

# **BIOLOGICAL OPINION**

**Effects of the Removal of Sun Ray Dam (a.k.a. Hospital Dam)  
and unnamed dam remnants in the Conewango Creek on the Northern  
Riffleshell (*Epioblasma torulosa rangiana*)  
Warren County, Pennsylvania**

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## CONSULTATION HISTORY

On June 13, 2012, the Pennsylvania Department of Environmental Protection (PADEP) conducted a search of the Online Pennsylvania Natural Diversity Inventory (PNDI) Environmental Review Tool for the proposed removal to the Sun Ray Dam, Conewango Township, Warren County, Pennsylvania. The response (receipt number 20120613359095) indicated a potential impact with resources under the jurisdiction of the U.S. Fish and Wildlife Service (Service).

On August 15, 2012, the Service received an August 13, 2012, letter from the PADEP with a proposed design for the remove Sun Ray Dam. In response, on September 25, 2013, the Service sent a letter to the U.S. Army Corps of Engineers (ACOE), the lead Federal Action Agency, and PADEP, stating that although long-term beneficial effects may result from the proposed dam removal, the project may affect, and is likely to adversely affect northern riffleshells. Therefore, the Service recommended that ACOE initiate formal consultation to ensure that permit issuance under their authority was not likely to jeopardize northern riffleshell.

On September 27 and 28, 2012, an electronic mail message exchange occurred between a project proponent, American Rivers, and the Service regarding our expectations of mussel salvaging locations and a request from American Rivers to discuss development of a biological assessment to be part of the formal consultation initiation package.

On May 2, 2013, we received a transmittal from American Rivers regarding mussel surveys proposed for the 2013 field season. These surveys were proposed in response to an April 26, 2013, letter from Pennsylvania Fish and Boat Commission (PFBC) to PADEP requesting that they implement the dam removal in such a way that minimizes effects on rare and protected freshwater mussels and their host fish.

On July 26, 2013, the Service received an electronic mail message from PFBC regarding their July 18, 2013, mussel survey of Conewango Creek at the Sun Ray Dam removal site. That survey located one male northern riffleshell mussel along the left-descending bank in an area that was anticipated to be within the Contractor's Work Area (CWA) as specified on GP-1 General Plan and Typical Cross Section site plan.

On October 25, 2013, the Service received an October 21, 2013, letter from ACOE requesting initiation of formal consultation along with an initiation package, including a biological assessment, freshwater mussel survey report and project design plans.

The Service acknowledged initiation of formal consultation by letter of November 21, 2013, and indicated a biological opinion would be issued by March 10, 2014.

The final biological opinion (BO) was completed and delivered to the ACOE on March 22, 2014.

## BIOLOGICAL OPINION

This biological opinion is based on information provided in the following documents: (1) *Biological Assessment of the Removal of Sun Ray Dam and unnamed dam remnants Conewango Creek (River Miles ~ 3.3)* (2) *Freshwater Mussel Survey of Conewango Creek remnant dam July 18, 2013*, and (3) *General Plan and Typical Cross Section Sun Ray Dam Removal Project*, as well as other information available in Fish and Wildlife Service files. The complete administrative record of this consultation is on file at the Service's Pennsylvania Field Office.

### DESCRIPTION OF THE PROPOSED ACTION

As defined in 50 CFR 402.02, "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States. The "action area" is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, State, or private activities within the action area, as well as cumulative effects of future State or private activities that are reasonably certain to occur within the action area.

This biological opinion evaluates a proposed dam removal and removal of dam remnants upstream of the proposed dam removal site. The project is currently under consideration for Clean Water Act, section 404 permit issuance by the ACOE on Conewango Creek, located in Conewango and Glade Townships, Warren County, Pennsylvania. This opinion addresses those actions for which the Service believes adverse effects may occur. In their biological assessment, the ACOE outlined activities that would adversely affect the federally listed, endangered northern riffleshell (*Epioblasma torulosa rangiana*). The following opinion considers whether implementation of the dam removal project is likely or not likely to jeopardize the continued existence of this species.

We consider effects within the "action area", defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The action area extends approximately 0.38 miles upstream of the Sun Ray Dam to the northern tip of the first island upstream where a riffle sequence can be observed and the effects of impounded water are dissipated (see Figure 1). As shown in Figure 2, the Sun Ray Dam is partially breached (sometime during the 1960s). Therefore, accumulated sediments behind the dam are likely mobilized during high flow events, limiting the amount that may be released during and after dam removal. Therefore, we anticipate that the action area may extend approximately 0.75 miles downstream, an action area comparable to that considered for the 2009 removal of Carter Dam, which is downstream of this project. The action area encompasses the Conewango Creek and streambanks that will be affected by dam removal, dam remnants removal, stream stabilization activities, siltation, deposition, scouring, stabilization, and fluvial-hydrological effects.

Figure 1. Action Area depicted in red on a satellite image taken on September 16, 2013. <http://www.google.com/earth> (Accessed in February 2014)

