Missouri River Recovery Program Independent Science Advisory Panel

Charge Description #1: Spring Pulse Adaptive Management

I. BACKGROUND AND INTRODUCTION

The US Army Corps of Engineers (Corps) - Missouri River Recovery Program (MRRP) is engaged in recovery and mitigation projects on the Missouri River, with significant efforts to restore ecosystem functions as they relate to recovering threatened and endangered species. This effort relies on collaborations with a wide range of governmental, academic, and private organizations that are working to deliver products, including extensive scientific analyses and syntheses. The Missouri River Recovery Implementation Committee (MRRIC), a group of 69 members representing various interests, tribes, and agencies, assists these efforts by developing recommendations for the agencies implementing the ecosystem management efforts.

The desire and need for well thought out science and independent scientific advice and recommendations to support decisions and directions taken by the Corps has increased, and is also desired by the MRRIC. As a result, the MRRP Integrated Science Program (ISP) has established a standing Independent Science Advisory Panel (ISAP) for the MRRP and the MRRIC, utilizing Oak Ridge Associated Universities as the Third Party Science Neutral (TPSN) contracted by the US Institute for Environmental Conflict Resolution (USIECR), as a lead advisor for the management of scientific advisor selection, panel processes, and panel products. The independent science advice/reviews required are scientific in nature, and decision making and policy interpretation are left to the Corps after consideration of any consensus recommendations from MRRIC.

The initial ISAP, established in January, 2011, comprises the following members selected for a three-year term:

- Margaret A. Palmer, Ph.D. – Aquatic/Riverine Ecologist
- Martin W. Doyle, Ph.D. – River Hydrologist/Geomorphologist
- Adrian H. Farmer, Ph.D. – Least Tern/Piping Plover Specialist
- Christopher S. Guy, Ph.D. – Sturgeon Specialist
- Steven M. Bartell, Ph.D. – Quantitative Ecologist/Statistician
- Dennis D. Murphy, Ph.D. – Conservation Biologist

II. CHARGE SCOPE: SPRING PULSE AND ADAPTIVE MANAGEMENT

This document describes the first charge to the ISAP, including questions it is to consider, and the procedures and timeline that it is to follow in responding to the charge. This charge description incorporates the "Independent Science Advisory Panel Outline of Charge Scope" drafted and approved by the Corps and the MRRIC ISP Working Group (Attachment A). That document provides the background and rationale for the spring pulse and adaptive management topic area, a range of questions for the panel to consider and advise on, and a list of publications for the panel to review and consider in answering the questions. This charge description is developed pursuant to the "USACE MRRIC ISAP Approach Structure Ground Rules" (entitled "Third Party Science Neutral

Support to Establish an Independent Science Advisory Panel for the Missouri River Recovery Program") approved by MRRIC on July 21, 2010 (see Attachment B).

As described in more detail below, it is anticipated that the ISAP will have a kick-off conference call as soon as practicable in early 2011, face to face meetings concurrent with the February, May, and July MRRIC meetings, other conference calls as needed, and a collaborative SharePoint site within which to share draft materials. Opportunities for panel interaction with MRRIC participants will occur at the February and May meetings, along with a report out and discussion of findings and recommendations planned for the July meeting. The panel will submit a final written report thereafter.

III. HOW THE INDEPENDENT SCIENCE ADVISORY PANEL WORKS

1. The TPSN has contracted with the six panel members to reimburse them for their time and to coordinate travel arrangements and reimburse travel costs. Panel members will work closely with TPSN staff to minimize time spent on logistics and maximize time available for work of the panel.

2. Kick-off Conference Call: The TPSN will schedule a conference call with panel members as soon as possible after contracts are completed with all panel members. Agenda for the call will include introductions, goals and expected products, initial assignments, selection of panel chair, timeline, ground rules for operation, next steps.

3. Expected products: The ISAP will produce a report addressing the "Outline of Charge Scope" (Attachment A). The report will include:

    - Summary of the goals and objectives of the charge to the panel on spring pulse and adaptive management.
    - Summary of key points of the panel discussion and the results including consensus and/or independent opinions and recommendations regarding each question.
    - An analysis of the findings including observations of the strengths and weaknesses of the findings and any dissenting opinions. The report is to accurately present the views of the entire panel.
    - Exercises (e.g., evaluations or assessments) completed as part of the process.
    - Information considered by the panel (including copies of unpublished or other information not readily available to the public, and content of any presentations or other information received).
    - Brief summary of the panelists' qualifications.

    The Panel Chair shall be responsible for writing and editing initial, draft, and final reports, coordinating writing and review assignments among panel members. The TPSN will ensure that the report addresses Attachment A, is thorough, and is understandable. The TPSN will provide a secure collaboration SharePoint site for the panel to share and track draft materials. The report will be delivered in electronic format as a text selectable "pdf" file (portable document format created with Adobe Acrobat). The panel (or panel chair) also will present its draft report at a MRRIC meeting and have opportunity to discuss its conclusions.

4. Panel Chair: A panel chair will be chosen to ensure consideration of all technical matters amongst panelists and coalesce a final report. The method for choosing the chair will be determined by the panel members with the assistance of the TPSN. Possible options include, but are not limited to, a different chair for each charge/topic, a chair for the full period of time (three-year term), and a rotating chair.

