United States Department of the Interior

FISH AND WILDLIFE SERVICE
Indiana Ecological Services Field Office
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Indiana Endangered Species Determination Key

Standing Analysis

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1 Introduction

1.1 Purpose of the Standing Analysis

The U.S. Fish and Wildlife Service (Service) developed this Standing Analysis under Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (ESA), to support an optional, streamlined consultation process for federal agencies. The Standing Analysis provides the scientific analysis of a species' biology, potential impacts of various actions, and the rationale for determining effects to the species or their Critical Habitat.

We created this analysis to simplify Federal consultation for actions that may affect but are not likely to adversely affect (NLAA) federally listed species or their Critical Habitat. Federal agencies may also use the analysis for making a No Effect (NE) determination.

Federal agencies can access this analysis by completing the Determination Key (DKey) in the Information for Planning and Consultation (IPaC) system. When agencies use the DKey, they provide specific project information and adopt all or part of the Standing Analysis to support their NLAA determination and request for concurrence.

This analysis supports—but does not replace—formal consultation under ESA Section 7(a)(2). Agencies do not need to consult with the Service for actions they determine will have no effect on listed species or Critical Habitat. However, they must receive written concurrence from the Service for NLAA determinations.

Throughout this document, the term “Standing Analysis” refers to both the analysis itself and the associated DKey.

1.2 Benefits of the Standing Analysis

By building on our experience evaluating similar federal actions, we developed this Standing Analysis to streamline consultations for qualifying projects. This process offers several key benefits:

- Speeds up consultation for eligible actions;
- Reduces review time for Service staff;
- Provides consistent and timely responses to agencies, consultants, and project proponents;
- Improves our ability to track multiple independent actions affecting listed species and habitats.

1.3 Eligibility for Use of the Standing Analysis

This analysis does not serve as an automatic concurrence for individual NLAA determinations but can help agencies with the following:

- Support their own NLAA evaluations;
- Submit well-supported concurrence requests;
- Identify potential No Effect actions.

The analysis evaluates or covers[1] the species and Critical Habitat, area, and activities listed in Sections 2, 3, and 4. We can concur a project's effects on certain listed species or habitats are insignificant, discountable, or wholly beneficial if the project is within a defined or covered area, consists of described or covered activities, and incorporates certain conservation measures.

If a project is outside the scope of this analysis, the action agency or project proponent should contact the Indiana Ecological Services Field Office (INFO; IndianaFO@fws.gov) to coordinate ESA consultation as appropriate.

1.4 Ensuring Accurate Determinations

To use this analysis properly, agencies must provide complete and accurate information about the entire proposed action. We rely on the accuracy of this information during our evaluations.

Where applicable, we identify specific actions that we expect will have no effect[2] on listed species or habitats. Agencies may use this information as technical assistance when making their NE or NLAA determinations.

1.5 Updates to the Standing Analysis

We will review and update the Standing Analysis annually to ensure it reflects the following:

- The best available scientific and commercial data;
- Changes in listed species or designated habitats;
- Updated conservation measures or project types;
- ESA compliance requirements.

When we update the analysis, we will issue a revised version with a new cover sheet. We will maintain both current and previous versions at the lead field office for reference.

If we revise the analysis in a way that requires reinitiation of consultation for ongoing projects, we will notify the affected agencies and advise them on the next steps.

2 Covered Species & Critical Habitats

Animals

Birds

1 The term “cover” is used throughout this document to define the limits of use of a Standing Analysis. However, although the area, activities, and species are "covered" by the Standing Analysis, the future activities themselves are not "covered" by the Standing Analysis; there are additional steps (with or without a DKey) that take place for an action agency to utilize the information in the Standing Analysis and to request FWS concurrence that their proposed action is NLAA for listed species and Critical Habitat.

2 A “no effect” determination is appropriate when either the species is not present in the action area or is not exposed to any possible stressors or impacts from the proposed action, or the proposed action would not result in any physical, chemical, biotic changes to the environment that are reasonably certain to occur and would not occur but for the action (i.e., no action area can be defined). This footnote needs to be changed because this is not accurate. A no effect determination is also appropriate if it would not result in any physical, chemical, biotic changes to the environment that are reasonably certain to occur and would not occur but for the action (i.e., no action area can be defined).

- Piping Plover (*Charadrius melodus*) - Endangered
- Rufa Red Knot (*Calidris canutus rufa*) - Threatened
- Whooping Crane (*Grus americana*) – Nonessential Experimental Population

Freshwater Mussels

- Clubshell (*Pleurobema clava*) - Endangered
- Fanshell (*Cyprogenia stegaria*) - Endangered
- Fat Pocketbook (*Potamilus capax*) - Endangered
- Longsolid (*Fusconaia subrotunda*) - Threatened
- Northern Riffleshell (*Epioblasma torulosa rangiana*) - Endangered
- Pink Mucket (*Lampsilis abrupta*) - Endangered
- Rabbitsfoot (*Quadrula cylindrica cylindrica*) - Threatened
- Rayed Bean (*Villosa fabalis*) - Endangered
- Rough Pigtoe (*Pleurobema plenum*) - Endangered
- Round Hickorynut (*Obovaria subrotunda*) - Threatened
- Salamander Mussel (*Simpsonaias ambigua*) – Proposed Endangered
- Sheepnose (*Plethobasus cyphyus*) - Endangered
- Snuffbox (*Epioblasma triquetra*) - Endangered
- White Catspaw Pearly Mussel (*Epioblasma obliquata perobliqua*) - Endangered

Insects

- Mitchell's Satyr (*Neonympha mitchelli mitchelli*) – Endangered
- Western Regal Fritillary (*Argynnis idalia occidentalis*) – Proposed Threatened
- Monarch Butterfly (Danaus plexippus) – Proposed Threatened

Mammals

- Gray Bat (*Myotis grisescens*) - Endangered
- Indiana Bat (*Myotis sodalis*) - Endangered

Reptiles

- Copperbelly Water Snake (*Nerodia erythogaster neglecta*) - Threatened
- Eastern Massasauga Rattlesnake (*Sistrurus catenatus*) - Threatened

Plants

- Eastern Prairie Fringed Orchid (*Platanthera leucophaea*) - Threatened
- Mead's Milkweed (*Asclepias meadii*) - Threatened
- Pitcher's Thistle (*Cirsium pitcheri*) - Threatened
- Short's Bladderpod (*Physaria globosa*) - Endangered
- Short's Goldenrod (*Solidago shortii*) - Endangered
- Virginia Sneezeweed (*Helenium virginicum*) - Threatened

Critical Habitats (CH)

- Piping Plover CH
- Rabbitsfoot CH
- Round Hickorynut CH
- Salamander Mussel Proposed CH
- Short's Bladderpod CH

3 Covered Area

This Standing Analysis applies within the entire State of Indiana, unless otherwise excluded (Section 4.1). In delineating the geographic scope of this Standing Analysis (covered area), we determined the appropriate extent based on the species and Critical Habitats included and the activities covered herein. To qualify to use this Standing Analysis, a project's action area must fall completely within the covered area. Specific action areas will be determined on a project-by-project basis.

4 Covered Activity Description

This Standing Analysis includes the most common activities requiring consultation. The activity description, conservation measures, and covered area inform the Standing Analysis and describe which specific activities are NE or NLAA outcomes. The description of activities and their inclusion in the Standing Analysis does not indicate these activities will always result in a NE or NLAA determination and does not cover activities outside the scope described below.

Action agencies are not required to use this Standing Analysis. They continue to have the option to request separate consultation on a project; however, in most cases, using the Standing Analysis will substantially decrease consultation timeframes.

The covered activities include many types of projects that often do not significantly affect any federally listed threatened or endangered species or Critical Habitats in Indiana. Common project types include, but are not limited to, the following:

- prescribed burns
- commercial, residential, and recreational developments
- construction, maintenance, operation, and/or removal of:
  - roads and trails
  - communication towers
  - transmission and utility lines
  - oil and gas pipelines
  - bridges and culverts
  - water treatment plants
  - solar power facilities
  - hydroelectric facilities/dams
  - site or habitat restoration or enhancement
- dredging and filling of wetlands or waterbodies, and

- military operations.

For more details, the effects analyses for each taxa covers the potential effects or likelihood of exposure resulting from these activities to each species and to their Critical Habitats.

4.1 Limits

To assist action agencies/project proponents in determining if their project is within the scope of this Standing Analysis, the Service developed a Dkey in IPaC. The Dkey consists of a series of qualification questions to assess the impacts of the action. If the impacts of the action cannot be meaningfully measured, detected, or evaluated, we consider them insignificant. If the impacts are extremely unlikely to occur, we consider them discountable. Insignificant and discountable impacts are unlikely to adversely affect listed species or Critical Habitat and are within the scope of this Standing Analysis. Any actions likely to adversely affect a listed species or Critical Habitat do not are outside the scope of this Standing Analysis and require separate individual project review and consultation with the INFO.

Projects involving certain activities are outside the scope of the Standing Analysis (see Section 4.1.1). For projects requiring consultation (i.e., that "may affect" listed species or Critical Habitats) but are outside the scope of the Standing Analysis, action agencies or project proponents must contact the INFO directly to fulfill their consultation requirements.

4.1.1 Activity-based Limits

Actions and activities including the following are outside the scope of the Standing Analysis:

1. Purposeful take of a listed species
    a. Take is prohibited under Section 9 of the ESA. If incidental take is anticipated, then formal consultation with the Service may be required to issue an incidental take permit.
2. Construction or operation of wind turbines
    a. This activity can have significant impacts on listed species and migratory birds and thus is outside the scope of this Standing Analysis.
3. Construction of a communication tower that uses guy wires or is over 450 feet in height
    a. This activity can have significant impacts on listed species and migratory birds and thus is outside the scope of this Standing Analysis. More specific information would be required about the project including an analysis of the project's potential impacts to listed species and migratory birds and communication with the Migratory Birds Program.
4. Aerial or other broad application of chemicals
    a. This activity can have significant impacts to listed species, their habitats, and/or their other necessary resources (e.g., food) and thus is outside the scope of this Standing Analysis.
5. Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) transportation projects
    a. FHWA, FRA, or FTA actions should not use this Standing Analysis for Indiana bat determinations. The FHWA, FRA, FTA Programmatic Consultation for

Transportation Projects is intended for projects funded or authorized by FHWA, FRA, or FTA, that may affect the endangered Indiana bat, the endangered tricolored bat and/or the endangered northern long-eared bat, which requires consultation with the Service under Section 7 of the ESA.

To ensure compliance with the ESA, project-specific consultation (or other programmatic consultation, if applicable) with the Service may be required for projects involving the actions listed above. However, projects including these actions do not necessarily indicate the project will have adverse effects on listed species or Critical Habitats.

4.2 Conservation Measures

This Standing Analysis incorporates conservation measures (CMs) as design features to avoid adverse effects on individuals, populations, or species. When action agencies voluntarily implement certain CMs, the resulting effects are often reduced to the extent that formal consultation is not required. In such cases, the Service and the action agency have concluded the action is not likely to adversely affect listed species or Critical Habitat.

Projects relying on this Standing Analysis to support a determination of NE or NLAA must fully meet all its requirements. If a project cannot voluntarily adopt the specified CMs, it may no longer qualify to use this Standing Analysis and may require additional coordination with the Service.

Section 5 lists species-specific CMs under their species description.

5 Covered species & Critical Habitat Descriptions

The following section provides a summary of key background information on the species and CH considered in developing this Standing Analysis. For comprehensive species descriptions, refer to the Service's ECOS website (https://ecos.fws.gov). This overview is intended to familiarize the reader with the relevant species prior to the analysis of potential effects from the proposed action.

Species and CH within a project's action area that may be affected by the proposed action but are not addressed in this Standing Analysis will require separate consultation with the INFO.

5.1 Birds

5.1.1 Piping Plover (*Charadrius melodus*)

5.1.1.1 Species Summary

The piping plover is currently listed by the Service under the ESA as 'endangered' in the Great Lakes watershed (USFWS 1985). Threats to this species include the loss and degradation of habitat due to development, disturbance by humans and pets, disease, predation, and unpredictable changes in the environment. The Service's species profile for the piping plover can be found at https://ecos.fws.gov/ecp/species/6039. Additional information can be found at https://www.fws.gov/species/piping-plover-charadrius-melodus. A summary of the ecology of this species can be found in the Service's piping plover recovery plan (USFWS 2003) and 5-year

review (USFWS 2020). Critical Habitat was designated for the Great Lakes breeding population of piping plover (USFWS 2001).

5.1.1.2 Biological Information

In the Great Lakes region, piping plovers nest, feed, and rear their young in open, sparsely vegetated sandy areas. These areas include sand spits and sand beaches with wide, unforested dunes and swales or in the flat pans behind the primary dune (Pike 1985, Powell & Cuthbert 1992). Piping plover nests are scraped-out depressions in sandy soil, and they may be lined with pebbles (Pike 1985, Perles 1995). Generally, a pair will defend a small territory of about 200 meters (m; 656 feet [ft]).

Piping plovers begin arriving in northern Indiana and Michigan in late April, and most mated pairs are nesting by mid- to late May. Eggs typically hatch from early June to mid-July, with chicks fledging 21-30 days after hatching (Lambert & Ratcliff 1981, Pike 1985, Wemmer 2000). Although piping plovers typically produce one brood per year, they sometimes have two broods in a summer. Most adults depart for their wintering grounds by mid-August with juveniles following a few weeks later.

These birds can only tolerate a low level of disturbance at the beginning of the nesting period during nest site selection, egg laying, and incubation, but can tolerate higher levels of disturbance as the nesting season progresses. Some beach activities that may be associated with a high level of disturbance include walking pets off leash, loud noises, driving all-terrain vehicles, or any other activity that significantly increases the level of people using the beach (Pike 1985, Hoopes 1996, Burger 1994, Lambert & Ratcliff 1979).

5.1.1.3 Distribution & Critical Habitat Designation

Piping plovers have 3 disparate breeding populations: The Great Lakes, the Northern Great Plains, and the Atlantic Coast. Individuals from all 3 breeding populations winter along the Atlantic and Gulf coastal areas from North Carolina to Texas.

The Service designated 35 units of CH in eight states for the Great Lakes breeding population of the piping plover, including approximately 323 kilometers (km; 201 miles [mi]) of mainland and island shoreline (USFWS 2001). In Indiana, one unit has been designated along the Indiana Dunes National Lakeshore in Porter County.