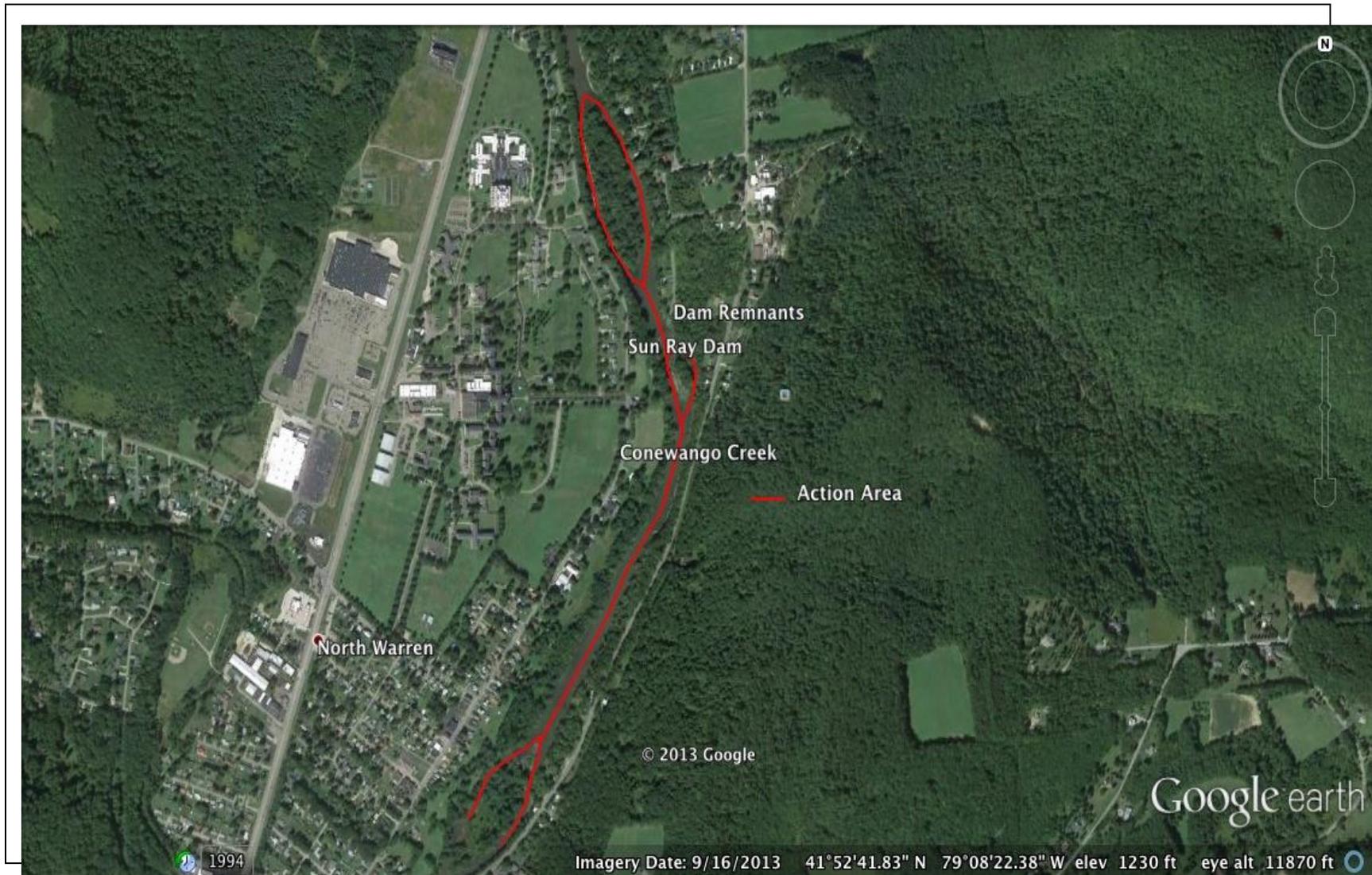
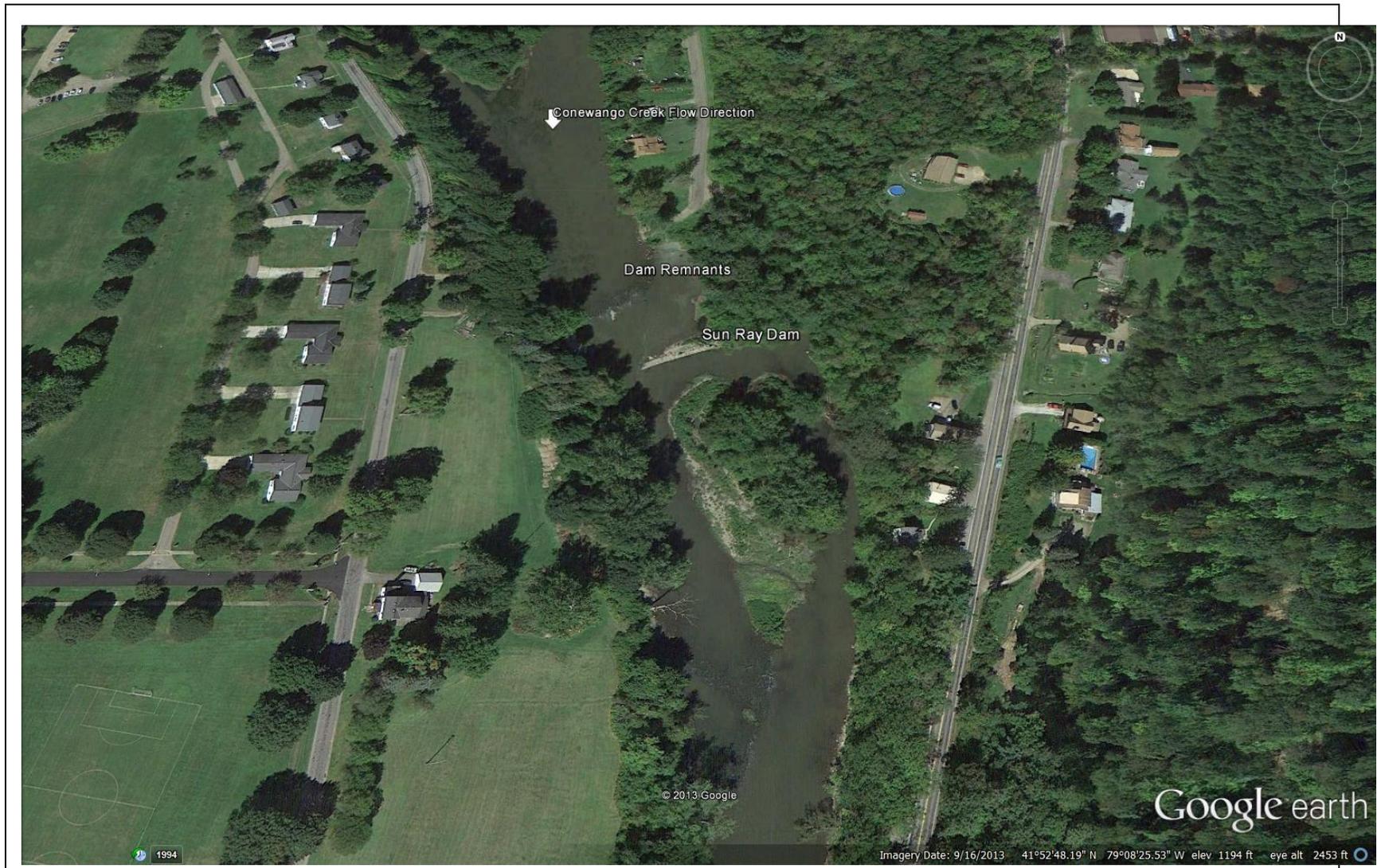


Figure 2. Sun Ray Dam and unnamed dam remnants map created from September 16, 2013 <http://www.google.com/earth> (Accessed in February 2014)



The following project description is summarized from the *Biological Assessment for the Removal of Sun Ray Dam and unnamed dam remnants – Conewango Creek (River Miles ~3.3)*:

### *Project Setting*

Conewango Creek flows through the City of Warren, Pennsylvania, where it joins the Allegheny River approximately 3.3 miles downstream of Sun Ray Dam. The exposed remnants of an unnamed dam exist approximately 115 feet (35 m) upstream (right descending bank) of Sun Ray Dam and curve upstream to a point that is approximately 229 feet (69.7 m) upstream of Sun Ray Dam.

At the project site, the creek is bordered by forested riparian corridors on both banks, the Warren State Hospital on the right descending bank and low density residential houses and roads on the left and right bank. Upstream of the dam remnants, the creek is bordered by forested riparian buffers on both banks, the Warren State Hospital on the right descending bank and roads and agriculture on the left descending bank. Downstream of the dam, the creek is bordered by forested riparian buffers on both banks, a large connected mature forest on the left descending bank, roads on both banks, and residential houses associated with the community of North Warren on the right descending bank. In the action area, there is a minimum of a 50-100 foot (15-30 m) forested riparian buffer along the creek. See Figure 1 to accompany this description.

Conewango Creek is approximately 215 feet (66 m) wide at the dam breast. The dam pool is expected to be very shallow and impoundment affects minimal due to the previous breach in the dam. The dam remnants are approximately 233 feet (71 m) long and curve upstream. According to the Pennsylvania Code Chapter 93, Water Quality Standards, Conewango Creek is classified as a warm water fishery.

### *Project Description*

#### Sun Ray Dam Removal

Sun Ray Dam (also known as Sunray or Hospital Dam) was constructed circa 1903 as a water supply for the then recently-built Warren State Hospital (State Hospital for the Insane at Warren, Pennsylvania, as it was known then). Presently, Sun Ray Dam can be described as a concrete encasement of a rock-filled timber crib interior that nearly spans the width of Conewango Creek (dam is approximately 81 meters long, with about half protruding into the creek). The dam has been breached along the right descending bank sometime during the 1960s. There is minimal impoundment behind Sun Ray Dam as a result of this breach. Presumably there is some scour downstream of the dam since flows are constricted to the right descending bank.

Due to Sun Ray Dam's poor structural condition, the PADEP and American Rivers have proposed the removal of this dam in order to abate a threat to public safety as well as to restore natural stream function and connectivity to nearly 27 miles of the Conewango Creek.