5. Schedule/timeline: (to be refined as the process unfolds)

Jan 2011	Kickoff conference call
Jan 2011-Feb 2011	Background reading and conference call(s) discussion, TBD
Feb 14-17 2011	Meeting, Denver; meet and greet with MRRIC, meet with ISP-WG
Feb-Apr 2011	Conference call(s) discussion, TBD; begin drafting response
May 2-5 2011	Meeting, Kansas City; meet with ISP-WG, others TBD
May-July 2011	Conference call(s) TBD; draft report
July 25-28 2011	Meeting, Great Falls; present draft report, discuss with MRRIC
Aug 2011	Conference call(s) TBD; produce near-final report
Sep 30 2011	Produce final report

6. Implementation: In coordination with the Corps, the ISP WG, and the USIECR, the TPSN will schedule face-to-face and virtual panel meetings and coordinate all logistical issues associated with carrying out the panel's charge. The TPSN will facilitate selection of the panel chair, then with the panel chair, will facilitate panel deliberations, external panel interaction, and report preparation and dissemination. The TPSN will also provide other project management duties including ensuring product completion per schedule and budget.

   Panel meetings generally are open to the public for observation (the panel may choose to deliberate some issues in executive/closed session). Opportunities to interact with the panel will be scheduled as demand dictates and as time allows. The TPSN will announce meeting times to the USIECR and ISP WG. Individuals wishing to observe or to speak with the panel are asked to coordinate with the USIECR and TPSN to ensure that logistical arrangements for the meeting can accommodate their participation.

   Key agency staff and members of MRRIC are available to provide input as necessary when requested by the panel. The TPSN and USIECR will coordinate such interaction.

7. Standing Ground Rules: To facilitate consideration of multiple perspectives on the issues, a structured process has been developed to avoid bias, ensure transparency, and guide communications between Science Advisory Panel members and the Corps, MRRIC, and other interested parties including the public. The TPSN may add to or refine these as situations warrant.

   - The TPSN will coordinate all contact between panelists and interested parties.
   - There will be no direct communication between interested parties and panelists, except as invited by the Science Advisory Panel through the TPSN.
   - All communication regarding the topics under consideration, between the Corps, MRRIC members, and panelists, will be coordinated through the TPSN.

Communications between the Corps and/or MRRIC members and the panelists outside of the MRRIC process are inappropriate.

- Questions or information received after the initial questions have been delivered to the Science Advisory Panel (including from the USIECR's Independent Science Advisory Panel web site) will be routed to the USIECR and TPSN. The USIECR and TPSN will assess the information/ questions received. The TPSN will forward to the panel information and questions that are determined to be pertinent to the proceedings. To ensure the transparency of the process the USIECR and TPSN will inform the Corps and ISP Work Group and MRRIC of any information/questions received and the disposition of these items.
- During their deliberations, science advisors may access and reference any peer reviewed literature in their review deliberations and report(s). They also may reference other information that the panel deems credible, and include a copy of the other information with their report(s).
- The panel may make on-site visits to gain understandings in topics being addressed and to see, first-hand, the challenges and successes. (Such visits currently are not budgeted.)
- During their deliberations science advisors may (through the TPSN) invite presentations and/or request information through the USIECR from MRRIC including member agencies, Corps, or any source that they believe may be of value to their deliberations. The presenters and content of the presentations or information received will be included with their report(s).
- Science advisors may recommend the need for Independent Scientific Review.
- It is anticipated that the Science Advisory Panel will meet with the ISP WG and the Corps periodically during the advisory process and in some cases the MRRIC. These meetings will be open to MRRIC members and the public. Additional questions may be agreed to by the ISP WG/MRRIC and the agencies as the process iterates.

The MRRIC, Corps, the public, the USIECR, TPSN, and advisory panelists will follow the above ground rules and communication protocols. The USIECR and TPSN should be alerted to possible violations of the protocols, or to other undue biases or influences immediately. When the violations are related to a panel member's conduct, the USIECR and TPSN will assess the situation and act accordingly and then report back to MRRIC on disposition of the issue. If the violations are related to the MRRIC, the Charter and Operating Procedures will be used to address the situation.

Attachment A
Independent Science Advisory Panel

Final Outline of Charge Scope (final as of January 28, 2011)

TOPIC:

Missouri River Spring Pulse and Adaptive Management

PURPOSE:

To review and provide recommendations to the US Army Corps of Engineers (USACE), US Fish and Wildlife Service (USFWS), and the Missouri River Recovery Implementation Committee (MRRIC) on the expected outcomes for the Missouri River Gavins Point Dam spring pulse management action. To review the metrics, monitoring, investigations, and management actions and provide recommendations on their potential refinement (or any other appropriate solutions). In addition, the results of the review are intended to be used in developing an adaptive management plan.

CONTEXT/BACKGROUND:

The construction of dams and associated flow management under the Missouri River Mainstem Reservoir System Master Water Control Manual (Master Manual) has provided economic and social benefits to those within and outside the basin. Environmental consequences have been associated with the damming and channelization of the Missouri River. Following the listing of the Least Tern, Piping Plover, Pallid Sturgeon, and Bald Eagle as threatened or endangered species, the USFWS provided Biological Opinions (BiOp).

In the 2003 Amendment to the 2000 Biological Opinion on the Operation of the Missouri River Main Stem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and the Operation of the Kansas River Reservoir System (2003 Amended BiOp), the USFWS issued a jeopardy opinion and recommended a Reasonable and Prudent Alternative (RPA). The RPA included a bi-modal spring pulse release from Gavins Point Dam to benefit the pallid sturgeon. The expected outcomes of this portion of the RPA have been identified as:

1) Provide a spawning cue to pallid sturgeon;
2) Increase nutrients, invertebrates, and forage fish for larval and juvenile pallid sturgeon and adult and young least terns, in association with floodplain connectivity and the construction of shallow-water habitat; and
3) Scour pallid sturgeon spawning areas to increase the likelihood of successful survival of pallid sturgeon eggs and
4) Condition new and existing emergent sand bar habitat in preparation for nesting and rearing young by least terns and piping plovers.

