Independent Science Advisory Panel (ISAP)

Review of the MRRP

Biological Assessment and Draft Biological Opinion

22 March DRAFT for MRRIC and presentation at

MRRIC Plenary Meeting, 27 March 2018

Considerations in reviewing the Draft Biological Opinion

- The BiOp is a policy and science document that is supposed to be informed by the "best available science." Guidance for the form and function of BiOps is provided in the *Endangered Species Act Consultation Handbook.*

- Although the handbook describes the obligation for consultations to include an effects analysis, BiOps tend to be weak disclosure documents. They typically do not provide a logic chain that links the best available science to the determinations therein – the jeopardy call(s) and attending RPAs or RPMs, and the Incidental Take Statement.

- The Draft BiOp could be strengthened by making that linkage more explicit; however the ISAP understands that the Service is not necessarily obliged to do so.

... review considerations

- The Draft BiOp would be strengthened for its regulatory purposes with consideration of several additions and adjustments.

- The BiOp needs to define explicitly and rigorously 1) adaptive management and 2) monitoring and assessment to codify those concepts consistent with the SAMP and best professional practices.

- Scientific terminology in the BiOp should be technically accurate, consistent, and reflect its common uses in population biology and in conservation planning applications.

- To the extent practicable, the Draft BiOp text needs to be clarified to make explicit its intent, to emphasize salient technical points, and to provide essential links to the MRRP foundational documents and findings therein.

- The relevance of the information – original and referenced data, analyses, and findings – supporting the determinations needs to be made clear. The BiOp should not appear to be a data dump with asserted management prescriptions at the end.

The form and function of the answers to the task questions

- Answers to the task questions are presented as affirmative observations and concerns that might require corrections or clarification in the final draft of the BiOp. Actionable input in the answers is accompanied with an importance "ranking" – high, medium, low – to convey to the Service the ISAP's sense of the priority of the issue.

- The issues that would benefit from adjustments in the BiOp tend to fall into three categories –

    1. issues that are characterized in the draft BiOp as being certain, but ISAP understands them as being uncertain,

    2. issues that ISAP finds to be mischaracterized in the draft BiOp, but are presented accurately in other MRRP documents,

    3. issues pertinent to the determinations in the draft BiOp that are not presented or are not effectively addressed in MRRP efforts that have preceded the review document.

Not all of the observations in the answers to the task questions require responses or adjustments in the draft BiOp.

The 6 review questions reordered in the ISAP response

- In addressing the overarching original Question #5, **whether the USFWS used the best available science and the appropriate analyses in reaching its conclusions in the Draft BiOp**, the ISAP brings this question to the forefront, and then answers the other five questions that were provided by a collaborative effort of the agencies and MRRIC.

- The answer to that original Question 5 is addressed first in this document, and also implicitly embedded in the responses to the remaining questions. The remaining responses slightly reorder the original Questions to 1, 2, 3, 6, and 4, which the Panel thought made a more logical flow.

Question 5: Did the USFWS use the best available science and the appropriate analyses in reaching its conclusions in the draft BO, explain your response(s)?

- The Draft BiOp, with some revisions as described specifically in the ISAP answers that follow and certain editorial revisions, can be viewed as consistent with the best available science.

- While the ISAP differs with the Fish and Wildlife Service on some of the information presented and the style of its presentation, and even the agency's reasoning on several issues, the ISAP finds no technical flaws that compromise the determinations in the Draft BiOp.

- The Service does not use unreliable data or indefensible findings from previous studies and information syntheses in the Draft BiOp. The Service does not misinterpret standing information in ways that would lead it to flawed jeopardy calls or clearly unproductive RPMs.

- The 'explanations of our responses' are contained in the following specific questions.

Question 1

Using the best available scientific and commercial data, and standards of applied scientific practice, do the BA and draft BO accurately represent the historic and current population status and trends of the listed species and the environmental factors that determine them?

Question 1 -- Piping Plover

- The BA and Draft BO use the best available scientific data to describe the current status of the Missouri River piping plover population.

- Population trends for piping plovers are described in the BA and Draft BO for the period since monitoring was initiated on the Missouri River in 1986.

