MISSOURI RIVER
PLENARY GROUP MEETING

MISSOURI WESTERN STATE COLLEGE
ST. JOSEPH, MO
JUNE 1-2, 2005

General Meeting Summary

Use and Meaning of the Meeting Notes: *Plenary and Technical Working Group meeting notes are intended to be a general summary of key issues raised and discussed by participants at meetings. The presentation of issues or items discussed is not designed to be totally comprehensive, or reflect the breadth or depth of discussions. However, it is intended to record the gist of conversations and conclusions.*

Where a consensus or other agreement was reached, it will be so noted. Where ideas are comments are from only one or several participants, or where a brainstormed list is presented the content of which was not agreed to by all group members, the recorders will to the best of their abilities note these qualifiers. When participants raise comments about the meeting notes, or make other suggestions or comments following meetings which are more than "corrections," we will add these in a section at the end of the meeting notes captioned "Post Script".

Opening and convening: Opening remarks made by General Grisoli (USACE), welcome by other federal agencies representatives and the meeting convened by CDR Associates**.**

Plenary Group Membership and Meeting Attendees: *See Attachment A.*

Facilitators: Chris Moore and Joe McMahon of the CDR Team.

Listing of Key Topics from Days 1 and 2, and Action or Results

Discussion Topic	Action or result
June 1	
Plenary Group Protocols and Ground rules (all topics in the Protocol discussed)	Discussion and accepted with limited changes. See revised Protocol.
How do the USACE and FWS service view this process?	Rose Hargrave (USACE) and Charlie Scott (FWS) presented perspective on the Spring Rise, options for negotiation and topics that were outside of this process. Q&A session.

Discussion Topic	Action or result
Discussion of principles that should guide the process	Explanation and handout for evening discussion and consider.
June 2	
Review of June 1 discussion	Completed
Public comment	Completed
Identification of Plenary Group of key principles that should guide the Spring Rise Process	Completed in small discussion groups and results posted on the wall. (*See Attachment B).*
Coordinating Committee for the Plenary Group	The Plenary determined to have a small Coordinating Committee (*See Attachment C*) that will advise the CDR Team on process issues. The Coordinating Committee is not authorized to make any substantive decisions.
Large group discussion of the key issues and interests relevant to specific components of a Spring Rise.	For each interest group and for each element of the three elements of the Spring Rise, the large group identified (a) key issues/interests and (b) data or information needs. This information is to be digested by the CDR Team and used to guide the facilitation of the Technical Working Groups. (*See Attachment D)*
Identification of Technical Working Groups and membership thereof.	The Plenary discussed the recommendations of the Core Planning Group for Technical Working Groups, and determined to use four Technical Working Groups. (*See Attachment E).*
On-going communications	Discussed email and website options
Adjournment	Approximately 3:20 pm

Detailed Meeting Summary

Day 1 – June 1

Introduction. The following points were expressed:

- The USACE and FWS have determined that they will partner in this process, as co-leaders. They have explained that this will be an alternative to the more traditional regulator-regulatee relationship.

- They wish to implement a Spring Rise that has minimum impact on the basin stakeholders while complying with applicable law and providing necessary care for the Pallid Sturgeon to remove jeopardy.
- The Agencies will look at all feasible options, and want to assess wet, normal and dry year issues.

Plenary Group Protocols and Groundrules. All topics in the Protocol were discussed and several amendments were made to the wording – the revisions resulting from this discussion were posted on the USIECR web site (http://missouririver.ecr.gov). Unless modified, the Protocol was approved and is now in effect as posted on the web site.

How the USACE and FWS service view this process. The agencies stressed that the goal for this effort for a Spring Rise is to find a starting point for use in 2006 and later years, that will be adjusted through adaptive management. General discussion included the following topics: selection of the Gavin's area over other areas, Pallid Sturgeon in the Yellowstone area; the Ft Peck area; the definition of "connectivity"; sediment in dams and potential use; and "restoration".

The USACE and FWS stated that:
- The three elements of the Spring Rise are the only components subject to this process and that summer flows are not included in this effort.
- The agencies will look at variation to these three elements including variable rates, timing, duration, magnitude.
- The agencies will seek to run a Spring Rise whenever possible but anticipate (per BiOp) that it will not occur every year.
- FWS will be looking to see how the Spring Rise actually works – it will not continue the Spring Rise if proven to be ineffective.
- The USGS should be involved in this process as a resource.
- The USACE and FWS presented PowerPoint presentations (*See Attachment F for copies*).

Membership: A discussion was held and it was determined that the Corn Growers were not to be added to the Plenary but may serve as a second alternate member for the Farm Bureau.

Discussion of the usefulness of identifying the principles that should guide the process. A handout was distributed to help parties prepare to identify key interests, guiding principles and needs regarding the Spring Rise.

Day 2 – June 2

Review of June 1 discussion. Completed.

Public comment. Completed. One comment made.

"To have a full and fair discussion, the parties must know the alternative to a negotiated resolution. The agencies have not provided sufficient detail to allow a meaningful dialogue. For example, if no agreement is reached, what flood control constraints will apply to start/stop a man-made rise based on downstream conditions?"

Plenary Group Identification of key principles that should guide the Spring Rise Process. Using small group discussions at tables, parties identified key principles, interests and issues that should guide this Spring Rise Process. A committee organized the responses into categories (*See Attachment B*).

Coordinating Committee for the Plenary Group. The Plenary Group created a Coordinating Committee that has advisory, not decision, authority to assist with schedules, agendas, and other similar matters, and to serve as a sounding board. (*See Attachment C*).

Large group discussion of the key issues and interests that are relevant to a Plenary Group recommendation on Spring Rise. Using a matrix that listed the three elements of the Spring Rise and the key interest groups identified by the Core Planning Group, the large group identified key issues for the Spring Rise. (*See Attachment D for the matrix and list of issues*). This list was developed in part to guide discussions of the Technical Working Groups.

Identification of Technical Working Groups. The Plenary Group accepted the recommendation of the Core Planning Group for three Technical Working Groups, modified the names of the Groups and added an additional Group for Historical, Cultural and Burial Sites. (*See Attachment E for membership*).

On-going communications. As of the date of the Plenary Meeting, the web site was in an early stage. It is now running and operational. Notices will also be distributed by email.

Adjournment at approximately 3:20 pm.

Attachment A
Plenary Group Membership and Meeting Attendees
Plenary Group Meeting
St. Joseph, MO June 1-2, 2005

Members Listed in Blue Attended the June 1-2 Meeting.

- **A.T. Stafne**, Assiniboine & Sioux Tribes of Fort Peck
  - *Alternate:* Deb Madison
- **Antoine Provost**, Omaha Tribe of Nebraska and Iowa
  - *Alternate:* Ansley Griffin
- **Bill Lay**, Missouri Levee & Drainage District Association
- **Bob Bacon,** Coalition to Protect the Missouri River
- **Bob Riehl**, Western Area Power Administration
  - *Alternate:* Nick Stas
- **Boone Witmer,** Upper Basin Bank Stabilization (unconfirmed)
  - *Alternate:* Buzz Mattelin (unconfirmed)
- **Brian Barels**, Nebraska Public Power District
- **Chad Smith**, American Rivers
- **Charlie Scott**, U.S. Fish and Wildlife Service
  - *Alternate:* Mike Olson
- **Dan Fuhrman,** MO-ARK
- **Darrell Dorsey,** Kansas City Board of Public Utilities
- **Dave Nelson**, Cheyenne River Sioux Tribe
  - *Alternates:* Bob Walters, Rebecca Kidder
- **David Murphy,** Conservation Federation of Missouri
- **Don Jorgenson**, Missouri River Technical Group
- **Donald "Bucky" Pilcher**, Sac & Fox Nation of Missouri in Kansas and Nebraska
- **Felix Kitto**, Santee Sioux Tribe, NE
- **Gene Zuerlein**, Nebraska (Game & Parks)
- **George Cunningham,** Sierra Club
- **Herb Grenz**, Upper Basin Irrigation
  - *Alternate:* Dave Johnson, Garrison Diversion Conservancy District
- **Howard Paul,** Missouri River Sedimentation
- **Jason Skold**, The Nature Conservancy
- **Jim Berkley**, Environmental Protection Agency