The USACE, with input from basin constituents, developed technical criteria for the implementation of spring pulse releases from Gavins Point Dam and published the criteria in its revised 2006 Master Manual. It has been following those criteria since 2006.

In response to the 2003 Amended BiOp, the USACE is implementing the Missouri River Recovery Program (MRRP), which includes significant efforts to restore ecosystem functions as they relate to recovering threatened and endangered species. The implementation of the MRRP relies on collaboration with a wide range of governmental, academic, and private organizations that are working to deliver products, including extensive scientific analyses and syntheses. MRRIC, a group of 70 members representing various stakeholder interests, tribes, and state and federal agencies, assists these efforts by developing recommendations for the agencies implementing the ecosystem management efforts.

This document was jointly developed by USACE, USFWS, and the MRRIC Integrated Science Program Working Group (ISP WG). MRRIC members rated the spring pulse as the topic of highest interest for science review in the fall of 2009. This interest is due in large part to both the support for the concept and concerns and controversy related to this topic ranging from: questions regarding potential flooding; questions regarding the validity of the science associated with pulses; questions regarding the needs for pulses by sturgeons, terns, and plovers; desires to first pursue alternate management actions; belief that given current constraints (e.g. Master Manual) the pulse has no benefits and should be discontinued; to concerns that the current pulse may not be large enough and larger magnitude/duration pulses should be explored; and concerns that not enough data collection and analysis is ongoing to truly assess performance either way.

A review of the spring pulse topic and its associated monitoring following three applications (May 2006, March 2008, and May 2009) over the past 5 years is also consistent with the overall adaptive management approach called for in the implementation of the 2000 and 2003 Amended BiOp. The 2003 Amended BiOp recognized the uncertainty related to the management actions and biological responses and identified adaptive management (AM) as a process to address this uncertainty. The 2003 Amended BiOp RPA tasked the USACE with establishing an independent group of scientists to develop an adaptive management plan (RPA VI.A.4) for flows.

This initial charge to the ISAP is being undertaken to begin addressing the spring pulse topic leading, if supported by the science, to the eventual preparation of an adaptive management plan for spring pulse flows. Results of the response to charges below will provide input to the management agencies and MRRIC to utilize in eventually developing an adaptive management plan for the spring pulse.

INFORMATION TO BE PROVIDED TO THE PANEL:

A list of materials to be provided as background and for review by the panel is attached, Appendix A.

CHARGE QUESTIONS:

a. Goals/Objectives: Review the scientific literature (add references) related to the Gavins Point spring pulse management action and the specific expected outcomes identified in the 2003 Amended BiOp, and spring pulses generally, and respond to the following:
   1) Is there reasonable assurance, given the status of science surrounding the spring pulse management action and accompanying ecological and biological response(s) and current Missouri River channel and floodplain morphology below Gavins Point Dam, that the spring pulse management action and technical criteria will achieve the expected outcomes:
      i. Provide a spawning cue to pallid sturgeon;
      ii. Increase nutrients, invertebrates, and forage fish for larval and juvenile pallid sturgeon and adult and young least terns, in association with floodplain connectivity and the construction of shallow-water habitat; and
      iii. Scour pallid sturgeon spawning areas to increase the likelihood of successful survival of pallid sturgeon eggs and
      iv. Condition new and existing emergent sand bar habitat in preparation for nesting and rearing young by least terns and piping plovers.
   2) Is there reasonable assurance, given the status of science surrounding spring pulse flows, species recovery, and restoration of large river systems, that further investigation into and/or water management changes are needed to: (add references)
      i. Recover the federally listed species (i.e., pallid sturgeon, least terns, and piping plovers) under the Endangered Species Act?
      ii. Achieve expected outcomes?
      iii. Restore the ecosystem to prevent further declines of other native species?

b. Metrics: Review the following list of current performance metrics (abiotic and/or biotic). Make recommendations including options for better, more specific, more measurable, both short and long term metrics to use in assessing the Spring Pulse expected outcomes and for use in adaptive management.

Current ecological metrics:

- Sturgeon migration, reproductive readiness, and successful spawning activity associated with pulses.
- Successful pallid recruitment to support sustainable population.
- Conditioning of spawning beds/locations by spring pulse flows.
- Pre-conditioning of tern and plover habitats.
- Increased primary and secondary productivity associated with the spring pulse.
- Magnitude, timing, duration of pulse, attenuation through downstream reaches.

c. Ecological Uncertainties and Risks: Review the following list of risks and uncertainties. Identify any other major risks and uncertainties pertaining to the role of the Gavins Point spring pulse in all three species recovery. Provide recommendations on how to address these uncertainties through the monitoring and investigations (following sections). Provide advice regarding the effects of these risks and uncertainties on achieving the expected outcomes.

Uncertainties:

- Whether the occurrence, timing, water quality (e.g., temperature, turbidity, etc.), and magnitude of the spring pulse releases from Gavins Point Dam, as formulated, are beneficial or detrimental to the species spawning and recruitment?
- Linking the pulse flow events, whether managed or natural, to biological response.
- Pulse could be working, but monitoring not able to detect.
- Pulse may not be working, but unable to verify.
- To what level do pallid sturgeon need pulses from Gavins Point Dam or downstream tributaries to spawn successfully?
- Role of pulses in successful pallid sturgeon recruitment.
- Magnitude of pulse to have effect.
- Could rises on tributaries provide adequate magnitude to test efficacy?
- Effects of pulses on socioeconomic resources including interior drainage and downstream groundwater levels.
- Is the Gavins Point Spring Pulse Management action needed given the naturally occurring downstream pulses?

