Standing Analysis for the Missouri Threatened and Endangered Species Determination Key Delivered by the U.S. Fish and Wildlife Service's Information for Planning and Consultation (IPaC) Tool

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PURPOSE OF ANALYSIS

This Standing Analysis (SA) provides the analytical basis the "Missouri Threatened and Endangered Species Determination Key" (Missouri Dkey or Dkey) delivered by the U.S. Fish and Wildlife Service (Service) Information for Planning and Consultation (IPaC) project planning tool. The Dkey is an optional tool developed by the Service's Missouri Ecological Services Field Office (ESFO) to streamline the process of evaluating effects of projects proposed in Missouri to species and critical listed under the Endangered Species Act of 1973, as amended (Act).

The Dkey consists of a logically structured set of questions that assists users in determining if a proposed project qualifies for a predetermined outcome regarding anticipated effects. This SA supports the Dkey by describing the Missouri ESFO's approach for developing the key and by outlining the information informing outcomes. By documenting the rationale for outcomes, the SA also provides project proponents predictability and transparency on the Missouri ESFO's process for evaluating effects to federally listed species and their critical habitat.

DETERMINATION KEY APPLICABILITY AND USE

The Missouri Dkey can be used both for consultation under section 7 of the Act for projects funded, authorized, or implemented by Federal agencies and for proactive technical assistance for projects without a Federal nexus (see sections below). Eligible users include Federal agencies or their designated non-Federal representatives, consultants, applicants, and other project proponents.

The Dkey may be used for a variety of different proposed projects provided the project's Action Area is entirely within Missouri. Eligible types of projects include, but not limited to:

- Vegetation management, such as mowing, timber harvest, prescribed burning, and forestry management;
- Construction, maintenance, operation, and/or removal of roads and trails, communication towers, transmission and utility lines, bridges and culverts, oil and gas pipelines, solar power facilities, and mines/quarries;
- Commercial, residential and recreational developments;
- Agricultural activities;
- Habitat restoration or enhancement; and
- Dredging and filling of wetlands.

To use the Dkey, project proponents first delineate their project area in IPaC and generate an "Official Species List". The list identifies federally listed, candidate, or proposed species and designated or proposed critical habitat with a Species List Area (SLA) intersected by the proposed project area. The SLA represents the geographic area occupied by the species or designated as critical habitat. However, the SLA may also include adjacent areas in which projects could affect the species (such as recharge areas of occupied caves, upland areas draining into occupied stream reaches, and tributaries and upstream stream reaches draining into occupied stream reaches).

Once an Official Species List is generated, the user is notified of available Dkeys for species or critical habitat on the list. When selecting the Missouri Dkey, the user is asked a series of initial questions to determine if the project is eligible for use of the Dkey (see **GENERAL EXCLUSIONS**). If the project is not eligible to use the Dkey, the user is instructed to coordinate directly with Missouri ESFO to complete consultation or receive technical assistance. If the user's project qualifies for use of the Dkey, they are asked a series of additional questions based on the specific species and critical habitat on the Official Species List. Some questions, called "semantic questions", are automatically answered for the user based on previous input or spatial data embedded within the Dkey. The possible outcomes for Federal and non-Federal projects are described below.

Determination Key Outcomes

When an IPaC user completes the Missouri Dkey, the IPaC tool generates an outcome for each species or critical habitat identified on the Official Species List and covered by the key. Outcomes represent the Service's recommended determination of effects based on the user's response to questions in the key. Three outcomes are possible for species and critical habitat on the species list, with the outcome based on responses to Dkey questions:

1) No effect (NE) - information provided by the user is sufficient to conclude the proposed action will not affect the species or critical habitat.

2) Not likely to adversely affect (NLAA) – information provided by the user is sufficient to conclude effects to the species or critical habitat will be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (a) be able to meaningfully measure, detect, or evaluate insignificant effects; or (b) expect discountable effects to occur.

3) May affect (MA) – information provided by the user (a) indicates there may be adverse effects from the project, or (b) the project does not qualify for a pre-determined NE or NLAA outcome.

Projects with a Federal Nexus

Federal agencies are required to consult with the Service under section 7(a)(2) of the Act on any action they fund, authorize, or implement if the action may affect a federally listed species or designated critical habitat (50 CFR §402). The process is referred to as "section 7 consultation" or "consultation" when it involves a listed species or designated critical habitat and "conference" when it involves a species proposed for listing or critical habitat proposed for designation.

When a Federal agency or their designated non-Federal representative completes the Missouri Dkey, all or part of the SA is adopted by the agency and the IPaC tool generates an outcome for each species or critical habitat identified on the Official Species List and covered by the key. Consultants or applicants can also use the key on behalf of Federal agencies or their designated non-Federal agencies to generate outcomes the Federal agency or designated non-Federal

representative may use to complete consultation. The different types of letters generated by completing the key for Federal projects are summarized in **Table 1**.

NE Technical Assistance Letter

Federal agencies are not required to consult with the Service on actions they determine will have no effect on listed species and critical habitat. Therefore, projects reaching NE outcomes for all species and critical habitat on the Official Species List do not require submittal to the Service. The letter generated through the IPaC system is referred to as a "NE Technical Assistance Letter" because it provides technical assistance indicating that the action will not affect listed species and critical habitat (**Table 1**). The NE Technical Assistance Letter can be generated when a Federal agency or their designated non-Federal representative completes the Missouri Dkey or when a consultant or applicant consultant completes it on their behalf.

NLAA Concurrence Letter

For Federal projects reaching a combination of NE and NLAA outcomes for species and critical habitat on the Official Species List, the letter generated through the IPaC system is referred to as a "NLAA Concurrence Letter" when the IPaC user is a Federal agency representative or a designated non-Federal representative (**Table 1**). The NLAA Concurrence Letter verifies a determination of 'may affect, but not likely to adversely affect" determination for all species and critical habitat receiving a NLAA outcome. The NLAA Concurrence Letters have a 30-day verification period to allow the Service to review project details and ensure the action reached the appropriate outcome. During this time, the Service may contact the project proponent or IPaC user to clarify details of a project or request additional information. If the Dkey user is not contacted by the Service during the 30 days, the NLAA determinations are verified and consultation is considered complete.

NLAA Technical Assistance Letter

For Federal projects reaching a combination of NE and NLAA outcomes for species and critical habitat on the Official Species List, the letter generated through the IPaC system is referred to as a "NLAA Technical Assistance Letter" when the IPaC user is not a Federal agency representative or a designated non-Federal representative (**Table 1**). The letter provides technical assistance by indicating the project is consistent with a determination of NE or NLAA for all covered species and critical habitat with a NE or NLAA outcome. However, the effects determinations do not become applicable until the lead Federal agency or designated non-Federal representative submits them to the Service via IPaC using a code provided in the letter. Once the Federal agency or designated non-Federal representative submits the determinations via IPaC, a NLAA Concurrence Letter is generated (see above).

May Affect Technical Assistance Letter

Federal projects reaching a MA outcome for one or more species or critical habitat receive a "May Affect Technical Assistance Letter" through IPaC (**Table 1**). The letter indicates that the project, as entered, is consistent with a MA determination, and the user is advised to contact the Missouri ESFO to complete consultation outside of the Dkey for species or critical habitat with MA outcomes. However, not all projects receiving a MA outcome are anticipated to result in adverse impacts to listed species or critical habitat. Some projects that are ineligible for pre-

determined NE or NLAA outcomes may result in NE or NLAA determinations after consultation with the Missouri ESFO, depending on project details. In some cases, users may return to the key after coordination with the Missouri ESFO and successfully complete the key for species and critical habitat with MA outcomes.

When the IPaC user is a Federal agency or designated non-Federal representative, the letter also verifies a determination of NLAA for species and critical habitat with a NLAA outcome. The May Affect Letters with NLAA outcomes have a 30-day verification period to allow the Service to review project details and ensure the action reached the appropriate outcome. During this time, the Service may contact the project proponent or IPaC user to clarify details of a project or request additional information. If the Dkey user is not contacted by the Service during the 30 days, the NLAA determinations are verified and consultation on species and critical habitat with these determinations is considered complete.

When the IPaC user is not a Federal agency or designated non-Federal representative, the letter provides additional technical assistance by indicating the project is consistent with a determination of NLAA for species and critical habitat with a NLAA outcome. However, similar to a NLAA Technical Assistance Letter, the effects determinations do not become applicable until the lead Federal agency or designated non-Federal representative submits them to the Service via IPaC using a code provided in the letter.

Table 1. The name, covered outcomes, and function of each type of output letter generated by the Missouri Dkey for Federal Projects.

Letter Name	Covered Outcomes	Function of Letter
NE Technical Assistance Letter	NE for all covered species and critical habitat	Provides technical assistance on Federal actions by indicating the project is consistent with an action that will not affect listed species and critical habitat.
NLAA Concurrence Letter	Combination of NE and NLAA for all covered species and critical habitat	Generated for Federal actions when the IPaC user is a Federal agency or designated non-Federal representative. Verifies a determination of NLAA for all covered species and critical habitat with a NLAA outcome. If the IPaC user is not notified by the Service within 30 days, the letter documents the Service's concurrence with the NLAA determinations.
NLAA Technical Assistance Letter	Combination of NE and NLAA for all covered species and critical habitat	Generated for Federal actions when the IPaC user is not a Federal agency or designated non-Federal representative. Provides technical assistance by indicating the project is consistent with a determination of NE or NLAA for all covered species and critical habitat. The effects

Letter Name	Covered Outcomes	Function of Letter
		determinations become applicable when the lead Federal agency or designated non-Federal representative submits them to the Service. If the lead Federal agency or designated non-Federal representative submits the determinations via IPaC using a code provided in the letter, a NLAA Concurrence Letter is generated (see above).
May Affect Technical Assistance Letter	One or more MA outcomes	Provides technical assistance by indicating the project is consistent with a MA determination for one or more species or critical habitat and advises the user to contact the Missouri ESFO to complete consultation outside of the Dkey for species and critical habitat with MA outcomes. When the IPaC user is a Federal agency or designated non-Federal representative, the letter **also** verifies a determination of NLAA for all covered species and critical habitat with a NLAA outcome. If the IPaC user is not notified by the Service within 30 calendar days, the letter documents the Service's concurrence with the NLAA determinations. When the IPaC user is not a Federal agency or designated non-Federal representative, the letter provides additional technical assistance by indicating the project is consistent with a determination of NLAA for all covered species and critical habitat with a NLAA outcome. The effects determinations become applicable when the lead Federal agency or designated non-Federal representative submits them to the Service.

Proposed Species, Proposed Critical Habitat, Non-Essential Experimental Populations (NEPs)

The Missouri Dkey currently does not cover proposed species and proposed critical habitat (see **Covered Species and Critical Habitat**), and Federal agencies are not required to conference on actions that could affect a proposed species or proposed critical habitat, unless the action could jeopardize the continued existence of a species or destroy or adversely modify critical habitat. However, proactively conferring can help resolve potential conflicts if the species is listed or the critical habitat designated before the action is complete. Therefore, when proposed species or critical habitat are on the Official Species List, The Missouri Dkey's output letters include information on assessing potential impacts on the species or critical habitat.

Federal agencies are also not required to consult on actions that could affect a population designated under section 10(j) of the Act as a non-essential experimental population (NEP), except: 1) on National Wildlife Refuge System or National Park System lands, where NEPs are treated as threatened species or 2) when the action could jeopardize the continued existence of

the species. Because NEPs are, by definition, not essential to the continued existence of the species, effects of proposed actions affecting a NEP will generally not rise to the level of jeopardizing the continued existence of the species. In addition, neither of the NEPs in Missouri occur on National Wildlife Refuge System or National Park System lands. Therefore, consultation is not required on NEPs in Missouri, and the populations are not covered by the Missouri Dkey.

Projects with No Federal Nexus

Consultation with the Service under section 7(a)(2) of the Act is not required for projects with no Federal nexus. However, the projects are still subject to take prohibitions outlined in section 9 of the Act and may warrant an incidental take permit (ITP) if take of one or more listed species is reasonably certain to occur. The Missouri Dkey helps determine if an ITP is needed by providing outcomes indicating the likelihood of take. [Note: Because impacts to critical habitat and incidental take of NEPs (non-essential experimental populations) are not prohibited under section 9 of the Act and are assessed only during section 7 consultation by Federal agencies, outcomes for critical habitat and NEPs are not provided in output letters for non-Federal projects.]

When a user completes the key for a non-Federal project, the possible outcomes for each species identified in the IPaC Official Species List are the same as those for Federal projects (see **Determination Key Outcomes**). Although the determination language is associated with consultation under section 7(a)(2) of the Act, non-Federal projects that reach "no effect" (NE) or "may affect, but not likely to adversely affect (NLAA) outcomes for all species on the Official Species List are not expected to result in take. The different types of letters generated by completing the key for non-Federal projects are described below and summarized in **Table 2**.

NLAA Technical Assistance Letter

Non-Federal projects reaching a combination of NE and NLAA outcomes for all species on the Official Species List will receive a "NLAA Technical Assistance Letter" that provides technical assistance by indicating the project is consistent with a determination of NE or NLAA for all species covered by the key (**Table 2**). The NLAA Technical Assistance Letters have a 30-day verification period to allow the Service to review project details and ensure the action reached the appropriate outcome. During this time, the Service may contact the project proponent or IPaC user to clarify details of a project or request additional information. If the Dkey user is not contacted by the Service during the 30 days, the NE and NLAA determinations are verified and the IPaC user can conclude that take of species covered by the Missouri Dkey is not reasonably certain to occur.

May Affect Technical Assistance Letter

If a project receives a MA outcome for any species, the user receives a "May Affect Technical Assistance Letter" that provides technical assistance by indicating the project is consistent with a MA determination for one or more species covered by the key and advises the user to contact the Missouri ESFO for further technical assistance outside of the Dkey (**Table 2**). Similar to Federal projects, reaching a MA outcome through the key does not indicate take will necessarily occur. It may only indicate that the project is not eligible for a pre-determined NE or NLAA outcome.

However, if after coordination with the Missouri ESFO, it is determined that take of one or more listed species is reasonably certain to occur, the project proponent should consider applying for an ITP under section 10(a)(1)(B) of the Act.

Table 2. The name, covered outcomes, and function of each type of output letter generated by the Missouri Dkey for non-Federal Projects.

Letter Name	Covered Outcomes	Function of Letter
NLAA Technical Assistance Letter	Combination of NE and/or NLAA for all covered species and critical habitat	Provides technical assistance by indicating the project is consistent with a determination of NE or NLAA for all covered species. If the IPaC user is not notified by the Service within 30 days, the NE and NLAA outcomes are verified and the user may conclude that take of species covered by the Missouri Dkey is not reasonably likely to occur.
May Affect Technical Assistance Letter	One or more MA outcomes	Indicates the project is consistent with a MA determination for one or more species and advises the user to contact the Missouri ESFO for further technical assistance outside of the Dkey. The letter also provides technical assistance by indicating if the project is consistent with a determination of NE or NLAA for other species (those not having a MA outcome). If the IPaC user is not notified by the Service within 30 days, the user can conclude that take of species with NE or NLAA outcomes is not reasonably certain to occur.

Proposed Species and Non-Essential Experimental Populations (NEPs)

Take of species proposed for listing is not prohibited under section 9 of the Act, and the Missouri Dkey currently does not cover proposed species (see **Covered Species and Critical Habitat**). However, proactively assessing potential effects to proposed species can help resolve potential conflicts if the species is listed or the critical habitat designated before the action is complete. Therefore, when proposed species or critical habitat are on the Official Species List, The Missouri Dkey's output letters include information on assessing potential impacts on the species or critical habitat.

Intentional take of a population designated under section 10(j) of the Act as a non-essential experimental population (NEP), such as capturing or possessing, is prohibited under section 9 of the Act. However, incidental take is not prohibited. Therefore, coordination is not required on NEPs in Missouri, and the populations are not covered by the Missouri Dkey.

Ensuring Accurate Determinations

Reaching the appropriate conclusions through the DKey requires users to provide complete and accurate responses to the questions and accurately delineate the geographic boundaries of the

action area of the project. Characteristics of suitable habitat and other information is provided to assist the user in answering questions. However, it is the responsibility of the user to ensure accuracy of their responses. Failure to accurately represent the project or failure to implement the project as detailed in responses to the Dkey questions invalidates Dkey conclusions. Therefore, the following statement is included in letters delivered to Dkey users after completing the key: "*All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC and your responses to the Missouri Dkey questions, including implementation of conservation measures, invalidates this letter, including the Service's concurrence with any NLAA determinations*."

