



United States Department of the Interior Fish and Wildlife Service



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June 18, 2018

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

RE: Endangered Species Act Formal Consultation for the proposed Evansville Marine Service, Inc. barge fleetling (LRL-2016-1070) that May Affect Sheepnose Mussels in the Ohio River, Spencer County, Indiana.

Dear Mr. Baldrige,

This document transmits the U.S. Fish and Wildlife Service's (Service's) final Biological Opinion (BO) based on our review of the Evansville Marine Service, Inc. project that may impact the 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 request for formal consultation was received on March 9, 2018. The Biological Opinion is based on information provided in the February 2018 Biological Assessment (BA), the August 2017 mussel survey report, and other available literature. A complete administrative record of this consultation is on file at this office.

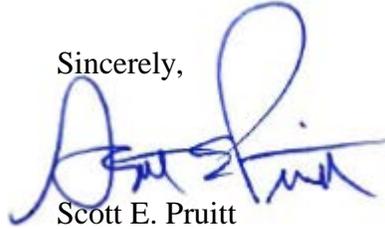
The enclosed BO addresses effects of the project, which the U.S. Army Corps of Engineers determined were "likely to adversely affect" (LAA) the sheepnose mussel. Included in your BA were determinations of "not likely to adversely affect" for all other federally listed species that may occur in the area.

This BO specifically covers the Evansville Marine Service, Inc. barge fleetling project for which the Service concurred was likely to adversely affect the 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 sheepnose and an analysis of potential effects of the actions to this species, it is our determination that this project is not likely to jeopardize the continued existence of the sheepnose mussel.

This concludes formal consultation on the Evansville Marine Service, Inc. barge fleetling 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. 215 or Marissa_Reed@fws.gov.

Sincerely,

A handwritten signature in blue ink, appearing to read "Scott Pruitt", with a large, stylized loop at the end of the name.

Scott E. Pruitt
Field Supervisor

Enclosure

Biological Opinion

**Impacts to the Sheepnose Mussel
from the
Evansville Marine Service, Inc. Project
in the Ohio River (ORM 748.5-749.5)
Spencer County, Indiana**



Prepared by:

U.S. Fish and Wildlife Service
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620 S. Walker Street
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June 18, 2018

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CONSULTATION HISTORY

This section lists key events and correspondence during the course of this consultation. A complete administrative record of this consultation is on file in the Service's Indiana Field Office.

January 23, 2017 –USACE issues a Public Notice for the proposed barge fleeting facility at Evansville Marine Service, Inc. in Spencer County, Indiana.

February 13, 2017 – INFO, in coordination with the Kentucky Field Office (KFO), responded to the Public Notice 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.

August 24, 2017 – INFO received a mussel survey plan from Lewis Environmental Consulting, LLC.

August 30, 2017 – INFO provided a concurrence letter to conduct mussel surveys in the project area as proposed in the mussel survey plan.

September 19, 2017 – INFO received letter from USACE requesting informal consultation on the barge fleeting project for federally listed mussels. The USACE's letter included the mussel survey report.

September 28, 2017 – INFO sent the USACE a letter acknowledging receipt of their request. INFO notified the USACE that the Service does not concur with a may affect, not likely to adversely affect determination for the sheepsnose mussel.

March 9, 2018 – INFO received letter from USACE requesting formal consultation on the barge fleeting project for the sheepsnose mussel. The USACE's letter included a biological assessment describing potential impacts to the sheepsnose mussel.

March 28, 2018 – INFO sent the USACE a letter acknowledging receipt of their request and BA and that formal consultation on the sheepsnose mussel had been initiated (starting on 9 March) on the barge fleeting project.

June 8, 2018 – INFO submits draft biological opinion to the USACE for review.

June 18, 2018 – INFO issued its final biological opinion to the USACE.

BIOLOGICAL OPINION

INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion based on our review of the *Biological Assessment for Evansville Marine Service, Ohio River Mile 748.5 – 749.5 RDB* (hereafter referred to as the BA). The BA was received at the Service's Indiana Ecological Services Field Office (INFO) on March 9, 2018 as part of a letter requesting us to initiate formal consultation on potential adverse effects on the sheepsnose mussel. The U.S. Army Corps of Engineers (USACE) determined that all activities addressed in the BA are not likely to adversely affect all other federally-listed species in the area. A may affect, likely to adversely affect determination was made for the 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 ensure 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 construction of a barge fleeting facility in the Ohio River associated with the Evansville Marine Service, Inc. project in Spencer County, Indiana.