- *Alternates:* Gale Hutton, Joe Cothern
- **Jim Dinsmore**, IA Audubon
- **Jim Peterson**, Missouri River Bank Stabilization Association
- **Jim Stone, Jr.**, Yankton Sioux Tribe
  - *Alternate:* Cliff Johnson
- **Joseph Smith**, Standing Rock Sioux Tribe
- **Lanny Meng**, Missouri River Levee & Drainage District Association
- **Larry Foster**, Omaha Municipalities (unconfirmed)
  - *Alternate:* Skip Meisner
- **LeRay Klopprodt,** North Dakota Sportfishing Congress
- **Lynn Muench**, The American Waterways Operators
  - *Alternate:* Kevin Nepper
- **Mike McGhee**, Iowa
  - *Alternates:* Harold Hommes, John Hey
- **Mike Wells**, Missouri
  - *Alternate:* Denise Garnier
- **Rose Hargrave**, United States Army Corps of Engineers
  - *Alternate:* Mary Roth
- **Scott Jones**, Lower Brule Sioux Tribe
- **Steve Adams**, Kansas
  - *Alternate:* Dave Barfield
- **Sue Jennings**, National Park Service
  - *Alternate:* Wayne Werkmeister
- **Sue Lowry**, Wyoming
  - *Alternate:* Jodee Pring
- **Tex Hall**, Three Affiliated Tribes of Fort Berthold
  - Alternate: Steve Kelly, Paul Danks
- **Todd Sando,** North Dakota
- **Tom Graves**, Mid-West Electric Consumers Association
  - *Alternate:* Lee Nelson
- **Tom Schrempp**, Water One
- **Tom Huntley**, Mid-West Electric Consumers Association
- **Troy Bredenkamp,** American Farm Bureau Association
  - *Alternates:* Dan Cassidy, Garrett Hawkins
- **Wayne Nelson-Stastny,** South Dakota (DGF&P)
  - *Alternates:* Garland Erbele, Mark Rath

- **William Beacom**, Passenger Vessel Association
- TBD, Crow Creek Sioux Tribe
- TBD, Montana
    - *Alternate:* Tim Bryggman
- TBD, Ogala Sioux Tribe, Rosebud Sioux Tribe, or Trenton Indian Services
    - *Alternate:* Walt Moran, Trenton Indian Service Area
- TBD, Sisseton-Wahpeton Oyate
- TBD, Upper Basin Recreation

Observers

- Adam Kingree
- Alvin Lynn Ewhrt
- Bill Bryan
- Bill Jackson
- Brent Coller
- Catherine Tudor
- Cocmila Rossi
- Dawnette Owens
- Diane Bechman
- Doug Shepherd
- Ernie Quinana
- Jody Farhat
- Joe Gibbs
- Joel Ames
- John Drew
- John Seeronen
- Karen Rouse
- Lanny Frakes
- Larry Cieslik
- Mike George
- Paul Davis
- R.N. Deshon
- Ron Blakley
- Roy McAllister
- Sam Johnson
- Tom Waters
- Virgil Crockett
- William Weddell

Attachment B
Missouri River Spring Rise Principles and General Issues

Note: This is a brainstormed list. No effort was made to reach consensus on the following points.

Data

Principles

- Recommendations on a Spring Rise must be based on the best science available **– as** well as best professional judgment
- Share the pain
- Technical groups must be provided specific mandates with sideboards to be effective

Issues

- Can mainstem changes alone solve the problem?
- Is shovelnose a good surrogate for pallid since shovelnose are prolific spawners?

- How will the effects of pushing for the spring rise will affect the water intakes?

- How can we conduct a study considering the last 107 years of flows on the Missouri River & create a series of flood control constraints which will be effective to control the maximum flows to protect the riparian landowners & those residing & working along the river from flooding and the prolonged blockage or drainage structures?
- How can we maximize efficiency by linking studies by BOR on Platte River Pallid recovery & additional discussion on Yellowstone River options?
- What can be done about Misuse/abuse of shallow water habitat?
- Is non-point source pollution being addresses in the monitoring or study work as $ impacts on Pallid recovery?
- How will Ft. Peck & Gavin's Point spring rise be compared or analyzed?
- How are sturgeon responding to high water flows?
- How long do we monitor an action before we try something else?

Clarification/elaboration of the science that has been established!

- Principles:
    - Need historic data on pallid sturgeon breeding, hatching, rearing, survival
    - What is available?
- Can you isolate the variables to determine what pallids are responding to?

- What are effects on system hydrology? What do species need? Who pays for mitigation actions?
- Monitoring to determine effect of action; Independent science reviews
- Issues: What is most important, the absolute value of the rise or the delta (change in lows)?
- What are the target flows & durations along various sections of the river for the spring rise?; How can the Corps or other entities use their experience & funds to fix critical infrastructure problems, i.e. drinking H_2O, H_2O intake that may be significant barriers to starting the spring rise?; How do we determine if the spring rise will have ecological meaningful effects?
- COE & USFWS must fulfill their trust responsibilities to tribes
- What new science gives credible latitude to depart from prescriptions of '03 BiOp? Flow/Duration/Timing?
- Use best science available; must define/identify benefits to species, must provide benefits to species
- (Integration) Full and complete info from all parties – Federal agencies & stakeholders
- Issue:
    - How frequently do we need a spring rise?
- Science? Science? Science?
- Is there a way to get successful PS reproduction w/o a spring rise?
    - Since Q & habitat is present in the lower rise?
- Access to data, all historic & current
- What caused spring pulse (1) & (2) → what is the natural variability in timing, duration, magnitude, etc.; Limitations of existing system
- Must evaluate economic impacts of actions and provide payment for damages; Mitigation plans for federal actions
- What kind of variability can we build into the spring rise, given basin hydrological conditions?
- What is the historic baseline for the river – what did the hydrograph look like, how did the system function (sediment, meandering, biologic diversity etc) & how degraded is it now?
- What is the limiting factor in the upper river/and lower river for PS reproduction?
- How are needs of pallid at each life cycle related to Q?
- Will natural spring rises suffice for man-made- determine this before trying cop releases
- Principle:
- What is the role of temperature tied to pulse? What are spawning?
- Issues:
    - Can Insurance Policies be structures to protect interests from damage caused by spring rise; can flood easements be purchased by COE for Spring Rise?
    - What impacts will spring rise have on water quality for drinking water supplies? Upstream & Downstream
    - What impacts will Spring Rise have on other species
    - Include all example issues
    - What do we know about Spring Rise impacts on temperature and habitat needs
    - How will Spring Rise affect water intakes?

Impacts

Principles:

- Human health needs to be top priority
- Impacts need to be mitigated
- Do no harm!
- Gravesites & cultural sites must be protected.
- Management of pulsing should minimize impacts
- Mitigate impacts, minimize harm – shared mitigation burden
- Negotiations must be based on understanding of true impacts to interests, not positions
- Spring Rise should not increase probability of flooding/interior drainage
- Water supply intakes need to be protected
- If experiment is not sound, do not waste water

Issues:

- How can flood control constraints be used to control impacts to downstream agriculture?
- What are the included socioeconomics, cultural impacts/benefits, and how do we measure them?
- How can we assure that a Spring Rise will not compromise flood control (travel times & impacts)
- How can we assure that releases for Spring pulse do not cause a navigation preclude
- How will spring rise affect cultural sites and water supply/quality?
- What are the impacts to the reservoir system to prepare for the G.P. spring rise – i.e. releases in winter & spring?
- How will pulsing impact mining tailings exposures & damage to species/contamination of water?
- How can we assure that the SR process will not result in loss of clean drinking water
- Questions:
    - Are all issues created equal?
    - What are the ecological responses we are looking for associated with a spring rise in different conditions?
    - Can you put a price tag on actions, how do you prove direct relationship?
- Increased flood risk reservoir fishery impacts erosion, sedimentation, delta formation, irrigation intakes, fluctuating river levels, reservoir access, hydropower impacts water supply for cities, power plants
- At what flow rates do impacts to agriculture occur?
    - What did we learn in the 1990's?
- How can the impact of pulsing on mining tailing exposures be managed to minimize destruction of species & contamination of drinking water sources
- How can Bank stabilization, which is a concern all over the region, best be addressed?

- What are impacts to each factor (ag, nav, ecoplan (*?)*, water, hydro-wildlife/fish) - both neg & positive
- How will pulsing affects graves & cultural sites?
- How do we measure effects of SR on pallid sturgeon?; Who compensates for impacts?; Flooding; Drainage; Current of takes for the pulse
- How will spring rise affect access to drinking water/ water intakes?
- How can we assure that a Spring Rise will not result in agricultural impact
- How can we manage silt deposition resulting from pulsing and minimize impacts on water supply & quality
- What is the scope of navigation needs? Missouri & Mississippi & just MO
- How can we accurately define in the best possible detail the environmental requirements necessary to sustain the species
- How can we fully understand the climatic variability and the impact this variability has had on the species over time. The spring rise could mimic long term climactic conditions.
- Is artificially created habitat providing the proposed/expected benefits. What modifications are necessary to optimize "artificial" environments.
- How will system conditions impact spring rise?
    - Winter high flow – impact on habitat & sturgeon?
    - Balancing reservoirs, vacating storage?
    - Effects on fish by high winter flow?
- Can base flows in the river be reduced to provide from in the river channel to handle spring rise without spilling over the levee systems and flooding ag land?