Length of Time Outcomes are Valid

Outcomes of the Missouri DKey do not expire unless reinitiation of consultation is required. The triggers for reinitiation of consultation identified in 50 CFR §402.16 that apply to projects evaluated in the Dkey include: 1) new information reveals effects of the project that may affect listed species or critical habitat in a manner or to an extent not previously considered; or 2) the project is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered previously.

So that proponents of both Federal and non-Federal actions are aware when Dkey outcomes may no longer be valid, all letters include the following language: "*Please re-evaluate the Action in IPaC or contact the Missouri Ecological Services Field Office if: 1) the scope or location of the proposed Action is changed; 2) the Action is modified in a manner that causes effects to listed species or designated critical habitat in a manner or to an extent not previously considered; 3) new information reveals that the Action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; or 4) a new species is listed or a new critical habitat designated. Re-evaluation of the Action in IPaC or coordination with the Service should occur before changes are implemented and as soon as the new information becomes available*."

Use with Other Determination Keys in IPaC

Only one determination key may be completed per species for each proposed project. Therefore, project proponents should carefully review the descriptions of all available Dkeys to select the most appropriate key for the project. Completing a key for a species will disable other keys that cover the same species for the project.

COVERED AREA

This SA applies throughout the state of Missouri. To use the SA and the Missouri Dkey, project's Action Area must fall completely within Missouri. Projects that extend into other states are not eligible to use the key.

COVERED SPECIES AND CRITICAL HABITAT

Species and critical habitat covered by the Dkey and this SA are listed in **Table 3**. In general, the Missouri Dkey and SA covers federally listed species and designated critical habitat with SLAs in Missouri. However, the key and SA does not cover the northern long-eared bat (*Myotis*

septentrionalis) and tricolored bat (*Perimyotis subflavus*) because a range-wide Dkey and supporting SA were developed for the species.

Although the Missouri Dkey and the SA will be updated periodically (see **UPDATING THE DKEY STANDING ANALYSIS**), the key currently also not cover species proposed for listing, critical habitat proposed for designation, or nonessential experimental populations (NEPs) (for more information, see sections above on consultation and coordination on these species).

Table 3. Species and critical habitat covered by the Missouri Dkey. The Federal status is represented as "E" for endangered species and "T" for threatened species. * Denotes species with designated critical habitat.

Common Name	Scientific Name	Federal Status
Mammals		
Gray bat	*Myotis grisescens*	E
Indiana bat*	*Myotis sodalis*	E
Ozark big-eared bat	*Corynorhinus townsendii ingens*	E
Hellbenders		
Missouri Distinct Segment of the eastern hellbender	*Cryptobranchus alleganiensis alleganiensis*	E
Ozark hellbender	*Cryptobranchus alleganiensis bishopi*	E
Fishes		
Grotto sculpin	*Cottus specus*	E
Neosho madtom	*Noturus placidus*	T
Niangua darter	*Etheostoma nianguae*	T
Ozark cavefish	*Amblyopsis rosae*	T
Pallid sturgeon	*Scaphirhynchus albus*	E
Topeka shiner	*Notropis topeka (=tristis)*	E
Mussels		
Curtis pearlymussel	*Epioblasma florentina curtisii*	E
Fat pocketbook	*Potamilus capax*	E
Higgins eye (pearlymussel)	*Lampsilis higginsii*	E
Neosho mucket*	*Lampsilis rafinesqueana*	E
Pink mucket (pearlymussel)	*Lampsilis abrupta*	E
Rabbitsfoot*	*Quadrula cylindrica cylindrica*	T
Scaleshell mussel	*Leptodea leptodon*	E
Sheepnose mussel	*Plethobasus cyphyus*	E
Snuffbox mussel	*Epioblasma triquetra*	E
Spectaclecase (mussel)	*Cumberlandia monodonta*	E
Western fanshell	*Cyprogenia aberti*	T
Winged mapleleaf	*Quadrula fragosa*	E
Snails		
Tumbling Creek cavesnail*	*Antrobia culveri*	E

Common Name	Scientific Name	Federal Status
Insects		
Hine's emerald dragonfly*	*Somatochlora hineana*	E
Crustaceans		
Benton County cave crayfish	*Cambarus aculabrum*	E
Big Creek crayfish*	*Faxonius peruncus*	T
St. Francis River crayfish*	*Faxonius quadruncus*	T
Flowering Plants		
Decurrent false aster	*Boltonia decurrens*	T
Eastern prairie fringed orchid	*Platanthera leucophaea*	T
No common name	*Geocarpon minimum*	T
Mead's milkweed	*Asclepias meadii*	T
Missouri bladderpod	*Physaria filiformis*	T
Pondberry	*Lindera melissifolia*	E
Virginia sneezeweed	*Helenium virginicum*	T
Western prairie fringed orchid	*Platanthera praeclara*	T

ANALYTICAL APPROACH

In developing the Missouri Dkey, we did not attempt to comprehensively cover all circumstances that result in NE or NLAA outcomes for each species and critical habitat. Instead, our goal was to cover the most common conditions that result in these outcomes. Our first step was to identify actions that warrant independent review because the actions either have a higher potential to result in adverse effects or require a more in-depth evaluation to assess effects. These actions are identified in the **GENERAL EXCLUSIONS** section and are not eligible for using the key.

Next, we identified the most relevant information Missouri ESFO biologists consider when evaluating effects of individual projects. We then developed pathways for evaluating effects to the listed species and critical habitat covered by the key. Each pathway depends on a species' life history and habitat and thus, varies among species. Therefore, to develop questions for the key, we grouped species into categories with shared pathways for assessing effects. The species categories and the effects pathways are described under **PATHWAYS FOR EVALUATING EFFECTS**.

GENERAL EXCLUSIONS

Certain actions are not eligible to use the Missouri Dkey because the actions either: 1) are more likely to result in adverse effects or 2) require a more in-depth evaluation of effects. Actions not eligible for using the key include:

1) Purposeful take of a listed species;
2) Collection of a threatened or endangered plant species or its parts;
3) Construction or operation of wind turbines;
4) Aerial or other broad application of chemicals including herbicides and/or pesticides;

5) Dredging or large-scale removal of woody debris from water bodies;
6) Effluent discharge into streams or sinkholes;
7) Stream diversion and/or construction of dams;
8) Activities resulting in modification to cave and karst systems; and
9) Activities affecting the water level of lakes or reservoirs downstream of listed species or critical habitat (e.g., Lake of the Ozarks, Bull Shoals Reservoir, Norfork Reservoir, Stockton Lake, or Wappapello Lake).

Users are asked a set of initial questions to determine if the project is eligible to use the Dkey. If a user indicates a project will involve one of the actions listed above, the user is notified that the project is not eligible for using the key and is instructed to coordinate directly with the Missouri ESFO to evaluate effects to listed species and critical habitat.

STATUS OF COVERED SPECIES AND CRITICAL HABITAT

Provided below is a brief summary of the status of each species covered by the Missouri Dkey, including the species' distribution within the state. The information represents the best available scientific information and provides the basis for evaluating effects to the species and their critical habitat from actions eligible to use the key.

Bats

Gray Bat (Myotis grisescens)

The gray bat was listed as endangered on April 28, 1976 (41 FR 17736). At the time of listing, the main historical threats to the gray bat were human disturbance to roosting bats, environmental contamination, impoundment of waterways and roost modification or destruction. Such roost modifications include cave entrance or mine sealing and other modifications of the internal environment and entrances. The species is also negatively impacted by cave commercialization, improper gating and natural calamities, like cave-ins and flood events. Emerging threats, like interactions with wind turbines and climate change have been added as potential threats, since gray bats were first federally listed.

The gray bat occurs in limestone karst areas, meaning a landscape marked by caves, sinkholes, springs, and other features, of the southeastern and Midwestern United States. It is estimated that more than 95% of the species range-wide population hibernate in only 15 caves. Based on known roost locations, mist net captures, results of acoustic surveys, and assumed flight pathways between roosts, the gray bat is assumed to occur within 102 of the 114 counties in Missouri.

Additional information on the gray bat can be found at https://www.fws.gov/species/gray-bat-myotis-grisescens.

Indiana Bat (*Myotis sodalis*)

The Indiana bat was listed as endangered on March 11, 1967, under the Endangered Species Preservation Act of 1966 (32 FR 4001), a precursor to the current version of the Endangered Species Act. Threats to the species include human disturbance of hibernating bats,

commercialization of caves where the bats hibernate, loss of summer habitat, pesticides and other contaminants, and most recently, the disease white-nose syndrome.

The Indiana bat range includes Alabama, Arkansas, Connecticut, Georgia, Iowa, Kentucky, Maryland, Michigan, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, and West Virginia. Missouri is part of the Indiana bat Ozark-Central Recovery Unit, and the species is assumed to occur throughout the entire state.

Critical habitat for the Indiana bat was designated on September 24, 1976 (41 FR 41914). The critical habitat designated in Missouri represented the major hibernacula known of the time, as approximately 75-percent of the known population hibernated at the designated sites. The bats are entirely dependent on the shelter provided by the caves and mines during the winter and their loss of subjection to excessive disturbance or modification would lead to the near or total extinction of the species. Due to the sensitive nature of these systems to disturbance, trespassing, and vandalism, the precise localities of these caves and mines were not released and instead critical habitat was designated at a county level. The caves in Missouri designated as critical habitat include 6 caves within Crawford, Franklin, Iron, Shannon, and Washington counties.

Additional information on the Indiana bat can be found at https://www.fws.gov/species/indiana-bat-myotis-sodalis.

Ozark Big-eared Bat (Corynorhinus townsendii ingens)

The Ozark big-eared bat was originally listed as an endangered subspecies on November 30, 1979, under the scientific name *Plecotus townsendii ingens* (44 FR 69206). However, a subsequent genetic analysis determined a taxonomic restructuring of the genus into *Corynorhinus.* The primary threat to the species is disturbance to maternity caves and hibernacula, as the species is highly sensitive to human entry and are well known to abandon sites after such. Recovery practices have largely centered around cave gating and limiting human disturbance.

The distribution of the Ozark big-eared bat historically was limited to northwestern Arkansas and neighboring Oklahoma and Missouri. However, there have been no confirmed observations of the species in Missouri since 1971, and the Service considers them extirpated from the state.

Additional information on the Ozark big-eared bat can be found at https://www.fws.gov/species/ozark-big-eared-bat-corynorhinus-townsendii-ingens

Fishes

Grotto Sculpin (*Cottus specus*)

The grotto sculpin was listed as endangered on October 25, 2013 (78 FR 58938). The species' primary threats are water quality degradation and siltation. Because of the grotto sculpin's small range, population-scale fish kills are of particular concern. Fish kills can occur when contaminants from the surface wash into cave streams occupied by the species.

The grotto sculpin is found in just five cave systems and their resurgence streams within the Bois Brule drainage in Perry County, Missouri. The cave systems include those of Crevice Cave, Tom Moore Cave (Moore Cave), Mystery Cave, Rimstone River Cave, and Running Bull Cave. The areas are characterized by thousands of sinkholes where consistent water flow, organic input, and connection to surface streams are sufficient for grotto sculpin to migrate seasonally from underground streams to surface streams to complete their life cycle.

Critical habitat was also designated for the grotto sculpin at the time of listing on October 25, 2013 (78 FR 58923). The Service determined the following physical or biological features are essential to the conservation of the grotto sculpin:

- Geomorphically stable stream bottoms and banks (stable horizontal dimension and vertical profile) with riffles, runs, pools, and transition zones between these stream features.
- Instream flow regime with an average daily discharge between 0.07 and 150 cubic feet per second (cfs), inclusive of surface runoff, cave streams, resurgences, springs, and occupied surface streams and all interconnected karst areas with flowing water.
- Water temperature between 12.8 and 16.7 °C (55 and 62 °F), dissolved oxygen 4.5 milligrams or greater per liter, and turbidity of an average monthly reading of no more than 200 Nephelometric Turbidity Units for a duration not to exceed 4 hours.
- Adequate water quality characterized by low levels of contaminants. Adequate water quality is defined as the quality necessary for normal behavior, growth, and viability of all life stages of the grotto sculpin.
- Bottom substrates consisting of a mixture of sand, gravel, pebble, cobble, solid bedrock, larger cobble and rocks for cover, with low amounts of sediments.
- Abundance of aquatic invertebrate prey base to support the different life stages of the grotto sculpin.
- Connected underground and surface aquatic habitats that provide for all life stages of the grotto sculpin, with sufficient water levels to facilitate movement of individuals among habitats.

Additional information on the grotto sculpin can be found at https://www.fws.gov/species/grotto-sculpin-cottus-specus.

Neosho Madtom (*Noturus placidus*)

The Neosho madtom was listed as threatened on May 22, 1990 (55 FR 21148). Primary threats to the species include deteriorating water quality and heightened sedimentation resulting from lead-zinc mining, agricultural runoff, and urban development. Additionally threats include the construction of impoundments, improper gravel extraction, and dewatering for municipal and agricultural.

Historically, the Neosho madtom range included the mainstem rivers of the Neosho River and Spring River drainage system south to the Neosho's confluence with the Arkansas River in

Oklahoma (the Neosho River is now referred to as the Grand River in Oklahoma). The species was also known from the Illinois River in Oklahoma. The Neosho madtom is now limited to approximately two-thirds of its original range, with the loss due to habitat alteration and/or fragmentation by 7 large mainstem dams (4 in Oklahoma and 3 in Kansas), and approximately 16 low-head dams in the remainder of its range.
Within Missouri, the Neosho is known to occur only in the Spring River in Barton and Jasper counties in the southwestern portion of the state.

Additional information on the species can be found at https://www.fws.gov/species/neosho-madtom-noturus-placidus.

Niangua Darter (Etheostoma nianguae)

The Niangua darter was listed as threatened on June 12, 1985 (50 FR 24649). Threats to the species include the destruction of habitat caused by the removal of sand and gravel from the stream channel, degradation of stream quality caused by livestock grazing along stream banks and use of streams for livestock water sources, barriers to the movement, including other aquatic life, created by poorly designed low-water crossings, accumulating silt and gravel on the upstream side of low-water crossings and formation of plunge pools on the downstream side of bridges which changes the physical characteristics of streams, fertilizer and pesticide run-off into streams from adjacent farm fields, and degraded water quality caused by waste from humans and livestock.

The species inhabits clear, medium-sized streams in the Osage River watershed in west central Missouri. The Niangua darter is known to currently occur in the Maries River, Big Tavern Creek, Niangua River, Little Niangua River, Pomme de Terre River, Brush Creek, North Dry Sac River, and Bear Creek.

Critical habitat was designated for the Niangua darter at the time of listing (50 FR 24649) and includes 90 of the 128 miles of streams inhabited by the species, plus a 50-foot riparian zone along each side of the 90 miles of stream. The critical habitat is in Camden, Cedar, Dallas, Greene, Hickory, Miller, and St. Clair Counties, Missouri. The Service determined the following physical or biological features are essential to the conservation of the Niangua darter:

- Medium-sized creeks with silt-free pools and riffles
- Moderately clear water draining hilly areas underlain by chert and dolomite.
- Water ranging from 8 to 46 inches in depth over gravel with scattered rubble.

Additional information on the species can be found at https://www.fws.gov/species/niangua-darter-etheostoma-nianguae.

Ozark Cavefish (*Amblyopsis rosae*)

The Ozark cavefish was listed as threatened on November 1, 1984 (49 FR 43965). Threats to the Ozark Cavefish include water pollution and declining bat populations. Contaminants can flow into the groundwater and travel for miles before finally reaching waters where the cavefish live. They also are at risk of specimen collection, cave disturbance and destruction, as well as

changing water tables.

The Ozark cavefish distribution is restricted to the Springfield plateau geologic province of Arkansas, Missouri, and Oklahoma. The Springfield plateau encompasses approximately 21,000 km^2 and drains the White, Neosho, and Osage rivers. In Missouri, active sites are distributed throughout 10 counties including Greene, Jasper, Lawrence, Newton, Christian, Barry, and Stone Counties.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/ozark-cavefish-amblyopsis-rosae.

Pallid Sturgeon (Scaphirhynchus albus)

The pallid sturgeon was listed as endangered on September 6, 1990 (55 FR 36641). Threats to the species primarily stem from habitat alterations resulting from dam construction, river channelization, and navigation maintenance along major waterways. These modifications detrimentally impact spawning grounds, diminish food availability or accessibility, and impede the sturgeon's movement within river systems. Water pollution stemming from rural and urban development along riverbanks further compounds threats to pallid sturgeon populations. A more recent concern with potential implications for the species' future is the phenomenon of hybridization with shovelnose sturgeon.

