Grand River Ecosystem Restoration Study

Final Integrated Feasibility Report and Environmental Assessment

Appendix J: Biological Assessment

August 2020

US Army Corps of Engineers ®
Kansas City District

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1.0. Introduction

The U.S. Army Corps of Engineers (USACE) Kansas City District has prepared this Biological Assessment (BA) for consultation under Section 7 of the Endangered Species Act (ESA) of 1973, as amended. Section 7 of the ESA states that Federal agencies shall ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification to designated critical habitat. Therefore, Federal agencies consult with the U.S. Fish and Wildlife Service (USFWS) and/or the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS), depending on the species that may be affected.

USACE has partnered with the Missouri Department of Conservation (MDC) and the Missouri Department of Natural Resources (MoDNR) as the cost-share sponsors and signatories to the Feasibility Cost Share Agreement on the Grand River Feasibility Study. The Missouri Department of Transportation (MoDOT), U.S. Fish and Wildlife Service (USFWS), USDA – Natural Resources Conservation Service (USDA-NRCS), U.S. Environmental Protection Agency (EPA), and U.S. Geological Survey (USGS) are study partners.

The feasibility study was authorized by the 108th Congress 2nd Session on June 23, 2004. The authorization stated:

> *That the Secretary of the Army is requested to review the report of the Chief of Engineers on the Grand River and Tributaries, Missouri and Iowa, published as House Document 241, 89th Congress, First Session, and other pertinent reports, to determine whether any modifications of the recommendations contained therein are advisable at the present time in the interest of flood damage reduction, municipal and industrial water supply, recreation, fish and wildlife conservation, or environmental restoration in the Grand River Basin, Iowa and Missouri.*

The geographic scope of the study authorization included the entire Grand River basin. The Grand River basin drains 7,900 square miles in southern Iowa and north central Missouri, making it the largest Missouri watershed north of the Missouri River. Hundreds of miles of channels within the Grand River basin were straightened in the early 1900s to facilitate agricultural development, causing progressive instability of the watershed, loss of high value habitat, and continually threatened infrastructure. Flood frequency and intensity have increased in recent years. The study was focused on the Lower Grand River sub-basin in consideration of schedule, budget, and input from the study sponsors. Key areas of the Lower Grand River sub-basin have experienced the most degradation and have the greatest restoration potential. This area is referred to as the focused study area, which includes Pershing State Park, Fountain Grove Conservation Area, Swan Lake National Wildlife Refuge, and Yellow Creek Conservation Area.

2.0. Action Area

2.1. Action Area Description

The action area for this consultation includes the area directly and indirectly affected by the actions included in the recommended plan identified in the Grand River Integrated Feasibility Report and Environmental Assessment. This includes the areas that were evaluated for focused habitat evaluation within three focused study areas: Locust Creek, Fountain Grove, and Yellow Creek. The focused study areas were delineated into terrestrial and aquatic habitat tracts for evaluation (Figures 1 and 2).

Terrestrial Locust Creek (TLC) Tracts:

- TLC1 – North of proposed diversion berm
- TLC2 – Higgins Ditch from proposed diversion to HWY 36
- TLC3 – Proposed Sediment Detention Basin Area
- TLC4 – Higgins Ditch from HWY 36 to below Hickory Branch
- TLC5 – Zell tract Area from HWY 36 to below Hickory Branch
- TLC6 –Locust Creek from HWY 36 to below Hickory Branch
- TLC7 –Locust Creek from Hickory Branch to Confluence with Hickory Branch
- TLC8 – Locust Creek from Hickory Branch Confluence to Grand River

Aquatic Locust Creek (ALC) Tracts:

- ALC1 – Upper Boundary of Locust Creek to existing avulsion to Higgins Ditch
- ALC2 – Higgins Ditch, Avulsion to Footbridge
- ALC3 –Locust Creek, Avulsion to HWY 36
- ALC4 – Proposed Sediment Detention Basin Area
- ALC5 – Higgins Ditch, Footbridge to Hickory Branch
- ALC6 –Locust Creek, HWY 36 to Muddy Creek
- ALC7 – Upper Boundary of Muddy Creek to Confluence with Locust Creek
- ALC8 – Upper Boundary of Hickory Branch to Confluence with Higgins Ditch
- ALC9 – Hickory Branch, from confluence with Higgins Ditch to Locust Creek
- ALC10 –Locust Creek, Confluence with Muddy Creek to Hickory Branch
- ALC11 –Locust Creek, Confluence with Hickory Branch to Grand River
- ALC12 – Proposed Higgins Ditch to Locust Creek Connector

Terrestrial Fountain Grove (TFG) Tracts:

- TFG1 – Parsons / Little Parsons Creek Area
- TFG2 – West side of Parsons Creek Area
- TFG3 – West side Fountain Grove CA
- TFG4 – South side Fountain Grove CA

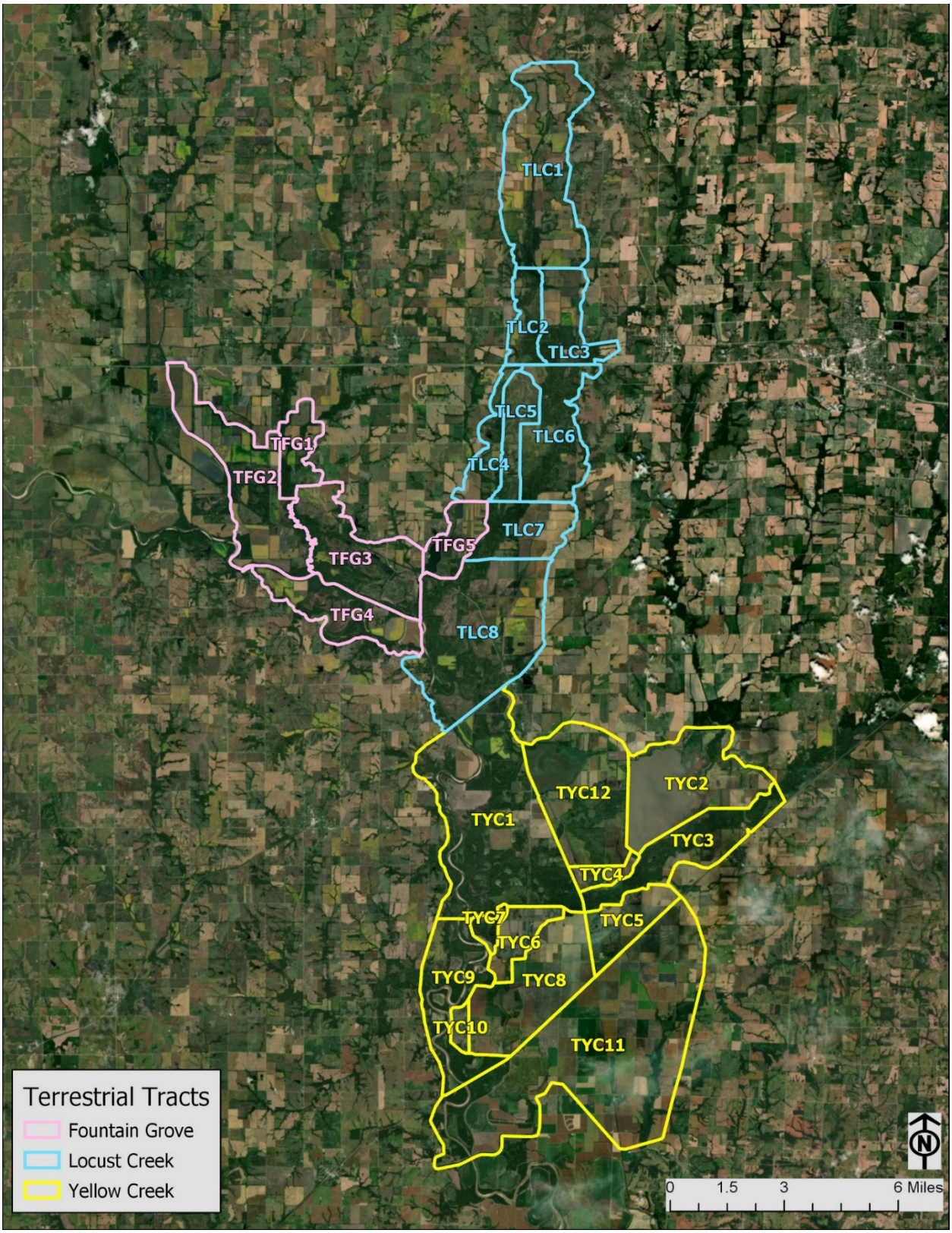

Figure 1. Terrestrial Habitat Tracts Delineated for the Three Focus Study Areas.

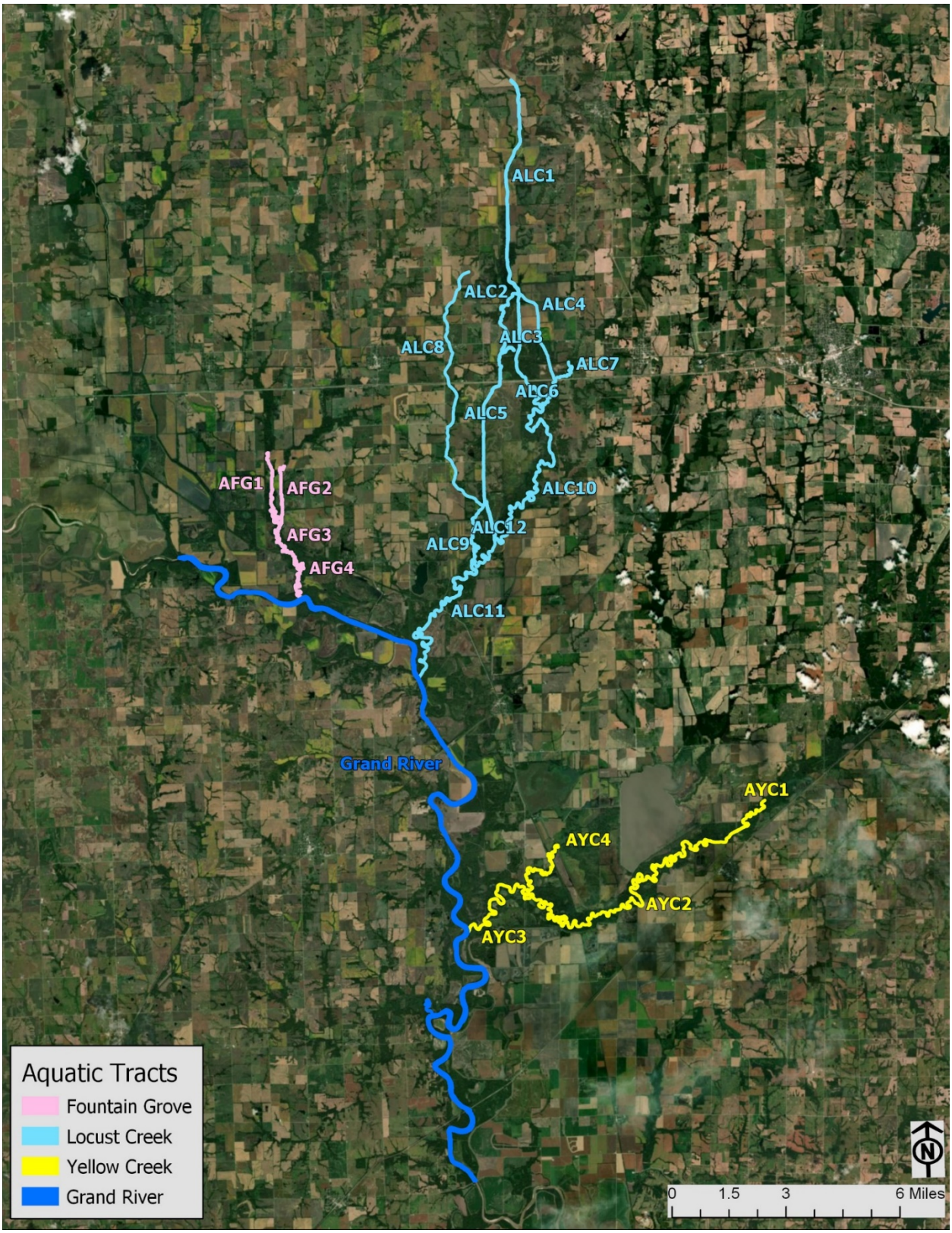

Figure 2. Aquatic Habitat Tracts Delineated for the Three Focus Study Areas.

