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Public Comments Processing
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U.S. Fish and Wildlife Service
MS: BPHC
5275 Leesburg Pike
Falls Church, VA 22041-3803

RE: Comments of the Center for Biological Diversity in support of critical habitat designation for the yellow lance (*Elliptio lanceolata*); 85 Fed. Reg. 6,856 (Feb. 6, 2020)

Figure 1. Yellow lance (*Elliptio lanceolata*) mussels. Photo by Sarah McRae, USFWS.

The following are the comments of the below-listed organizations in support of designation of critical habitat for the yellow lance (*Elliptio lanceolata*), pursuant to the Endangered Species Act ("ESA"). These comments are submitted on behalf of the following groups:

Center for Biological Diversity
Upper Neuse Riverkeeper
Pamlico-Tar Riverkeeper

We urge the United States Fish and Wildlife Service ("Service") to finalize its rulemaking proposal and designate all proposed critical habitat for the yellow lance without further delay. Staff and members of our organizations live, work, and recreate in the range of this species in North Carolina, Virginia, and Maryland. Their survival is of scientific, moral, aesthetic, recreational, spiritual, economic, and other interest to our staff and members.

BACKGROUND

After being initially described in the nineteenth century as *Unio lanceolatus* by Isaac Lea and T.A. Conrad, the yellow lance was described as part of a species complex and lumped with several other taxa by Johnson (1970). However, this work has recently been questioned by many researchers, and a number of these synonymized taxa have been recognized as unique species, including the yellow lance. Work by Bogan *et al.* (2009) has clarified the taxonomic position of the species, based on genetic evidence and the morphology of samples from a variety of drainages across the Atlantic Coast. This work confirmed the original placement of the yellow lance as a unique species (Bogan *et al.* 2009).

The yellow lance is a bright yellow freshwater mussel whose shell darkens as it ages. It is typically more than twice as long as it is tall, growing up to about 3.5 inches long. The nacre on the inside of the shell may range in color from salmon to white to an iridescent blue (NatureServe 2016). The mussels are omnivorous filter feeders, consuming a great deal of microscopic material from the water column including plankton, bacteria, detritus, and dissolved organic matter (Haag 2012, p. 26). Freshwater mussels improve water quality through this filtration, but depend on relatively clean water to begin with, and so their presence in a waterway serves as an indicator of a system's water quality.

Adult yellow lance inhabit sandy bottoms and silt-free gravel beds in large creeks and river environments with moderately flowing water and high levels of dissolved oxygen (NatureServe 2016; 85 Fed. Reg. 6,860, Feb. 6, 2020). Specifically, they require water with temperatures of below 35ºC and dissolved oxygen contents of greater than 3 milligrams per Liter as adults, as well as low levels of ammonia, salinity, and other contaminants, especially as juveniles (82 FR 16563). They depend on this clean, high quality water, and notably, no populations have been found below pollution point sources or in areas with high levels of nutrient loading and runoff (Alderman 2003, p. 6).

The life cycle of the yellow lance is similar to that of most freshwater mussels, and is dependent on fish hosts for reproduction. The adult mussels release glochidia, or larvae, into the water column, and these must attach themselves to the gills of nearby host fish such as the white shiner (*Luxilus albeolus*) and pinewoods shiner (*Lythrurus matutinus*) (85 Fed. Reg. 6,860, Feb. 6, 2020), where they will grow as parasites before dropping off to fend for themselves. This is also their main method of dispersal, as the fish can carry their larvae upstream and allow for genetic exchanges (USFWS 2017).

Many species of freshwater mussels are perilously close to extinction across almost the entirety of the North American continent. The yellow lance is an emblematic example of the challenges facing these bivalves, which are declining rapidly due mostly to anthropogenic factors. They had previously been found in watersheds along the Atlantic Coast from the Patuxent River Basin in Maryland to the Neuse River Basin in North Carolina, but have already been presumed extirpated from 3 of their original 12 Management Units (MUs), as outlined by the Service. 82 Fed. Reg. 16,559, April 5, 2017. Of the remaining 9 occupied MUs, 6 exist in a state of low resiliency. 83 Fed. Reg. 14,193, April 3, 2018.

The yellow lance faces the clear and present threat of extinction. The remaining populations of this species are highly vulnerable and face extirpation due to a series of threats such as habitat destruction and fragmentation, declines in water quality, and a loss of the conditions that are crucial for larval development. Ongoing human-generated extinction pressures such as development, logging, agriculture, and climate change, continue to escalate across their range, pushing the marginal extant populations closer to extinction.