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 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 Rivers and Harbors Act of 1899 Section 10 permit for the proposed construction of a barge fleeting facility in the Ohio River in Spencer County, Indiana.

Evansville Marine Service, Inc. proposes to construct and maintain a barge fleeting facility between Ohio River Miles 748.5 to 749.5 along the right descending bank near Rockport, Spencer County, Indiana. The proposed fleeting area will cover approximately 5,249 feet (1.0 mile) of shoreline. Six mooring stations would be installed along the bank. Each mooring station would consist of a buried concrete deadman anchor with steel chains and shackles, steel cables, and mooring buoys. The deadman anchors would be installed approximately 15 feet from the defined top of bank. The depth of each deadman anchor would be approximately five feet deep to the top and 11 feet deep to the bottom. Excavation for the deadman anchors and steel cables would be performed in a manner to minimize the amount of surface disturbance, and appropriate measures would be implemented to prevent the discharge of material in to the river channel. The barge fleeting would consist of a proposed capacity of 144 barges, with barges typically being moored six abreast and five deep between each set of deadman anchors, with the exception of the downstream fleet, which would be configured as six abreast and four deep between the deadman anchors. The proposed fleeting area would extend a distance of 235 feet out from the shoreline.

1.1. Action Area

For purposes of consultation under ESA §7, 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” (50 CFR §402.02). The Service considers the action area to be the proposed project area as described in the BA. The action area includes the maximum footprint size of the proposed barge fleeting area ranging from approximate ORM 748.5 to 749.5, encompassing approximately 30 acres. This maximum area of direct impact spans approximately 235 feet wide and 5,249 feet long.

1.2. Conservation Measures

Evansville Marine Service, Inc. has incorporated conservation measures into the proposed project; these measures are designed to avoid, minimize, and mitigate impacts of the proposed action on the sheepnose 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. All equipment maintenance will be conducted away from the river, whenever possible.

Fuel storage shall be contained/maintained in an area where leakage and spilling into the river will be avoided.

2. Excavation for the deadman anchors and steel cables would be performed in a manner to minimize the amount of surface disturbance, and appropriate measures would be implemented to prevent the discharge of material into the river channel. During excavation, temporary silt fence will be installed around each deadman anchor site during excavation and installation. Extreme caution will be exercised during excavation/installation activities to prevent sediment from being washed into the Ohio River.
3. The towboat will be operated at as low of RPM's as practicable when approaching and leaving the work site to minimize river bottom scouring and downstream siltation.
4. Fleeting arrangements will be configured so that loaded barges will be positioned in the deeper areas of the fleeting area and empty barges will be positioned in the shallower areas of the fleeting area.

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 the listed mussel, 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.

1.3.Action Components

The Service's evaluation of the proposed barge fleeting project resulted in the identification of two activities that may result in negative impacts to the federally endangered sheepsnose mussel: (1) tow boat operation, and (2) barge mooring.

1.3.1. Action Component 1: Tow Boat Operation

Tow boats will be used to position the crane barge to install the anchor system and to position barges to the deadman anchors. Tow boats produce propeller wash, which is a strong under current caused by the boats' engines and can result in water turbulence for some distance behind a tow boat. In shallow water, propeller wash can disturb channel substrates.

Based on our evaluation of the proposed tow boat activities, this activity is likely to result in the following stressors on the sheepsnose: sediment disturbance and water quality degradation. These stressors and their effects on the sheepsnose are discussed in section 5.

1.3.2. Action Component 2: Barge Mooring

Use of deadman anchors allows the shoreline row of barges to rest against the river bottom, which can cause destabilization of the river bank, compaction of sediment, and directly affect the flow of water along the river bottom. Barges moving while contact is made with the river bottom can cause destabilization of the river bottom, destabilization of mussel habitat, and downstream siltation.

Based on our evaluation of barge mooring, this activity is likely to result in the following stressors on the sheepsnose: direct mortality, sediment disturbance, and water quality degradation. These stressors and their effects on the sheepsnose are discussed in section 5.

1.4. Interrelated and Interdependent Actions

A biological opinion evaluates the effects of a proposed federal action. For purposes of consultation under ESA §7, the effects of a federal action on listed species or critical habitat include the direct and indirect effects caused by the action, plus the direct and indirect effects caused by interrelated or interdependent actions. “Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration” (50 CFR §402.02).