Within the CH units, only the areas that contain the physical and biological features of piping plover habitat are designated as CH. For nesting habitat to be physically and biologically suitable for piping plovers, it must have a total shoreline length of at least 0.2 km (0.12 mi) of gently sloping, sparsely vegetated (less than 50 percent herbaceous and low woody cover) sand beach with a total beach area of at least 5 acres (ac; 2 hectares [ha]) (USFWS 2001). Appropriately sized sites must also have areas of at least 50 m (164 ft) in length where: (1) the beach width – defined as the distance from the normal high-water line to the foredune edge, or to the sand/vegetation boundary – is more than 7 m (23 ft); (2) there is protective cover (e.g., small patches of herbaceous vegetation, cobble, gravel, or debris) for nests and chicks; and (3) the distance to the tree line (from the normal high-water line to where the forest begins) is more than

50 m (164 ft). The dynamic ecological processes that create and maintain piping plover habitat, such as erosion, accretion, plant succession, and lake-level fluctuations, are also important biological and physical features.

5.1.1.4 Conservation Measures & Determination Key Guidance

The following list includes CMs to avoid or minimize effects of the action:

1. The action avoids suitable piping plover habitat (as described in Section 5.1.1.3).
2. The action occurs outside of the piping plover breeding season and migration windows (April-September).

Projects that intersect the piping plover species list area may result in a NE determination if the following applies:

1. The action does not intersect the piping plover buffer zone.
   OR
2. The action intersects the piping plover buffer zone.
3. The action does not occur in suitable habitat (as described in Section 5.1.1.3) and occurs outside of the piping plover migration windows (April 1-May 1 OR August 15-September 15).
4. The action area intersects CH, but the action is not a federal action OR the habitat does not contain any physical or biological features essential to piping plover conservation (as described in Section 5.1.1.3).

Projects that intersect the piping plover species list area may result in a NLAA determination if the following applies:

1. The action intersects the piping plover buffer zone, and all the following apply:
   a. The action does not occur in suitable habitat (Section 5.1.1.3).
   b. The action occurs during the migration season (April 1-May 1 OR August 15-September 15).
2. The action intersects the piping plover buffer zone and all the following apply:
   a. The action occurs in suitable habitat (Section 5.1.1.3).
   b. The action results in changes to piping plover habitat quality, quantity, or availability that are not permanent.
   c. The action does not overlap with the breeding season (April 15-August 15).
   d. The action does not result in increased disturbance or predation.
3. The action area occurs within CH, contains physical or biological features essential to the conservation of the piping plover (Section 5.1.1.3), and all the following apply:
   a. The action does not result in changes to piping plover habitat quality, quantity, or availability.
   b. The action does not result in increased disturbance or predation.

If these CMs are not incorporated into the proposed action, the project is not within the scope of the Standing Analysis for a NE or NLAA determination. Instead, the project may affect (MA) this species and requires further coordination with the Service.

5.1.2 Rufa Red Knot (*Calidris canutus rufa*)

5.1.2.1 Species Summary

The rufa red knot is currently listed by the Service under the ESA as 'threatened' across its range (USFWS 2014). Major threats to this species include the loss of both breeding and nonbreeding habitat, likely effects related to disruption of natural predator cycles on breeding grounds, reduced prey availability throughout nonbreeding range, and increasing frequency and severity of asynchronies (mismatches) in the timing of the annual migratory cycle relative to favorable food and weather conditions. The Service's species profile can be found at https://ecos.fws.gov/ecp/species/1864. Additional information can be found at https://www.fws.gov/species/red-knot-calidris-canutus-rufa. A summary of the ecology of the species can be found in the recovery plan (USFWS 2023), the 5-year review (USFWS 2021) and the species status assessment (USFWS 2020).

5.1.2.2 Biological Information

Red knot suitable habitat in the Great Lakes region includes beaches, dunes, mudflats, peat banks, sandbars, or shoals. In many wintering and stopover areas, quality, high tide roosting habitat (i.e., close to feeding areas, protected from predators, with sufficient space, free from excessive human disturbance) is limited. In non-breeding habitats, rufa red knot requires unvegetated or sparsely vegetated sand or mud flats and wash over areas with broad, unvegetated zones and little to no topographic relief to avoid predators (USFWS 2020, 2023). Inland stopover habitats may include riverine wetlands and manmade impoundments (USFWS 2023).

5.1.2.3 Distribution & Critical Habitat Designation

The rufa red knot is a migratory shorebird that breeds in the Canadian Arctic and winters in the southeastern United States, the Caribbean, Central America, and South America. Some rufa red knots fly more than 14,967 km (9,300 mi) from south to north every spring and repeat the trip in reverse every autumn, making this bird one of the longest-distance migrants in the animal kingdom (USFWS 2023). Major migration stopover and staging areas occur along the Gulf and Atlantic coasts of North and South America; however, rufa red knots also use sites in the Great Lakes region as stopover areas during migration and have been regularly sighted in inland areas of the United States within the Atlantic and central flyways, including the coasts of the Great Lakes (USFWS 2020). Migration sightings in the Great Lakes region may occur in May through September, with peaks in May and mid-July.

No Critical Habitat has been designated in Indiana for the rufa red knot.

5.1.2.4 Conservation Measures & Determination Key Guidance

The following list includes CMs to avoid or minimize effects of the action:

1. The action occurs outside of the rufa red knot migration window (May 15-June 15 or July 1-September 30).
2. The action avoids suitable stopover habitat (as described in Section 5.1.2.2).

Projects that intersect the rufa red knot species list area may result in a NE determination if the following applies:

1. The action does not intersect the rufa red knot buffer zone.
2. The action occurs outside of the rufa red knot migration window (May 15-June 15 or July 1-September 30).

Projects that intersect the rufa red knot species list area may result in a NLAA determination if the following applies:

1. The action occurs during the red knot migration windows (May 15-June 15 or July 1-September 30).
2. The action does not modify beaches, dunes, mudflats, peat banks, sandbars, shoals, or other suitable rufa red knot habitats.
3. The action does not result in increased human disturbance or predation.

If these CMs are not incorporated into the proposed action, the project is not within the scope of the Standing Analysis for a NE or NLAA determination. Instead, the project may affect (MA) this species and requires further coordination with the Service.

5.1.3 Effects Analysis for Birds

Qualifying projects typically involve some or all of the stressors listed below.

Habitat Loss/Degradation

Permanent alteration to piping plover habitat, especially alteration of the essential physical and biological features, would significantly impact the breeding, nesting, and foraging habits of these birds. Actions taking place during the breeding season of piping plovers could decrease nesting and breeding success due to modification of suitable habitat for nesting and foraging.

Permanent alteration to rufa red knot stopover habitat could impact their migratory success, especially if the action takes place during their migratory window. Actions taking place during the migratory windows of rufa red knots may impact foraging birds due to modification of suitable habitat for foraging.

Some projects that qualify for use of this DKey may result in minor loss, fragmentation, and/or temporary degradation of available habitat for these federally listed birds. However, adherence to the CMs listed in Sections 5.1.1.4 and 5.1.2.4 will ensure any reduction or modification of available habitat will result in only insignificant effects to listed species and Critical Habitats. CMs minimizing significant loss/degradation of habitat include restrictions on the extent and timing of certain activities (e.g., timing projects modifying piping plover habitats to their migration window).

Increased Human Disturbance and Predation

Any alterations causing an increase of disturbance (e.g., a hiking trail through suitable habitat) could diminish breeding and nesting success (for piping plovers), increase predation, and

decrease foraging success. Actions taking place during the breeding season of piping plovers may also diminish nesting and breeding success due to increased construction noise and activity.

This Standing Analysis does not cover projects that will increase the amount of human disturbance and/or predation to either piping plovers or rufa red knots. These projects will receive a MA determination and would require further coordination with the Service to minimize or eliminate these effects.

5.2 Freshwater Mussels

5.2.1 General Information for Unionid Mussels

5.2.1.1 Biological Information

Unionid mussels are suspension-feeders that siphon water and filter out food sources like suspended algae, bacteria, detritus, and microscopic animals (Gatenby et al. 1996, Strayer et al. 2004). Some adult mussels can also shift to deposit feeding using their foot with ciliary tracts, but mainly juveniles use this method of feeding (Yeager et al. 1994, Haag 2012).

In terms of reproduction, unionid mussels are all thought to have a similar process: sperm is released into the water by males to be taken in by downstream females (Cummings & Mayer 1992). The resulting larvae are called glochidia which are then released by the female to latch onto the gills or fins of a host fish. Once there, the glochidia form cysts on the fish and parasitically obtain oxygen and nutrients until they mature into juveniles and drop from the fish. Each species of freshwater mussel uses specific fish host species for their glochidia.

Threats to unionid mussels include degraded habitat and water quality from pollution (e.g., toxic waste, excess nutrients) and excess sediment from such things as dredging and agricultural runoff. Instream activities such as bridge and road construction also have the potential to impact localized populations. Additional threats include dams, fluctuations in water temperature and invasive species (e.g., zebra mussels).

5.2.2 Clubshell (*Pleurobema clava*)

5.2.2.1 Species Summary

The clubshell mussel is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1993). The Service's species profile for the clubshell can be found at https://ecos.fws.gov/ecp/species/3789. Additional information can be found at https://www.fws.gov/species/clubshell-pleurobema-clava. A summary of the ecology of this species can be found in the Service's recovery plan (USFWS 1994) and the most recent five-year review (USFWS 2019). No Critical Habitat has been designated for this species.

5.2.2.2 Distribution & Critical Habitat Designation

The clubshell mussel used to be ubiquitous throughout the Ohio River system, found in most tributaries throughout Kentucky, Illinois, Indiana, and Ohio and in more isolated systems in Michigan, Pennsylvania, and West Virginia (USFWS 1994). At the time of its listing in 1993, the clubshell was thought to be extant in 12 streams, two of which run through Indiana: the

Tippecanoe River (Kosciusko, Fulton, Pulaski, and Tippecanoe Counties) and Fish Creek of the St. Joseph River (DeKalb County, Indiana and Williams County, Ohio) (USFWS 2019). Now, the clubshell is thought to be limited to 11 extant populations occupying 19 streams including sites where augmentation or reintroduction has taken place.

Critical Habitat has not been designated in Indiana for the clubshell.

5.2.3 Fanshell (*Cyprogenia stegaria*)

5.2.3.1 Species Summary

The fanshell mussel is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1990). The Service's species profile for the fanshell can be found at https://ecos.fws.gov/ecp/species/4822. Additional information can be found at https://www.fws.gov/species/fanshell-cyprogenia-stegaria. A summary of the ecology of this species can be found in the Service's Recovery Plan (USFWS 1991) and the most recent five-year review (USFWS 2019). No Critical Habitat has been designated for this species.

5.2.3.2 Distribution & Critical Habitat Designation

This species can be found in various rivers in Alabama, Illinois, Indiana, Kentucky, Ohio, Tennessee, Virginia and West Virginia – all within the Ohio River basin. In Indiana as of 2017, the fanshell has been found in the East Fork White and Tippecanoe Rivers, and the last live individual in the Wabash River was found in 2004 (USFWS 2019). These populations are not abundant, but there is evidence that some reproduction is occurring.

Critical Habitat has not been designated in Indiana for the fanshell mussel.

5.2.4 Fat Pocketbook (*Potamilus capax*)

5.2.4.1 Species Summary

The fat pocketbook pearly mussel is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1976). The Service's species profile for the fat pocketbook can be found at https://ecos.fws.gov/ecp/species/2780. Additional information can be found at https://www.fws.gov/species/fat-pocketbook-potamilus-capax. A summary of the ecology of this species can be found in the Service's Recovery Plan (USFWS 1989) and the most recent five-year review (USFWS 2019). No Critical Habitat has been designated in Indiana for this species.

5.2.4.2 Distribution & Critical Habitat Designation

The fat pocketbook was historically found in Arkansas, Illinois, Indiana, Iowa, Kentucky, Mississippi, Missouri, and Ohio. In Indiana, this mussel has only been found in the Wabash and Ohio Rivers and in both rivers' tributaries (USFWS 2019).

Critical Habitat has not been designated in Indiana for the fat pocketbook.

5.2.5 Longsolid (*Fusconaia subrotunda*)

5.2.5.1 Species Summary

The longsolid mussel is currently listed by the Service under the ESA as 'threatened' across its range (USFWS 2023). The Service's species profile for the longsolid can be found at https://ecos.fws.gov/ecp/species/9880. Additional information can be found at https://www.fws.gov/species/long-solid-fusconaia-subrotunda. A summary of the ecology of this species can be found in the Service's Species Status Assessment (USFWS 2022). No Critical Habitat in Indiana has been designated for this species.

5.2.5.2 Distribution & Critical Habitat Designation

Historically, the longsolid was found in four basins: the Great Lakes, Ohio, Cumberland, and Tennessee River basins. However, the longsolid is considered extirpated from the Great Lakes basin and is found predominantly in the Ohio basin, which drains portions of New York, Pennsylvania, Ohio, West Virginia, Virginia, Kentucky, Illinois, and Indiana. The Cumberland basin drains portions of Kentucky and Tennessee, and the Tennessee basin drains portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia. Currently, the longsolid is found in the states of Alabama, Kentucky, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia, and is considered extirpated from Georgia, Indiana, and Illinois (USFWS 2022).

Approximately 1,794 river km (1,115 river mi) falling within 12 units of Critical Habitat has been designated for the longsolid; however, no Critical Habitat has been designated for this species in Indiana (USFWS 2023).

5.2.6 Northern Riffleshell (*Epioblasma torulosa rangiana*)

5.2.6.1 Species Summary

The northern riffleshell is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1993). The Service's species profile for the northern riffleshell can be found at https://ecos.fws.gov/ecp/species/527. Additional information can be found at https://www.fws.gov/species/northern-riffleshell-epioblasma-torulosa-rangiana. A summary of the ecology of this species can be found in the Service's Recovery Plan (USFWS 1994) and the most recent five-year review (USFWS 2019). No Critical Habitat has been designated for this species.

