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Fish and Wildlife Service



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July 14, 2016

Mr. Greg McKay
U.S. Army Corps of Engineers
Louisville District, Regulatory Branch
P.O. Box 59
Louisville, Kentucky 40201-0059

RE: Biological Opinion for the Perry County Port Authority Dredging Project (PCPA; LRL-2014-69) affecting the Rabbitsfoot and Sheepnose in the Ohio River, Perry County, Indiana

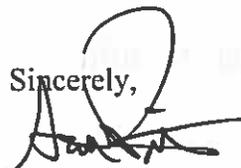
Dear Mr. McKay:

This document transmits the U.S. Fish and Wildlife Service's (Service's) final Biological Opinion (BO) based on our review of the Perry County Port Authority project that may impact the rabbitsfoot mussel (*Quadrula cylindrica cylindrica*) and sheepnose mussel (*Plethobasus cyphus*) under section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your March 4, 2015 request for formal consultation was received on March 10, 2016. The Biological Opinion is based on information provided in the February 2015 Biological Assessment (BA), the June 2016 addendum to the Biological Assessment, the 2015 mussel survey report, and other available literature. A complete administrative record of this consultation is on file at this office.

The enclosed BO addresses effects of the project, which the U.S. Army Corps of Engineers determined were "likely to adversely affect" (LAA) the rabbitsfoot and sheepnose mussels. Included in your BA were determinations of "no effect" on the gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), and northern long-eared bat (*Myotis septentrionalis*).

This BO specifically covers the Perry County Port Authority dredging project for which the Service concurred was likely to adversely affect the rabbitfoot and sheepnose. This opinion provides an effects and jeopardy analysis based upon anticipated incidental take as a result of this project. After reviewing the status and environmental baseline of the rabbitsfoot and sheepnose and an analysis of potential effects of the actions to these species, it is our determination that this project is not likely to jeopardize the continued existence of the rabbitfoot and sheepnose mussels.

This concludes formal consultation on the Perry County Port Authority dredging project and precludes the need for additional consultation as required under section 7 of the Endangered Species Act of 1973, as amended. If, however, new information on endangered species within the proposed project area becomes available or if significant changes are made to ongoing projects, or if you have questions regarding the BO, then please contact Marissa Reed at (812) 334-4261 ext. 1215 or Marissa_Reed@fws.gov.

Sincerely,


Scott E. Pruitt
Field Supervisor

Enclosure

Biological Opinion
and
Incidental Take Statement
for the
Effects of the Perry County Port Authority Dredging Project
on the Threatened Rabbitsfoot Mussel (*Quadrula cylindrica*
***cylindrica*) and the Endangered Sheepnose Mussel**
(*Plethobasus cyphus*) in Perry County, Indiana

Prepared by:
U.S. Fish and Wildlife Service
Indiana Ecological Services Field Office
620 South Walker Street
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July 14, 2016

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EXECUTIVE SUMMARY

This Biological Opinion was issued to the U.S. Army Corps of Engineers and analyzed the effects of the Perry County Port Authority (PCPA) dredging project in Tell City, Perry County, Indiana on the federally threatened rabbitsfoot mussel (*Quadrula cylindrica cylindrica*) and the federally endangered sheepsnose mussel (*Plethobasus cyphus*). The individual site-specific consultation under Section 7 of the Endangered Species Act was used to address one proposed project. This consultation analyzed the direct, indirect, and cumulative impacts from the dredging project on rabbitsfoot and sheepsnose mussels.

Live individuals of 16 species of mussels, including rabbitsfoot and sheepsnose, were collected during survey efforts completed in the project area in May 2015. Since the proposed project may have an impact on the environment where a listed species or critical habitat is present a biological assessment for the PCPA dredging project was prepared.

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 United States Code [USC] §1536), requires Federal agencies (U.S. Army Corps of Engineers in this case) to insure that their actions are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat that has been designated for those species. In addition, under section 7(a)(1) of the Endangered Species Act, all federal agencies are required to carry out programs for the conservation of federally listed species. This biological opinion satisfies the U.S. Army Corps of Engineers' section 7(a)(2) consultation requirement.

The Service concluded that the effects of the dredging project are not likely to jeopardize the rabbitsfoot and sheepsnose mussels and no critical habitat will be affected.

INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion based on our review of the Biological Assessment of Federal Endangered and Threatened Mussel Species for the Tell City Boat Works Development Project in the Ohio River (hereafter referred to as the BA). The BA was received at the Service's Bloomington, Indiana Ecological Services Field Office (BFO) on March 10, 2016 as part of a letter requesting us to initiate formal consultation on potential adverse effects on the rabbitsfoot mussel and sheepsnose mussel. The U.S. Army Corps of Engineers (USACE) determined that all activities addressed in the BA have no effect on all other federally-listed species in the area. A may affect, likely to adversely affect determination was made for the rabbitsfoot mussel and sheepsnose mussel.

This biological opinion was prepared in accordance with section 7(a)(2) of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.) and is the culmination of formal section 7 consultation under the Act. The purpose of formal section 7 consultation is to insure that any action authorized, funded, or carried out by the Federal government is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of any officially designated critical habitat of such species. This biological opinion covers the proposed action which includes dredging in the Ohio River associated with development of the PCPA project in Tell City, Perry County, Indiana.

CONSULTATION HISTORY

The Service began coordination with USACE in February 2015. A chronological summary of coordination events and actions associated with this consultation is presented below.

February 6, 2015 – Early coordination initiated by USACE with the submittal of the *Memorandum for Coordinating Agencies* for the proposed Perry County Port Authority project in Tell City, Perry County, Indiana.

February 13, 2015 – BFO, in coordination with the Kentucky Field Office (KFO), responded to the *Memorandum for Coordinating Agencies* requesting a mussel survey be conducted due to potential suitable habitat in the project area and the occurrence of federally listed mussel records near the area.

April 15, 2015 – BFO received a mussel survey plan Ecological Specialists, Inc.

April 24, 2015 – BFO provided a concurrence letter to conduct mussel surveys in the project area as proposed in the mussel survey plan.

May 20, 2015 – BFO received notification that the federally listed rabbitsfoot and sheepsnose mussels were collected during the approved survey effort. BFO notified the USACE and the applicant that formal consultation would be required to complete the proposed project.

September 2, 2015 – BFO received letter from USACE requesting formal consultation on the PCPA project for the mussels. The USACE's letter included the mussel survey report.

September 4, 2015 – BFO sent the USACE a letter acknowledging receipt of their request. BFO notified the USACE that all the information necessary to initiate formal consultation had not been received.

March 10, 2016 – BFO received letter from USACE requesting formal consultation on the PCPA project for the mussels. The USACE’s letter included a biological assessment describing potential impacts to rabbitsfoot and sheepsnose mussels.