Adaptive Management

Principles:

- Process shall consider the socio-economic impacts of the spring rise
- Share the economic burdens of the spring rise
- Management of the flows must be tailored to hydrologic conditions. High water is a different option than low water.
- Fish & Wildlife, Corps & USGS must be represented in all Tech Groups
- Spring Rise shall not cause the loss of drinking water
- COE & F&W fulfill their obligations to the tribes
- Adaptive management practices reactive to current condition and effects on municipalities
- Spring rise should follow current climatic pattern. Maybe subsections *? A*cross the basin?
- No man made shortages or floods
- Spring rise should not be seen during adverse water conditions
- Fix water intakes separate from MRRIC process
- Discussions of science should include participation of FWS & COE
- Participants understand system operations adequately
- As many interests as possible should be presented to the group

- Spring rise shall NOT occur during prolonged drought indicated by low system storage and/or lower docile projected runoff; Do NOT use reservoir storage to provide spring rise. When system storage is below 44 maf, minimize negative impacts to all authorized
    - system benefits plus historical/pre-historical cultural resources.
- Spring Rise shall be managed recognizing long term climatic shifts –
    - dry periods – minimal spring rise
    - wet periods – more pronounced spring rise
- Not create a flooding condition or water levels which will exceed flood stage on the Missouri River, either above or below Gavin's Point dam.
- Not create water levels which exceed the height of drainage structure or popes by reason of a man made rise

Issues:

- Are we taking into account tribal influence not just Gavin's in creating Spring Rise? "Credit"; For what conditions are we defining a Spring Rise? What are the trigger points?
- How can we establish clear standards for changes in river operations?
- How can we think broadly?
    - Ecosystem, economics, tribes/watersheds
- After "starting point", what is the role of elected representative in their implementation? Must include landowners.
- What are the various hypotheses for all spring rise components? Which is priority?
- How will management be adapted/linked to hydrological conditions?
- What are the sideboards on adaptive management?
    - Adaptive management or operational changes should provide enough lead time to provide businesses to make adjustments. Not jeopardize the viability of businesses or ag.
    - What kinds of "insurance policies" or compensation would be put in place to mitigate for a spring rise?
- How will adaptive management be used to guide decision making – includes monitoring, F&W, socioeconomics – and how will we obtain adequate funding
- How can we assure adequate opportunities for <u>input</u> re: proposed actions by those likely to be damaged by the activities?
- What should carry over from this process to MRRIC?
- How will pulsing spring rise impact graves & cultural issues (erosion & water levels)
    - How will pulsing spring rise affect mining tailings?
    - How will spring rise affect flood control?
    - How will spring rise affect interior drainage?
    - How will the spring rise affect storage for navigation?
- Spring Rise should be based on natural run-off and should not be augmented by reservoir storage?

- How can we "Think positive" – maximize benefits, but be sure to address all concerns & impacts
- How can we assure that the Spring rise must consider both upstream & downstream issues, interests and impacts?
- What is the impact of hydrologic conditions?
- Is there a pulse annually on the lower river without a GP release?
- What is sufficient storage to meet conditions to implement spring rise
- Can the size of the spring rise vary with hydrologic conditions in the basin?
- What is the "medium hydro climatic conditions"
- How will flow be used to target for spring pulse releases – based on downstream pulse targets?
- Understand and recognize climatic variability over the entire watershed in design annual spring rise scenario
- Questions:
    - Under what conditions should SR be implemented?
    - What will be impact to system storage?
    - How will SR affect system operations (release from Ft. Peck)?
        - How will SE be implemented w/respect to intra-system regulation & Fort Peck SR?
    - How will adequacy of SR be determined?
    - How will hydropower production be affected?
- :
- Are we considering all of the important variables?
- The Spring Rise should <u>not</u> increase the flood control constraints
- Management must be based on the actual conditions of the river and hydrological and environmental conditions in the Basin at the time. Management during a drought should be very different from management during high water conditions
- Do we need the spring rise? Natural conditions exist anyway. (esp below James River)

Results

- Define expected results and have monitoring to measure effects
- Sound Science; Long-Term monitoring essential; Focused discussion on task at hand = spring rise below Gavins Pt. – not dealing with the past or posturing
- We are here to find the flexibility, to find a starting point, to start adaptive management; Technical information needs to be clearly explained or translated to the plenary possibly by someone in the tech. groups
- What are the criteria for success? How do we measure results?
- Effects of flow release plans on hydropower availability – (fall dumping of water)
- Spring Rise should <u>not</u> have multiple navigation service levels

Attachment C
Coordinating Committee Members

1) Flood Control
- Bob Bacon

2) Hydropower
- Tom Graves/ Tom Huntley (Alternate)

3) Navigation
- Bill Beacom

4) Recreation
- Wayne Nelson-Stastny

5) Fish & Wildlife
- Gene Zuerlein/Jason Skold (Alternate)

6) Water Supply & Irrigation
- Todd Sando

7) Water Quality
- Mike Wells

8) Tribal
- Paul Danks

Attachment D
Issues and Data Needs related to specific Components of a Spring Rise

Cross Reference Table - Elements of the Spring Rise vs. Missouri River uses

Missouri River Uses and Interests →

	Spring Rise Elements ↓	A Flood Control	B Hydropower	C Power	D Navigation	E Water Supply	F Irrigation	G Recreation	H Fish & Wildlife	I Water Quality	J Agriculture	K Riparian Landowner	L Conservation/Environmental	M Bank Stabilization	N Socio/Cultural Resources	O Federal Govt	P State Govt	Q Tribal Govt	R Municipalities	S Upper Basin	T Lower Basin
1	Winter Release																				
2	Early Spring Pulse, First Bimodal Spring Rise																				
3	Post Early Pulse flow reduction (Following First Rise)																				
4	Second Spring Rise, Second Bimodal Spring Rise																				
5	Summer Low Flow																				

Note: This is a brainstormed list. No effort was made to reach consensus on the following points.

ISSUES

EARLY SPRING PULSE

- Flood Control Issues
    - What effects does ice on the river have on the possibility and timing of an early rise?
    - What potential negative impacts might there be on later seasonal flows due to amt of early release
    - Impacts on land/crops etc on banks
- Hydropower Issues
    - How might an early rise impact the cost of power to customers?
    - How might an early rise impact generation capacity later in a year?
- Thermal Issues
    - How might releases for an early rise impact later power needs for peaking and cooling water?
- Navigation Issues
    - What impacts might an early rise have on scouring and establishment of a navigation channel
    - If there is no ice, can SR be earlier so that navigation can open earlier? If this happens, are there any potential temperature effects?
    - What is possibility that early rise may preclude later navigation
    - What timeline/advanced notice and planning should occur so that businesses can plan?
- Water Supply Issues
    - What impacts will a SR have on treatment of water?
    - What impacts will a SR have on water intakes?
- Irrigation Issues
    - What potential impacts might a SR have on storage reduction?
- Recreation Issues
    - What impacts might a SR have on boat safety & recreation
    - What impacts might a SR have on reservoir draw down, levels & access docks?
    - What might a SR and the timing of its end have on sport fishing and spawning
    - What positive impacts might there be on increased fish production due to early SR
    - How can we avoid Yankton area Wild and Scenic Rivers?
- Fish Wildlife Issues
- What impacts might a SR have on other native fish species that might be listed in the future?
    - What different effects might a spring rise have on reservoir levels and fish and wildlife?

- What will be the impact of raising or lowering reservoir levels on spawning?
- How can we isolate impacts of interventions on pallid sturgeons?
- How can we avoid potential negative impacts on wetlands along river
- If there are net positive impacts on the environment of a SR, are there any potential negative effects on other species?
- What impacts on subsistence users of FW?
- What impacts on native species?

- H_2O Quality Issues
  - What are potential effects of SR on DO?
  - What are potential effects of a SR on re-suspension of heavy metals
  - What impacts might a SR have on turbidity?
  - What impacts might a SR have on mobilization of pesticides?
- Agricultural Issues
  - What impacts might a SR have on alluvial ground water?
  - What impacts might a SR have on the water table?
  - What impacts might a SR have on ranching and cattle production on the upper river?
- Riparian Land Owners Issues
  - What impacts might a SR have on the flooding of tribal lands?
  - What are potential positive or negative impacts on bank erosion? (especially areas not repaired or rip rapped)
  - What impacts might ice have on infrastructures along banks?
  - What is the COE's authority to take land? To provide compensation?
- Social Issues
  - Any EJ issues raised by SR?
  - What are potential economic effects of SR?
  - How would people have to adapt/respond to an early SR?
- Federal Government Issues
  - What authority, funding is appropriate and needed for a federal adaptive management plan?
  - What congressional authorizations/appropriations might be needed?
  - How can we assure that the SR proposals meet federal government trust responsibilities to tribes?
  - How will federal responsibilities for actions related to a SR be integrated and coordinated?
- Municipal Interests
  - Are there potential impacts of a SR on taxes due to potential loss of land & agriculture production?
  - What might be the economic effects of a SR on all levels of government?
  - What might be the impacts of a SR on all levels of government regarding waste water/storm water discharge?
- Cultural Issues
  - What needs to be done to assure cultural protection of designated reaches?

