White Perch (*Morone americana*)
Ecological Risk Screening Summary

Web Version—07/30/2014

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1 Native Range, and Status in the United States

Native Range
From Page and Burr (1991):

"North America: St. Lawrence-Lake Ontario drainage in Quebec, Canada south to Peedee River in South Carolina, USA."

Status in the United States
From Fuller et al. (2014):

"This species has been recorded for Colorado (Everhart and Seaman 1971); Lake Michigan (Savitz et al. 1989; Mills et al. 1993), the Illinois River (Cochran and Hesse 1994; Burr et al. 1996; Irons [et al.] 2002; Blodgett 1993), and the Mississippi River (Cochran and Hesse 1994; Rasmussen 1998), Illinois (Burr et al. 1996; Irons et al. 2002); Lake Michigan and several inland lakes, Indiana (Mills et al. 1993; R. Horner, personal communication; R. Robertson and D. Keller, personal communication); the Missouri River, Iowa (Hergenrader 1980; Bernstein 2001; Larson, personal communication); Hoover Pond in Kingman City Riverside Park, Cheney and Wilson reservoirs, and Browning Oxbow on the Missouri River, Kansas (Whitmore 1997; Rasmussen 1998; T. Mosher, personal communication; Goeckler, pers. comm.); inland lakes and ponds statewide except Aroostook County, Maine (Halliwell 2003); nonnative, inland waters of Massachusetts (Hartel 1992; Hartel et al. 1996; USFWS 2005); the Great Lakes, Michigan (Johnson and Evans 1990; Mills et al. 1993; Bowen, pers. comm.); Duluth Harbor, Lake Superior, Minnesota (Johnson and Evans 1990; Mills et al. 1993); Lake Contray in Buchanan County, Big Lake in Holt County, and the Missouri River in Carroll and Howard counties, in Missouri (Pflieger 1997); the Missouri River and the Platte River drainage in Nebraska (Hergenrader and Bliss 1971; Morris et al. 1974; Hergenrader 1980; Cross et al. 1986; Whitmore 1997; Rasmussen 1998) and Branched Oak Reservoir (Nebraska Parks and Game Commission [personal communication]); inland lakes in New Hampshire (Scarola 1973); Lake Champlain (Plosila and Nashett 1990; Good, personal communication) and the Great Lakes drainage, New York (Scott and Christie 1963; Lee et al. 1980 et seq.; Emery 1985; Smith 1985; Johnson and Evans 1990; Mills et al. 1993), including lakes Ontario and Erie, Oneida Lake, Cross Lake, and the Seneca River (Dence 1925; Dence 1952); James, Norman, and Jordan reservoirs, North Carolina (Feiner et al. 2012); Lake Erie drainage and inland streams of Ohio (Busch et al. 1977; Trautman 1981; Smith 1985; Rasmussen 1998; Johnson and Evans 1990; Mills et al. 1993; Czypinski et al. 2001) and Cedar Point National Wildlife Refuge (USFWS 2005); Kaw and Keystone reservoirs, Oklahoma (J. Boxrucker, pers. comm.); Lake Erie, Pennsylvania (Larsen 1954; Busch et al. 1977; Johnson and Evans 1990; Page and Burr 1991; Mills et al. 1993); Lake Champlain, Vermont (Plosila and Nashett 1990; Good, personal communication). Smith Mountain Lake and Kerr Reservoir, Virginia (Jenkins and Burkhead 1994); the upper Potomac drainage, West Virginia (Cincotta, personal communication); and Lake Michigan at Green Bay, the St. Louis River estuary, Horicon National Wildlife Refuge, and Chequamegon Bay, Wisconsin (Savitz et al. 1989; Johnson and Evans 1990; Mills et al. 1993; Cochran and Hesse 1994; Czypinski et al. 2001; Associated Press 2003; Scheidegger, personal communication; USFWS 2005)."

Means of Introductions in the United States

From Fuller et al. (2014):

