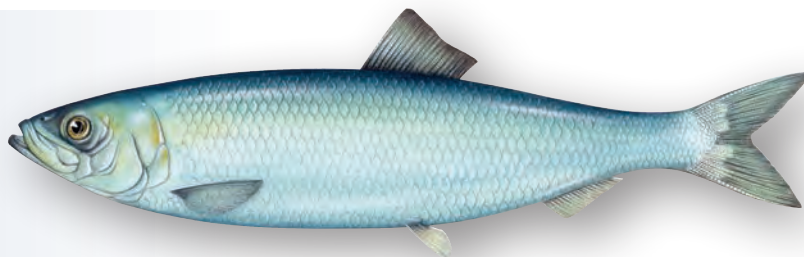




# Table of Contents

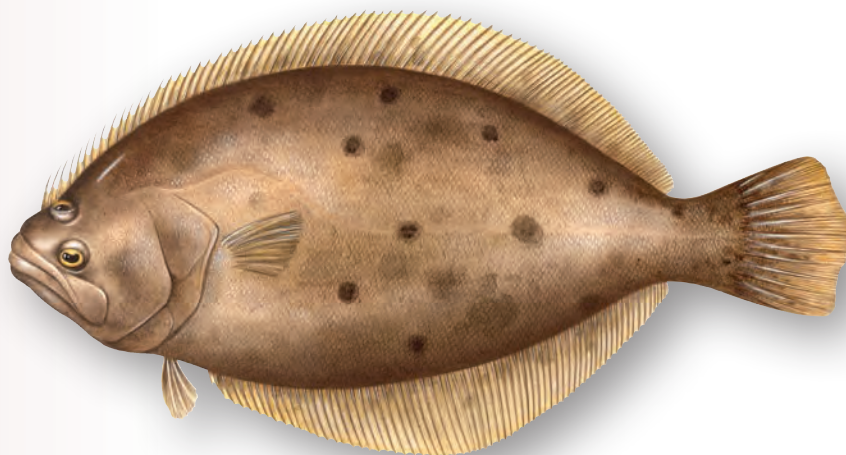
## Northeast

- American Lobster
- Atlantic Herring
- Northern Shrimp
- Winter Flounder



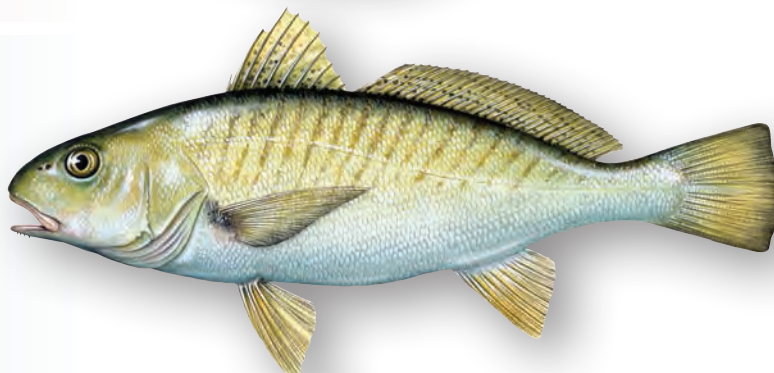
## Mid-Atlantic

- Atlantic Menhaden
- Black Sea Bass
- Bluefish
- Coastal Sharks
- Horseshoe Crab
- Scup
- Spiny Dogfish
- Summer Flounder
- Tautog
- Weakfish



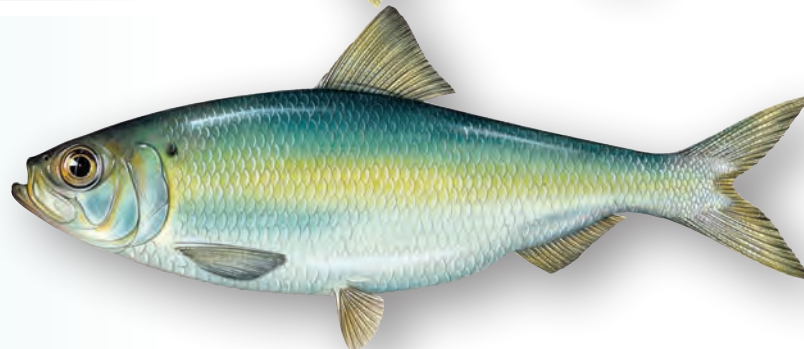
## South Atlantic

- Atlantic Croaker
- Black Drum
- Red Drum
- Spanish Mackerel
- Spot
- Spotted Seatrout



## Diadromous

- American Eel
- Atlantic Striped Bass
- Atlantic Sturgeon
- River Herring
- Shad



management • science • habitat

# Interstate Fisheries Management Program

The 25 species and species groups contained in this folder are all managed through the Interstate Fisheries Management Program (ISFMP) of the Atlantic States Marine Fisheries Commission.

The bulk of the Commission's decision making occurs through the ISFMP, where Commissioners determine management strategies that the states implement through fishing regulations. The ISFMP operates under the direction of the ISFMP Policy Board and works through species management boards.

The ISFMP Policy Board, comprised of the Commissioners from the 15 member states and representatives of District of Columbia (DC), the Potomac River Fisheries Commission (PRFC), the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, oversees the program and meets at least bi-annually to establish and monitor the direction of the program.

The species management boards, also comprised of Commissioners and representatives from the federal agencies, DC and the PRFC, consider and approve the development and implementation of fishery management plans, including the integration of scientific information, proposed management measures, and considerations for habitat conservation, and the management of protected species/fishery interactions. All Boards receive scientific advice and stakeholder input through technical committees and advisory panels. Board membership is composed of Commissioners from the states that have declared an interest in the species' management program.

For species that have significant fisheries in both state and federal waters (i.e., Atlantic herring, summer flounder, scup, black sea bass, bluefish), the Commission works jointly with the relevant East Coast regional fishery management council to develop fishery management plans. The Commission also works with the National Marine Fisheries Service to develop compatible regulations for the exclusive economic zone.

The Atlantic Coastal Fisheries Cooperative Management Act of 1993 (ACFCMA) established the mechanism and procedures to ensure state compliance with mandatory management measures in all interstate fishery management plans. It funds the lion share of the fisheries management activities that occur along the coast at both the state and coastwide levels and is largely responsible for many of the fisheries management successes that have occurred over the last 15 years (striped bass, bluefish, Atlantic menhaden, northern shrimp, Atlantic herring).

The Commission was formed by the 15 Atlantic coast states in 1942 with the goal of conserving and managing the states' shared nearshore (0 – 3 miles) fishery resources — marine, shell, and diadromous — for sustainable use.

Coastal states from Maine through Florida, including Pennsylvania, make up the Commission with each state represented by three Commissioners — the director for the state's marine fisheries management agency, a state legislator, and an individual appointed by the governor. Commissioners participate in the deliberations in the Commission's main policy arenas: interstate fisheries management, fisheries science, habitat conservation, and law enforcement. The one-state one-vote concept allows Commissioners to address stakeholder-resource balance issues at the state level.

## **Mission**

To promote the better utilization of the fisheries, marine, shell and diadromous, of the Atlantic seaboard by the development of a joint program for the promotion and protection of such fisheries, and by the prevention of physical waste of the fisheries from any cause.

## **Vision**

Sustainably managing Atlantic Coastal fisheries



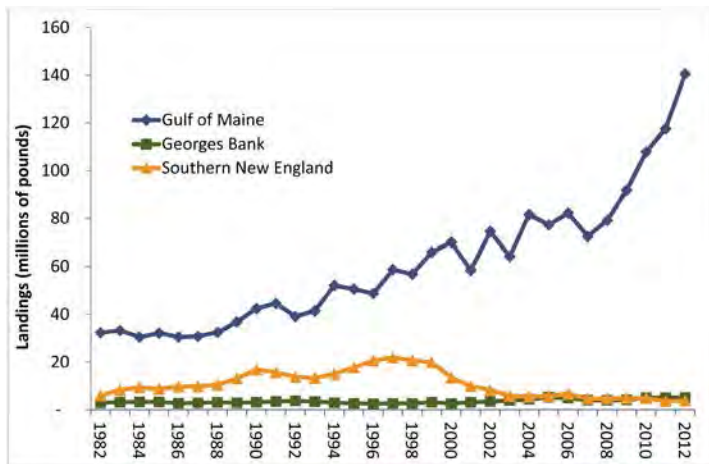
# American Lobster

## *Homarus americanus*

### Life History

American lobster, *Homarus americanus*, is a bottom-dwelling crustacean, widely distributed over the continental shelf of North America. In the inshore waters of the US, it is most abundant from Maine through New Jersey, with abundance declining from north to south. Offshore, it occurs from Maine through North Carolina. Three stock units have been identified based on regional differences in life history parameters. They are the Gulf of Maine (GOM), Georges Bank (GBK), and Southern New England (SNE).

Reproduction and growth are linked to the molting cycle. Lobsters periodically shed their shell to allow their body size to



American Lobster Preliminary Landings by Stock Unit.  
Source: ACCSP Data Warehouse, 2013.

increase and mating to occur. Sperm is deposited in recently molted females and stored internally until extrusion, which can extend for two years. When extruded, the eggs are fertilized and attached to the underside of the female, where they are carried for 9 to 11 months before hatching. Eggs hatch from mid-May to mid-June. Lobster larvae transition through 5 stages. For the first 4 stages larvae are planktonic, swimming at or near the water surface. At the fifth larval stage, juveniles sink to the ocean floor where they remain for the rest of their lifetime. Lobsters reach market size in about four to nine years, depending on water temperature and other biological factors.

### Commercial & Recreational Fisheries

American lobster is one of the most valuable commercial fisheries along the Atlantic coast, with an ex-vessel value of \$430 million in 2012. The fishery has seen an incredible expansion in effort and landings since the late 1940s and early 1950s, when landings varied around 25 million pounds. Over the past two decades, coastwide landings have increased substantially, rising to 57 million pounds in 1993 to a peak of 150 million pounds in 2012.

A majority (~90%) of the commercial landings of lobster are caught in state waters (0-3 miles from shore), with Maine and Massachusetts accounting for 84% and 10% of the landings, respectively. Lobster pots are the main method of harvest, although gill nets, otter trawls and dredges also account for some landings. In 2012, approximately 94% of the coastwide landings have come from GOM. SNE and GBK each accounted about 3% of the landings.

Lobster is recreationally caught by anglers using lobster pots or by hand while SCUBA diving. However, the magnitude of these recreational landings is unknown.

### Stock Status

The 2009 peer-reviewed stock assessment report presents a mixed picture of lobster abundance throughout its US range. The report indicates record high abundance and recruitment (number of lobsters entering the fishery) throughout most of GOM and GBK. The SNE stock is in poor condition with continued low abundance and recruitment. Further analysis on the SNE stock has found that the reproductive potential and abundance of the SNE stock is continuing to fall lower than data presented in the 2009 assessment. The SNE stock is critically depleted and abundance indices are at all time lows.

Based on biological reference points, adopted in 2010, GOM and GBK stocks are in favorable condition, with exploitation at a moderate level in the GOM and favorable in GBK. The SNE is in an unfavorable condition, requiring Board action to rebuild



**ASMFC American Lobster FMP Coordinator, Toni Kerns, with a lobster sampled during the Gulf of Maine Northern Shrimp Survey.**

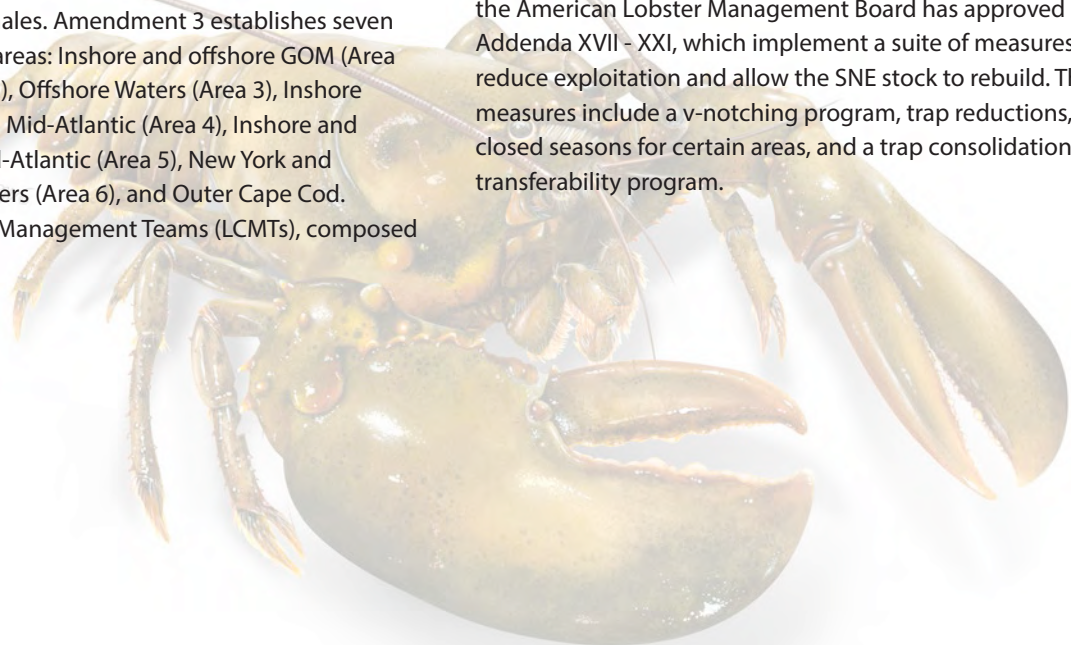
the stock and address the low levels of recruitment. The next benchmark stock assessment will be conducted in September 2014, with the peer review scheduled for early 2015.

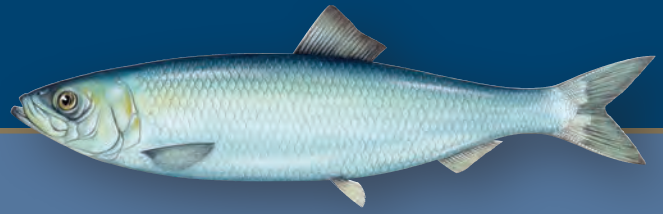
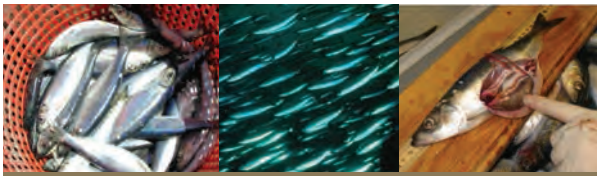
### *Atlantic Coastal Management*

American lobster is managed under Amendment 3 to the Interstate Fishery Management Plan for American Lobster, as well as Addenda I through XXI to the same plan. The main goal of the American lobster management plan is to increase egg production in females. Amendment 3 establishes seven lobster management areas: Inshore and offshore GOM (Area 1), Inshore SNE (Area 2), Offshore Waters (Area 3), Inshore and offshore Northern Mid-Atlantic (Area 4), Inshore and offshore Southern Mid-Atlantic (Area 5), New York and Connecticut State Waters (Area 6), and Outer Cape Cod. Lobster Conservation Management Teams (LCMTs), composed

of industry representatives, were formed for each management area. The LCMTs are charged with advising the Lobster Board and recommending changes to the management plan within their areas. The commercial fishery is primarily controlled through minimum/maximum size limits, trap limits and v-notching of egg-bearing females.

Given the critically depleted condition of the SNE stock, the American Lobster Management Board has approved Addenda XVII - XXI, which implement a suite of measures to reduce exploitation and allow the SNE stock to rebuild. These measures include a v-notching program, trap reductions, closed seasons for certain areas, and a trap consolidation/transferability program.





# Atlantic Herring

## *Clupea harengus*

### Life History

Atlantic herring, *Clupea harengus*, are oceanic, plankton-feeding fish that occur in large schools and inhabit coastal and continental shelf waters from Labrador to Virginia. Juveniles (called sardines) undergo seasonal inshore-offshore migrations. Sardines are abundant in shallow, inshore waters during the warmer months of the year. Adults (age three and older) migrate south from summer/fall spawning grounds in the Gulf of Maine and Georges Bank to spend the winter in Southern New England and the Mid-Atlantic.

Herring spawn as early as August in Nova Scotia and eastern Maine and during October and November in the southern Gulf of Maine, Georges Bank, and Nantucket Shoals. Spawning habitat consists of rock, gravel, or sand bottoms, ranging in depth from 50-150 feet. Females can produce between 30,000 and 200,000 eggs each. Schools can produce so many eggs the ocean bottom is covered in a dense carpet of eggs several centimeters thick. Eggs hatch in 10-12 days depending on water temperature. By their fourth year, fish are about 10" in length and may eventually grow to about 15" (1 ½ pounds) at ages 15 to 18 years. Herring are filter feeders preying entirely on plankton. They usually feed at night following the massive vertical migrations of zooplankton that inhabit deep waters by day and surface waters by night.

### Commercial & Recreational Fisheries

Atlantic herring are one of the most important species in the Northeast because of the vast role they play in the marine ecosystem and their importance to fishermen. Herring form the base of the food web as a forage fish for marine mammals, seabirds and many fish throughout the Mid-Atlantic and Northeast. Schooling herring serve as an important prey resource for migrating whale and dolphin populations, which eco-tourism activities such as whale watching, are dependent on. Atlantic herring also provide effective and affordable bait to lobster, blue crab and tuna

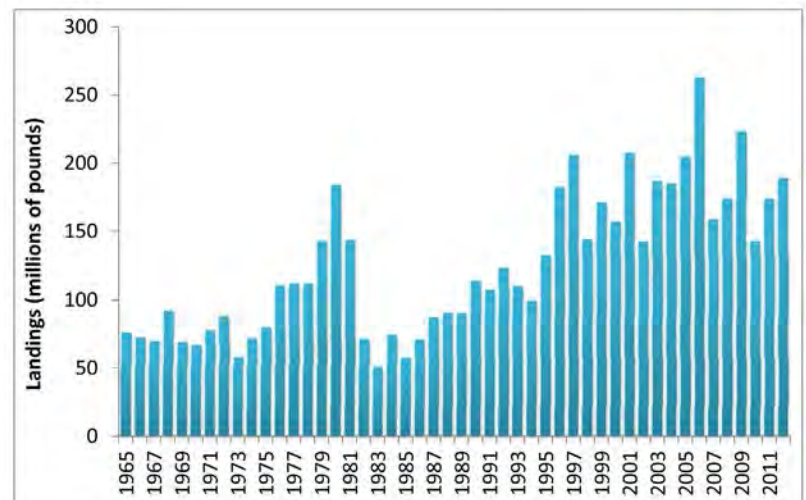


Atlantic herring captured as part of the Northeast Fisheries Science Center's (NEFC) Pelagic Trawl Survey. Photo credit: NWFSC.

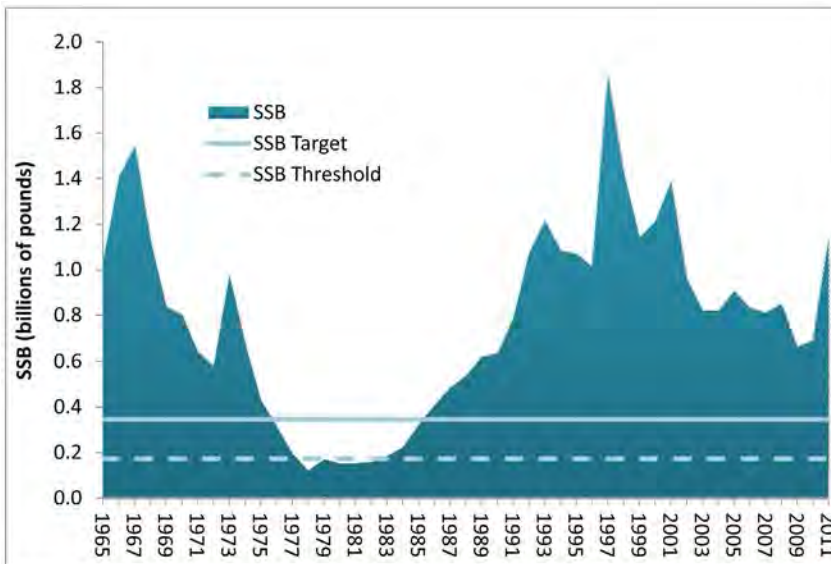
fishermen and are sold as canned sardines, steaks and kippers. They are also a valued commodity overseas where they are frozen and salted. Since 2000, the ex-vessel value of commercial herring landings has averaged about \$27 million/year.

The commercial herring fishery in New England developed in the late 19th century, spurred by the development of the canning industry. The lobster fishery developed about the same time, creating

a market for herring as bait. Commercially landed herring are caught using purse seines and mid-water trawls. Landings averaged 59,860 mt (132 million pounds) throughout the late 1890s and early 1900s, and again in the late 1940s and 1950s. An aggressive foreign fishery developed on Georges Bank in the early 1960s, with landings peaking at 477,760 mt (1 billion pounds) in 1968. This excessive harvest led to a collapse of the offshore herring stock. Today, the stock is rebuilt with the average annual catch since 2008 just below 90,736 mt (200 million pounds). The majority of these landings are taken from the Gulf of Maine, but fisheries also occur on Georges Bank and areas south and west of Cape Cod.



Atlantic Herring Commercial Landings. Source: ACCSP, 2013.



**Atlantic Herring Spawning Stock Biomass (SSB).** Source: 54th Northeast Regional Stock Assessment Workshop, 2012

### Stock Status

The latest stock assessment, conducted by the Northeast Regional Stock Assessment Workshop in 2012, indicates Atlantic herring are not overfished and overfishing is not occurring. Spawning stock biomass in 2011 is estimated at 518,000 mt (1.1 billion pounds), well above the SSB threshold and target of 78,500 mt (173 million pounds) and 157,000 mt (364 million pounds), respectively. Current fishing mortality is estimated at 0.14, below the fishing mortality threshold of 0.27. The latest assessment represents a significant departure from previous assessments in that it examines predator consumption on Atlantic herring biomass and productivity to address herring ecosystem functions.

### Atlantic Coastal Management

Atlantic herring are managed under Amendment 2 to the Interstate Fishery Management Plan for Atlantic Herring and its associated addenda. Because herring can be found in state and federal waters, there are complementary management plans between the Commission and New England Fishery Management Council (Council) which set annual quotas, called annual catch limits (ACL), for three management areas and two sub-areas. The ACLs for these areas are set based on the maximum sustainable yield that allows for a sustainable harvest but leaves enough herring for fish, birds and marine mammals.

While the plans for state and federal waters share management boundaries, there are a few differences. The Council prohibits mid-water trawling from June 1 - September 30 in federal waters

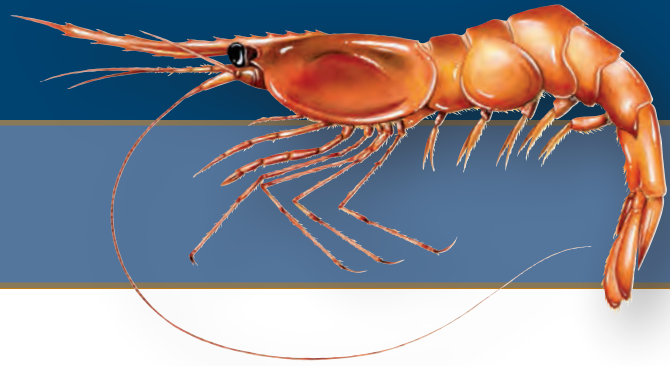
(3-200 miles from shore). The Commission plan includes spawning closures and a “days out” provision. Days out is the primary effort control measure for the inshore fishery, restricting vessels to 2,000 pounds of herring on a day out to prolong a management area’s TAC.

Addendum VI, approved in 2013, complements the Council’s Framework Adjustment 2 to the Federal FMP by establishing seasonal splitting in the four management areas, a rollover of up to 10% unused quota to the year after final landings data are made available, harvest control measures in the form of triggers, and a specification process to set the triggers.

For the 2013-2015 fishing seasons, the Commission set the ACL at 237.7 million pounds, an 18% increase from 2010-2012 limits. For all three years, the ACL is further subdivided by Atlantic herring management areas as

follows: Area 1A = 68.8 million pounds, Area 1B = 10.14 million pounds, Area 2 = 66.15 million pounds, and Area 3 = 92.6 million pounds. The Area 1A sub-ACL is distributed seasonally with 72.8% available from June 1-September 30 and 27.2% available from October 1-December 31. Directed fisheries within a management area will close when 92% of that period’s quota has been harvested, and the stock-wide fishery will close when 95% of the ACL is projected to be reached. Maine, New Hampshire, and Massachusetts continue to modify days-out of the fishery during the season to prolong the fishery in Area 1A (inshore GOM), making herring available during peak demand. In October 2013, the Area 1A fishery was closed having landed 92% of the management area’s ACL.

Concerns raised by the Commission and stakeholders regarding river herring (alewife and blueback herring) bycatch in the Atlantic herring fishery prompted the NEFMC to include catch/bycatch monitoring requirements and measures to reduce interactions with river herring stocks in Amendment 5 to the federal FMP. However, NOAA Fisheries only partially implemented Amendment 5 in 2013. To address the measures not approved in Amendment 5, NEFMC selected catch cap options for the Atlantic herring fishery (Draft Framework Adjustment 3) and will be initiating the development of Framework Adjustment 4 in 2014 to address measures such as slippage and dealer weighing provisions.



# Northern Shrimp

## *Pandalus borealis*

### Life History

Northern shrimp, *Pandalus borealis*, is a crustacean located in the cold waters of the Northern Hemisphere. The species is found in Canadian waters and in the northern-most waters of the U.S. On the U.S. Atlantic coast, it primarily inhabits waters off of Maine, New Hampshire, and Massachusetts. Northern shrimp are hermaphroditic, maturing first as males at roughly 2 ½ years of age and then transforming to females at about 3 ½ years. Female shrimp may live up to five years old and attain a size of up to three to four inches in length. Differences in size at age by area and season can be ascribed to temperature effects, with more rapid growth rates at higher temperatures. Differences in size at age from year to year, and in size at sex transition, have been attributed to both environmental and stock density effects.

Spawning takes place in offshore waters during the late summer. By early fall, most adult females extrude their eggs onto the abdomen. Egg-bearing females move inshore in late autumn and winter, where the eggs hatch. Northern shrimp are an important link in marine food chains, preying on both plankton and benthic invertebrates and, in turn, being consumed by many important fish species, such as cod, redfish, and silver and white hake.

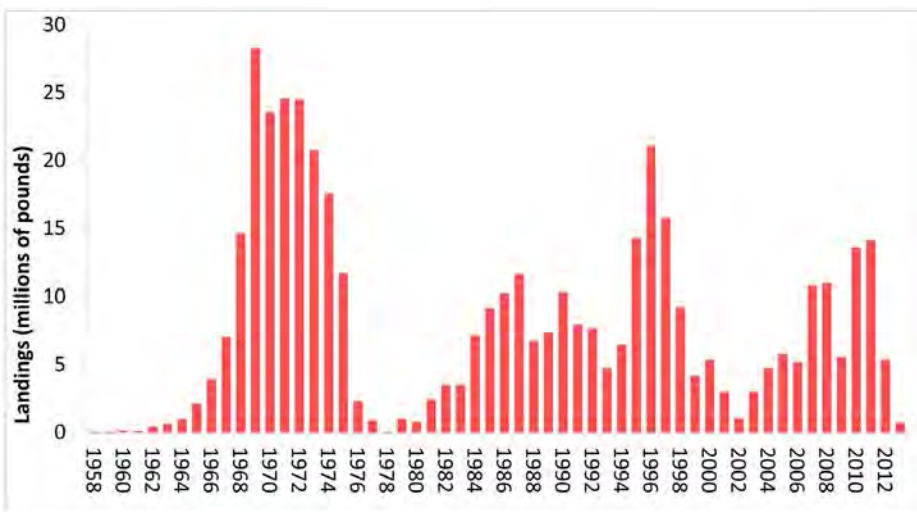
### Commercial & Recreational Fisheries

Historically, northern shrimp have provided a small but valuable fishery to the New England states. The fishery is seasonal in nature, peaking in late winter when egg-bearing females move into inshore waters and ending in the spring under regulatory closure.

The commercial fishery began in earnest in the late 1950s/early 1960s and experienced an incredible expansion in landings, peaking in 1969 at 28.3 million pounds. Over the next decade, landings dropped precipitously to a low of less than 85,000 pounds in 1977. The fishery was closed in 1978 due to a stock collapse. The fishery slowly reopened in 1979 and landings increased steadily to over 11 million pounds by 1987. Landings ranged from 5.1 to 9.7 million pounds during 1988-1994, and then rose dramatically to 20.1 million pounds in 1996, the highest since 1973. Landings declined to an average of 4.2 million pounds for 1999 to 2001, and dropped further in the 25-day 2002 season to 992,250 pounds, the lowest northern shrimp landings since the fishery was closed in 1978. Landings then increased steadily, averaging 4.6 million pounds during the 2003 to 2006 seasons, then jumping to 10.8 million pounds in 2007 and 11 million pounds in 2008. In 2009, 5.5 million pounds were landed during a season that was market-limited. The proposed

180-day season for 2010 was cut short to 156 days with 13.5 million pounds landed, due to the industry exceeding the recommended landings cap for that year, and concerns about small shrimp.

