



Species Action Plan: Chesapeake Logperch (*Percina bimaculata*)

Purpose: This plan provides an updated five-year blueprint for the actions needed to attain near-term and, ultimately, long-term goals for the conservation and recovery of the Chesapeake Logperch. The action plan is a living document and will be updated as needed to reflect progress toward those goals and to incorporate new information as it becomes available.

Goal: The immediate goal is to maintain and expand the extant populations of Chesapeake Logperch in the Commonwealth and to protect its habitat. The secondary goal is to describe the autecology of the Chesapeake Logperch and develop appropriate reintroduction and monitoring strategies. Ultimately it is hoped the species will recover to the point where it can be removed from the Pennsylvania list of threatened species (58 Pa. Code §75.2).

Natural History

Taxonomy: Class Actinopterygii, Order Perciformes, Family Percidae, Chesapeake Logperch (*Percina bimaculata*, Haldeman 1844).

Description: The Chesapeake Logperch was recently removed from taxonomic synonymy with the Logperch *Percina caprodes*, and recognized as a distinct and

valid species by Near (2008) with a limited global distribution in the Chesapeake Bay watershed. Near (2008) stated that genetic analyses of Logperch and Chesapeake Logperch did not result in monophyletic groups and that the Chesapeake Logperch was morphologically distinct in multiple characters from other logperches. The Chesapeake Logperch usually has the following combination of characters: 7 to 11 irregular lateral bars; orange-yellow band in the first dorsal fin (poorly defined in females), nape of adults naked, breast naked except for modified breast scales, supraoccipital and prepectoral naked, and no prepectoral blotch. The Logperch has many more regular lateral bars, higher scale counts, and no orange-yellow on the first dorsal fin.



Figure 1. Chesapeake Logperch (*Percina bimaculata*).
Photo credit: Rob Criswell

Life History and Habitat: There is little information available for this species regarding most aspects of life history, our observations are noted herein. It occurs primarily in larger waterways and lowermost sections of tributaries. This species was collected from East Branch and West Branch Octoraro Creek stations (see distribution and status section below) where



the mean width was 18.9 m and 15.3 m, respectively, but it was absent at upstream stations where mean widths were 14.0 m and 13.1 m, respectively (PFBC and R. Criswell, unpublished data). We are aware of no Pennsylvania collections from smaller sections of waterways than those above, except aforementioned tributaries directly associated with the Conowingo Pool and Octoraro Creek. Near the mouth of smaller tributaries to the Susquehanna River it is most frequent in riffles and runs where rubble and boulders provide cover (R. Criswell, unpublished data). In West Branch Octoraro Creek it was taken where substrates included cobble, rubble, silt, sand, and detritus, and from coarse woody debris (PFBC and R. Criswell, unpublished data). Larvae were collected at inshore stations in the Conowingo Pool during the period 24 April 1977 – 19 June 1977 with mean densities (N per 1000 m³) ranging from 0.13 to 3.18 (RMC, Ecological Division 1978). This species is utilized in the diet of white crappie *Pomoxis annularis* in Conowingo Pool (Mathur 1972).

Multiple length classes have been collected from the East Branch and West Branch Octoraro Creek, and the Susquehanna River and tributary stations indicating successful spawning within the state (PFBC and R. Criswell, unpublished data); however, not much else is known about reproduction.

Research is needed to define basic aspects of life history and ecology such as age structure, growth, diet, habitat use, population density, population genetics, and

health of this species. The influence of anthropogenic perturbations on populations, especially in regards to early life history needs to be characterized. Interaction between the Chesapeake Logperch and introduced species has yet to be characterized and would be a useful component of a life history and status assessment.

Distribution and Status

National Distribution: The Chesapeake Logperch has historically been known from the Chesapeake Bay watershed in the District of Columbia (formerly), Maryland, Pennsylvania, and Virginia. It is limited to lower sections of the Potomac (now extirpated) and Susquehanna rivers and tributaries, and a few direct tributaries to the Chesapeake Bay (Haldeman 1842; Jenkins and Burkhead 1994). Pollution and sedimentation have been identified as the probable causes for the extirpation of the Potomac River population (Lee 1977). (Figure 2).

