APPENDIX K-5

Biological Opinion

Clarification Note: This document was completed before the development of Central Alternative 1B Modified (Selected). However, FHWA submitted a letter to USFWS dated June 10, 2021 (Appendix H-7) stating that the design modifications do not require the re-initiation of consultation with USFWS in accordance with the BO guidelines.

Federal Highway Administration's I-69 Ohio River Crossing Project

Biological Opinion on the
Fat Pocketbook (*Potamilus capax)* and Sheepnose (*Plethobasus cyphyus)*

and

Conference Opinion on the
Longsolid (*Fusconaia subrotunda)*

FWS #: 2020-F-1733

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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 U.S. Fish and Wildlife Service's (Service) Kentucky Field Office (KFO).

June 26, 2017: Kentucky Transportation Cabinet (KYTC) hosted a meeting that included the Service, Stantec Consulting, Inc. (Stantec), the Federal Highway Administration (FHWA), and Indiana Department of Transportation (INDOT) to discuss endangered, threatened, and rare species survey recommendations for the I-69 Ohio River Crossing Project.

September 11, 2017: KYTC hosted section 7 meeting that included the Service, KYTC, Parsons Corporation (Parsons), Stantec, and FHWA to discuss mussel surveys/habitat assessments, locations, and methods.

July 16, 2018: KYTC hosted a meeting that included the Service, Parsons, Stantec, KYTC, and FHWA to discuss the mussel survey study plan. The Service agreed that the proposed study plan would be adequate to make an affects determination.

December 17, 2018: KYTC hosted a meeting that included the Service, Stantec, Parsons, KYTC, and FHWA to discuss the mussel survey results. Survey efforts identified live mussels in the majority of survey areas identified as suitable substrate.

December 19, 2018: The Service hosted a meeting that included Stantec and KYTC to further discuss the mussel survey results. The Service concluded that adverse effects were not likely and that formal consultation was not warranted.

March 25, 2019: FHWA submitted a draft Biological Assessment (BA) to the KFO for review and comment.

March 5, 2020: KYTC hosted a meeting that included the Service, Stantec, Parsons, KYTC, and INDOT to discuss the BA and review comments provided by the Service.

April 8, 2020: A virtual meeting was held that included the Service, KYTC, Parsons, and Stantec to further discuss the draft BA. Based on these discussions, FHWA planned to resubmit the BA with a "May Affect, Likely to Adversely Affect" determination for the Fat Pocketbook and Sheepnose and request formal consultation for these species. In addition, FHWA also planned to include an analysis of potential impacts on the Longsolid, a species of special concern at that time.

August 5, 2020: FHWA submitted the final BA to the Service that determined the proposed action "may affect, and is likely to adversely affect" the Fat Pocketbook, Sheepnose, and Longsolid. FHWA requested initiation of formal consultation on the Fat Pocketbook and Sheepnose and formal conference on the Longsolid.

The FHWA also determined that the proposed action "may affect, but is not likely to adversely affect" the Catspaw (*Epioblasma obliquata*), Northern Riffleshell (*Epioblasma rangiana*), Snuffbox (*Epioblasma triquetra*), Pink Mucket (*Lampsilis abrupta*), Spectaclecase (*Margaritifera monodonta*), Ring Pink (*Obovaria retusa*), Orangefoot Pimpleback (*Plethobasus cooperianus*), Clubshell (*Pleurobema clava*), Rough Pigtoe (*Pleurobema plenum*) Rabbitsfoot (*Theliderma cylindrica*), least tern (*Sternula antillarum*), and gray bat (*Myotis grisescens*).

In addition, FHWA determined that the proposed action "may affect, and is likely to adversely affect the Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*), but potential adverse effects to these species would be addressed under separate consultation processes.

September 3, 2020: The Service concurred that the proposed action "may affect, and is likely to adversely affect" the Fat Pocketbook, Sheepnose, and Longsolid.

September 29, 2020: The Service proposed designated critical habitat for the Longsolid and proposed listing the Longsolid as "threatened" (50 CFR 61384-61458).

December 15, 2020: The Service provided a draft BO to FHWA and KYTC for review and comment.

December 16, 2020: KYTC provided comments on the draft BO and the Service incorporated those comments.

December 17, 2020: The Service, KYTC, and FHWA had a call to clarify Conservation Measure 11 in the draft BO and the Service incorporated those clarifications.

BIOLOGICAL OPINION

1.0 INTRODUCTION

A biological opinion (BO) is the document that states the opinion of the U.S. Fish and Wildlife Service (Service) under the Endangered Species Act of 1973, as amended (ESA), as to whether a Federal action is likely to:

a) jeopardize the continued existence of species listed as endangered or threatened, or
b) result in the destruction or adverse modification of designated critical habitat.

The FHWA, in coordination with INDOT and KYTC, propose to construct, operate, and maintain a new section of Interstate 69 (I-69) from Henderson, Kentucky to Evansville, Indiana (the Action).

A BO evaluates the effects of a Federal Action, including interrelated and interdependent actions and effects from non-federal actions unrelated to the Action (cumulative effects), relative to the status of listed species and the status of designated critical habitat. A Service BO that concludes a proposed Federal action is *not* likely to jeopardize species and is *not* likely to destroy or adversely modify critical habitat fulfills the Federal agency's responsibilities under §7(a)(2) of the ESA of 1973, as amended.

"*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). "*Destruction or adverse modification*" means a direct or indirect alteration that appreciably diminishes the value of designated critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR §402.02).

In addition, while consultation is required when a proposed action may affect listed species, a conference is only required when the proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. However, Federal action agencies may request a conference on any proposed action that may affect proposed species or proposed critical habitat. Further, in the event that these proposed species are subsequently listed and/or critical habitat designated through final rulemakings, conference opinions may later serve as biological opinions, thus satisfying FHWA's obligations under ESA Section 7(a)(2). Therefore, this document includes both the Service's biological opinion on the Fat Pocketbook and Sheepnose and our conference opinion on the Longsolid.

2.0 PROPOSED ACTION

The FHWA, in coordination with INDOT and KYTC, proposes to construct, operate, and maintain a new section of Interstate 69 (I-69) from Henderson, Kentucky to Evansville, Indiana. The project is part of a larger, national proposal to connect the three North American trading

partners of Canada, the United States, and Mexico by an interstate highway through the states of Michigan, Indiana, Kentucky, Tennessee, Mississippi, Arkansas, Louisiana, and Texas.
The purpose of the Action is to (1) provide cross-river system linkage and connectivity between I-69 in Indiana and I-69 in Kentucky that is compatible with the National I-69 Corridor, (2) develop a solution to address long-term cross-river mobility, (3) provide a cross-river connection that reduces traffic congestion and safety, and (4) improve safety for cross-river traffic.

2.1 Components of the Action

The Action includes the construction of a new I-69 Bridge that is approximately 7,600 feet long over the Ohio River and associated floodway, located approximately 1.5 miles east of the existing US 41 Bridges. The new bridge would include four lanes, and would be wide enough to carry six lanes in the future, if needed, by restriping the lanes on the bridge. The approach roadways would be four lanes wide. The northbound US 41 Bridge would be retained for vehicular traffic, and the southbound US 41 Bridge would be removed. The northbound US 41 Bridge, which has two lanes, would be converted from a one-way bridge to a two-way bridge for local traffic. The Action includes several components that are described below.

2.1.1 Tree Removal & Grubbing

Construction of the I-69 alignment and bridge approaches would begin with clearing and grubbing of trees, brush, and other vegetation within the clearing limits of the project alignment. Tree removal may occur prior to grubbing to accommodate tree clearing restrictions without requiring site stabilization. Disposal of clearing and grubbing material may consist of a combination of the following approved methods: disposal or recycling of material legally off the project area, reusing chipped material as mulch, burning, or burying of material on site.

2.1.2 Causeway Construction

The Action will likely require temporary causeways in the river to facilitate construction of the bridge piers. As design plans are not finalized, exact plans for causeway construction are unknown. Probable construction includes two temporary fixed causeway bridges constructed of steel piling driven into the river bed. Causeways will be built outside of the bridge alignment, on one side to provide access from the causeway. Transverse “legs” going from this main causeway will provide access to build pier foundations. This causeway design is beneficial over fill-based causeways as impacts are confined to the smaller footprint of the steel pilings. Additionally, the cross-sectional area of the river will remain unimpeded and should not affect aquatic habitats via elevated velocities and bed scour. Relatively small amounts of fill will be used on/near the banks for the transition onto the causeway and for pier construction on land.

2.1.3 Bridge Construction (including piers)

While the exact construction methods for the I-69 Bridge have not been finalized, construction will likely include the use of drilled shaft foundations and waterline footings for the bridge piers to minimize in-stream construction work. However, the contractor may use caissons or cofferdams at pier locations to allow for work in dry conditions. Each bridge will have a disturbance footprint up to 15,000 square feet (ft^2) (three piers at 5,000 ft^2 each). Excavation of the drilled shafts will be accomplished using an auger, drilling bucket, rock auger, belling bucket or similar tool depending on soil conditions and presence of rock. Drilling machines will be

mounted on a carrier, such as a crane, excavator, crawler or truck, and operated from drilling platforms or barges.