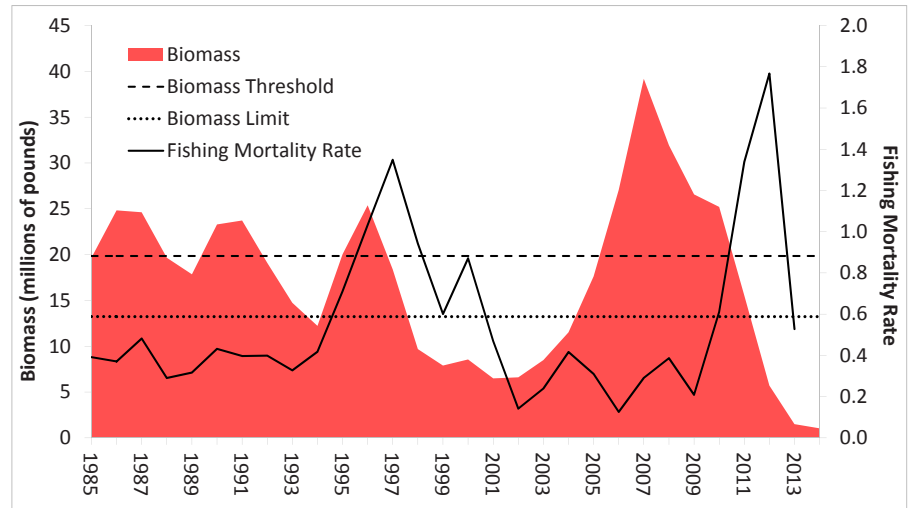
As in 2010, the 2011 season was closed early. The season was scheduled to be 136 days, but was closed after 90 days. A preliminary total of 14.1 million pounds of shrimp were landed, exceeding the recommended limit (4,000 mt) by approximately 8.8 million pounds. In 2012, the season was further restricted, with the trawl fishery beginning on January 2 with 3 landings days per week (Mondays, Wednesdays, and Fridays) and the trap fishery beginning on February



Northern Shrimp Landings. Source: ASMFC Northern Shrimp Technical Committee, 2013

1 with a 1,000 pound limit per vessel per day. The TAC was set at 4.9 million pounds and would close when the projected landings reached 95% of the TAC. The season was closed on February 17, resulting in a 21-day trawler season and a 17-day trap season.

The 2013 season, which was classified as a “do no harm” fishery, resulted in a fishing mortality rate (0.53) above the target (0.38). This was despite the fact that only 49% of the total allowable catch was harvested (676,935 pounds of 1.39 million pounds).



**Gulf of Maine Northern Shrimp Total Stock Biomass and Fishing Mortality.** Source: ASMFC Assessment Report for the Gulf of Maine Northern Shrimp, 2013

### Stock Status

The results of the 2013 Assessment Report for Gulf of Maine Northern Shrimp indicate the northern shrimp stock is overfished and overfishing is occurring. Northern shrimp abundance in the western Gulf of Maine has declined steadily since 2006. Current biomass (1.1 million pounds) is the lowest value in recent history, estimated at 5.2% for the biomass reference period (1985-1994), and well below the biomass threshold of 19.85 million pounds and the biomass limit of 13.23 million pounds. Additionally, there has been recruitment failure for the past three years. The Northern Shrimp Technical Committee considers the stock to have collapsed with little prospect of recovery in the near future.

In the Gulf of Maine, increasing water temperatures and a decline in phytoplankton abundance (a food source for shrimp) are factors which likely have and will continue to contribute to the poor recruitment in the stock. The increased abundance of northern shrimp predators (spiny dogfish, redfish and silver hake) may play a role in declining biomass. Northern shrimp stocks in other areas of the world (Greenland, Flemish Cap, Grand Banks) have also seen decreasing trends in abundance and recruitment, providing additional evidence that environmental conditions are impacting northern shrimp across their range.

The benchmark stock assessment was peer reviewed through the Northeast Regional Stock Assessment Review Committee on January 27-31, 2014. The assessment uses a new model which incorporates additional data sets that are not included in the stock assessment update. The Section will review the findings and consider the report for management use at its next meeting.



Northern shrimp being landed with traps.  
Photo: Cinamon Moffett, University of Maine.

### Atlantic Coastal Management

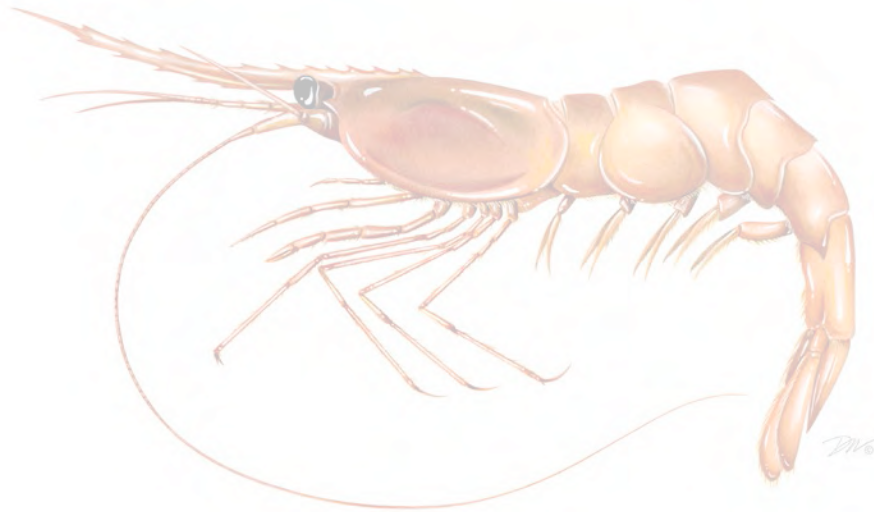
The Gulf of Maine fishery for northern shrimp is managed by the Commission’s Northern Shrimp Section through an interstate agreement between the states of Maine, New Hampshire and Massachusetts. Amendment 1, implemented in 2004, established biological reference points for the first time in the shrimp fishery and expanded the tools available to manage the fishery. Management of northern shrimp under Amendment 1 resulted in a rebuilt stock and increased fishing



opportunities. However, early season closures occurred in the 2009/2010 and 2010/2011 fishing seasons because landing rates were far greater than anticipated. Furthermore, untimely reporting resulted in short notice of the season closures and an overharvest of the recommended total allowable catch (TAC). In response to these issues, Amendment 2, approved in October 2011, provides management options to slow catch rates throughout the season, including trip limits, trap limits, and days out of the fishery. The Amendment completely replaces the FMP. It modifies the fishing mortality reference points to include a threshold level; includes a more timely and comprehensive reporting system, and allows for the initiation of a limited entry program to be pursued through the adaptive management addendum process.

Addendum I to Amendment 2, approved in November 2012, clarifies the annual specification process, and allocates the TAC with 87% for the trawl fishery and 13% for the trap fishery based on historical landings by each gear type.

In December 2013 in response to the findings of the 2013 Assessment Report, the Northern Shrimp Section established a moratorium for the 2014 fishing season to protect the remaining spawning population and reduce pressure on the collapsed stock. The Section noted that due recruitment failure, it is possible that the moratorium could extend beyond one year.

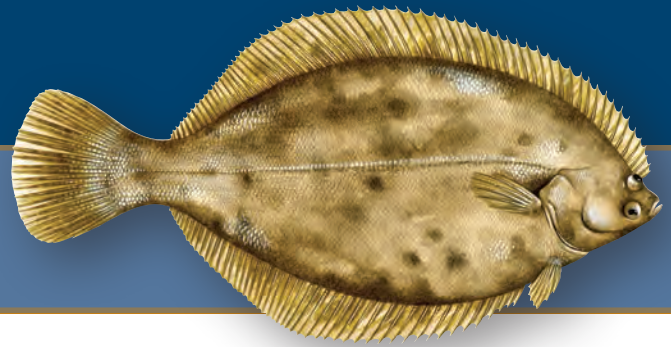






# Winter Flounder

## *Pseudopleuronectes americanus*



### Life History

Winter flounder, *Pseudopleuronectes americanus*, is an estuarine flatfish found in almost all shoal water habitats along the northwest Atlantic coast. The geographic distribution ranges from nearshore habitats to offshore fishing banks along the coasts of Labrador through Georgia, although they are most common north of the Chesapeake Bay. The name 'winter' flounder refers to their annual spawning migrations into nearshore waters during the winter. Adults migrate in two phases: an autumn estuarine immigration prior to spawning, and a late spring/summer movement to either deeper, cooler portions of estuaries or to offshore areas after spawning. This pattern of seasonal distribution may change in the colder waters of the northern extent of the range, where they migrate to shallow water in the summer and deeper waters in the winter. The annual spawning period varies geographically. Although spawning periods overlap considerably, peak spawning times happen earlier in southern locations.

During spawning, females release demersal adhesive eggs, which clump together, sink, and attach to sandy or muddy substrate. This keeps most of the eggs within spawning grounds. Many factors influence larval and juvenile growth and survival, including temperature, salinity, dissolved oxygen, and food availability. Nursery habitat for winter flounder larvae and juveniles is typically saltwater coves, coastal salt ponds, estuaries, and protected embayments; although larvae and juveniles have also been found in open ocean areas such as Georges Bank and Nantucket shoals. Larvae are predominantly found in the upper reaches of estuaries in early spring, moving into the lower estuary later in the season.

### Commercial & Recreational Fisheries

Historically valuable to commercial and recreational fishermen throughout New England and the Mid-Atlantic, winter flounder fisheries are a mere fraction of what they once were. Total landings (commercial and recreational) in both areas peaked in the early 1980s at approximately 10 million pounds for GOM and 36 million pounds for SNE/MA.

Over the last decade, commercial harvest has accounted for about 90% of total fishing mortality with half of the commercial



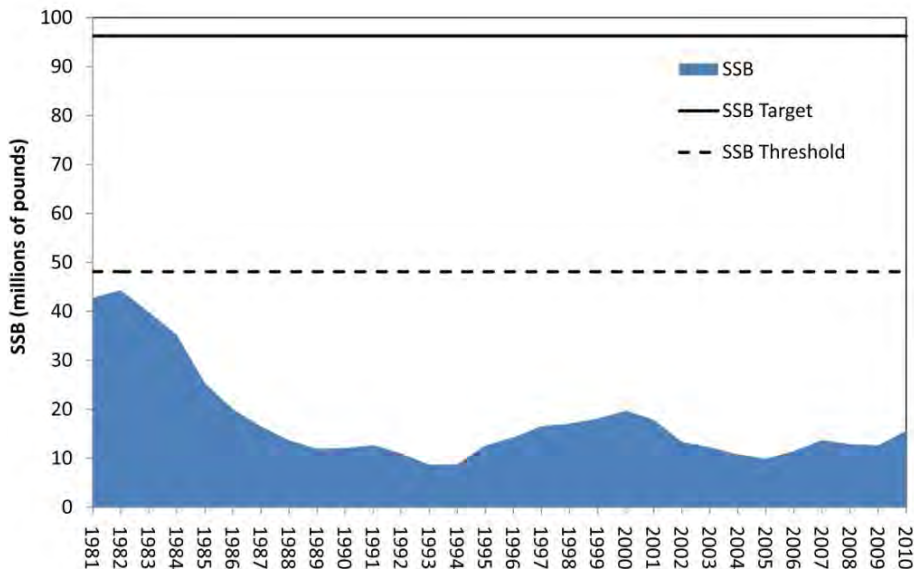
Winter flounder in eel grass.  
Photo credit: Carl Lobue, The Nature Conservancy.

landings occurring in state waters. Additionally, the vast majority of commercial harvest (~98%) has been taken by fishermen who possess a federal groundfish permit. The 2011 estimate for commercial landings of winter flounder was 4.6 million pounds. The majority of the recreational harvest occurs in state waters.

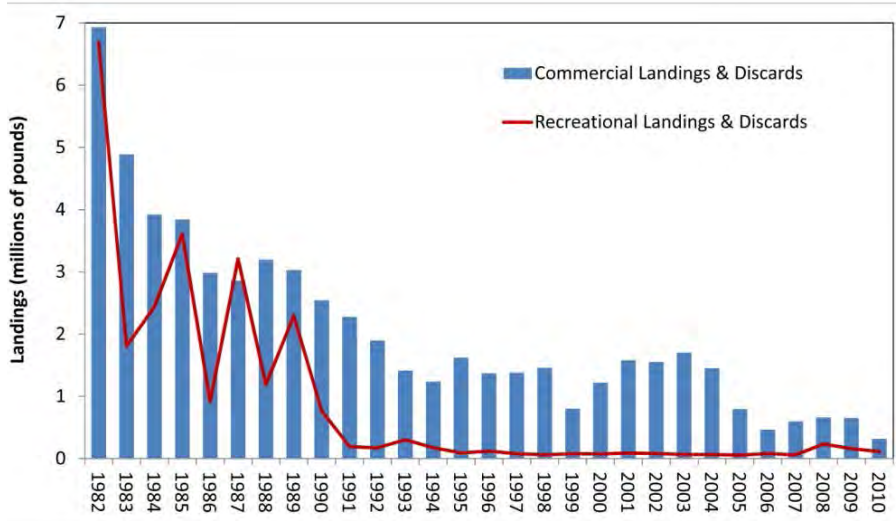
### Stock Status

Winter flounder stocks were most recently assessed at the 52nd Northeast Regional Stock Assessment Workshop/Stock Assessment Review Committee (SAW/ SARC 52) in 2011. Consistent with previous assessments and management delineations, three regional assessments were produced: Gulf of Maine (GOM), SNE/MA, and Georges Bank (GBK). The GOM stock occurs in the coastal waters north of Cape Cod, while the SNE/MA stock occurs in coastal waters south of Cape Cod. The offshore GBK stock does not fall under Commission management, and is managed solely by the Council and NMFS. The GBK stock is not overfished and not experiencing overfishing.

SAW/SARC 52 found that overfishing was not occurring in 2010 and the overfished status is unknown for the GOM stock. It also determined that the SNE/MA stock was overfished but not experiencing overfishing. SSB was estimated to be 15.6 million pounds in 2010, about 16% of the SSBTARGET (SSBMSY) of 96.3 million pounds, an improvement from 9% of SSBTARGET in 2007. Fishing mortality in 2010 was estimated to be 0.051, well below the FTHRESHOLD (FMSY) of 0.29.



Southern New England/Mid-Atlantic winter flounder spawning stock biomass (SSB).  
Source: NMFS 52nd Northeast Regional Assessment Workshop, 2011.



Gulf of Maine winter flounder landings and discards.  
Source: NMFS 52nd Northeast Regional Assessment Workshop, 2011.

### *Atlantic Coastal Management*

and Addendum I are designed to protect spawning females (the most productive part of the population) when they have migrated to inshore state waters spawning grounds because they are easy to locate and catch when congregated for spawning. The Commission and Council use stock area-specific management measures for both the recreational and commercial sectors of the fishery.

The Commission significantly reduced fishing on state waters spawning grounds in 2005 when Amendment 1 to the Interstate

FMP for Inshore Stocks of Winter Flounder (Amendment 1) replaced all previous winter flounder management documents. Amendment 1 established a minimum size limit, shortened seasons, and lowered trip/bag limits to reduce fishing pressure on spawning fish and rebuild the spawning stock biomass to target levels. Amendment 1 complemented Amendment 13 and Framework 42 to the Groundfish FMP, which focused on offshore commercial fisheries (3 - 200 miles). Its goal is to rebuild overfished stocks by reducing fishing mortality and minimizing adverse effects on all essential fish habitat with seasonal closures, gear restrictions, minimum size limits, trip limits, limited access, and days-at-sea restrictions.

Considerable management changes occurred in 2009 following the 2008 peer-reviewed benchmark assessment, which estimated the SNE/MA stock at 9% of the target biomass. To rebuild the depleted stock, the Commission initiated Addendum I to Amendment 1 (Addendum I), the Secretary of Commerce prohibited retention of SNE/MA winter flounder through interim action, and the Council included measures to incorporate the assessment results into Amendment 16 to the Groundfish FMP (Amendment 16). Rather than prohibit possession of winter flounder, resulting in increased discard mortality and loss of fishery-dependent data, the Commission opted to establish bycatch-only possession limits for the SNE/MA stock. Addendum I limits recreational fishermen to 2 fish and commercial fishermen can land a maximum of 50 pounds (or 38 fish) in the

SNE/MA. For the GOM, Addendum I required states to reduce recreational fishing mortality by 11% and established a 250 pound commercial trip limit.

In October 2012, in response to updated stock status information and recent federal action to increase the GOM winter flounder state waters' estimated harvest level, the Commission's Winter Flounder Management Board approved Addendum II. The Addendum modifies the commercial and recreational management requirements for the Gulf of Maine (GOM) stock. Specifically, the commercial trip limit has been increased to 500 pounds per trip and the recreational season has been expanded to year round. These measures apply only to GOM state waters' fisheries until June 1, 2013.



# Atlantic Menhaden

## *Brevoortia tyrannus*

### Life History

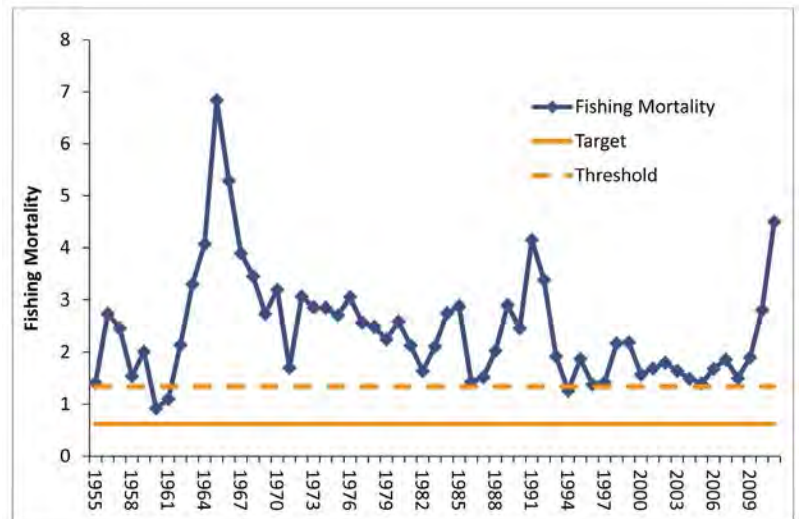
Atlantic menhaden, *Brevoortia tyrannus*, are found in estuarine and coastal waters from northern Florida to Nova Scotia and serve as prey (food) for many fish, sea birds and marine mammals. Adult and juvenile menhaden form large, near-surface schools, primarily in estuaries and nearshore ocean waters from early spring through early winter. By summer, menhaden schools stratify by size and age along the coast, with older and larger menhaden found farther north. During fall-early winter, menhaden of all sizes and ages migrate south around the North Carolina capes to spawn.

Sexual maturity begins just before age three, with major spawning areas from the Carolinas to New Jersey. Most spawning occurs offshore (20-30 miles) during winter. Buoyant eggs hatch at sea and larvae are carried into estuarine nursery areas by ocean currents. Juveniles spend most of their first year of life in estuaries, migrating to the ocean in late fall. Adult and juvenile menhaden migrate south in fall-winter, and adult menhaden migrate north in spring.

Menhaden feed by straining plankton from the water, their gill rakers forming a specialized basket to efficiently capture tiny food. They provide a link between primary production and higher organisms by consuming plankton and providing forage (food) for species such as striped bass, bluefish and weakfish, to name just a few.



Schooling Atlantic menhaden. Photo credit: ASMFC.

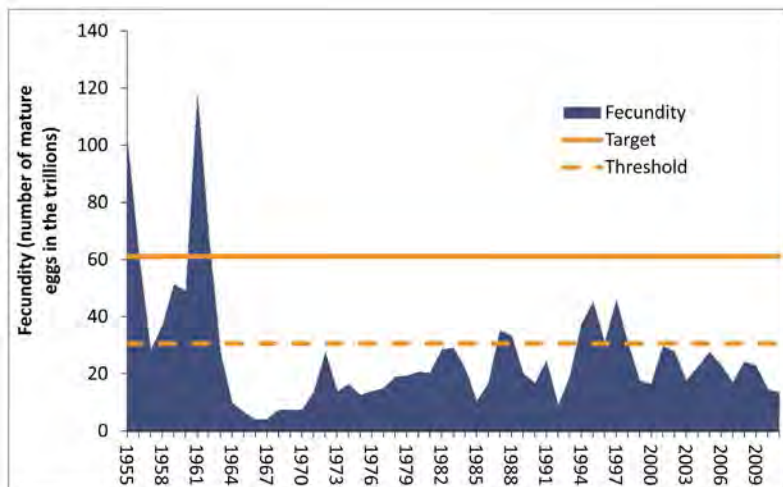


Atlantic Menhaden Fishing Mortality (Full F). Source: ASMFC Atlantic Menhaden Stock Assessment Update, 2012

### Commercial and Recreational Fisheries

The Atlantic menhaden commercial fishery has two major components, a reduction sector that harvests fish for animal feed and fish oil, and a bait sector that supplies bait to other commercial and recreational fisheries. Total commercial landings averaged 464 million pounds from 2008-2012, with approximately 77% harvested by the reduction fishery and 23% harvested for bait purposes.

The reduction fishery, named because it processes the whole fish into fish meal, fish oil and fish solubles, first began in New England during the early 1800s and spread south after the Civil War allowing the fishery to expand. Major technological innovations led to further expansion of the fishery coastwide. As a result, landings and fishing effort increased from 1940 through the late 1950s, declined precipitously during the 1960s when the population was overfished, and then increased significantly during the late 1970s and early 1980s. Currently, there is only one remaining reduction plant in operation on the Atlantic coast processing Atlantic menhaden into fishmeal and oil. The fishmeal is used as fertilizer and animal feed, while fish oil is used in many commercial products and in omega-3 supplements for human health. Most of the catch occurred within the Chesapeake Bay, in Virginia waters, and in ocean waters off New Jersey.



Atlantic Menhaden Fecundity. Source: ASMFC Atlantic Menhaden Stock Assessment Update, 2012

## Stock Status

Both the 2010 benchmark stock assessment and the 2012 stock assessment update indicate that Atlantic menhaden are experiencing overfishing, but it is unknown if the stock is overfished. The uncertainty in the overfished determination comes from conflicting results of sensitivity runs explored in the 2012 assessment update. The next benchmark stock assessment is scheduled for peer review in December of 2014.

## Atlantic Coastal Management

Atlantic menhaden are currently managed under Amendment 2 to the Interstate Fishery Management Plan (FMP) for Atlantic Menhaden. Approved in December 2012, Amendment 2 establishes a 170,800 MT total allowable catch (TAC) beginning in 2013 and continuing

The bait fishery has become increasingly important from North Carolina to New England, supplying fishermen with bait for popular commercial (e.g., American lobster and blue crab) and sport fisheries (e.g., striped bass, bluefish). In recent years, the majority of bait landings has been harvested from Virginia and New Jersey waters, followed by Massachusetts and Maryland. Between 2001 and 2010, the percent of total menhaden landings attributed to the bait fishery rose from 13% to a high of 25% in 2008. Currently, bait harvest is approximately 23% of the total menhaden harvest.

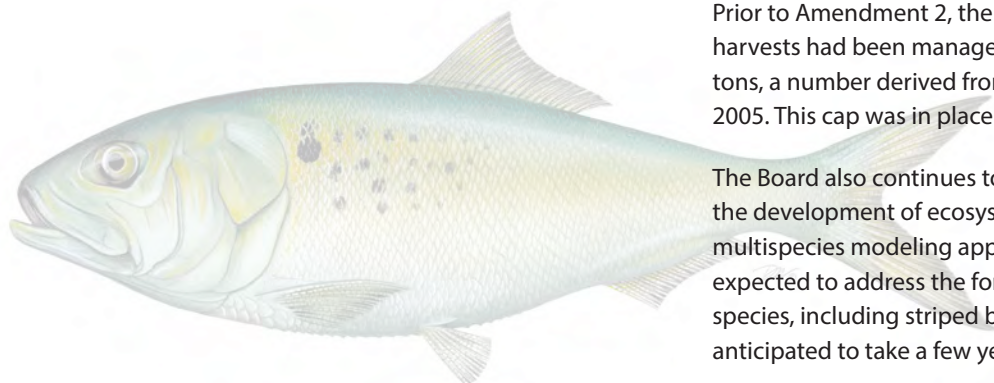
Recreational landings of Atlantic menhaden are estimated to represent less than 1% of the total landings of the species. During the last decade (2001-2012), there was an average annual recreational catch of 589,000 pounds of menhaden.

until completion of, and Board action on, the next benchmark stock assessment, scheduled for 2014. The TAC represents a 20% reduction from the average of landings from 2009-2011 and an approximately 25% reduction from 2011 levels. The Amendment also establishes new biological reference points for biomass based on maximum spawning potential (MSP), with the goal of increasing abundance, spawning stock biomass, and menhaden availability as a forage species. These new abundance points use the same metric (e.g., MSP) as that used for define overfishing (fishing mortality target of  $F_{30\%MSP}$ ) and (fishing mortality threshold of  $F_{15\%MSP}$ ).

The Amendment allocates the TAC on a state-by-state basis based on landings history of the fishery from 2009-2011; allocation will be revisited three years after implementation. Further, it reduces the Chesapeake Bay reduction fishery harvest cap by 20% (this is an adjustment of cap which was in place since 2006). States will be required to close their fisheries when the state-specific portion of the TAC has been reached; any overages must be paid back the following year.

Prior to Amendment 2, the Chesapeake Bay reduction fishery harvests had been managed by an annual cap of 109,020 metric tons, a number derived from the average of harvests from 2001 – 2005. This cap was in place from 2006 – 2012.

The Board also continues to place a high priority on advancing the development of ecosystem reference points using a multispecies modeling approach. Ecosystem reference points are expected to address the forage needs of menhaden's predator species, including striped bass, weakfish, and bluefish. This work is anticipated to take a few years.





# Black Sea Bass

## *Centropristis striata*



### Life History

Black sea bass, *Centropristis striata*, inhabit Atlantic coastal waters from the Gulf of Maine to the Florida Keys, concentrating in areas from Cape Cod, Massachusetts to Cape Canaveral, Florida. Two distinct stocks of black sea bass exist along the Atlantic coast with overlapping ranges. The northern stock migrates seasonally and spawns off of New England in the late summer. The southern stock spawns off of Chesapeake Bay in the early summer. A temperate reef fish, black sea bass commonly inhabit rock bottoms near pilings, wrecks, and jetties. Black sea bass rely on their large mouth and swift ocean currents to catch prey, which include fish, crabs, mussels, and razor clams. Black sea bass summer in northern inshore waters at depths of less than 120 feet and winter in southern offshore waters at depths of 240 to 540 feet.

Black sea bass are protogynous hermaphrodites, which mean they start life as a female and when they reach 9-13 inches (2 - 5 years of age) they change sex to become males. Thirty-eight percent of the females in the Mid-Atlantic demonstrate sex reversal between August and April, after most fish have spawned. Even though some fish are males when they reach sexual maturity, most produce eggs when they first mature. Following transition, a sea bass will either become a dominant male, characterized by a larger size and a bright blue nuchal hump during spawning

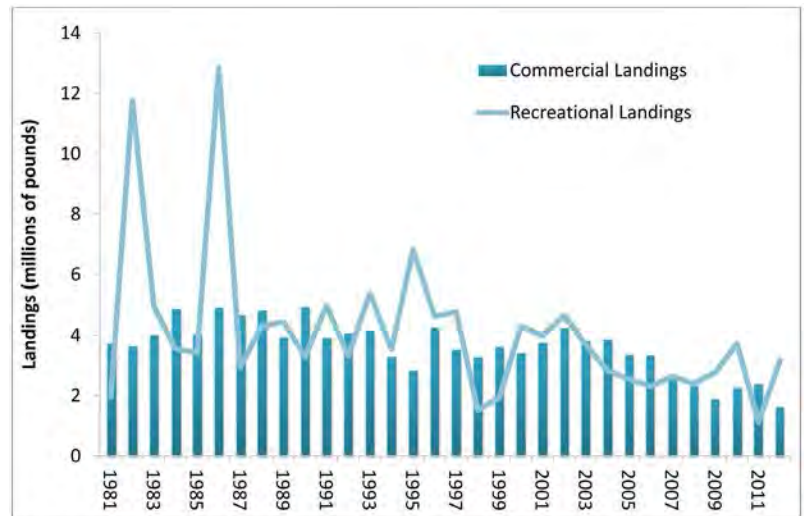


Scientist aboard the NEAMAP SNE/MA Nearshore Trawl Survey with a dominant, male black sea bass as evidenced by the nuchal hump right at the top of its head before its dorsal fin. Photo credit: NEAMAP.

season (see accompanying photo), or a subordinate male that has few distinguishing features.

