

BIOLOGICAL OPINION
ON THE IMPACTS OF THE
SUGARCREEK BOROUGH
PIPELINE STABILIZATION PROJECT
ON THE
NORTHERN RIFFLESHELL AND CLUBSHELL

September 17, 2002

Prepared by:

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

TABLE OF CONTENTS

CONSULTATION HISTORY.....	1
BIOLOGICAL OPINION.....	2
Description of the proposed action.....	2
Status of the species.....	5
Environmental baseline.....	10
Effects of the action.....	11
Cumulative effects.....	13
Conclusion.....	13
Incidental take statement.....	14
Amount or extent of take.....	14
Effect of the take.....	16
Reasonable and prudent measures.....	16
Terms and conditions.....	17
Conservation recommendations.....	21
REINITIATION NOTICE.....	22
LITERATURE CITED.....	23

CONSULTATION HISTORY

The history of this consultation is as follows:

- 7/13/01 The U.S. Fish and Wildlife Service receives a Pennsylvania State Programmatic General Permit, Joint Permit Evaluation Form from the U.S. Army Corps of Engineers (Corps), Pittsburgh District. The proposed project is to make emergency repairs to a sanitary sewer siphon and associated pipeline which is currently undercut and exposed. Three alternatives were proposed: rip-rap, grout bags, and concrete blocks.
- 7/17/01 The Service responds to the Corps with a Pennsylvania State Programmatic General Permit, Endangered Species Act Comment Form, that there is possible occurrence of northern riffleshell (*Epioblasma torulosa rangiana*) and clubshell (*Pleurobema clava*) in the project area and a survey should be conducted at the appropriate time of year by a qualified surveyor.
- 9/20/01 Charles Bier, a qualified mussel surveyor from the Western Pennsylvania Conservancy, completes a survey of the proposed project impact area.
- 10/1/01 Northwest Engineering (representing Sugarcreek Borough) calls Robert Anderson of the Service to discuss the critical nature of the repair project and proposed construction work.
- 11/16/01 Northwest Engineering sends letter discussing their preferred alternative (rip-rap).
- 11/27/01 The Service sends a letter acknowledging the need to complete the project immediately to ensure that winter river conditions do not cause the exposed pipe to rupture. The letter discusses emergency consultation procedures, and recommends the grout bag alternative as the preferred alternative.
- 12/23/01 Northwest Engineering sends a letter to the Corps describing the modified concrete block and concrete encasement alternative. This alternative is modified to reduce “take.”
- 1/4/02 Robert Anderson (Service) completes a memo to the file discussing a telephone conversation with Charles Bier concerning a new rip-rap design alternative proposed by Sugarcreek Borough. A message was left for the Corps indicating that if construction techniques change, then the reasonable and prudent measures could change.
- 1/9/02 The Corps issues an emergency permit with the modified concrete block alternative chosen as the method of construction.

- 1/10/02 The Pennsylvania Department of Environmental Protection issues an emergency permit authorizing the work to be completed within 90 days.
- 5/28/02 The Service calls the Corps to discuss the after-the-fact consultation and discovers the project has not yet been completed. Since the danger of winter flows has passed, the Service requests that the emergency consultation be rescinded and that the Corps enter into formal consultation immediately.
- 6/12/02 The Service receives a request from the Corps that formal consultation procedures be initiated, and expedited as much as possible to allow for the sewer line repairs to be completed during low flow conditions.
- 7/16/02 Service acknowledges receipt of the Corps' request to initiate formal consultation, indicating that the required information has been supplied, and expecting to provide the Corps with a biological opinion by October 25, 2002.
- 7/18/02 Memo to the file regarding a telephone conversation between the Corps and the Service. The Corps clarifies that they want to consult only on the concrete block alternative.
- 7/22/02 Service calls Northwest Engineering to discuss project.
- 7/23/02 Northwest Engineering sends memo documenting a July 22, 2002, telephone conversation with the Service. Issues discussed were flood frequency, modification of the siphon, mussel translocation, stream diversion, and boulder excavation.
- 9/17/02 Service issues biological opinion to the Corps.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Project Area

French Creek begins in Chautauqua County, New York, and flows for 117 miles through Crawford, Erie, Mercer, and Venango Counties in northwestern Pennsylvania, eventually entering the Allegheny River. The French Creek drainage basin encompasses approximately 1270 square miles, and provides habitat for more species of fish (70) and freshwater mussels (25) than any other stream in Pennsylvania.

The Sugarcreek Borough wastewater pipeline and siphon is located on the east bank of French Creek, approximately 1000 feet upstream of its confluence with the Allegheny River at Franklin. The river

within the project area has a designated use of “warm water fishery,” as assigned by the Pennsylvania Department of Environmental Protection.

The town of Franklin, which consists primarily of permanent residences and small businesses, is located on the west side of French Creek. The town of Rocky Grove is located on the east bank. The Borough of Sugarcreek is located several miles north of Rocky Grove. Several small islands are located close to the project site. Immediately upstream is an abandoned railroad trestle and a bridge that carries Route 62/8 over French Creek.

The proposed action area extends from approximately 20 feet upstream to 40 feet downstream of the two exposed 8-inch diameter wastewater pipelines, and approximately 30 feet riverward from the streambank. The pipelines run perpendicular to the east bank of French Creek. The action area also includes the portion of the French Creek bank proposed to be stabilized, along with associated staging and access areas for construction.