- TFG5 – East side Fountain Grove CA

Aquatic Fountain Grove (AFG) Tracts:

- AFG1 – Little Parsons Creek to Parsons Creek
- AFG2 – Parsons Creek to Little Parsons Creek
- AFG3 – Middle Parsons Creek
- AFG4 – Lower Parsons Creek to Grand River

Terrestrial Yellow Creek (TYC) Tracts:

- TYC1 – Northwest Area along Grand River
- TYC2 – Silver Lake Area
- TYC3 – Northeast Yellow Creek Area
- TYC4 – Levee / Railroad Setback Area below Swan Lake
- TYC5 – South side of Yellow Creek below Swan / Silver Lake
- TYC6 – Large Levee Setback Area
- TYC7 – Small Levee Setback Area
- TYC8 – Area below Levee Setbacks and North of Railroad
- TYC9 – Area West of Levee Setbacks along Grand River
- TYC10 – Small Levee Setback Area 2
- TYC11 – Area below Levee Setbacks and South of Railroad
- TYC12 – Swan Lake Area

Aquatic Yellow Creek (AYC) Tracts:

- AYC1 – Upper Yellow Creek
- AYC2 – Middle Yellow Creek
- AYC3 – Lower Yellow Creek
- AYC4 – Elk Creek

The action area also includes four Hydrologic Unit Code (HUC)-10 watersheds where upstream bank stabilization projects may occur. These HUC-10 watersheds include Watkins Creek-Locust Creek (excluding the portion in Iowa); East Locust Creek; West Locust Creek; and Locust Creek (Figure 3).

2.2. Species in the Action Area

An official species list was obtained on July 10, 2019 from the USFWS Information, Planning, and Conservation (IPaC) system for the action area (Consultation Code 03E14000-2019-SLI-2317). Four threatened or endangered species were identified on the list as potentially being present within the area of the proposed action:

- Gray bat (*Myotis grisescens*), Endangered
- Indiana bat (*Myotis sodalis*), Endangered
- Northern long-eared bat (*Myotis septentrionalis*), Threatened

- Pallid sturgeon (*Scaphirhynchus albus*), Endangered

The IPaC review identified that there was no critical habitats within the action area.

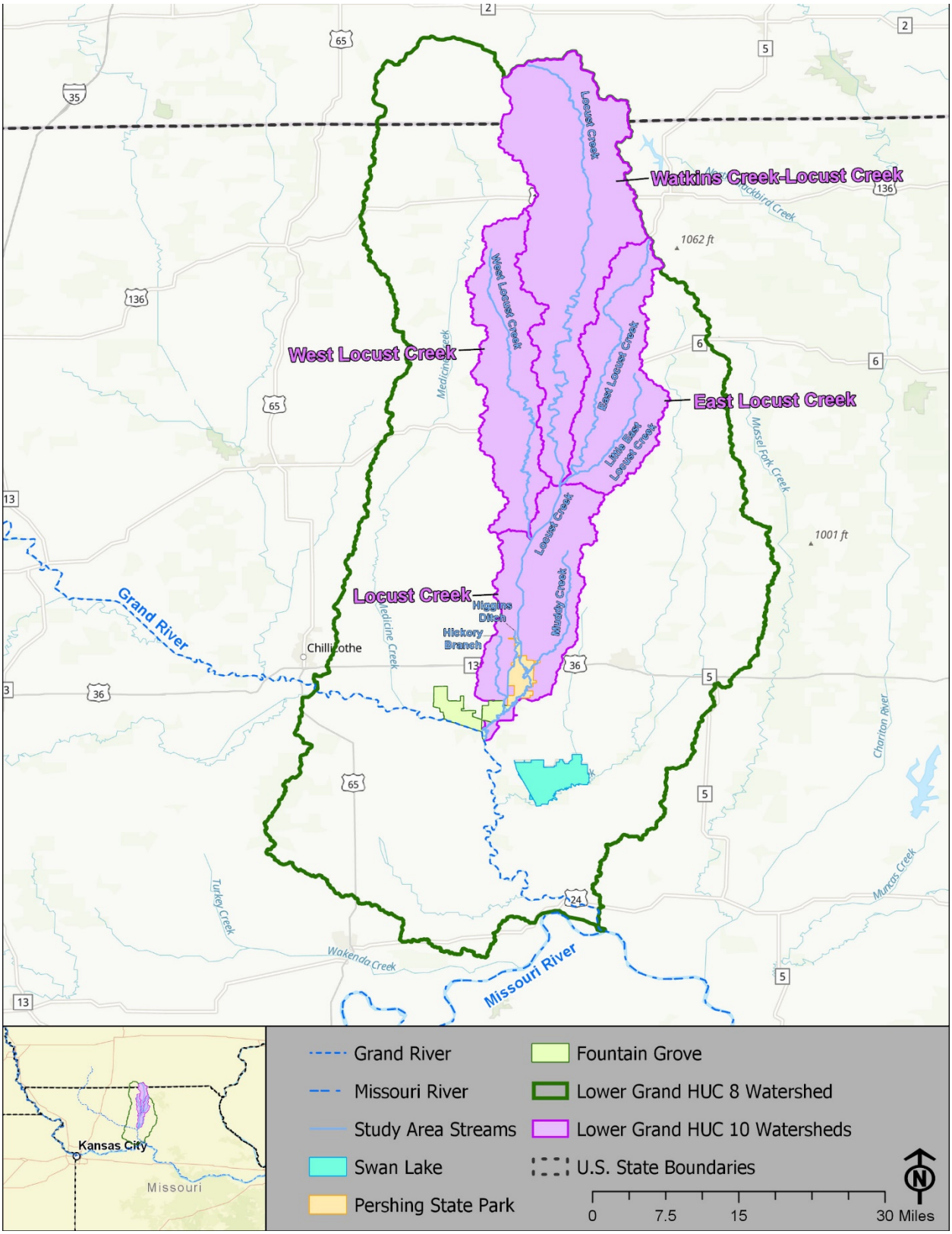

Figure 3. HUC 10 watersheds for upstream bank stabilization projects.

3.0. Description of the Proposed Action

The Proposed Action is composed of actions within the three focus study areas: Locust Creek, Fountain Grove, and Yellow Creek.

1.1. USACE Plan Components

1.1.1. Locust Creek/Pershing State Park

The dominant features of the proposed action for Locust Creek are a large sediment detention basin to reduce sediment deposition on significant habitat within and around Pershing State Park and dredging portions of Locust and Muddy creeks to restore flow conveyance (Figure 4). A more detailed description of the plan features follows:

- **Land Acquisition –** Approximately 1,394 acres of existing private land would be acquired to allow for construction of the sediment detention basin.
- **Diversion berm –** A diversion berm would be constructed across the Locust Creek floodplain and extending into the Locust Creek channel on Pershing State Park. The floodplain portion of the berm would serve to prevent the progression/formation of additional avulsions that might divert water and bypass the sediment detention basin. The in-channel portion of the berm would serve to divert flows into the sediment basin while also allowing water to continue downstream on Locust Creek and Higgins Ditch. This portion of the berm would be designed to allow for fish and aquatic organism passage. The floodplain portion of the berm would be approximately 1.5 feet tall compared to the lowest point in the floodplain. The diversion structure in the channel was designed such that the structure overtops when Locust Creek at Linneus reaches a flow of 4,000 cfs (approximately between 95% AEP (1/1.05 year) and 90% AEP (1/1.11 year) frequency events), corresponding to a flow of 2,900 cfs just upstream of the diversion channel and structure. At higher flows, it is anticipated that Higgins Ditch and the existing Locust Creek channel would convey flow. The diversion berm would be comprised of two structures: the structure that would cross the existing Locust Creek channel and the structure that would cross the floodplain to the west of the existing Locust Creek channel (Figure 5).
- **Sediment Detention Basin Perimeter Levee, Spillways, and Drainage–** This measure includes the raise/construction of a perimeter levee around the sediment detention basin (Figure 5). Average levee height was assumed to be approximately 6-feet tall relative to the surrounding terrain. Two spillways were included in the levee raise to allow water to overtop in a controlled manner. The west spillway is intended to allow large flows to travel into Locust Creek, through the main avulsion, and into Higgins Ditch, preventing potential damages and channel erosion in Locust Creek and Muddy Creek since Higgins Ditch has sized itself to carry most existing flows. The north spillway allows ponded water on the north side of the basin to spill into the basin in a controlled manner. The spillway dimensions were identified through an iterative process where the dimensions were adjusted until a constant 100-year inflow on Locust Creek at Linneus did not overtop the basin perimeter except at the spillways. The iterative process for sizing the spillways was used in conjunction with the other measures. Additionally, a drainage channel with a flap gate located north of the northern basin perimeter was included as part of this measure. The drainage channel serves to drain private property north of the basin to Locust Creek. The drainage channel was sized by examining existing drainage

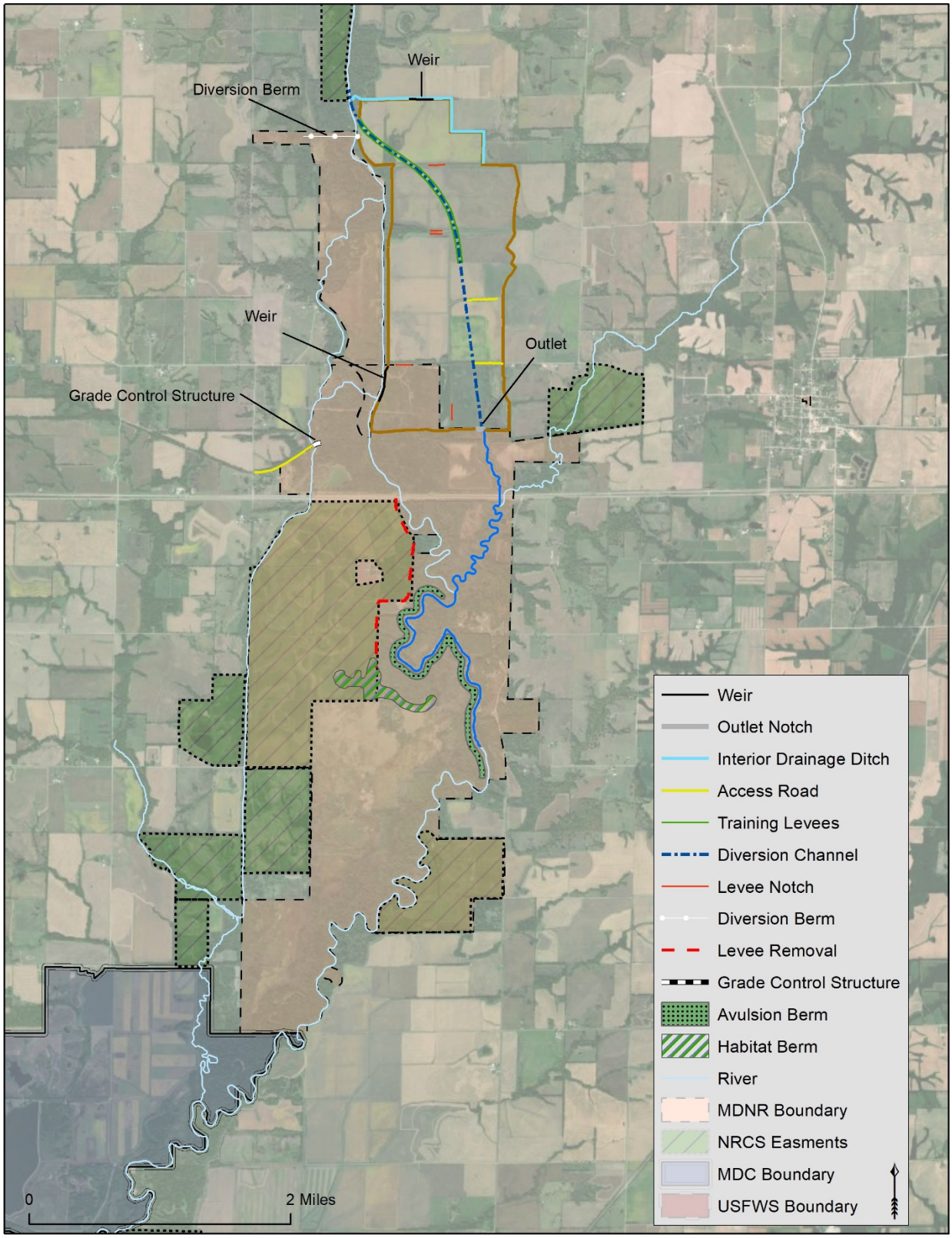

Figure 4. Locust Creek Proposed Action Features.