March 29, 2016 – BFO sent the USACE a letter acknowledging receipt of their request and BA and that formal consultation on the rabbitsfoot and sheepsnose mussel had been initiated (starting on 10 March) on the PCPA project.

June 15, 2016 – BFO received addendum to the biological assessment.

June 23, 2016 – BFO submits draft biological opinion to the USACE for review.

July 14, 2016 – BFO issued its final biological opinion to the USACE.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

As defined in the ESA section 7 regulations (50 CFR 402.02), “action” means “all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas.” The “action area” is defined as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present Federal, State, or private activities, as well as the cumulative effects of reasonably certain future State or private activities within the action area.

The federal action being evaluated in this biological opinion is the USACE’s issuance of a Clean Water Act section 404 (CWA 404) permit for stream impacts resulting from development of the PCPA project. The proposed project includes dredging along 152 meters of shoreline in the Ohio River.

Action Area

The Service considers the action area to include the reach of the maintenance dredging plus a buffer of 200 meters upstream and 500 meters downstream, which encompasses the Ohio River from Ohio River Mile (ORM) 726.0 to 726.8. The action area is designated in this way because (a) it contains the entirety of the proposed project area and (b) it contains the areas upstream and downstream of the proposed project where the indirect and cumulative effects of the proposed action are likely to occur.

Conservation Measures

PCPA has incorporated conservation measures into the proposed project; these measures are designed to avoid, minimize, and mitigate impacts of the proposed action on the rabbitsfoot and sheepsnose mussels. The Service has analyzed the effects of the proposed action based on the assumption that all conservation measures will be implemented. A summary of the conservation measures follows.

1. No over-excavation will occur. Only the deposited sand and silt will be dredged.
2. No dredging will be done between April 1 and June 15 to avoid the fish spawning season.
3. Dredging will be accomplished using a crane with a clamshell bucket.
4. There will be no discharge of dredged material into the river. Dredged material will be placed in an approved disposal site on the right bank of the Ohio River at ORM 736.
5. All fill materials will be purchased limestone riprap with choke stone.

The Service recognizes that, individually and/or cumulatively, these conservation measures that are included in the BA contribute to the avoidance and minimization of adverse effects to these listed mussels, but that these measures do not necessarily eliminate all adverse effects that may result from the proposed action.

These conservation measures are included, along with additional minimization actions, in the Reasonable and Prudent Measures and Terms and Conditions portion of this Biological Opinion.

STATUS OF THE SPECIES

Species Listing and Critical Habitat

This biological opinion covers the rabbitsfoot mussel (*Quadrula cylindrica cylindrica*) and sheepsnose mussel (*Plethobasus cyphus*). The rabbitsfoot is federally listed as a threatened species and the sheepsnose is federally listed as endangered.

Rabbitsfoot

The following taxonomic and descriptive information is gleaned from the status review for this species (Butler 2005). The rabbitsfoot was described by Thomas Say in 1817, and the type locality is the Wabash River, probably in the vicinity of New Harmony, Posey County, Indiana.

The rabbitsfoot is regarded as primarily a species of the Mississippi drainage, principally the Ohio, Cumberland, and Tennessee River systems, but is also found in portions of the Lower Great Lakes Basin. Historically it was known from 137 streams in 15 states. In the Ohio River system, it historically had populations in 63 streams, but today it is thought to be extant in only 16 Ohio River streams. In the Ohio River main stem, it historically occurred in the entire length of the Ohio River, but, currently, only a few populations are known from the lower Ohio River. The only Ohio River main stem populations currently known occur from near Paducah, Kentucky downstream to the Mound City, Illinois area, a reach of about 39 miles; and, in a section of the Ohio River near Ohio River Mile 745.0. The population in the

Ohio River is considered viable with indications of multiple age and size classes.

The following description is summarized from Parmelee and Bogan (1998) and Oesch (1984). The rabbitsfoot is a medium-sized to large mussel reaching about six inches in length with an elongate rectangular and moderately inflated shell. The beaks barely extend above the hinge line on the anterior portion of the mussel. Externally, a posterior ridge extends diagonally from the umbo to the posterior ventral margin. Shell sculpture generally consists of a few large, rounded, low tubercles on the posterior slope, and occasional elongated pustules anteriorly. The periostracum is generally smooth, yellowish, greenish, or olive in color and covered with dark green or black chevrons and triangles. As with many mussel species, growth rest periods appear as grooves in the shell surface. Internally, the right valve contains a single low and straight to slightly wavy lateral tooth. The left valve has two low, triangular, grooved pseudocardinal teeth and two lateral teeth. The beak cavity is deep and the interdentum is narrow. Nacre color is white and iridescent, often with gray-green tinges of color in the cavity of the umbo. Soft parts are generally orange in color.

Sheepnose

The sheepnose is a recently federally listed species (Federal Register 2012). Critical habitat for this species has not yet been designated.

The following taxonomic and descriptive information is summarized from the status review of this species (Butler 2003). The sheepnose was described by Constantine Rafinesque in 1820. The type locality is the Falls of the Ohio River near Louisville, Kentucky, and adjacent Indiana.

Historical and current distribution information on the sheepnose is summarized from Butler (2003). The sheepnose historically occurred throughout much of the Mississippi River system with the exception of the upper Missouri River system and most lowland tributaries in the lower Mississippi River system. This species is known from the Mississippi, Ohio, Cumberland, Tennessee River main stems, and scores of tributary streams range wide. It historically occurred in at least 77 streams in 15 states. The current distribution includes 26 streams in 14 states. The sheepnose has been eliminated from about two-thirds of the total number of streams from which it was historically known (26 streams currently compared to 77 streams historically), and has been eliminated from long reaches in streams in which it currently occurs. The sheepnose was historically known from 28 streams in the Ohio River system. Currently, only 11 streams are thought to have extant populations. The sheepnose was historically documented from the entire length of the Ohio River. The sheepnose has been recently recorded from the main stem Ohio River downstream of Louisville, Kentucky.

The following description is generally summarized from Parmelee and Bogan (1998). This medium sized mussel reaches nearly 5.5 inches in length, and the shape of the shell is elongate ovate, moderately inflated, with the valves thick and solid. The anterior end of the shell is rounded and the posterior is truncate to bluntly pointed. The posterior ridge is gently rounded and flattened ventrally, and there is generally a row of large, broad tubercular swellings on the center of the shell extending from the beak to the ventral margin. A shallow sulcus lies between the posterior ridge and central swellings. Beaks are high and located near the

anterior margin. In young individuals the periostracum is often light yellow to yellowish brown, becoming darker with age. The beak cavity is shallow to moderately deep and generally white in color. The right valve contains a large triangular pseudocardinal tooth and the lateral teeth are heavy, long, and slightly curved.