Uncertainty addressed through previous investigations:

- Effects on cultural resources due to reservoir fluctuations.

Risks:

- Performing pulses may ultimately be determined unnecessary; thus delaying or hampering more meaningful pallid sturgeon recovery opportunities.
- Not performing pulses (or performing inadequate pulses) may miss opportunities to assist reproduction and recruitment of listed species.
- Potential contribution of spring pulse releases' to downstream flooding and issues associated with interior drainage and downstream ground water levels.

d. Monitoring: Review the provided list of monitoring activities and results. What changes, modifications, or additions should be considered to:
   1) Improve the ability to assess the metrics;
   2) Adaptively manage the pulses; and
   3) Determine if expected outcomes have or can be achieved.

References: Ongoing monitoring efforts are listed in Appendix A, e.1-3.

e. Investigations/Research: Review the provided list of investigations and research. What focused investigations/research are necessary to reduce uncertainties and address risks associated with the spring pulse releases from Gavins Point Dam? What additions or alternatives to a spring pulse are possible to address the research needs for each of the expected outcomes (i.e., laboratory studies, inclusion of additional surrogate species)? For each investigation, describe its relationship to the outcomes/metrics, risks, and uncertainties. For example are investigations needed to address the following:
   1) Relationship between flows, sediment transport/sediment availability, development of future habitat and species recovery actions on the Missouri River.
   2) Are the natural rises from tributaries (i.e. frequency, duration, and magnitude) providing "sufficient" pulses to accomplish the outcomes on specific segments of the Missouri River mainstem? (TO DO: provide list and map of segments below Gavins Points)
   3) Can implementation of habitat creation (e.g., chutes, widening of channel, levee setback, etc.) be enhanced to contribute to Outcome #2 and aid in pallid sturgeon spawning and recruitment?

   References: Ongoing investigation efforts are listed in Appendix A, e.1-3.

f. Analyses and Assessments: Discuss the methods by which the data collected through monitoring and investigations should be analyzed and compared to performance metrics. This may include a recommendation for any conceptual or numeric models that could be used in the analysis. Discuss how the data analyses could be used to influence management actions.

   References: Are there references/ongoing assessment for the appendix?

g. Management Actions:
   1) When considering the current Missouri River form and hydrology, what is the importance of hydrology (functional/flow pulses/flow management) versus morphology (physical form/habitat creation) when considering management actions for species recovery?
   2) What spring hydrologic profile(s) (magnitude, frequency, duration, timing, temperature, rate of change, and temporal and geographic variation) should be evaluated as part of an Adaptive Management program?
   3) What alternatives to a spring pulse releases from Gavins Point Dam are available to achieve the desired outcomes?

h. Subsequent Questions: Once the ISAP issues their draft report, the USACE, USFWS, and MRRIC ISP Work Group may jointly submit appropriate follow-up questions to help inform or clarify comments or conclusions contained in the report.

Appendix A

INFORMATION TO BE PROVIDED TO THE PANEL

The information is directly explicit to the spring pulse charge and should be understood by the panel.

a. **Missouri River** Missouri River Basin geography, climate, historic hydrology, and the physical and hydrological changes to the river.
   1) The Missouri River Ecosystem, Exploring the Prospects for Recovery; National Research Council Report, National Academies Press, 2002. 175pp.
   2) Big River Ecology, Arthur C. Benke and Colbert E. Cushing, Chapter 10: Missouri River Basin, pp 427-482. Academic Press, 2005.
   3) Missouri River Planning: Recognizing and Incorporating Sediment Management; National Research Council Report, National Academies Press, 2010. 111pp.

b. **Missouri River System** Development of the Missouri River System and its current operation.
   1) Big Dam Era, A Legislative and Institutional History of the Pick-Sloan Missouri River Basin Program, John R. Ferrell. US Government Printing Office, 1993. 228pp.
   2) Missouri River Mainstem Reservoir System Master Water Control Manual. 432pp.
   3) Environmental Assessment for the Inclusion of Technical Criteria for Spring Pulse Releases from Gavins Point Dam**.** 45pp. http://www.nwd-mr.usace.army.mil/rcc/reports/pdfs/MRMainstemSystemSpringPulseEAFINAL.pdf
   4) Spring Rise Formulation, FEIS and RDEIS Alternatives: Storage, Lake Level, and Flow Files - Downloadable http://www.nwd-mr.usace.army.mil/mmanual/rdeis-files.html
   5) Design of a naturalized flow regime-an example from the Lower Missouri River, USA; Robert B. Jacobson and David L. Galat, Ecohydrology 2008, vol. 1, pp 81-104.
   6) Judicial Challenges to Missouri River Mainstem Regulation; John Seeronen. Missouri Environmental Law and Policy Review, Vol.16, No.1, 2010, pp60-98.
   7) U.S. Army Corps of Engineers. 2006. Missouri River Mainstem System 2005−2006 Annual Operating Plan. January 2006.

c. **2003 Amended Biological Opinion on the Operation of the Missouri and Kansas River System and the Bank Stabilization and Navigation Project**
   1) 2003 Amendment to the 2000 Biological Opinion on the Operation of the Missouri River Main Stem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System. 308pp. Selected pages, 137-263
   2) Expected Outcomes of the Restoration of a Normalized Hydrograph, Missouri River, Downstream from Gavins Point; USFWS, December 16, 2009. 6pp.
   3) Actual pulse timing, magnitude, hydrographs at locations showing attenuation/magnitude.