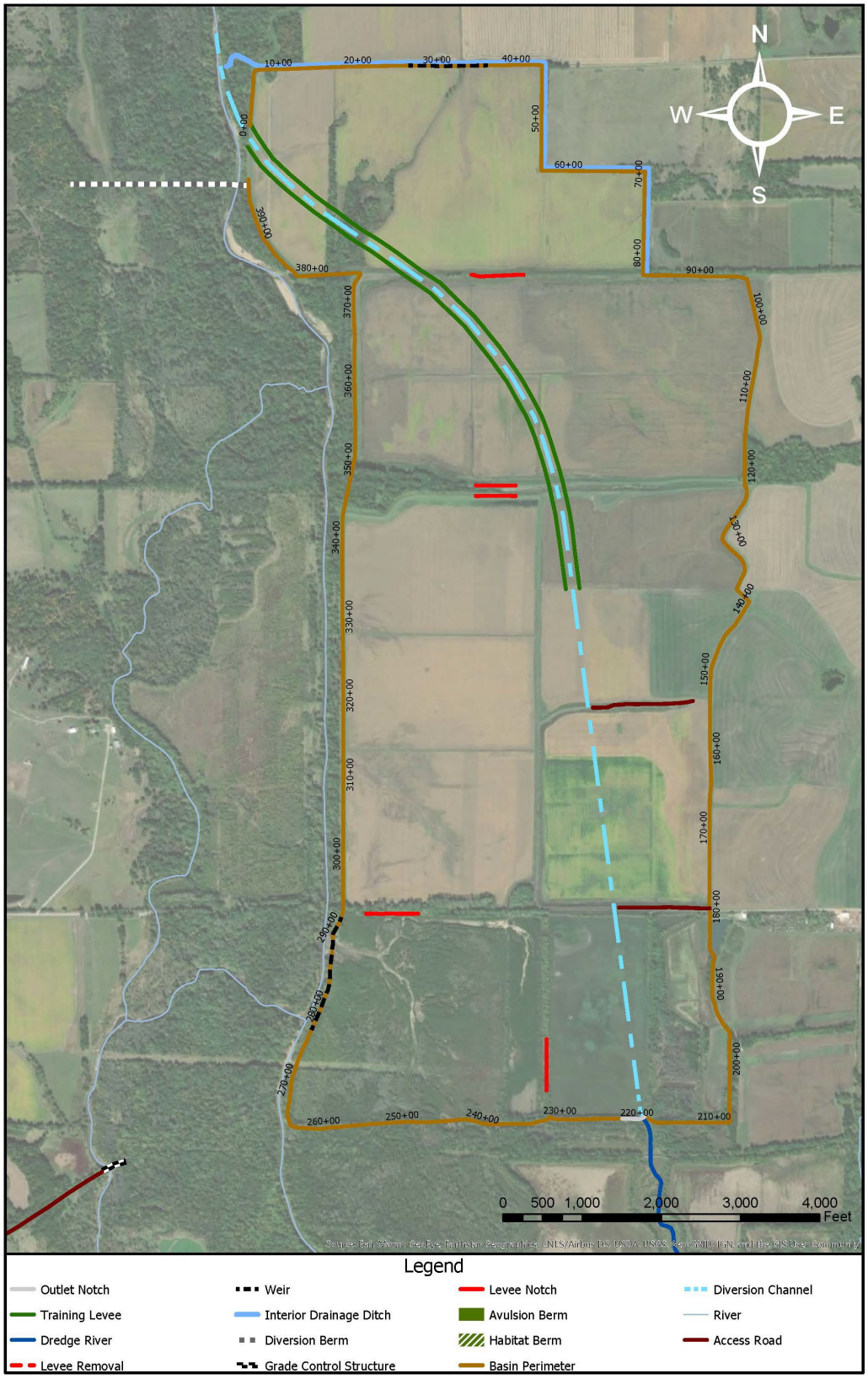

Figure 5. Locust Creek Proposed Action Features Located Upstream of Highway 36.

features used to drain the same area and applying similar sizes to the channel dimensions. Material for constructing the perimeter levee would come from excavation for other plan features. Both spillways would be armored with rock.

- **Pilot/Diversion Channel and Training Levees–** A pilot/diversion channel into the sediment detention basin would be excavated to convey sediment and logs away from the diversion berm and reduce the risk of plugging the mouth of the diversion (Figure 5). The upstream section of the diversion channel includes a wide width (90-foot bottom width) to allow logs to pass through the sediment basin inlet without initiating a log jam. Two training levees are also included on each side of the channel to concentrate flow, increase depths in the channel, and increase velocities to prevent sedimentation and log jams from forming at the basin entrance. The two training levees are approximately 6 feet higher than the surrounding ground. Suitable material from the diversion channel excavation would be used to construct the training levees and sediment detention basin perimeter levee.
- **Levee Notches –** A portion of the existing levee on the east bank of Locust Creek would be notched to allow flow into the sediment detention basin (Figure 5). In addition, several existing levees within the sediment detention basin would be notched to promote meandering of the diversion channel within the basin and facilitate sediment deposition. Material from the levee notches would be used to construct the sediment detention basin perimeter levee.
- **Access Roads –**Access roads would be required to allow for removal of logs and other operations and maintenance. Some of the access roads were incorporated into the basin perimeter and training levees.
- **Exit notch –** Water would exit the sediment detention basin through a levee notch located on the south side of the sediment detention basin (Figure 5). The notch is sized to promote backwater and sedimentation within the sediment detention basin. The existing conditions Locust Creek channel capacity downstream of HWY 36 is approximately 2,000 cfs. The notch discharge is intended to increase flows in the Locust Creek channel via Muddy Creek to simulate overbank flows and increase water availability for wet prairie habitat. The notch is designed such that the downstream Locust Creek channel would convey the 99% AEP flows for both Muddy Creek (~400 cfs) and Locust Creek (~2,000 cfs). Because the Locust Creek channel between the avulsions and Muddy Creek passes some water, a flow of 1,500 cfs was used as the notch design discharge for contributions from Locust Creek between Year 0 and Year 10. At Year 10, an increase in discharge to 4,000 cfs is needed to ensure the basin is functional for the full 50-year period. The dimensions of the levee notch will be determined during design to obtain the specified discharges.
- **Grade Control –** Four grade control structures would be constructed as part of the plan. Two would be located on Locust Creek, one north of the pilot/diversion channel and one south of the diversion berm. Another grade control structure would be constructed along Higgins Ditch to limit sediment deposition on the west side of the Locust Creek floodplain below HWY 36. The Higgins Ditch grade control and associated upstream/downstream bank stabilization would require approximately 15,000 CY of fill. The upstream and downstream bank stabilization would affect approximately 750 feet of streambank to prevent flanking. The fourth grade control structure would be required on

Muddy Creek upstream of its connection with the sediment detention basin to prevent head-cutting.

- **Dredge –** Approximately 23,500 feet of Muddy and Locust creeks would be dredged to provide channel dimensions sufficient to accommodate the historic bankfull flow and provide appropriate slope (Figure 6). This also ensures that sediment currently in those stream channels is not activated and deposited in sensitive habitat areas once the sediment detention basin becomes operational. Dredge material would be used to perform small levee modifications and habitat enhancements. This dredging would be a one-time occurrence and no long-term O&M of the dredged portion of Muddy and Locust creeks is anticipated. The need for and the methods of bank stabilization within the dredged reach would be determined during PED.
- **Avulsion Spoil Berm/Habitat Enhancements**- Dredged material would be spoiled along a portion of Locust Creek (Figure 6) to create an avulsion spoil berm. The avulsion spoil berm was developed from state sponsor recommendations based on prior experience in Pershing State Park. The recommendations included a berm offset 100-feet from the stream, 1-foot in height vertical slope, 200-feet wide, with a landside side slope of 10H:1V. The 100-foot offset was included to allow additional room for future stream meandering due to the formation of log jams within the system. An average height of 1-foot was used to establish the top elevation of the avulsion spoil berm. The berm would be intended to protect against future avulsions of Locust Creek to Higgins Ditch. It would require approximately 22,600 cubic yards. The material for the berm would come from the dredging of Muddy/Locust Creek. Dredged material would also be used to construct a habitat enhancement area comprising approximately 83,200 cy of material. The habitat feature would tie into previously constructed habitat features at Pershing State Park. The spoil area would be planted to native species to provide habitat enhancements for massasauga rattlesnakes.
- **Downgrade of Existing Pershing State Park Levee** – This measure includes the partial removal of a levee separating the east and west sides of the Locust Creek floodplain south of HWY36. The removal of the levee serves to help restore floodplain connectivity between Higgins Ditch and the Locust Creek channel. Conceptual design assumes the levee would be lowered approximately 4 feet to match the floodplain elevations east of the levee.
- **Upper watershed bank stabilization –** Bank stabilization measures would be implemented in the Locust Creek watershed upstream of the sediment detention basin. It is estimated that approximately 300 bank stabilization projects would be implemented to achieve a 14% reduction in quantified risk associated with uncertainties in forecasted sediment loading. The projects would emphasize the use of soil bioengineering techniques; however, hard stabilization such as rock rip-rap would likely be incorporated. It is anticipated that these upstream measures would ensure/extend the lifespan of the sediment detention basin, as well as address the larger instabilities in the system that contribute to high sediment loading. Projects may be implemented in the following HUC-10 watersheds (Figure 3): Watkins Creek-Locust Creek (excluding the portion in Iowa); East Locust Creek; West Locust Creek; and Locust Creek.