Life History

Rabbitsfoot

The following life history information is gleaned from the status review for this species (Butler 2005). The rabbitsfoot is a filter-feeding species from the Unionidea family with a diet likely consisting of a mixture of algae, detritus, bacteria, and microscopic zooplankton. Most mussels, including the rabbitsfoot, generally have separate sexes. Age at sexual maturity for the rabbitsfoot is unknown. Fertilization success is apparently influenced by mussel density and flow conditions. The female rabbitsfoot utilizes all four gills as a marsupium for its glochidia and is considered to be a short-term brooder with an inferred brooding period from May to July. Fish hosts for the rabbitsfoot mussel are thought to be shiners (e.g., spotfin shiner (*Cyprinella spiloptera*), rosyface shiner (*Notropis rubellus*), blacktail shiner (*Cyprinella venusta*), etc.).

The following habitat requirements are summarized from Parmalee and Bogan (1998). The rabbitsfoot primarily inhabits small to medium-sized streams and some large rivers. It usually occurs in shallow areas along the bank and adjacent runs and shoals where the water velocity is reduced. It may also occupy deep water runs, having been reported in 9 to 12 feet of water. Bottom substrates generally include sand and gravel. The rabbitsfoot is often found lying on its side.

Sheepnose

The life history information is summarized from the status review of this species (Butler 2003). Thick shelled, larger river mussels such as the sheepnose are thought to live longer than other species. The life span of the sheepnose is thought to be about 21 to 25 years. The reproductive cycle of the sheepnose is likely similar to that of other native freshwater mussels. As with most mussel species the sheepnose has separate sexes. Age at sexual maturity is unknown but is estimated at about 3 years. Female sheepnose utilize only the outer pair of gills as marsupium for its glochidia, and is considered to be a short-term brooder with most reproduction taking place in early summer (Parmalee and Bogan 1998). Glochidia are released in the form of conglomerates, which are narrow and lanceolate in outline, solid and red in color, and discharged in unbroken form (Oesch 1984). Several score to a few hundred glochidia probably occur in each conglomerate. Total fecundity per female sheepnose is probably in the tens of thousands.

Glochidia must come into contact with a specific host fish to survive and develop further. Little is known regarding the host fish for the sheepnose, but one known host is the sauger, *Stizostedion canadense*. It is possible that other fish species may also serve as a suitable host. Newly metamorphosed juveniles drop off the host and begin a free living existence on the stream bottom.

The following habitat requirements of the sheepsnose are summarized from Oesch (1984) and Parmalee and Bogan (1998). The sheepsnose is primarily a larger stream species, usually occurring in shallow shoal habitats with moderate to swift currents over coarse sand and gravel. Habitats also may have mud, cobble, and boulders, and it may occur in deep runs.

Population dynamics

Population size - rabbitsfoot

Information on rabbitsfoot population size is summarized from Butler (2005). The rabbitsfoot was widespread and locally common in many Mississippi River Basin streams. Quantitative historical abundance data are rare, but relative abundance information can be gathered from the size and number of museum lots. The historical museum data (pre-1980) indicate that good rabbitsfoot populations occurred in many rivers, including the Ohio River. Based on the historical data, an argument can be made that in many locations the rabbitsfoot was locally abundant. When experts started attempts to compile lists of imperiled mussels, the rabbitsfoot was considered to be a rare species as early as 1970. Many studies in recent history have indicated the rabbitsfoot is rare, sporadic, or extirpated throughout most of its range. The American Malacological Union and American Fisheries Society consider the rabbitsfoot to be threatened (Williams et al. 1993). Populations of the rabbitsfoot were last reported decades ago from about one-third of streams where it historically occurred. The compilation of distributional information in the status review by Butler (2005) indicates a severe reduction in range over the past 40 years. About 66 percent of the historical streams of occurrence have lost their populations of this species. Populations in 91 streams of known historical populations are now considered extirpated. It is very likely that other poorly sampled or totally unsampled stream populations of this species have experienced similar declines. The amount of habitat loss and the extirpation of this species from thousands of miles of habitat within its range indicate catastrophic population losses as well. Total range reduction and overall population loss for the rabbitsfoot realistically approaches, if not exceeds, 90 percent.

Population size - sheepsnose

The information below is summarized from the status review of this species by Butler (2003). The sheepsnose, although widespread in many Mississippi River system streams was rarely very common. Archaeological evidence on relative abundance indicates that it has been an uncommon or even rare species in many streams for centuries. Museum collections of this species, with few exceptions, are almost always small. Fair numbers were recorded historically from the upper Muskingum River system in Ohio, and the lower Wabash River. Cummings and Mayer (1992) considered it 'rare throughout its range'. The sheepsnose has experienced a significant reduction in range and most of its populations are disjunct, isolated, and appear to be declining range wide. The extirpation of the sheepsnose from over 50 streams within its historical range indicates substantial population losses have occurred. In the vast majority of streams with extant populations, it appears to be uncommon at best. Small population size and/or restricted stream reaches of current occurrences are currently the norm. No new populations of sheepsnose have been discovered and populations have not yet been reestablished in historic habitat.

Population variability - rabbitsfoot

Little is known on the population variability of the rabbitsfoot. Few individuals are observed during survey efforts, making it difficult to accurately assess populations. Densities are often so

low that only a few individuals may comprise a population.

Population variability - sheepsnose

This species is considered extremely rare wherever it is found. Little is known on the population variability of the sheepsnose. Few individuals are observed during survey efforts, making it difficult to accurately assess populations.

Population stability - rabbitsfoot

The stability of rabbitsfoot populations is not well known. In most locations where this species appears to be present, the presence of rabbitsfoot is evident from occasional individuals or only a few individuals recorded. In the lower Ohio River, the low numbers encountered during mussel surveys is of little value other than indicating the species may exist in a certain area over a relatively long period of time at low population levels.

Population stability - sheepsnose

The stability of sheepsnose populations is not well known. In most locations where this species appears to be present, the presence of sheepsnose is evident from occasional individuals or only a few individuals recorded. In the lower Ohio River, the low numbers typically encountered during mussel surveys is of little value other than indicating the species may exist in a certain area over a relatively long period of time.

Status and distribution

Reasons for listing – rabbitsfoot

The following summary is primarily from Butler (2003). The decline of the rabbitsfoot is primarily the result of habitat loss and degradation from impoundments, sedimentation, and pollution. Chief among the causes of decline are impoundments, channelization, chemical contaminants, mining, and sedimentation (Neves 1993; Neves et al. 1997; Watters 2000). Impoundments result in the modification of riffle and shoal habitats and the resulting loss of mussel resources, especially in larger rivers. Dams interrupt most of a river's ecological processes by modifying flood pulses; controlling impounded water elevations; altering water flow, sediments, nutrients, and energy inputs and outputs; increasing depth; decreasing habitat heterogeneity; decreasing stability due to subsequent sedimentation; blocking host fish passage; and isolating mussel populations from fish hosts. Even small low-head dams can have some of these effects on mussels. In addition, dams can alter downstream water quality and habitat.

