# UPPER MISSISSIPPI RIVER RESTORATION
# FEASIBILITY REPORT
# WITH INTEGRATED ENVIRONMENTAL ASSESSMENT

## GILEAD SLOUGH
## HABITAT REHABILITATION AND ENHANCEMENT PROJECT

**POOL 25, UPPER MISSISSIPPI RIVER MILES 253-248**
**CALHOUN COUNTY, IL**

Appendix C: Biological Assessment

US Army Corps of Engineers
St. Louis District

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Upper Mississippi River Restoration
Leading·Innovating·Partnering

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# 1 INTRODUCTION

The Upper Mississippi River Restoration (UMRR) Gilead Slough project area is located along the east bank of the Mississippi River Pool 25 between river miles (RM) 253 - 248 in Calhoun County, Illinois (Figure 1). This property is General Plan (GP) Lands owned by the USACE and is managed by the U.S. Fish and Wildlife Service (USFWS) through a cooperative agreement. The USFWS currently manages this site as a National Wildlife Refuge. The study area is located in Pool 25 within the Lower Impounded Cluster as identified by the Habitat Needs Assessment II (HNA-II).

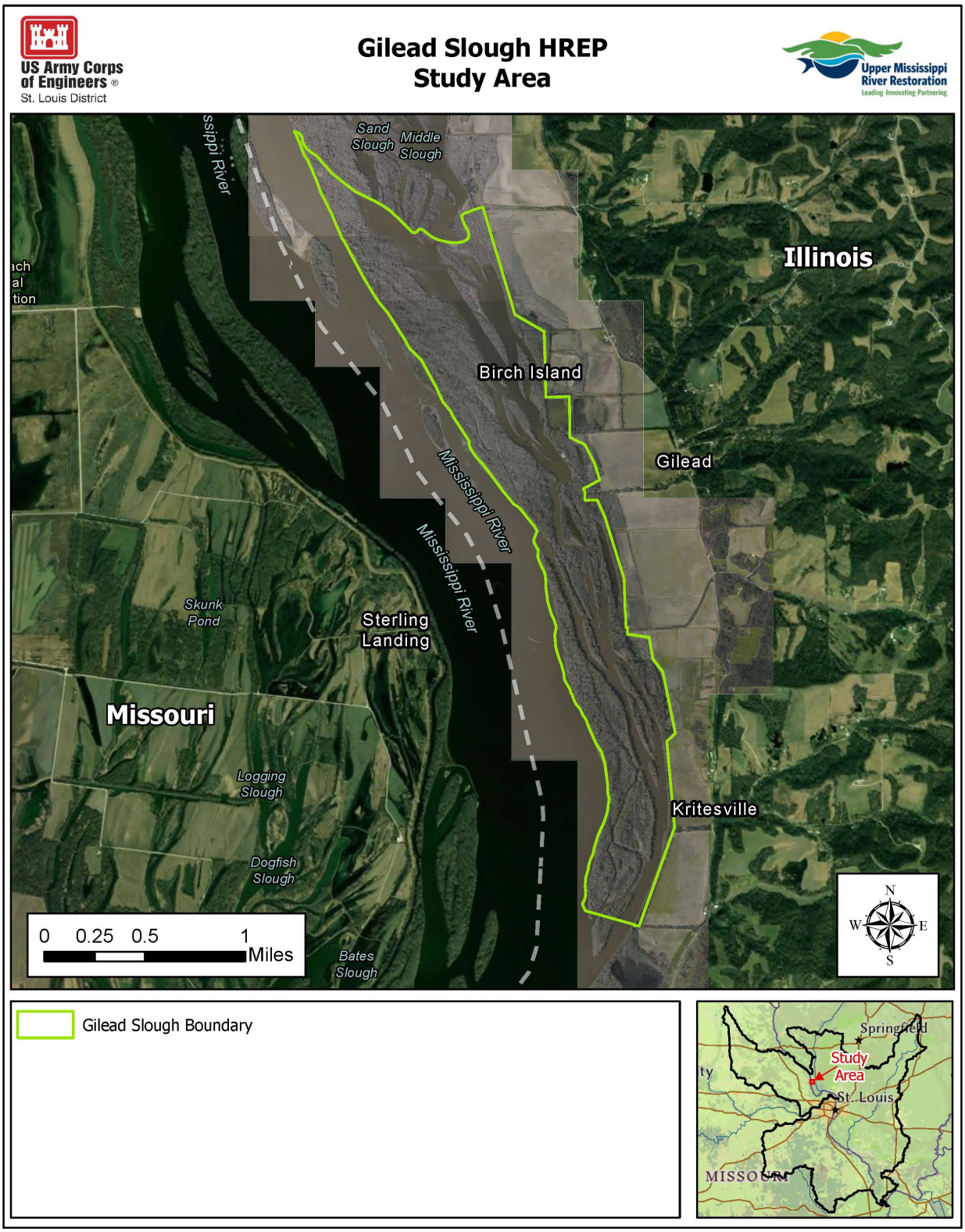


**Figure 1.** Project Location Map

## 2 PURPOSE

The purpose of this Biological Assessment is to describe the habitat requirements of listed species and to evaluate the impacts to these species as a result of the implementation of the proposed alternatives. Each species will be given an effect determination based on the type of impact and the availability of suitable habitat within the project areas. Informal consultation with the USFWS will be entered into should any of the measures result in a "may affect, not likely to adversely affect" (NLAA) determination.

## 3 PROPOSED ACTION

Measures deemed feasible were carried forward for consideration in the development of alternatives. Alternatives are combinations of measures that contribute to attaining the planning objectives. Measures were combined based on appropriate dependencies and exclusivities. There are four alternatives proposed for the project:

- **No Action Alternative:** This alternative is defined as the alternative in which no federal action takes place. The future without project (FWOP) condition would be anticipated as a result of no federal action.

- **Maximum Habitat Benefit:** This is the alternative that maximizes habitat improvements and gets the habitat closest to optimal functionality in both aquatic and terrestrial areas. Measures included in this strategy address project problems statements to the greatest extent. Measures include
    - Enhancing river substrate using gradual slope revetment (GSR) along a shoreline protection/sediment deflection berm that will preclude future sediment from impacting the project area up to a ten-year event.