5.2.6.2 Distribution & Critical Habitat Designation

The northern riffleshell was listed as endangered in 1993. This mussel was historically found in Illinois, Indiana, Kentucky, Michigan, Ohio, Pennsylvania, West Virginia, and western Ontario. It was widespread in the Ohio and Maumee River basins, and in tributaries of western Lake Erie. At the time of its listing in 1993, the northern riffleshell occurs in short reaches of the Green River in Kentucky; the Detroit and Black Rivers in Michigan; Big Darby Creek in Ohio; and French Creek, LeBoeuf Creek and the Allegheny River in Pennsylvania. In 2015, the Indiana Department of Natural Resources (IDNR) began a reintroduction effort in the Tippecanoe River (Pulaski and White Counties, Indiana) (Fisher 2018).

Critical Habitat has not been designated in Indiana for the northern riffleshell.

5.2.7 Pink Mucket (*Lampsilis abrupta*)

5.2.7.1 Species Summary

The pink mucket is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1976). The Service's species profile for the pink mucket can be found at https://ecos.fws.gov/ecp/species/7829. Additional information can be found at https://www.fws.gov/species/pink-mucket-lampsilis-abrupta. A summary of the ecology of this species can be found in the Service's Recovery Plan (USFWS 1985) and the most recent five-year review (USFWS 2019). No Critical Habitat has been designated for this species.

5.2.7.2 Distribution & Critical Habitat Designation

The pink mucket historically had a widespread distribution throughout the Ohio, Cumberland, and Tennessee River Basins (USFWS 1985). In Indiana, this mussel could be found in the Ohio, Wabash, and White Rivers. The species is now considered extirpated from all but 29 streams (USFWS 2019). Currently, the Ohio River is the only river in Indiana to potentially contain pink mucket mussels; however, only two subpopulations have been observed: one upstream between Ohio and West Virginia and the second near the mouth between Illinois and Kentucky.

Critical Habitat has not been designated in Indiana for the pink mucket.

5.2.8 Rabbitsfoot (*Quadrula cylindrica cylindrica*)

5.2.8.1 Species Summary

The rabbitsfoot is currently listed by the Service under the ESA as 'threatened' across its range (USFWS 2013). The Service's species profile for the rabbitsfoot can be found at https://ecos.fws.gov/ecp/species/5165. Additional information can be found at https://www.fws.gov/species/rabbitsfoot-quadrula-cylindrica-cylindrica. A summary of the ecology of this species can be found in the Service's Recovery Plan (USFWS 2023), the most recent five-year review (USFWS 2020), and the species status assessment (USFWS 2021). Critical Habitat has been designated in Indiana for this species, see the listing in the Federal Register for more information (USFWS 2015).

5.2.8.2 Distribution & Critical Habitat Designation

This mussel is found in rivers and streams in Alabama, Arkansas, Georgia, Kansas, Kentucky, Illinois, Indiana, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, Tennessee, and West Virginia. The Service estimates that the rabbitsfoot has been extirpated from 63-70% of the watersheds in its historical range (USFWS 2021). The two basins of interest for Indiana are the Lower Great Lakes Sub-basin and the Ohio River Basin. The rabbitsfoot occurs in Fish Creek, a river flowing through northeastern Indiana and northwestern Ohio, in the Lower Great Lakes Sub-basin; in low abundance in the Wabash and Eel Rivers; and in the Ohio River main stem with approximately 60 records of occurrence along the entire river, including Perry County, Indiana (USFWS 2021).

Critical Habitat has been designated for this subspecies in Indiana. Throughout its range, approximately 2,312 river km (1,437 river mi) divided into 31 units has been designated as

Critical Habitat (USFWS 2015). Indiana contains Critical Habitat in Carroll, Pulaski, Tippecanoe, and White Counties, protecting sections of the Tippecanoe and Wabash Rivers.

5.2.9 Rayed Bean (*Villosa fabalis*)

5.2.9.1 Species Summary

The rayed bean is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 2012). The Service's species profile for the rayed bean can be found at https://ecos.fws.gov/ecp/species/5862. Additional information can be found at https://www.fws.gov/species/rayed-bean-villosa-fabalis. A summary of the ecology of this species can be found in the Service's species status assessment (USFWS 2022) and the most recent five-year review (USFWS 2018). No Critical Habitat has been designated for this species.

5.2.9.2 Distribution & Critical Habitat Designation

The rayed bean historically was found across a wide expanse that included parts of the Midwest and eastern United States, north to Ontario, Canada. Once found in at least 115 streams, canals, and lakes, the rayed bean now occurs in only 30 streams and one lake (USFWS 2022). Currently, there are 19 extant populations found in Indiana, Michigan, New York, Ohio, Pennsylvania, Tennessee, West Virginia, and Ontario, Canada.

Critical Habitat has not been designated for the rayed bean.

5.2.10 Rough Pigtoe (*Pleurobema plenum*)

5.2.10.1 Species Summary

The rough pigtoe is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1976). The Service's species profile for the rough pigtoe can be found at https://ecos.fws.gov/ecp/species/6894. Additional information can be found at https://www.fws.gov/species/rough-pigtoe-pleurobema-plenum. A summary of the ecology of this species can be found in the Service's recovery plan (USFWS 1984) and the most recent five-year review (USFWS 2021). No Critical Habitat has been designated for this species.

5.2.10.2 Distribution & Critical Habitat Designation

Currently, all streams known to contain rough pigtoes occur within the Ohio River basin (USFWS 2021). Most of the populations are found within the Licking, Green, Barren, Cumberland, Tennessee, and Clinch Rivers. The most recent Indiana record was found in the East Fork White River in 1992; however, it was also historically found in the Wabash and Tippecanoe Rivers (USFWS 1984, 2021).

Critical Habitat has not been designated for the rough pigtoe.

5.2.11 Round Hickorynut (*Obovaria subrotunda*)

5.2.11.1 Species Summary

The round hickorynut is currently listed by the Service under the ESA as 'threatened' across its range (USFWS 2023). The Service's species profile for the round hickorynut can be found at https://ecos.fws.gov/ecp/species/9879. Additional information can be found at

https://www.fws.gov/species/round-hickorynut-obovaria-subrotunda. A summary of the ecology of this species can be found in the Service's Species Status Assessment (USFWS 2022). Critical Habitat has been designated in Indiana for this species.

5.2.11.2 Distribution & Critical Habitat Designation

Historically, the round hickorynut had 301 populations in the Great Lakes, Ohio, Cumberland, Tennessee, and Lower Mississippi River basins spanning 12 states (USFWS 2022). Currently, 232 populations have been lost and they are considered extirpated from Georgia, Illinois, and New York. There are three extant populations in Indiana which can be found in the Tippecanoe and Eel Rivers and Richland Creek, a tributary of the White River. This species has had a steady decline in distribution and abundance in some parts of its range in the Great Lakes and Ohio River basins but are thought to be expanding their range in Indiana and have lost few populations in the state.

Approximately 1,482 river km (921 river mi) falling within 14 units of Critical Habitat in Pennsylvania, Ohio, Indiana, Kentucky, West Virginia, Tennessee, Alabama, and Mississippi has been designated for the round hickorynut (USFWS 2023). The Critical Habitat in Indiana includes 120.8 river km (75 river mi) of the Tippecanoe River in Fulton, Marshall, Pulaski, and Starke Counties. Each unit of Critical Habitat contains all the essential physical and biological features for the round hickorynut: 1) Adequate flow (i.e., a hydrologic flow regime) to maintain benthic habitat and stream connectivity, 2) suitable substrates and connected instream habitats, 3) water and sediment quality necessary to sustain their physiological processes, and 4) the presence and abundance of suitable fish hosts.

5.2.12 Sheepnose (*Plethobasus cyphyus*)

5.2.12.1 Species Summary

The sheepnose mussel (formerly referred to as the bullhead mussel) is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 2012). The Service's species profile for the sheepnose can be found at https://ecos.fws.gov/ecp/species/6903. Additional information can be found at https://www.fws.gov/species/sheepnose-plethobasus-cyphyus. A summary of the ecology of this species can be found in the Service's sheepnose 5-year review (USFWS 2020) and the species status assessment (USFWS 2022). No Critical Habitat has been designated for this species.

5.2.12.2 Distribution & Critical Habitat Designation

This species is known from the Mississippi, Ohio, Cumberland, Tennessee, and Ohio River main stems, and scores of tributary streams range wide. Currently, there are 15 extant populations in the Ohio River basin, spanning portions of Illinois, Indiana, Ohio, Kentucky, Tennessee, Virginia, West Virginia, Pennsylvania, North Carolina, and New York.

Critical Habitat has not been designated in Indiana for the sheepnose mussel.

5.2.13 Snuffbox (*Epioblasma triquetra*)

5.2.13.1 Species Summary

The snuffbox is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 2012). The Service's species profile for the snuffbox can be found at https://ecos.fws.gov/ecp/species/4135. Additional information can be found at https://www.fws.gov/species/snuffbox-epioblasma-triquetra. A summary of the ecology of this species can be found in the Service's snuffbox's most recent 5-year review (USFWS 2019) and its species status assessment (USFWS 2022). No Critical Habitat has been designated for this species.

5.2.13.2 Distribution & Critical Habitat Designation

Historically, the snuffbox was widespread, occurring in 211 streams and lakes in 18 states and Ontario, Canada (USFWS 2022). The population has been reduced to 83 streams and lakes in 14 states and Ontario. The snuffbox is currently found in Alabama, Arkansas, Illinois, Indiana, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, Wisconsin, and Ontario, Canada. Most populations are small and geographically isolated from one another, further increasing their risk of extinction. There are 30 populations in the Ohio River basin, which includes a portion of Illinois, Indiana, Kentucky, Pennsylvania, Ohio, and West Virginia, with 13 of them at high risk.

Critical Habitat has not been designated for the snuffbox.

5.2.14 White Catspaw Pearly Mussel (*Epioblasma obliquata perobliqua*)

5.2.14.1 Species Summary

The white catspaw pearly mussel is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1976). The Service's species profile for white catspaw pearly mussel can be found at https://ecos.fws.gov/ecp/species/6893. Additional information can be found at https://www.fws.gov/species/white-cats-paw-pearly-mussel-epioblasma-obliquata-perobliqua. A summary of the ecology of this species can be found in the Service's white catspaw pearly mussel's most recent 5-year review (USFWS 2021) and its recovery plan (USFWS 1990). No Critical Habitat has been designated for this species.

5.2.14.2 Distribution & Critical Habitat Designation

The white catspaw pearly mussel was historically found in the Wabash, White, Tippecanoe, Maumee, and St. Joseph Rivers in Indiana and the Maumee and St. Joseph Rivers and Fish Creek in Ohio (USFWS 2021). Now, this mussel is believed to exist in only a three-mile portion of Fish Creek in Ohio. With only one known population, the white catspaw pearly mussel is one of the most critically endangered animals.

Critical Habitat has not been designated for the white catspaw pearly mussel.

5.2.15 Conservation Measures & Determination Key Guidance

The following list includes CMs to avoid effects of the action:

1. The action avoids impacts to local hydrology.
2. The action avoids indirect or direct impacts to streams or rivers.
3. The action avoids impacts to riparian zones.

Projects that intersect the species list area for any listed mussel may result in a NE determination if the following applies:

1. The action will not temporarily or permanently affect local hydrology.
2. The action will not have any direct impacts to a stream or river.
3. The action will not have the potential to impact the riparian zone.
4. The action will not have indirect impacts to a stream or river.

If these CMs are not incorporated into the proposed action, the project is not within the scope of the Standing Analysis for a NE or NLAA determination. Instead, the project may affect (MA) this species and requires further coordination with the Service.

5.2.16 Effects Analysis for Mussels

Qualifying projects typically involve the stressor listed below.

Habitat Loss/Degradation

Freshwater mussels are vulnerable to habitat alterations and water quality degradation. Riparian zones are essential to prevent soil erosion and buffer against surface runoff which would result in excess sedimentation and water pollution, which in turn directly impacts mussel health. Mussels are also directly impacted by dewatering or dredging of the river/stream bottom which destroys or modifies potentially suitable habitat. The implementation of the CMs listed above avoids impacts from the proposed action(s) to potentially suitable habitat and to water resources. If these CMs are not incorporated into the proposed action, the project is not within the scope of the Standing Analysis for a NE or NLAA determination. Instead, the project may affect (MA) this species and requires further coordination with the Service.

5.3 Insects

5.3.1 Mitchell's Satyr (*Neonympha mitchelli mitchelli*)

5.3.1.1 Species Summary

The Mitchell's satyr is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1991). The primary threat to this butterfly is the loss and disruption of suitable fen habitats from wetland alteration and drainage and natural disturbance like wildfire (USFWS 1998). Collection of this rare butterfly also negatively impacts the species. The Service's species profile for the Mitchell's satyr can be found at https://ecos.fws.gov/ecp/species/8062. Additional information can be found at https://www.fws.gov/species/mitchells-satyr-butterfly-neonympha-mitchellii-mitchellii. A summary of the ecology of this species can be found in the Service's Mitchell's satyr recovery plan (USFWS 1998) and most recent 5-year review (USFWS 2021). Critical Habitat has not been designated for the Mitchell's satyr in Indiana.

5.3.1.2 Biological Information

Mitchell's satyrs are prairie fen specialists (USFWS 2014). Fens are sensitive to hydrological disturbance in the regional watershed in addition to other threats like water pollution, overgrazing, invasive species, beaver extirpation, and fire exclusion (Abbas 2011, Sampath et al. 2016, USFWS 2020).

One study found that they preferred habitat that had 70% ground cover, less than 55% canopy cover, and 60% maximum sedge cover (USFWS 2021). Sedges are thought to be the primary host plants for the Mitchell's satyr larvae, particularly those species in the genus *Carex* (USFWS 2014, 2021). They also may require a variety of wildflowers (e.g., black-eyed susan [*Rudbeckia hirta*] and mountain mint [*Pycanthemum virginianum*]) for nectaring (USFWS 2014). However, they need an intermixing of grass-like plants and wildflowers which is best accomplished by regular fire, maintaining wetlands in a semi-open state suitable for Mitchell's satyrs (USFWS 2020).

5.3.1.3 Distribution & Critical Habitat Designation

Currently, there are populations of Mitchell's satyr in Michigan, Indiana, Virginia, Mississippi, and Alabama. In Indiana, only one population occurs at a site in LaGrange County, which is not considered viable as only six satyrs were found in 2018 and only one in 2019 (USFWS 2021). This site was acquired by LaGrange County Parks in 2020, and restoration efforts are underway. In addition to these efforts, 42 captive-reared individuals were released in 2016-2017 in Noble County, Indiana; however, none were observed at this site in the following years.

