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 2, 2014

Keith Lynch
Federal Highway Administration
228 Walnut Street, Room 508
Harrisburg, PA 17101-1720

RE: USFWS Project #2014-0846
PNDI receipt #20140430448964

Dear Mr. Lynch:

This responds to your letter of June 27, 2014, (which we received on July 2, 2014) requesting formal consultation regarding the effects of the proposed Washington Crossing (State Route (S.R.) 0062, Section B08) bridge restoration/rehabilitation project on several federally listed endangered or threatened species. The Washington Crossing Bridge crosses French Creek in the City of Franklin, Venango County, Pennsylvania. The following comments are provided pursuant to the Endangered Species Act of 1973 (Act; 87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.) to ensure the protection of endangered and threatened species.

On December 15, 2011, the Fish and Wildlife Service (Service) issued a programmatic biological opinion (PBO) regarding the effects of the Pennsylvania Department of Transportation's (PennDOT) bridge replacement, removal, restoration/rehabilitation, and preservation projects within the Ohio River basin in Pennsylvania (hereafter referred to as Bridge Program). The Service's PBO evaluated the potential effects of PennDOT's bridge program activities on the endangered northern riffleshell (*Epioblasma torulosa rangiana*) and clubshell (*Pleurobema clava*). The PBO was revised on December 6, 2012, to also consider three recently listed species, the rayed bean (*Villosa fabalis*), snuffbox (*Epioblasma triquetra*), sheepnose (*Plethobasus cyphyus*), and amended December 13, 2013, to consider the rabbitsfoot (*Quadrula cylindrica cylindrica*), a federally-listed, threatened species. In the PBO, we determined that carrying out the Bridge Program during the five year period considered, with full implementation of avoidance, minimization, and conservation measures, as proposed, was not likely to jeopardize the northern riffleshell, clubshell, rayed bean, snuffbox, sheepnose, or rabbitsfoot mussels.

Although the Service provided a PBO for the Bridge Program to the Federal Highway Administration (FHWA) and PennDOT, the Service continues to review site-specific projects that the project proponents determine "may affect" federally listed species. The Service will determine if any adverse effects are likely to occur as a result of a site-specific project in a

manner, or to an extent, not evaluated or previously disclosed and considered in the Service's PBO. We consider this site-specific project analysis to be "Tier 2" of the consultation process, with the programmatic consultation (and resulting PBO) constituting the "Tier 1" consultation. Our project-specific (Tier 2) consultations focus on: 1) compliance with the reasonable and prudent measures and associated terms and conditions in the PBO, 2) consistency with the scope and effects previously analyzed in that opinion, 3) project-specific incidental take versus take estimated in the PBO, and 4) any project-specific reasonable and prudent measures and associated terms and conditions that may further reduce the likelihood or quantity of take. If implementation of the measures outlined in the PBO can avoid the take of listed mussels, such that the Service can determine that a project is not likely to adversely affect listed species, no further evaluation by the Service is necessary, and section 7(a)(2) consultation will be considered complete for that project with documentation provided via our written concurrence.

We reviewed the information provided in the "Tier 2" biological assessment entitled, *Washington Crossing S.R. 0062 B08, Pier 2 and 3 Scour Project Over French Creek, Venango County, Pennsylvania*, which describes the potential effects of the proposed bridge scour protection repair project on federally listed species. The proposed project type (*i.e.*, restoration/rehabilitation project) includes a novel causeway and cofferdam design, but the anticipated effects are comparable to those discussed and evaluated in the Bridge Program biological assessment and PBO. Therefore, this consultation qualifies as a "Tier 2" consultation under the Bridge Program PBO (Tier 1) consultation.

The FHWA request for formal consultation did not include a request to conference regarding proposed rabbitsfoot critical habitat; however, this was considered in the BA with the determination that the project *may affect* and *is likely to adversely affect, but is not likely to destroy or adversely modify proposed rabbitsfoot critical habitat*. Therefore, this document also includes the Service's conference opinion on the effects of the Washington Crossing Bridge project on proposed critical habitat for the rabbitsfoot mussel. As the PBO did not consider the effects of the Bridge Program on critical habitat, those effects are considered in this project-specific conference opinion.

FHWA and PennDOT Effect Determinations

The project area was surveyed for presence of federal and state-listed endangered or threatened freshwater mussels in June of 2010. The survey results indicated that a substantial mussel assemblage (12 species) is present, despite the marginal mussel habitat found. The federal and state endangered northern riffleshell (*Epioblasma torulosa rangiana*), clubshell (*Pleurobema clava*), and rayed bean (*Villosa fabalis*) were detected in a preconstruction survey. The snuffbox (*Epioblasma triquetra*) and rabbitsfoot (*Quadrula cylindrica cylindrica*) were not detected during the survey.

Based on the results of a June 2010 freshwater mussel survey and anticipated direct and indirect disturbance in identified mussel habitat, FHWA determined that the scour protection repair project as proposed at the Washington Crossing Bridge *may affect, and is likely to adversely affect* northern riffleshell and rayed bean mussels. Although not detected during the mussel survey in the project action area, FHWA determined that the project *may affect, and is likely to adversely affect* clubshell, snuffbox, and rabbitsfoot mussels. Based on the best available

commercial and scientific information that demonstrates the presence of these species upstream and downstream of the action area, in locations with a comparable mussel community, we agree that these three species may be present in the action area, albeit at population densities below detection of the survey method and survey effort extended in June 2010. Therefore, we concur with the above effect determinations.

The following Tier 2 biological opinion and conference report (Tier 2 BO) considers the effect of the Washington Crossing Bridge Project on northern riffleshell, rayed bean, clubshell, snuffbox, and rabbitsfoot and on proposed rabbitsfoot critical habitat. Specific activities considered involve 1) installation and removal of three water-filled bladders (water-filled cofferdams) as a water diversion measure instead of traditional cofferdams; 2) dewatering the area around Piers 2 and 3; 3) excavating substrate materials near the piers (six feet wide and six feet deep); 4) backfilling the excavation site with concrete and the concrete curing process; 5) access to the work sites, including access points and staging areas; 6) disposal of the excavated materials; and 7) implementing avoidance and minimization measures, as described in the Tier 2 BA. We also consider a mussel salvage that is proposed to minimize the number of federally listed species killed during bridge repair activities. This Tier 2 BO evaluates whether the project, as now proposed, is consistent with PBO and, assuming that this is the case, estimates the incidental take anticipated due to implementation of the Washington Crossing Bridge scour protection repair project and the cumulative total incidental take due to the Bridge Program implementation.

FHWA and PennDOT Effect Determination for Proposed Critical Habitat

The project action area is within proposed critical habitat for the rabbitsfoot mussel. Under Section 7(a)(4) of the Act and the associated Fish and Wildlife Service regulations, Federal agencies may confer with the Service on actions that "may affect" proposed critical habitat. Federal agencies are required to confer with the Service on actions that are "likely to destroy or adversely modify proposed critical habitat". When critical habitat is listed, Federal agencies must consult with the Service on any action they authorize, fund, or carry out if those actions "may affect" designated critical habitat. In the project biological assessment (pages 25 and 27), PennDOT and FHWA determined that the proposed project may affect proposed rabbitsfoot critical habitat but that it is not likely to destroy or adversely modify critical habitat because the actions are largely temporary and comparatively small in scale.

Description of the Proposed Action

The Washington Crossing Bridge is located about 1000 feet (0.2 miles) upstream from the French Creek confluence with the Allegheny River, and about 0.68 miles downstream from State Route 322 in the City of Franklin, Venango County, Pennsylvania. The existing bridge is a five-span I-beam bridge, with an overall length of 554 feet. It carries four lanes of traffic over French Creek, and has a cantilevered sidewalk attached to the southern-side of the structure. Recent bridge inspections document extensive scouring of the river bottom around piers 2 and 3 of the bridge. PennDOT proposes to fill the scour holes at the base of the piers to protect the structural integrity of the bridge. The repair method proposed is to reconstruct an existing access road (laydown and staging area on right-descending bank (western shoreline)), dewater the area around the piers, install erosion and sedimentation controls (*e.g.*, geo-fabric filter bag on the west

side of French Creek), excavate the streambed around the pier (six feet from the face of the pier and six feet below the top of the pier footing), install concrete fill and reuse excavated streambed materials, and dispose of the excess excavated materials (Figure 1).

PennDOT proposes to use water-filled bladder cofferdams to provide access to Piers 2 and 3 by diverting and dewatering the worksite. The intent is to minimize the duration of instream activity, minimize the number of endangered mussels killed or injured, and avoid long-term adverse effects to stream substrates that may be imposed with the use of traditional rock cofferdams. Construction access will be made from both sides of French Creek, as well as from the bridge deck. A temporary (in place 2 days or less) water-filled bladder will also be used to divert higher water velocity around Pier 3, while the larger cofferdam is installed around this pier (Figure 2). The area inside the cofferdams surrounding both piers will be dewatered by pumping water to a geotextile filter bag sited on river right (western bank). Effectiveness will be monitored post-construction to assess the utility of water-filled bladders at reducing the number of endangered mussels killed or injured, compared to traditional cofferdam and causeway structures.