    - Enhancement of moist soil habitat (MSU) by constructing a wetland area controlled by a water control structure with a pump to provide precise water level management for moist soil vegetation production.
    - Enhancing bathymetric diversity, thermal refugia, and providing access between backwaters and side and main channels by excavating deep-water pockets and connections to join the various habitats.
    - Creating substrate and flow diversity by placing various rock structures within the side channels such as scour structures, hard points, and barbs.
    - Restoring lost side channel habitat by reconnecting the side channel to the main channel just downstream of the Red's Landing and Gilead Slough boundary berm.
    - Creation of a riverine island that will undergo early forest succession after allowing pioneer species to populate.

- **Intermediate Habitat Benefits:** This alternative strategy focuses on measures that improve the structure and function of the existing conditions while prioritizing measure configurations that have the most efficient use of unit size to realize benefits.
    - The intermediate alternative includes every measure from the maximum with some exceptions. It will not utilize a pump in the moist soil unit – utilizing a stop log structure to achieve water level management through a more passive means. The intermediate will also not include a side channel connection in the upper portion of Gilead Slough – this will give more preference to backwater habitat rather than more than side channels habitat, which is a more limited resource in the lower impounded portions of the Mississippi River as well.

- **Minimum Habitat Benefit:** This alternative strategy identifies the smallest (least cost) plan resulting in minimal improvements towards each project objective while making a measurable and cost-effective improvement to existing conditions.
    - The minimum includes every measure from the intermediate alternative with the exception of the following: there will be no moist soil unit creation (neither active or passive), no hard points, no island creation, bank protection, or substrate diversity.

# 4 SPECIES LIST AND CRITICAL HABITAT CONSIDERED

In compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, a list of species and critical habitat was acquired from the USFWS Information for Planning and Conservation (IPaC) website on 4 September 2025 (Project Code: 2024-0097216) for the Proposed Action Area. The IPaC report included a total of six species; two endangered, one proposed endangered, one threatened, and two proposed threatened species (Table 1). The IPaC Report is also included in Section 5.1, Appendix A: Coordination, for reference.