Project Description

Sugarcreek Borough is proposing to make repairs to two, 8-inch diameter wastewater pipelines and siphon carrying wastewater from Sugarcreek Borough to the City of Franklin’s wastewater collection and treatment system. The sanitary sewer siphon and pipelines are believed to have been constructed in 1938. The siphon is a 10- by 25-foot, non-mechanical concrete enclosure that forces wastewater through the pipelines through the force of air pressure. When the project was constructed, the siphon was located 40 to 60 feet from the bank of French Creek. The streambank has eroded to the point that the siphon is now located on the streambank of French Creek, and approximately 20 feet of the pipelines have been exposed and undermined. The siphon and pipelines are located approximately 100 feet downstream of the eastern end of the SR 62/8 bridge, just upstream of the confluence with the Allegheny River. Three abandoned railroad abutments are located between the bridge and the project site.

Sugarcreek Borough proposes to stabilize the exposed portion of the wastewater pipelines with concrete blocks and concrete encasement. Ten 2'x2'x6' blocks will be partially buried one foot apart perpendicular to the stream between the existing siphon intake structure and the exposed pipeline. A 30-foot-long trench will be dug to a maximum depth of three feet to “key” the concrete blocks into the stream bottom. Five 2'x2'x6' concrete blocks will be placed parallel to the pipe on the upstream side. Fourteen 2'x2'x6' concrete blocks will be placed perpendicular to the pipeline on the downstream side. The greater area of impact on the downstream side is proposed to provide greater stability from scour, and to provide a stable area for heavy equipment to work from, if needed. Revised placement of the upstream blocks reduced the area of direct impact by 54 square feet in comparison to the initial proposal. Cast-in-place concrete will be poured between the blocks to encase the pipeline. Low-permeability geotextile will be installed around the pipeline and filled with concrete.

Construction activities will be completed over the course of one week. Silt fence or jersey barriers will be installed upstream to divert the flow away from the construction activities. A backhoe will be operated from the streambank, and if needed, from the top of the concrete blocks placed downstream of the pipelines. The excavated material will be sorted, with the larger boulders being placed downstream of the concrete blocks and the remaining material being placed in a designated upland area.

Conservation Measures

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. However, such measures must minimize impacts to listed species within the action area in order to be factored into the Service's analyses.

The Corps has studied the alternatives and suggested conservation measures which have resulted in a selection that is proposed to minimize impacts to the freshwater mussel beds in the vicinity of this project.

1. Concrete blocks will be placed in the stream along the wastewater pipeline. The area of streambed to be disturbed by excavation and placement of fill shall not exceed 30 feet riverward from the bank, with a maximum width of 15 feet. Approximately 30 feet of the bank will be stabilized with concrete block.
2. The upstream block will be installed parallel to the pipelines to minimize the footprint of the direct impact area.
3. Excavation to facilitate the placement of concrete blocks will occur from the banks, or from the top of the concrete blocks, with no equipment directly in the stream.
4. All excavated material will be carefully handled, screened, and sorted, with all live mussels being immediately returned to the water. An effort must be made to document the number and species of mussels which are relocated as a result of this action.
5. Larger rocks excavated from the channel will be placed along the downstream toe of the concrete blocks to minimize additional scour and hydraulic changes in the structure. The rocks will form a sill to lessen the fall of the flow.

6. The form created by the concrete blocks will be lined with geotextile material to prevent the loss of cement fines during the pouring of concrete. As the concrete is being placed inside the form, the pump will remove the water being displaced and such water will be discharged in the wastewater siphon for treatment.
7. Additional stream and mussel surveys may be required to document that the project had minimal impact on the endangered species.

STATUS OF THE SPECIES

General Biology of Freshwater Mussels in the Family Unionidae

Freshwater mussels (unionids) are sedentary filter feeders as adults, filtering oxygen and food from the water column across their gills. The breeding season is initiated by seasonal changes, such as water temperature. Females hold unfertilized eggs in water tubes within specialized regions of the gills called marsupia. Males liberate sperm into the water and females lying downstream uptake the sperm with incoming water. The eggs are then fertilized in the water tubes within the marsupium. The fertilized eggs develop into minute bivalve larvae, or glochidia, which, in turn, develop over a period of days to months. 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).

The glochidia of most unionids are believed to be obligate parasites, with fish serving as the host organism for most species. Although many unionids are probably host-specific, the degree of host specificity and the host species for most unionid species, including the clubshell (*Pleurobema clava*) and northern riffleshell (*Epioblasma torulosa rangiana*), are unknown (U.S. Fish and Wildlife Service 1994). The following species were capable of serving as hosts under laboratory conditions (Watters 1996, 1997) for the clubshell: striped shiner (*Notropis chrysocephalus*), central stoneroller (*Campostoma anomalum*), blackside darter (*Percina maculata*), and logperch (*P. caprodes*). The same studies reported that the northern riffleshell was capable of utilizing banded darter (*Etheostoma zonale*), bluebreast darter (*E. camurum*), brown trout (*Salmo trutta*), and banded sculpin (*Cottus carolinae*). Some of these species (brown trout and banded sculpin) are not native to the Allegheny River system, while others may have habits that make them unavailable to the respective mussels species at the correct season. The host suitability studies described above did not test all of the fish species native to the Allegheny River; therefore, it is possible that additional species can be utilized by the glochidia of the clubshell and northern riffleshell.

Methods of host infestation depend on how glochidia are released. Some unionid species expel individual glochidia out the exhalant siphon. Host fishes either pass suspended glochidia over their gills during respiration where they attach, or contact settled glochidia on the substrate, where they attach to fins or skin. Other unionids have methods of luring potential host fish to the gravid female mussel through the use of lures. Lures for some species are extensions, or modifications of the female's body,

which appear to resemble prey organisms, such as a fish or insect. The gravid northern riffleshell displays a brilliant white mantle margin to attract the fish host. In other freshwater mussel species, glochidia are bound together in a mucus matrix called a conglutinate, which can mimic insect larvae or other fish prey items. The gills and mouth of the host fish become infested when fish strike at the lure or attempt to eat the conglutinate (U.S. Fish and Wildlife Service 1994).