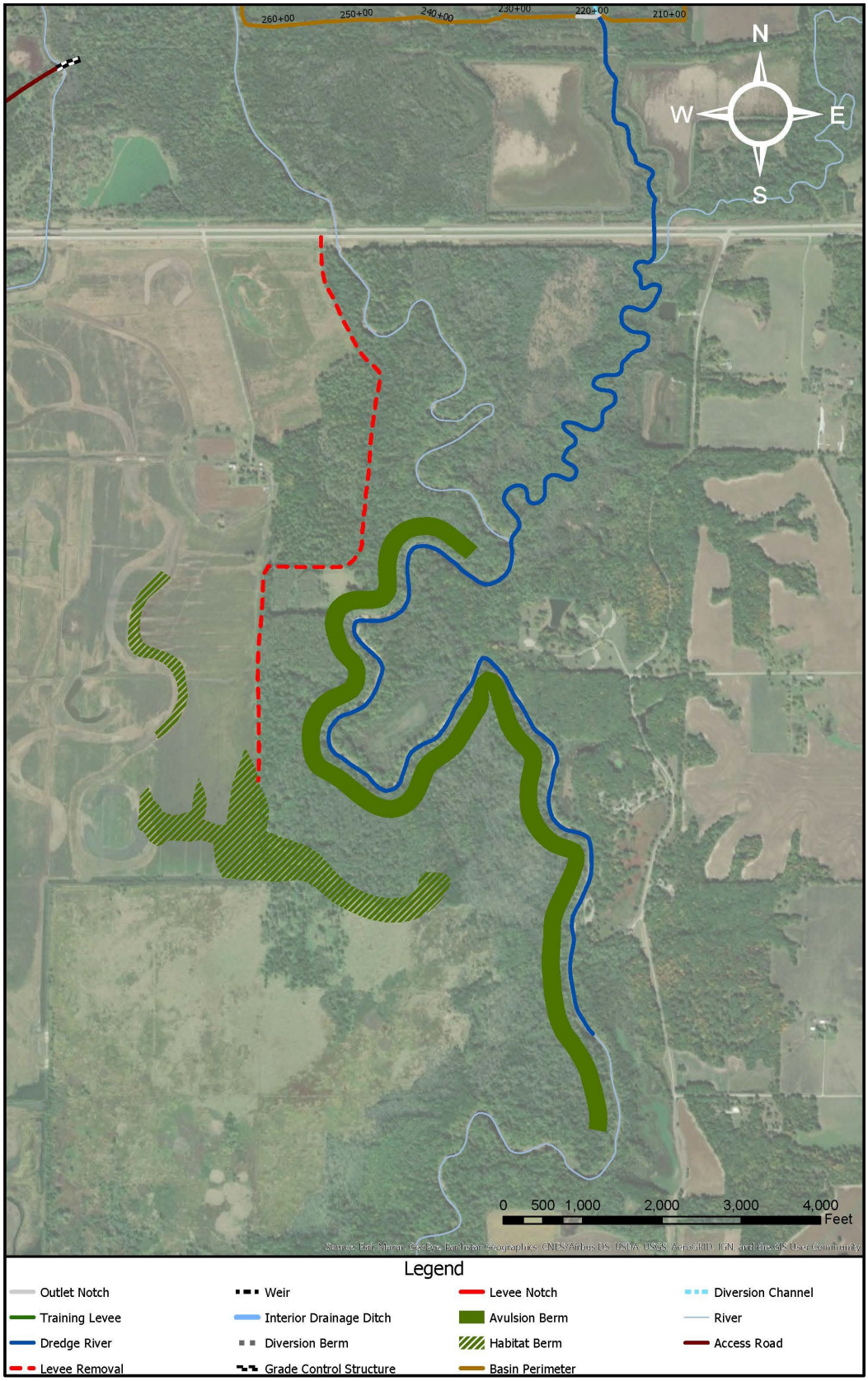

Figure 6. Locust Creek Proposed Action Features Located Downstream of Highway 36.

1.1.2. Fountain Grove

The proposed action for Fountain Grove features a suite of actions to enhance wetlands through increased natural ecosystem form and function, improved habitat development and improved water management (Figure 7). The main features of the plan include:

- **Bank armoring and outlet relocation** – The bank of the channel downstream of the Pool 3 Levee WCS, referred to as Jackson's Ditch, would be armored to prevent erosion on the neighboring property. This measure allows for opening the gates at Pool 3 Levee WCS to increase the drainage rate from Fountain Grove CA pools. Additionally, the structure would be relocated to the new levee just upstream of the existing location to alter the direction of flow into the ditch.
- **Water Control Structures** – The Pool 1 WCS #1 would be replaced with two 96-inch PVC pipes with two sluice gates. The culverts are used to drain Pool 1 to Pool 2. The proposed pipe dimensions would be further refined during design.
- **Levee construction/modification** – A new levee would be constructed, running north/south, on the west side of Fountain Grove CA where Parson Creek flows are entering the area under existing conditions. The levee would prevent frequent Parson Creek flows from entering Fountain Grove CA. The levees within the pools would be reconfigured to generally follow the elevation contours and allow for independent water control for most pools. The levees would be broader with smaller side slopes to improve resiliency when the levees overtop. The levee on the east side of Fountain Grove CA would be set back to increase flood resiliency.
- **Sloughs** – Sloughs would be excavated through Fountain Grove CA to effectively move Parson Creek flows through the area during high flow events. Outside of high flow events, the features serve as water distribution channels and provide aquatic/edge habitat for wetland species.
- **Berm removal** – a portion of the abandoned Chillicothe-Brunswick rail berm would be removed. This would improve sheet-flow and distribution of shallow water across the area.
- **West Side micro-topography restoration** – Micro-topography on the site would be enhanced through the creation of additional sloughs and habitat mounds. Spoil from the main slough excavation and existing levees would be used to form the habitat mounds.
- **East Side micro-topography restoration** – earthwork would be performed to modify the existing pool design on the east side of Fountain Grove CA. The intent would be to provide more naturally shaped wetland pools, which is consistent with modern wetland management practices. The redesign of the pools on the east side would allow for the removal of some water control structures in that area, creating more natural conditions, and allowing for more efficient management.
- **South Fountain Grove CA groundwater pumps** – Two electric groundwater pumps would be installed on South Fountain Grove CA to facilitate wetlands development and more reliable hydrology.

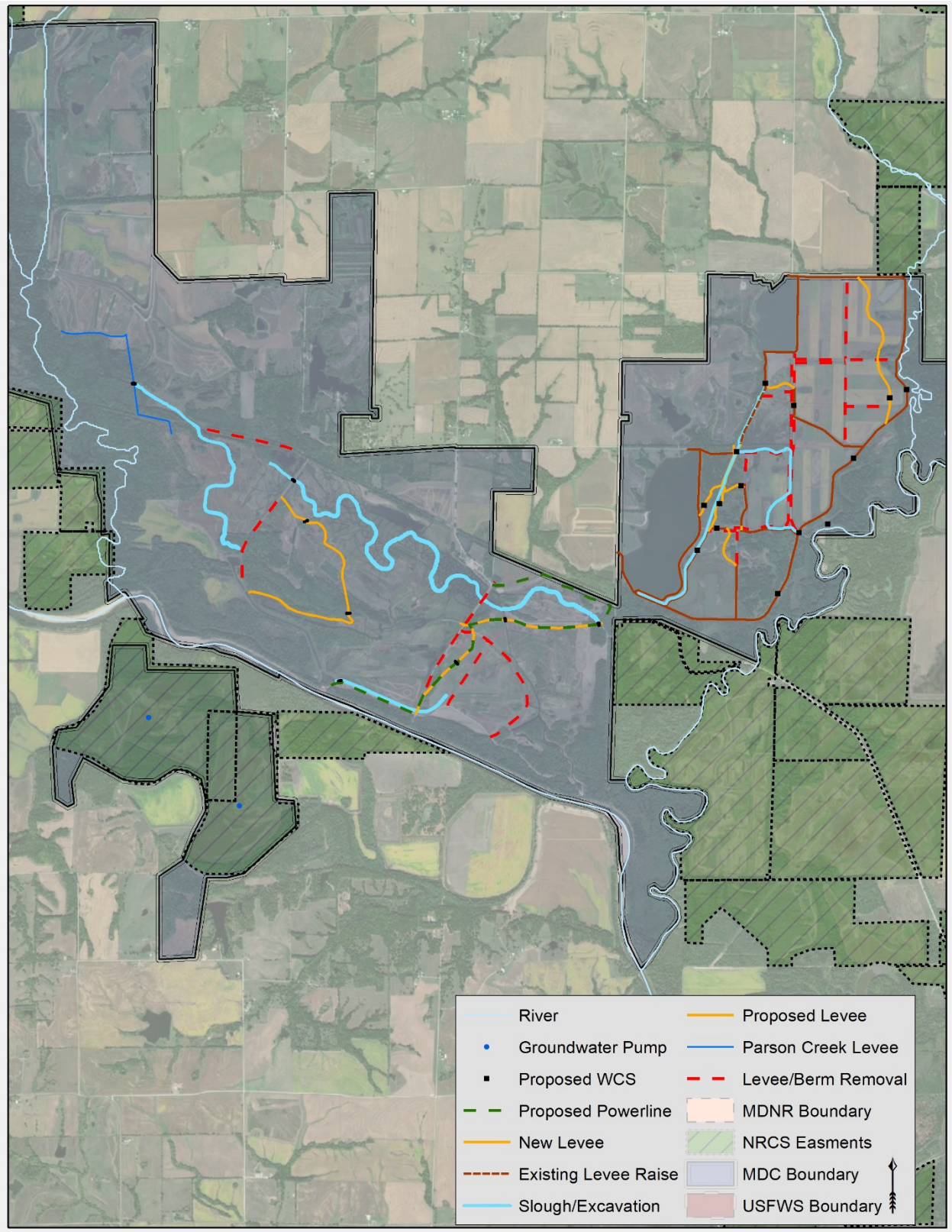

Figure 7. Fountain Grove Proposed Action Features.

1.2. USFWS Plan Components– Yellow Creek

The main feature of the Yellow Creek proposed action is the setback of a levee on Swan Lake NWR (Figure 8). The plan would include levee removal, removing three existing culverts, raising a portion of existing levee, constructing a portion of new setback levee, and addition of two 3-foot diameter concrete culverts with flap gates.

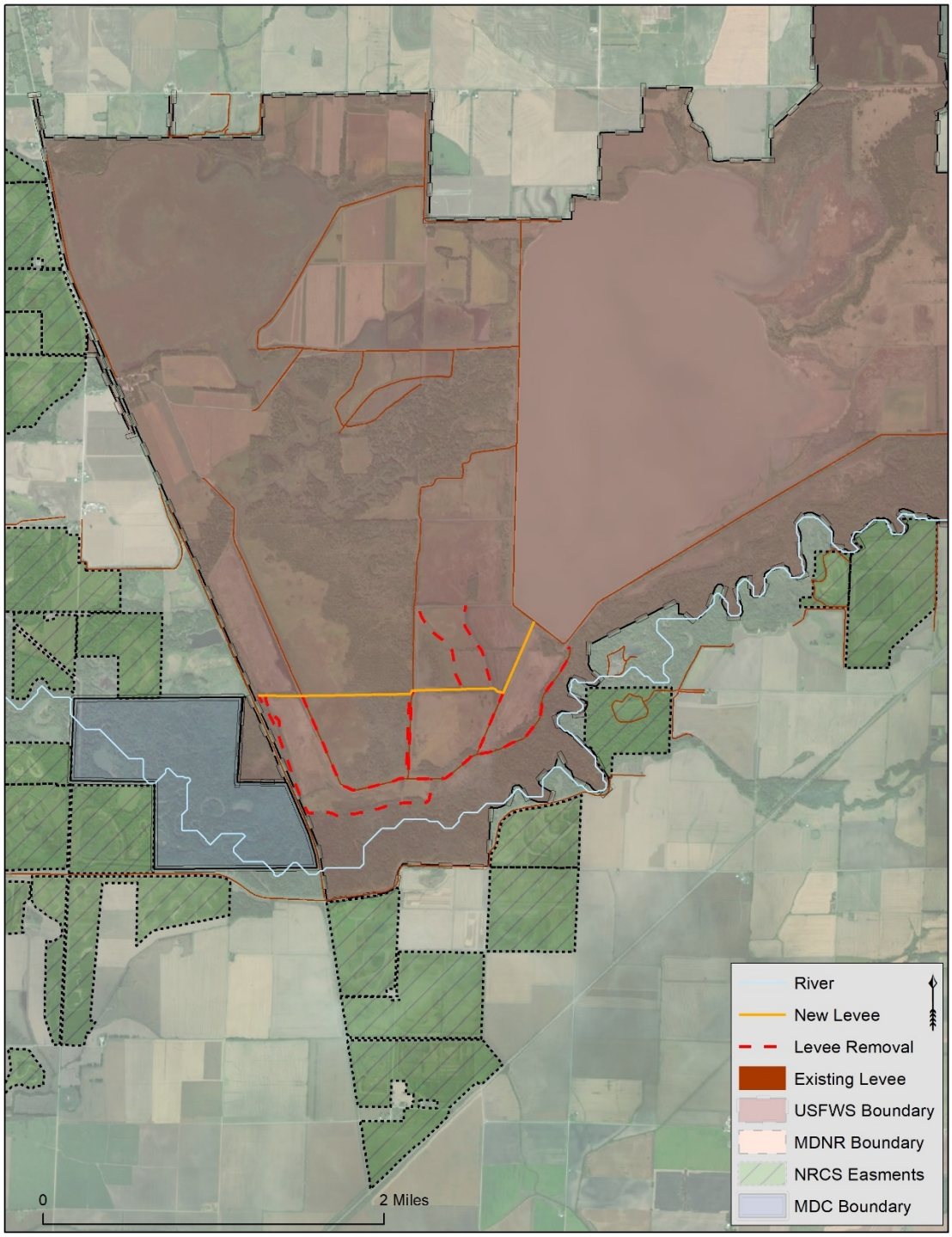

Figure 8. Proposed Action Features on Swan Lake National Wildlife Refuge.