The specific project sequence is proposed as follows:

The contractor will access the Sun Ray Dam work area via Front Street, located on the east, or left descending bank. The access way will be limited to the Contractor Work Area (CWA), totaling 0.50 acres of disturbance, of which 0.15 acres are within the Conewango Creek. The CWA is depicted on the site plan titled: *General Plan and Typical Cross Section Sun Ray Dam Removal Project*. Trees and shrubs will only be removed from the access way as needed.

Sun Ray Dam will be removed by mechanical means via a hydraulic hammer mounted on an excavator. The excavator will travel across the top of the existing dam structure and work sequentially back towards the east bank. No causeways will be constructed. In addition to removal of the dam structure, all manmade debris and dead trees (8-inch-diameter and larger) will be removed from within the CWA. The CWA extends approximately 10 feet (3 m) on either side of the existing dam structure in order to allow excavator to retrieve debris.

#### Unnamed dam remnants

The exposed remnants of an unnamed dam were previously submerged by the Sun Ray Dam pool. The original purpose of this remnant dam and its date of construction are unknown but clearly pre-date Sun Ray Dam (*i.e.*, > 110 years old). Based upon the remnants visible from aerial photographs, the structure may have been constructed as a mill dam. The visible remnants consist of timbers and iron rods that jut out of Conewango Creek substrate. Large cobble present among the timbers may have been fill for the original structure. The remnants are approximately 230 feet long and appear to create an upstream pool. The maximum depth and extent of the pool are unknown. A riffle appears to have formed over the former structure and is visible upstream of Sun Ray Dam.



**Dam remnants upstream of Sun Ray Dam. (Welte and Allison 2013).**

Following the breaching of Sun Ray Dam, PADEP and American Rivers are proposing removal of dam remnants to alleviate a public safety concern and restore the natural stream function of Conewango Creek. PADEP and American Rivers are concerned that removal of Sun Ray by itself may result in slight lowering of creek elevation, thus causing the dam remnants to block more stream flow.

Using the Sun Ray Dam CWA near its access to Front Street, the visible iron and timber debris from dam remnants will be removed using an excavator. Remnant material will be removed from the creek across its entire length. An excavator will travel across the top of the existing remnants and work sequentially back towards the east bank using a thumb or grapple attachment to remove exposed timbers and iron rods. No causeways will be constructed. This proposed

work area will be limited to a maximum of 25 feet (7.5 m). As referenced above, spoil from these remnants will be taken off-site to a previously-approved and permitted spoil area.

Spoil and debris from both the Sun Ray Dam removal and the remnant dam removal will be transported off-site to a permitted spoil area (*i.e.*, spoil area has an approved erosion and sediment control plan (E&S Plan) and meets conditions of Chapter 102 and/or other State and Federal Regulations). Dam removal will be completed between July 1 and September 30, during low flow conditions, and preferably when fair-weather is forecasted in the drainage basin upstream of the dam for at least the next 4 days.

For the entire project, erosion and sediment controls will be installed and maintained in accordance with an approved Warren County Conservation District Erosion and Sediment Control Plan. Erosion and sediment control measures will be removed once the site has reached 70 percent uniform vegetative cover. The dam removal and streambank restoration area required to be completed within 30 calendar days following the start of the on-site work. The contractor will be required to, at minimum, restore disturbed area to pre-construction conditions.

#### *Conservation Measures*

Measures are proposed to minimize and monitor the effects of the dam removal and removal of dam remnants on northern riffleshell. As summarized from the project biological assessment, these measures include:

- Prior to the demolition of the dam and dam remnants, PFBC-coordinated surveys will take place in the direct impact areas in order to remove all live northern riffleshell and other mussel species not previously detected.
- During dam demolition, PFBC biologists and a group of volunteers will salvage stranded mussels that may be impacted due to impoundment dewatering. Mussels will be measured, marked, and relocated to appropriate habitat upstream of the project area.
- PFBC will evaluate survivorship of relocated mussels at the relocation sites. Surveys will be conducted at these sites, two and five years after dam removal.
- Surveys will be conducted to assess mussel recolonization upstream and downstream of the dam at two and five years after dam removal.
- Removal of trees will be limited to only those necessary to properly carry out dam removal activities. Clearing trees, but not grubbing them will also help to minimize accelerated erosion processes.

## STATUS OF THE SPECIES

Relevant biological and ecological information considered by the Service in formulating this biological opinion is presented below. Appropriate information on the life history of the species, habitats, distribution, and other factors affecting species survival is included to provide background for analyses in later sections. This section also documents the effects of past human and natural activities or events that have led to the current status of the northern riffleshell.

### **Northern Riffleshell**

#### *Species Description*

The northern riffleshell is a federally listed endangered freshwater mussel. Freshwater mussels are sedentary filter-feeders, and as such, they are vulnerable to substrate disturbance, silt deposition, scouring, water quality degradation, changes in channel morphology, and alterations of river hydrology.

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

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, occurring principally in larger rivers. All but one species in this genus are either thought to be extinct or are listed as endangered species under the federal Endangered Species Act. The northern riffleshell's two sibling species, the tubercled blossom (*E. torulosa torulosa*) and green blossom (*E. torulosa gubernaculum*), have not been seen alive or freshly dead in recent decades, and may be extinct.

#### *Life History*

Rogers *et al.* (2001) found that males of the related golden riffleshell (*Epioblasma florentina aureola*) release sperm into the water in August and September, fertilizing eggs in females downstream. Watters (1996) and O'Dee and Watters (2000) conducted host suitability studies that identified four fish species on which northern riffleshell glochidia develop into juveniles: banded darter (*Etheostoma zonale*), bluebreast darter (*E. camurum*), brown trout (*Salmo trutta*), and banded sculpin (*Cottus carolinae*). McNichols *et al.* (2007) reported that Iowa darters (*E. exile*), Johnny darters (*E. nigrum*), and mottled sculpin (*Cottus bairdi*) also transformed northern riffleshell glochidia. These studies did not test all of the fish species that are native to the range of the northern riffleshell. Further, these fish species do not occur in all habitats that support northern riffleshells. Therefore, there are probably other, as yet unidentified, suitable fish host species for the northern riffleshell – most likely several species of *Etheostoma* and *Percina* (Zanatta and Murphy 2007).

The northern riffleshell is a long-term breeder (bradyctictic); however, individuals within a population exhibit a range of behaviors, and may release glochidia from spring through late summer. Gravid northern riffleshells expose a brilliant white mantel margin to attract host fishes from May to October, although captive northern riffleshell females synchronously emerged from the substrate in early January 2006 (G.T. Watters, Ohio State University, 2007 personal communication). Jones (2004) reported that congeners of the northern riffleshell not only attract fish with the mantel display, but capture and hold those that come in contact with the mantel pads. Fish are temporarily trapped between the valves of the rapidly closing female while she expels glochidia onto the fish's gills and other tissues.

### *Habitat*

Northern riffleshell often occur in clean, packed, coarse sand and gravel in riffles and runs of small and large streams (Stansbery *et al.* 1982, Watters 1990). This species is also known to occur in relatively slow-flowing, more lentic, or deep run habitats. Within Pennsylvania, Northern riffleshells are found in the Allegheny River in run-of-the-river navigation pools that are impounded to facilitate navigation, and may only experience significant water flow during high river discharge periods. It is not clear if specimens living in more typical riffle/run areas can adapt to slower water should conditions change. Use of low-flow areas may also be limited in more turbid waters, where concomitant silt deposition may limit survival or successful reproduction.

Northern riffleshells bury themselves to the posterior margin of the shell, although females may be more exposed, especially during the breeding season (U.S. Fish and Wildlife Service 1994). Rogers *et al.* (2001) reported that golden riffleshell populations in Virginia are not visible on the substrate surface from November through January. Northern riffleshells also appear to undergo a seasonal vertical migration in the fall (Anderson 2000).