In Missouri, pallid sturgeon inhabit the extent of the Mississippi River below lock and dam 25 near Winfield, Missouri and the entirety of the Missouri river. Pallid sturgeon primarily utilize main channel, secondary channel, and channel border habitats throughout their range. Juvenile and adult pallid sturgeon are rarely observed in habitats lacking flowing water which are removed from the main channel (i.e., backwaters and sloughs).

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/pallid-sturgeon-scaphirhynchus-albus.

Topeka Shiner (*Notropis topeka*)

The Topeka shiner was listed as endangered on December 15, 1998 (63 FR 69008). The primary threats to the species include habitat loss and degradation, diminished water quality, altered stream hydrology, barriers impeding fish movement, and heightened extreme weather events linked to climate change. Habitat loss and degradation, compounded by poor water quality, stem from various sources such as sediment-laden runoff, streamside vegetation removal, poorly engineered stream crossings, improper gravel extraction, inappropriate culvert placements, insufficient erosion controls, and timber clearance operations. Other contributors to hydrological changes include drain tile installation, wetland loss, groundwater depletion, channel straightening, and the construction of impoundments. Barriers to fish movement, such as dams, perched culverts, and high-velocity culverts, pose a significant threat to species like the Topeka Shiner, particularly in headwater reaches of streams where seasonal water fluctuations dictate habitat suitability and survival.

Missouri's Topeka shiner extant streams identified by the Missouri Department of Conservation include: 2 streams within the Thompson River watershed (not including the Thompson River

main stem), and 9 streams within the Moniteau Creek watershed (including the Moniteau Creek main stem). These occupied streams represent two population complexes: a remnant of the Thompson River population complex and the Moniteau Creek population complex, both of which are part of the larger Missouri River watershed. Sugar Creek in the Thompson River watershed is considered by the Missouri Department of Conservation to be susceptible to extirpation due to the relatively low numbers of individuals typically captured during sampling efforts and few sites with collection records.

The Service jointly with the Missouri Department of Conservation and the Nature Conservancy, reestablished the Topeka shiner under section 10(j) of the Act and classified the reestablished population as a NEP within portions of the species' historical range in Adair, Gentry, Harrison, Putnam, Sullivan, and Worth Counties, Missouri (78 FR 42702). Reintroduction sites included Little Creek headwaters in Harrison County; East Fork Big Muddy Creek in Gentry, Harrison, and Worth Counties; and tributaries of Spring Creek in Adair, Putnam, and Sullivan Counties. The special rule that accompanied the section 10(j) final rule was designed to broadly exempt, from the section 9 take prohibitions, any take of Topeka shiners that is incidental to otherwise lawful activities.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/topeka-shiner-notropis-topeka

Hellbenders

Eastern and Ozark hellbenders represent two distinct subspecies of salamanders inhabiting Missouri. While Eastern hellbenders range from southern New York to northern Georgia and extend westward into Missouri, Ozark hellbenders are exclusively found in southern Missouri and Arkansas. Both subspecies are permanently aquatic, favoring the cool, swift-flowing rivers characteristic of the Ozark Highland region. These nocturnal creatures typically seek refuge beneath flat rocks in sizable, perennial streams and rivers. They feature a distinctive appearance, characterized by a broad, flat head, diminutive lidless eyes, and variable coloration ranging from reddish-brown to greenish gray, sometimes with blotches. Their bodies and limbs are adorned with soft, prominent folds of skin, while their flattened, rudder-like tails aid in navigation through water currents.

Declining populations of hellbenders are primarily attributed to habitat degradation and alteration, including factors such as stream impoundments, ore and gravel mining, and sediment runoff. Water quality deterioration, stemming from sources like agricultural and livestock runoff, malfunctioning septic tanks, and chemical spills, also poses a significant threat. Illegal collection and human disturbance, predation, and diseases further exacerbate their plight. Additionally, a significant number of hellbenders fall victim to mistaken beliefs regarding their toxicity or perceived danger, resulting in unwarranted killings.

Eastern Hellbender (Cryptobranchus alleganiensis alleganiensis)

Populations of the eastern hellbender were listed as endangered as a Distinct Population Segment (DPS) on April 8, 2021 (86 FR 13465).

The historical and current range of the Missouri DPS of the eastern hellbender are the same and include the: Niangua River, Gasconade River, Osage Fork of the Gasconade River, Big Piney River, Meramec River, Huzzah Creek, Courtois Creek, and Big River. We consider the DPS to consist of 3 populations, with each population defined as all the occupied rivers within a watershed flowing into the Missouri or Mississippi River. Thus, the Niangua River population consists of individuals in the Niangua River; the Gasconade River population consists of individuals from the Gasconade River, Osage fork of the Gasconade River, and Big Piney River; and the Meramec River population consists of individuals from the Meramec River, Huzzah Creek, Courtois Creek, and Big River.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/eastern-hellbender-cryptobranchus-alleganiensis-alleganiensis.

Ozark Hellbender (Cryptobranchus alleganiensis bishopi)

The Ozark hellbender was listed as endangered on November 7, 2011 (76 FR 61956).

The current range of the Ozark hellbender is currently identified as Bryant Creek, the North Fork White River, the lower portion of the White River mainstem, the Spring River, the Eleven Point River, Jacks Fork River, and the Current River. Though the Black River is presumed to be part of the Ozark hellbender's historical range, no additional hellbenders have been captured during surveys and habitat no longer appears suitable.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/ozark-hellbender-cryptobranchus-alleganiensis-bishopi.

Mussels

Mussels, being largely sedentary creatures, face considerable risks from pollutants, sediment, and alterations to their aquatic habitats. They are commonly found across various water bodies, with a preference for continuously flowing water atop stable substrates. Typically nestled in clean, silt-free beds of sand, gravel, and boulders, they thrive in streams and rivers. While some species inhabit oxbow lakes, backwaters, and muddy side-channels, others exhibit limited distribution, confined to specific rivers or locales. Remarkably, Missouri's waterways harbor significant populations of rare and endangered mussel species, underscoring their conservation importance. Mussels sustain themselves by siphoning and filtering nutrients from the water, a process through which they can filter several gallons daily. Their life cycle hinges on a symbiotic relationship with vertebrate hosts, predominantly fish. Despite their diminutive size and vulnerability in early life stages, mussels, under favorable conditions, can endure for remarkably extended periods, with some individuals surpassing 80 years of age.

The decline of numerous mussel species can be attributed to both direct and indirect alterations and degradation of stream habitats. Activities such as gravel mining, deforestation along stream banks, nonpoint source pollution from agricultural and urban areas, dredging, channelization, dam construction, and the creation of impoundments, work pads, and coffer dams have significantly impacted their habitats. These practices have led to habitat loss, increased stagnation, siltation, and potentially the elimination or reduction of essential host populations.

Curtis Pearlymussel (*Epioblasma curtisii*)

The Service listed the Curtis pearlymussel as endangered on June 14, 1976 (41 FR 24062).

The Curtis pearlymussel has a small historical range within the Ozark Highlands, historically occurring in the Black, St. Francis, and White River drainages in Southeast Missouri and Northeast Arkansas. At the time of the last status review in 2010, a living population could not be located in Missouri. It had last been seen alive in 1993 when living specimens were observed from the Mudpuppy Conservation Area on the Little Black River in Missouri (USFWS 2010). The Little Black River remains the last place the Curtis' pearlymussel has been seen alive. No other information is available on the status of the species within its known range in Missouri and Arkansas. Therefore, it is still unknown whether an extant population exists.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/curtis-pearly-mussel-epioblasma-florentina-curtisii.

Fat Pocketbook (*Potamilus capax*)

The Service listed the fat pocketbook as endangered on June 14, 1976 (41 FR 24062).

The fat pocketbook is found in Missouri within the St. Francis River drainage basin and upper Mississippi River in highly variable habitat ranging from relatively natural and stable conditions to impounded or channelized rivers.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/fat-pocketbook-potamilus-capax.

Higgins Eye Pearlymussel (*Lampsilis higginsii*)

The Service listed the Higgins eye pearlymussel as endangered on June 14, 1976 (41 FR 24062).

The Higgins eye pearlymussel is native to the Mississippi River and some of its northern tributaries in Missouri.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/higgins-eye-lampsilis-higginsii.

Neosho Mucket (Lampsilis rafinesqueana)

The Service listed the Neosho mucket as endangered on September 17, 2013 (78 FR 57076).

In Missouri the Neosho mucket is restricted to the Neosho River Basin; Center Creek upstream of Bens Branch, Spring River, North Fork Spring River downstream of the Dry Fork confluence, Cow Creek, a tributary to the Spring River, Shoal Creek, and Elk River.

The Service designated critical habitat for the Neosho mucket on June 1, 2015 (80 FR 24692). In total, approximately 777 river kilometers (483 river miles) in Arkansas, Kansas, Missouri, and Oklahoma fall with the boundaries of the critical habitat designation for the Neosho mucket. The

Service determined that the following physical or biological features are essential to the conservation of the Neosho Mucket:

- Geomorphically stable river channels and banks (channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as stable riffles, sometimes with runs, and mid-channel island habitats that provide flow refuges consisting of gravel and sand substrates with low to moderate amounts of fine sediment and attached filamentous algae).
- A hydrologic flow regime (the severity, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where the species are found and to maintain connectivity of rivers with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussel's and fish host's habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats.
- Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.
- The occurrence of natural fish assemblages, reflected by fish species richness, relative abundance, and community composition, for each inhabited river or creek that will serve as an indication of appropriate presence and abundance of fish hosts necessary for recruitment of the Neosho mucket and rabbitsfoot. Suitable fish hosts for Neosho mucket glochidia include smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), and spotted bass (*Micropterus punctulatus*). Suitable fish host for rabbitsfoot may include, but are not limited to, blacktail shiner (*Cyprinella venusta*) from the Black and Little River and cardinal shiner (*Luxilus cardinalis*), red shiner (*C. lutrensis*), spotfin shiner (*C. spiloptera*), bluntface shiner (*C. camura*), rainbow darter (*Etheostoma caeruleum*), rosyface shiner (*Notropis rubellus*), striped shiner (*L. chrysocephalus*), and emerald shiner (*N. atherinoides*).
- Competitive or predaceous invasive (nonnative) species in quantities low enough to have minimal effect on survival of freshwater mussels.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/rabbitsfoot-quadrula-cylindrica-cylindrica

Pink Mucket (Lampsilis abrupta)

The pink mucket was listed as endangered on June 14, 1976 (41 FR 24062).

In Missouri, the pink mucket is found within sporadic patches within the Upper Mississippi River basin - Meramec River, Bourbeuse River, and Big River; the Lower Mississippi River basin – St. Francis River, the White River drainage – Black River, and Spring River; the Missouri River drainage – Osage River, Sac River, and Gasconade River. The Pink Mucket is also considered extirpated from the Little Black River in Missouri having not been found live of

dead since ca. 1980.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/pink-mucket-lampsilis-abrupta

Rabbitsfoot (Quadrula cylindrica cylindrica)

The rabbitsfoot mussel was listed as threatened species on September 17, 2013 (78 FR 57076).

Despite being a wide-ranging mussel species, the rabbitsfoot mussel is sporadically restricted to the tributaries of the St. Francis, Spring, and Black rivers in Missouri.

The Service designated critical habitat for the rabbitsfoot (*Quadrula cylindrica cylindrica*), under the Endangered Species Act of 1973, as amended (Act). In total, approximately 2,312 river kilometers (1,437 river miles) in Alabama, Arkansas, Illinois, Indiana, Kansas, Kentucky, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, and Tennessee, fall within the boundaries of the critical habitat designation for the Rabbitsfoot. The Service determined that the following physical or biological features are essential to the conservation of the rabbitsfoot mussel:

- Geomorphically stable river channels and banks (channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as stable riffles, sometimes with runs, and mid-channel island habitats that provide flow refuges consisting of gravel and sand substrates with low to moderate amounts of fine sediment and attached filamentous algae).
- A hydrologic flow regime (the severity, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where the species are found and to maintain connectivity of rivers with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussel's and fish host's habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats.
- Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.
- The occurrence of natural fish assemblages, reflected by fish species richness, relative abundance, and community composition, for each inhabited river or creek that will serve as an indication of appropriate presence and abundance of fish hosts necessary for recruitment of the Neosho mucket and rabbitsfoot. Suitable fish hosts for Neosho mucket glochidia include smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), and spotted bass (*Micropterus punctulatus*). Suitable fish host for rabbitsfoot may include, but are not limited to, blacktail shiner (*Cyprinella venusta*) from the Black and Little River and cardinal shiner (*Luxilus cardinalis*), red shiner (*C. lutrensis*), spotfin shiner (*C. spiloptera*), bluntface shiner (*C. camura*), rainbow darter (*Etheostoma caeruleum*), rosyface shiner (*Notropis rubellus*), striped shiner (*L.*

chrysocephalus), and emerald shiner (*N. atherinoides*).

- Competitive or predaceous invasive (nonnative) species in quantities low enough to have minimal effect on survival of freshwater mussels.

This critical habitat designation was designed for the conservation of those areas containing the physical and biological features necessary to support the species' life-history traits. Each of the areas designated in this rule contain sufficient PBFs to provide for one or more of the life history functions of the rabbitsfoot.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/rabbitsfoot-quadrula-cylindrica-cylindrica

Scaleshell (Leptodea leptodon)

The Scaleshell mussel was listed as endangered on October 9, 2001 (66 FR 44171).

The Scaleshell is still present, although rare, within its strong-hold populations in the Meramec, Bourbeuse, and Gasconade rivers in Missouri. When the Scaleshell was listed as endangered in 2001, it was considered extant in 14 of 55 rivers from which it occurred (USFWS 2001). These rivers included the Meramec, Bourbeuse, Big, Gasconade, and Osage rivers in Missouri.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/scaleshell-leptodea-leptodon

Sheepnose (Plethobasus cyphyus)

The sheepnose mussel was listed as endangered species on March 13, 2012 (77 FR 14914).

In Missouri, the sheepnose is restricted to the Meramec River, Bourbeuse River, and Osage Fork Gasconade River and possibly the Mississippi river; however, the last known live record from MO portion of Mississippi River was in 1988.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/sheepnose-plethobasus-cyphyus

Snuffbox (Epioblasma triquetra)

The snuffbox mussel was listed as endangered species on February 14, 2012 (77 FR 8632).

The highly disjunct occurrences of snuffbox mussels in Missouri suggest that it was more widespread historically, however currently it is restricted to the Meramec River, Bourbeuse River, St. Francis River, and Black River.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/snuffbox-epioblasma-triquetra.

Spectaclecase (Cumberlandia monodonta)

The Service listed the Spectaclecase mussel as endangered under the Act on March 13, 2012 (77 FR 14914).

The Spectaclecase mussel is currently found within the Meramec River, Bourbeuse River, Big River, Osage River, Sac River, Gasconade River, Big Piney River, and Osage Fork of the Gasconade River.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/spectaclecase-cumberlandia-monodonta.

Western Fanshell (*Cyprogenia aberti*)

The western fanshell mussel was listed as threatened on March 3, 2022 (87 FR 12338). In addition, the service finalized a rule under the authority of section 4(d) of the Act that provides measures that are necessary and advisable to provide for the conservation of these species. The 4(d) rule provides for the conservation of the species by allowing exceptions, including certain standard exceptions, to take prohibitions caused by actions and activities that, while they may have some minimal level of disturbance to the western fanshell, will not have a negative impact (i.e., will have only de minimis impacts) on the species' conservation. The exceptions to these prohibitions include incidental take associated with (1) Channel and bank restoration projects; (2) silviculture and forest management that implements best management practices; and (3) transportation projects that avoid instream disturbance in waters occupied by the species.

1. The first exception is for incidental take resulting from channel and bank restoration projects for creation of natural, physically stable, ecologically functioning streams, taking into consideration connectivity with floodplain and groundwater aquifers. This exception includes a requirement that bank restoration projects require planting appropriate native vegetation, including woody species appropriate for the region and habitat. This exception also includes a requirement for surveys and relocation prior to commencement of restoration actions (and, if applicable, monitoring after relocation) for western fanshell that would otherwise be negatively affected by the actions. Actions related to restoration activities that would negatively affect western fanshell include individual mussels being removed, dislodged, crushed, and/or killed by heavy equipment operations and rip-rap placement; removal, destruction, and/or replacement of habitat; increased turbidity from streambed disturbance; and alterations to flow and turbidity from permanent (weirs) or temporary (causeways) structures needed for construction.

