United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

September 21, 2010

Mr. Ross Mantione
Environmental Specialist
Federal Highway Administration
228 Walnut Street, Room 558
Harrisburg, PA 17101-1720

RE: USFWS Project #2008-0341

Dear Mr. Mantione:

The Fish and Wildlife Service has reviewed the project plans and biological assessment for the proposed Mead Avenue Bridge Replacement (S.R. 102) over French Creek, located in the City of Meadville, Crawford County, Pennsylvania. Your April 22, 2010, request for formal consultation was received on April 26, 2010. The enclosed document represents the Service's biological opinion on the effects that the proposed activity will have on the northern riffleshell (*Epioblasma torulosa rangiana*), a species that is federally listed as endangered. This biological opinion is provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.).

This biological opinion is based on information provided in your March 2010, biological assessment, field investigations, meetings (see consultation history), and other information available in our files. A complete administrative record of this consultation is on file in this office.

This biological opinion does not address two federal candidate species known to occur in the area – the rayed bean (*Villosa fabalis*) and rabbitsfoot (*Quadrula cylindrica cylindrica*). Candidate species are species for which the Service has substantial information on file to support the appropriateness of proposing to list as threatened or endangered; however, they receive no regulatory protection under the Act. Nor does the biological opinion address the snuffbox (*Epioblasma triquetra*), which is a species of concern that may be elevated to candidate status, or may be listed as endangered or threatened, pending further review by the Service. Rayed bean, rabbitsfoot and snuffbox populations may benefit from measures taken to avoid and minimize take of northern riffleshell. However, this biological opinion does not authorize take of these species if they are listed. As indicated in the Reinitiation Notice, if a species in the action area is listed as endangered or threatened before the action is completed, the Federal Highway Administration is required to reinitiate formal consultation with the Service.

If you have any questions regarding this biological opinion, please contact Robert Anderson of my staff at 814-234-4090.

Sincerely,

Clinton Riley
Field Office Supervisor

Enclosure

BIOLOGICAL OPINION

Effects of the Mead Avenue Bridge Replacement Project
(State Route 102, Section B00)
on the Northern Riffleshell
Crawford County, Pennsylvania

September 21, 2010

U.S. Fish and Wildlife Service
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801

BIOLOGICAL OPINION

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Mead Avenue Bridge Replacement Project (State Route 102, Section B00)
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CONSULTATION HISTORY

On April 25, 2000, the Fish and Wildlife Service (Service) attended a site visit to the Mead Avenue Bridge over French Creek, Crawford County, Pennsylvania. The project was proposed by the Pennsylvania Department of Transportation (PennDOT), who represented the Federal Highway Administration (FHWA) on this and other occasions. We recommended that a survey be conducted to determine if two federally listed endangered species, the northern riffleshell (*Epioblasma torulosa rangiana*) and clubshell (*Pleurobema clava*), occur in the proposed action area.

On August 10, 2004, the Service received a list request and project description for the replacement of the Mead Avenue Bridge. We responded on September 14, 2004, again recommending that a survey be competed for the clubshell and northern riffleshell, and we provided suggestions regarding methodology and surveyor qualifications.

PennDOT's agent, EnviroScience, Inc., conducted a mussel survey of the project area between September 29 and October 2, 2004. FHWA provided us with the December 2005 report of the EnviroScience survey results that confirmed the presence of northern riffleshell in the project area. The survey results also showed the presence of three mussel species of concern, the rayed bean (*Villosa fabalis)*, rabbitsfoot (*Quadrula cylindrica cylindrica*), and snuffbox (*Epioblasma triquetra*). The rayed bean and rabbitsfoot are listed as federal candidate species (69 FR 24875 24904 and 74 FR 57803, respectively).

On May 23, 2007, the Service attended a site visit with PennDOT staff to discuss possible avoidance options and the consultation process.

Service personnel attended a meeting on October 10, 2008, regarding alternatives under consideration for the Mead Avenue Bridge replacement project. During that meeting we described the information that would be needed to initiate formal consultation, and we discussed possible avoidance measures and other options to offset the anticipated take of northern riffleshell.

On January 29, 2010, the Service received a request (dated January 27, 2010) from FHWA to initiate formal consultation on the Mead Avenue Bridge replacement project. The Service responded on February 19, 2010, requesting a hydrologic analysis of the proposed bridge, particularly related to the effect of a proposal to grade the stream banks adjacent to the bridge, the effect of which was not considered in the initiation package.

On April 26, 2010, the Service received a request (dated April 22, 2010) from FHWA again requesting initiation of formal consultation, along with a revised initiation package. The Service acknowledged initiation of formal consultation by letter of May 25, 2010, and committed to providing a biological opinion by September 8, 2010.

The final biological opinion was completed and delivered to the Federal Highway Administration on September 21, 2010.

BIOLOGICAL OPINION

This biological opinion is based on information provided in the following documents: *Biological Assessment and 58 PA Code, Chapter 75 State Coordination Document for the Potential Effects to the Northern Riffleshell, Rayed Bean, Snuffbox and Rabbitsfoot, Mead Avenue Bridge Replacement Project, Crawford County, Pennsylvania* (biological assessment) dated March 2010; and other information available in Fish and Wildlife Service files. A complete administrative record of this consultation is on file at the Service's Pennsylvania Field Office in State College, Pennsylvania.

DESCRIPTION OF THE PROPOSED ACTION

As defined in 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. 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 within the action area, as well as cumulative effects of future State or private activities that are reasonably certain to occur within the action area.

This biological opinion evaluates a proposed roadway project currently under consideration by FHWA and PennDOT. This opinion addresses those actions for which the Service believes adverse effects may occur. In their biological assessment, FHWA and PennDOT outlined those activities that would adversely affect the federally listed, endangered northern riffleshell. The following opinion addresses whether implementation of the project is likely to jeopardize the continued existence of this species.

The following project and project area descriptions are summarized from the biological assessment.

<u>Project Area</u>

The Mead Avenue Bridge conveys Mead Avenue across French Creek just downstream from the confluence with Cussewago Creek. The bridge connects the City of Meadville to the east, with State Route 102 (Cussewago Road) Vernon Township, Crawford County, to the west. S.R. 102 parallels a portion of the western side of French Creek. Nearby surrounding land use is primarily industrial and commercial.

The original truss bridge was built in 1871 and rests on cut stone abutments and a center pier. The bridge was modified in 1911 to include a second supporting truss. Due to structure deficiencies and severe degradation, the Mead Avenue Bridge was closed to all traffic in 2007.

The action area associated with the Mead Avenue Bridge Replacement Project includes French Creek in the vicinity of the bridge, and extends from 300 meters (984 feet) upstream (EADS 2005) to 200 meters (656 feet) downstream of the bridge to encompass the area within which project-associated environmental effects (*e.g.*, earth disturbance, erosion, siltation, scouring, and fluvial-hydrological alteration) are anticipated to occur. The action area also encompasses those portions of the river bank that will be affected during bridge demolition, grading, and construction activities.

Project Description

The proposed action involves complete removal of the existing Mead Avenue Bridge and replacement with a new bridge on the existing alignment. Because the existing bridge is closed to traffic, no detour is proposed. The new two-lane bridge will be approximately 70 meters (230 feet) long and 13.4 meters (44 feet) wide. A new center pier is proposed in French Creek and new abutments will be set behind the location of the existing bridge abutments. The location of the western side of the bridge is constrained by the need to connect to S.R. 102.