3.1. Operation, Maintenance, Rehabilitation, Replacement, and Repair

Operation, Maintenance, Rehabilitation, Replacement, and Repair (OMRRR) would include oversight, management, monitoring, woody debris removal, clearing of drainage areas and sloughs, levee and spillway maintenance and inspection, riprap repair, earthwork, tree clearing, plantings, and additional rock placement for stabilization sites.

3.2. Monitoring and Adaptive Management

Project monitoring is designed to gauge progress toward meeting the project objectives. Per Section 2039 of Water Resources Development Act (WRDA) 2007, monitoring for ecosystem restoration studies will be conducted to determine project success, and is defined as:

> *The systematic collection and analysis of data that provides information useful for assessment of project performance, determining whether ecological success has been achieved, or whether adaptive management may be needed to attain project benefits.*

The implementation guidance for Section 2039, in the form of a CECW-PB Memo dated 31 August 2009, also requires that an adaptive management plan be developed for all ecosystem restoration projects. The primary incentive for implementing an adaptive management plan is to increase the likelihood of achieving desired project outcomes given the identified uncertainties, which may include incomplete description and understanding of relevant ecosystem structure and function, imprecise relationships among project management actions and corresponding outcomes, engineering challenges in implementing project alternative and ambiguous management and decision-making processes.

A monitoring and adaptive management plan has been developed with input from the study technical team. Details on performance indicators, monitoring targets, time of effect, frequency of monitoring, adaptive management triggers and responsibilities of monitoring and data collection are detailed in the plan. Per Section 2039 guidance, monitoring costs (not to exceed 10 years after project construction) were considered as part of project costs and developed for each considered alternative. Any monitoring conducted after 10 years would not be part of the total project cost and will be 100% non-Federal costs.

Inspection of diversion structure, sediment detention basin, and drainage sloughs and potential removal of woody debris or sediment accumulation to restore functionality. Levees must be inspected to ensure their integrity is not compromised during flood events. Future avulsion creation above diversion structure or below HWY 36 will be monitored to ensure avulsions do not compromise the integrity of the design, could lead to additional earthwork or placement or rip-rap depending on location. Sediment detention basin may require adjustment to design, particularly inlet and outlet structures. Direct excavation adaptive management response would involve actions to correct any bed or bank stability concerns occurring after excavation which appear to be tied to the excavation.

4.0. Status of the Species and Critical Habitat

Section 7 of the Endangered Species Act (ESA) (16 USC 1531 et seq.) requires federal agencies to ensure that any actions authorized, funded, or carried out by the agency do not jeopardize the continued existence of a federally listed threatened or endangered species, or result in the destruction or adverse modification of the designated critical habitat of a federally listed species. An official species list was obtained from the USFWS Information, Planning, and Conservation system for the project. Four Federally listed species were identified with potential to occur in the study area: gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), Northern long-eared bat (*Myotis septentrionalis*), and pallid sturgeon (*Scaphirhynchus albus*). These species are discussed in the following sections. No critical habitat is found in the study area.

4.1.1. Gray Bat

The gray bat was Federally listed as endangered in 1979 due to declining populations. The range of the gray bat is geographically limited to the limestone karst areas of the southeastern United States. This species primarily occurs in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee although few gray bats also occur in northwestern Florida, western Georgia, southeastern Kansas, southern Indiana, southwestern Illinois, northeastern Oklahoma, northeastern Mississippi, western Virginia, and western North Carolina. The gray bat is identifiable by its uniform grayish-brown fur which is dark gray following their molt and then lightens to a rusty brown in the summer. This species is most easily identified and distinguished from other closely related bat species by its wings that attach to the ankle and not the base of the toes. The gray bat also has a distinct notch on the inside curve of each claw (MDC 2019).

Gray bats occupy caves in limestone karst regions within its range during both the summer and the winter. In the winter, these bats hibernate in deep, vertical cold caves or mines that trap large volumes of cold air (USFWS 2019a). Hibernacula for this species often have multiple entrances and maintain temperatures between 5 and 9°C (41 and 48.2°F) with a range of 1 to 4°C (33.8 to 39.2°F) being more preferable. During the summer, females roost in warmer caves ranging in temperature from 14 to 25°C (57.2 to 77°F) with close proximity to water where they can forage (USFWS 2006).Gray bats mate in the fall when males and females arrive at the hibernacula. Female gray bats begin hibernating in early fall following copulation, store the sperm through the winter and become pregnant in spring after emerging from hibernation. Male gray bats remain active after the females enter hibernation until early November, when they also begin to hibernate. Females give birth to one pup in late May or early June after a 64-day gestation period and form large maternity colonies in caves with domed ceilings. Gray bats are dependent on aquatic insects, in particular mayflies, caddisflies, and stoneflies and use water features and forested riparian corridors for foraging and travel. Due to this foraging need, maternity colonies are usually within close proximity to prime feeding areas near large reservoirs or rivers (USFWS 2006).

Human disturbance, habitat loss and degradation, cave commercialization, and improper gating continue to threaten the gray bat. The continued spread of white-nose syndrome also poses a threat to this species, as is the case with many bats. The gray bat is vulnerable to disturbance due to their narrow habitat requirements and high density of cave occupancy. Disturbance during hibernation reduces energy stores and disturbance during the roosting period startles mothers which could cause potential harm to the pups. Caves within the gray bat range have been flooded from reservoir creation which forces the bats out in search of another suitable cave which may be difficult. Commercialization of caves also forces bats out and alters the conditions that make it suitable habitat for gray bats (USFWS 2019a).

4.1.2. Northern Long-Eared Bat

The northern long-eared bat was listed as a threatened species under ESA in 2015 (80 FR 17974). This small bat species occurs across much of the eastern and north central United States, encompassing 37 states and all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia. During the summer months, the northern long-eared bat roosts underneath bark or in cavities of a variety of tree species, both live and dead, and may roost individually or in colonies.

Summer roosting sites may also include caves, mines, or human-made structures, such as barns, other buildings, utility poles, window shutters, and bat houses (80 FR 17974). During the winter, the northern long-eared bat inhabits large caves or mines known as hibernacula (Caceres and Pybus 1997). Foraging habitat consists of forested areas or forested edges along rivers and lakes. Northern long-eared bats feed at dusk preying on moths, leafhoppers, caddisflies, and beetles while in flight or by gleaning insects from vegetation (USFWS 2019b).

The northern long-eared bat was placed on the Endangered Species List due to severe impacts of white-nose syndrome, a fungal disease that has caused massive population declines in some portions of the species range (81 FR 1901). Other threats include habitat fragmentation, destruction, and modification from logging, oil/gas/mineral development, and wind energy development. Disturbances of hibernacula caused by recreational caving activities have also been documented as a potential threat to the northern long-eared bat (78 FR 61046). In January 2016 the USFWS published a Final 4(d) Rule which provides an exemption from incidental take restrictions for northern long-eared bats occurring in areas not yet affected by white-nose syndrome (81 FR 1901).

The study area falls within the range of the northern long-eared bat. The entire state of Missouri is within the white-nose syndrome zone per the Final 4(d) Rule. Thus individuals in the area are subject to full protection under ESA. Some of the counties adjacent to the Missouri River in Missouri have known hibernacula infected with white-nose syndrome. Efforts to identify and record hibernacula and maternity roost trees for the northern long-eared bat are ongoing (USFWS 2019b).

4.1.3. Indiana Bat

The Indiana bat (*Myotis sodalis*) is listed as an endangered species under the ESA. This species was listed as in danger of extinction in 1967 and was grandfathered in under the ESA in 1973 (USFWS 2007). The range of the Indiana bat spans most of the eastern half of the United States, but the population is largely concentrated in southern Indiana. The Indiana bat is similar in size to the northern-long eared bat and has many of the same habitat requirements. However, the Indiana bat requires hibernacula with cooler temperatures than those used by the northern long-eared bat. The Indiana bat is more selective with roosting sites, showing preference for trees that are dying or dead, and has been found to select trees by size, species, and surrounding canopy cover (USFWS 2007). Like the northern long-eared bat, foraging habitat for the Indiana bat consists of forested areas or forested edges along rivers and lakes. Indiana bats feed while in flight on a variety of flying insects along rivers, lakes, and uplands. This species consumes up to half of its body weight in insects daily (USFWS 2019c).

Hibernating population estimates for the Indiana bat in Missouri show a downward trend from an estimated 399,000 in 1965 to 65,104 in 2005. As of 2006, 20 Indiana bat maternity colonies had been recorded in Missouri, some of which are in Chariton County. Threats to this species include loss or alteration of cave and forest habitats and human disturbance of hibernating individuals (USFWS 2007).

4.1.4. Pallid Sturgeon

Pallid sturgeon are large, long-lived benthic (i.e. bottom dwelling) fish that inhabit rivers of the Missouri and Mississippi River basins. They have physical features adapted to life in turbid fast-flowing rivers such as a flattened shovel-shaped snout; a long, slender, and completely armored body; fleshy barbels; and a protrusible mouth (i.e. capable of being extended and withdrawn from its natural position) that supplement their small eyes in detecting and capturing food. The pallid sturgeon was listed as endangered under the ESA on September 6, 1990 (55 Federal Regulation 36641–36647). A recent revision of the species recovery plan notes that the species status has improved and is currently stable as a result of artificial propagation and stocking efforts under the Pallid Sturgeon Conservation Augmentation Program (USFWS 2014; Steffensen et al. 2013). However, the population remains neither self-sustaining nor viable and if stocking were to cease, pallid sturgeon would face local extirpation in several reaches of the Missouri River (USFWS 2014). Sampling on the Grand River has been limited as the majority of pallid

sturgeon monitoring and sampling efforts occur on the Missouri and Mississippi rivers. However, six pallid sturgeon captures were recorded in the Grand River in 2018 and 2019. In addition, three angler-caught records of pallid sturgeon in the Grand River were confirmed by MDC. Winders and Steffensen (2014) developed population estimates for a reach of the Missouri River downstream of Kansas City, Missouri. The annual population estimates of pallid sturgeon varied from 6.1 to 11.1 fish/river kilometer (rkm), of which known hatchery-origin pallid sturgeon (5.5 to 10.2 fish/rkm) were much more abundant than those of wild origin (0.6 to 0.9 fish/rkm) (Winders and Steffensen 2014).

Pallid sturgeon are long-lived, with females reaching sexual maturity later than males (Keenlyne and Jenkins 1993). However, the age at first reproduction can vary between hatchery-reared and wild fish, depending on local conditions (USFWS 2014). The estimated age at first reproduction of wild fish is about 15 to 20 years for females and approximately 5 to 7 years for males (Keenlyne and Jenkins 1993). Minimum age-at-sexual maturity for known-aged hatchery-reared fish was age-9 for females and age-7 for males (Steffensen et al. 2012). Pallid sturgeon generally spawn from late April through May in the lower Missouri River (DeLonay et al. 2016). Reproductively ready pallid sturgeon indicate consistent patterns of upstream migration before spawning. Migration patterns can differ between males and females; where male patterns are less regular. Migrating pallid sturgeon in Missouri selected shallow places in the channel, and velocities on the low end of the distribution, which indicates selection of migration pathways that optimize energy expenditure (DeLonay et al. 2016).