"The first report of White Perch in the Great Lakes drainage was from Cross Lake, central New York, in 1950 (Dence 1952). The species apparently gained access to the lake via movement through the Erie Barge Canal in the 1930s and 1950s (Lee et al. 1980 et seq.; Johnson and Evans 1990; Mills et al. 1993). Scott and Christie (1963) stated that the white Perch most likely gained access to Lake Ontario via the Oswego River, as a result of spread of Hudson River populations northward and westward through the Mohawk River Valley and Erie Barge Canal. Once in Lake Ontario, it gained access to Lake Erie through the Welland Canal in 1953 and continued to spread to the upper Great Lakes (Johnson and Evans 1990; Mills et al. 1993). The first reports of westward movement through the Great Lakes are as follows: Lake Erie in 1953 (Larsen 1954), Lake St. Clair in 1977, Lake Huron in 1987 (Johnson and Evans 1990), Lake Michigan at Green Bay-Fox River, Wisconsin in May 1988 (Cochran and Hesse 1994), and Illinois waters of Lake Michigan off Chicago in September 1988 (Savitz et al. 1989). One oddity is that the first record from Lake Superior was in 1986 from Duluth Harbor-one year before the fish was found in Lake Huron, and two years before it was seen in Lake Michigan. The Duluth Harbor population may be restricted to that location because it is the warmest part of the lake. This population likely represents a separate introduction because it does not fit the pattern of western dispersal (Johnson and Evans 1990). In this case it is possible that the introduction occurred via ships' ballast water."

"White perch was brought from New Jersey to Nebraska in 1964, and fry produced that year in a hatchery were accidentally introduced into a reservoir that provided access to the Missouri River (Hergenrader and Bliss 1971). White perch has been stocked intentionally in other areas for sportfishing. In Kansas, fish found at Browning Oxbow on the Missouri River are believed to have come from Nebraska. The species was not recorded from Missouri River in Missouri until the 1990s (Pflieger 1997). The source of the fish in the two Kansas reservoirs is a result of stock contamination from a striped bass stocking (Mosher, personal communication). White perch were stocked in West Virginia in the early 1900s (Cincotta, personal communication) and are being illegally stocked by individuals in inland lakes in Indiana (R. Robertson and D. Keller, personal communication)."

Remarks

From Fuller et al. (2014):

"Established in all five Great Lakes and their surrounding states, as well as in Kentucky, Massachusetts, Missouri, Nebraska, New Hampshire, North Carolina, and Vermont. Current status in Colorado and Kansas is unknown."

"Although the White Perch was found in the Missouri River in Missouri almost to the Missouri/Iowa state border (Pflieger 1997), as of March 1998, there are no known collections in the state of Iowa (M. Konrad, personal communication)."

"Feiner et al. (2012) found life history differences (e.g., growth rate, reproductive investment) across introduced populations within three large reservoirs in North Carolina representing different stages of invasion, and suggest that this plasticity allows for increased success during establishment."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2011):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Osteichthyes
Class Actinopterygii
Subclass Neopterygii
Infraclass Teleostei
Superorder Acanthopterygii
Order Perciformes
Suborder Percoidei
Family Moronidae
Genus Morone
Species Morone americana (Gmelin, 1789)

Taxonomic Status: Valid."

Size, Weight, and Age Range

From Page and Burr (1991):

"Maturity: Lm ? range ? - ? cm; Max length : 49.5 cm TL male/unsexed; (IGFA 2001); common length : 13.5 cm TL male/unsexed; (Hugg 1996); max. published weight: 2.2 kg (Robins and Ray 1986); max. reported age: 16 years (Altman and Dittmer 1962)."

Environment

From Page and Burr (1991):

"Marine; freshwater; brackish; demersal; anadromous (Riede 2004); depth range 10 - ? m (Robins and Ray 1986)."

Climate/Range

From Page and Burr (1991):

"Temperate; 52°N - 29°N, 79°W - 57°W."

Distribution Outside the United States

Native

From Page and Burr (1991):

"North America: St. Lawrence-Lake Ontario drainage in Quebec, Canada south to Peedee River in South Carolina, USA."

Introduced

From Page and Burr (1991):

This species is reported as introduced in China (Bartley 2006) and Canada (Crossman 1991).

Means of Introduction Outside the United States

From Page and Burr (1991):

Reasons for listed for introduction of this species include diffused from other countries (Crossman 1991) and unknown (Bartley 2006).

Short description

From Siriwardena (2014):

"*M. americana* has a deep and laterally compressed body. The colour varies from dark greyish-green, dark silvery-green, or dark brown to almost black on the back, pale-olive or silvery-green on the sides and silvery-white on the belly. The white perch has a terminal mouth and a tongue with two narrow tooth patches on the anterolateral margin for grasping prey items (Jenkins and Burkhead 1994). It does not have barbels. *M. americana* has two dorsal fins, slightly connected by a membrane, the anterior with six to ten spines, the posterior with one spine and 10-13 rays, no adipose fin, anal fin with one spine and eight to ten rays and lateral line with 44-52 ctenoid scales. The juveniles are similar to the adults, but may have faint lateral stripes."

"Other identifying characteristics include the following. The body is deepest just ahead of, or at the beginning of, the dorsal fin; there are no lines or stripes on the back or sides; when the spiny dorsal fin is pulled erect, the soft dorsal fin also becomes erect; the second and third bony anal spines are almost exactly the same length; and the anal fin usually has eight or nine soft rays behind the three bony spines (National Sea Grant 1998, Wisconsin Sea Grant 2002, Chesapeake Bay Program 2006)."