Critical Habitat has not been designated for the Mitchell's satyr in Indiana.

5.3.1.4 Conservation Measures & Determination Key Guidance

The following list includes CMs to avoid or minimize effects of the action:

1. The action avoids all suitable habitat (as described in Section 5.3.1.2).
2. The action avoids the alteration or fill of one or more acres of wetland.
3. The action avoids spraying insecticides.
4. The action avoids ground or vegetation disturbance.

Projects that intersect the Mitchell's satyr species list area may result in a NE determination if the following applies:

1. The action does not take place in suitable habitat (as described in Section 5.3.1.2).

Projects that intersect the Mitchell's satyr species list area and take place in suitable habitat may result in a NLAA determination if the following applies:

1. The action does not alter or fill one or more acres of wetland.
2. The action does not include spraying insecticides.
3. The action does not affect local hydrology (either temporarily or permanently).
4. The action does not disturb the ground or existing vegetation.

If these CMs are not incorporated into the proposed action, the project is not within the scope of the Standing Analysis for a NE or NLAA determination. Instead, the project may affect (MA) this species and requires further coordination with the Service.

5.3.2 Effects Analysis for Insects

Qualifying projects typically involve one or more of the stressors listed below.

Habitat Loss/Degradation

Actions resulting in significant alteration to wetlands, effects to local hydrology (either temporary or permanent), and disturbance to the ground or existing vegetation are outside the scope of the CMs and Standing Analysis. In Indiana, approximately 85% of the historical wetlands in the state have been lost (IN DNR 1996). As wetlands disappear, the Mitchell's satyr – a prairie fen specialist – also disappears. Thus, this Standing Analysis does not cover activities permanently altering or filling more than one acre of wetland nor activities impacting the local hydrology. Since the Mitchell's satyr is dependent on certain vegetation types (e.g., sedges, wildflowers, grasses, etc.), this analysis does not cover activities involving disturbance to the ground or existing vegetation in suitable habitat. Thus, if the CMs listed in Section 5.3.1.4 are implemented, the Mitchell's satyr will not be significantly impacted.

Direct Harm

This analysis does not cover projects that include spraying insecticides, which could involve take of individuals of the species. Any projects that include insecticide usage requires further coordination with the Service as take is one of the limits to this analysis (see Section 4.1.1).

5.4 Mammals

5.4.1 Gray Bat (*Myotis grisescens*)

5.4.1.1 Species Summary

The gray bat is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1976). Disturbance to caves from humans during their hibernation is the primary threat to the gray bat; however, white-nose syndrome (WNS) caused by the fungus *Pseudogymnoascus destructans* is also considered a relatively low threat (USFWS 2009). The Service's species profile for the gray bat can be found at https://ecos.fws.gov/ecp/species/6329. Additional information can be found at https://www.fws.gov/species/gray-bat-myotis-grisescens. A summary of the ecology of this species can be found in the Service's recovery plan (USFWS 1982) and 5-year review (USFWS 2025). No Critical Habitat has been designated for this species.

5.4.1.2 Biological Information

Gray bats are considered cave-obligate species, migrating seasonally between hibernating and maternity caves (USFWS 1982, 2009). These bats require caves with specific conditions. In the summer, female gray bats form their maternity colonies within a select few caves that are near a water source and are warm (14°-25°C) (USFWS 2009). In contrast, the caves used for hibernation in the winter are typically deep, vertical caves with internal temperatures between 1°-9°C, multiple entrances, and good air flow. Gray bats also use non-cave summer roost sites, such as concrete box culverts and crevices under bridges (Cervone et al. 2016).

Male gray bats arrive at the hibernacula first in the fall (mainly in September and October) to mate with the females before they enter hibernation (USFWS 2009, Green & Robbins 2020). Males remain active until approximately November 10 before hibernation (Tuttle 1976a).

Females become pregnant upon emergence from hibernation in late March to early April, giving birth to a single pup in late May or early June (USFWS 2009). Females then form maternity colonies in the summer that are within 1-4 km from foraging locations (Tuttle 1976b, USFWS 2009). Bachelor males segregate into separate aggregations within a colony home range, using several caves along a water source (Tuttle & Kennedy 2005).

The foraging habits of gray bats are strongly correlated with open water of rivers, streams, lakes, or reservoirs (USFWS 2009). They are highly dependent on aquatic insects such as mayflies, caddisflies, and stoneflies, but will also opportunistically eat beetles and moths. Thus, water quality and keeping riparian zones intact are important to the foraging habits of gray bats.

5.4.1.3 Distribution & Critical Habitat Designation

The gray bat generally occupies limestone karst areas of the southeastern United States (USFWS 1982). They are mainly found in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee with some populations found in northwestern Florida, western Georgia, southeastern Kansas, southern Indiana, southern and southwestern Illinois, northeastern Oklahoma, northeastern Mississippi, western Virginia, and western North Carolina.

This species seems to be moving northward in their distribution as more individuals are observed farther north than their historic range (J. Wieringa, USFWS, pers. comm., 2024). In Indiana, gray bats have been found as far north as White County but have also been increasingly found in central and south-central counties like Brown, Greene, Hendricks, Marion, Monroe, Morgan, Owen, Parke, Vermillion, and Vigo Counties (USFWS 2025, unpubl. data).

Critical Habitat has not been designated in Indiana for the gray bat.

5.4.1.4 Conservation Measures & Determination Key Guidance

The following list includes CMs to avoid or minimize effects of the action:

1. All bridge or culvert construction will occur during the inactive season for gray bats (October 1-March 31 OR November 15-March 31 if near a hibernaculum).
2. Bridge or culvert construction activities will not permanently alter potential bat roosting spaces (e.g., existing joints, cracks, or crevices).
3. Prior to any drilling or boring activities, the project proponent will implement appropriate preliminary evaluations to ensure that karst voids or other voids are unlikely to be encountered.
4. The project proponent will contact the Service if potentially suitable gray bat hibernacula or roosting habitat is encountered during drilling or boring activities.
5. When installing new or replacing existing permanent lights, the project proponent will use downward-facing, full cut-off lens lights (with the same intensity or less for replacement lighting).
    a. For those transportation agencies using the BUG system developed by the Illuminating Engineering Society, the goal is to be as close to 0 for all three ratings with a priority of “uplight” of 0 and “backlight” as low as practicable.

6. The project proponent will direct temporary lighting away from suitable gray bat habitat during the active season (April through September).
7. The project proponent will implement best management practices associated with applicable federal and state permits during construction to minimize sedimentation in streams.
    a. For examples, refer to the *Indiana Department of Transportation Storm Water Management Field Guide* (2018).

Projects that intersect the gray bat species list area may result in a NE determination if ALL the following applies:

1. The action does not involve the removal/modification of an existing bridge or culvert.
2. The action does not involve drilling, boring, or blasting (other than a fireworks display).
3. The action does not involve large-scale and/or aerial insecticide spraying.
4. The action does not include new temporary or permanent lighting of roadways, facilities, and/or parking lots.
5. The action does not involve a new point-source discharge from a facility other than a water treatment plant or stormwater system.
6. The action does not create a new water-borne contaminant source.
7. The action does not impact the riparian zone of a stream or river.
8. The action does not involve perennial stream impacts that would require an individual permit under Section 404 of the Clean Water Act.
9. The project proponent agrees to implement best management practices associated with applicable state and/or federal permits to minimize sedimentation in streams during construction.

Projects that intersect the gray bat species list area may result in a NLAA determination if the following applies:

1. The action does not take place within a 0.5-mile buffer of a known gray bat maternity colony.
2. Bridge construction and culvert modification activities:
    a. Bridges/culverts are not within 1000 feet of forested habitat.
    b. Culverts do not meet the minimum dimensions for gray bat suitability (4 feet height/diameter and 23 feet or greater in length) and does not involve the removal or modification of a bridge.
    c. Bridges/suitable culverts have been inspected for signs of roosting bats using Appendix K of the Service's survey guidelines (see USFWS 2024a), no signs of bats are observed, and the bridge/culvert assessments are less than two years old.
    d. All construction activities take place during the gray bat inactive season (October 1-March 31 or November 15-March 31 if within the buffer of a gray bat hibernaculum) if bats are observed or if no bridge/culvert assessment has been completed.
    e. The action does not have construction activities within a 0.5-mile buffer of a known gray bat hibernaculum.

f. The construction activities will not permanently alter potential roosting spaces (e.g., existing joints, cracks, and/or crevices).

3. Actions involving drilling, boring, or blasting (other than a fireworks display):
    a. The project proponent conducts a Phase I habitat assessment in accordance with the guidance in Appendix H of the Service's Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines (USFWS 2024a) for all karst features and/or non-karst, cave-like structures (e.g., rockshelters, underground quarries, abandoned mine portals) found in the action area.
    b. The Phase I habitat assessment does not support that the cave or cave-like features in the action area could provide suitable habitat for bats.
    c. The project proponent will contact the Service if potentially suitable bat hibernacula or roosting habitat is encountered during drilling or boring into the ground greater than ten feet in depth.
    d. The action does not involve blasting bedrock.
4. The action does not include large-scale and/or aerial insecticide spraying.
5. Actions involving the installation of new or replacement of existing permanent lights or temporary lighting:
    a. When installing new or replacing existing permanent lights, the project proponent will use downward-facing, full cut-off lens lights (with the same intensity or less for replacement lighting).
    b. For those transportation agencies using the BUG system developed by the Illuminating Engineering Society, the goal is to be as close to 0 for all three ratings with a priority of "uplight" of 0 and "backlight" as low as practicable.
    c. The project proponent will direct temporary lighting away from suitable gray bat habitat during the active season (April through September).
6. The action does not result in a new point source discharge from a facility other than a water treatment plant or stormwater system.
7. The action does not involve the creation of a new water-borne contaminant source (e.g., leachate pond, pits containing chemicals not compliant with *NSF/ANSI 60: Drinking Water Treatment Chemicals – Health Effects*).
8. The action does not impact a riparian zone.
9. The action does not involve perennial stream impacts that would require an individual permit under 404 of the Clean Water Act.
10. The project proponent agrees to implement all BMPs associated with applicable state and/or federal permits to minimize sedimentation in streams during construction.
    a. For examples, refer to the *Indiana Department of Transportation Storm Water Management Field Guide* (2018).

If these CMs are not incorporated into the proposed action, the project is not within the scope of the Standing Analysis for a NE or NLAA determination. Instead, the project may affect (MA) this species and requires further coordination with the Service.

5.4.2 Indiana Bat (*Myotis sodalis*)

5.4.2.1 Species Summary

The Indiana bat is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1967). Disturbance to caves from humans during their hibernation, WNS, degradation of habitat (e.g., forested woodland), environmental contaminants, wind turbines, non-native, invasive species, and artificial lighting at night are threats to this species (USFWS 2007, 2019). WNS spread across the entire range of the Indiana bat by 2013 and caused the mortality of tens of thousands of Indiana bats as well as mortality for eleven other bat species (WNS 2023). In recent years, winter populations of Indiana bats in Indiana and several other states (e.g., IL and MO) have met or have exceeded pre-WNS numbers (USFWS 2024b). The Service's species profile for the Indiana bat can be found at https://ecos.fws.gov/ecp/species/5949. Additional information can be found at https://www.fws.gov/species/indiana-bat-myotis-sodalis. A summary of the ecology of this species can be found in the Service's draft recovery plan (USFWS 2007) and the most recent 5-year review (USFWS 2019). Critical Habitat has been designated in Indiana for this species (USFWS 1977).

5.4.2.2 Biological Information

Fall swarming at the hibernacula occurs for the Indiana bat as early as late July but increases through August and peaks in September and early October (USFWS 2007). At this time, mating occurs, and the females store the sperm throughout the winter until their emergence in the spring when fertilization occurs (Guthrie 1933). Also, in September and October, these bats will forage in the vicinity of the hibernaculum to rapidly gain weight prior to hibernation (Hall 1962, LaVal & LaVal 1980). Males stop at multiple hibernacula before hibernation and will remain active longer than females, as late as mid- to late October (Cope & Humphrey 1977, LaVal & LaVal 1980).

The Indiana bat spends the winter in hibernacula in caves and other cave-like locations (e.g., abandoned mines) (USFWS 2007). These caves generally have a large volume with large rooms and vertical or extensive passages, helping to buffer the cave environment against rapid and extreme changes in outside temperature. The ambient temperature of the hibernacula typically remains below 10°C (50°F) and is relatively stable throughout the winter.

Indiana bats are also known to use bridges and/or culverts with cracks and crevices suitable for bat occupation (USFWS 2024a). Bats, including Indiana bats, have been documented throughout the United States using bridges and culverts as maternity sites, hibernation sites, temporary resting sites during foraging, and during periods of staging and swarming.

Females typically emerge from hibernation in mid-April and males follow in mid-May (Cope & Humphrey 1977). In the summer, reproductive females will form maternity colonies in habitat with numerous trees that have exfoliating bark and receive sunlight for more than half the day (Carter 2006, USFWS 2007, Bergeson et al. 2018). These trees, which are generally snags, are usually within canopy gaps in a forest or along a wooded edge, close to forest cover. One study found that areas with greater canopy cover (e.g., forests and shrubland) were selected over areas with greatly reduced canopy cover (e.g., agricultural lands) (Womack et al. 2013). Another study found that these bats will preferentially choose habitat in forest or riparian habitat that is closer to good foraging resources (Menzel et al. 2005). Male Indiana bats will select summer roosts that

are better for predator avoidance – such as available snags and live trees that are tall with exfoliating bark (Bergeson et al. 2018).

Riparian habitat and road corridors are preferentially selected by Indiana bats as foraging habitat; however, these bats have been observed using upland, forested habitat to forage as well (Menzel et al. 2005, Carter 2006). According to the Service's Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines, suitable summer habitat for Indiana bat 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 (USFWS 2024a). This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches dbh 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. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet of other forested/wooded habitat.

5.4.2.3 Distribution & Critical Habitat Designation

The Indiana bat has a distribution that is widespread, ranging across most of the Midwest to the Northeast and into the Southeast (USFWS 2007). The states where winter hibernacula have been observed are Alabama, Arkansas, Connecticut, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin. However, the highest priority hibernacula occur in Illinois, Indiana, Kentucky, Missouri, New York, Tennessee, and West Virginia. In 2024, the Indiana bat population estimate was approximately 631,786 bats with 75% of them hibernating in Missouri and Indiana (USFWS 2024b).