- Links between plover status and trends and environmental factors are established for that period, including direct links between river flows, habitat dynamics, and plover population size.

- However, population status and trends for piping plovers prior to the initiation of project operations is not known and is subject to disagreement.

- ***The Service should acknowledge in the BO that there are differing views about plover status on the river before the dams, and should present information that supports the hypothesis that project operations have negatively affected plover populations. (Medium importance in the BO)***

Question 1 -- Pallid Sturgeon

- Section 4.3.1 in the BA and section 3.1 in the Draft BO describe the status of pallid sturgeon. Both documents use the best available scientific and commercial data to describe the current status of pallid sturgeon in the Missouri River, including both wild pallid sturgeon and hatchery-origin pallid sturgeon.

- The science reported in the documents refers to publications that include contemporary capture-recapture models to estimate population size. Table 1 in the Draft BO illustrates the status of pallid sturgeon throughout the basin, and acknowledges uncertainties.

- The link between the species' status and trends and environmental factors is not clear, but emerging information supports limited drift distance as the essential factor affecting pallid sturgeon in the upper basin.

- ***Status and trend analyses of pallid sturgeon should include data from the Mississippi River (including the entire Interior Highlands Management Unit). (High)***

- ***Population trend for pallid sturgeon is not well delineated in the BA and Draft BO and should be differentiated between hatchery-origin and wild pallid sturgeon. (Low)***

Question 1 -- Modeling

- Quantitative characterization of plover fledglings and adults exists for the period 1995-2017.
- Increasing or decreasing trends are found depending on the subset of years in historical record.
- Pallid sturgeon abundances are described for Missouri River management at different points in time.
- Table 1 (Draft BO) summarizes hatchery and wild sturgeon based on previous studies, however there is minimal description of population trends.
- PSPAP is identified as the principal source of pallid population trend data.
- PSPAP 2.0 is described as informing the population modeling efforts.
- ***Examine the ability of the population models for birds and pallid sturgeon to reconstruct historical trends in distribution and abundance as a basis for projecting outcomes of management actions. (Medium)***

Question 2

Do the BA and draft BO use the best available scientific and commercial data and appropriate analyses to provide clear evidence and rationale for the analysis of the effects of river operations and management actions on the listed species?

Question 2 -- Piping Plover

- The Draft BO is unclear in its logic regarding 1) analyses that have been conducted to quantitatively assess the effects of project operations on the piping plover, and 2) support for the conclusion that achieving plover management actions would sufficiently mitigate project effects to the point of avoiding jeopardy.

- ***Buenau et al. (2015) analyzed four scenarios (existing conditions, no operations, unregulated, and calibrated target); the results of those analyses could be used by the Service to better support their conclusions regarding project effects, adequate mitigation, and jeopardy avoidance. (Medium)***

- ***The acreage targets for sub-objective 2 (Draft BO Table 3, page 71) differ substantially from targets in the latest version of the Recovery Plan for the piping plover (see USFWS 2016). The disparities are large. The Service should explain/reconcile those respective targets in the BO. (Medium)***

Question 2 -- Pallid Sturgeon

- The effects of Missouri River operations on pallid sturgeon differ with geographic region. The BA and Draft BO used the best available scientific information in describing those effects.

- Given the current state of uncertainty in relating river operations and management on the pallid sturgeon, a Science and Adaptive Management Plan (SAMP) was developed that provides a roadmap for better understanding the factors that influence pallid sturgeon recruitment. The SAMP and the supporting documents were developed using the best available scientific and commercial data and appropriate analyses.

- Continually updating the knowledge of river-operations effects on pallid sturgeon recruitment is fundamental to the BO. The programmatic monitoring scheme, technical team assessments and adaptive management workshops, process for assessing new information, and governance process are essential to the success of the consultation and should be unwaveringly followed.