Equipment necessary to complete the work will be lowered from the bridge deck using a crane. Excavated materials will also be lifted from the work area to the bridge by crane and transported for off-site disposal. The excavated area will be backfilled with concrete (pumped down from the bridge deck), and some of the excavated streambed material will be imbedded into the wet concrete. The work will remain "in the dry" until the concrete has cured, then the water-filled cofferdam will be removed. FHWA and PennDOT propose to conduct continuous and spot-check (via hand held meter) in-stream monitoring of pH during the concrete curing process (about three days) (Tier 2 BA, Page 11, and Revised Tier 2 BA, Appendix D, Page 1) to document any unintentional releases of high pH water outside of the contained work area. If there are elevated pH levels that would indicate a potential problem, contractors will be notified and corrective action taken (Revised Tier 2 BA, Appendix D, Page 2). The anticipated duration of instream disturbance is about one month, with a planned start date in August 2015 (a typically low stream flow period).

In summary, the proposed area of direct streambed disturbance in endangered and threatened mussel habitat is around the two piers identified for repair and beneath the temporary water-filled bladder cofferdam and stream diversion system: an area of approximately 29,988 ft^2 (2,786 m^2).

Consistent with the Programmatic bridge consultation, best management practices are proposed as part of the project design (Tier 2 BA, Pages 15 thru 21). These measures are necessary to reduce the amount of take. The Best Management Practices and Conservation Measures checklist in the Tier 2 BA amendment was revised as an amendment to the Tier 2 BA (per FHWA email of August 11, 2014). It provides clarifying notes where necessary, and includes a description measures that are occurring as part of this project. This information is hereby incorporated by reference.

The action area is defined in 50 CFR 402.02 to mean "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area identified by the project proponents for construction of the Washington Crossing

Bridge project extends 90 meters (295 feet) upstream and 150 meters (492 feet) downstream of the existing bridge (Tier 2 BA, Page 22). Because the action area is based on the area affected by the project (*i.e.*, is not restricted solely to the area of anticipated adverse effects), we extended the action area to include the length of the western side channel and French Creek to the mouth of the western side channel (downstream from the bridge to 180 meters (591 feet)). The cofferdams are likely to create a backwater in French Creek that may temporality divert stream flow to the back channel, especially during any increased stream discharge events.

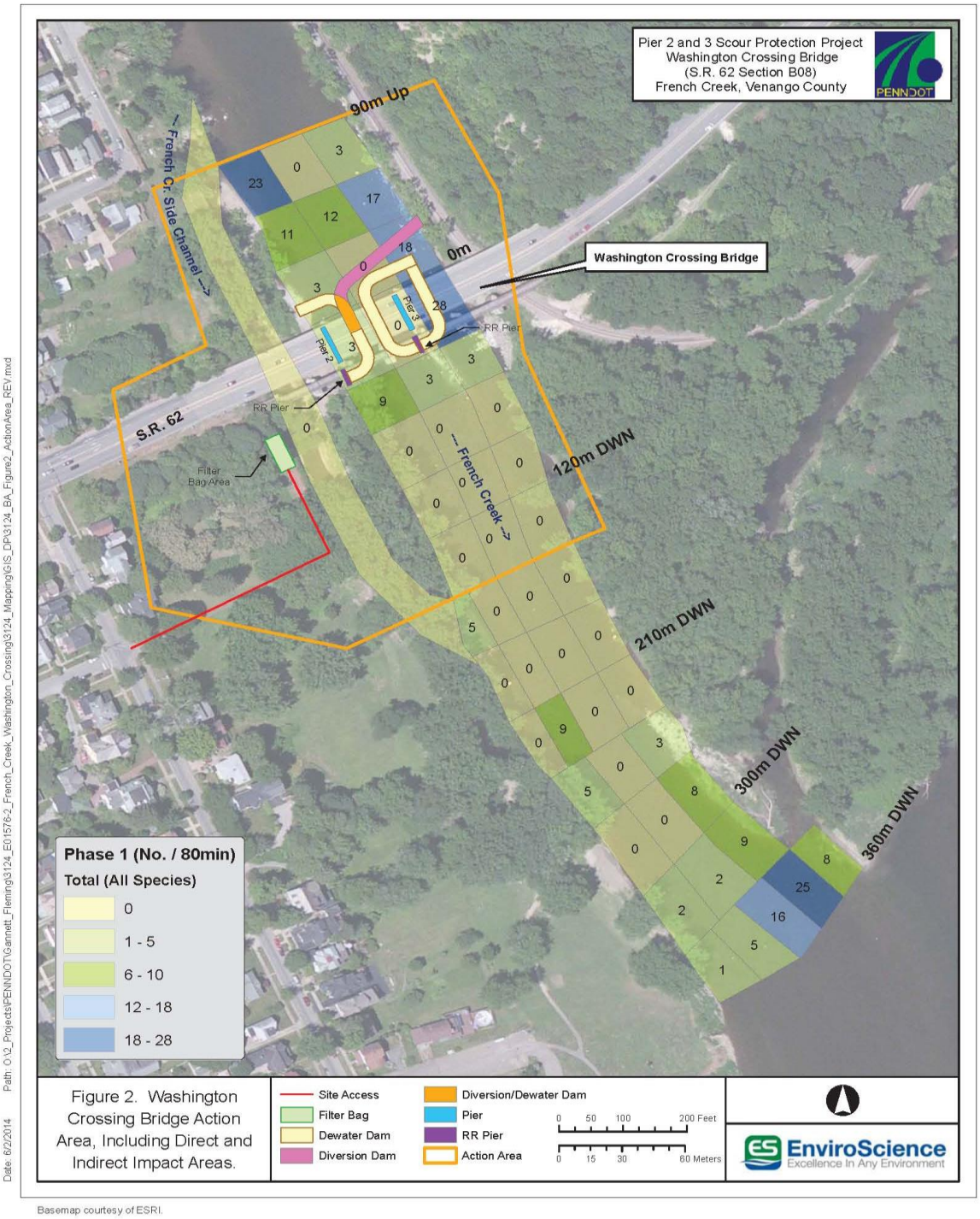

Figure 1. Project action area, mussel survey area and number of species detected. Note that the action area encompasses areas of anticipated direct and indirect effects. The "0" recorded in many search cells may indicate that either no mussels were detected, or a lack of data because the cell was not searched. (Adapted from Figure 2, the Tier 2 BA, Federal Highways Administration, 2014).

Conservation Measures

Conservation measures represent actions pledged in the project description that the action agency or the applicant will implement to further the species' recovery. Such measures may be tasks recommended in the species' recovery plan, should be closely related to the action, and should be achievable within the authority of the action agency or applicant. 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. Such measures, however, must minimize adverse effects to listed species within the action area in order to be factored into the Service's analyses.

The following conservation measures have been incorporated into the project description for the Washington Crossing Bridge Project. These measures are designed specifically to avoid and minimize adverse effects of the proposed action on endangered mussels. The Service has analyzed the effects of the proposed action based on the assumption that all conservation measures will be implemented. More detailed descriptions of the conservation measures are provided in the Amended Tier 2 BA checklist (Pages 15 thru 21) (provided via email from FHWA on August 11, 2014).

Off-site Measures:

A mussel salvage operation in the direct disturbance areas will be completed prior to construction. This salvage effort includes a one meter buffer around the direct disturbance area to encompass the area where endangered mussel will most likely be killed or injured. Salvaged mussels will be relocated to the Elk River at Queen Shoals, West Virginia, or an appropriate alternative site, per an approved mussel salvage plan (and consistent with the species recovery plan objective 4.22). Project proponents have committed to one monitoring event about three years following the mussel translocation to determine the health and status of the translocated mussels (Tier 2 BA, Page 10).

On-site Measures:

FHWA and PennDOT suggest that the water filled cofferdams will incur less damage on the mussel population than traditional cofferdam designs. A post-construction monitoring event is proposed to establish if there is a conservation benefit to the alternate design.

Status of the Species

Species description, life history, population dynamics, status, and distribution are fully described for the northern riffleshell, rayed bean, clubshell, snuffbox, and rabbitsfoot mussels in the revised December 13, 2013, PBO on pages 27 to 38. This information is hereby incorporated by reference. Since issuance of the Service's Tier 1 PBO, there are no substantial changes in the status of the northern riffleshell, rayed bean, clubshell, snuffbox, or rabbitsfoot mussels.

Status of Proposed Critical Habitat

Critical habitat was proposed for the rabbitsfoot in the October 16, 2012, *Federal Register*. Overall, the Service proposed 2,664 river kilometers (1,655 river miles) in 12 States, including Alabama, Arkansas, Illinois, Indiana, Kansas, Kentucky, Mississippi, Missouri,

Ohio, Oklahoma, Pennsylvania, and Tennessee. In Pennsylvania, the Service identified 133 river miles of proposed critical habitat in Crawford, Erie, Mercer, and Venango counties as essential to the conservation of the rabbitsfoot mussel. Areas of proposed critical habitat in Pennsylvania include portions of the Allegheny River, French Creek, and the Shenango River. No critical habitat is proposed that is not known to be occupied by the species. The comment period on the proposed rule was re-opened for public comment in the August 27, 2013, *Federal Register*, and again in the May 14, 2014, *Federal Register*.