The Mead Avenue Bridge is within the 100-year floodplain of French Creek. The design of the new bridge includes measures to reshape the stream bank and a portion of the stream channel to mitigate for potential changes in the 100-year floodplain related to construction of a new structure.

Construction of the new bridge and removal of the existing bridge will require use of an in-stream, rock-filled work platform for cofferdam installation, removal of the existing pier, and construction of the new pier. Demolition of the existing bridge will be accomplished by dropping the entire bridge into the river and picking the bridge members out using two shore-based staging pads (approximately 18 m by 6 m) positioned on each side of the bridge. The bridge trusses will be removed using shaped explosive charges to cut the bridge into smaller pieces. Any larger sections of the truss will be cut further after the bridge is dropped. All bridge sections and debris will be removed from the site with trucks. The drop zone beneath the bridge is approximately 792 m^2 (8,528 ft^2).

Following removal of the bridge superstructure, a temporary abutment and access ramp will be constructed on the western side of the bridge. A second temporary rail or cribbing abutment will be placed in the stream channel near the old bridge pier. A metal sheetpile cofferdam will be placed around the old bridge pier and filled with clean rock and soil to create a 12 m by 6 m (40 ft by 52 ft) construction pad. The temporary abutments will be used to support a pre-fabricated bridge that will span French Creek from the western shoreline to the construction pad. Water will continue to flow under the temporary bridge, which is being used to reduce the hydrologic changes otherwise created by a continuous causeway and to minimize the amount of fill in the river channel. The existing pier will be removed to two feet below the normal stream bed elevation, and then backfilled to grade with appropriate fill material.

Following pier removal, another 5 m by 16 m (15 ft by 52 ft) cofferdam will be constructed at the eastern side of the construction pad. This will be dewatered and excavated to allow for construction of the new pier footing and poured concrete pier. The new pier will be smaller than the existing pier, but will result in 44 m^2 (468 ft^2) of permanent habitat alteration. When pier construction is complete, the temporary abutments, cofferdams, fill material and temporary access road will be removed and the streambed restored. The construction pad and associated features will be in place for 6 to 8 weeks, within one construction season.

Subsequent to completion of pier construction, the existing abutments will be removed and the proposed floodplain mitigation plan will be implemented. This involves grading the western shoreline from 34.1 m (112 feet) upstream to 45.7 m (150 feet) downstream of the existing bridge wing-walls for an area of approximately 1107.8 m^2 (11,925 ft^2). At the eastern shore, grading is proposed from 16.8 m (55 feet) upstream to 42.7 m (140 feet) downstream of the abutment wing-walls for a total area of 505.4 m^2 (5,440 ft^2). Grading is not planned to extend

into the wetted stream channel. Portions of the excavated areas will be covered with R-7 rock, while the remaining area will be covered with vegetative blankets (BA, Figure B-3).

Following the floodplain mitigation activities, the two new abutments will be constructed. The new abutments will be constructed in upland areas; however, construction of the eastern abutment requires a stream diversion along eastern bank. The stream diversion will be created using concrete Jersey Barriers rather than sandbags to reduce the area of encroachment into French Creek. The diversion will result in 119 m^2 (1,272 ft^2) of in-stream disturbance. Construction of the remaining portions of the new bridge will be completed from the shore staging areas.

Avoidance, Minimization, and Conservation Measures

The following avoidance and minimization measures have been incorporated into the project description for the Mead Avenue Bridge replacement project. These measures are designed specifically to avoid and minimize impacts of the proposed action on northern riffleshell. The Service has analyzed the effects of the proposed action based on the assumption that all avoidance and minimization measures will be implemented. More detailed descriptions of these measures are provided in the biological assessment (in part, on pages 2-7).

Avoidance and minimization measures

1. Complete instream work in a single season.
2. Use a temporary bridge to access the causeway construction pad to minimize backwater areas and the risk of high-flow related streambed scour.
3. Minimize use of rock fills to reduce the area of direct streambed disturbance.
4. Replace excavated streambed areas with natural bed material.
5. Avoid streambed impacts during stream bank grading.
6. Restore all disturbed areas to their original vegetative state.
7. Conduct geotechnical borings within proposed construction disturbance areas.
8. Decontaminate construction equipment that will be used in French Creek.
9. Minimize the causeway footprint through the use of Jersey Barriers to reduce the area of direct streambed disturbance.
10. Salvage and relocate mussels prior to construction or demolition.

Conservation measures represent actions pledged in the project description that the action agency will implement to further the recovery of the species under review. Such measures should be closely related to the action and should be achievable within the authority of the action agency. The beneficial effects of conservation measures are taken into consideration in the Service's conclusion of jeopardy or non-jeopardy to the listed species, and in the analysis of incidental take if they minimize impacts to listed species within the action area. No conservation measures have been proposed in association with the replacement of the Mead Avenue Bridge.

STATUS OF THE SPECIES

Northern Riffleshell

Species Description

The northern riffleshell is a small to medium-size mussel, up to three inches long. The shell exterior is brownish-yellow to yellowish-green with fine green rays. The shell interior is typically white. The species is sexually dimorphic; male shells are irregular ovate in outline, with a wide shallow sulcus just anterior to the posterior ridge. Female shells are obovate in outline, and greatly expanded post-ventrally.

Life History

The adult northern riffleshell is a sedentary filter feeder, obtaining oxygen and food directly from the water column or from water flowing through the substrate (interstitial flow). The breeding season appears to be initiated by seasonal changes, such as changes in water temperature. There have been no detailed life history studies of the northern riffleshell; however, the life history of this species is probably similar to that of closely related species, such as the tan riffleshell (*Epioblasma florentina walkeri*) which has been the subject of detailed study by Rogers *et al.* (2001). Females hold unfertilized eggs in water tubes within a specialized marsupial region of the gill. In the related tan riffleshell, males release sperm into the water in August and September, and downstream females uptake the sperm with incoming water (Rodgers *et al.* 2001). The eggs are then fertilized in the water tubes within the marsupium, where they are held until the following summer. The expanded shell shape of the female riffleshell results from shell growth around the expanded marsupial gill region.

The fertilized eggs develop into minute bivalve larvae, or glochidia, which are unique to freshwater mussels (Parmalee and Bogan 1998). While in the marsupium, developing glochidia are exposed to the adult's circulatory fluid, but not directly to the water column (Gardiner *et al.* 1991, Richard *et al.* 1991). Northern riffleshell glochidia are obligate parasites on fish. Banded darter *(Etheostoma zonale*), bluebreast darter (*E. camurum*), brown trout (*Salmo trutta*), and banded sculpin (*Cottus carolinae*) have transformed glochidia under laboratory conditions but additional host species may be suitable. From May to September, gravid females of this species expose a brilliant white mantle margin to attract host fishes, which are captured by the female riffleshells and infested with glochidia. The transformed juveniles fall from the host fish and burrow into the substrate. Unlike the adults, which are filter feeders, juveniles are relatively mobile and appear to be pedial feeders, sifting food items from sediments with hair-like structures (cilia) arranged on their foot.

The northern riffleshell is a long-term breeder (bradytictic), with fertilization in the late summer and glochidial release the following spring or summer (Ortmann 1919). Individuals within a population exhibit a range of behaviors, and may release glochidia from spring through late summer.

