Species Assessment and Listing Priority Assignment Form

SCIENTIFIC NAME: *Percina bimaculata (Haldeman, 1844)*

COMMON NAME: Chesapeake logperch

LEAD REGION: Region 5 (Northeast Region)

LEAD REGION CONTACT:

LEAD FIELD OFFICE CONTACT:

INFORMATION CURRENT AS OF: 1/15/2018

STATUS/ACTION

___ Funding provided for a proposed rule. Assessment not updated.

___ Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

___ New Candidate

___ Continuing Candidate

___ Candidate Removal

- ___ Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status
- ___ Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species
- ___ Range is no longer a U.S. territory
- ___ Insufficient information exists on biological vulnerability and threats to support listing
- ___ Taxon mistakenly included in past notice of review
- ___ Taxon does not meet the definition of "species"
- ___ Taxon believed to be extinct
- ___ Conservation efforts have removed or reduced threats
- ___ More abundant than believed, diminished threats, or threats eliminated.

PETITION INFORMATION

__ NON-PETITIONED

_x_ PETITIONED

90-DAY POSITIVE:

12-MONTH POSITIVE:

Did the Petition request a reclassification?

For Petitioned Candidate Species:

Is the listing warranted? If yes, see summary threats below.

To Date, has publication of the proposal to list been precluded by other higher priority listing?

Explanation of why precluded:

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EXTENT OF OCCURRENCE/AREA OF OCCUPANCY

Historical and Current States/Territories/Counties of Occurrence:

Countries: United States

Historical States: Maryland, Pennsylvania, Virginia**,** District of Columbia

Historical Counties: See Table 1, Figure 1

Current States: Maryland, Pennsylvania

Current Counties: See Table 1, Figure 2

Sources of Occurrence Information:

Lee et al. 1984; Near 2008; Ashton and Near 2010; PA-DEP 2010; MD-DNR et al. 2012; PA-FBC 2015; PGC-PFBC 2015

Table 1. Current (2000–2017, **bold text**) and historical (pre-2000) occurrences of Chesapeake Logperch (*Percina bimaculata)* by state and county.

State	County	River Basin
District of Columbia		Potomac River*
Maryland	**Cecil**	**Lower Susquehanna River**
	Harford	**Lower Susquehanna River**
	Prince George's	Potomac River
Pennsylvania	**Lancaster**	**Lower Susquehanna River**
	York	**Lower Susquehanna River**
Virginia	Westmoreland	Potomac River*

*Considered extirpated

LAND OWNERSHIP:

Chesapeake Logperch (*Percina bimaculata*) is a species endemic to the Chesapeake Bay River basin. It is restricted geographically to the lower Susquehanna River and in the lower reaches of its tributaries which flow through both privately and publicly owned lands. This includes, but is not limited to, private properties, conservation easements (e.g., The Nature Conservancy on Octoraro and Conowingo creeks), and State Parks (e.g., Susquehanna State Park, Maryland and Pennsylvania).

BIOLOGICAL INFORMATION

SPECIES DESCRIPTION:

The Chesapeake Logperch, like other logperches (genera *Percina*), is a larger species of darter characterized by an elongate body, broad interorbital width (i.e., large space on top of head between the eyes), two distinctly separate dorsal fins, modified midventral scales, and a conical, fleshy snout that extends beyond the upper jaw. Chesapeake Logperch are distinguished from other closely related species of the *Percina caprodes* clade by a combination of morphometric and meristic characteristics and pigmentation patterns. These include (1) a more robust body, (2) 7–11 irregularly shaped, dark lateral bars, (3) 4 dark dorsal saddles, (4) large spot at the base of the caudal fin, (5) first dorsal fin with a narrow orange submarginal band (less evident in females), (6) broad frenum, (7) 16–28 modified midventral scales (males), and (8) unscaled nape and breast regions (Haldeman 1842, 1844; Near 2008; Ashton and Near 2010). Adult Chesapeake Logperch can reach up to 109 mm in standard length and are sexually dimorphic with males exhibiting larger snout and anal fin lengths; however, breeding pigmentation in males has not been described (Near 2008).

TAXONOMY:

Table 2. Taxonomic hierarchy for Chesapeake Logperch (*Percina bimaculata*).

Scientific Classification	
Kingdom	Animalia
Subkingdom	Bilateria
Infrakingdom	Deuterostomia
Phylum	Chordata
Subphylum	Vertebrata
Infraphylum	Gnathostomata
Superclass	Actinopterygii
Class	Teleostei
Superorder	Acanthopterygii
Order	Perciformes
Suborder	Percoidei
Family	Percidae
Genus	Percina
Species	*Percina bimaculata* (Haldeman, 1844)
Common Name	Chesapeake Logperch

Chesapeake Logperch belong to the perch family, Percidae. Until recently, Chesapeake Logperch were believed to be a synonym of logperch (*Percina caprodes*). Haldeman (1942) first described Chesapeake Logperch from the lower Susquehanna River as *Percina nebulosa*. Two years later, Haldeman (1944) described a second specimen—collected from the same river—as *Percina bimaculata*. Given the collection locality and similar descriptions Haldeman reported of the two specimens, and the fact that the name *P. nebulosa* had been previous described elsewhere by Rafinesque (1814), it believed these two specimens were the same species and *P. bimaculata* the appropriate name. However, *P. bimaculata* was not recognized as a distinct species but rather was considered part of the *P. caprodes* clade that is composed of multiple species. Stemming from phylogenetic and morphological investigations on the genera Percina (see Near and Benard 2004), Near (2008) presents phylogenetic, morphologic, and geographic evidence to support the recognition of Chesapeake Logperch as a distinct species.