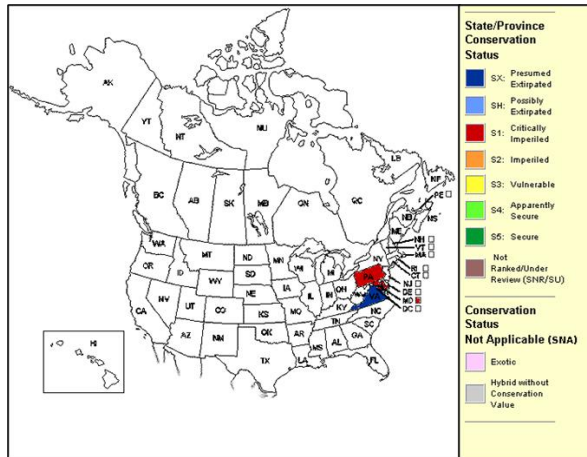


Figure 2. NatureServe map of national range and conservation status of the Chesapeake Logperch (<http://explorer.natureserve.org/servlet/NatureServe?searchName=Perca+bimaculata>).

Pennsylvania Distribution: The Chesapeake Logperch occurs only in the Piedmont Province of the lower Susquehanna River drainage. The Chesapeake Logperch formerly occupied the Susquehanna River at least as far upriver as Columbia, Lancaster County (Haldeman 1842). It is currently restricted to the Susquehanna River and the lowermost section of four tributaries within the Conowingo Pool, and in Octoraro Creek and a single tributary. Additionally, populations were documented in Octoraro Lake and Muddy Run Recreation Lake. The Chesapeake Logperch only occurs in approximately 30 combined stream and river miles within Pennsylvania (see Figure 2). Hydroelectric dams on the Susquehanna River likely act as barriers to upstream recolonization of historic range from the lower river.

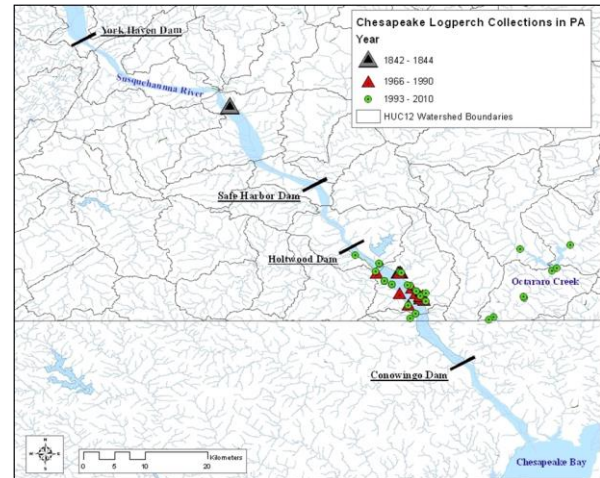


Figure 3. Historic and recent collections of Chesapeake Logperch in York and Lancaster counties, Pennsylvania.

Pennsylvania Legal Status: Threatened (58 Pa. Code §75.2).

State Rank: S1S2 – Critically Imperiled

Global Status: G1G2 – Critically Imperiled

The Chesapeake Logperch is classified as a threatened species in Maryland (the only other state where it has recently been documented), is considered to be endangered by the American Fisheries Society Endangered Species Committee (Jelks et al. 2008), and is listed in the 2010 update of Threatened Fishes of the World (Ashton and Near 2010). The Chesapeake Logperch’s limited global distribution, extirpation from a significant portion of its historic range, and extant threats make it a “responsibility species” for Pennsylvania and as such was listed by the state as threatened in 2012.



Management Status

The Chesapeake Logperch is currently on Pennsylvania's list of threatened and endangered fishes; therefore, it receives the protection afforded by Chapter 75 of the Title 58 PA Code and it is reviewed in the Environmental Review permitting program administered by the Pennsylvania Natural Heritage Program. The Pennsylvania Department of Environmental Protection has demonstrated willingness to evaluate waters inhabited by the Chesapeake Logperch for redesignation 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.

