Evaluation of Sediment Augmentation in the Central Platte River, NE, USA

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The Platte River near Lexington, Nebraska incised due to lack of sediment downstream of an irrigation return that releases sediment-free water into the river channel. Since the start of operations at the J2 Hydropower Return in the 1940s, the river channel downstream of the Return transformed from a braided river planform to a wandering planform. Starting in 2017, the Platte River Recovery Implementation Program, a large-scale endangered species recovery and adaptive management program, implemented sediment augmentation as a management strategy to address the possibility of incision and planform change affecting downstream habitat for target species, including the endangered whooping crane (*Grus americana*). Sediment augmentation included mechanical transfer of terrace sediments into the active channel for immediate mobilization by the river. The cost of this project ranged from $60,000–$260,000 each year. In this study, we evaluate changes during the first five years of sediment augmentation and one year prior to augmentation (2016–2021) to help decisionmakers assess whether to continue sediment augmentation efforts. We evaluate the efficacy with analyses of longitudinal change in sediment volume, river channel elevation, and channel geometry (slope, width, and sinuosity). Aggradational response from augmentation is present immediately downstream of the augmentation area (average 5 in of elevation gain over 1.3 mi), and bed erosion throughout the upper half of the study area decreased by 45–60%. Downstream, the channel remains degradational (average 16 in and 7 in of elevation loss over 1.0 mi and 1.7 mi, respectively) until it rejoins the main channel of the Platte. Within the habitat areas beyond the confluence, we observed relative stability despite the continued sediment deficit. Sediment augmentation is considered successful in this context for a defined distance, but uncertainties remain regarding the persistent sediment imbalance and threat of river incision to downstream habitat areas.

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