Question 2 -- Modeling

- The BA relies on previously completed Effects Analysis for pallid sturgeon – Jacobson et al. (2016), plovers and terns – Buenau et al. (2015), and physical modeling – Fischenich et al. (2016)
- Incorporation of these documents into the BA requires reviewers to be familiar with or have ready access to the EAs.
- The Draft BO uses selected data and information from EAs and technical literature to describe potential effects of river management on the listed species.
- Application of the predictive model for ESH in the BA (USACE 2015a) and evaluating extinction likelihoods for plovers in relation to management scenarios (Buenau et al. 2015) is technically defensible.
- Strengths, limitations, and implications of uncertainty have been well articulated for these models.
- Pallid sturgeon management considerations have been addressed more qualitatively, with emphasis on needed Level 1 and 2 work.
- Development of individual-based pallid modeling approach is underway.
- Pallid sturgeon modeling used mainly to inform design of monitoring plans.
- ***Wherever feasible, escalate the pace of Level 1 and 2 studies to support the needed pallid sturgeon modeling of anticipated population outcomes of management actions. (High)***

Question 3

Are there data or analyses omitted by the BA and draft BO that would have a substantial effect on the representation of the status and trends of the listed species and the effects of river operations and management actions on them?

Question 3 -- Piping Plover

- The BA and Draft BO incorporate information from recently completed and ongoing studies that inform the AM planning effort.

- The Draft BO describes emerging data from the ongoing metapopulation study that underscores the importance of plovers in the U.S. alkali lakes region to status and trends (and population persistence) of plovers that nest on the Missouri River.

- Those new data need to be considered in meeting management objectives for the Missouri River.

- ***The BO should state in Conservation Recommendations (page 106) that AM priorities be assigned to monitoring, and to analysis of Missouri River ESH targets based on modeling that considers the entire plover population unit, including birds on river segments, reservoirs, and alkali lakes. (High)***

Question 3 -- Pallid Sturgeon

- Twenty-six percent of 132 publications in a Web of Science search that contained pallid sturgeon or *Scaphirhynchus albus* in the title were included in the Draft BO.

- While it may appear that a small portion of published science on pallid sturgeon was included in the Draft BO, in fact much of the essential literature related to sturgeon status and trends and the effects of river operations was included.

- Several important agency publications were included in the Draft BO, such as Delonay et al. (2009, 2010, 2012, 2014, and 2016) and Jacobson et al. (2016) on the effects analysis and working hypotheses.

- The criteria for personal communication, unpublished information, annual reports, and peer-reviewed publications used in the Draft BO are unclear.

- ***Minimize (or better document) the use of personal communication and unpublished data (e.g., Kynard unpublished data page 28 in the BO); it is not possible to assess the reliability of that information. (Medium)***

Question 3 -- Modeling

- The BA and Draft BO are largely silent on recent Missouri River pallid sturgeon modeling studies (e.g., Wildhaber et al. 2017, 2015; Moran et al. 2016).
- Wildhaber et al. (2017) is mentioned in Draft BO, but the citation is absent from the references section.
- Ongoing interactions among MO River scientists and the adaptive management team and Wildhaber and his colleagues are not evident in BA or Draft BO.
- The previous stage-based pallid sturgeon model is transforming to an individual-based model. The current model application emphasizes efficient monitoring designs, and it has not yet been used to project effects of river management actions.
- Model usefulness depends on results of Level 1 and 2 studies on pallid sturgeon.
- ***Increase transparency regarding collaborations and information among Missouri River pallid sturgeon modeling efforts. Convey applications of available models to project expected outcomes, recognizing the uncertainty, of proposed management actions on pallid sturgeon population dynamics. (High)***

Question 6

Do the BA and draft BO adequately describe uncertainty in the scientific and commercial data, and the effect of that uncertainty in the analysis of the effects of river operations and management actions on the listed species?

Question 6 -- Piping Plover

- The Draft BO identifies sources of uncertainty pertinent in the analysis of effects of management of the piping plover; however, those sources are not described in detail or addressed in recommendations to reduce uncertainty.

- ***The last paragraph on page 69 states that the degree of plover exchange between the northern River and the alkali lakes is not yet understood with the precision needed to inform plover habitat targets. Given the potential importance of this issue, the BO should recommend the development of a monitoring scheme necessary to inform conservation plans. (Medium)***

- ***The fifth item in Conservation Recommendations (page 106) concerning studies to better predict reservoir habitat availability should address not only habitat availability, but the wider range of data gaps that limit the ability to model the dynamics of plovers nesting on the reservoirs. (Medium)***

- Supporting information that could enhance modeling capability regarding reservoir birds can be found in the Recovery Plan for the piping plover (USFWS 2016), which includes an informative discussion of reservoir dynamics and piping plovers (page 73).