Primary constituent elements (PCEs) are the physical or biological features that, when laid out in the appropriate quantity and spatial arrangement to provide for a species' life-history processes, are essential to the conservation of the species. PCE components include features such as space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; and sites for breeding, reproduction, or rearing. In order to be considered critical habitat, an area must have all or most of the PCEs present, with the absent PCEs being readily developable. With respect to rabbitsfoot critical habitat, the PCEs include:

1) Geomorphically stable stream channel and banks (channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussels and native fish (*e.g.*, stable riffles, sometimes with runs, and mid-channel island habitats that provide flow refuges consisting of gravel and sand substrates with low to moderate amounts of fine sediment and attached filamentous algae).

2) A hydrologic flow regime (the severity, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where rabbitsfoot are found and to maintain connectivity of rivers with the floodplain, allowing the exchange of nutrients and sediment for maintenance of rabbitsfoot and host fish habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats.

3) Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.

4) The presence and abundance of fish hosts (currently unknown) necessary for recruitment of the rabbitsfoot. The occurrence of natural fish assemblages, reflected by fish species richness, relative abundance, and community composition, for each inhabited river or creek will serve as an indication of appropriate presence and abundance of fish hosts until appropriate host fish can be identified.

5) Either no competitive or predaceous invasive (nonnative) species or such species in quantities low enough to have minimal effect on survival of freshwater mussels.

Environmental Baseline

The Environmental Baseline for the Bridge Program action area is described on pages 38 to 39 of the Tier 1 PBO (amended) and is hereby incorporated by reference. Since issuance of the Service's PBO, several bridge projects have been initiated in the program action area that have resulted in take (see Appendix A). To date, only the Carlton Bridge replacement has proceeded, resulting in incidental take of northern riffleshell, rayed bean, clubshell, snuffbox, and rabbitsfoot.

French Creek flows through Franklin and empties into the Allegheny River. It contains more than 80 species of fish and 26 mussel species, and is among the most biologically diverse streams in the northeastern United States. Although French Creek contains outstanding water quality and rich biodiversity, environmental concerns include chlorine and ammonia discharges (from industrial waste water), farm and highway runoff, failing septic systems, erosion, and sedimentation. However, improvements to sewage treatment plants in Meadville, Cambridge Springs, and Saegertown have helped reduce the amount of chlorine and other chemicals entering the waterway.

Factors Affecting the Species' Environment at the Washington Crossing Bridge

The Washington Crossing Bridge spans French Creek near the confluence of French Creek and the Allegheny River in the City of Franklin, in Venango County. Franklin sits among rolling hills and in a generally rural setting. Other land uses in the project vicinity are a mix of rural wooded land, private dwellings, commercial businesses, riverside industry, recreation, and French Creek Riverfront Park. A rail line runs along French Creek on the left-descending bank and crosses French Creek just downstream of the Washington Crossing Bridge. Riparian buffer areas are contiguous, but narrow throughout this reach of river.

Status of the Species within the action area

A freshwater mussel survey was completed on June 1 through 5, 2010, and June 14 through 17, 2010, encompassing portions of French Creek between 90 meters upstream from the bridge to 360 meters downstream of the bridge (including the small side channel on the western side of the creek). The survey methodology followed a two phase approach with a qualitative (Phase 1) search of 29 - 20 m by 30 m cells searched for 1.3 person-hours per cell, for a total search effort of 37.7 person-hours. This was followed by a quantitative survey (Phase 2) of 0.25 m quadrats to estimate search efficiency. Water velocity constrained the actual study area searched. Additional Phase 1 cells, identified in the survey plan, could not be included in the survey (Figure 1) from approximately 60 meters downstream of the bridge to 240 meters downstream.

Phase 2 surveys were within the anticipated area of direct streambed disturbance (30 meters up- and 60 meters downstream of the bridge) but limited, due to high water velocity mid-channel, to two areas; 76 - 0.25 m^2 quadrats were surveyed along the left-descending side of the channel and 98 - 0.25 m^2quadrats positioned in the western back channel. A third Phase 2 location was surveyed near the confluence with French Creek, which is outside of the action area based on the effects of the project as proposed. The Phase 2 sampling quadrat were visually searched and then all materials within the quadrats were excavated (to 10 – 15 cm), inspected for remaining

mussels, and processed stream-side. Because all visual surveys were not first conducted on the survey quadrats, as described in the survey report (EnviroScience, 2011. Page 4), this technique cannot be used for accurately estimating the search efficiency.

Habitat was reported to range from shallow water with large slabs of flat rock, boulders, cobbles, and sand gravel (upstream of the bridge) to swifter velocity water (increased slope) containing boulders, and construction debris that was swept clean of smaller substrate materials necessary for suitable mussel habitat. Aquatic vegetation was missing in the direct disturbance area, but limited *Vallesneria* sp. could be found in quieter waters. As French Creek approached the Allegheny River, substantial sand and gravel deposits were evident on the left descending bank toward mid-stream.

In total, 347 mussels representing 12 species were found during the survey. No additional species were represented only by dead shells. The project area was found to contain significant freshwater mussel resources, including northern riffleshell and rayed bean. The calculated population density for northern riffleshell is $1.7/m^2$ (n=19) in the western back channel and $0.05/m^2$ for rayed bean (n=1) in the main channel (EnviroScience 2011). The most significant mussel population in the project area was located from mid-channel to river left between 330 and 360 meters downstream of the bridge. However, the BA concludes that this mussel population density is not representative of the area that will be directly disturbed, as 1) few mussels were found in Phase 1 cells within the direct project area, and 2) approximately 85 percent of the habitat within the main channel immediately surrounding the Washington Crossing Bridge is described as marginal quality for mussels (the western back channel was not surveyed in Phase 1 but was reported to be largely suitable as endangered mussel habitat). Through Phase 2 sampling in the main channel (within the anticipated area of direct streambed disturbance), a total average northern riffleshell density was calculated at $0.025\ /m^2$ (EnviroScience 2011). The BA adjusted northern riffleshell density down in various Phase 1 cells because no northern riffleshell were sampled in the quadrats along the right-descending-bank; therefore, it was not possible to make a direct population estimate. Based on an estimated search efficiency of 20 percent and the 29 northern riffleshell found in Phase 1 surveys in the main channel cells searched, the mussel survey estimated an overall population density of northern riffleshell of $0.025/m^2$ (EnviroScience 2011, Page 9). Due to the sampling conditions and methodology, we have concerns about the validity of these estimates.

The mussel survey was completed prior to and during a relatively high flow period on June 1 to 5 and June 14 to 17, 2010. The stream discharge during sampling (Figure 2) likely limited both the area that could be effectively surveyed and the apparent habitat condition reported. Higher stream discharge rates also reduced efficiency and species detection. Quantitative sample was also restricted to specific and limited locations within the overall survey area. Freshwater mussels typically exhibit a clumped distribution that is sometimes referred to as “mussel beds”. The survey results demonstrate that at Washington Crossing, both mussel habitat and distribution of animals are not homogeneous. The most common species encountered in the Phase 1 survey was northern riffleshell which comprised 43.5 percent of the mussels located, including many along the right-descending-bank in the project area. Although Phase 2 sampling was focused along the right-descending-bank, northern riffleshell was not detected in quantitative searches. By comparison, Phase 2 sampling found a single rayed bean—a species that in Phase1 sampling

represented only 3.2 percent in relative abundance. Although both the mussel survey report and the BA attempt to extrapolate the 2010 mussel survey data in various ways, the sampling conditions appear to strongly bias the data to habitat along the stream margins. The 2010 survey data demonstrate the presence of northern riffleshell, rayed bean, and a diversity of other species in the action area; however, the survey effort does not appear to be adequate to extrapolate abundance across the action area with the precision proposed in the Washington Crossing Tier 2 BA.

As stated above, the clubshell, rabbitsfoot, and snuffbox were not found in the action area. However, these species are known to occur upstream and downstream of the project area (Smith, 2005) and may be present, albeit at population abundances below detection, using the survey methods and search effort implemented in the 2010 mussel survey.