Habitat

The northern riffleshell occurs in clean, packed, coarse sand and gravel in riffles and runs of small and large streams (Stansbery *et al.* 1982, Watters 1990). The common name “riffleshell” implies habitat often associated with the genus, although several species, including the northern riffleshell, frequently occur in relatively slow-flowing and deep runs. It is not clear if specimens

living in more typical riffle areas can adapt to slower water should conditions change. Use of low-flow areas may also be limited in more turbid waters where concomitant silt deposition may limit survival or successful reproduction. Northern riffleshells bury themselves to the posterior margin of the shell, although females may be more exposed, especially during the breeding season (U.S. Fish and Wildlife Service 1994). The tan riffleshell populations in Virginia are not visible on the substrate surface from November through January (Rogers *et al.* 2001), and northern riffleshells also appear to undergo a seasonal vertical migration (Anderson 2000).

Population Dynamics

Riffleshells appear to have a relatively short life-span for a freshwater mussel. Sexual maturity can be reached in as little as three years, and most individuals probably live for only eight to 15 years (Rodgers *et al.* 2001). Like other mussels, the northern riffleshell probably experiences very low annual juvenile survival. The combination of short life span and low fecundity indicates that populations depend on a large annual cohort resulting from a large population (Musick 1999). Species following this reproductive strategy are susceptible to loss of individuals from predation and stochastic events, and are slow to recover from such losses (Rodgers *et al.* 2001), but may be well suited to exploit dynamic micro-habitat shifts characteristic of free-flowing rivers.

Threats

The northern riffleshell is now sparsely distributed within a highly restricted range, although population numbers may be high in localized areas. As stated above, large populations appear to be necessary for the long-term conservation of this species; below this level, mortality exceeds reproductive potential and the population may crash.

The northern riffleshell is subjected to many of the same threats as are other aquatic species. 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 (U.S. Fish and Wildlife Service 1994). 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. Northern riffleshells may be directly affected by siltation through smothering. High turbidity may interfere 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 (U.S. Fish and Wildlife Service 1994). Point and non-point source pollution and acid mine drainage probably contributed to the species' decline in various portions of its range. In addition, the construction and operation of oil and gas wells may result in the discharge of brine. Point source discharges are typically regulated; however, some inputs may not be sufficiently regulated, particularly those originating some distance from a waterway supporting northern riffleshell. In 2005, more than 18,000 oil and gas wells were drilled in Pennsylvania (Pennsylvania Department of Environmental Protection, Bureau of Oil and Gas Management; accessed at http://www.dep.state.pa.us on October 21, 2009). Many of these wells are within the range of the northern riffleshell.

The zebra mussel (*Dreissena polymorpha*) is a highly invasive bivalve native to Europe and western Asia, but accidentally introduced to Lake Erie around 1985 via release of trans-Atlantic ship ballast water. Zebra mussels have spread throughout much of the eastern United States where they sometimes quickly reach enormous population densities. Such populations compete for food, oxygen, and space with native mussels, including the northern riffleshell, causing mortality and population declines. Zebra mussels are established in the French Creek watershed; however, population densities have remained low in most locations, and no negative effects on the northern riffleshell population have been documented thus far.

Status and Distribution

Historically, the northern riffleshell was relatively common and appears to have been a highly successful species occupying a range of riverine habitats throughout the Ohio River basin; Michigan and Ontario tributaries of Lake Erie and Lake St. Clair; and the Detroit and St. Clair Rivers (U.S. Fish and Wildlife Service 1994). The northern riffleshell has suffered a range reduction of over 95 percent. As a result, it was listed as endangered, without critical habitat, in 1993. Of 54 streams once known to be occupied by this species, six still support populations of the northern riffleshell, and only three of these populations show evidence of reproduction -- two in the Allegheny River system (Allegheny River and French Creek, Pennsylvania), and one in the Sydenham River (Ontario, Canada). Table 1 lists the known locations and status of remaining northern riffleshell populations.

The northern riffleshell population is discontinuously distributed in the lower reaches of French Creek, from its confluence with the Allegheny River at Franklin, upstream to the vicinity of the State Route 6 Bridge at Mill Village. Within this reach, northern riffleshells range from relatively common, to rare or absent at sites that have otherwise diverse mussel communities. For example, of 31 sites investigated along the length of French Creek in 2003, northern riffleshells were documented to occur in nine of the lower 21 sites surveyed. These nine sites had mussel diversity of between six and 19 species, although they were often separated by apparently equally diverse sites, with up to 15 species, but excluding northern riffleshells (Tamara Smith, Western Pennsylvania Conservancy, personal communication).

Since 1998, at least 10 federal actions have taken place (all in Pennsylvania) that have adversely affected the northern riffleshell. The Service determined that these actions would not jeopardize the continued existence of the northern riffleshell, and estimated incidental take for each action (U.S. Fish and Wildlife Service, 1998a, 1998b,, 1999, 2001, 2002, 2003a, 2003b, 2004, 2006 and 2009). Eight of the 11 actions were bridge replacement projects. The incidental take of northern riffleshell was estimated to be 2,227 individuals that would be directly killed, harmed or harassed by the actions, plus an unquantified number of animals indirectly affected by each action. The incidental take estimate was exceeded for three projects, as indicated by the number of northern riffleshell salvaged from the action areas prior to construction.

Table 1. Location and status of northern riffleshell populations

Basin	**Sub-Basin**	**Stream**	**State/ Canadian Province**	**Range**	**Status**[1]
Lake Erie (St. Lawrence River system)	Detroit River	Detroit River	MI/Ontario		rare; *possibly extirpated*
	St. Joseph River	Fish Creek	OH	~2 miles	rare; *possibly extirpated*
	Sydenham River	East Sydenham River	Ontario	lower reaches	present; reproducing
	Ausable River	Lake St. Clair	Ontario	Middle reaches	present; reproducing
Ohio River	Green River	Green River	KY	Hart and Edmonson Counties	rare; *possibly extirpated* (last observed 1980's)
	Kanawha River	Elk River	WV	One site	rare; *possibly extirpated* (Last observed in 1993)
	Scioto River	Big Darby Creek	OH	15-20 mile reach	rare; limited reproduction
	Allegheny River	Allegheny River	PA	scattered over 66 miles	Rare to abundant; reproducing
		French Creek	PA	Crawford, Venango Co.	present; reproducing
		LeBoeuf Creek	PA	3-mile reach	present; reproducing
		Muddy Creek	PA	1 site	rare; unknown

[1] A status of rare indicates that less than ten individual living or recently dead specimens have been observed in recent years in that water body.

Table 2. Previous biological opinions authorizing incidental take of the northern riffleshell

Project Name, State	**Estimated Incidental Take (direct take)**	**Year**	**Monitoring Report Received**	**Monitoring Report Reference**	**Project Status**
Kennerdell Bridge, PA	444	1998	YES	U.S. Geological Survey (2002)	Complete
Utica Bridge, PA	74	1998	YES	U.S. Geological Survey (2002)	Complete
Forest Plan - Allegheny National Forest, PA	unquantified	1999	NO	-	Ongoing
Foxburg Bridge, PA	33	2001	YES	EnviroScience (2010)	Complete
East Brady Bridge, PA	210	2002	NO	USFWS (2006)	Complete
Hickory Street Bridge, PA	23	2003	NO	-	Complete
Mill Village Truss Bridge, PA	9	2004	YES	EnviroScience (2006)	Complete
West Hickory Bridge, PA	905	2004	YES	U.S. Geological Survey (2009)	Complete
Gravel Run Road Bridge, PA	519	2006, 2010	NO	-	Ongoing
Millers Station Bridge, PA	10	2009	NO	-	Ongoing

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR §402.02) define the environmental baseline as the past and present impacts of all federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress.