HABITAT / LIFE HISTORY:

Chesapeake Logperch prefer larger rivers and the lower reaches of tributaries draining into them, although Ashton and Near (2010) also reported occurrences in impounded habitats. Neely and George (2006) reported collecting Chesapeake Logperch approximately 0.25 km upstream from the confluence with the Susquehanna River in a high-gradient riffle composed of bedrock and larger substrates (e.g.,

small–large boulders). They also noted encounters occurred primarily in runs and flowing pools (Neely and George 2006; Near 2008). During surveys for federally listed Maryland Darter (*Etheostoma sellare*), Chesapeake Logperch were found in "shallow, fast-flowing riffles and in deep, tidally-influenced pools over a variety of substrate types" of tributaries and the mainstem of the Susquehanna River (MD-DNR et al. 2012). They also reported Chesapeake Logperch to occur most commonly in areas composed of fine gravel and sand/silt and vegetation. Similarly, the Pennsylvania Department of Environmental Protection (PA-DEP 2010) reported collections in tributaries flowing into the Susquehanna River. Described as a habitat generalist, Chesapeake Logperch can occur in fast currents of riffles with cobble substrates (e.g., Piedmont streams of Maryland and Pennsylvania) or in vegetated habitats characterized by slower flows (e.g., Coastal Plain waters of Maryland) (MD-DNR 2016). While habitat preferences have not been thoroughly assessed beyond reporting of habitat characteristics at occupied localities, and are in need of further studies, Near (2008) and Ashton and Near (2010) suggest that Chesapeake Logperch habitat preferences are likely similar to *P. caprodes* clade species (e.g., warm habitats with unembedded, gravely substrates) (Page and Burr 1991; Etnier and Starnes 1993; Jenkins and Burkhead 1994).

Chesapeake Logperch are insectivores that use their snout to overturn rocks in search of food. Information on reproduction is limited, but Ashton and Near (2010) suggest that it is likely similar to *P. caprodes*: reproductive maturity at 1 year, spawning in the spring (timing driven by water temperatures) over sand and gravel substrates (Jenkins and Burkhead 1994). Pennsylvania species action plan for Chesapeake Logperch reported larval collections in Conowingo creek from late-April to mid-June of 1977 (PA-FBC 2015). Information on local dispersal ranges for individuals of Chesapeake Logperch is unavailable, but it is possible they can move over long distances. Roberts et al. (2014) reported dispersal patterns for *Percina rex* (Roanoke logperch), to move (on average) between sites 14 km apart and as far as 55 km apart. Additional studies are needed to fill gaps in knowledge on the life-history and ecology of Chesapeake Logperch (Ashton and Near 2010; PA-FBC 2015).

HISTORICAL AND CURRENT RANGE / DISTRIBUTION:

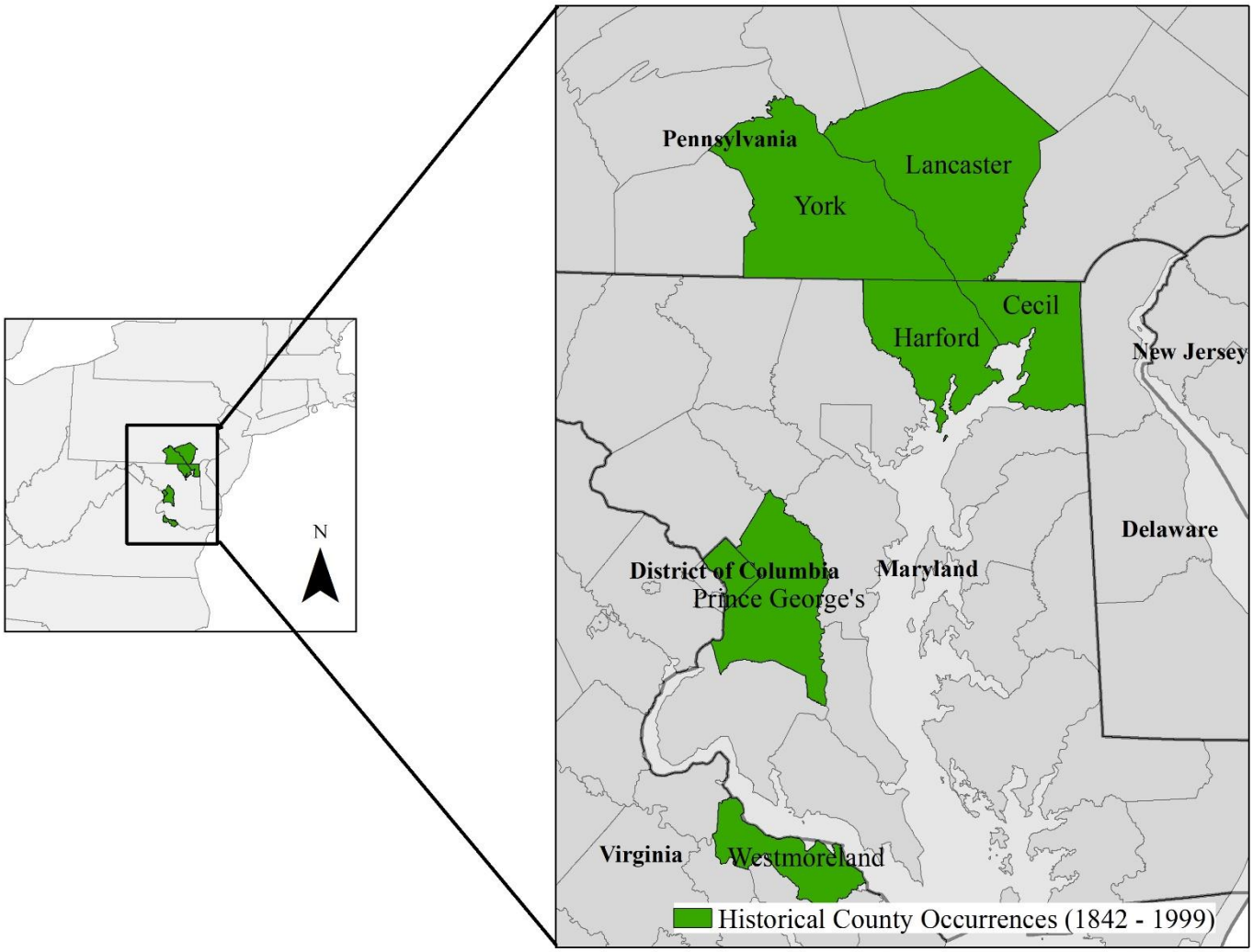

Figure 1. Historical (1842–1999) range of Chesapeake Logperch (*Percina bimaculata*). Occurrences are shown by county.

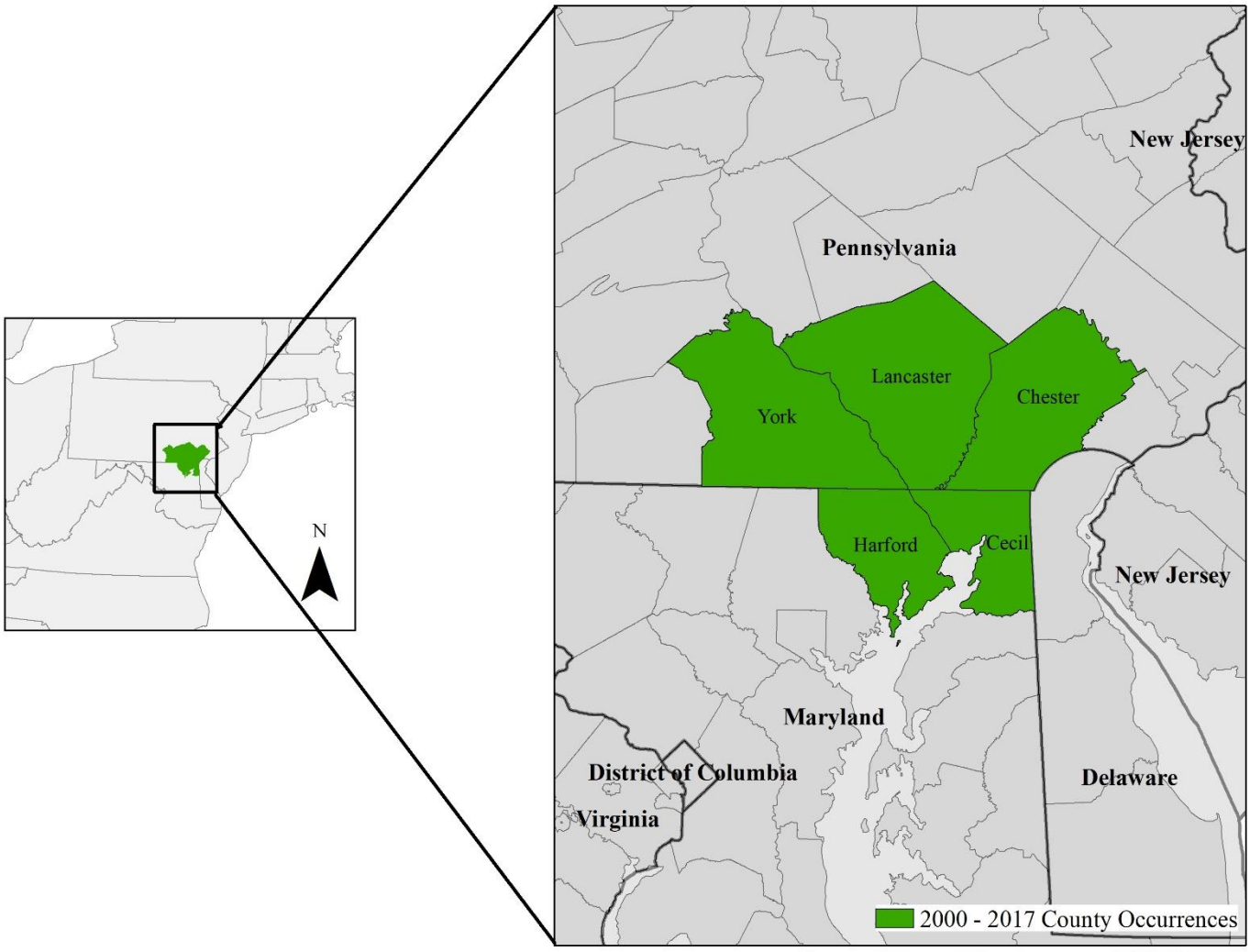

Figure 2. Extant (collections post-2000) range of Chesapeake Logperch (*Percina bimaculata*). Occurrences are shown by county.

Chesapeake Logperch are endemic to the Chesapeake Bay basin. Historically, Chesapeake Logperch were distributed across the lower Susquehanna River basin of Pennsylvania and Maryland and in the middle and lower Potomac River basin of Maryland, Virginia, and the District of Columbia (Near 2008; Ashton and Near 2010). Haldeman (1842) reported the absence of Chesapeake Logperch upstream of Lancaster County, where the Holtwood Dam (constructed 1905–1910) stands today (PA-FBC 2015).