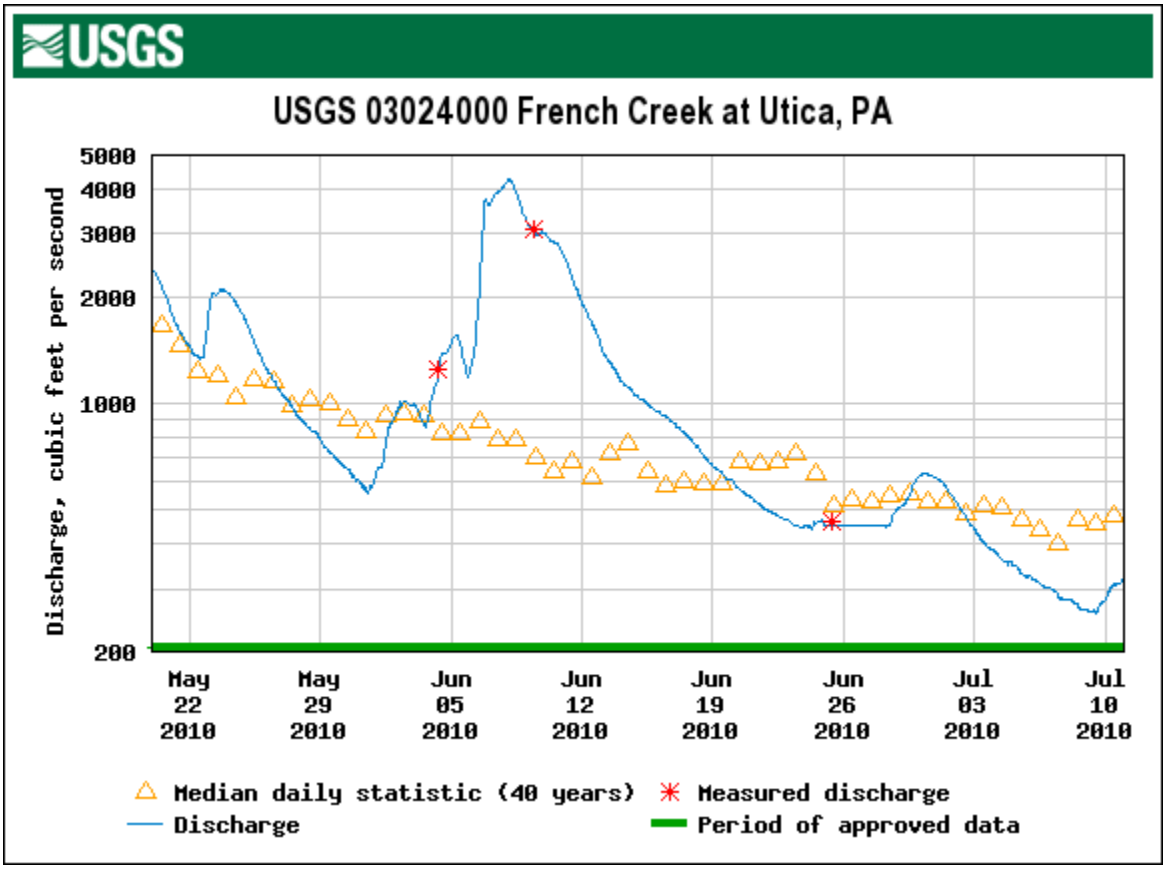

Figure 2. French Creek discharge at Utica, PA between May 20, 2010 and July 10, 2010. The U.S. Geological Survey Gaging Station is approximately 9 miles upstream of the Washington Crossing Bridge. The freshwater mussel survey was completed between June 1 to 5, 2010, and June 14 to 17, 2010

Status of Proposed Critical Habitat in the Action Area

Proposed critical habitat for rabbitsfoot includes 120.4 river-kilometers (74.8 river-miles) of French Creek from Union City Reservoir Dam northeast of Union City, Erie County, Pennsylvania, downstream to its confluence with the Allegheny River near Franklin, Venango County, Pennsylvania (Unit RF23). This unit was occupied at the time of listing and contains all or some components of the physical and biological features essential to the conservation of the rabbitsfoot, and contains all five PCEs (USFWS 2012). The presence of a diversity of freshwater mussels in the action area and downstream at the confluence demonstrates that all PCEs may be present at the Washington Crossing Bridge site. The action area is within proposed critical habitat for rabbitsfoot.

Effects of the Action

Direct effects are caused by or will result from, and occur contemporaneously with, the proposed action. Indirect effects are caused by, or will result from, the proposed action and are later in time, but are still reasonably certain to occur. The effects of the action include the direct and indirect effects on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action. These effects are considered along with the environmental baseline and the predicted cumulative effects to determine the overall effects to the species [50 CFR §402.02]. Additional descriptive information of the types of effects that typically occur as a result of bridge program projects is provided in the Tier I PBO on pages 50 to 59.

Direct Effects

Based on our analysis of the information provided in the Tier 2 BA, we anticipate that direct adverse effects will result from the Washington Crossing Bridge project when northern riffleshell, rayed bean, clubshell, snuffbox, and rabbitsfoot are killed, injured, or harmed (via crushing, smothering, poisoning (due to elevated pH), dislodging, removing, translocation stress, and dewatering) in areas in, or near, direct streambed disturbance. Sources of adverse effects include placement of the water-filled bladders over mussel habitat, dewatering of the work site, removal of substrate, side-slope failure of substrate disturbed but not physically removed, minor backwater/siltation, scour around the cofferdams, water quality alteration (*e.g.*, elevated pH from freshly poured concrete), and siltation downstream of the project when the cofferdams are drained and removed.

During construction, the stream diversion and cofferdams at the upstream end of the project area and around piers 2 and 3 may result in increases the river stage during higher flows. Localized backwater effects can facilitate silt deposition upstream and streambed scour downstream. Localized scour and redisposition that can occur near the cofferdams may result in substrate movement that mussels are not able to tolerate. The streambed material and any endangered mussels that are dislodged and re-deposited downstream where water velocity decreases, may be smothered when sediments settle out. Those mussels not killed or injured during this process may still be killed or harmed through suffocation; gill clogging; or increased predation as a result

of increased exposure, if they are unable to right themselves and re-burrow into suitable habitat downstream.

According to the Amended Tier 2 BA (Appendix D, sent via email August 11, 2014), the water-filled diversion and cofferdams will be deflated slowly, in a controlled manner directly into French Creek. As the cofferdams will have been in place for about one month, siltation in the backwater areas may build up. When the water-filled cofferdams are removed, the back water will once again be restored to a free-flowing condition, potentially carrying accumulated silt with it. Mussel injury or mortality may occur from discharge for this accumulated silt through 1) suffocation, 2) gill-clogging, 3) malnutrition (if mussels stop filtering), or stress-induced glochidia abortion.

The extent of adverse effects will depend on river flows and silt load in disturbed substrate when the action occurs. Equipment is at risk of flooding or sinking during high flow events if the water-filled cofferdams that protect them are overtopped, unless precautions are taken to avoid this. Further, construction materials and equipment may affect mussels if the equipment is washed into the river and is either physically transported downstream by currents, or if toxic materials, such as fuel or hydraulic fluids, spill into the river. Such spills could directly or indirectly affect endangered mussels, resulting in take. Toxic spills can be anticipated if construction equipment (*i.e.* excavator) or work sites are flooded or become compromised. As a best management practice, PennDOT and FHWA committed to implement a pollution protection plan that details strict implementation of siltation and erosion measures, off-site storage of toxic materials, and construction crew education to reduce the risk of accidental or unintended catastrophic events (PBA, page 68). Although there appears to be a relatively low population density of endangered mussels in the action area, such an event would increase the amount of take and expand the area in which endangered mussels are killed, harmed, or harassed.

High water events when the water-filled cofferdam coffers are in place would substantially increase backwater upstream, which would increase flow in the western back channel. Because northern riffleshell are more abundant in the back channel, increased water volume and velocity will increase the risk of scour throughout the side channel and may dislodge or bury (smother) adult and juvenile northern riffleshell and erode the species habitat, resulting in harm.

As filter feeders on microscopic food items, the northern riffleshell, rayed bean, clubshell, snuffbox, and rabbitsfoot are very susceptible to smothering by silt and other sediments in the water. Siltation also may result in reduced dissolved oxygen and increased organic material at the substrate level. At sublethal levels, silt interferes with feeding and metabolism in general. Because the clubshell typically burrows completely beneath the substrate, and rayed bean are small, and tend to occupy habitat along the stream margin or other flow refugia, these species may be particularly susceptible to siltation, which clogs the substrate interstices and suffocates the animal.

Mussels will be smothered, buried, or have their gills clogged from project-related silt and other sediments. The extent of the silt plume will depend upon background silt load during the bridge repair, water velocity, and particle size. Silt plumes during construction and removal of the water-filled cofferdams may extend out of the areas of direct streambed disturbance. The

estimated area of incidental take for the Washington Crossing Bridge project extends 90 meters (295 feet) upstream and 150 meters (492 feet) downstream of the existing bridge, to encompass the section of the river and adjacent riverbanks where the anticipated scour protection repair will occur.

Within the silt plume, mortality, injury, or stress to mussels is expected from siltation and other types of sedimentation caused by in-stream construction (*i.e.*, backwater siltation effects from water-filled cofferdam diversions and coffers, and stream adjustments/hydraulic modifications as the stream establishes equilibrium post-construction), site restoration post-construction (*i.e.*, siltation, water quality effects, and scour when the water-filled cofferdams are removed, and dissemination of the water filling the water-filled cofferdams), and streambank construction (*i.e.*, staging areas, and access road re-construction). Implementation of erosion and sedimentation control practices are critical to minimize these sources of sediment.