Biology

From Page and Burr (1991):

"Occurs in fresh, brackish and coastal waters (Robins and Ray 1986). Primarily found in brackish water but common in pools and other quiet water areas of medium to large rivers, usually over mud. Neither anterolateral glandular groove nor venom gland is present (Smith and Wheeler 2006)."

From Siriwardena (2014):

"In its native estuarine environment, *M. americana* is semi-anadromous and spawns in the spring when water temperatures are between 10 and 16°C (Mansueti 1961, Jenkins and Burkhead 1994). It migrates from the saltier bays and coastal areas into tidal, but more freshwater portions of streams and rivers to spawn in spring. In landlocked waters, it spawns in both rivers and reservoirs, and migrates from deep to shallow waters to spawn when temperatures are between 15 and 20°C, but may show no preference for habitat types during spawning and egg deposition (Zuerlein 1981)."

"M. americana maturation is size-specific with males maturing at smaller sizes than females (Mansueti 1961). Males may spawn for the first time at 2 years, and females usually by 3 years, usually in late spring in brackish to nearly fresh water rivers over sandy bottoms. Spawning occurs over a period of 10 to 21 days with individual females expelling eggs on more than one occasion (Mansueti 1961). Female *M. americana* are oviparous, broadcasting demersal, adhesive eggs to be fertilized externally (Mansueti 1961). The eggs sink to the bottom and stick (Thomson et al. 1978). Its fecundity ranges between 20,000 and 150,000 eggs per individual female (Jenkins and Burkhead 1994). Hatching takes place from 1 to 6 days following fertilization; 4 days at the usual spawning temperature of 15°C (Natureserve 2008)."

"Larval *M. americana* feed on zooplankton such as rotifers, copepods and cladocerns (Setzler-Hamilton et al. 1982). One-year-old *M. americana* first feed on zooplankton early in life, but then changes their diet to benthic invertebrates (Gopalan et al. 1998), and as they grow larger, aquatic insect larvae (chironomids, trichopterans, and ephemeropterans) become an important part of the diet. Large individuals consume a high percentage of fishes (Scott and Crossman 1973). Fish eggs are an important component of the *M. americana* diet especially in spring months. It may consume its own eggs (McGovern and Olney 1988), or *Stizostedion vitreum* (walleye) or *Morone chrysops* (white bass) eggs can make up to 100% of the *M. americana* diet depending on which fish is spawning. *M. americana* also feed heavily on minnows of *Notropis* spp. and zooplankton."

Human uses

From Page and Burr (1991):

"Fisheries: minor commercial; gamefish: yes; aquarium: public aquariums."

Diseases

From Page and Burr (1991):

Epitheliocystis, Bacterial diseases.

There are no known OIE-reportable diseases for this species.

Threat to humans

Harmless.

3 Impacts of Introductions

From Fuller et al. (2014):

"Fish eggs are an important component of the diet of White Perch especially in the spring months. White Perch generally preys on eggs of Walleye *Stizostedion vitreum vitreum*, White Bass *Morone chrysops*, other species, and can cannabilize its own eggs (Schaeffer and Margraf 1987). Walleye or White Bass eggs can make up 100% of White Perch diet depending on which fish is spawning. During a three-year study, this diet was found to be unique in that: 1) eggs were eaten for a comparatively long time, 2) they were the only significant food item eaten by adults during two of the three years, 3) large volumes were eaten per individual, and 4) most fish were feeding. White Perch also feeds heavily on minnows *Notropis spp*. (Schaeffer and Margraf 1987). The collapse of the Walleye fishery in the Bay of Quinte (on the north shore of Lake Ontario) coincided with the increase in the White Perch population and may have been a result of egg predation and lack of recruitment (Schaeffer and Margraf 1987)."

"Bur and Klarer (1991) found that *Morone americana* has a large portion of its diet consisting of zooplankton in the central basin of Lake Erie. In comparison to available zooplankton, a disproportionately large amount was the invasive *Bythotrephes cederstroemi* (Bur and Klarer 1991)."

"Parrish and Margraf (1990) hypothesized that White Perch compete with native Yellow Perch *Perca flavescens* for zooplankton. They determined that growth rates of Yellow Perch had declined since the invasion of White Perch in Lake Erie, especially in the western basin. They also determined that the two species had considerable diet overlap and found one sample in which White Perch consumed 27 percent more food than Yellow Perch."

