
**POTENTIAL IMPACTS FROM OPERATION
AND MAINTENANCE ACTIVITIES ON THE
9-FOOT NAVIGATION CHANNEL, MISSISSIPPI RIVER,
KEITHSBURG, ILLINOIS**

BLACK SANDSHELL MUSSEL
(Ligumia recta)

and

BUTTERFLY MUSSEL
(Ellipsaria lineolata)

CONSERVATION PLAN
JUNE 2009



**US Army Corps
of Engineers** ®
Rock Island District

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I. BACKGROUND

The U.S. Army Corps of Engineers, Rock Island District (District) is directed by Congress to maintain a 9-foot navigation channel on the Upper Mississippi River (UMR). The bottom sediments of the UMR are in a dynamic state, moving and rearranging as a result of natural fluvial processes.

The main channel in this reach of Pool 18 is attempting to reach from the right descending bank to the left, which flows into the head of Mapes Island and causes loss of island habitat. As the river water volume decreases in the main channel, river bed sedimentation settles out in the navigation channel. This region of Pool 18 has two chronic dredging areas, which continue to require dredging on an almost annual basis.

In order to direct flow into the main channel; reduce sediment accumulation in the main channel; and prevent further erosion into Mapes Island, the District is proposing a channel stabilization project composed of five segmented offshore rock structures and the placement of riprap along Mapes Island in Pool 18 of the Mississippi River [River Miles (RM) 426.8 – 427.2] in Mercer County, Illinois, near Keithsburg. The offshore protection structures in the main channel border, including areas between the navigation channel and the riverbank, would divert water flow like a wingdam toward the main channel. The increased flow into the main channel would decrease the dredge frequency in this chronic dredge area by preventing sediment from settling out. Channel borders often contain channel training structures, i.e. wing dams, closing dams, and chevrons, that can provide a diversity of biota and habitat, including many combinations of depths, substrate types, and velocities. Additionally, the structures would protect the head of Mapes Island from continued erosion, allow for sediment deposition behind these structures, and re-establish the head of the island.

II. COORDINATION

During the District's normal National Environmental Policy Act (NEPA) coordination effort with appropriate natural resource agencies regarding this proposed action, it was discovered that the proposal had the potential to impact two Illinois state-listed species of freshwater mussel: the black sandshell mussel (*Ligumia recta*) and the butterfly mussel (*Ellipsaria lineolata*).

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Through subsequent telephone conversations, meeting, and letters with the Illinois Department of Natural Resources (IDNR), Office of Resource Conservation; the IDNR, Division of Natural Heritage; and the IDNR, Office of Realty and Environmental Planning, it has been concluded that the District's proposed actions could result in the incidental taking of an undetermined number of black sandshell and/or butterfly mussels. Consequently, the District is required to write a Conservation Plan (CP) describing how to mitigate and compensate for the loss, or mortality. If this CP is approved by the IDNR, Endangered and Threatened Species Program, the District would receive Incidental Take Authorization, which would allow the construction of five segmented offshore rock structures and the placement of riprap along Mapes Island after an approved Environmental Assessment (EA) is written for Mapes Island.

III. PROJECT LOCATION

The placement of off-shore rock structures on historic placement sites and the riprap on Mapes Island head are in Pool 18 of the Mississippi River, RM 426.8 – 427.2 in Mercer County, Illinois, near Keithsburg (figure 1).



Figure 1: Project Location

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IV. BIOLOGICAL DESCRIPTION

Black sandshell mussel (*Ligumia recta*). The black sandshell is an Illinois state-threatened species of mussel that is known to occur in 23 counties. Associated habitats typically include shorelines, large lakes, medium rivers, large rivers, a moderate gradient, and gravel to firm sand. Adult mussels are filter feeders and usually feed upon plankton and detritus from their aquatic environment. Butterfly mussels bring water from their habitat into their shells through specialized regions that are similar to the true siphons of clams. The water is then filtered over its gills and food particles are trapped and eventually digested. The reproductive cycle of the species relies on host fish such as black and largemouth bass, bluegill, sauger, walleye, and white crappie. The mantle lure of the female is very large and active, and the marsupial gill is stark white. The predator fish attack the lure, rupturing the marsupia that lie between the mantle flaps and releasing the glochidia. Once matured, the glochidia fall off the host fish onto the water body substrate. Potential threats to black sandshell populations include altered hydrologic regimes, altered sediment loads, dams, dredging and channelization, invasive plants and animals, and pollution. Recently, studies suggest species decline could, in part, be due to due to zebra mussel infestation.

