



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

3817 Luker Road  
Cortland, NY 13045



May 27, 2016

Mr. Hans Anker  
Federal Highway Administration  
Leo W. O'Brien Federal Building  
11A Clinton Avenue, Suite 719  
Albany, NY 12207

Dear Mr. Anker:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the proposed Interstate 86 (I-86) Bridge Repair Project (Project) located in the Towns of Carrollton and Allegany, including the Allegany Territory of the Seneca Nation of Indians (SNI), Cattaraugus County, New York (PIN 5006.99, BIN 6600159), and its effects on the federally-listed, endangered, rayed bean (*Villosa fabalis*) mussel, in accordance with section 7(a)(2) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your letter February 9, 2016, requesting initiation of formal consultation was received on February 16, 2016.

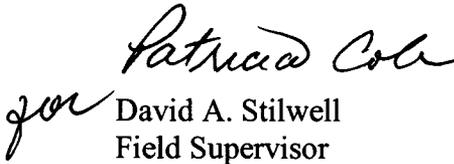
The Federal Highway Administration (FHWA) has evaluated the effects of the above referenced project pursuant to section 7(a)(2) of the Act on federally-listed species and prepared a Biological Assessment (BA) to document the evaluation. The FHWA has determined that the project, as proposed, is likely to adversely affect the rayed bean and has requested formal consultation with the Service.

This Opinion is based on information provided in the February 9, 2016, the BA, as well as supplemental information, telephone calls, conference calls, meetings, emails, and other information. A complete administrative record of this consultation is on file at this office.

After reviewing the current status of the rayed bean mussel, the environmental baseline for the action area, the effects of the proposed activities, and cumulative effects, the Service has determined that the action, as proposed, is not likely to jeopardize the continued existence of this species.

The Service appreciates the cooperation of the FHWA and the New York State Department of Transportation during this consultation. If you have any questions regarding this Opinion, please contact Sandra Doran of my staff at (607)753-9334.

Sincerely,

  
David A. Stilwell  
Field Supervisor

Enclosure

cc: FHWA, Albany, NY (M. Toni)  
NYSDOT, Buffalo, NY (S. Jones, K. Lorenz)  
NYSDEC, Albany, NY (L. Holst)  
NYSDEC, Allegany, NY (A. Rothrock)  
NYSDEC, Buffalo, NY (permits)  
COE, Buffalo, NY (S. Metiever)  
FWS, Hadley, MA (G. Smith)

**BIOLOGICAL OPINION**

**on the**

**Effects of the**

**Interstate 86 Bridge Repair Project  
(Exit 20 to East Seneca Nation Line)**

**on the Rayed Bean Mussel**

**Towns of Carrollton and Allegany**

**and the**

**Territory of the Seneca Nation of Indians,**

**Cattaraugus County, New York  
(PIN 5006.99, BIN 6600159)**

Submitted to the Federal Highway Administration

May 27, 2016

Prepared by:  
U.S. Fish and Wildlife Service  
New York Field Office  
3817 Luker Road  
Cortland, NY 13045

## TABLE OF CONTENTS

Page No.

INTRODUCTION .....	1
CONSULTATION HISTORY .....	2
BIOLOGICAL OPINION.....	4
DESCRIPTION OF THE PROPOSED ACTION .....	4
<i>Project Description</i> .....	4
<i>Project Location</i> .....	5
<i>Project Timeline</i> .....	8
<i>Action Area</i> .....	13
STATUS OF THE SPECIES .....	13
<i>Listing Status</i> .....	13
<i>Critical Habitat</i> .....	13
<i>Species Description</i> .....	13
<i>Life History</i> .....	14
<i>Habitat</i> .....	14
<i>Population Dynamics</i> .....	15
<i>Threats</i> .....	15
<i>Rangewide Status and Distribution</i> .....	17
<i>Status of the Species in New York</i> .....	17
<i>Conservation Needs of the Species</i> .....	18
ACTION AREA.....	21
ENVIRONMENTAL BASELINE.....	21
<i>Status of Species within the Action Area</i> .....	22
EFFECTS OF THE ACTION .....	25
SUMMARY OF EFFECTS .....	28
<i>Impacts to Individuals</i> .....	28

<i>Impacts to Populations</i> .....	28
<i>Impacts to Species</i> .....	29
CONCLUSION .....	29
INCIDENTAL TAKE STATEMENT .....	29
AMOUNT OR EXTENT OF TAKE .....	30
EFFECT OF THE TAKE.....	31
REASONABLE AND PRUDENT MEASURES.....	31
<i>Terms and Conditions</i> .....	31
<i>Monitoring and Reporting Requirements</i> .....	32
<i>Conservation Recommendations</i> .....	33
REINITIATION NOTICE .....	34
LITERATURE CITED .....	34

## INTRODUCTION

The U.S. Fish and Wildlife Service (Service) reviewed the Biological Assessment (BA) and supplemental information provided by the Federal Highway Administration (FHWA) for the proposed Interstate 86 (I-86) Bridge Repair Project (Project) and minor repair work. The project is located in the Towns of Carrollton and Allegany, including the Allegany Territory of the Seneca Nation of Indians (SNI), Cattaraugus County, New York (PIN 5006.99, BIN 6600159). The BA includes FHWA evaluation of effects on the rayed bean mussel (*Villosa fabalis*) in accordance with Section 7(a)(2) of the Endangered Species Act (Act or ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

On February 16, 2016, the Service received the FHWA's request for formal consultation and a draft BA for the proposed Project. The work will begin at I-86, Exit 18 to the east SNI line. The Service provided a letter accepting the BA on April 19, 2016. This document transmits the Service's Biological Opinion (Opinion) for the Project.

The Project begins at Exit 20 and ends at the eastern boundary of the SNI territory, just beyond Exit 23. The bridge repair and road rehabilitation will require a Clean Water Act (Section 404) permit from the U.S. Army Corps of Engineers, Buffalo District (Corps). We understand that the Project will not require permits (Article 15, Part 186) from the New York State Department of Environmental Conservation (NYSDEC). This project does not disturb over one acre of land and, therefore, is not subject to SPDES or NPDES permit regulations. Therefore, a formal Stormwater Pollution Prevention Plan (SWPPP) was not prepared. However, as standard in all New York State Department of Transportation (NYSDOT) projects, erosion and sedimentation best management practices (BMPs) will be utilized and maintained to protect water quality and aquatic habitat. These measures will lessen any potential indirect impacts downstream that may result from the proposed project that are minimal and temporary in nature. The salvage limit for mussels has been set at 100 meters (m) downstream and 20 m upstream of the bridge due to the limited potential for construction related sediment to cause indirect impacts and also to limit the harassment of mussels and other aquatic species.

This Opinion is based on information provided in the BA and supplemental information for PIN 5006.99, numerous telephone calls, conferences, electronic email exchanges between the Service and the FHWA (Hans Anker, Melissa Toni) and the NYSDOT-Region 5 (Sylvia Jones and Kimberly Lorenz), and other information. Field investigations were conducted by the NYSDOT and their agent, Mr. Paul Lord, State University of New York (SUNY) Oneonta, who conducted mussel surveys on June 14, and August 3 and 4, 2015. Mr. Lord sent an email to the Service on August 4, 2015, informing the Service that two live rayed bean mussels were found in the project area of the bridge. The Service received the report from the FHWA on February 11, 2016.

## CONSULTATION HISTORY

**May 9, 2014:** FHWA requested informal conference for the northern long-eared bat (*Myotis septentrionalis*) (NLEB).

**May 15, 2014:** Service responded with non-jeopardy determination.

**May 4, 2015:** The NLEB was listed as threatened under the ESA.

**June 14, August 3, and August 4, 2015:** NYSDOT consultant conducted mussel surveys

**July 1, 2015:** The NYSDOT visited the Service's Information, Planning and Conservation (IPaC) website and followed the project review process (TAILS number 05E1NY00-2016-I-0170). Three federally-listed species were identified as potentially located in the project area; two freshwater mussel species - the rayed bean (*Villosa fabalis*) and the clubshell (*Pleurobema clava*), and the northern long-eared bat.

**August 4, 2015:** Email from Paul Lord informing the Service that he found two rayed bean mussels during a mussel survey for the I-86 Bridge.

**October 21, 2015:** The FHWA submitted a letter to the Service describing the proposed bridge repair work in the Allegheny River and determined that the project *May Affect, but Not Likely to Adversely Affect* (NLAA) listed mussels. The FHWA requested concurrence from the Service.

**December 11, 2015:** The Service sent a letter to the FHWA stating that the Service was unable to concur with the NLAA determination as rayed bean mussels were found to be present in the project area and formal consultation would be required.

**January 28, 2016:** The Service participated in a teleconference call with the NYSDOT and FHWA to discuss the Service's letter of nonconcurrence. We discussed the confirmed presence of the rayed bean mussel in the project area, the contents of the draft biological assessment, reasonable and prudent measures, conservation measures to minimize impacts to mussels, and identification of all involved stakeholders that will be involved in the project, including the SNI as the project is located on the Seneca Territory. During the call, the FHWA stated that they considered the project an "emergency" as a large scour hole was found during a routine inspection and it would need to be filled this year. The Service explained that for the purposes of section 7 consultation, an "emergency" is defined as "a situation involving an act of God, disasters, casualties, national defense or security emergencies, etc." (50 CFR 402.05) and includes response activities that must be taken to prevent imminent loss of human life or property (Final Endangered Species Act Section 7 Consultation Handbook, March 1998, chapter 8; (<http://www.fws.gov/endangered/esa-library/pdf/CH5-9.PDF>)). The proposed work did not meet this definition and, therefore, emergency consultation procedures were not available for this project. However, the Service agreed to work with the FHWA to complete the Opinion by June 1, 2016.

**February 2, 2016:** The Service requested a call with FHWA to discuss the status of the project. The FHWA responded that they were available for a call, however, they were preparing the additional information as requested.

**February 8, 2016:** The Service sent an email to FHWA requesting the additional information be sent by February 12, 2016, in order for us to meet the requested timeline. The FHWA responded stating that they hoped to provide the information by February 9, 2016.