Status of Species within the Action Area

The Mead Avenue Bridge is within the City of Meadville, just downstream of the confluence of Cussewago Creek. Cussewago Creek is a low gradient, relatively silt-laden stream originating from a largely undeveloped and wetland dominated watershed. Landuse immediate surrounding the bridge is primarily industrial and commercial, but a local park also boarders a portion of French Creek to the east. State Route 102 and associated commercial and residential developments boarders a portion of the west side of the stream. One property abutting French Creek to the east of the action area is known to be contaminated by lead, although the extent of any lead contamination reaching the stream is not known.

A freshwater mussel survey was conducted in French Creek between September 29 and October 2, 2004, from 120 meters upstream to 210 meters downstream of the Mead Avenue Bridge. This area was divided into 33 cells of approximately 450 m^2 each, encompassing the anticipated direct and indirect effect area of the proposed action. Each cell was qualitatively searched by at least two individuals for between 30 to 60 minutes. This resulted in approximately 13.3 percent of each cell in the anticipated area of direct streambed disturbance being searched and 6.7 percent of the area that may be indirectly affected being searched. Shoreline middens were also examined for evidence of additional mussel species in the project area. Quantitative surveys were conducted bank to bank (45 to 50 m wide) from 120 m (394 ft) upstream to 210 m (689 ft) downstream the bridge. Quantitative surveys were restricted to the area of anticipated direct streambed disturbance approximately 25 m (82 ft) upstream to 75 m (246 ft) downstream of the bridge where 432 - 0.25 m^2 quadrats were searched.

In summary, 2,081 mussels of 20 species were located alive, including the northern riffleshell. The greatest mussel concentration appears to be located between 30 m upstream of the bridge to 210 meters downstream of the bridge (the downstream limit of the survey). In the immediate vicinity of the bridge (*i.e.*, 25 meters upstream to 75 meters downstream), northern riffleshell densities were estimated to be $0.01/m^2$. It is estimated that 34 northern riffleshell (90 percent CI: 7 to 172 northern riffleshell) occur in the immediate vicinity of the bridge.

Approximately 70 percent of the substrate beneath the bridge, and 60 percent of the surrounding surveyed area was considered to have moderate to high quality habitat. The Mead Avenue bridge is at the approximate boundary of two habitat types – slower and deeper habitat upstream and faster and shallower habitat downstream. The hydrologic conditions created by the bridge abutments and pier (which have been in place for 138 years) – particularly during high-flow events – are among the influences that have affected the distribution of northern riffleshells in the vicinity of the bridge. The existing bridge structure constrains the stream channel, causing a backwater area during high-flow events that partially impounds habitat up to 300 meters upstream (EADS, 2005). Combined, the urban and natural conditions in the action area may contribute to the somewhat lower abundance of northern riffleshell as compared to other sites in French Creek.

Rayed bean (*Villosa fabalis*), rabbitsfoot (*Quadrula cylindrica cylindrica*), and snuffbox (*Epioblasma triquetra*) mussels were also located during the survey. The presence of between 1786 to 3554 rayed bean mussels (density $0.7/m^2$) in the project area is particularly notable, since this species may be listed as threatened or endangered in the future. However, because the rayed bean currently receives no regulatory protection under the Act, the effect of the proposed action on this species will not be considered in this opinion.

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 biological assessment, which describes indirect effects as those occurring in a buffer around the direct effect area, indirect effects in the Endangered Species Act are defined 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.

Direct Effects

Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action and include the effects of interrelated and interdependent actions. Future federal actions that are not part of the action under consideration (and not included in the environmental baseline or treated as indirect effects) were not evaluated.

At the Mead Avenue Bridge, the zone within which direct effects are expected to occur extends from 60 meters upstream to 60 meters downstream of the existing bridge (not all of which is suitable northern riffleshell habitat), where there are an estimated 34 northern riffleshells. Within this zone, direct adverse effects resulting from bridge demolition and construction will occur in the following in-stream areas: 1) areas where debris falls during bridge demolition; 2) the footprint of the construction pad surrounding the pier, particularly upstream and downstream areas not already disturbed during bridge demolition; 3) the footprint of the new pier (permanent habitat loss); 4) areas adjacent to the existing pier and new pier, including those areas within and adjacent to cofferdams; 4) areas adjacent to the eastern abutment within and adjacent to the stream diversion; 5) areas subjected to siltation or scouring resulting from bridge construction and demolition activities (*e.g*., beneath the temporary bridge during high-flow events).

Within this zone, minimization efforts and commitments by the project proponents have reduced adverse effects. Streambed disturbances are largely overlapping. For example, the construction platform and new piers are within the anticipated drop zone of the bridge, which is estimated to be 792 m^2 (8,828 ft^2). With this area, new pier placement is expected to affect 73 m^2, of which 44 m^2 will be permanent habitat impacts. Most mussels that are not salvaged from the in-stream project footprint will be killed during bridge demolition, construction, and pier removal. In addition, mussels that are not salvaged from the area immediately adjacent to the cofferdams and causeway will be killed, injured, or significantly disturbed during bridge construction and pier removal. Take (*e.g.*, death, injury, harm, harassment) is expected to occur due to suffocation, crushing, and/or displacement by construction and demolition activities.

The proposed construction platform and temporary abutments avoid the use of a full causeway by incorporating a temporary bridge to facilitate pier removal and construction of the new pier. This temporary bridge is expected to reduce take by reducing the area of streambed disturbance. It will span areas where causeway fill or dewatering would have resulted in 100 percent mortality. Further, the structure is expected to reduce adverse effects on mussels by decreasing the amount of the river channel blocked by the causeway, thereby reducing backwater effects upstream and potential scour locations downstream.

The extent of adverse effects outside of the construction pad and cofferdam will depend on construction practices, river flows, silt load in disturbed substrates, and the effectiveness of erosion and sedimentation control measures. The greatest potential for substrate scouring and deposition would occur in association with construction and removal of the construction platform and cofferdams, as well as the presence of instream features, particularly during high flows. Cranes are at risk of flooding or sinking during high flow events if the construction pad is overtopped, unless precautions are taken to avoid this. Construction materials and equipment may affect mussels if the equipment is washed into the river and either physically transported downstream by currents, or if toxic materials such as fuel spill into the river. Such spills could directly or indirectly affect endangered mussels, resulting in take. However, due to the project proponents commitment to develop and implement a Pollution Prevention Plan, toxic spills are not anticipated; therefore, the effects of such spills have not been evaluated in this opinion.

Juvenile and adult clubshell and northern riffleshell, and fishes that serve as hosts for their glochidia, could be taken (*e.g.*, killed, injured, or stressed) or adversely affected by substrate disturbance (*e.g.*, scouring), increased turbidity, sediment deposition, and introduction of petroleum products into the river. The physical presence of construction activities may affect northern riffleshell reproduction upstream and downstream by affecting transport of sperm and glochidia, or by modifying host fish behavior, travel patterns, or habitat use. These effects are expected to be short term and localized in extent, but may result in take in the form of harm or harassment.