Population losses due to impoundments have probably contributed more to the decline and imperilment of the rabbitsfoot than any other single factor. Channelization and dredging activities have also altered riverine habitats nationwide. Chemical contaminants contained in point and non-point discharges can degrade water and substrate quality impacting mussel populations and may be most profound on juvenile mussels. Various forms of pollution from municipal, agricultural, and industrial sources can impact mussels in a variety of ways. Siltation can increase turbidity which irritates or clogs the gills of mussels and can even physically smother the animal. Mussel life cycles can be affected indirectly from siltation by impacting host fish populations (e.g., smothering fish eggs or larvae, reducing food

availability, etc.).

Currently, the vast majority of the historical range of the rabbitsfoot has been altered and no longer offers suitable habitat. With few exceptions, extant populations are: 1) invariably small (rarely are more than one or two individuals found per sample); 2) characteristically rare (having low relative abundance); 3) sporadically or occasionally distributed (despite the extent of seemingly suitable habitat it is very patchy in distribution and occurrence); and 4) generally limited in linear extent, and typically lacking evidence for recent recruitment. With many disjunct populations and its overall scarcity, the species is highly susceptible to localized extirpations from the genetic implications of extremely low population size and because of threats that are extremely difficult if not impossible to control. Stochastic events are a real concern for all populations, particularly reach-limited populations and those associated with navigation channels and other major transportation arteries. Other threats include exotic species, such as Asian clams, zebra mussels, and Asian carp.

Reasons for listing – sheepnose

The following summary is primarily from Butler (2003). The sheepnose has experienced a significant reduction in range and most of its populations are disjunct, isolated, and appear to be declining range wide. The extirpation of the sheepnose from over 50 streams within its historical range indicates substantial population losses have occurred. The decline of the sheepnose is primarily the result of habitat loss and degradation from impoundments, sedimentation, and pollution. Chief among the causes of decline are impoundments, channelization, chemical contaminants, mining, and sedimentation. Impoundments result in the modification of riffle and shoal habitats and the resulting loss of mussel resources, especially in larger rivers. Dams interrupt most of a river's ecological processes by modifying flood pulses; controlling impounded water elevations; altering water flow, sediments, nutrients, and energy inputs and outputs; increasing depth; decreasing habitat heterogeneity; decreasing stability due to subsequent sedimentation; blocking host fish passage; and isolating mussel populations from fish hosts. Even small low-head dams can have some of these effects on mussels. In addition, dams can alter downstream water quality and habitat. Population losses due to impoundments have probably contributed more to the decline and imperilment of the sheepnose than any other single factor. Channelization and dredging activities have also altered riverine habitats nationwide. Gravel mining activities may be a localized threat in some streams with extant sheepnose populations. Chemical contaminants contained in point and non-point discharges can degrade water and substrate quality impacting mussel populations and may be most profound on juvenile mussels. Various forms of pollution from municipal, agricultural, and industrial sources can impact mussels in a variety of ways. Siltation can increase turbidity which irritates or clogs the gills of mussels and can even physically smother the animal. Mussel life cycles can be affected indirectly from siltation by impacting host fish populations (e.g., smothering fish eggs or larvae, reducing food availability, etc.). Currently, the vast majority of the historical range of the sheepnose has been altered and no longer offers suitable habitat. With few exceptions, extant populations are: 1) invariably small (rarely are more than one or two individuals found per sample); 2) characteristically rare (having low relative abundance); 3) sporadically or occasionally distributed (despite the extent of seemingly suitable habitat it is very patchy in distribution and occurrence); and 4) generally limited in linear extent, and typically lacking evidence for recent recruitment. With many disjunct populations

and its overall scarcity, the species is highly susceptible to localized extirpations from the genetic implications of extremely low population size and because of threats that are extremely difficult if not impossible to control. Stochastic events are a real concern for all populations, particularly reach-limited populations and those associated with navigation channels and other major transportation arteries. Other threats include exotic species, such as Asian clams, zebra mussels, and Asian carp.

Rangewide trend - rabbitsfoot

Based on rabbitsfoot status information in Butler (2005), about 66 percent of the historical streams of occurrence have lost their populations of this species. Much more than 66 percent of the species' historically available habitat no longer supports populations. Populations in 91 streams having known historical populations are considered extirpated. Habitat losses measured in the thousands of miles have occurred in large streams from which the rabbitsfoot is now considered extirpated, and thousands of additional miles in scores of smaller streams. Total range reduction and overall population loss for the rabbitsfoot likely meets or exceeds 90 percent. With few exceptions, the extant populations are extremely small and occur in relatively short river reaches despite the extent of seemingly suitable habitat in many streams. A majority of populations are essentially limited to discrete reaches making the species in these streams highly susceptible to elimination from catastrophic stochastic events.

Rangewide trend - sheepsnose

The sheepsnose has experienced a significant reduction in range and most of its population are disjunct, isolated, and appear to be declining range wide. It is extirpated from over 50 streams in its historical range. In the majority of streams with extant populations, the sheepsnose appears to be uncommon at best. Several extant populations are thought to exhibit some level of population viability; however, given its current distribution, abundance, and trend information, the sheepsnose appears to exhibit a high level of imperilment.

New threats

The zebra mussel, an exotic species that colonizes the shells of native mussels, is a relatively new threat to mussels including the fat pocketbook, pink mucket, orangefoot pimpleback, and sheepsnose. It is present in the Ohio River and has been observed attached to native mussels and can restrict the ability of a mussel to move, feed, respire, and reproduce, especially if large numbers are present on the shell of the native mussel.

An additional new potential threat to both the rabbitsfoot and sheepsnose is a molluscivore (mollusk predator) fish, the black carp, *Mylopharyngodon piceus*. It has been recorded in the Mississippi River near the mouth of the Ohio River.

Analysis of the species likely to be affected

The rabbitsfoot and sheepsnose mussels are federally listed species likely to be adversely affected in the action area of this project. No critical habitat has been designated for the sheepsnose mussel species; therefore, none will be affected. However, critical habitat has been finalized and published (Federal Register, 2015) for the rabbitsfoot mussel.

Critical habitat is present in portions of several states including: Alabama, Arkansas, Indiana, Illinois, Kansas, Kentucky, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, and Tennessee. The total estimated miles of critical habitat for all states is 1,437 miles in 31 units. The project area does not contain any designated critical habitat for the rabbitsfoot.

Under the Endangered Species Act, the Service is required to identify the physical or biological features essential to the conservation of the species. The Service considers primary constituent elements (PCEs) to be the elements of physical or biological features that, when laid out in the appropriate quantity and spatial arrangement to provide for a species' life-history processes, are essential to the conservation of the species. The PCEs for the rabbitsfoot are: 1) 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 sediments and attached filamentous algae); 2) 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 mussel and fish host habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats; 3) 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; 4) the presence and abundance (currently unknown) of fish hosts necessary for recruitment of the rabbitsfoot; and 5) either no competitive or predaceous invasive (nonnative) species, or such species in quantities low enough to have minimal effect on survival of freshwater mussels.