### Commercial & Recreational Fisheries

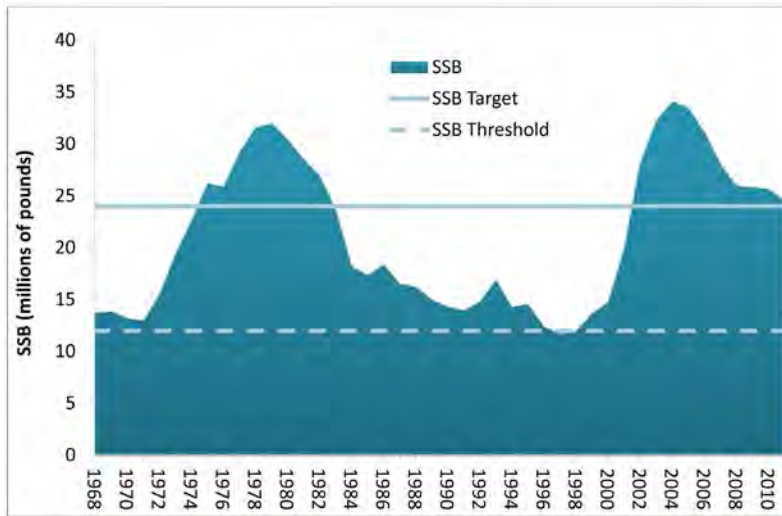
Black sea bass are highly sought by both commercial and recreational fishermen throughout the Mid-Atlantic. Fisheries change seasonally with changes in fish distribution. Inshore



Black Sea Bass Commercial and Recreational Landings. Source: ACCSP and MRIP, 2013

and more southern commercial fisheries are primarily use with fish pots and handlines. When fish move offshore in the winter, they are primarily caught in trawl fisheries targeting summer flounder, scup and Loligo squid. Recreational fisheries generally occur during the period that sea bass are inshore. Since the fishery management plan's approval in 1997, the black sea bass fishery has operated under a quota. Landing levels for both the commercial and recreational fisheries are restricted by annual total allowable landings.

Commercial landings of black sea bass have been recorded since the late 1800s. From 1887 through 1948, commercial landings north of Cape Hatteras fluctuated around six million pounds and then peaked at 22 million pounds in 1952. Fish were primarily harvested by handlines during the 1900s. The 1950s marked the development of the trap fishery. Otter trawls and fish pots/traps have accounted for the majority of the



**Black Sea Bass Spawning Stock Biomass (SSB).** Source: Northeast Fisheries Science Center Black Sea Bass Projections, 2012

black sea bass landings in most states. Other important gear includes hand lines and lobster pots. Commercial landings were estimated to be 1.63 million pounds in 2012.

Black sea bass are also an important recreational species in the Mid-Atlantic, commonly caught using squid and natural bait. In 1965, over half of the total catch of black sea bass was credited to recreational fishing. Angling pressure increased markedly in the mid-1980s. In 1998 and 1999, recreational landings decreased substantially relative to levels in the early to mid-1990s. The decrease in recreational landings may be partially attributed to an increase in minimum size limits. Landings started to increase in 2000 and averaged 4 million pounds from 2000 to 2004. Recreational landings in 2012 were estimated at 3.18 million pounds.

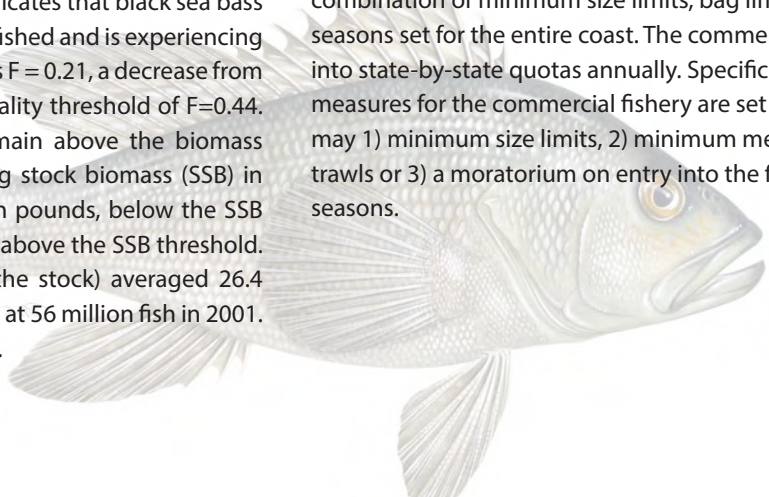
### *Status of the Stock*

The 2012 stock assessment update indicates that black sea bass continues to be rebuilt; it is not overfished and is experiencing overfishing. Fishing mortality in 2011 is  $F = 0.21$ , a decrease from 2010 and well below the fishing mortality threshold of  $F = 0.44$ . Estimates for 2011 total biomass remain above the biomass maximum sustainable yield. Spawning stock biomass (SSB) in 2011 was estimated to be 24.6 million pounds, below the SSB target of 27.6 million pounds but well above the SSB threshold. Recruitment at age 1 (fish entering the stock) averaged 26.4 million fish during 1968-1999, peaking at 56 million fish in 2001. The 2011 year class was 21 million fish.

### *Atlantic Coastal Management*

Black sea bass is managed jointly by the Atlantic States Marine Fisheries Commission and the Mid-Atlantic Fishery Management Council under Amendment 13 to the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan (August 2002) and its subsequent addenda (Addendum XIII-XXII). The objectives of the FMP are to reduce fishing mortality to assure overfishing does not occur, reduce fishing mortality on immature black sea bass to increase spawning stock biomass, improve yield from the fishery, promote compatible regulations among states and between federal and state jurisdictions, promote uniform and effective enforcement, and to minimize regulations necessary to achieve the stated objectives.

The management program divides a total annual quota between the recreational fishery (51%) and the commercial fishery (49%). Recreational fishery management measures include the same combination of minimum size limits, bag limits and fishing seasons set for the entire coast. The commercial quota is divided into state-by-state quotas annually. Specific management measures for the commercial fishery are set by each state, which may 1) minimum size limits, 2) minimum mesh requirements for trawls or 3) a moratorium on entry into the fishery and closed seasons.

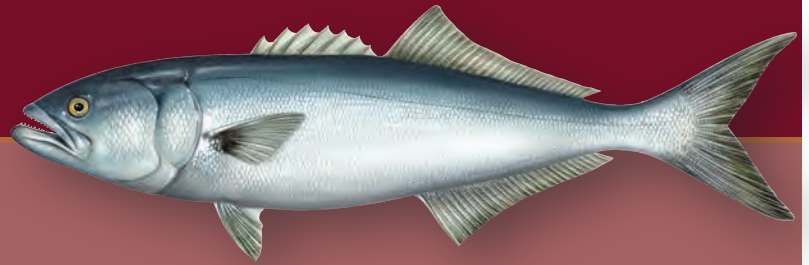






## Bluefish

*Pomatomus saltatrix*



### Life History

Bluefish, *Pomatomus saltatrix*, are a migratory, oceanic species found throughout the world in most temperate, coastal regions, except the eastern Pacific. Bluefish migrate seasonally, moving north in spring and summer as water temperatures rise and moving south in autumn and winter to waters in the South Atlantic Bight. During the summer, concentrations of bluefish are found in waters from Maine to Cape Hatteras, North Carolina. In winter they tend to be found offshore between Cape Hatteras and Florida. Bluefish generally school by size, with schools that can cover tens of square miles of ocean, equivalent to around 10,000 football fields.

Bluefish are fast growers and opportunistic predators, feeding voraciously on almost any prey they can capture. Bluefish live up to 12 years and may exceed lengths of 39" and weights of 31 pounds. Bluefish reach sexual maturity at age two and spawn offshore from Massachusetts through Florida. Discrete groups spawn at different times and are referred to by the season in which they spawn: the spring-spawned cohort and the summer-spawned cohort. Recent research has also identified a fall-spawned cohort, demonstrating an expanded and prolonged spawning season. The cohorts mix extensively on the fishing grounds and probably comprise a single genetic stock.

### Recreational & Commercial Fisheries

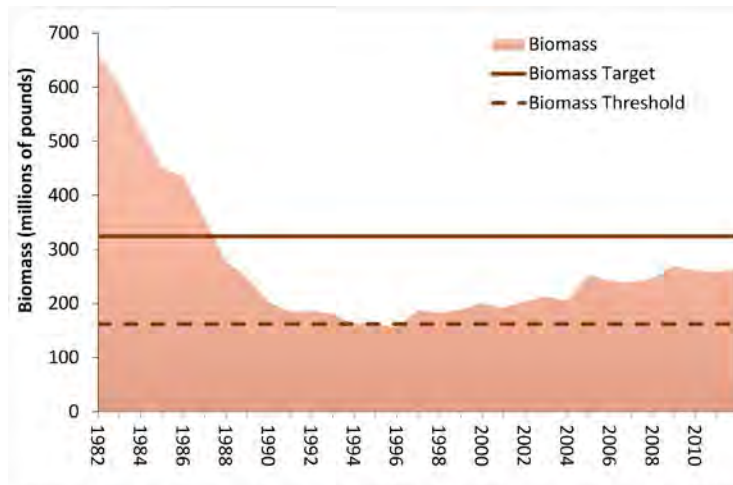
Bluefish support recreational and commercial fisheries along the entire Atlantic coast. Commercial fishermen target bluefish using a variety of gears including trawls, gillnets, haul seines, and pound nets. Commercial harvest peaked in the 1980s, with the highest recorded harvest totaling almost 16.5 million pounds (1981). Currently, the commercial fishery is managed under a state quota system and landings since 2005 have ranged between 4.5 and 7.1 million pounds. 2012 commercial landings totaled 4.5 million pounds, three-quarters of which were landed in New York, New Jersey, and North Carolina.

The recreational sector is more popular, accounting for 66% of the total catch by weight from 1981 to 2012. In 2012, anglers harvested a total of 5.5 million pounds of bluefish, a 9% increase from 2011. Anglers target bluefish near inlets, shoals, and rips that often hold large schools of bait attracting bluefish into a feeding frenzy. The excitement involved in angling these aggressive fighters makes them the second most harvested species behind striped bass.

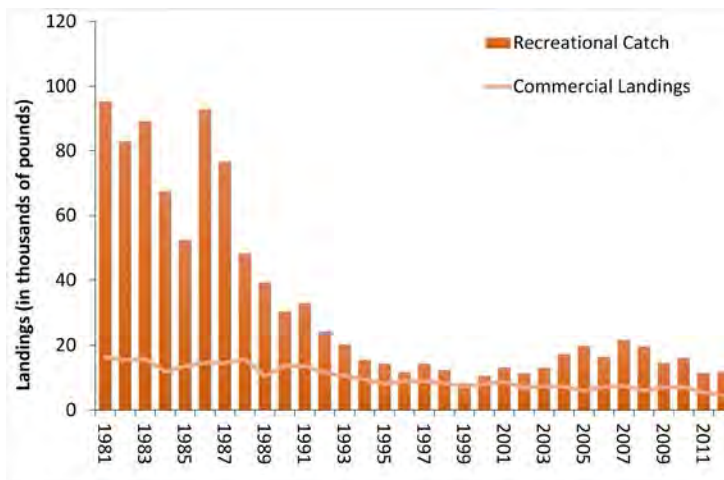
### Stock Status

The 2013 stock assessment update finds the resource to be in good condition; it is neither overfished nor experiencing overfishing. The assessment is annually updated in the spring and used to help set total allowable landings for the following year. The current biological reference points for Atlantic bluefish are: biomass target of 324 million pounds; biomass threshold of 162 million pounds; and a fishing mortality target of 0.19. Total biomass is estimated at 277 million pounds, approximately 85% of its target and about a 3% decline from 2010. Fishing mortality is estimated to be 0.097, below the fishing mortality threshold (0.19).

Based on these findings and preliminary 2013 landings, the Commission and the Mid-Atlantic Fishery Management Council adopted a 7.49 million pound commercial quota and a 13.59 million pound recreational harvest limit for the 2014 fishery.



Estimated Bluefish Biomass. Source: NEFSC Bluefish Stock Assessment Update, 2013

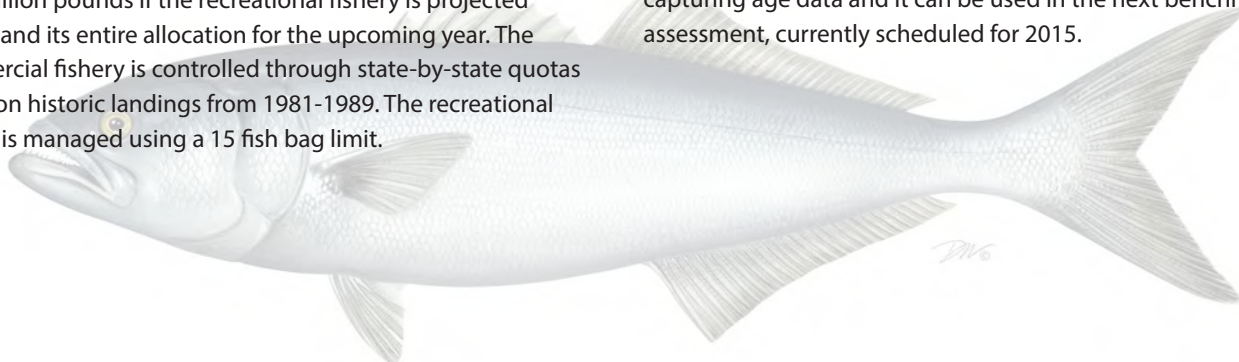


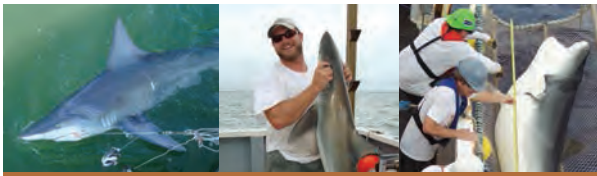
Bluefish Commercial Landings and Recreational Catch. Source: Personal communication NMFS Fisheries Statistics Division, 2013

### Atlantic Coastal Management

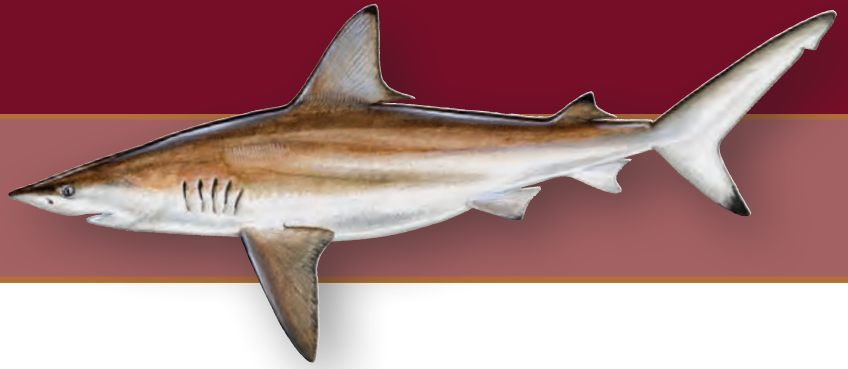
Bluefish is managed under Amendment 1 to the Fishery Management Plan for the Bluefish Fishery and Addendum I. The Commission and Council approved Amendment 1 to the FMP in 1998. Amendment 1 allocates 83% of the resource to recreational fisheries and 17% to commercial fisheries. However, the commercial quota can be increased up to 10.5 million pounds if the recreational fishery is projected to not land its entire allocation for the upcoming year. The commercial fishery is controlled through state-by-state quotas based on historic landings from 1981-1989. The recreational fishery is managed using a 15 fish bag limit.

A coastwide biological sampling program to improve the quantity and quality of information used in future bluefish stock assessments was approved and implemented in 2012 through Addendum I. A 2013 review the inaugural biological sampling program found the geographic range, distribution of sampling times, and program design are effectively capturing age data and it can be used in the next benchmark assessment, currently scheduled for 2015.





# Coastal Sharks



## Life History

Sharks belong to the class Chondrichthyes (cartilaginous fish) that also includes rays, skates, and deepwater chimaeras (ratfishes). Relative to other marine fish, sharks have a very low reproductive potential. The low reproductive rate is due to sharks slow growth, late sexual maturity, one to two-year reproductive cycles, a small number of young per brood, and specific requirements for nursery areas. These biological factors leave many species of sharks vulnerable to overfishing.

Sharks have internal fertilization and the embryo of most species spend their entire developmental period protected within their mother's body, although some species lay eggs. Females produce a small number (2 – 25) of large pups, which have an increased chance of survival due to their size. Adults usually congregate in specific areas to mate and females travel to specific nursery areas to pup. These nursery areas are discrete geographic areas, usually in waters shallower than those inhabited by the adults. Frequently, the nursery areas are in highly productive coastal or estuarine waters where abundant small fish and crustaceans provide food for the growing pups. These shallow areas have fewer large predators than deeper waters, thus enhancing the chances of survival of the young sharks.

Sharks are a vital part of ocean ecosystems all over the world. Scientists consider them to be a keystone species because they generally reside at the top of the food chain having a strong impact on other species either directly or indirectly. Removing or reducing shark populations in an area can cause an imbalance in the food chain and produce far reaching negative impacts. Because of this, the health of shark populations in an ecosystem is often an accurate indicator of the overall health of the system.



Research technician Erin Voigt on a University of North Carolina Coastal Shark Survey Cruise out of Morehead City, NC. Photo by Mike Waive.

## Commercial & Recreational Fisheries

Commercial shark fishing effort is generally concentrated in the Southeastern U.S. and Gulf of Mexico. Commercial fishermen catch sharks using bottom longlines and gillnets. The Atlantic fishery targets both large coastal shark (LCS) and small coastal shark (SCS) species. Bottom longline is the primary commercial gear employed in the LCS and SCS fisheries in all regions. Gear characteristics vary by region, but in general an approximately ten-mile long bottom longline, containing about 600 hooks, is fished overnight. Skates, other sharks, or various finfish are used as bait. Commercial landings of Atlantic LCS species in 2012 were approximately 441,000 pounds (dressed weight), a slight decrease from 2011. Commercial landings of small coastal shark species in 2012 were approximately 419,990 pounds (dressed weight), a decrease of approximately 164,000 pounds from 2011. Total U.S. landings of Atlantic pelagic species of sharks were 314,000 pounds (dressed weight) in 2012.

Recreational fishing for Atlantic sharks occurs in federal and state waters from New England to the Gulf of Mexico and Caribbean Sea. In the past, sharks were often called "the poor man's marlin." Recreational shark fishing with rod and reel is now a popular sport at all social and economic levels, largely because of accessibility to the resource. Sharks can be caught

virtually anywhere in salt water, with even large specimens available in the nearshore area to surf angler or small boaters. Most recreational shark fishing takes place from small to medium-size vessels. Makos, white sharks, and large pelagic sharks are generally accessible only to those aboard ocean-going vessels. Recreational shark fisheries are exploited primarily by private vessels and charter/headboats although there are some shore-based fishermen active in the Florida

Keys. Recreational landings of shark species in 2012 were similar to other years. Approximately 44,000 fish were harvested during the 2012 fishing season, compared to 182,900 fish in the 2011 season, and 178,200 fish in the 2010 fishing season. The small coastal shark group had the most landings, comprising approximately 75% of the harvest in 2012. LCS complex came next with approximately 23% of the harvest, and pelagic species comprised 2% of the total harvest.

### Stock Status

Stock status is assessed by species complex for most coastal shark species and by species group for species with enough data for an individual assessment. A 2011 benchmark assessment of dusky (*Carcharhinus obscurus*), sandbar (*Carcharhinus plumbeus*), and blacknose (*Carcharhinus acronotus*) sharks indicates that both sandbar and dusky sharks continue to be overfished with overfishing occurring for dusky sharks. Blacknose sharks, part of the SCS complex, are overfished with overfishing occurring. The Board approved the assessment for management use in February 2012, and NOAA Fisheries' Highly Migratory Species Division (HMS) is incorporating the results of the assessment as part of Amendment 5 to its FMP.

Porbeagle sharks were assessed by the ICCAT Standing Committee on Research and Statistics in 2009. The assessment found that while the Northwest Atlantic stock is increasing in biomass, the stock is considered to be overfished with overfishing not occurring.

The 2007 SouthEast Data Assessment Review (SEDAR 13) assessed the SCS complex, finetooth, Atlantic sharpnose, and bonnethead sharks. The SEDAR 13 peer reviewers considered the data to be the 'best available at the time' and determined the status of the SCS complex to be 'adequate.' Finetooth, Atlantic sharpnose and bonnethead were all considered to be not overfished and not experiencing overfishing.

SEDAR 11 (2006) assessed the LCS complex and blacktip sharks. The LCS assessment suggested that it is inappropriate to assess the LCS complex as a whole due to the variation in life history parameters, different intrinsic rates of increase,

Stock Status of Atlantic Coastal Shark Species and Species Groups			
Species or Complex Name	Stock Status		References/Comments
	Overfished	Overfishing is Occurring	
Porbeagle	Y	N	Porbeagle Stock Assessment, ICCAT Standing Committee on Research and Statistics Report (2009)
Dusky	Y	Y	SEDAR 21 (2011); designated a prohibited species
Large Coastal Sharks	Unknown	Unknown	SEDAR 11 (2006); difficult to assess as a species complex due to various life history characteristics and lack of available data
Blacktip	Unknown	Unknown	SEDAR 11 (2006)
Sandbar	Y	N	SEDAR 21 (2011)
Atlantic Sharpnose	N	N	SEDAR 34 (2013)
Blacknose	Y	Y	SEDAR 21 (2011)
Bonnethead	N	N	SEDAR 34 (2013)
Finetooth	N	N	SEDAR 13 (2007)
Smooth Dogfish	Unknown	Unknown	No assessment; benchmark assessment scheduled for 2014

and different catch and abundance data for all species included in the LCS complex. Based on these results, NMFS changed the status of the LCS complex from overfished to unknown. As part of SEDAR 11, blacktip sharks were assessed for the first time as two separate populations: Gulf of Mexico and Atlantic. The results indicated that the Gulf of Mexico stock is not overfished and overfishing is not occurring, while the current status of blacktip sharks in the Atlantic region is unknown.

SEDAR 34 (2013) assessed Atlantic sharpnose and bonnethead sharks. This assessment indicated that neither Atlantic sharpnose or bonnethead are overfished or undergoing overfishing. The stock assessment panel also pointed out that there may be two separate stocks of bonnethead, so in the future there should be two separate assessments.

There is no assessment for smoothhound dogfish on the Atlantic coast. The first coastwide assessment and peer review is scheduled for completion in 2014.

### Atlantic Coastal Management

In the mid-1980s, sharks were considered an underutilized resource and fishermen were encouraged to fish for them. Over the next few years, fishing effort increased considerably and the impact of unregulated harvest was beginning to take its toll on some shark species. In the early 1990s, the National Marine Fisheries Service (NMFS) implemented a Fishery Management Plan (FMP) for Sharks of the Atlantic Ocean to rebuild depleted stocks and protect healthy stocks from overfishing. In May 2008,

the Atlantic States Marine Fisheries Commission adopted an Interstate Fishery Management Plan for Atlantic Coastal Sharks (August 2008) to complement federal management actions and increase protection of pregnant females and juveniles in inshore nursery areas. The FMP regulates 40 different species of coastal sharks found on the Atlantic coast, and includes Addendum I (see accompanying table).

Addendum I, approved in 2009, modified recreational possession limits for smoothhound dogfish and other species, allowed at-sea processing of smooth dogfish from March - June, and removed the two-hour net check requirements, which was determined to be ineffective at reducing bycatch. Addendum II and Addendum III (2013) addressed changes in the federal management of coastal sharks. Addendum II allocated state-shares of the smoothhound dogfish coastwide quota, and modified the maximum fin-to-carcass ratio, consistent with the Shark Conservation Act of 2010. Addendum III created two new species groups ('Hammerhead' and 'Blacknose') and increased the recreational size limit for hammerheads.

Based on the recommendation of its Coastal Sharks Technical Committee, the Board approved a 36 fish possession limit for sharks in the large coastal sharks (LCS) species group (silky, tiger, blacktip, spinner, bull, lemon, nurse, scalloped hammerhead, great hammerhead, and smooth hammerhead sharks) for 2014. The Board's action complements the proposed federal shark specifications.

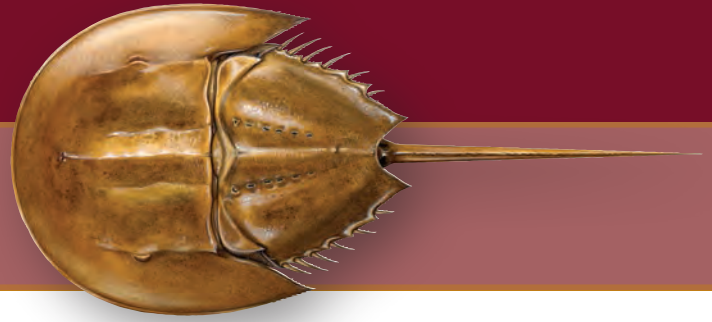
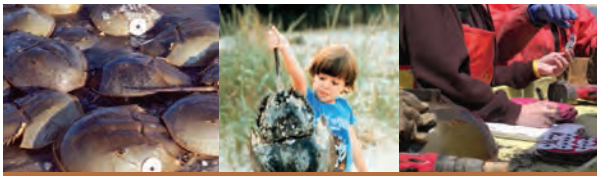
The Shark Conservation Act of 2010 instituted additional measures to protect shark species from illegal, unreported, and unregulated fishing activities while protecting the sustainable fishing practices of domestic shark fishermen. In 2013, several states initiated or passed shark fin bans, which prohibited the possession of unattached shark fins. NOAA Fisheries released a proposed rule to preempt these state shark fin bans, as they interfere with the agency's ability to sustainably manage shark fishing in domestic waters. Currently, NOAA Fisheries is working

with each state to ensure adequate protection of sharks and optimum sustainable yield from shark fisheries, and the impact of unregulated harvest was beginning to take its toll on some shark species. In the early 1990s, the National Marine Fisheries Service (NMFS) implemented a Fishery Management Plan (FMP) for Sharks of the Atlantic Ocean to rebuild depleted stocks and protect healthy stocks from overfishing. In May 2008, the Atlantic States Marine Fisheries Commission adopted an Interstate Fishery Management Plan for Atlantic Coastal Sharks (August 2008) to complement federal management actions and increase protection of pregnant females and juveniles in inshore nursery areas. The FMP regulates 40 different species of coastal sharks found on the Atlantic coast, and includes Addendum I (see accompanying table).

Addendum I, approved in 2009, modified recreational possession limits for smooth dogfish and other species, allowed at-sea processing of smooth dogfish from March - June, and removed the two-hour net check requirements, which was determined to be ineffective at reducing bycatch. In 2012, the Commission's Coastal Sharks Management Board approved a 36 fish possession limit for sharks in the large coastal sharks (LCS) species group (silky, tiger, blacktip, spinner, bull, lemon, nurse, scalloped hammerhead, great hammerhead, and smooth hammerhead sharks) for 2013, consistent with the federal specifications.

Species Groups	Species Within Group
Prohibited	Sand tiger, bigeye sand tiger, whale, basking, white, dusky, bignose, Galapagos, night, reef, narrowtooth, Caribbean sharpnose, smalltail, Atlantic angel, longfin mako, bigeye thresher, sharpnose sevengill, bluntnose sixgill, and bigeye sixgill sharks
Research	Sandbar sharks
Small coastal	Atlantic sharpnose, finetooth, and bonnethead sharks
Blacknose	Blacknose
Aggregated large coastal	Silky, tiger, blacktip, spinner, bull, lemon, and nurse
Hammerhead	scalloped hammerhead, great hammerhead, and smooth hammerhead sharks
Pelagic	Shortfin mako, porbeagle, common thresher, oceanic whitetip, and blue sharks
Smoothhound	Smooth dogfish, Florida smoothhound





# Horseshoe Crab

## *Limulus polyphemus*

### Life History

Horseshoe crabs, *Limulus polyphemus*, are a marine arthropod found along the Atlantic coast from northern Maine to the Yucatan Peninsula and the Gulf of Mexico. The Delaware Bay supports the largest spawning population in the world. Adults either remain in estuaries or migrate to the continental shelf during the winter months. Migrations resume in the spring when the horseshoe crabs move to beach areas to spawn. Juveniles hatch from the beach environment and spend the first two years in nearshore areas.

Spawning usually coincides with the high tide during the full and new moon. Breeding activity is consistently higher during the full moon than the new moon and is also greater during the night. Adults prefer sandy beach areas within bays and coves that are protected from surf. Eggs are laid in clusters or nest sites along the beach with females laying approximately 90,000 eggs per year in different egg clusters.