Water quality is necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages. As sedentary creatures, mussels may be especially vulnerable to pH increases (from newly poured "green concrete") and reduced dissolved oxygen (from dispersion of anoxic water from the water-filled cofferdams once work is completed), as they cannot move quickly to refugia and stay out of harm's way. Mussels may become stressed, injured or killed when degraded water passes over them.

Indirect Effects

Indirect effects resulting from Washington Crossing Bridge project are similar to those described in the PBO and include injury resulting from altered hydrology, siltation, and scour as the stream reaches equilibrium after the construction is completed.

Critical Habitat

The proposed project may affect, and is likely to adversely affect proposed rabbitsfoot critical habitat within the action area during construction, due to the instream water-filled cofferdams and substrate excavation, and following construction until the streambed achieves a new equilibrium with the repaired structures. This equilibrium will likely occur following several bank-full flow events.

The effect of the Bridge Program on proposed rabbitsfoot critical habitat was not considered in the Programmatic Biological Assessment (PBA). The effects of the project in proposed rabbitsfoot critical habitat were assessed by PennDOT and FHWA in the Tier 2 BA and concluded that the project may affect proposed rabbitsfoot critical habitat, and is likely to adversely affect it, but would not likely result in destruction or adverse modification. Adverse Modification is direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical. Our analysis includes assessing how the action affects the primary constituent elements (PCEs) or other pertinent habitat features, and how such

effects on the PCEs will affect the survival and recovery of rabbitsfoot. The PCE's of rabbitsfoot critical habitat are detailed above.

1) *Will the proposed action temporarily or permanently alter geomorphic stability of French Creek in a manner that reduces the habitat function to support a diversity of freshwater mussels and native fish?*

   The change of the flow patterns around the existing bridge piers are likely to result in long-term effects, as French Creek flow patterns adjust to the presence of the new sub-structure around each pier base. We anticipate that shifts in habitat locations of suitable habitat will occur, but that streambed will achieve a new equilibrium over time and that the overall amount and quality of proposed rabbitsfoot critical habitat will then be similar to the existing condition.

2) *Will the proposed action temporarily or permanently alter the hydrologic flow regime necessary to maintain (1) benthic habitats where rabbitsfoot are found; (2) connectivity of rivers with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussels' and fish hosts' habitat and food availability; (3) spawning habitat for native fishes; and (4) the ability for newly transformed juveniles to settle and become established in their habitats?*

   The water-filled cofferdam installation sites together with the dewatered work site across much of French Creek will result in a temporary alteration of flow in the action area as a consequence of upstream backwater and increased water velocity between the water-filled cofferdam coffer and diversion sections. During the relatively short period of time during which the work platforms will be in place (approximately 2-3 days for the water-filled cofferdam diversion, and up to 30 days for the water-filled cofferdam coffers), there will likely be some substrate scouring within several feet of the in-stream water-filled cofferdams during high flows, due to increased water velocities. The material will be deposited downstream when water velocity decreases.

   A long-term reduction in habitat quality may occur within the footprint of the work site, in the water-filled cofferdam interior, as the material near the existing piers will be excavated and replaced with concrete. The presence of additional concrete rather than native bed materials within the proposed critical habitat may reduce the quality and availability of habitat post-project. Scouring may also result in subtle changes in area hydrology, as channels are formed in the river bottom, and substrate composition is altered.

3) *Will the proposed action degrade water or sediment quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all mussel life stages?*

   Habitat degradation in the form of water quality impairment may also occur. There is the potential for elevated water pH, if the proposed concrete installation at the pier bases does not cure properly or is subjected to high water events before completely curing,

though the potential for this will be greatly reduced by doing work in the dry, and monitoring the pH levels within the action area. Treatment of the water from areas that contains "green concrete" is proposed, but not detailed, in the Tier 2 BA.

Instream areas may be adversely affected by equipment refueling and maintenance activities within the work area, especially if there is an accidental spill. This can be alleviated by preparing and implementing a Pollution Prevention Plan.

Mussels within the action area may be affected by silt and anoxic water, once the water-filled cofferdams are emptied, after the 30-day construction period. The quality of water in the water-filled cofferdams greatly depends on the water source used to fill them, the duration of the water within the water-filled cofferdams, temperatures of the contained water, methods used to "deflate" the water-filled cofferdams, and sedimentation and erosion controls used to empty the bags of their water load once construction is completed. Proper implementation of erosion and sedimentation controls, coupled with slow releases of the contained water (perhaps through filter bags) could minimize some of these effects. However, installation and removal of the water-filled cofferdams have not been detailed in the Tier 2 BA.

4) *Will the proposed action preclude presence or reduce abundance of fish hosts (currently unknown) necessary for recruitment of the rabbitsfoot?*

   Habitat for fish species that serve as hosts for rabbitsfoot glochidia, could be 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 modify host fish behavior, travel patterns, or habitat use. These effects are expected to be short-term and localized in extent, and largely limited to the period of instream construction. Like the habitat modification described above, the amount and quality of fish habitat is likely to return as the stream channel shifts in response to the presence of the new structures.

5) *Will the proposed action introduce or increase abundance of competitive or predaceous invasive (nonnative) species, to levels that effect the survival of rabbitsfoot?*

   In the PBA and Tier 2 BA, PennDOT and FHWA committed to disinfect and inspect all vehicles and equipment for zebra mussels and other potential invasive or exotic species before entering French Creek, and to provide evidence that this has been done following accepted protocols (BA, page 17). We do not anticipate any long-term habitat alteration will occur that would make proposed critical habitat more conducive to invasive species that could reduce the amount or quality of habitat for survival of rabbitsfoot.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local, or private actions, not involving a Federal action, that are reasonably certain to occur in the action area considered in this biological opinion. Future federal and non-federal actions that are reasonably certain to

occur, but 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. Cumulative effects are described on page 61 of the Tier 1 PBO, and are hereby incorporated by reference.

The Washington Crossing Bridge is in a residential/commercial/industrial area in a rural setting in Franklin Borough. While a variety of activities are likely to occur in such a setting, we are not aware of specific actions that are likely to occur and that would adversely affect the species in the action area, beyond the section 7 action considered in this opinion.

Conclusion

Table 6-1 in the Tier 2 BA outlines the proposed disturbance areas by activity type. Due to the larger footprint of the water-filled cofferdams (versus traditional cofferdams), the project design exceeds the level of streambed disturbance considered in the PBO for this bridge. The programmatic Tier 1 biological assessment estimated that, without avoidance and minimization measures, the Washington Crossing Bridge project would result in a total disturbance area of up to 425m^2 (4,574.7 ft^2). The Tier 2 BA indicated that the total direct disturbance area now proposed (including water-filled cofferdams, diversion structure, and dewatered worksite area) is 2,786 m^2, greatly exceeding the pre-minimization estimate. However, the 2010 survey indicates that mussel populations within action area are less than those considered in the PBO; therefore, the estimated level of take is less than, or comparable, to that considered in the PBO.

After reviewing the size and scope of the proposed project; the environmental baseline; the overall status of the northern riffleshell, rayed bean, clubshell, snuffbox, and rabbitsfoot mussels; the effects of the action; and the cumulative effects, we conclude that the Washington Crossing Road Bridge rehabilitition project *may affect, and is likely to adversely affect* the northern riffleshell, rayed bean, clubshell, snuffbox, and rabbitsfoot mussels. The effects of the action will not result in adverse effects that are beyond those that were considered in the Service's PBO for northern riffleshell, rayed bean, clubshell, snuffbox, rabbitsfoot mussels.

This project has not resulted in a jeopardy determination because: (1) the project-specific level of anticipated take is less than that considered in the PBO for northern riffleshell, rayed bean, and snuffbox; (2) the Federal Highway Administration and PennDOT will implement conservation measures to maintain water quality and minimize adverse effects to mussel habitat; (3) the Federal Highway Administration and PennDOT will implement a mussel salvage to reduce the number of mussels directly killed or injured in the action ara; (4) the project design incorporates avoidance and minimization measures that increase the likelihood that endangered mussels will be able to recolonize the area once the project is completed.

The Washington Crossing Bridge project is also likely to adversely affect proposed rabbitsfoot critical habitat during construction, and, for a period of time afterward until a new stream channel equilibrium is established. We anticipate that these changes will be temporary because a comparable area of suitable rabbitsfoot habitat will become reestablished following several high (*e.g.*, bank full) channel-shaping flow events. Therefore, after reviewing the current status of rabbitsfoot, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's conference opinion that the Washington Crossing

Bridge rehabilitation project, as proposed, is not likely to destroy or adversely modify proposed critical habitat for rabbitsfoot.