ENVIRONMENTAL BASELINE

Status of the species within the action area

Rabbitsfoot

This species has been recorded at several sites in the Ohio River downstream of the project site and is known to occur in the Cannelton Bed (ORM 724.7 – 726.3) which lies within and upstream of the project site and is within the action area as defined in this biological opinion.

Sheepnose

This species has been recorded at several sites in the Ohio River and is known to occur in the Cannelton Bed (ORM 724.7 – 726.3) which lies within and upstream of the project site and is within the action area as defined in this biological opinion.

Factors affecting species environment within the action area

The habitat conditions within the action area consist primarily of sand, soft silt over sand, and

small areas of gravel and/ or clay. Other factors possibly affecting the species environment in the action area include runoff from agriculture activities which can increase turbidity and add sediment, including possible contaminants from urban runoff, dams which can affect host fish movement and habitat conditions, sewer outfalls, and industrial complexes located upstream in the Ohio River. Barge traffic will continue to operate in the river channel riverward of the project footprint.

Previous Incidental Take Authorizations

Rabbitsfoot

Eight biological opinions involving take of the rabbitsfoot mussel are provided in Appendix A. The incidental take statements from the above mentioned consultations have authorized the potential loss of about 1,327 acres of habitat, 213 individuals, and an indeterminate number of individuals from several consultations indicating an unknown number of individuals will be taken within a project area. The total amount of actual take of rabbitsfoot mussels associated with these biological opinions is difficult to accurately determine for several reasons:

- Young mussels are small and may be difficult to detect.
- A quantitative assessment of the number of mussels taken was not always given in some of the Biological Opinions.
- Mussels are long-lived and have a complex life-cycle making assessment of indirect effects difficult (e.g. effects of water quality changes, long-term relocation effects, impacts to host species, etc.).

Despite the inherent difficulties associated with assessing the actual amount of take associated with projects impacting mussels and the uncertainties associated with the long-term impacts, the Service concludes that the aggregate effects of the activities and incidental take covered in previous biological opinions on the rabbitsfoot have not degraded the overall conservation status (i.e., environmental baseline) of this species.

Sheepnose

Twelve biological opinions that have included take of this species are summarized in Appendix B. The incidental take statements from the above-mentioned consultations have authorized the take of 430 individuals and another indeterminate number of individuals from consultations where an estimate of taken individuals could not be determined. The total amount of actual take of sheepnose mussels associated with these biological opinions is difficult to accurately determine for several reasons:

- Young mussels are small and may be difficult to detect.
- A quantitative assessment of the number of mussels taken was not always given in some of the Biological Opinions.
- Mussels are long-lived and have a complex life-cycle making assessment of indirect effects difficult (e.g. effects of water quality changes, long-term relocation effects, impacts to host species, etc.).

Despite the inherent difficulties associated with assessing the actual amount of take associated

with projects impacting sheepnose mussels and the uncertainties associated with the long-term impacts, the Service concludes that the aggregate effects of the activities and incidental take covered in previous biological opinions on the sheepnose mussel have not degraded the overall conservation status (i.e., environmental baseline) of this species.

EFFECTS OF THE ACTION

Factors to be considered

This section includes an analysis of the direct and indirect effects of the proposed action on the species and/or critical habitat and its interrelated and interdependent activities. While analyzing direct and indirect effects of the proposed action, the Service considered the following factors:

Proximity of the action – We describe known species locations and designated critical habitat in relation to the action area and proposed action;

Distribution – We describe where the proposed action will occur and the likely impacts of the activities;

Timing – We describe the likely effects in relation to sensitive periods of the species' lifecycle;

Nature of the effects – We describe how the effects of the action may be manifested in elements of a species' lifecycle, population size or variability, or distribution, and how individual animals may be affected;

Duration – We describe whether the effects are short-term, long-term, or permanent;

Disturbance frequency – We describe how the proposed action will be implemented in terms of the number of events per unit of time;

Disturbance intensity – We describe the effect of the disturbance on a population or species; and

Disturbance severity – We describe how long we expect the adverse effects to persist and how long it would take a population to recover.

Proximity of the action:

The proposed action will occur upstream of Tell City on the Indiana side of the river from approximately Ohio River Mile 726.0 to 726.8. The project site is known to contain rabbitsfoot and sheepnose mussels, based on surveys conducted in 2015 within the project site and the defined action area. Live individuals of both species were found in a survey of the site.

Distribution:

Direct impacts to the rabbitsfoot and sheepnose mussels and their habitats will most likely occur within the project footprint and in other portions of the action area downstream and riverward of the project footprint.

Timing:

Depending on when the actual dredging activity occurs, impacts to the rabbitsfoot and sheepnose mussels could occur during sensitive periods of their life cycle.

The rabbitsfoot and sheepsnose mussels are thought to become gravid during spring and/or summer, brood glochidia for a short period of time and release larvae in the late summer (short-term brooder). Sensitive periods in late spring-summer for adults, include the release of sperm into the water column and the fertilization of eggs and brooding of larvae. Another sensitive period for female mussels is the time of release of partially developed larvae or glochidia, and their attachment onto the fish host (summer). Sensitive periods for the juveniles include their attachment to the host fish and excystment from the host fish as they drop to the riverbed and establish themselves in the substrate (summer). Because dredging will be avoided during the period of April 1 – June 15 impacts to adults will be minimized. However, the sensitive periods for glochidia and juveniles could occur during the dredging phase of the proposed project.

Nature of the effect:

It is likely that the proposed action will have a variety of effects on rabbitsfoot and sheepsnose mussels. Any of the periods of these species life cycle can potentially be disturbed or disrupted by activities during dredging and operation of the facility. This project could result in the (a) direct and/or indirect mortality of individual adults and juveniles from dredging activity; (b) dislodgement of adults and/or juveniles due to flow alterations and/or navigation activity; (c) reduction or other modification in the availability of fish hosts that is caused by degradation/alteration of habitat and that may harm and/or harass individuals through interference with respiration, feeding, and reproduction; and (d) creation of turbidity and/or deposition of sediment that may directly and/or indirectly affect adults and/or juveniles by harm and/or harassment. In addition, these species may be impacted if fish host behavior and presence is negatively affected by flow alterations, turbidity, or changes in sediment deposition.

Duration:

Potential impacts to the rabbitsfoot and sheepsnose will be direct and indirect, and remain for the duration of the dredging activity which is expected to occur no more than once every two months and be permitted for 10 years. It is likely that continued operation of the facility will require continued dredging and need for permit renewals for an undetermined period of time in the future.