2. The second exception is for incidental take resulting from silviculture and forest management activities that use State-approved best management practices to protect water and sediment quality and stream and riparian habitat. Best management practices are designed to reduce sedimentation, erosion, and bank destruction, thereby protecting instream habitat for these species.

3. The third exception is for incidental take resulting from transportation projects that do not include activities that disturb instream habitat. Bridge designs that include spanning the stream and avoiding stream bank disturbance reduce sedimentation and erosion, thereby

protecting instream habitat for these species.

The western fanshell exists within several basins in Missouri. The Spring River originates in the Ozark Highlands in Missouri, flows south to the South Fork Spring River confluence near Hardy, Arkansas, and then flows southwest to the Black River near Black Rock, Arkansas. Historically, the western fanshell occurred in the Spring River from the Sugar Creek confluence near Hardy, Arkansas to the Eleven Point River confluence north of Black Rock, Arkansas (approximately 48.3 rkm), and in the South Fork Spring River from near the Missouri/Arkansas state line to the confluence with Spring River (approximately 88.4 rkm). Within the Lower Mississippi–St. Francis River basin in Missouri, Western Fanshell currently has two populations, one in the Lower St. Francis River (below Lake Wappapello) and Upper St. Francis River (above Lake Wappapello). The Lower St. Francis River is approximately 456 rkm, but Western Fanshell only occurs at 1 site 0.8 rkm below Wappapello Dam. The Upper St. Francis River population occupies approximately 80 rkm and is one of the best remaining populations range wide. The Black River originates in the St. Francois Mountains in Missouri and flows southwesterly through Arkansas until its confluence with the White River near Newport, Arkansas. Historically, Western Fanshell occurred in the Black River from just below Clearwater Lake Dam to approximately 20.2 river kilometers (rkm) upstream of the Lawrence and Jackson County line (approximately 184.9 rkm).

Critical habitat was designated for the western fanshell on July 27, 2023 (88 FR 41724). In total, approximately 261.4 river miles (420.7 kilometers) in Arkansas and Missouri fall within the boundaries of the critical habitat designation for the western fanshell. The Service determined that the following physical or biological features are essential to the conservation of the western fanshell:

- Adequate flows, or a hydrologic flow regime (magnitude, timing, frequency, duration, rate of change, and overall seasonality of discharge over time), necessary to maintain benthic habitats where the species are found and to maintain stream connectivity, specifically providing for the exchange of nutrients and sediment for maintenance of the mussels' and fish hosts' habitat and food availability, maintenance of spawning habitat for native host fishes, and the ability for newly transformed juveniles to settle and become established in their habitats. Adequate flows ensure delivery of oxygen, enable reproduction, deliver food to filter-feeding mussels, and reduce contaminants and fine sediments from interstitial spaces.
- Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks (that is, channels that maintain lateral dimensions,
- longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel and coarse sand substrates).
- Water and sediment quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages, including, but not limited to dissolved oxygen (generally above 3 parts per million (ppm)) and water temperature (generally below 80 degrees Fahrenheit (°F) (27 degrees Celsius (°C)). Additionally,

water and sediment should be low in ammonia (generally below 1.0 ppm total ammonia-nitrogen) and heavy metals and lack excessive total suspended solids and other pollutants.

- The presence and abundance of fish hosts necessary for recruitment of the western fanshell; this includes logperch (*Percina caprodes*), rainbow darter (*Etheostoma caeruleum*), slenderhead darter (*Percina phoxocephala*), fantail darter (*Etheostoma flabellare*), or orangebelly darter (*Etheostoma radiosum).*

This critical habitat designation was designed for the conservation of those areas containing the physical and biological features necessary to support the species' life-history traits. Each of the areas designated in this rule contain sufficient PBFs to provide for one or more of the life history functions of the western fanshell.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/western-fanshell-cyprogenia-aberti.

Winged Mapleleaf (*Quadrula fragosa*)

The winged Mapleleaf mussel was listed as endangered species on June 20, 1991 (56 FR 28345).

Currently available data on winged Mapleleaf are restricted solely to the Bourbeuse River and are limited in scope to make any assessments of the species' viability in the river.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/winged-mapleleaf-quadrula-fragosa.

Crayfishes

Benton County Cave Crayfish (*Cambarus aculabrum*)

The Benton County cave crayfish was listed as endangered on April 27, 1993 (58 FR 25742). Threats to Bear Hollow Cave include contaminants from storm water runoff (incompatible chemical use/disposal, highways, and leaks and spills), excessive nutrient influx from residential septic systems and agriculture operations, physical alteration from mining operations (e.g., limestone quarries), vandalism, and hydrologic alteration from land clearing/conversion activities.

The Benton County cave crayfish is presently known from only four cave streams in Benton County Arkansas; Logan Cave, Old Pendergrass Cave, Elm Springs, and Bear Hollow Cave. Bear Hollow Cave in particular has a total recharge of 4 km^2 that extends into southwest Missouri in McDonald and Barry counties.

The current condition and additional information about the species can be found at https://www.fws.gov/species/benton-county-cave-crayfish-cambarus-aculabrum

Big Creek Crayfish (*Faxonius peruncus*)

The Big Creek crayfish was listed as threatened on May 30, 2023 (88 FR 25512). The primary

threat to the Big Creek crayfish is the woodland crayfish, a non-native crayfish that was discovered within a tributary to the St. Francis River in 1984. Since its introduction, the woodland crayfish has spread throughout a large portion of the upper St. Francis River drainage and has caused the range of the Big Creek crayfish to contract. Water quality degradation is the other main threat, particularly from lead mining contamination.

The Big Creek crayfish has localized distributions in the St. Francis River basin upstream of Wappapello dam in Iron, Madison, St. Francois, and Wayne counties in southeastern Missouri. The Big Creek Crayfish appears most abundant in Big Creek, other streams on the west side of the basin, and the Twelve-mile Creek sub watersheds on the east side of the basin. Because the species are habitat generalists and not all reaches of streams within the watershed have been sampled, it is likely that the species occur at more locations in the watershed. Therefore, we consider the species' ranges to include all streams within occupied 12-digit hydrologic units watersheds (referred to as sub watersheds).

At the time of listing, the Service designated critical habitat for the species; in total, approximately 1,069 river miles (1,720 river kilometers) in Iron, Madison, St. Francois, Washington, and Wayne Counties, Missouri. The Service determined that the following physical or biological features are essential to the conservation of the Big Creek crayfish:

- Stream flow velocity generally between 0 and 1.1 feet per second (ft/s) (0 and 0.35 meters per second (m/s)).
- Stream depths generally between 0.2 and 1.6 ft (0.06 and 0.49 m) for the Big Creek crayfish
- Water temperatures between 34- and 84-degrees Fahrenheit (°F) (1.1 and 28.9 degrees Celsius (°C)).
- Adequately low stream embeddedness so that spaces under rocks and cavities in gravel remain available to the Big Creek crayfish.
- An available forage and prey base consisting of invertebrates, periphyton, and plant detritus.
- Connectivity among occupied stream reaches of the Big Creek crayfish (both within and among occupied subwatersheds)
- Ratios or densities of nonnative species low enough to allow for maintaining the populations of the Big Creek crayfish.

This critical habitat designation is designed for the conservation of those areas containing the physical and biological features necessary to support the species' life-history traits. Each of the areas designated in this rule contain sufficient PBFs to provide for one or more of the life history functions of the Big Creek crayfish.

The Big Creek crayfish also has a rule under 4(d) of the Act that provides regulatory measures considered necessary and advisable to provide for the conservation of the species. To discourage the spread of the woodland crayfish (and other invasive species) and discouraging other actions that could reduce the species' health, provisions of the rule prohibit all take except for:

1) Take from research or education when that person is conducting the research or education under a valid Missouri Department of Conservation Wildlife Collector's permit.
2) Take that is incidental to an otherwise lawful activity and occurs during restoration activities or other activities.

The current condition and additional information about the species can be found at https://www.fws.gov/species/big-creek-crayfish-faxonius-peruncus.

St. Francis River Crayfish (*Faxonius quadruncus*)

The St. Francis River crayfish was listed as threatened on May 30, 2023 (88 FR 25512). The primary threat to the St. Francis River crayfish is the woodland crayfish, a non-native invertebrate that was discovered within the St. Francis River tributary in 1984. Since its introduction, the woodland crayfish has spread throughout a large portion of the upper St. Francis River drainage and has caused the range of the St. Francis River crayfish to contract. Water quality degradation is the other main threat, particularly from lead mining contamination.

The St. Francis River crayfish has a localized distributions in the St. Francis River basin upstream of Wappapello dam in Iron, Madison, St. Francois, and Wayne counties in southeastern Missouri. The St. Francis River crayfish mainly inhabits the upper St. Francis River tributaries on the upper end of the Upper St. Francis River watershed. Because the species is a habitat generalist and not all reaches of streams within the watershed have been sampled, it is likely that the species occur at more locations in the watershed. Therefore, we consider the species ranges to include all streams within occupied 12-digit hydrologic units watersheds (referred to as subwatersheds).

At the time of listing, the Service designated critical habitat for the species; in total, approximately 1,043 river miles (1,679 river kilometers) in Iron, Madison, St. Francois, Washington, and Wayne counties in Missouri. The Service determined that the following physical or biological features are essential to the conservation of the St. Francis River crayfish:

- Stream flow velocity generally between 0 and 1.1 feet per second (ft/s) (0 and 0.35 meters per second (m/s)).
- Stream depths generally between 0.2 and 1.7 ft (0.06 and 0.52 m)
- Water temperatures between 34- and 84-degrees Fahrenheit (°F) (1.1 and 28.9 degrees Celsius (°C)).
- Adequately low stream embeddedness so that spaces under rocks and cavities in gravel remain available to the St. Francis River Crayfish.
- An available forage and prey base consisting of invertebrates, periphyton, and plant detritus.
- Connectivity among occupied stream reaches and connectivity among occupied stream reaches of the St. Francis River Crayfish (both within and among occupied sub watersheds).

- Ratios or densities of nonnative species low enough to allow for maintaining the populations of St. Francis River Crayfish.

This critical habitat designation is designed for the conservation of those areas containing the physical and biological features necessary to support the species' life-history traits. Each of the areas designated in this rule contain sufficient PBFs to provide for one or more of the life history functions of the St. Francis River crayfish.

The St. Francis River crayfish also has a rule under 4(d) of the Act that provides regulatory measures considered necessary and advisable to provide for the conservation of the species. To discourage the spread of the woodland crayfish (and other invasive species) and discouraging other actions that could reduce the species' health, provisions of the rule prohibit all take except for:

1) Take from research or education when that person is conducting the research or education under a valid Missouri Department of Conservation Wildlife Collector's permit.
2) Take that is incidental to an otherwise lawful activity and occurs during restoration activities or other activities.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/st-francis-river-crayfish-faxonius-quadruncus

Snails

Tumbling Creek Cavesnail (*Antrobia culveri*)

The Tumbling Creek cavesnail was listed as endangered via an emergency rule on December 27, 2001 (66 FR 66868) and formally listed as endangered on August 14, 2002 (67 FR 52879). The primary threats are related to the degradation of water quality in Tumbling Creek and include increased siltation from overgrazing, tree removal, and other activities. Nonpoint source pollution within the recharge area of Tumbling Creek cave is also a threat to the species. The deposition of silt into Tumbling Creek from aboveground activities within the recharge area of Tumbling Creek Cave has likely contributed to the decline of the species by eliminating the species' habitat, covering egg masses, or adversely impacting the snail in other ways.

The Tumbling Creek cavesnail is restricted to a single cave stream in Tumbling Creek Cave in Taney County, southwestern Missouri. The cave occurs in the southeastern portion of the recharge area and north of the Bull Shoals reservoir. The recharge area encompasses the surface northwest of the cave system recently estimated at 7,055.38 acres (2,855.21 hectares). Suitable habitat includes the underside of rocks, small stones, and cobble, and occasionally the upper surface of solid rock bottom within sections of Tumbling Creek that have moderate current.

The Service designated critical habitat for the Tumbling Creek cavesnail on Jul 28, 2011 (76 FR 37663). In total, approximately 25 acres (10.25 hectares) located in Taney County, Missouri, fall within the boundaries of the critical habitat designation. The Service determined that the following physical or biological features are essential to the conservation of the Tumbling Creek cavesnail:

- Geomorphically stable stream bottoms and banks (stable horizontal dimension and vertical profile) in order to maintain bottom features (riffles, runs, and pools) and transition zones between bottom features; to continue appropriate habitat to maintain essential riffles, runs, and pools; and to promote connectivity between Tumbling Creek and its tributaries and associated springs to maintain gene flow throughout the population.
- Instream flow regime with an average daily discharge between 0.07 and 150 cubic feet per second (cfs), inclusive of both surface runoff and groundwater sources (springs and seepages).
- Water quality with temperature 55–62 °F (12.78–16.67 °C), dissolved oxygen 4.5 milligrams or greater per liter, and turbidity of an average monthly reading of no more than 200 Nephelometric Turbidity Units (NTU; units used to measure sediment discharge) for a duration not to exceed 4 hours.
- Bottom substrates consisting of fine gravel with coarse gravel or cobble, or bedrock with sand and gravel, with low amounts of fine sand and sediments within the interstitial spaces of the substrates.
- Energy input from guano that originates mainly from gray bats that roost in the cave; guano is essential in the development of biofilm (the organic coating and bacterial layer that covers rocks in the cave stream) that cavesnail's use for food.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/tumbling-creek-cavesnail-antrobia-culveri

Insects

Insects are extremely sensitive to direct and indirect exposure to herbicide and pesticide application. Potential adverse effects of the action include crushing or harming eggs, larvae, or adults; toxic effects to insects due to direct or indirect exposure to the herbicides; physical habitat alteration; adverse effects to host plants or species, prey of insect larvae (e.g., aquatic macroinvertebrates including mayflies, isopods, caddisflies, midge larvae, and aquatic worms) and the prey of tenerals and adults (e.g., small flying insects, dipterans). To preclude directly taking (e.g., harming, killing) insect or adversely modifying critical habitat while conducting the management and restoration activities, the conservation measures identified above will be taken in the various project areas. Listed insects may occur near some project areas. Project design and implementation will require avoidance of preferred habitats; therefore, negative impacts are anticipated to be insignificant. Project activities may cause minor and temporary behavioral responses by some individuals while the activities are in progress. Such behavioral responses should be insignificant and will not rise to the level of take in a single event, nor cumulatively over the course of the project term.

Hine's Emerald Dragonfly (*Somatochlora hineana*)

The Hine's emerald dragonfly was listed as endangered on January 26, 1995 (60 FR 5267). Destruction or alteration of Hine's emerald dragonfly habitat is the primary threat to its survival as alteration of water regimes could potentially affect surface water flow patterns, cause seep

heads, and reduce existing or potential larval habitat. Contamination from landfills, and past/present applications of chemicals such as insecticides, herbicides and fertilizers from agriculture and recreation remains a significant threat.

In Missouri the species is found in Crawford, Dent, Iron, Phelps, Reynolds, Ripley, Washington, and Wayne Counties in Missouri. The species occupies marshes and sedge meadows fed by calcareous groundwater seepage and underlain by dolomite bedrock. In general, these areas are characterized by the presence of slowly flowing water and nearby or adjacent forest edges.

The Service designated critical habitat for the species on September 5, 2007 (72 FR 51101), and revised this designation on April 23, 2010 (75 FR 21393). Currently, approximately 26,531.8 acres (ac) (10,737 hectares (ha)) in 37 units are designated in Cook, DuPage, and Will Counties in Illinois; Alpena, Mackinac, and Presque Isle Counties in Michigan; Crawford, Dent, Iron, Phelps, Reynolds, Ripley, Washington, and Wayne Counties in Missouri; and Door and Ozaukee Counties in Wisconsin. The Service determined that the following physical or biological features are essential to the conservation of the Hine's emerald dragonfly:

For egg deposition and larval growth and development:

- Organic soils (histosols, or with organic surface horizon) overlying calcareous substrate (predominantly dolomite and limestone bedrock);
- Calcareous water from intermittent seeps and springs and associated shallow, small, slow flowing streamlet channels, rivulets, and/or sheet flow within fens;
- Emergent herbaceous and woody vegetation for emergence facilitation and refugia;
- Occupied burrows maintained by crayfish for refugia; and
- Prey base of aquatic macroinvertebrates, including mayflies, aquatic isopods, caddisflies, midge larvae, and aquatic worms.

For adult foraging; reproduction; dispersal; and refugia necessary for roosting, resting, refuge for adult females to escape from male harassment, and predator avoidance (especially during the vulnerable teneral stage):

- Natural plant communities near the breeding/larval habitat which may include fen, marsh, sedge meadow, dolomite prairie, and the fringe (up to 328 ft (100m)) of bordering shrubby and forested areas with open corridors for movement and dispersal; and
- Prey base of small flying insect species (e.g., dipterans).