    - What impacts of a might a SR have on burial sites, archeology and historical sites?
- Impacts on Streambed
    - What impacts might there be on streambed degradation all along the river?

EARLY POST PULSE FLOW REDUCTION

- Flood Control Issues
    - What impacts might there be of a SR on delayed evacuation of H_2O
- Thermal Power Issues
- What impacts might there be on inadequate cooling of H_2O
- Navigation
    - What economic benefits might there be in pushing flood evacuation to the fall on the Mississippi River?
- Recreation Issues
    - What benefits might there be to recreation of saving H_2O?
- Fish and Wildlife Issues
- How much shallow H_2O habitat will be lost/created if there is a cut back?
- Reservoir Issues
    - What if any potential negative impacts might occur on fall reservoir evacuation?
    - What habitats might be caused/impacted by post-rise reductions?
- Flood Control Issues
    - Does flow rate create benefit to river to carry more H_2O in summer storms?
- Tribal Issues
- What would be the impact on Tribes of flow reductions?
- Mississippi River Issues
    - What impacts might SR activities have on the Mississippi River?
- Data Analysis Issues
- Who is studying the Pallid Sturgeon? Reports?

SECOND SPRING RISE

- Fish and Wildlife Issues
    - How can we analyze the impacts of a SR on: a) FW, b) invasive species, and c) endangered species?
    - What is the impact of a SR on other species & negative effects on birds?
    - What is the potential impact of a 2^{nd} pulse on fish spawning?
    - What impacts might a SR have on greater debris in PS habitat?
- Hatchery Issues
    - What are impacts of the SR on hatcheries?
    - How can hatcheries be used productively in relation to a SR?
- Agricultural Issues

- What would be the agricultural and economic impacts if flooding occurs when crops are in the ground and it is too late to replant?

- Timing and Occurrence Issues
  - Is a second pulse needed all the time? If not, how frequently is it needed?
- Riparian Landowner Issues
  - Will there be more erosion & sedimentation w/higher flows/velocities?

WINTER RELEASE

- Ice flows
  - What impacts do ice flows have on reservoir levels, water availability or other water related impacts?

SIDEBOARDS

- Staggering reservoir levels?
- Protection of plovers & terns?
- Downstream flood protocols?

TECHNICAL ISSUES

- Accuracy of forecasts. Too optimistic.
- How far back do we look to ID patterns of forecast & accuracy of predictions?
- Flood control constraints?
- Run off/system storage & current conditions relationships
- Timing of normal reservoir evacuations – early or later – and avoiding unnecessary impacts on crops
- @ 31-Mar many Native-Am communities are without water
- How high should flood control constraints be, esp. if it could preclude a spring rise?
- Look at pulse impacts on superfund sites & uncovering/releasing toxics in river
- Impacts of Platte flows on flood control constraints & subsequent spring rise possibilities in the MO
- What is synergy between various habitat recovery efforts & spring rise? How do they build upon each other?
- Deal with H_2O intakes, then address other SR issues (River res intakes) (Possible additional basin-wide meeting on this issue?)
- Drought conservation measures in revised manual will not be reopened in this process

MEDIAN RUNOFF:

24.6 m

Upper ¼ - 30.6
Upper 1/10 – 34.5

Lower ¼ - 19.5
Lower 1/10 – 15.5

DATA NEEDS

- General
    - Info on DW Intake Need Levels

- Row 2 – Early Spring Rise
    - 2A (FC) – Flood Control
        - May 1 – June 15 (±) historical hydrograph
        - Compare to proposed pulse
        - Data quality/reliability
    - 2B (HP) - Hydropower
        - Master manual/cost shifts
    - 2C (Th) - Thermal
        - Water needs/cooling
        - Peaking Power
        - Water quality effect
    - 2D (Nav) – Navigation
    - 2E (WS) – Water Supply
        - Treatability (VP)
    - 2F (IR) – Irrigation (CF Issues)
    - 2G – REC - Recreation(See Issues)
    - 2H – FW – Fish and Wildlife
        - What effect on other native species?
        - Differential effects of different reservoir levels
        - How to isolate effects of different interventions? Recommendation?
        - Wetlands drying – effect?
        - Define ecological response for each element of SR. Would it occur without SR?
        - Negative effects on other species
        - Impacts on subsistence use
    - 2I – (WQ) - Water Quality
        - Effects on DO
        - Re-suspension of heavy metals

    - Turbidity
    - Pesticide (mobilized) effects
- 2J – (AG) - Agriculture
    - Impact from ground water levels
    - Impact of round water level on ranching
- 2K (RL) - Riparian Landowners
    - Acreage of inundation?
    - What impact on flooding of tributaries?
    - Bank erosion impacts?
        - Including areas without riprap
        - Effect of ice
        - Incl. pos (land accretion)
    - Ice effects on Structures, bridges, etc.
- 2L - None
- 2M - None
- 2N (S)– Social Impacts
    - Economic effects on low-income communities. (+)(-)
    - Health & safety/welfare effects on low income comm. (Rebecca Kidder)
- 2O (FED) – Federal Govt.
    - What funding opportunities?
    - What is funding need for adaptive management?
- 2P (GOVT) – Secondary economic effects on all levels of governments from economic impacts (health/welfare costs) on pop. (RK)
- 2R (MUNI) – Municipal
    - What econ effect (recreation, etc.)
    - Waste water
- 2 (CULK) Cultural
    - Cultural impacts?
    - Effect on burial sites?
    - Hist/cult effects → Tribal TNPO

♦ Row 3 Data – Unique/new issues, in addition to row 2

- 3A – Fish and Wildlife
- Effect of delayed education
- 3C - Thermal– Effect of inadequate cooling H_2O
- 3D – Socio Econ – economic benefits of pushing fall navigation (Miss)
    - effect of _____ on Missouri
- 3G – Rec - Benefits to rec by saving H_2O
- 3H - Habitat
    - How much shallow habitat lost & created?
    - What (-) impacts of later, fall evac
    - What habitats are created by the post-pulse reduction?
    - Monitor/eval effects …

        - Isolation effect on biota from pulsing/reduction
        - Does flow reduction produce a benefit re storm waters, runoff
        - What effects on Mississippi?
            - Flood control, etc.

- Row 4 (Second Rise) – New & Unique Data Needs
    - 4H (FW) – Fish and Wildlife
        - Flooding effect on other species
        - Relative benefit of 2nd pulse
    - 4M – Δ for erosion/sed with increase in 2nd pulse
    - 4N- Socio Econ
        - What relocation impacts
        - Cost impacts (schools, police, etc.)
    - Gen
        - Fish spawn efforts
        - Debris effects
        - Ice effects on DW intakes
        - Sideboards (process to id)

Attachment E
Technical Working Group Members

- All groups to also address monitoring and evaluation
- Coordinating Committee to help ensure focus of Working Groups

Hydrology and Water Quality Issues

- **Bob Bacon,** CPR
- **Bob Riehl,** WAPA
- **Bruce Englehardt,** NDSWC
- **Claude Strasser,** USACE, ret. (unconfirmed)
- **David Barfield,** KS DWR
- **Deb Madison,** Ft Peck
- **Don Jorgenson,** Missouri River Technical
- **Jeff Shafer,** NE DNR
- **Jodie Farhat,** USACE
- **Joe Gibbs,** MLDA
- **John Childs,** SD
- **John Drew,** MODNR
- **John Dunn,** EPA (unconfirmed)
- **John Shaddle,** NPPD
- **Mark Rath,** SD
- **Mike Sauer,** ND Health Dept
- **Paul Danks,** MHA Nation
- **Rick Inglis,** NPS
- **Robert L. Pearce,** USACE, ret. (unconfirmed)
- **Roger Collins,** USFWS
- **Roy McAllister,** USACE
- **Tom Christensen,** Basin Electric Power Corp.
- **Tyler Cole,** NPS
- **TBD,** Tribal
- **TBD,** Tribal
- **TBD,** EPA SuperFund

Resources to the Working Group

- **Robb Jacobson,** USGS
- **Dr. David Galat**, USGS
- **Dale Blevins**, USGS

Pallid Sturgeon/Fish and Wildlife

- **Bill Beacom,** PVA
- **Bob Bacon,** CPR
- **Brian Canaday,** MDC
- **Chris Hay,** U of NE (unconfirmed)
- **Craig Fleming,** USACE
- **Deb Madison,** Ft Peck
- **Doug C. Latka,** USACE
- **Gerald Mestl,** NE Game & Fish
- **Harold Tyus,** U. of CO (unconfirmed)
- **Jane Ledwin,** USFWS
- **Jim Jennigus,** NPPD
- **John Shaddle,** NPPD
- **Mark Drobish,** USACE
- **Mike Ruggles,** MT FWP (unconfirmed)
- **Nick Stas,** WAPA
- **Pat Cassidy,** Kansas City Board of Public Utilities
- **Paul Danks,** MHA Nation
- **Rocky Plettner,** NPPD
- **Stephen Wilson,** NPS
- **Tracy Hill,** USFWS
- **Wayne Nelson-Stastny,** SD GF&P
- **TBD,** Tribal
- **TBD,** Tribal