Summary of Effect Determinations

Species	**Listing Status**	**FHWA Effect Determination (FWS concurrence)**
Pleurobema clava (clubshell)	Federal and State Endangered	May Effect, Likely to Adversely Affect (FWS concurs)
Epioblasma torulosa rangiana (northern riffleshell)	Federal and State Endangered	May Effect, Likely to Adversely Affect (FWS concurs)
Villosa fabalis (rayed bean)	Federal and State Endangered	May Effect, Likely to Adversely Affect (FWS concurs)
Epioblasma triquetra (snuffbox)	Federal and State Endangered	May Effect, Likely to Adversely Affect (FWS concurs)
Quadrula cylindrica cylindrica (rabbitsfoot)	State Endangered and Federal Threatened, and Proposed Critical Habitat	May Effect, Likely to Adversely Affect (FWS concurs) **Critical Habitat:** May Affect, Likely to Adversely Affect; not likely to destroy or adversely modify (FWS concurs)

Incidental Take Statement

This "Tier 2" biological opinion is based on potential adverse effects to the northern riffleshell and rayed bean, clubshell, snuffbox and rabbitsfoot (and rabbitsfoot proposed critical habitat) mussels during scour protection repairs of the Washington Crossing Bridge over French Creek. This "Tier 2" BO identifies the incidental take anticipated due to implementation of this Management Unit 1 bridge repair project with the incorporation of measures to minimize take. The cumulative total incidental take resulting from Bridge Program actions to the date of this Tier 2 BO is included in Appendix A.

Construction related to the scour protection repair of the Washington Crossing Bridge will occur between 2014 and 2018, and may result in take of northern riffleshell, rayed bean, clubshell, snuffbox, and rabbitsfoot mussels. Species abundance estimates from the 2010 mussel survey are not reliable for estimating take due to the patchy distribution of the populations of listed species and the very low number of mussels encountered. This appears to have been exacerbated by the marginal sampling conditions (*e.g.*, relatively high stream discharge) when the survey was completed. The approach taken in the PBO, uses the best available commercial and scientific

information at the time to estimate incidental take of endangered and threatened species as measured indirectly based on the area of direct streambed habitat disturbed (m^2 of area) and the predicted population density of each species in the PBO. This estimate appears too significantly over-estimate take, especially of rayed bean and northern riffleshell, compared to the Phase 1 (qualitative sampling) results that found relatively few of either species in the area of direct disturbance. In the Tier 2 BA, the project proponents propose to use the number of each species detected in Phase 1 cells, and an assumed twenty percent detection rate, to calculate likely abundance in each Phase 1 survey cell in the project area. The detection rate of various species likely varies throughout the year due to mussel size related to age or adult size, vertically migration in the substrate, and habitat factors such as water clarity, benthic periphyton cover, substrate particle size, etc. Juvenile mussels and mussels species with a small adult size, such as rayed bean, are particularly challenging to locate.

At the Hulton Bridge over the Allegheny River, Allegheny County, Pennsylvania a comparison of qualitative and quantitative mussel survey results suggested a ten percent detection rate based on the general failure to detect another small mussel species, the fawnsfoot (*Truncilla donaciformis*; EnviroScience 2008). The search conditions are very different at the Hulton Bridge and Washingtons Crossing; however, the stream discharge and substrate present in French Creek during June 2010 substantially limited the survey area and also likely reduced detection rate during the Phase 1 survey. Applying an assumed ten percent detection rate at Washingtons Crossing results in an mean population abundance estimate in the main channel of French Creek, within the area of direct streambed disturbance, of 0.05 northern riffleshell (36 northern riffleshell with a ten percent detection rate indicates 360 individuals are present in the 7,200 square meter search area). The lowest number of an individual species (including rayed bean) found during Phase 1 sampling was one, which at the assumed detection rate of ten percent, suggests that 10 may be present in the 7,200 square meter area for an overall population density of 0.001 per square meter. However, a single rayed bean was detected in Phase 2 sampling of 72 quadrats, resulting in an abundance estimate of $0.05/m^2$. To calculate take, we estimated abundance of 0.05 northern riffleshell and rayed bean per square meter of substrate and less than 0.001 per square meter for clubshell, snuffbox and rabbitsfoot, which may be in the project area, albeit at an abundance less than what was likely to be detected with the survey effort extended.

Table 1a. Northern riffleshell incidental take estimates for the Washington Crossing Bridge (S.R. 62) Scour Protection Repair Project, Venango County, PA.

Area Within Which Take Will Occur	Type of Take	Estimated mean population density	Number of Northern Riffleshell
Area of directly disturbed mussel habitat: 2,786 m^2. Includes water-filled cofferdam installation – both temporary diversion and coffers (1,490 m^2) dewatering construction site (1,296 m^2).	Northern riffleshell killed, harmed or harassed by crushing smothering, dislodging during construction after an effective (70 percent) salvage effort	0.05 Northern riffleshell/m^2	42[1]
Total incidental take: Area exposed to backwater effects, sedimentation and siltation during construction and water-filled cofferdam removal, scour during and following construction, altered hydrology (90-m upstream, 180-m downstream, 67.5-m wide); 18,225 m^2	Northern riffleshell harmed or harassed during construction and post-construction	0.05 Northern riffleshell/m^2	911[2]
The number of northern riffleshell salvaged assuming a 70 percent efficiency during the mussel salvage	Animals harassed during salvage and relocation	0.05 Northern riffleshell/m^2	97[3]

[1] Direct effects: 2,786 m^2 (direct habitat disturbance) x 0.05 northern riffleshell/m^2 x 0.3 (70% salvage efficiency) = 42 northern riffleshell (rounded to nearest whole animal)

[2] 18,225m^2 x 0.05 northern riffleshell/m^2 = 911 northern riffleshell (rounded to nearest whole animal)

[3] 2,366 m^2 (direct habitat disturbance total – area for the temporary diversion water-filled cofferdam) x 0.05 northern riffleshell/m^2 x 0.7 (70 % salvage efficiency) = 97 (rounded to nearest whole animal)

Table 1b. Rayed bean incidental take estimates for the Washington Crossing Bridge (S.R. 62) Scour Protection Repair Project, Venango County, PA.

Area Within Which Take Will Occur	Type of Take	Estimated mean population density	Number of Rayed Bean
Area of directly disturbed mussel habitat 2,786 m^2. Includes water-filled cofferdam installation – both temporary diversion and coffers (1,490 m^2) and dewatering construction site (1,296 m^2).	Rayed bean killed, harmed or harassed by crushing, smothering, dislodging or removal for translocating during construction.	0.05 rayed bean/m^2	42[1]
Total incidental take: Area exposed to backwater effects, sedimentation and siltation during construction and water-filled cofferdam removal, scour during and following construction, altered hydrology (90-m upstream, 180-m downstream, 67.5-m wide); 18,225 m^2	Rayed bean harmed or harassed during construction and post-construction	0.05 rayed bean/m^2	911[2]
The number of rayed bean salvaged assuming a 70 percent efficiency during the mussel salvage	Animals harassed during salvage and relocation	0.05 rayed bean/m^2	97[3]

[1] Direct effects: 2,786 m^2 (direct habitat disturbance) x 0.05 rayed bean/m^2 x 0.3 (70% salvage efficiency) = 42 rayed bean (rounded to nearest whole animal)

[2] 18,225m^2 x 0.05 rayed bean/m^2 = 911 rayed bean (rounded to nearest whole animal)

[3] 2,366 m^2 (direct habitat disturbance total – area for the temporary diversion water-filled cofferdam) x 0.05 rayed bean/m^2 x 0.7 (70 % salvage efficiency) = 97 (rounded to nearest whole animal)

Table 1c. Clubshell incidental take estimates for the Washington Crossing Bridge (S.R. 62) Scour Protection Repair Project, Venango County, PA.

Area Within Which Take Will Occur	Type of Take	Estimated mean population density	Number of Clubshell
Area of directly disturbed mussel habitat 2,786 m^2. Includes water-filled cofferdam installation – both temporary diversion and coffers (1,490 m^2) and dewatering construction site (1,296 m^2).	Clubshell killed, harmed or harassed by crushing smothering, or dislodging during construction.	≥0.001 clubshell/m^2	1[1]
Total incidental take: Area exposed to backwater effects, sedimentation and siltation during construction and water-filled cofferdam removal, scour during and following construction, altered hydrology (90-m upstream, 180-m downstream, 67.5-m wide); 18,225 m^2	Clubshell harmed or harassed during construction and post-construction	≥0.001 clubshell/m^2	18[2]
The number of clubshell salvaged assuming a 70 percent efficiency during the mussel salvage	Animals harassed during salvage and relocation	≥0.001 clubshell/m^2	2[3]

[1] Direct effects: 2,786 m^2 (direct habitat disturbance) x 0.001 clubshell/m^2 x 0.3 (70% salvage efficiency) = 1 clubshell (rounded to nearest whole animal)

[2] 18,225m^2 x 0.001 clubshell/m^2 = 18 clubshell (rounded to nearest whole animal)

[3] 2,366 m^2 (direct habitat disturbance total – area for the temporary diversion water-filled cofferdam) x 0.001 clubshell/m^2 x 0.7 (70 % salvage efficiency) = 2 (rounded to nearest whole animal)

Table 1d. Snuffbox incidental take estimates for the Washington Crossing Bridge (S.R. 62) Scour Protection Repair Project, Venango County, PA.