In the event of significant high flows while the construction pad and cofferdam are in the river, localized scour is likely to occur in and downstream of the causeway openings, resulting in bed movement that mussels are not likely able to tolerate. The material, and any mussels, will be re-deposited downstream when water velocity decreases. Scouring will cause mussels to become dislodged from the substrate, and either carried downstream by the current, or smothered when sediments redeposit. Those mussels not killed or injured during this process may still suffer death, injury, or increased predation risk if they are unable to right themselves and re-burrow into suitable habitat downstream. Mussels may be subjected to the impacts (*e.g.*, gill clogging, suffocation) of sediment re-deposition.

Any sediment originating from shoreline construction, grading and construction pad activities is likely to remain concentrated near the source before becoming mixed in French Creek and will, therefore, have more of an effect on animals closer to the source. As a filter feeder on microscopic food items, the northern riffleshell is very susceptible to smothering by silt and other sediments in the water (Ellis 1936, in U.S. Fish and Wildlife Service 1994). Siltation may also result in reduced dissolved oxygen and increased organic material at the substrate level (Ellis 1936, Harman 1974; both in U.S. Fish and Wildlife Service 1994). At sub-lethal levels, silt interferes with feeding and metabolism in general (Aldridge *et al*. 1987, in U.S. Fish and Wildlife Service 1994). Because juvenile northern riffleshells typically burrow completely

beneath the substrate, they are particularly susceptible to siltation, which clogs the substrate interstices and suffocates the animals.

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). The areas subjected to indirect effects are less well defined than are those that will be directly disturbed. However, indirect effects are expected to occur in areas subjected to altered hydrology resulting from placement of a new, smaller, mid-channel pier, including areas where the substrate is destabilized during pier construction. In addition, the new bridge will alter stormwater runoff patterns as compared to the existing condition. Stormwater runoff carries silt and contaminants; therefore, changes in localized stormwater input can alter habitat suitability in French Creek.

A long-term alteration in habitat quality is likely to occur within the action area of the Mead Avenue Bridge, in part due to a different bridge structure with a wider hydrologic opening, which will be further accentuated by the proposed floodplain mitigation design, which creates an even wider channel to pass high flow events. The Assessment considers the hydrologic conditions at an average flow and during a 10-year flood event. Because the floodplain mitigation does not extend into the low-flow channel, immediate low flow changes are unlikely. Further, the mean water velocity discussed in the Assessment may not be relevant to the conditions experienced by mussels at, or within the substrate boundary layer, and the flow conditions cited in a coastal southern stream during drought conditions (Johnson *et al.* 2001) probably do not directly apply to species adapted to a higher gradient stream system such as French Creek.

Freshwater mussels, including northern riffleshell, are adapted to withstand the effects of variable stream flows under natural conditions, especially in an armored channel. The location of freshwater mussel habitat is the result of complex hydrologic and substrate variables (Layzer and Madison 1995; Hardison and Layzer 2001; Howard and Cuffey 2003; Daraio *et al*., 2010; Allen and Vaughn 2010) rather than only stream velocity. The modeling described in the Assessment considered lower flow events that are not likely to be strongly influenced by the graded stream banks. At increasingly higher flows, the substantially widened channel that will result from stream bank grading will ultimately reform the channel through scour and deposition. These effects may be far reaching, considering the existing bridge is apparently affecting habitat up to 300 meters upstream (EADS 2010). Long-term habitat alteration is expected to occur from several years to several decades post-construction, depending on the occurrence of high-flow stream events. Velocity patterns will change, altering river bed stability and aggregation and scour patterns. The altered channel configuration is likely to result in sediment re-deposition in some areas of existing northern riffleshell habitat, as well as scour and redeposition. The individual animals affected may die, or fail to reproduce in the altered habitat due to changes in fish host distribution. A long-term reduction in habitat availability or quality for northern riffleshells and/or their host fish, would prevent the species from maintaining a population in the vicinity of the bridge even if immediate mortality is minimal.

Habitat degradation in the form of water quality impairment may occur as a result of the operation and maintenance of the new bridge. In-stream areas are likely to be degraded by runoff from the bridge deck when rain flushes oil, dirt, and other road surface deposits directly

into the river. Declines in mussel populations have been documented downstream of bridges; these declines appear, in part, to be related to water quality changes (Andersen *et. al* 2003). Water quality degradation may result from bridge deck and approach road runoff carrying silt, hydrocarbons, and deicing materials. New de-icing materials may be adopted, or developed, during the life of the bridge. To the extent that these materials reach the receiving water below the bridge, northern riffleshells may be adversely affected. The risk to listed mussels from bridge deck runoff is inversely related to the amount of runoff that can be intercepted and treated, rather than directly discharged to French Creek. Directing some runoff to land based areas will ameliorate some of the risk from bridge deck runoff. Further, while the design of the new bridge is expected to reduce the maintenance needed, compared to the existing bridge, The widened high-flow channel resulting from grading the stream banks is likely to induce the development of gravel bars that may further alter habitat if debris is entrained, or subsequent bridge maintenance actions are proposed to remove accumulated gravel.

Effects of Avoidance, Minimization and Conservation Measures

The project proponents have incorporated measures into the proposed project design to avoid and minimize the adverse effects of the project. They estimate these measures will reduce direct take by at least 35 percent as opposed to the initial design. These measures are summarized in the "Avoidance, Minimization, and Conservation Measures" section of the biological assessment, and their effects are considered in this opinion. Limiting the duration of streambed disturbance during construction will limit temporal and spatial disturbance to mussels. This will allow the northern riffleshell the opportunity to recruit from nearby, less disturbed habitat, and limit adverse effects on reproduction to only one reproductive season. Developing and implementing an Erosion and Sedimentation Control Plan and a Pollution Prevention and Control Plan will have the effect of reducing on-site and off-site effects, and the chance of accidental adverse events. This will limit the extent of direct and indirect effects on endangered mussels if the plans are effectively implemented.

The proposed salvage and relocation of endangered mussels from the in-stream project footprint (bridge fall area, piers, cofferdams, and construction pad) is expected to further reduce take, although some mortality of translocated mussels is expected due to translocation-induced stress and/or placement in habitat potentially less suitable than that previously occupied. Salvaging and relocating mussels from areas where their survival is unlikely further reduces the number of animals that will be permanently lost. This provides an important opportunity to reduce take and advance recovery of the species by placing them in habitat that has recovered from past pollution or degradation events.

Cumulative Effects

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

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

The Mead Avenue Bridge is within a commercial and industrial area. While a variety of activities may affect northern riffleshell, we are aware of no specific actions under consideration. Because no cumulative effects are foreseen; none have been evaluated for the Mead Avenue Bridge replacement project.

CONCLUSION

After fully considering the direct and indirect effects of the proposed action and the cumulative effects, the Service has concluded that the northern riffleshell will recover to levels slightly below their present levels within the action area. This conclusion is based upon the following considerations: 1) the French Creek watershed populations of the northern riffleshell are intermittently distributed in portions of French Creek, therefore, there is the potential for recolonization of disturbed areas from upstream and downstream populations of northern riffleshell; 2) the project proponents will implement project avoidance and minimization measures to reduce take; 3) there will be some mortality and stress of individuals within the action area, but relatively few northern riffleshells are likely to be killed or injured at this bridge replacement site; 4) recent documentation suggests mussels can survive some nearby streambed disturbance (such as between bridge causeway sections); and 5) the long-term reductions in mussel habitat quality due to the floodplain mitigation design will be relatively limited in area as compared to the distribution of the species in French Creek.