### *Population Dynamics*

Riffleshells appear to have a relatively short life-span for a freshwater mussel. Sexual maturity can be reached in as little as three years, and most individuals probably live for only 7 to 15 years (Rogers *et al.* 2001, Crabtree and Smith 2007). Like other mussels, the northern riffleshell probably experiences very low annual juvenile survival. The combination of short life span and low fecundity indicates that populations depend on a large annual cohort produced by a large population (Musick 1999). Species following this reproductive strategy are susceptible to loss of individuals from predation and stochastic events and are slow to recover from such losses (Rogers *et al.* 2001). However, these species may be well suited to exploit dynamic micro-habitat shifts characteristic of free-flowing rivers.

With the exception of displaying females, northern riffleshell are cryptic, with an estimated 48 percent of a population occurring below the substrate surface (Smith *et al.* 2001); therefore, qualitative population estimates must take into account undetected individuals. In addition, where northern riffleshell are found at low population densities, population estimates may have large margins of error due to undetected mussels. Sparsely distributed juveniles indicative of successful reproduction are likely even more difficult to detect.

Successful recruitment of northern riffleshell populations is often difficult to detect when densities are very low or surveys are single-day, catch-per-unit efforts. Few intensive, statistically valid surveys have been conducted on populations of this species outside of French Creek and the Allegheny River, and populations with densities near or below the detection rate may not be practically assessed with quantitative techniques. The difficulty in detecting northern riffleshells results in poorly defined information about the species' distribution and abundance, even within the streams where the species is known to occur.

### *Threats*

The northern riffleshell is subjected to many of the same threats as are other aquatic species. Pollution from municipal, agricultural, and industrial sources has reduced or eliminated mussel populations directly, as well as indirectly through elimination of host fish, resulting in reproductive failures (U.S. Fish and Wildlife Service 1994). Increases in turbidity and suspended sediments are detrimental in that they decrease the depth and amount of light penetration, affect primary productivity, decrease oxygen levels, increase water temperature, irritate or cause clogging of gills, and result in a blanket of silt on the substrate. Northern riffleshells may be directly affected by siltation through smothering. High turbidity may interfere with sight lures, such as conglutinates, which attract host fish. Siltation affects mussels by smothering eggs or larvae of the fish host populations and by reducing food availability. Siltation also fills interstitial spaces, thereby eliminating spawning habitat critical to the survival of young fish and juvenile mussels. Altered hydrologic regimes resulting from land-clearing, mining, agriculture, urbanization, and channelization were probably responsible for many of the population losses observed (U.S. Fish and Wildlife Service 1994). Point and non-point source pollution and acid mine drainage likely contributed to the species decline in various portions of its range.

The zebra mussel (*Dreissena polymorpha*) is a highly invasive bivalve native to Europe and western Asia, but accidentally introduced to Lake Erie around 1985 via release of trans-Atlantic ship ballast water. The species has since spread through much of the eastern United States. Zebra mussels can quickly reach enormous population densities that compete for food, oxygen, and space with native mussels, including the northern riffleshell. Zebra mussels produce byssal threads able to firmly attach to many substrates. When zebra mussels attach to native mussels, they can cause mortality of native mussels by preventing them from closing, preventing them from borrowing, and increasing drag to the point that they are scoured from the substrate. Unlike native mussels, zebra mussels do not require a host fish to reproduce. Their planktonic young appear to be relatively intolerant of turbulent free-flowing streams, and may require greater dissolved calcium concentrations than native mussels. Zebra mussels have not become established in all habitats to which they have been introduced, including some currently occupied by northern riffleshell. Zebra mussels appear to have eliminated northern riffleshells in Lake Erie and the Detroit River. They were documented in French Creek in 2002, but are not known to occur in the free-flowing portion of the Allegheny River at this time. That said, however, zebra mussels are known from the Allegheny River basin at Edinboro Lake, and from within the lower navigation channel of the river.

Other introduced exotic species now present in the historic range of the northern riffleshell may

present a threat should they expand in range or increase in abundance in waters supporting the northern riffleshell. These include two exotic bivalves, the quagga mussel (*Dreissena bugensis*), and Asiatic clam (*Corbicula fluminea*); and two invasive exotic fish, the round goby (*Neogobius melanostomus*) and black carp (*Mylopharyngodon piceus*), both of which are molluscivores.

### *Status and Distribution*

The northern riffleshell is now sparsely distributed within a highly restricted range, although population numbers can be high in localized areas. Of 54 streams once known to be occupied by this species, only four show evidence of reproduction – three apparently large and recruiting populations occur in Allegheny River, French Creek, and East Branch Sydenham River. A fourth, smaller population in Ausable River has also recently (2006) been shown to be recruiting. Each of these populations is susceptible to both natural stochastic events, such as floods, and anthropogenic threats, such as toxic spills. Although northern riffleshells have been documented in one additional Allegheny River tributary (besides French Creek), and two French Creek tributaries, the species occurs in the lower reaches of these streams, and these occurrences may not be self-sustaining if the mainstem population is damaged.

In contrast to the above populations, five northern riffleshell populations have declined since the species was listed as endangered in 1994, and some of these may be extirpated. Extirpated or nearly extirpated populations include the following: the Detroit River, following zebra mussel infestation; the Green River, possibly due to point and non-point inputs, and hydrologic controls on flow and temperature from the Green River Reservoir; Big Darby Creek, as a result of urban and agricultural runoff; Fish Creek, following a 1993 diesel fuel spill; and the Tippecanoe River, where no living or fresh-dead northern riffleshell have been observed since the 1970s. A few individual specimens have been reported from the Elk River in West Virginia; however, no evidence of recent successful reproduction has been reported from this stream. Although specific events are cited as causing the apparent loss of several northern riffleshell populations, these events likely worked in concert with other events that cumulatively reduced overall population levels to the extent that a single event could result in extirpation. Recent surveys have failed to locate living specimens in other streams where the species was thought to be extant at the time of listing (USFWS 2008). In many cases, diverse freshwater mussel populations persist where northern riffleshells have not. Like other *Epioblasma*, this species may be more sensitive to environmental perturbations than other mussel species. This may be because life history traits make recovery from a disturbance less likely than with other non-*Epioblasma* mussels, or because this species is more sensitive to silt and contaminants.

In the Allegheny River, the most upstream location that northern riffleshells have been found alive in recent years is near the City of Warren, Pennsylvania (EnviroScience 2002). The Allegheny River in Warren is strongly influenced by hypolimnetic releases from Kinzua Dam, and this population appears to be dependent on warmer, more nutrient-rich water coming from Conewango Creek, which confluences with the Allegheny River immediately upstream of the habitat supporting this species. Northern riffleshells appear to become a frequent member of the Allegheny River mussel community about nine miles below Warren, with peak densities documented near the Forest and Venango County line in the vicinity of the Hunter Station Bridge. At that location, northern riffleshells are the dominant mussel species, with a mean density of 7.57 individuals/m<sup>2</sup> and an estimated population of 169,622 individuals in a 100-meter-wide cross-section of the Allegheny River (USGS 2002). Northern riffleshell populations are known from scattered locations in the middle Allegheny River

(*e.g.*, near the towns of Kennerdell, Foxburg, Oil City, Parker, East Brady, and downstream to river mile 58), where population densities are generally less than 0.1/m<sup>2</sup>. The total population of northern riffleshell in the Allegheny River may exceed 6 million individuals (Villevilla 2007). Although this represents a large population, the distribution in linear river system means that a single perturbation, such as toxic spill or flood event, could damage or eliminate the entire population.