Depending on soils, shafts may be partially to fully cased in steel that may be temporary or permanent. Casing will be installed to the appropriate depth using either an oscillator or rotator. Once casings are installed, the shaft will be filled with water or slurry to prevent collapse as the shafts are excavated. Following excavation of the shaft, a reinforcing cage constructed of rebar will be placed in the drill shaft and then concrete will be pumped into the shaft, displacing the water or slurry in the shaft. Drilled material will be disposed of offsite and will not enter waterways. Piers will be installed either on waterline footings or at the river/substrate interface, with concrete poured in dry conditions facilitated by the caissons/cofferdams. All efforts will be made to keep any water contaminated by the pours from entering the river. Any contaminated water will be extracted and either treated or properly disposed. Once the piers are installed, bridge construction will be able to proceed with little to no impact on instream features.

2.1.4 Roadway Construction

Construction of the roadway embankment will begin following clearing and grubbing activities, using approved rock and excavated materials to bring the roadbed up to final grade. Roadway construction on the new I-69 Bridge should not involve any impacts to instream features. Other portions of roadway construction may require filling wetlands to bring existing conditions up to necessary road grade. Roadway construction may also require straightening and channelizing perennial, intermittent, and ephemeral streams for short distances. These streams will be permanently routed under bridges or through culverts depending on stream size.

2.1.5 US 41 Bridge Demolition

The Action includes removing one existing US 41 Bridge from service. The existing asphalt/concrete roadway on the bridge will be removed without impacts to the river below, with waste being trucked off the bridge to an upland location for disposal. The bridge superstructure (not including the roadway), which is made up of a steel truss superstructure and concrete piers, would likely be removed using a controlled explosive demolition technique. The controlled explosive demolition technique involves using small explosive charges at key structural components of the bridge to induce a controlled collapse. This approach will result in dropping the steel superstructure in sections into the river where it will then be removed for disposal.

2.1.6 Pier Removal

Following removal of the roadway and steel superstructure from US 41 Bridge, the remaining concrete piers will be removed with wire saws, barge-based jackhammers, or explosives to water level. The underwater portion of the piers may be demolished using wire saws or explosives and may require dredging of the river bottom for concrete debris.

2.1.7 Staging Areas

Staging, refueling, and clean-up areas will be constructed at a minimum of 100 feet from the normal water line, bank of jurisdictional waters, or waters of the State. Equipment cleaning/staging areas will be lined to prevent groundwater seepage and will include drainage controls to filter runoff through vegetated areas. Sediment control structures will be located between the staging area and receiving water-bodies to minimize the potential for impacts to

jurisdictional waters. Fuel and other petroleum products will be stored in the staging area and best management practices (BMPs) will be implemented to minimize the potential for fuel spills and contamination.

2.2 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 Action Area occurs within Henderson County, Kentucky and Vanderburgh, Indiana between Ohio River miles 776.1 and 846.0. The Action Area extends from I-69 (formerly I-164) in Indiana on the south side of Evansville (i.e., northern terminus) across the Ohio River to I-69 (formerly Edward T. Breathitt Pennyrile Parkway) at the KY 425 interchange southeast of Henderson, Kentucky (i.e., southern terminus) (Figure 1). The western limit of the project area is parallel to and extends a maximum of about 2,000 feet west of US 41. The eastern limit of the project area extends about 1,500 feet to 3.4 miles east of US 41.

2.3. Conservation Measures

Conservation measures are those proposed actions taken to minimize incidental take and benefit or promote the recovery of the species under review. Conservation measures are included as an integral portion of the Action. FHWA has committed to implement the following conservation measures specific to mussels as part of the Action:

<u>(CM 1) Erosion and Sediment Controls</u>
A Stormwater Pollution Prevention Plan (SWPPP) will be developed and approved by INDOT, KYTC, Indiana Department of Environmental Management (IDEM), and the Kentucky Department of Environmental Protection (KDEP) prior to construction. Best management practices (BMPs) will be used, including erosion and sediment control measures that will be implemented prior to, and maintained throughout, construction. Temporary seeding and mulch will be used to stabilize disturbed areas.

<u>(CM 2) Equipment Maintenance, Cleaning, Fueling, and Monitoring Plan (EMCFM Plan)</u>
An EMCFM Plan will be developed to prevent equipment related impacts from reaching waterways within the Action Area. Staging, refueling, and clean-up areas will be constructed a minimum of 100 feet from the normal water line, bank of jurisdictional water, or waters of the State to reduce the risk of fluids from equipment leaking into waterways. Fuel and other petroleum products will be stored in the staging area and BMPs will be implemented to minimize the potential for fuel spills and contamination. A spill response plan will be required and equipment will be monitored during construction operations for any oil, hydraulic, or fuel leaks. If leaks are found, the use of that equipment will be halted until leaks are repaired. All effluent from upland staging areas will be filtered using a variety of BMPs prior to confluence with any waterbodies.

<u>(CM 3) Catch Barges for US 41 Roadway Removal</u>
The removal of the existing southbound US 41 Bridge will be designed to minimize and avoid impacts to waterways and mussel habitat to the greatest extent feasible. Catch barges will be

used underneath sections of the bridge/roadway as they are demolished to minimize debris from entering the waterway.

(CM 4) Demolition and Recovery of the US 41 Bridge
The demolition and recovery of the US 41 Bridge will be designed to minimize impacts to the surrounding aquatic environment. The design has not been finalized; however, explosives may be used to demolish the bridge during a navigation stoppage, followed by the use of barge-mounted equipment to remove the debris from the river bed and transport it offsite.

(CM 5) US 41 Pier Removal
Barge work platforms will be used to limit material falling into the Ohio River for the US 41 Bridge pier removal. Pier material below the waterline will be dredged from the river bottom and the use of a floating turbidity curtain may be used to limit downstream sedimentation.

(CM 6) Upland Storage of Bridge Materials
All bridge materials will be stored at an upland staging area, away from the normal water line.

(CM 7) Barge Spud Locations
To minimize impacts to Ohio River substrates, barges and other boat traffic will be restricted to deploying spuds within impact areas around causeways and piers to isolate substrate impacts to a smaller footprint.

(CM 8) Concrete Pouring
Concrete will be poured in a manner to avoid spills into the Ohio River. Piers will be constructed using incased drilled shafts, precast waterline footing platforms, or in the dry, with caissons or cofferdams, preventing concrete spills into the river, while facilitating proper installation. If concrete spills occur, protocols outlined in the SWPPP will be implemented.

(CM 9) Environmentally Sensitive Area Minimization Procedures
Construction activities will be avoided/minimized in areas of high environmental quality, including the mussel habitat, to the greatest extent possible.

(CM 10) Revegetation of Riparian Areas & Limited Use of Riprap
The use of bio-engineering techniques to provide natural armoring of stream banks will be considered and implemented where practicable. Installation of riprap would be limited to areas necessary to protect structural integrity. If riprap is required to protect erodible slopes, it will be installed outside the stream bed and between the toe of slope and the ordinary high water mark where possible. Design plans will include the planting of native woody and herbaceous vegetation to stabilize stream banks except for areas under bridges.

(CM 11) Contribution to Mussel Propagation
FHWA, INDOT and KYTC are committed to making a monetary contribution, based on the number of federally listed mussels in the Action Area (68 Fat Pocketbooks and 9 Sheepnose, Section 4.0). These funds are intended to support recovery efforts by funding propagation efforts for the Fat Pocketbook, Sheepnose, and/or Longsolid at a permitted mussel propagation facility.

Based on current rearing costs, it is estimated that $438.00 is an appropriate contribution per individual Fat Pocketbook mussel. Based on the number of individuals estimated to be present within the Action Area (68), FHWA has agreed to contribute a total of $29,784.00 ($438.00 per individual x 68 individuals = $29,784.00). It is also estimated that $313.00 is an appropriate contribution per individual Sheepnose. Based on the number of individuals estimated to be present within the Action Area (9), FHWA has agreed to contribute a total of $2,817 ($313.00 per individual x 9 individuals = $2,817.00). Therefore, the total contribution should be $32,601.00.

2.4. Interrelated and Interdependent Actions

A BO 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, FHWA did not describe, and the Service is not aware of, any interrelated or interdependent actions to the Action

3.0 STATUS OF THE SPECIES

This section summarizes the best available data about the biology and current condition of the Fat Pocketbook, Sheepnose, and Longsolid throughout their range that are relevant to formulating an opinion about the Action.

3.1. Fat Pocketbook

The Service listed the Fat Pocketbook as endangered on June 14, 1976 (41 FR 24062). The most recent 5-year review was completed in 2019 (USFWS 2019). A recovery plan was finalized in October 1985 and amended September 2019.

3.1.1 Species Description

The Fat Pocketbook has a large (five inches), rounded to somewhat oblong, and greatly inflated, thin to moderately thick shell. The outer most layer of the shell is smooth and shiny, yellow, yellowish-tan, or olive in color without rays and becoming dark brown in older individuals (Cummings and Mayer 1992). The inner layer of the shell is white, sometimes tinged with pink or salmon.

