

# ESTUARINE STRIPED BASS, *Morone saxatilis*

## Central Southern Management Area

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### Life History

Striped bass (*Morone saxatilis*) are an estuarine dependent species found from the lower St. Lawrence River in Canada to the west coast of Florida through the northern shore of Gulf of Mexico to Texas. In North Carolina, it is also known as striper, rockfish, or rock. In their northern range (Albemarle Sound and points north), striped bass are anadromous, meaning they spend the majority of their adult life in the estuaries and ocean before migrating up freshwater rivers to spawn in the spring. For more southern stocks, including the Central Southern Management Area (Tar/Pamlico, Neuse, and Cape Fear stocks), striped bass are considered to be riverine, meaning they do not migrate to the ocean like other northern striped bass stocks and, instead, spend their entire life in the upper estuary and riverine system.

Spawning takes place from late March until early June. Spawning grounds are not clearly defined in these systems as access to spawning areas may be influenced by river flows as well as impediments to migration. Mature females, age 3 and older for the Central Southern Management Area stocks, produce large quantities of eggs, which are broadcast into riverine spawning areas and fertilized by mature males (age 2 and older). Striped bass require flowing, freshwater habitats in order to spawn successfully, allowing the eggs to remain suspended until they hatch, and to transport larvae to the nursery areas. Fertilized eggs drift with the downstream currents and continue to develop through a larval stage for several days, eventually arriving in river deltas and the inland portions of coastal sounds and estuaries where they

develop into juveniles. Environmental conditions, including temperature, rainfall and river flows during the spring spawning season, are critical factors in determining the number of juveniles produced annually.

Striped bass are relatively long-lived and capable of attaining a moderately large size. Fish weighing 30 pounds are not exceptional. In general, females grow larger than males with reported maximum lengths of 40 inches and 31 inches, respectively. Striped bass can form large schools and feed on whatever fishes are seasonally and geographically available. They also feed on a wide variety of invertebrates. In general, oily fish such as menhaden, herrings, and shads are very important prey items, but they will also eat spot, striped mullet, Atlantic croaker, American eel and various invertebrates such as blue crab.

## Fisheries

Historically commercial striped bass landings in the Central Southern Management Area have been relatively low compared to the Albemarle Sound Management Area. In the Neuse River, commercial landings averaged 1,972 pounds from 1972 to 1993 and 5,993 pounds from 1994 to 2006. In the Pamlico and Pungo rivers, commercial landings averaged 19,067 pounds from 1972 to 1993 and 7,853 pounds from 1994 to 2006. In Pamlico Sound, commercial landings averaged 9,973 pounds from 1972 to 1993 and 10,678 pounds from 1994 to 2006. In the Cape Fear River, commercial landings averaged 2,672 pounds from 1972 to 1993 and 1,282 pounds from 1994 to 2008 (a harvest moratorium has been in place since 2009).

Commercial harvest is currently constrained by a 25,000-pound spring quota (quota began in 1994 and fall season eliminated in 2004) and an 18-inch minimum total length size limit. Since 2008, most commercial landings have come from the Pamlico, Pungo and Neuse rivers. Since 2007 striped bass commercial landings for the Central Southern Management Area have averaged 23,851 pounds and ranged from a low of 10,115 pounds in 2008 to a high of 28,597 pounds in 2013 (Figure 1). In 2016, commercial landings for striped bass harvested was 23,041 pounds with a dockside value of \$69,271.

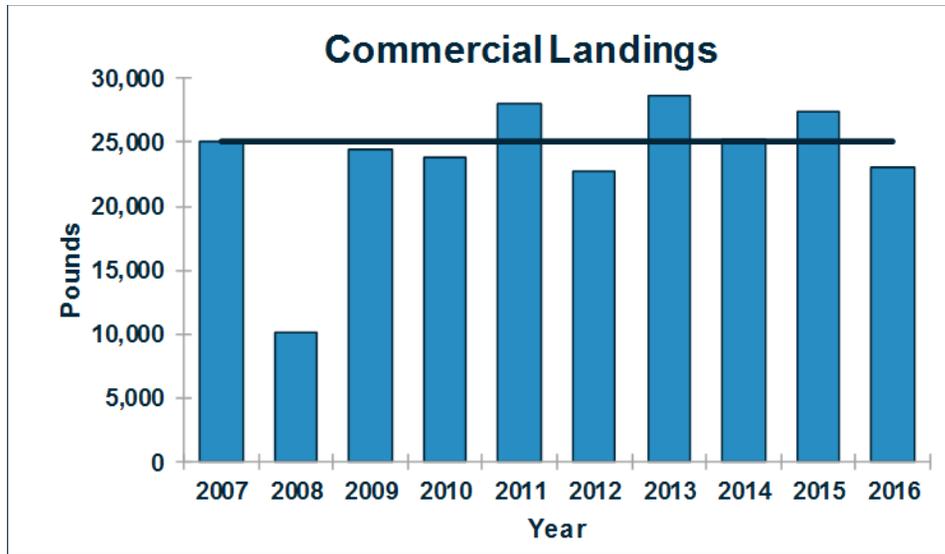


Figure 1. Annual commercial landings of Central Southern Management Area striped bass in North Carolina, 2007-2016. The black line represents the annual total allowable catch of 25,000 pounds.