This critical habitat designation is designed for the conservation of those areas containing the physical and biological features necessary to support the species' life-history traits. Each of the areas designated in this rule contain sufficient PBFs to provide for one or more of the life history functions of the Hine's emerald dragonfly.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/hines-emerald-somatochlora-hineana.

Flowering Plants

Decurrent False Aster (*Boltonia decurrens*)

The decurrent false aster (also known as claspingleaf doll's daisy) was listed as threatened on November 14, 1988 (53 FR 45858). The primary threats to the species are the destruction or modification of wet prairies and natural marshes. Prolonged flooding during the growing season may also be a limited flooding, as large flooding events along the Mississippi River become more frequent. The species is also susceptible to discing and herbicide use in low-lying marginal lands for crop weed control.

The decurrent false aster is found in eastern half of St. Charles County in areas subject to Mississippi River flooding including wet prairies, in marshes, and along the shores of some rivers and lakes including riverbanks, old fields, roadsides, mudflats, and lake shores. There currently consists of 18 known populations in Illinois and 2 known populations in Missouri. Not all these populations are considered self-sustaining. These hardy perennials are commonly found in North American habitats, particularly in regions with a preference for damp or wet soils. The decurrent false aster is often spotted along the margins of freshwater bodies, such as riverbanks, pond edges, and the borders of marshes. It favors habitats with consistently moist conditions, demonstrating a strong affinity for areas where the water table is relatively high. The soil composition in decurrent false aster habitats varies but typically includes loamy or sandy soils. These well-draining soils are essential for the plant's growth, allowing it to receive adequate moisture without succumbing to waterlogged conditions. The adaptability to different soil types contributes to the widespread distribution of this species in suitable regions. In terms of sunlight, decurrent false asters are predominantly sun-loving plant; they flourish in areas with ample sunlight, showcasing their full potential when exposed to direct sunlight for a significant portion of the day. This preference for sunlight is reflected in their growth habit, with the plants often reaching heights that allow them to absorb sunlight efficiently.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/claspingleaf-dolls-daisy-boltonia-decurrens

Eastern Prairie-Fringed Orchid (*Platanthera leucophaea*)

The eastern prairie-fringed orchid was listed as threatened on September 28, 1989 (54 FR 39857). The main threats to the species are the lack of land management of high-quality wetland habitats on which this species depends, including increased development, spread of exotic species, and fire suppression.

The eastern prairie fringed orchid is a large and showy North American orchid species adapted to fire and drought. It occurs in Illinois, Indiana, Iowa, Maine, Michigan, Missouri, Ohio, Virginia, and Wisconsin. In Missouri, the eastern prairie-fringed orchid is found in Grundy County in mesic areas of upland prairies, in bottomland prairies, and in prairie fens. This orchid species prefers habitats characterized by tallgrass prairies and wet meadows, showcasing a particular affinity for regions with well-drained soils. It often thrives in areas with a history of natural disturbances, such as occasional fires or periodic flooding, which contribute to the maintenance of its preferred open, sunny conditions. The eastern prairie-fringed orchid is particularly associated with native grasses like big bluestem and Indian grass, as well as other prairie

wildflowers. Its habitat is often marked by a diverse array of plant species. The eastern prairie-fringed orchid is well adapted to abundant sunlight and typically thrives in locations with open canopies, where sunlight can penetrate to the ground, supporting the orchid's photosynthetic needs. This sunlight requirement is crucial for its growth, development, and flowering. The soil composition in these habitats is typically well-drained and may consist of loamy or sandy soils. Adequate drainage is essential for the orchid's survival, preventing waterlogging that could be detrimental to its delicate roots.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/eastern-prairie-fringed-orchid-platanthera-leucophaea

Geocarpon (Geocarpon minimum)

Geocarpon was listed as threatened on July 16, 1987 (52 FR 22930). As an early successional species, competition from successional grasses and shrubs can invade, trap soil and moisture, and allow oak-juniper woodland invasion due to a lack of natural disturbance regime.

The species is found in scattered locations within Dade, Polk, Greene, Cedar, Lawrence, Henry, and St. Clair counties on channel sandstone exposure. Personnel from the Missouri Department of Conservation have reported 25 documented sites in Missouri. Geocarpon habitat is often characterized by its proximity to wetlands and damp, sandy soils. These plants prefer areas with a high-water table, ensuring a consistently moist environment that is essential for their growth and reproduction. Geocarpon are most commonly found along the edges of freshwater marshes, riverbanks, and other waterlogged landscapes. The soil composition in Geocarpon habitats is usually sandy or loamy, providing a well-draining substrate that prevents waterlogging while retaining enough moisture for the plants to flourish. This preference for specific soil types is a key factor in the distribution of geocarpon.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/geocarpon-geocarpon-minimum

Mead’s Milkweed (*Asclepias meadii*)

Mead’s milkweed was listed as threatened species on September 1, 1988 (53 FR 33982-33996). Habitat loss and modification represent the greatest threat. This species’ requirement of tallgrass prairie and glade/barren habitat makes it vulnerable to disturbances that alter habitat conditions or successional stages. This plant is essentially restricted to sites that have never been plowed and only lightly grazed, and hay meadows that are cropped annually for hay

Within Missouri, Mead’s milkweed is found in prairie remnants and railroad rights-of-way, primarily in the Osage Plains region, and on igneous glades in the St. Francois Mountains region of the Ozarks. Mead's milkweed is typically found in tallgrass prairies, open meadows, and savannas, particularly in regions with well-drained soils. It displays a preference for habitats that receive ample sunlight, showcasing its adaptability to open canopies and sunny landscapes. This plant is often associated with native grasses and wildflowers, creating a diverse and vibrant ecosystem. The soil composition in Mead's milkweed habitats typically consists of well-drained, sandy, or loamy soils. This characteristic allows the plant's roots to access moisture while avoiding waterlogged conditions, contributing to its resilience in various environmental

conditions. One notable feature of Mead's milkweed habitats is their periodic exposure to natural disturbances such as fire. This plant has evolved to thrive in landscapes where occasional fires are a natural part of the ecosystem. The presence of fire helps control competing vegetation, promoting the growth and establishment of Mead's milkweed, which often emerges from underground rhizomes after a fire event.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/meads-milkweed-asclepias-meadii

Missouri Bladderpod (*Physaria filiformis)*

The Missouri bladderpod, also known as the limestone glade bladderpod, was listed as threatened on January 8, 1987 (52 FR 679). Threats to Missouri bladderpod include habitat loss to the natural glade habitat of the Missouri bladderpod is threatened with residential development, overgrazing and competition from encroaching woody and non-native grasses. Lack of fire on the landscape is also negatively impacting the species.

The Missouri bladderpod is found in Dade, Greene, Christian, and Lawrence counties and can be locally abundant in rocky grazed pastures and along roadsides in areas with limestone outcrops and glades. Missouri bladderpod is typically found in open, rocky glades, and prairies, where it thrives in well-drained, gravelly or rocky soils. These habitats often feature sparse vegetation, with the Missouri bladderpod adapted to the challenges of these environments, where competition for resources can be intense. One of the defining characteristics of the Missouri bladderpod's habitat is the prevalence of sunny conditions. The plant exhibits a preference for open canopies, basking in full sunlight, which is crucial for its growth and reproductive success. This sunlight requirement is reflected in the plant's stature, often growing low to the ground to maximize exposure to sunlight. Given the specific geological features of its habitat, the Missouri bladderpod has adapted to tolerate nutrient-poor soils.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/limestoneglade-bladderpod-physaria-filiformis

Pondberry (Lindera melissifolia)

The pondberry was listed as threatened on July 31, 1986 (51 FR 27495). The species primary threated include habitat modification through wetland drainage, timber-harvesting, road construction, and conversion of habitat to agricultural.

The pondberry is currently found in Ripley County in swampy, sandy depressions of lowland forests with poorly drained sandy soils in heavily shaded areas. Pondberry habitats in Missouri typically include lowland areas, swamps, and the edges of ponds or slow-moving streams. The plant thrives in soils that are consistently moist and occasionally experience seasonal flooding. The proximity to water sources ensures a suitable environment for pondberry, allowing it to flourish in areas with a high-water table. The soil composition in pondberry habitats is often characterized by loamy or sandy soils with good drainage. While pondberry can tolerate periodic inundation, well-drained soils prevent waterlogging, supporting the health and longevity of the shrub. These habitats often feature a mix of other wetland vegetation, including sedges, rushes,

and various aquatic plants. Pondberry is well adapted to coexist with these species, creating a complex and interconnected ecosystem that benefits both the plant and the diverse array of organisms that inhabit wetland environments. The shrub's preference for partially shaded areas within its wetland habitat is reflected in its ability to thrive under the canopy of taller vegetation, where it can receive filtered sunlight.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/pondberry-lindera-melissifolia.

Virginia Sneezeweed (*Helenium virginicum)*

The Virginia sneezeweed was listed as threatened on November 3, 1998 (63 FR 59239). Primary threats to the species include changes to hydrology (e.g., drought or flooding as a result of changing climate, ditching or pond deepening on private lands, or groundwater withdrawal associated with development), ATV or other vehicle use, and competition and encroachment by other plant species including invasive species such as knapweed.

Virginia sneezeweed habitats in Missouri typically include open, sunny areas with a high-water table or that periodically flood, creating consistently moist to wet soils within the Ozark plateau. This plant is well adapted and resilient to seasonal changes in water levels. The soil composition in Virginia sneezeweed habitats is often loamy or sandy, allowing for good drainage to prevent waterlogging while retaining enough moisture to support the plant's needs. Virginia Sneezeweed contributes to overall biodiversity of these ecosystems and often coexists with a diverse array of moisture-loving wetland vegetation, including grasses, sedges, and other wildflowers. Preferred habitat includes stream edges and shoreline, plains around sinkholes and ponds, wet meadows, and other low-lying areas where water collects.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/virginia-sneezeweed-helenium-virginicum

Western Prairie-Fringed Orchid (*Platanthera praeclara*)

The western prairie-fringed orchid was listed as threatened on September 28, 1989 (54 FR 39857). Main threats to the species include the conversion of remnant prairie to cropland, incompatible use of herbicides and pesticides, siltation, changes in hydrology, fire suppression, encroaching woody vegetation, and the spread of non-native, invasive plant species. Heavy grazing and early haying may also have detrimental impacts on population.

In Missouri, the western prairie-fringed orchid is known only in Atchison, Holt and Harrison counties in mesic areas of upland prairies, and in bottomland prairies. Western prairie-fringed orchids are typically associated with tallgrass prairies and meadows, where they thrive in open, sunny environments. These habitats are characterized by a rich diversity of native grasses, wildflowers, and other herbaceous plants. The soil composition in western prairie-fringed orchid habitats is often well-drained and can include loamy or sandy soils. This characteristic allows the orchid's specialized root system to access moisture while preventing waterlogging, ensuring optimal conditions for its growth and development. One of the defining features of these habitats is the periodic occurrence of natural disturbances, such as fire. Western prairie-fringed orchids have evolved to thrive in landscapes where occasional fires play a role in shaping the ecosystem.

The presence of fire helps control competing vegetation, creating the open conditions that are conducive to the orchid's growth. Given its specific ecological niche, the western prairie-fringed orchid is highly dependent on openness to sunlight.

The most up to date information on the current condition and threats to the species can be found at https://www.fws.gov/species/western-prairie-fringed-orchid-platanthera-praeclara

PATHWAYS FOR EVALUATING EFFECTS

To develop pathways for evaluating effects to listed species and critical habitat covered by the Missouri Dkey, we considered the most relevant information Missouri ESFO biologists use when evaluating effects of individual projects. In general, the most relevant information includes:

1) Proximity of the project's action area to known occurrences of listed species or areas designated as critical habitat;
2) Likelihood of unknown occurrences of listed species within a project's action area;
3) Severity of potential impacts should a listed species be present; and
4) Conservation measures that will be implemented[1].

Each pathway depends on a species' life history and habitat and thus, varies among species. Therefore, to develop questions for the key, we grouped species into categories with shared pathways for assessing effects. Similarly, the pathways for evaluating effects to critical habitat depends on the physical or biological features considered essential to the species' conservation. Thus, most of the questions pertaining to critical habitat are species-specific. The categories, category descriptions, and the species included each category are provided in **Table 4**, and the effects pathway for each category is described below.

Many of the effects pathways include questions regarding the proximity of a project to sensitive resources, such as bat hibernaculum. To avoid disturbance, trespassing, or vandalism, the precise localities of these resources are often not released. Therefore, the Dkey references embedded Geographic Information Systems (GIS) data to automatically answer questions about sensitive resources located within or near the action area delineated in IPaC for a project. Questions automatically answered, either by GIS data embedded in the key or based on the response to previous questions, are referred to as "Hidden semantic" questions.

To account for unknown occurrences of listed species, many pathways include questions about the presence of suitable habitat within or near the project area, whether surveys were completed, and/or if the species was documented.

As noted under **COVERED SPECIES AND CRITICAL HABITAT**, the Missouri Dkey does not currently cover proposed species, proposed critical habitat, or NEPs (non-essential experimental populations). Therefore, we did not develop a pathway for evaluating effects to these species.

[1] The Service has previously found that incorporation of certain conservation measures, while voluntarily adopted by action agencies, has reduced effects to the extent that the actions are not likely to adversely affect species and critical habitat.

Activities involving purposeful take, such as capture of individuals, are not eligible to use the key and thus, are not discussed further.

Table 4. Categories used for evaluating effects to species and critical habitat covered by the Missouri Dkey and the species included in each category.

Category	Description	Species
Bats	All covered bat species	gray bat, Indiana bat, Ozark big-eared bat
Stream-Dwelling	Aquatic species occurring primarily in surface streams:	Big Creek crayfish, eastern hellbender, Neosho Madtom, Niangua Darter, Topeka Shiner, Curtis Pearlymussel, Fat Pocketbook, Higgins Eye Pearlymussel, Neosho Mucket, Ozark hellbender, Pink Mucket, Rabbitsfoot, Scaleshell, Sheepnose, Snuffbox, Spectaclecase, St. Francis River crayfish Western Fanshell, Winged Mapleleaf
Cave Obligates	Aquatic species occurring primarily within cave systems	Benton County cave crayfish, Grotto Sculpin, Ozark cavefish, Tumbling Creek Cavesnail
Flowering Plants	All covered plant species	decurrent false aster, eastern prairie-fringed orchid, Geocarpon, Mead's milkweed, Missouri bladderpod, pondberry, Virginia sneezeweed, western prairie-fringed orchid
Species-Specific	Species with unique effects pathway	Pallid Sturgeon, Hine's emerald dragonfly,
Critical Habitat	All covered critical habitat	Big Creek crayfish, Grotto Sculpin, Hine's emerald dragonfly, Indiana bat, Neosho Mucket, Niangua Darter, Rabbitsfoot, St. Francis River crayfish, Tumbling Creek Cavesnail, Western Fanshell

Bats

Bats covered by the Missouri Dkey include the gray bat, Indiana bat, and Ozark big-eared bat. Bat species can be adversely affected if physical characteristics of hibernacula are impacted, if hibernating individuals are disturbed, if individuals roosting under bridges or in culverts or tunnels are disturbed, or if impacts to aquatic resources reduce the species' prey base. However, differences in the species' life history influence how individuals may be affected in other ways. Therefore, other impacts are evaluated separately for each species.

Projects involving the installation or operation of one or more wind turbines are not eligible to use the key (see **GENERAL EXCLUSIONS**). Therefore, impacts from these activities are not discussed below.

Projects with No Effects

The key asks the user if the action will occur entirely within an already-developed area. If the user answers "Yes", the key bypasses additional questions informing bat outcomes and provides a NE outcome for the gray bat and Indiana bat.

A NE outcome is also provided for the gray bat or Indiana bat when results of presence/absence surveys indicate absence of the species. Surveys must follow USFWS Range-wide Listed Bat Survey guidelines, site study plans must be submitted to the Missouri ESFO and approved prior to conducting surveys, results must be verified by the Missouri ESFO, and all documentation must be uploaded to IPaC.

Extensive bat surveys have been conducted within portions of the Kansas City and St. Louis metropolitan areas, and the lack of gray bat and Indiana bat detections within these areas indicate the likelihood of the species' presence is very low. Therefore, the Missouri Dkey uses embedded GIS data to determine if actions are located within these areas. Actions located entirely within these areas bypass additional questions informing bat outcomes and also automatically reach NE outcomes for the gray bat and Indiana bat.