Butterfly mussel (*Ellipsaria lineolata*). The butterfly mussel is an Illinois state-threatened species that is known to occur in 14 counties. Butterfly mussel populations reach its greatest abundance in large rivers in stretches with pronounced current and a substrate of coarse sand and grave, sometimes at a depth of 20 feet. Typically, the species is truncate and heavy shelled species, light yellow to brown, with rows of eye-like spots radiating outward from the umbo. In larger individuals, spots may appear as faded dark lines or rays. The butterfly mussel is a small to medium-sized freshwater mussel that is sexually dimorphic. Male Butterfly mussels release sperm into the swift current of a medium to large-sized river. Sperm enters females through siphon-like regions and fertilization of eggs occurs within female shells. These fertilized eggs develop into special larva called glochidia. Glochidia continue to develop and are released into the water column when fully matured. The parasitic glochidia must find and attach to the gills or fins of the appropriate host fish, usually freshwater drum, green sunfish, or sauger. Juvenile mussels release from the host to find a suitable substrate, often the gravel or sand bottom of a river. Threats to the butterfly mussel are similar to the black sandshell, with human alteration of the environment, water pollution, and invasive species as possible reasons for declining populations.

V. DISTRICT'S TAKING ACTIVITIES

Within the District's Mapes Island proposal, there are two activities that could be potential "incidental takers" of Illinois state-listed threatened black sandshell and butterfly mussels. The construction of five segmented offshore rock structures and the placement of riprap along Mapes Island have the potential to cause some mortality (incidental taking) during the construction phase of the project. While the rocks directly involved in the placement of riprap along the island head is not likely to impact mussels, the boats and equipment used to place the rock could potentially crush, bury, or kill individual mussels as they approach the shallow water areas surrounding the island's northwest

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bankline. Mussels inhabiting historic rock placement sites could be crushed and killed when the segmented offshore rock structures are constructed on those sites. As a goal of this project, island habitat and wetlands would be restored at the head of the island. As some of the area behind the offshore structures slowly shoals in, some mussels may not be able to migrate to alternative suitable habitat, which may lead to additional mussel mortality.

VI. QUANTIFICATION OF TAKE

The total number of mussels currently inhabiting the project area is unknown. From a cursory mussel survey performed on August 24, 2006 by Robert Schanzle of the Illinois Department of Natural Resources, 275 individuals were recovered within the project area (table 1). Of those individuals, one black sandshell and six butterfly mussels were discovered from a 60-minute hand picking in the shallows of the island head. Only portions of the proposed 9 acres of the total project area were surveyed, so accurate mussel population estimates do not exist. Therefore, it is impossible to accurately predict the number of individual mussels that could be impacted by the proposed action at this time.

Table 1. Mussel Survey Summary

Species	Common Name	Number Collected By Method		
		Method A 60 minutes hand picking in shallows at head of island	Method B Ten 3-minute trail hauls (8 riverward of island head, 2 in chute).	Method C Four 10-minute scuba dives riverward of island head
<i>Amblema plicata</i>	Threeridge	22		2
<i>Arcidens confragosus</i>	Rock			1
<i>Ellipsaria lineolata</i>	Butterfly ¹	6		
<i>Lampsilis cardium</i>	Plain pocketbook	6		6
<i>Lampsilis siliquoidea</i>	Fat mucket	5		
<i>Ligumia recta</i>	Black sandshell ¹	1		23
<i>Obliquaria reflexa</i>	Threehorn	104	8	6
<i>Obovaria olivaria</i>	Hickorynut	25	1	7
<i>Quadrula metanevra</i>	Monkeyface	7	1	2
<i>Quadrula nodulata</i>	Wartyback			6
<i>Quadrula pustulosa</i>	Pimpleback	23		3
<i>Quadrula quadrula</i>	Mapleleaf	9	1	
<i>Cumberlandia</i>	Spectaclecase ²	4 ³		

¹ Illinois State -listed Threatened Species

² Federally listed Threatened and Endangered Candidate Species

³ The mussel finds were comprised of dead material.