The last reported encounter in the Potomac River basin occurred in 1938 (Lee et al. 1984; Near 2008). Today, Chesapeake Logperch are geographically restricted to the lower Susquehanna River basin of Pennsylvania and Maryland and are believed to be extirpated from the Potomac. Collections over the past two decades indicate extant populations occur in the mainstem of the lower Susquehanna River—above and below Conowingo Dam—and in the lower reaches of its tributaries. Occupied tributaries include Conowingo, Deer, Broad, Octoraro, Northeast, and Swan creeks of Maryland, and Fishing, Michael Run, Muddy, and Octoraro creeks of Pennsylvania (Near 2008; Ashton and Near 2010; PA-DEP 2010; MD-DNR et al. 2012).

POPULATION ESTIMATES / STATUS:

Population Estimates:

The current population size of Chesapeake Logperch is unknown (Near 2008; Ashton and Near 2010; NatureServe-IUCN 2014). While local population estimates for Chesapeake Logperch are unavailable, fish sampling data and recent species reviews (Near 2008; Ashton and Near 2010) provide some insight into temporal and spatial population trends.

In the 1890s, Smith and Bean (1899) reported Chesapeake Logperch to commonly occur in Potomac River basin streams flowing through the District of Columbia. But by 1940, Chesapeake Logperch had declined to undetectable levels in the Potomac, with the last reported collection in 1938 (Lee et al. 1984; Near 2008). Since its discovery from the lower Susquehanna in the 1840s, Chesapeake Logperch has been sporadically encountered across several of its tributaries and mainstem localities. Chesapeake Logperch still occur in several of the historically occupied tributaries and mainstem locations of the lower Susquehanna River basin; however, several previously known localities are lacking recent presence data (Near 2008). However, this does not necessarily signify true absence and local extirpation but could be due to a low detectability, unavailable and updated survey data (e.g., sites not recently reassessed, unpublished collections), or insufficient sampling efforts. Limited interest from state and federal agencies (prior to Near's publication) to conserve and monitor Chesapeake Logperch are a result of being (until recently) a species regarded as a synonym to *P. caprodes* (Near 2008). Additional studies are needed to assess Chesapeake Logperch distributions and obtain baseline estimates of population size (Near 2008; Ashton and Near 2010; PA-FBC 2015).

Table 2. Chesapeake Logperch listing status.

State	State Status	S Rank*	Mentioned in SWAP	SGCN**	SGCN Rank	Source	Notes
Maryland	T	S1S2	Yes	Yes	A	MD-DNR	Conservation Status Category A = Highest conservation status
Pennsylvania	T	S1S2	Yes	Yes	NA	PA-DEP 2010; PA-FBC 2015; PGC-PFBC 2015	
Virginia	EX	NA	NA	NA	NA	Near 2008; VDGIF 2015; VaFWIS	
District of Columbia	EX	NA	NA	NA	NA	Near 2008	

State Species Protection Status

E = State Endangered

T = State Threatened

EX = State Extirpated

**SGCN = Species of Greatest Conservation Need (identified by the states)

IUCN Status = Vulnerable

American Fisheries Society = Endangered

S Rank* = NatureServe Subnational (state) Conservation Status Rank

SX = Presumed Extirpated

S1 = Critically Imperiled (≤ 5 occurrences)

S2 = Imperiled (≤ 20 occurrences)

S3 = Vulnerable (≤ 80 occurrences)

S4 = Apparently Secure (uncommon but not rare)

S5 = Secure (Common, widespread, abundant)

Chesapeake Logperch NatureServe Global Level Conservation Status Rank = G1G2 = Critically Imperiled

(detailed definitions available at http://explorer.natureserve.org/nsranks.htm)

Listing Status in Virginia and the District of Columbia.—Species presumed to be extirpated. Last collected in 1938 in the Potomac River basin. No listing status.

Listing Status in Maryland.—Listed as State Threatened. Considered a high priority conservation species and designated as a SGCN. It is listed under a Conservation Status Category A, defined as a species of highest conservation status to the state. Maryland DNR Fisheries Service assigns Chesapeake Logperch to its internal Threaten species conservation status category.

Listing Status in Pennsylvania.—Recently added to the state's list of threatened and endangered species (State Threatened). Chesapeake Logperch is designated as a SGCN and is considered a "responsibility species" for Pennsylvania as >10% of Chesapeake Logperch global population resides within the state.

In a 2013 biological review, Chesapeake Logperch were listed as a Vulnerable species under IUCN definitions due to its limited number of occurrences (spatial extent and localities) and vulnerable, declining habitat quality.

The NatureServe (NatureServe-IUCN 2014; NatureServe 2017) last reviewed the conservation status of Chesapeake Logperch in 2012 and concluded that it should be listed as a Critically Imperiled Species (G1 ranking); a status defined as a species at very high risk of extinction dur to extreme rarity (generally < 5 populations), significant declines, or other factors. The justification for this classification and recommendations for its conservation were noted as:

"Small range in rivers in Pennsylvania and Maryland; apparently extirpated in the Potomac River basin; threatened by impaired water quality and siltation; better information is needed on current status, abundance, and trends." -NatureServe 2017, Chesapeake Logperch Species Account

Near's (2008) morphological and molecular phylogenetic analysis and review of Chesapeake Logperch geographical distribution provided evidence to support the recognition of Chesapeake Logperch as a distinct species. Near (2008) concluded that given its extremely limited geographical distribution and large loss in its range since its discovery in 1842, Chesapeake Logperch warrants conservation and legal protections and should be considered for protection under the ESA (1973).

