

**NATIONAL RESEARCH COUNCIL (NRC) 2010 PRE-PUBLICATION STUDY
MISSOURI RIVER PLANNING: RECOGNIZING AND INCORPORATING
SEDIMENT MANAGEMENT
STUDY RECOMMENDATIONS AND IMPLEMENTATION TASKS IDENTIFIED BY
THE U.S. ARMY CORPS OF ENGINEERS**

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The National Academies (NAS study) provided recommendations to the U.S. Army Corps of Engineers for improved sediment management and adaptive processes in association with the Missouri River Recovery Program (MRRP), including shallow water habitat (SWH) creation projects. Recommendations from the NAS study have been grouped into four categories relating to sediment budget, nutrients, water quality, and adaptive management. Additional NAS study recommendations relating to policies with the Missouri River Recovery Implementation Committee (MRRIC) and setting numeric criteria for nutrients are considered long-term tasks.

I. Sediment Budget: Sediment budgets are a summary of sources and sinks of sediment along a river, and can be useful for management for a number of reasons. For example, at an individual project level, a sediment budget can provide constraints as to how quickly sediment could be added to the river, and on a reach level, could provide context as to what effects there could be in relation to aggrading or degrading areas, tributaries, and other sediment management activities.

Level of detail and accuracy are a key consideration in developing a sediment budget, and availability of existing data can be a limitation. The NAS study called upon the Corps (and USGS) to “develop a detailed Missouri River sediment budget for the headwaters to the river’s mouth.” Depending on the level of detail and geographic scope, given the number of studies and activities involving sediment management, this recommendation could extend beyond MRRP authority. However a sediment budget crafted to evaluate SWH would be beneficial for informing MRRP sediment management decisions.

A tiered approach has been developed for a sediment budget related to SWH creation that would likely be focused downstream of Gavins Point to the mouth of the Missouri River, allowing for completion of easier tasks and planning for ways to improve accuracy in the future.

SB Task #1: Update SWH construction table to include known amounts of sediment inputs through construction and natural development based on best available information, creating a database to track sediment inputs to the Missouri River over time.

SB Task #2: An initial framework for a Missouri River sediment budget will be created using published recent and historical annual loads at major gaging stations, known commercial

dredging quantities, and habitat creation data. Known sediment deposition rates in the mainstem and Kansas River reservoirs could also be incorporated.

In addition to total sediment, bed material loads are of importance to understand the potential to influence the bed of the river. Where possible, a bed material budget could be developed, though it is anticipated that data availability would be a limitation in completing this task.

SB Task #3: Better refinement on a sediment budget could be realized using modeling tools, enabling evaluation of multiple SWH creation projects to identify potential sediment discharge impacts in the navigation reach of the Missouri River from Sioux City, IA to St Louis, MO. Recommendations regarding allowable sediment discharge to the river will be determined using a HEC-RAS SIAM model.

SB Task #4: Related to SB Task #3, programs such as HEC 6T provide additional sediment routing capabilities, and could provide more refinement. This task relates to exploring these more extensive types of options and developing a scope of work for further consideration.

II. Nutrient Studies: The NAS study was focused on upper limit estimates of nutrients anticipated to enter the Missouri River and Gulf of Mexico from Corps SWH creation projects. A system to track actual contribution, at least to the Missouri River, would be beneficial.

NS Task #1: Compile a list of all water quality information by site and populate the spreadsheet identified in SB Task #1 with all available data to facilitate load computations.

NS Task #2: A recommendation of the NAS study also suggested on page 104 to 105 that “Development of numeric criteria for sediment and nutrients should be based on further understanding of the sediment and phosphorus history of the river, and the effects on native species, as that information becomes available through the MRRP and other ongoing studies.” A study to estimate historical background phosphorous levels would be beneficial for evaluating whether differences exist between historical sediments and SWH sites.

However, locating sites to represent natural background levels could be difficult as most areas of the Missouri River floodplain -- current and historic -- have been impacted by humans.

Primarily three things would have the largest impact on phosphorus levels in floodplain soils: 1) alluvial sediments deposited during flooding, 2) agricultural-chemicals applied during farming, and 3) biological activity near the soil surface. Unless large levees are present, nearly all sites in the Missouri River Floodplain have been inundated by flooding, at least during the 1993 flood event. Accordingly, “least impacted” areas would appear to be non-accreted lands that have never been in agricultural production. Engineers and water quality experts will be working with GIS and statisticians to identify and prioritize sites for consideration of natural background

nutrient level estimates, and to determine the number of sites, and samples per site needed to make comparisons to SWH site data. Once completed, publication of the findings will ensure the study can be cited in future documents.

III. Water Quality Monitoring: The NAS study stated on page 107 that “All actions by the Corps of Engineers that discharge sediment to the Missouri River either during project construction or through erosion following construction, should be subjected to monitoring requirements for sediment physical and chemical characteristics. This monitoring should be conducted to ensure that sediment or other pollutants discharged to the river comply with applicable water quality criteria.”

WQ Task #1: Pre-project site characterization through soil, water, and elutriate tests is completed for each site as a part of the NEPA and Clean Water Act compliance in the habitat creation program. The Corps also monitors representative SWH sites after construction to answer key questions such as effects and or benefits of SWH creation on water quality as part of the Integrated Science Program’s Water Quality Monitoring.

IV. Adaptive Management: The NAS study provided several recommendations related to adaptive management, for example on page 74 “At a minimum, it will require a sustained commitment of resources for monitoring and science programs, stakeholder participation and discussions, expert input and advice, and patience in working with large ecological systems and species that do not respond quickly or predictably to management actions.”

- “Develop performance objectives that are based on ecological and biological variables” Pg 74
- “Develop conceptual ecological models” Pg 74
- “Ensure that ecosystem monitoring is targeted to testing of hypotheses derived from the conceptual models” Pg 74
- “Explicitly assess progress of relevant MRRP programs towards achieving the 2000/03 Biological Opinion goal of reducing jeopardy to the three listed species.” Pg 74
- “The ESH (emergent sandbar habitat) and SWH programs, and the suite of new Missouri River system initiatives and studies, thus should formulate alternative actions that eventually may need to be implemented to increase the likelihood of species recovery.” Pg 75

AM Task #1: The Adaptive Management Integration Team (Corps and USFWS) has been developing an overall framework for adaptive management, collaborating with MRRIC on the proposed processes, and working with its partners to develop processes for ESH, SWH, and other aspects of the MRRP. The NAS study provided clarity at a critical time that we were moving in the right direction with our monitoring programs. The Missouri River Ecosystem Restoration Plan (MRERP) is also assessing the current conditions of focal natural resources, including federally threatened and endangered species, and considering stresses on these resources as a foundation for formulating future alternatives for species recovery.