4) Shallow Water Habitat clarified definition, Letter to USACE from USFWS, June 29, 2009. 2pp.
5) U.S. Fish and Wildlife Service, 2007, Pallid Sturgeon (*Scaphirhynchus albus*); 5-year review summary and evaluation: U.S. Fish and Wildlife Service, 120 pp. Federal Register 70:39326-39327. http://www.fws.gov/mountain-prairie/missouririver/Pallid_Sturgeon_5-year_review_June%202007.pdf

d. **Missouri River Recovery Program**
1) Water Resources Development Act 2007, Section 5018
2) GAP Analysis for MRRP

e. **Integrated Science Program**
1) Spring Pulse Implementation
a. U.S. Army Corps of Engineers. 2005. Spring Pulse Flood Control and Drainage Impediment Analyses – Omaha, Nebraska to Hermann, Missouri: Missouri River Master Water Control Manual Review and Update, Missouri River Basin Water Management Division, Northwestern Division, 39 pp.
b. U.S. Army Corps of Engineers. 2008. Draft Report on 2006 Spring Pulse Monitoring: Missouri River Recovery, Integrated Science Program Report, 11pp. Roy McAllister, Project Manager.
2) Biologic Monitoring and Investigations
a. Delonay et al, 2009. Ecological requirements for Pallid Sturgeon Reproduction and Recruitment in the Lower Missouri River: A Research Synthesis 2005-2008: U.S. Geological SurveyScientific Investigations Report 2009-5201, 59 pp.
b. Korschgen, C.E., ed., 2007, Factors affecting the reproduction, recruitment, habitat and population dynamics of pallid sturgeon and shovelnose sturgeon in the Missouri River: U.S. Geological Survey Open-File Report 2007-1262, 280pp. http://pubs.usgs.gov/of/2007/1262
c. Reuter, J.M., Jacobson, R.B., Elliott, C.M., and DeLonay, A.J., 2009, Assessment of Lower Missouri River physical aquatic habitat and its use by adult sturgeon (genus Scaphirhynchus), 2005–07: U.S. Geological Survey Scientific Investigations Report 2009–5121, 81pp. http://pubs.usgs.gov/sir/2009/5121
d. DeLonay et al, 2010, Ecological requirements for pallid sturgeon reproduction and recruitment in the Lower Missouri River: annual Report 2009:U.S. Geological Survey Open File Report 2010-1215, 64 pp.
e. Brosnan, D, etal, 2008, Review of the Comprehensive Sturgeon Research Program. Sustainable Ecosystems Institute, 45pp. http://sei.org/sturgeon/review.htm
f. Quinn, J, etal, 2005, Independent Science Review of the Pallid Sturgeon Assessment Program: Final Report, Sustainable Ecosystems Institute, 76pp. http://sei.org/sturgeon/population.htm.

g. Auer et al 2005. Independent Science Review of the Habitat Assessment and Monitoring Program Study Plan for the Missouri River. Sustainable Ecosystems Institute, 39 pp. http://sei.org/sturgeon/HAMPStudyPlanISR.pdf
h. Jacobson, R.B., Johnson, H.E. III, and Dietsch, B.J., 2009, Hydrodynamic simulations of physical aquatic habitat availability for pallid sturgeon in the Lower Missouri River, at Yankton, South Dakota, Kenslers Bend, Nebraska, Little Sioux, Iowa, and Miami, Missouri 2006–07: U.S. Geological Survey Scientific Investigations Report 2009–5058, 68 p.
i. Laustrup, M.S., Jacobson, R.B., and Simpkins, D.G., 2007, Distribution of potential spawning habitat for sturgeon in the Lower Missouri River, 2003−06: U.S. Geological Survey Open-File Report 2007-1192, 26 p. http://pubs.usgs.gov/of/2007/1192/
j. Reuter, J.M., Jacobson, R.B., Elliott, C.M., Johnson, H.E., III, and DeLonay, A.J., 2008, Hydraulic and substrate maps of reaches used by sturgeon (Genus *Scaphirhynchus*) in the Lower Missouri River, 2005–07: U.S. Geological Survey Data Series Report 386, 442 p. http://pubs.usgs.gov/ds/386/
k. Bergman,H.L., Boelter,A.M., Parady,C., Fleming,T., Latka,D.C., Korschgen,C., Galat,D.L., Hill,T., Jordan,G., Krentz,S., Nelson-Stastny,W., Olson,M., Mestl,G.E., Rouse,K., and Berkley,J., 2008, Research needs and management strategies for pallid sturgeon recovery: Proceedings of a workshop held July 31-August 2, 2007, St. Louis, Missouri, Final Report to the U.S.Army Corps of Engineers.William D.Ruckelshaus Institute of Environment and Natural Resources, University of Wyoming, Laramie., (91554)

3) Interior Drainage and Groundwater Monitoring
   a. U.S. Army Corps of Engineers. 2008. 2006 Spring Pulse – Interior Drainage and Groundwater Monitoring After Action Report: Hydrologic Engineering Branch, Engineering Division, Omaha District, 51 pp. Matt Krajewski, Project Manager.
   b. U.S. Army Corps of Engineers. 2008. 2008 Spring Pulse and Rises Drainage Monitoring and Evaluation: Missouri River Recovery, Integrated Science Program Report, 153pp. Roy McAllister, Project Manager.
   c. U.S. Army Corps of Engineers. 2008. 2008 Groundwater Monitoring and Evaluation Report: Missouri River Recovery, Integrated Science Program Report, 10pp. Roy McAllister, Project Manager.
   d. U.S. Army Corps of Engineers. 2010. *In Review*: 2010 Groundwater Monitoring and Evaluation Report, Missouri River Recovery, Integrated Science Program Report, 28pp. Roy McAllister, Project Manager.
   e. U.S. Army Corps of Engineers. 2009. 2009 Groundwater Monitoring and Evaluation Report - *In Review*: Missouri River Recovery, Integrated Science Program Report, 19pp. Roy McAllister, Project Manager.