After reviewing the status of the northern riffleshell, the environmental baseline for the action area, the effects of the proposed replacement of the Mead Avenue Bridge over French Creek, and the cumulative effects, it is the Service's biological opinion that the bridge replacement, as proposed, is not likely to jeopardize the continued existence of the northern riffleshell. No critical habitat has been designated for this species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of Endangered Species Act, as amended, prohibit the take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the federal agency or the applicant. 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 a prohibited taking 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 Chapter 105 Dam Safety and Encroachment Permit from the Pennsylvania Department of Environmental Protection; and an approved Erosion and Sedimentation Control Plan from the Crawford County Conservation District. Again, 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 FHWA so that they become binding conditions of any funding, permits, and/or approvals issued to PennDOT for the exemption in section 7(o)(2) to apply. FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If FHWA 1) fails to require PennDOT 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, FHWA or PennDOT 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 (Table 3). We anticipate that northern riffleshell will be taken during implementation of the Mead Avenue Bridge Replacement Project through direct mortality, injury, and stress. Mortality will occur within a 936 m^2 area (*i.e.*, 792 m^2 for demolition of the existing bridge, 73 m^2 for construction of the new pier, and 71 m^2 for construction of the eastern abutment) and the area surrounding these features. Mortality and injury may also occur outside these directly affected areas during and after construction due to sedimentation, scouring, and changes in hydrology related to the placement of an instream pier and an overall greater hydraulic opening.

Stress, short-term reproductive impairment, and limited mortality due to changes in hydrology, construction-induced scour, and sediment deposition are predicted to occur in an area extending from 300 meters upstream to at least 200 meters downstream of the new 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 loss or decreased suitability of mussel habitat due to sedimentation and scouring as the stream channel achieves a new equilibrium in response to the new center bridge pier and wider stream channel. These events will result in harm to adult northern riffleshell, the glochidial life stage of this species, and populations of host fishes.

We anticipate the northern riffleshell population within the project action area will recover to near its present level, because mussels will eventually recolonize disturbed areas. While the presence of a new instream pier is predicted to have a minimal or neutral effect on overall channel morphology, it is likely to create new areas of northern riffleshell habitat at some

locations and scour in currently stable areas.

Table 3 provides estimates of the take expected due to direct and indirect effects at the Mead Avenue Bridge construction and demolition site. We were able to estimate the type and amount of take within the project footprint because mussel density and distribution within the footprint is known, and the effects within the footprint are obvious. However, outside the footprint, various other direct and indirect effects may occur. Because the extent of these effects will be influenced by several factors, including time of year, stream flows, and the effectiveness of erosion and sedimentation controls, it is not possible to predict how many individuals or what percentage of the population will be taken. We expect some portion of the population to be harmed and/or harassed, and expect that more mussels will be temporarily affected (*e.g.*, by sedimentation, scouring, backwater effects, disruption of breeding) than will be killed. The actual level of incidental take will be difficult to detect or quantify because individuals (juveniles and adults) are small and often buried in the substrate, making it unlikely that dead or injured specimens will be located.

The numerical take levels in Table 3 include estimates of the level of take caused by direct effects, and the *minimum* level of anticipated take caused by *indirect* effects. The Service is unable to quantify the expected levels of take outside the primary impact area due to uncertainties regarding the extent of adverse effects that will occur (*e.g*., scouring, sedimentation, and hydrologic changes). Take within this secondary or indirect impact area is expected to be primarily in the form of harm, and be limited to an area extending from 60 meters upstream to 200 meters downstream of the bridge.

If a release of petroleum products or other hazardous substances into French Creek occurs during project implementation, or if a failure of erosion and sediment control measures occurs such that adverse effects extend beyond 200 meters downstream of the bridge, FHWA shall immediately take remedial action(s), contact the Service for recommendations to reduce the risk of take, and determine whether reinitiation of consultation will be required. If significant streambed redeposition or scour (as determined in the Reasonable and Prudent Measures, below) is documented more than 60 meters upstream or 200 meters downstream of the bridge, FHWA should, in consultation with the Service, initiate an evaluation to determine the cause. If evidence suggests that the cause was related to the project, reinitiation of consultation may be required.

Table 3. Northern riffleshell incidental take estimates for the Mead Avenue Bridge Replacement Project.

Area Within Which Take Will Occur	**Type of Take**	**Estimated mean population density**	**Number of northern riffleshell**
Direct effects area of 936 m^2 (*i.e.*, 792 m^2 for demolition of the existing bridge, 73 m^2 for construction of the new pier, 71 m^2 for construction of the eastern abutment)	Animals killed by crushing or smothering. Harassment or harm during and after construction resulting in mortality, injury, or temporary effects to breeding, feeding or sheltering	0.01 northern riffleshell/m^2	9[1]
Indirect effects area of 8,580 m^2 extending from 60 meters upstream to 200 meters downstream of the bridge[2]	Harassment or harm during and after construction resulting in mortality and injury, largely from habitat alterations related flood mitigation measures	0.01 northern riffleshell/m^2	86[3]

[1] 936 m^2 x 0.01 northern riffleshell/m^2 = 9 northern riffleshell

[2] An estimated 60 percent of the indirect effects area has suitable habitat, and the stream is approximately 55 meters wide. 260 meters x 55 meters = 14,300 m^2 x 60% = 8,580 m^2

[3] 8,580 m^2 x 0.01 northern riffleshell/m^2 = 86 northern riffleshell

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of expected take is not likely to result in jeopardy to the northern riffleshell.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize incidental take of the northern riffleshell at the Mead Avenue Bridge demolition and construction site:

1. FHWA and PennDOT must implement all avoidance and minimization measures described in the biological assessment. These measures are hereby incorporated by reference as mandatory project features. The Service believes that all measures proposed are necessary and appropriate to minimize take of northern riffleshell.
2. The Mead Avenue Bridge has been a hydrologic control in French Creek for more than a century, directly influencing northern riffleshell habitat in the action area. To minimize take of endangered mussels and alteration of their habitat, minimize channel alteration, instream construction, and demolition-related disturbance. Monitor take of the northern riffleshell population and the effects on the species habitat (*e.g.,* streambed elevation and scour) post-construction.
3. Minimize the impact of bridge operation and maintenance on endangered mussels and their habitat.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Endangered Species Act, FHWA must comply with the following terms and conditions, which carry out the reasonable and prudent measures described above, and outline monitoring and reporting requirements. These terms and conditions are non-discretionary.

1. To reduce adverse effects on the northern riffleshell, the FHWA, PennDOT, and their agents and contractors will implement all project avoidance and minimization measures. These obligations include, but are not limited to:

    A. To reduce the area of streambed directly affected by bridge demolition, all decking and bridge members that are not necessary for bridge support should be removed via shore access (rather than dropping them in the river).

    B. Develop and implement an erosion and sedimentation control plan to address all sources of project-related erosion and sedimentation, including, but not limited to, access roads, roadway approaches, staging areas, piers, abutments, and causeways**.**

        i) FHWA and/or PennDOT, and contractors will monitor the project site daily when the site is active and not stabilized, and as soon as possible following severe storms or ice flows when the site is inactive and/or otherwise stabilized, to ensure the erosion and sedimentation control practices are implemented, and to identify any project-related impacts due to scouring or sedimentation.

ii) Best Management Practices for erosion and sedimentation control will be in place before, during, and after any work is conducted.