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During the spring of 2009 and prior to initiation of project construction, the District will work with local natural resource agencies to survey the island head and historic rock placement sites to more accurately indentify and quantify mussel species and establish an overall mussel population estimate.

The District does not anticipate a reduction in the likelihood of survival for the black sandshell or butterfly mussel in the wild within the state of Illinois. There currently are black sandshell occurrences in 23 counties and butterfly mussel occurrences in 14 counties. The black sandshell is associated with habitats typically composed of shorelines, large lakes, medium rivers, large rivers, a moderate gradient, and gravel to firm sand. The butterfly mussel populations reach its greatest abundance in large rivers in stretches with pronounced current and a substrate of coarse sand and grave, sometimes at a depth of 20 feet. The typical habitat of neither mussels of concern would be greatly reduced as a result of this project.

VII. MITIGATION MEASURES

The District has no plans to restrict the location of riprap or segmented offshore rock structures placement in order to minimize the number of black sandshell and butterfly mussels potentially impacted from the direct placement of rock during construction. The District anticipates possible mussel fatalities attributed to habitat loss, as sediment accretes behind the offshore structures. Therefore, modifications were made to the design of the proposed offshore protection structures and to the project implementation process in order to minimize impacts to mussel resources.

In the planning process, the District collaborated with natural resource agencies to identify resources of concern. Once mussel survey results, which denoted mussel resources within the project area, were received, the original plans were modified. The original proposal consisted of constructing a solid offshore protection structure along the historic island footprint on historic rock placement sites, and dredge material placement behind the rock structure to recreate historic Mapes Island. Plans were modified to change the solid offshore rock structures to segmented structures, which would allow for some water and sediment to flow into the area behind the rock structures, creating both shoaling for island recreation and scouring for fish habitat. To allow for natural mussel migration, no dredge material would be placed behind the offshore rock structures. The island would be allowed to slowly accrete and form island habitat, thus giving mussels time to relocate. Just north of the project area, along the left descending bank near Keithsburg, there are known mussel beds and a healthy population. South of Mapes Island, along Willow Bar Island, surveys indicate a healthy mussel population and suitable habitat. With suitable mussel habitat located both up and downstream of the project area, the District anticipates some successful mussel migration from Mapes Island to adjacent mussel beds.

To further minimize potential impacts to mussel resources, implementation of construction and the construction process has been altered. When possible, rock placements would take place under high

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water conditions, presumably in the spring time frame. High water would provide more water depth and distance between the construction machinery and the river bottom, thus decreasing the likelihood of mussels being crushed or smothered by sedimentation.

Construction of the riprap along the current island head bankline would be initiated by setting up crane barges along the northeast or southwest side of Mapes Island and then using end loaders and excavators to move the rock down the bankline from that loading zone. Rock would be incrementally added along the bankline, from the starting point of the crane barge, until the island head riprap protection is completed, approximately 1,725 feet or 3,500 tons of inert and uncontaminated limestone/dolomite rock. To get rock for riprap work to the island bankline alongside the crane barge, low draft barges would be used. In areas of low water depth, subject to both river stage and river bottom topography, low draft barges would operate. The District will use hydrographic surveys to specify which size and draft of barges will be allowed for each loading zone.

For the placement of 84,040 tons of Class D inert limestone/dolomite rock on historic offshore rock placement sites, crane barges and boats would be stationed along the outside edge of historic sites. With water depths during flat pool averaging 6 to 10 feet and construction proposed to take place mostly during high water stages, the District expects no impacts on mussels beyond the direct mortality resulting from rock placement onto individuals during rock structure construction. To further reduce mussel mortality, rock would be placed along the outside ring of the historic placement sites.