**February 11, 2016:** The Service received a copy of the letter requesting initiation of formal consultation (dated February 9, 2016) along with a copy of the mussel survey with maps, project

location map, site plans, and a revised draft BA (dated February 3, 2016). Subsequently, the FHWA submitted an updated BA (dated February 9, 2016) and asked the Service to disregard the February 3, 2016, version.

**February 16, 2016:** The Service received the FHWA's official letter dated February 9, 2016, requesting initiation of formal consultation on the I-86 Bridge Repair Project including the draft BA dated February 9, 2016.

**March 1, 2016:** The Service sent an email to the FHWA and the NYSDOT explaining the use of emergency consultation procedures and requested additional information lacking from the February 9, 2016, BA (i.e., project footprint, maps, plans, details of the mussel salvage, scope of work, and amount of estimated take as a result of construction).

**March 21-22, 2016:** The Service and FHWA exchanged emails regarding emergency consultation under the ESA.

**April 7, 2016:** The FHWA responded to the Service's request for additional information (March 1, 2016) by providing a supplemental document (dated April 1, 2016) and a proposed timeline for the Opinion.

**April 19, 2016:** The Service sent an initiation letter to the FHWA, confirming receipt of the supplemental information to the BA and concurred with the FHWA NLAA the clubshell mussel. The Service also acknowledged the immediacy of the project and would try to meet the requested timeframe for an Opinion by June 1, 2016.

**April 20, 2016:** The Service requested additional information from FHWA and NYSDOT, including a copy of any hydraulic analyses conducted for the project.

**April 22, 2016:** The Service requested additional information from the FHWA and NYSDOT including a bathymetric survey, a habitat map showing mussel habitat within the action area and the relocation area, plans for the causeway and cofferdam and, if proposed, a SWPPP and salvage plan, a copy of the request for proposals (RFP) for the mussel work including a salvage plan, and an estimate of the amount of take based on this information. The Service also requested that the FHWA re-evaluate the proposed action area as "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 FHWA's proposed action area is 20 m upstream and 100 m downstream of the bridge. The Service recommended that FHWA evaluate how far the sediment plume will travel downstream based on flow, recalculate the action area, and provide a new map.

**April 26, 2016:** The Service requested that additional information and clarification regarding the project area as the documentation referred to two exits, cofferdam details, if proposed, and dimensions of the causeway, the size of rocks/pipes proposed to be used for the causeway, timing, an erosion and sedimentation control plan, and contingency plans for rapid response and remediation from unexpected events should be developed and submitted to the Service.

**May 19, 2016:** The FHWA called to inform the Service that the salvage for the bridge project is scheduled to begin on June 2, 2016.

**May 23, 2016:** The FHWA provided a response to questions including a letter from the SNI regarding hellbender surveys. A hydraulic analysis was not prepared for this project. NYSDOT clarified that the minor work (i.e., culvert repair work) is proposed between Exit 20 and the SNI line. There were signs placed between Exit 18 and Exit 20 that have been completed.

**May 26, 2016:** The final biological opinion was delivered to the Federal Highway Administration.

## **BIOLOGICAL OPINION**

### DESCRIPTION OF THE PROPOSED ACTION

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

#### *Project Description*

The proposed project entails repair and rehabilitation of the I-86 Bridge over the Allegheny River in the Towns of Carrollton and Allegany, Cattaraugus County, New York.

The proposed activities (actions) include:

1. Mussel salvage and relocation activities will be conducted by an approved malacologist.
2. Construction activities for the bridge repair:

The I-86 Bridge Repair Project is expected to directly disturb the streambed of the Allegheny River, however, the temporary causeway and the permanent placement of stone fill around Pier #3 (proposed to be approximately 920 cubic yards) will be located in less than optimal habitat for rayed bean. The area of permanent impacts is anticipated to be approximately 0.07 acre. The volume of stone fill proposed for construction of the temporary causeway in the Allegheny River is anticipated to be approximately 3,630 cubic yards. The area of temporary impacts is anticipated to be approximately 0.34 acre. The location and the dimensions of the proposed permanent and temporary impacts for stone fill to be installed are shown on drawings. The construction sequence is proposed as follows:

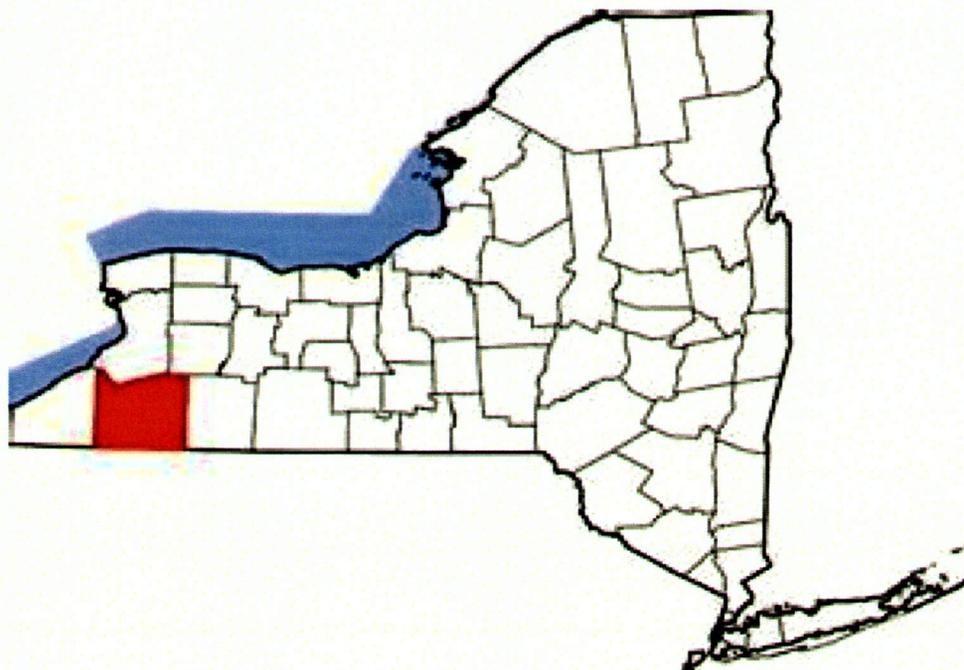
- a) The NYSDOT proposes to begin work in the river on July 1, 2016. Prior to construction of the project, an erosion and sedimentation control plan will be developed to minimize impacts to the aquatic environment. Contingency plans will be developed for rapid response and remediation of impacts from unexpected events in the construction area (e.g., floods, fuel spills, and siltation). Hazardous materials and refueling areas will be located at least 150 feet from the Allegheny River. Appropriate spill cleanup materials will be available on-site.

- b) Install temporary access road (345 feet long x 33 feet wide) on upland to access the bridge and provide a staging area.
- c) Install a temporary causeway made of heavy stone riprap. The causeway will extend from the left descending bank, looking downstream, approximately 90 feet out from the wetted channel to Pier #3. Mechanical equipment (backhoe, track hoe, dump trucks) will be used to discharge approximately 3,630 cubic yards of stone fill material in the river starting on the west riverbank (descending bank) and ending at Pier #3 located in the center of the river. The temporary causeway will also wrap around Pier #3 to provide a safe work platform for bridge repairs. It will be about 191 feet long and about 33 feet from the center of the pier on either side or 66 feet wide including the pier. The heavy stone riprap placed to construct the base layer of the temporary causeway will convey stream flow through the structure. Some flow will diffuse through the riprap, maintaining a mild current behind the causeway. The pier footer will be capped with stone riprap material to maintain the existing streambed elevation and provide scour protection. Water will be temporarily diverted between Piers #3 and #4 (Figure 5).
- d) Using the temporary causeway to access the pier, mechanical equipment will be used to discharge approximately 920 cubic yards of stone fill in the river to provide scour protection around Pier #3. The fill will be capped with large stone riprap to ensure protection of the pier. The streambed material will be replaced over the pier footer to match the existing riverbed elevation.
- e) Remove silt curtain and causeway to pre-existing conditions. Remove access road and stabilize soils.
- f) Repair a retaining wall located above the waterline and adjacent to the Allegheny River. This work will be completed in the beginning of the 2016 construction season.
- g) Conduct minor repairs along the roadway from Exit 20 to the Seneca Nation Line including culvert replacement and road surface repair along the highway corridor. This work will be completed in the beginning of the 2016 construction season.

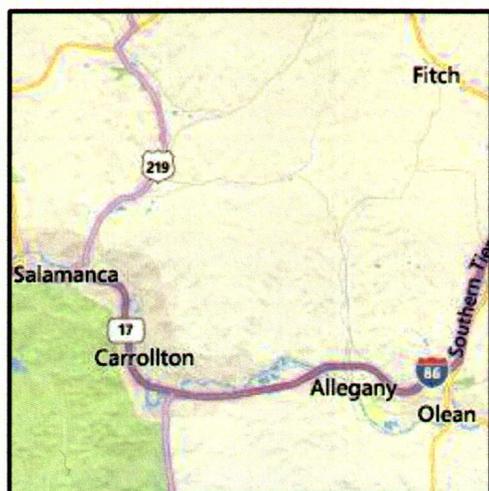
### *Project Location*

The I-86 Bridge Repair Project is located in the Allegheny River and the proposed road rehabilitation project is located along a 7-mile stretch of I-86, from Exit 20 to the East Seneca Nation Line in the Towns of Carrollton and Allegany and the Allegany Territory of the Seneca Nation of Indians, Cattaraugus County, New York (Figures 1-4). The Allegheny River is approximately 325 miles long and 204,000 square miles. The river rises in north central Pennsylvania, then flows west and turns north into western New York, looping westward across southern Cattaraugus County for approximately 30 miles (48 km), flowing through Seneca Nation lands close to the northern boundary of Allegany State Park before re-entering

northwestern Pennsylvania approximately 20 miles (32 km) southeast of Jamestown, New York. The river joins the Monongahela River in Pennsylvania and flows into the Ohio River. The river has eight locks and dams (numbered two through nine) that form corresponding pools and is impounded by the Kinzua Dam in northwestern Pennsylvania, resulting in the Allegheny Reservoir.