3.1.2 Life History

Gravid Fat Pocketbooks have been observed from June to October, which indicates the species is bradytictic where spawning takes place in summer, glochidia overwinter in females, and are expelled the following spring (Ortmann 1914). Gravid mussels were reported to have mature glochidia between June 6 and June 20 in Missouri, but released glochidia sometime between then and August 13 and August 22 (Barnhart and Roberts 1997). Fat Pocketbook glochidia are reported to be rather small (0.105 x 0.185 mm), spined, and ax-headed or hatchet-shaped (Utterback 1916 as cited in Oesch 1984). The Fat Pocketbook is described as having an

opportunistic life history strategy, with a short lifespan, young age at sexual maturity, and moderate to high fecundity (Haag 2012). The host fish for Fat Pocketbook is Freshwater Drum (*Aplodinotus grunniens*) (Cummings and Mayer 1992).

3.1.3 Habitat

Early habitat information was based upon scattered collection sites and general field observations. Parmalee (1967) reported the Fat Pocketbook from sand and mud bottoms, in flowing water a few inches to more than eight feet in depth. Bates and Dennis (1983) found the species in sand, mud, and fine gravel substrates in the St. Francis River, Arkansas. Conversely, Clarke (1985) reported this species primarily from sand substrates in the St. Francis River. Historically, the Fat Pocketbook was probably more common in large river sloughs and oxbows having a silt substrate (Miller and Payne 2005). Such habitat was more common near the mouth of rivers prior to man-induced modifications such as locks, dams, levees, channel maintenance, and bank protection measures. Ahlstedt and Jenkinson (1991) reported that Fat Pocketbook was most likely to be found in a mixture of sand, clay, and silt, which they referred to as "sticky mud." Based on the presence of dense populations of Fat Pocketbook in the St. Francis watershed, Arkansas, the species appears to be tolerant and even show a preference for depositional areas. This recent information tends to show the species is not lotic (i.e., inhabiting or situated in rapidly moving fresh water) as previously thought by the USFWS (1989). In western Kentucky, Haag, and Cicerello (2016) described the Fat Pocketbook's habitat as medium-sized to large rivers in depositional backwater areas along shore, behind wing dams, or in side channels and sloughs.

3.1.4 Range and Distribution

Based on historical records, the Fat Pocketbook was found in larger rivers within the Mississippi River drainage from Arkansas and Mississippi north to Minnesota and Wisconsin, and west to eastern Missouri and Iowa, and within the Ohio River upstream to near the mouth of the Green River in Kentucky and Indiana (Haag and Cicerello 2016). However, most records for the species appear to occur within three population centers, including the upper Mississippi River above St. Louis, Missouri, the Wabash River in Indiana, and the St. Francis River in Arkansas (Bates and Dennis 1983). According to the USFWS (1989) and Miller and Payne (2005), the largest extant population of Fat Pocketbook is in the St. Francis River and its associated canals and sloughs. In Kentucky, the Fat Pocketbook has been reported from the Mississippi River, the Ohio River mainstem up to near the mouth of Green River, and the lower Cumberland, Green, Clarks, and Tradewater Rivers (Haag and Cicerello 2016). Populations in the lower Ohio River appear to be large and healthy, and together with the large population in the Wabash River may form one single metapopulation.

3.1.5 Conservation Needs and Threats

Since the 2012 5-year review, impoundment and hydropower projects with potentially adverse effects on the Fat Pocketbook have been completed with minimal impact to the species, while hydrokinetic development in the Lower Mississippi River has been abandoned (USFWS 2019). According to the most-recent 5-year review (USFWS 2019), potential threats have been further reduced by development and implementation of U.S. Army Corps of Engineers programs protective of the Fat Pocketbook and its habitats in the St. Francis, Mississippi, and Ohio River drainages. The species' increase in abundance and range,

including within channelized ditches highly affected by agricultural runoff and in navigable river channels subject to dredging, shows resiliency to non-point source pollution and channel maintenance activities (USFWS 2019). While the Fat Pocketbook remains locally vulnerable to illegal discharges, spills, and non-point source pollution, the expansion of its range provides redundancy; therefore, previously identified threats to habitat and range have declined, and/or the species has become locally adapted to conditions across its range (USFWS 2019).

According to the 2019 5-year review (USFWS 2019) the main recovery objective is to secure the conservation of the Fat Pocketbook to the extent that the protections of the ESA are no longer required. This will require multiple, independent viable populations across the species' range, and securing management of those populations and their habitats for the foreseeable future.

3.2 Sheepnose

The Service listed the Sheepnose as endangered on March 13, 2012 (77 FR 1491). There is currently no recovery plan for this species. The most-recent 5-year review was completed August 2020 (USFWS 2020).

3.2.1 Species Description

The Sheepnose was first described as a distinct species by Rafinesque in 1820 from specimens collected at Falls of the Ohio (Haag and Cicerello 2016). The Sheepnose has an oblong and slightly inflated shell that can be up to 5 inches in length. The shell surface is mostly smooth with a row of knobs/tubercles on the center of valve, which may become worn down in older specimens. The outermost layer of the shell has no rays and is often yellowish color, but may also become dark brown with age (Cummings and Mayer 1992).

3.2.2 Life History

The Sheepnose is a short-term brooder, spawning and releasing young within a few weeks during the summer between mid-May and early August (Watters et al. 2009). The species is defined as having a long life span, late sexual maturity, short brooding period, and generally low fecundity (Haag 2012). Field and laboratory observations suggest that Sheepnose are a host specialist, predominantly using only members of the cyprinid family and occasionally a few other fish species as hosts (Haag 2012). Laboratory studies by Wolf et al. (2012) and Hove et al. (2016) found transformation of juveniles on 12 different minnow species, including a topminnow, and 29 cyprinid and six non-cyprinid species, respectively. However, it is important to note, that although these fish species successfully transformed sheepnose glochidia in a laboratory setting, differing habitat requirements often prevent or result in infrequent sheepnose interactions with many of these fish species in their natural environment (USFWS 2020).

3.2.3 Habitat

The Sheepnose primarily inhabits medium to large rivers in shallow areas with moderate to swift current that flows over gravel or mixed sand and gravel substrate (Cummings and Mayer 1992). It has also been found in habitats composed of mud, cobble and boulders, and in large rivers it may be found in deep runs (USFWS 2012). During flood conditions, Sheepnose will likely occur within flow refuges, where shear stress and particle movement is low (Strayer 1999).

3.2.4 Range and Distribution

Records indicate the Sheepnose historically occurred in at least 76 streams, comprising portions of 14 States, including Alabama, Illinois, Indiana, Iowa, Kentucky, Minnesota, Mississippi, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin. Extant populations of the sheepnose are known from 25 streams in all 14 states of historical occurrence. (USFWS 2020). It is known to occur within the Ohio River from the confluence with the Mississippi River upstream to Pennsylvania, including extant populations in western Kentucky and southern Indiana (Haag and Cicerello 2016). The populations in the lower Ohio River may be contiguous with those in the lower Tennessee and Green Rivers (Haag and Cicerello 2016). Currently, populations are considered to be stable to increasing in 2 streams, stable in 8 streams, declining in 4 streams, and unknown in 11 streams. Collectively, the last known and/or recent survey efforts have identified juvenile specimens in 10 of the 25 populations, from three of the five extant river basins (USFWS 2020).

3.2.5 Conservation Need and Threats

Large-river habitat throughout most of the Sheepnose range has been impounded, leaving short, isolated patches of habitat in areas between dams. These conditions result in population fragmentation, isolation, and other genetic-related concerns (USFWS 2020). Other previously-identified threats include channelization, chemical contaminants, mining, sedimentation, disease or predation, inadequacy of existing regulatory mechanisms, invasive species, oil and gas development, temperature, climate change, and overutilization for commercial, recreational, scientific, or educational purposes (USFWS 2020).

There is no recovery plan for the Sheepnose; however, the 5-year review (USFWS 2020) suggests that the species could benefit from the development and implementation of a monitoring program to evaluate conservation efforts, monitor population levels and habitat conditions, and assess the long-term viability of extant, newly discovered, augmented, and reintroduced sheepnose populations. In addition the species could benefit from maintaining and increasing vegetated riparian buffers of streams throughout the range of the species and riparian habitat restoration projects in and or upstream of rivers with sheepnose.

3.3 Longsolid

The Service proposed listing the Longsolid as “threatened” and also proposed to designate critical habitat for the Longsolid on September 29, 2020 (50 CFR 61384-61458). Designated critical habitat includes approximately 1,115 river miles (1,794 kilometers), all of which is occupied by the species in Pennsylvania, Kentucky, West Virginia, Virginia, Tennessee, and Alabama.

3.3.1 Species Description

The Longsolid is a freshwater river mussel belonging to the Unionidae family, also known as the naiads and pearly mussels. Longsolid adults are light brown in color, darkening with age. The shell is thick and medium-sized (up to 5 inches), and typically has a dull sheen (Williams et al. 2008). There is variability in the inflation of the shell depending on population and latitudinal location (Ortmann 1920).

3.3.2 Life History

The Longsolid is a slow growing species that is believed to live to ages of 25 to 50 depending on environmental conditions (USFWS 2019a). The Longsolid is a short-term brooder, with females gravid from June through August. Glochidia are released in red to pink cylinders within a composite conglutinate (Watters et al. 2009). Its host fish is unknown; however, it is likely a minnow host specialist, like other Fusconaia species (Haag and Cicerello 2016).