In its request for consultation, the USACE did not describe, and the Service is not aware of, any interrelated or interdependent actions to the proposed barge fleeting facility. Therefore, this biological opinion does not further address the topic of interrelated or interdependent actions.

1.5. Figures for Proposed Action

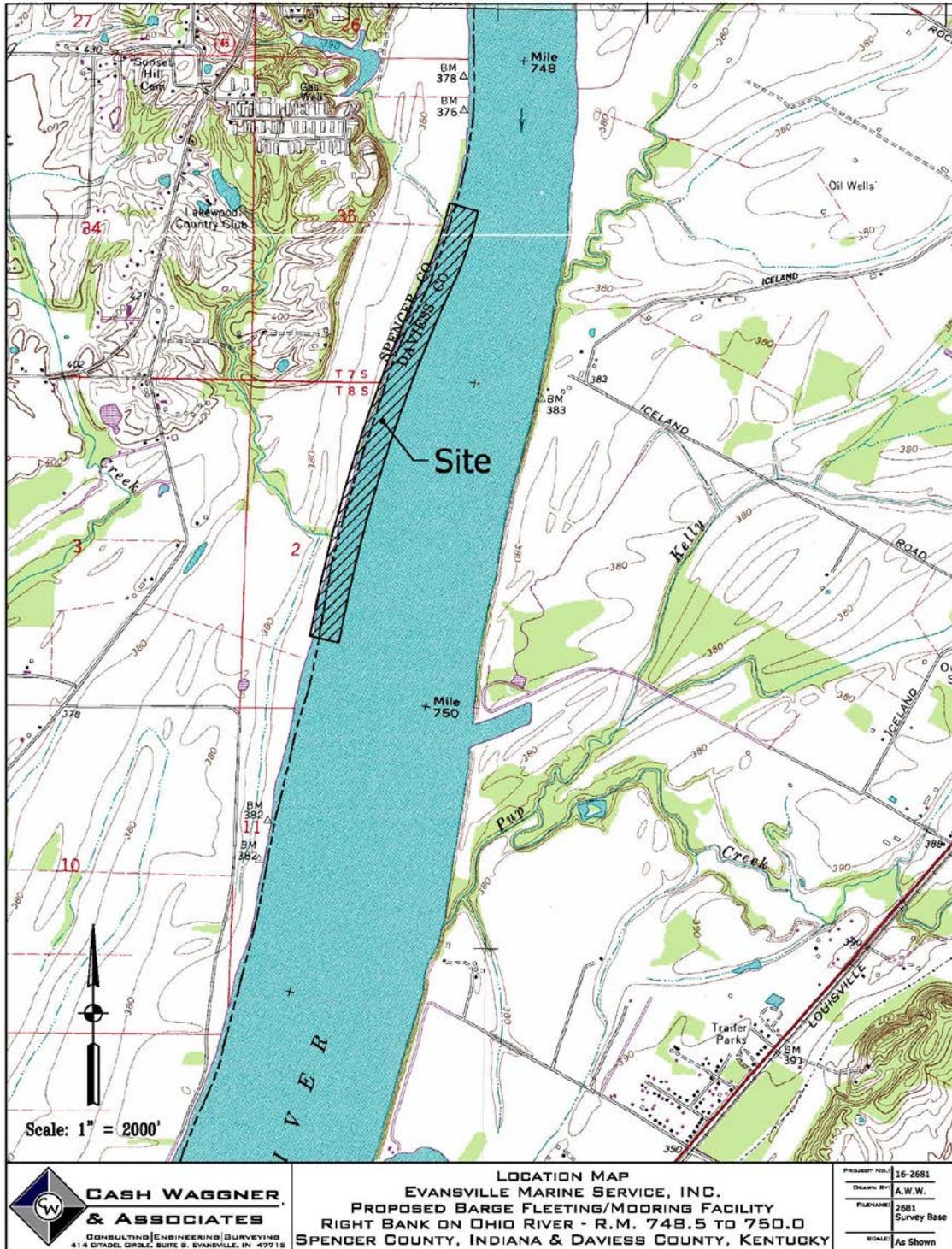


Figure 1: Project Area

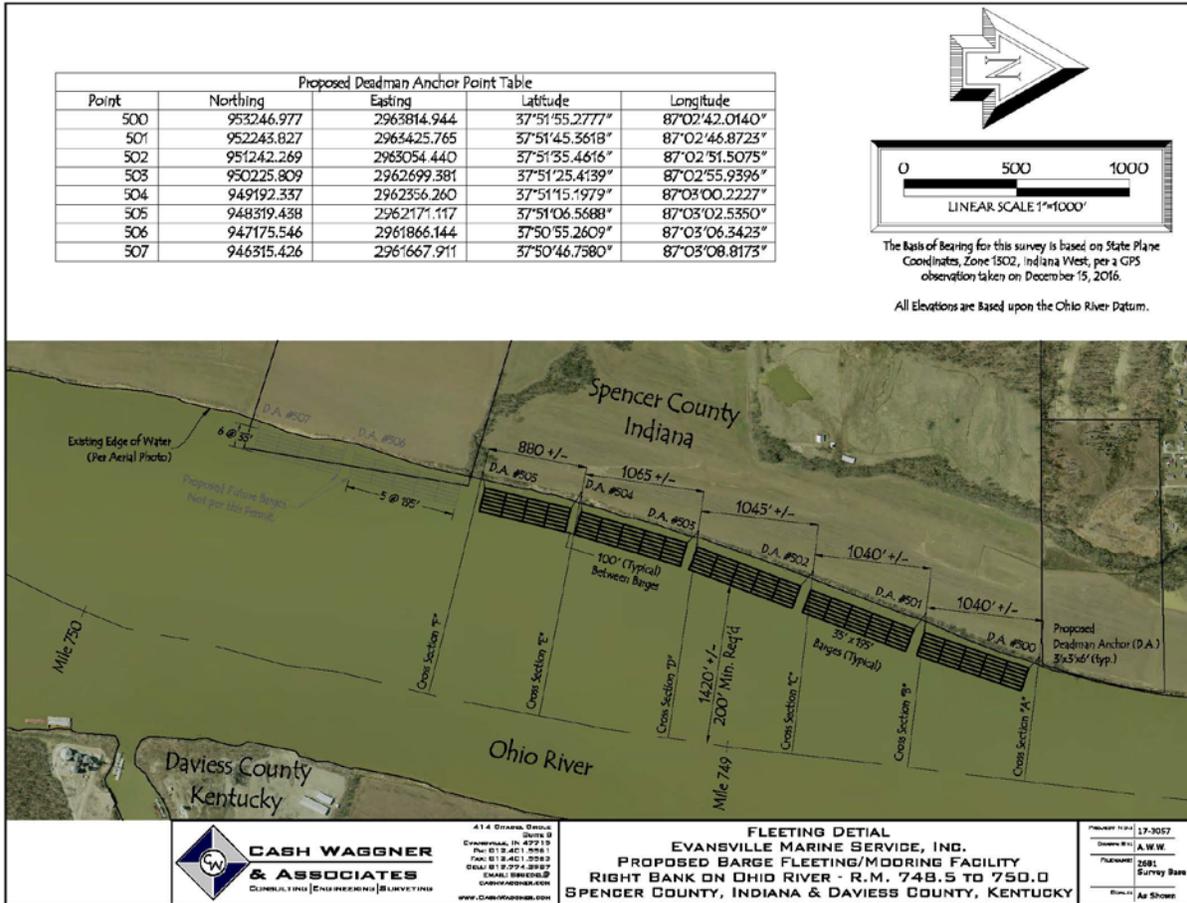


Figure 2: Action Area showing barge fleet configuration.

STATUS OF THE SPECIES

This section summarizes best available data about the biology and current status of the sheepnose mussel (*Plethobasus cyphus*) throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to list the sheepnose as endangered on March 13, 2012 (77 FR 14914-14945).

1.6.Species Description

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 (Parmalee and Bogan 1998).

1.7.Life History

The sheepnose 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 (Oesch 1984 and Parmalee and Bogan 1998). The life span of the sheepnose is thought to be about 21 to 25 years. Age at sexual maturity is unknown but is estimated at about 3 years (Butler 2003). 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). 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 (Butler 2003). Critical habitat for this species has not been designated.