The areas designated as Critical Habitat for the Indiana bat in Indiana include the Big Wyandotte Cave in Crawford County and Ray's Cave in Greene County (USFWS 1977). The Indiana bat also has nine other caves and two mines designated as Critical Habitat in Illinois, Kentucky, Missouri, Tennessee, and West Virginia.

5.4.2.4 Conservation Measures & Determination Key Guidance

The following list includes CMs to avoid or minimize effects of the action:

1. All bridge or culvert construction will occur during the inactive season for Indiana bats (October 1-March 31 OR November 15-March 31 if near a hibernaculum).
2. Bridge or culvert construction activities will not permanently alter potential bat roosting spaces (e.g., existing joints, cracks, or crevices).
3. Prior to any drilling or boring activities, the project proponent will implement appropriate preliminary evaluations to ensure that karst voids or other voids are unlikely to be encountered.
4. The project proponent will contact the Service if potentially suitable Indiana bat hibernacula or roosting habitat is encountered during drilling or boring activities.

5. When installing new or replacing existing permanent lights, the project proponent will use downward-facing, full cut-off lens lights (with the same intensity or less for replacement lighting).
    a. For those transportation agencies using the BUG system developed by the Illuminating Engineering Society, the goal is to be as close to 0 for all three ratings with a priority of "uplight" of 0 and "backlight" as low as practicable.
6. The project proponent will direct temporary lighting away from suitable Indiana bat habitat during the active season (April through September).
7. Prescribed burns will include an average flame length of <8 feet.
8. Prescribed burning will occur when temperatures are above 40 degrees Fahrenheit.
9. Prescribed burning will avoid the Indiana bat non-volant pup season (May 15-July 31).
10. Tree cutting, tree trimming, and/or pesticide application will avoid impacting potential Indiana bat roost trees (i.e., trees ≥5 inches in diameter at breast height with cracks, crevices, and/or exfoliating bark), where practicable.
11. Tree cutting/trimming will not clear ≥5 acres of forest or fragment a connective corridor between two or more forest patches.
12. Any cutting/trimming of potential Indiana bat roost trees will be limited to the inactive season for Indiana bats (October 1-March 31 or November 15-March 31 if near a hibernaculum).

Projects that intersect the Indiana bat species list area may result in a NE determination if ALL the following applies:

1. The action does not involve the removal/modification of an existing bridge or culvert.
2. The action does not involve drilling, boring, or blasting (other than a fireworks display).
3. The action does not involve tree cutting and/or trimming.
4. The action does not involve prescribed fire.
5. The action does not involve large-scale and/or aerial insecticide spraying.
6. The action does not include new temporary or permanent lighting of roadways, facilities, and/or parking lots.

Projects that intersect the Indiana bat species list area may result in a NLAA determination if the following applies:

1. A presence/absence survey following the Service's Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines (USFWS 2024a) has been conducted within the action area and demonstrates the probable absence of Indiana bats.
2. Bridge construction and culvert modification activities:
    a. Bridges/culverts are not within 1,000 feet of forested habitat.
    b. Culverts do not meet the minimum dimensions for Indiana bat suitability (4 feet height/diameter and 23 feet or greater in length) and does not involve the removal or modification of a bridge.
    c. Bridges/suitable culverts have been inspected for signs of roosting bats using Appendix K of the Service's survey guidelines (see USFWS 2024a), no signs of bats are observed, and the bridge/culvert assessments are less than two years old.

    d. All construction activities take place during the Indiana bat inactive season (October 1-March 31 or November 15-March 31 if within the buffer of an Indiana bat hibernaculum) if bats are observed or if no bridge/culvert assessment has been completed.
    e. The action does not have construction activities within a 0.5-mile buffer of a known Indiana bat hibernaculum.
    f. The construction activities will not permanently alter potential roosting spaces (e.g., existing joints, cracks, and/or crevices).
3. Actions involving drilling, boring, or blasting (other than a fireworks display):
    a. The project proponent conducts a Phase I habitat assessment in accordance with the guidance in Appendix H of the Service's survey guidelines (see USFWS 2024a) for all karst features and/or non-karst, cave-like structures (e.g., rockshelters, underground quarries, abandoned mine portals) found in the action area.
    b. The Phase I habitat assessment does not support that the cave or cave-like features in the action area could provide suitable habitat for bats.
    c. The project proponent will contact the Service if potentially suitable bat hibernacula or roosting habitat is encountered during drilling or boring into the ground greater than ten feet in depth.
    d. The action does not involve blasting bedrock.
4. Actions involving tree cutting and/or trimming:
    a. The action clears <5 acres of contiguous forest (i.e., connected by 1,000 feet or less).
    b. The action does not fragment a riparian or other connective forested corridor (e.g., tree line) between two or more forest patches of at least 5 acres.
    c. The action area clears all suitable summer habitat/roost trees during the inactive season for Indiana bat (October 1-March 31 or November 15-March 31 if near an Indiana bat hibernaculum).
    d. The action does not clear suitable summer habitat/roost trees within a 0.5-mile buffer of a known Indiana bat hibernaculum.
5. Actions involving prescribed fire:
    a. The fire prescription includes an average flame length of <8 feet.
    b. The prescribed fire will take place when temperatures are >40 degrees Fahrenheit.
    c. The prescribed fire does not occur during the non-volant pup season for the Indiana bat (May 15-July 31).
    d. The prescribed fire does not occur within a 0.5-mile buffer of a known Indiana bat hibernaculum.
6. The action does not include large-scale and/or aerial insecticide spraying.
7. Actions involving the installation of new or replacement of existing permanent lights or temporary lighting:
    a. When installing new or replacing existing permanent lights, the project proponent will use downward-facing, full cut-off lens lights (with the same intensity or less for replacement lighting).

b. For those transportation agencies using the BUG system developed by the Illuminating Engineering Society, the goal is to be as close to 0 for all three ratings with a priority of "uplight" of 0 and "backlight" as low as practicable.
c. The project proponent will direct temporary lighting away from suitable Indiana bat habitat during the active season (April through September).

If these CMs are not incorporated into the proposed action, the project is not within the scope of the Standing Analysis for a NE or NLAA determination. Instead, the project may affect (MA) this species and requires further coordination with the Service.

5.4.3 Effects Analysis for Bats

Qualifying projects typically involve some or all the stressors listed below.

Habitat Loss/Degradation

Indiana and gray bats hibernate in a relatively small number of caves and mines (i.e., hibernacula) that provide suitable microclimates throughout the winter. In addition to the hibernacula themselves, the roosting and foraging habitat (i.e., wooded areas and riparian zones) that surrounds them is ecologically important to Indiana and gray bats.

Conservation measures that control for significant loss/degradation of habitat include restrictions on the extent and timing of certain activities. This DKey covers only those projects that take place during the inactive season of Indiana and gray bats (October 1-March 31 or November 15-March 31 if near a hibernaculum). This reduces the likelihood of directly taking a listed bat as they will be in their hibernacula for the winter. The actions in the vicinity of a hibernaculum have a different time restriction because of fall swarming around the entrance to the hibernaculum; thus, there is a higher probability of a bat being disturbed by construction noise or using roost trees near a hibernaculum during October and early November.

Additionally, this Standing Analysis does not cover the clearing of more than five acres of trees or from fragmenting corridors between two forest patches (e.g., tree lines, riparian corridors). This threshold was established due to the extreme fragmentation of forests in Indiana as a whole, but especially in the northern half of the state, and thus the extreme fragmentation of suitable summer habitat for the Indiana bat. Actions that clear connective forested corridors further contribute to this fragmentation by limiting the bats' movements and foraging opportunities. However, actions that clear only a small number of trees and avoid clearing forested corridors are expected to have a minor impact on listed bats – especially when the trees are cleared during the inactive season – because they avoid major habitat alterations that would adversely affect the bats' abilities to forage and roost. Projects that include more than five acres of tree clearing or fragmenting connective forested corridors can still reach a NLAA determination but would require further coordination with the Service. Regardless, each project with tree clearing as part of the action is required to answer a survey question asking about the acreage of tree clearing so that the Indiana Field Office can gauge the relative impact on the suitable habitat availability for listed bats in the state.

For the purposes of this Standing Analysis, we define hazard trees as trees that create imminent danger to human life. The ESA's implementing regulations (50 CFR part 17) include a take exemption pursuant to the defense of human life (for endangered species, see 50 CFR 17.21(c)(2)): "any person may take endangered [or threatened] wildlife in defense of his own life or the lives of others."). The regulations at 50 CFR 17.21(c)(4) require that any person taking, including killing, listed wildlife in defense of human life under this exception must notify our headquarters Office of Law Enforcement, at the address provided at 50 CFR 2.1(b), in writing, within 5 days. In addition, section 11 of the ESA enumerates the penalties and enforcement of the ESA. In regard to civil penalties, section 11(a)(3) of the ESA states, "Notwithstanding any other provision of this [Act], no civil penalty shall be imposed if it can be shown by a preponderance of the evidence that the defendant committed an act based on a good faith belief that he was acting to protect himself or herself, a member of his or her family, or any other individual from bodily harm, from any endangered or threatened species" (16 U.S.C. 1540(a)(3)). Section 11(b)(3) of the ESA contains similar language regarding criminal violations (see 16 U.S.C. 1540(b)(3)). If the project proponent thinks incidental take of listed bats was reasonably certain to have occurred because of hazard tree removal, they are advised to contact the Office of Law Enforcement as outlined above and given the recommendation to plan in the future so that tree removal of potentially hazardous trees does not become an emergency. If the project proponent determines an emergency exists, however, and human life is in imminent danger, do not delay action. Also, the project proponent is encouraged not to delay action if removal of the hazard tree is part of a federal response to a situation involving an act of God, disaster, casualty, national defense or security emergency, etc. and should coordinate with the Service as soon as practicable after the emergency is under control.

The CMs for bridge construction and/or culvert modification avoid or diminish the adverse impacts to roosting bats. If the action area is not within 1,000 feet of suitable forested habitat (as defined in the Service's survey guidelines), then listed bats are unlikely to use the bridge as a roost due to its distance from other suitable habitat. In accordance with Appendix K of the Service's survey guidelines, a Bridge/Culvert Bat Assessment Form can be filled out to determine: 1) if the culvert has suitable dimensions for Indiana and gray bats and 2) if there are signs of roosting bats in the bridge/culvert (USFWS 2024a). If there are no signs of roosting bats or if the culvert has unsuitable dimensions, then the bridge/culvert can be considered as unsuitable roosting habitat for listed bats; on the other hand, if there are signs of roosting bats, then the action must be constrained to the inactive season and the construction must not alter potential roosting spaces to remain within the scope of this Standing Analysis (USFWS 2024a). As mentioned previously, the timing restriction to the inactive season for gray and Indiana bats also reduces the probability of disturbing or taking listed bats and is dependent on proximity to a hibernaculum. In other words, listed bats may use the bridge/culvert as roosting during fall swarming if the action area is close enough to a hibernaculum.

Impacts to the hibernacula can be avoided or minimized by the CMs listed in Sections 5.4.1.4 and 5.4.2.4. This DKey requires that the project proponent assess any karst features or cave-like structures for potential hibernacula habitat in accordance with Appendix H of the Service's survey guidelines prior to any drilling, boring, or blasting activities to be covered by this

Standing Analysis. If there are features in the action area that could provide suitable bat hibernacula habitat for either the Indiana or gray bat, then the project proponent is encouraged to coordinate further with the Service. Furthermore, to be covered by this Standing Analysis, if there are suitable bat hibernacula features encountered in the process of drilling or boring, the project proponent agrees to contact the Service to discuss options to avoid potential adverse effects. To streamline the projects with drilling/boring which have little to no impact on listed bats, the projects drilling/boring into the ground with a depth of less than 10 feet are not required to answer further questions beyond agreeing to contact the Service if suitable bat hibernacula habitat is encountered. This depth covers projects like underground cable or pipe installations that the INFO believes do not have significant impacts on caves or cave-like structures.

For gray bats, impacts to riparian zones and water quality (e.g., sedimentation, point source pollution, water-borne contaminants, etc.) are also significant to their ability to forage effectively. If an action includes any impacts to the riparian zone or to water quality, they should coordinate further with the Service.

Some projects that qualify for use of this DKey may result in minor loss/fragmentation or temporary degradation of available habitat for these federally listed bats. However, we believe that adherence to the specific conservation measures listed in Sections 5.4.1.4 and 5.4.2.4 ensures that any reduction or modification of available habitat results in only insignificant effects to listed species.

Prescribed Fire

For Indiana bats, prescribed fire could impact habitat and directly harm an individual. However, with the implementation of the CMs listed in Section 5.4.2.4, the Service believes that these impacts are minimized or have potentially beneficial long-term effects in the case of habitat management (as suggested in Boyles & Aubrey 2006, Johnson et al. 2010, and Bergeson et al. 2018). For instance, the direct effects of prescribed fire on Indiana bats (e.g., smoke inhalation, burns) are avoided or minimized by: 1) occurring outside of the non-volant pup season (May 15-July 31); 2) taking place when the temperatures are above 40 degrees Fahrenheit; 3) applying a fire prescription with an average flame length of less than 8 feet; and 4) occurring at least 0.5 miles away from a known hibernaculum. The first CM avoids the period when pups cannot fly to escape approaching flames. The second CM minimizes the possibility of the bats being in torpor and thus too sluggish to flee from the direct impacts of heat and smoke. The third CM is a measurement of fire intensity, meaning that the action is limited to a moderate to low-intensity fire to receive a NLAA determination. Finally, the fourth CM minimizes or avoids disturbance and habitat impacts to known hibernacula. By implementing these CMs, both effects to habitat and disturbance to individual bats are avoided or minimized to be considered insignificant. If one of the CMs is not met, then the Standing Analysis does not cover the action, and the project proponent should coordinate further with the Service.

Insecticide Spraying

Indiana and gray bats are insectivores, meaning they are dependent on insects as their food source. Broad-scale or aerial insecticide spraying can be hugely impactful to their foraging

success. Any actions which include this kind of insecticide spraying is not covered by the Standing Analysis, and the project proponent should coordinate further with the Service.

Minor Noise and Vibration

Minor noise and vibration produced by projects are typically produced temporarily during the construction phase (i.e., operation of construction equipment) and may be permanently produced during the operation phase (e.g., vehicular traffic). However, we believe these disturbances results in only insignificant effects to these bats. CMs that limit exposure to these stressors and control for significant disturbance include restrictions on the timing of certain activities (e.g., tree cutting during the Indiana bat active season) and buffers around hibernacula.