DISTINCT POPULATION SEGMENT (DPS):

Not applicable

THREATS

A. THE PRESENT OR THREATENED DESTRUCTION, MODIFICATION, OR CURTAILMENT OF ITS HABITAT RANGE:

Habitat degradation, fragmentation, and loss are the most significant threats to Chesapeake Logperch. Over the last 150 years, stream habitat and water quality have been heavily influenced by expanding urbanization, increased agriculture, mining and forestry operations, poor land-use practices, toxic spills, and dams. These anthropogenic factors have driven habitat loss and degradation by increasing siltation, nutrient loading, pollution, pH, and water temperatures. Over the past century, agriculture and urban land uses have increased nutrient loading through soil erosion and nutrient run-off and have increased exposure and concentrations of contaminants in the water such as pesticides, herbicides, and synthetic estrogens. In addition, dams alter water quality and habitat suitability through modifications to natural river hydrological and geomorphological processes. These impacts include alteration to natural thermal and hydrological regimes which can limit individual growth, create hypoxic (low dissolved oxygen levels) conditions, contribute to (potentially toxic) algae blooms, prevent or destroy essential nursery, foraging, protection habitats once provided by aquatic vegetation, and disrupt reproduction and limit recruitment success across aquatic communities—consequently altering food-web, predator-prey, and competition dynamics (Jenkins and Burkhead 1994; Ligon et al. 1995; Poff et al. 1997; Wood and Armitage 1997; Lessard and Hayes 2003; McDonald et al. 2013; Ankley et al. 2017).

Stream habitat and water quality in the Chesapeake Bay watershed have been significantly impacted over the last two centuries by various human activities such as coal mining and logging operations, agriculture, poorly-treated wastewater effluent, dams, and chemical releases (Goldberg et al. 1978; PGC-PFBC 2015; MD-DNR 2016). Acidic mine drainage from decades of coal mining in the Bay area has, and continues to, negatively impact water quality in the Susquehanna River through increased levels of heavy metals and sulfate (USGS 1997). Increased nutrient pollution from agriculture and urbanized areas (wastewater treatment facilities, surface runoff, point source pollution) have increased phosphorus and nitrogen inputs to freshwater and coastal systems in the region, particularly in the Chesapeake Bay watershed. These fluxes in phosphorus and nitrogen nutrients have been linked to mass algal blooms that are harmful—sometimes toxic—to fishes (and other aquatic biota) and accelerated eutrophication of systems (Anderson et al. 2002). In addition, agriculture and urbanization have contributed to degraded freshwater habitats in the region by altering flow regimes through water extractions, diversions, and impoundments, and by increasing erosion, sedimentation, and contaminants.

Since their construction in the early-1900s, three hydroelectric dams along the lower Susquehanna River have been trapping nutrients and accumulating sediments in their reservoirs; including large quantities of coal and heavy metal contaminants from coal mining (USGS 1997; Langland 2015; Chesapeake Bay Program). While a USGS (1997) study found that two of the reservoirs had already reached storage capacity, they estimated the furthest downstream, and largest, reservoir formed by

Conowingo Dam to be at 81% capacity and predicted it would reach equilibrium capacity by 2007-2017 (USGS 1997; Langland 2015). In a more recent evaluation on nutrient and sediment transport and capacity in these three lower Susquehanna River reservoirs, Hirsch (2012) and Langland (2015) reported that Conowingo Dam had reached 92% capacity by 2011 and no longer was able to trap nutrients and sediments effectively. Consequently, sediment, metals, and nutrient loads from the Conowingo Dam are expected to increase downstream into the Susquehanna River—habitat currently occupied by Chesapeake Logperch—and into the Chesapeake Bay (Hirsch 2012; Langland 2015; Chesapeake Bay Program).

Stressors to freshwater fishes triggered by these human activities (i.e., source of stressor) may be episodic or chronic. Examples include 1) elevated levels of nutrient loading, metal contaminants, sedimentation, and suspended solids, 2) elevated temperatures, 3) low dissolved oxygen conditions and increased oxygen demands, 4) harmful algal blooms, and 4) alteration to natural pH, thermal, and flow regimes (Jenkins and Burkhead 1994; Richter et al. 1997; Anderson et al. 2002; PA-DNR 2015; MD-DNR 2016). Given Chesapeake Logperch preference for clean, unembedded gravel substrates, populations residing within the mainstem of the lower Susquehanna River may be negatively impacted by increased sedimentation and nutrient loading.

Compounded by the many existing anthropogenic stressors to Chesapeake Logperch and other aquatic biota, impending changes in climate are predicted to exacerbate habitat and water quality issues throughout the Mid-Atlantic region. Anticipated changes include warmer temperatures, increased precipitation, altered hydrological regimes, sea-level rise, increased magnitude and frequency of flooding and drought events, and encroachment by invasive (Moore et al. 1997; Najjar et al. 2000; EPA 2001). These changes threaten stream habitat and water quality, and consequently Chesapeake Logperch populations, by altering natural hydrological and biogeochemical processes, increasing polluted run-off and erosion, increased toxicity of contaminants, raising water temperatures, decreased dissolved oxygen, and increased salinity through potential saltwater intrusion species (Moore et al. 1997; Najjar et al. 2000; EPA 2001; Ficke et al. 2007).

B. OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC, OR EDUCATIONAL PURPOSES:

Overutilization of Chesapeake Logperch for commercial, recreational, scientific, or educational purposes has not been reported and are not believed to be a significant threat to the species. It is possible that some Chesapeake Logperch may be taken incidentally during angler bait-bucket collections, but, there is no evidence to suggest this is a threat to this particular species. Also, while there is a growing aquarium trade for native freshwater fishes and potential illegal take, Chesapeake Logperch have not been reported as a targeted species.