The northern riffleshell population is also discontinuously distributed in about 60 miles of lower French Creek in Pennsylvania, from its confluence with the Allegheny River at Franklin, upstream to the vicinity of the State Route 6 bridge at Mill Village, PA. Within this reach, northern riffleshell range from relatively common, to rare or absent at sites that have otherwise diverse mussel communities. For example, of 31 sites investigated along the length of French Creek in 2003, northern riffleshell were documented to occur at nine of the lower 21 sites, where population estimates in 2004 ranged from 23 to over 10,000 individuals (Smith and Crabtree 2005). These nine sites supported mussel assemblages containing between 6 and 19 species, although they were often separated by sites that appeared to be equally diverse (up to 15 species) but did not include northern riffleshell (Smith and Crabtree 2005).

Northern riffleshell have also been found in Conewango Creek in Warren County (an Allegheny River tributary), as well as in the lower reaches of two French Creek tributaries, Muddy Creek (Crawford County) and LeBoeuf Creek (Erie County). Due to the proximity of these populations to French Creek and the Allegheny River, they may represent extensions of the larger mainstem population rather than self-sustaining sub-populations.

The larger populations of northern riffleshell in Pennsylvania are providing a source of animals to implement recovery actions described in the species' recovery plan. However, translocation and population augmentation will only work to the extent that historic habitat is now suitable to support both the species and its fish host(s). Because the reasons for the original decline of northern riffleshell have often not been identified, transferred animals may also not survive. Ongoing translocation actions are preceded by pilot studies with smaller number of animals to establish site suitability.

Table 1. Extant and possibly extant northern riffleshell populations.

<b>Basin</b>	<b>Population</b>	<b>Stream</b>	<b>Approximate Range</b>	<b>Status<sup>1</sup></b>	
St. Lawrence River system	Lake St. Clair	East Branch Sydenham River	Lower and middle reaches, 17 sites	Recruitment documented; declining	
	Lake Huron	Ausable River	Upper and middle reaches	Recruitment documented; declining	
	Maumee River	Fish Creek	Last reported in early 1990's, 2-mile reach	Status unknown; possibly extirpated	
	Detroit River	Detroit River	A freshly dead shells found in 2005	Status unknown; possibly extirpated	
Ohio River	Green River	Green River	One to two freshly dead shells found in 1987 and 1989 at two sites	Status unknown; possibly extirpated	
	Scioto River	Big Darby Creek	Last reported in early 1990's;	Status unknown; possibly extirpated; Augmentation project	
	Allegheny River	Allegheny River	scattered over 66 miles – Warren, Forest, Venango, Clarion, Armstrong Counties	Successful recruitment at multiple sites; stable	
		Conewango Creek	Near the confluence with the Allegheny River and upstream approximately 5.5 miles to Russel, PA.	A few live individuals found in 2005 and 1 male found in the dam remnants area in 2013	
	French Creek	French Creek	Scattered over 60 miles -- Venango & Crawford Co.	Successful recruitment at multiple sites; stable	
		LeBoeuf Creek	3-mile reach	Recruitment documented; stable	
		Muddy Creek	1 site near the confluence with the French Creek	Peripheral to French Creek; status unknown	
	Kanawha River	Elk River	Two freshly dead shells found in 2003 at one site	Status unknown; possibly extirpated	
	<b>TOTALS</b>	9 populations	12 streams	4 populations in 5 streams recruiting	

Table 2. Previous biological opinions authorizing incidental take of the northern riffleshell (U.S. Fish and Wildlife Service 1998a, 1998b, 1999, 2001, 2002, 2003a, 2003b, 2004, 2006, 2009, 2010a, 2010b, 2012, and 2013).

<b>Project Name, State</b>	<b>Population Density</b>	<b>Estimated lethal take (take post-salvage)<sup>1</sup></b>	<b>Year</b>	<b>Monitoring Report Received</b>	<b>Monitoring Report Reference</b>	<b>Project Status</b>
Kennerdell Bridge, PA	0.42/m <sup>2</sup>	875 (444)	1998	YES	U.S. Geological Survey (2002)	Complete
Utica Bridge, PA	0.35/m <sup>2</sup>	389 (74)	1998	YES	U.S. Geological Survey (2002)	Complete
Forest Plan - Allegheny National Forest, PA	unquantified	unquantified	1999	NO	-	Complete
Foxburg Bridge, PA	0.08/m <sup>2</sup>	65 (33)	2001	YES	EnviroScience (2010)	Complete
SugarCreek Borough Pipeline	0.35/m <sup>2</sup>	20	2002	NO	-	Ongoing
East Brady Bridge, PA	0.1/m <sup>2</sup>	210 (95)	2002	YES	USFWS (2006)	Complete
Hickory Street Bridge, PA	0.01/m <sup>2</sup>	23 (no salvage)	2003	NO	-	Complete
Mill Village Truss Bridge, PA	0.028/m <sup>2</sup>	9 (3)	2004	YES	EnviroScience (2006)	Complete
West Hickory Bridge, PA	0.493/m <sup>2</sup>	905 (453)	2004	YES	U.S. Geological Survey (2009)	Complete
Gravel Run Road Bridge, PA	0.146/m <sup>2</sup>	519 (no salvage)	2006, 2010	NO	-	Complete
Carters Dam Removal	0.01/m <sup>2</sup>	537	2009	YES	PFBC (2010)	Complete
Millers Station Bridge, PA	0.022/m <sup>2</sup>	10 (no salvage)	2009	NO	-	Complete
Mead Avenue, PA	0.01/m <sup>2</sup>	95	2010	NO	-	Ongoing
PennDOT Bridge Program	Variable	2,944	2011 - 2016	NO		Ongoing

Table 2. (Continued) Previous biological opinions authorizing incidental take of the northern riffleshell (U.S. Fish and Wildlife Service 1998a, 1998b, 1999, 2001, 2002, 2003a, 2003b, 2004, 2006, 2009, 2010a, 2010b, 2012, and 2013).

<b>Project Name, State</b>	<b>Population Density</b>	<b>Estimated lethal take (take post-salvage)<sup>1</sup></b>	<b>Year</b>	<b>Monitoring Report Received</b>	<b>Monitoring Report Reference</b>	<b>Project Status</b>
Carlton Bridge	3.21/m <sup>2</sup>	1,626 (813)	2013	NO		Ongoing
<b>TOTAL</b>		8,227 <sup>2</sup>				

<sup>1</sup> Estimated take within the direct effect area, followed by the estimated mortality after a mussel salvage and relocation is completed (in parentheses).

<sup>2</sup> The estimated incidental take of northern riffleshell was substantially exceeded at West Hickory Bridge (2,750 relocated) and at Mill Village Truss (8 relocated), but this is not reflected on this Table.

## ENVIRONMENTAL BASELINE

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

### Status of Species within the Action Area

Ortmann (1919) reported northern riffleshell (as *Truncilla rangiana*) in Conewango Creek at Russell, PA, approximately 5.5 miles (8,850 m) upstream of Sun Ray Dam. Recently, northern riffleshell were relocated to a site 3.0 miles (4,828 m) upstream of the project site (Backup Corners, Tarr property) following a 2009 salvage effort at Carter's Dam (Welte 2010). Northern riffleshell are known from several sites in Conewango Creek downstream by Evans (2005), Evans and Smith (2005), PFBC (*unpublished data*, 2013) and nearby in the Allegheny River (USFWS/WPC, *unpublished data*). A live male northern riffleshell was observed in the dam remnants during a PFBC site assessment on July 18, 2013 (Welte and Allison 2013).

## EFFECTS OF THE ACTION

“Effects of the action” refers to the direct and indirect effects of an action on listed species or critical habitat, together with the effects of other activities interrelated and interdependent with that action, which will be added to the environmental baseline. Indirect effects are caused by the proposed action and are later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action, and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

### Direct Effects

“Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action and include the effects of interrelated and interdependent actions. Future federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated” (USFWS and NMFS 1998).

