

## Spotted Bass *Micropterus punctulatus* (Rafinesque, 1819)



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### Taxonomic Status

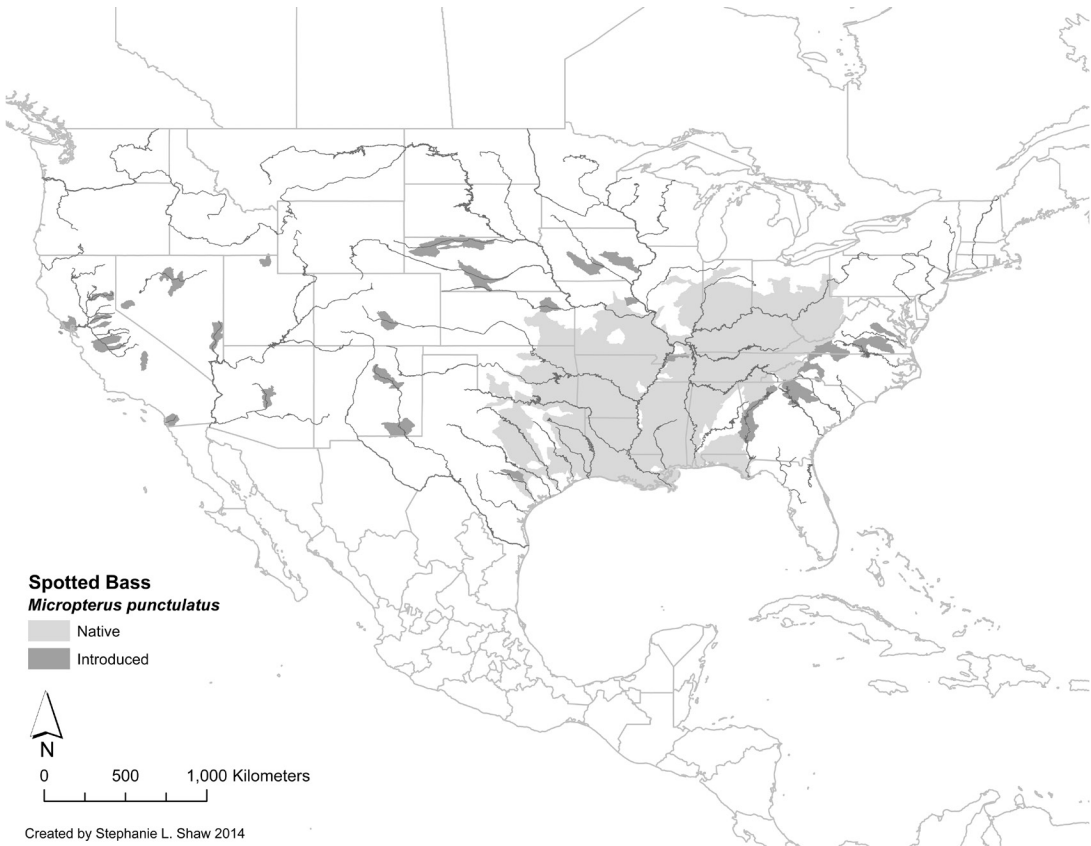
Three subspecies of Spotted Bass *Micropterus punctulatus* were historically recognized: the smaller Northern Spotted Bass *M. p. punctulatus*, the larger, longer-lived Alabama Spotted Bass *M. p. henshalli*, and the now invalidated Wichita Spotted Bass *M. p. wichitae* (Bailey and Hubbs 1940; Cofer 1995; Warren 2009; Rider and Maceina 2015, this volume). The subspecific status has been examined over the past decade as advanced genetic analyses have been developed (e.g., Kassler et al. 2002; Baker et al. 2008; Tringali et al. 2015, this volume). The American Fisheries Society has recently changed the designation of the Alabama Spotted Bass to a separate species, Alabama Bass *M. henshalli* (Page et al. 2013). The remainder of this paper will discuss the biology and conservation of only Spotted Bass. Both species have been observed to hybridize with other *Micropterus* spp. (Koppelman 1994; Pierce and Van Den Avyle 1997; Barwick et al. 2006).

### Distribution

Spotted Bass were originally distributed within the Mississippi River basin from southern Ohio and West Virginia to southwestern Kansas and south to the Gulf of Mexico and Gulf river drainages from Choctawhatchee River, Alabama and Florida, west to the Guadalupe River, Texas (Robbins and MacCrimmon 1974; Warren 2009). Not all Spotted Bass populations within the Gulf of Mexico drainage were native. Introductions were reported in the Apalachicola River by Bailey and Hubbs (1949) and in the Chattahoochee River system by Sammons (2012). Several of the Gulf drainage populations of purported Spotted Bass have more recently been reported as mixed or unnamed *Micropterus* species (Tringali et al. 2015). Spotted Bass have had their range expanded significantly through introductions and now inhabit many river systems, including the Missouri River and the southern half of the western United States (Robbins and MacCrimmon 1974).