1.8.Numbers, Reproduction, and Distribution

Little is known on the population dynamics of the sheepnose. This species is known from the Mississippi, Ohio, Cumberland, and 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, and has been eliminated from long reaches in streams in which it currently occurs. Surveys conducted within the last 5-10 years in the lower Ohio River that have recorded this species, are usually targeted at specific projects (e.g., fleeting areas, loading/unloading facilities, Corps dredging needs, and sand and gravel dredging operations). Based on these more recent records, it appears the sheepnose may be somewhat more common than previously believed in this reach of river, but no quantitative assessment is available. 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.

1.9. Threats

The decline of the sheepsnose is primarily the result of habitat loss and degradation from 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 sheepsnose 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 sheepsnose 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 sheepsnose 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 5) 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.

The zebra mussel, an exotic species that colonizes the shells of native mussels, is a relatively new threat to mussels including the 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 the 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.

ENVIRONMENTAL BASELINE

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the sheepsnose, its habitat, and ecosystem within the Action Area. The environmental baseline is a “snapshot” of the species’ health in the Action Area at the time of the consultation, and does not include the effects of the Action under review.

1.10. Action Area Numbers, Reproduction, and Distribution

As stated in the 2017 mussel survey report (LEC 2017), no individuals of federally endangered mussels were encountered during the mussel survey. However, recent data shows that the sheepsnose mussel occurs in the majority of the mussel beds within the Newburgh Pool of the Ohio River. Based on the number of species collected and the abundance of mussels through portions of the survey area, it is possible that this listed mussel species could occur in the area. This survey area covered approximately 3,375 m² during the transect and qualitative searches and no individuals of this species were collected. In the majority of the Newburgh Pool mussel beds it took much less survey effort than that to locate individuals of *Plethobasus cyphus*, which would indicate that if *Plethobasus cyphus* does occur within the fleeting area, it is likely to be found in low numbers compared to the other mussel beds based on the fact that no individuals were located over a large survey area. Even in the mussel beds where sheepsnose are known to exist, they occur at very low densities (Table 1).

Table 1: Estimated density of *Plethobasus cyphus* in the Newburgh Pool mussel beds.

Sample Year	Newburgh Pool River Mile	Area Sampled (m ²)	# Sheepsnose	Area Searched per Sheepsnose (m ²)	Estimated Density
2014	ORM 726	713	1	713	0.0014
2015	ORM 773	613	2	306	0.0033
2015	ORM 734	4463	15	298	0.0034
2015	ORM 725	3560	1	3560	0.0003
2015	ORM 725	5345	3	1782	0.0006
2015	ORM 760	4520	1	4520	0.0002
2016	ORM 740	1898	3	633	0.0016
2017	ORM 747	575	2	288	0.0035
2017	ORM 744	1043	4	261	0.0038
Estimated Mean Density of Sheepsnose in the Newburgh Beds where Sheepsnose were Present					0.0020

Table 1 shows that in the majority of the mussel beds, it took less than 1,000 square meters of search effort before individuals of *Plethobasus cyphus* were collected. Three of the mussel beds required between 1,782 – 4,520 square meters of search effort to locate *Plethobasus cyphus*; however, the density of *Plethobasus cyphus* were very low in each of these instances (Table 1). Overall, the estimated mean density of *Plethobasus cyphus* within the Newburgh Pool mussel beds is low at 0.002 per square meter (Table 1). In the three mussel beds where much larger search efforts were required to locate *Plethobasus cyphus*, estimated density of *Plethobasus cyphus* ranged from 0.0002 – 0.0006 and average density was five times less than the other sites at 0.0004 per square meter. It would be expected that the Evansville Marine Service site would be less likely to hold *Plethobasus cyphus* than these nine areas based on

historical impacts to the site from previous fleeting activities, less desirable habitat in many areas of the site, and a different mussel species composition than the majority of these sites. Based on these factors, it is estimated that the density of *Plethobasus cyphus* at the Evansville Marine Service site would be at or less than the lowest density observed in the other mussel beds, therefore it is assumed that the density of *Plethobasus cyphus* at the site would not exceed 0.0002 per square meter. Based on this estimate, it would be possible that there could be as many as 24 *Plethobasus cyphus* present within the 120,096 square meter fleeting area.

1.11. Factors Affecting the Species within the Action Area

Substrate Conditions

The habitat conditions within the action area consist primarily of clay, sand, and a silt, sand, and gravel mixture.

Water Quality

Another factor potentially affecting the species' environment in the action area includes the makeup of water quality from upstream of the site, including possible contaminants from urban runoff, sewer outfalls, and industrial complexes located upstream and downstream of the site.