Although not a target species, data collected on hybrid striped bass (a cross between a striped bass and a white bass, *Morone chrysops*) by the North Carolina Division of Marine Fisheries at commercial fish houses showed a peak abundance in the commercial fishery in 2014. In North Carolina, striped bass and hybrid striped bass are managed collectively and are not distinguished. Hybrid striped bass are commercially harvested from both the Tar/Pamlico and Neuse river systems; however, it is important to note their numbers have declined in the past several years (Figure 2). It is hypothesized that most of the hybrids observed in these systems originated from aquaculture facilities and escaped during flooding events. The last known major flooding event in the Central Southern Management Area was during Hurricane Irene in 2011, when river waters rose and flooded local aquaculture facilities. It was reported that tens of thousands (80 to 90 percent) of yearling hybrids were lost, presumably into the Pamlico River. While, it is likely that the majority of hybrids within the Central Southern Management Area river systems escaped from aquaculture facilities, it is also possible that hybridization may be occurring in the wild. Additional studies are needed to determine if this is occurring.

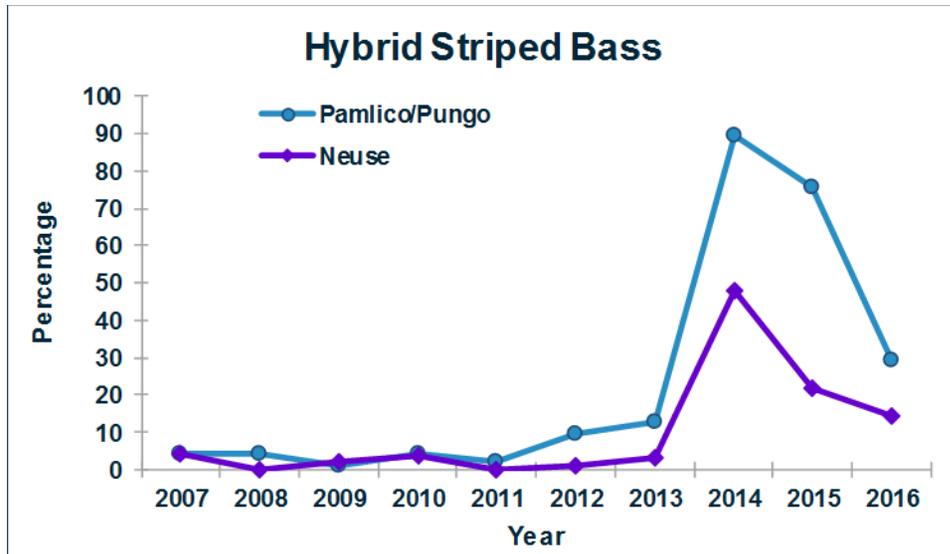


Figure 2. Percentage of hybrid striped bass in the commercial fish house samples (Pamlico/Pungo, and Neuse rivers), 2007-2016.

Angling methods used to catch striped bass vary depending on time of year and location, but include conventional, spinning and fly tackle gear using live, dead and artificial bait. Recreational harvest averaged 12,024 pounds over the past ten years and has ranged from a low in 2008 and 2009 averaging 3,026 pounds to a high of 25,661 pounds in 2016 (Figure 3).

