Public Abstract

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Title: Relation of Missouri River Flows to Sandbar Morphology with Implications for Selected Biota

Sandbars provide a variety of aquatic and terrestrial habitats in large rivers important to resident and migratory fishes, invertebrates, turtles, and birds. Channel modification and flow regulation of the lower Missouri River have reduced sandbars and contiguous shallow water, low velocity habitats they provide by over 90%. Resource agencies have identified the need to increase sandbars and their associated aquatic habitats as one of their highest priorities.

Predictive models of sandbar morphometry (area, wetted perimeter, elevation, and water-surface slope) were developed to determine how changes in discharge affect the quantity of submergent-sandbar ATTZ (depth) and emergent-sandbar ATTZ (elevation) for a representative sample of sandbars within a segment of the lower Missouri River. Topographic maps were created for 13 sandbars classified as: point sandbars (formed on the inside of river bends) and wing-dike sandbars (formed behind wing-dikes). River discharge-surface area predictive models of sandbar ATTZ were applied to high- and low-flow scenarios proposed by resource agencies to explore the effect of sandbar habitat availability on foraging of migratory shorebirds and wading birds, nesting of softshell turtles, and nursery of riverine fishes.

Point sandbars were as much as 22 times greater in area than wing-dike sandbars for shallow-water and exposed-sandbar area, but wing-dike sandbars were more abundant, composing 85% of all sandbars in the Grand River to Osage River segment of the lower Missouri River. Reduced summer flows associated with flow-management alternatives GP1528 and GP2021 increased available wetted perimeter in July and August for post breeding wading birds and during the beginning of autumn shorebird migration while also creating more emergent sandbar habitat during softshell turtle nesting. River discharge-sandbar area models indicate management of low summer flows within the current channel could increase sandbar habitat, providing ecological benefits, while maintaining flows necessary for navigation. Results can be used to further understand the effects of river management on sandbar habitat availability and provide guidance in selecting future flow management alternatives to benefit this critical resource.