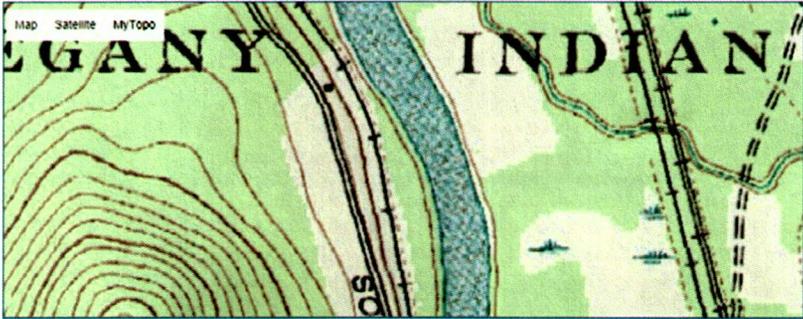


**Figure 1:** Map of New York showing location of Cattaraugus County, NY.



**Figure 2:** Map of the project site located between the Towns of Carrollton and Allegany, NY.

Figures 3(a) and 3(b) provide maps of the project area depicting the area prior to construction of Interstate 17 (now I-86). The site is located on the Allegheny Indian Reservation (Seneca Nation) (Figure 3a) and post construction of I-86 (Figure 3b).



Lat/Long 42.093, -78.651

Figure 3(a).



Figure 3(b).



**Figure 4:** Aerial views of project area.

The local topography is gently rolling forested hills with flat valleys created by glacial deposits and traversed with state highways and regional (County) and local (town) roadways. The valley supports agriculture, residential and commercial business, railways, and highways.

The site is bordered to the west by Allegany State Park, to the east by open water ponds and upland buffers. The river flows south to north at the project site and is bordered by undeveloped forested riparian areas.

#### *Project Timeline*

The seven-mile project, including the repair of a retaining wall, minor culvert rehabilitation, and pavement repairs, will be completed in the 2016 construction season. The bridge scour and steel work on the bridge is proposed to begin July 1, 2016, and be completed in September 2016.

June 1, 2016: Implement BMPs and implement the NYSDOT ESCP Construct access road.  
Begin mussel salvage/relocation (based on river conditions).

July 1, 2016: Construction of temporary causeway (Figure 5). The instream activity associated with the bridge is anticipated to be within the first (and last) 1.5 to 2 weeks and is associated with the installation (and removal) of the temporary causeway and turbidity curtain.

The installation of the permanent stone scour protection around Pier #3 will take place during installation of the temporary causeway and turbidity curtain.

The bridge repair work is anticipated to take approximately seven weeks. No instream work or impacts to the river are anticipated during the bridge repair work.

August 2016: Removal of causeway.

September 2016: Removal of access road and stabilize soils.

The entire project is proposed to take over a period of 10-12 weeks, with most instream activity (causeway construction and removal, installation of weighted silt curtain, and pier repair) commencing within the first 1.5-2 weeks of the project (mid-July 2016). The causeway and access platform are anticipated to be in place for a period of 12 weeks.

#### Conservation Measures

The following conservation measures were provided with the NYSDOT supplemental information (p. 4) dated April 1, 2015:

- a) A turbidity curtain will be installed in the river before installation of the temporary causeway. The curtain will be properly anchored and maintained during in-water work to minimize the potential for construction-related sediment to leave the project area. The curtain can remain for the full 10 weeks or could be removed once the causeway installation is complete. The curtain will be maintained per NYSDOT specifications. The curtain will be removed post construction.
- b) BMP's will be in place prior to construction to reduce sediments carrying potential pollutants into the river and to minimize turbidity.
- c) Any excavated riverbed material will be removed from the river and placed in an upland area to minimize the potential for sediment to re-enter the river. Suitably stabilized material will replace the excavated riverbed material within the work zone.
- d) Notes have been included on the plans that offer specific direction to NYSDOT staff and the contractor regarding proper sediment and erosion control measures.
- e) Disturbed areas of the river bank will be restored to original contours and conditions and suitably stabilized to prevent bank erosion. The portion of the access road/causeway leading down to the river bank above ordinary high water will remain in place as requested by the SNI. None of the temporary causeway will remain in the river.
- f) The turbidity curtain will remain in place for the duration of in-water activities.
- g) Refueling of equipment will occur on impervious surfaces away from the river and outside the ordinary high water level.

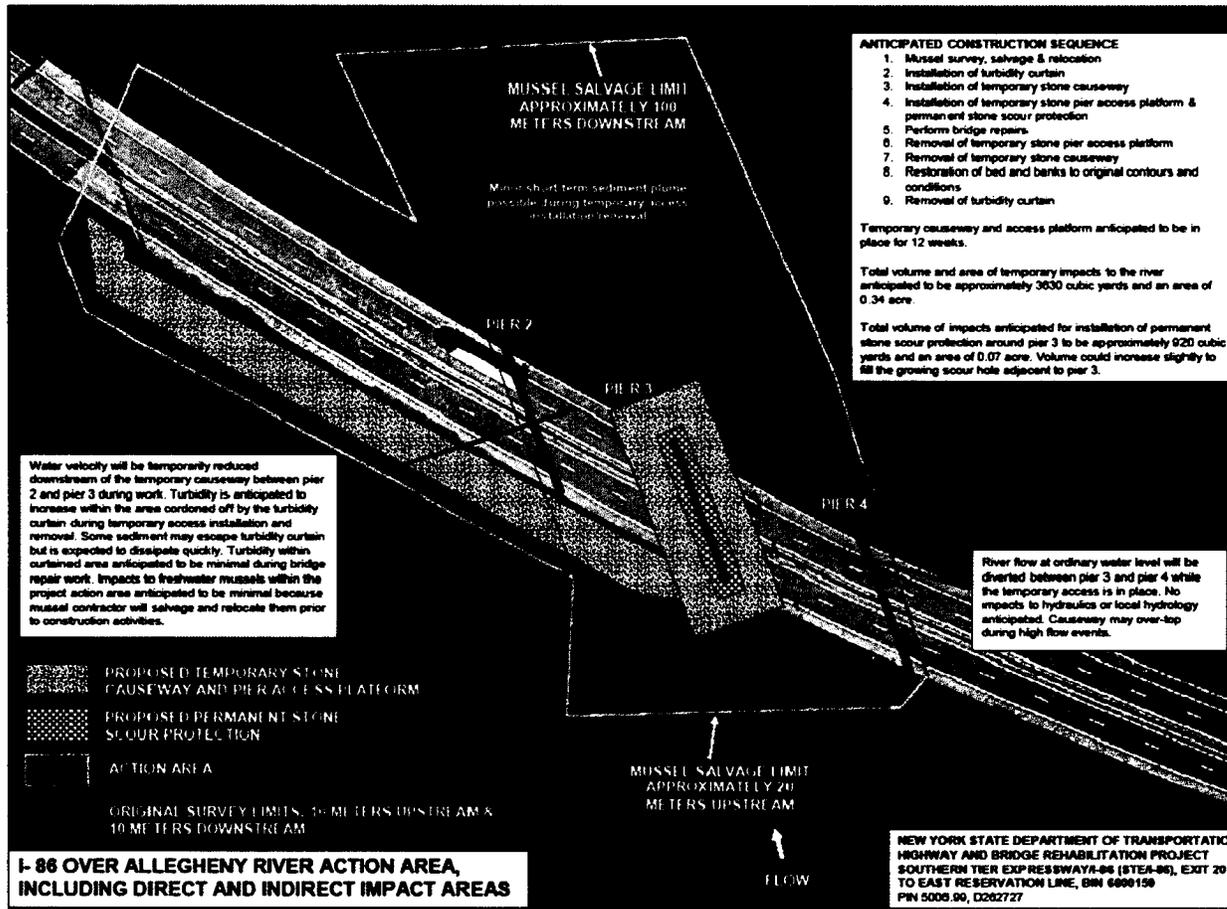


Figure 5: Construction plan view diagram showing area of direct activities.



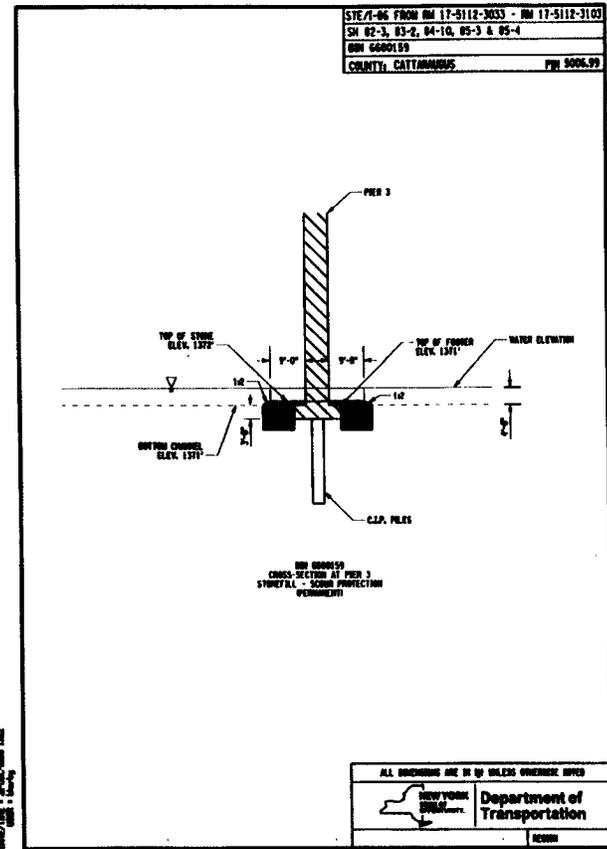
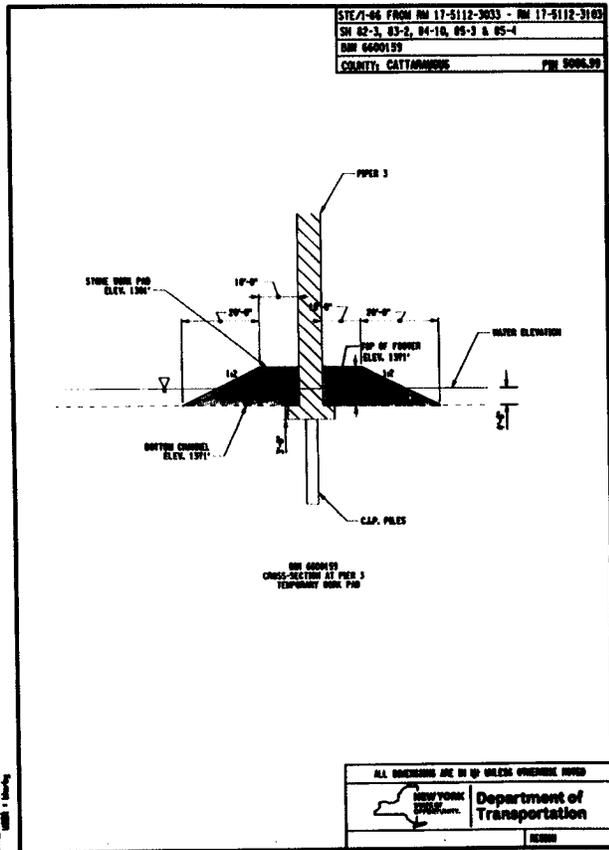


Figure 5(b). Cross sectional diagram.