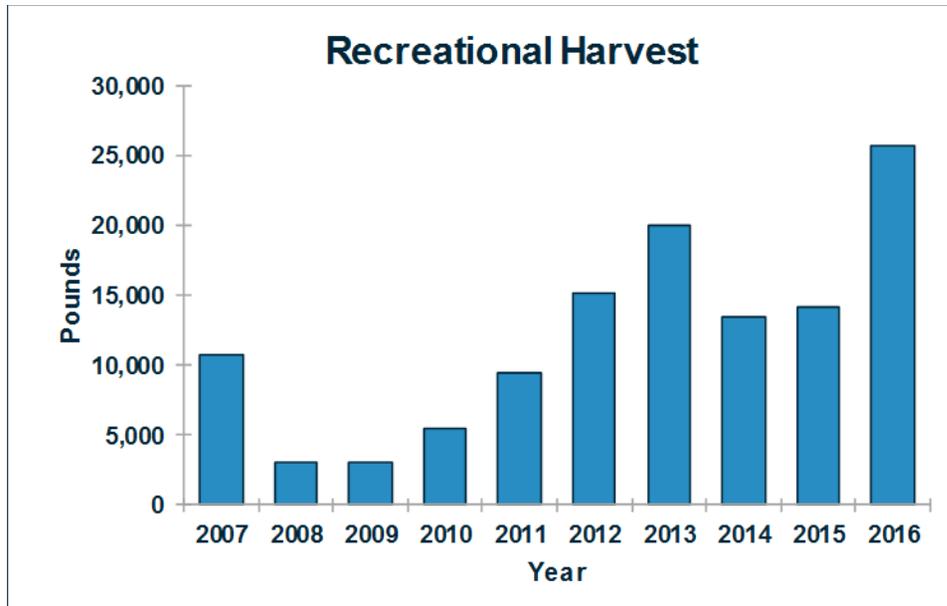


Figure 3. Annual recreational landings of Central Southern Management Area striped bass in North Carolina, 2007-2016.

In recent years, both the number of trips and hours spent targeting striped bass within the Central Southern Management Area have increased. In 2016, mainly due to the large number of undersized striped bass available, there was more than a threefold increase in the number of discards occurring in the fishery. From 2007 to 2016, an average of 20,404 undersized striped bass were discarded annually. In 2016, there were 71,797 total striped bass discards within the Central Southern Management Area (Figure 4).

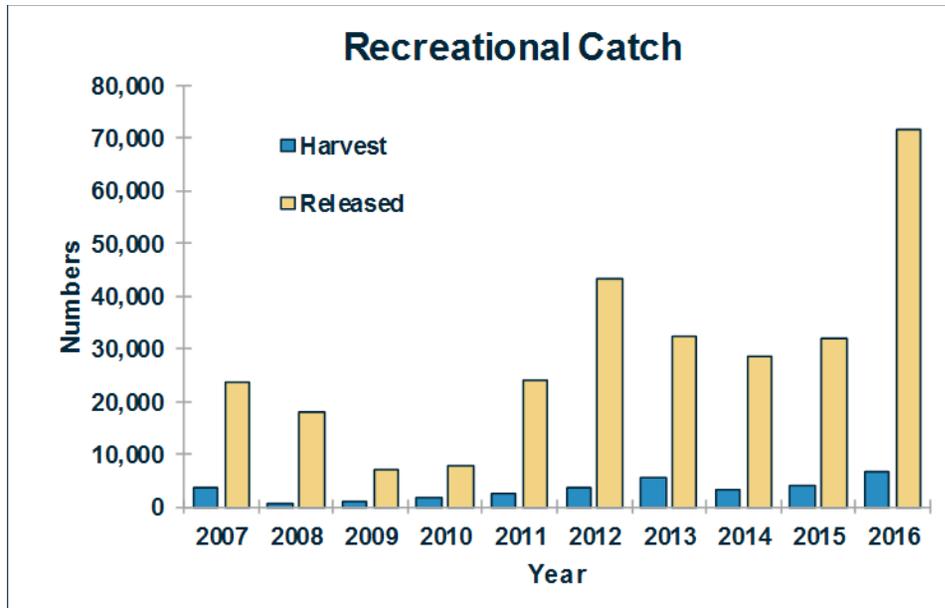


Figure 4. Annual recreational catch of Central Southern Management Area striped bass in North Carolina, 2007-2016.

## Management

The Central Southern Management Area includes all internal coastal, joint, and contiguous inland waters of North Carolina south of the Albemarle Sound Management Area to the South Carolina state line. There are spawning stocks in each of the major river systems within the Central Southern Management Area (the Tar/Pamlico, Neuse, and Cape Fear rivers). Due to the non-migratory behavior of these stocks, they are not included in the Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan for Atlantic Ocean Striped Bass, and management is the responsibility of the North Carolina Marine Fisheries Commission (coastal and joint fishing waters) and the North Carolina Wildlife Resources Commission (joint and inland waters). Striped bass in the Central Southern Management Area are managed under the North Carolina Estuarine Striped Bass Fishery Management Plan. Amendment 1 to the state plan maintained the status quo measures for recreational and commercial harvest (including a targeted fishery) with two exceptions: 1) a quota overage payback for the commercial fishery was implemented and effective beginning with the 2014 fishing season and 2) proclamation authority was given to the division director to allow the sale and purchase of striped bass

taken by hook and line gear. This will not automatically authorize the use of hook and line gear in the commercial striped bass fishery, but it allows for the issuance of a proclamation to allow the use of this gear at some future date. Amendment 1 also implemented an annual stocking goal of 100,000 hatchery reared striped bass in each of the major river systems (Tar/Pamlico, Neuse, and Cape Fear rivers) to aid in recovery of the stocks (stocking previously occurred on a rotating basis where only two systems were stocked annually). The fishery management plan review for estuarine striped bass is underway and results from a benchmark stock assessment are expected late in 2017.