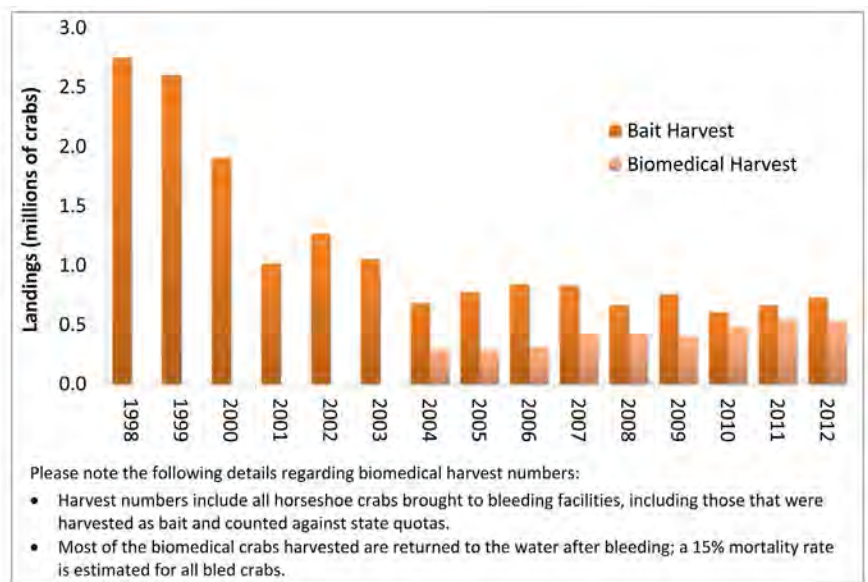
The eggs play an important ecological role in the food web for migrating shorebirds. The Delaware Bay Estuary is the largest staging area for shorebirds in the Atlantic Flyway. An estimated 425,000 to one million migratory shorebirds converge on the Delaware Bay to feed and rebuild energy reserves prior to completing their northward migration.

### Commercial Fisheries & Biomedical Harvest

Horseshoe crabs provide the backdrop for one of the most interesting marine resource management issues along the Atlantic coast. In addition to their role as a food source for birds, horseshoe crabs provide bait for commercial American eel and conch fisheries along the coast. Their unique blood is also used by the biomedical industry to produce *Limulus* Amoebocyte Lysate (LAL). The challenge of fisheries managers is to ensure that horseshoe crabs are managed to meet all these diverse needs, while conserving the resource for future generations.

From the 1850s to the 1920s, between 1.5 and two million horseshoe crabs were harvested annually for fertilizer and livestock feed. Harvest dropped throughout the 1950s and ceased in the 1960s. Between 1970 and 1990, reported commercial harvest ranged from less than 20,000 pounds to greater than two million pounds annually. Since the mid- to late 1990s, commercial harvest has been sold primarily as bait for the American eel and whelk pot fisheries. Increased need for bait in the whelk fishery likely caused an increase in horseshoe crab harvest in the 1990s, with a peak of nearly six million pounds in 1997. Reported coastwide bait landings in 2012 remained well below the coastwide quota at 729,100 crabs.

Commercial fishermen have adopted new gear such as bait bags and cups allowing them to effectively catch eel and conch while using as little as a tenth of the bait. The majority of horseshoe crab harvest comes from the Delaware Bay Region, followed by the New York, New England, and Southeast Regions. Trawls, hand harvests, and dredges make up the bulk of commercial horseshoe crab bait landings. Discard mortality occurs in various dredge fisheries and may vary seasonally



Coastwide Horseshoe Crab Bait Landings & Biomedical Harvest. Source: ASMFC State Reports, 2012



A close-up view of spawning horseshoe crabs.  
Photo credit: Dr. Rob Robinson, British Trust for Ornithology.

with temperature, impacting both mature and immature horseshoe crabs; however, the actual rate of discard mortality is unknown.

Horseshoe crabs are also collected by the biomedical industry to support the production of LAL (short for *Limulus amoebocyte lysate*), a clotting agent that aids in the detection of human pathogens in patients, drugs, and intravenous devices. No other procedure has the same accuracy as the LAL test. Blood from the horseshoe crab is obtained by collecting adults, extracting a portion of their blood, and releasing them alive. Since 2004 when reporting began, biomedical use has increased with an estimated 611,800 crabs captured in 2012. As required by the FMP, bled crabs are returned to the water from where they were harvested except in some states where bled crabs are sold to the bait industry to minimize the impact on the population. The Board is working with the biomedical industry to find ways to incorporate biomedical data into a regional stock assessment.

### *Stock Status*

Little is known about the status of the horseshoe crab population. Limited time-series of horseshoe crab population data make it difficult to assess its status. However, the 2013 stock assessment update indicates horseshoe crab abundance has increased in the Southeast (North Carolina through Florida) and remains stable in the Delaware Bay region (New Jersey through coastal Virginia). The New York and New England regions continue to see a decrease in abundance. These continued declines are being investigated by the Stock Assessment Subcommittee.

### *Atlantic Coastal Management*

Horseshoe crabs are managed under the Interstate Fishery Management Plan for Horseshoe Crab (December 1998). In 2000 under Addendum I, the Commission established state-by-state quotas in all Atlantic states for crabs harvested for bait. In 2006, in response to decreasing migratory shorebird populations Addendum IV was approved. This enabled the Commission to reduce quotas in New Jersey and Delaware and added additional protection in Maryland and Virginia to increase horseshoe crab and egg abundance in and around Delaware Bay. These measures were in place from 2006 - 2012.

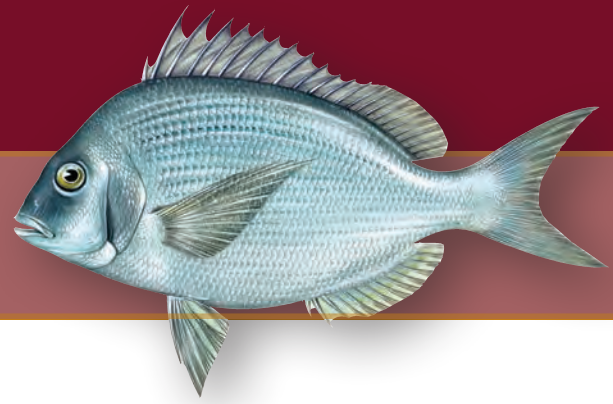
2013 marked the first year the Horseshoe Crab Management Board used the Adaptive Resource Management (ARM) Framework to set horseshoe crab harvest levels for the Delaware Bay area. The ARM Framework, established through Addendum VII, incorporates both shorebird and horseshoe crab abundance levels to set optimized harvest levels for horseshoe crabs of Delaware Bay origin. For both the 2013 and 2014 fishing seasons, the Board approved a 500,000 male-only crab harvest. This total harvest is allocated among the four states that harvest horseshoe crabs from the Delaware Bay crab population (New Jersey, Delaware, Maryland, and Virginia). The allocation is based upon multiple decision options, including the proportion of horseshoe crab harvested that originate from Delaware Bay and allowance for additional male harvest by Virginia and Maryland to compensate for protecting female horseshoe crabs when the ARM harvest output includes a moratorium on female crabs. Since 2008, New Jersey has had a moratorium on horseshoe crab harvest.





# Scup

## *Stenotomus chrysops*



### Life History

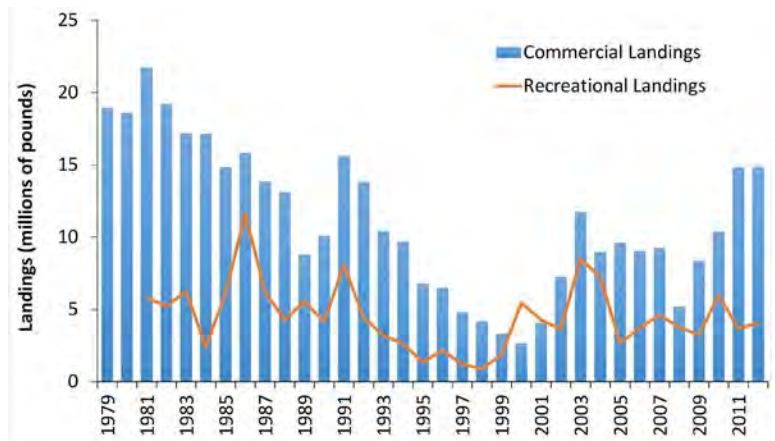
Scup, *Stenotomus chrysops*, are a migratory, schooling species found on the continental shelf of the Northwest Atlantic, commonly inhabiting waters from Cape Cod, Massachusetts to Cape Hatteras, North Carolina. The abundance of scup in a specific area is frequently influenced by water temperature. Scup prefer temperatures greater than 45 degrees F and are most frequently encountered in water temperatures from 55 to 77 degrees F.

Scup overwinter in offshore waters from southern New Jersey to Cape Hatteras. When water temperatures begin to rise in spring and summer scup migrate to more northern and inshore waters to spawn. Spawning areas include locations from southern New England to Long Island, New York. Large fish arrive to the spawning grounds first, followed by successive waves of smaller individuals, suggesting that scup school by size. Larval scup are pelagic and are found in coastal waters during warmer months. Juvenile scup use a variety of coastal habitats and can dominate the overall fish population in large estuarine areas during the summer months.

### Commercial & Recreational Fisheries

Scup support commercial fisheries from Massachusetts to North Carolina. From 1974 to 1986, commercial landings fluctuated between 15.4 and 22 million pounds without trend. By 2000, in response to low stock abundance and quota management that began in 1997, landings dropped to 2.7 million pounds, an all-time low for the time series (1930-2008). Since then, landings have been slowly increasing, with 2012 landings estimated at 14.8 million pounds. The primary commercial fishing gear is otter trawl, accounting for approximately 80 percent of the total catch. About one-third of the commercial landings occur in state waters, the largest shares of which are landed in New Jersey and Rhode Island. Commercial fishery discards are an important part of the total fishery removals from the stock, often at about the same level as the commercial landings. Since 2000 the commercial discards have been reduced due to fishery regulations.

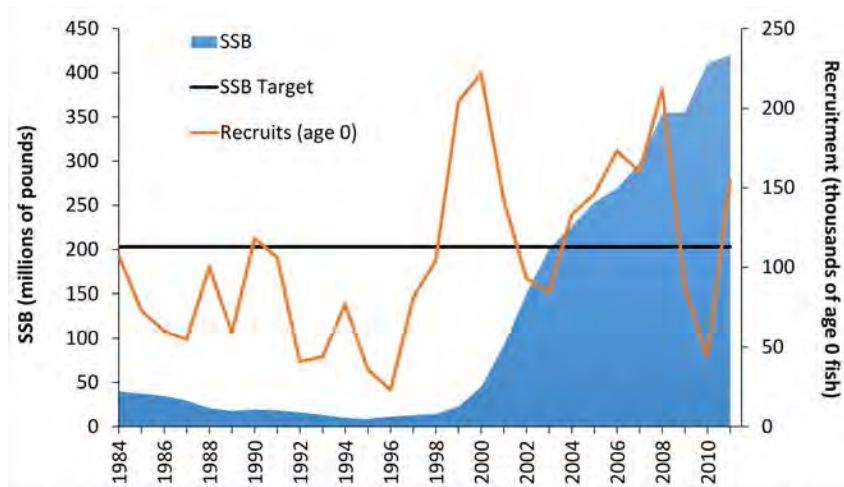
The recreational fishery for scup is significant, with anglers accounting for 17 to 67% of total annual catches from 1985 to 2001. Recreational landings have fluctuated since 1998. Data shows increases through 2001, decreases in 2002, and substantial increases in 2003. Since 2004 landings have ranged from 2.4 to 4.4 million pounds. In 2012, recreational anglers harvested 4.1 million pounds, with the majority of the harvest coming from Massachusetts, New York, Rhode Island, and Connecticut catching the greatest proportion (>90%).



Commercial and Recreational Scup Landings. Sources: NMFS Statistics Division and ACCSP, 2013

### Stock Status

According to the 2012 scup stock assessment update, scup is not overfished and overfishing is not occurring. The fishing mortality was estimated to be 0.034 in 2011, below the fishing mortality threshold of 0.177. Spawning stock biomass (SSB) was estimated to be 420 million pounds, 207% of its target. After below average recruitment in 2009 and 2010, the 2011 year class was estimated to be above average at 154 million age 0 fish. Technical advice to managers has cautioned rapid increases in quota to meet the revised maximum sustainable yield given uncertainties in recruitments. They advised a more gradual increase in quotas is a preferred approach reflective of the uncertainty in the model estimates and stock status.



Scup Spawning Stock Biomass (SSB) and Recruitment. Source: NEFSC Stock Assessment Update, 2012

### Atlantic Coastal Management

Scup are one of four species jointly managed by the Atlantic States Marine Fisheries Commission and the Mid-Atlantic Fishery Management Council (MAFMC). Scup are managed under Amendment 13 to the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan - Executive Summary (August 2002) and its subsequent Addenda (Addendum XX - XIII). The management program divides a total annual quota between the recreational fishery (22%) and the commercial fishery (78%). Recreational fishery management measures usually include a combination of minimum size limits, bag limits, and fishing seasons. Since 2004, the states of

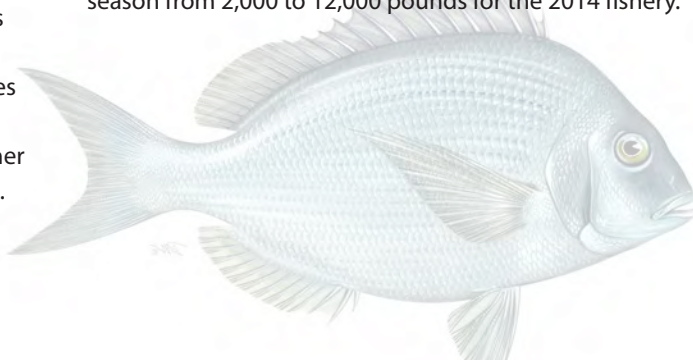
Massachusetts, Rhode Island, Connecticut, and New York have formed a northern region when setting their recreational regulations. This regional approach creates consistency between the states where fishermen from different states are often fishing alongside each other in the same waters.



Recreational angler with scup.  
Photo credit: Mark Terceiro, NMFS NEFSC.

In August 2012, the Commission and MAFMC initiated the development of a draft amendment to the Scup Fishery Management Plan to consider revisions to seasonal and sector allocations. Proposed measures will include options to modify the commercial/recreational allocation, currently set at 78%/22%, and options to move a portion of the Winter I & II Period allocation to the Summer Period (currently at 38.95% of the quota). The Commission and Council set an upper limit for the amount of allocation distributed to the recreational sector at 40%. For the seasonal allocation, both groups set a maximum percentage of allocation distributed to the Summer Period at 50%. These measures are being considered to maximize the overall benefits of the available total allowable catch.

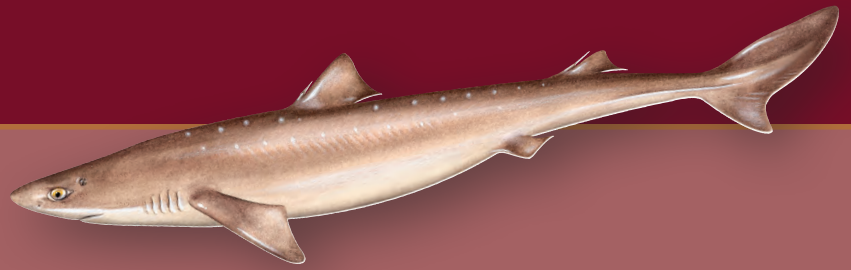
For the 2014 fishing season, both the Commission and MAFMC set the commercial quota at 21.95 million pounds and the recreational harvest limit at 7.03 million pounds. In addition, the Commission increased the commercial possession limit for the Winter II commercial season (November 1-December 31) season from 2,000 to 12,000 pounds for the 2014 fishery.





# Spiny Dogfish

## *Squalus acanthias*



### Life History

Spiny dogfish, *Squalus acanthias*, are a small shark species that inhabit both sides of the North Atlantic and North Pacific Oceans, mostly in the temperate and subarctic areas. In the Northwest Atlantic, the stock ranges from Labrador to Florida, and is most abundant from Nova Scotia to Cape Hatteras. Spiny dogfish migrate north in the spring and summer and south in the fall and winter. In the winter and spring, they congregate primarily in Mid-Atlantic waters but also extend onto the shelf break of southern Georges Bank. In the summer, they are located farther north in Canadian waters and move inshore into bays and estuaries. By autumn, dogfish have migrated north with high concentrations in Southern New England, on Georges Bank, and in the Gulf of Maine. They remain in northern waters throughout autumn until water temperatures begin to cool and then return to the Mid-Atlantic.

Juvenile spiny dogfish school by size until sexually mature and then aggregate by both size and sex. Female dogfish reach sexual maturity at 12 years (~29.5 inches), while males reach sexual maturity at six years (~23.6 inches). Mating occurs in the winter months and the pups are delivered on the offshore wintering grounds. Females give birth every two years with litters ranging from two to 15 pups. While carrying one litter, the female will begin developing eggs for the fertilization of her next litter. After an 18 to 24 month gestation period, the longest of any vertebrate, pups are released live and fully formed at about 14 inches.

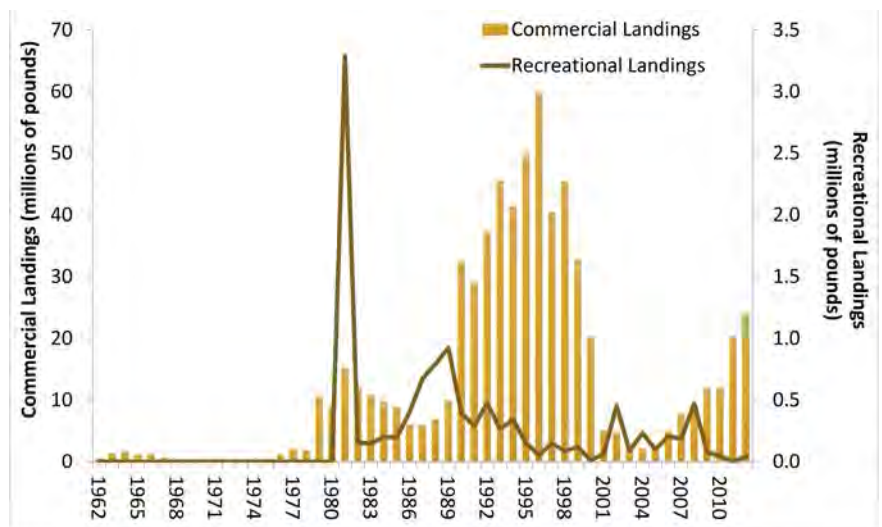
### Commercial Fisheries

Prior to the Fishery Conservation and Management Act of 1976 (now known as the Magnuson-Stevens Reauthorization Act), foreign fleets caught the majority of dogfish in U.S. waters but U.S. fishermen have had uncontested access ever since the Act's passage. The National Marine Fisheries Service (NMFS) encouraged commercial fishermen to target the bountiful stocks of spiny dogfish in the 1980s and 1990s when stocks of other commercially valuable fish in the Northeast declined. Then in 1998, NMFS determined that spiny dogfish were overfished and implemented stringent harvest restrictions in federal waters to allow the stock to rebound. The states followed shortly after with

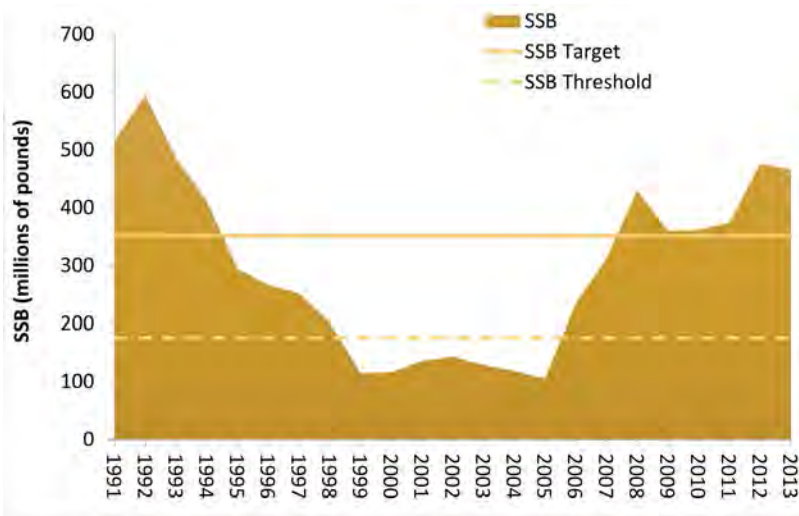
complementary regulations for state waters. Today, commercial fishermen catch spiny dogfish using longlines, trawls, and purse seines. Fishermen target female dogfish because the females grow larger than males and tend to school together. Processors prefer the larger dogfish because they are easier to hold and cut. The commercial fishery supplies the European food fish markets that use dogfish "belly flaps" for fish and chips in England and as a popular beer garden snack called shillerlocken in Germany.

There is also a small scientific fishery in Maine, which uses spiny dogfish to study several of the species' unique biological characteristics. Dogfish have an organ called a rectal gland whose study helps scientists better understand the function of human kidneys. They also secrete a molecule called squalamine, which has strong antibiotic characteristics and shows promise as an anticancer agent.

Landings were approximately 37.2 million pounds in 1992, gradually increasing to a peak of about 60 million pounds in 1996. In the late 1990s, landings declined to an average of around 40 million. After federal and state regulations were implemented in the early 2000s, landings declined to less than five million pounds in 2001 and 2002. They then ranged between two and eight million pounds between 2003 and 2009. As the stock began to improve, landings were increased to 21 million pounds in 2011. Commercial landings continue to be



**Spiny Dogfish Landings.** Source: NEFSC Update on the Status of Spiny Dogfish in 2013 and Projected Harvests at the FMSY Proxy & PSTAR of 40%, 2013



**Spiny Dogfish Spawning Stock Biomass (SSB) ( $\geq 80$  cm).** Source: NEFSC Update on the Status of Spiny Dogfish in 2013 and Projected Harvests at the FMSY Proxy & PSTAR of 40%, 2013

mostly female dogfish, with female landings comprising about 98% of the total commercial catch. The 2014/2015 quota is 49.37 million pounds and the 2015/1016 quota is 50.61 million pounds.

### Stock Status

The 2013 stock assessment update, conducted by the Northeast Fisheries Science Center, estimates spiny dogfish are not overfished and not experiencing overfishing. Spawning stock biomass (SSB) was estimated at 465.99 million pounds in 2013 and has exceeded the target (351.23 million pounds) for the past six years. Fishing mortality was estimated to be 0.15 in 2012, well below the plan's threshold (0.2439). The recommendation from the MAFMC Science and Statistical Committee (SSC) took into account the projected record low recruitment from 1997 to 2003; the recommended quotas are not expected to cause SSB to decline below the biomass threshold.

Discards have remained relatively stable around 11 million pounds over the past decade and are expected to remain near that level in the future fishing seasons. Canadian and foreign



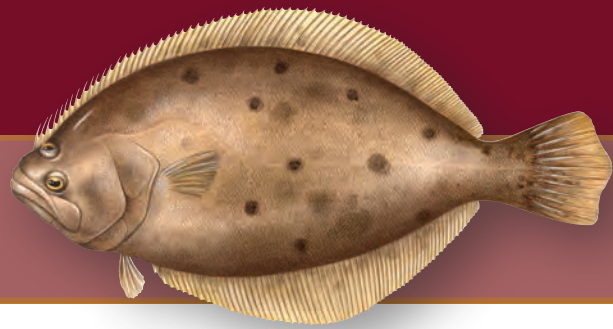
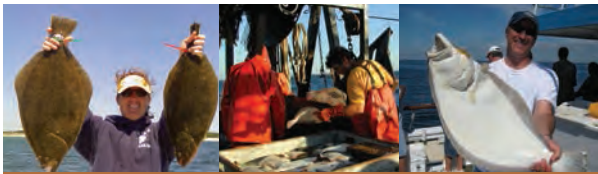
Spiny dogfish captured as part of the NEAMAP SNE/MA Nearshore Trawl Survey; biological information will be collected on these specimens for use in stock assessments. Photo credit: NEAMAP.

landings have also decreased significantly in recent years. It is anticipated the Canadian dogfish harvest will not increase in the near future given the lack of demand for the product and the subsequent closure of Canadian spiny dogfish processors.

### Atlantic Coastal Management

In 1998, NMFS declared spiny dogfish overfished and initiated the development of a joint fishery management plan (FMP) between the Mid-Atlantic (MAFMC) and New England Fishery Management Councils (NEFMC) in 1999. The Commission began development of an interstate FMP to complement the federal plan in 1999. The Interstate FMP was approved in late 2003 and implemented for the 2003-2004 fishing year. Both the Commission and federal plans use a fishing mortality rate to set annual quotas and trip limits but there are a few differences between the federal and interstate management programs. The Commission's FMP has an addition four addenda (Addendum I - IV).

In October 2013, the Commission's Spiny Dogfish and Coastal Sharks Management Board increased its spiny dogfish quotas for the 2014/15 and 2015/16 fishing seasons (May 1 – April 30) in response to increases in spawning stock biomass. The 2014/2015 quota is now set at 49,370,000 pounds (previously 41,784,000 pounds) and the 2015/1016 quota is set at 50,612,000 pounds (previously 41,578,000 pounds), with a maximum possession limit of 4,000 pounds per day for the northern region states (Maine through Connecticut). The quota is subdivided into a northern region (Maine - Connecticut) share of 58% and state-specific shares for the southern region, allocated as follows New York (2.707%); New Jersey (7.644%); Delaware (0.896%); Maryland (5.92%); Virginia (10.795%; and North Carolina (14.036%). Any overages from the previous fishing seasons will be paid back by the region or state in the following season, as has been done in the past.



# Summer Flounder

## *Paralichthys dentatus*

### Life History

Summer flounder, *Paralichthys dentatus*, are found in inshore and offshore waters from Nova Scotia, Canada to the east coast of Florida. In the U.S., they are most abundant in the Mid-Atlantic region from Cape Cod, Massachusetts to Cape Fear, North Carolina.

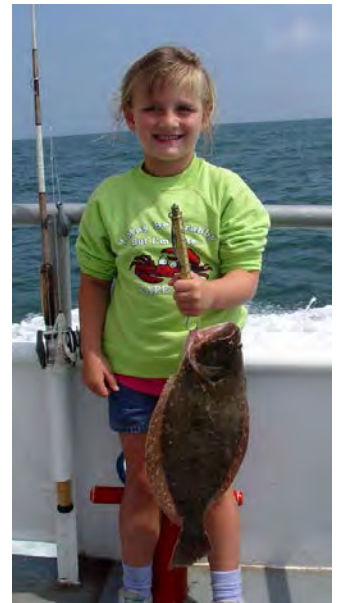
Summer flounder usually begin to spawn at age two or three, at lengths of about 10 inches. Spawning occurs in the fall while the fish are moving offshore. Spawning migration is linked to sexual maturity, with the oldest and largest fish migrating first. As in their seasonal migrations, spawning summer flounder in the northern portion of the geographic range spawn and move offshore (depths of 120 to 600 feet) earlier than those in the southern part of the range. Larvae migrate to inshore coastal and estuarine areas from October to May. The larvae, or fry, move to bottom waters upon reaching the coast and spend their first year in bays and other inshore areas. At the end of their first year, some juveniles join the adult offshore migration.

Adults spend most of their life on or near the sea bottom burrowing in the sandy substrate. Flounder lie in ambush and wait for their prey. They are quick and efficient predators with well-developed teeth allowing them to capture small fish, squid, sea worms, shrimp, and other crustaceans.

### Commercial & Recreational Fisheries

Summer flounder are one of the most sought after commercial and recreational fish along the Atlantic coast, with landings at approximately 19.62 million pounds in 2012. Using baseline data from 1980 to 1989, the current plan allocates the summer flounder quota on a 60/40 percent basis to commercial and recreational fisheries, respectively.