f. **Missouri River Recovery Program Adaptive Management Process Framework**
   1) AM Framework document - including Appendix C

g. **Other Related Readings Suggested by MRRIC Members**

1) Wildhaber, M.L., et al. 2007. A Conceptual Life-History Model for Pallid and Shovelnose Sturgeon: U.S. Geological Survey Circular 1315, 18 pp.
2) Elliott, C.M., Reuter, J.M., and Jacobson, R.B., 2009, Channel morphodynamics in four reaches of the Lower Missouri River, 2006–07: U.S. Geological Survey Scientific Investigations Report 2009–5074, 258 p. http://pubs.usgs.gov/sir/2009/5074/
3) Galat, D.L., Lipkin, R., 2000, Restoring ecological integrity of great rivers: historical hydrographs aid in defining reference conditions for the Missouri River. *Hydrobiologia* 422/423: 29–48.
4) Jorgensen, D.G., 2009, Natural hydrograph of the Missouri River near Sioux City and the least tern and piping plover: ASCE Journal of Hydrologic Engineering, Dec. 2009, v. 14,n. 12, pp. 1365-1373
5) Caitlin et al, 2010,Discussion of "Natural Hydrograph of the Missouri River near Sioux City and the Least tern and Piping Plover" by Donald G. Jorgensen, (ASCE Journal Hydrologic Engineering , v. 14 n. 12, pp.1365 -1373), Journal Hydrologic Engineering, 2010, v. 15, n. 12, pp. 1376 – 1378..
6) Jorgensen, D. G., 2010, Closure of "Natural Hydrograph of the Missouri River near Sioux City and the Least tern and Piping Plover" by Donald G. Jorgensen, (ASCE Journal Hydrologic Engineering , v. 14, n. 12, pp. 1365 -1373), Journal Hydrologic Engineering v. 15, n. 12, pp. 1078- 1089.
7) Hedman, E.R., and Jorgensen, D.G., 1990, Surface and ground-water interaction and hydrologic budget of the Missouri River Valley Aquifer between Yankton, South Dakota and St. Louis, Missouri, U.S. Hydrologic Investigation Atlas, 721.
8) Jorgensen, D.G., Meisner, D.M., Beacom, W., and Tondreau, R.E., 2002, Review of Missouri River management alternatives and development of a preferred alternative: Missouri River Technical Committee of Siouxland Chamber of Commerce, Sioux City Iowa, 63 p. http://www.missouririvertechnicalteam.com/
9) Jorgensen, D.G., 2003a, Evaluation of a spring rise for the Missouri River: Missouri River Technical Committee of Siouxland Chamber of Commerce, Sioux City, Iowa, 68 p. http://www.missouririvertechnicalteam.com/
10) Jorgensen, D.G., 2003b, Analysis of the Missouri River natural hydrograph at Sioux City, Iowa: Missouri River Technical Committee of Siouxland Chamber of Commerce, Sioux City Iowa, 38 p., http://www.missouririvertechnicalteam.com/
11) Jorgensen, D.G., 2005, Some concepts relative to pallid sturgeon (Scaphirhynchus albus) spawning and plans to facilitate successful spawning: Missouri River Technical Committee of Siouxland Chamber of Commerce, Sioux City Iowa, 37 p. http://www.missouririvertechnicalteam.com/
12) Jorgensen, D.G., 2006, anthropogenic changes in the Lower Missouri River Basin, their effects on pallid sturgeon and management implications: Missouri River Technical Committee of Siouxland Chamber of Commerce, Sioux City Iowa, 63 p. http://www.missouririvertechnicalteam.com/

13) Kelly, B.P., 2000, Effects of alternative Missouri River management plans on ground-water levels in the lower Missouri River flood plain: U.S. Geological Survey Water-Resources Investigations Report 00−4052, 128 p.
14) Missouri River Mainstem Reservoir System Master Water Control Manual, Missouri River Basin Water Travel Time, Plate IV-1.

Attachment B
Third Party Science Neutral Support to Establish an Independent Science Advisory Panel for the Missouri River Recovery Program

Approved by MRRIC on July 21, 2010
(Note: some details of this "approach" document have been updated in the charge description.)

I. BACKGROUND AND INTRODUCTION

The US Army Corps of Engineers (Corps) - Missouri River Recovery Program (MRRP) are engaged in large scale ecosystem management on the Missouri River, with significant efforts to restore ecosystem functions and recover threatened and endangered species. This effort relies on collaborations with a wide range of governmental, academic, and private organizations that are working to deliver products, including extensive scientific analyses and syntheses. The Missouri River Recovery Implementation Committee (MRRIC), a group of 69 members representing various interests, tribes, and agencies, assists these efforts by developing recommendations for the agencies implementing the ecosystem management efforts.

The desire and need for well thought out science and independent scientific advice and recommendations to support decisions and directions taken by the Corps has increased, and is also desired by the MRRIC. As a result, the MRRP Integrated Science Program (ISP) is working to ensure the quality, completeness, and application of scientific information in use, and is following the Office of Management and Budget's "Final Information Quality Bulletin for Peer Review" (2005). This approach is also consistent with Corps civil works review policy guidance EC 1165-2-209.

This document describes the Corps' intent to establish a standing independent Science Advisory Panel for the MRRP and the MRRIC, utilizing the Third Party Science Neutral (TPSN) contracted by the US Institute for Environmental Conflict Resolution (USIECR), as a lead advisor for the management of scientific advisor selection, panel processes, and panel products.

