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CESU Interim Report Summary for
Partial Restoration of Natural Hydrology on the Upper Mississippi River System:
An Adaptive Management Approach for Water Level Reductions
W912HZ-09-2-0001

Purpose: The purpose of this report is to suggest an approach for learning more about summer water level drawdowns as a management tool, including where and how drawdowns can be applied most effectively within the Upper Mississippi River System (UMRS).

Location: On the Upper Mississippi River, 28 dams built between Minneapolis, Minnesota, and St. Louis, Missouri, and eight dams built on the Illinois River.

Proposed Methods: Multi-faceted analysis of drawdown impacts.

Anticipated Results: Modeling is recommended as a critical part of adaptive management, and can include conceptual constructs, simulation/numerical constructs, or both. Models provide a vehicle for expressing current knowledge about how a system functions. They serve to document current understanding and uncertainties, and provide a concise way to communicate that information among stakeholders. Predictions and perspectives from modeling can be tested in the field to help determine the effectiveness of drawdowns at achieving specific management objectives. These models (Chapter 2) should be updated as future observations lead to a better understanding of these relationships and effects.

1. The design for study and experimentation to address significant questions and uncertainties regarding drawdown effects (Chapter 3) should derive from the specific conceptual models developed herein (Figs. 5-10), as well as from the "parent" UMRS model (Fig 4).
2. Incorporating pools from northern and southern reaches into the study design (Chapter 3, p. 18)is critical to learning about how drawdowns function under the different environmental conditions encountered in the UMRS.
3. The frequency of repeated drawdowns is a critical question that needs to be addressed in any learning design process. More frequent drawdowns may be more costly, but there may also be positive long-term gains in some desirable responses. We encourage consideration of two potential options for incorporating frequency treatments into an experimental design to address the ecological effects of drawdowns (Chapter 3, pp.19-20).
4. While implementing an adaptive strategy for evaluating effects of drawdowns, unacceptable responses may be identified. Such responses must be acted upon quickly

to avoid unnecessary additional costs or potential damages to the system. When the design has effectively provided enough information to answer critical questions, the design can be modified, including a return to standard dam operation, if desired (Chapter 3, p. 20).

5. Experimental treatment pools must be selected carefully, with consideration given to (a) specific implementation requirements identified to achieve the planned management actions and (b) economic costs and social effects of implementation (Chapter 3, pp. 21-22).
6. When specific treatment pools are chosen for the experimental design, managers must determine the major responses that are of primary concern to them and those that need not be evaluated. We recommend that the details of sampling, including sample size, spatial extent, and analyses, be determined through collaboration among managers, researchers, and statisticians (Chapter 4).
7. For assessing the effects of drawdowns, a reference pool should be as similar as possible to the drawdown (treatment) pool(s), but unaffected by events in the treatment pool(s). The reference pool(s) should provide data on background variability and large scale directional trends during the study period for comparison to the treatment pools (Chapter 3, p. 22).
8. Along with pool-wide adaptive management experiments, specific focused studies may be needed to provide information on mechanisms underlying effects observed through experimental monitoring (Chapter 3, pp. 22-23).
9. Monitoring within the context of learning proposed for drawdowns must provide a basis to address critical questions derived from conceptual modeling. Thus, monitoring should focus more on processes and cause-and-effect relations, rather than monitoring for broad data assemblages. Monitoring variables should provide information on both structure and function of the UMRS, to help better identify mechanisms that underlie drawdown responses (Chapter 4).
10. Given current knowledge, uncertainties, and stakeholder concerns, we suggest that the most critical elements for monitoring relate to determining mechanisms that affect long-term dynamics of aquatic vegetation, mussels, and fish. In addition, some level of monitoring related to long-term effects on forest communities would help determine if repeated drawdowns can affect forest composition and community dynamics (Chapter 4).
11. Information derived from monitoring must be incorporated into new decisions about next-steps in the experimental design and ultimately, into management policies. The process and expected schedule for reporting monitoring results and for decision points should be identified in project planning documents (Chapter 5).
12. Adaptive management requires flexibility in decision making, both administratively and scientifically, to account for variation in system drivers, in funding, or in the time required to generate needed data. Agency procedures need to be flexible to allow for

modifications to projects plans in ways that can overcome obstacles without compromising the ability to achieve project goals (Chapter 5).

13. We recommend that the Decision Support System currently being developed under NESP be used as the primary repository and access point for new information from this and other approaches to achieving ecosystem restoration goals and objectives (Chapter 5).

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Prepared For: USACE

CESU: Great Rivers