- h) The temporary causeway will be composed of non-erodible stone material to minimize the potential for a storm event to wash it away.
- i) An approved mussel surveyor will salvage all of the freshwater mussels from the project action area (10,058 m<sup>2</sup>) within 30 days prior to commencement of work (proposed for July 1, 2016). Mussels will be salvaged, tagged, and relocated from within the project limits to the nearest suitable habitat to minimize the potential for indirect impacts from construction activities.
- j) A temporary causeway will be used for construction access to further minimize the potential for additional direct and indirect impacts during construction because equipment will be out of the water and off the riverbed.

## Project Setting

### *Action Area*

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 includes the width of the river, approximately 20 m upstream of the bridge and 100 m downstream (10,058.4 m<sup>2</sup>) as shown in Figure 5. This area is where project-associated environmental effects (e.g., earth disturbance, erosion, siltation, fill, scouring, and fluvial-hydrological alteration) are anticipated to occur and where the mussel salvage is proposed.

## STATUS OF THE SPECIES

### *Listing Status*

The rayed bean is an uncommon species and has declined or disappeared over its range. It was first listed as a species of Special Concern in New York (Williams et al. 1993) and listed as an endangered species pursuant to the ESA on February 14, 2012 (77 FR 8632), effective March 15, 2012 (Docket Number FWS-R3-ES-2010-0019).

### *Critical Habitat*

The Service found that critical habitat was not determinable at the time of listing (Service 2012).

### *Species Description*

The rayed bean is a small (<1.5 inches in length) freshwater mussel that has a smooth-texture and green, yellowish-green, or brown shell with numerous dark-green wavy lines (Cummings and Mayer 1992). The male's shell shape is generally elongated, whereas the female's is smaller and elliptical (Parmalee and Bogan 1998).

### *Life History*

Adult freshwater mussels are filter-feeders, siphoning phytoplankton, diatoms, and other microorganisms from the water column (Fuller 1974). For their first several months, juvenile mussels employ foot (pedal) feeding and are thus suspension feeders that feed on algae and detritus (Yeager et al. 1994). Mussels tend to grow relatively rapidly for the first few years and then slow appreciably at sexual maturity (when energy is being diverted from growth to reproductive activities) (Service 2002).

Most mussels, including the rayed bean, generally have separate sexes. Age at sexual maturity for the rayed bean is unknown, but in other species is estimated to occur after a few years. Males expel clouds of sperm into the water column, which are drawn in by females through their incurrent siphons. Hermaphroditism occurs in many species of mussel (van der Schalie 1966), but is not known for the rayed bean. This reproductive mechanism, which is thought to be rare in dense populations, may be implemented when populations exhibit low densities and high dispersion levels. Females changing to hermaphrodites may be an adaptive response (Bauer 1987), assuring that a recruitment class may not be lost in small populations. Fertilization takes place internally, and the resulting zygotes develop into specialized larvae termed glochidia within the gills. The rayed bean is thought to be a long-term brooder; gravid females have been collected from May through October (Parmalee and Bogan 1998; Ecological Specialists, Inc. 2000; Woolnough 2002).

Glochidia must come into contact with a specific host fish(es) in order for their survival to be ensured. Without the proper host fish, the glochidia will perish. Little has been published regarding host fishes of the rayed bean (Parmalee and Bogan 1998; West et al. 2000). Published research identifies the Tippecanoe darter (*Etheostoma tippecanoe*) as a host fish for the rayed bean (White et al. 1996). Other hosts are thought to include the greenside darter (*E. blennioides*), rainbow darter (*E. caeruleum*), mottled sculpin (*Cottus bairdi*), and largemouth bass (*Micropterus salmoides*) (Woolnough 2002). Based on inference of closely related species (i.e., purple bean, *V. perpurpurea*; Cumberland bean, *V. trabalis*), additional hosts may be suitable, including species in the *Etheostoma* subgenus *Nothonotus* (e.g., bluebreast darter, *E. camurum*; sculpins (*Cottus* spp.), and fantail darter (*E. flabellare*) (J.W. Jones, VPI&SU, pers. comm., 2002). The spotted darter (*Etheostoma maculatum*) was later identified as a suitable host fish in 2011 (Gibson et al. 2011). The method of host fish attractant reported above seems to be more appropriate for small predatory fishes like darters and sculpins (Service 2002).

### *Habitat*

The rayed bean generally lives in smaller, headwater creeks, but it is sometimes found in or near shoal or riffle areas, large rivers, and wave-washed areas of glacial lakes. It prefers gravel or sand substrates and is often found in and around roots of aquatic vegetation. Adults spend their entire lives partially or completely buried in substrate, filtering water through their gills to remove algae, bacteria, detritus, microscopic animals, and dissolved organic material for food (Service 2012).

In New York, the rayed bean is often found in shallow riffles in creeks or small rivers, often among aquatic plants. It also occurs in some lakes (Chautauqua and Lake Erie) (Strayer and Jirka 1997).

Suitable habitat was found at the project site, in the Allegheny River in the vicinity of the bridge. The surveyors reported occurrence of two live rayed bean mussels and eleven shells (SUNY 2015). Rayed bean had not been documented in the New York portion of the Allegheny River prior to this report.

### *Population Dynamics*

The life cycle of the rayed bean, like most freshwater mussels, is unusual and complex. Males release sperm into the water column that is then siphoned by females to fertilize their eggs. Fertilized eggs develop into microscopic larvae, called glochidia, within special gill chambers. Females expel mature glochidia, which then must attach to the gills or fins of specific host fish species to complete development into juvenile mussels. After attaching to host fish, glochidia mature within a few weeks. Juvenile mussels then drop off and continue to grow, if they fall onto appropriate substrate. Using fish as a host species allows the rayed bean to move upstream and populate habitats it could not otherwise reach (Service 2012).

Most mussels, including the rayed bean, generally have separate sexes. Age at sexual maturity for the rayed bean is unknown, but in other species is estimated to occur after a few years.

### *Threats*

The rayed bean is subjected to many of the same threats as other aquatic invertebrates. Pollution from municipal, agricultural, and industrial sources has reduced or eliminated mussel populations directly, as well as indirectly, through elimination of host fish, resulting in reproductive failures. Increases in turbidity and suspended sediments are detrimental in that they decrease the depth and amount of light penetration, affect primary productivity, decrease oxygen levels, increase water temperature, irritate or cause clogging of gills, and result in a blanket of silt on the substrate. Mussels in general may be directly affected by siltation through smothering when high turbidity interferes with sight lures, such as conglutinates, which attract host fish. Siltation also affects mussels by smothering eggs or larvae of the fish host populations and by reducing food availability. Siltation also fills interstitial spaces, eliminating spawning habitat critical to the survival of young fish and juvenile mussels. Altered hydrologic regimes resulting from land-clearing, mining, agriculture, urbanization, and channelization were probably responsible for many of the population losses observed. Point and nonpoint source pollution and acid mine drainage may have contributed to the species' decline in various portions of its range.

The Service (2012) found that the following types of activities are threats to the rayed bean rangewide:

**Impoundment:** Dams affect both upstream and downstream mussel populations by disrupting natural river flow patterns, scouring river bottoms, changing water temperatures, and eliminating habitat. Adapted to living in flowing water, the rayed bean cannot survive in the still water impounded behind dams. The rayed bean also depends on host fish as a means to move upstream. Because dams block fish passage, mussels are also prevented from moving upstream, which isolates upstream mussel populations from downstream populations, leading to small, unstable populations more likely to die out.

**Chemical Contaminants:** Adult mussels are easily harmed by toxins and degraded water quality from pollution because they are sedentary (they tend to stay in one place). Pollution may come from specific, identifiable sources such as accidental spills, factory discharges, sewage treatment plants, and solid waste disposal sites, or from diffuse sources like runoff from cultivated fields, pastures, cattle feedlots, poultry farms, mines, construction sites, private wastewater discharges, and roads. Contaminants may directly kill mussels, but they may also reduce water quality, affect the ability of surviving mussels to have young or result in lower numbers, or cause disappearance of host fish.

**Dredging/Channelization/Siltation:** Although sedimentation is a natural process, poor land use practices, dredging, impoundments, and other activities accelerate erosion and increase sedimentation. Sediment that blankets a river bottom can suffocate mussels. Accelerated sedimentation may also reduce feeding and respiratory ability for rayed bean mussels, leading to decreased growth, reproduction, and survival.

**Development:** Development activities may impact streams and their mussel fauna where adequate streamside buffers are not maintained and erosion of sediments on impacted land is allowed to enter streams, degrading water quality. Dams, river and stream channelization and water withdrawals associated with land use development activities have isolated mussel populations. Agriculture, housing, commercial and industrial development, infrastructure crossing rivers and stream include pipelines carrying oil, gas and water, droughts, sedimentation, chemical contaminants also threaten rayed bean populations. Impervious surfaces that alter hydrologic factors (i.e., increase volumes of flow, annual flow rates, peak flows and duration and temperature; decreased base flow and changes in sediment loading can effect mussels and their habitat.