"Parrish and Margraf (1994) speculated that competition between White Perch and forage fishes, such as Emerald Shiner *Notropis atherinoides* and Spottail Shiner *N. hudsonius*, may actually be more complex and may be responsible for the declines of the latter species. Decline of these species could also affect Walleye *Stizostedion vitreum*, the top predator in Lake Erie (Parrish and Margraf 1994)."

"Within three years after being introduced into a Nebraska reservoir, White Perch had completely replaced the previously dominant Black Bullhead *Ameiurus melas*. Species composition changed from 74 percent Black Bullhead to 70 percent White Perch in that timeframe (Hergenrader and Bliss 1971)."

"Feiner et al. (2013) found significant overlap in trophic niche and resource use between White Perch and juvenile White Bass *Morone chryops* in Lake James, North Carolina, suggesting the potential for resource competition."

"Invasion of the Great Lakes brought White Perch into sympatric distribution with White Bass, a closely related but previously allopatric species, allowing hybridization to occur. White Perch x White Bass hybrids have been reported in western Lake Erie, in Ohio and Michigan, and from the Detroit and St. Clair Rivers in Michigan (Todd 1986). Hybrids were first noted in western

Lake Erie in the early 1980s, as White Perch were increasing in this region (Todd 1986). These hybrids probably occur in other Great Lakes because the two species are sympatric throughout the chain of lakes. However, Todd was not aware of any other locations with these hybrids, and his extensive surveys around Saginaw Bay, Lake Huron, and Lake Ontario in the mid-1980s failed to find any (Todd, personal communication). Todd (1986) provided photographs of both parent species and the hybrid and gave characteristics of each. Because these hybrids are capable of backcrossing with the parental species, and possibly producing of F2 hybrids by crossing amongst themselves (Todd 1986), they dilute the gene pool of each parent species. The White Perch x White Bass hybrid is the first naturally occurring *Morone* hybrid known (Todd 1986). Hybrids of *M. americana* and *M. mississippiensis* were first found in 2000 in the middle Illinois River (Irons et al. 2002). Hybridization and competition may represent another threat to the already dwindling Yellow Bass of that region."

From GISD (2014):

"Morone americana compete for food with native fish species and also eat the eggs of walleye (*Stizostedion vitreum*), white bass (*Morone chrysops*), other *M. americana* and possibly other species as well. They are also believed to be a potential cause of decline in *S. vitreum* populations. Another concern is that *M. americana* have hybridized with native *Morone chrysops* in western Lake Erie. Hybrids are capable of backcrossing with parent species as well as crossing among themselves and could dilute the gene pool of both parent species (Fuller et al. 2006). Fish eggs are an important diet component in the spring. Depending on which fish is spawning, the eggs of either walleye or white bass comprise 100% of *M. americana*'s diet. Collapse in certain fisheries have coincided with increases in *M. americana* populations and are believed to be a result of egg predation and resulting lack of recruitment (Fuller et al. 2006)."

"Great Lakes (North America)
Reduction in native biodiversity: Prolific competitors of native fish species, *Morone americana* are believed to have the potential to cause declines of Great Lakes walleye populations (WDNR 2004)."

"Lake Erie (North America)
Competition: Parrish and Margraf (1990) hypothesized that *M. americana* compete with native yellow perch *Perca flavescens* for zooplankton. They determined that growth rates of yellow perch had declined since the invasion of *M. americana* in Lake Erie, especially in the western basin. They also determined that the two species had considerable diet overlap and found one sample in which *M. americana* consumed 27 percent more food than yellow perch (Fuller et al. 2006)."

"Interaction with other invasive species: Bur and Klarer (1991; in Fuller et al. 2006) found that a large proportion of *M. americana*'s diet consists of zooplankton in the central basin of Lake Erie - primarily the invasive *Bythotrephes cederstroemi*."

"Other: Parrish and Margraf (1994) speculated that competition between *M. americana* and forage fishes, such as emerald shiner *Notropis atherinoides* and spottail shiner *N. hudsonius*, may actually be more complex and may be responsible for the declines of the latter species. Decline of these species could also affect walleye *Stizostedion vitreum*, the top predator in Lake Erie (Parrish and Margraf 1994, in Fuller 2005)."

"Lake Erie, St. Clair River, Detroit River, Ohio (North America)
"Hybridisation: Invasion of the Great Lakes brought white perch into sympatric distribution with a closely related but previously allopatric species, white bass *Morone chrysops*, allowing hybridisation to occur (Todd, 1986). White perch hybridise with native white bass *M. chrysops* in western Lake Erie, in Ohio and Michigan (Todd, 1986). They have also been reported from the Detroit River and the St. Clair River in Michigan (Todd, 1986). These hybrids were first noted in western Lake Erie in the early 1980s, the same period during which white perch were increasing in this area (Todd, 1986). These hybrids probably occur in other Great Lakes because the two species are sympatric throughout the chain of lakes. However, Todd was not aware of any other locations with these hybrids, and his extensive surveys around Saginaw Bay, Lake Huron, and Lake Ontario in the mid-1980s failed to find any (Todd, pers. comm., in Fuller et al. 2006)."