Direct effects are expected to occur at, and immediately upstream and downstream of the Sun Ray dam and dam remnants removal, during the period when in-stream activities (*e.g.*, dam removal) take place. One male northern riffleshell was found in the dam remnants area (Welte and Allison 2013). As a conservation measure, salvaging northern riffleshell and other mussels will occur prior to construction, to reduce the number of animals directly killed or injured during the dam removal process. Because northern riffleshell are small and often bury completely in sand and gravel substrates, and may be of a similar size and color to the substrate, it is highly unlikely that all animals, especially juveniles will be located during salvage. Those animals not relocated outside of the area of direct disturbance will be crushed, dislodged, or buried during the

dam and dam remnant removal. Dam removal is proposed during a period when female northern riffleshell are likely to be gravid with eggs or glochidia. Dislodged and disturbed gravid females may abort their young resulting in a failure to reproduce for that year. Both male and female northern riffleshell not directly killed or injured may temporarily cease feeding or respiring when active dam removal is occurring, due to siltation or vibrations. There is likely to be some mortality of relocated mussels due to stress, handling, and inappropriate placement at a new site.

Northern riffleshell will be at risk during construction if chemical spills occur. Construction materials and equipment may affect mussels if the equipment is washed into the river and either physically transported downstream by currents, or if toxic materials, such as fuel, spills into the river. Nearshore placement of earthmoving equipment and trucks will place them at risk of flooding during high-flow events unless precautions are taken to avoid this. Toxic chemical spills could directly or indirectly affect this species, and result in take.

### Indirect Effects

Indirect effects are those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur [50 CFR §402.02]. Dam removal and remnants removal is expected to result in indirect effects on northern riffleshell both upstream and downstream of the dam, as sediments behind the dam and dam remnants are mobilized and transported, and as stream hydrology and morphology upstream and downstream of the dam adjust to the removal of these features. These indirect effects are expected to occur intermittently over a period of several years following the removal of the dam and dam remnants.

Adverse effects are expected to extend approximately 0.38 miles (0.61 km) upstream to the northern tip of the first upstream island, as a result of pool draw-down and changes to in stream hydrology and morphology. Because Sun Ray Dam is partially breached, stream depth behind the dam does not differ significantly upstream and downstream. Therefore, while pool draw-down may result in the dewatering of shallow areas upstream of the dam, we only expect a small amount of the now wetted stream channel to be exposed. However, any mussels in these dewatered areas will likely be stranded and killed. The loss of mussels due to stranding will be minimized by having PFBC biologists and volunteers on-site during demolition, to salvage mussels from de-watered and direct impact areas (see *Conservation Measures*). Because the exposed portions of the channel are likely to coincide with those areas that have historically been dewatered during low-flow conditions and droughts, the risk of northern riffleshell mortality in these areas is relatively low.

Northern riffleshell upstream of the dam may be killed or injured as stream morphology and flow adjust to the new channel configuration over a period of years in a series of scouring, sediment transport, and deposition events. Northern riffleshell that occur in areas that are scoured or subjected to head-cutting will be displaced from the stream substrate and transported downstream. They may be injured or exposed to predation in the process. If they are not able to right themselves and re-burrow in suitable habitat, they will die. Those northern riffleshell that occur in areas where sediments deposit may be smothered and killed. The changes in flow patterns are also expected to alter host fish habitat and distribution, which may adversely affect mussel reproduction success.

Adverse effects are expected to extend approximately 0.75 mile (1.2 km) downstream near the middle of the second downstream island. Downstream indirect effects are expected to result from sedimentation, as well as alterations in stream hydrology and morphology as the stream channel adjusts to the absence of the dam(s). Since a portion of the Sun Ray dam was breached on the right descending bank, it is anticipated that most of the sediment that had accumulated behind the dam was flushed downstream during the breach event. However, we expect that some sediment will be released when both the dam and dam remnants are removed. As sediments behind the dams are mobilized, they will be subjected to several cycles of mobilization and re-deposition as high flows flush them downstream.

Mortality, injury, and stress to northern riffleshell are expected from sedimentation and siltation caused by dam removals and associated activities. Sediment is likely to remain concentrated near the source before becoming mixed in the Conewango Creek and will, therefore, have more of an effect on mussels closer to the source. Female northern riffleshell may be gravid with eggs or glochidia for most of the year, and are at risk from significant sediment exposure, which has been documented to cause mussels to abort eggs or young that would likely die. As filter-feeders on microscopic food items, northern riffleshells are very susceptible to smothering by silt and other sediments in the water (Ellis 1936, in U.S. Fish and Wildlife Service 1994). Siltation may also result in reduced dissolved oxygen and increased organic material at the substrate level (Ellis 1936, Harman 1974; both in U.S. Fish and Wildlife Service 1994). At sub-lethal levels, silt interferes with feeding and metabolism in general (Aldridge *et al.* 1987, in U.S. Fish and Wildlife Service 1994). Because northern riffleshells typically bury themselves to the posterior margin of the shell (U.S. Fish and Wildlife Service 1994), this habitat also renders them susceptible to siltation, which clogs the substrate interstices and suffocates the animals, as well as limits their ability to feed. Proper implementation of erosion and sedimentation control practices will help to minimize some sources of sediment, but it will not prevent the release and transport of sediment currently trapped behind the dam.

Sediment toxicity is also a potential risk for take. No sediment sampling has been conducted in the impounded pool, so any contaminants in these sediments have not been identified or quantified. The Conewango Creek watershed contains a significant amount of agricultural land use, in addition to historical industrial uses. Additionally, outfall pipes from wastewater treatment plants and other sources may have added to pollutants in sediments that have accumulated behind the dam. Heavy metals, polychlorinated biphenols (PCBs), industrial solvents, agricultural pesticides and herbicides, and fertilizers are some of the pollutants that can be found in such sediments (Quinn 1999). If northern riffleshell are exposed to contaminated sediments survival of glochidia or juveniles, and reproduction of adults may be adversely affected.

Because we have no hydrology or stream morphology data for Conewango Creek in the vicinity of Sun Ray Dam, it is difficult to predict exactly how, or how far, stream hydrology and morphology will be altered by dam removal. Flow is restricted to the right descending bank at the breached portion of Sun Ray dam. As a result of this constriction, we expect that scour of the channel has occurred in this area. The scour area may aggrade as sediment from upstream discharges below the current dam location. Additionally, immediately downstream of the dam is an island, with most of the flow going down the right descending channel. Once the dams are

removed, the left descending channel may receive an increased portion of the stream flow, sediment from upstream may also be increasingly deposited in this area. If northern riffleshells have colonized in the left descending channel, they would be buried and suffocate. In addition, the changes in flow patterns are also expected to alter host fish habitat and distribution, adversely affecting mussel reproduction.

We expect that over a period of several years, the channel will become reconfigured by flow pattern changes in response to the dam removals. The most significant changes are expected to occur in close proximity to the project area. As these changes occur, some areas will be scoured and some will be subjected to sediment deposition. According to Bushaw-Newton *et al.* (2002), monitoring the first spring after a dam removal indicated a significant decline in aquatic organism abundance downstream of the dam, coincident with sediment transport, scouring and deposition in these habitats from the former impoundment. These cycles of scouring, sediment transport, and sediment deposition are expected to occur primarily during high-flow events over a period of several years. In the process, pool, riffle, and run sequences will be altered, potentially burying habitat or existing mussel beds.