**Population Fragmentation and Isolation:** The majority of the remaining populations of the rayed bean are generally small and geographically isolated. The patch distribution pattern of populations in short river reaches makes them much more susceptible to extirpation from single catastrophic events, such as toxic chemical spills. This level of isolation makes natural repopulation of any extirpated population unlikely without human intervention. Population isolation prohibits the natural interchange of genetic material between populations, and small population size reduces the reservoir of genetic diversity within populations, which can lead to inbreeding depression.

### *Rangewide Status and Distribution*

The historic range of the rayed bean was wide and included parts of the midwest and eastern United States, north to Ontario, Canada. According to the Service Status Assessment (SSA) in 2002, the rayed bean historically occurred in Illinois, Indiana, Kentucky, Michigan, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia and was historically known from 106 streams, lakes, and some man-made canals in 10 states and 3 Service regions (3, 4, and 5) and Ontario, Canada.

In 2002, the rayed bean appeared to be declining, as it has been eliminated from 78% of the total number of streams and other waterbodies in which it was historically known (22 streams and a lake) in five states and Ontario, Canada.

On November 2, 2010, the Service published a rule in the Federal Register proposing to list the rayed bean. At that time, the rayed bean had declined significantly rangewide and is now known from only 28 streams and one lake (down from 110), a 75 percent decline. The rayed bean is currently found in Indiana, Michigan, New York, Ohio, Pennsylvania, West Virginia (reintroduction), and Ontario, Canada.

The species is considered extirpated from Illinois, Kentucky, and Virginia. After extirpation from Tennessee and West Virginia, reintroductions have restored the rayed bean to these states (Service 2012). Extant populations are listed in Appendix A.

Rayed bean ranges throughout the Ohio River, Lake Erie, and Lake St. Clair basins (Service 2002). In Pennsylvania, rayed bean is known to occur at six sites – the Allegheny River

In New York, the rayed bean is found in the Allegheny River, Olean Creek, lower Ischua Creek, and Cassadaga Creek. The project is located in the New York portion of the Allegheny River, which eventually flows into the Ohio River.

### Ohio River System

Rayed bean was once found in at least 67 streams, canals, and lakes in the Ohio River system. In 2002, rayed bean was extant in 12 streams and a lake. In 2016, the Service began working on a species status assessment. Currently, rayed bean occurs in only 34 streams and one lake (A. Boyer, pers. comm. 2016.)

### *Status of the Species in New York*

In 2015, the Service reported five extant sites in New York. Currently, a total of approximately 224 rayed bean have been found in New York in the following waterbodies: the Allegheny River, Cassadaga Creek, Oil Creek, and Oswayo Creek.

## *Conservation Needs of the Species*

The SSA for the rayed bean (Service 2002) recommends the national strategy for the conservation of mussels, compiled by the National Native Mussel Conservation Committee (1998) for detailed information on conserving North America's imperiled mussel fauna. Shute et al. (1997) also outlined management and conservation considerations for imperiled mussels and other aquatic organisms, while incorporating ecosystem management into the equation. The following is a summary of the most important aspects of research, surveys, and monitoring recommended in 2002.

**Implement existing laws and regulations:** In order for effective recovery to occur, it is critical to the survival of the rayed bean that federal and state agencies continue to protect its extant populations with those laws and regulations that address protection and conservation of the species and its habitats.

**Prioritize streams and watersheds:** Streams, stream reaches, lakes, and watersheds should be prioritized for protection based on a variety of factors, with emphasis on conserving the best existing populations and stream reaches as opposed to restoring habitats. These factors include high endemism; high diversity of imperiled species; biogeographic history of rare species; highly fragmented habitats; cost effectiveness and ease of preservation, management, recovery, and restoration; landowner complexity; watershed size; existing land-use patterns; public accessibility; likelihood for success; and low resilience to disturbance.

**Involve local communities:** The assistance of various stakeholders, working at the ecosystem and watershed levels, will be essential for the conservation and restoration of imperiled mussel populations. More importantly, the support of the local community, including agricultural, silvicultural, mining, construction, and other developmental interests, local individuals, and landowners will be essential in order to meet rayed bean recovery goals. Without a partnership with the people who live and work in these watersheds and who have an influence on habitat quality, recovery efforts will be doomed.

**Seek funding:** Seeking funding from various sources will be crucial in the recovery of the rayed bean. Sources such as Section 6 of the Act, and other funds administered by the Service, Mussel Mitigation Trust Fund, National Fish and Wildlife Foundation, U.S. Geological Survey, and many others will be necessary to aid in the recovery of the rayed bean and other mussels.

**Implement BMPs on riparian lands:** Maintaining vegetated riparian buffers is a well-known method of reducing stream sedimentation and runoff of chemicals and nutrients. Buffers reduce impacts to fish and other aquatic faunas and are particularly crucial for mussels. Other BMPs should be implemented on riparian lands throughout the range of the rayed bean.

**Initiate more habitat restoration programs:** More watershed-level, community-based riparian habitat restoration projects should be initiated in high biodiversity streams harboring the rayed

bean. By establishing bioreserves and other large-scale projects, significant levels of habitat can be restored and protected for the betterment of the Nation's imperiled mussel resources.

**Adjust numerical criteria for pollutants:** Where current numerical criteria of certain pollutants may not be protective of the rayed bean and other mussels, these standards should be adjusted to better conserve mussel resources.

**Monitor populations and habitat conditions:** A monitoring program should be developed and implemented to evaluate efforts, monitor population levels and habitat conditions, and assess the long-term viability of extant, newly discovered, augmented, and reintroduced rayed bean populations.

**Reduce impacts of mining:** Roell (1999) makes management recommendations to reduce the impacts upon streams from sand and gravel mining. These recommendations should be implemented wherever impacts from these activities are occurring in rayed bean habitat.

**Increase public outreach and education:** Public outreach and environmental education is crucial for effective recovery programs. The role of this program should be to promote aquatic ecosystem management and a community-based watershed restoration approach to managing water and aquatic habitat quality in river systems harboring rayed bean populations or in unoccupied habitat essential for its recovery.

**Conduct stress analyses:** Stress analyses should be undertaken in at least those watersheds with significant extant rayed bean populations. The purpose of a stress analysis is to determine the entire suite of stressors to the rayed bean and its habitat, to locate the sites of the various stressors, and to outline management activities to eliminate or at least minimize each stressor. Freeman et al. (2002) presents a good example of a stress analysis report.

**Establish a Geographic Information System database:** A comprehensive Geographic Information System database to incorporate information on the species distribution, population demographics, and various threats identified during monitoring activities should be established.

**Research, surveys, and monitoring needed:**

- a. To complete the status assessment and allow for an informed listing decision, additional survey work may be warranted in some river systems (e.g., upper Allegheny River system in western New York). However, the Ohio River Valley Ecosystem Mollusk Subgroup believes that there is enough information on the distribution, population trends, status, and threats compiled in the status review to accurately assess the rayed bean for consideration for candidate status.
- b. To bring about recovery, determine additional hosts: Several darters apparently serve as host fishes for the rayed bean (Tippecanoe and spotted darters). Other fishes potentially

serve as host for this species. Knowing all its host fishes rangewide will facilitate rayed bean recovery.

**Develop propagation technology:** Propagation technology for the rayed bean should be developed. By propagating significant numbers of juveniles in laboratory or hatchery settings, population augmentation and reintroduction into historical habitats will become much more feasible.

**Research species life history and habitat needs:** Very little information is available with regard to the life history of the rayed bean. Additional biological information will be needed in order to successfully implement the recovery tasks. In addition, the species habitats (e.g., relevant physical, biological, chemical components) for all life history stages need to be elucidated. The sensitivity of each life stage to contaminants and general threats to the species also need investigating.

**Monitor zebra mussel populations:** Monitoring existing populations of the zebra mussel and its spread into new systems should be implemented in the most at-risk systems. These include, among others, the lower Great Lakes drainages, and the Allegheny and Tippecanoe River systems.

**Investigate criteria necessary for population viability:** Criteria that determine long term population viability are crucial if we are to understand what constitutes a healthy rayed bean population. Detailed information is needed on the demographic structure, effective population size, and other genetic attributes of extant populations.

**Develop parameters for species augmentation:** A set of biological, ecological, and habitat parameters will need to be developed to determine if an extant rayed bean population will be suitable for species augmentation. This is particularly important in habitats that may be considered marginal (e.g., where the rayed bean appears to be barely hanging on). Prioritized populations and potential augmentation sites for this task will be selected based on present population size, demographic composition, population trend data, potential site threats, habitat suitability, and any other limiting factor that might decrease the likelihood of long-term benefits from population augmentation efforts. Augmentation activities should not be conducted at totally unprotected sites or at sites with significant uncontrollable threats.

**Develop parameters for species reintroduction:** A set of biological, ecological, and habitat characterization parameters will need to be developed to determine if a site will be suitable for rayed bean reintroduction. These will include habitat suitability, substrate stability, presence of host fishes, potential site threats, and any other limiting factor that might decrease the likelihood of long-term benefits from population reintroduction efforts. Reintroduction activities should not be conducted at totally unprotected sites or at sites with significant uncontrollable threats.

**Survey for additional populations:** The loss of much of its historical habitat, coupled with past and ongoing threats, clearly indicates the heightened level of imperilment of the rayed bean.

However, survey work to search for potentially new rayed bean populations, thought to be extirpated populations, and to assess the status of presumably small populations would be beneficial in several rivers for recovery and conservation purposes. These streams should be prioritized in order of importance to achieve this recovery goal with limited funding resources.

**Investigate reasons for rangewide differences in survival:** A research project should be designed to determine why the rayed bean is doing relatively well in some glaciated northern streams and why it has disappeared from the southern, unglaciated portion of its range.