Night Lighting

Night lighting produced by qualifying projects is typically temporary during the construction phase and/or permanent during the operation phase (e.g., facility lighting). Birds and bats can potentially be exposed to this stressor at night while foraging and commuting/migrating. Night lighting produced during projects is localized. It is typically the most severe in developed areas rather than forests and other potential habitats. In addition, the conservation measures for lighting listed in Sections 5.4.1.4 and 5.4.2.4 include avoidance and minimization measures that would reduce the effects of lighting on the bats' activity. Therefore, most federally listed species are not expected to be significantly affected by night lighting.

5.5 Herps

5.5.1 Copperbelly Water Snake (*Nerodia erythrogaster neglecta*)

5.5.1.1 Species Summary

The populations of copperbelly water snake (i.e., copperbelly[ies]) north of the 40th Parallel in Indiana, Michigan, and Ohio (i.e., the Northern Population Segment [NPS]) are currently listed by the Service under the ESA as 'threatened' (USFWS 1997). The primary threat to this snake is the loss of sufficient contiguous wetland/upland habitat complexes (USFWS 2008). Other threats include human persecution, inadequate habitat management, and road crossings. The Service's species profile for the northern populations of copperbelly water snake can be found at https://ecos.fws.gov/ecp/species/7253. Additional information can be found at https://www.fws.gov/species/copperbelly-water-snake-nerodia-erythrogaster-neglecta. A summary of the ecology of this species can be found in the Service's NPS recovery plan (USFWS 2008) and the most recent 5-year review (USFWS 2023). Critical Habitat has not been designated in Indiana for the NPS of the copperbelly water snake.

5.5.1.2 Biological Information

Copperbellies are generally associated with wetlands, particularly shallow wetlands like shrub-scrub wetlands with buttonbush (*Cephalanthus occidentalis*), emergent wetlands, or the margins of palustrine open water wetlands (USFWS 2008). They will use buttonbush swamps as basking areas and will forage in the portions of the wetland with shallow water, an open canopy, and short, dense vegetation. They have also been known to use seeps and springs with very little

standing water. Seasonal wetlands are important in providing easily accessible food resources as they dry out – copperbellies only hunt in water that is less than 10-20 cm (4-8 in) deep – leaving prey like tadpoles stranded.

An upland-wetland matrix is very important to copperbellies. They use the uplands for foraging and aestivating, as well as using them as habitat corridors to move from one wetland to another. Copperbellies require twice as many wetlands per year as northern water snakes and they move between wetlands three times more often (Kingsbury et al. 2003, Roe et al. 2004).

These snakes also need suitable hibernacula for their hibernation in the winter. Their hibernacula tend to be burrows of crayfish from the family Cambaridae which are found in palustrine forested wetlands and immediately adjacent upland forest (USFWS 2008). These burrows can be flooded during the winter without harming the snakes as it is hypothesized that the cold water temperatures reduce the metabolism, and subsequently the oxygen demands, to permit survival (Kingsbury & Coppola 2000).

5.5.1.3 Distribution & Critical Habitat Designation

Historically, the NPS of the copperbelly had populations in the northeastern corner of Indiana, southern Michigan, and the northwestern corner of Ohio (USFWS 2008). However, in 2008, only five populations were confirmed via surveys. Presently, population models indicate that the populations are still declining. Surveys in 2020 and 2021 did not find any individuals; surveys in 2022 found six individuals in Ohio, which were collected to establish a captive rearing population; and surveys in 2023 resulted in detecting five individuals in approximately the same area in Ohio, with all but one collected (USFWS 2023).

At the time of its listing, the Service determined designating Critical Habitat for the NPS of the copperbelly was not prudent because one of the main threats is human persecution, and the designation of Critical Habitat would not provide enough significant additional protection (USFWS 1997, 2008).

5.5.1.4 Conservation Measures & Determination Key Guidance

The following list includes CMs to avoid or minimize effects of the action:

1. The action avoids suitable habitat (as described in Section 5.5.1.2).
2. The project proponent minimizes speed of vehicles on existing roads through suitable habitat.
3. The project proponent reports any copperbelly water snake observations to the Service within 24 hours.
4. The project proponent uses wildlife-safe materials for erosion control and site restoration.
    a. Wildlife-safe materials are those that are 100% biodegradable and use a loose weave (often called leno weave) that allow animals to wiggle free. To minimize wildlife entanglement and plastic debris pollution, temporary erosion and sediment control products should be used that either do not contain netting or contain netting manufactured from 100% biodegradable non-plastic materials such as jute, sisal, or coir fiber.

    b. Degradable, photodegradable, UV-degradable, oxo-degradable, or oxo-biodegradable plastic netting (including polypropylene, nylon, polyethylene, and polyester) are not acceptable alternatives.
    c. All netting materials used have a wildlife-safe, loose-weave design with movable, non-welded joints between the horizontal and vertical twines, allowing the twine to move independently and thus reducing the potential for wildlife entanglement. The use of silt fences reinforced with metal or plastic mesh is avoided.
    d. When no longer required, temporary erosion and sediment control products are promptly removed.
5. The project proponent follows all appropriate label instructions regarding the appropriate herbicide or other pesticide formulation and its proper use in suitable copperbelly water snake habitat.
    a. Spray drift beyond the target species/area is avoided by observing label instructions regarding optimal wind speed and direction, boom height, droplet size calibration, precipitation forecast, etc.
6. At the conclusion of the action, all disturbed areas are revegetated with appropriate plant species (i.e., native species or other suitable non-invasive species), as appropriate.
7. The project proponent agrees to monitor all restoration plantings for proper establishment and implement supplemental plantings as necessary to ensure restorations are of equal to or better habitat quality than previous conditions.
8. The project proponent agrees to best management practices for avoiding the spread of invasive species into suitable copperbelly water snake habitat, such as inspecting and cleaning equipment and vehicles for invasive plant materials and seeds before entering suitable habitat.

Projects that intersect the copperbelly water snake species list area may result in a NE determination if ALL the following applies:

1. The action does not take place in suitable copperbelly water snake habitat.

Projects that intersect the copperbelly water snake species list area may result in a NLAA determination if the action takes place in suitable copperbelly habitat and the following applies:

1. The action does not result in the permanent loss of more than one acre of wetland.
2. The action does not result in the conversion of more than five acres of potential upland habitat for copperbelly water snake.
3. The action does not include the construction or maintenance of a road or other barrier (e.g., paved trail).
4. The action does not have permanent or temporary effects to hydrology that result in a significant change (i.e., more than 6 inches in elevation change or results in inundation) in the elevation of surface water upstream or downstream, or in the local groundwater elevations.
5. The project proponent agrees to minimize vehicle speeds on existing roads through suitable habitat.

6. The project proponent agrees to report any copperbelly water snake observations to the Service within 24 hours.
7. The action does not include ground or vegetation disturbance OR
8. Actions involving ground or vegetation disturbance:
    a. The action does not involve grading, fill, digging, trenching, disking, or any other earth-moving activity.
    b. The project proponent agrees to use wildlife-safe materials for erosion control and site restoration and eliminate the use of erosion control products containing plastic mesh netting or other similar material that could ensnare copperbelly water snakes.
    c. Actions involving pesticide application follow the appropriate label instructions regarding the appropriate herbicide or other pesticide formulation and its proper use.
    d. Actions involving pesticide application avoid spray drift beyond the target species/area, observing label instructions regarding optimal wind speed and direction, boom height, droplet-size calibration, precipitation forecast, etc.
    e. At the conclusion of the action, the project proponent agrees to revegetate all disturbed areas with appropriate plant species (i.e., native species or other suitable non-invasive species present on site prior to disturbance), as appropriate.
    f. The project proponent agrees to monitor all restoration plantings for proper establishment and implement supplemental plantings as necessary to ensure restorations are of equal to or better habitat quality than previous conditions.
    g. The project proponent agrees to avoid the spread of invasive species by implementing best management practices, such as inspecting and cleaning equipment and vehicles for invasive plant materials and seeds before entering suitable copperbelly water snake habitat.

If these CMs are not incorporated into the proposed action, the project is not within the scope of the Standing Analysis for a NE or NLAA determination. Instead, the project may affect (MA) this species and requires further coordination with the Service.

5.5.2 Eastern Massasauga Rattlesnake (*Sistrurus catenatus*)

5.5.2.1 Species Summary

The eastern massasauga rattlesnake (EMR) is currently listed by the Service under the ESA as 'threatened' across its range (USFWS 2016a). Habitat loss and fragmentation of wetlands from development and vegetative succession (i.e., invasion of woody species) are the most prevalent threats (USFWS 2021a). Other threats include persecution and collection, road mortality, hydrologic fluctuation, habitat management practices (e.g., mowing and prescribed fire), and disease (USFWS 2016b). The Service's species profile for the EMR can be found at https://ecos.fws.gov/ecp/species/2202. Additional information can be found at https://www.fws.gov/media/eastern-massasauga-rattlesnake. A summary of the ecology of this species can be found in the Service's EMR recovery plan (USFWS 2021a), the most recent 5-

year review (USFWS 2021b) and the current Species Status Assessment (USFWS 2016b). No Critical Habitat has been designated for this species.

5.5.2.2 Biological Information

EMRs live in wet areas, including wet prairies, marshes, fens, sedge meadows, peatlands, and low areas along rivers and lakes (USFWS 2016b). In the active season, EMRs use habitat that has open canopy wetlands with adjacent upland areas. EMRs hibernate below the frostline in crayfish or small mammal burrows, tree root networks or rock crevices in areas where the water table is near the surface (areas where the soil is saturated but not inundated) and with consistent hydrology to prevent freezing or dehydration (Sage 2005). Hibernacula are typically near wetland edges, wet prairies, closed canopy forests with mossy substrates, wet grasslands, or sedge meadows (DeGregorio 2008). EMRs stay in the area around their hibernacula for about a week after emergence before establishing an activity center 200-600 m (0.1-0.4 mi) away from their hibernacula for the active season (Marshall et al. 2006).

EMRs usually begin to emerge from their hibernacula in late March to early April and remain active until November, depending on weather conditions (USFWS 2016b). This snake is highly cryptic in nature and solitary, hibernating alone or in small clusters and persisting with low density populations, which makes them difficult to detect.

During the mating season, which is thought to take place in summer and early fall, the males will pursue females, resulting in longer daily movements and defensive behavior. EMRs are ovoviviparous and, depending on their health, adult females may bear young every year or every other year. Since most EMRs mate in late summer (primarily in August), ovulation and fertilization are thought to occur upon emergence the following spring and parturition takes place in summer and early fall (Aldridge et al. 2008).

5.5.2.3 Distribution & Critical Habitat Designation

The EMR's historical range stretched from western New York and Pennsylvania and southeastern Ontario, Canada through northern Indiana, Illinois, and Ohio and southern Michigan to southeastern Minnesota, eastern Missouri and Iowa. Currently, the EMR is extirpated in the western edge of their range in Minnesota and Missouri and there are only three populations in the eastern edge in New York and Pennsylvania (USFWS 2021b). The highest occupancy in Indiana has historically been found in northeastern Indiana and still has multiple extant populations. However, in one surveying effort, occupancy was only confirmed in 14 of the 87 historical management units (Lehman & Kingsbury 2017). As of 2020, EMRs were observed in Indiana in LaPorte, LaGrange, Steuben, Noble, and Marshall Counties with one new population identified in 2021 (USFWS 2021b).

Critical Habitat has not been designated for the eastern massasauga rattlesnake. At the time of its listing, the Service determined designating Critical Habitat for the EMR would not be prudent because one of the main threats is human persecution, and the designation of Critical Habitat would not provide enough significant additional protection (USFWS 2016a).

5.5.2.4 Conservation Measures & Determination Key Guidance

The following list includes CMs to avoid or minimize effects of the action:

1. The action avoids suitable habitat, including potential hibernacula habitat (as described in Section 5.5.2.2).
    a. A qualified biologist conducts a habitat assessment of the site, including assessing whether potential hibernacula are present on the action site.
2. The project proponent minimizes speed of vehicles on existing roads through suitable habitat during the active season (March 16-October 31).
3. The project proponent agrees to use low-impact equipment (e.g., all terrain vehicles and other lightweight, track-mounted vehicles with low ground pressure) off existing access roads.
4. The project proponent agrees to limit operating vehicles/equipment in EMR habitat to when the ground is frozen during the inactive season (December through February).
5. The project proponent reports any EMR observations to the Service within 24 hours.
6. The project proponent uses wildlife-safe materials for erosion control and site restoration.
    a. Wildlife-safe materials are those that are 100% biodegradable and use a loose weave (often called leno weave) that allow animals to wiggle free. To minimize wildlife entanglement and plastic debris pollution, temporary erosion and sediment control products should be used that either do not contain netting or contain netting manufactured from 100% biodegradable non-plastic materials such as jute, sisal, or coir fiber.
    b. Degradable, photodegradable, UV-degradable, oxo-degradable, or oxo-biodegradable plastic netting (including polypropylene, nylon, polyethylene, and polyester) are not acceptable alternatives.
    c. All netting materials used have a wildlife-safe, loose-weave design with movable, non-welded joints between the horizontal and vertical twines, allowing the twine to move independently and thus reducing the potential for wildlife entanglement. The use of silt fences reinforced with metal or plastic mesh is avoided.
    d. When no longer required, temporary erosion and sediment control products are promptly removed.
7. The project proponent agrees to properly install and maintain exclusionary fencing to exclude EMR from the area of any earth-moving activity (e.g., grading, digging, trenching, disking, etc.) during the active season (March 16-October 31), clear the action area using a qualified biologist prior to beginning work, and then promptly remove all fencing material at the conclusion of work.
8. If placing fill, the project proponent ensures that all fill material is free from contaminants or invasive species.
9. Actions involving mowing:
    a. The project proponent agrees to mow tall vegetation (>6 inches) during the inactive season (November 1-March 15).
    b. The project proponent ensures that mower decks are raised above 8 inches for maintaining non-turf grass during the active season (March 16-October 31).
    c. The project proponent agrees to maintain turf grass less than 6 inches throughout the active season (March 16-October 31).