Area Within Which Take Will Occur	**Type of Take**	**Estimated mean population density**	**Number of Snuffbox**
Area of directly disturbed mussel habitat 2,786 m^2. Includes water-filled cofferdam installation – both temporary diversion and coffers (1,490 m^2) and dewatering construction site (1,296 m^2).	Snuffbox killed, harmed or harassed by crushing smothering, or dislodging during construction.	≥0.001 snuffbox/m^2	1[1]
Total incidental take: Area exposed to backwater effects, sedimentation and siltation during construction and water-filled cofferdam removal, scour during and following construction, altered hydrology (90-m upstream, 180-m downstream, 67.5-m wide); 18,225 m^2	Snuffbox harmed or harassed during construction and post-construction	≥0.001 snuffbox/m^2	18[2]
The number of snuffbox salvaged assuming a 70 percent efficiency during the mussel salvage	Animals harassed during salvage and relocation	≥0.001 snuffbox/m^2	2[3]
Total Incidental Take			

[1] Direct effects: 2,786 m^2 (direct habitat disturbance) x 0.001 snuffbox/m^2 x 0.3 (70% salvage efficiency) = 1 snuffbox (rounded to nearest whole animal)

[2] 18,225m^2 x 0.001 snuffbox/m^2 = 18 snuffbox (rounded to nearest whole animal)

[3] 2,366 m^2 (direct habitat disturbance total – area for the temporary diversion water-filled cofferdam) x 0.001 snuffbox/m^2 x 0.7 (70 % salvage efficiency) = 2 snuffbox (rounded to nearest whole animal)

Table 1e. Rabbitsfoot incidental take estimates for the Washington Crossing Bridge (S.R. 62) Scour Protection Repair Project, Venango County, PA.

Area Within Which Take Will Occur	Type of Take	Estimated mean population density	Number of Rabbitsfoot
Area of directly disturbed mussel habitat 2,786 m^2. Includes water-filled cofferdam installation – both temporary diversion and coffers (1,490 m^2) and dewatering construction site (1,296 m^2).	Rabbitsfoot killed, harmed or harassed by crushing smothering, or dislodging during construction.	≥0.001 rabbitsfoot/m^2	1[1]
Total incidental take: Area exposed to backwater effects, sedimentation and siltation during construction and water-filled cofferdam removal, scour during and following construction, altered hydrology (90-m upstream, 180-m downstream, 67.5-m wide); 18,225 m^2	Rabbitsfoot harmed or harassed during construction and post-construction	≥0.001 rabbitsfoot/m^2	18[2]
The number of rabbitsfoot salvaged assuming a 70 percent efficiency during the mussel salvage	Animals harassed during salvage and relocation	≥0.001 rabbitsfoot/m^2	2[3]

[1] Direct effects: 2,786 m^2 (direct habitat disturbance) x 0.001 rabbitsfoot/m^2 x 0.3 (70% salvage efficiency) = 1 rabbitsfoot (rounded to nearest whole animal)

[2] 18,225m^2 x 0.001 rabbitsfoot/m^2 = 18 rabbitsfoot (rounded to nearest whole animal)

[3] 2,366 m^2 (direct habitat disturbance total – area for the temporary diversion water-filled cofferdam) x 0.001 rabbitsfoot/m^2 x 0.7 (70 % salvage efficiency) = 2 rabbitsfoot (rounded to nearest whole animal)

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of northern riffleshell, clubshell, rayed bean, and rabbitsfoot.

1. Implement project-specific avoidance, minimization, and conservation measures described in the Tier 2 BA (pages 10 to 11, and 15-21) and all Reasonable and Prudent Measures and Terms and Conditions detailed in the PBO and applicable Management Unit 1, Tier 2 actions.

2. Develop and implement a study to test the effects (lethal or otherwise) of the water-filled cofferdams on resident mussels within the area occupied by the temporary water filled diversion dam.

3. Monitor weather and river stages, and remove any hazardous materials from the river and the floodplain in the event that flooding is expected.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Federal Highway Administration, U.S. Army Corps of Engineers, Pennsylvania Department of Transportation, and their contractors, must comply with the following terms and conditions, which implement the reasonable and prudent measures described above, and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. Develop a pollution prevention plan and an erosion and sedimentation control plan that detail strict implementation of siltation and erosion measures, off-site storage of toxic materials, contingency plans for unintended catastrophic events, and construction crew education.

    a. The erosion and sedimentation control plan will address all sources of project-related erosion and sedimentation, including construction access roads, roadway approaches, staging areas, pier work sites, etc.

        i. Install and implement a duel filter bag system (one on-line, and one spare on site as a contingency, or two in parallel). The filter bag will be installed on a level area in the site indicated in the Tier 2 BA, and surrounded by a compost filter sock in such a manner that filtered water is allowed to seep back into the stream in an area that is downstream of the work.

        ii. A second filter bag system will be installed on the system used to treat water containing green concrete (dependent upon treatment system proposed).

iii. All excavated materials from the project will be stored or disposed of in a predetermined, confined, upland site and precluded from re-entry into any aquatic resource.

iv. After pier scour repairs are completed, backfill area with natural streambed material (reserved from the excavation) to conform to the surrounding bed elevations. Contractors will expedite all restoration efforts directly after construction to reduce run-off into aquatic areas downstream.

b. The pollution prevention plan will based on the most effective prevention and remediation practices to prevent hazardous materials (e.g., petroleum products, solvents, paints, alkaline water, etc.) from entering the French Creek or contaminating soils or waters within the watershed. Such measures will include, but are limited to, stationing of emergency response equipment at the project site, and designation of contained fueling and fuel storage areas away from the river and monitoring pH during concrete pours.

i. Implement pH monitoring and contingency plan as proposed in Appendix D of the Tier 2 BA.

1. Maintain at least one (1) backup functional pH meter at the physical work site. Concrete pours may not commence on any day there is not a minimum of two (2) functional pH meters on site.

2. Application of wet concrete shall cease if pH levels rise above 8.5 in the monitoring area outside of the cofferdams.

a. If pH remains at 8.5 for 30 minutes after cessation or begins to decline below 8.5, operations may resume but the rate of pumping shall be reduced to prevent additional rises in pH levels.

b. If pH continues to rise above 8.5, operations shall remain suspended until pH returns to 8.5, and either remains at that level for 30 minutes or continue to decline below 8.5.

c. If pH rises above 9.0 at sampling sites outside of the cofferdam, an inspection of downstream areas extending at least 500 feet shall be performed and fish or benthic insect mortality to stress (e.g., rapid breathing, drift) will be recorded. If adverse effects are observed, the inspection shall then be extended downstream until occurrences have ceased.

3. FHWA, PennDOT, or their contractors, shall immediately notify the Service if any aquatic life "kill" is observed.

4. Prepare and submit a report detailing the pH levels, in 15 minute time increments at each sample location, and operational adjustments that occur during the project within 30 days of completion of the project.

5. Stream monitoring will continue up to three hours after the water-filled cofferdams are deflated.

c. The pollution prevention plan and an erosion and sedimentation control plan will be made available to the Service at least 60 days prior to the start of construction to ensure that the risk of take is consistent with that considered in the PBO and this Tier 2 BO.

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

   ii. If a spill or siltation event does occur in French Creek, all construction must cease until emergency remediation procedures are implemented to contain the spill, and consultation (including a revised biological opinion) is completed.

d. Ensure that all contractors are aware of the significant consequences of deviating from full implementation of all measures to avoid and minimize adverse effects, as detailed in the opinion. Of particular importance to contractors are those measures designed to prevent the release of petroleum products, concrete leachates (elevates pH), or other hazardous substances and to ensure the appropriate installation and maintenance of erosion and sediment control measures.

2. To minimize take of endangered mussels in areas of that will be directly affected by bridge repairs, conduct a salvage effort in the summer/fall season (i.e., July thru September) prior to initiation of construction to locate mussels visible on the substrate surface. We anticipate that the level of effort necessary to accomplish the salvage operation will be two teams of divers (two divers per team) conducting the salvage for three to five days.

   a. The salvage will be conducted in the areas of that will be directly affected by water-filled cofferdams and dewater area, except in scoured areas that are hazardous to divers.

      i. Develop and implement a plan for mussel salvage from the salvage areas. 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 and holding 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 instream salvage activities.

ii. 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 instream reference marking shall be done for the purposes of defining the salvage area prior to the construction season.

iii. 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 area via diving, wading, and/or snorkeling, as appropriate. All mussel identifications will be done by a Service-approved biologist.

iv. Personnel conducting the salvage and holding of endangered or threatened species 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.

v. The salvaged mussels will be relocated to a site in the Elk River, Queen Shoals, West Virginia, or an alternate Service approved site

vi. A report documenting the salvage 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, and transporting mussels; and proposed husbandry conditions and methods of the holding facility. The results section should include the total number of individuals of each mussel species collected; date collected; water and air temperatures; river stage; total number of live and dead endangered or threatened species collected; data regarding non endangered mussels; and

maps or figures showing project features (cofferdams or other access) and salvage area.

b. At least one monitoring event, three years following the mussel relocation, will be completed to determine the health and status of the translocated mussels (Tier 2 BA, Page 10).

   i. Provide the Service with the salvage monitoring plan for concurrence and approval at least 60 days before the proposed monitoring event.

   ii. Provide a monitoring report to the Service documenting the status and health of the relocated mussels.