"Lake Ontario (North America)
Predation: Fish eggs are an important component of the diet of white perch especially in the spring months. White perch generally prey on eggs of walleye *Stizostedion vitreum vitreum*, white bass *Morone chrysops*, other species, and can cannabilize its own eggs (Schaeffer and Margraf, 1987). Walleye or white bass eggs can make up 100% of white perch diet depending on which fish is spawning. During a three-year study, this diet was found to be unique in that: 1) eggs were eaten for a comparatively long time, 2) they were the only significant food item eaten by adults during two of the three years, 3) large volumes were eaten per individual, and 4) most fish were feeding. White perch also feed heavily on minnows *Notropis spp*. (Schaeffer and Margraf, 1987). The collapse of the walleye fishery in the Bay of Quinte (on the north shore of Lake Ontario) coincided with the increase in the white perch population and may have been a result of egg predation and lack of recruitment (Schaeffer and Margraf, 1987)."

"Illinois River (United States (USA))
Hybridisation: Hybrids of *Morone americana* and *M. mississippiensis* were first found in 2000 in the middle Illinois River (Irons et al. 2002). Hybridization and competition may represent another threat to the already dwindling yellow bass of this region."

"Nebraska (United States (USA))
Reduction in native biodiversity: Within three years after being introduced into a Nebraska reservoir, *M. americana* had completely replaced the previously dominant black bullhead *Ameiurus melas*. Species composition changed from 74 percent black bullhead to 70 percent *M. americana* in that timeframe (Hergenrader and Bliss 1971) (Fuller 2005)."

From Siriwardena (2014):

"*M. americana* can thrive in a wide range of environments, but is naturally found in brackish waters and can invade freshwater habitats. *M. americana* has the ability to compete with native species, preying on fish eggs and young fish, and has the ability to hybridize with native species and quickly become the dominant species in freshwater lakes. It is native to the Atlantic seaboard and inland rivers of northeastern USA, but has invaded the Great Lakes and surrounding watersheds and also occasionally further west. Like many invasive fish, it can become the most abundant species in many environments due to its opportunistic feeding, broadcast spawning with no preference for specific substrate type, and high fecundity."

"Invasion by *M. americana* can have a negative impact on resident fish populations (Harris 2006), which in turn could cause degradation in fishing quality and subsequent economic impacts. Drops in abundance of native fishes have often followed white perch invasions (Hergenrader and Bliss 1971, Zeurlein 1981, Boileau 1985, Gopalan et al. 1998, Wong et al. 1999, Madenjian et al. 2000)."

From Prout et al. (1990):

"Diet and growth of age-0 white perch *Morone americana* and age-0 yellow perch *Perca flavescens* were compared during July–October 1980 and 1987. Both fish species fed on *Daphnia pulex* in 1980 and growth was rapid; prey biomass per gram of fish was 2–12 times higher for white perch than for yellow perch. In 1987, white perch consumed up to three times more prey biomass than yellow perch, but the subsequent disappearance of *D. pulex* caused both fish species to switch to macroinvertebrates and growth of both species declined. Between 1977 and 1987, mean weights and specific growth rates of white perch exceeded yellow perch by October in all years, and weights of white perch were closely tied to the density of *D. pulex* in late summer–early fall (Spearman's rank correlation = 0.58, $P = 0.07$). Diet overlap for age-0 white and yellow perch was high when *D. pulex* was present, and the potential for interspecific competition was greatest when these fish were similar in length. Because of a prolonged spawning period, age-0 white perch had a wide range in lengths, which enabled them to feed on a broad size range of prey. As a result, predation on *D. pulex* by white perch was exerted over a wider size range than was exerted by yellow perch. Such circumstances may allow daphnids to persist when age-0 white perch are abundant. Consequently, competitive interactions between young white and yellow perch appear to be asymmetric, because the ability of large cohorts of yellow perch to collapse *Daphnia pulex* populations has greater effect on white perch growth than large cohorts of white perch have on yellow perch growth."