C. DISEASE OR PREDATION:

Disease and predation pressures have not been reported as specific threats to the persistance of Chesapeake Logperch populations. There is a growing potential for disease and predation to become signifcant threats to native aquatic species under anticipated climate change impacts on freshwater ecosystems. Rahel and Olden (2008) found that climate change will increase the occurrence of non-native invasions and their subsequent likelihood of successful establishment. This may alter the impacts non-native have on natives by magnifying predation pressures, and could increase the likelihood and virulence of introduced diseases and parasites. Furthermore, projected changes in water quality and elevated water temperatures may increase fish susceptibility to exisiting or introduced pathogens (Ficke et al. 2007). Jackson and Mandrak (2002) reported that warming temperatures under climate change will reduce overwintering mortality in predatory species, thereby intensifying predation pressures. Williamson et al. (2017) showed how climate-change-induced increases in precipitation can increase wildlife (and human) exposure to infectious diseases through increased instream levels of dissolved organic matter that inhibit solar ultraviolet radiation ability to inactivate pathogens. Again, while disease and predation are not currently significant threats to Chesapeake Logperch populations, there is growing evidence in freshwater ecosystems to suggest that predator-prey and disease-dynamics (and host-parasite relationships) will shift in response to climate change; consequently altering species compositions (Jackson and Mandrak 2002; Ficke et al. 2007; Rahel and Olden 2008; Marcogliese 2016; Williamson et al. 2017).

D. THE INADEQUACY OF EXISTING REGULATORY MECHANISMS:

Lower Susquehanna River Basin: Maryland and Pennsylvania

Currently not federally listed or a species of concern, Chesapeake Logperch are under review for protection. Chesapeake Logperch are listed as State Threatened throughout their current known range (Maryland and Pennsylvania) and were identified as a SGCN in Maryland and Pennsylvania's most recent State Wildlife Action Plans (PGC-PFBC 2015; MD-DNR 2016). The species may receive cascading benefits from conservation actions applied in the drainage that protect and restore habitat and water quality for federally endangered Maryland Darter (*Etheostoma sellare*; ESA 1967, Ashton and Near 2010). Designated critical habitat for the Maryland Darter includes Deer and Swan creeks; two tributaries with current records for Chesapeake Logperch.

Potomac River Basin: Virginia and District of Columbia

Last encountered in the Potomac in 1938, Chesapeake Logperch are now considered extirpated from the Potomac River basin of Virginia and the District of Columbia (Lee et al. 1984; Jenkins and Burkhead 1994; Near 2008; Angermeier and Pinder 2015). While Virginia State Legislation for Threatened and Endangered species does not explicitly mandate regulatory protections for Chesapeake Logperch, this species (if present) would benefit from habitat restoration activities occurring in the Potomac River drainage.

E. OTHER NATURAL OR MANMADE FACTORS AFFECTING ITS CONTINUED EXISTENCE:

Human-related Factors-

Not only do dams and other man-made structures alter water quality and habitat conditions through modifications to natural river hydrological and geomorphological processes, but they fragment habitat and act as barriers to upstream fish dispersal (Vannote et al. 1980; Poff et al. 1997; Richter et al. 1997; Graf 2006). The resulting fragmentation of habitat causes loss of riverine connectivity between subpopulations; disrupting gene flow and creating isolated populations that are vulnerable to genetic drift and extirpation. Isolated populations are also susceptible to stochastic events and anthropogenic stressors. Maryland and Pennsylvania SWAPs identify the interrupted connectivity of free-flowing river systems as a threat to aquatic habitats and biodiversity. Dams have prevented Chesapeake Logperch from recolonizing historically occupied (upstream) reaches and expanding their range into upstream habitats.

Non-native and Invasive Species-

Roughly 50% of the fish community in the lower Susquehanna River are introduced non-native species (PA-SWAP 2015). Introductions of non-native fishes pose a serious threat to native fish communities in their potential to modify habitat, act as pathogen vectors, reduce genetic integrity of natives through hybridization, shift native species' habitat use and predator-prey dynamics, and increase competitive pressures; consequently causing species declines and extirpations, and homogenizing fish communities (Rahel 2000; Vitousek et al. 1996, Schmitz and Simberloff 1997; Gray et al. 2005). Banded Darter (*Etheostoma zonale*), Greenside Darter (*Etheostoma blennioides*), and Mimic Shiners (*Notropis volucellus*) are examples widely distributed non-natives in the Susquehanna River drainage (Denoncourt et al. 1975a, 1975b, 1977; Gray et al. 2005; Neely and George 2006; PA-PBC 2015). Several studies have reported negative effects of introduced darter species on native fish fauna in the Susquehanna River drainage (Gray and Stauffer 2001; Neely et al. 2003; Gray et al. 2005; Carlson 2008). In a study examining the effects of a non-native species on the habitat use of a Susquehanna River native species, Gray et al. (2005) found introduced Banded Darter were excluding native Tessellated Darters (*Etheostoma olmstedi*) from preferred riffle and run habitats. The impact of non-native fishes on native Chesapeake Logperch populations is unknown and warrants further investigation (PA-SWAP 2015).

Natural Factors-

As mentioned earlier, climate change is anticipated to increase non-native species invasions (and ranges) and influence the ecological relationships of non-native species on native species. Invasive

species are anticipated to shift and expand their ranges in a northward direction as temperatures increase in the northern hemisphere (Rahel and Olden 2008). Climate-change-induced changes have been shown to increase predation and competition pressures between natives and introduced species and can alter trophic dynamics and vector-pathogen interactions (Moyle et al. 1986; Ficke et al. 2007). Non-native species may outcompete natives for resources (e.g., food, spawning and feeding habitats, mates [hybridization]) and be more resilient to changing environmental conditions.