Working with local natural resource agencies, the District will survey the historic island head and historic rock placement sites to more accurately identify and quantify mussel species and establish an overall mussel population estimate prior to initiation of project construction in the spring of 2009. Based on mussel survey findings, the District will relocate mussels to suitable habitat near the project site. Suitable habitats will be identified in advance of the relocation by cursory hydrographic and mussel surveys of other like areas within Pool 18. Following consultation from local natural resource agencies, primarily the Illinois Department of Natural Resources, the District will relocate mussels from the project area to the area identified as suitable placement habitat. Once relocation of the collected mussels within the project area is complete, the District is not planning to monitor the relocated population for mortality or relocation success.

VIII. ALTERNATIVES CONSIDERED

Alternative sites for riprap and training structure placement were not addressed in the project EA because alternative sites would not meet the project objectives for the creation of island habitat at the historic island location. In addition, any alternative location upstream of the island would require a sizable increase in rock structure size, which would in turn produce a larger footprint with greater potential environmental impacts; require more tonnage of rock; and be at a substantially higher construction cost. Hydrologic modeling was performed to determine the best configuration and rock structure placement for the preservation of the main channel and the prevention of further erosion to

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the island, with results supporting an upgrade of the existing rock structures that are currently under water and no longer effective.

For the No Action Alternative, no segmented offshore protection structures would be placed on the historical placement sites and no riprap would be placed along the bankline of Mapes Island. Erosion processes currently affecting the head of Mapes Island would continue to destroy island habitat. Under present conditions, the threat of the river cutting completely through the island and flowing into the current backwater area of Mapes Island exists. The main channel would continue to fill with sediment and require future dredging along with potential associated environmental impacts. In the event of sand bar creation within the navigation channel, costly emergency action would be needed, possibly new construction or modification of existing channel training structures and dredging. The No Action Alternative is not a feasible alternative since it would be contrary to the Congressional mandate to maintain the 9-foot commercial navigation channel.

Alternatives explored for this proposal include construction of both segmented offshore rock structures and placement of riprap; construction of segmented offshore rock structures only; and placement of riprap only. Alternatives were evaluated using the following project criteria:

- provide for commercial navigation with the 9-foot navigation channel on the Mississippi River in a cost effective manner;
- create habitat diversity in the main channel border;
- create potential fish overwintering and rearing areas;
- create island habitat at historic island locations; and
- protect the existing island shoreline from ongoing erosion.

The District's preferred alternative for this project, based on objectives, is for the construction of segmented offshore rock structures on historic placement sites and the placement of riprap on the current island bankline.

IX. IMPLEMENTING AGREEMENT

T. Leo Keller, General Biologist, Rock Island District Corps of Engineers, Environmental Analysis Section, is the author of this CP and will be the primary author/compiler of the EA for the Mapes Island project. The EA for this project is scheduled to be released for public review in the spring of 2009.

Kenneth A. Brenner, Committee to Assess Regulatory Structures Coordinator, Rock Island District Corps of Engineers, will be responsible for the construction of the segmented offshore rock structures and the placement of riprap for the Mapes Island project.

Joseph A. Kath, Endangered Species Project Manager, Division of Natural Heritage, Illinois Department of Natural Resources, will be responsible for reviewing this CP for adequacy. If found

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adequate, Kath will be responsible for will be responsible for issuance of Illinois Department of Natural Resources Incidental Take Authorization to the District.

Robert W. Schanzle, Permit Program Manager, Office of Realty and Environmental Planning, Illinois Department of Natural Resources, will be responsible for mussel survey and relocation consultation to the Rock Island District Corps of Engineers.

X. ENVIRONMENTAL COMPLIANCE

An EA is being written for the District's proposed Mapes Island project, with a tentative Finding of No Significant Impact signing date of July 2009. Natural resource coordination was initiated by the District with appropriate state and Federal natural resource agencies through a letter dated December 12, 2008. A response by the IDNR to that letter was the catalyst for this Conservation Plan.

In order to act in accordance with with Illinois State Endangered Species laws, this Conservation Plan was created by the District.