3.3.3 Habitat

The Longsolid is restricted to main-channel habitats in medium to large rivers. It is found in gravel and sand and is typically a small component of existing mussel beds (Haag and Cicerello 2016). The Longsolid is known to inhabit depths in large rivers in excess of 20 feet (USFWS 2019a).

3.3.4 Range and Distribution

The Longsolid was once a common, and occasionally abundant, component of the mussel assemblage in rivers and streams where it formerly occurred. The Longsolid is currently found in the Ohio, Cumberland, and Tennessee River basins, overlapping within the States of Alabama, Kentucky, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. It is considered extirpated from Georgia, Indiana, and Illinois (USFWS 2020a). This range encompasses three major river basins (the Ohio, Cumberland, and Tennessee basins). Of the current populations, 3 are estimated to be highly resilient, 9 are estimated to be moderately resilient, and 48 are estimated to have low resiliency (USFWS 2020a).

3.3.5 Conservation Needs and Threats

The Longsolid is primarily threatened by habitat degradation or loss resulting from development and urbanization, including changes to water temperature, point and non-point source pollution, changes to water quantity, and dams and barriers (USFWS 2020a). The species also experiences competition with invasive and nonnative species, and negative effects associated with small population size (USFWS 2020a). There is no recovery plan for the Longsolid, but the species requires clean, flowing water with appropriate water quality and temperate conditions, natural flow regimes, predominantly silt-free, stable sand, gravel, and cobble substrates, suspended food and nutrients, and availability of sufficient host fish numbers to provide for glochidia infestation and dispersal (USFWS 2020a).

4.0 ENVIRONMENTAL BASELINE

In accordance with 50 CFR 402.02, the environmental baseline refers to the condition of the listed species or its designated critical habitat in the Action Area, without the consequences to the listed species or designated critical habitat caused by the Action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

4.1 Action Area Numbers, Reproduction, and Distribution

The Fat Pocketbook, Sheepnose, and Longsolid are reasonably certain to occur in the portion of the Action Area within the Ohio River that is affected by the construction of the I-69 Bridge and demolition of the US 41 Bridge and piers (Figures 3 and 4). There is no designated critical habitat or proposed designated critical habitat in the Action Area. In November 2017, Mainstream Commercial Divers Inc. (MCDI) collected acoustic side-scan sonar data to map substrate types within the Action Area. In December 2017, Stantec conducted ground-truthing of this data (Stantec 2018). The side-scan sonar survey indicated eight substrate types, while the field verification generally confirmed these classifications. Much of the habitat appeared to be shifting sands; however, multiple stable habitats did appear within the Action Area that included coarse gravel, cobble, hardpan, and bedrock (Figures 2 and 3).

Mussel Surveys

Stantec conducted a freshwater mussel survey from October 9-15, and 27-31, 2018 on the Ohio River between Evansville, IN and Henderson, KY (Stantec 2018a). Based on side-scanning sonar data from previous habitat assessment, 231 20-by-20 cells of potential mussel habitat were identified and were planned to be surveyed. Due to high flows and low water temperatures, conditions became unsuitable and only 108 of the 231 scheduled cells were surveyed. The coarse gravel/cobble/hardpan/bedrock substrate class typically contained suitable, occupied mussel habitat that is normally associated with a mussel bed; this area of habitat totals 365,300 m^2. During the 47.07 search hours, total collections included 452 live mussels from 20 species and 154 spent shells that included an additional four species (Stantec 2018a). The survey identified 11 live Longsolids* and a subfossil shell of the Fat Pocketbook.

4.1.1 Fat Pocketbook

Suitable habitat for the Fat Pocketbook in the Action Area includes (a) the mussel bed habitat (as identified in the 2018 survey) within the I-69 Bridge construction area and (b) the silt/clay banks of the river where substrate was found to be stable enough to support mussels within the US 41 Bridge removal area (Stantec 2018a). Considering the habitat in these two work locations, there is 365,738 m^2 of Fat Pocketbook habitat within the Action Area (Stantec 2020). In addition to the subfossil shell found within the affected area, Fat Pocketbooks have also been found in the Ohio River just upstream of the project area (approximately 2.0 miles upstream from the mouth of the Green River) and approximately 4.5 miles downstream of the project area (KSNPC 2017). The site upstream of Green River is located in Henderson County, KY at river mile 782.3 and was documented on October 3, 2008. Therefore, FHWA is reasonably certain that Fat Pocketbooks occur within the Action Area.

To estimate the number of Fat Pocketbooks that could occur within the Action Area, best available data from surveys that occurred in 2015 and 2017 on the Cumberland River, near the

* There has been some discussion and discrepancy among mussel experts regarding the identification of the 11 live Longsolids found during the mussel survey; however, based on the differing professional opinions of the identified Longsolids, the fact that the planned survey of suitable habitats in the action area was only partially completed, and the verified record from 1996, FHWA is reasonably certain the Longsolid occurs within the Action Area and has chosen to formally conference on the species relative to this project.

confluence with the Ohio River, were used (Stantec 2020). These surveys estimated the overall mussel density at the Cumberland River site to be 0.07/m^2 and the density of Fat Pocketbooks to be 0.001/m^2 (Third Rock Consultants 2020). Using the density of Fat Pocketbooks found during Cumberland River surveys (0.001/m^2), an estimated 365 Fat Pocketbooks would be expected in the Action Area, if the habitat within the Action Area was of similar quality to the Cumberland River site. However, the overall density of mussels that occurs in areas considered to be Fat Pocketbook habitat within the Action Area is 0.013/ m^2 (Stantec 2020). Therefore, to account for differences in habitat quality between the two sites, the number of Fat Pocketbooks is estimated using total Fat Pocketbook habitat (365,738 m^2), multiplied by the estimated density (0.001/m^2), and divided by the difference in habitat quality (0.07 divided by 0.013 = 5.38). This results in an estimated 68 Fat Pocketbooks within the Action Area that are likely to be adversely affected by the Action (Stantec 2020).

4.1.2 Sheepnose

Based on data provided by KSNPC (2017) and Indiana Department of Natural Resources (2017), Sheepnose have not been documented in the Action Area, but one pre-1990 occurrence is located at the mouth of the Green River. Additionally, a Sheepnose was found near the Action Area, in the Ohio River (river mile 783.4), upstream from the confluence of the Green River (Koch, pers. comm. 2017). Therefore, FHWA is reasonably certain that Sheepnose occur within the Action Area in low densities. Suitable Sheepnose habitat within the Action Area only occurs in the area affected by the I-69 Bridge construction and totals 147,044 m^2 (Stantec 2020). There is no suitable Sheepnose habitat for this species within the US 41 Bridge removal area (Stantec 2020).

The number of Sheepnose within the Action Area was determined by using data from the Survey of the Ohio River (2015) at the Anderson Island mussel bed area (Anderson Island). The total Anderson Island bed had mussel densities of approximately 3.21 mussels/m^2, while Sheepnose were found at rates of 0.0036/m^2. Using the density of Sheepnose found during transect surveys at the Anderson Island location (0.0036/m^2), an estimated 530 Sheepnose would be expected in the Action Area, if the habitat within the Action Area was of similar quality to the Anderson Island bed. However, the overall density of mussels in the Action Area that occurs within Sheepnose habitat is 0.055/ m^2 (Stantec 2020). Therefore, to account for differences in habitat quality between the two sites, the number of Sheepnose is estimated using total Sheepnose habitat (147,044 m^2), multiplied by the estimated density (0.0036/m^2), and divided by the difference in habitat quality (3.21 divided by 0.055 = 58.4). This results in an estimated 9 Sheepnose within the Action Area that are likely to be adversely affected by the Action.

4.1.3 Longsolid

Eleven Longsolids were identified within the Action Area by Stantec during the 2018 freshwater mussel surveys (Stantec 2018a). Based on the 2018 survey data and amount of suitable habitat within the Action Area (365,300 m2), Longsolid densities were estimated at 0.0018 individuals per square meter, resulting in a total population estimate of 658 individuals within the Action Area. The proposed action is expected to affect approximately 147,044 m2 of Longsolid habitat. Therefore, this results in an estimated 265 Longsolids within the Action Area that are likely to be adversely affected by the Action (0.0018 multiplied by 147,044 = 265).

4.2 Action Area Conservation Needs and Threats

The Fat Pocketbooks, Sheepnose, and Longsolids within the Action Area are likely exposed to the same threats that these species are exposed to across the range as discussed in sections 3.1.5, 3.2.5, and 3.3.5. Within the Ohio River watershed, major land uses include pasture, row-crop agriculture, and urban development. Indiana and Kentucky are dominated by agriculture (ORANSCO 2016). Highly populated regions of the Ohio River are characterized by residential, commercial, and industrial land use types. Nonpoint source pollution from both urban and agricultural areas is a large contributor to degraded water quality in the river. Several point source pollution issues, such as combined sewer overflows, also exist along the Ohio River. In addition, significant portions of the Ohio River are impounded as a result of navigational dams.

5.0 EFFECTS OF THE ACTION

In accordance with 50 CFR 402.02, effects of the Action are all consequences to listed species or critical habitat that are caused by the Action, including the consequences of other activities that are caused by the Action. A consequence is caused by the proposed action if it would not occur "but for" the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the Action (see § 402.17).