Dam

Cannelton Locks and Dam started operation when dam construction was finished in 1966. This barrier on the river may impact host fish movement upstream and downstream, possibly limiting the amount of contact between fish and mussels at times when a gravid mussel is ready to release larvae. By preventing upstream movement, it is possible that the dam could cause a fish host to slow its movement upstream, and spend more time just downstream of the dam, thereby increasing its contact time with a mussel.

Barge Traffic

Barge traffic moves both upstream and downstream of the project site. The Service is not aware of any large spills from barges in recent years (i.e., 15 years) that have impacted mussels in the action area.

Other activities

Private actions that may impact the action area are primarily urban runoff and point source releases from the city and industries and agriculture-related activities, such as row crop farming, that may increase sedimentation and turbidity. Private boating and commercial navigation activities also occur in the Ohio River and are expected to continue. 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 mussels 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.

EFFECTS OF THE ACTION

This section analyzes the direct and indirect effects of the Action on the sheepsnose, which includes the direct and indirect effects of interrelated and interdependent actions. Direct effects are caused by the Action and occur at the same time and place. Indirect effects are caused by the Action, but are later in time and reasonably certain to occur. Our analyses are organized by

stressors and include those stressors identified as resulting from the Action Components described in section 1 of this biological opinion as summarized in the table below:

Table 2: Stressor by Action Component

Stressor	<i>Tow Boat Operation</i>	<i>Barge Mooring</i>
Sediment Disturbance	X	X
Water Quality Degradation	X	X
Direct Mortality		X

1.12. Stressor 1: Sediment Disturbance

Mussels may be affected by the movement and placement of barges within the fleeting area. Deadman anchor systems allow the shoreline row of barges to rest against the river bottom, potentially leading to erosion, destabilization of the river bank, and downstream siltation. Towboats will be used to move empty and loaded barges to and from the deadman anchors. When the tow boats are operating in shallow water, their propeller wash has the potential to impact sheepsnose by disturbing the river substrate resulting in substrate being removed in some locations and deposited in others.

Pathway 1

Stressor – Sediment disturbance

Exposure (time) – Year-round, whenever operating, for life of the project

Exposure (space) – Shallow portion of mooring area

Resource affected – Individuals (larvae, juveniles, adults), and habitat

Individual response – Harm

Interpretation – The barges resting on the river bottom could cause compaction of sediment. Barges moving while contact is made with the river bottom can cause destabilization of the river bottom, destabilization of mussel habitat, and downstream siltation. Towboat operation causes propeller wash, which can impact the river bottom habitat for mussels, can dislodge substrate, and can cause downstream siltation.

1.13. Stressor 2: Water Quality Degradation

Tow boats when operating in shallow water are likely to disturb substrate by propeller wash. Barges resting on the river bottom or close to the river bottom can directly affect the flow of river water along the river bottom. These activities may cause a local degradation of water quality in the form of increased turbidity and decreased dissolved oxygen levels.

Pathway 2

Stressor – Water quality degradation

Exposure (time) – Year-round, whenever operating, for life of the project

Exposure (space) – Shallow portions of the mooring area

Resource affected – Individuals (larvae, juveniles, adults)

Individual response – Harm

Interpretation – Water quality degradation may impair the ability of mussels to respire, reproduce, and feed, reducing the fitness of individual mussels and the population (Watters

2009). Loss of flow can result in the reduction of dissolved oxygen, at the sediment-water interface, which directly affects the respiratory efficiency of mussels. This stressor will be distributed across the action area wherever tow boat operations is conducted. The exposure to this stressor is expected to occur periodically over the duration of the project whenever mussels are encountered.

1.14. Stressor 3: Direct Mortality

Deadman anchor systems allow the shoreline row of barges to rest against the river bottom. The barges resting on the river bottom could cause compaction of sediment and direct mortality of mussels.

Pathway 3

Stressor – direct mortality

Exposure (time) – Year-round, whenever operating, for life of the project

Exposure (space) – Shallow portions of the mooring area

Resource affected – Individuals (juveniles and adults)

Individual response – Harm

Interpretation –This stressor will be distributed across the action area wherever the barges rest on the river bottom. Both adult and juvenile mussels could be affected. The exposure to this stressor is expected to occur periodically over the duration of the project whenever sheepnose mussels are encountered.