Resources to the Working Group

- **Mike Parsley**, USGS
- **Dr. David Galat**, USGS
- **Mike Mac**, USGS

Socio-economic Issues

- **Bill Jackson,** Agri-Services
- **Bob Bacon,** CPR
- **Darla Helms,** WAPA
- **Deb Madison,** Ft Peck
- **Don (Skip) Meisner,** Sioux City
- **Garland Eberle,** SD DENR
- **Jim Peterson,** MRBSA
- **Joe Gibbs,** MLDA
- **Larry Kilgo,** USACE (unconfirmed)
- **Mike Swenson,** USACE
- **Nick Stas,** WAPA
- **Pat Fridgen,** NDSWC
- **Paul Danks,** MHA Nation
- **Rebecca Kidder,** Cheyenne River Sioux Tribe
- **Rochelle Renken,** MDC (unconfirmed)
- **Roy McAllister,** USACE
- **Seth Meyer,** FAPRI, U of MO
- **Tim Owens,** NPPD
- **Tom Christensen,** Basin Electric Power Corp
- **Tom Graves,** Mid-West
- **Wayne Nelson-Stastny,** SD DENR
- **Wayne Werkmeister,** NPS
- **TBD,** Corn Growers
- **TBD,** Farm Bureau
- **TBD,** Tribal

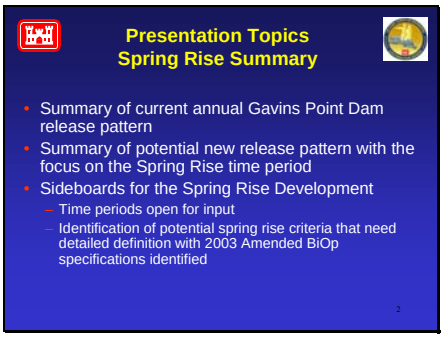
Historical/Cultural and Burial Sites Issues

- **Dave Kluth,** WAPA
- **Don Steven,** NPS
- **Joel Ames,** USACE
- **Larry Janis,** USACE (unconfirmed)
- **TBD,** Federal
- **TBD,** Federal Cultural/Historical Staff
- **TBD,** IA State SHPO
- **TBD,** KS State SHPO
- **TBD,** MO State SHPO
- **TBD,** MT State SHPO
- **TBD,** NE State SHPO
- **TBD,** SD State SHPO

Attachment F
Power Point Presentations and Handouts

Slide 1

Slide 2



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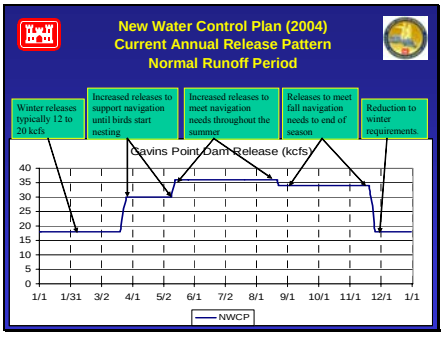

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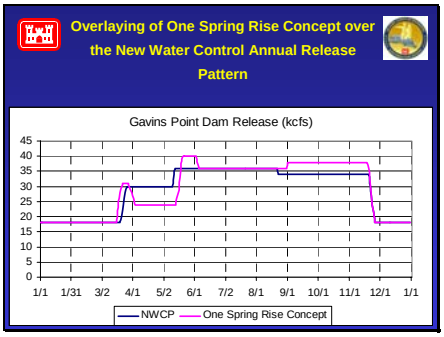

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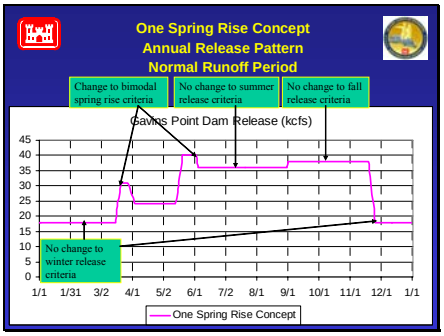

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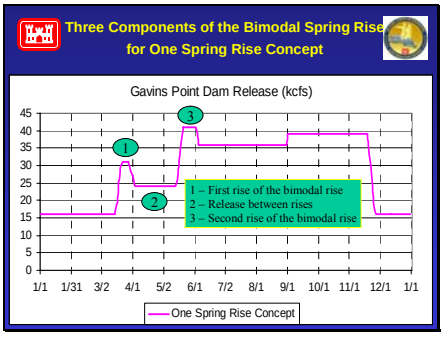

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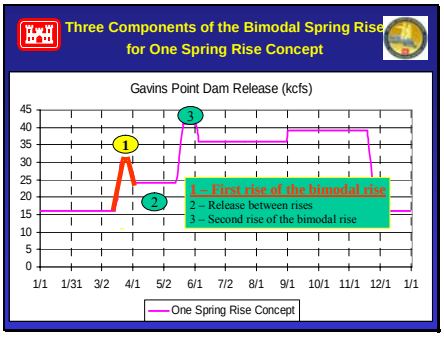

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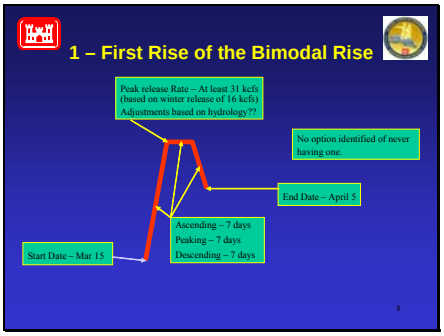


Slide 9

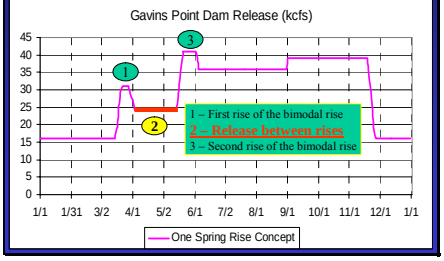
1 – First Rise of the Bimodal Rise

- 2003 Amended BiOp
  - Period – March 15, with 7/7/7 up/hold/down
  - Release Rate – at least 31 kcfs
- Options
  Variable rate depending on winter release (+ at least 15 kcfs)
  - Alternate timing of this rise
  - No rise during this period

9

Slide 10

Three Components of the Bimodal Spring Rise for One Spring Rise Concept



Slide 11

2 – Release Between Rises

Release Rate – "minimum amount possible while still maintaining project purposes"

Adjustments for Hydrology – Yes

Start Date – following first rise, which would compute to be March 15 plus 21 days, or **April 5**

End Date – start of second rise, which could be as early as **May 1** or as late as **May 15**

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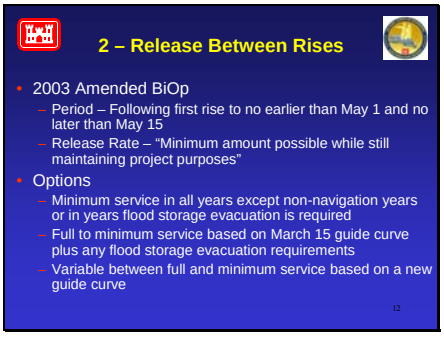
Slide 12



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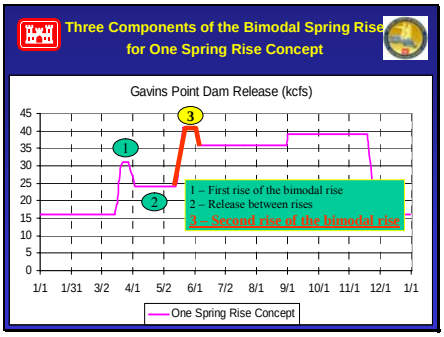

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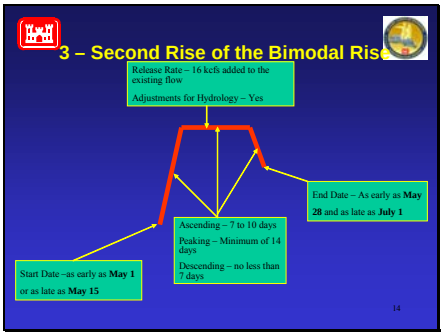

Slide 15

3 – Second Rise of the Bimodal Rise

- 2003 Amended BiOp
  - Period – Ramp up beginning no earlier than May 1 and no later than May 15 to ramp down beginning no earlier than June 15 but no later than July 1 with 7- to 10-day ramp up and 7-day ramp down (2-wk min)
  - Release Rate – 16 kcfs above the previous flow
- Options
  - Timing, Magnitude, and Duration
  - Stop protocols:
    - Downstream flood control constraints – variable increases from current
    - Suspended or variable rise during a drought