### Stock Status Overview

The lack of adequate data causes the Central Southern Management Area stocks to be quantitatively assessed as unknown and to be listed as “concern” by the division. Major causes for concern over striped bass in the Central Southern Management Area involves low overall abundance, minimal recruitment, quantifying sources of mortality, the absence of older fish on the spawning ground, non-optimal environmental conditions on the spawning grounds in the spring and the potential impacts on the population from stocked juveniles and hybrid striped bass. Prior studies indicated that stocked fish only contributed minimally to the spawning stock; however, in 2016, new genetic research showed that the striped bass stocks in the Tar/Pamlico, Neuse and Cape Fear rivers were overall comprised of 85 percent hatchery reared fish, indicating there is extremely limited natural reproduction and survival occurring in the Central Southern Management Area. The percent contribution of hatchery fish differs significantly between river system and area within each river. Dams blocking access to spawning habitat and low water flow associated with droughts, municipal withdrawals, and electrical power production limit the spawning success of this species in the Central Southern Management Area.

A fishery independent gill net survey was initiated by the North Carolina Division of Marine Fisheries in May 2001 in Pamlico Sound. This survey was expanded to the Pamlico, Pungo and Neuse rivers in 2003 and to the Cape Fear and New rivers in 2008. Catch rates of striped bass from this survey are calculated annually and are defined as the number of individual fish captured per gill net set expressed as an overall catch per unit effort (Figure 5).

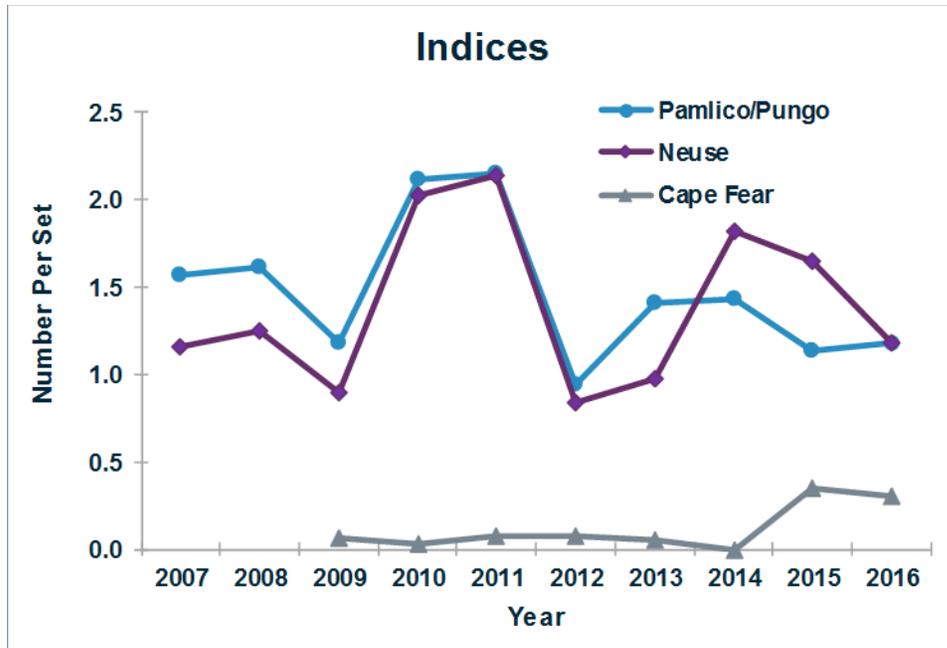


Figure 5. Annual indices of adult abundance of Central Southern Management Area striped bass in the Fisheries Independent Assessment Survey for the Pamlico/Pungo and Neuse rivers (2007-2016) and Cape Fear River (2009-2016).

## Research Needs

Research needs include expanding commercial, recreational, and fishery independent sampling in the Central Southern Management Area; determining the system of origin of fish on the spawning grounds, maturation schedules, and age structure of striped bass in the Central Southern Management Area; determining the contribution of hatchery reared fish, through parentage-based tags, that are harvested from the recreational and commercial fisheries, as well as from fishery independent sampling; determining if striped bass are producing eggs that match the current flow regimes on the Tar/Pamlico and Neuse rivers, and investigating why there is little to no natural recruitment of striped bass in the Central Southern Management Area.



## [Links](#)

### Management Agencies

[North Carolina Division of Marine Fisheries](#)

### Fishery Management Plans, Amendments, Revisions, & Supplements

[North Carolina Fishery Management Plans](#)

### Contacts

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