The Ozark big-eared bat, although once historically present in southwest Missouri, is now considered extirpated from the state by the Missouri Ecological Services Field Office. The Service is actively updating the species' range, which informs the IPaC system. Given there have been no confirmed observations of the species in Missouri since 1971 and all areas within the state fall outside the species' current known range, a NE outcome is provided for the species for all proposed projects in the species list area.

Effects to Hibernacula and Hibernating Bats

Both the gray bat and Indiana bat can be adversely affected if the integrity of their hibernacula is impacted or if hibernating individuals are disturbed.

To ensure actions with potential to result in these impacts do not reach NLAA outcomes, the Missouri Dkey uses embedded GIS data to determine if projects are located within 1 mile of a hibernaculum considered a priority or biologically significant or within 3 miles of the Sodalis Nature Preserve hibernaculum (referred to as "hibernacula buffers"). A 0.25-mile hibernacula buffer is delineated around all other hibernacula, including historical hibernacula not currently occupied but that are potentially important for species recovery. Projects located within a hibernacula buffer automatically reach a MA outcome for the bat species documented within the hibernaculum. Any activities outside of these hibernacula buffers and covered by the key[2] will have no effect on hibernating individuals and the hibernaculum's integrity, including structural characteristics of the hibernaculum, the hibernaculum's microclimate, and the surrounding forested habitat used for fall swarming and spring staging.

To account for hibernacula that may not be documented, the user is asked if the action will affect a cave or mine, their entrances, other openings (e.g. sinkholes), hydrology, or environment (physical or other alteration) or include activities such as boring, blasting, or drilling into karst. If the user answers "Yes", the user may be outside the scope of this determination key.

[2] Actions involving drilling or blasting are not eligible to use the Missouri Dkey.

Effects to Individuals Using Bridges, Culverts, or Tunnels for Roosting

Both gray bats and Indiana bats may roost during the active season under bridges or in culverts or tunnels. Therefore, the Dkey also includes the question: "*Will the project impact culverts or tunnels equal to or greater than 4.0 feet (1.3 meters) in height AND greater than 23 feet (7 meters) in length?*".

If the user answers "Yes" to the question, they are asked if they have or plan to have a qualified surveyor inspect the bridge or culvert for signs of roosting bats (guano, urine staining, bat vocalizations, and/or bats) within 2 years of the project start date[3]. If the user answers "No", the user reaches a MA outcome for the gray bat and Indiana bat. If the user answers "Yes", they are asked if there were signs of bats. If there were signs of bats, the user reaches a MA outcome for the gray bat and Indiana bat. If no signs of bats were observed, the user proceeds to the next question in the key. If the inspection has not yet been completed, the user is asked to continue with the Dkey questions once the inspection has been completed.

Impacts to Aquatic Resources

Gray bats and Indiana bats may be adversely affected if impacts to streams or other wetlands reduce the abundance of aquatic insects serving as prey. However, most projects impacting waters of the United States require a permit by the U.S. Army Corps of Engineers under section 404 of the Clean Water Act. Because these authorizations typically require implementation of measures to minimize impacts to wetlands, we expect the effects on aquatic resources will be temporary and minimal (insignificant) due to the scale of qualifying projects, the temporary nature of the activity, and implementation of measures to minimize impacts. Therefore, questions regarding impacts to aquatic resources are not included in the effects pathway for bats.

Impacts from Minor Noise, Vibration, and Night Lighting

Projects using the Missouri Dkey may produce minor noise and vibration either temporarily (such as from operation of construction equipment) or permanently (such as from vehicular traffic). Because projects impacting Indiana bat suitable roost trees during the active season or impacting known or potential gray bat summer roosting habitat during the active season reach a MA outcome for the relevant species, we expect the two species will be minimally exposed to temporary noise and vibration and will not respond by flushing from their roosts. Because there are several examples of gray bats and Indiana bats continuing to roost in areas where they are habitually exposed to noise and vibration, we expect the species also will not be adversely affected by permanent minor noise and vibration. Thus, we expect any effects from these stressors to be insignificant and as such, did not include relevant questions in the effects pathway.

Projects using the Missouri Dkey may also result in night lighting that is either temporary during the construction phase and/or permanent during the operation phase (such as facility lighting). Gray bats and Indiana bats could be exposed to this stressor at night while foraging and commuting. However, night lighting is localized and is typically most severe in areas where the

[3] Accompanying the question is a note stating that surveys should be completed during the same season in which impacts are expected to occur.

species are absent because forested habitat is already absent or has been removed during site preparation. For these reasons, we expect gray bats and Indiana bats to be minimally exposed to night lighting and to adjust their behavior to avoid these areas. Thus, we expect any effects from the stressor will also be insignificant and did not include relevant questions in the effects pathway.

Other Effects to the Gray Bat

The other ways in which gray bats may be adversely affected is if: 1) summer roosting habitat is impacted, 2) individuals roosting during the active season are disturbed, 3) their prey base is substantially reduced, or 4) their movement corridors are impacted.

Impacts to Summer Roosting Habitat and Individuals

To ensure actions that could affect the integrity of summer roosting habitat or disturb roosting individuals do not reach NLAA outcomes, the Missouri Dkey uses embedded GIS data to determine if projects are located near a known summer roost (referred to as "gray bat summer roost buffers"). Buffer sizes range from 0.25 miles to 1 mile and depend on the number of gray bats documented in each roost to account for the greater foraging area required to support larger summer colonies (*see Impacts to Prey Base or Movement Corridors*). Projects located within a gray bat summer roost buffer automatically reach a MA outcome for the species.

To account for summer roosts that may not be documented, the user is asked if the action will affect a cave or mine, their entrances, other openings (e.g. sinkholes), hydrology, or environment (physical or other alteration) or include activities such as boring, blasting, or drilling into karst. If the user answers "Yes", the user reaches a MA outcome for the gray bat.

Impacts to Prey Base or Movement Corridors

To ensure projects with potential to adversely affect the gray bat's prey base or movement corridors do not reach NLAA outcomes, the following questions result in MA outcomes for the gray bat when the user answers "Yes" (unless results of presence/absence surveys indicate the species is absent; see **Projects with No Effects**):

- Will more than 100 acres of forested habitat be removed or impacted?
- Will the action result in greater than 0.5-mi (2,640 linear feet) of tree removal along the banks(s) of a perennial pond, lake, river, and/or stream (independent of the total area or acreage of the project)?

Because we assume gray bats occur in higher densities near their summer roosts, the Missouri Dkey also uses embedded GIS data to determine if projects are located within a gray bat summer roost buffer. As noted above, the size of each gray bat summer roost buffer depends on the number of gray bats documented in the roost to account for the greater foraging area required to support larger summer colonies. A 1-mile buffer is delineated around summer roosts containing more than 5,000 individuals, which represent roosts considered Biologically Significant and classified in the species' most recent 5-year review as Category 1 (5,000–25,000 individuals) or Category 2 (over 25,000 individuals) (USFWS 2025). A 0.25-mile is delineated around all other gray bat summer roosts. Projects located within a gray bat summer roost buffer automatically

reach a MA outcome to ensure activities that could adversely affect the gray bat's prey base or movement corridors do not reach NLAA outcomes.

Other Effects to the Indiana Bat

The other ways in which Indiana bats may be adversely affected is if: 1) individuals roosting during the active season are disturbed, 2) summer roosting and foraging habitat is substantially reduced, and 3) a maternity roost tree is impacted.

Active Season Disturbance

To ensure actions with potential to disturb individuals roosting during the active season do not reach NLAA outcomes, the user is asked a series of questions about the presence of suitable roost trees, whether suitable roost trees will be impacted (e.g., tree removal, tree cutting or trimming, prescribed fire, or pesticide/herbicide application), and the time of year activities will be conducted. If activities impacting suitable roost trees will be conducted during the summer occupancy period (defined in Missouri as April 1 through October 15), the user reaches a MA outcome for the Indiana bat (unless results of presence/absence surveys indicate the species is absent or emergence surveys indicate a suitable roost tree is not occupied[4]).

Impacts to Summer Roosting and Foraging Habitat

Even when activities impacting suitable roost trees are conducted during the inactive season, Indiana bats may be adversely affected if roosting and foraging habitat and foraging habitat is substantially reduced. Indiana bats that return to their summer roosting area and find it removed must find new roost trees (Kurta and Rice 2002) and potentially new foraging areas. This extra energy expenditure could reduce an individual's ability to carry out necessary functions after migration (such as thermoregulation during cool spring weather or gestation) or cope with other stressors (such as unseasonably cold temperatures or WNS).

To ensure actions with potential to substantially reduce Indiana bat roosting and foraging habitat do not reach NLAA outcomes, we identified tree removal thresholds that when exceeded, result in a MA outcome for the Indiana bat (unless results of presence/absence surveys indicate the species is absent; see **Projects with No Effects**). Because there is a higher probability of impacting roosting or foraging habitat in areas with little forest or highly fragmented forests, the thresholds differ based on the amounts of forest cover within the area surrounding the project (**Table 5**). We expect that actions not exceeding the relevant tree removal thresholds will not meaningfully reduce roosting and foraging habitat.

To determine if the relevant tree removal threshold will be exceeded, the Dkey user is asked the acreage of trees that will be removed, and the response is compared with embedded GIS data used by the key.

[4] Presence/absence surveys must follow the Service's Range-Wide Survey Guidelines for Listed Bats (USFWS 2024), survey plans must be approved by the Missouri ESFO prior to surveys being conducted, and results must be submitted to the Missouri ESFO. Emergence surveys must also follow the guidelines, and suitable roost trees must be felled within 24 hours of the survey.

Table 5. Tree removal thresholds for the Indiana bat given the percent of forest cover within 5x5 km grid cell(s) intersected by the project.

Surrounding Percent of Forest Cover	Tree Removal Thresholds for the Indiana Bat (acres)
0 - 9.9%	≤ 5
10.0 - 19.9%	≤ 10
20.0 - 29.9%	≤ 20
30.0 – 49.9%	≤ 30
50.0 - 100%	≤ 50

Impacts to Maternity Colonies

Indiana bats may also be adversely affected if maternity roost trees are impacted, even if the impacts occur when bats are not present. Similar to the removal of foraging habitat and other roosting habitat, the removal of a maternity roost tree can reduce an individual's fitness due to the energy required to locate one or more new suitable roost trees. Additionally, the removal of maternity roost trees can lead to the fragmentation or break up of the maternity colony (Sparks 2003, Silvis et al. 2014).

To ensure actions with potential to impact Indiana bat maternity colonies do not reach NLAA outcomes, the Missouri Dkey uses embedded GIS data to determine if projects are located within a primary or secondary maternity colony buffer.

The primary maternity colony buffer is a 1-mile radius delineated around all documented acoustic, capture and roost records[5]. This distance represents the core area in which a colony is likely to forage, utilize different roost trees, and engage in intra-colony interactions (Kurta et al. 2002; USFWS 2024). To ensure projects with potential to substantially impact a colony's foraging habitat, roosting habitat, or colony dynamics do not reach a NLAA outcome through the Dkey, projects located within these buffers automatically reach a MA outcome, regardless of the timing of tree removal or implementation of other conservation measures.

The secondary maternity colony buffer is a 2.5-mile radius delineated around all Indiana bat acoustic detections and mist-netting captures during the summer occupancy period, as well as documented roost trees. This distance represents the area the Service assumes is utilized by an Indiana bat summer maternity colony for foraging and roosting during the summer occupancy period (USFWS 2024). Projects located within these buffers may reach a NLAA outcome through the Dkey, provided: 1) the project is located outside the primary maternity roost buffer and 2) other NLAA criteria are met (such as conducting tree removal during the inactive season and not exceeding the tree removal thresholds given the percent of surrounding forest cover). Because the presence of Indiana bats has already been established within these 2.5-mile buffers, absence cannot be assumed within the buffers, even if presence/absence surveys are conducted.

[5] Adult males and non-reproductive females have commonly been found summering with maternity colonies (USFWS 2024). Therefore, unless radiotracking results indicate probable absence of a maternity colony, a maternity colony is assumed present wherever Indiana bats are detected.

It is difficult to account for maternity roost trees that may not be documented. However, we expect the likelihood of impacting an undocumented roost tree will be low for projects located outside of Indiana maternity roost buffers and not exceeding the tree removal thresholds identified in **Table 5.** Therefore, projects not exceeding the tree removal thresholds reach a NLAA outcome for the Indiana bat.

Stream-Dwelling Species

Stream-dwelling species covered by the Missouri Dkey represent the aquatic species occurring primarily in surface streams within the Missouri, which includes the Big Creek crayfish, Curtis Pearlymussel, Eastern Hellbender, Fat Pocketbook, Higgins Eye Pearlymussel, Neosho madtom, Neosho Mucket, Niangua darter, Ozark Hellbender, Pink Mucket, Rabbitsfoot, Scaleshell, Sheepnose, Snuffbox, Spectaclecase, St. Francis River Crayfish, Topeka Shiner, Western Fanshell, and Winged Mapleleaf.

The stream-dwelling species have SLAs encompassing watersheds occupied by the species because large projects in upland areas of the watersheds have potential to affect stream conditions in occupied stream reaches. However, most of the actions that could result in far-reaching downstream effects (such as aerial or other broad application of chemicals, stream diversion, and construction of dams) are not eligible to use the Missouri Dkey (see **GENERAL EXCLUSIONS**). Therefore, we created GIS layers for each stream-dwelling species that more specifically represent areas occupied by the species. We refer to the layers as "stream layers", and the layers include the stream channel of occupied streams as well as 200 feet on each side of the channel.

The main ways that stream-dwelling species may be adversely affected is by disturbance in occupied areas, by changes to the physical structure of habitat, and by impacts to stream conditions, such as increases in turbidity or sedimentation, increased stream temperature due to loss of canopy cover, or other water quality degradation (such as increased levels of nitrogen and phosphorus, heavy metals, fecal coliform, or other pollutants). Disturbance of individuals can result in changes in foraging, sheltering, and breeding behavior and in some instances, injury or mortality. Changes to the physical structure of habitat may reduce the fitness of individuals and reproductive success due if the prey base is reduced, habitat for breeding is affected, or if predation risk is increased due to reduced availability of refugia. Impacts to stream conditions may also affect the fitness of individuals and reproductive success. For example, high levels of turbidity can foul fish and crayfish gills, sediment deposition can reduce the prey base and cover spaces under rocks and in the stream substrate used for refugia and foraging, increased temperature can reduce the ability of individuals to occupy the affected area, and degraded water quality can affect the health of individuals in a variety of ways.

To ensure actions with potential to adversely affect these species do not reach NE or NLAA outcomes, the user is asked if the project will occur within the stream channel and if the project will affect stream conditions (such as turbidity, sedimentation, flow regime, or other water chemistry or quality parameters). If the user answers "Yes" to either of the questions, they reach a MA outcome for species with stream layers intersected by the proposed project area. The pathway for evaluating effects to stream-dwelling species is depicted in **Figure 1**.

Because the stream layers can extend at least 5 miles upstream of known locations, projects not overlapping with the stream layers are unlikely to result in adverse effects to the species. Projects occurring outside the stream channel and not affecting stream conditions are also not likely to adversely affect the species.