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Slide 16

Summary of Spring Rise Criteria Questions

- 1 – First rise – Flat release like 31 kcfs, increase over previous release level, others??
- 2 – Release between rises (based on service level) – Full, minimum, variable between full with evacuation to minimum, or lower service?? (likely affects release magnitude during second rise)
- 3 – Second rise magnitude – Stay at 16 kcfs over previous service level??
- 3 – Second rise duration – 2 weeks at maximum Q or greater or lesser duration?? start and end dates??
- 3 – Stop protocols (magnitude and frequency)
  - Flood control constraints – Full rise increase to some lower level increase)
  - Drought preclude – Full rise until a set storage level and variable frequency and/or magnitude based on a "guide curve"

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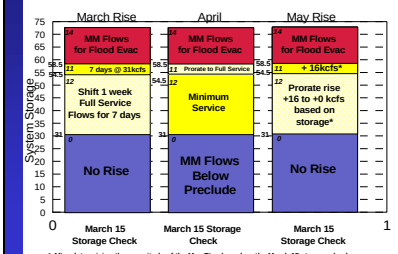
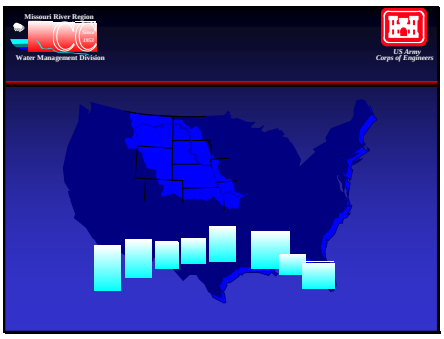
Slide 17



* After determining the magnitude of the May Rise based on the March 15 storage check, factor the resultant by 75% to 125% based on the March 1 runoff forecast.

Slide 18


Missouri River Region
Water Management Division
US Army
Corps of Engineers

PALLID STURGEON

Conclusion/Finding in 2003 Amended BO for Pallid Sturgeon

The Service has reviewed: 1) the current status of the pallid sturgeon; 2) the environmental baseline for the action area; 3) the effects of the current operations of the Missouri and Kansas Rivers under the CWCP with drought conservation measures and continued maintenance of the BSNP in concert with the RPA in the 2000 Biological Opinion; 4) the Corps' proposed alternative to implementation of specific elements of the RPA in the 2000 Biological Opinion; and 5) the cumulative effects of these actions.
After reviewing this information it is the Service's Biological Opinion that the actions, as proposed, are likely to appreciably reduce the likelihood of both the survival and recovery of the pallid sturgeon in the wild by reducing the reproduction and distribution of that species, thus jeopardizing the continued existence of pallid sturgeon. No critical habitat has been designated for this species, therefore, none will be affected.

Destruction and alteration of big river ecological functions and habitat that was once provided by the Missouri and Mississippi Rivers is believed to be the primary cause of declines in reproduction, growth, and survival of pallid sturgeon (USFWS 1993). The physical and chemical elements of channel morphology, flow regime, water temperature, sediment transport, turbidity and nutrient inputs that once functioned within this big river ecosystem have been dramatically altered by the construction and operation of mainstem and tributary dams, construction of navigation and bank stabilization projects (e.g., channelization) and the subsequent isolation of the floodplain through flood control projects.

As discussed in the status section of this Biological Opinion, pallid sturgeon populations are declining throughout their range. As shown by Table 5, generally the ratio of pallid sturgeon to all sturgeon is decreasing. In areas where the ratio of pallid sturgeon to shovelnose sturgeon is higher, this is likely the result of declining shovelnose sturgeon populations due to commercial fishing for sturgeon flesh and roe. Although spawning is known to occur, there is little evidence of successful reproduction as few juveniles are collected and there is no evidence of successful recruitment to reproduction. Pallid sturgeon in the Upper Missouri River are aging and isolated as a result of the Corps' operated dams. Hybridization appears to be increasing in the Lower Missouri River and Mississippi Rivers. The Atchafalaya River population has a diverse age structure, but is also hybridizing with the shovelnose sturgeon and is also reproductively isolated.

Implementation of the Corps' proposed action will continue to have ongoing, adverse impacts to the aquatic system utilized by the pallid sturgeon. In the Upper Missouri River, continued operation of Fort Peck Dam as proposed will continue to significantly impair the reproduction of pallid sturgeon in this reach. The altered hydrograph and altered temperature regime reduces the ability of pallid sturgeon to spawn. The survival of larval and juvenile pallid sturgeon in this reach is impaired by the artificially produced cold water temperatures that restrict the amount of riverine habitat available. In addition, these same factors affect the production of forage fish which are important to the overall survival of pallid sturgeon. The heritage population of pallid sturgeon in this reach is predicted to be extirpated by 2018 (Kapuscinski 2003). Pallid sturgeon in this reach are genetically different than pallid sturgeon located in the southern portions of their

range. In addition, this reach represents one of the few areas where broodstock can be obtained for artificial propagation purposes. The Corps' proposal to initiate flow tests from Fort Peck Dam to evaluate the efficacy of improving the hydrograph and temperature regime to benefit pallid sturgeon is commendable. However, given the ongoing drought conditions in the basin, it may be 4 to 5 years before the flow test can be implemented and evaluated. There is no long term commitment on the part of the Corps to implement full-scale changes to benefit pallid sturgeon in this reach.

Pallid sturgeon populations located in the inter-reservoir reaches between Garrison Dam and Gavins Point Dam are reproductively isolated. Similar to the Ft. Peck reach, the heritage pallid sturgeon in these reaches are aging and few in number. Given the altered hydrograph, altered temperature regimes and the relatively short amount of riverine habitat located between the lakes, it is not likely that the heritage population of pallid sturgeon can reproduce in this reach. These inter-reservoir reaches generally represent refugia for these heritage fish and juvenile sturgeon being stocked as a result of population augmentation efforts. The Corps' proposed actions are not likely to affect pallid sturgeon in these areas beyond what was described in the 2000 Biological Opinion.

The Lower Missouri River below Gavins Point Dam is an important reach for long-term survival and recovery of pallid sturgeon. The Lower Missouri River is the riverine conduit for maintaining the genetic connectivity and continuity of the species due to its connection with the Middle Mississippi River and the Lower Mississippi River. This connection is necessary to ensure that genetic material is dispersed throughout the population and genetic heterogeneity is maintained.

The Lower Missouri River is affected in different ways as a result of the Corps' operations. Overall, this entire reach is impacted by reduced sediment inputs that are important to creating and maintaining the diversity of habitats important for pallid sturgeon reproduction and survival. In addition, the reduction of turbidity has highly altered the river environment, impacting pallid sturgeon capability to forage successfully, increasing competition with other species and making the species more susceptible to predation by site-feeding predators. The reach of the Lower Missouri River from Gavins Point Dam to Ponca State Park has excellent habitat for pallid sturgeon. However, the hydrograph in this reach is significantly impacted by the Corps' operations. The lack of a bimodal spring rise in the hydrograph greatly reduces the possibility of pallid sturgeon spawning in this reach.

The reach of the Lower Missouri River from Ponca State Park to the Platte River is highly channelized with high velocities and minimal habitat diversity preventing usage of this area by all life stages of pallid sturgeon. The hydrograph in this reach is also significantly impaired due to the Corps' operations. The reach of the Lower Missouri River to the mouth is also channelized, however, habitat conditions are somewhat improved in this reach and the hydrograph is attenuated as the river progresses downstream due to tributary inflows. Although the Corps proposes to implement an accelerated habitat restoration program in the Lower Missouri River, this action will have little benefit to the pallid sturgeon without a concurrent or subsequent change in operations to provide a more normalized hydrograph to provide spawning cues critical for pallid sturgeon reproduction and movement of larvae and juveniles to shallow

water habitat. In particular, the reach below Gavins Point Dam is critical for providing pallid sturgeon reproduction. Without a change in the hydrograph, pallid sturgeon are restricted in the amount of area available for spawning in the Lower Missouri River.

Some natural reproduction is occurring in the reach of the Lower Missouri River below the mouth of the Platte River. However, larvae and juvenile pallid sturgeon are limited in the amount of shallow-water aquatic habitat available for rearing and refugia. This should be ameliorated over time with the development of shallow water habitat. However, a change in the hydrograph would provide immediate benefits by increasing the amount of shallow water habitat available to the species. Given the current status of the species, this could be very important for both survival and recovery.

The Middle Mississippi River represents an important riverine connection and genetic conduit for pallid sturgeon movement between the Lower Missouri River and the Lower Mississippi River. However, reduced sediment transport due to continued operation and maintenance of the Corps' projects on the Missouri River impair pallid sturgeon in this area due to reduced foraging capability, increased competition with other species and increased predation by site-feeding predators. The Corps' actions to evaluate the rerouting of sediment around Gavins Point Dam will benefit the species in this reach if implemented.