Population trends:

Population trends in Chesapeake Logperch are uncertain at this time. The Chesapeake Logperch's apparent absence from all reported collections upstream of the present location of Holtwood Dam since Haldeman (1842) suggest that it has been extirpated from at least 20 miles of the Susquehanna River. The lowermost sections of tributaries in this section of river were probably also occupied historically. Collections from the mid-1960s to present within the Conowingo Pool (RMC, Ecological Division 1978; Near 2008; Normandeau Associates, Inc. 2010; PFBC and R. Criswell, unpublished data) do not indicate an increase or decrease in distribution or abundance. There are no historic records from Octoraro Creek in Pennsylvania (Cooper 1983; Near 2008;

PFBC Agency Resource Database 1975 - 2008). A recent dam removal in Maryland (MDNR 2005) designed to facilitate the movement of diadromous fishes now permits access to the Pennsylvania section of the stream, but the East Branch and West Branch of Octoraro Creek were likely occupied prior to this action. Octoraro Dam, located just downstream of the confluences of the branches, forms a barrier to the upstream movement of fishes with the exception of eels which can utilize an eel-specific passage device (eel ladder). The American Eel, *Anguilla rostrata*, was common to abundant at stations below the dam, but was not collected above the dam during surveys prior to the construction of the eel ladder (PFBC and R. Criswell, unpublished data). Until 2008, all PFBC surveys conducted on the branches above the dam (1976-77, 1989-90, 2006) were performed upstream of the sites where populations of Chesapeake Logperch were recently documented (PFBC and R. Criswell, unpublished data; PFBC Agency Resource Database 1976 - 2010). It is likely that this population of Chesapeake Logperch was present historically, but remained undetected until recently.



Threats

- 1) **Water Quality Issues and Habitat Loss:**
The lower Susquehanna River Basin has water quality problems resultant from mining, agriculture, municipal sources, industry, on-lot sewage, acid rain, and urban runoff (Risser and Siwiec 1996). These activities have elevated metals concentrations, suspended and dissolved solids, nutrient loading, oxygen demand, and pH (Risser and Siwiec 1996; Hainly and Loper 1997). Nitrogen and sediment loading are particularly significant issues within the basin (Hainly and Loper 1997; Lindsey et al. 1997). The Susquehanna River Basin Commission stated that agricultural runoff has been a likely source of elevated nitrate levels and impairment in Octoraro Creek and its branches (Traver 1997). Data from both Octoraro Creek branches show no reduction in nitrates from 1995 to 2004 (median nitrate concentrations 7.4 - 8.4 mg/L) despite aggressive implementation of agricultural best management practices (Shuman 2005). Land use in the Octoraro Creek watershed is 75% agricultural, primarily dairy farming and swine farming. Siltation was obvious at recently surveyed sites on both the Susquehanna River and Octoraro Creek (pers. observ.). Total polychlorinated biphenyls (PCBs) have been documented at values exceeding the fish tissue reporting limit

(50 mg/kg) in the East Branch of Octoraro Creek and the Susquehanna River at Columbia (Bilger et al. 1992). Chlordane (pesticide/termiticide) levels have also been documented above fish tissue reporting limits in the East Branch of Octoraro Creek (Bilger et al. 1992). During a water quality monitoring and young-of-year smallmouth bass mortality investigation project conducted by the US Geological Survey on the main stem Susquehanna River, dissolved oxygen levels were measured at values below the Title 25, Chapter 93 (water quality standards) reporting limit (minimum daily average 5.0 mg/L and minimum 4.0 mg/L) for flowing waters (Chaplin et al. 2009).

- 2) **Direct Mortality:** Impingement of logperch has been reported (RMC, Ecological Division 1978) at the Peach Bottom Power Station and probably still occurs.
- 3) **Introduced Species:** Competition for space and resources with introduced species of similar habitat preferences and feeding guilds may be a significant interspecific threat to the Chesapeake Logperch. Of particular concern are the introductions of the Banded Darter *Etheostoma zonale* (Cooper 1983; Neely and George 2006) and Greenside Darter *Etheostoma blennioides* (Neely and George 2006) to the Susquehanna basin, presumably in the 1960's. Their ability



to successfully navigate extrinsic barriers to dispersal and intrinsic limitations [niche space, species packing, time, distance, number of entry points, water chemistry, dams, life history attributes etc.] has led to their swift and relatively widespread colonization. The Susquehanna River Basin has a depauperate native darter fauna consisting of five species, two of which are rare, (Hocutt et al. 1986; Neely and George 2006), which may predispose the basin to widespread colonization of non-native darter species. Similar colonization after introduction by the Mimic Shiner *Notropis volucellus* (Cooper 1983) should also be noted in this discussion. All three of these species were widespread and collected in relatively large numbers during the 2008-09 Pennsylvania Index of Biotic Integrity project [PADEP, PFBC, PSU] and during electrified benthic trawls on the lower Susquehanna River in 2010 (PFBC and R. Criswell, unpublished data). Banded Darters and Mimic Shiners were also present in Octoraro Creek in 2008-09 (PFBC and R. Criswell, unpublished data). Greenside Darters were reported by Normandeau Associates, Inc. (2007) from Octoraro Creek at two sites immediately upstream of the Maryland border.