4 Global Distribution

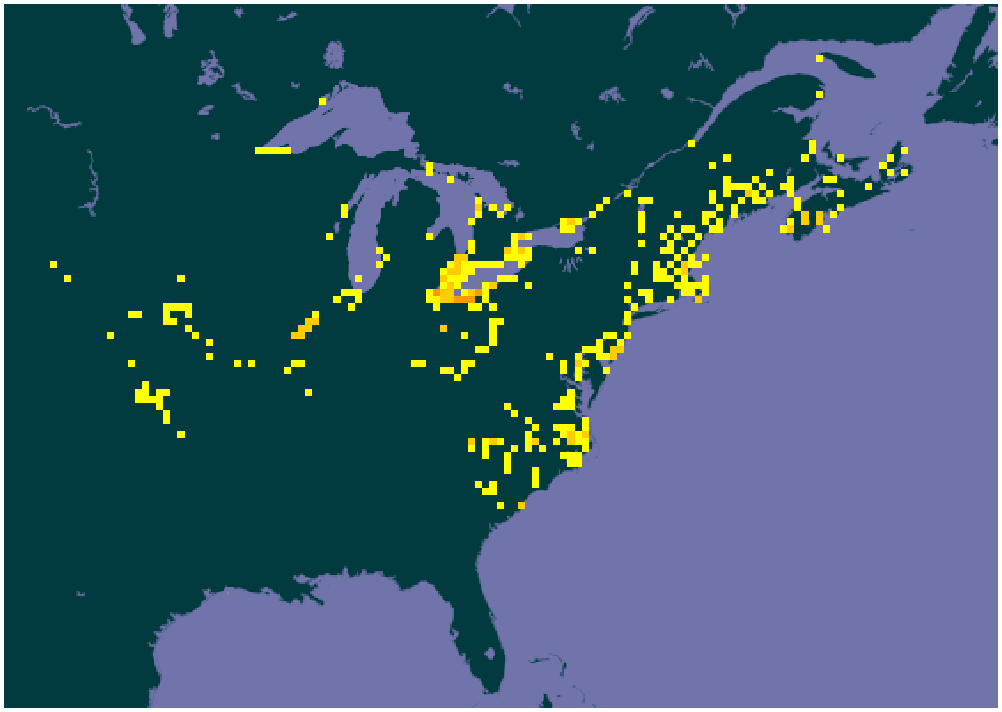

Figure 1. Global distribution of *Morone americana*. Map from GBIF (2014). Locations in Texas, Alabama, Tennessee, South Dakota, central Minnesota, and off the coast of Mexico were excluded due to incorrect location information.

5 Distribution within the United States

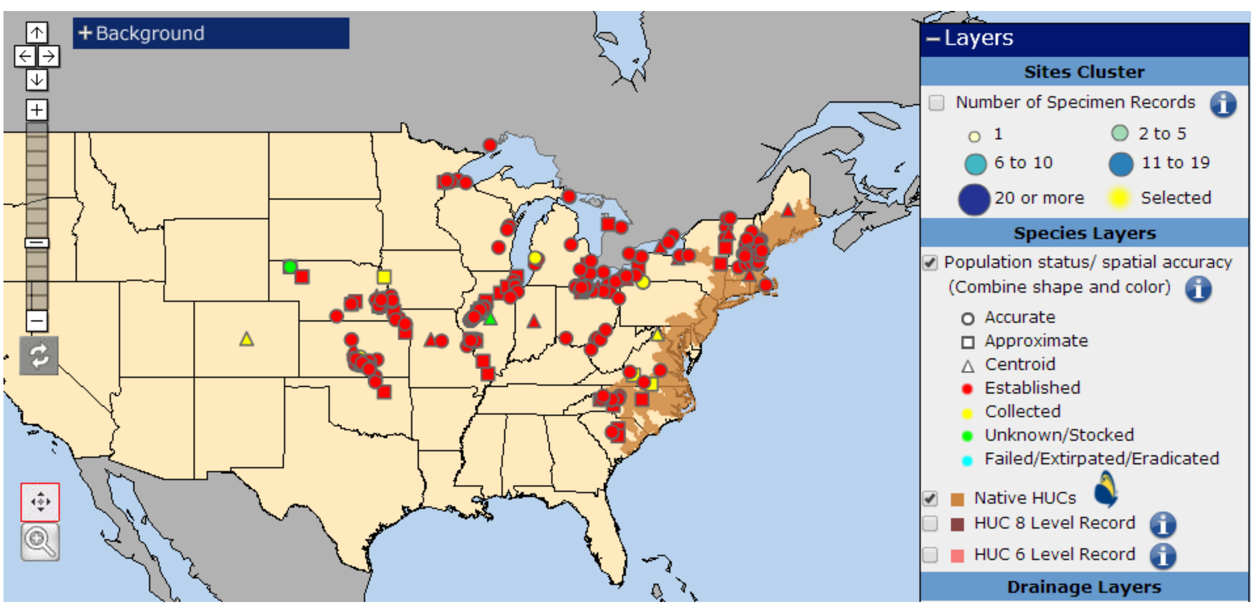

Figure 2. Distribution of *Morone americana* in the U.S. Map from Fuller et al. (2014).