Impacts associated with the to I-69 Bridge construction include 14.42 acres of direct impact, 5.75 acres associated with scouring and hydrology changes, and 330 acres downstream of the construction area that likely to be affected by water quality changes. Therefore, total impacts associated with the I-69 Bridge construction are approximately 350.17 acres (Figures 2 and 3). Impact areas associated with the US 41 Bridge removal total an estimated 28.8 acres. This includes 27.1 acres downstream of where the bridge sections will be dropped into the river and 1.74 acres associated with pier demolition (Figure 3).

Based on the description of the Action and the species' biology, we identified four stressor(s) to the Fat Pocketbook, Sheepnose, and Longsolid that are reasonably certain to result from the Action: (1) physical forces (crushing, entrapment, stranding, and removal of mussels), (2) water quality degradation, (3) changes in hydrology, and (4) reduced host fish interactions. Below, we discuss the best available science relevant to each stressor. A discussion of each Stressor-Exposure-Response pathway is summarized below and detailed in Appendix A.

5.1 Physical Forces (Pathway #1)

The Action includes several components, as described in Section 2.1, that are expected to result in physical forces that adversely affect the Fat Pocketbook, Sheepnose, and Longsolid. Physical forces include crushing, entrapment, stranding, and removal of mussels.

<u>Crushing</u>: Mussels could be crushed during construction activities, including the dropping of the US 41 Bridge into the Ohio River, removal of the structure from the river, falling concrete from pier demolition and removal, the installation of causeway bridge supports, spudding of barges, barges anchoring, and the installation of new piers for the I-69 Bridge. Mussels could also be

potentially crushed by dredging activities. Crushing is expected to result in harm, including injury and mortality.

Entrapment: Entrapment of mussels in the substrate may occur as concrete is poured for the piers and as riprap/fill is installed on riverbanks and around the piers. Mussels entrapped in substrate would be unable to reproduce, as multiple components of the mussel life cycle would be disrupted, resulting in harm, including mortality.

Stranding: Dewatering associated with waterline footings, caissons, or cofferdams at pier locations may result in stranding mussels on dry land. Stranding is expected to result in harm, including mortality.

Removal: Dredging may be used during causeway construction and to remove particles of the US 41 pier that fall into the river during demolition. Dredging activities associated with the Action may inadvertently remove mussels from their habitat. The removal of mussels is expected to result in harm, including mortality.

Applicable Science

The sessile nature of mussels makes them prone to physical disturbances (Badra 2011). The crushing of mussel shells can be related to natural weathering or predation, but also caused by placement of fill or heavy machinery associated with construction activities (Badra 2011). Behavioral mechanisms in response to stranding include tracking, burrowing, and tracking then burrowing (Gough et al. 2012). Tracking is a behavioral response where mussels move on top of the substrate away from the receding water levels in an attempt to avoid emersion. This response would be futile in the event that a cofferdam is used, as the mussels would be unable to pass through into the wetted portion of the river (Stantec 2020). Burrowing involves mussels burying themselves in the substrate to find thermal refuge and avoid desiccation (Stantec 2020). Freshwater mussels have developed behavioral adaptations to stage changes in streams such as drought conditions, but have no defense against permanent stranding (Seth et al. 2004, Cooper 2011). It is likely that the effects from removal are similar to those of stranding.

5.2 Water Quality Degradation (Pathway #2)

Short term increases in suspended sediments are expected during multiple phases of construction associated with the Action. The US 41 Bridge and pier demolition are likely to mobilize sediment on the river bottom as it is dropped into the Ohio River, increasing turbidity and reducing mussel filtration capacity. The installation of drilled shafts, cofferdam or caisson structures, and riprap may also cause increases in suspended sediments. These impacts would most likely affect mussels downstream of the I-69 Bridge. In addition, unintentional spills could result in water quality degradation and be detrimental to aquatic species, including mussels and host fish. However, these impacts can be reduced or avoided by following equipment servicing and operating guidelines, proper siting and use of staging areas, removing and property treating or disposing any water associated with the concrete pours, and using containment spill and herbicide use plans. Water quality degradation is expected to result in harm that can lead to injury and/or mortality.

Applicable Science
Intermittent exposure to high levels of suspended solids has been shown to decrease clearance rates (filtration) of mussels (Aldridge et al. 1987) impacting feeding ability. During extended exposure to elevated total suspended solids, female mussels were shown to forgo reproductive cycles (Gascho Landis et al. 2012). Construction activities could result in accidental spills of hazardous materials into the surrounding environment (USEPA 2017). Due to mussels' filter feeding behavior, freshwater mussels can be exposed to chemicals via ingestion, with chemicals in the water column directly impacting mussel gills, mantle, and kidneys resulting in mortality, as they uptake everything in the water that surrounds them, with no way to avoid toxic chemicals (Zimmerman et al. 2002). Bioaccumulation in tissues appears to be metal dependent (Naimo 1995). Bivalves have also been shown to readily bioaccumulate metals associated with road traffic (Zimmerman et al. 2002).

5.3 Changes in Hydrology (Pathway #3)

The Action will alter the hydraulic regime around the US 41 Bridge piers that are scheduled to be removed, as well as the I-69 Bridge piers that will be newly installed. Installation of drilled shafts and cofferdam/caisson structures will change local hydrology around pier locations, resulting in changes to water velocity. The area surrounding the new I-69 Bridge piers will be subject to continual impacts from scouring and changing hydrology as river waters divert around the piers. Changes in hydrology are expected to result in harm that can lead to injury or mortality.

Applicable Science
Freshwater mussel diversity has declined substantially, particularly in the southeast, as a consequence of hydrologic alteration (Watters 2000). Freshwater mussels are especially sensitive to changes in hydrological conditions, which are of particular importance in structuring mussel communities (Strayer et al. 2004) and may influence recruitment dynamics (Hardison and Layzer 2001). Freshwater mussel species have specific habitat requirements (e.g. substrate, flow, fish presence etc.) for survival (Haag 2012). Hydraulic components to habitat are thought to be critical for mussel presence (Allen and Vaughn 2010). Hydrological impacts are expected to scour the substrate around the piers and could prohibit mussel colonization (Stantec 2020). Altered velocity patterns may influence which fish species use habitats around the piers, potentially creating a disconnect between resident mussels and their preferred fish hosts (Stantec 2020).

5.4 Reduced Fish Host Interactions (Pathway #4)

The Action is expected to result in disturbance that will increase stress levels or mortality of fish inhabiting adjacent areas. Fish may be impacted directly during detonation of explosives, resulting in mortality, and death of any attached glochidia. This could have long term effects on overall recruitment of mussels in the project area. Reduced fish host interactions area expected to result in significant changes in behavior (including breeding, feeding, and sheltering) that lead to injury or death.

Applicable Science
The life cycle of freshwater mussels includes a parasitic stage, in which the larvae, known as glochidium or lasidium, need to attach to fish to continue their development (Strayer 2008). This parasitic stage distinguishes freshwater mussels from all other bi-valves (Haag 2012). Released glochidia can survive in the water column between a few hours and 14 days, varying among species and in relation to abiotic conditions (Haag 2012). Drifting glochidia are able to grab and attach to all kinds of surfaces, including many living organisms (Haag 2013). If attached to a suitable fish host, glochidia will encyst (Fisher and Dimock 2002), a process that takes place mainly in the gills and fins. During the installation of causeways and during pier construction, vibrations may be felt or heard throughout the water column, also impacting fish, increasing stress levels (Wysocki et al. 2006, Gutreuter et al. 2006). Impacts on fish are important because numerous species of fish in the Ohio River host mussel glochidia for transformation into juveniles (Stantec 2020). The collection of smaller size classes of non-listed mussels during the 2018 mussel survey indicate that active mussel recruitment within the project area is occurring, indicating that this fish host/mussel interaction is present in the project area (Stantec 2018a). Therefore, impacts to host fish population size or condition could decrease opportunities for encystment on a proper host fish, cause stress on encysted fish, or change the availability of fish hosts (Stantec 2020).

5.5 Summary of Effects
The proposed Action would expose the Fat Pocketbook, Sheepnose, and Longsolid to the stressors evaluated in Sections 5.1-5.4. All stressors are expected to result in harm to these species by causing injury or death, or significant changes in behavior (such as feeding, breeding, and sheltering) that lead to injury or mortality (Table 2) (Appendix A).

Table 2. Summary of Adverse Effects

Stressor	Effect
Physical Forces	Harm
Water Quality Degradation	Harm
Changes in Hydrology	Harm
Reduced Fish Host Interactions	Harm

6.0 CUMULATIVE EFFECTS
For purposes of consultation under ESA §7, cumulative effects are the effects of 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. No cumulative effects were identified by FHWA, and none are anticipated by the Service.

7.0 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 Fat Pocketbook, Sheepnose, and Longsolid, the environmental baseline, 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 Fat Pocketbook, Sheepnose, and Longsolid.

This determination is based on several factors: (a) the mussel survey results (Stantec 2018a) showed that relatively low numbers of individuals that could be adversely affected within the Action Area; (b) the Fat Pocketbook, Sheepnose, and Longsolid continue to persist in the Ohio River watershed 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 construction activities. In addition, the contribution of funds to use for propagation, monitoring, research, or other tasks that benefit native freshwater mussels will benefit the Fat Pocketbook, Sheepnose, and Longsolid (CM 11).