After encysting on the host fish, the glochidia transform into juveniles. They fall from their host and burrow into the substrate or attach to larger objects. Unlike the adults, which are filter feeders, juveniles appear to be pedal feeders, sifting food items from sediments with hair-like structures (cilia) arranged on their foot.

Clubshell mussel (Pleurobema clava)

The clubshell was listed as endangered, without critical habitat, in 1993. This is a small to medium-size mussel, up to three inches long. The shell exterior is yellow to brown with bright green blotchy rays. The shell interior is typically white. The shell is wedge-shaped and solid, with a pointed, and fairly high umbo.

Historically, this species was once abundant throughout Ohio River tributaries in Illinois, Indiana, Kentucky, Michigan, Ohio, Pennsylvania, and West Virginia. It was widespread in Ohio River basin rivers such as the Ohio, Allegheny, Scioto, Kanawha, Little Kanawha, Licking, Kentucky, Wabash, White, Vermillion, Mississinewa, Tippecanoe, Tennessee, Green, and Salt Rivers. The clubshell was also located in the Maumee River basin, and tributaries of western Lake Erie such as the Huron River and the River Raisin (Stansbery *et al.* 1982). This species has declined drastically with a greater than 95 percent range reduction. The largest remaining populations are in the Allegheny River and French Creek (and some tributaries), Pennsylvania. These streams support what appear to be reproducing populations, but with generally low numbers and a discontinuous distribution (*i.e.*, within suitable habitat areas scattered over several miles).

The clubshell inhabits clean, packed or loose, coarse sand and gravel in runs, often just downstream of a riffle, in medium to small rivers and streams (Stansbery *et al.* 1982). It cannot tolerate mud or slack water conditions (U.S. Fish and Wildlife Service 1994). The clubshell typically burrows completely beneath the substrate two to four inches, apparently relying on water to percolate between the sediment particles (Watters 1990).

The clubshell has a life span of 20 years or more. It is a short-term breeder (tachytictic); *i.e.*, fertilization takes place in mid-spring and the embryos (glochidia) are discharged into the water column in mid-summer (Ortmann 1919). Many aspects of the life history of this rare mussel are not known.

Clubshell populations are presently known to occur in the following streams; however, occupied stream reaches are generally restricted to a few miles or less.

State	Stream	County	Status¹
Indiana	Tippecanoe River	Kosciusko, Fulton	Present, reproducing
Kentucky	Green River	Taylor, Green, Hart	Rare
Michigan	East Fork of the West Branch	Hillsdale	Unknown
Ohio	Fish Creek	Williams	Rare
	Little Darby Creek	Madison	Present, reproducing
	Pymatuning Creek	Ashtabula	Rare, no reproduction
	St. Joseph River	Williams	Rare
	West Branch of the St. Joseph	Williams	Present, unknown
Pennsylvania	Walhonding River	Coshocton	Rare, unknown
	Allegheny River	Clarion, Forest,	Present, reproducing
	Conneaut Outlet	Crawford	Rare
	Conneauttee Creek	Crawford	Rare, unknown
	French Creek	Crawford, Erie,	Present, reproducing
	LeBoeuf Creek	Erie	Present, reproducing
	Muddy Creek	Crawford	Rare, unknown
	Shenango River	Mercer	Rare, unknown
West Virginia	Elk River	Kanawha	Present, reproducing
	Hackers Creek	Lewis	Rare, unknown
	Meathouse Fork	Doddridge	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. The second term under status refers to reproductive status.

Northern Riffleshell (Epioblasma torulosa rangiana)

The northern riffleshell was listed as endangered, without critical habitat, in 1993. It 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.

According to Williams *et al.* (1993), the genus *Epioblasma* is among the most diverse of the Unionidae in North America, with 25 recognized taxa. This genus once ranged from the St. Lawrence River system to the Mobile River system, principally in larger rivers. All but one species in this genus is either thought to be extinct or is listed as an endangered species under the federal Endangered Species Act. The two sibling species associated with the northern riffleshell, the tubercled blossom (*E. torulosa torulosa*), and green blossom (*E. t. gubernaculum*) have not been seen alive or freshly dead in recent decades, and may be extinct.

The historical range of the northern riffleshell was somewhat similar to that of the clubshell, but with extensions further north into Michigan and Ontario tributaries of Lake Erie, Lake St. Clair, and the Detroit and St. Clair Rivers (U.S. Fish and Wildlife Service 1994). Like the clubshell, the northern riffleshell has suffered a range reduction of over 95 percent.

In 1992, a population of the northern riffleshell in the Detroit River in Michigan was found to be threatened by invasion of the exotic zebra mussel (*Dreissena polymorpha*). Divers collected 30 to 40 individuals, which were relocated to the St. Clair River in Michigan. About a dozen individuals were kept in captivity. Populations of northern riffleshell in the St. Clair and Detroit Rivers appear to have been extirpated by zebra mussels (M. DeCapita, USFWS, personal communication, 2002)

The largest remaining populations occur in the Allegheny River and in French Creek, Pennsylvania. In the Allegheny River, the subpopulations are distributed over 80 miles of river (C. Bier, WPAC, *in litt.* 6 January 1994; in U.S. Fish and Wildlife Service 1994). The species has been documented to occur in good numbers at several locations in the Allegheny River, but its distribution is discontinuous (*i.e.*, localized to areas of suitable habitat) and the condition of these populations ranges from those exhibiting successful reproduction, to those with apparently depressed vigor and a predominance of older adults.