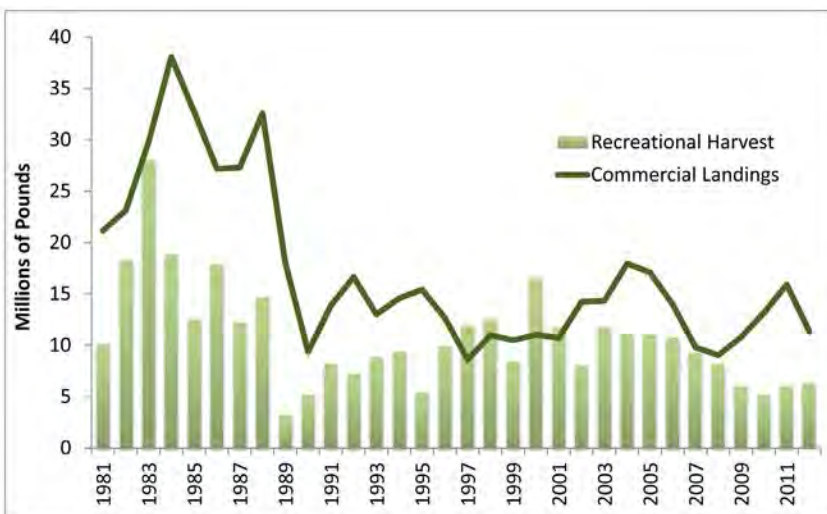
Two major commercial trawl fisheries exist — a winter offshore and a summer inshore. Summer flounder are also taken by pound nets and gillnets in estuarine waters. Throughout the 1980s, commercial landings ranged from 21 to 38 million pounds. By 1990, landings reached a low of nine million pounds and have since fluctuated between nine and 17 million pounds. In 1993, the coastwide quota was implemented for the first time, setting a



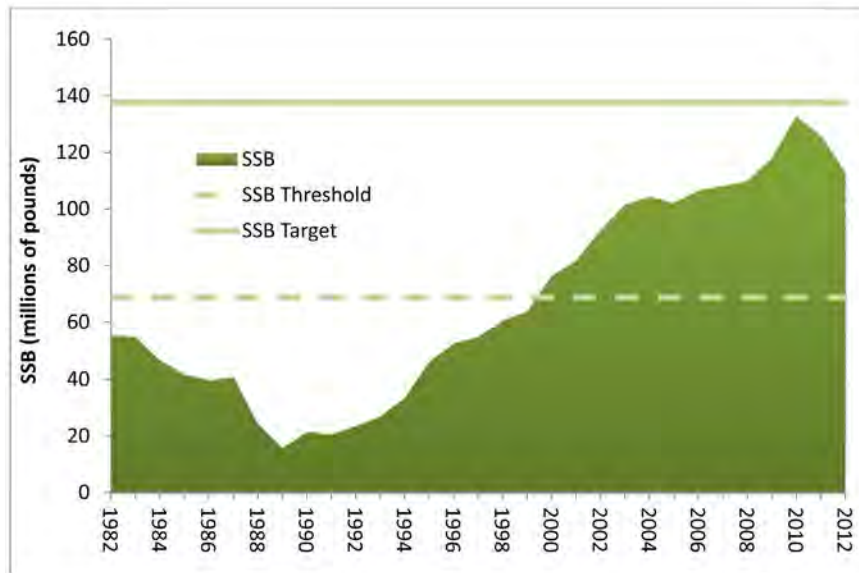
Young angler with a summer flounder. Photo credit: John Chisolm, MA DMF.

commercial landings limit of 12.35 million pounds. Commercial quotas have since ranged from 9.46 to 18.18 million pounds. Commercial landings (which are limited by the quota) have ranged from 8.81 million pounds to 18.17 million pounds since 1993. 2012 commercial landings were estimated at 13.33 million pounds.

Summer flounder are also highly prized in the recreational fishery. Anglers catch summer flounder from the shore, piers, and boats with hook and line. From 1980 through 2004, recreational landings varied widely from a high of 38 million pounds in 1980 to a low of three million pounds in 1989. Starting in 1993, harvest limits were implemented for the recreational fishery. From 1993 to 2011, landings ranged from 5.1 to 16.5 million pounds. 2012 recreational harvest was estimated at 6.29 million pounds.



Summer Flounder Commercial Landings and Recreational Harvest. Source: Personal communication NMFS Fisheries Statistics Division, MD, 2013



Summer Flounder Spawning Stock Biomass (SSB). Source: Northeast Fisheries Science Center Stock Assessment Summary, 2013

### Stock Status

The 2013 benchmark stock assessment indicates the stock was not overfished and overfishing was not occurring in 2012 relative to the biological reference points. The fishing mortality rate was estimated to be 0.285 in 2012, well below the threshold fishing mortality reference point of 0.309. Spawning stock biomass was estimated to be 125.97 million pounds in 2012, just below the biomass target of 137.55 million pounds. The stock was determined to be rebuilt in 2010.

Since 1982, average recruitment (the number of juvenile fish that will be able to reproduce that year) has been 43 million fish. The largest class was in 1983 at 76 million fish and the lowest was in 1988 at 10 million fish. The 2012 year class is estimated to be 37 million fish.

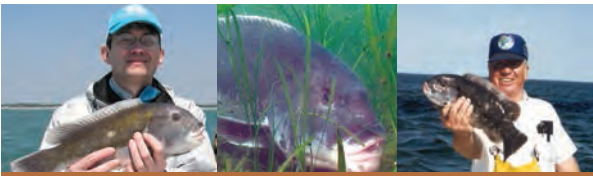
### Atlantic Coastal Management

The Commission approved the first Fishery Management Plan (FMP) for Summer Flounder in 1982, followed by a similar FMP approved by the Mid-Atlantic Fishery Management Council in 1988. Since then, both agencies have made significant revisions to the plan, increasing the protection of juvenile fish and ensuring the maintenance of an adequate spawning population. This increased protection was achieved through the implementation of larger minimum size limits across all sectors, increased mesh sizes, and decreased recreational possession limits. Cumulatively, these changes have contributed to rebuilding the resource. This is not to say that

challenges in managing this species do not still exist. Issues related to sector allocation and annual harvest levels persist.

In March 2014, the Commission’s Summer Flounder, Scup and Black Sea Bass Management Board approved regional management measures for two regions (1) Delaware, Maryland, and Virginia, including the Potomac River Fisheries Commission, and (2) Connecticut, New York, and New Jersey. Adopted regulations for the first region (DE-VA) include a 16-inch minimum size limit, 4 fish bag limit, and a year-round season, while the second region’s (CT-NJ) regulations include an 18-inch minimum size, 5 fish bag limit, and 128 day open season with not more than 45 days open from May 1 – June 30. Further, states have the option to develop a program that allows for a 16-inch minimum size limit at state designated sites offering only shore-based fishing access. For North Carolina, the Board approved the state’s maintenance of 2013 regulations for the 2014 fishery. The overall intent of the regional management measures for the summer flounder recreational fishery is to provide more equity in recreational harvest opportunities along the coast.

The Board also approved a request from Massachusetts and Rhode Island to split its region into individual state regions to account for the significantly different recreational fisheries of the two states. Both states will maintain their 2013 regulations for the 2014 fishery so that the effect of these measures, when combined with the other regions’ measures, will constrain the coastwide harvest to the recreational harvest limit of 7.01 million pounds.



# Tautog

*Tautoga onitis*



## Life History

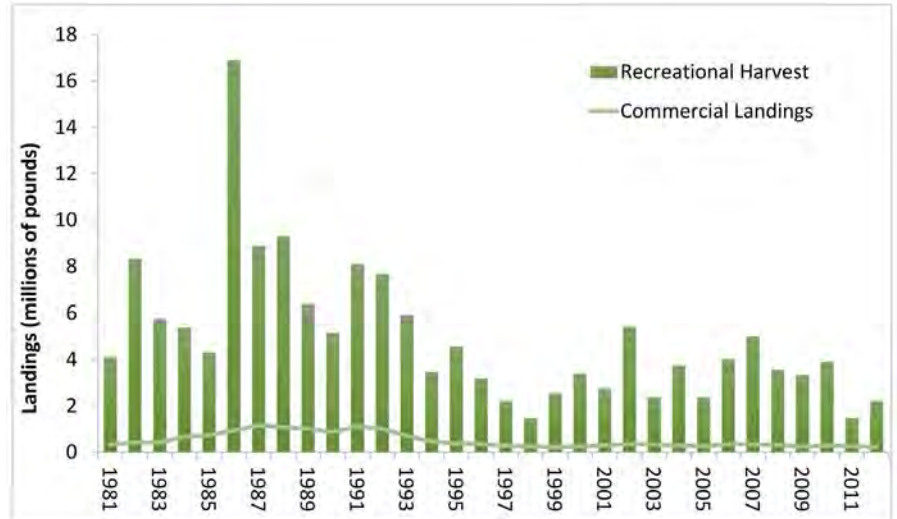
A member of the wrasse (Labridae) family, tautog, *Tautoga onitis*, is a stout fish with an arched head and broad tail. Juveniles are greenish in color and become darker with age. Fishermen have given tautog the nickname “blackfish” due to its dark mottled sides that are either dull black, brown, blackish green, or blackish blue. Anglers also call tautog “white chin” because this coloring pattern is commonly found on large males.

Tautog are slow growing and can live 35 to 40 years. Males and females are sexually mature at three to four years of age, but studies have shown that larger females produce significantly more (and potentially higher quality) eggs than smaller females.

Tautog are distributed along the Northeast Atlantic coast, from Nova Scotia to Georgia, with the greatest abundances occurring in the U.S. between Cape Cod, Massachusetts, and Chesapeake Bay. North of Cape Cod, the species generally remains close to shore in waters less than 60 feet deep. South of Cape Cod, they inhabit waters 40 miles offshore at depths up to 120 feet. During spring, as water temperatures approach 48° F, tautog migrate inshore to spawn in estuaries and nearshore



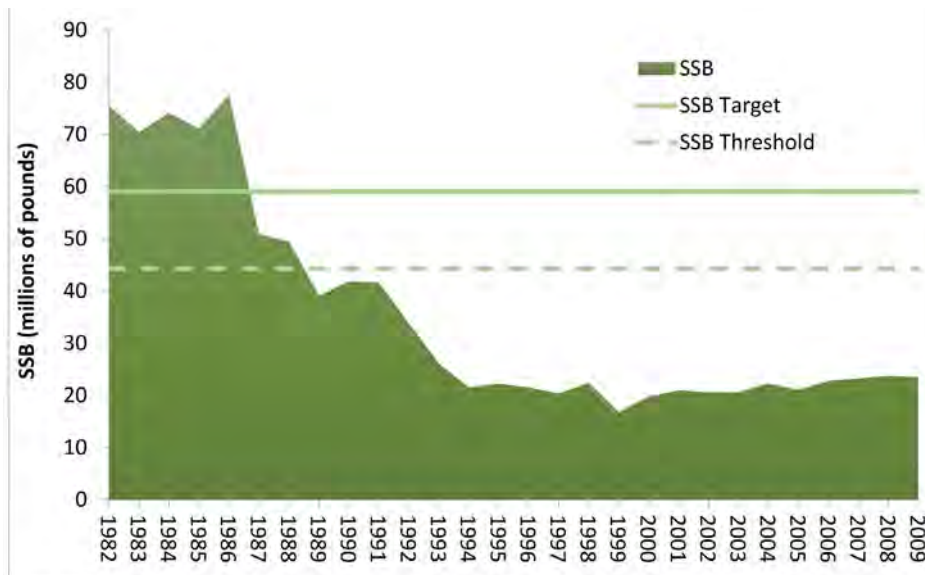
Young angler with a nice sized tautog.  
Photo credit: Paul Caruso, MA DMF.



**Tautog Recreational Harvest and Commercial Landings.** Source: Personal communication NMFS Fisheries Statistics Division, Silver Spring, MD, 2013

marine waters. They may remain inshore throughout the summer, then move to deeper (80- 150 feet) offshore wintering areas as fall approaches and water temperatures drop below 52° F. Toward the southern end of their range, some adults may remain offshore throughout the year.

Tautog are reef fish and aggregate around structured habitats throughout their life. Shallow, vegetated estuaries and inshore areas serve as juvenile nurseries, while larger juveniles cohabitate with adults in deeper offshore waters. North of Long Island, tautog are generally found around rocks and boulders. Toward the southern end of its range, tautog often inhabit wrecks, jetties, natural and artificial reefs, and shellfish beds. They are also found near the mouths of estuaries and other inlets. Adults stay close to their preferred home site and, although they may move away during the day to feed, they return to the same general location at night where they become dormant and may actually sleep. This aggregation around structure makes tautog easy to catch, even when biomass levels are low. The easy catchability and slow growth rate make tautog highly susceptible to overfishing and slow to rebuild.



Tautog Spawning Stock Biomass (SSB). Source: ASMFC Tautog Stock Assessment Update, 2012

### Commercial & Recreational Fisheries

Tautog can be found in waters off Massachusetts to Virginia, with the majority of landings occurring in state waters between Cape Cod and the Chesapeake Bay. Historically, tautog -- or "tog" as many fishermen like to call this popular game fish -- was a recreational fishery, with about 90% of the coastwide harvest taken by marine anglers. In recent years, however, commercial landings accounted for up to 40% of the catch in some states, largely due to a growing market for live fish. Most tautog are landed in the spring and fall, although some Mid-Atlantic fishermen pursue tautog year-round, and there is an active fishery off the Virginia coast in the winter.

Over the last 30 years, recreational harvest has ranged from a time series high of 16.9 million pounds in 1986 to a low of 1.5 million pounds in 1998. Since 2000, recreational harvest has averaged 3.3 million pounds, with 2012 harvest estimated at 2.2 million pounds. Connecticut anglers accounted for 45% of the 2012 recreational harvest, followed by Rhode Island (24%), and New York (11%).

Commercial landings have ranged from a high of 1.2 million pounds in 1987 to a low of 208,800 pounds in 1999. Landings have averaged about 290,000 pounds since 2000, with 2012 landings estimated at 214,000 pounds. More than 50% of the 2012 commercial harvest was landed in Massachusetts and New York. Rod and reel are the predominant commercial gear, although floating fish traps, fish pots, and otter trawl harvest are also used.

### Stock Status

The latest stock assessment update (2011) indicates that tautog continues to be overfished and subject to overfishing. SSB remained at low levels for the last decade, with SSB estimated at 23.5 million pounds, 39% of the target SSB (59 million pounds). The three-year average fishing mortality (2007-2009) was estimated at 0.31, well above the FMP's fishing mortality target of 0.15. The next benchmark stock assessment is scheduled to be completed in 2014.

### Atlantic Coastal Management

Tautog is managed under the Fishery Management Plan for Tautog (March 1996) and its subsequent addenda (Addendum I-VI). In 2011 in response to the latest scientific advice that the stock continues to be overfished with overfishing occurring, the Commission's Tautog Management Board approved Addendum VI in order to stop overfishing and improve chances of rebuilding. The Addendum establishes a new fishing mortality target of 0.15. Tautog's slow growth rate, late maturity, and spawning behavior makes it particularly susceptible to overfishing and limits stock rebuilding. To meet the Addendum VI fishing mortality target, states were required to implement measures to achieve a 39% reduction in exploitation by January 1, 2012.





# Weakfish

## *Cynoscion regalis*



### Life History

Weakfish, *Cynoscion regalis*, occur along the Atlantic coast of North America from Nova Scotia to southeastern Florida, but are more common from New York to North Carolina. Warming of coastal waters in the spring prompts an inshore and northerly migration of adults from their offshore wintering grounds between Chesapeake Bay and Cape Lookout, North Carolina to nearshore sounds, bays, and estuaries. Spawning occurs shortly afterwards, peaking from April to June, with some geographical variation in timing. Females continuously produce eggs during the spawning season and release them over a period of time rather than once. In the fall, an offshore and southerly migration of adults coincides with declining water temperatures.

Feeding on microscopic animals, larval weakfish journey from spawning areas to nursery areas, located in deeper portions of coastal rivers, bays, sounds, and estuaries. They remain in these areas until October to December of their first year, after which the juveniles migrate to the coast. Growth in weakfish is especially rapid in the first year and they mature at a young age. Size at age-1 is variable but most fish are 10 to 11 inches long. As adults, weakfish are often found near the periphery of eelgrass beds, perhaps because weakfish feed primarily on shrimp, other crustaceans, and small fish that are found near these grass beds.



Juvenile weakfish captured during MD DNR survey. Photo credit: MD DNR.

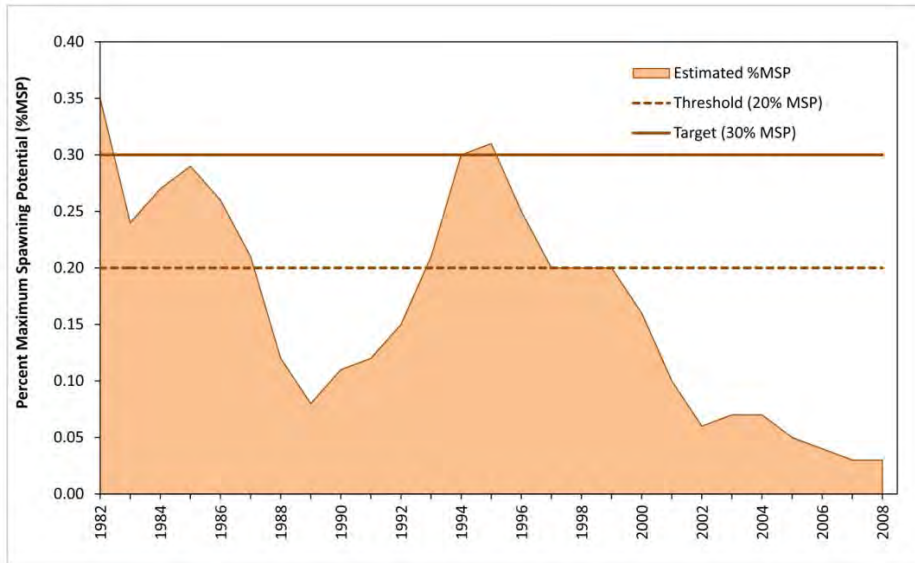
### Recreational & Commercial Fisheries

Weakfish have supported fisheries along the Atlantic coast since at least the 1800s. Recently, however, fishermen have had increasing difficulty landing weakfish. From 1950 to 1970, commercial landings fluctuated without trend, ranging from three to nine million pounds. The early 1970s began a period of tremendous growth in the fishery, with landings peaking at 36 million pounds in 1980. The commercial fishery declined steadily throughout the 1980s, dropping to a low of six million pounds in 1994. Following an increase in abundance due to management measures, commercial harvest increased slowly through 1998. Beginning in 1999, commercial landings began to decline again, and by 2011, were reduced to an historic low

of less than 150,000 pounds. In 2012, landings increased to 273,600 pounds. The primary commercial gears for weakfish are trawls and gillnets, although weakfish are also landed using pound nets and haul seines.

Recreational landings have followed a similar trend to that of commercial landings. After several harvests above 10 million pounds in the early 1980s, landings decreased to two million pounds by 1989,

and hovered between one and two million pounds through the early 1990s. Harvest then increased to over four million pounds by the late 1990s, before exhibiting a decline like that in the commercial fishery. The 2011 recreational harvest was also at a historic low of below 37,335 pounds. Like the commercial fishery, recreational harvest increased in 2012 to 265,700 pounds.



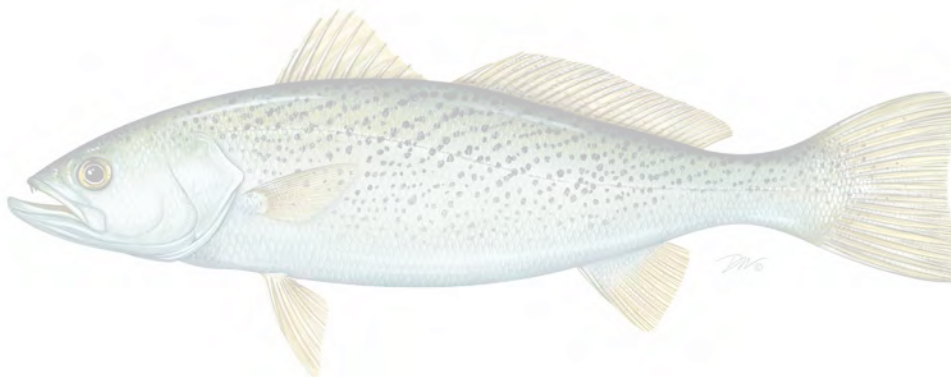
Weakfish maximum spawning potential. Source: ASMFC Weakfish Technical Committee, 2009

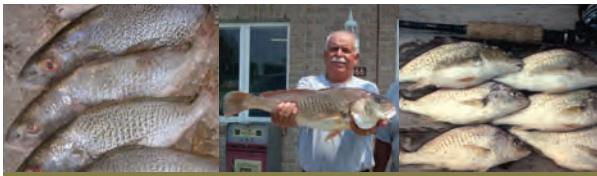
### Stock Status

The last weakfish stock assessment was conducted and peer reviewed in 2009. The resulting stock status for weakfish is depleted, with overfishing not occurring. Between 1982 and 1990, annual spawning stock biomass (SSB), as of January 1, declined drastically from 113.1 million pounds to 17.6 million pounds, with high fishing mortality rates driving the decline. Implementation of management measures in the early to mid-1990s reduced fishing mortality and resulted in an increase in SSB to a peak of 62.1 million pounds in 1996. After a slight decline through 2000, the stock began another drastic decline to the time-series low of 11 million pounds in 2007. The recent decline in biomass is not attributed to fishing mortality, which has remained relatively low and stable. Rather, natural mortality has increased to be two to four times the level of fishing mortality in recent years.

### Atlantic Coast Management

In 1985, as a result of population declines and limited biological information, the Atlantic States Marine Fisheries Commission developed an Interstate Fishery Management Plan for Weakfish. Weakfish are currently managed under Amendment 4 to the Interstate Fishery Management Plan for Weakfish and its subsequent addenda (Addendum I-IV). Addendum IV requires states to implement a one fish recreational creel limit, 100 pound commercial trip limit, 100 pound commercial bycatch limit during closed seasons, and 100 undersized fish per trip allowance for the finfish trawl fishery. The Addendum's measures are intended to reduce the level of harvest without creating a large amount of discards and poise the stock for recovery should natural mortality decrease in the future.





# Atlantic Croaker

## *Micropogonias undulatus*

### Life History

Atlantic croaker, *Micropogonias undulates*, are a bottom-dwelling species, in the same family as red drum and weakfish. They can be found from the Gulf of Maine to Argentina, but along the US Atlantic coast, they are most abundant from the Chesapeake Bay to northern Florida. They get their name from the croaking noises they make by vibrating their abdominal muscles against their swim bladder as part of their mating ritual during spawning season.

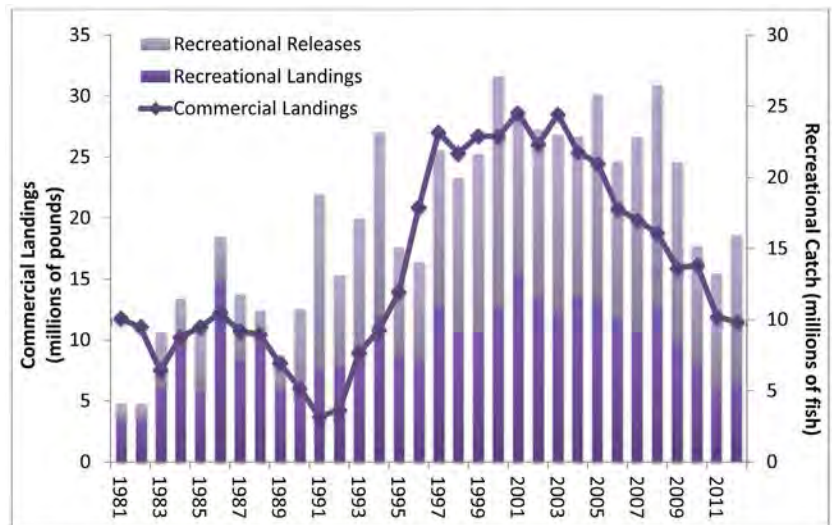
Atlantic croaker spawn in warm pelagic waters during the fall and winter months, and the larvae and juveniles settle in estuaries to mature. The Chesapeake Bay

is an important spawning and nursery habitat for croaker. Most Atlantic croaker are mature by the end of their first year. They grow quickly and may reach sizes of over 20". The world record for Atlantic croaker is 8 lbs 11 oz. The oldest observed age is 17 years, but it is uncommon to see fish older than 10 years in the catch.

### Commercial & Recreational Fisheries

Atlantic croaker are sought by commercial fisherman and recreational anglers alike. Commercial landings make up about 75% of the total reported landings. Gears used in this fishery include gill nets, pound nets, haul seines, and otter trawls. The majority of the landings come from North Carolina, Maryland, and Virginia, which report 95% of the coastwide commercial landings. Commercial landings are cyclical; catch in some years is almost 30 million pounds, while in others it is less than 2 million pounds. Since 2000, croaker appears to be on the downward trend of the cycle, with a steady decrease in landings from 30 million pounds in 2000 to 11.6 million pounds in 2012.

A majority of the recreational landings of croaker come from North Carolina, Maryland and Virginia (about 78%). There has been a decrease in recreational catch from New Jersey through Florida from 11 million pounds in 2001 to 3 million pounds in



Atlantic Croaker Commercial Landings and Recreational Catch. Source: Personal communication NMFS Fisheries Statistics Division, 2013

2011. In 2012, recreational anglers landed an estimated 2.9 million pounds and released 10.5 million fish, a slight decline from the 10 year average.

Atlantic croaker is also considered to be a part of the "scrap" or "bait" fishery, which tends to land fish smaller than marker-grade croaker. Estimates of these landings have declined in recent years, from a high of 3.5 million pounds in 1989 to a low of 185,000 pounds in 2008.

### Stock Status

The 2010 peer-reviewed stock assessment for Atlantic croaker indicates that the resource is not experiencing overfishing. Although model estimates of spawning stock biomass were too uncertain to be used to precisely determine overfished stock status, biomass has been increasing and the age-structure of the population has been expanding since the late 1980s. Atlantic croaker are now managed as a single stock on the Atlantic coast. The previous stock assessment divided the stock into Mid-Atlantic and South Atlantic regions and assessed only the Mid-Atlantic region. The most recent assessment used data from both regions to produce a single, coastwide assessment. The next benchmark stock assessment is planned for 2016.



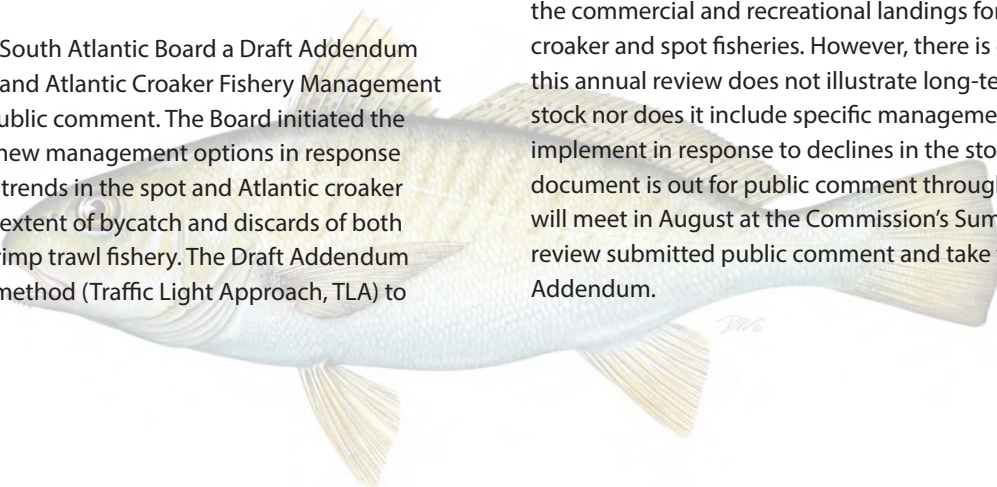
Atlantic croaker being commercially harvested. Photo credit: Steve Doctor, MD DNR.

## *Atlantic Coastal Management*

Atlantic croaker are managed under Amendment 1 to the Interstate Fishery Management Plan for Atlantic Croaker (2005) and Addendum I (2011). The Amendment does not require any specific measures restricting harvest but encourages states with conservative measures to maintain them. It also implemented a set of management triggers, based on an annual review of certain metrics, to respond to changes in the fishery or resource and initiate a formal stock assessment on an accelerated timeline if necessary. The Addendum revises the management program's biological reference points to assess stock condition on a coastwide basis as recommended by the 2010 stock assessment.

In May 2014, the South Atlantic Board a Draft Addendum to both the Spot and Atlantic Croaker Fishery Management Plans (FMP) for public comment. The Board initiated the development of new management options in response to concerns over trends in the spot and Atlantic croaker fisheries and the extent of bycatch and discards of both species in the shrimp trawl fishery. The Draft Addendum proposes a new method (Traffic Light Approach, TLA) to

evaluate the status of the fisheries and potential coastwide or state-specified management actions (e.g. bag limits, size restrictions, time & area closures, and gear restrictions) based on the annual fisheries evaluation. The TLA has been used as a precautionary framework for fisheries with limited data to allow for a reasonable level of resource management. The name comes from assigning a color (red, yellow, or green) to categorize relative levels of indicators on the condition of the fish population or fishery, which can help clearly illustrate trends in the fishery. The current management of Atlantic croaker and spot compares annual changes in various indices (e.g. recent landings and survey information) to review trends in the fisheries. The most recent review found declines in the commercial and recreational landings for both Atlantic croaker and spot fisheries. However, there is concern that this annual review does not illustrate long-term trends in the stock nor does it include specific management measures to implement in response to declines in the stock or fishery. The document is out for public comment through July 2. The Board will meet in August at the Commission's Summer Meeting to review submitted public comment and take final action on the Addendum.