8.0 INCIDENTAL TAKE STATEMENT

ESA §9(a)(1) and regulations issued under §4(d) prohibit the take of endangered and threatened fish and wildlife species 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" (ESA §3). In regulations at 50 CFR §17.3, the Service further defines:

- "harass" as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering;"
- "harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering;" and
- "incidental take" as "any taking otherwise prohibited, if such taking 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 BO, FHWA 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 FHWA has a continuing duty to regulate the activity covered by this ITS. The protective coverage of §7(o)(2) may lapse if FHWA 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, FHWA must report the progress of the Action and its impact on the species to the KFO and INFO as specified in this ITS.

As a proposed species, the prohibitions against taking the Longsolid, as found in §9 of the ESA, do not apply until the species is listed. Therefore, this ITS does not become effective for the Longsolid unless the Service adopts the conference opinion as the biological opinion once a listing decision is final.

8.1 Amount or Extent of Take Anticipated

This section specifies the amount or extent of take of the Fat Pocketbook, Sheepnose, and Longsolid that the Action is reasonably certain to cause, which we estimated in the "Effects of the Action" section of this BO, using the best available data. We reference, but do not repeat, these analyses here.

We estimated the number of individuals reasonably certain to occur in the Action Area (Section 4.0, Environmental Baseline). We then evaluated the potential for these individuals to be exposed to the stressors resulting from the proposed Action. Finally, we evaluated how the individuals' responses to their exposure to these stressors would apply to the statutory and regulatory definition of take (Section 5.0, Effects of the Action). From our evaluation, the proposed Action is reasonably certain to cause the incidental take of the 68 Fat Pocketbooks, 9 Sheepnose, and 265 Longsolids within the Action Area and consistent with the definition of harm (Table 2).

Table 2. Summary of Expected Incidental Take

Species	# of Individuals	Take Type
Fat Pocketbook	68	Harm
Sheepnose	9	Harm
Longsolid	265	Harm

8.2 Reasonable and Prudent Measures

The Action includes conservation measures to avoid and minimize impacts to the Fat Pocketbook, Sheepnose, and Longsolid. The analysis of effects of the Action in this BO considers that FHWA will authorize, fund, or carry out all activities under the Action in a manner that is consistent with the description of activities provided in BA, including all applicable conservation measures. Due to the aforementioned commitments, our review of the Action, and conservation measures, the Service believes that no reasonable and prudent measures are necessary or appropriate to minimize incidental take of the fat pocketbook caused by the Action.

8.3 Terms and Conditions

No reasonable and prudent measures to minimize incidental take caused by the Action are provided in this BO; therefore, no terms and conditions for carrying out such measures are necessary.

8.4 Monitoring and Reporting Requirements

In order to monitor the impacts of incidental take, FHWA must 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, FHWA 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 KFO and INFO if the amount or extent of incidental take specified in this ITS is exceeded during Action implementation. The FHWA will (1) ensure that all of the identified Conservation Measures are implemented and (2) inform the KFO and INFO as soon as possible if the amount of take is exceeded or if any Fat Pocketbook, Sheepnose, and Longsolid are observed, injured, or crushed within the Action Area. The FHWA will report any results of monitoring to the KFO and INFO, as soon as possible.

9.0 CONSERVATION RECOMMENDATIONS

§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 has not identified any conservation recommendations for this BO.

10.0 RE-INITIATION NOTICE

Formal consultation for the Action considered in this BO is concluded. Reinitiating consultation is required if FHWA 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 BO;
c) the Action is modified in a manner that causes effects to listed species or designated critical habitat not considered in this BO; or
d) a new species is listed or critical habitat designated that the Action may affect.

This consultation was assigned FWS ID #2020-F-1733. Please refer to this number in any correspondence concerning this consultation.

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FIGURES

Figure 1. Action Area

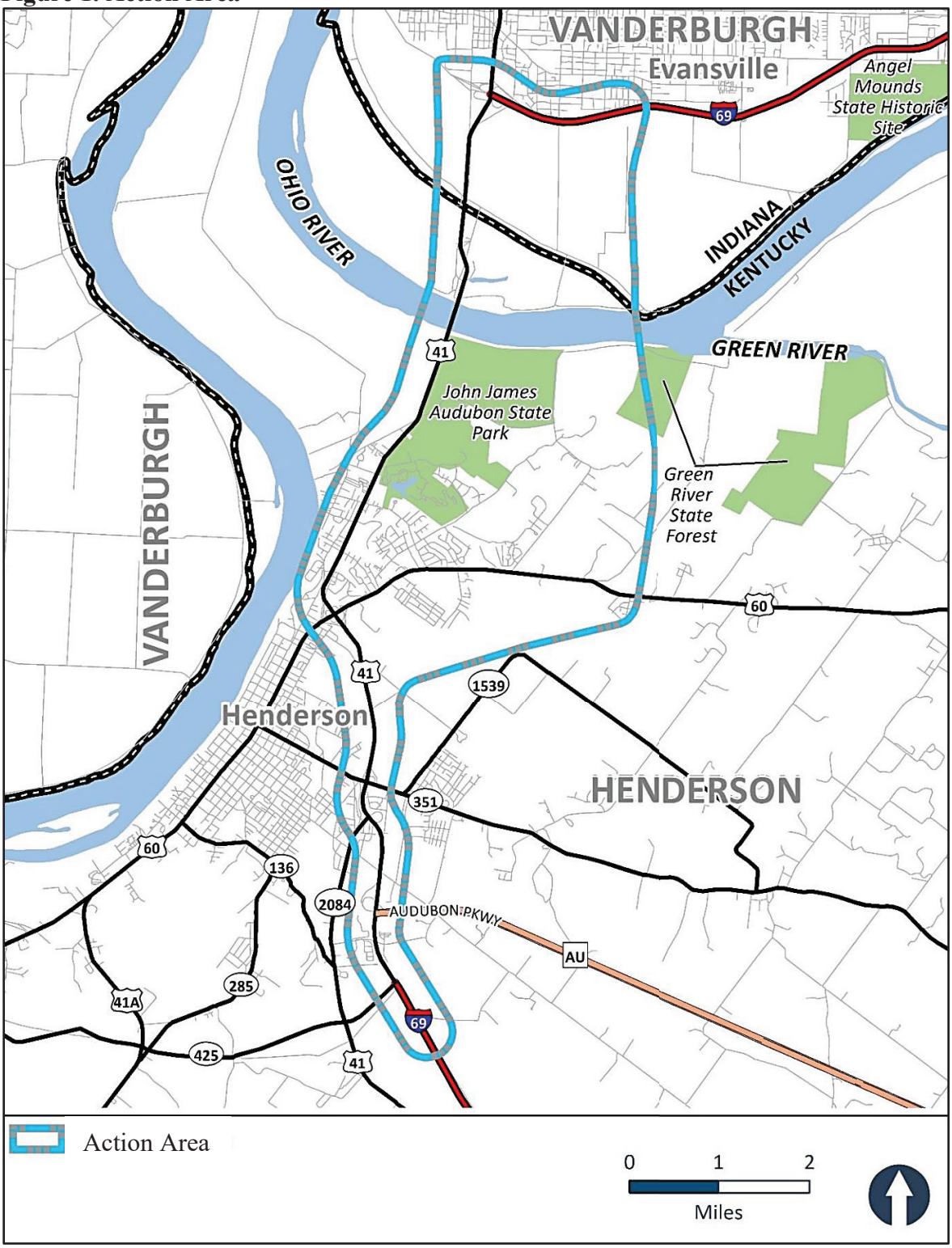
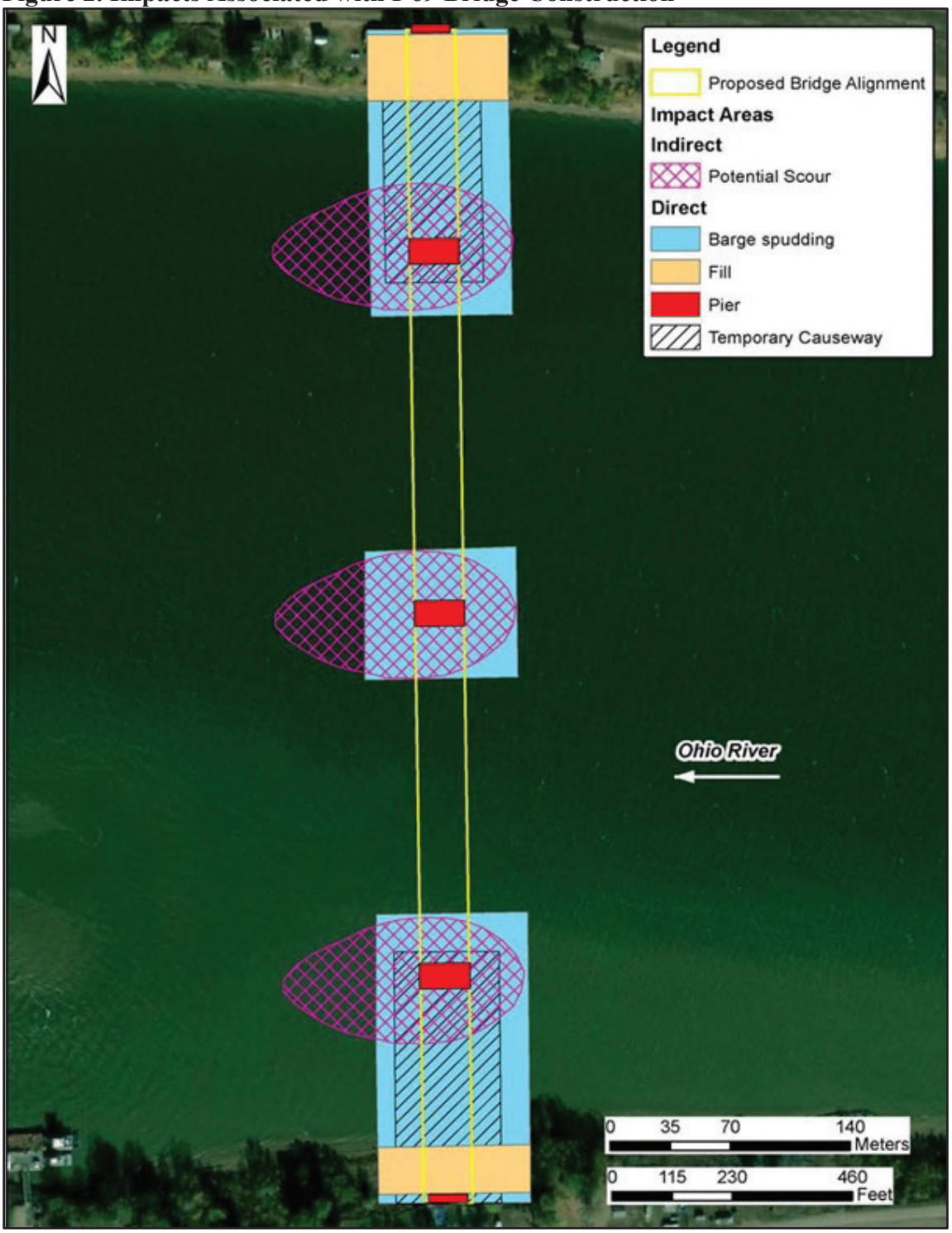