Fertilization to hatching, the embryo life stage, lasts 5-8 days depending on water temperature (DeLonay et al. 2016). Most of what is known about habitat requirements for embryos is extrapolated from laboratory studies. Naturally spawned pallid sturgeon eggs become adhesive 1 to 3 minutes after fertilization (Dettlaff et al. 1993) and presumably fall through the water column to affix to solid substrate such as rock (DeLonay et al. 2016). The relative importance of turbidity for the deposition, fertilization, and hatch of pallid sturgeon embryos is unknown (DeLonay et al. 2016). It is also unknown if predation is a threat to pallid sturgeon embryos (DeLonay et al. 2016). Spawning has not been documented in the Grand River.

A free embryo is a developing fish that no longer resides within the egg membrane. This life stage lasts 8 to 12 days post-hatch and covers the period from hatch until the larval fish begins feeding (DeLonay et al. 2016). Studies to date indicate: (1) pallid sturgeon free embryos drift and disperse downstream at a rate slightly less than mean water column velocity; (2) downstream drift and dispersal occur during day and night; (3) duration of the free embryo drift period depends on water temperature and rate of development; and (4) free embryos will drift and disperse several hundred kilometers during development into exogenously (i.e. external) feeding larvae, with total drift distance a function of water temperature, development rate, and velocity conditions in the river channel. Drifting free embryos use up their yolk sac and develop swimming ability, after which they "settle" into environments conducive to feeding, growth, and survival. The larval life stage is a developing fish without a yolk, feeding exogenously (i.e., it has consumed its yolk sac and must now feed externally). The period of transition from endogenous (growing or produced by growth from deep tissue) to exogenous feeding is considered critical because the larvae must find sufficient food or it will starve. Larval pallid sturgeon have been reported to consume the larvae and pupae of Dipterans (mainly from the family Chironomidae (i.e., midges) and Ephemeroptera nymphs (i.e., mayflies); DeLonay et al. 2016).

The juvenile life stage consists of sexually immature fish and lasts until the fish enter their first reproductive cycle. Diet composition plays a large role in the growth of juvenile pallid sturgeon to adult (Grohs et al. 2009), with chironomids (Order: Diptera) and mayflies (Order: Ephemeroptera) serving as important components of the early juvenile diet (Sechler 2010; Sechler et al. 2013). Pallid sturgeon diets shift from macroinvertebrates to fish as they grow. Of the food eaten by juvenile pallid sturgeon between 350 and 500 mm fork length, 57 percent was fish, whereas fish made up 90 percent of the diets of juvenile pallid sturgeons longer than 500 mm fork length (Gerrity et al. 2006; Grohs et al. 2009). Isotope analyses of pectoral spines support gut analyses and indicate that the diet shift of juvenile pallid sturgeon from

invertebrates to fish likely occurs at or before 500 mm fork length–well before pallid sturgeon reach reproductive maturity (French 2010). Limited prey sources increase mortality and may suppress growth in surviving juveniles (Deng et al. 2003; DeLonay et al. 2009). No clear relationship has been documented between abiotic factors (e.g., water temperature) and pallid sturgeon recruitment, but early diet and growth are hypothesized to affect recruitment into adult spawning populations (DeLonay et al. 2009; Sechler 2010).

5.0. Environmental Baseline

The environmental baseline is considered the same as the Future Without Project Condition (FWOP) described in the Grand River Integrated Feasibility Report and Environmental Assessment. The FWOP condition describes what is assumed to be in place if no federal project is implemented. In collaboration with the technical team, four general habitat types were identified for the focus of the habitat evaluation: wet prairie, emergent wetland, bottomland forest, and aquatic riverine habitat. These habitat types were selected because they are significant resources in the study areas that are representative of the habitat types being degraded. In consideration of the habitats on which the four federally listed species with potential to occur in the study area are associated with, this section focuses on the bottomland forest and aquatic riverine habitat types.

The USFWS's Habitat Evaluation Procedure methodology was used with all modeling to assess the quality and quantity of existing and future habitats in the study areas. In general, the Habitat Evaluation Procedure assigns Habitat Suitability Index (HSI) scores to model variables, which assess the quality or suitability of a habitat relative to a species ability to access food, secure shelter, and reproduce. H&H and sediment modeling outputs such as sedimentation depth, inundation extent, duration, and depth were used to evaluate and forecast future quality of habitat variables over time. Final HSI quality scores from 0.0 to 1.0 were used with habitat acreages to obtain habitat units (HUs), which measured the overall value of each habitat type. Cumulative average annual habitat units (AAHUs) and Net AAHUs were calculated and compared under FWOP and future with project (FWP) conditions to determine if a given alternative resulted in habitat lift or impairment over the 50-year period of analysis. The time intervals or stamps included Year 0 (existing, baseline conditions), Year 10 (for habitat types that reach sustainability quickly such as wetlands), Year 25 (for habitats with mid- to long-term growth characteristics), and Year 50 (for habitats that reach maturity after long periods of time such as old growth riparian corridors). Existing conditions were informed by existing data, previous field investigations and best professional judgment depending on the variables in each species HSI. FWOP and future with project (FWP) conditions were informed by sediment and H&H modeling output as well as best professional judgment from technical team members. The suite of species HSI models listed in Table 1 were identified for use in the focused study areas with review and approval by the technical team and USACE Ecosystem Center of Expertise.

Table 1. Habitat Models Used in Bottomland Forest and Aquatic Riverine Habitat Evaluation.

Habitat Type	Habitat Model	Notes
Bottomland Forest	Gray Squirrel HSI	Habitat type is present in all focus study areas. The model was selected because it has variables that allow assessment of bottomland forests with emphasis on hardmast tree species.
Aquatic Riverine	Qualitative Habitat Evaluation Index (QHEI)	The Locust Creek area used this habitat model to assess changes in aquatic riverine conditions. The model focuses on base flow conditions, channel morphology, riparian connectivity, and in stream habitat.

Figures 9, 10, and 11 illustrate the existing land cover within each study area. Average sediment deposition amounts in each Locust Creek terrestrial habitat tract were modeled at the end of 10, 25, and 50 years. Some habitat tracts were subdivided because the sediment behavior is significantly different within the tract. The evaluation assumed that floodplain deposition begins to affect forest productivity at 0.5 feet of depth over 50 years. Habitat degradation begins at 1.67 feet over 50 years. One foot of sediment deposition was viewed as a sustainable target. Modeling indicated that floodplain deposition well exceeds the recommended target for much of the region under the FWOP condition.

Based on degradation trends over the past 20 years and the results of sediment analysis, it can be expected that existing stands of bottomland hardmast forest within all of the study areas will continue to be impacted by inundation events and sedimentation under FWOP conditions. These impacts will reduce or eliminate hardmast recruitment and create conditions conducive for riparian forest species. As existing old-growth hardmast trees die-off and seed sources are removed, only sporadic hardmast tree cover can be expected in the study areas in the next 50 years.