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 species buries itself 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). From May to September, gravid females of this species expose a brilliant white mantel margin to attract host fishes. The northern riffleshell is a long-term breeder (bradyctictic), with fertilization in the late summer and glochidial release the following spring or summer (Ortmann 1919).

The present range of the northern riffleshell has been reduced to the following streams; however, occupied stream reaches are generally restricted to a few miles or less.

State	River System	County	Status ¹
Indiana/Ohio	Fish Creek	Dekalb, Williams	Rare, unknown reproductive status
Kentucky	Green River	Edmonson, Hart	Rare, unknown reproductive status
Michigan	Detroit River	Sanilac	Unknown, possibly extirpated drainages
Ohio	Big Darby Creek	Franklin, Pickaway	Rare, unknown reproductive status
Pennsylvania	Allegheny River	Clarion, Forest, Venango, Warren	Present, reproducing
	French Creek	Crawford, Erie, Mercer, Venango	Present, reproducing
West Virginia	Elk River	Kanawha	Rare, only 2 live young animals have been found in recent years

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. The second term under status refers to reproductive status.

Decline of, and Continued Threats to, the Clubshell and Northern Riffleshell

Because mussels are sedentary, long-lived, and annually have low juvenile survival rates, they are susceptible to both periodic and permanent environmental degradation. The range reductions of these mussels are attributed to physical loss of habitat and degraded water quality related primarily to water impoundments, channelization, streambank clearing, sewage, and agriculture. Impacts associated with run-off from human waste, chemical outfalls, and coal mining have also affected many tributaries.

The greatest diversity and abundance of mussels are associated with clean-swept sand and gravel substrates. Chronic increases in turbidity and suspended sediments can decrease the depth and amount of light penetration, affect primary productivity, decrease oxygen levels, increase water temperature, irritate or cause clogging of gills, and result in a blanket of silt on the substrate. Mussels may be directly affected by siltation through smothering. High turbidity may interfere with sight lures used by the northern riffleshell to 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 and habitat critical to the survival of young fish and juvenile mussels.

Pollution from municipal, agricultural, and industrial waste discharges has decreased or eliminated mussel populations directly, and indirectly through elimination of host fish species resulting in reproductive failures (U.S. Fish and Wildlife Service 1994).

The exotic and prolific zebra mussel, accidentally introduced to North America in the mid-1980's, poses a severe threat to all native mussel fauna through competition for space, food, and survival of glochidia. Presently, the zebra mussel, which was conveyed to the United States through ship ballast water from interior European ports, is abundant in the lower Great Lakes and the Ohio River, and is increasing in other portions of the range of these federally listed species. It is not known to occur in the free-flowing portion of the Allegheny River at this time. Zebra mussel populations in the French Creek basin (Edinboro Lake; French Creek at Venango) could pose a threat to unionid populations in French Creek.

ENVIRONMENTAL BASELINE

Status of the Species Within the Action Area

For the purposes of this Biological Opinion, the action area is defined as upland and streambank work areas, plus an instream area extending 30 feet riverward from the wastewater siphon, and approximately 20 feet upstream to 40 feet downstream of the wastewater pipelines.

Within the vicinity of the Sugarcreek Borough wastewater pipelines and siphon, the northern riffleshell occurs in low numbers. No living or fresh-dead clubshell mussels were found in the project area, but this species could occur in the project action area in low densities. Both species occur in low to moderate numbers and are discontinuously distributed in French Creek in Erie, Crawford, Mercer, and Venango Counties, Pennsylvania. Prior to the freshwater mussel surveys conducted in relation to this project, neither species was known to occur within the immediate project area; however, both species had been documented to occur upstream and downstream of this site in French Creek and the Allegheny River.

A mussel survey was conducted by Charles Bier of the Western Pennsylvania Conservancy at the Sugarcreek Borough wastewater pipelines and siphon site on September 20, 2001. The objectives of the survey were to determine the presence, or potential presence, of the northern riffleshell and clubshell; and to collect data to generally describe the freshwater mussel resources at the project site as to species, number, and approximate location. The second objective was never met because endangered mussels were found within the footprint of the project, and this fact was significant enough to halt the mussel survey because it was not prudent to spend time and money studying less important areas of the streambed. The survey was a qualitative survey. Survey design did not allow the collection of sufficient quantitative data to allow for an estimation of population size or density within the action area.

During the survey, two biologists conducted a three-hour survey of a 30- by 50-foot area under and adjacent to the pipeline. The survey was conducted with glass-bottom buckets where the water was three feet or less in depth. The stream in and near the action area was described as mixed riffle-run. Microhabitats varied within the survey area, largely due to the pipelines and other debris causing alteration of current, sorting of sediments, cutting, and deposition. Approximately one-third of the surveyed area was considered to be occupied habitat for northern riffleshell, with two-thirds being characterized as degraded or marginal.

Survey efforts resulted in the documentation of 41 mussels representing 11 species, including the northern riffleshell. The survey was not completed due to endangered mussel species being found within the footprint of the project. The surveyor felt it was not prudent to spend time and money surveying outside the project footprint due to documentation of endangered mussels within the footprint (*i.e.*, where the rip-rap was proposed to be placed).

Based on the survey, it appears that the project area provides moderate- to low-quality habitat for mussels based on substrate quality, flow, and species diversity. Therefore, although a quantitative mussel survey was not completed, Mr. Bier believes that the northern riffleshell exists at a relatively low density within the project area.