3. Develop and implement an appropriate plan for monitoring the water-filled cofferdams (including silt control measures, rates of water releases, and location of water releases) to evaluate the effect of the alternate cofferdam design proposed on *in situ* mussels in an area excluded from the mussel salvage operation.

   a. Provide the Service with the cofferdam monitoring plan for concurrence and approval at least 60 days before the proposed mussel salvage.

4. FHWA, PennDOT, or their contractor, will maintain a daily written log of weather and river stage (utilizing the U.S. Geological Survey stream gage for the Allegheny River, gage 0302550 – Franklin, PA and French Creek gage 03024000 - Utica, PA), and will immediately stabilize the work area and remove any hazardous materials from the river and the floodplain in the event that flooding is expected.

   a. As proposed, all instream work will be done during low flow conditions in August and September.

   b. The weather and river stage-monitoring log must be made available to the Service upon request and a copy provided to the Service when the project is complete.

   c. Contractors will remove any hazardous materials from the river and the floodplain in the event that flooding is expected.

   d. In the event of a flow event that overtops the causeway, FHWA and PennDOT will immediately initiate discussions with the Service to evaluate the consequences of the flood and determine if reinitiation of this consultation is required.

5. If the instream portion of the project is not completed by 2018, FWHA shall reinitiate section 7 consultation to re-evaluate project impacts on the northern riffleshell, rayed

bean, clubshell, snuffbox, and rabbitsfoot and to determine the appropriateness of the reasonable and prudent measures contained in this biological opinion.

6. The 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.

   Endangered or threatened species 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.

7. Notification must be made to the following Fish and Wildlife Service offices at least two weeks prior to beginning instream salvage activities.

   - Region 5 Division of Law Enforcement; 300 Westgate Center Drive, Hadley, MA 01035 9589 (telephone: 413 253 8343).

   - State College, Pennsylvania Field Office (Attn: Endangered Species Specialist); 315 South Allen Street, Suite 322, State College, PA 16801 (telephone: 814 234 4090).

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures, we believe that no more than 139 northern riffleshells, 139 rayed bean, and less than three each of clubshell, snuffbox, and rabbitsfoot will be incidentally taken due to the direct effects of the project. Larger numbers of these five species may be taken (*i.e.*. harm and harass) due to indirect effects as indicted in Table 1 (a – e). However, take due to indirect effects is expected to be nonlethal if the proposed avoidance and minimization measures are implemented, along with the above Reasonable and Prudent Measures and Terms and Conditions. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the Service's Pennsylvania Field Office the need for possible modification of the reasonable and prudent measures.

Reinitiation Notice

In accordance with our amended December 13, 2013, biological opinion, incidental take that occurs as a result of this and other Bridge Program projects cannot exceed the annual or cumulative incidental take levels established in the programmatic biological opinion. If implementation of any project or projects is anticipated to exceed these take levels, further consultation will be necessary. To ensure that incidental take is not exceeded, annual reports should be provided to this office tabulating the amount of incidental take (as it occurs) on projects being implemented throughout the programmatic action area.

Should new information reveal that the agency action may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; or 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 a new species is listed or critical habitat is designated that may be affected by the action; or the amount or extent of take as identified in Appendix A is exceeded, reinitiation of formal consultation as outlined in 50 CFR 402.16 is required.

If rabbitsfoot critical habitat is designated, you may ask the Service to confirm the conference opinion portion of this document as a biological opinion. The request must be in writing. If the Service reviews the proposed action and finds that there have been no significant changes in the action as planned, or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion on the project and no further section 7 consultation will be necessary. After designation of critical habitat and any subsequent adoption of this conference opinion, the Federal Highway Administration shall request reinitiation of consultation if: (1) new information reveals the agency action may affect critical habitat in a manner or to an extent not considered in this conference opinion; or (2) the agency action is subsequently modified in a manner that causes an effect to critical habitat that was not considered in this conference opinion.

Should new information reveal that the agency action may affect listed species in a manner or to an extent not considered in this opinion; or 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 a new species is listed or critical habitat is designated that may be affected by the action; or the amount or extent of take as identified in the above incidental take statement or Appendix A, is exceeded, reinitiation of formal consultation as outlined in 50 CFR 402.16 is required.

If you have any questions regarding this matter, please contact Jennifer Kagel of this office at 814-234-4090.

Sincerely,

For Lora Zimmerman
Field Office Supervisor

cc:
PFBC – Urban, Allison
PennDOT – District 1-0 – Kelley
COE – Pittsburgh - Edris
DEP – NWRO – Supel

Literature Cited

EnviroScience. 2008. Freshwater Mussel Survey in the Allegheny Rier at the Hulton Road Bridge (S.R. 2082, Section A08) in Harmar Township and Oakmont Borough, Allegheny County, Pennsylvania. Report prepared for PA Department of Transportation – District 11-0. 11 pages plus figures, tables and appendices.

EnviroScience. 2011. Freshwater Mussel Survey of French Creek (Venango County, Pennsylvania) at the Washington Crossing (Route 62) Bridge. Report prepared for PA Department of Transportation – District 1-0. 11 pages plus appendices.

Federal Highways Administration. 2014. Programmatic Tier II Biological Assessment: Washington Crossing S.R. 0062, B08, Pier 2 and 3 Scour Protection Project Over French Creek, Venango County, Pennsylvania. PA Department of Transportation – District 1-0. 24 pages plus Appendices.

Federal Highways Administration. 2014. Amendment to the Programmatic Tier II Biological Assessment: Washington Crossing S.R. 0062, B08, Pier 2 and 3 Scour Protection Project Over French Creek, Venango County, Pennsylvania. PA Department of Transportation – District 1-0. Tier 1 Consultation Best Management Practices and Conservation Measures checklist, and Appendix D.

Smith, T. and Crabtree, D. Freshwater Mussel (Unionidae) and Fish Assemblage Habitat Use and Spatial Distributions in the French Creek Watershed: Reference for Western Pennsylvania Unionid Protection and Restoration. Report Funded by the U.S. Fish and Wildlife Service. 118 pp.

U.S. Fish and Wildlife Service. 2012. Proposed endangered status for the Neosho mucket, threatened status for the rabbitsfoot, and designation of critical habitat for both species. Federal Register Volume 77, No. 200, pages 63440-63536.

Appendix A

Bridge Program projects by project type and Management Unit (adapted from Appendix C of the BA). Tier 2 incidental take estimates (in parentheses and bold text) verses those considered during the program biological assessment.

County	Project Title	Project Type	MU	Density Estimates (Estimates based upon site specific survey information)				Proposed area of direct riverbed disturbance (M2)	Direct Effect Take Estimate (Estimates based upon site specific survey information)				Project Status
				Northern Riffleshell	Clubshell	Rayed bean	Snuffbox		Northern Riffleshell	Clubshell	Rayed bean	Snuffbox	
Mercer	Carlton Rd Bridge/New Lebanon over French Creek	Replacement	1	1.82 (0)	0 (0)	3.35 (2.18)	0.33 (0.08)	432 (533)	786 (1708)	4 (0)	1447 (1160)	143 (43)	Tier 2 consultation 2013
Venango	Washington Crossing (S.R. 62) over French Creek	Rehabilitation	1	2.03 (0.05)	0.001 (0.001)	3.24 (0.05)	0.16 (0.001)	425 (2,786)	862 (139)	0 (3)	1376 (139)	68 (3)	Tier 2 consultation 2013
Bridge replacement projects in MU 1 = 2 of 6				Tier 1 Estimated Incidental Take Tier 2 Estimated Incidental Take Potential salvaged Remaining Tier 1 Incidental Take considered					2475 (1,847) 951 628	252 (3) 2 250	4381 (1299) 677 3082	648 (46) 23 602	
Mercer	Race Street bridge/Greenville over Lt Shenango River	Replacement	2	0.0 (0)	0.001 (0)	0 (0)	0.080 (0.061)	234 (501+770)	0	0	0	18 (78)	Tier 2 consultation 2013
Allegheny	Hulton Road Bridge over the Allegheny River	Replacement	2	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)	0.001 (0)		11 (66)	11 (66)	11 (66)	0 (0)	Tier 2 consultation 2014

Bridge replacement projects in MU 2 = 1 of 10		Tier 1 Estimated Incidental Take Tier 2 Estimated Incidental Take Potential salvaged Remaining Tier 2 Incidental Take considered	89 (66) 0 23	126 (66) 0 60	129 (66) 0 63	339 (78) 15 276	