The yellow lance was first identified as needing federal protection in 1991. The Center petitioned for its protection in 2010 and filed a lawsuit in 2015 to compel the agency's decision on the imperiled mussel's protection. The combination of the precipitous range-wide decline of the species and the Center's advocacy led the Service to list this species as threatened under the ESA on April 3, 2018. 83 Fed. Reg. 14,189. After 29 years of waiting for full protection while living under the threat of extinction, all of the species' proposed critical habitat units should be designated as essential to the conservation of the species, without further delay.

THREATS

The yellow lance faces numerous threats which in total paint a very bleak picture for the future success of the species, as its range is rapidly contracting and what remains is severely compromised. The species has declined due to immense pressure from human development, agriculture, logging, and climate change.

Development

The primary impact of human development on mussels is through urbanization and the creation of impervious surfaces. The impacts of impervious surfaces on rainfall, runoff,

and streams are well documented, and can include reductions in water quality, fluctuations in water quantity, and loss of habitat (Ren *et al*. 2003, p. 649).

Storm water runoff that normally would filter through the soil naturally and reach the stream over a long period of time instead rushes over the surface into the streams all at once, carrying along chemicals and pollutants from the urbanized area through which it flows. These contaminants can include nitrogen, phosphorous, chloride, pesticides, and metals, and can alter the water chemistry, potentially making it unsuitable for the yellow lance (Giddings *et al.* 2009, pp. 1-2).

The increased flow of runoff can alter habitat by creating channels, reshaping the streams and eroding the banks (Giddings *et al.* 2009, p. 2). It can also become superheated in storm drains, and along with the accumulated pollutants and sediment this can severely stress or harm the mussels as well as the fish they depend on for reproduction.

Development and urbanization also leads to the construction of culverts where roads and streams intersect. The improper construction of these culverts can act as a significant barrier in the stream, particularly if they flow differently from the rest of the stream or are perched above the bed of the stream. This can limit the ability of host fish to pass through them, fragmenting populations of yellow lance and eliminating potential habitat.

Based on 2011 National Land Cover Data analyzed in the SSA (2017), development impacts all of the river basins where the yellow lance has extant populations, from 7 percent development in the Tar River basin to 25 percent in the Patuxent River basin. This threat will only continue to grow in the coming years.

Agriculture

Agriculture affects the yellow lance (and other freshwater animals) in two main ways: through nutrient runoff and water pumping. Huge amounts of nitrogen and phosphorous, found in high concentrations in fertilizers and animal manure, are swept into nearby rivers from agricultural fields and concentrated animal feeding operation facilities during rain events, or can leach into the ground water. These will result in eutrophication and potentially algal blooms, which suffocate fish that host yellow lance larvae and can dramatically reduce the amount of dissolved oxygen present in the water. 82 Fed. Reg. 16,563, Apr. 5, 2017.

Water from streams is often pumped into agricultural fields for irrigation, and when done improperly this can have serious consequences for downstream habitat and animals. By removing large quantities of water, this can lead to reduced availability of water for sensitive areas during dry times of year, and potentially to the stranding of mussel beds and eventually their desiccation and death. This is a common practice in many agricultural areas, and all of the watersheds where the yellow lance is found have at least 20 percent or more devoted to agriculture. *Id*. These combined effects are a major threat to the yellow lance.

Forest Management

Certain silvicultural activities can have a severe negative impact on the yellow lance. Systems such as best management practices (BMPs) can sometimes be effective when followed, but are not required by permit in many of the states where the yellow lance is found. Instead, they rely on a voluntary system of compliance that has no enforcement mechanism. While forest products companies and those in the timber industry tout their high levels of compliance, the facts on the ground indicate that many logging projects do not meet these baseline water conservation standards.

The consequences on the yellow lance from those that fail to follow BMPs or implement them improperly could be severe, including the increase in insolation on the water of the stream. This in turn increases the temperature of the water, which has a direct effect on the suitability of the site for the yellow lance, and can also change the species richness and composition for macro and micro-invertebrates (Couceiro *et al.* 2007, p. 272; Caldwell *et al.* 2014, p. 3). The yellow lance depends on these animals for food, and is also highly sensitive to increases in water temperature.

With the removal of trees, increased sediment loading often affects sensitive downstream habitats, compromising the viability of the habitat for *Elliptio lanceolata*. With all of these potential consequences, the probability of mismanaged or non-compliant silvicultural operations should be considered a continuing threat to the critical habitat of the yellow lance.

Climate Change

Climate change is an ever-growing danger that will inevitably affect all living species in some way, and the yellow lance is no different. They are very dependent on certain water temperatures to complete all the stages of their life cycles, and a warming climate will impair the viability of populations via warming water temperatures. Due to their limited mobility, they have limited ability to seek climate refugia, as other species will, and therefore are likely to experience high mortality as a result of warming. They are also susceptible to mortality from events such as drought and flood, which are projected to increase as climate change progresses. Thus, even if other human-caused threats are addressed, they are still likely to decline due to climate change alone. The Service must therefore act to protect the mussel from other habitat stressors so that populations are robust and have increased resiliency to climate induced stressors.

