4 MINUTE READ

Lower Brule

from **Engineering With Nature: An Atlas, Volume 3.**

by **US Army Engineer Research and Development Center**

Lower Brule, South Dakota, United States

Collaborating with a tribal nation to restore an ecosystem. The Missouri River has historically played a central role in many aspects of life and culture to the Lower Brule Sioux Tribe; however, shoreline erosion and habitat loss have inhibited tribal use and access. To counter these effects, this nation's first Tribal Partnership Program project restored degraded wetland and riparian habitats along almost two kilometers of Lake Sharpe (Big Bend Dam) shoreline and combined ecosystem restoration with natural and nature-based techniques to provide bank stabilization and resiliency. The project included a new boat ramp and recreation site to replace a previous recreation site lost to shoreline erosion and provided members of the tribe with safe access to the Missouri River. In addition, the project protected wastewater lagoons from erosion due to ice shove and wave action that had eroded the shoreline to within 12 meters of the lagoon embankments. The project was approved in December 2019 and promptly proceeded to design and construction. Construction was completed in May 2023, and the five-year plant-establishment, adaptive-management, and monitoring phase is underway. The project was awarded the 2019

Outstanding Planning Achievement Award by the U.S. Army Corps of Engineers (USACE)–Omaha District and Northwestern Division and the 2023 Project Delivery Team of the Year by USACE Omaha District.

Article Cover: Aerial view of the completed breakwater. (Photo by the Lower Brule Sioux Tribe)

Producing Efficiencies

Climate and ice-force data informed the project alternatives' development and evaluation. Data on the forces ice sheets can exert on shorelines and how ice performs when it meets a barrier were used to design the slope and height of breakwaters and address the preservation of natural resources and the resiliency of restored habitats. A climate assessment helped to evaluate risks to project performance from future ice and wave conditions and the climate's effects on the habitat-restoration plantings. Shorter, warmer winters expected in the project area could lead to thinner ice sheets and longer periods of open water and waves.

Aerial view of the preproject Lower Brule shoreline and sewage lagoons. (Photo by the Lower Brule Sioux Tribe)

Preproject erosion impacting a Lower Brule town playground.
(Photo by the Lower Brule Sioux Tribe)

Using Natural Processes

The offshore breakwater creates a 1.5 kilometer-long wetland sheltered from waves and driven ice, which will permit the reestablishment of wetland plant species that are scarce along the otherwise turbulent and turbid shoreline. The wetland is up to one meter deep, and the transitional shoreline zones are being planted in native wetland seeds. Four large box culverts connect the wetlands and Lake Sharpe and allow water to flow freely between them. The resulting exchange of nutrients and aquatic species also helps preserve the wetlands' water quality.

Aerial view of construction of the wetlands area. The ability to safely access and interact with the restored plants and the Missouri River will provide unique opportunities for the Lower Brule Sioux Tribe to pass on indigenous knowledge and traditions to future generations.

(Photo by the Lower Brule Sioux Tribe)

Broadening Benefits

The offshore breakwater helps preserve the shoreline and restored habitats. Its integrated riparian planting bench will hold a strip of native cottonwoods planted to address the loss of thousands of hectares of cottonwood forests. Cottonwoods (*Populus deltoides*) and native plants are used for fuel, medicine, and ceremonial purposes. Reestablishing them will restore some of those activities. The breakwater's threekilometer maintenance trail along the shoreline loops around the wetland and is already a popular hiking path. The project's swim area, boat launch, and picnic area will become a focal point for many tribal and family gatherings for many years.

Construction of the boat ramp and swim beach.
(Photo by the Lower Brule Sioux Tribe)

Promoting Collaboration

This project required the efforts of many leaders over several years. Workshops involving several federal agencies explored authorities that could help achieve the tribe's vision. The Tribal Council and Elders identified the most historically important aspects of the Missouri River ecosystem. Coordination with the Tribal Fish and Wildlife Office and the Tribal Historic Preservation Office was continuous. Tribal, agency, and public meetings gathered insights, and meetings held during review of the draft report gathered feedback on the analysis and recommended plan. Once the project moved into design and construction, the Tribal Wildlife Office's role grew, and their participation was instrumental in its success.

Aerial view of the constructed recreation area and swim beach, respectively. These integrated features will be an essential part of the Tribal community.

(Photo by the Lower Brule Sioux Tribe)

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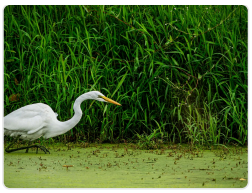

Conclusion

4min pages 292-297

Mayer Ranch

4min pages 288-291

Kaskaskia River Basin

4min pages 284-287

Port of Málaga

4min pages 280-283

Big River at Calico Creek

4min pages 276-279

Shark River

4min pages 272-275

Port Lands

5min pages 268-271

Cape Cod

4min pages 264-267

Newlyn

4min pages 260-263

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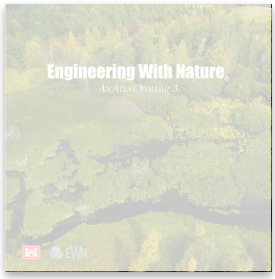

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