The Corps' proposed actions do not sufficiently normalize the hydrograph and the temperature regime critical to pallid sturgeon reproduction and reproductive success in the reaches below Fort Peck and Gavins Point Dams. For this reason, the Corps' actions continue to appreciably reduce the likelihood of both survival and recovery of the species, thus jeopardizing its continued existence in the wild.

Pertinent Excerpts of 2003 Amended BO - Reasonable and Prudent Alternatives for Pallid Sturgeon

The Service has determined that the Corps' proposed action, i.e. removal of the flow components of RPA element I1.A of the 2000 Biological Opinion and the modification of RPA element 1I.B and the proposed substitute actions proposed in the 2003 Biological Assessment, and all other elements of the 2000 Biological Opinion that where applicable to pallid sturgeon will not reduce the likelihood of jeopardizing the pallid sturgeon in the wild. In order to be exempt from the prohibitions of take under section 9 of the ESA the Corps must implement the following elements of a new RPA, along with any new actions proposed in the 2003 Biological Assessment that are not modified here, and the remaining elements of the 2000 RPA that pertain to pallid sturgeon.

The Service provided the Corps with a reasonable and prudent alternative (RPA) in the 2000 Biological Opinion to alleviate the likelihood of their actions jeopardizing the pallid sturgeon. The Corps responded to the Service with a Biological Assessment in November of 2003 which described for the Service some 2000 RPA elements that they would delete (flow changes out of Gavins Point Dam and full implementation of flow changes from Fort Peck Dam) and some alternative elements that they believed would likely avoid jeopardizing the three species if done in conjunction with the other requirements of the 2000

Biological Opinion. As described in the preceding sections, the Service has analyzed those new proposed RPA elements in light of the ongoing elements of the 2000 Biological Opinion and the environmental baseline, and has determined that the proposed new RPA package (old RPA elements agreed to by the Corps plus the new RPA elements proposed by the Corps) does not avoid the likelihood of jeopardizing the pallid sturgeon. In this section, we summarize the applicable elements of the 2000 RPA package, the 2003 Amended elements that the Corps proposed and provide new additional RPA elements. These additional RPA elements replace element I1 (Flow Enhancement) of the 2000 Biological Opinion and are described as elements VI-VIII.

Regulations (50 CFR §402.02) implementing section 7 of the Act define an RPA as an alternative action, identified during formal consultation, that: (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction; (3) is economically and technologically feasible; and (4) would, the Service believes, avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.

The primary elements necessary to avoid jeopardy to listed species have not changed substantially since they were first outlined in the 1990 Biological Opinion, and later refined in the 2000 Biological Opinion. Information gained from experience during the last 13 years reinforces the need for immediate adoption of those elements.

The Service's 2000 Biological Opinion conclusion of jeopardy to the pallid sturgeon reflects degradation of the entire ecosystem. The intent of section 2(b) of the ESA is to focus attention on the conservation of the ecosystem upon which listed species depend. Such an approach is often not readily apparent in single species consultations for small or localized project areas, but is paramount in multiple-species consultations covering large regional areas. Research emphasizes the concept that recovery of endangered aquatic biota and biodiversity conservation must be pursued through an ecosystem approach (Blackstein 1992, Williams and Rime 1992, Sparks 1995). This concept is particularly important given the wide-ranging nature of the species, geographic scope of this consultation, and the interrelatedness of the actions.

The reasonable and prudent alternative developed to avoid the likelihood of jeopardizing the continued existence of the tern, plover, and pallid sturgeon in the 2000 Biological Opinion included elements applicable to all three listed species in the ecosystem, as well as elements specific to each of the three species. In this section, we describe all the RPA elements applicable to pallid sturgeon. Under the terms and conditions implementing the incidental take statement, the Corps will be required to provide the Service an annual report which documents progress in the implementation of the reasonable and prudent alternative.

Because this Biological Opinion has found jeopardy to pallid sturgeon, the Corps is required to notify the Service of its final decision on the implementation of the actions of the reasonable and prudent alternative identified below. Additional clarifying language has been provide in the new elements discussed later concerning adaptive management.

I. Adaptive Management

Because the Corps has adopted this RPA element from the original 2000 RPA, and has indicated in their November 2003 Biological Assessment that they will adopt an adaptive management approach, below we modified the wording of the original RPA.

The Corps shall adopt adaptive management as one tool to preclude jeopardy to pallid sturgeon. Adaptive management is a process that allows regular modification of management actions in response to new information and to changing environmental conditions. Adaptive management is based on the premise that managed ecosystems are complex and inherently unpredictable. The complexity of the Missouri River ecosystem and management for fish and wildlife underscores the need for such an approach to ensure the variability and flexibility necessary to manage multiple species and be consistent with project purposes.

The adaptive management framework is a particularly effective way to address multiple species, ecosystem variability, and biological unknowns about the lifecycles, behaviors, and habitat requirements of the listed species under consultation. This is especially true with the aquatic species of concern, the pallid sturgeon. Whereas direct observations of species' behaviors often occur for terrestrial species, such as the least tern and piping plover, the ability to observe the behaviors of aquatic species is far more difficult. This difficulty is further compounded when dealing with a wide-ranging aquatic species with an exceedingly small population, as with the pallid sturgeon. Thus, adaptive management is an approach that can address various biological responses of threatened and endangered species, and other rare species to changes in the Corps' MR, BSNP, and KR Operations or habitat restoration projects.

This RPA will describe the framework for an adaptive management approach to the Corps' river operations and maintenance along the Kansas and Missouri rivers to avoid jeopardy to listed species and facilitate their eventual recovery. This approach will include a regular regime of discussion, information exchange, evaluation and reevaluation, and monitoring between the Corps and the Service. The general management actions identified in this opinion as part of the current project descriptions and as the RPA, likely will be conducted, modified and continually improved upon through adaptive management.

The Corps, in cooperation with the Service, shall identify and describe the specifics of implementing and modifying management actions needed at any given time. The specific methods of implementing the management actions may vary yearly and monthly as necessary to adapt to changing river conditions. Modifications to management actions shall be based on an evaluation of habitat, flow, climate, species response and other information that is available each year. The Corps shall address implementation of those actions through meetings held jointly with the Service at least twice a year, or more frequently if needed. Monitoring shall be used to document how management actions were implemented and their effects within the river and on listed species. Monitoring species responses shall be necessary to determine progress towards species survival. The agencies shall jointly define sufficient progress within specific timeframes that will indicate that the Corps' actions are avoiding jeopardy.

Specific recommendations incorporating the adaptive management approach are included in the following elements of the Reasonable and Prudent Alternative.

New Reasonable and Prudent Elements of the 2003 Amended Biological Opinion

The following elements are a substitute for RPA I1 (Flow Enhancement) as well as additional elements that pertain to habitat development and adaptive management, Fort Peck temperature control, and must be implemented in concert with all other elements of the RPA as described in the 2000 Biological Opinion. Each of the elements described below are integral to each other and must be implemented in their entirety.

VI. Feasibility, Flow Development, and Adaptive Management

The intention of this element is to develop a flow regime that meets the needs of the species as described in element VII. Although the processes outlined below are described as individual steps it is intended that the pieces be developed in tandem and each individual piece together makes up the whole. The purpose of this element is to determine how flows can be provided that are essential for the survival of the pallid sturgeon if the flows are necessary. It is the intent of this element to have information available and evaluated to implement element VII in March of 2006. Additionally it is intended that the adaptive management be a dynamic and ongoing process that results in action being implemented as data develops.

Biological Needs

The Service has recognized throughout this opinion that there is significant scientific uncertainty surrounding certain life history aspects of the pallid sturgeon. However, there is little debate that pallid sturgeon need a more normalized river, which includes the overlying hydrograph.