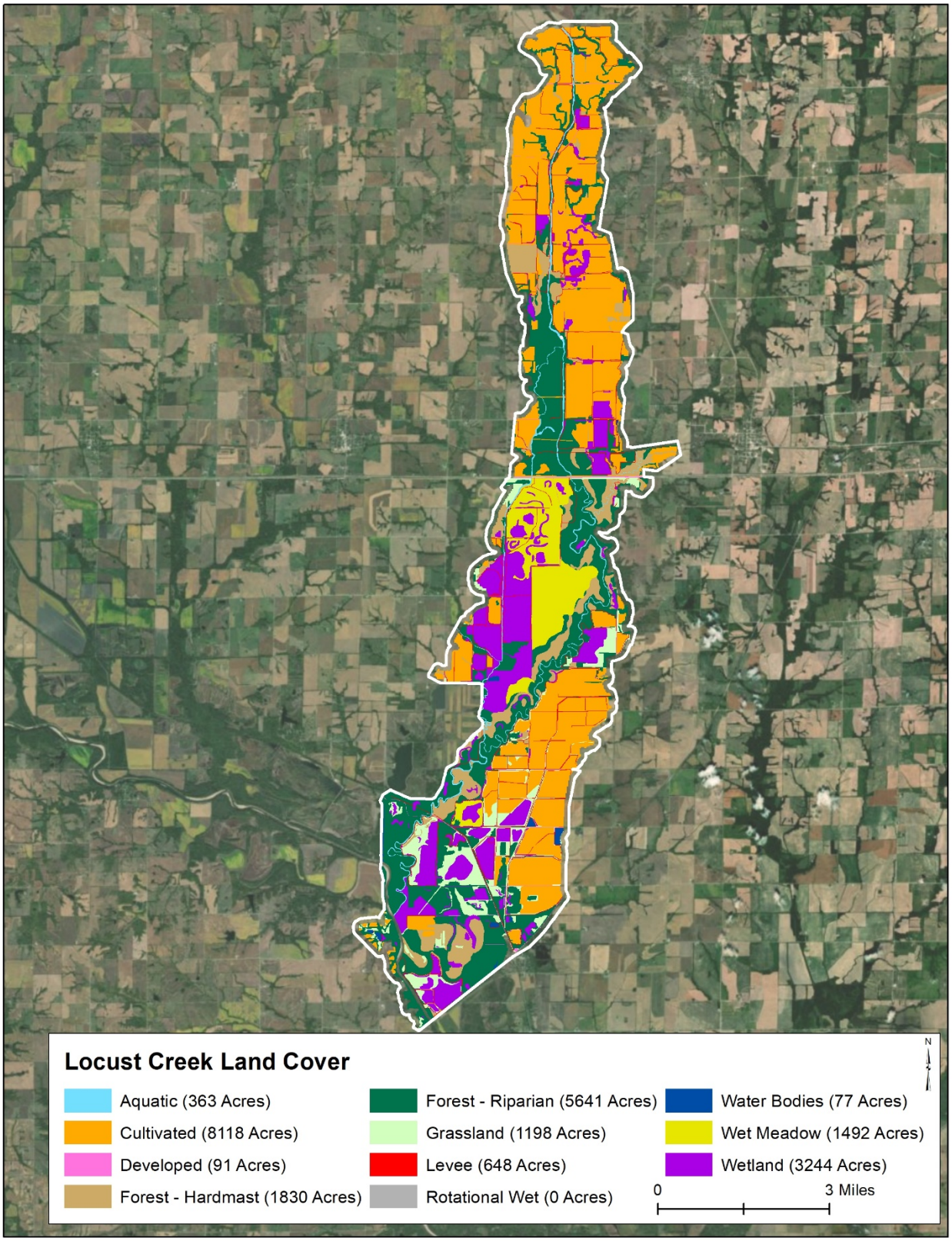

Figure 9. Existing Conditions for Locust Creek Terrestrial and Aquatic Tracts

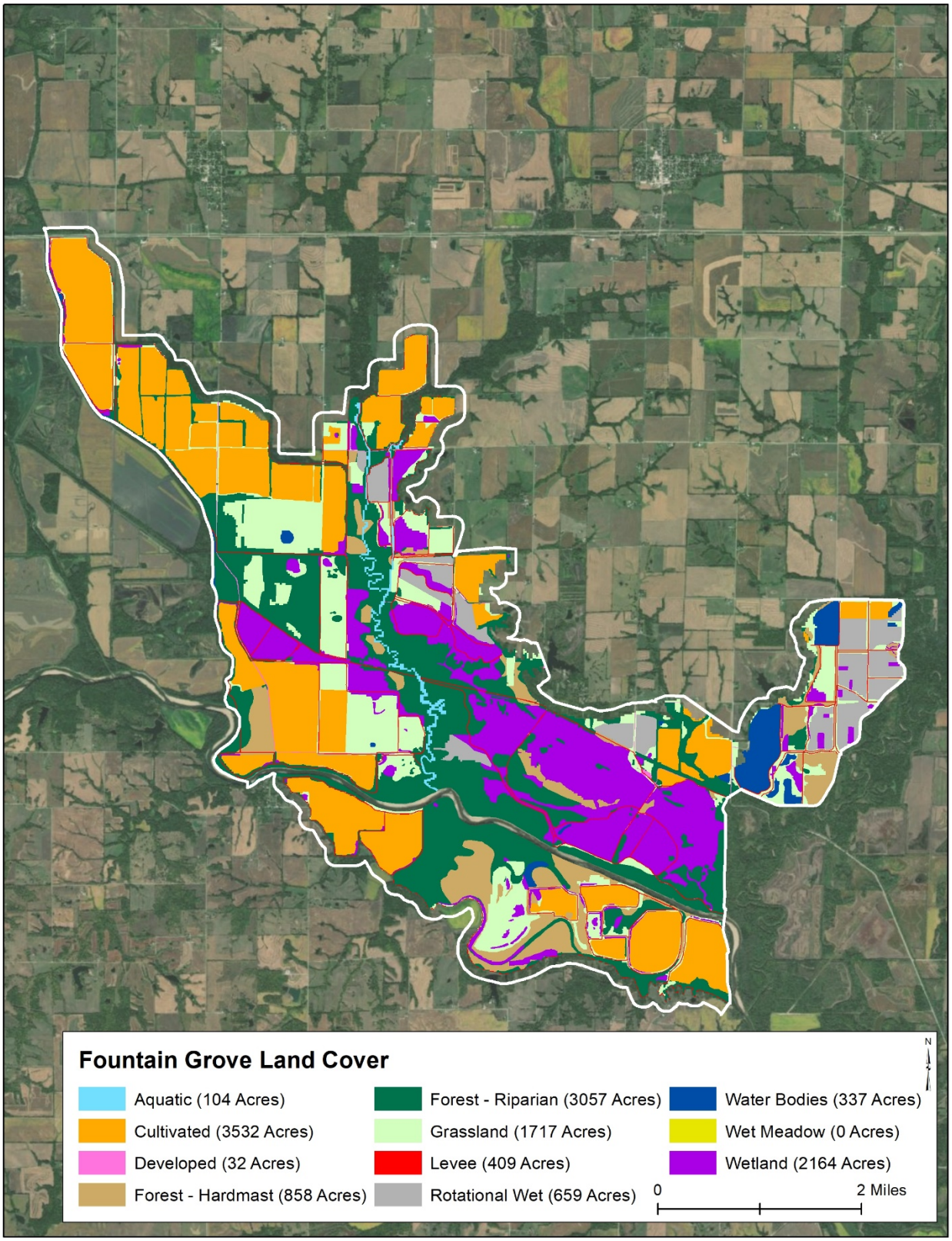

Figure 10. Existing Conditions Fountain Grove Terrestrial and Aquatic Tracts

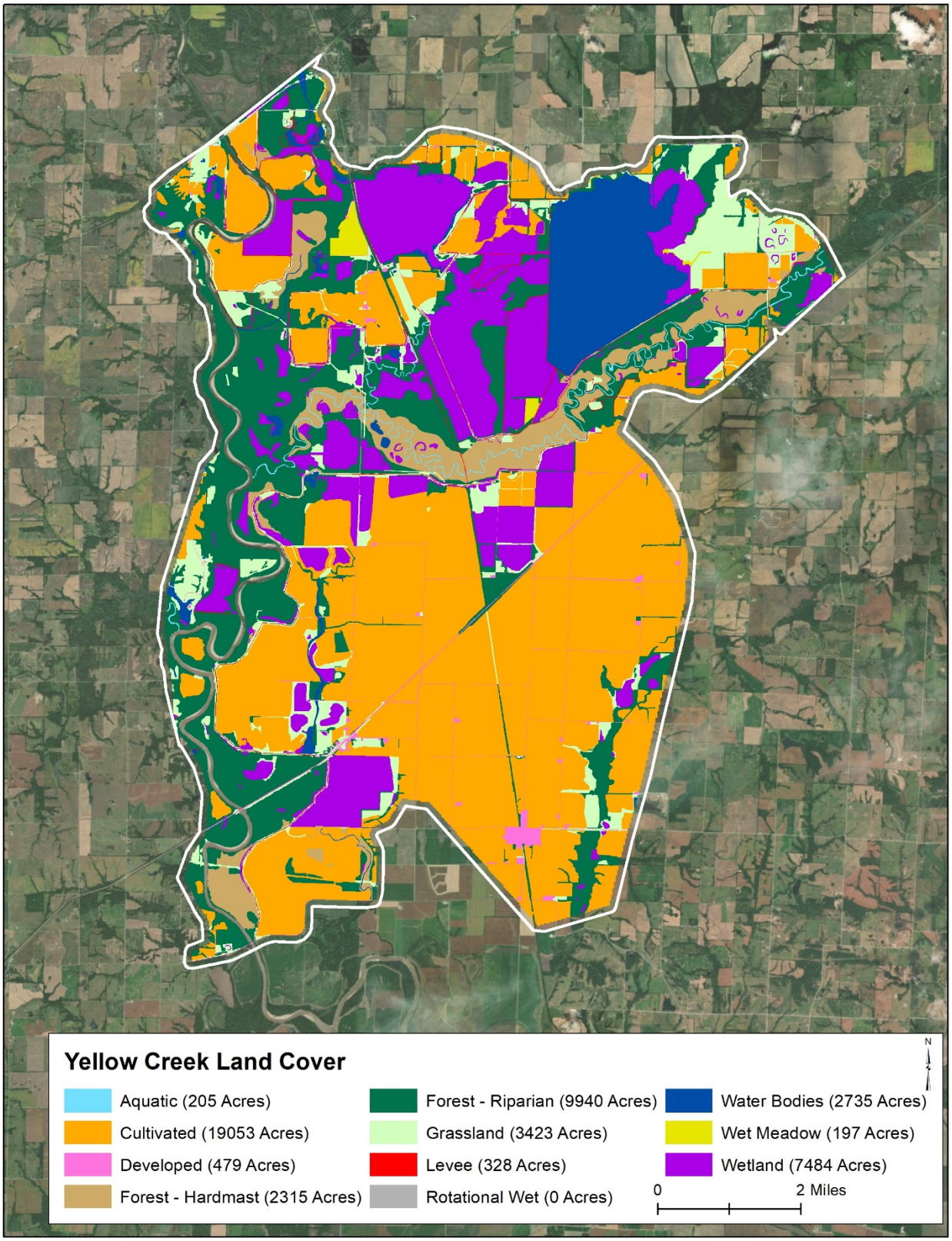

Figure 11. Existing Conditions for Yellow Creek Terrestrial Habitat Tracts.

The potential effects to aquatic riverine habitat were only assessed in the Locust Creek study area. The FWOP condition for the various aquatic tracts/reaches is highly dependent upon the existing quality of a given reach (i.e., channelized, constricted by levees, have adequate base flows) and the potential for future changes due to log jams, aggradation, and de-watering through avulsions. Due to the inability to accurately predict where or when the next log jam or avulsion might occur, future new avulsions were considered, but not modeled. In general, aquatic habitat quality varied over the 12 reaches that were assessed in the Locust Creek study area. Under the FWOP condition, some reaches remained relatively stable (i.e., ALC1, ALC5, ALC7); other reaches showed gradual increases in quality or initial decreases followed by increases as reach width, sinuosity, and depth evolved with changed flows (i.e., ALC2, ALC10); and many reaches had decreasing value over time due to degradation (i.e., ALC8, ALC9, ALC11) or had no habitat due to a lack of base flows (i.e., ALC3, ALC6).

Tables 2 and 3 summarize the average annual habitat units with the terrestrial and aquatic Locust Creek habitat tracts under the FWOP condition. Table 4 summarizes the average annual habitat units with the terrestrial Fountain Grove habitat tracts under the FWOP condition. Table 5 summarizes the average annual habitat units with the terrestrial Yellow Creek habitat tracts under the FWOP condition.

Table 2. Bottomland Forest Average Annual Habitat Units at Locust Creek Terrestrial Habitat Tracts under the Future Without Project Condition.

Tract	Bottomland Forest	
	Acres	AAHUs
TLC1	1,028.4	560.9
TLC2	778.0	151.4
TLC3	483.9	251.0
TLC4	191.5	62.9
TLC5	97.7	12.7
TLC6	1,481.9	720.0
TLC7	553.9	215.7
TLC8	2,856.9	1,411.3
Totals:	**7,472.2**	**3,385.9**

Table 3. Average Annual Habitat Units by Locust Creek Aquatic Habitat Tract under the Future Without Project Condition.

Habitat Tract	Acres	AAHUs
ALC1	1,200.3	24.0
ALC2	363.8	7.3
ALC3	0.0	0.0
ALC4	0.0	0.0
ALC5	643.0	12.9
ALC6	0.0	0.0
ALC7	432.3	8.6
ALC8	705.6	14.1
ALC9	429.4	8.6
ALC10	1,660.0	33.2
ALC11	2,251.0	45.0
ALC12	0.0	0.0
Totals	**7,685.4**	**153.7**

Table 4. Bottomland Forest Average Annual Habitat Units at Fountain Grove Terrestrial Habitat Tracts under the Future Without Project Condition.

Tract	Bottomland Forest	
	Acres	AAHUs
TFG1	307.4	105.2
TFG2	1,074.0	316.2
TFG3	1,324.3	291.2
TFG4	1,022.8	670.1
TFG5	188.1	146.6
Totals:	**3916.6**	**1,529.3**

Table 5. Bottomland Forest Average Annual Habitat Units at Yellow Creek Terrestrial Habitat Tracts under the Future Without Project Condition.

Tract	Bottomland Forest	
	Acres	AAHUs
TYC1	4,728.1	1,598.6
TYC2	333.3	126.9
TYC3	1,947.5	1,068.3
TYC4	110.1	36.4
TYC5	152.7	96.2
TYC6	79.8	5.9
TYC7	258.2	118.8
TYC8	171.7	7.1
TYC9	1,854.7	473.1
TYC10	12.7	0.3
TYC11	1,888.8	819.3
TYC12	720.7	227.7
Totals:	**12,258.3**	**4,578.6**

6.0. Effects Analysis

6.1. Federally Listed Bats

All three of the Federally-listed bat species are known to occur in one or more of the study areas. Tree clearing would be necessary to construct certain project features included in the proposed action. Approximately 248 acres of tree clearing is estimated for construction of the proposed action. The majority of tree clearing (approximately 86 acres) would be associated with constructing the avulsion spoil berm that is a component of the Locust Creek proposed action. The bats roost in forest and woodland habitats. Amounts of required tree clearing would be refined during the design phase of the project. Any opportunity to avoid or minimize tree clearing would be considered during design. Any necessary tree clearing would be restricted to the non-active period of November 1 to March 31 to avoid any impacts to bat species. Similarly, although the specific location of all the upstream bank stabilization projects are not know at this time, efforts would be made to avoid or minimize necessary tree clearance and seasonal tree clearing restrictions would be observed in construction of those projects. The habitat evaluation indicates that the proposed actions would result in a net increase of almost 1,400 bottomland forest AAHUs over the 50-year period of analysis (Table 6). This would represent long-term beneficial impacts to bat species over the 50-year period of analysis. Therefore, USACE concludes that the appropriate determination for the three listed bat species is “may affect, not likely to adversely affect”. Beneficial effects are expected over the long-term.

Table 6. Net change in Bottomland Forest and Aquatic Riverine AAHUs Modeled for the Proposed Action.

Study Area	Bottomland Forest		Aquatic Riverine	
	Cumulative AAHU	Net AAHU	Cumulative AAHU	Net AAHU
Locust Creek	4,029.7	643.6	198.6	44.9
Fountain Grove	2,013.2	483.9	NA	NA
Yellow Creek	4,850.1	271.4	NA	NA
Total	**10,893.0**	**1,398.9**	**198.6**	**44.9**

6.2. Pallid Sturgeon

Pallid sturgeon would not likely be adversely affected by the proposed action. Pallid sturgeon have been recently captured in the Grand River. Pallid sturgeon are well known to travel long distances. MDC has indicated non-wadeable, mid-sized, Missouri River tributaries in Missouri are currently understudied. The USFWS indicated this situation limits understanding of the potential presence and use of pallid sturgeon in the study area. Aquatic riverine habitat in the Locust Creek study area is expected to improve with the proposed action (Table 6). In-stream construction activities would not occur in the Grand River; therefore, no direct impacts to pallid sturgeon are anticipated. Pallid sturgeon are adapted to the naturally-turbid waters of the Missouri and Mississippi Rivers. Suspended sediment reductions or turbidity changes in the Grand River would be negligible because of Locust Creek’s relatively small contribution to Grand River sediment loads. As a result, and due to the low numbers of pallid sturgeon captured in the Grand River, no indirect adverse effects are likely from the proposed action. After input from the USFWS, USACE has determined that the proposed action may affect, but would not likely adversely affect pallid sturgeon.