Disturbance frequency:

These disturbances (i.e., flow changes, increased turbidity, movement of sediment, etc.) are expected to occur and remain in effect over a period of time as dredging activities alter the makeup of the river's flow characteristics, sediment removal, and/or sediment transport/deposition patterns.

Disturbance intensity:

The disturbance intensity will likely be dissimilar throughout the action area and is expected to occasionally create habitat conditions that are unfavorable for the rabbitsfoot and sheepsnose.

Disturbance severity:

The disturbance severity of the dredging activity is expected to be severe and permanent in the footprint of the project. The recovery rate of these mussel species in this part of the action area is unknown. Taken as a whole, the overall disturbance severity is expected to be minor to the

population of rabbitsfoot and sheepsnose in the Ohio River and range-wide.

Analyses for effects of the action

Beneficial effects:

No wholly beneficial effects have been identified or are expected to occur. The proposed action is expected to result in adverse effects on the rabbitsfoot and sheepsnose populations within the action area.

Direct effects:

Direct effects of the proposed action on the rabbitsfoot and sheepsnose; include harassment, harm, and mortality from dredging activity at the site. Dredging activities may result in temporary increases in levels of suspended sediment in the footprint of the project and for some unknown distance downstream of the dredged area. This disturbance may also temporarily harass or scare potential host fish from the area.

Other direct effects to the rabbitsfoot and sheepsnose include, but are not limited to, habitat modifications such as changes in flow and dissolved oxygen concentrations due to increased turbidity, and sediment deposition which could bury mussels, especially juveniles, and cause injury and/or mortality. These effects could also restrict mussel respiration (e.g., suffocation due to inability to purge sediment from gills), limit feeding (e.g., starvation due to inability to eliminate sediment), and interfere with reproduction (e.g., abortion from stress, host fish absence during critical reproductive periods).

In summary, the following direct effects are anticipated:

1. Mortality that is the result of dredging activity. This action could damage (e.g., damaged shell or bruised animal), bury or crush rabbitsfoot and sheepsnose mussels.
2. Harm resulting from the dredging activity may result in mussel dislodgement, increased turbidity, flow alterations, sediment removal, sediment deposition, and decreased dissolved oxygen levels. This may impair the ability of these mussel species to respire, reproduce, and feed, reducing the fitness of individual mussels and the population.
3. Harassment in the form of induced stress from activities that result in, but not limited to, displacement of mussels during dredging activities, and degradation of remaining/adjacent habitat. This harassment could result in decreased ability of these species to respire, reproduce, and feed.

All of these direct effects can lead to reduced population levels for these mussel species in this portion of the Ohio River, which, in turn, can reduce their reproductive capacity.

Interdependent and interrelated activities occur because of, or in association with, the proposed project activities. These activities would include substrate disturbance from propeller wash, bank erosion from wave action, spills/debris as a result of barge traffic, and sediment disturbance from tugboat and barge activity at the site.

Indirect effects:

Indirect effects of this project on the rabbitsfoot and sheepsnose include:

- changes in fish host behavior and/or presence that could impact the ability of glochidia to attach to the fish at the proper time when released from the female mussel;
- changes in flow regimes and sediment transport in the action area;
- minor alteration of flow conditions and possibly riverbed substrate conditions at and downstream of the dredging activity;
- elevated levels of suspended sediment, sedimentation, altered flow patterns due to some disturbance of the area near the proposed project;
- injury to mussels or host fishes by noise, or other construction-related disturbances; and
- impacts to water quality and respiration, as well as effects to food sources and feeding capabilities.

In summary, the following indirect effects are anticipated:

1. Mortality of adult and juvenile mussels that results from a) live rabbitsfoot and sheepsnose mussels that may be placed in dredge spoils and later die due to dewatering and b) turbidity and changes in the flow regime from dredging activities involving redistributing sediments that smother mussels due to new deposition.
2. Harm in the form of decreased ability to respire, reproduce, and feed as a result of the redistribution of sediments resulting from changes in flow regimes. Dredging activity may affect turbidity, flows, dissolved oxygen levels, and the presence of host fish during the future reproductive seasons of these mussel species.

Species' response to a proposed action

Numbers of individuals/populations in the action area affected:

The total number of rabbitsfoot and sheepsnose mussels in the action area is not possible to accurately determine. Two mussel surveys have been conducted within the action area. Both surveys recorded one individual each of rabbitsfoot and sheepsnose. However, the exact number of these mussels in the project area is currently unknown. Based on the mussel assemblage and habitat conditions recorded during the survey, it is likely these species may occur in suitable habitat throughout the project area.

The survey conducted by Environmental Solutions, Inc. resulted in an estimated density of 2.7 ± 1.2 mussels per square meter (m^2) based on quantitative sampling (ESI 2015). A second survey by Lewis Environmental Consulting (LEC) did not conduct quantitative sampling thus no mussel density was calculated (LEC 2015). The rabbitsfoot and sheepsnose each represented 0.4% of all mussels found during the ESI survey and 0.02% of all mussels found during the Lewis Environmental survey. Using the estimated density of 2.7 ± 1.2 mussels/ m^2 and the total impact area of 2,190 m^2 , a range of 1-2 (LEC) and 13-34 (ESI) individuals of both rabbitsfoot and sheepsnose may be impacted by the dredging activity. Given the wide range, the Service estimates 7 individuals of each species may be taken, which is the average of the lower limits of the two studies.

It is not possible to accurately determine (or quantify) the indirect effects to these species in this area.

Sensitivity to change:

The degree to which the rabbitsfoot and sheepsnose are prone to change when disturbed is unknown. These species are thought to be relatively sedentary within the substrate. As a result, they are likely unable to respond to change by moving great distances; however, it is possible they could move several meters. When disturbed, mussels, in general, tend to close their valves for a period of time; however, this response will vary depending on the disturbance. Mussels exposed to disturbance events will likely close their valves when disturbed and remain closed if continued to be disturbed. They are not likely to move out of the area of disturbance on their own because of their inability to move great distances in a short period of time and because their valves will likely remain closed.

Resilience:

Resilience relates to the characteristics of populations or a species that allow them to recover from different magnitudes of disturbance. Assuming that the flow characteristics and habitat conditions in the action area are not appreciably changed, the magnitude of disturbance is expected to be low and resilience is not expected to change from its current level. However, this can only be determined through monitoring of the population and habitat over time.