**Table 1.** IPaC list of federally listed species potentially located in the vicinity of the Project Area

| **Common Name (*Scientific Name*)** | **Classification** | **Habitat** |
|---|---|---|
| Indiana Bat *(Myotis sodalist)* | Endangered | Hibernates in caves and mines. Maternity & foraging habitat includes small stream corridors with well-developed riparian woods, upland & bottomland forests. |
| Tricolored Bat (*Perimyotis subflavus*) | Proposed Endangered | Roosts among live and dead leaf clusters of live or recently dead deciduous hardwood trees in summer and fall. Hibernates in caves and mines in winter. |
| Spectaclecase (mussel) (*Cumberlandia monodonta*) | Endangered | Found in large rivers where they live in areas sheltered from the main force of the river current. Often clusters in firm mud and in sheltered areas, like beneath rock slabs, between boulders and even under tree roots. |
| Monarch Butterfly *(Danaus plexippus)* | Proposed Threatened | Grassland and other herbaceous dominated habitats with Milkweed resources during the breeding life stage and similar habitats with abundant nectar resources during breeding and migration life stages. Overwintering occurs outside our region and must provide specific roosting microclimate conditions. |
| Western Regal Fritillary (*Argynnis idalia occidentalis*) | Proposed Threatened | Restricted to remnant prairies, slightly degraded prairies, pastures, and old fields with abundant violets. |
| Decurrent False Aster (*Boltonia decurrens*) | Threatened | Disturbed alluvial soils. Moist, sandy floodplains and prairie wetlands along the Illinois River and a small portion of the Mississippi River primarily above the Missouri-Mississippi River confluence. |

### 4.1 Indiana Bat

During late fall and winter, Indiana bats hibernate in caves and mines. During the spring and summer, Indiana bats roost in trees. Suitable roosting trees can be alive or dead, but all would have loose, exfoliating bark, holes, and other damage that can be used by a roosting bat. These damages allow bats to crawl inside and be sheltered from predators and weather. Indiana bat roost trees are typically at least five inches in diameter at breast height (DBH) with suitable roosting characteristics (U.S. Fish & Wildlife Service, 2022). Preferred roost sites are in forest openings, at the forest edge, or where the overstory canopy allows some sunlight exposure to the roost tree, which is usually within one km (0.6 mi.) of water. Indiana bats forage for flying insects (particularly moths) in and around the tree canopy of floodplain, riparian, and upland forests (U.S. Fish & Wildlife Service, 2024). The most significant threat facing Indiana bat populations today is white-nose syndrome (WNS), a fungal disease. Other major range wide threats to the Indiana bat include habitat loss/degradation, forest fragmentation, winter disturbance, and environmental contaminants (U.S. Fish & Wildlife Service, 2024). The forested areas within the Gilead Slough project area do contain suitable summer roosting and overall foraging habitat.

### 4.2 Tricolored Bat

Tricolored bats were formerly called Eastern Pipistrelle. Tricolored bats are usually found roosting singly, only sometimes in pairs or clusters of up to a dozen individuals. In winter, tricolored bats hibernate in caves. They prefer caves that are humid and warm. In summer, they leave their hibernation caves and roost in trees amongst dead leaves, in crevices in cliffsides, and in human-made structures. They also sometimes roost in caves during summer. Tricolored bat forages for insects high in the air along forest edge and the boundary of streams or open bodies of water. Tricolored bats mate during spring, fall, and sometimes in the winter. Maternity colonies begin forming in mid-April and females bear one to two pups by late May to mid-July (Missouri Department of Conservation, 2022). Similar to the Indiana bat, summer roosting and foraging habitat exists in the forests within the Gilead Slough project area.