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2008; 16 climate variables; Euclidean Distance) was high to medium for most of the contiguous U.S. east of the Rocky Mountains. Low matches occur west of the Rocky Mountains. Climate 6 proportion indicated that the contiguous U.S. has a high climate match. The range for a high climate match is 0.103 and greater; climate match of *Morone americana* is 0.749.

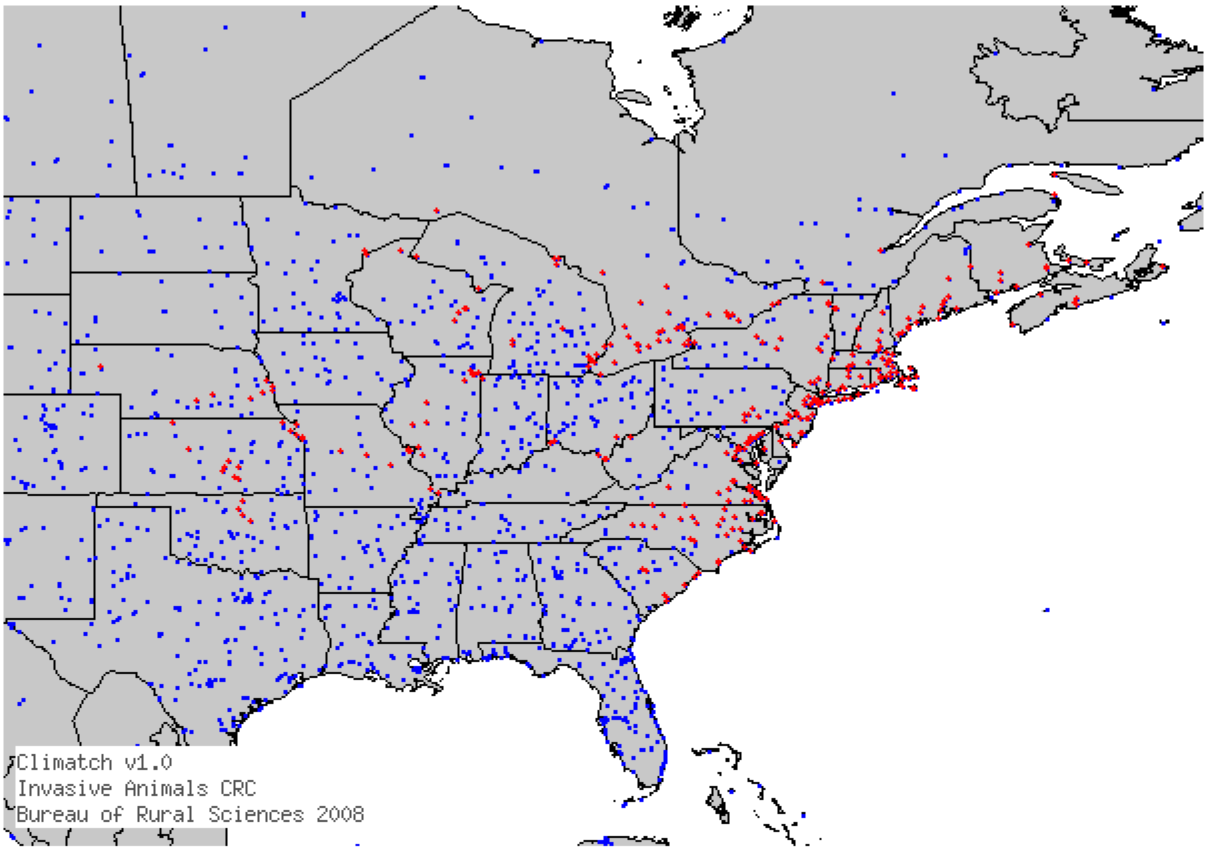

Figure 3. CLIMATCH (Australian Bureau of Rural Sciences 2008) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *Morone americana* climate matching. Source locations from GBIF (2014) and Fuller (2014).