**Investigate possible taxonomic distinction of populations:** A rangewide phylogenetic study on the rayed bean should be conducted to determine if there are any populations that may be taxonomically distinct. There is a possibility that the disjunct population in the upper Tennessee River system was a unique population. Unfortunately, the rayed bean is now extirpated from this system.

**Develop and implement cryogenic techniques:** Developing and implementing cryogenic techniques to preserve rayed bean genetic material until such time as conditions are suitable for reintroduction may be beneficial to recovery. If a population were lost to a catastrophic event, such as a toxic chemical spill, cryogenic preservation could allow for the eventual reestablishment of the population using genetic material preserved from that population.

## ACTION AREA

The “action area” is the entire area within which project-associated environmental effects are anticipated to occur (e.g., earth disturbance, sedimentation) and effects will extend beyond the bridge repair. The Service generally agrees with the action area described in the BA with slight modifications as described below.

The identified action area extends 20 m upstream of the I-86 bridge and 100 m downstream of the bridge (10,058.40 m<sup>2</sup>). It is within these parameters that project impacts will be felt, including turbidity, sedimentation, and direct disturbance to the stream bed.

## ENVIRONMENTAL BASELINE

Under Section 7(a)(2) of the ESA, when considering the “effects of the action” on federally-listed species, the Service is required to take into consideration the environmental baseline. The environmental baseline analyzes the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and the ecosystem within the action area.

The Allegheny watershed has been heavily impacted by human activities including development, road and bridge construction, residential, commercial, agricultural development, forestry, dams, pollution, erosion, and sedimentation. The action area has been impacted by transportation

corridors (construction of I-86 and the original bridge) and adjacent upland development roads, building, ponds etc.

*Status of Species within the Action Area*

The Upper Allegheny River tributaries are known to support rayed bean mussels. The surveys for mussels that were conducted as part of the due diligence for this project included the area that extended from 10 m upstream of the I-86 Bridge to 10 m downstream. The survey report included the following information: On June 14, 2015, conditions in the river were “high and muddy water from recent flooding.” Dive time was 4.5 hrs. On August 3 and 4, 2015, three divers searched for mussels. Total dive time for the two days was 11 hours, 50 minutes. Two live rayed bean mussels were found in different locations downstream of the bridge. Eleven rayed bean shells were also found during the survey. The surveyors identified the two rayed bean mussels, recorded the location, and then returned them to the mussel bed where they were found. On August 4, 2015, Mr. Paul Lord contacted the Service and the NYSDEC to notify the agencies of the find.

This is the first time rayed bean mussels have been found in the New York portion of the Allegheny River. Generally, rayed bean lives in smaller, headwater creeks, but is sometimes found in large rivers and wave-washed areas of glacial lakes. The rayed bean prefers gravel or sand substrates, and is often found in and around roots of aquatic vegetation. Generally, it lives in smaller, headwater creeks, but is sometimes found in large rivers and wave-washed areas of glacial lakes. Mussel surveys have increased in New York since the rayed bean was listed as endangered. However, research needs to continue to determine whether the rayed bean is stable, declining (contracting), or increasing.

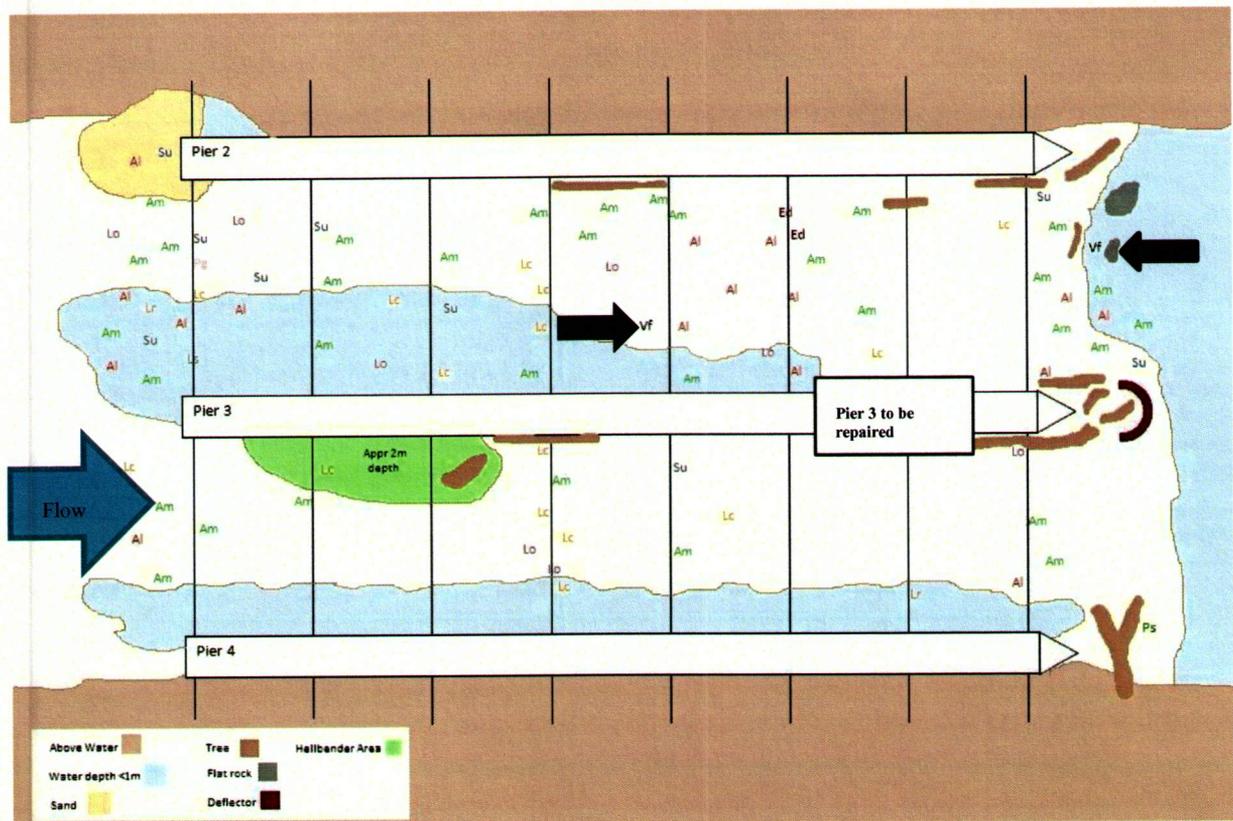
**Table 1.** A total of 90 individual pearly mussels representing 11 species were collected at the proposed project site, including rayed bean. Below is a list of species found, quantity, and state/federal status (SUNY 2015).

<i>Species name</i>	<i>Quantity</i>	<i>NYSDEC Status</i>	<i>USFWS Status</i>
Black Sandshell ( <i>Ligumia recta</i> )	2	High Priority SGCN	
Creeper ( <i>Strophitus undulatus</i> )	9		
Elktoe ( <i>Alasmadonta marginata</i> )	33	SGCN	
Fat mucket ( <i>Lampsilis siliquoidea</i> )	1		
Fluted shell ( <i>Lasmigona costata</i> )	15		
Giant floater ( <i>Pyganodon grandis</i> )	1		
Mucket ( <i>Actinonaias ligamentina</i> )	16	SGCN	
Plain pocketbook ( <i>Lampsilis ovata</i> / <i>L. cardium</i> )	8	SGCN	
Round pigtoe ( <i>Pleurobema sintoxia</i> )	1	SGCN	
Spike ( <i>Elliptio dilatata</i> )	2		
Rayed bean mussel ( <i>Villosa fabalis</i> )	2	High Priority SGCN	Endangered

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#### Mussel Distribution

Figure 6 is a map provided by the agent (surveyor) showing the location and habitat of each mussel/species identified in the surveyed area. The figure depicts the type of substrate and shows pearly mussel species locations with reference to pier and girder configuration of the bridge as surveyed on August 3 and 4, 2015 (SUNY 2015). Not showing on the figure is Pier #1 which is above the waterline. The edge of water begins at Pier #2. Bottom substrates of all areas between Piers #2 and #4 not otherwise labeled were comprised of unconsolidated cobbles and boulders interspersed with sand and gravel and minimal silt (SUNY 2015).



**Figure 6:** Pearly mussel species locations with reference to pier and girder configuration of BIN 6600159 STE/I-86 Bridge. In order to provide context, the survey area includes under the bridge and extends 10 meter above and below the bridge. The action area for this consultation is 20 m above the bridge and 100 m below the bridge. See below for legend. Figure not to scale (SUNY 2015).

Legend:

Black Sandshell ( <i>Ligumia recta</i> )	Lr
Creeper ( <i>Strophitus undulatus</i> )	Su
Elktoe ( <i>Alasmadonta marginata</i> )	Am
Fat mucket ( <i>Lampsilis siliquoidea</i> )	Ls
Fluted shell ( <i>Lasmigona costata</i> )	Lc
Giant Floater ( <i>Pyganodon grandis</i> )	Pg
Mucket ( <i>Actinonaias ligamentina</i> )	Al
Plain pocketbook ( <i>Lampsilis ovata</i> )	Lo
Round pigtoe ( <i>Pleurobema sintoxia</i> )	Ps
Spike ( <i>Elliptio dilatata</i> )	Ed
Rayed bean mussel ( <i>Villosa fabalis</i> )	Vf (black arrows show location of rayed bean)

Rayed bean habitat is reported by the surveyors to be limited in this area due to the low abundance of vegetation, heavy silt deposition, and bed movement during high flow events (SUNY 2015). However, two mussels were found in this area, between Piers #2 and #3

(depicted as arrows on map). Mussels were found in the center of the channel (<1 m water depth) and on the right ascending bank (>1 m water depth).

## EFFECTS OF THE ACTION

“Effects of the action” refers to the direct and indirect effects of an action on listed species or critical habitat, together with the effects of other activities interrelated and interdependent with that action, which will be added to the environmental baseline. In contrast with the project BA, which describes indirect effects as those occurring in a buffer around the direct effect area, indirect effects are defined in the Act as those caused by the proposed action and which are later in time, but are still 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.

