



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



Chesapeake Logperch (*Percina bimaculata*).
Credit: Rob Criswell.

Purpose and Goals

Purpose: This Species Action Plan is an initial five-year blueprint for actions to address near-term and long-term goals for the conservation and recovery of the Chesapeake Logperch. As new information becomes available this document will be updated to reflect progress toward those goals.

Goals: The near-term goal is to maintain extant populations of Chesapeake Logperch in the Commonwealth and to protect its habitat. A secondary near-term goal is to describe the autecology of the Chesapeake Logperch (i.e., the relationship of this species with its habitat and other species) and develop appropriate re-introduction and monitoring strategies. The long-term goal is to sufficiently secure the species for its removal from the Pennsylvania list of threatened species (58 Pa. Code §75.1).

Natural History

Taxonomy: Class - Actinopterygii, Order - Perciformes, Family - Percidae, Genus species - *Percina bimaculata* (Haldeman, 1844), Common Name - Chesapeake Logperch. 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

restricted to 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 pre-pectoral naked, and no pre-pectoral blotch. The Logperch has many more regular lateral bars, higher scale counts, and no orange-yellow on the first dorsal fin.

Life-History and Habitat: Little information is available regarding most aspects of life-history. We provide our observations herein. The Chesapeake Logperch occurs primarily in larger waterways and lowermost sections of tributaries. This species was collected from the 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. However, 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

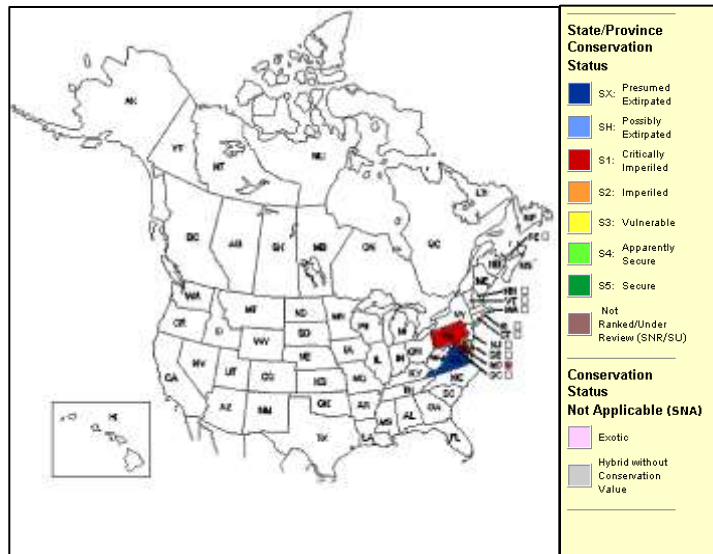


Figure 1. NatureServe map of national range and conservation status of the Chesapeake Logperch (<http://explorer.natureserve.org/servlet/NatureServe?searchName=Percina+bimaculata>).

collections from smaller sections of waterways than those above, except aforementioned tributaries directly associated with the Conowingo Pool of the Susquehanna River and Octoraro Creek. Near the mouth of smaller Susquehanna River tributaries it frequents 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 comprises the diet of White Crappie *Pomoxis annularis* in Conowingo Pool (Mathur 1972).

Multiple size-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, little is known about reproductive habits.

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 disturbances, especially on early life-history is especially required for identifying conservation actions. 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

Global and 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) (Figure 1). Pollution and sedimentation have been identified as the probable causes for the extirpation of the Potomac River population (Lee 1977).



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. The Chesapeake Logperch only occurs in approximately 30 combined stream and river miles within Pennsylvania (Figure 2). Hydroelectric dams on the Susquehanna River likely act as barriers to upstream recolonization of historic range from the lower river.