Recovery rate:

In this biological opinion, the recovery rate relates to the time required for a rabbitsfoot and sheepsnose individual or population to return to equilibrium after exposure to a disturbance. Mussel populations are expected to continue to spawn and recruit new individuals into the population; however, the level of successful recruitment to the adult stage is unknown, especially in areas that may be subjected to repeated degradation (i.e., the shallow, near-shore areas). The recovery rate for these species is likely to vary within the action area.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Private actions in the vicinity of the action area are primarily urban and agriculture-related activities. We are reasonably certain these actions will continue and do not expect these activities to change appreciably in the future from current conditions. Effects from urban and agricultural activities on rabbitsfoot and sheepsnose could include increased sediment deposition, turbidity, and herbicide/pesticide levels in localized portions of the Ohio River. However, these effects, if they are occurring, are indeterminable. Private boating and commercial navigation activities also occur in the Ohio River and are expected to continue, but they are not expected to result in additional adverse effects even though they could potentially result in increased turbidity, physical disruption of habitat, and spills of petroleum products. Essentially, we cannot predict that these specific types of adverse effects will occur.

We are not aware of any other State, tribal or local actions to include under cumulative effects.

CONCLUSION

After reviewing the current status of the rabbitsfoot and sheepsnose, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of these species, and is not likely to destroy or adversely modify designated critical habitat for the rabbitsfoot mussel since none occurs in the area.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as 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 the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the USACE so that they become binding conditions of any grant, permits or contracts, as appropriate, for the exemption in section 7(o)(2) to apply. The USACE has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the USACE (1) fails to assume and implement the terms and conditions or (2) fails to require the Permittee to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the grant, permit or contract, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the USACE must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement [50 CFR § 402.14 (1)(3)].

AMOUNT OR EXTENT OF TAKE

The Service expects that approximately 0.5 acres of mussel habitat could be taken as a result of this proposed action. Indirect impacts include potential long-term sedimentation and habitat disturbance from the proposed project.

The Service expects that seven (7) rabbitsfoot and seven (7) sheepnose will be taken as a result of this proposed action. The take provided is set based on results of the two mussel surveys conducted in the action area, as described in the biological opinion.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of expected take is not likely to result in jeopardy to the species or result in the destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize take of these two species.

1. The USACE shall have a Special Condition in the DA permit stating that the project will occur as designed, planned, and documented in the BA, the addendum to the BA dated June 9, 2016, and this biological opinion.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the Act, the USACE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. The PCPA must agree to implement the proposed action as described in the BA and the addendum to the BA. This Term and Condition supports RPM 1.
2. Prior to dredging activities, the PCPA will have a qualified biologist relocate mussels from within the entire dredge area. A mussel relocation plan will be submitted to the USFWS and Indiana Department of Natural Resources for review prior to conducting the mussel relocation. The mussel relocation will be performed within six months prior to the dredging activities. The mussel relocation will be performed when the water temperature exceeds 60° F and during the low water season, typically occurring from May to November. To minimize impacts to mussels, all mussels located within the dredge area will be removed prior to commencement of dredging activities. The mussels will be relocated to an area of suitable habitat outside of the project footprint area. This Term and Condition supports RPM 1.
3. The PCPA shall reduce impacts from the dredging activity by using a sediment curtain deployed as a perimeter control around the active dredging area to contain sediment within the work zone. This Term and Condition supports RPM 1.
4. The PCPA shall contribute \$17,500.00 to the Kentucky Waterways Alliance (KWA) Kentucky Aquatic Resources Fund (KARF) following issuance of this biological opinion and prior to any dredging as related to this project. These funds will be used in recovery efforts for the two federally listed mussels addressed in this biological opinion,

thereby minimizing the take expected to occur on this project.

To derive the figure of \$17,500.00, we estimated an amount that could be applied towards an approximately three year effort to replace the mussels estimated to be taken. These funds will be used to collect adult mussels and fish hosts, care for adult mussels and fish, propagate and culture juvenile mussels, and to monitor recovery efforts. Rabbitsfoot: For the seven (7) rabbitsfoot taken, we estimated \$500.00 per individual. Some considerations involved in determining this cost include: (a) there is an anticipated low cost to locate adults, (b) the species is a short term brooder and easily aborts larvae when handled; (c) there has been previous success on fish host identification with this species; (d) there has been previous success on propagation and culture with this species; and (e) little is known regarding how this species will respond to captivity. However, given these factors, we expect a relatively low cost to locate adults to use for propagation and culture. Sheepnose: For the seven (7) sheepnose taken, we estimated \$2,000.00 per individual. Considerations involved in deriving this amount include: (a) there is an anticipated high cost to locate adults; (b) the species is a short term brooder and easily aborts larvae when handled; (c) there has been previous success on fish host identification with this species; (d) there has been previous success on propagation and culture with this species; and (e) little is known regarding how this species will respond to captivity. As a result, the cost to collect and propagate sheepnose is substantially higher than for the other species.

The contribution shall be made using certified funds and should be made out to – "Kentucky Waterways Alliance" – with KARF and any other appropriate details in the memo section. The contribution shall be mailed to: Attention: Judith Petersen, Executive Director, Kentucky Waterways Alliance, 120 Webster Street, Suite 217, Louisville, Kentucky 40206. The Kentucky Waterways Alliance's office telephone number is 270-524-1774. Contact Ms. Petersen if the contribution will be made by direct deposit or a wire transfer. This Term and Condition supports RPM 1.

Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Bloomington, Indiana Ecological Services Field Office at 620 S. Walker Street, Bloomington, Indiana 47403 (phone (812) 334-4261). Care should be taken in handling sick or injured mussels. All federally listed mussels that are moribund or have died recently are to be preserved according to standard museum practices (preferably kept frozen and/or preserved in 95% ethyl alcohol and then frozen), properly identified or indexed (date of collection, complete scientific and common name, latitude and longitude of collection site, description of collection site), and submitted to the Bloomington, Indiana Ecological Services Field Office, or to another location if instructed by the Service.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than seven (7) rabbitsfoot and seven (7) sheepnose will be incidentally taken. If during the course of the action, this level of incidental take is exceeded; such incidental take represents new information requiring re-initiation of consultation and review of the reasonable and prudent measures provided. In addition, if any other federally listed mussels are recorded during the mussel relocation activities, re-initiation of consultation and review

of the reasonable and prudent measures provided is required. The USACE must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATION

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

The USACE should consider implementing the following conservation recommendation: Provide financial assistance to the Kentucky Department of Fish and Wildlife Resources Center for Mollusk Conservation (CMC) to support programs that work to restore federally listed mussels and other native mussels in the lower Ohio River. Such assistance could take the form of protecting or enhancing similar habitat and/or providing funding to the CMC facility to propagate federally listed mussels and other native mussels.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, please provide notification to the Service's Bloomington, Indiana Ecological Services Field Office of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation with the USACE on the Perry County Port Authority dredging project for the federally threatened rabbitsfoot mussel and federally endangered sheepsnose mussel. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

For this biological opinion, the incidental take would be exceeded when the take exceeds seven (7) rabbitsfoot and seven (7) sheepsnose which is what has been exempted from the prohibitions of section 9 by this biological opinion.