# Black Drum

*Pogonias cromis*

## Life History

Black drum, *Pogonias cromis*, can be found in nearshore waters along the Atlantic coast from the Gulf of Maine to Florida and as far south as Argentina. Atlantic coast black drum migrate inshore to the north in the spring, and to the south in the fall. Fish can reach over 46", 120 lbs and 60 years of age. Black drum grow rapidly until the age of 15, at which time growth slows.

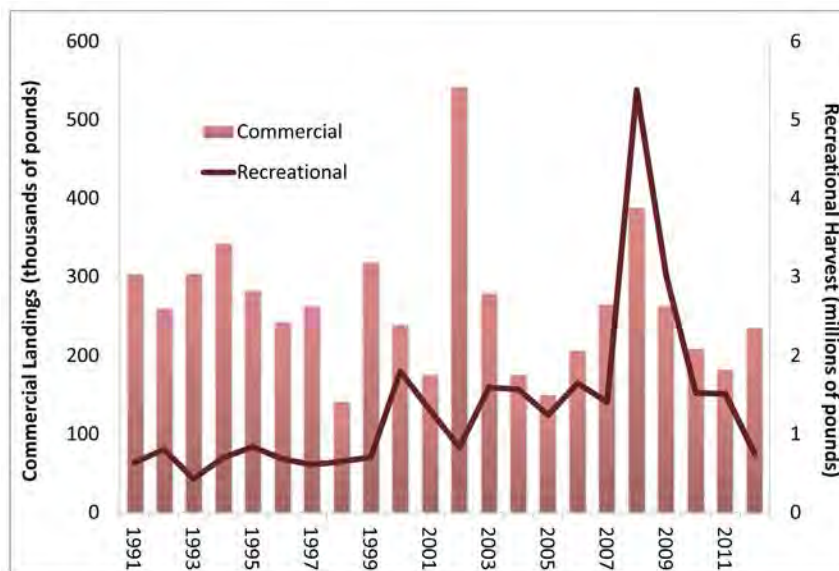
Black drum spawn during the winter and early spring, with spawning occurring earlier in the southern areas (November – April) and later in the northern areas (April – June). An average-sized female (13.4 lbs) may spawn 32-million eggs each year. Recruitment appears to be sporadic, with infrequent large events.

Black drum are primarily bottom feeders. Young black drum feed on small fish and invertebrates, such as copepods, annelids, and amphipods. Black drum eggs and larvae were shown to be subject to high predation. As juveniles, they are prey to a wide range of estuarine fish species, such as spotted seatrout and crevalle jack.

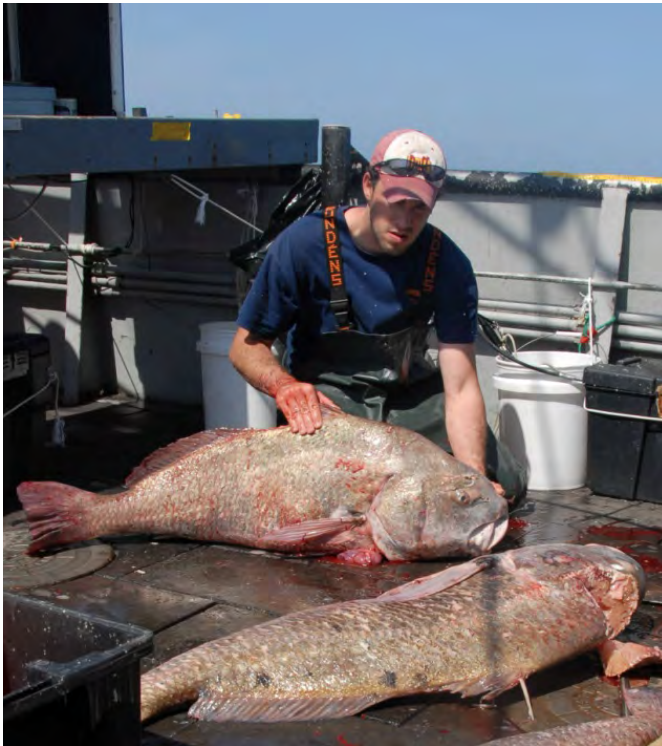
## Commercial & Recreational Fisheries

The black drum fishery is predominantly recreational, with anglers landing about three times the fish (by weight) than the commercial fishery. From 2000-2008, recreational harvest trended upward with harvest peaking at 5.4 million pounds in 2008. Harvest has been on the decline since then with an estimated 742,800 pounds harvested in 2012. Florida and North Carolina fisheries comprise the majority of recreational black drum harvest. Historically, commercial landings averaged approximately 368,000 pounds in the 1950s and 1960s and then declined to an average of approximately 211,000 pounds in the 1970s and 1980s.

The commercial fishery landed approximately 243,000 pounds in 2012. Since 2000, the majority of commercial landings occur in North Carolina and Virginia, while a smaller portion is landed in New Jersey, Maryland, Delaware, and Florida. In recent years, gillnets and pound nets have been the primary gear used.



**Black Drum Recreational Harvest and Commercial Landings. Sources: ACCSP Data Warehouse and NMFS Fisheries Statistics Division, 2013**



Scientist aboard the NEAMAP SNE/MA Nearshore Trawl Survey removing otoliths from 2 black drum. The otoliths will be used to determine the age of the fish. Photo credit: NEAMAP.

No coastwide index of abundance is available for black drum. Few reliable regional indices of abundance can be generated due to lack of targeted monitoring programs and low incidental catch of black drum in most existing surveys. In particular, few surveys consistently encounter and sample adult fish across the wide range of potential ages. These surveys do not indicate any major trends in the status of the population, which may be due to low or inconsistent intercepts of black drum.

## *Atlantic Coastal Management*

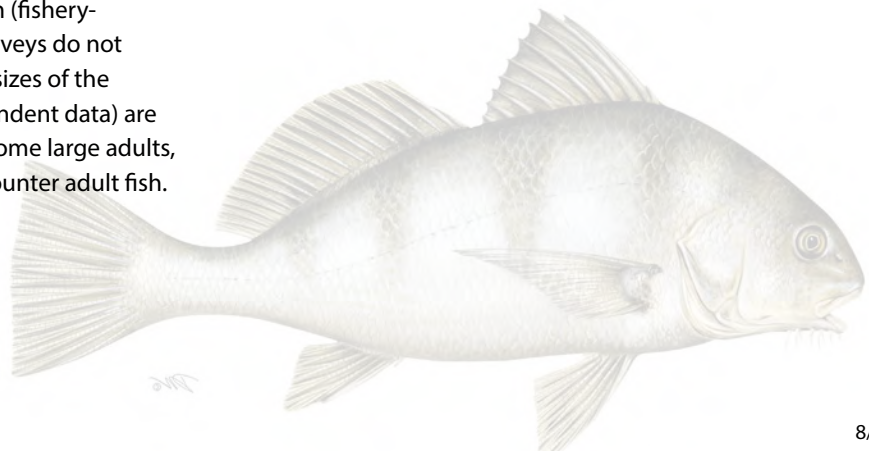
In May 2013, the Commission adopted the Interstate Fishery Management Plan for Black Drum. The FMP requires all states to maintain current regulations for black drum and implement a maximum possession limit and minimum size limit (of no less than 12 inches) by January 1, 2014. States will be required to further increase the minimum size limit (to no less than 14 inches) by January 1, 2016. Further, the FMP establishes a management framework to address future concerns or changes in the fishery or population. This will be particularly important as the Commission works towards the finalization of the first coastwide benchmark stock assessment for black drum in 2014.

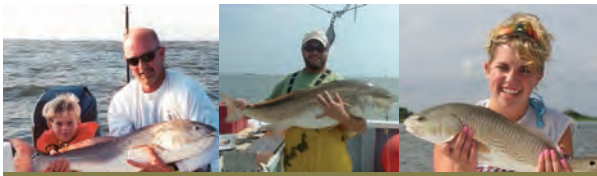
## *Stock Status*

No coastwide assessment has been performed for black drum, although the Commission plans to complete a benchmark stock assessment and peer review in 2015. Two regional stock assessments, one in Florida and other in Chesapeake Bay, have been completed. The Florida assessment, which was conducted in 1995, suggested that its black drum stocks could sustain the level of fishing that occurred in the early 1990s. In 2001, the regional Chesapeake Bay assessment suggested fishing mortality was below FMSY, the fishing level that would sustain the stock at its maximum yield.

There are no targeted surveys for black drum (fishery-dependent or independent), and current surveys do not sufficiently intersect with the vast ages and sizes of the population. Most landings (i.e., fishery-dependent data) are restricted to younger and smaller fish with some large adults, and fishery-independent surveys rarely encounter adult fish.

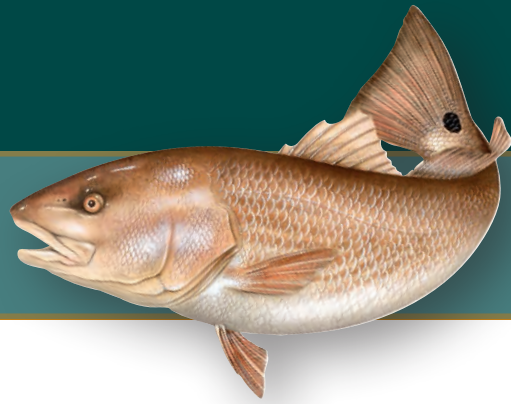
The FMP was initiated to address a number of concerns. There has been a significant increase in harvest by both recreational and commercial fishermen in recent years, with the fishery targeting very young fish in some areas and more heavily targeting the established breeding stock in other areas; both of which could undermine the stock's ability to sustain itself. Further, the lack of consistent coastwide regulations or management goals may negatively impact the black drum population as fishing pressures shifts from other stocks.





# Red Drum

## *Sciaenops ocellatus*



### Life History

The historic distribution of red drum, *Sciaenops ocellatus*, on the Atlantic coast is from Massachusetts through Florida, though few fish have been reported north of the Chesapeake Bay in recent years. Juveniles are most abundant in estuarine waters and inlets, while fish older than age four inhabit deeper waters. The adult fish migrate seasonally, moving offshore or south in the winter and inshore or north in the spring. Spawning occurs at night in the nearshore waters during the summer and fall. Prolific spawners, large females may produce up to two million eggs in a season. Eggs hatch within 24 to 36 hours of being spawned, and the larvae are carried by wind and tidal action into shallow, low salinity estuarine nursery areas. Juveniles and sub-adults stay in estuarine areas feeding on zooplankton and invertebrates such as small crabs and shrimp. Gradually, red drum expand their diet to include fish and larger invertebrates. Depending on the area, males mature between age one and four (20-28 inches in length), while females mature between age three and six (31-36 inches in length). Red drum may reach 60 years of age and 60 inches in length (corresponding to greater than 90 pounds in weight).

### Commercial & Recreational Fisheries

Red drum are one of the most recreationally sought-after fish throughout the South Atlantic. It is a nearshore fishery, targeting small, "puppy drum" in shallow estuarine waters and large trophy fish along the Mid- and South Atlantic barrier islands. Recreational harvest peaked in 1984 at 2.6 million pounds. Since 1988, the number has fluctuated without trend between 800,000 and 2.1 million pounds. The 2012 recreational landings of 1.7 million pounds represent a 22% increase from the previous ten year average (2002-2011). Since 1990, recreational landings have averaged approximately 88% of total landings of red drum. In 2012, this number spiked up to 96%.

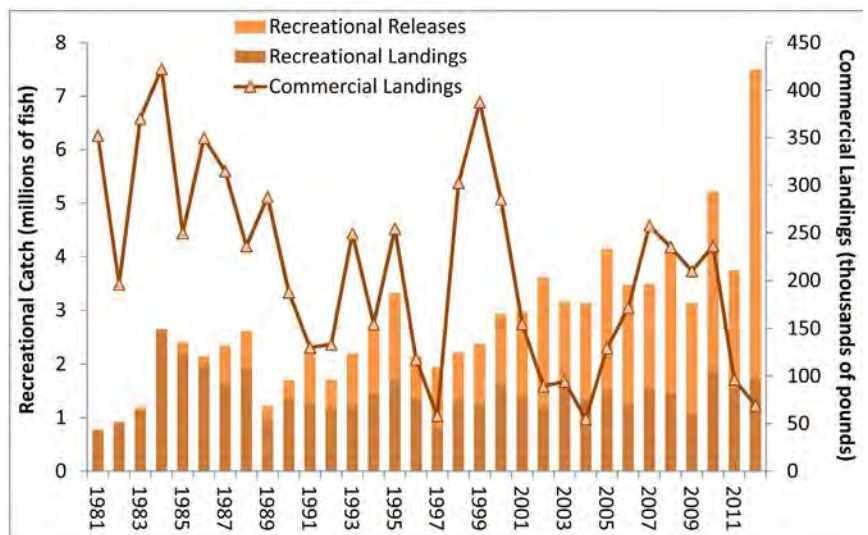
Atlantic coast commercial landings of red drum have been reported since the 1880s. The commercial fishery was more prevalent in the

1980s, but has declined since then. Since 1990, landings have averaged approximately 180,000 pounds per year. Today, no directed commercial fishery exists for Atlantic red drum. Fish are landed as bycatch in several states, predominantly North Carolina where gillnets take the vast majority of the state's harvest. The catch in North Carolina is restricted by an annual quota and low daily fish limit. Commercial harvest and sale in New Jersey through Virginia and Georgia is restricted to recreational limits, and in South Carolina and Florida, commercial harvest is prohibited.

### Stock Status

The 2009 peer-reviewed stock assessment indicates that abundance of young fish for both the northern (NJ - NC) and southern (SC - FL) stock complexes have remained relatively stable since 2000. The stock assessment concluded that sufficient numbers of young fish are surviving to move offshore and join the adult spawning population, indicating that overfishing is likely not occurring.

Data limitations resulting from red drum's life history characteristics and management regime present unique challenges to scientists as they try to assess the status of the



**Red Drum Recreational Catch and Commercial Landings.** Source: Personal communication NMFS Fisheries Statistics Division, 2013

stock. Relatively little is known about the adult (spawning) population of red drum (ages 4 and older) as these fish are primarily found in offshore waters where fishing for red drum is prohibited under federal law. As such, there is little fishery-dependent information on the larger, reproductive fish and limited fishery-independent data. Existing data are largely for the juvenile component of the resource (ages 1 - 3) found in inshore waters. Fishery-dependent data are constrained by the fisheries slot limit, which ranges anywhere from 14 to 27 inches (again limiting the amount of information about larger fish) and fishery-independent data are supplied by multiple state inshore surveys. The end result of these limitations is a stock assessment that adequately describes abundance and exploitation rates for the pre-adult component of the population (ages 1 - 3), particularly for the northern region, but provides no reliable information on the adult component.

Additionally, the stock assessment model was considered to be informative only about the relative, not absolute, trends in age 1 - 3 abundance and exploitation. Therefore, only general conclusions about trends in stock status could be provided and total stock biomass cannot be estimated. The next benchmark stock assessment is scheduled for 2015.

### *Atlantic Coastal Management*

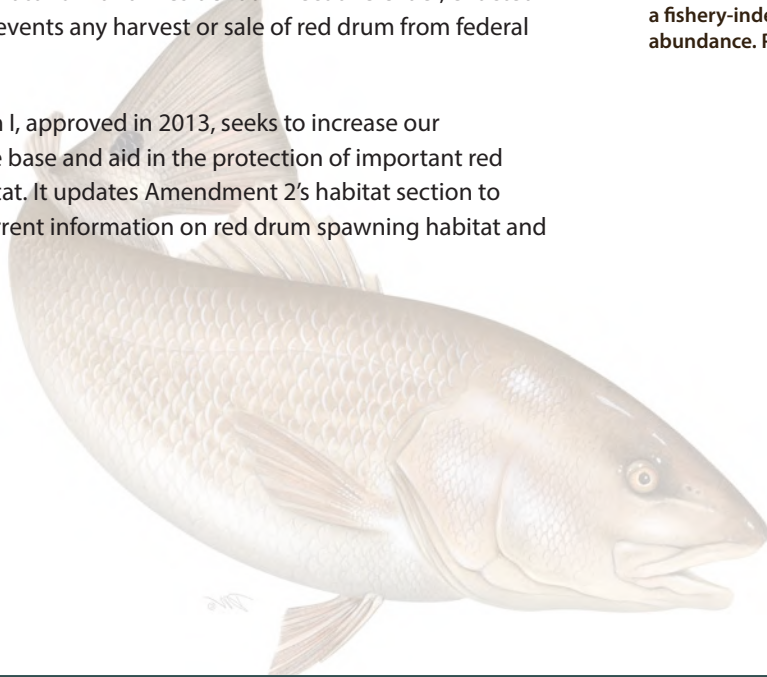
Red drum are managed solely by the Commission through Amendment 2 to the Interstate FMP. The Amendment requires states to implement recreational creel and size limits to achieve the fishing mortality target, including a maximum size limit of 27 inches, and maintain existing commercial regulations. A harvest moratorium and Presidential Executive Order, enacted in 2007, prevents any harvest or sale of red drum from federal waters.

Addendum I, approved in 2013, seeks to increase our knowledge base and aid in the protection of important red drum habitat. It updates Amendment 2's habitat section to include current information on red drum spawning habitat and

habitat by life stage (egg, larval, juvenile, sub-adult, and adult). It also identifies and describes the distribution of key habitats and habitats of concern, including threats, habitat bottlenecks (habitat or habitat characteristics that limit the sustainability or recovery of red drum), and ecosystem considerations.



Red drum captured as part of the SEAMAP-South Atlantic Longline Survey, with the goal of providing a fishery-independent index of adult red drum abundance. Photo credit: Bryan Frazier, SC DNR.







# Spanish Mackerel

## *Scomberomorus maculatus*

### Life History

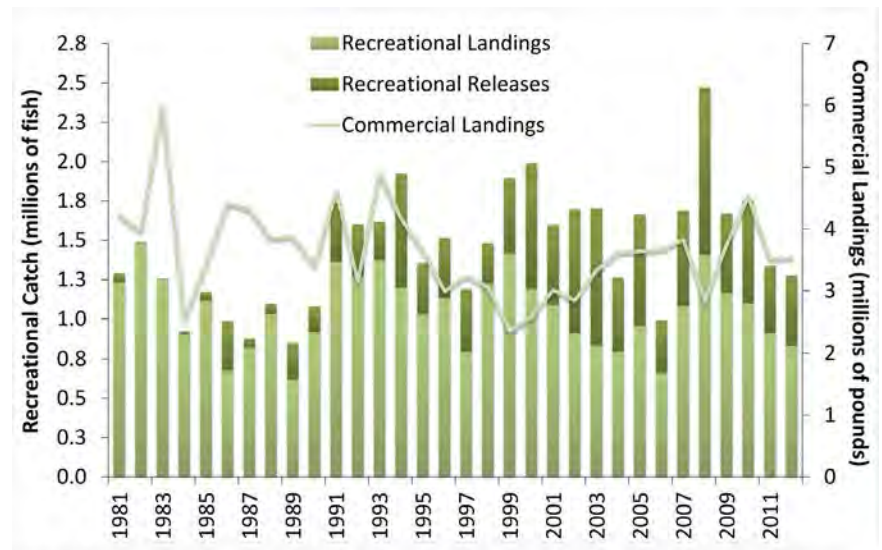
A fast swimming fish, known to gather in large schools and travel great distances, Spanish mackerel, *Scomberomorus maculatus*, can be found throughout the coastal waters of the eastern US and the Gulf of Mexico. Their migratory and schooling nature often frustrate anglers, as large congregations of fish can be found in an area one day and gone the next. Spanish mackerel prefer open water but are sometimes found over deep grass beds and reefs, as well as in shallow estuaries. They live for five to eight years. Females spawn by age two, releasing between half a million and 1.5 million eggs. Larvae grow quickly, reaching lengths of 12 to 15 inches in a year. Older fish may weigh several pounds. Along the Atlantic coast, Spanish mackerel range from the Florida Keys to New York, and occasionally as far north as New England. These fish winter off Florida, moving northward to North Carolina in early April and to New York in June. Later in the year, as waters cool, Spanish mackerel return to warm Florida waters.

### Commercial and Recreational Fisheries

Spanish mackerel support significant recreational and commercial fisheries in South Atlantic waters and the species is gaining importance in the Mid-Atlantic. Many anglers target and catch Spanish mackerel to use whole fish as bait for big game fishing. Total 2012 landings were 4.7 million pounds, with commercial and recreational fisheries harvesting approximately 70% and 30% of the resource, respectively.

From 1981-2011, the commercial sector accounted for approximately 70% of the total landings. Coastwide commercial landings have been consistently below four million pounds since 1995, with the exception of 2010 when commercial landings increased to 4.5 million pounds. 2012 landings are estimated at 3.5 million pounds. Almost 63% of the landings occur in Florida, with the remaining amount harvested in North Carolina. The primary commercial gear are gillnets (40%), cast nets (27%), and hook and line (30%).

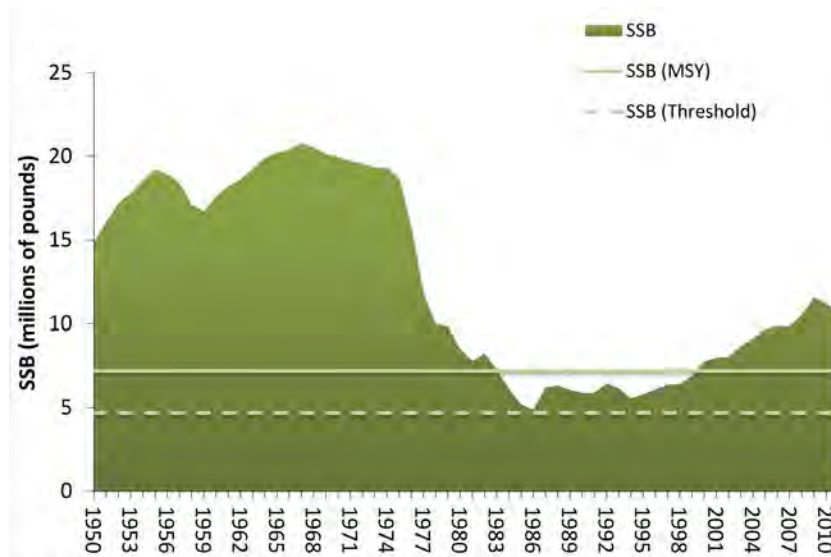
Recreational anglers harvested 1.2 million pounds of Spanish mackerel in 2012. The number of recreationally-harvested fish appears to show a cyclical trend, with low harvests in the early to mid-1980s and mid- to late 1990s, interspersed with higher harvests. Florida and North Carolina continue to account for the majority of recreational landings in both number and weight (on average, 86% by number since 1981).



Spanish Mackerel Commercial Landings and Recreational Catch (Landings and Live Releases). Source: ACCSP and MRIP, 2013

### Stock Status

In 2012, Spanish mackerel was assessed and peer reviewed through the SouthEast Data, Assessment and Review. The results of the assessment indicate that the stock is not overfished and it is not undergoing overfishing. The stock biomass remained at a low level from the mid-1980s to the mid-1990s and has been steadily increasing since 1995. Fishing mortality has been decreasing since the early 1990s. South Atlantic Fishery Management Councils. The latest full assessment, conducted in 2012 determined that Atlantic Spanish mackerel are not overfished and not experiencing overfishing.



Spanish Mackerel Spawning Stock Biomass (SSB). Source: SouthEast Data, Assessment and Review, 2012

## Atlantic Coastal Management

Spanish mackerel is one of several species that the Commission manages cooperatively with the South Atlantic Fishery Management Council (SAFMC). Since adoption of the Fishery Management Plan in 1990, Southern and Mid-Atlantic states have responded to the plan's recommendations through implementation of bag limits, size limits, commercial trip limits, and /or provisions for seasonal closures to complement the Council's measures for federal waters. Implementation of these measures helped rebuilt the fishery from a level that was once in decline.

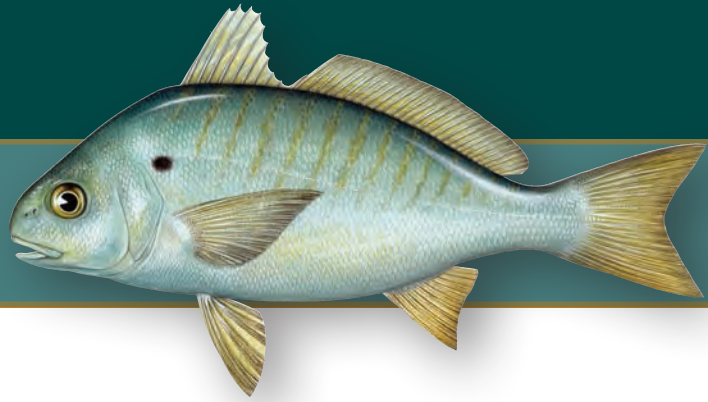
The Commission's South Atlantic Board approved the Omnibus Amendment for Spot, Spotted Seatrout, and Spanish Mackerel in 2011. The Amendment updates all three species plans with requirements of the Commission's Interstate Fisheries Management Program Charter. Specific to Spanish mackerel, the Amendment includes commercial and recreational management measures, adaptive management measures, and a process for Board review and action in response to changes in the federal regulations. This will allow for complementary management throughout the range of the species. The Omnibus Amendment includes provisions that are consistent with the SAFMC's recently approved Amendment 18. The Omnibus Amendment was implemented by the states on July 1, 2012.



Juvenile Spanish mackerel captured as part of the NJ DEP Delaware River Seine Survey. Photo credit: NJ DEP.

In 2013, the South Atlantic Board approved Addendum I, establishing a pilot program to allow states to reduce the Spanish mackerel minimum size limit for the commercial pound net fishery to 11½ inches during the months of July through September for the 2013 and 2014 fishing years only. The measure is intended to reduce waste of these shorter fish, which are

discarded dead in the summer months, by converting them to landed fish that will be counted against the quota. After the 2014 fishing year, the Board will evaluate the success of the program for consideration in years beyond 2014. The Addendum responds to reports about the increased incidence of Spanish mackerel ¼ to ½ inch short of the 12 inch fork length minimum size limit in pound nets during the summer months. While the fish are alive in the pound net, once the net is bunted and bailing commences, they die before being released. This may be due to a combination of temperature, stress, and crowding. While individual fishermen have experimented with different wall or panel mesh sizes depending on the target species, there is no consistent use of cull panels. Those who have used cull panels have noted the difficulty and lack of success in being able to release the undersized fish quickly enough to prevent dead discards during this time of year.



# Spot

*Leiosomus xanthurus*

## Life History

Spot, *Leiosomus xanthurus*, occur along the U.S. Atlantic coast in estuarine and coastal waters from the Gulf of Maine to Florida, although they are most abundant from Chesapeake Bay to South Carolina. Spot migrate seasonally, entering bays and estuaries in the spring where they remain until late summer or fall when they move offshore to spawn. Spot mature between the ages of two and three, at lengths of seven to eight inches. Their maximum life span is about six years, although fish older than four years are uncommon.

Spawning takes place in the ocean from fall to early spring and the post-larvae move into estuaries, utilizing low salinity tidal creeks where they develop into juveniles. As spot grow, they move toward higher salinity areas during the summer and early fall and offshore in the fall as water temperatures decrease. Those that summered in the northern portion of their range also move south in the autumn. Spot are opportunistic bottom feeders, eating mainly worms, small crustaceans and mollusks, and organic material. The post-larvae prey on plankton but become bottom feeders as juveniles or adults. Predators such as striped bass, weakfish, summer flounder, bluefish, and sharks eat them in turn.

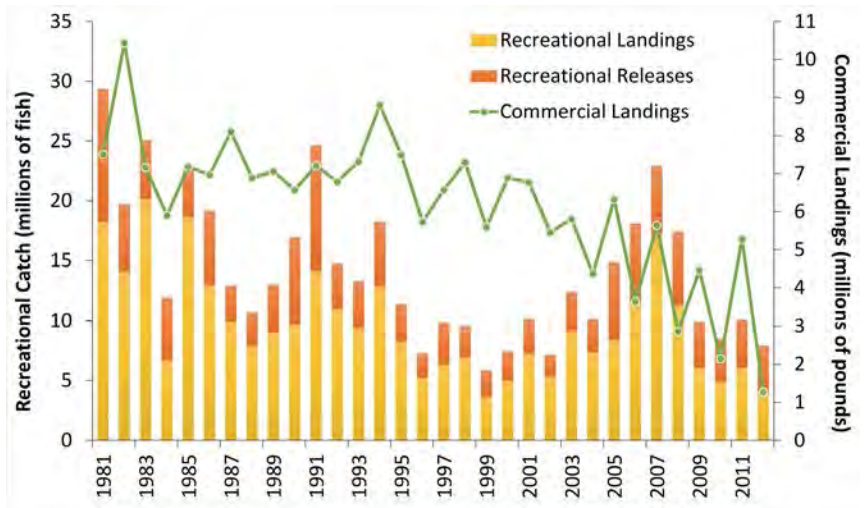
## Commercial & Recreational Fisheries

Spot provide important recreational and commercial fisheries in the South Atlantic, although year-to-year fluctuations in landings are common. This is because spot are short-lived and the catch in most years consists of a single year-class, the strength of which is variable (partly due to environmental conditions prevalent in the spawning and nursery areas).

