukel received his B.S. in Biology from Mount Marty College and an M.S. in Wildlife and Fisheries Management from South Dakota State University.

Wednesday 10:10-11:50 a.m.
Meeting Room C

River Morphology and the Dynamic Missouri River

Tim Cowman
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The Missouri River is a cultural and natural resource important to South Dakota. This river has a long and storied history that dates back to the last ice age. Glacial advances changed the course of the river thousands of years ago and ultimately put South Dakota in the path of this powerful resource. In many ways the river has been tamed by man. Large mainstem dams control much of the upper river basin. Channelization is used to control much of the lower river basin.

South Dakota contains two segments of the river designated by Congress as the Missouri National Recreation River. In these segments there are many natural properties of the river still in place. Erosion is active, water levels fluctuate, and meanders move. Historical air photos dating back to 1941 and historical maps that predate the Lewis and Clark expedition are used to document former river channels and show the movement of river meanders. Understanding how the river behaved historically can help identify some of the lost cultural artifacts of the river, as well as help us understand how the river will affect us in the future.

Bio: Tim Cowman is a natural resources administrator with the Geological Survey Program in the South Dakota Department of Environment and Natural Resources. He is involved in implementing GIS in South Dakota state government, working on projects to integrate environmental data-

bases into GIS, and building a digital base map coverage of the state. Tim also assists local government entities with GIS projects. He has an M.S. in Natural Sciences from the University of South Dakota.

Developing a Longitudinal Classification on the Missouri River National Recreational River

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Co-Author: Robert B. Jacobson, U. S. Geological Survey, Columbia, MO

The 39-mile and 59-mile segments of the Missouri National Recreational River (MNRR) on the South Dakota-Nebraska border are substantially affected by flow management, but retain much of their natural form. These reaches have numerous sandbars, variably vegetated islands, and laterally eroding banks characteristic of the historic braided river. Designation of these segments as a National Recreational River in 1978 charged the National Park Service with preserving the river’s free flowing condition, even though it is bordered extensively by private land and it is substantially affected by reservoir regulation. In addition, the river is subject to management actions intended to stabilize banks, maintain habitats for threatened and endangered species, and improve recreational opportunities.

This project is developing a reach-scale classification using a continuous longitudinal classification that delineates process domains in the MNRR. An understanding

of the longitudinal distribution of channel form and the fundamental controls on fluvial processes in the 39-mile and 59-mile segments will be useful to inform management decisions. High resolution digital orthophotography dating from 1993 to 2003 is used to document bank position, bar persistence, and additional channel attributes. Results indicate that channel width, bank erosion, the distribution of large woody debris, and bar persistence are highly spatially variable in the MNRR; persistence of channel features through time supports the concept that fundamentally different process domains can be identified along the river. These spatial patterns will be statistically analyzed to identify reaches with similar suites of geomorphic processes, and therefore inherently similar management challenges.

Bio: Carrie Elliott is a hydrologist with the U.S. Geological Survey in Columbia, MO. She has an M.S. in Geology from Utah State University.