Population trends: Population trends in Chesapeake Logperch are uncertain at this time. Reported by Haldeman (1842), the apparent absence of Chesapeake Logperch from all reported collections upstream of the present location of Holtwood Dam suggest that it has been extirpated from at least 20 miles of the Susquehanna River. The lowermost sections of tributaries in this river-reach were likely 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;

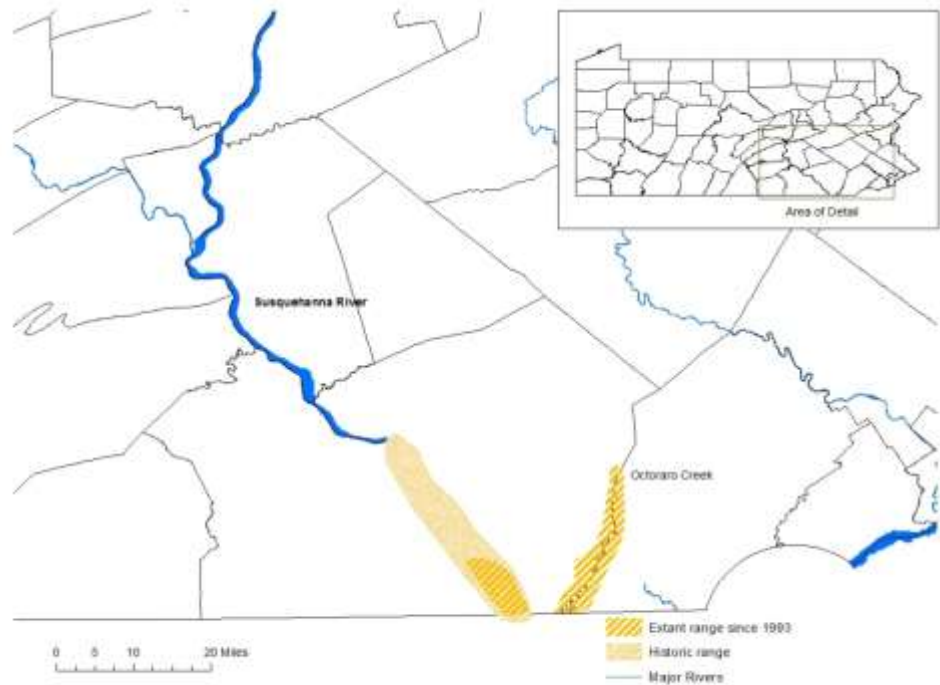


Figure 2. Historic and recent collections of Chesapeake Logperch in York and Lancaster counties, Pennsylvania.

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. The American Eel, *Anguilla rostrata*, was common-to-abundant at stations below the dam, but was not collected above the dam during recent surveys (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.

Status:

Pennsylvania Legal Status: Threatened

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 recently 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). Limited global distribution, extirpation from a significant portion of its historic range, and extant threats make the Chesapeake Logperch a “responsibility species” for Pennsylvania and as such was listed in 2012 as state threatened species [42 Pa.B. 7684](#) and [43 Pa.B. 6348](#).

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 Title 58 PA Code and 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 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.

Threats

Water Quality Issues and Habitat Loss: The lower Susquehanna River Basin has water quality problems resulting 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).

Direct Mortality: Impingement of Logperch has been reported (RMC, Ecological Division 1978) at the Peach Bottom Power Station and probably still occurs.

Introduced Species: Competition with introduced species for similar habitat preferences and food sources may be a significant interspecific threat to the Chesapeake Logperch. Of particular concern are the introduction 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. The ability of these introduced species 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), and 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. 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 and would be a useful component of a life-history and status assessment.

Additional non-native species which may affect Chesapeake Logperch include the voracious and fast growing Flathead Catfish *Pylodictis olivaris*, now 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 Actions:

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.
 - 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.
2. Conduct research to describe life-history and ecological attributes for management strategies including:
 - i. age structure
 - ii. growth
 - iii. diet
 - iv. habitat use
 - v. health
 - vi. population density
 - vii. population genetics
 - i. influence of anthropogenic disturbance on populations
 - ii. interaction between the Chesapeake Logperch and introduced species.
3. Re-introduction and Augmentation
 - a. Assess location and habitats upstream of Holtwood Dam for re-introduction based on results of the life-history study.
 - b. Develop a re-introduction strategy based on life-history study and location and habitat assessments.
 - c. Implement re-introduction strategy.
4. Monitoring
 - a. Develop a monitoring strategy based on previous surveys, the life-history study, and re-introduction strategy.
 - b. Initiate monitoring of existing populations at reference stations.



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