1.14.1. Summary of the Effects of the Action on Sheepnose Mussel

No wholly beneficial effects have been identified or are expected to occur as a result of the Action.

Sheepnose mussels are likely to be directly and/or indirectly affected by the proposed action resulting in harm. The following effects of the action by stressor, are summarized in the table below.

Table 5: Form of Incidental Take

Stressor	Action Component		Form of Incidental Take
	<i>Tow Boat Operation</i>	<i>Barge Mooring</i>	
Sediment Disturbance	X	X	X
Water Quality Degradation	X	X	X
Direct Mortality		X	X

These direct and indirect effects can lead to reduced population levels of the sheepnose mussel in this portion of the Ohio River, which, in turn, can reduce their reproductive capacity.

CUMULATIVE EFFECTS

For purposes of consultation under ESA §7, cumulative effects are those caused by future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the proposed action are not considered, because they require separate consultation under §7 of the ESA. We are not aware of any other State, tribal or local actions to include under cumulative effects.

CONCLUSION

“*Jeopardize the continued existence*” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02). After reviewing the current status of the species, the environmental baseline for the Action Area, the effects of the Action and the cumulative effects, it is the Service’s biological opinion that the Action is not likely to jeopardize the continued existence of the sheepsnose.

This determination is based on several factors: (a) The mussel survey results showed low numbers of individuals that could be adversely affected within the project area, and these survey results are similar to other survey results in other areas near the action area that contain habitat suitable for the species; (b) This species continues to persist in the Ohio River and other portions of its range, often at higher population levels than those observed within the action area; and (c) The conservation measures will minimize the likelihood of mortality and other population effects by limiting the impact of barge fleeting activities to the defined fleeting area. In addition, the contribution of funds to use for mussel propagation and culture will assist in recovery of this listed mussel in the Ohio River.

INCIDENTAL TAKE STATEMENT

ESA §9 and regulations issued under §4(d) prohibit the take of endangered and threatened species, respectively, without special exemption. The term “take” in the ESA means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” The Service defines “harass” as an intentional or negligent act or omission that 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. The Service defines “harm” as an act that actually kills or injures wildlife, including significant habitat modification or degradation that significantly impairs essential behavioral patterns, such as 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 ESA §7(b)(4) and §7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered prohibited, provided that such taking is in compliance with the terms and conditions of an incidental take statement (ITS).

For the exemption in ESA §7(o)(2) to apply to the Action considered in this biological opinion, the USACE must undertake the non-discretionary measures described in this ITS, and these measures must become binding conditions of any permit, contract, or grant issued for

implementing the Action. The USACE has a continuing duty to regulate the activity covered by this ITS. The protective coverage of §7(o)(2) may lapse if the Corps fails to:

- (a) Assume and implement the terms and conditions; or
- (b) Require a permittee, contractor, or grantee to adhere to the terms and conditions of the ITS through enforceable terms that are added to the permit, contract, or grant document.

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 this ITS.

1.15. Amount or Extent of Take

This section specifies the amount or extent of take of sheepnose that the Action is reasonably certain to cause, which we estimated in the “Effects of the Action” section(s) of this biological opinion.

Of the 120,096 square meters that will be utilized by the fleeing area, a large portion contains unfavorable habitat for sheepnose, or mussels in general (Table 4). The area from 0 – 20 meters from shore, which accounts for 29% of the area, would be unlikely to hold individual sheepnose because of poor habitat conditions and an assemblage of species that resides in lower quality habitats. The remaining area from 20 – 70 meters off shore had 16 sections (19% of the area) with no mussels and another 10 sections (12% of the area) with very few mussels because of heavy timber debris or unfavorable habitat, such as loose substrate, consolidated substrate, or conglomerate rock. Based on this, 40% of the area had suitable habitat and the diverse assemblage of mussel species where it would be likely to encounter individuals of *Plethobasus cyphus*. With habitat taken into account and considering that only 40% of the 120,096 square meter area would be likely to contain sheepnose, it results in 48,038 square meters of favorable habitat that may contain 10 individuals of *Plethobasus cyphus* at a density of 0.0002 per square meters.

Table 4. Estimated number of mussels and federally listed mussels within the proposed fleeing area.