General support tasks of the independent Science Advisory Panel could include but are not limited to the following:

- Synthesis of all available information on a specific topic which may include meetings with scientists, agency personnel and stakeholders and culminates in a written report providing independent advice and recommendations to the Corps or MRRIC.
- Scientific or technical services to gather, evaluate, and synthesize the best available information/data on a scientific topic resulting in a report to the Corps. Providing independent opinion and recommendations on the topics presented.
- Evaluation of scientific proposals and making recommendations on how to proceed.
- A standing program of independent opinions and recommendations for the overall MRRP-ISP.

- Assessment of documents (models, data, monitoring plans, management plans, and recovery actions) for contextual clarity and their application to a specific project planning effort, resulting in a letter report to the Corps.
- Responding to scientific questions from the Corps, USFWS, or MRRIC.

II. MRRP SCIENCE ADVISORY PANEL

1. A standing panel of up to 6 science advisors who will meet at least annually (and more often in the initial stages of setting up the panel and as required by specific scope of tasks). This panel will be charged with overall independent science support and technical oversight of the ISP program. In addition, the panel will be charged to provide advice on specific topics as needed. The general disciplines of expertise desired on the standing panel will be from the following areas of science including:
    a. Aquatic/Riverine Ecologist: Expertise in energy flow dynamics; flora and fauna community assembleges; river/floodplain dynamics; and knowledge of biological/physical drivers and processes.
    b. River Hydrologist/Geomorphologist: Expertise in dynamics of river and associated landforms; sediment dynamics/transport; large dryland river physical processes; and flow modeling.
    c. Least Tern/Piping Plover Specialist: Ornithological expertise in least tern and piping plover population dynamics; ecological threats; habitat, energy, and security requirements; and status of population and productivity within the interior population of least tern and Great Plaines population of piping plovers.
    d. Sturgeon Specialist: ichthyological expertise in scaphirhynchus sturgeon population dynamics; ecological threats; habitat, energy, and security requirements; knowledge of the current understanding of life history needs; and status of population and productivity within the pallid sturgeon range.
    e. Quantitative Ecologist/Statistician: Expertise in biostatistical methods, analytical tools, and the interpretation of ecological data sets; mathematical modeling; and presentation of complex analysis.
    f. Conservation Biologist: Expertise in ecological community interations with emphasis on large river form and function; restoration and recovery at the population/ landscape scale.

2. Ad hoc specialists may be added to the standing panel, as needed, to provide expertise not represented by standing panel members for a particular topic. These individuals would serve only for the duration of the topical study for which they are selected. The type of expertise needed may be identified by the Corps or MRRIC as they develop questions to be considered by the standing panel, or by the standing panel itself if it convenes around a topic and determines additional expertise is needed. In either case, the TPSN would select a candidate and potential alternates qualified in that expertise for the panel following the criteria and selection process for the standing panel.

3. Standing panel members are expected to commit to a three year term, renewable upon review by the TPSN.

III. SELECTION OF SCIENCE ADVISORS

1. When selecting science advisors, the TPSN shall comply with the National Academy of Science's "Policy and Procedures on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports" (2003) and the Office of Management and Budget's "Final Information Quality Bulletin for Peer Review" (2005). The TPSN shall strive to establish a panel of science advisors that demonstrates:
    a. Expertise. Varied knowledge, experience and skill.
    b. Balance. A diversity of scientific perspectives.
    c. No Conflict of Interest. No financial or other interest that impairs the panel's objectivity or gives an unfair competitive advantage to a person or organization.

2. The TPSN shall undertake a structured search process whereby they shall select science advisors that represent a broad spectrum of scientific expertise within their discipline and that have established high-caliber scientific credentials including:
    a. Widely recognized by peers for expertise in their field
    b. Strong publication record or record of scientific leadership
    c. Willingness to participate with objectivity and professionalism
    d. Track record of fair and unbiased, yet constructive, criticism
    e. Ability to function within a team and an interdisciplinary setting
    f. High standard of scientific integrity, independence, and objectivity
    g. Demonstrated ability to forge creative solutions to address identified topics or problems
    h. Knowledge and understanding of adaptive management process and application (represented in at least some members)

3. The TPSN will provide a proposed list of panelists for each position to the full MRRIC. The ISP Work Group (and any other MRRIC members who choose to participate), Corps, and USIECR will have the opportunity to review and collaboratively provide input (through a joint facilitated conference call or meeting) on the proposed panelists. All MRRIC members will also have the opportunity to provide comments to the ISP Work Group Points of Contact to bring into the conversations. The TPSN will select the standing panel members representing the general disciplines using the criteria identified above.

4. The TPSN shall recognize and provide clear direction to prospective panel members that the independent science advice/reviews required are scientific in nature and that decision making and policy interpretation are left to the Corps after consideration of any consensus recommendations from MRRIC.

IV. HOW THE INDEPENDENT SCIENCE ADVISORY PANEL WORKS

8. Task Orders/Charge Questions: Topics for the Science Advisory Panel may originate from either the Corps or MRRIC (or collectively). For each topic, initial charge questions will be drafted by the proposing entity for review and discussion. If the Corps develops the initial questions, MRRIC members will have an opportunity to provide questions they would like addressed through the ISP WG for consideration as part of the initial questions to be presented to the Science Advisory Panel for their evaluation. Ideally, the ISP WG and the

Corps will agree on the questions to be delivered to the TPSN. Where there is not agreement, both the ISP WG and Corps have the option to provide questions to the TPSN.