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## Habitat

Warren (2009) reported that Spotted Bass generally have habitat requirements that are intermediate between Largemouth Bass *M. salmoides* and Smallmouth Bass *M. dolomieu*. Spotted Bass are associated with clearer, less productive waters than Largemouth Bass and warmer, more turbid waters than Smallmouth Bass. Spotted Bass are frequently sympatric with other *Micropterus* spp., including Largemouth Bass, Smallmouth Bass, and Redeye bass *M. coosae* but may exhibit subtle degrees of spatial segregation from other *Micropterus*. Spotted Bass have been reported to use different cover types, water depth, and productivity gradients compared to their congeners (Vogele 1975b; Trautman 1981; Scott and Angermeier 1998; Sammons and Bettoli 1999; Long and Fisher 2005; Hunter and Maceina 2008). Relatively little is known about ontogenetic shifts in habitat use and movement. Spotted Bass are found in a wide range of systems from creeks to reservoirs and rivers (Etnier and Starnes 1993). In streams, they inhabit low-velocity reaches or pools with gravel substrates. They are common in and around vegetation, complex woody debris, and undercut banks (Warren 2009). In Virginia reservoirs, Spotted Bass may be widely distributed but may be more often associated with fine substrate, woody debris, and undercut banks than Smallmouth Bass (Scott and Angermeier 1998). The same Virginia study found that Spotted Bass were less associated with steep drop-offs and rocky shorelines favored by Smallmouth Bass. Several studies throughout the southern United States have reported that Spotted Bass abundance is inversely related to primary production among oligomesotrophic reservoirs and among reaches within a reservoir (Buynak et al. 1989; Greene and Maceina 2000; Maceina and Bayne 2001). These findings contrast with the direct relationship between Largemouth Bass abundance and increasing eutrophication (Maceina and Bayne 2001). Spotted Bass have been observed in high salinity waters but rarely occur in coastal marshes with salinities exceeding 4 parts per thousand (Peterson and Ross 1991).

## Reproduction

Most Spotted Bass reach sexual maturity at age 2 or age 3, but spawning has been observed as early as age 1 (Olmstead 1974; Voegelé 1975a, 1975b). Spawning occurs over a 1–2-month period from March to May or June, depending on latitude and water temperature (Olmstead 1974; Voegelé 1975b; Sammons et al. 1999). Most spawning occurs between 14°C and 23°C (Ryan et al. 1970; Smitherman and Ramsey 1972; Gilbert 1973; Olmstead 1974; Sammons et al. 1999). Nest placement is usually on top of hard substrates (e.g., sand, gravel, and rock ledges) and near cover (e.g., overhangs, stumps, and submerged trees) (Voegelé 1975b; Voegelé and Rainwater 1975). Nest depths averaged 2.3–3.7 m (range 0.9–6.7 m; Voegelé 1975a, 1975b). In one Tennessee reservoir, the timing of Spotted Bass reproduction and hatching was not linked to spring water levels, in marked contrast to Largemouth Bass in that same system (Sammons et al. 1999).

Spawning behavior of Spotted Bass is similar to the other *Micropterus* spp., with males excavating and guarding up to three nests for females to deposit eggs. Courtship behavior is variable in duration. Males begin fanning the fertilized eggs and defending them against predators until hatch in about 5 d (Voegelé 1975b). Larvae become free swimming at 6.0–7.5 mm total length (TL; DiCenzo and Bettoli 1995). Fry of a single brood may mix with other broods to form larger schools after being guarded by a single male for up to 4 weeks. Schools break up as fry reach about 30 mm TL (Voegelé 1975b).

## Diets

Spotted Bass are often the only top carnivore in small streams and the dominant top predator in larger rivers and reservoirs (Cross 1967; Trautman 1981). Spotted Bass are considered opportunistic carnivores, utilizing prey items found throughout the water column. Young Spotted Bass first consume microcrustacean zooplankton until transitioning to immature aquatic insects such as mayflies. They switch to feeding on fish and crayfish at 50–100 mm TL (Applegate et al. 1967; Clady and Luker 1982; Matthews et al. 1992; Scott and Angermeier 1998). Fish preyed upon by adult Spotted Bass include clupeids and sunfish in reservoirs; in lotic systems, Spotted Bass prey upon crayfish, darters, cyprinids, and catfishes. When preferred prey items are scarce, Spotted Bass may shift their diet to include terrestrial insects found on the water's surface (e.g., hymenopterans, coleopterans, dipterans, and adult odonates; Applegate et al. 1967; Gilbert 1973; Voegelé 1975a; Matthews et al. 1992; Scott and Angermeier 1998). One study found that Spotted Bass fed most actively in the day (Horton et al. 2004). Except for higher utilization of terrestrial insects in the day, other investigators concluded that Spotted Bass exhibited no clear diel pattern in feeding (Scott and Angermeier 1998). In the Flint River, Georgia, juvenile Spotted Bass diets were dominated by fish and insects, and their diet was intermediate between the diet of juvenile Largemouth Bass (fish were the most common prey item) and juvenile Shoal Bass *M. cataractae*, which consumed mostly insects and crayfish (Sammons 2012).