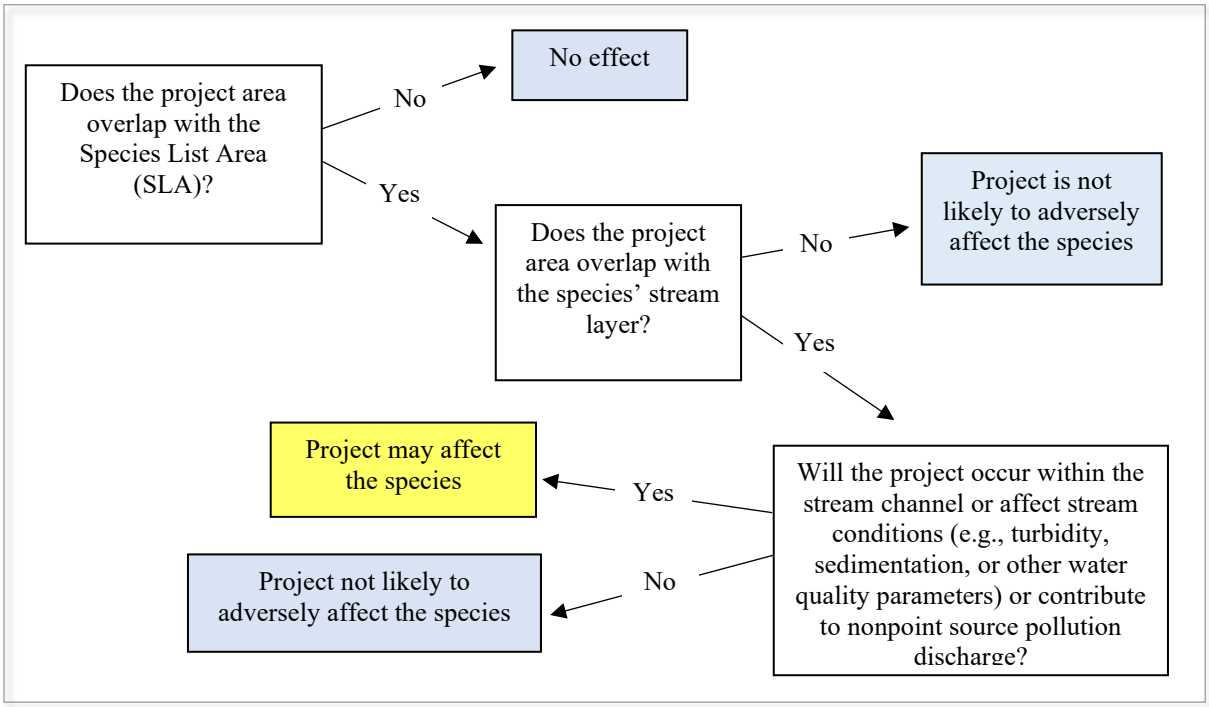

Figure 1. Pathway for evaluating effects to stream-dwelling species.

Cave Obligates

Cave obligate species covered by the Missouri Dkey represent the aquatic species occurring primarily within cave systems, which includes the Benton County cave crayfish, grotto sculpin, Ozark cavefish, and Tumbling Creek cavesnail.

The main ways that cave obligate species may be adversely affected are the same as those for stream-dwelling species: by disturbance in occupied areas, by changes to the physical structure of habitat, and by impacts to stream conditions, such as increases in turbidity or sedimentation, increased stream temperature due to loss of canopy cover, or other water quality degradation (such as increased levels of nitrogen and phosphorus, heavy metals, fecal coliform, or other pollutants). Because above-ground projects affect water conditions in occupied underground streams (and surface streams occupied by the grotto sculpin), cave obligate species covered by the key have SLAs encompassing the recharge areas[6] of occupied caves.

To avoid direct effects to individuals from disturbance, projects that may affect a cave or mine, their entrances, other openings (e.g., sinkholes), hydrology, or environment (physical or other

[6] The geographical area in which surface water can infiltrate the ground and replenish the underlying groundwater.

alteration) including activities that require boring, blasting, or drilling into karst geology are not eligible to use the Missouri Dkey (see **GENERAL EXCLUSIONS**).

To ensure other actions with potential to adversely affect cave obligate species do not reach NE or NLAA outcomes, the user is provided a list of conservation measures that ensures impacts to the species' habitat and stream conditions are avoided, and the user is also asked if the project will implement all relevant conservation measures. If the user answers "No", they reach a MA outcome for the species for which all relevant measures cannot be implemented. The pathway for evaluating effects to stream-dwelling species is depicted in **Figure 2**, and the conservation measures for each species are listed below.

For projects intersecting the grotto sculpin SLA, the user is also asked if the project will involve the installation of vertical drains. Vertical drains are wells, pipes, pits, or bores in the ground into which drainage water can be discharged. Because vertical drains with inadequate filter systems can input sediment and other contaminants into the groundwater, users that answer "Yes" to the question reach a MA outcome for the grotto sculpin so that the Missouri ESFO can provide a more in-depth review of the project.

Conservation Measures

- Minimize sedimentation and introduction of chemical or nutrient-laden runoff into streams, sinkholes, caves, and abandoned wells by implementing and monitoring erosion and sediment controls for the duration of the project.
- Take care to contain all construction debris to prevent its accidental introduction into caves, sinkholes, or springs as a result of clean-up activities, run-off, flooding, wind, or other natural forces.
- Dispose of chemicals, toxic waste, garbage, and wash water from trucks in areas designated for such wastes. These sites should be away from caves and sinkholes.
- If temporary roadways must be built, ensure that roadways are of low gradient with sufficient roadbed and storm water runoff drains and outlets.
- Revegetate disturbed areas as soon as possible to minimize erosion.
- Ensure that chemical spills are quickly reported; proper steps are taken to mitigate damages; and ensure proper cleanup occurs. Have a spill plan in place before a spill occurs. Make sure materials needed to contain a spill are readily and quickly accessible.
- During times of pesticide application, avoid spraying at least 50 feet from any groundwater input (i.e., sinkholes, vertical drainpipes, spring resurgences, and streams).
- Avoid pesticide and herbicide application prior to precipitation events to minimize direct runoff into nearby groundwater inputs.

Additional Conservation Measures for the Grotto Sculpin

- Establish and maintain forested buffers at least 100 feet wide along streams and at least 50 feet wide around cave and sinkhole entrances as well as vertical drainpipes.

- Do not seal or alter cave entrances or sinkholes as sculpin depend on the outside environment for food and nutrients.
- Avoid and minimize disturbances during nesting and spawning activities from November to March.

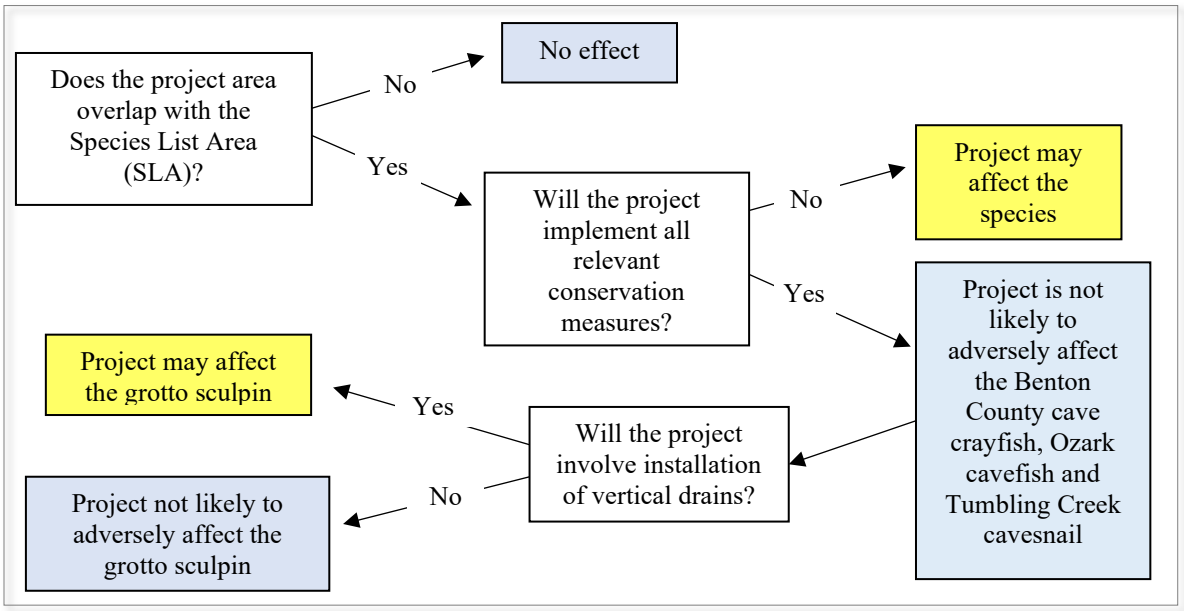

Figure 2. Pathway for evaluating effects to cave obligate species.

Pallid Sturgeon

The pallid sturgeon may be adversely affected in the same ways as stream-dwelling species: by disturbance in occupied areas, changes to the physical structure of habitat, and by impacts to stream conditions. However, we used additional pathway to evaluate effects to the pallid sturgeon because a step-by-step process for evaluating effects has already been developed for the species.

In coordination with the Service, the U.S. Army Corps of Engineers (Corps) developed Standard Local Operating Procedures for Endangered Species (SLOPES) that include criteria for reaching NE or NLAA determinations for the pallid sturgeon and other species. Although the procedures pertain to actions requiring a Nationwide Permit (NWP) under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act, any project eligible to use the Missouri Dkey and potentially adversely affecting the pallid sturgeon requires an NWP. Therefore, we incorporated the SLOPES procedures to cover more circumstances for which NE or NLAA outcomes are appropriate.

To ensure actions with potential to result in these impacts do not reach NE or NLAA outcomes, the following circumstances result in MA outcomes:

- Projects that are a dam, hydropower plant, or other activity that will result in riverine or secondary channel pathway obstruction.
- Projects that involve bucket or hydraulic dredging.
- Project involving modification to existing or construction of new diversion structure or turbines.
- Projects involving the addition or modification to water intake structures when the following water intake minimization measures cannot be implemented:
    - Water intakes will be screened with a ¼-inch (6.35 mm) or smaller mesh
    - Water intakes will have an intake velocity of less than ½ ft/sec (15.24 cm/sec), and
    - Water intakes will be placed at water depths greater than 15 feet (4.575 m).
- The project involves instream sand and/or gravel mining and cannot implement all of the following conservation measures:
    - A dredging plan shall be submitted to the Corps and the U.S. Fish and Wildlife Service's Missouri Field Office, including dredging locations (GPS coordinates), proposed dates, type of material to be dredged, and the amount of material to be dredged in cubic yards. The plan shall be submitted and approved two weeks prior to beginning the dredging operation.
    - The permittee shall be prohibited from dredging on gravel bars (particles > 0.3 in (8 mm) diameter) during the pallid sturgeon spawning season (April 1 through June 30 of each year).
    - The permittee would be prohibited from dredging within a secondary channel, or within 500 feet of the entrance or exit of a secondary channel.
- The project will involve activities that will disturb more than 100 feet of shoreline or increase sediment loads for more than 48 hours.
- The project will involve streambank stabilization or boat ramp activities (i.e., construction or maintenance) that cannot be completed outside the pallid sturgeon spawning season (April – June 30) and conducted from the top of the bank.

Hine's Emerald Dragonfly

The Hine's emerald dragonfly occurs in marshes and sedge meadows fed by calcareous groundwater seepage and underlain by dolomite bedrock. Because no other species covered by the Missouri Dkey occupy similar habitat, we developed an effects pathway specific to the species.

The main way that the Hine's emerald dragonfly may be adversely affected is by disturbance to its habitat. Because the species occurs in a specific habitat that is uncommon, we used an effects pathway primarily based on the proximity of projects to known occurrence sites and the presence of suitable habitat (**Figure 3**).

To ensure actions with potential to adversely affect the Hine's emerald dragonfly do not reach NE or NLAA outcomes, the Missouri Dkey first uses embedded GIS data to determine if projects overlap with known occurrence sites. Known occurrence sites were delineated using element of occurrence polygons in Missouri Department of Conservation natural heritage data. Projects overlapping with known sites automatically reach a MA outcome for the species.

If a project does not overlap with any known occurrence sites, the user is asked if the project will occur within 500 meters of calcareous wetland, fen, sedge meadow, or marsh suitable for Hine's Emerald Dragonfly (a description of suitable habitat is provided). If the user answers "Yes", they are asked if the following conservation measures can be implemented:

- Avoid changing the hydrology of the seep, fen, sedge meadow, slow moving stream, or intermittent stream pools by diverting, altering, or collecting the flow through ditching, underground tile or "spring developments.", impounding the habitat or inundating it with a dam or other structure, or dredging or deepening of the habitat to create a pool or pond.
- Minimize sedimentation and introduction of chemical or nutrient-laden runoff into streams, sinkholes, caves, and abandoned wells by implementing and monitoring erosion and sediment controls for the duration of the project.
- Do not apply pesticides and herbicides prior to precipitation events and at least 65-ft from suitable larval habitat to minimize direct runoff into nearby groundwater inputs.
- Pesticides should not be applied during the sensitive flight period Jun 1 – Aug 1
- Staging and filling of fuel, herbicides and other chemicals in upland areas should not be up gradient to HED larval habitat or within rapid recharge areas (e.g. Henry formation) or documented through groundwater modeling or analysis;
- Access by foot or operational vehicles should only use existing trails and access paths with no operational vehicles on matting in suitable wetland areas

If the measures cannot be implemented, the user reaches a MA outcome for the species. If the measures can all be implemented, the user reaches a NLAA outcome for the species.

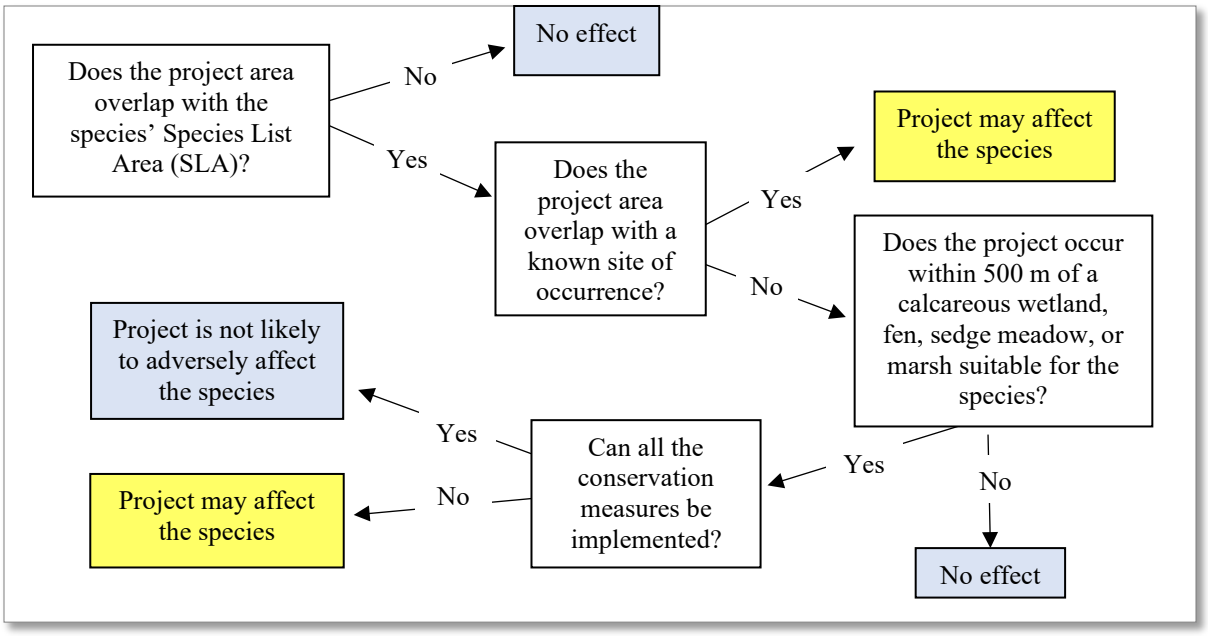

Figure 3. Pathway for evaluating effects to the Hine's emerald dragonfly.

Flowering Plants

Species of flowering plants covered by the Missouri Dkey include the decurrent false aster, eastern prairie-fringed orchid, Geocarpon, Mead's milkweed, Missouri bladderpod, pondberry, Virginia sneezeweed, and western prairie-fringed orchid.

The main ways plant species may be adversely affected is by disturbance to the species' habitat or to plants themselves. Although various conservation measures can be implemented to avoid adverse effects, most plant species covered by the key occur in specific habitats that are uncommon, such as remnant prairies. Therefore, we used an effects pathway primarily based on the proximity of projects to known occurrences and the presence of suitable habitat (**Figure 4**).

To ensure other actions with potential to adversely affect flowering plant species do not reach NE or NLAA outcomes, the Missouri Dkey first uses embedded GIS data to determine if projects overlap with known occurrence sites. Known occurrence sites were delineated using element of occurrence polygons in Missouri Department of Conservation natural heritage data. Projects overlapping with known sites automatically reach a MA outcome for the relevant species.

If a project does not overlap with any known occurrence sites, the user is asked if the project will impact an area with suitable habitat for the species (a description of suitable habitat is provided for each species). If the user answers "Yes", they are asked if surveys were conducted during the blooming season (blooming season dates are provided for each species). If surveys were not conducted, the user reaches a MA outcome for the relevant species. If surveys were conducted, the user is asked if the species was observed. If the user answers "Yes", the user reaches a MA outcome for the relevant species.