10. Actions involving cutting or removing brush/trees:
    a. The project proponent removes brush or trees when the ground is completely frozen (December through February).
    b. The project proponent agrees to hand cut or use low-impact harvest methods in suitable EMR habitat.
        i. E.g., lightweight, track-mounted vehicles with low ground pressure, hand tools, access the site on foot, not burning brush piles onsite.
11. The project proponent follows all appropriate label instructions regarding the appropriate herbicide or other pesticide formulation and its proper use in suitable EMR habitat.
    a. Spray drift beyond the target species/area is avoided by observing label instructions regarding optimal wind speed and direction, boom height, droplet size calibration, precipitation forecast, etc.
12. At the conclusion of the action, all disturbed areas are revegetated with appropriate plant species (i.e., native species or other suitable non-invasive species), as appropriate.
13. The project proponent agrees to monitor all restoration plantings for proper establishment and implement supplemental plantings as necessary to ensure restorations are of equal to or better habitat quality than previous conditions.
14. The project proponent agrees to best management practices for avoiding the spread of invasive species into suitable EMR habitat, such as inspecting and cleaning equipment and vehicles for invasive plant materials and seeds before entering suitable habitat.

Projects that intersect the EMR species list area may result in a NE determination if ALL the following applies:

1. The action does not take place in suitable EMR habitat.

Projects that intersect the EMR species list area may result in a NLAA determination if the action takes place in suitable EMR habitat and the following applies:

1. The project proponent agrees to report any EMR observations to the Service within 24 hours.
2. The action does not result in the permanent loss of more than one acre of wetland.
3. The action does not result in the conversion of more than five acres of potential upland habitat for EMR.
4. If the action has permanent effects to hydrology, the impacts do not result in a significant change (more than 6 inches or inundation) in the elevation of surface water upstream or downstream, or in the local groundwater elevations.
5. The action takes place within the active season (March 16-October 31) and has temporary effects to hydrology which result in a significant change in the elevation of surface water upstream or downstream, or in the local groundwater elevations.
6. A qualified biologist conducts a habitat assessment of the site, including assessing whether potential hibernacula are present on the action site.
    a. If suitable hibernacula habitat is present, the action avoids disturbing these areas.
7. The action avoids the spread of invasive species into suitable EMR habitat by following best practices.

    a. E.g., inspecting and cleaning equipment and vehicles for invasive plant materials and seeds before entering EMR habitat.
8. The project proponent agrees to minimize vehicle speeds and follow posted speed limits on existing roads through suitable EMR habitat if there are existing roads within 100 meters of EMR habitat and the action occurs within the active season (March 16-October 31).
9. If vehicles are used off of existing access roads, the project proponent uses low-impact equipment (e.g., lightweight, track-mounted vehicles with low ground pressure).
    a. If the vehicles/equipment are not low impact, the project proponent limits the operation of such vehicles and equipment in suitable EMR habitat to when the ground is frozen (December through February).
10. The action does not create a new road, alter an existing road, or convert the surface of an existing road from a non-paved to a paved surface.
11. The action does not result in a new or increased permanent barrier to snake movement (e.g., widening an existing road or trail, new linear features like trails, fences, walls, canals).
12. The action does not involve prescribed fire within the active season (March 16-October 31).
13. The project proponent agrees to use wildlife-safe materials for erosion control and site restoration and eliminates the use of erosion control products containing plastic mesh netting or other similar material that could ensnare EMR.
14. If the action involves grading, fill, digging, trenching, disking, or other earth-moving activities:
    a. The project proponent agrees to properly install and maintain exclusionary fencing to exclude EMR from the area of disturbance during the active season (March 16-October 31).
    b. The action area is cleared using a qualified biologist prior to beginning work.
    c. At the conclusion of work, the project proponent agrees to promptly remove all fencing material.
15. If placing fill, the project proponent ensures the fill material is free from contaminants or invasive species.
16. If the action involves mowing:
    a. Mowing tall vegetation (>6 inches) occurs during the inactive season (November 1-March 15).
    b. The project proponent ensures that mower decks are raised above 8 inches for maintaining non-turf grass during the active season (March 16-October 31).
    c. Turf grass in the action area is maintained to less than 6 inches throughout the active season (March 16-October 31).
17. If the action involves removing brush and/or trees:
    a. If removing brush or trees, the project proponent accesses the site when the ground is completely frozen (December through February).
    b. The project proponent hand cuts or uses low-impact harvest methods in areas of suitable habitat.

        i. This includes using low-impact equipment (e.g., lightweight, track-mounted vehicles with low ground pressure).

18. If the action involves pesticide application:
    a. The project proponent follows all appropriate label instructions regarding the appropriate herbicide or other pesticide formulation and its proper use in potential EMR habitat.
    b. The project proponent will avoid spray drift beyond the target species/area (observing label instructions regarding optimal wind speed and direction, boom height, droplet size calibration, precipitation forecast, etc.).
19. At the conclusion of the action, the project proponent agrees to revegetate all disturbed areas with appropriate plant species (i.e., native species or other suitable non-invasive species present prior to disturbance).
    a. The project proponent agrees to monitor all restoration plantings for proper establishment and implement supplemental plantings as necessary to ensure that restorations are of equal to or better habitat quality than previous conditions.

If these CMs are not incorporated into the proposed action, the project is not within the scope of the Standing Analysis for a NE or NLAA determination. Instead, the project may affect (MA) this species and requires further coordination with the Service.

5.5.3 Effects Analysis for Herps

Qualifying projects typically involve some or all the stressors listed below.

Habitat Loss/Degradation

The measures laid out in this Standing Analysis do not allow for actions to include significant alteration to wetlands. In Indiana, approximately 85% of the historical wetlands in the state have been lost (IN DNR 1996). As both EMR and copperbellies are dependent on wetland habitat, this measure requires further coordination with the Service for actions with more than one acre of wetland loss. Similarly, excessive destruction of potential upland habitat for both snakes, with particular emphasis on upland habitat adjacent to wetlands, is detrimental to the hibernaculum needs of EMR and the upland-wetland matrix habitat necessary for copperbellies.

Actions with temporary or permanent effects to the hydrology can also have detrimental impacts to these snakes if there is a significant change in the elevation of surface water upstream or downstream of the action area, or in the local groundwater elevations. Copperbellies are dependent on a wetland system with multiple shallow seasonal wetlands which are thus impacted by effects to hydrology. Likewise, these hydrological effects can impact the wetlands that EMRs are dependent upon. EMRs are also known to be susceptible to water level changes during their inactive season because EMRs hibernate below the frostline in crayfish or small mammal burrows, tree root networks or rock crevices in areas where the water table is near the surface (areas where the soil is saturated but not inundated), and they need consistent hydrology to prevent freezing or dehydration (Sage 2005).

For most EMR populations, the locations of hibernacula are unknown, but these areas are critical to protect; thus, to be covered by this Standing Analysis, a qualified biologist is required to

conduct a habitat assessment of the site to determine if suitable hibernation habitat exists in the action area. If suitable hibernation habitat occurs onsite and the project proponent does not agree to avoid these areas, they are asked to coordinate further with the Service.

This Standing Analysis does not cover earth-moving activities for actions within suitable copperbelly water snake habitat. Due to the high imperilment of copperbellies in Indiana and the unknown causes of mortality for these snakes, actions that involve earth-moving activities require further coordination with the Service to protect individuals during their hibernation and any suitable habitat within the action area.

Both copperbelly and EMR habitats are negatively impacted by the introduction of invasive species. Vegetative succession from woody non-native plant species (e.g., bush honeysuckle [*Lonicera tatarica*]) has been cited as a major contributor to EMR habitat loss (USFWS 2016). As a result, this Standing Analysis only covers activities if the project proponent agrees to implement best practices to reduce the chances of introducing invasive species, such as ensuring all fill material is free from contaminants and invasive species and revegetating disturbed areas with appropriate native species. The project proponent also agrees to monitor all restoration plantings for proper establishment and to implement supplemental plantings as necessary to ensure the restorations are of equal to or better habitat quality than previous conditions. For projects involving pesticide application, including herbicides, insecticides, etc., the project proponent also agrees to follow all appropriate label instructions regarding pesticide formulation and spray drift avoidance measures. These measures ensure that actions taking place in suitable EMR and copperbelly habitat are only temporarily impacting the suitability for these snakes.

If an action involves the construction of a new or increased permanent barrier to snake movement, the project requires further coordination with the Service. Habitat fragmentation from new roads or other barriers is a major threat for both copperbellies and EMRs.

Some projects that qualify for use of this DKey may result in minor loss/fragmentation or temporary degradation of available habitat for this listed species. However, we believe that adherence to the conservation measures listed in Sections 5.5.1.4 and 5.5.2.4 ensures that any reduction or modification of available habitat results in only insignificant or temporary effects to the EMR and copperbelly water snake.

Individual Mortality

Road mortality is a significant threat to both EMRs and copperbellies. Project proponents incorporating these conservation measures into their proposed projects reduce the likelihood of this threat by committing to minimize speed of vehicle operation on any roads through (i.e., suitable habitat on either side of the road) or within 100 meters of suitable EMR or copperbelly habitat. This distance from suitable habitat was chosen because male copperbellies in one study were found to move up to 60 meters per day on average and an EMR study found that individuals infrequently move long distances of up to 100 meters per day (Roe et al. 2004, Dreslik et al. 2017). Thus, by minimizing speeds in those areas with suitable habitat nearby, the project proponent reduces their likelihood of striking these listed snakes.

As mentioned previously, EMR are known to be susceptible to water level changes during their inactive season because EMRs hibernate below the frostline in areas where the soil is saturated but not inundated and they need consistent hydrology to prevent freezing or dehydration (Sage 2005). Therefore, actions with temporary or permanent effects to the hydrology can also have detrimental impacts to individual snakes if there is a significant change in the elevation of surface water upstream or downstream of the action area, or in the local groundwater elevations.

This Standing Analysis only covers some activities (e.g., earth-moving activities, vehicle operation in suitable habitat, brush or tree removal) when time restrictions and other CMs are observed to avoid direct mortality. For instance, earth-moving activities must take place in the active season (to avoid harming hibernating snakes) after the action area has been cleared by a qualified biologist and exclusionary fencing must be installed and maintained to avoid injuring or killing these snakes. Furthermore, if vehicles and/or equipment are being operated offroad as part of the action, the equipment should be low-impact equipment (e.g., all-terrain vehicles and other lightweight, track-mounted vehicles with low ground pressure), or if the project proponent does not plan on using low-impact equipment, then they should limit vehicle/equipment access to EMR habitat to when the ground is frozen (December through February) to avoid crushing or otherwise negatively impacting snakes. For the same reasons, brush or tree removal activities are covered when access to the site is restricted to when the ground is completely frozen and when the project proponent agrees to hand cut or use low-impact harvest methods in suitable habitat. Only prescribed burns that take place entirely in the inactive season for EMRs are covered by this Standing Analysis. Direct mortality of EMRs can result from a prescribed fire taking place after emergence from their hibernacula. Mowing tall vegetation (>6 inches) should take place during the inactive season. To maintain vegetation during the active season, mower decks should be raised above 8 inches for non-turf grass and turf grass should be maintained at <6 inches. These restrictions reduce the chances of injuring or killing EMR during mowing practices. By implementing these timing restrictions and other CMs, the project proponent reduces the likelihood of injuring or killing EMRs.

As mentioned in the preceding subsection, this Standing Analysis does not cover earth-moving activities for actions within suitable copperbelly water snake habitat. Due to the high imperilment of copperbellies in Indiana and the unknown causes of mortality for these snakes, actions that involve earth-moving activities require further coordination with the Service to protect individuals during their hibernation and any suitable hibernaculum habitat.

With the implementation of the conservation measures listed in Sections 5.5.1.4 and 5.5.2.4, such as reporting EMR and copperbelly water snake sightings to the Service and using wildlife-safe materials for erosion control and site restoration, we believe that the risk to individuals being killed during an action are minimized. These measures increase awareness for project proponents during the action implementation and control the exposure of these snakes to potentially fatal projects and management practices (e.g., prescribed burning, mowing, road construction, etc.). Especially with habitat management practices, we believe that these measures minimize the risk of injuring or killing EMRs and copperbelly water snakes while still gaining the benefits to important snake habitat.

5.6 Plants

5.6.1 Eastern Prairie Fringed Orchid (*Platanthera leucophaea*)

5.6.1.1 Species Summary

The eastern prairie fringed orchid (EPFO) is currently listed by the Service under the ESA as 'threatened' across its range (USFWS 1989). Habitat loss and fragmentation of wetlands from development and vegetative succession (i.e., invasion of woody species) are the most prevalent threats (USFWS 1999). Other threats include competition from non-native, invasive plant species and collection for commercial and scientific purposes. The Service's species profile for the EPFO can be found at https://ecos.fws.gov/ecp/species/601. Additional information can be found at https://www.fws.gov/species/eastern-prairie-fringed-orchid-platanthera-leucophaea. A summary of the ecology of this species can be found in the Service's EPFO recovery plan (USFWS 1999) and the most recent 5-year review (USFWS 2020). No Critical Habitat has been designated for this species.

5.6.1.2 Biological Information

The EPFO grows in a wide variety of habitats, from tallgrass prairie to wetlands such as sedge meadows, marsh edges, and bogs (Bell et al. 2021). The species may also occur along ditches or roadways where suitable habitat is present. The EPFO occurs on glacial soils, lake plain deposits, muck, or peat which ranges from neutral to mildly calcareous (Bowles et al. 2005). It requires full sun for optimum growth and flowering and a grassy habitat with little or no woody encroachment (USFWS 1999). Disturbance, such as fire, is important in seedling establishment because the EPFO tends to colonize habitat where competition from other plants is reduced (USFWS 1999).

5.6.1.3 Distribution & Critical Habitat Designation

The EPFO was historically found in wide range from eastern Iowa, Missouri, and Oklahoma across southern Wisconsin, northern and central Illinois, southern Michigan, northern Indiana and Ohio, and northwestern Pennsylvania to western New York and southern Ontario (USFWS 1999). There were also disjunct populations in New Jersey, Virginia, and Maine. As of 2019, there are populations of EPFO in Illinois, Indiana, Iowa, Maine, Michigan, Missouri, Ohio, Virginia, and Wisconsin. Indiana only supports one population with low viability, which is defined by having 10-25 plants flowering and a decreasing population trend (USFWS 1999, 2020).

Critical Habitat has not been designated for the EPFO.