Total Fleeing Area	120,096 m ²	100%
Total Mean Mussel Density	0.49 per m ²	
Estimated Total Mussels in the Fleeing Area	56,990	
Shoreline Area 0 – 20 meters	- 34,313 m ²	29%
Estimated Area w/ No Mussels	- 22,875 m ²	19%
Poor Habitat (i.e. heavy timber debris, loose substrate, consolidated substrate, conglomerate rock)	-14,297 m ²	12%
Total Area Most Likely to Contain <i>Plethobasus cyphus</i>	48,610 m²	40%
Estimated <i>Plethobasus cyphus</i> Density	0.0002 per m²	
Estimated # of <i>Plethobasus cyphus</i>	10	

1.16. Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures (RPMs) are necessary or appropriate to minimize the impact of incidental take caused by the Action on listed wildlife species. RPMs are described for each listed wildlife species in the subsections below.

RPM #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 and this biological opinion.

1.17. Terms and Conditions

In order for the exemption from the take prohibitions of §9 and of regulations issued under §4(d) of the ESA to apply to the Action, the USACE must comply with the terms and conditions (T&Cs) of this ITS provided below. These T&Cs are mandatory. As necessary and appropriate to fulfill this responsibility, the USACE must require any permittee, contractor, or grantee to implement these T&Cs through enforceable terms that are added to the permit, contract, or grant document.

T&C 1 (RPM #1). The USACE shall ensure that the project will occur as designed, planned, and documented in the BA and this biological opinion.

T&C 2 (RPM #1). Evansville Marine Service, Inc. shall contribute \$20,000.00 to the Kentucky Waterways Alliance (KWA) Kentucky Aquatic Resources Fund (KARF) following issuance of this biological opinion and prior to any work as related to this project. These funds will be used in recovery efforts for the federally listed mussel addressed in this biological opinion, thereby minimizing the take expected to occur on this project.

To derive the figure of \$20,000.00, 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. For the 10 sheepsnose 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.

The total contribution will be made prior to initiation of the Action to:
Kentucky Aquatic Resources Fund
Attention: Mr. Ward Wilson, Executive Director
Kentucky Waterways Alliance
120 Webster Street, Suite 217
Louisville, Kentucky 40206

The KWA's office telephone number is 270-524-1774. Mr. Wilson should be contacted to determine if the contribution will be made by mail, direct deposit or a wire transfer.

1.18. Monitoring and Reporting Requirements

In order to monitor the impacts of incidental take, the USACE must require the permittee to report the progress of the Action and its impact on the species to the Service as specified in the ITS (50 CFR §402.14(i)(3)). This section provides the specific instructions for such monitoring and reporting. As necessary and appropriate to fulfill this responsibility, the USACE must require any permittee, contractor, or grantee to accomplish the monitoring and reporting through enforceable terms that are added to the permit, contract, or grant document. Such enforceable terms must include a requirement to immediately notify the USACE and the Service if the amount or extent of incidental take specified in this ITS is exceeded during Action implementation.

The USACE will require through Special Condition, that the permittee monitor the take of this project annually by (1) ensuring that all of the identified Conservation Measures are implemented and maintained, as necessary, by the applicant and (2) informing the Service as soon as possible if the amount of take is exceeded or if any sheepsnose mussels are observed, injured, or crushed within the project area. The USACE will report any changes or deviations to the above monitoring requirements, to the Service's Indiana Field Office, as soon as possible, or annually once the project is in operation.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by conducting conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary activities that an action agency may undertake to avoid or minimize the adverse effects of a proposed action, implement recovery plans, or develop information that is useful for the conservation of listed species. The Service offers the following recommendation that is relevant to the listed species addressed in this biological opinion and that we believe is consistent with the authorities of the USACE.

- 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.

REINITIATION NOTICE

Formal consultation for the Action considered in this biological opinion is concluded. Reinitiating consultation is required if the USACE retains discretionary involvement or control over the Action (or is authorized by law) when:

- a. the amount or extent of incidental take is exceeded;
- b. new information reveals that the Action may affect listed species or designated critical habitat in a manner or to an extent not considered in this biological opinion;

- c. the Action is modified in a manner that causes effects to listed species or designated critical habitat not considered in this biological opinion; or
- d. a new species is listed or critical habitat designated that the Action may affect.

In instances where the amount or extent of incidental take is exceeded, the USACE is required to immediately request a reinitiation of formal consultation. Please note that the Service cannot exempt from the applicable ESA prohibitions any Action-caused take that exceeds the amount or extent specified in the ITS of this biological opinion that may occur before the reinitiated consultation is concluded.

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