Factors Affecting Freshwater Mussel Environment Within the Action Area

Past and future operation of the pipelines and wastewater siphon presents an on-going threat to populations of both the northern riffleshell and clubshell in and downstream of the action area. This threat is a result of the periodic overflow of the wastewater siphon into the creek, and flood water from the creek overtopping the wastewater siphon, both of which result in untreated sewage entering French Creek. The effects of these sewer overflows on endangered mussels is dependent upon several factors, including stream flow (dilution), and the type and concentration of chemicals in the sewage.

This population is also subjected to mammalian predation, acid mine drainage, and point- and non-point source pollution in French Creek. Additionally, riverbed scour appears to be a significant factor limiting these species within the action area.

EFFECTS OF THE ACTION

It is expected that all clubshell and northern riffleshell within the 30- by 60-foot (1800 ft²) instream action area will be taken due to trenching and placement of concrete blocks and large boulders. Take (*i.e.*, death, injury, harm, harassment) is expected to occur due to suffocation, crushing, and/or displacement by these activities.

Juvenile and adult clubshell and northern riffleshell, and fishes that serve as hosts for their glochidia, could also be affected (*i.e.*, killed, injured, or stressed) by substrate disturbance (*e.g.*, scouring),

increased turbidity, sediment deposition, and introduction of petroleum products into the river. These impacts would occur during construction and use of staging areas; placement of the concrete blocks and poured concrete; trenching; placement of the jersey barriers; removal of debris; and heavy equipment operation on the bank and on the concrete block “platform” in the stream.

The extent of these impacts will depend on construction practices; river flows during construction; silt load in disturbed substrates; and the effectiveness of erosion and sedimentation control measures, and pollution prevention and remediation measures. The greatest potential for substrate scouring and deposition would occur in association with trenching and placement of concrete blocks, especially during high flows that induce riverbed movement (*i.e.*, scour). 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 downstream will be subject to the impacts (*e.g.*, gill clogging, suffocation) of sediment re-deposition.

A long-term alteration in habitat quality may occur within the action area. Water velocities during low flow periods may fall below required thresholds of these species. Conversely, currently unstable areas now highly susceptible to scour may become more suitable during low flow periods, as well as less susceptible to scour during higher flows.

As filter feeders on microscopic food items, the northern riffleshell and clubshell are very susceptible to smothering by silt and other sediments in the water (Ellis 1936, in U.S. Fish and Wildlife Service 1994). Siltation also may 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 (Aldrige *et al.* 1987, in U.S. Fish and Wildlife Service 1994). Because the clubshell typically burrows completely beneath the substrate, it is particularly susceptible to siltation, which clogs the substrate interstices and suffocates the animal.

Mussels will be smothered, buried and/or have their gills clogged from project-related silt and other sediments. Mortality, injury, and stress to mussels are expected from siltation and other types of sedimentation caused by both in-stream construction and onshore construction. This will increase the likelihood of sediment and other pollutants reaching the river. Implementation of the flow diversion (silt fence/jersey barriers) should help to minimize these sources of sediment.

Sediment and silt will also be resuspended due to project-related scouring. Silt and sediment resulting from project activities, as well as suspended material transported from upstream to the project area is likely to be deposited in areas of reduced water velocity and in eddies. The proposed project is likely to produce silt depositional areas, particularly upstream of the pipeline as flow decreases, creating a minor pooling effect.

Project-related changes in hydrology that would result in pooling upstream of the pipeline may result in decreased oxygen levels, and decreased food and sperm availability. Pooling resulting from the work on the bank are anticipated to be minimal, however. The clubshell generally is found in clean, coarse

sand and gravel in runs; it cannot tolerate mud or slackwater conditions. The northern riffleshell also occurs in riffles and runs. It, too, may be intolerant of slackwater conditions.

The physical presence of construction activities may affect clubshell and 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.

After fully considering the direct and indirect effects of the proposed action, the Service believes that the northern riffleshell may eventually recolonize a portion (perhaps half) of the action area upstream and downstream of the pipeline and concrete blocks; however, less habitat will be available than existed pre-project. Recolonization would be possible due to the presence of the northern riffleshell upstream and downstream of the project area.

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, since they would require separate consultation pursuant to section 7 of the Act.

No cumulative effects are anticipated; therefore, none have been evaluated.

CONCLUSION

After reviewing the current status of the clubshell and northern riffleshell, the environmental baseline for the action area, the effects of the proposed Sugar Creek Borough wastewater siphon and pipeline project, and the cumulative effects, it is the Service's biological opinion that this project, with implementation of the conservation measures, is not likely to jeopardize the continued existence of the clubshell or the northern riffleshell. No critical habitat has been designated for these species; therefore, none will be affected.

The Service has based this determination on the size and relatively low habitat quality of the action area, and therefore, the relatively few northern riffleshell and clubshell that are likely to be killed or injured during stabilization of the pipeline. Several higher-density northern riffleshell sub-populations, and several other clubshell populations occur upstream and downstream of the action area in French Creek and the Allegheny River. Many of these documented sites support greater numbers of these species, and have higher quality habitat. The quality of the habitat in the action area has been influenced by the railroad abutments, pipelines, and wastewater siphon (causing instability and contamination), resulting in a reduced northern riffleshell population. Therefore, based on our range-wide review of the species' status, reproduction, numbers, and distribution, the Service has determined that the proposed action will adversely affect endangered mussels in the action area, but not to the extent that this will appreciably reduce the likelihood of survival and recovery of the northern riffleshell and clubshell.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of Act, as amended, prohibit taking (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.

