Preliminary Review of Proposed Monitoring Approaches in Support of Adaptive Management of Listed Species

Independent Science Advisory Panel

MRRIC Plenary

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Introductory remarks

- MRRP is transitioning from initial **conceptual** challenges of developing an AM framework (using best available science and expert judgment)…
- To the very real **technical** challenges of implementing management actions and monitoring their performance (using best available science and professional standards of practice).
- Readily available models to guide the design of effective monitoring programs at this scale are virtually non-existent.

Incompatibility of previous monitoring with AMP monitoring

- Minimal foundation in ecology of the species
- Basis for selecting condition indicators unclear
- Absence of causal linkages to help interpret monitoring in relation to goals, objectives
- Absence of decision criteria (trigger values)
- Few linkages between monitoring results and management decisions
- Proposed AMP monitoring programs address these previous shortcomings

AMP proposed monitoring recognizes critical steps to success

- Specify management objectives in terms of measurable attributes
- Identify and justify monitoring state variables (indicators)
- Define spatial-temporal domain of monitored resources
- Specify types and magnitudes of change to detect
- Design corresponding sampling programs
- Specify required accuracy, precision, and statistical power
- Quantify uncertainty
- Define quantitative decision criteria (thresholds, trigger points)

Comprehensive monitoring and relevant scales (geographic and demographic)

- Monitoring in support of specific local MRRMP management actions
  - Performance of target species
  - Changes in habitat quality and distribution
- Monitoring to evaluate the full complement of programmatic management actions (on listed species populations) within the planning domain
- Monitoring beyond the defined planning domain
  - Assess populations across their full ranges
  - Discern the effects of management on survival and recovery

Initial ISAP perceptions of the proposed pallid sturgeon monitoring documents

- PSPAP v. 2.0 and Effectiveness Monitoring documents demonstrate that the pallid technical team proposes to:
  - Monitor pallid sturgeon in relation to management objectives
  - Monitor habitats in relation to age-0 pallid sturgeon catch
  - Monitor at relevant spatial and temporal scales
- Authors recognize need to assess separate pallid demographic units targeted under the MRRMP
- Documents reflect a high-quality first engagement with challenges in implementing an effective monitoring program for the Missouri River
- Physical sciences are well presented and parallel USACE standard methods and approaches
- Detailed data management plans are needed to describe the flows of data among project components

PSPAP V. 2.0 White Paper

- Good initial effort on proposed adjustments of PSPAP for the upper and lower Missouri River
- V. 2.0 perhaps best for estimating sturgeon abundance and linking to stocking. Linkages to other management actions less convincing
- Difficult to determine efficacy of V. 2.0 in measuring increases in age-1 pallid sturgeon
- Success in linking monitoring with population modeling depends importantly on uncertainty associated with estimates of age-0 survival

PSPAP V. 2.0 White Paper - continued

- Bayesian network approach might effectively guide monitoring efforts, but needs process to prevent drifting from fundamental management objectives
- Need to ensure congruence among agencies and stakeholders in achieving the stated fundamental objectives
- Strongly recommend that V. 2.0 extends efforts to include Mississippi River monitoring data to increase likelihood of linking monitoring results to fundamental objectives
- Expansion of V. 2.0 to integrate with Mississippi River monitoring might require focused efforts in relation to budget constraints (e.g., place less emphasis on vital rates that are less important to the population model)

PSPAP V. 2.0 White Paper - continued

- Focus on age-1 and older fish to back calculate recruitment of early life stages could introduce multiple year time lag in evaluating age-0 response to management actions and bias decision making
- Identify source of the basin-specific Poisson distributions for recruitment used in the Bayesian Decision Network

PSPAP V. 2.0 White Paper - continued

- Concerns regarding quality (e.g., power) of legacy CPUE data and its contribution to proposed V. 2.0 monitoring
- Need decision regarding time period for maintaining connection with legacy data
- Suggest further explanation of Figure 1 in relation to projecting pallid sturgeon responses to management actions

Effectiveness Monitoring White Paper

- Thorough and well-written document that is further supplemented with Appendices E.1 to E.6, of which E.1 (IRCs) and E.2 (SWH) are currently available to the ISAP
- Figures and tables present clear pathways to actions on the river that should contribute to adaptive management
- Physical science sections of the document (and Appendices) are well presented and parallel standard USACE approaches
- Would profit from additional description of how the accuracy and reliability of the hydrodynamic models have been evaluated and potentially used for prediction
- As channel form is a function of both hydrology and sediment routing, additional monitoring of sediment dynamics would further inform the AM program

Effectiveness Monitoring White Paper – cont.