SUMMARY OF THREATS:

Of the five listing factors—under section 4 of the Endangered Species Act—considered by the U.S Fish and Wildlife Service to determine whether a proposal for listing is warranted for a species, two pose threats to the recovery and long-term viability of Chesapeake Logperch populations and their habitats: (A) the present or threatened destruction, modification, or curtailment of the species' habitat or range, and (E) other natural or manmade factors affecting the species' continued existence. The most significant threat to Chesapeake Logperch populations is the loss, degradation, and fragmentation of suitable habitat resulting from increased urbanization and agriculture, mining operations, dams, and compounding climate change impacts. These two listing factors (A, E) share common sources of stressors on freshwater fish populations. Dams (factor A) modify and fragment suitable habitat and (factor E) serve as physical barriers to fish movement. Secondly, climate change can (A) degrade habitat conditions and (E) influence non-native species invasions and their impacts (e.g., habitat exclusion, competition) on native species (E).

CONSERVATION MEASURES IMPLEMENTED, PLANNED, AND RECOMMENDED

Literature.—

- Ashton and Near (2010) recommend additional studies to fill gaps in knowledge of Chesapeake Logperch ecology, life history, distribution, and stressors, and to investigate population genetics between the historical Potomac River basin specimens and Lower Susquehanna River individuals. They also suggest the use of best management practices to improve habitat and water quality.

- Near (2008) asserted that Chesapeake Logperch could potentially warrant federally protection based on its limited geographical distribution, loss from historically occupied localities in the Lower Susquehanna River basin, and extirpation from the Potomac River basin—a significant portion of its historical range.

Virginia and District of Columbia.—

- Considered extirpated from the Potomac River basin. No direct conservation measures implemented or planned.

Virginia Comments (NE Review).—

- "Species is extirpated from Virginia. All information about it would need to come from states where it is extant. It would be an easy species to propagate and reintroduce."

- "Recently resurrected as a full species. No modern Virginia records and considered to be extirpated."

- Recommended USFWS Bin = S-a (Strong data already available on species status, we have strong information now indicating the species is likely warranted for listing)

Maryland.—

- The species may be receiving cascading benefits from conservation actions applied in the drainage that protect and restore habitat and water quality for federally endangered Maryland Darter (*Etheostoma sellare*; ESA 1967). Designated critical habitat for the Maryland Darter includes Deer and Swan creeks; two tributaries with current records for Chesapeake Logperch.

- The license for Conowingo Dam expired in September of 2014. The licensee (Exelon Generation Corporation, LLC) filed a Notice of Intent and Pre-Application Document in 2012 to the Federal Energy Regulatory Commission (FERC) to begin the relicensing process for a new 46-year license. Studies (USGS 1997; Hirsch 2012; Langland 2015) have shown that the dam has reached >90% capacity and no longer is effectively trapping sediment and phosphorus. The legacy and future impacts from the dam are expected to further degrade the Chesapeake Bay and prevent the Chesapeake Bay cleanup goals from being met.

  The FERC relicense is contingent on the applicant obtaining a Clean Water Act, Section 401 Water Quality Certification for continued operations from the Maryland Department of Environment (MDE). Exelon initially filed for this certification in 2014. It is still under undergoing review by the MDE which has until May 2018 to complete. Through this process, MDE (and other stakeholders) are requesting the applicant sufficiently demonstrate that dam operations will comply with water quality standards and for Exelon to better address the issues with sediment and nutrient pollution.

  To address the sediment trapped behind Conowingo Dam, Maryland assembled a multi-agency working group to form a Dredge Material

Management Program that would investigate dredging solutions and how dredged material could be re-used in innovative and environmentally beneficial ways. A pilot dredging project is planned for 2018 to test whether extensive-dredging actions are feasible and effective.

These actions to reduce sediment and nutrient pollution from increasing in the downstream reaches of the lower Susquehanna River and Chesapeake Bay will be beneficial to Chesapeake Logperch by protecting and (potentially) enhancing habitat in the mainstem below Conowingo Dam (Sources of information compiled from the FERC, the MDE, The Baltimore Sun, and American Rivers).

Maryland Comments (NE Review).—

- "Rationale for 'G': status and distribution are sufficiently known; current and emerging threats are identified; pro-active conservation opportunities exist. State listing as Threatened but not critically imperiled at this point. Some info is available with regard to five listing factors."

- Recommended USFWS Bin = S-b (Strong data already available on species status, we have strong information now indicating the species is likely not warranted for listing)

Pennsylvania.—

- As a State Threatened Species, Chesapeake Logperch are given protection under Chapter 75 of Title 58 PA Code.

- "The Pennsylvania Department of Environmental protection has demonstrated willingness to evaluate waters inhabited by the Chesapeake Logperch for re-designation as Exceptional Value, Migratory Fishes based on the "exceptional ecological significance" criterion listed in Chapter 93.4b(b)(2) of the Title 25 PA Code." -PA-FBC 2015

- As categorized in Pennsylvania's SWAP (2015), Chesapeake Logperch are a high priority for focused conservation actions that contribute to the range-wide conservation of the species. Chesapeake Logperch are also categorized as a rare, native, and imperiled species that have a high feasibility for recovery in the next 10 years.

- Conservation actions identified for Chesapeake Logperch include Planning, Reintroductions, and Law and Policy (Table 3).