### 4.3 Spectaclecase Mussel

The Spectaclecase is a large mussel that can grow up to nine inches in length. The shape of the shell is elongated, sometimes curved, and somewhat inflated, making the mussel resemble a case for spectacles. Spectaclecase are found in large rivers in segments that are sheltered from the main current where they cluster in firm mud beneath rock slabs, boulders, and in-between tree roots. There are a variety of conservation concerns for the species, including small population size, sedimentation, pollution, channelization of rivers, and the invasive zebra mussel. Conservation efforts for this species include preventing the spread of invasive species and conducting monitoring and research on existing populations (U.S. Fish & Wildlife Service, 2019). The lotic habitat in the southern portion of Gilead Slough is likely suitable habitat for Spectaclecase mussels as there is adequate connection the main channel of the Mississippi River, and the side channels contain old revetment that meet the description of suitable habitat.

### 4.4 Monarch Butterfly

The monarch butterfly is a large orange butterfly that is a candidate for listing on the Endangered Species List. Monarch populations of eastern North America have declined by 90%. Much of the monarch butterfly's life is spent migrating between Canada, Mexico, and the United States. Monarchs do not overwinter in Illinois or Missouri. The monarch occurs in a variety of habitats where it searches for its host plant, milkweed. Of the over 100 species of milkweed that exist in North America, only about one fourth of them are known to be important host plants for monarch butterflies. Three factors appear most important to explain the decline of Monarchs: loss of milkweed breeding habitat, logging at overwintering sites, and climate change and extreme weather. In addition, natural enemies such as diseases, predators, and parasites, as well as insecticides used in agricultural areas may also contribute to the decline (U.S. Fish & Wildlife Service, 2021). Monarchs could use the open areas in Gilead Slough during migration, but do not overwinter in the state. Breeding populations could occur anywhere host milkweed is present.

### 4.5 Western Regal Fritillary

In Illinois, this butterfly occurs in prairie habitat, especially sand prairies and open sand savannah. Is also known to occur in dry, sandy habitats, prairie restoration areas, and remnant prairie. Requires violets for larval feeding and is closely associated with populations of violets. Adults require nectar plants for feeding and tall prairie grasses and scattered shrubs for resting. Avoids forested areas and open areas that do not support prairie grasses. Adults rarely use forested areas or areas that lack prairie grasses. Most individuals spend their entire lifecycle within a few miles of the patches of violets where females lay their eggs (Moorehouse, 2022). Suitable habitat is not present on Gilead Slough. The area is mostly

forested, and the open areas lack the prairie grasses and violets preferred by western regal fritillary.

### 4.6 Decurrent False Aster

The decurrent false aster is a perennial floodplain plant of open, wetland habitats, and its distribution includes St. Charles County, MO, and Madison and St. Clair counties, IL. Currently it is found most often in old agricultural fields and along roadsides and lake shores where alluvial soils have been disturbed. This plant is an early successional species that requires either natural or human disturbance to create and maintain suitable habitat, as well as high light requirements for growth and seed germination. Shading from other vegetation is thought to contribute to its decline in undisturbed areas. Seeds of this plant can be dispersed by flooding or carried by wind and animals. Decurrent false aster is predominantly located on old or mowed fields, in wetlands, or on the edges of active fields, farm facilities, golf courses, or a railroad right-of-way. Conservation concerns include habitat loss, siltation, and herbicide contamination (U.S. Fish & Wildlife Service, 2019). The open, disturbed areas at Gilead Slough could provide suitable habitat for decurrent false aster, but there are currently no known populations in the area.

## 5 EFFECTS ANALYSIS

### 5.1 No Action (Future Without Project Conditions)

The bat species may be beneficially affected should the floodplain forest communities at Gilead Slough continue to degrade into the future. However, these impacts would not necessarily be a result of the No Action, as limited forestry management would continue regardless of whether an alternative is selected. Timber in the north area of Gilead Slough may continue to experience higher stress and mortality because of the high sedimentation rates that will begin to impact drainage, resulting in some extended periods of inundation in forest stands; and the encroachment of invasives species such as Japanese hops. This would temporarily provide more standing dead timber for bats to utilize, providing beneficial uplift.

Spectaclecase mussel status in the study area would likely remain similar to existing conditions. The river channel habitat adjacent to the study area is currently considered suitable and is unlikely to change over time.