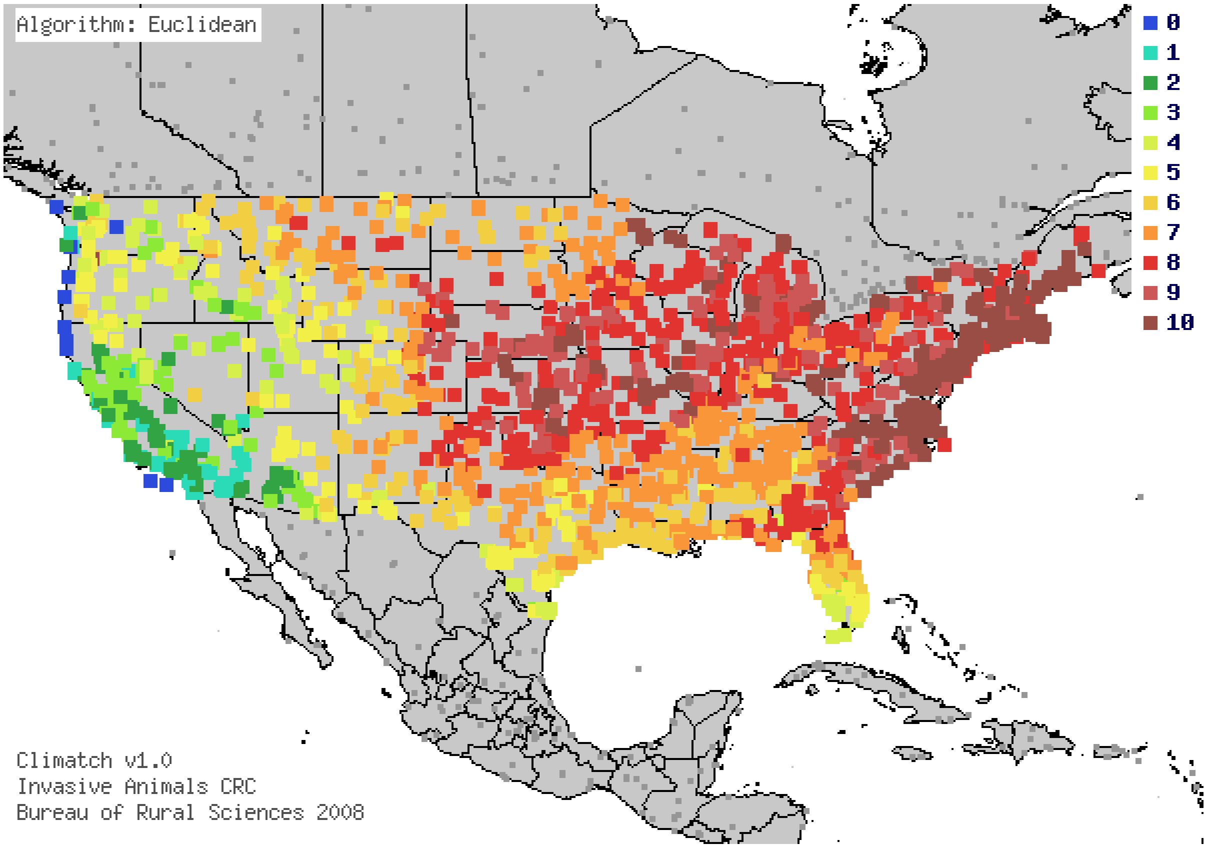

Figure 4. Map of CLIMATCH (Australian Bureau of Rural Sciences 2008) climate matches for *Morone americana* in the continental United States based on source locations reported by GBIF (2014) and Fuller (2014). 0= Lowest match, 10=Highest match.

Table 1. CLIMATCH (Australian Bureau of Rural Sciences 2008) climate match scores.

Climatch Score	0	1	2	3	4	5	6	7	8	9	10
Count	14	52	89	85	94	162	232	339	411	180	316
Climate 6 Proportion =		0.749									

7 Certainty of Assessment

The biology and distribution of *Morone americana* are well-documented. Negative impacts from introductions of this species are adequately documented in the scientific literature. No further information is needed to evaluate the negative impacts the species is having where introduced. Certainty of this assessment is high.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Morone americana is a euryhaline fish native to the East Coast of the U.S. and Canada. This species has spread to other areas east of the Rocky Mountains by bait fish release and fish movement through watersheds. Several types of impacts have been documented for this species. Fish eggs are an important part of the diet of *Morone americana*; egg predation on Walleye eggs has been implicated in the decline of at least one Walleye fishery. *Morone americana* is believed to be competing with native Yellow Perch, Black Bullhead, and several forage fish species as their diets overlap. Considerable growth rate decreases have been seen in native fishes. Hybridization between *Morone americana* and several native species is occurring in the U.S. Climate match with the contiguous U.S. is high, with most likely habitat east of the Rocky Mountains. The overall risk for this species is high.

Assessment Elements

- **History of Invasiveness (Sec. 3):** High
- **Climate Match (Sec.6):** High
- **Certainty of Assessment (Sec. 7):** High
- **Overall Risk Assessment Category: High**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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