Our analysis of effects for rayed bean mussels entails: (1) evaluating individual mussel exposure to action-related stressors and response to that exposure; (2) integrating those individual effects (exposure risk and subsequent response) to discern the consequences to the populations to which those individuals belong; and (3) determining the consequences of any population-level effects to the species rangewide.

### *Nature of the effect*

It is likely that the proposed action will have a variety of effects on individual rayed bean mussels. In particular the proposed project activities are expected to: (a) temporarily eliminate occupied and potential habitat in the project area through discharge of stone fill to construct a temporary causeway to access the bridge pier and filling the scour hole; (b) temporarily alter downstream habitat from change in hydrology, bedload movements, and diversion of water flows; (c) modify rayed bean behavior (burying into sediment to prevent suffocation from sediments in the water column or being washed away by water flows that will be redirected by the causeway); (d) potentially cause the mortality and/or injury of individual rayed bean that are translocated; and (e) cause mortality and/or injury of remaining mussels not found prior to bridge work on the riverbed or buried below the riverbed.

### *Duration*

The proposed causeway, weighted silt curtain, and temporary staging area around Pier #3 will be in the water for a period of 7 weeks. The proposed action may cause the permanent destruction of rayed bean habitat from the placement of fill around Pier #3, the diversion of water around the causeway and between Piers #2 and #3, may alter the riverbed material (rock, gravel, sand, and vegetation) to the point that the mussel bed may erode bed material, and cause the material to shift to a new location, or be washed downstream depending on river flows. Disturbance of the river bottom will cause sediment in the water column to increase temporarily, until the sediment settles. This may cause temporary alteration of rayed bean habitat.

### *Direct Effects*

The riverbed will be disturbed by the salvage efforts as divers look for mussels in the substrate, causing take of the mussels, and adverse effects to the mussel beds by increasing turbidity in the water column, applying pit tags to adult rayed bean and non-listed mussels, and relocating them to the nearest suitable habitat. Any remaining mussels may be crushed, suffocated, or injured from installation of the causeway, bridge repair, and removal of the causeway, until the river flows and bedload stabilizes. The species' resiliency to natural and anthropogenic disturbances on some level has been demonstrated through monitoring and surveys. Rayed bean mussels are limited in terms of movement and sedentary animals. Any remaining mussels that survive the initial impact would be anticipated to readjust to the riverbed when it stabilizes overtime. However, we anticipate that all rayed bean mussels that are in the action area may be taken by either death, injury, or harassment. Efforts to salvage rayed bean mussels will result in take by harassment, but are being undertaken in an effort to reduce mortality. Rayed bean mussels have been found to be sensitive to salvage efforts (R. Anderson, pers. comm. 2016.), so it is likely that at least some mortality will result from translocation efforts.

Lethal take by crushing, suffocation, or burial of rayed bean mussels that may be undetected is expected to occur during the installation of the causeway (approximately 0.34 acre footprint), the placement of stone fill around Pier #3 (anticipated to be 0.7 acre and the filling of the scour hole, and during the removal of the causeway.

These activities are expected to cause take from crushing, suffocation, and/or displacement of mussels during instream activities. Implementation of an approved erosion and sedimentation control plan and BMPs should minimize sources of sediment and reduce erosion into the river. The Pier #3 scour repair will be conducted from temporary access pads around the bridge pier, and water discharged from the construction area will be treated in sediment retention ponds before being returned to the Allegheny River, if necessary.

### *Indirect Effects*

Indirect effects are those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur (50 CFR 402.02). Stormwater runoff carrying silt and contaminants is expected to occur in the area subjected to siltation or scouring prior to and following bridge repair and roadway rehabilitation. This area extends from bank to bank, approximately 20 m upstream of the bridge and 100 m downstream of the bridge. These effects are expected to occur over several years post-construction, as river currents and river bed stability are affected by the causeway and pier repair.

If a significant high flow event occurs when the causeway is in place, scour could be extensive due to constriction of the channel and diversion of flow around the causeway. Such an event would likely directly affect rayed bean mussels by dislodging them from the substrate, transporting them with shifting substrate, and burying them downstream where the river flow

decreases and transported material is deposited. Long-term indirect effects are likely to occur as this material is then redistributed in subsequent flood events until a stable channel configuration is achieved.

Habitat degradation in the form of water quality impairment may occur as a result of the operation and maintenance of bridge, scour, and shifting bedload. Declines in mussel populations have been documented downstream of bridges; these declines appear, in part, to be related to water quality changes. Water quality degradation may result from the temporary causeway and temporary access road runoff carrying silt, heavy metals, hydrocarbons, and de-icing materials. Rayed bean may be adversely affected based on the extent that these materials reach the Allegheny River. The risk to listed mussels from runoff is inversely related to the amount of runoff that can be intercepted and treated, rather than directly discharged to the river.

Water quality degradation may also result from spilled toxic materials should an accident occur on the bridge or approach road. Because the type, toxicity, and volume of future spills, if any, cannot be predicted, this Opinion does not evaluate the effects of such incidents or authorize any take resulting from them.

### *Conservation Measures*

The project proponents have incorporated measures into the proposed project design to avoid and minimize the adverse effects of the project. These measures are summarized in the “Conservation Measures” section of this document and detailed in the BA. Beneficial and negative impacts from salvaging mussels are already addressed above. Limiting the duration of streambed disturbance during construction will limit temporal and spatial disturbance to mussels. This will allow the rayed bean mussel the opportunity to recruit from nearby, less disturbed habitat, and limit adverse effects on reproduction to only one reproductive season. Developing and implementing a sediment and erosion control plan and BMPs will have the effect of reducing on-site and off-site effects (effects outside the project’s action area), and the chance of accidental adverse events. This will limit the extent of direct and indirect effects if the plans are effectively implemented.

### *Cumulative Effects*

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation under Section 7 of the Act.

The BA does not include information regarding channel clearing or other long-term maintenance of the bridge. Because the scope and timing of these non-federal activities are not described and cannot be predicted, this Opinion does not evaluate the effects of such actions or authorize any take resulting from them.

## SUMMARY OF EFFECTS

### *Impacts to Individuals*

Direct effects to rayed bean mussels include potential crushing, resulting in injury or death; they become stranded on substrate, or buried in sediment in the water column. Permanent impacts are anticipated to be 0.7 acre for the fill around Pier #3 and temporary impacts are approximately 0.34 acre. Indirect effects include increased turbidity/sedimentation, increased pollution (oil and gas runoff from equipment), and chemical exposure due to an accidental spill (fuel or other toxic material released). Instream disturbance is expected to affect areas 20 m above the bridge and 100 m downstream of the bridge.

Two live rayed bean mussels were found during the survey effort in 2015. The detection rate for these mussels is low due to their small size and the fact that mussels can and do bury into the sediment. Because of the lack of surveys in the Allegheny River and the difficulties of surveying for rayed bean, the actual number of individuals that may be affected by the project is uncertain. However, we derived an estimated level of anticipated incidental take based upon the following assumptions. According to the survey report, two rayed mussels were found in the vicinity of the bridge. Since there are no known detection rates for rayed bean, the default is 0.001. For the West Hickory bridge site on the Allegheny River (July 1999), the total density and abundance of clubshell (*Pleurobema clava*) within the area of direct impact was 13.42 percent (relative abundance) with a density of 0.377 (number/m<sup>2</sup>). Since clubshell mussels are larger than rayed bean mussels (usually <60 but up to <80 mm vs. <40 mm), the rate of detection is assumed to be lower than clubshell. Based on this estimate and due a presumed detection rate of approximately 10 percent for finding rayed bean in the substrate, we assume that 90 percent of rayed bean mussels were not found. Therefore, we assume that the density is between 0.001 and 0.3/ m<sup>2</sup> in the action area (10,058.40 m<sup>2</sup>). As a result, we estimate that between 10 and 30 individual rayed bean mussels will be taken by harassment, injury, or death.

### *Impacts to Populations*

For the purposes of this Opinion, we define a “population” of rayed bean as all sites within a contiguous reach of free-flowing river. For this project, there is one population, the Upper Allegheny River population, located above the Kinzua Reservoir, that may be impacted. This portion of the Allegheny River is separated from the rest by the Kinzua dam. There are five known occupied sites within the Upper Allegheny River at this time in New York, however, there may be other, currently undocumented, rayed bean sites within the population. The nearest known population of rayed bean in New York is located approximately 14 miles from the site. The six sites in Pennsylvania are located in the Allegheny River, below the Kinzua Dam to lock and dam #6, and in the French Creek watershed (including Cussewago Creek, LeBoeuf Creek, Muddy Creek, and Woodcock Creek).

It is anticipated that mussel re-colonization will occur from adjacent, occupied habitat upstream and downstream of the project area and that rayed bean mussels will regain their current population levels after completion of the project. This conclusion is based upon the following considerations: 1) the watershed populations of the rayed bean mussel are intermittently distributed in portions of the Allegheny River and its tributaries and a sufficient amount of host fish are available in the Upper Allegheny River to move glochidia; 2) recruitment has been documented for rayed bean within the population at multiple locations; 3) the most significant project-related river modifications are, for the most part, temporary; and 4) NYSDOT will implement project avoidance, minimization, and conservation measures to reduce the amount of take.

Finally, there are several other extant sites located in the Upper Allegheny River Population (in Pennsylvania) and we assume unknown locations in New York (based on the fact that suitable habitat exists in the river), therefore, long-term reductions in the fitness of the Upper Allegheny River Population is not anticipated.

#### *Impacts to Species*

We assume that the project will impact individuals within the action area; however, we do not anticipate long-term reductions in fitness of the associated population because these impacts are restricted to the action area and will not affect the recruitment of mussels from upstream after the project is completed. Therefore, we do not anticipate a reduction in the likelihood of both survival and recovery of the species as a whole.

#### CONCLUSION

After reviewing the status of the rayed bean mussel, the environmental baseline of the species, the effects of the proposed repair of the I-86 Bridge over the Allegheny River, and cumulative effects, it is the Service's biological opinion that the bridge repair, as proposed, is not likely to jeopardize the continued existence of the rayed bean. No critical habitat has been designated for this species; therefore, no critical habitat will be affected.

#### INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR §17.3). Harass is defined by the Service 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 (50 CFR §17.3). Incidental take is defined as take that is incidental to, and not the

purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered to be prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Because incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity, this Incidental Take Statement is valid only upon receipt by the applicant of all appropriate authorizations and permits from federal, state, and local permitting authorities. These permits/authorizations may include, but are not limited to, a permit under section 404 of the Clean Water Act from the Corps of Engineers; a section 401 Water Quality Certification, and an approved SWPPP. This incidental take statement (along with its exemption from the section 9 prohibitions of the Endangered Species Act) is valid only upon receipt of all required permits and authorizations.

The measures described below are non-discretionary, and must be undertaken by the FHWA so that they become binding conditions of any funding, permits, and/or approvals, as appropriate, issued to NYSDOT for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA: 1) fails to require NYSDOT to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, authorization, or funding document; and/or 2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the FHWA or NYSDOT must report the progress of the action and its impact on the species to the Service, as specified in the incidental take statement (50 CFR §402.14(i)(3)).

#### AMOUNT OR EXTENT OF TAKE

The Service anticipates that take in the form of killing, harm, and harassment (as defined in 50 CFR §17.3) will occur as a result of the proposed actions. We have estimated that the take of 10-30 individual rayed bean mussels will occur during the salvage efforts and construction of the proposed action. However, due to the low probability of detection, it is unlikely that the actual number of mussels taken will be measurable. Therefore, it is appropriate to use area of suitable habitat as a surrogate. We anticipate that all of the rayed bean mussels within the action area will be taken during implementation of the repair work at the I-86 Bridge through direct mortality, harm, injury, or harassment.

Mortality may occur during salvage efforts, relocation efforts or within the footprint of the fill (due to construction of a temporary causeway, pier repair which has a footprint of approximately 830 m<sup>2</sup> area) and in areas outside the footprint. This area includes 20 m upstream and 100 m downstream of the bridge, from riverbank to riverbank.

Mortality and injury may also occur during and after construction due to sedimentation, scouring, and changes in hydrology related to the placement of an instream causeway and cofferdam and scour repair around Pier #3. Stress, short-term reproductive impairment, and mortality due to changes in hydrology and construction-induced scour and deposition are

predicted to occur in an area extending from 20 m upstream to 100 m downstream of the bridge. Stressors include low oxygen, decreased food and sperm availability in the water column, and increased silt and other sediment loading. The project will also result in temporary loss or decreased suitability of mussel habitat due to sedimentation and scouring as the stream channel achieves a new equilibrium with the fill from the scour repair. These events could result in harm to adult rayed bean, the glochidial life stage of this species, and populations of host fishes.

### **EFFECT OF THE TAKE**

In the accompanying Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the rayed bean mussel. No critical habitat has been designated for rayed bean mussels, so none would be impacted.

### **REASONABLE AND PRUDENT MEASURES**

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of rayed bean.

- 1) The FHWA will ensure the mussel salvage effort is conducted in a manner to reduce impacts to rayed bean.
- 2) The FHWA will ensure the proposed project components (e.g., conservation measures, BMPs) are implemented as described in the BA and supplemental information.

### *Terms and Conditions*

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

- a) The FHWA will ensure that one or more federally permitted mussel surveyors will conduct the mussel salvage relocation and monitoring for the Project (RPM 1).
- b) The FHWA will ensure that the proposed project components (e.g., mussel survey and relocation) will occur as planned and documented. All federally-listed mussels will be removed from the project action area, recorded and tagged (at the discretion of the mussel surveyor), along with non-listed species (Species of Greatest Conservation Need (SGCN)). Mussels will carefully be placed in mesh bags and transported in coolers maintained at temperatures that closely match river water temperature and transported to the nearest suitable habitat upstream of the bridge (approximately 1.5 miles). SGCN species can be used as a surrogate species when relocating non tagged animals into suitable habitat. The mussels

shall be carefully placed in suitable habitat, buried in posterior side up, and facing the current. The location shall be permanently marked for future monitoring (RPM 1).

- c) The Project shall comply with all the lawful requirements including the SNI, municipalities, counties, or other local agencies regarding the discharge of stormwater from construction activities. Reduction in stormwater runoff and turbidity curtains are minimization efforts that limit the potential for sedimentation into the river, which could adversely impact mussels (RPM 2).
- d) Restore all disturbed areas used for storage of materials, access road, or staging areas by planting native riparian vegetation to decrease further erosion and sedimentation as per the SNI (RPM 2).
- e) During all mussel survey work, surveyors must return all federally-listed mussels to the substrate by hand and allowing them to burrow on their own (RPM 1). If rayed bean mussels are too small to tag, then the surveyor will mark the relocation site with rebar (painted) and place the rayed bean mussel next to a tagged non-listed mussel for further monitoring. Monitoring of the project area and the relocation site(s) will be conducted 30 days post construction (qualitative) and one year post construction (quantitative) to measure survivability and the success of the relocation (RPM 1).
- f) Any federally-listed mussel found during the relocation must be recorded and adult mussels tagged (if appropriate) before relocation. Tagging will be at the discretion of the mussel surveyor (RPM 1).
- g) Post construction activities shall include removal of the causeway and all stone material from the river bottom and restore the riverbed to pre-existing conditions and elevations. All erosion and sediment controls will be completely removed from the site post construction (RPM 2).

### *Monitoring and Reporting Requirements*

“In order to monitor the impacts of incidental take, the federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement” (50 CFR §402.14(i)(3)).

1. The FHWA, or NYSDOT if designated by the FHWA, shall notify the Service in writing (digital format) regarding the actual start and completion dates of the project construction activities and verification that the project was completed according to the project description (including conservation measures) by **December 31, 2016**.
2. FHWA will monitor the success of the mussel salvage effort.

- a) The FHWA will ensure that the mussels relocated from the Project area will be monitored within 30 days post construction (quantitative) and one year post construction (qualitative) following Smith protocols (Smith et al. 2001).
  - b) The FHWA will provide two mussel monitoring reports to the Service (including basic project report and site photographs) detailing post construction conditions of the river and documenting the success of the relocation after 30 days and 1 year post construction. The reports are due to the Service by **December 31, 2016**, and **December 31, 2017**, respectively.
3. If any dead, injured, or sick individuals are found, the NYSDOT, or their agents must immediately notify the FHWA and the Service at 607-753-9334. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury. Preservation of specimens should be done in ethanol. The Service will advise NYSDOT/FHWA if the specimens must be retained or if an alternative means of disposition is required.

#### *Conservation Recommendations*

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

- a) Provide educational and outreach materials to the NYSDOT staff, local highway departments, the public, and other agencies regarding the importance of stream health and implementation of best management practices (BMPs) to reduce pollutant runoff from yards, roads, and fields.
- b) Provide ongoing opportunities for the SNI to participate in mussel surveys and recovery under the supervision of a federally permitted malacologist, Eastern hellbender education and research, and stream health monitoring efforts.
- c) Fund additional surveys throughout the Allegany River system to locate any additional rayed bean sites near other bridges/culverts far in advance of any proposed projects.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation measures.

## REINITIATION NOTICE

This concludes formal consultation with the FHWA on the proposed repair of the I-86 Bridge and work conducted between Exit 20 and the East Seneca Nation, located in Cattaraugus County, New York. As provided in 50 CFR §402.16, the reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

For the purposes of this Opinion, the incidental take exemption would be exceeded if (1) any of the above discussed effects occur beyond and outside of the described action area; (2) any previously undescribed activity results on an adverse effect (e.g., accidental release of petroleum products or other contaminants into the Allegheny River) during project implementation; or (3) it is determined that any other listed species occurs within the project area and may be affected by the project.

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**APPENDIX A**

**Rayed bean (*Villosa fabalis*) extant populations\***

<b>Stream/Service Region</b>	<b>State/Province</b>	<b>Last Observed</b>	<b>Recruiting?</b>
<b>Region 3</b>			
Black River	Michigan	2001	?
Pine River	Michigan	2002	Yes
Belle River	Michigan	1992	?
Clinton River	Michigan	1991	Yes
St. Joseph River	Indiana	1998	?
Fish Creek	Indiana, Ohio	1991	?
Tippecanoe River	Indiana	1995	Yes?
Lake Maxinkuckee	Indiana	1997	?
Sugar Creek	Indiana	1998	?
Blanchard River	Ohio	1998	Yes
Tymochtee Creek	Ohio	1977-87	?
Walhonding River	Ohio	1991-95	No?
Scioto Brush Creek	Ohio	1987	No?
Little Miami River	Ohio	1990-91	No?
East Fork Little Miami River	Ohio	1990-91	?
Stillwater River	Ohio	1987	No?
<b>Region 4</b>			
NO EXTANT OCCURRENCES			
<b>Region 5</b>			
Allegheny River	Pennsylvania	2001	Yes
French Creek	Pennsylvania	2001	Yes
Cussewago Creek	Pennsylvania	1991	?

## APPENDIX B

U.S. Fish and Wildlife Service. Region 3 Biological Opinion's/Incidental Take Statements for the Rayed bean mussel and other mussels.

<b>Projects</b>	<b>Service Office and Date BO Issued</b>	<b>Incidental Take (IT) Form</b>
IR 475	Columbus, Ohio April 16, 2015	157 square meters of habitat (40 individuals)
Multi-use trail and bridge crossing (PID 84756)	Columbus, Ohio May 2, 2012	2 individuals or 2.47 acres of habitat
I-71 Bridge Replacement	Columbus, Ohio March 16, 2016	60 NRS, 36, SB, 57 CS, 3 RF, 3 Rayed bean or 66,646 ft <sup>2</sup>
ITS MAD 14-0-0.00 Bridge replacement on Little Darby Creek PID 16705	Columbus Ohio July 12, 2002	2.37 acres of habitat
BO and ITS for the Rayed Bean and Snuffbox at the West Milton Dam Removal Project on the Stillwater River in Miami County, Ohio	Columbus, Ohio August 13, 2014	28.217 acres of habitat; 5 RB, 10 SB.