- The physical values (i.e., depth, velocity) used to define food producing and foraging habitat need further justification and evaluation
- Consider impacts of time lags in the general linear model for CPUE (Equation 1) for characterizing pallid responses to management actions
- Conduct power analyses to determine detectable change in geomorphology metrics in relation to management actions
- Clearly define what is “biologically significant” in relation to the stated management objectives
- Translocation at Intake could potentially be treated as a new hypothesis, as its inclusion did not follow the same process as the other actions

APPENDIX E.1 – IRC Monitoring

- Proposed measurements of physical responses to habitat modification are well detailed, rigorous, and extensive
- Biological responses limited to only pallid sturgeon ignore lower trophic levels that may dictate much of the sturgeon response to habitat modifications; we suggest commensurate effort on at least invertebrate responses
- Further evaluate the anticipated statistical power associated with proposed monitoring of IRC effects on pallid CPUE (i.e., robustness of the 80% chance of detecting an 80% increase)
- Provide justification for an 80% increase in CPUE as level of detection useful in evaluating management actions
- Consider that the Site x Time interactions could dominate the outcome of the CPUE model, more so than controllable factors such as sample size (e.g., number of trawls)

APPENDIX E.2 – SWH Monitoring

- Better define relationships between newly constructed IRCs and SWH modifications; identify circumstances where SWH modifications will contribute to the pool of IRCs; better define what will serve as reference sites for selected SWH
- The use of BACI for IRCs and (weaker) Before-After for SWH can complicate statistical interpretations; may be preferable to use paired SWH sites (from pool of n=29) in a more robust BACI design
- Demonstrate usefulness of results of SWH modifications (e.g., age-0 survival and growth) toward achieving pallid sturgeon management objectives

Bird Monitoring White Paper

- Encourage development of bird monitoring plan that parallels the structure of documents provided for pallid sturgeon
- Encourage more thorough use of USGS (Shafer 2013) and especially ESSA (Schwarz et al. 2017) reports
- Support use of bird model to guide the design of cost-effective monitoring plan
- Emphasize the importance of monitoring to help improve understanding of relationships between bird population dynamics, habitat, and management actions.

Bird Monitoring White Paper – (scope)

- Expand scope of white paper to address habitat and effectiveness monitoring at appropriate spatial scales
- Improve monitoring of reservoir habitat/populations to get unbiased estimates (historically underestimated)
- Expand scope of model beyond ESH and the Missouri River channel to realistically address abundance and persistence of the N. “Missouri River” plover population
  - Improve modeling of reservoir habitat (area) and population dynamics
  - Incorporate compatible habitat/population data from alkali lakes, apparently an integral portion of the “Missouri River” population
- Identify tasks and timeline necessary to implement these programmatic improvements

Bird Monitoring White Paper – (MRRIC questions)

Does the monitoring plan address the hypotheses/fundamental objectives?

- Yes, USGS, ESSA external reviews of TPMP
- But, modifications to obtain unbiased data, more effectively

Do we have the appropriate hypotheses for Piping Plovers in the AM Plan?

- Yes, general agreement on “first” round of AM
- But, AMP should be able to incorporate new hypotheses if appropriate

Should we be looking at birds that go into Canada as well?

- ??? No evidence to suggest strong connection to “Missouri River” population

Summary and Recommendations

- The pallid sturgeon monitoring documents provide a reliable foundation for and guidance toward implementation of monitoring designs in support of adaptive management of the species
- The monitoring support document for piping plovers and least terns provides the quantitative basis for development of a monitoring framework similar to that now available for pallid sturgeon
- Further development of monitoring documents for fish and birds should adhere to a common template (approach) – guided by management hypotheses – and applied to meet the need to assess project performance, and to provide an ongoing assessment of trends in species distributions, population sizes, and the environmental conditions that affect them