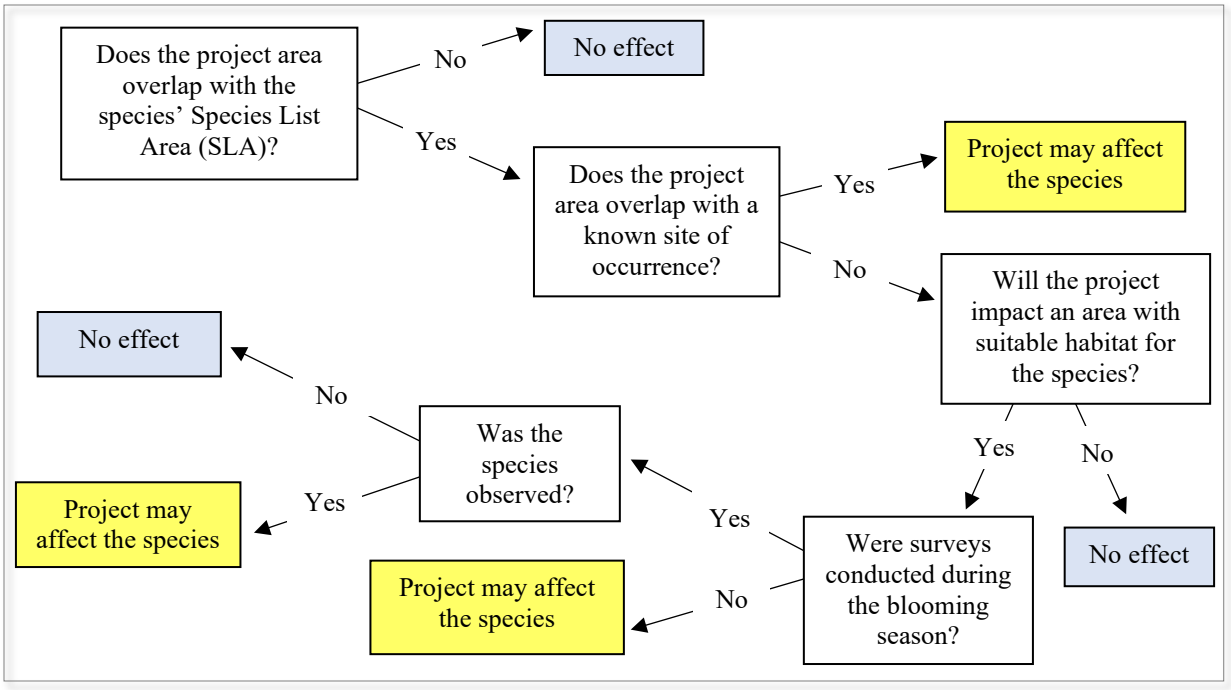

Figure 4. Pathway for evaluating effects to plant species.

Critical Habitat

Critical habitat covered by the Missouri Dkey key includes that for the Big Creek crayfish, Grotto sculpin, Hine's emerald dragonfly, Indiana bat, Neosho mucket, Niangua darter, rabbitsfoot, St. Francis River crayfish, Tumbling Creek cavesnail, and western fanshell.

The pathway for evaluating effects to critical habitat depends on the physical or biological features (PBFs) considered essential to the species' conservation. Therefore, the user is asked a series of questions regarding potential impacts to critical habitat PBF, which are species-specific (see **Status of Covered Species and Critical Habitat**). The general effects pathway is depicted in **Figure 5**.

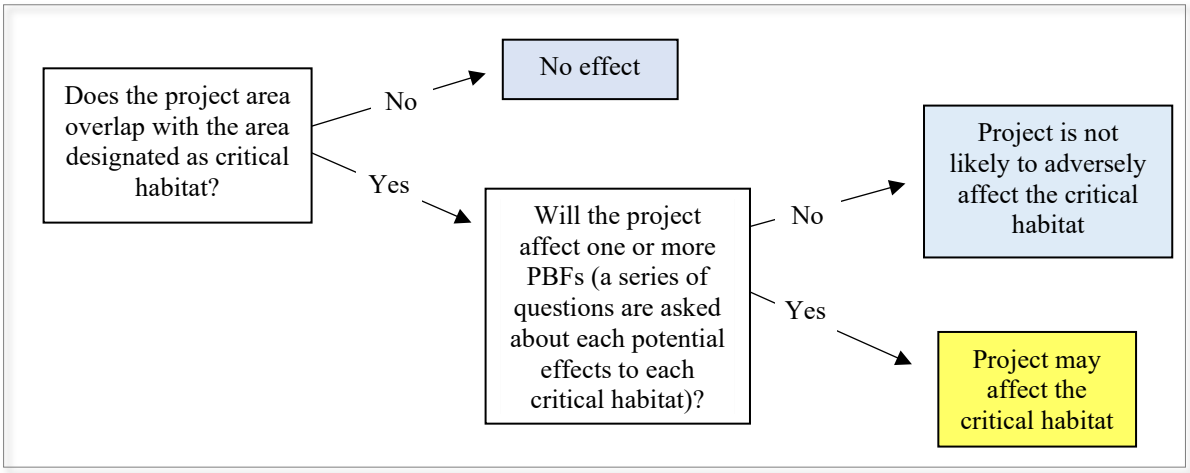

Figure 5. General pathway for evaluating effects to critical habitat.

Effects of Actions Covered by the Determination Key

Effects of an action include all the consequences to listed species or critical habitat that are caused by the proposed action, including consequences of other activities that are caused by the proposed action but that are not part of the action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02).

Projects that reach MA outcomes for one or more species or critical habitat when using the Missouri Dkey require coordination with the Missouri ESFO. All other projects that qualify to use the key may result in one or more of the following types of effects: 1) insignificant habitat loss or degradation; 2) noise and vibration; 3) smoke, dust, chemicals, and odor; or 4) night lighting. However, adherence to the specific conservation measures outlined under each effects pathway will ensure that any impacts to listed species and critical habitats will be insignificant.

Some projects that are eligible to use the key will result in no effects to species and critical habitat covered by the key, such as when the project occurs entirely within an already-developed area (e.g., within an existing structure, graveled or paved lot, industrial site) that does not provide habitat for listed species. For the purpose of the D-key, an "already-developed area", is defined as highly disturbed habitat that does not provide potential feeding, breeding, or sheltering resources for any federally listed species (examples of developed or disturbed areas that still provide resources to listed species include road or transmission line rights-of-way, other roadside habitat, bridges, culverts, etc.).

Projects also reach a NE outcome for some species when the user indicates the species were not detected during presence/absence surveys or when suitable habitat is not present within the action area.

Updating the Determination Key and Analysis

This SA is based on the best available scientific information. The Service's Missouri ESFO will ensure that this SA is updated whenever changes are made to the DKey and whenever new information warrants updates. Public access to the most recent version of the SA will be via available in IPaC on the description page for the Dkey and on the Missouri Dkey webpage at https://www.fws.gov/library/collections/missouri-threatened-and-endangered-species-determination-key-dkey.

REFERENCES CITED

Kurta, A., S.W. Murray, and D.H. Miller. 2002. Roost selection and movements across the summer landscape. Pp. 118-129 in A. Kurta and J. Kennedy (eds.), The Indiana bat: biology and management of an endangered species. Bat Conservation International, Austin, TX.

Kurta, A. and H. Rice. 2002. Ecology and Management of the Indiana Bat in Michigan. Michigan Academician 34:175-190.

Sparks, D.W. 2003. How does urbanization impact bats? PhD Dissertation, Indiana State University, Terre Haute, Indiana.

Silvis, A., A.B. Kniowski, S.D. Gehrt, and W.M. Ford. 2014. Roosting and foraging social structure of the endangered Indiana bat (*Myotis sodalis*). PloS ONE 9(5):1-12.

[USFWS] U.S. Fish and Wildlife Service. 2024. Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines. U.S. Fish and Wildlife Service, Region 3, Bloomington, MN. 95 pp.

[USFWS] U.S. Fish and Wildlife Service. 2025. Gray Bat (*Myotis grisescens*) 5-Year Review: Summary and Evaluation. Missouri Ecological Services Field Office, Columbia, Missouri. 65 pp.

GLOSSARY OF TERMS

Act - The Endangered Species Act of 1973, as amended.

Action agency – The agency that authorizes, carries out, or funds an action.

Action area – All areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Conference - A process which involves informal discussions between a Federal agency and the Service under section 7(a)(4) of the Endangered Species Act of 1973, as amended, regarding the impact of an action on proposed species or proposed critical habitat and recommendations to minimize or avoid the adverse effects.

Consultation - The various processes under section 7(a)(2) of the Endangered Species Act of 1973, as amended, including both consultation and conference if proposed species are involved.

Covered species and critical habitat– Species and critical habitat covered by the Missouri Dkey.

Critical habitat - Specific geographic areas, whether occupied by a listed species or not, that are essential for its conservation and that have been formally designated by rule published in the Federal Register.

Determination – The conclusion made by a Federal agency on impacts to listed or proposed species or designated or proposed critical habitat.

Designated non-Federal representative - The person, agency, or organization designated by the Federal agency as its representative to conduct informal consultation or prepare a biological assessment.

Determination key (Dkey) – A logically-structured sets of questions which assists a user in determining whether a project qualifies for a predetermined consultation outcome based on an existing programmatic consultation or internal standing analysis.

Dkey outcome – The conclusion reached for a species or critical habitat when using the Missouri Dkey.

Endangered species - A species of wildlife listed in 50 CFR §17.11 or a species of plant listed in 50 CFR §17.12 and designated as endangered.

Experimental population - A population (including its offspring) of a listed species designated by rule published in the Federal Register that is wholly separate geographically from other populations of the same species. An experimental population may be subject to less stringent prohibitions than are applied to the remainder of the species to which it belongs.

Federal action – An activity or program authorized, funded, or carried out, in whole or in part, by a Federal agency.

Federal nexus – A connection to an action undertaken by a Federal agency, such as funding, authorization, or implementation by a Federal agency.

Hidden semantic – A question in the Dkey that is automatically answered, either by Geographic Information Systems (GIS) data embedded in the key or based on the response to previous questions.

Incidental take - Take that results from, but is not the purpose of, carrying out an otherwise lawful activity.

Information for Planning and Consultation (IPaC) - An online tool, located at http://ecos.fws.gov/ipac/, that provides information to project proponents to help determine whether a project will have effects on federally listed species or designated critical habitat, as well as other sensitive resources managed by the Service.

Likely to adversely affect (LAA) determination – the appropriate finding in a biological assessment (or conclusion during informal consultation) if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or beneficial (see definition of "is not likely to adversely affect"). In the event the overall effect of the proposed action is beneficial to the listed species, but is also likely to cause some adverse effects, then the proposed action "is likely to adversely affect" the listed species. If incidental take is anticipated to occur as a result of the proposed action, an "is likely to adversely affect" determination should be made. An "is likely to adversely affect" determination requires the initiation of formal section 7 consultation.

Listed species - Any species of fish, wildlife or plant which has been determined to be endangered or threatened under section 4 of the Endangered Species Act of 1973, as amended.

May affect (MA) determination – The appropriate conclusion when a proposed action may pose any effects on listed species or designated critical habitat. When the Federal agency proposing the action determines that a "may affect" situation exists, then they must either initiate formal consultation or seek written concurrence from the Services that the action "is not likely to adversely affect" listed species and critical habitat.

May Affect Technical Assistance Letter - A letter issued via IPaC for both Federal and non-Federal projects that reach a May Affect (MA) outcome through the Missouri Dkey for one or more species or critical habitat on the project's Official Species List. The letter advises the IPaC user to contact the Missouri ESFO for further technical assistance outside of the Missouri Dkey for species with MA outcomes. The letter also provides technical assistance

by indicating if the project is consistent with a determination of NE or NLAA for other species (those not having a MA outcome).

NE Technical Assistance Letter – A letter issued via IPaC for projects with a Federal nexus that reach No Effect (NE) outcomes through the Missouri Dkey for all species and critical habitat on the project's Official Species List. The letter provides technical assistance by indicating the project is consistent with an action that will not affect listed species and critical habitat. Federal agencies are not required to consult with the Service on actions they determine will have no effect on listed species and critical habitat.

Non-essential experimental population (NEP) – A reintroduced population of a federally listed species that is designated under section 10(j) of the Endangered Species Act of 1973, as amended, as a non-essential experimental population. An experimental population is treated as threatened, regardless of the species' designation elsewhere in its range. For purposes of section 7, NEPs are treated as proposed for listing. Federal agencies are not required to consult on actions that could affect a NEP, except on National Wildlife Refuge System or National Park System lands, where they are treated as threatened species.

NLAA Concurrence Letter – A letter issued via IPaC for projects with a Federal nexus that reach a combination of No Effect (NE) and Not Likely to Adversely Affect (NLAA) outcomes through the Missouri Dkey for all species and critical habitat on the project's Official Species List. The letter verifies a determination of NLAA for all covered species and critical habitat receiving a NLAA outcome. Unless the IPaC user is notified by the Service within 30 days of the letter date, the letter also documents the Service's concurrence with the NLAA determinations (concurrence is not required for NE determinations).

NLAA Technical Assistance Letter – A letter issued via IPaC for projects with no Federal nexus that reach a combination of No Effect (NE) and Not Likely to Adversely Affect (NLAA) outcomes through the Missouri Dkey for all species on the project's Official Species List. The letter provides technical assistance by indicating the project is consistent with a determination of NE or NLAA for all species covered by the key. Unless the IPaC user is notified by the Service within 30 days of the letter date, the NE and NLAA outcomes are verified and the user may conclude that take of species covered by the Missouri Dkey is not reasonably likely to occur.

No Effect (NE) determination – the appropriate conclusion when the action agency determines its proposed action will not affect a listed species or designated critical habitat.

Not Likely to Adversely Affect (NLAA) determination - the appropriate conclusion when effects on listed species and critical habitat are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: 1) be able to meaningfully measure, detect, or evaluate insignificant effects; or 2) expect discountable effects to occur.

Official Species List – A letter generated in IPaC that assists in evaluating potential impacts of a proposed project. The letter includes a list of the Service's trust resources, including species and critical habitat that should be considered under Section 7 of the Endangered Species Act of 1973, as amended.

Outcome – The conclusion reached for a species or critical habitat when using the Missouri Dkey.

Proposed species - Any species of fish, wildlife or plant that is proposed in the Federal Register to be listed under section 4 of the Endangered Species Act of 1973, as amended.

Section 7 - The section of the Endangered Species Act of 1973, as amended, outlining procedures for interagency cooperation to conserve Federally listed species and designated critical habitats. Section 7(a)(1) requires Federal agencies to use their authorities to further the conservation of listed species. Section 7(a)(2) requires Federal agencies to consult with the Services to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Other paragraphs of this section establish the requirement to conduct conferences on proposed species; allow applicants to initiate early consultation; require FWS and NMFS to prepare biological opinions and issue incidental take statements. Section 7 also establishes procedures for seeking exemptions from the requirements of section 7(a)(2) from the Endangered Species Committee.

Section 7 consultation - The various section 7 processes, including both consultation and conference if proposed species are involved.

Section 9 - The section of the Endangered Species Act of 1973, as amended, that prohibits the taking of endangered species of fish and wildlife. Additional prohibitions include: 1) import or export of endangered species or products made from endangered species; 2) interstate or foreign commerce in listed species or their products; and 3) possession of unlawfully taken endangered species.

Section 10 - the section of the Endangered Species Act of 1973, as amended, that provides exceptions to section 9 prohibitions. The exceptions most relevant to section 7 consultations are takings allowed by two kinds of permits issued by the Services: 1) scientific take permits and 2) incidental take permits. The Services can issue permits to take listed species for scientific purposes, or to enhance the propagation or survival of listed species. The Services can also issue permits to take listed species incidental to otherwise legal activity.

Species List Area (SLA) - The geographic area occupied by a listed or proposed species or designated or proposed as critical habitat as well as other areas in which projects could affect the specie or critical habitat (such as recharge areas of occupied caves, upland areas draining into occupied stream reaches, and tributaries and upstream stream reaches draining into occupied stream reaches). Species with SLAs intersected by a proposed project's geographic area delineated in IPaC are included in the IPaC Official Species List.

Reasonably certain to occur – The foreseeability standard used by the Service when assessing the scope of effects to species or critical habitat or the amount of incidental take of a species.

Standing Analysis (SA) - An internal evaluation by the Service on potential effects of different actions or types of actions. The analysis can be used as a basis for a consultation and can provide guidance on projects that wish to be considered under the Standing Analysis. The Standing Analysis for the Missouri Threatened and Endangered Species Determination Key Delivered by the U.S. Fish and Wildlife Service's Information for Planning and Consultation (IPaC) Tool

Take - To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct. Harm is further defined by Service to include an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Harass is defined by the Service an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.

Threatened Species - A species of wildlife listed in 50 CFR §17.11 or plant listed in 50 CFR §17.12 and designated as threatened.