Figure 2. Impacts Associated with I-69 Bridge Construction*



***Does not include 330 acres of downstream water quality impacts, see Figure 3.**

Figure 3. I-69 Bridge Construction Impact Area and Substrates

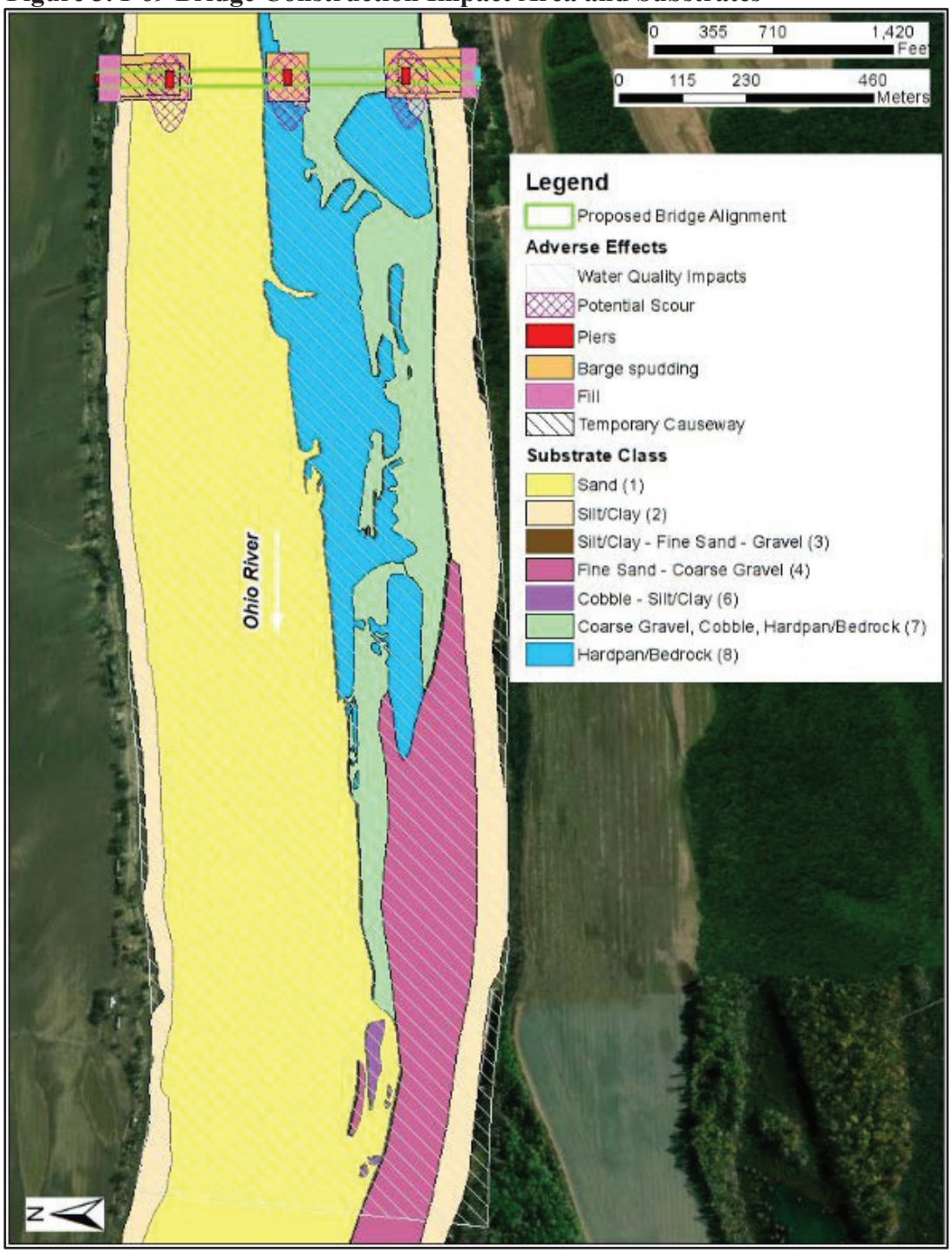


Figure 4. US 41 Bridge and Piers Demolition Impact Area and Substrates

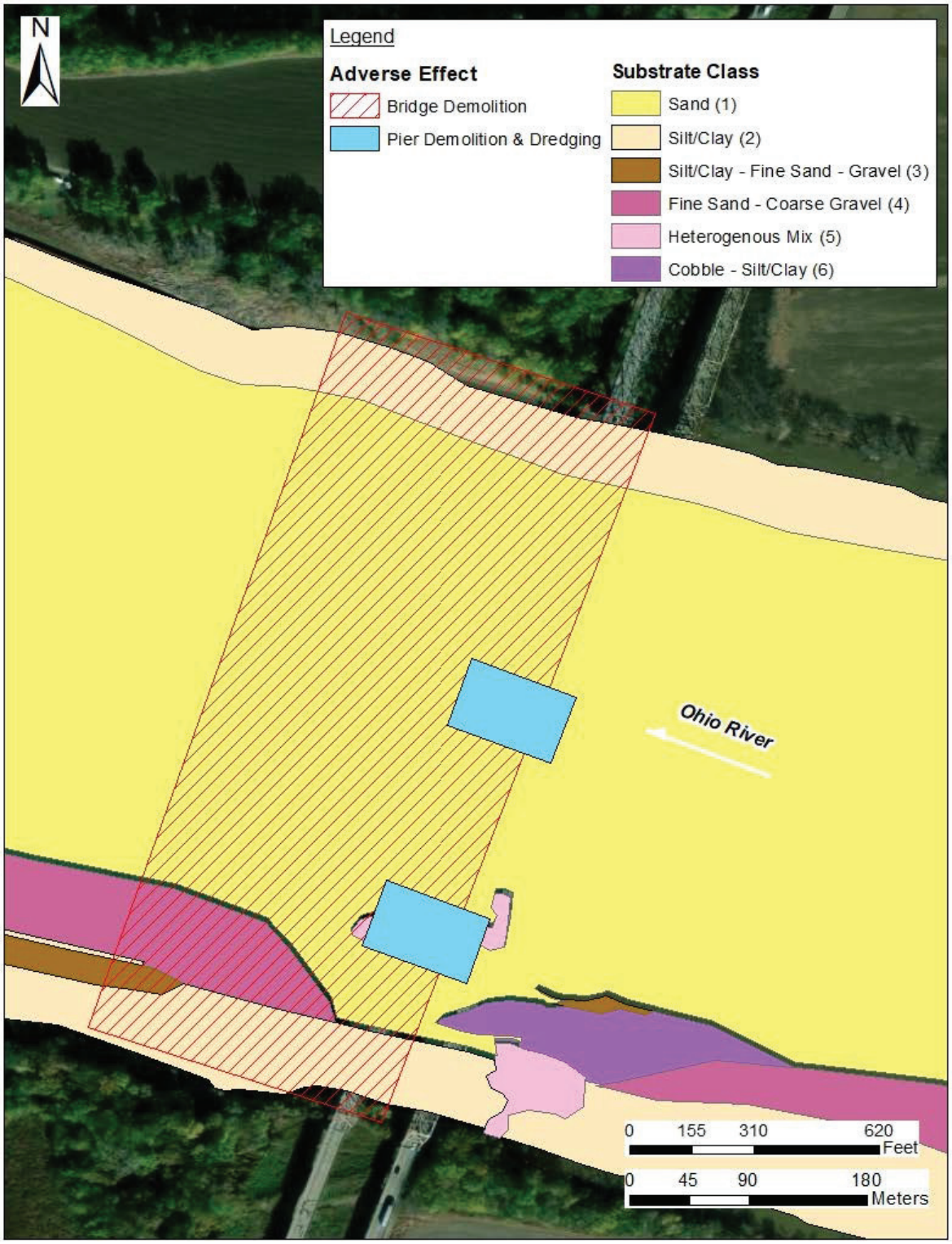
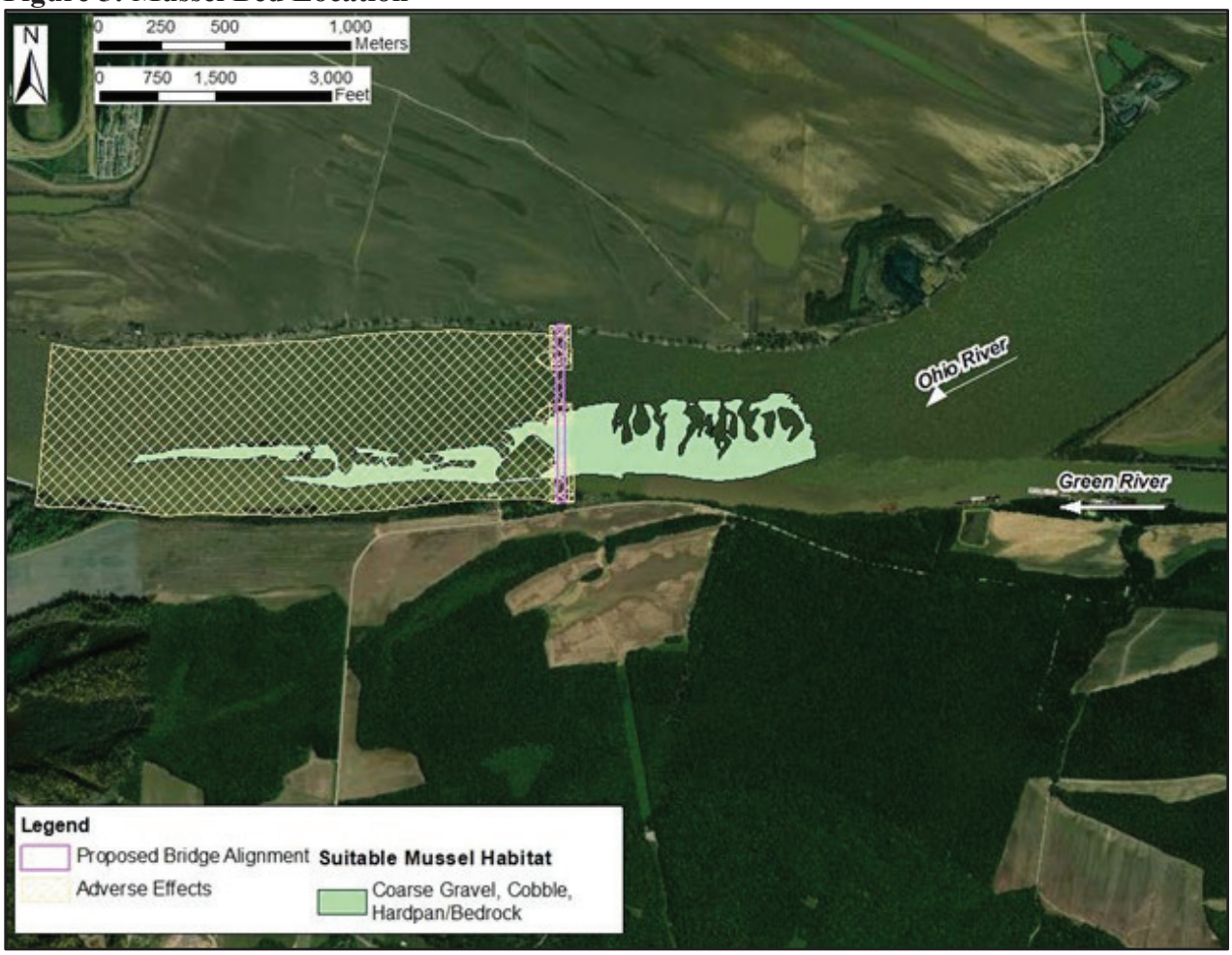


Figure 5: Mussel Bed Location



APPENDIX A

Stressor-Exposure-Response Pathways

Effects Pathway #1: Fat Pocketbook, Sheepnose, and Longsolid (Section 5.1)	
Activities: Causeway Construction, I-69 Bridge Construction, US 41 Bridge Demolition, and Pier Removal	
Stressor	Physical Forces (crushing, entrapment, stranding, and removal)
Exposure	Areas impacted by the I-69 Bridge construction and US 41 Bridge demolition (Figures 3 and 4); temporary.
Resource Affected	All mussels present, including adults and juveniles
Individual Response	Injury and death
Relevant Conservation Measures (Section 2.3)	CM 3: Catch Barges for US 41 Roadway Removal CM 4: Demolition and Recovery of the US 41 Bridge CM 5: US 41 Pier Removal CM 7: Barge Spud Locations CM 8: Concrete Pouring CM 9: Environmentally Sensitive Area Minimization Procedures
Interpretation	Mussels are likely to experience injury/mortality from being crushed/entrapped by equipment, spudding barges, falling bridge materials, and concrete poured on the river bottom. Mussels are likely to experience mortality from stranding when areas are de-watered, and mortality when inadvertently removed during dredging activities. The implementation of conservation measures should minimize mussel exposure to this stressor by avoiding mussel habitat to the greatest extent possible.
Effect	Harm

Effects Pathway #2: Fat Pocketbook, Sheepnose, and Longsolid (Section 5.2)	
Activities: Causeway Construction, I-69 Bridge Construction, US 41 Bridge Demolition, and Pier Removal	
Stressor	Water Quality Degradation
Exposure	Areas impacted by the I-69 Bridge construction and US 41 Bridge demolition (Figures 3 and 4); temporary.
Resource Affected	All mussels present, including adults and juveniles
Individual Response	Significant changes in behavior (including breeding, feeding, and sheltering) that leads to injury or death.
Relevant Conservation Measures (Section 2.3)	CM 1: Erosion and Sediment Controls CM 2: Equipment Maintenance, Cleaning, Fueling, and Monitoring Plan CM 8: Concrete Pouring Techniques CM 10: Revegetation of Riparian Areas & Limited Use of Riprap