C. Develop and implement a Pollution Prevention and Control Plan based on the most effective prevention and remediation practices to prevent hazardous materials (*e.g.*, petroleum products, solvents, paints, *etc*.) from entering French Creek or contaminating soils or waters within this watershed. Such measures will include, but are not limited to, stationing of emergency response equipment at the project site, and designation of contained fueling and fuel storage areas at least 150 feet away from French Creek and waterways leading to French Creek.

i) FHWA and/or PennDOT, and contractors will monitor the project site daily when the site is active and not stabilized, and as soon as possible following severe storms or ice flows when the site is inactive and/or otherwise stabilized, to ensure that spill avoidance practices are implemented.

ii) If a spill does occur, implement emergency remediation procedures to contain the spill, and prevent the spill from entering French Creek.

iii) If flooding is anticipated, weather and river stages will be monitored and hazardous materials will be removed from the river and floodplain.

iv) The Service will be notified immediately of any spills of hazardous materials.

D. No project-related or project-generated materials, waste, or fill will be deposited in areas that would result in fills of or sedimentation to, any streams inhabited by threatened or endangered mussels.

E. During the bidding process, prospective project contractors will be notified regarding the presence of endangered species in the project area and the special provisions necessary to protect them. The successful contractor(s) will be instructed on the importance of the natural resources in the project area and the need to ensure proper implementation of the required erosion and sedimentation controls, and spill avoidance/remediation practices.

i) The following conditions (language) will be included in all construction and demolition contracts awarded for project implementation:

(a) Endangered species are present in the project area and there is a risk of take (Endangered Species Act section 9 violation) if the Terms and Conditions of the U.S. Fish and Wildlife Service's biological opinion are not closely followed.

(b) Best Management Practices for erosion and sedimentation control will be in place before, during, and after any work is conducted.

(c) Contractors will monitor the project site daily when the site is active and not stabilized, and as soon as possible following severe storms or ice flows when the site is inactive and/or otherwise stabilized, to ensure the erosion and sedimentation control and spill avoidance practices are implemented.

(d) Develop and implement a Pollution Prevention and Control Plan based on the most effective prevention and remediation practices to prevent hazardous materials (*e.g.*, petroleum products, solvents, paints, etc.) from entering French Creek, or contaminating soils or waters within this watershed. Such measures will include, but are not limited to, stationing of emergency response equipment at the project site, and designation of contained fueling and fuel storage areas at least 150 feet away from French Creek and waterways leading to French Creek.

(e) Contractors will monitor weather and river stages, and remove any hazardous materials from the river and the floodplain in the event that flooding is expected.

(f) If a spill does occur, implement emergency remediation procedures to contain the spill, and prevent the spill from entering French Creek.

(g) The Service will be notified immediately of any failures of erosion and sedimentation control measures or spills of hazardous materials.

(h) No project-related or project-generated materials, waste, or fill will be deposited in areas that would result in fills of, or sedimentation in, any streams inhabited by endangered mussels.

F. To minimize take of endangered mussels in areas that will be directly affected by bridge demolition and construction, conduct a mussel salvage and relocation in the summer/fall season (*i.e.*, July thru September) prior to initiation of construction. We anticipate that the level of effort necessary to accomplish the salvage operation will be less than one week.

i) The salvage will be conducted in and immediately adjacent to the in-stream project footprint. This includes areas immediately adjacent to, and within, the expected debris fall area in French Creek beneath the bridge, the construction pad, the new and old pier locations, and other areas of proposed instream disturbance. These areas constitute the "salvage areas."

ii) Develop and implement a plan for the salvage of mussels from the salvage areas (see above), and the relocation of these mussels to appropriate habitat and/or a holding and propagation facility elsewhere. The plan should include a protocol for maximizing the probability of finding the endangered mussels; a protocol for removing mussels from the substrate; and protocols for handling, holding, transporting, and relocating mussels. Salvage of mussels must be done only when the water temperature is above 55 degrees Fahrenheit and water clarity is good. All procedures and techniques will require Service approval through the Pennsylvania Ecological Services Field Office. The mussel salvage plan will be submitted to the Service for approval at least three months prior to initiating any in-stream salvage activities.

iii) Prior to the salvage effort, identify appropriate relocation sites, in coordination with the Fish and Wildlife Service. Field reconnaissance will be necessary to identify appropriate sites. Preliminary and final relocation sites will require Fish and

Wildlife Service review and approval. The relocation sites should have characteristics that optimize species survival.

iv) Prior to the salvage effort, the salvage areas will be clearly marked. Temporary and/or permanent marking shall be done in such a manner as to assist the salvage team. Bank and in-stream reference marking shall be done for the purposes of defining the salvage areas prior to the construction season.

v) Service-approved, qualified personnel who are thoroughly briefed on the techniques to be used will perform the salvage of mussels. These personnel will survey the salvage areas via diving, wading, and/or snorkeling, as appropriate. Because dive conditions at the river bottom will preclude consistent and accurate identification of mussels by divers, all mussels located shall be collected by hand and transported to the surface for identification. All mussel identifications will be done by a Service-approved biologist.

vi) Personnel conducting the salvage and relocation of northern riffleshell must obtain a Scientific Collector's Permit from the Pennsylvania Fish and Boat Commission.

vii) A report documenting the salvage and relocation effort shall be prepared and submitted to the Service's Pennsylvania Field Office and the Pennsylvania Fish and Boat Commission within six months of completion of the salvage. The report shall include an introduction, methods section, results section, conclusion and/or summary, and any relevant supplementary information (e.g., names and qualifications of surveyors). The methods section should detail protocols used for surveying, holding, handling, transporting and relocating mussels. The results section should include the total number of individuals of each mussel species found; date found; water and air temperatures; river stage; total number of live and dead northern riffleshell found; condition, size and approximate age of live northern riffleshell; data regarding non endangered mussels; and maps or figures showing project features (cofferdams, construction pad, piers, abutments) and salvage areas. The report should also detail the relocation effort, including, but not limited to: map of the relocation site(s); mussel death or injury during transit; time of departure from the salvage area; time of arrival at the relocation site(s); methods for handling and placement of mussels at the relocation sites, list of mussels (number, sex, size) placed at each relocation site; *etc*.

viii) In accordance with the project avoidance and minization measures, FWHA and PennDOT will incur the cost of relocating salvaged mussels to nearby suitable habitat or to a Service approved alternate site. A plan to ensure survival of salvaged mussels will be submitted to the Service for review and concurrence at least three months prior to commencing salvage efforts.

2. Conduct a mussel survey in the direct and indirect effects area, between three and five years post-construction, following a Fish and Wildlife Service-approved mussel sampling protocol to assess mussel community composition, abundance, and habitat conditions.

A. Surveys for mussels will be performed by Fish and Wildlife Service-approved, qualified personnel, following Smith *et al*. (2001). These personnel shall survey the direct and indirect effects area via diving, wading, and/or snorkeling, as appropriate. All mussels located shall be identified to species, recorded, and replaced in the substrate.

B. Reports detailing survey methods and results shall be provided to the Fish and Wildlife Service within six months after field work is completed.

3. The stream bank grading plan will increase the hydrologic changes brought about by the new bridge structure and is likely to result in long-term alteration of stream velocity and substrate deposition patterns during high flow events. These changes are expected to alter the distribution and abundance of northern riffleshell.