Spot are caught commercially along the Atlantic coast, particularly from Chesapeake Bay southward. They are harvested by a variety of commercial gears including haul seines, pound nets, gillnets, and trawls. Commercial catches fluctuated widely between 1950 and the early 1980s, ranging from 3.9 to 14.5 million pounds. Such variability is expected because spot are a short-lived species and catch in

most years consists of a single year class, the strength of which appears to be determined by environmental conditions that prevail on the spawning and nursery grounds in any particular year. Landings show less year-to-year variability from 1984 to 2011, ranging from 2.1 to 8.8 million pounds. Commercial harvest in 2012 was estimated at 1.2 million pounds, with the majority taken by gillnets. This is a 75% decrease from landings in 2011, although the reason for the decrease is unknown.

Spot is a popular recreational species sought by anglers from Delaware Bay to northern Florida, with more than half the harvest occurring in Virginia and North Carolina. Most of the Atlantic recreational harvest is taken within three miles of the coast, from shore or by private or rental boats rather than by party or charter boats. Recreational harvest has fluctuated from a high of 20.1 million fish (6.9 million pounds) in 1981 to a low of 3.6 million fish (1.7 million pounds) in 1999. Over the last ten years, recreational harvest has averaged 9.1 million fish (3.7 million pounds), and for the first time in 2006, recreational landings surpassed commercial landings. Recreational harvest again surpassed commercial harvest in 2008 and more recently in 2012, with harvest estimated at 1.9 million pounds.



**Spot Recreational Catch & Commercial Landings.** Source: personal communication, NMFS Fisheries Statistics Division, 2013



Spot with its distinguishing mark behind its gill plate.  
Photo credit: NC Division of Parks & Recreation.

### *Stock Status*

No coastwide assessment has been performed for spot; however, spot are a target or component of several state surveys using trawls, gillnets, or seine nets. Juvenile abundance indices (JAIs) have been highly variable throughout the survey time series, although many indices, including some from North Carolina, South Carolina, Virginia, and Maryland, showed increases in 2010. In contrast, many of the adult abundance indices show little change or a decline over the past years, possibly indicating a disconnect between juvenile recruitment and adult abundance.

In addition to these surveys, commercial and recreational catch-per-unit effort (CPUE) data provide indices of relative spot abundance. Since 1980, commercial CPUE has generally increased over time in Maryland, although it has declined over the past five years. Within Virginia, it has varied without trend since 1994. Trends have been relatively stable in North Carolina, but most have been showing a decline since 2000. Maryland recreational CPUE has generally decreased with a few spikes and a small amount of potential recovery in 2000-2006, but recent years have shown additional declines. Virginia's recreational CPUE has been variable around the time series average, and North Carolina recreational CPUE has shown a general increase over time, although there have been decreases since 2007. South Carolina's recreational CPUE has shown high variability since 1981, with a large peak in 2007 and a gradual decline to the time series mean in 2010.

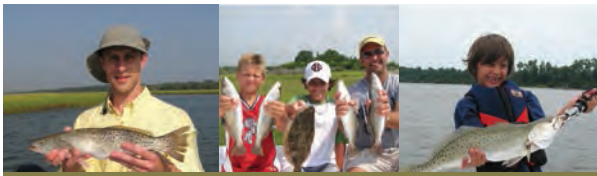
The first coastwide benchmark stock assessment for spot is planned for 2016.

### *Atlantic Coastal Management*

In 2011, the South Atlantic Board approved the Omnibus Amendment for Spot, Spotted Seatrout, and Spanish Mackerel. The Amendment updates all three species plans with requirements of the Commission's ISFMP Charter. Specific to spot, the Amendment includes a management trigger to assist the Board in monitoring the status of the stock until a full coastwide stock assessment can be completed. The first review of triggers, which are comprised of fishery-dependent and -independent data sets, occurred in 2012. While the triggers did not trip, they were extremely close. In response to the findings, the Board agreed to watch the status of the stock for an additional year to determine whether the pattern remains before initiating management action.

In May 2014, the South Atlantic Board a Draft Addendum to both the Spot and Atlantic Croaker Fishery Management Plans (FMP) for public comment. The Board initiated the development of new management options in response to concerns over trends in the spot and Atlantic croaker fisheries and the extent of bycatch and discards of both species in the shrimp trawl fishery. The Draft Addendum proposes a new method (Traffic Light Approach, TLA) to evaluate the status of the fisheries and potential coastwide or state-specified management actions (e.g. bag limits, size restrictions, time & area closures, and gear restrictions) based on the annual fisheries evaluation. The TLA has been used as a precautionary framework for fisheries with limited data to allow for a reasonable level of resource management. The name comes from assigning a color (red, yellow, or green) to categorize relative levels of indicators on the condition of the fish population or fishery, which can help clearly illustrate trends in the fishery.

The current management of Atlantic croaker and spot compares annual changes in various indices (e.g. recent landings and survey information) to review trends in the fisheries. The most recent review found declines in the commercial and recreational landings for both Atlantic croaker and spot fisheries. However, there is concern that this annual review does not illustrate long-term trends in the stock nor does it include specific management measures to implement in response to declines in the stock or fishery. The document is out for public comment through July 2. The Board will meet in August at the Commission's Summer Meeting to review submitted public comment and take final action on the Addendum.



# Spotted Seatrout

## *Cynoscion nebulosus*



### Life History

On the Atlantic coast, spotted seatrout, *Cynoscion nebulosus*, occur from Cape Cod, Massachusetts to the Florida Keys, but are most abundant from the Chesapeake Bay southward. They are found primarily in estuaries, but move into nearshore ocean waters during cold periods. In general, spotted seatrout appear to be non-migratory and spend their entire life within five to ten miles of their natal estuary, although fish from the Chesapeake Bay have been known to migrate seasonally (south in the fall, north in the spring) to North Carolina waters.

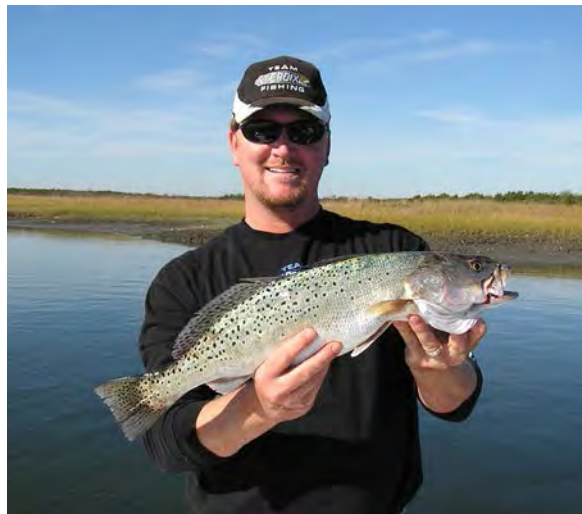
From April to September, sexually mature females spawn around estuary inlets. Depending on the size of the female, spotted seatrout produce anywhere from 10,000 to millions of oceanic eggs. The most important nursery grounds for the young are small tidal marsh creeks and shallow grass beds, while larger juveniles are widely distributed in estuarine areas and along coastal beaches. The fry gather in schools during their first summer and tend to travel together until they are four or five years old. They mature at the age of one year, when males are about 10 inches long and females about 11 inches. At any given age, females are larger than males, and they also attain a greater maximum age and size. They may live as long as 18 years, but individuals over five years of age are rare.

Adults frequent grass beds, live oyster beds, creek mouths, drop-offs, and structures such as jetties, stumps, pilings, and wrecks, where they feed primarily on shrimp and fish. They are most abundant in depths of less than ten feet and prefer temperatures between 60 and 80° F. Water temperatures below 45° F appear to cause large-scale mortalities. They tolerate a range of salinities, but adults appear to be most numerous in waters with salinities approaching that of seawater.

### Commercial & Recreational Fisheries

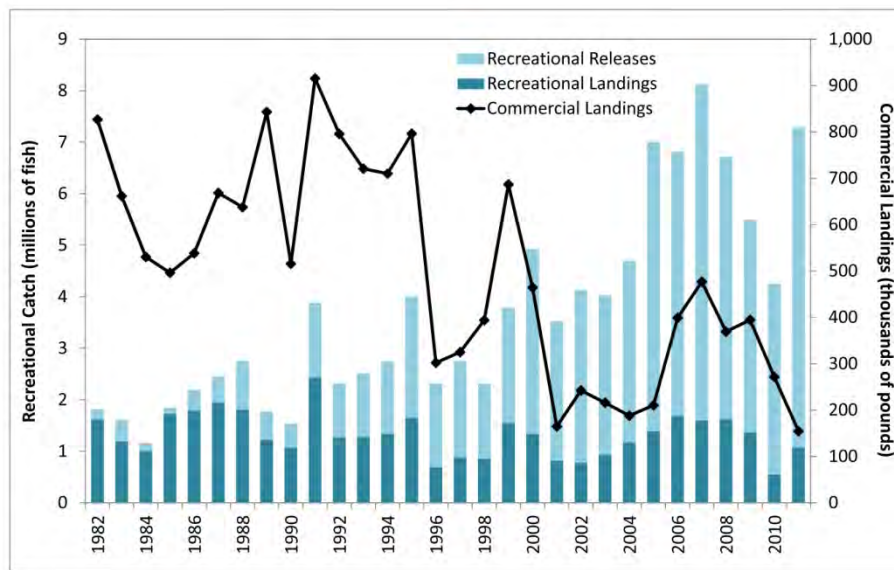
Commercial landings of spotted seatrout along the Atlantic coast historically came from Florida's east coast and North Carolina, with Virginia, South Carolina, and Georgia accounting for a small portion of the total. From 1950 to 1976, commercial landings averaged 1.33 million pounds, but have declined since then due to increased regulation and possible declines in abundance. Significant changes to regulations include the

1987 designation of spotted seatrout as a gamefish in South Carolina, and the 1995 prohibition on the use of gillnets in Florida's coastal waters. From 1977 to 2006, commercial landings have averaged fewer than 600,000 pounds. Variability in annual harvest is typical and seems to parallel the climatic conditions of the preceding winter and spring. In 2012, the commercial landings were estimated at 408,500 pounds, with about 65% harvested in North Carolina.



Captain Bateman with a spotted seatrout. Photo credit: Captain Walter Bateman, [www.carolinaguide.com](http://www.carolinaguide.com)

Spotted seatrout support important recreational fisheries in the South Atlantic. In Florida in particular, where the fish is highly accessible, spotted seatrout is often the most sought after and exploited gamefish. The number of fish taken coastwide by anglers varies from year to year, but has averaged 1.3 million fish annually (1.76 million pounds). Over the last 27 years, the recreational catch of spotted seatrout has shown a strong upward trend, increasing from 1.6 million fish in 1982 to 8.8 million fish in 2012. The majority of this increase, particularly in recent years, is due to expansion of the recreational releases, which now constitute 75 to 85 percent of the total recreational catch. Recreational catches are generally made with rod and reel, but some are taken by recreational nets and by gigging, where these methods are permitted. Most recreational fishing is conducted from private boats and the majority of the catch



Spotted seatrout recreational catch (landings and releases) and commercial landings.  
 Source: Personal communication from NMFS Fisheries Statistics Division, Silver Spring, MD, 2012.

is taken in inland waters. *Stock Status*

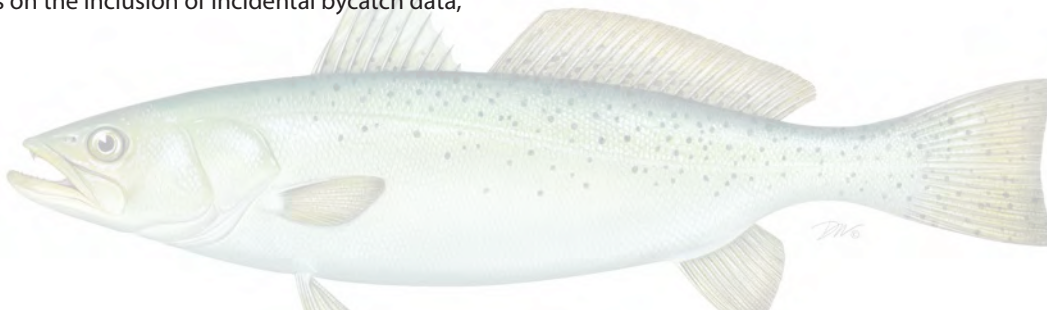
Increased coastal development and the resulting loss of estuarine habitat, coupled with heavy fishing pressure, have effected spotted seatrout populations. The extent of anthropogenic effect is unclear as there is no coastwide stock assessment for the species and local assessments vary by state. Spotted seatrout are also susceptible to inshore calamities such as winter freezes, excessive fresh water, hurricanes, and red tide conditions. Fortunately, seatrout have a life history trait that helps maintain population size - the ability to reproduce prolifically. Compared to other marine gamefish, spotted seatrout enjoy one of the longest spawning seasons.

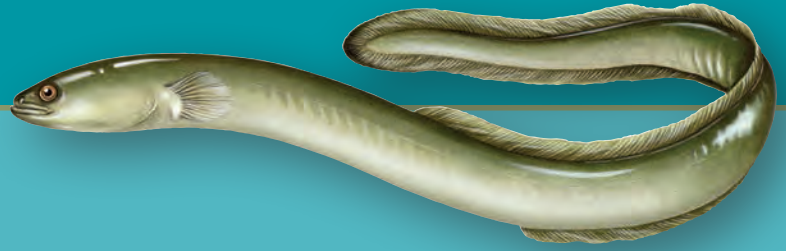
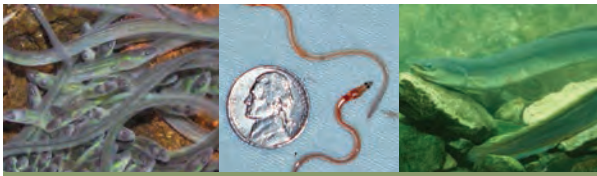
A coastwide stock assessment of spotted seatrout has not been conducted given the largely non-migratory nature of the species and the lack of data on migration where it does occur. Instead, South Carolina, Georgia, and Florida have performed age-structured analyses on local stocks of spotted seatrout, and North Carolina will be conducting its first spotted seatrout assessment in 2007/2008. Recent assessments are putting more emphasis on the inclusion of incidental bycatch data,

release mortality, and the size and age structure of releases. Stock assessments provide estimates of spawning potential ratio (SPR), which is a measure of the effect of fishing pressure on the relative abundance of the mature female segment of the population. The Commission's Spotted Seatrout FMP recommends a goal of 20 percent SPR; South Carolina and Georgia have adopted this goal, and Florida has established a 35 percent SPR goal.

*Atlantic Coastal Management*

In 2011, the South Atlantic Board approved the Omnibus Amendment for Spot, Spotted Seatrout, and Spanish Mackerel. The Amendment updates all three species plans with requirements of the Commission's ISFMP Charter. Specific to spotted seatrout, the Amendment includes recommended measures to protect the spawning stock, as well as a required coastwide minimum size of 12 inches.





# American Eel

*Anguilla rostrata*

## Life History

American eel, *Anguilla rostrata*, are a catadromous fish species, spending most of their life in freshwater or estuarine environments, traveling to the ocean as adults to reproduce and die. Sexually maturing eel migrate to spawning grounds located in the Sargasso Sea, a large portion of the western Atlantic Ocean east of the Bahamas and south of Bermuda. American eel are a panmictic stock, meaning that individuals from the entire range come together to reproduce. American eel found along the eastern coast of Mexico are from the same population as eel found in the St. Lawrence River in Canada.

American eel have a multitude of life stages: leptocephali, glass eel (also known as elvers), yellow eel, and silver eel. Yellow eel are the primary life stage harvested by commercial and recreational fishermen.

## Commercial & Recreational Fisheries

American eel are an important resource from both a biodiversity and human use perspective. They serve as an important prey species for many fish, aquatic mammals and fish-eating birds. Although fisheries are a fraction of what they were historically, eel support valuable commercial, recreational and subsistence fisheries.

From the 1970s to the mid-1980s, American eel supported significant commercial fisheries, with landings ranging from 2.5 to 3.6 million pounds. Landings dropped to 1.6 million pounds in 1987 and have remained at low levels, ranging from 1.5 million to 700,000 pounds since then. State reported landings of yellow and silver eels in 2012 totaled over one million pounds and were valued at approximately \$1.5 million. Yellow and silver eel landings in 2012 were the second highest in the past decade, decreasing by 8% from the decade high achieved

in 2011. Since 2010, increased demand for glass eels by foreign markets has led to a dramatic increase in the value of glass eel, with record high prices for catch being recorded.

In 2012, glass eel harvest from Maine and South Carolina totaled 22,215 pounds and was valued at nearly \$40 million, 20 times greater than the average value for the past 11 years. According to preliminary landings data, Maine and South Carolina harvested an estimated 20,320 pounds of glass eels in 2013.

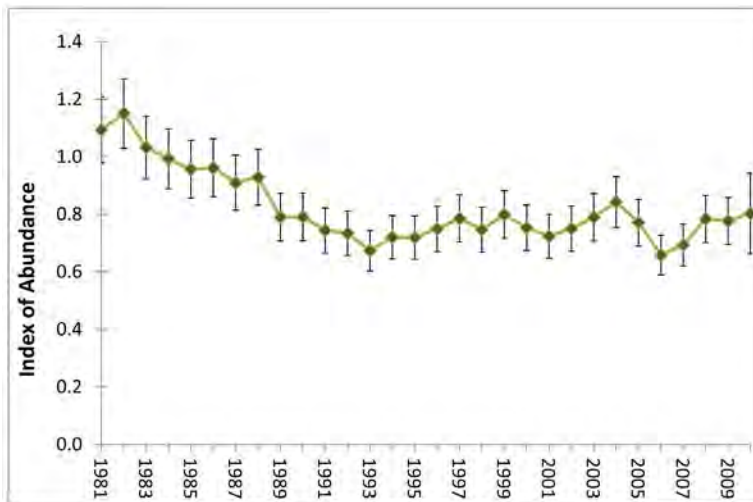
Recreational harvest has been on the decline since its peak in 1985 at 160,000 eel. Harvest was last estimated to be around 6,000 in 2009 (the last year the Marine Recreational Information Program collected recreational data on American eel). Given the limited scope of the fishery in recent years, there is limited monitoring of recreational catch by the states.



Student with glass eels and elvers as part of NYSDEC's American Eel Project. Photo credit: Chris Bowser, NYSDEC.

## Stock Status

From a biological perspective, much is still unknown about the species. Information is limited about their abundance, status at all life stages, and habitat requirements. According to the 2012 benchmark stock assessment, American eel population is depleted in U.S. waters. The stock is at or near historically low levels due to a combination of historical overfishing, habitat loss, food web alterations, predation, turbine mortality, environmental changes, toxins and contaminants, and disease. The Panel Review Panel that reviewed and endorsed the stock assessment for management use urged the Commission to examine alternative reference points to provide more protection to the spawning stock biomass.



**Index of Abundance for Yellow-phase American Eels along the Atlantic Coast. Source: ASMFC American Eel Benchmark Stock Assessment, 2012**

### *Atlantic Coastal Management*

American eel are a challenging species to conserve and manage on a coastwide basis for a number of reasons. During its life-span the American eel will have navigated through and resided in a wide range of habitats, from the oceanic waters of the Sargasso Sea to the brackish waters of coastal estuaries and the inland freshwater river systems. Additionally, throughout this journey, eel will have been under a myriad of management authorities, from international to multiple federal, state and local governments. Life history characteristics such as late age of maturity and a tendency to aggregate during certain life stages further confound conservation efforts.

American eel are managed by the Commission in territorial seas and inland waters along the Atlantic coast from Maine to Florida. Increasing demand for eel by Asian markets and domestic bait fisheries, coupled with concern about declining eel abundance and limited assessment data, spurred development of the first Interstate Fishery Management Plan (FMP) for American Eel in the mid-1990s. The plan, approved in 1999, provided several reasons why heavy harvest pressure may adversely affect American eel populations: (1) American eel have a slow rate of maturation, requiring eight to 24+ years to attain sexual maturity; (2) glass eel tend to aggregate seasonally during migration, making them vulnerable to directed harvest; (3) harvest of yellow eel is a cumulative stress, over multiple years, on the same yearclass; and (4) all fishing mortality occurs prior to spawning.

In August 2013, in response to the findings of the 2012 stock assessment, the Commission approved Addendum III to the Interstate FMP, with the goal of reducing mortality and

increasing conservation of American eel stocks across all life stages. The Addendum establishes new management measures for both the commercial (glass, yellow, and silver) and recreational eel fisheries, as well as implements fishery independent and fishery dependent monitoring requirements. As approved, Addendum III reduces overall mortality of American eel. Given the wide range of public input received during the development of Addendum III, some of the proposed management options originally considered in the public comment draft of Addendum III were transferred to Draft Addendum IV for further development. Draft Addendum IV, which proposes a wide range of management options for the glass, yellow, and silver eel commercial fisheries, was released in late May for public comment (public comment will be accepted until July 17, 2014). The American Eel Management Board will review submitted comment and consider final action on the addendum in August at the Commission's Summer Meeting.

In late 2013, the American Eel Management Board approved a conservation equivalency proposal from the State of Maine to allow quota management of its glass eel fishery. A quota of 11,749 pounds is in place for Maine's 2014 glass eel fishing season, which began on April 6th. This quota, developed with input from Maine's fishing industry and Tribal Nations, represents a 35% reduction in 2013 Maine's glass eel harvest. In addition to quota management, Maine has implemented a harvester swipe card system with daily dealer reporting in order to increase accuracy of landings data and reduce opportunities for illegal harvest.





# Atlantic Striped Bass

*Morone saxatilis*

## Life History

Striped bass, *Morone saxatilis*, are an estuarine species that can be found from Florida to Canada, although the stocks that the Commission manages range from Maine to North Carolina. A long-lived species (at least up to 30 years of age), striped bass typically spend the majority of their adult life in coastal estuaries or the ocean, migrating north and south seasonally and ascending to rivers to spawn in the spring.

Mature females (age six and older) produce large quantities of eggs, which are fertilized by mature males (age two and older) as they are released into riverine spawning areas. While developing, the fertilized eggs drift with the downstream currents and eventually hatch into larvae. After their arrival in the nursery areas, located in river deltas and the inland portions of coastal sounds and estuaries, they mature into juveniles. They remain in coastal sounds and estuaries for two to four years and then join the coastal migratory population in the Atlantic Ocean. In the ocean, fish tend to move north during the summer and south during the winter. Important wintering grounds for the mixed stocks are located from offshore New Jersey to North Carolina. With warming water temperatures in the spring, the mature adult fish migrate to riverine spawning areas to complete their life cycle. The majority of the coastal migratory stock originates in the Chesapeake Bay spawning areas, with significant contributions from the spawning grounds of the Hudson and Delaware Rivers.

## Commercial & Recreational Fisheries

Striped bass have formed the basis of one of the most important fisheries on the Atlantic coast for centuries. Early records recount their abundance as being so great at one time they were used to fertilize fields. However, overfishing and poor environmental conditions lead to the collapse of the fishery in the 1980s. Through the hardship and dedication of both commercial and recreational fishermen, the stock was rebuilt and today's anglers again harvest striped bass in great number.



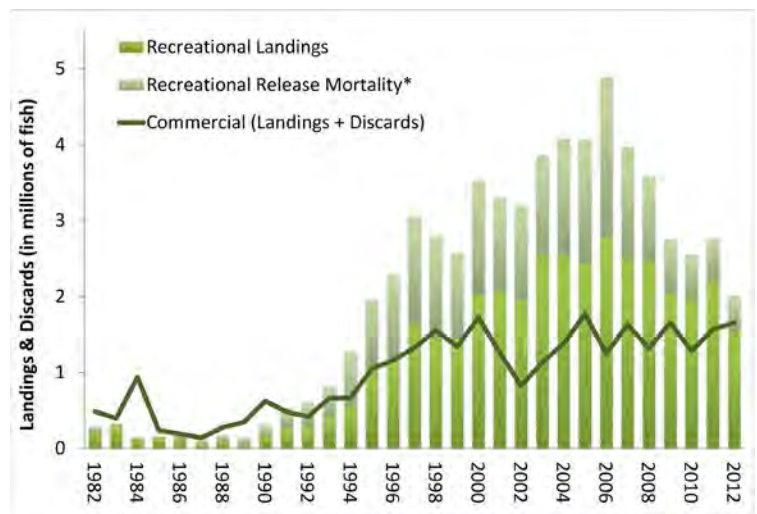
Young anglers with an Atlantic striped bass.  
Photo credit: Captain John Brackett of the Queen Mary.

The striped bass commercial harvest steadily grew from 3.4 million pounds in 1995 to peak at over 7 million pounds in 2003. Commercial harvest of the species since 2004 has averaged around 7 million pounds per year. Gill nets are the dominant commercial gear used to target striped bass. Other commercial fishing gears include hook and line, pound nets, seines, and trawls.

As the saltwater recreational fishing sector has grown, so has the popularity of striped bass. The recreational sector now accounts for a larger portion of the total harvest than the commercial sector. Recreational harvest has grown steadily since the reopening of many state fisheries in 1990, with landings of 19 million pounds in 2012.

## Stock Status

The 2013 Atlantic striped bass benchmark assessment indicates the resource is not overfished or experiencing overfishing relative to the proposed new reference points. Although the stock is not overfished, female SSB has continued to decline

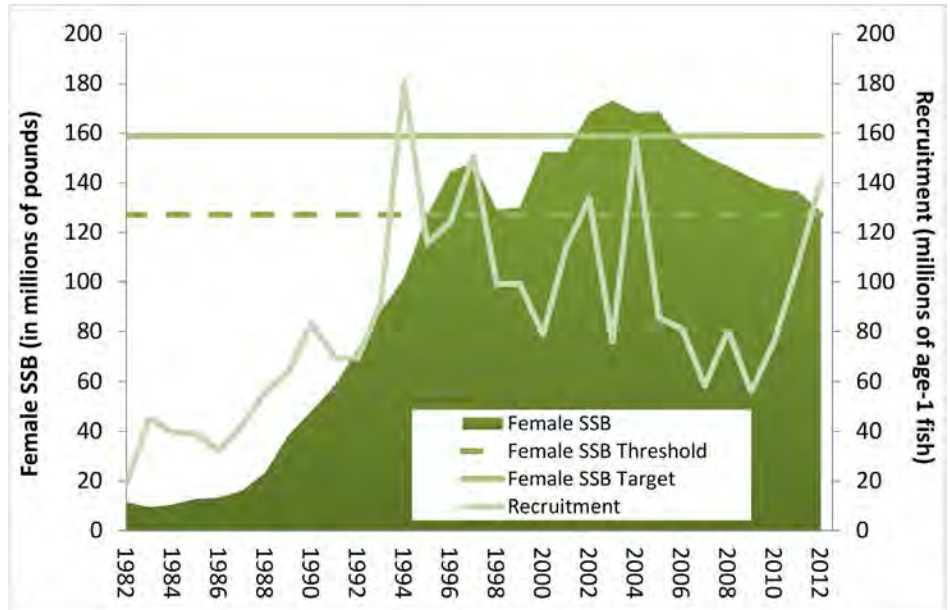


Atlantic Striped Bass Commercial Landings and Discards & Recreational Landings and Release Mortality. Source: ASMFC Atlantic Striped Bass Stock Assessment Update, 2013. (\*Note: Recreational release mortality assumes that 9% of the fish released alive die.)

since 2004 and is estimated at 128 million pounds just above the SSB threshold of 127 million pounds, and below the SSB target of 159 million pounds (Figure 2). Additionally, total fishing mortality is estimated at 0.20, a value that is between the proposed new fishing mortality threshold (0.219) and fishing mortality target (0.18).

Atlantic striped bass experienced a period of strong recruitment (number of age-1 fish entering the population) from 1993-2003, followed by a period of lower recruitment from 2004-2009 (although not as low as the early 1980s, when the stock was overfished). The 2011 year-class was strong (i.e., abundant), but early observations from several states' juvenile indices indicate the 2012 year class was very weak (i.e., low abundance).