## Pathogens of Concern in the Wild

Little information exists on the pathology of Spotted Bass. Sullivan (1975) provided a general overview of diseases that affect black basses, but acknowledged that many pathogens are not lethal. A single study of parasites found only nematodes, cestodes, and trematodes in Spotted Bass living in lakes, including Lake Erie (Bangham 1933). One other study examined the effects of larval tapeworms on Spotted Bass hepatic tissue (Joy and Madan 1989). Neither of these studies determined parasite load thresholds for lethality. Grizzle et al. (2003) found Largemouth Bass virus in a few Spotted Bass in the early 1990s, but the virus was not as lethal to Spotted Bass as it was to Largemouth Bass (Goldberg 2002).

## Growth

Spotted Bass in seven studies averaged about 113 mm TL at age 1 (Warren 2009). Growth rates were usually higher in reservoirs than in streams (Voegelé 1975a). Alabama Bass live longer and grow faster than Spotted Bass, which rarely exceed 425 mm TL, 2.0 kg, and age 6 (Gilbert 1973; Webb and Reeves 1975; Carlander

1977; Page and Burr 1991; Wiens et al. 1996; Maceina and Bayne 2001). The world angling record is 4.65 kg from Pine Flat Lake, California (IGFA 2012). This fish was likely an Alabama Bass, but no genetic evaluation was published.

## Sport Fisheries

Spotted Bass are popular sport fish in streams and reservoirs of the southeastern United States. They are often targeted by anglers using light tackle and fly rods but are often caught incidentally by anglers targeting other bass species and often misidentified as Largemouth Bass (Cross 1967; Etnier and Starnes 1993; Ross 2001). Larger Spotted Bass are taken in reservoirs and tailwaters where food is often more abundant than in streams (Ross 2001). Spotted Bass are often the dominant or codominant *Micropterus* spp. in the southern United States and often represent the majority of the catch of black bass (Novinger 1987; Buynak et al. 1989, 1991; DiCenzo and Maceina 1995; Pflieger 1997; Sammons et al. 1999; Sammons and Bettoli 1999; Long and Fisher 2005). Black bass management usually focuses on other *Micropterus* spp., not Spotted Bass (Long and Fisher 2005); in systems where Spotted Bass and other *Micropterus* spp. occur, it is not uncommon for special regulations to apply to other black basses but not Spotted Bass. Spotted Bass harvest restrictions are often liberalized to increase exploitation and benefit Largemouth Bass or Smallmouth Bass (Buynak et al. 1991; Long and Fisher 2005).

## Conservation Status

Spotted Bass are presently considered secure throughout most of their range, but peripheral populations are considered vulnerable in Illinois and imperiled in North Carolina (Warren 2009; NatureServe 2012). The unresolved genetic status of Spotted Bass populations, species status within the genus *Micropterus*, and hybridization with other *Micropterus* spp. continue to be the primary conservation concerns for Spotted Bass (Kassler et al. 2002; Pierce and Van Den Avyle 1997; D. P. Philipp, Illinois Natural History Survey, personal communication). The most recently discovered conservation issue facing managers today is rapid loss of Smallmouth bass when Spotted Bass are introduced into existing reservoir Smallmouth Bass fisheries (Pierce and Van Den Avyle 1997; Godbout et al. 2009).

## Research Needs

Future research should focus on clarifying the genetic and taxonomic relationships of Spotted Bass and the other black bass species (Kassler et al. 2002; Tringali et al. 2015). Studies should also be conducted to determine the long-term effects of Spotted Bass hybridization with other black basses in reservoirs and streams and what environmental factors cause reproductive isolating mechanisms to break down (Koppelman 1994; Pierce and Van Den Avyle 1997). Researchers need to answer basic life history questions such as how Spotted Bass distribute themselves over the year across different habitats and their annual movements in streams, rivers, and reservoirs (Warren 2009). It is worth noting that in contrast to Largemouth Bass and Smallmouth Bass, Spotted Bass are rarely studied using biotelemetry; we know of only two peer-reviewed studies (cited herein) that reported on Spotted Bass movements and behavioral ecology using radiotelemetry or ultrasonic telemetry. The effects of climate change on the ecology and distribution of all black basses, including Spotted Bass, is another rapidly developing area of study (Regier and Meisner 1990; Eaton and Scheller 1996). The thermal ecology of Spotted Bass should be explored to assess both current and future habitat availability if populations are to be maintained in a changing climate.

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