Ecological shifts within the Susquehanna River darter fauna following the spread of introduced darter species have been reported and discussed by numerous

researchers. Neely et al. (2003) and Neely and George (2006) considered the introductions of the Banded Darter and Greenside Darter to pose potential threats to native darters, especially the endemic and federally endangered Maryland Darter *Etheostoma sellare*. The Maryland Darter hasn't been observed since the late 1980s (Neely et al., 2003) despite recent efforts (MDNR, 2010a) and its likely extinction is noteworthy in this discussion of threats to rare Susquehanna River darters. In laboratory experiments, Gray and Stauffer (2001) showed that Tessellated Darters *Etheostoma olmstedi* shifted from large to small substrate in the presence of Banded Darters. A substrate shift by Shield Darters *Percina peltata* (the only sympatric congener of the Chesapeake Logperch in Pennsylvania) was not observed (Gray and Stauffer 2001). Banded Darters were also documented to be the most frequent aggressor in behavioral interactions with Tessellated and Shield Darters (Gray and Stauffer 2001). Gray et al. (2005) observed Susquehanna River darter communities in situ via habitat snorkeling surveys. They reported that Tessellated Darters shifted from riffles and runs to shallow pools in the presence of Banded Darters and that the shift constituted a compression of niche breadth. Carlson (2008) further discussed Banded Darter and Tessellated Darter competition and presented evidence that a habitat shift was responsible for changes in the feeding



behavior and trophic morphology of Tessellated Darters. Interaction between the Chesapeake Logperch and other species has yet to be characterized thoroughly and would be a useful component of a life history and status assessment.

The following non-native species occurrences are also noteworthy. The voracious and fast growing Flathead Catfish *Pylodictis olivaris* has been established in the lower Susquehanna River. Zebra Mussels *Dreissena polymorpha* have recently been discovered in the vicinity of Conowingo Dam (MDNR 2010b) and present an undefined future threat.

Conservation and Recovery

Conservation and Recovery Goal: The goal of this plan is to implement actions that maintain, augment, protect and enhance extant populations of Chesapeake Logperch in the Commonwealth and ensure sufficient distribution to adequately secure the species and allow its removal from the Pennsylvania list of endangered, threatened and candidate species (58 Pa. Code §75).

- 1) Work towards the protection, conservation and enhancement of extant populations.
 - a. Continue to review appropriate permits through the Environmental Review Program for Chesapeake Logperch conservation; continue to work with federal and state government agencies to minimize pollution and habitat destruction.
- 2) Conduct research to describe outstanding life history and ecology attributes needed to develop management strategies including the following:
 - a. Health
 - b. Continue to work with federal and state government agencies to minimize impingement and entrainment.
 - c. Encourage the development of regulations and policies that would reduce the introduction and spread of aquatic invasive species.
 - c. Thoroughly characterize interactions between the Chesapeake Logperch and introduced species (Banded and Greenside darters).
 - d. Study the movement of reintroduced logperch between the repatriation streams and the Susquehanna River, if any.
- 3) Reintroduction and Augmentation
 - a. Continue to implement the reintroduction strategy initiated in 2019.
 - i. Increase the contribution of cultured logperch to repatriation efforts by annually producing fish at the USFWS Northeast Fisheries Center at Lamar and PFBC Aquatic Conservation Center at Union City.



- ii. Continue to translocate or release logperch to Conewago Creek and Chiques Creek until natural reproduction and an expanding population are documented.
- 4) Monitoring
- a. Continue to monitor Conewago and Cheques creeks to document reintroduced population status.
 - i. Use monitoring data to decide when to select new release sites and streams for future efforts.
 - b. Initiate monitoring of existing populations at reference stations.

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