5.6.2 Mead's Milkweed (*Asclepias meadii*)

5.6.2.1 Species Summary

Mead's milkweed is currently listed by the Service under the ESA as 'threatened' across its range (USFWS 1988). Threats to Mead's milkweed habitat include urbanization, land conversion to agriculture, habitat fragmentation, lack of prescribed fire, habitat destruction from feral hogs, and pesticide application, which affects both the plant itself and its pollinators (USFWS 2022).

The Service's species profile for Mead's milkweed can be found at https://ecos.fws.gov/ecp/species/8204. Additional information can be found at https://fws.gov/species/meads-milkweed-asclepias-meadii. A summary of the ecology of this species can be found in the Service's Mead's milkweed recovery plan (USFWS 2003) and the most recent 5-year review (USFWS 2022). No Critical Habitat has been designated for this species.

5.6.2.2 Biological Information

Mead's milkweed is a long-lived perennial herb, meaning reintroduced populations are predicted to take decades to sexually reproduce and may be further delayed if there is a lack of fire or haying and grazing takes place before the seed capsules can mature (Bowles et al. 2001, Grman & Alexander 2005, USFWS 2012).

Mead's milkweed requires mesic to dry mesic upland tallgrass prairie or glade/barren habitat characterized by vegetation adapted for drought and fire but can also occur in hay meadows. These plants prefer full sun, such as in prairie, but can also be found in partial shade, such as in glades or barrens. Mead's milkweed is typically found between 800-1,200 ft (243-366 m) above sea level on slopes with a less than 20 percent grade (USFWS 2003).

Northern populations of Mead's milkweed generally grow on calcareous, nutrient-rich soils developed in glacial drift often with a deep mantle of loess; however, throughout its range, the Mead's milkweed can grow in a variety of different soil types with varying pH levels, nutrients, and organic matter.

Throughout its range, Mead's milkweed is associated with many of the same common species found in tallgrass prairies, such as big and little bluestem grass (*Andropogon gerardii* and *Schizachyrium scoparium*). There are also specific plant associations in certain parts of its range. For example, some plant associates in southern Illinois barrens habitat include old-field goldenrod (*Solidago nemoralis*) and poverty oat grass (*Danthonia spicata*) (Kurz & Bowles 1981).

5.6.2.3 Distribution & Critical Habitat Designation

Historically, Mead's milkweed occurred throughout the eastern tallgrass prairie region of the central United States, which included Kansas, Missouri, Illinois, southern Iowa, southwest Wisconsin, and northwest Indiana (USFWS 2003). Currently, there are approximately 346 natural populations across its range with one occurring in Illinois/Indiana in a tallgrass prairie community in the Grand Prairie physiographic region (USFWS 2022). There have also been 29 reintroductions throughout its range, one of which is in the Northwestern Morainal physiographic region in Indiana. Only three of the current populations are considered high viability with the majority considered low viability (246 natural populations; 13 reintroduced populations). Mead's milkweed grows slowly and rarely reproduces, so it may take decades for any introduced populations to be viable (USFWS 2012).

Critical Habitat has not been designated for this species.

5.6.3 Pitcher's Thistle (*Cirsium pitcheri*)

5.6.3.1 Species Summary

Pitcher's thistle (PITH) is currently listed by the Service under the ESA as 'threatened' across its range (USFWS 1988). Threats to PITH are shoreline development, dune stabilization, recreation, and invasive non-native plants and animals, including seed-eating weevils (USFWS 2002, 2018). The Service's species profile for PITH can be found at https://ecos.fws.gov/ecp/species/8153. Additional information can be found at https://www.fws.gov/species/sand-dune-thistle-cirsium-pitcheri. A summary of the ecology of this species can be found in the Service's PITH recovery plan (USFWS 2002) and the most recent 5-year review (USFWS 2023). No Critical Habitat has been designated for this species.

5.6.3.2 Biological Information

PITH is found on the sparsely vegetated or open sand dunes, requiring 70% open sand for successful seedling establishment (McEachern 1992). These plants are foredune and beach specialists that colonize low open beach ridges of Great Lakes shorelines. The species requires active sand dune processes to maintain its early successional habitat and full sunlight to achieve maximum survival and growth (Rowland & Maun 2001, USFWS 2002).

5.6.3.3 Distribution & Critical Habitat

PITH, as a dune specialist, has historically been distributed along the shorelines of the Great Lakes in both the United States and Canada (USFWS 2002). Currently, there is a total of 222 known occurrences in the United States with the majority in Michigan with 182 extant occurrences, 24 extant occurrences in Indiana, 5 extant occurrences in Illinois, and 11 extant occurrences in Wisconsin (USFWS 2023).

Critical Habitat has not been designated for PITH.

5.6.4 Short's Bladderpod (*Physaria globosa*)

5.6.4.1 Species Summary

Short's bladderpod is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 2014a). Threats to Short's bladderpod include competition from invasive plant species; prolonged inundation and soil erosion from extreme precipitation, flooding, and water level manipulation; habitat loss and degradation from construction and right-of-way maintenance; and canopy shading due to forest succession (USFWS 2020). The Service's species profile for Short's bladderpod can be found at https://ecos.fws.gov/ecp/species/7206. Additional information can be found at https://www.fws.gov/species/globe-bladderpod-physaria-globosa. A summary of the ecology of this species can be found in the Service's Short's bladderpod recovery plan (USFWS 2021a), the species status assessment (USFWS 2020) and the most recent 5-year review (USFWS 2021b). Critical Habitat has been designated in Indiana for this species (USFWS 2014b).

5.6.4.2 Biological Information

Short's bladderpod typically grows on steep, rocky, wooded slopes and talus slopes and along tops, bases, and ledges of bluffs – often near rivers or streams – and on south to west-facing slopes (USFWS 2020). Most populations are closely associated with calcareous outcrops; however, the site in Indiana is unique in that Short's bladderpod grows in a narrow strip of herbaceous vegetation between a road and forested bank of a cypress slough (Shea 1993, USFWS 2014b).

5.6.4.3 Distribution & Critical Habitat Designation

Short's bladderpod was historically distributed throughout Kentucky and Tennessee and in one county in southern Indiana. As of 2020, 28 out of the 33 extant occurrences have less than 100 individual plants (USFWS 2021a). There is a single occurrence in Posey County in Indiana that has been recorded since 1992 (Shea 1993). This one Indiana occurrence located in the Wabash-Ohio Bottomlands ecoregion has decreased from hundreds-to-thousands of plants in 1992 to a few hundred plants in 2020 (USFWS 2021a). The observation of a few hundred plants in 2020 marks the first time that more than 100 plants have been observed at this site since 2012.

There are 20 Critical Habitat units designated for the Short's bladderpod in Indiana, Kentucky, and Tennessee, totaling 373.0 hectares (925.5 acres; USFWS 2014b). In Indiana, the Bonebank Road unit consists of 1.7 hectares (4.3 acres) of land in Posey County. This unit is characterized by its soil being composed of Quaternary glacial outwash, which is very different from the calcareous soil that is typical throughout the rest of this species' range. However, this unit also has the critical element of forest vegetation with canopy openings along a road edge that permits hundreds of plants to grow.

5.6.5 Short's Goldenrod (*Solidago shortii*)

5.6.5.1 Species Summary

Short's goldenrod is currently listed by the Service under the ESA as 'endangered' across its range (USFWS 1985). Threats to Short's goldenrod include competition from invasive and woody plant species; habitat loss and degradation from construction and other kinds of human disturbance (e.g., grazing, herbicide application, poorly timed prescribed fire, etc.); and ecological succession to closed canopy woodlands (USFWS 2007). The Service's species profile for Short's goldenrod can be found at https://ecos.fws.gov/ecp/species/5367. Additional information can be found at https://www.fws.gov/species/shorts-goldenrod-solidago-shortii. A summary of the ecology of this species can be found in the Service's Short's goldenrod recovery plan (USFWS 1988) and the most recent 5-year review (USFWS 2023). Critical Habitat has not been designated for this species.

5.6.5.2 Biological Information

Short's goldenrod requires high light and high nutrient levels to maintain high vigor (USFWS 2007). Thus, they require habitat that is mostly open with full sun or partial shade, and which is dry and upland (USFWS 1988). Suitable habitat includes limestone cedar glades, open eroded areas, cedar thickets, pastures, old fields, power line rights-of-way, rock ledges along highways, and edges of dry, open, oak-hickory forest. These habitats were probably once maintained

through natural disturbances such as periodic fires and trampling and grazing by large animals like bison, elk, and deer. Short's goldenrod prefers sites that are underlain by bedrock composed of layers of Ordovician limestones, shales, and siltstones and soils that are a flaggy, silty clay texture with 20-30% rock fragments (USFWS 2007). In Indiana, Short's goldenrod can be found on relatively dry, limestone ledges along the Blue River which are periodically scoured during flooding events (USFWS 2023). This routine scouring is thought to provide enough disturbance to keep competition at a minimum (USFWS 2017).

Other life cycle characteristics seem to be like other *Solidago* species, so it is presumed that the poor competitive and colonization abilities are the primary factors for its narrow endemism (Baskin et al. 2000).

5.6.5.3 Distribution & Critical Habitat Designation

Historically, the Short's goldenrod is thought to have occurred mainly in Kentucky with populations in Indiana and Kentucky. As of 2023, there are 13 natural occurrences across its range with 7 introduced occurrences in Kentucky (USFWS 2023). One of these natural occurrences is in Harrison County, Indiana at the Greenbrier Knob Nature Preserve.

Critical Habitat has not been designated for Short's goldenrod.

5.6.6 Virginia Sneezeweed (*Helenium virginicum*)

5.6.6.1 Species Summary

Virginia sneezeweed is currently listed by the Service under the ESA as 'threatened' across its range (USFWS 1998). Threats to Virginia sneezeweed are changes to hydrology, encroachments of invasive plant species, and ATV or other vehicle use (USFWS 2000, 2020). The Service's species profile for Virginia sneezeweed can be found at https://ecos.fws.gov/ecp/species/6297. Additional information can be found at https://www.fws.gov/species/virginia-sneezeweed-helenium-virginicum. A summary of the ecology of this species can be found in the Service's Virginia sneezeweed draft recovery plan (USFWS 2000) and the most recent 5-year review (USFWS 2020). No Critical Habitat has been designated for this species.

5.6.6.2 Biological Information

The habitat for Virginia sneezeweed in Virginia ranges from seasonally flooded sinkhole ponds, which is a very rare habitat, to disturbed sites like seasonally wet meadows, depressions in lawns, roadside ditches, and the margins of farm ponds (Knox et al. 1995, Knox 1997, Van Alstine 2009). In Missouri, the habitat ranges from less disturbed sinkhole pond margins and wet meadows to temporary wetlands in hayfields, roadside ditches, cattle ranches, and rural airports (Rimer & Summers 2006). The type of wetland habitat characterized by acidic clay soil with a matrix of sand, gravel, and cobble atop a limestone bedrock is preferred. These plants are typically found in higher elevations and open growing conditions, like those which are found in highly altered habitats, that provide plenty of sunlight and a variable hydroperiod and water depth (Rimer & Summers 2006, Knox 1997, Knox et al. 2016).

5.6.6.3 Distribution & Critical Habitat Designation

The Virginia sneezeweed is found primarily in Virginia and Missouri as two disjunct populations; however, it was discovered in Hamilton County, Indiana in 2018 at a nature preserve (USFWS 2020). Overall, there are 76 occurrences in the three states where Virginia sneezeweed is found: 19 occurrences in Virginia, 56 occurrences in Missouri, and 1 occurrence in Indiana. It is thought that this plant was introduced to the Indiana site as part of a seed mix during restoration work and is not a natural occurrence, but additional surveying is needed to determine if this is the case.

Critical Habitat has not been designated for Virginia sneezeweed.

5.6.7 Conservation Measures & Determination Key Guidance for Plants

Projects that intersect a plant's species list area may result in a NE determination if ALL the following applies:

1. The action does not take place in suitable habitat for the plant species on the project proponent's species list.
2. The action does not disturb the ground or existing vegetation.
3. A survey for the listed plant is conducted and the plant is not found in the action area.
4. The action does not indirectly alter the habitat or resources of the listed plant (e.g., changes in canopy cover, microclimate, or humidity, increase in invasive species, alteration of hydrology, etc.).
5. The action does not directly harm the plant (e.g., prescribed fire, grazing, trampling, cultivation, reduce to possession, etc.).
6. The action is not funded, authorized, or carried out by a federal agency.

Projects that intersect a plant's species list area may result in a NLAA determination if the action takes place in suitable habitat for the species and ALL the following applies:

1. A survey for the listed plant is conducted and the plant is found in the action area AND the rest of the following applies.
2. The action does not indirectly alter the habitat or resources of the listed plant (e.g., changes in canopy cover, microclimate, or humidity, increase in invasive species, alteration of hydrology, etc.).
3. The action does not directly harm the plant (e.g., prescribed fire, grazing, trampling, cultivation, reduce to possession, etc.).
4. The action is funded, authorized, or carried out by a federal agency.

If these CMs are not incorporated into the proposed action, the project is not within the scope of the Standing Analysis for a NE or NLAA determination. Instead, the project may affect (MA) this species and requires further coordination with the Service.

5.6.8 Effects Analysis for Plants

Qualifying projects typically involve some or all the stressors listed below.

<u>Habitat Loss/Degradation</u>

Due to the high sensitivity of listed plants to habitat loss and ground disturbance, this DKey does not cover actions that directly or indirectly impact the habitat or resources of these listed plants. These projects receive a MA determination and are encouraged to consult with the Service to minimize or avoid these effects. If the action does not occur in suitable habitat nor indirectly alter the habitat or resources of the plants in any way, then the project proponent may then receive a NE or a NLAA determination.

Direct Harm

If the action includes anything that will directly harm a listed plant, the project proponent is encouraged to consult with the INFO to minimize or avoid these effects, even if the action is for habitat management.

6 Conclusion

If a project is not consistent with the general and species/taxon-specific conservation measures and/or exclusions detailed above, the DKey provides a response indicating that it cannot generate a conclusion for all species and recommends project-specific coordination with the INFO. In other words, for any species for which the user gets a "may affect" determination, further consultation with INFO is required and their endangered species review cannot be completed using the DKey. On the other hand, if the user provides project-specific information consistent with the conservation measures, IPaC generates a consistency letter (for non-Federal action agencies) or a concurrence letter (for Federal action agencies) concluding that the project is consistent with NE and/or NLAA determinations for all listed species.

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