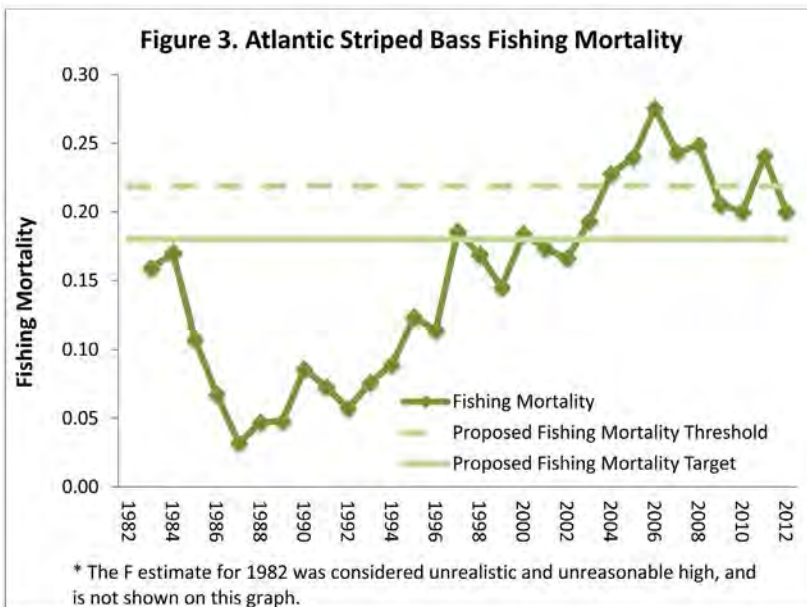
Projections of female SSB and fishing mortality suggest if the current fishing mortality rate (0.20) is maintained during 2013-2017, the probability of the stock being overfished (SSB less than the SSB threshold) is high and increases until 2015-2016, but declines thereafter. This trend is driven by the lack of strong year classes currently in the fishery, and the emergence of the strong 2011 year class that matures into the spawning stock in three to four years. Despite recent declines in SSB, the stock is still well above the SSB during the moratorium that was in place in the mid-1980s.



**Atlantic Striped Bass Female Spawning Stock Biomass (SSB) & Recruitment (Age-1).** Source: ASMFC Atlantic Striped Bass Stock Assessment Update, 2013.

### *Atlantic Coastal Management*

Striped bass is managed through Amendment 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass (February 2003) and its subsequent addenda (Addendum I-III). The management program includes target and threshold biological reference points and sets regulations aimed at achieving the targets. Required regulatory measures include recreational and commercial minimum size limits, recreational creel limits, and commercial quotas. States can implement alternative management measures that are deemed to be equivalent to the preferred measures in Amendment 6.



In response to the results of the 2013 benchmark assessment, the Board initiated the development of Draft Addendum IV. The Draft Addendum will propose the adoption of the new fishing mortality reference points for the coastal stock as well as stock-specific reference points for the Chesapeake Bay and Albemarle/Roanoke stocks. The Draft Addendum will also propose a range of commercial and recreational management measures for the coastal, Chesapeake Bay, and Albemarle/Roanoke stocks to reduce fishing mortality to at least the target with a proposed implementation date of January 2015. The Board will consider approval the Draft Addendum for public comment in August 2014, at the Commission's Summer Meeting.



# Atlantic Sturgeon

## *Acipenser oxyrinchus*

### *Life History*

Atlantic sturgeon, *Acipenser oxyrinchus*, are ancient fish dating back at least 70 million years, and can be found along the entire Atlantic coast from Florida to Labrador, Canada. They are anadromous, migrating from the ocean into coastal estuaries and rivers to spawn. Atlantic sturgeon may live up to 70 years old, with females reaching sexual maturity between the ages of seven to 30, and males between the ages of 5 to 24.

Typically sturgeon inhabiting the southern part of the species range mature faster and grow larger than those in the northern part of the range. Females reach sexual maturity between the ages of 7 and 30, and males between the ages of 5 and 24. The number of eggs that a female produces increases with age and size, which means that older and larger females are more valuable to the population because they produce more eggs (up to eight millions eggs per spawning event) than younger, smaller females (estimated 400,000 eggs per spawning event).

Most juveniles remain in their natal river from one to six years before migrating back out to the ocean. Little is known about the movements of Atlantic sturgeon when they are at sea. As juveniles, Atlantic sturgeon feed on flies, worms, shrimps, and small mollusks and crustaceans. As adults, they are opportunistic feeders and prey mainly on mollusks, snails, worms, shrimps and benthic fish. Very little is known about their natural predators.

### *Commercial & Recreational Fisheries*

Since colonial times, Atlantic sturgeon have supported commercial fisheries of varying magnitude. In the late 1800s, they were second only to lobster among important fisheries, with landings estimated at seven million pounds per year just prior to the turn of the century. Overharvesting of sturgeon for flesh and eggs (known as caviar) continued through the 1990s until the Commission and

federal government implemented a coastwide moratorium in late 1997 and early 1998. Because the population has been severely overfished, the Commission's Fishery Management Plan for Atlantic Sturgeon calls for a coastwide moratorium through at least 2038, in order to build up 20 year classes. Several facilities culture Atlantic sturgeon for research purposes.

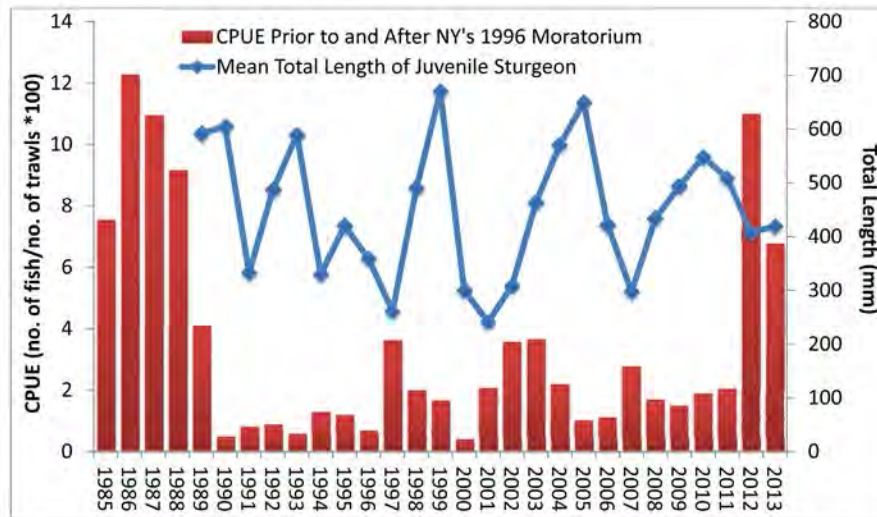
### *Stock Status*

In 2013, the Commission initiated the development of a coastwide benchmark stock assessment for Atlantic sturgeon to evaluate stock status, stock delineation, and bycatch; the findings of which should be available in early 2015. The assessment responds to the 2012 ESA listing of Atlantic sturgeon as threatened for the Gulf of Maine distinct population segment (DPS) and endangered for the remaining DPSs (New York Bight, Chesapeake Bay, Carolina, and South Atlantic).

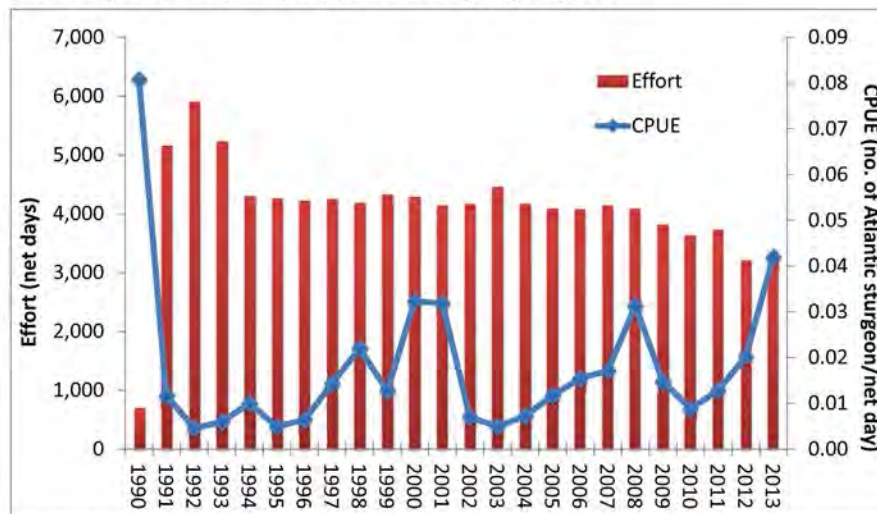
Very little is known about the Atlantic sturgeon's stock status. Reliable data are difficult to obtain because many river systems have few fish, and rivers with more fish are often not easily sampled. Several states have been conducting long-term



Atlantic sturgeon being measured as part of a Cooperative Federal/State/Industry Atlantic Sturgeon Bycatch Reduction Survey. Photo credit: ASMFC.



**Catch Per Unit Effort (CPUE) of Hudson River Juvenile Atlantic Sturgeon.** Source: NY State Dept. of Environmental Conservation with Survey Data from Hudson River Power Generating Companies, Hudson River Monitoring Program, 2013

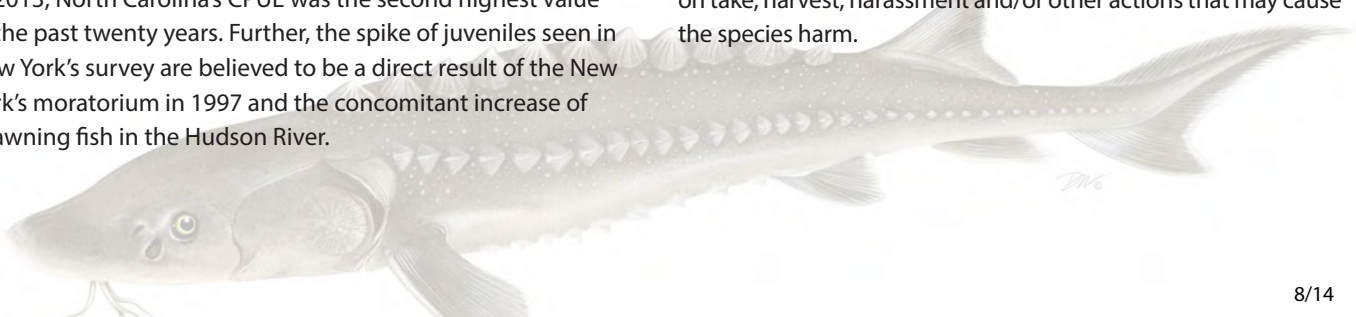


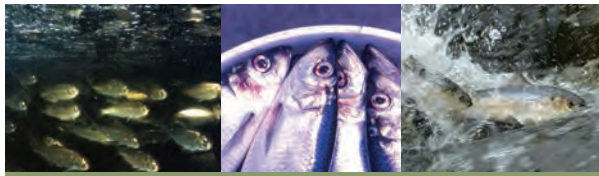
**Fishery-independent Catch Rates of Juvenile Atlantic Sturgeon in Albemarle Sound** Source: NC Division of Marine Fisheries, 2013

monitoring of Atlantic sturgeon. Data from two of these efforts are provided in the accompanying graphs, which depict catch per unit effort (CPUE) for fishery-independent surveys conducted by North Carolina and New York. Both surveys have experienced significant fluctuations in recent years. However, in 2013, North Carolina's CPUE was the second highest value in the past twenty years. Further, the spike of juveniles seen in New York's survey are believed to be a direct result of the New York's moratorium in 1997 and the concomitant increase of spawning fish in the Hudson River.

### *Atlantic Coastal Management*

Atlantic sturgeon is managed through Amendment 1 to the Interstate Fishery Management Plan for Atlantic Sturgeon (July 1998) and its subsequent addenda (Addendum I - III). There is currently a moratorium on the species, as well as a prohibition on take, harvest, harassment and/or other actions that may cause the species harm.



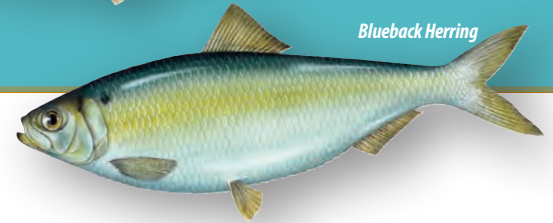


# River Herring

*Alewife (Alosa pseudoharengus) • Blueback Herring (Alosa aestivalis)*



Alewife



Blueback Herring

## Life History

Alewife and blueback herring (collectively known as river herring) are relatively small anadromous fish that spend most of their adult life at sea, but return to freshwater areas to spawn in the spring. Alewife spawn in rivers, lakes, and tributaries from northeastern Newfoundland to South Carolina, but are most abundant in the Mid-Atlantic and the Northeast. Blueback herring prefer to spawn in swift flowing rivers and tributaries from Nova Scotia to northern Florida, but are most numerous in waters from the Chesapeake Bay south. Mature alewife (ages three to eight) and blueback herring (ages three to six) migrate rapidly downstream after spawning. Juveniles remain in tidal freshwater nursery areas in spring and early summer, but may also move upstream with the encroachment of saline water. As water temperatures decline in the fall, juveniles move downstream to more saline waters. Little information is available on the life history of juvenile and adult river herring after they emigrate to the sea and before they mature and return to freshwater to spawn.

## Commercial & Recreational Fisheries

River herring formerly supported significant commercial and recreational fisheries throughout their range. Fisheries were traditionally executed in rivers, estuaries, and coastal waters. Although recreational harvest data are scarce, most harvest is believed to come from the commercial industry. Commercial landings have declined dramatically from historic highs.

River herring are caught both as a target species and as bycatch in ocean fisheries targeting other species, such as Atlantic herring and mackerel. Although river herring are caught by recreational anglers, both as a target species and as bait for other gamefish like striped bass, there is very little data on recreational landings.

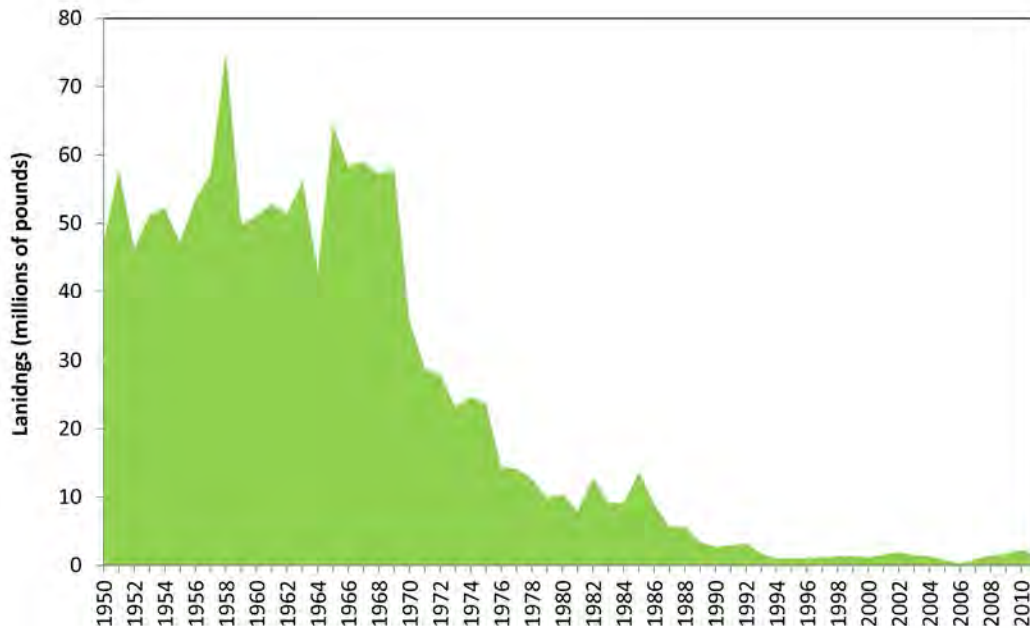
East Coast commercial landings of river herring have ranged from a high of 74.9 million pounds in 1958 to an historic low of approximately 273,000 pounds in 2006. Landings in 2012 were estimated at 1.7 million pounds. A decline in landings has occurred in all states with commercial fisheries.

## Stock Status

While the Interstate Fishery Management Plan (FMP) for Shad & River Herring addresses four species – American shad, hickory shad, alewife, and blueback herring – a lack of comprehensive and accurate commercial and recreational fishery data for the latter three species make it difficult to ascertain the status of these stocks.

In 1990, the Commission assessed the status 15 alewife and blueback herring stocks between New Brunswick and North Carolina. At the time of the assessment, five stocks were found to be overfished: St. John River, New Brunswick (alewife and blueback); Damariscotta River, Maine (alewife); Potomac River, Virginia (alewife); and Chowan River, North Carolina (alewife). Four other stocks were found to be in decline: Potomac River, Virginia (blueback); Chowan, North Carolina (blueback); Nanticoke River, Maryland (alewife); and Rappahannock River, Virginia (alewife). The assessment stated that heavy fishing pressure in Maine, Virginia, and North Carolina was primarily responsible for the continued decline of river herring stocks in the Damariscotta, Rappahannock, and Chowan Rivers. The report recommended that additional conservation measures be implemented to reduce fishing mortality.

A benchmark stock assessment for river herring was completed in 2012. The assessment found that for the 52 stocks of alewife and blueback herring for which data were available, 23 were depleted relative to historic levels, one stock was increasing, and the status of 28 stocks could not be determined because the time-series of available data was too short. The “depleted” determination was used instead of “overfished” and “overfishing” because of the many factors that have contributed to the declining abundance of river herring, which include not just directed and incidental fishing, but also habitat loss, predation, and climate changes. Estimates of abundance and fishing mortality could not be developed because of the lack of adequate data.



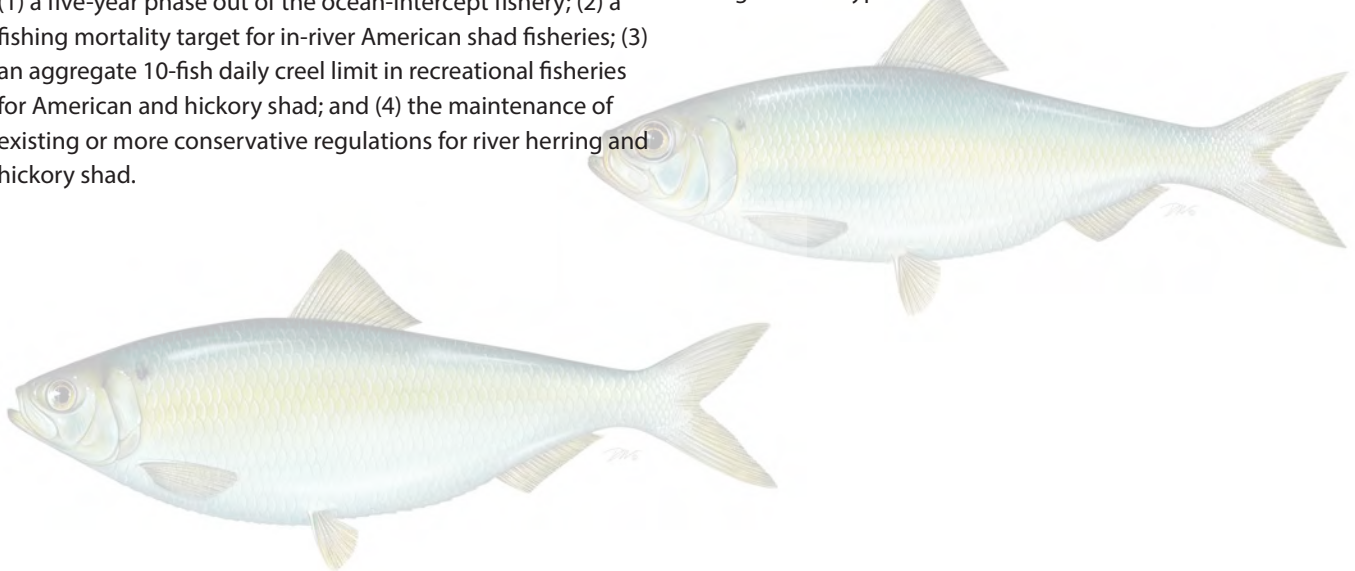
Commercial landings of river herring along the Atlantic coast. Source: Personal communication from NMFS Fisheries Statistics Division, Silver Spring, MD, 2012.

### *Atlantic Coastal Management*

All 15 Atlantic coastal states from Maine through Florida currently manage shad and river herring species under Amendment 1 to the Interstate FMP. The goals of Amendment 1 are to improve data collection and stock assessment capabilities and control exploitation of American shad populations, while maintaining the status quo in other fisheries for hickory shad and river herring.

Amendment 1 contains four primary regulatory requirements: (1) a five-year phase out of the ocean-intercept fishery; (2) a fishing mortality target for in-river American shad fisheries; (3) an aggregate 10-fish daily creel limit in recreational fisheries for American and hickory shad; and (4) the maintenance of existing or more conservative regulations for river herring and hickory shad.

In 2009, the Shad and River Herring Management Board approved Amendment 2 to the Plan to address concerns regarding declining river herring populations. Specifically, Amendment 2 requires that state and jurisdictions develop sustainable fishery plans in order to maintain a commercial and/or recreational river herring fishery. Fisheries without such plans will be required to close by January 1, 2012. The states of Maine, New Hampshire, New York, North Carolina, and South Carolina all have approved plans in place and allow various degrees and types of fisheries.





# Shad

*American Shad (Alosa sapidissima) • Hickory Shad (Alosa mediocris)*



American Shad



Hickory Shad

## Life History

American shad are found in many Atlantic coastal rivers from Newfoundland to the St. Johns River, Florida. Shortly after recruitment, juveniles emigrate from estuarine nursery areas and join a mixed-stock, migratory population. After four to six years as coastal migrants, individuals become sexually mature and migrate to their home (natal) rivers during spring to spawn. American shad that spawn in more northerly rivers may survive to spawn again, while shad native to the rivers south of Cape Fear, North Carolina die after spawning. American shad adults that exhibit repeat spawning return to the sea soon after spawning and migrate northward to summer feeding grounds in the Gulf of Maine.

Hickory shad spawn in rivers and tributaries along the Atlantic coast from the Bay of Fundy to the Tomoka River, Florida. After spawning, hickory shad return to the ocean, but their distribution and movements are essentially unknown. Fertilized eggs are carried by river currents and eventually develop into larvae. Larvae drift downstream into tidal freshwater reaches of the spawning rivers, and gradually mature into juveniles. In early to late summer, juvenile hickory shad migrate out of their nursery areas to the sea. With increasing water temperatures in the spring, mature hickory shad will migrate back to their native rivers to complete their life cycle.

## Commercial Fisheries

Shad historically supported significant commercial and recreational fisheries throughout their range. Information specific to hickory shad is difficult to obtain, due to mixing with American shad upon landing, poorly understood geographic ranges, and poorly monitored recreational fishing areas. Since 1950, hickory shad account for roughly 6% total shad landings. Fisheries were traditionally executed in rivers, estuaries, and coastal waters. Although recreational harvest data are scarce, most harvest is believed to come from the commercial industry. Commercial landings for both species have declined dramatically from historic highs. In the late 19th century, annual harvests reached over 50.5 million pounds. Shad have been commercially targeted both in-river and at-sea, through a directed fishery and as bycatch in other fisheries. The at-sea fishery harvests American shad

from different river systems along the East Coast, as they are schooling together in ocean waters, while the in-river fishery harvests fish from that specific river system.

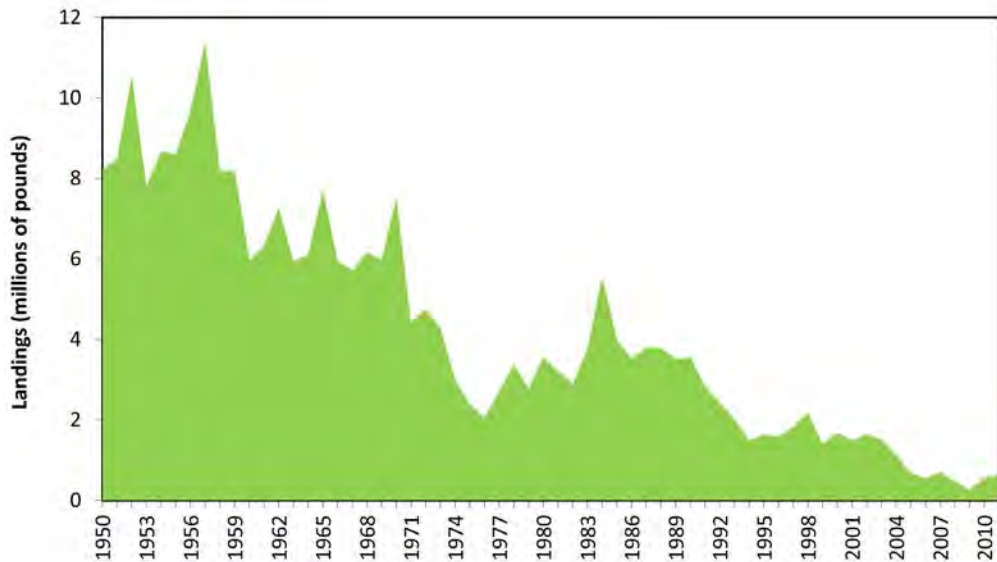
From the 1950s through 1970, commercial landings of shad ranged from a high of 11.7 million pounds (1957) to a low of 5.9 million pounds (1967), generally averaging 7.9 million pounds for the 20-year period. Over the next two decades, landings declined to around 3.6 million pounds per year. Since the mid-1990s, landings have steadily decreased to nearly two orders of magnitude lower than in the late 19th century. The 2012 total landings were 717,915 pounds, which reflects an increase from the low of 373,299 pounds in 2009.

In 2005, the directed at-sea fishery for American shad was closed. Since then landings of American shad from the ocean are only permitted as bycatch in other fisheries and not allowed to exceed more than five percent of the total landings from that fishery. Fishing in the Chesapeake Bay for American shad has been banned since 1994, but there are currently small bycatch allowances. Coastwide, recreational fishing for American shad is popular during the spring spawning run, however harvest information is unreliable.

## Stock Status

Coastwide stock assessments for American shad were completed in 1988, 1998 and 2007. The most recent assessment found that American shad stocks are currently at all-time lows and do not appear to be recovering. Recent declines in stock abundance were reported for Maine, New Hampshire, Rhode Island, and Georgia, and for the Hudson (NY), Susquehanna (PA), James (VA), and Edisto (SC) Rivers. Low and stable stock abundance was indicated for Massachusetts, Connecticut, Delaware, Chesapeake Bay, the Rappahannock River (VA), and some South Carolina and Florida stocks. The Potomac River stock has shown rebuilding in recent years.

The 2007 report identified primary causes for stock decline as a combination of overfishing, pollution, and habitat loss due to dam construction. Since 2004, coastwide harvest has averaged



Commercial landings of shad along the Atlantic coast. Source: Personal communication from NMFS Fisheries Statistics Division, Silver Spring, MD, 2012.

646,000 pounds, nearly two orders of magnitude lower than in the late 19th century. Given these findings, a peer review panel recommended that current restoration actions need to be reviewed and new ones need to be identified and applied. The panel suggested considering a reduction of fishing mortality, enhancement of dam passage and mitigation of dam-related fish mortality, stocking, and habitat restoration.

The Commission has not conducted a coastwide assessment of hickory shad stock status.

### *Atlantic Coastal Management*

All fifteen Atlantic coastal states from Maine through Florida currently manage shad and river herring species under Amendment 3 to the Interstate Fishery Management Plan. Amendment 3 revised shad regulatory and monitoring programs. Specifically, Amendment 3 prohibits state waters commercial and recreational fisheries beginning January 1, 2013, unless a state or jurisdiction has a sustainable management reviewed by the Technical Committee and approved by the Management Board. Connecticut, the Delaware River Basin, the Potomac River Fisheries Commission, North Carolina, South Carolina, Georgia and Florida all have approved sustainable fishery management plans in place for shad.

Amendment 3 also requires states and jurisdictions to submit a habitat plan regardless of whether their commercial fishery would remain open. The habitat plans outline current and historical spawning and nursery habitat, threats to those

habitats, and habitat restoration programs in each of the river systems. The purpose of the habitat plans is to provide a record of the major threats facing American shad to aid in future management efforts. The habitat plans provide a comprehensive picture of threats to American shad in each state and include collaboration with other state and federal agencies (e.g., state inland fish and wildlife agencies, water quality agencies, U.S Army Corps of Engineers).

The two largest threats identified in the habitat plans were barriers to migration and a lack of information on the consequences of climate change. A key benefit of the habitat plans is that each river system relevant to shad now has its threats characterized. The habitat plans will be filed with the Federal Energy Regulatory Commission to ensure that shad habitat is considered when hydropower dams are licensed. They will also be shared with inland fisheries divisions to aid in habitat monitoring and restoration efforts. In February 2014, the Board approved habitat plans for the majority of states and jurisdictions. It is anticipated that habitat plans will be updated every five years.