Question 6 -- Pallid Sturgeon

- The BA and Draft BO acknowledge uncertainty regarding river operations and pallid sturgeon recruitment – largely referencing the Effects Analysis and the SAMP.

- The BA and Draft BO recognize the great uncertainty concerning the effects of river operations and management on recruitment of pallid sturgeon, hence the need for the SAMP.

- Currently, data are lacking that clearly link river operations to recruitment of pallid sturgeon. The level of uncertainty varies by location in the basin.

- Through the SAMP and the four-level investigation agenda, hypotheses will be evaluated in order to increase reliable knowledge regarding river management on pallid sturgeon recruitment.

- There is an explicit description of uncertainty in the BA and Draft BO regarding the status of pallid sturgeon (confidence intervals on abundance estimates), but that uncertainty is not then related to river operations.

Question 6 -- Modeling

- Uncertainty in the BA is framed largely as incompletely understood or imprecise anticipated outcomes of management actions in relation to species objectives.
- Uncertainty is also discussed in the BA in the context of adaptive management, aimed at increasing accuracy and reliability of projected species outcomes as a function of management actions.
- The Draft BO is largely silent on uncertainty from the perspective of quantitative analysis and modeling – although the Draft BO does note the need to address uncertainty in bird survival rates to better predict the effects of ESH availability on bird population responses.
- ***The BO should characterize the accuracy and precision of physical and ecological models in relation to management actions and environmental variability for factors (e.g. depth, velocity, ESH) that influence the population dynamics of the listed species. That is, address uncertainty as it relates to "signal:noise" in adaptive management for the listed species for the Missouri River. (Medium)***

Question 4

Are river operations and management actions as described in the BA, or if those actions are modified by the draft BO, supported by research, modeling, monitoring, and assessment, as specified in the Science and Adaptive Management Plan, and do they meet the criterion of being informed by the best scientific and commercial data available?

Question 4 -- Piping Plover

- The proposed management actions for plovers, as described in the BA and Draft BO, are well supported by the research and modeling that were conducted during the AM planning effort.

- Monitoring plans for plovers and plover management actions are being developed and have not yet been provided for independent scientific review.

Question 4 -- Pallid Sturgeon

- The BA cites propagation and augmentation actions, population assessment, level 1 and 2 studies, spawning habitat construction, channel reconfiguration for interception and rearing complex habitat, and habitat development and land management on MRRP lands as management actions for pallid sturgeon.

- The Draft BO lists the actions recognized in the BA (section 1.6 Pallid Sturgeon Management Actions and in the Effects of the Action section 4 and 4.2.2, 4.2.4, and 4.2.4).

- Management actions for pallid sturgeon are supported by the best available scientific and commercial data, which is primarily in the form of products from research projects and monitoring program – little information to date is drawn from modeling exercises.

- Adaptive management in the BA (section 3.6) is also based on the best scientific and commercial data; the AM plan establishes a logical framework for addressing the uncertainties associated with river operations and pallid sturgeon recruitment.

- ***The BO should describe the method by which new information, particularly from monitoring, can be incorporated into AM plans to increase the pace of gaining reliable knowledge. (Medium)***

Question 4 -- Modeling

- “The effects determinations, conservation measures, and mitigative actions are informed by the EA completed by Jacobson et al. (2016b), Buenau et al. (2015) and Fischenich et al. (2016). USFWS and USACE have agreed that these documents provide a summary of the best available science and descriptions of management actions hypothesized to benefit the least tern, piping plover, and pallid sturgeon.” (BA p. 153)
- The Draft BO affirms that the completed EAs are based on best available scientific and commercial data.
- The Draft BO recognizes the EAs as evolving studies within the framework of science and adaptive management (SAMP).
- The SAMP provides a formal process for identifying and incorporating new knowledge, data, and information for managing the listed species.