Barriers

Barriers such as dams can have dramatic effects on freshwater ecosystems, and have led to the extinction of many mussel species across the continent (NCWRC 2015). Upstream of dams, their preferred habitats of shallow, flowing water have been inundated by impounded water, leading to increased water depth and sediment deposition, decreased oxygen, and changes in the local species composition of fish. Downstream, the

fluctuations in water flow can alter the habitat and again change the local assemblages of fish, which is critical to the reproductive success of the yellow lance.

Barriers also cause fragmentation of habitats and populations for the mussel, as their dispersal is very limited and the fish they depend on to spread larvae can no longer travel as far due to the presence of these barriers, especially for small fish such as those that the yellow lance relies on.

CRITICAL HABITAT

Critical Habitat Designation is Required for *Elliptio lanceolata*

When the Service lists a species as endangered or threatened, it must also designate the critical habitat of that species. 16 U.S.C. § 1533(a)(3)(A)(i). The ESA defines "critical habitat" as:

> "(i) the specific areas within the geographical area occupied by the species . . . on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species . . . upon a determination by the Secretary that such areas are essential for the conservation of the species."
>
> 16 U.S.C. § 1532(5)(A).

The best scientific information available clearly indicates that all of the units of critical habitat proposed by the Service for *E. lanceolata* are essential to the conservation of the species. Furthermore, the best scientific information available clearly indicates that the species is at risk of imminent collapse due to ongoing disturbances and other threats within its range (see above). The units of critical habitat proposed by the Service represent a small and rapidly-dwindling number of locations where these species may still survive within severely degraded, highly-fragmented landscapes and watersheds which continue to undergo rapid degradation via ongoing human disturbance pressures.

Under the status quo, and without robust, swift action to safeguard all remaining populations and their remaining viable habitat, this species has no reasonable prospect of avoiding extinction. Therefore, the designation of all proposed critical habitat units is "essential for the conservation of the species." *Id.*

In light of the myriad threats that have led to this species' precipitous decline, extirpations, and imminent risk of extinction, we urge the Service to designate all proposed critical habitat units for the yellow lance without further delay. Species with critical habitat are more likely to move towards recovery than species which lack designated habitat (Taylor et al. 2005).

Because of these species' constricted range, reduced population size, and compromised resiliency, all 319 stream miles of proposed critical habitat for the yellow lance should be designated as critical habitat without further delay.

Yellow Lance Critical Habitat Units

All 11 units of proposed critical habitat, spanning 319 stream miles of habitat essential to the survival and recovery of the species, are presently occupied by the yellow lance. 85 Fed. Reg. 6,861, Feb. 6, 2020. Additionally, all 319 stream miles of all 11 units contain physical and biological features which are essential to the conservation of the species and which may require special management considerations or protection. *Id.* As such, designation of all proposed critical habitat units is not only lawful under 16 U.S.C. § 1532(5)(A)(i), but required in order to ensure the yellow lance's survival and recovery. *Id.*

Exclusions

The Service excludes from the definition of critical habitat "manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on the effective date of this rule." 85 Fed. Reg. 6,871, Feb. 6, 2020. This exclusion should be construed as narrowly as possible. While it is logical to exclude pre-existing pavement and human structures (as well as the land directly underneath said structures and pavement), this exclusion should not be construed to exclude undeveloped land from critical habitat simply because said land may share a parcel with otherwise-excluded pavement or human structures.

Consideration of Economic Impacts

Notably, the Service's economic analysis for this rulemaking revealed that this critical habitat designation for the yellow lance would primarily result in insignificant administrative economic costs and no additional Section 7 consultations. 85 Fed. Reg. 6,867, Feb. 6, 2020. This is an extremely economical−and not unduly burdensome−price for to pay to save this species from extinction.

When the Service designates critical habitat for this species, it should also take into consideration the economic benefits of protecting their habitat. Some examples of economic benefits resulting from protection of *E. lanceolata* habitat include ecosystem services, the protection of clean water, the reduced cost of water treatment for drinking water supplies, as well as public health benefits.

CONCLUSION

The best available scientific information clearly shows that all proposed critical habitat units for the yellow lance are essential to the conservation of the species, pursuant to the Endangered Species Act at 16 U.S.C. § 1532(5)(A). We urge you to finalize designation of

all proposed critical habitat units for this imperiled species to safeguard its continued existence.

Thank you for taking our comments into consideration.

On Behalf of All Parties,

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