1. Feasibility and Flow Development

The following elements shall be completed within 2 years of issuance of this 2003 Amended Biological Opinion.

a) The Corps shall prepare and finalize a feasibility report which is comprised of several elements that address flow regimes, adaptive management, feasibility of various options, and impediments to implementation.

b) The Corps shall develop and complete studies to establish a long-term flow management plan for flow releases from Gavins Point Dam that will be implemented under the Master Manual. This study will establish, as minimum criteria, flows that provide sufficient magnitude, duration, frequency, and rate of change. The spring pulse shall be a bimodal release from Gavins Point Dam that provides for spawning cues and floodplain connectivity in the later spring and early summer. The flow plan shall also provide for a summer habitat flow that will optimize shallow water habitat, either naturally occurring or constructed. This flow plan shall be responsive to the hydrologic conditions in the basin based on system storage, winter precipitation, and the future projected precipitation based on probabilities from historical records.

c) The Corps shall evaluate the feasibility of the various alternatives for flow study outlined in element VI. 1 .a above. The purposes of this part will be to identify the methods that the Corps may use to provide flows necessary for the survival of the

pallid sturgeon, determine impediments to implementing the flows necessary to ensure the survival of pallid sturgeon, and identify mitigation measures to address the impacts of removing impediments to implementation (e.g. floodplain easements, scouring easements, navigation off-sets).

d) The Corps shall establish an independent group of scientists that have expertise in the design, development, and implementation of adaptive management processes. This group will eventually be incorporated into the MRRIP to help guide that process. The Corps, shall collaborate with the Service and the USGS, in development of an adaptive management program that will: identify the scientific uncertainties surrounding the life history and conservation needs of pallid sturgeon, identify scientific experiments that can be implemented in the construction of the flow regimes that are to be developed above, design data collection and analysis methods and mechanisms to evaluate the experiments, identify the critical metrics against which decision-making can be made, the pathways to modify project operations or additional experimentation if needed, depending on results. The adaptive management program developed shall be implemented in conjunction with the first flow modification from Gavins Point Dam in 2006, whether it is the one developed in the intervening 2 years or the one described below in element VII. 1 .a. This construct shall also apply to the Fort Peck flow enhancement program and the habitat development program.

e) The Corps shall modify operations based on the outcomes from the adaptive management program. The adaptive management program is an ongoing and dynamic process that results in change over time to improve the intended purposes of this RPA.

Justification

The Corps, in their proposed action, committed to a review of their action in three years based on information they collected and may possibly modify their action based on adaptive management. However, they were largely silent on how, when, what actions they might take, or the level of commitment to subsequent action depending on data and results. Due to some scientific uncertainty surrounding the pallid sturgeon and its critical population status in the wild, it is crucial to be able to respond to new information. In order to ensure the highest probability of success, experimentation and data collection must be collected in a structured, well thought out, and accurate manner. There is a need to develop information that will refine the Corps capability to manage flows for the needs of the pallid sturgeon. Prescriptive flows that are not flexible or responsive to the hydrology in the basin, both in terms of when hydrologic events may occur and the magnitude of the events, will not likely provide optimum conditions for the pallid sturgeon. A process to develop more refined criteria and remove the impediments that may exist for implementing certain aspects of flow modifications are critical to ensuring survival of the pallid sturgeon while minimizing impacts to other project purposes. Subsequent evaluation must be targeted to produce a management decision. Establishing an expert independent group of scientists to assist the Corps in developing an adaptive management program will help ensure the highest probability of success for implementation. This will help ensure the survival of the pallid sturgeon in the wild. It is important to realize that 3 years have passed since the 2000 Biological

Opinion and RPAs were provided to the Corps. The Corps has not taken action in this area despite time available to develop an information base to act on.

VII. Flow Modification

Gavins Point downstream

Biological Needs
The Service has determined restoration of a normalized river hydrograph below Gavins Point Dam is still necessary to avoid jeopardizing the continued existence of the pallid sturgeon. Several biologically relevant features are needed in the reach. Flows to cue spawning that are sufficiently high for an adequate duration and flows that provide for connection of low-lying lands adjacent to the channel. Inundation of low-lying lands is important processes for pallid sturgeon survival. This provides organic material and redistribution to produce forage for rearing fish at a time synchronized with the presence of larval and juvenile fish. Flows that are sufficiently low to provide for shallow water habitat as rearing refugia and foraging areas for larval, juvenile, and adult pallid sturgeon are also necessary.

1. Flows below Gavins Point Dam
To meet the biological needs for the pallid sturgeon, the Service finds that the Corps shall no later than the 2004 annual operation (which will begin in March, 2004):

a) ensure that the Final Environmental Impact Statement and subsequent Master Manual is changed to ensure the long term capability to provide a summer habitat flow of no greater than 25 Kcfs beginning no later than July 1,2004 lasting for a minimum of 30 days at its lowest point. To subsequently raise flows from this target the Corps must demonstrate tangible impacts to other project purposes. The Corps shall ramp down to the habitat flow over a minimum of 7 days. Once the Corps begins to ramp up to meet new service levels, such ramping will be gradual over no less than 7 days. As shallow water habitat is developed, through re-engineering of the channel below Sioux City to St. Louis, the level of the habitat flow may be increased proportionally to optimize the habitat suitability, based on adaptive management and monitoring. This element may be subsequently modified or superceded by the flow options developed under other sections of elements I and I1 of this opinion.

b) in any year that the Drought Conservation Plan results in a shortening of the navigation season, the Corps shall ensure that the period of time that the navigation is suspended shall occur during the low summer flow period previously described for the pallid sturgeon. When approximately 1,200 acres of new shallow water habitat has been made available above that which currently exists between Sioux City and Omaha (approximately the amount that would be developed through flow management) the Corps, in consultation with the Service, may modify flows to take advantage of that habitat and more fully meet project purposes.

c) the Corps shall ensure that the Master Manual and the corresponding NEPA document provide the latitude for the eventual implementation of a spring rise and summer low flow of at least a magnitude identified in the Draft Environmental Impact Statement (USACE, 2001) as altemative GP2021. A variation that was not part of this altemative was the bimodal nature of the naturalized river hydrology that will need to be evaluated.

Underlining and Bold Text added in text below by C. Scott 611105

d) **Within the first 2 gears, as the information is available to establish an acceptable flow management plan identified in I.A.l.d, the Corps shall, if hydrologic conditions are suitable, initiate an experimental spring pulse to assist and inform the process for establishing the long-term flow plan. Such a pulse shall be developed collaboratively, in collaboration with the Service and the USGS as well as with Tribes, States, and stakeholders**

e) **The Corps shall ensure that within 2 years, based on the results of the adaptive management and feasibility processes outlined below, a flow management plan will be implemented to provide a spring rise and summer low flow which will provide for the life history needs of the pallid sturgeon. This long-term flow regime must address. based on the best available information, spawning, rearing. maximization of floodplain connectivity, forage production and shallow water habitat. The long-term flow regime shall be reflective of the normalized river hydrology in order to be responsive to dry, intermediate, and wet conditions.**

f) **If the Corps. with the review and approval of the Service, is unable to determine a suitable flow management paln that incorporates the life history needs of the pallid sturgeon over all relevant flow frequencies within 2 years the Corps shall operate in the following manner in the operating year that begins on March 1,2006. This initial starting point shall be sub-iect to annual review and modification based on data collected and evaluated under the adaptive management program. This assumes a median hydroclimatic conditions in the basin based on system storage, past precipitation, and projections of future precipitation based on historical probabilities:**

i. **During the winter release of 2006, the Corps shall minimize the releases from Gavins Point Dam to 16 Kcfs or less.**

ii. **Beginning on or about March 15,2006, the Corps shall provide for an early spring pulse of at least 31Kcfs which will last at least 7 days at the peak. Such a rise will have an ascending limb of approximately 7 days and a descending limb of approximately 7 days. After the pulse the Corps will reduce flows to the minimum amount possible while still maintaining project purposes.**

iii. **Beginning on or about May 1,2006 but not later than May 15, 2006 the Corps shall provide a second spring pulse release that will be no less than 16 Kcfs, added to the existing flow (i.e. if the flow on May 1 is 24 Kcfs the pulse would be 40 Kcfs). This pulse will last for a minimum of 14 days at its peak. The ascending limb of this pulse will not be less than 7 days but no longer than 10. The descending limb of this pulse will be no less than 7 days but may extend for longer as proiect purposes demand.**

iv. **Beginning on or about June 15,2006 but no later than July 1,2006 the Corps shall begin reducing flows to provide a minimum 30 day summer low flow release of no greater than 25 Kcfs. Once the low flow period has been achieved, the Corps may increase flows the minimum amount necessary to achieve proiect purposes by September 1,2006.**

v. **If the operating year starting on March 1.2006 is other than a median year. the Corps shall proportionally modify the flow regime either up or down depending on if runoff is projected to be in the upper quartile water year definition or the lower quartile, and within the bounds of health and human safety for the wetter period. Summer low flows must always be no greater 25 Kcfs and may extend for longer periods of time depending on hydrology,**

vi. **When the navigation season is shortened through implementing, the drought conservation program, the Corps shall coordinate that period of non-navigation (with the summer habitat flow described in this section) to maximize benefits to pallid sturgeon.**

Justification

Based on the effects described in the Effects of the Action it is the opinion of the Service that the flow regime elements described here will provide suitable spawning cues of enough frequency for pallid sturgeon to exploit the entire reach of the Missouri River from Gavins Point Dam to the confluence with the Mississippi River. By providing flows that are sufficiently high in the spring, connectivity to low-lying lands will be enhanced thereby providing additional production and input of nutrients and forage items for YOY fish at a time needed to enhance survival through the first year. Habitat flows will subsequently provide low velocity refugia habitat, enhanced in-channel productivity and provide for the spatial and temporal concentration of forage and prey items to areas where YOY and adult fish can exploit the prey base.