A. To minimize adverse effects on northern riffleshell due to habitat alteration, re-evaluate the need for extensive stream bank grading, or develop and implement a design based upon a natural streambed design. If this is not possible, monitor the long-term effects of the proposed floodplain mitigation on northern riffleshell.

i) If stream bank grading is not avoided, develop and implement a plan to monitor riverbed movement in the area where indirect effects are anticipated (60 meters upstream to 200 meters downstream of the bridge) due to scouring and sediment deposition.

(a) Monitoring will be conducted prior to construction and within one year following any flood event with a greater than 3-year recurrence interval (as measured in French Creek at the U.S. Geological Survey gage at Meadville, PA) for a period of ten years after construction.

(b) A report documenting the scour and sediment monitoring will be prepared and submitted to the Fish and Wildlife Service's Pennsylvania Field Office within six months of completion of each monitoring event.

B. Re-vegetate the graded areas of stream bank with native herbaceous and woody vegetation to stabilize the stream bank and restore existing conditions.

C. If habitat or population monitoring fails to document recovery of northern riffleshell (as determined surveys described in Terms and Conditions 2 and 3), FWHA and PennDOT will incur the cost of either augmenting the on-site population with juveniles produced through captive propagation; or making a contribution to a mussel conservation fund to be established pursuant to an agreement between the U.S. Fish and Wildlife Service and the Pennsylvania Fish and Boat Commission.

i) Prior to the reintroduction or augmentation, develop and implement a monitoring plan capable of detecting survival and mortality of reintroduced animals or their progeny. The monitoring plan should be developed by a reputable biologist in coordination with the Service, and will be subject to review and approval by the

Service.

ii) If relocation is selected to partially offset take, determine if northern riffleshell from the proposed source site (*e.g.*, Hunter's Station bridge site) are genetically comparable to extant populations in French Creek at Mead Avenue. A study plan shall be submitted to the Service for review and approval at least three months prior to conducting this investigation.

iii) If augmentation is selected to offset take, an augmentation plan will be developed and implemented by a reputable biologist in coordination with the Service, and will be subject to review and approval by the Service.

iv) Personnel conducting captive holding and propagation of northern riffleshell must obtain a federal threatened and endangered species permit from the Service, as well as a Scientific Collector's Permit from the Pennsylvania Fish and Boat Commission, and must provide evidence of success in producing and raising endangered mussels.

v) A report documenting the reintroduction or augmentation effort will be prepared and submitted to the Service's Pennsylvania Field Office and the Pennsylvania Fish and Boat Commission within six months of the reintroduction or augmentation effort. The report shall include an introduction, methods section, results section, conclusion and/or summary, and any relevant supplementary information (*e.g*., names and qualifications of surveyors). The methods section should detail protocols used for surveying, reintroduction (or augmentation), and monitoring of mussels. The results section should include the total number of individuals of each mussel species collected; date collected; water and air temperatures; river stage; condition, size and approximate age of live northern riffleshell; data regarding non-endangered mussels; and maps or figures showing project features.

vi) One additional post-construction monitoring event may be necessary to determine survival of reintroduced individuals or individuals added via augmentation, pending Service review of the post-construction monitoring reports.

4. Operation and maintenance of the Mead Avenue Bridge over the expected life of the project presents an ongoing potential adverse effect on the northern riffleshell. A plan should be developed and implemented to limit this effect.

   A. Review alternatives for de-icing the roadway surface, and select materials that have minimal effects on aquatic biota.

   B. To the extent practicable, implement drainage control measures (*e.g.*, runoff collection and settling basins, permeable roadway surfaces) that remove silt and contaminants from the bridge before runoff enters French Creek.

   C. Consult with the Service prior to implementing any maintenance activities that may directly or indirectly affect mussels or their habitat (*e. g.*, channel clearing, scour-hole repair, pier and abutment work, *etc*.).

5. If the in-stream portions of this project are not completed by 2016, FWHA shall reinitiate consultation with the Service to re-evaluate project impacts on the northern riffleshell, and to determine the appropriateness of the reasonable and prudent measures and the terms and conditions contained in this biological opinion.

6. The Fish and Wildlife Service's Pennsylvania Field Office and Region 5 Division of Law Enforcement are to be notified within 24 hours should any endangered or threatened species be found dead or injured as a direct or indirect result of the implementation of this project. Notification must include the date, time, and location of the carcass, and any other pertinent information. Northern riffleshells that are accidentally killed, or that are moribund or freshly-dead and contain soft tissues, are to be preserved according to standard museum practices, properly identified or indexed (date of collection, complete scientific and common name, latitude and longitude of collection site, description of collection site), and submitted to a recognized museum or research facility (*e.g.,* USGS facility in Leetown, WV). The appropriate person at the selected repository institution should be contacted regarding proper specimen preservation and shipping procedures.

   Prior to undertaking salvage efforts pursuant to Term and Condition 1F of this biological opinion, notification must be made to the following Fish and Wildlife Service offices at least two weeks prior to beginning in-stream salvage activities:

   U.S. Fish and Wildlife Service
   Division of Law Enforcement
   300 Westgate Center Drive
   Hadley, MA 01035-9589
   (telephone: 413-253-8343)

   U.S. Fish and Wildlife Service
   Pennsylvania Field Office
   Endangered Species Specialist
   315 South Allen Street, Suite 322
   State College, PA 16801
   (telephone: 814-234-4090)

The reasonable and prudent measures, and the implementing terms and conditions of this biological opinion are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service anticipates that nine northern riffleshell will be incidentally taken due to the direct effects of replacing the Mead Avenue Bridge. In addition, up to 86 northern riffleshell will be harmed or harassed in the vicinity of this bridge during and following construction as the stream hydrology adjusts to the presence of the new bridge structure. If, during the course of the action, the numerical or narrative levels of incidental take are exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. FHWA must immediately provide an explanation of the causes of the taking, and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

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

The Service has identified the following actions which, if undertaken by PennDOT and/or FHWA, would further the conservation and assist in the recovery of the northern riffleshell.

1. Implement conservation strategies identified by PennDOT's working group on mussels.
2. Continue to participate in the development of a conservation plan for the northern riffleshell in Pennsylvania, along with agencies that carry out activities that potentially affect this species (Recovery Plan, Task 1).
3. Seek opportunities to participate in efforts to recover northern riffleshell throughout the species' historic range (Recovery Plan, Task 4).
4. Support research to determine captive husbandry techniques suitable for propagation of the northern riffleshell. This action would partially meet the objectives of the Recovery Plan (Tasks 4.23, 4.24, and 4.3) for this species and may offset project-related effects elsewhere.
5. Within the Allegheny River watershed, implement and/or support projects that would improve water quality by reducing non-point source pollution. Such projects would include, but are not limited to, wetland preservation, wetland restoration, streambank fencing, and streambank restoration (via establishment of native plant species). This action would partially meet the objectives of the recovery plan (Recovery Plan, Task 2.2) for this species and may offset project-related effects elsewhere.
6. Support research to further define the species' habitat requirements (Recovery Plan, Task 3), and provide additional details regarding the species' distribution and threats (Recovery Plan, Task 2.5).

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 the conservation recommendations carried out.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the information presented with FHWA's April 22, 2010, request for initiation of formal consultation. As written in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law), and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals the agency action 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.

Clint Riley, Field Office Supervisor

9/21/10
Date

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