The measures described below are non-discretionary, and must be undertaken by the U.S. Army Corps of Engineers so that they become binding conditions of any funding, permits, and/or approvals issued to Sugarcreek Borough for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps 1) fails to require Sugarcreek Borough 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. In order to monitor the impact of incidental take, the Corps or Sugarcreek Borough 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 clubshell and northern riffleshell will be taken during stabilization of the Sugarcreek Borough wastewater pipelines through direct mortality, injury, and stress. Take is predicted to occur within the footprint of the concrete block placement, boulder placement, trenching and the areas surrounding these activities.

Direct mortality and injury will also occur outside the direct impact area due to sedimentation resulting from construction activities, scouring, and changes in hydrology due to the concrete block and boulder placement. Some mortality of mussels dislocated during scouring is expected due to predation or injury.

Stress, short-term reproductive impairment, and limited mortality due to changes in hydrology, including ponding and scouring, are predicted to occur from at least 10 feet upstream to 25 feet downstream of the direct impact area. 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 ponding, sedimentation, scouring, and fill placement (e.g. blocks, boulders). These events could result in harm to adult clubshell and northern riffleshell, the glochidial life stage of these species, and populations of host fishes.

The actual level of incidental take will be difficult to detect or quantify for the following reasons: 1) as indicated by the results of the mussel survey and the habitat quality within the project action area, the northern riffleshell occurs in small numbers; 2) the clubshell, if present, occurs in small, and possibly undetectable numbers; 3) individuals (juveniles and adults) of both species are small, and often buried in the substrate, making them difficult to locate; and 4) finding dead or injured specimens is unlikely.

Although a quantitative mussel survey was not conducted in the project area, two such surveys have been conducted upstream and downstream of the project area. A mussel survey conducted at the Utica bridge (located approximately eight miles upstream on French Creek) yielded a northern riffleshell mussel density estimate of $.35/\text{m}^2$ ($0.0325/\text{ft}^2$). A mussel survey conducted at the Kennerdell bridge (approximately six miles downstream on the Allegheny River) yielded a northern riffleshell density estimate of $.42/\text{m}^2$ ($0.039/\text{ft}^2$). Since the Utica bridge site is on French Creek, and has habitat characteristics similar to the proposed action area, the estimated densities for the Utica bridge site will be assumed for this project.

Based on available information regarding project impacts, species abundance, and spatial distribution, the Service has estimated the level of expected take for the northern riffleshell. Implementation of the proposed project would be expected to result in the take of up to 20 individuals within the action area (*i.e.*, direct and indirect impact areas). Take is expected to be in the form of mortality and harm.

The estimated take of the northern riffleshell was calculated based on the percentage of the action area that has the best mussel habitat. The best mussel habitat is found in about one-third (600 ft^2) of the action area. Therefore, assuming a northern riffleshell density of $0.0325/\text{ft}^2$, the estimated take of northern riffleshell is expected to be 20 individuals ($600 \text{ ft}^2 \times 0.0325/\text{ft}^2$).

No density information is available for the clubshell at this site, and surveys failed to reveal its presence; therefore, the Service has not attempted to estimate a numerical level of take for this species. Accordingly, take for this species is defined as the loss of all clubshell within the action area.

To further clarify and encompass all levels of take (direct and indirect), the Service is providing the following narrative statements:

1. Loss (due to death or injury) in the action area. However, it is anticipated that recolonization by mussels will gradually occur in half of the action area post-construction;
2. The spill or release of petroleum products or other hazardous substances into French Creek during construction;

3. The discharge of large amounts of sediment during construction, as defined by a noticeable sediment plume.

If criteria 2 or 3 (above) occur, the Corps shall immediately take remedial action(s), and contact the Service for recommendations and to determine if reinitiation of consultation will be required.

EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the clubshell or northern riffleshell.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize incidental take of *Pleurobema clava* and *Epioblasma torulosa rangiana*:

1. Prior to project construction, conduct an intensive survey of the action area and translocate all native mussels encountered to suitable habitat upstream or downstream of the action area. In accordance with protocols subject to approval by the Service, mussels will be collected and relocated to suitable habitat in late summer/early fall (*i.e.*, by October 15) prior to beginning project construction.

If a thorough survey and effective salvage attempt are conducted, this level of take should be reduced to 10 northern riffleshell, assuming: 1) mussels visible or residing within 10 cm of the substrate/water interface will be located and retrieved during the salvage attempt; and 2) approximately 50 percent of the northern riffleshell will be retrieved during the salvage. However, some mortality, injury, and stress are also expected to occur from salvage activities; this take is estimated to be less than 10 percent of the salvaged mussels. In addition, when handling northern riffleshell during salvage activities during the late summer, spontaneous abortion of glochidia may occur.