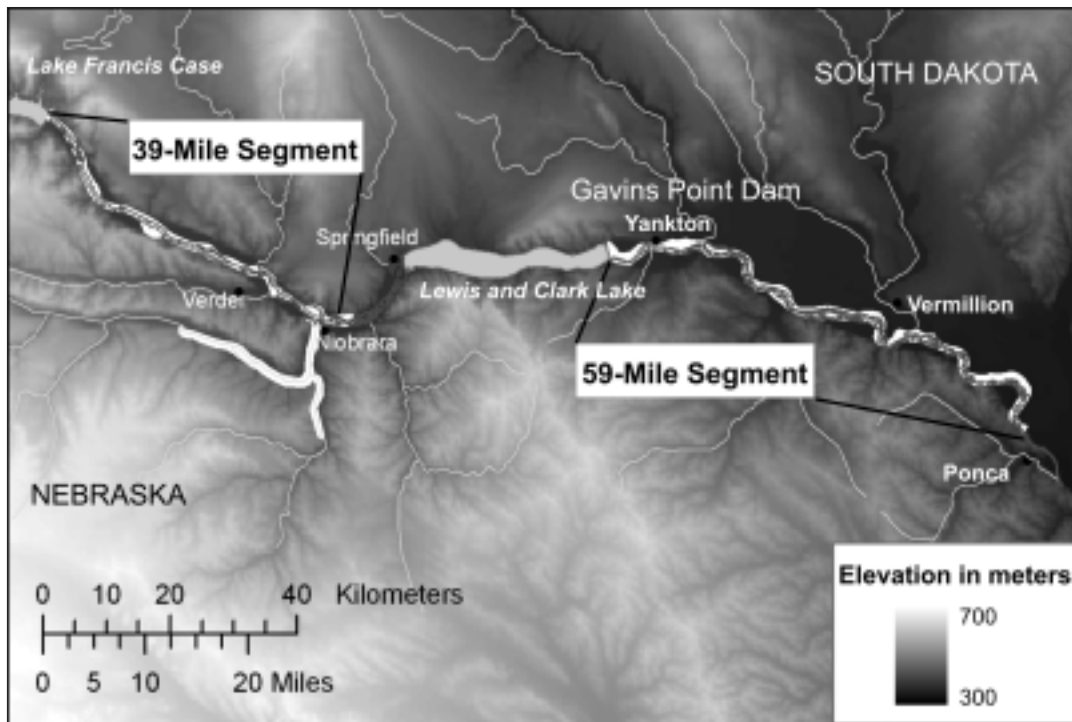
Ponca State Park Habitat Restoration Project

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Ponca State Park is located within the 59-mile segment of the Missouri National Recreational River (MNRR). During the spring of 2004, a mosaic of prairie, wet meadow, backwaters, wetlands, and emergent sandbar habitat was restored on 295 acres of bottomland recently acquired by the Nebraska Game and Parks Commission (NGPC). The newly acquired land consisted of a series of side channels, backwaters, and farmed wetlands that had degraded as a result of land use practices, and hydrology and sediment transport changes in the Missouri River.

The goal of the project was to restore these habitats in a manner that would maximize the benefits to fish and wildlife. Construction involved the removal of approximately

Missouri National Recreational River





533,240 cubic yards of material using a hydraulic cutter-head dredge, and disposing of the material within the river channel. The project resulted in the creation of 29 acres of backwater habitat, 17.5 acres of wetland, and 37 acres of emergent sandbar habitat. Immediately after construction, the backwaters were utilized by waterfowl, shorebirds, five species of turtles, frogs, and a variety of other wildlife. In addition, over 3,900 fish representing 36 different species were collected from the backwaters during a 2004 summer sampling effort conducted by the NGPC. Twenty-three piping plovers and 64 interior least terns were successfully fledged from the constructed emergent sandbar habitat, making the Ponca sandbar complex the most productive interior least tern complex on the Missouri River.

Bio: Luke Wallace is an environmental resource specialist with the U.S. Army Corps of Engineers. He has spent several years working on aquatic and terrestrial habitat restoration projects along the Missouri River. Luke received his B.S. in Environmental Studies from the University of Nebraska at Omaha and is currently finishing his M.S. in Biology.

Least Tern & Piping Plover Productivity on Created Habitat – Ponca State Park

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In the spring of 2004 spoil material from a dredge operation undertaken to open a side channel of the Missouri River at Ponca State Park, Nebraska was used to construct a three sandbar complex in the Missouri to benefit two shorebirds, the endangered least tern and the threatened piping plover. Data will be presented showing nest use, nest success, chick survivability and fledging success by the two species at the complex. Data will also be presented showing changes that occurred to the complex's size and shape throughout the summer of 2004.

Bio: Greg Pavelka is a wildlife biologist in the endangered species section of the U.S. Army Corps of Engineers, Omaha District. He oversees the least tern and piping plover monitoring for the Corps on the Missouri River from Fort Peck Lake, Montana to Ponca State Park, Nebraska and now has twelve years of experience working with terns and plovers on the Missouri River. Greg has a B.S in Wildlife Biology from Kansas State University.