Although take of northern riffleshell will occur upstream and downstream of these dam features due to project implementation, the project is likely to have a beneficial effect on the northern riffleshell population in Conewango Creek over the long-term. Dam removal will improve population connectivity and facilitate fish host dispersal, thereby benefitting the population. In addition, some unsuitable habitat areas behind the dam may become more suitable for the northern riffleshell as the accumulated sediments are flushed downstream.

#### *Cumulative Effects*

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation under section 7 of the Endangered Species Act. No cumulative effects are foreseen; therefore, none have been evaluated for the Sun Ray Dam and Unnamed Dam Remnants Removal Project.

#### CONCLUSIONS

After reviewing the status of the northern riffleshell, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is the Service's biological opinion that the proposed removal of the Sun Ray Dam and associated removal of unnamed dam remnants upstream is not likely to jeopardize the continued existence of the northern riffleshell. No critical habitat has been designated for this species; therefore, none will be affected.

While this project will result in the take of some northern riffleshells, removal of these dam features is expected to improve population connectivity and host fish dispersal and, therefore, benefit the northern riffleshell population in Conewango Creek over the long-term. Ultimately, removal of the dam will improve the existing stream system for mussel species, including northern riffleshell. Despite the direct and indirect take anticipated, we expect the population to

eventually recolonize the effected portions of Conewango Creek in the action area, and repopulate the downstream sections after shifting gravel and sediment have stabilized.

### **INCIDENTAL TAKE STATEMENT**

Sections 4(d) and 9 of Endangered Species 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.

Because incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity, this Incidental Take Statement is valid only upon receipt by the applicant of all appropriate authorizations and permits from Federal, State and local permitting authorities. These permits/authorizations may include, but are not limited to, a permit under section 404 of the Clean Water Act from the Corps of Engineers; a section 401 Water Quality Certification and Chapter 105 Dam Safety and Encroachment Permit from the Pennsylvania Department of Environmental Protection; a section 75.4 Special Permit from the Pennsylvania Fish and Boat Commission; and an approved Erosion and Sedimentation Control Plan from the Warren County Conservation District. Again, this incidental take statement, along with its exemption from the section 9 prohibitions of the Endangered Species Act, is valid only upon receipt of all required permits and authorizations.

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

## AMOUNT OR EXTENT OF TAKE

The Service anticipates that take in the form of killing, harm, and harassment (as defined in 50 CFR §17.3) will occur as a result of the proposed action. We anticipate that northern riffleshell will be taken during implementation of the Sun Ray Dam removal project and removal of upstream unnamed dam remnants through direct mortality, injury, and stress. Mortality and injury may occur in the action area during and after dam removal due to sedimentation, scouring, and changes in river hydrology and morphology.

Stress, short-term reproductive impairment, and limited mortality due to changes in hydrology, scouring, and sedimentation, are predicted to occur in the action area. Stressors include low oxygen, decreased food, and decreased sperm availability in the water column, and increased silt and other sediment loading. The project will also result in the temporary loss or decreased suitability of mussel habitat due to sedimentation and scouring as the stream channel achieves a new equilibrium without the dam structures. These events will result in harm to adult northern riffleshell, the glochidial life stage of this species, and populations of host fishes.

We estimate the actual number of northern riffleshell in Conewango Creek between the northern point of the dam remnants to the southern tip of the first downstream island to be 116<sup>1,2</sup> individuals. We expect mussels in this part of the action area to face the highest risk of death, injury, or stress due to their proximity to the dam. Take upstream and downstream of the dam, is also expected to occur, but is considered unquantifiable because we cannot predict the timing, frequency, duration or extent of scouring and subsequent sediment deposition. However, effects related to sediment deposition and scouring are expected to diminish with increasing distance from Sun Ray Dam and the unnamed dam remnants.

Table 3 provides a qualitative description of the take that is expected to occur due to direct and indirect effects of the Sun Ray Dam removal project. We are able to describe the type and relative risk of take upstream and downstream of the dam, but we cannot quantify take due to numerous uncertainties. For example, the actual density and distribution of northern riffleshell upstream and downstream of the dam are not known. Nor do we know which sections of Conewango Creek will be subject to scouring and sediment deposition following dam removal. The extent of indirect effects will be influenced by several factors, including stream velocity, shifts in stream hydrology related to dam removal, depth of sediment behind the dam, how far the pool extends upstream, and the effectiveness of erosion and sedimentation controls. Due to

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<sup>1</sup> From the northern point of the dam remnants to the southern tip of the first downstream island 214 m long by 54 m wide (average stream width) = 11,556 sq m x .01 northern riffleshell per m<sup>2</sup> = 115.56 northern riffleshell mussels. The density of .01 northern riffleshell per m<sup>2</sup> is based on the northern riffleshell density documented in the 2001 Hickory Street Bridge Replacement survey report (EnviroScience 2002).

<sup>2</sup> Evaluating direct effects specifically at the dam remnants area 85 m long by 5.8 m wide (average width) = 493sq m x .01 northern riffleshell per/ m<sup>2</sup> = 4.93 northern riffleshell mussels in the dam remnant area (based on EnviroScience 2002). This number is included in the estimated 116 individuals.

all of these uncertainties, it is not possible to predict how many individuals or what percentage of the population will be taken. However, we do expect some portion of the population will be harmed and/or harassed, and expect that more mussels will be temporarily affected (*e.g.*, by sedimentation, scouring, change in channel width, disruption of breeding) than will be killed. The actual level of incidental take will be difficult to detect or quantify because individual mussels (juveniles and adults) are small, and often buried in the substrate, making it unlikely that dead or injured specimens will be located.

Over the long term, we anticipate the northern riffleshell population within the action area will recover to near or above present levels, as mussels eventually recolonize suitable habitat. Once the project is completed, habitat above the dam will be more accessible to host fish, facilitating mussel population expansion. This project is expected to improve connectivity between the northern riffleshell population upstream and downstream of the dam sites.

If either (1) a spill or release of petroleum products or other hazardous substances into Conewango Creek occurs during dam removal; or (2) a failure of erosion and sediment control measures occurs, the ACOE will immediately take remedial action(s), contact the Service for recommendations, and determine whether reinitiation of consultation will be necessary.

Table 3. Incidental take estimates of northern riffleshell for the Sun Ray Dam and remnant dam Removal Project.

<b>Individuals</b>	<b>Type of Take</b>	<b>Area Where Take Will Occur</b>
≤ 116	Kill, harass, or harm during and after dam removal, resulting in mortality, injury, stress, or temporary impairment of feeding or reproduction.	Conewango Creek from the northern point of the dam remnants to the southern tip of the first downstream island (214 m)
unquantifiable	Harass or harm during and after dam removal, resulting in mortality, injury, stress, or temporary impairment of feeding or reproduction. The risk of take is expected to decrease with increasing distance from Sun Ray Dam and unnamed dam remnants.	Conewango Creek from the northern tip of the first upstream island to the middle of the second island downstream (1.13 miles or 1819 m)

#### EFFECT OF THE TAKE

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

#### REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize incidental take of the northern riffleshell at the Sun Ray Dam and dam

remnants removal project site:

1. Minimize the impact of dam removal on endangered mussels and their habitat through careful project design and implementation.
2. Minimize take by salvaging endangered mussels and relocating them to suitable habitat, as described in the project *Conservation Measures*.
3. Monitor and report the take of mussels resulting from project implementation.