9. Charge Description: The description of the charge to the Science Advisory Panel shall be developed as follows:
    - The TPSN shall expeditiously develop a proposal containing specific instructions to the science advisors including:
        i. Description of topic.
        ii. Expected products and ground rules for operation.
        iii. How panel deliberations will be conducted, either sessions open to the general public and/or restricted to only the panel; and how findings will be presented.
            1. The TPSN shall make the science advisors aware that key agency staff and members of MRRIC are available to provide input as necessary when requested by the panel.
            2. A panel chair (and/or the full panel if desired) shall present findings to MRRIC via video teleconference or at a regularly scheduled meeting.
        iv. Schedule/timeline.
    - The ISP WG, USACE, and USIECR will review and collaboratively provide input on the TPSN proposed description of the charge.
    - The TPSN will provide the final charge description to the MRRIC, USACE, and USIECR.

10. Implementation: In coordination with the Corps and the ISP WG, the TPSN shall schedule the review and coordinate all logistical issues associated with carrying out the panels' charge including, but not limited to, travel, facilities, equipment, facilitators, panelists, arranging for transcription of panel discussions (if necessary), and public access (as necessary).

11. Panel Chair: A panel chair will be chosen to ensure consideration of all technical matters amongst panelists and coalesce a final report. The method for choosing the chair will be determined by the panel members with the assistance of the TPSN. Possible options include, but are not limited to, a different chair for each topic, a chair for the full period of time, and a rotating chair.

12. Facilitation: The TPSN will facilitate selection of panel chair, all panel deliberations, external panel interaction, and report preparation and dissemination. The TPSN will also provide other project management duties including ensuring product completion per schedule and budget.

13. Standing Ground Rules: To facilitate consideration of multiple perspectives on the issues, a structured process has been developed to avoid bias and guide communications between Science Advisory Panel members and the Corps, MRRIC, and other interested parties including the public. The TPSN may add to or refine these in certain situations as necessary (see How the Independent Science Advisory Panel Works, 2.a.ii. above).
    - The TPSN will coordinate all contact between candidate or selected panelists and interested parties.

- There will be no direct communication between interested parties and candidate or selected panelists, except as invited by the Science Advisory Panel through the TPSN.
- All communication regarding the topics under consideration, between the Corps, MRRIC members, and candidate or selected panelists, will be coordinated through the TPSN. Communications between the Corps and/or MRRIC members and the candidate or selected panelists outside of the MRRIC process are inappropriate.
- Questions or information received after the initial questions have been delivered to the Science Advisory Panel (including from the Institute's Independent Science Advisory Panel web site) will be routed to the Institute and TPSN. The Institute and TPSN will assess the information/ questions received. The TPSN will forward to the panel information and questions determined pertinent to the proceedings. To ensure the transparency of the process the Institute and TPSN will inform the Corps and ISP Work Group and MRRIC of any information/questions received and the disposition of these items.
- During their deliberations, science advisors may access and reference any peer reviewed literature in their review deliberations and report(s). They also may reference other information that the panel deems credible, and include a copy of the other information with their report(s).
- The panel may make on-site visits to gain understandings in topics being addressed and to see, first-hand, the challenges and successes.
- During their deliberations science advisors may (through the TPSN) invite presentations and/or request information through the Institute from MRRIC including member agencies, Corps, or any source that they believe may be of value to their deliberations. The presenters and content of the presentations or information received will be included with their report(s).
- Science advisors may recommend the need for ISR.
- It is anticipated that the Science Advisory Panel will meet with the ISP WG and the Corps periodically during the advisory process and in some cases the MRRIC. These meetings will be open to MRRIC members and the public. Additional questions may be agreed to by the ISP WG/MRRIC and the agencies as the process iterates.

14. Interaction with MRRIC: The Science Advisory Panel will interact directly with the MRRIC at the beginning (soon after the charge is given to the Advisory Panel) of their work on a particular topic and when they are ready to present their draft report and recommendations. The presentations and panel interaction with MRRIC will occur at a regular MRRIC meeting.

15. MRRIC Input/Recommendations: Once the Advisory Panel recommendations are final MRRIC will have the opportunity to develop recommendations on: 1) implementation of the Advisory Panel recommendations; and 2) the socio/economic and Tribal impacts from implementing the recommendations/alternatives presented by the Advisory Panel.

The MRRIC, Corps, the public, the Institute, TPSN, and candidate and selected advisory panelists will follow the above ground rules and communication protocols. The Institute and TPSN should

be alerted to possible violations of the protocols, or to other undue biases or influences immediately. When the violations are related to a panel member's conduct, the Institute and TPSN will assess the situation and act accordingly and then the report back to MRRIC on disposition of the issue. If the violations are related to the MRRIC, the Charter and Operating Procedures will be used to address the situation.

V. FINAL REPORT

The Panel Chair shall be responsible for writing and editing any initial, draft, and/or final reports that are required under the task order. The TPSN should ensure that the report addresses all task order requirements, is thorough, and is understandable.

The TPSN shall deliver a final report. In general, the final report for each task order shall:

1. Summarize the goals and objectives of the charge to the panel, the process undertaken to select any additional advisory panel participants, the participants selected, a brief summary of their qualifications, the information considered by the panel, the exercises completed as part of the process, summary of panel discussion and the results.

2. Include an analysis of the findings including observations of the strengths and weaknesses of the findings and any dissenting opinions.

3. Provide independent opinions and recommendations regarding each task request or question as assigned.

4. Accurately present the views of the entire panel.

5. Be delivered in electronic format as a text selectable "pdf" file (portable document format created with Adobe Acrobat) within the dates established in the task order schedule.

VI. LITERATURE CITED

National Academy of Sciences. 2003. Policy and Procedures on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports. May 2003. Available online at: http://www.nationalacademies.org/coi/index.html

Office of Management and Budget. 2005. Final Information Quality Bulletin for Peer Review. December 16, 2004. Available online at: http://www.whitehouse.gov/omb/memoranda/fy2005/m05-03.pdf