

Sediment Changes the Depth and Shape of the Upper Mississippi River



Photo courtesy of Andrew Stephenson

The recently published **Ecological Status and Trends of the Upper Mississippi and Illinois Rivers Report** investigated changes in the distribution of sediment in select backwaters of the Upper Mississippi River. Sediment accumulation has changed the river structure by creating new floodplain land areas and reducing depths in backwater areas. These changes affect the quality and availability of habitat for fish and wildlife.

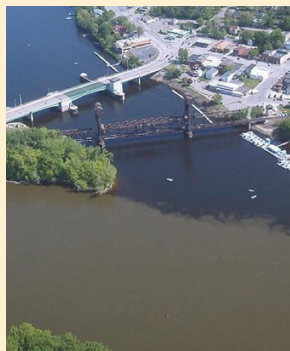
There is more water in the river more of the time.

Flood events are occurring in the river system more often and are more severe than in the past. This can move large amounts of sediment through the river system quickly. Increased discharge may also contribute to greater probability of river bank erosion.

Predicting future changes to river structure and its ecological effects is challenging. Years with high flows are more likely to remove fine-grained sediment from backwater areas while also depositing sediment on the floodplain, creating new land areas.

Why are sediment accumulation and erosion important?

Large rivers change their size and shape over time. Changes in the Upper Mississippi and Illinois Rivers reflect both natural processes and human modifications to the river system. As a result of these structural alterations, the river's hydrological, hydraulic, and sediment dynamics have also changed. These shifts have long been a concern of agencies charged with maintaining and restoring river habitat due to their effects on the quality and availability of habitat for fish and wildlife.



Above: Aerial photo of confluence of Minnesota and Mississippi Rivers with sediment suspension visible.

Photo courtesy of MPCA

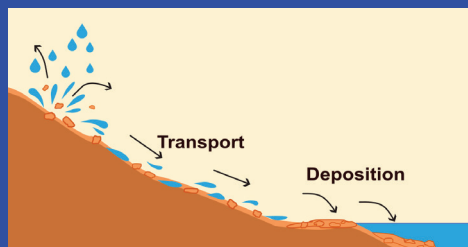
What is sediment?

In rivers, sediment consists of fine particles of sand, silt, and clay that are moved there by wind, water, and ice. Sediment and water interact within a river system in complex ways to affect the amount, quality, and configuration of aquatic and floodplain habitats. For example, sediment distribution across a riverbed changes river depth and sediment particles suspended in the water can affect water clarity, impacting aquatic plant communities.

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How does sediment move in the river system?

Sediment enters the system when soil is carried into the river by water, wind, ice, and other erosional processes. Sediment then continues to move through the river system suspended in the water and along the river bed.



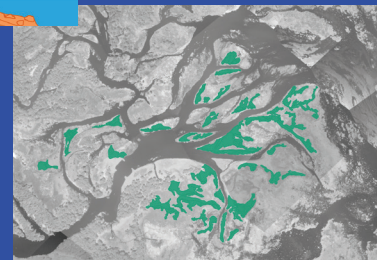
To the Left: Erosion processes transport sediment into and throughout the river system. Deposition occurs when sediment stops moving.

Photo courtesy of Erin Spry

Deposition occurs when suspended sediments sink onto the riverbed or floodplain, filling in channels and lakes and forming deltas, islands, and other landforms.

To the Right: Map shows new landmasses in green formed as a crevasse delta in Pool 4.

Photo courtesy of Molly Van Appledorn and Jim Rogala



Historic erosion and sedimentation

Erosion and sedimentation in the Upper Mississippi River were significantly changed in the middle to late 20th century because of lock and dam construction. Rates of erosion and sedimentation may also be impacted by increased annual rainfall, increased variability in flood severity from year to year, and increases in upland sources of sediment from many tributaries.



Above: Riverbank erosion exposes roots of a cottonwood tree. Photo courtesy of USFWS

How has sediment impacted our rivers?

The report highlights two main findings:

- ▶ Sediment accumulation in backwater lakes can reduce depth of and water flow to these areas, impacting suitable habitat for some fish species, especially during winter months. The loss of uncommon, deep backwater areas (reported for Pools 4 and 8 near Wabasha, Minnesota and La Crosse, Wisconsin) concerns resource managers because of their importance as habitat for fish.
- ▶ Sediment is being deposited on banks in the Upper Impounded Reach, creating critical habitat for shorebirds and waterbirds and providing ideal growing conditions for trees such as willow and cottonwood.

To the Right: Greater yellowlegs at Pool Slough IA.

Photo courtesy of Larry Reis



Looking Ahead

Multiple agencies continue to monitor changes to the size and shape of the river, which can help predict future habitat availability for aquatic and floodplain plants and wildlife. Additional research on sediment, erosion, and deposition in the Upper Mississippi River System will be important for managing and improving the health and function of this complex ecosystem.