Climate Change Benefits from the Horseshoe Bend Engineering with Nature Project


Project Description
During the 1990s, placement of shell material dredged from Horseshoe Bend occurred at eight wetland development sites located along the river’s banklines adjacent to the channel. Capacity of the majority of the placement sites was nearly exhausted by 1998. Thus, to meet the anticipated disposal requirements for future channel maintenance, the US Army Corps of Engineers New Orleans District evaluated three placement alternatives: (1) convert the wetland development sites into upland disposal areas; (2) open water placement of dredged material via a long-distance pipeline into the open waters of Atchafalaya Bay; and (3) mounding of material at mid-river open water placement sites within a 350-acre (142 ha) area immediately adjacent to the navigation channel and upriver of a small naturally forming island. The third alternative was selected on a demonstration basis to investigate the impacts of mid-river placement on shoaling trends downstream of the site. Beginning in 2000, strategic placement of the sediment dredged from Horseshoe Bend occurred at the mid-river open water placement area. Placement of between 0.5 to 1.8 million cubic yards of sediment was conducted every 1 to 3 years which influenced and contributed to the development of an approximately 35 ha island mid-river. The practice of strategically placing dredged sediments upriver of a naturally-occurring island was conducted to aid the island’s growth to produce greater environmental benefits than otherwise would be present using more conventional placement practices.

Goals
The initial goal was to understand why the island formed. To this end, the USACE conducted studies to better understand the hydrology of the river used to transfer the mounded material onto the island. Information regarding ecosystem classification and mapping and floral and faunal composition of the island were conducted to document environmental benefits. Since 2015, the project team conducted additional analyses to identify and quantify climate change, navigation, environmental, and economic benefits.

Climate Change Benefits
Services produced through the creation of Horseshoe Bend Island included carbon sequestration, nutrient sequestration, emissions reductions, research opportunities, and navigation (Table 1). It was estimated that Horseshoe Bend Island will sequester an average of 5.620 kg of carbon per year assuming that this section of the river remains relatively stable well into the future. Emissions reduction realized per year given the amount of fuel saved per trip and the number of trips made each year by tugs and ships is 186 million metric tons of carbon dioxide equivalent (MTCO2e; U.S. Environmental Protection Agency’s conversion of a gallon of diesel fuel to MTCO2e - 0.01217). The island’s sediments are reducing the annual load of nutrient delivered to the Gulf of Mexico by 0.059%, potentially reducing the annual hypoxic zone. The most quantifiable economic value realized is navigational service and maintenance expressed as the reduction in dredging requirements. The three year cost of dredging prior to island creation is valued at $509.9M, and the three-year estimated cost of dredging after island creation is $9.9M. The estimated $12.9M savings translates into $4.3M per year.

Objectives
The objective was to identify and quantify the various climate change and other benefits being realized by applying best practices of beneficial use, demonstrating how dredged material can be used to nourish a naturally-forming river island. Climate change, navigation, environmental, and economic benefits were quantified that are enhancing the coastal Louisiana landscape.

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