2. Prevent the introduction of zebra mussels into French Creek during project implementation, and implementation of the reasonable and prudent measures (and associated terms and conditions).
3. Implement the project modifications and commitments designed to minimize project-related hydrological and hydraulic impacts (*e.g.*, ponding and scouring) and other impacts to *P. clava* and *E. t. rangiana* and their habitat.
4. Develop and implement an erosion and sedimentation (E&S) control plan. The E&S plan is subject to review and approval by the Service. These measures should include, installation of jersey barrier/silt fence to redirect the flow to minimize take from sediment, installation of silt

fence between the river and construction activities on the bank, and revegetation of all disturbed areas. Daily site monitoring will be conducted to ensure plan implementation;

5. Control measures shall be implemented to ensure that hazardous substances do not enter French Creek.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above, and outline reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. In lieu of project conservation measure #4 (related to searching through the excavated stream material to locate endangered mussels), conduct a mussel translocation. Prior to commencement of work, translocate all live native mussels, including *P. clava* and *E. t. rangiana*, from the action area to suitable habitat upstream or downstream of the project area.
 - a. The action area includes area of direct and indirect impact. For the purposes of translocation, the instream action area includes the area to be directly impacted by the concrete blocks and poured concrete core, large boulders, and trenching, plus upstream and downstream indirect effect areas. Therefore, the area from which mussels shall be relocated extends 30 feet riverward from the toe of the bank, and from 20 feet upstream to 40 feet downstream of the upstream pipeline. The instream dimensions of this area, therefore, are approximately 30 by 60 feet.
 - b. Develop and implement a plan for translocating mussels from the action area to an appropriate relocation site. The plan should include: a protocol for maximizing the probability of finding the endangered mussels; a protocol for removing mussels from the substrate (searching substrate to a depth of at least 10 cm); protocols for handling and holding mussels; and a delineation of the area to which mussels will be relocated.
 - c. Prior to the translocation effort, the in-stream action area shall be clearly marked. Temporary bank and in-stream reference marking shall be done in such a manner as to assist the translocation team.
 - d. Collection and relocation must be done only when the water temperature is above 55 degrees Fahrenheit and water clarity is good.
 - e. Surveys and translocation of mussels will be performed by approved, qualified personnel who are thoroughly briefed on the techniques to be used. These personnel

shall survey the action area via diving, wading, and/or snorkeling, as appropriate. All mussels located shall be collected by hand and removed.

- f. All mussels shall be identified to species, counted, and if possible, sexed, processing all *P. clava* and *E. t. rangiana* immediately upon finding. Live specimens of *P. clava* and *E. t. rangiana* shall be measured, and sexed (*E.t. rangiana* only).
- g. While awaiting identification and relocation, *P. clava* and *E. t. rangiana* shall be held temporarily using a Service-approved protocol that will maximize survival and minimize stress (*e.g.*, held in containers circulating river water to ensure appropriate and consistent water temperature and oxygen levels). During boat (or other vehicle) transfer to the relocation site, *P. clava* and *E. t. rangiana* shall be held in containers with fresh river water. Relocation of individual *P. clava* and *E. t. rangiana* shall take place within three hours of collection.
- h. *P. clava* and *E. t. rangiana* removed during the pre-construction survey shall be relocated to suitable habitat upstream or downstream of the pipeline. Suitable habitat includes an area: 1) with stable sand/gravel or sand/gravel/cobble substrate below the ordinary low water elevation; 2) with similar mussel species diversity, including the presence of *E. t. rangiana*; and 3) not currently subject to mixing zones associated with point-source discharges, or subject to evident sources of non-point source pollution.

Non-endangered mussels should be translocated in such a manner as to increase their chances for survival.
- i. Individual *P. clava* and *E. t. rangiana* shall be hand-placed securely in the substrate by a professional malacologist or other qualified individual. The siphons of *P. clava* and *E. t. rangiana* shall be exposed at the substrate/water interface. This will avoid dislodging of the mussels during high flow events. Due to the compacted nature of the substrate in certain areas it may be necessary to excavate a place in the substrate with a tool or by hand for the endangered mussels.
- j. Any *P. clava* and *E. t. rangiana* accidentally killed, or that are moribund or fresh-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 the Biological Resource Division, Leetown Science Center, 1700 Leetown Road, Kearneyville, WV 25430. The appropriate person at BRD should be contacted regarding proper specimen preservation and shipping procedures.

In addition, the Service's Region 5 Division of Law Enforcement must be notified within 24 hours of this take.

- k. Notification must be made to the following Service offices at least two days prior to beginning in-stream translocation activities:

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

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

- l. A report documenting the translocation effort shall be prepared and submitted to the Service's Pennsylvania Field Office and the Pennsylvania Fish and Boat Commission within three months of completion of the translocation. 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 translocating mussels; and establishment and location of the relocation site. The results section should include: the total number of individuals of each mussel species collected and relocated; date collected; water and air temperatures; river stage; total number of live and dead *P. clava* and *E. t. rangiana* collected; condition, size and approximate age of live *P. clava* and *E. t. rangiana*; data regarding non-endangered mussels; and maps or figures showing 1) project features and action area; and 2) the relocation site.
2. Any floating craft, anchors, anchor chains, propellers, outboard motors, cranes, bulldozers, or other equipment that originates from, or has come in contact with waters known or suspected to contain zebra mussels (such as the Mississippi or Ohio River, or lower reaches of the Allegheny River), shall be free of zebra mussel adults and veligers. This includes equipment deployed during the translocation of *P. clava* and *E. t. rangiana*. Evidence shall be provided to the Service that all equipment to be used in French Creek (during construction or mussel relocation) has never been in zebra mussel-infested waters, or that equipment has been appropriately cleaned, disinfected, and inspected for zebra mussel adults and veligers, using accepted protocols.
 3. Implement the project modifications and commitments designed to minimize project-related hydrological and hydraulic impacts (*e.g.*, ponding and scouring), and other impacts to *P. clava* and *E. t. rangiana* and their habitat. Measures shall be implemented to minimize adverse effects to *P. clava* and *E. t. rangiana* and their habitat due to project-related hydrological impacts. This includes the installation of boulders to create a sill to lessen the fall of the flow (to minimize take by reducing scouring on the downstream side of the project), and placement of

the upstream concrete blocks parallel to the pipelines (to minimize the change in hydrology and the upstream pooling effect).