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United States Department of the Interior

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December 6, 2019

Jason Farmer
Chief, Environmental Resources Section
U.S. Army Corps of Engineers
Planning, Programs, and Project Management Division
601 East 12th Street
Kansas City, MO 64106-2824

Dear Mr. Farmer:

The U.S. Fish and Wildlife Service (Service) has reviewed the U.S. Army Corps of Engineers (USACE) Biological Assessment (BA) for the Grand River Feasibility Study (GRFS) dated October, 2019. The following comments are provided in accordance with the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.).

The USACE was provided a list of federally listed species, via the Information, Planning, and Conservation system (IPaC) (Consultation Code: 03E14000-2019-SLI-2317), which are potentially affected by the project activities. The USACE has requested the Service's concurrence with a "May Affect, Not Likely to Adversely Affect" (NLAA) determination for the following species: gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), and northern-long eared bat (*Myotis septentrionalis*). The USACE is also considering a No Effect determination for the Pallid Sturgeon (*Scaphirhynchus albus*).

Upon reviewing the BA, the USACE indicated that the gray bat, Indiana bat, northern long-eared bat, and Pallid Sturgeon are potentially in the Action Area. The Pallid Sturgeon is well known to travel long distances and has been recently documented in the Grand River and other Missouri River tributaries throughout its range. The Missouri Department of Conservation has indicated non-wadeable, mid-sized, Missouri River tributaries in Missouri are currently understudied. This situation limits our understanding of the potential presence and use of Pallid Sturgeon within the defined Action Area. Therefore, given the existing species information within/near/downstream of the project area, we believe a NLAA determination is more appropriate for Pallid Sturgeon. The Service concurs with the USACE' NLAA determination for the federally listed bat species based on the Conservation Measures indicated below.

As part of the GRFS coordination, the Service provided the USACE the following conservation measures to be incorporated within project activities to help reduce potential direct, indirect, and cumulative impacts to federally listed bats:

1. All tree clearing resulting from the USACE action will occur during the inactive season from November 1 to March 31 unless negative presence/probable absence survey results were obtained for the action area through appropriate surveys approved by the Service.
2. The USACE will require a habitat assessment if the project will occur in Zone 1[1] and includes more than 10 acres of tree clearing. If the results indicate that more than 10 acres of suitable roosting habitat will be cleared, the USACE will require presence/probable absence surveys to determine if additional consultation is necessary or the project will not affect listed bats.
3. The USACE will require a habitat assessment if the project will occur in Zone 2[2] and includes more than 5 acres of tree clearing. If the results indicate that more than 5 acres of suitable roosting habitat will be cleared, the USACE will require presence/probable absence surveys to determine if additional consultation is necessary or the project will not affect listed bats.
4. If located in Zone 1, the project will not remove more than 10 acres of suitable roosting habitat during the inactive season.
5. If located in Zone 2, the project will not remove more than 5 acres of suitable roosting habitat during the inactive season.
6. The project and the USACE action will not result in the removal of trees in Zone 3[3].
7. Tree clearing associated with the project and the USACE action will not result in a cumulative loss of more than 5% of the baseline (2005) forested acreage.
8. If the project is located in a karst area and will involve construction methods that may cause deep ground disturbance, the USACE will require a cave search be conducted to determine if any caves are present in the action area that would be considered suitable habitat for bats and/or are currently or formerly used by listed bats.
9. If the demolition of an existing building or structure will occur as a result of the project in Zones 2 or 3, the USACE will require bat use surveys in collaboration with the Service. If during the course of demolition, bats of any species are discovered, then all work must cease and the Service must be immediately contacted. If the structure is safe to leave as is, then it will be left until after November 1, or until bats have stopped using the structure. If the structure is unsafe and poses a risk to human health and safety, the USACE will request the assistance of the Service in determining reasonable measures to exclude the bats.

As a reminder, the referenced species list is valid for 90 days. Therefore, a new species list should be obtained and reviewed prior to construction activities. Thank you for the consideration of threatened and endangered species. Please contact our office if you have any questions.

Sincerely,

Karen J. Herrington
Field Supervisor

cc: USACE, CENWK, Michael Snyder
USACE, CENWK, Kaely Megaro,

[1]Zone 1 = Conservation measures apply to actions within the State of Missouri excluding Zones 2 and 3.
[2]Zone 2 = Conservation measures apply to actions within 5.0 miles (radius) of a known capture of a listed bat.
[3]Zone 3 = Conservation measures apply to actions within 0.25 miles (radius) of a known roost tree or hibernacula.

DEPARTMENT OF THE ARMY
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October 8, 2019

Environmental Resources Section
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Ms. Karen Herrington
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Columbia, MO 65203-0057

Dear Ms. Herrington:

The purpose of this letter is to transmit the Biological Assessment for the Grand River Feasibility Study (Consultation Code 03E14000-2019-SLI-2317). The Proposed Action described in the BA is the tentatively selected plan identified in the *Draft Grand River Feasibility Report and Environmental Assessment* released for public and agency review on October 8, 2019. The draft feasibility report and EA can be obtained at the following weblink: https://www.nwk.usace.army.mil/Media/Public-Notices/Planning-Public-Notices/Article/1982752/draft-grand-river-feasibility-study-environmental-assessment/.

This BA addresses the potential to affect the federally-listed species identified on the IPaC official species list obtained for the referenced consultation code. Those species include the gray bat (*Myotis grisescens*), Indiana bat (*M. sodalis*), northern long-eared bat (*M. septentrionalis*) and pallid sturgeon (*Schaphirhynchus albus*). As documented in the BA and in accordance with Section 7 of the Endangered Species Act, USACE has concluded a preliminary determination of "May Affect, Not Likely to Adversely Affect" for the gray bat, Indiana bat, and northern long-eared bat and a determination of "No Effect" for the pallid sturgeon.

If you have any questions regarding this request, please contact Mr. Michael Snyder, Environmental Resources Specialist, at (816) 389-3141, or michael.v.snyder@usace.army.mil.

Jason Farmer
Chief
Environmental Resources Section

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Missouri Ecological Services Field Office
101 Park Deville Drive
Suite A
Columbia, MO 65203-0057
Phone: (573) 234-2132 Fax: (573) 234-2181

In Reply Refer To: July 10, 2019
Consultation Code: 03E14000-2019-SLI-2317
Event Code: 03E14000-2019-E-05368
Project Name: Grand River Feasibility Study

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.).

Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. N**ote that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days.** The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance

Refer to the Midwest Region S7 Technical Assistance website for step-by-step instructions for making species determinations and for specific guidance on the following types of projects: projects in developed areas, HUD, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

Federally Listed Bat Species

Indiana bats, gray bats, and northern long-eared bats occur throughout Missouri and the information below may help in determining if your project may affect these species.

Gray bats - Gray bats roost in caves or mines year-round and use water features and forested riparian corridors for foraging and travel. If your project will impact caves, mines, associated riparian areas, or will involve tree removal around these features particularly within stream corridors, riparian areas, or associated upland woodlots gray bats could be affected.

Indiana and northern long-eared bats - These species hibernate in caves or mines only during the winter. In Missouri the hibernation season is considered to be November 1 to March 31. During the active season in Missouri (April 1 to October 31) they roost in forest and woodland habitats. Suitable summer habitat for Indiana bats and northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags 5 inches diameter at breast height (dbh) for Indiana bat, and 3 inches dbh for northern long-eared bat, that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Tree species often include, but are not limited to, shellbark or shagbark hickory, white oak, cottonwood, and maple. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, Indiana bats or northern long-eared bats could be affected.

Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas;
- Trees found in highly-developed urban areas (e.g., street trees, downtown areas);
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees; and
- A stand of eastern red cedar shrubby vegetation with no potential roost trees.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of "There are no listed species found within the vicinity of the project," then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.

2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project other than bats (see #3 below) then project proponents can conclude the proposed activities **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species through the S7 Technical Assistance website.

3. If IPac returns a result that one or more federally listed bat species (Indiana bat, northern long-eared bat, or gray bat) are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** these bat species **IF** one or more of the following activities are proposed:

a. Clearing or disturbing suitable roosting habitat, as defined above, at any time of year;
b. Any activity in or near the entrance to a cave or mine;
c. Mining, deep excavation, or underground work within 0.25 miles of a cave or mine;
d. Construction of one or more wind turbines; or
e. Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on listed bat species. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.

If any of the above activities are proposed in areas where one or more bat species may be present, project proponents can conclude the proposed activities **may affect** one or more bat species. We recommend coordinating with the Service as early as possible during project planning. If your project will involve removal of over 5 acres of suitable forest or woodland habitat, we recommend you complete a Summer Habitat Assessment prior to contacting our office to expedite the consultation process. The Summer Habitat Assessment Form is available in Appendix A of the most recent version of the Range-wide Indiana Bat Summer Survey Guidelines.

Other Trust Resources and Activities

Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

Next Steps

Should you determine that project activities **may affect** any federally listed species or trust resources described herein, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

If you have not already done so, please contact the Missouri Department of Conservation (Policy Coordination, P. O. Box 180, Jefferson City, MO 65102) for information concerning Missouri Natural Communities and Species of Conservation Concern.

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

Karen Herrington

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Missouri Ecological Services Field Office
101 Park Deville Drive
Suite A
Columbia, MO 65203-0057
(573) 234-2132

Project Summary

Consultation Code: 03E14000-2019-SLI-2317

Event Code: 03E14000-2019-E-05368

Project Name: Grand River Feasibility Study

Project Type: LAND - RESTORATION / ENHANCEMENT

Project Description: The study is evaluating alternatives for ecosystem restoration within the Lower Grand River sub-basin HUC-8. Three primary areas for management actions were identified include the area of Locust Creek/ Pershing State Park, Fountain Grove Conservation Area, and the Yellow Creek areas, which includes Swan Lake National Wildlife Area and Yellow Creek Conservation Area. The project area uploaded for this review encompasses the extent of the habitat being evaluated as part of the study.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/39.68228158450006N93.28819255247356W

Counties: Carroll, MO | Chariton, MO | Linn, MO | Livingston, MO

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Bat *Myotis grisescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Fishes

NAME	STATUS
Pallid Sturgeon *Scaphirhynchus albus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7162	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

The following FWS National Wildlife Refuge Lands and Fish Hatcheries lie fully or partially within your project area:

FACILITY NAME	ACRES
Swan Lake National Wildlife Refuge **Swan Lake National Wildlife Refuge** 16194 Swan Lake Ave Sumner, MO 64681-9117 (660) 856-3323 https://www.fws.gov/refuges/profiles/index.cfm?id=33570	11,000

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

Due to your project's size, the list below may be incomplete, or the acreages reported may be inaccurate. For a full list, please contact the local U.S. Fish and Wildlife office or visit https://www.fws.gov/wetlands/data/mapper.HTML

FRESHWATER EMERGENT WETLAND

- PEM1/FO1A
- PEM1/FO1Ad
- PEM1/FO1C
- PEM1/FO1Ch
- PEM1/FO1Cx
- PEM1/SS1A
- PEM1/SS1Ad
- PEM1/SS1Ah
- PEM1/SS1Ch
- PEM1/SS1C
- PEM1/SS1Cd
- PEM1/SS1Cx
- PEM1/SS1K
- PEM1/USA
- PEM1A
- PEM1Ad

FRESHWATER POND

- PABF
- PABFx
- PABGx

LAKE

- L1UBH

- L1UBKx
- L2USAh
- L1UBHh
- L1UBK
- L2UBG
- L2USK