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APPENDIX A

Rabbitsfoot (*Quadrula cylindrica cylindrica*) biological and/or conference opinions including amount and form of take exempted.

PROJECTS	SERVICE OFFICE AND DATE BO ISSUED	INCIDENTAL TAKE (IT) FORM	TAKE EXEMPTED or SURROGATE MEASURE TO MONITOR
Final Biological and Conference Opinions: Proposed Approval and Participation of Conservation Memorandum of Agreement with Crestwood Midstream Partners LP, to Provide Recovery Benefits for the Speckled Pocketbook (<i>Lampsilis streckeri</i>), Rabbitsfoot (<i>Quadrula cylindrica cylindrica</i>), and Yellowcheek Darter (<i>Etheostoma moorei</i>).	Arkansas Ecological Services Field Office on January 15, 2010 and an amendment to it prepared on March 11, 2011	Provided in the form of acres	Incidental take for rabbitsfoot was not provided as a number of individuals; however, authorized take would be considered exceeded when the take exceeded 256 acres and/or ephemeral and intermittent stream crossings in any one year or 1,280 acres and 875 stream crossings over a period extending from 2010 – 2014
Biological Opinion on Tennessee Department of Transportation's State Route 50 Bridge replacement over the Duck River at River Mile 64 in Hickman County, TN.	Cookeville Field Office in Cookeville, Tennessee, November 13, 2013	Provided as direct mortality, injury or harassment, increased vulnerability to disease and reduced ability to feed and/or respire.	All individuals in 14.46 acre area.
Wolf Pen Gap Trail on Ouachita National Forest and several mussel species.	Arkansas Field Office, December 19, 2013	Provided in form of tons of sediment (1,077 tons) per year.	Difficult to determine so used sedimentation rate as measure.

Westlake Vinyls, Inc., BO at Tennessee River Mile 17.8-18.0 in Marshall County, KY and effects on listed mussels.	Kentucky Field Office, July 30, 2013	Direct and Indirect impacts.	Provided for take of 21 individuals. In addition, the Service expects 0.73 acres of habitat could be taken as a result of this action. The amount of area taken due to indirect impacts from project operation, potential long-term sedimentation, and habitat disturbance is unknown.
Biological Opinion on Effects of PA Dept. of Transportation Bridge Replacement and Maintenance Program on several listed mussels in Pennsylvania	Pennsylvania Field Office, December 13, 2013	Harm and harassment through mortality, injury, and stress	Provided for take of 86 individuals
Amended BO and Conference Opinion on Mead Avenue Bridge replacement project in Crawford Co., PA	Pennsylvania Field Office, February 26, 2014	Direct and Indirect effects from streambed disturbance.	Provided for take of 95 individuals
Biological Opinion for the Huntsville Utilities SE Water Treatment Plan, Paint Rock River Crossing	Alabama Field Office June 25, 2015	Direct and Indirect effects from streambed disturbance.	Provided for take of 10 individuals
Biological Opinion for the TVA Shawnee Fossil Plant Mooring Cell Removal/Restoration at ORM 946, McCracken County, KY	Kentucky Field Office, October 2, 2015	Direct and indirect effects from construction and repair of mooring cells	Provided for take of 1 individual and 32.1 acres critical habitat

APPENDIX B

Sheepnose (*Plethobasus cyphus*) biological opinions including amount and form of incidental take exempted.

PROJECTS	SERVICE OFFICE AND DATE BO ISSUED	INCIDENTAL TAKE (IT) FORM	TAKE EXEMPTED or SURROGATE MEASURE TO MONITOR
Biological Opinion and Incidental Take Statement for Fanshell (<i>Cyprogenia stegaria</i>), Pink Mucket Pearly Mussel (<i>Lampsilis abrupta</i>), Snuffbox (<i>Epioblasma triquetra</i>), and Sheepnose (<i>Plethobasus cyphus</i>) at the Ohio Department of Transportation Ironton- Russell Bridge Replacement Project (LAW-93C-O.00, PID 81595) in Lawrence County, Ohio	Ohio Ecological Services Office- 2011	Harm and Harassment	Undeterminable but provided a take of 6 individuals.
Biological Opinion and on Proposed State Route 70 (Kyles Ford) Bridge replacement over the Clinch River in Hancock County, Tennessee	Cookeville Field Office in Cookeville, Tennessee, April 9, 2014	Harassment	Undeterminable but provided for up to 50 percent of the species.
Westlake Vinyls, Inc., BO at Tennessee River Mile 17.8-18.0 in Marshall County, KY and effects on listed mussels.	Kentucky Field Office, July 30, 2013	Direct and Indirect impacts	Provided for take of 7 individuals.
Biological Opinion on Effects of PA Dept. of Transportation Bridge Replacement and Maintenance Program on several listed mussels in Pennsylvania	Pennsylvania Field Office, December 13, 2013	Harm and harassment through mortality, injury, and stress	Provided for take of 86 individuals

West Virginia American Water, Pratt Waterline, Kanawha Co., WV	West Virginia Field Office, Set 27, 2013	Mortality, injury, stress, reproductive impairment	Provided take of 3 individuals.
Biological Opinion on Hunter Station Bridge Replacement in Forest County, PA	Pennsylvania Field Office, November 18, 2013	Killing, harm and harassment from stress, reproductive impairment, changes in hydrology, scour and deposition	Provided take of 103 individuals.
Proposed State Route 70 (Kyles Ford) Bridge Replacement over the Clinch River in Hancock County, Tennessee	Cookeville Field Office, April 9, 2014	Harassment through interference of normal activities	Provided take of 196 individuals
Biological Opinion on James Marine Project on Tennessee River at TRM 12.5-13.5, Marshall Co., KY	Kentucky Field Office, June 20, 2014	Mortality from direct physical impact, dislodgement, turbidity, flow alterations, sediment deposition and/or removal, degradation of habitat.	Provided take of four individuals
Biological Opinion and Conference Opinion for the Pre-Coat Metals Project at ORM 726.2, Hancock County, KY	Kentucky Field Office, March 9, 2015	Direct and indirect effects from disturbance of substrate	Provided for take of 3 individuals
Amended Biological Opinion for the Pre-Coat Metals Project at ORM 726.2, Hancock County, KY	Kentucky Field Office, July 22, 2015	Direct and indirect effects from disturbance of substrate	Provided for take of 6 individuals

Biological Opinion for the TVA Shawnee Fossil Plant Mooring Cell Removal/Restoration at ORM 946, McCracken County, KY	Kentucky Field Office, October 2, 2015	Direct and indirect effects from construction and repair of mooring cells	Provided for take of 1 individual
Biological Opinion for the AEP Rockport maintenance dredging project at ORM 744-745.5, Spencer County, IN and Daviess County, KY	Kentucky Field Office, January 21, 2016	Direct and indirect effects from maintenance dredging	Provided for take of 15 individuals