Interpretation	Activities associated with bridge construction and demolition are expected to mobilize sediment in the Action Area. This will impact mussels due to their sessile nature causing decreased recruitment and decreased ability to feed. Chemical spills may also lead to mussel mortality if they cause localized toxic conditions for mussels. The conservation measures are expected to minimize the amount of sediment to the greatest extent possible and reduce the likelihood of chemical spills.
Effect	Harm

Effects Pathway #3: Fat Pocketbook, Sheepnose, and Longsolid (Section 5.3)	
Activities: I-69 Bridge Construction, US 41 Bridge Demolition, and Pier Removal	
Stressor	Changes in Hydrology
Exposure	Areas impacted by new piers associated with the I-69 Bridge construction and the US 41 Bridge pier removals (Figures 3 and 4); permanent.
Resource Affected	All mussels present, including adults and juveniles
Individual Response	Significant changes in behavior (including breeding, feeding, and sheltering) that leads to injury or death.
Relevant Conservation Measures (Section 2.3)	None
Effect Pathway	Mussels that occur in the areas of pier construction for the I-69 Bridge and pier removal for the US 41 Bridge will either be swept downstream as scouring and velocities increase in their existing habitat, or they will be subject to lower flows than normal, potentially reducing fish host interactions and food availability. There are no conservation measures to prevent the localized changes in hydrology.
Effect	Harm

Effects Pathway #4: Fat Pocketbook, Sheepnose, and Longsolid (Section 5.4)	
Activities: Causeway Construction, I-69 Bridge Construction, US 41 Bridge Demolition, and Pier Removal	
Stressor:	Reduced Host Fish Interactions
Exposure	Areas impacted by the I-69 Bridge construction and US 41 Bridge demolition (Figures 3 and 4); temporary.
Resource Affected	Reproductive mussels and mussel host fish
Individual Response	Significant changes in (fish host) behavior (including breeding, feeding, and sheltering) that leads to injury or death.
Relevant Conservation Measures (Section 2.3)	CM 3: Catch Barges for US 41 Roadway Removal
Effect Pathway	Fish hosts may be impacted directly during detonation of explosives, resulting in mortality, and death of any attached glochidia. If fish hosts flee the area due to disturbance, this could affect availability of fish hosts in the Action Area, especially if this occurs during critical reproduction periods. Catch barges preventing falling US 41 roadway particles from reaching the river will be used where possible to minimize impacts on fish within the impact area. The effect is expected to be temporary as host fish are likely to move back in the area once river disturbances associated with the Action are complete.
Effect	Harm