## TERMS AND CONDITIONS

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

1. Design and implement the project in a manner that minimizes impacts on the northern riffleshell and its habitat, as described below.
  - a. Submit the permit to the Service for review at least 30 days prior to the start of any proposed removal activities to ensure the resulting effects are consistent with those disclosed in the biological assessment and evaluated in this opinion.
  - b. As proposed, remove the dam between May 1 and September 30. During this period, water levels are relatively low (compared to winter and early spring), and mussel salvage and relocation will be more successful.
  - c. All rock must be ‘clean’ and free of any debris or fines prior to using it for the rock construction entrance or bank stabilization (if necessary). This also includes any rock or concrete that is reused from the dam.
  - d. Develop and implement an erosion and sedimentation control plan to address all sources of project-related erosion and sedimentation, including, but not limited to, construction access roads, roadway approaches, staging areas, dam removal, etc.
    - i. Monitor the project site daily and keep a daily log to ensure the erosion and sedimentation control practices are implemented and properly maintained, and to identify any project-related impacts due to scouring or sedimentation. This log should be available upon request.
    - ii. Follow the Warren County Conservation District’s approved Erosion and Sediment Control Plan.

- e. Develop and implement a spill avoidance/remediation plan based on the most effective prevention and remediation practices to prevent hazardous materials (*e.g.*, petroleum products, solvents, etc.) from entering Conewango Creek, or from contaminating soils or waters within this watershed. Such measures will include, but are not limited to, stationing of emergency response equipment at the project site, and designation of contained fueling and fuel storage areas at least 300 feet (91m) away from the river.
  - i. ACOE and/or PADEP, and contractors will monitor the project site daily to ensure spill avoidance practices are implemented.
  - ii. If a spill does occur, implement emergency remediation procedures to contain the spill, and prevent the spill from entering Conewango Creek.
  - iii. If flooding is anticipated, weather and river stages will be monitored and hazardous materials will be removed from the floodplain.
  - iv. The Service (Robert M. Anderson) will be notified immediately of any spills of hazardous materials at 814-234-4090 or at Robert\_M\_Anderson@fws.gov.
- f. Following dam removal, no project-related or project-generated materials, waste, or fill will be deposited in streams inhabited by threatened or endangered mussels.
- g. During the bidding process, prospective project contractors will be notified regarding the presence of endangered species in the project area, and the special provisions necessary to protect them. The successful contractor(s) will be instructed on the importance of the natural resources in the project area, and the need to ensure proper implementation of the required erosion and sedimentation controls, and spill avoidance/remediation practices. The following conditions (language) will be included in all construction and demolition contracts awarded for project implementation:
  - i. Endangered species are present in the project area and there is a risk of take (Endangered Species Act section 9 violation) if the Terms and Conditions of the Service's biological opinion are not closely followed.
  - ii. Best Management Practices for erosion and sedimentation control will be in place before, during, and after any work is conducted. All best management practices will be properly installed and maintained.
  - iii. Contractors will monitor the project site daily to ensure the erosion and sedimentation control, and spill avoidance practices are implemented. A monitoring log will be made available to the Service on request.

- iv. Develop and implement a spill avoidance/remediation plan based on the most effective prevention and remediation practices to prevent hazardous materials (*e.g.*, petroleum products, solvents, paints, etc.) from entering Conewango Creek, or from contaminating soils or waters within this watershed. Such measures will include, but are not limited to, stationing of emergency response equipment at the project site, and designation of contained fueling and fuel storage areas at least 300 feet (91m) away from the river.
  - v. Contractors will monitor weather and river stages (See the USGS Gage Station at Russell, PA (<http://waterdata.usgs.gov/usa/nwis/uv?03015000>)), and remove any hazardous materials from the river and floodplain in the event that flooding is likely.
  - vi. The Service will be notified immediately of any failures of erosion and sedimentation control measures, or spills of hazardous materials.
  - vii. Following dam removal, no project-related or project-generated materials, waste, or fill will be deposited in streams inhabited by endangered mussels.
- h. If this project is not completed by 2019, the ACOE will reinstate consultation with the Service to re-evaluate project impacts on the northern riffleshell, and to determine the appropriateness of the reasonable and prudent measures, and terms and conditions contained in this biological opinion.
2. To minimize take of endangered mussels, conduct mussel salvage in areas that are de-watered during dam demolition, and relocate the salvaged mussels to suitable habitat outside the direct impact area (see *Conservation Measures*). This salvage will be conducted by a PFBC malacologist or Service-approved qualified mussel surveyor. Mussels will be handled, processed, transported, and relocated in a manner that minimizes the risk of mussel injury or mortality. A report documenting the salvage and relocation effort shall be prepared and submitted to the Service's Pennsylvania Field Office within three months of completion of the salvage.
3. 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. Northern riffleshells that are accidentally killed, or that are moribund or freshly-dead and contain soft tissues, are to be preserved according to standard museum practices, properly identified or indexed (date of collection, complete scientific and common name, latitude and longitude of collection site, description of collection site), and submitted to a recognized museum or research facility (*e.g.*, USGS facility in Leetown, WV). The appropriate person at the selected

repository institution should be contacted regarding proper specimen preservation and shipping procedures.

4. Notification must be made to the following Fish and Wildlife Service offices at least two weeks prior to beginning in-stream salvage activities.
  - a. Region 5 Division of Law Enforcement; 300 Westgate Center Drive, Hadley, MA 01035-9589 (telephone: 413-253-8343).
  - b. State College, Pennsylvania Field Office (Attn: Endangered Species Biologist); 315 South Allen Street, Suite 322, State College, PA 16801 (telephone: 814-234-4090).

The above reasonable and prudent measures, and the implementing terms and conditions are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that up to 116 northern riffleshell in Conewango Creek from the northern point of the dam remnants to the southern tip of the first downstream island could be incidentally taken (killed, injured, stressed) during and after the removal of the Sun Ray Dam and dam remnants area . An additional unquantifiable number of northern riffleshell will be harmed or harassed upstream and downstream of the dam due to sediment transport and hydrologic shifts.

If during the course of the action, the numerical or narrative levels of incidental take are exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. Take due to spills of contaminants (*e.g.*, fuel), or failures of erosion and sedimentation controls, is not covered by this opinion, and must be reported to the Service immediately. The ACOE must immediately provide an explanation of the causes of the taking, and review with the Service the need for possible modification of the reasonable and prudent measures, and terms and conditions.

## CONSERVATION RECOMMENDATIONS

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

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

1. Participate in the development of a conservation plan for the northern riffleshell in Pennsylvania, along with agencies that carry out activities that potentially affect these species (Recovery Plan, Task 1).
2. Seek opportunities to participate in efforts to recover northern riffleshell throughout the species historical range (Recovery Plan, Task 4).
3. Support research to determine captive husbandry techniques suitable for propagation of the clubshell and northern riffleshell. This action would partially meet the objectives of the Recovery Plan (Tasks 4.23, 4.24, and 4.3) for these species and may offset project-related effects elsewhere.
4. Within the Allegheny River watershed, implement or support projects that would improve water quality by reducing non-point source pollution. Such projects would include, but are not limited to, wetland preservation, wetland restoration, streambank fencing, and streambank restoration (via establishment of native plant species). This action would partially meet the objectives of the recovery plan (Recovery Plan, Task 2.2) for these species and may offset project-related effects elsewhere.
5. Develop best management practices (BMP's) for dam removal in areas occupied by threatened and endangered freshwater mussels, and conduct outreach to make successful BMP's available to various interest groups in the range of the species (Recovery Plan, Task 2).
6. Monitor headcutting and scouring that may occur from the northern most point of the first upstream island (0.38 miles), downstream to the middle of the second island (0.75 miles) at weekly intervals for 1 year post-removal to search for stranded mussels. If mussels are exposed due to shifting stream flows post dam removal, immediately salvage and relocate any exposed mussels into the interior of the stream channel.

To be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of the conservation recommendations carried out.

## REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the information presented with the U.S. Army Corps of Engineers, October 21, 2013, request for initiation of formal consultation. As written in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law), and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals the agency action may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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Lora L. Zimmerman, Field Office Supervisor

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Date

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