Monarch butterfly may be adversely affected if the continuing spread of invasive species reduces the availability of nectar sources, but invasive species control would continue, even in the FWOP condition. Western regal fritillary status is likely to remain similar to existing conditions as suitable habitat is not present currently and will not develop on the study area. In both the FWOP and the FWP condition, the existing open areas would gradually reforest over time, reducing the area of open fields for foraging butterflies.

Decurrent false aster does not occur on Gilead Slough, but could become established sporadically after future disturbance events, but this would not be related to the FWOP. Decurrent false aster status is likely to remain similar to existing conditions.

### 5.2 Future with Project Conditions

The proposed actions do not include forest stand improvement measures that would enhance and/or restore forest bat habitat on the study area. Land managers would continue to perform forestry activities independently from the proposed action. The existing suitable forest habitat would continue to be available throughout Gilead Slough. The action

alternatives will each require some amount of tree clearing to create moist soil units and water controls structures to manage them, as well as the shoreline protection, sediment deflection, and GSR measures. The maximum alternative would result in the most amount of tree clearing because of the shoreline protection and sediment deflection berm along the riverbank.

Suitable habitat for Spectaclecase would not specifically be created as part of the proposed action. The GSR would create some additional substrate features but the extent to which Spectaclecase mussels will use these features is currently unclear. Future mussel monitoring of GSR locations will provide more insight into a connection between GSR and Spectaclecase habitat use.

There is very limited open field or non-forested habitat on the site, but it does provide some nectar sources for monarchs. However, none of the action alternatives propose to increase the area of old fields nor to enhance habitat for flowering forbs that might be used by migrating or breeding monarchs. The proposed actions would not create suitable habitat for western regal fritillary. There would be no prairie grasses nor violets established on the site over time as a result of the implementation of one of the action alternatives. The old field areas are also anticipated to become forested over time due to natural succession. The open field habitats used by monarch and western regal fritillary would be reduced over time, but this would be independent of the implementation of the action alternatives.

The implementation of the action alternatives would not result in permanent increases to decurrent false aster habitat. However, the soil disturbance caused during construction could create conditions suitable for germination, as this species responds favorably to disturbance events. Any decurrent false aster seeds present in the seedbank may result in a small population becoming established.

# 6 CONSERVATION MEASURES

Conservation measures are incorporated into the Proposed Action to avoid or minimize adverse impacts to specific protected natural resources.

Tree removal would be restricted to the winter months to reduce adverse impact to the listed bat species. Tree clearing will only be allowed between 01 November to 31 March of any given year.

Haul roads would consist of both new and existing roads. Landings and staging areas would be established where necessary on flat areas suitable for access and appropriate to minimize soil disturbance. Access roads and staging areas would not be used during periods of saturated soil conditions to prevent excessive rutting and compaction. Routes for new access roads would be designed to run along high elevation when possible and for minimal tree removal. Typical soil erosion prevention BMPs would be used throughout. During construction, best management practices (BMPs) designed to reduce and prevent soil erosion would be implemented. These practices would reduce the sedimentation pollution that would enter nearby waterbodies. The contractor would be required to have a stormwater pollution prevention plan, which would provide further BMPs to reduce the adverse impact from erodible soils and fuel and chemical spillage. Areas of disturbed soil will be restored using a native seed mix. If Spectaclecase are present in the areas where the GSR material will be placed, the location and/or quantity of proposed GSR would be modified to avoid and minimize any impacts to Spectaclecase.

# 7 CONCLUSIONS AND DETERMINATION OF EFFECTS

The USACE St. Louis District has made a NLAA determination for the Indiana bat, tricolored bat, Spectaclecase, Monarch butterfly, and western regal fritillary, and decurrent false aster.

The construction disturbance will cause temporary, minor adverse impact in the form of vibration and noise. The vibration and noise could disturb bats roosting and forging nearby. The movement of construction equipment may temporarily interfere with monarch or western regal fritillary foraging behavior, but foraging habitat would not be disturbed by any action alternative. The action alternatives will cause soil disturbance, which may provide an opportunity for decurrent false aster to become established in wet roadside areas.

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