4. Develop and implement a project erosion and sedimentation (E&S) control plan. This plan will address all sources of project-related erosion and sedimentation, including the concrete blocks and poured concrete, construction access road, staging areas, and bank work. This plan will include a plan for diverting the flow during construction, which can include, but is not limited to, temporary jersey barriers or staked silt fence.
 - a. Best Management Practices for erosion and sedimentation control shall be in place before, during, and, as appropriate, after any work is conducted. The E&S plan shall include, but is not limited to, the following provisions: revegetation of disturbed upland areas with native vegetation immediately following construction; removal of in-stream diversion devices immediately following project completion; and use of silt fencing on the stream bank to keep silt from entering French Creek.
 - b. The Corps and/or Sugar Creek Borough will monitor the project site daily to ensure the E&S control practices are implemented, and to identify any project-related impacts from scouring or sedimentation.
 - c. Contractors should be instructed on the importance of the natural resources in the project area and the need to ensure proper implementation of the required E&S control practices.
 - d. Implement a penalty system for contractors that do not fully implement the E&S control plan.
 - e. A report on implementation of these measures, and on evidence of scouring and sediment deposition, will be provided to the Service within three months of project completion. If it appears that scouring or sediment deposition are beyond that considered normal, the Service should be contacted promptly.
 - f. All construction activities will be performed from the bank or on top of the concrete blocks.
 - g. Work shall be completed within a one week period of time.
 - h. Work will be completed during low flow conditions.
5. Prevent hazardous materials (*e.g.*, petroleum products, solvents, untreated sewage, etc.) from entering French Creek or contaminating soils or waters within the watershed. If a spill does occur, implement emergency remediation procedures to contain the spill and/or prevent the spill from entering French Creek.

- a. All hazardous substances (e.g. fuel, oil) shall be stored at least 100 feet from French Creek and its tributaries. Refueling and maintenance of equipment shall occur at least 100 feet from French Creek and its tributaries.
- b. The Corps or Sugarcreek Borough will monitor the project site daily to ensure that spill avoidance practices are implemented.
- c. Contractors should be instructed on the importance of the natural resources in the project area and the need to ensure proper implementation of the required spill avoidance/remediation practices.
- d. Implement a penalty system for contractors that do not fully implement the spill avoidance/remediation plan.
- e. Monitor weather and river stages to allow removal of any hazardous materials from the floodplain in the event that flooding is expected.
- f. The Service shall be notified immediately of any spills of hazardous materials.
- g. Construct a water-tight cover on the wastewater siphon to prevent wastewater from entering the creek and the creek from entering the siphon. This shall be completed within one year of the pipeline stabilization, and documentation of compliance shall be provided to the Service.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the 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 the Corps and/or the Sugarcreek Borough, would further the conservation and assist in the recovery of *P. clava* and *E. t. rangiana*.

1. Monitor the action area at least twice over the next ten years to determine species-specific rates of natural recolonization following construction.
2. Support research to determine the natural fish host species for *P. clava* and *E. t. rangiana*.
3. Within the Allegheny River and French Creek watersheds, implement and/or support projects which would improve water quality by reducing non-point source pollution. Such projects

include, but are not limited to, wetland preservation, wetland restoration, streambank fencing, and streambank restoration (via establishment of native plant species).

4. Remove dams in historic mussel habitat (e.g. Union City dam on French Creek).

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

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the information presented with the U.S. Army Corps of Engineers, June 12, 2002, request for initiation of formal consultation. As provided 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 effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Date

Supervisor, Pennsylvania Field Office

LITERATURE CITED

- Gardiner, D.B., H. Silverman, and T.H. Dietz. 1991. Musculature associated with the water canals in freshwater mussels and response to monoamines *in vitro*. *Biological Bulletin* 180:453-465.
- Ortmann, A.E. 1919. A monograph of the naiades of Pennsylvania. Part III. Systematic account of the genera and species. *Memoirs of the Carnegie Museum* 8:1-385.
- Richard, P.E., T.H. Dietz, and H. Silverman. 1991. Structure of the gill during reproduction in the unionids *Anodonta grandis*, *Ligumia subrostrata*, and *Carunculina parva texasensis*. *Canadian Journal of Zoology* 69:1744-1754.
- Stansbury, D.H., K.G. Borrer, and K.E. Newman. 1982. Biological abstracts of selected species of Unionid mollusks recovered from Ohio. Unpublished. Prepared for the Ohio Heritage Foundation. Ohio Department of Natural Resources.
- U.S. Fish and Wildlife Service. 1994. Clubshell mussel (*Pleurobema clava*) and northern riffleshell (*Epioblasma torulosa rangiana*) recovery plan. Hadley, MA. 68 pp.
- Watters, G.T. 1990. 1990 survey of the unionids of the Big Darby Creek System. Final Report to The Nature Conservancy. 229 pp.
- Watters, G.T. 1996. Hosts for the northern riffleshell (*Epioblasma torulosa rangiana*). Triannual Unionid Report, Report No.10, September 1996, p. 14.
- Watters, G.T. and S.H. O'Dee. 1997. Identification of potential hosts: *Elliptio fisheriana* (Lea 1838), *Fusconaia masoni* (Conrad 1834), *Fusconaia flava* (Rafinesque 1820), and *Pleurobema clava* (Lamarck 1819). Triannual Unionid Report, Report No. 13, November 1997, p. 38-39.
- Williams, J.D., M. L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation Status of Freshwater Mussels of the United States and Canada. *Fisheries*, Vol. 18, No. 9., Pp. 6-22.