Pennsylvania Comments (NE Review).—

- "Populations within the Conowingo Pool of the Susquehanna River appear to be stable, but relatively small and restricted by hydropower dams and tributaries impacted by land uses. Recovery potential is high with partnerships and conservation implementation actions (e.g., trap and transfer above dams) given the availability of suitable habitats upstream above dams. Listed as State Threatened in Pennsylvania."

- Recommended USFWS Bin = C-b (Conservation opportunities in development or underway, threats to the species can be reduced through targeted and "do-able" actions)

Table 3. Identified conservation actions and objectives to address threats and support recover plans for Chesapeake Logperch populations in Pennsylvania (PA-FBC 2015; PA-SWAP 2015)

Conservation Action Category	Threat	Action & Objective
Planning	Sediment and water pollution (sediment and nutrient loading, pesticides/termiticide). Elevated nitrate and siltation in Octoraro Creek. Potential threat of PCBs and Chlordane.	To maintain water quality standards and habitat in the Lower Susquehanna River basin through best management practices.
Data Collation and Analysis		Develop and initiate monitoring program for extant populations
Species Reintroductions and Stockings	Dams	Translocation of fish upstream of barriers and, if possible, removal of barriers to reestablish populations across its historical, upstream distribution range.
	Introduced, non-native species (Banded Darter, Greenside Darter)	Prevent invasive species introductions and expansions. Reintroductions should relocate Chesapeake Logperch above barriers that are not occupied by non-native species.
	Reintroductions	Assess and identify habitats upstream of Holtwood Dam for reintroductions. Develop and implement reintroduction strategy.
Law and Policy	Mining operations (chemical releases, erosion, sedimentation)	New legislation and state regulations to support SGCN recovery plans.

To support conservation actions and Chesapeake Logperch recovery to the Lower Susquehanna River basin, the PA-SWAP (2015) and PA-FBC (2015) recommend further research to address the following gaps in knowledge:

(1) Describe the autoecology of the Chesapeake Logperch (e.g., age structure, growth, habitat preferences, diet, population dynamics and genetics, anthropogenic-induced stressor impacts, introduced species impacts)

(2) Can Chesapeake Logperch populations be reestablished above barriers into historically occupied waters?

(3) Within Chesapeake Logperch historically occupied waters, is current habitat and water quality suitable for reintroductions?

FOR SPECIES THAT ARE BEING REMOVED FROM CANDIDATE STATUS

Not applicable

____ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

DESCRIPTION OF MONITORING

Haldeman collected Chesapeake Logperch in 1842 from the Susquehanna River in Pennsylvania and later described the species in 1844. Although records indicate Chesapeake Logperch historically occurred in the lower reaches of Susquehanna tributaries upstream of where Holtwood Dam is today (Pennsylvania), surveys conducted by the PFBC since the 1970s have failed to rediscover Chesapeake Logperch in these reaches. It is believed to be extirpated from 20 miles of the river above Holtwood Dam (PA-FBC 2015). Several collections have been made in the impoundment formed by the Conowingo Dam since the 1960s (Near 2008; PA-FBC 2015). The PFBC encountered Chesapeake Logperch in Fishing Creek in 1993, and later with R. Criswell in Octoraro Creek in 2008 (PA-DEP 2010; PA-PFBC 2015).

Neely and George (2006; details as reported by Near 2008) reported Chesapeake Logperch (its synonym *Percina caprodes*) from the lower reaches of Conowingo Creek were collected during a previous status survey on logperch. Near (2008) reports that the Maryland Biological Stream Survey has documented Chesapeake Logperch populations in Conowingo, Deer, Broad, and Octoraro creeks that drain to the Susquehanna River, and in Northeast River and Winters Run that flow into the Chesapeake Bay (Maryland). Recent surveys for the Maryland Darter (2008–2010) incidentally documented Chesapeake Logperch in four sites (Deer, Octoraro, and Swan creeks, and mainstem Susquehanna River). Near (2008) provides a thorough review of historical specimen collections in the Potomac and Susquehanna River basins and more recent collections in the Lower Susquehanna River basin. Additional studies are needed to assess Chesapeake Logperch distributions and obtain baseline estimates of population size (Near 2008; Ashton and Near 2010; PA-FBC 2015).

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SPECIES ASSESSMENT/LISTING PRIORITY ASSIGNMENT FORM – DEVELOPMENT

INDICATE WHICH STATE(S) (WITHIN THE RANGE OF THE SPECIES) PROVIDED INFORMATION OR COMMENTS ON THE SPECIES OR LATEST SPECIES ASSESSMENT:

Maryland, Pennsylvania, Virginia

INDICATE WHICH STATE(S) DID NOT PROVIDE ANY INFORMATION OR COMMENT:

STATE COORDINATION:

The Northeast Association of Fish and Wildlife Agencies (NEAFWA) and Conservation Management Institute (CMI, Virginia Tech) compiled the above information regarding the status of, and threats to, Chesapeake Logperch. Chesapeake Logperch are not federally listed or of concern. They are listed as State Threatened and as a Species of Greatest Conservation Need (SGCN) in Maryland and Pennsylvania's most recent State Wildlife Action Plans (SWAP).

FOLLOWING SECTION FOR U.S. FISH AND WILDLIFE SERVICE USE ONLY

PRIORITY TABLE

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/Population	3
	Non-Imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/Population	9
	Non-Imminent	Monotypic genus	10
		Species	11
		Subspecies/Population	12

RATIONALE FOR CHANGE IN LISTING PRIORITY NUMBER:

MAGNITUDE:

IMMINENCE:

____ Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

EMERGENCY LISTING REVIEW

____ Is Emergency Listing Warranted?