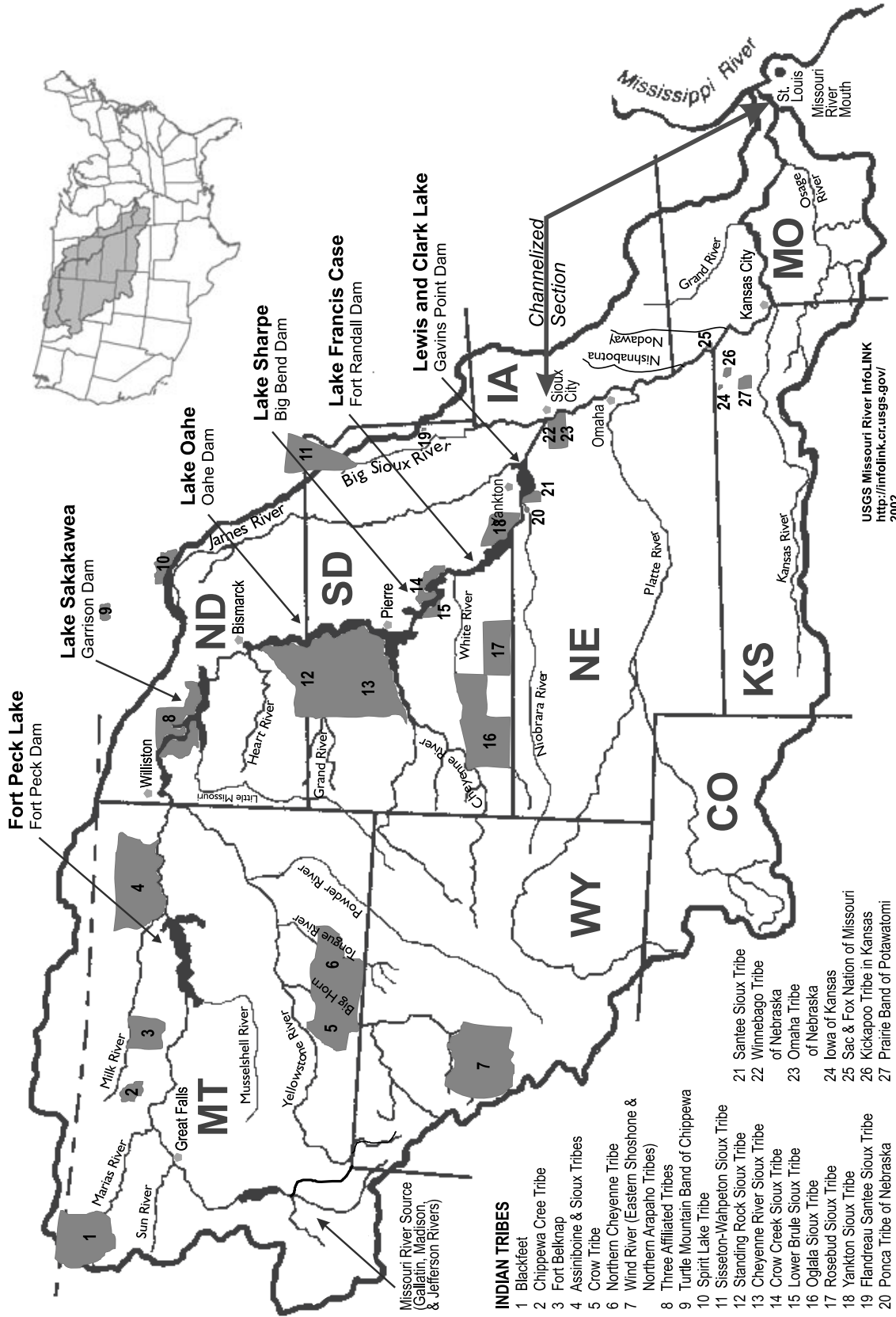
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