

## Species Profile: Red Drum

### Benchmark Assessment Finds Resource Relatively Stable with Overfishing Not Occurring

#### Introduction

Attempts to regulate the Atlantic coast red drum fishery date back to the first annual meeting of the Atlantic States Marine Fisheries Commission in 1942 when a Delaware Commissioner urged that red drum be made a sport fish, or be protected by adequate size limits and daily catch limits, and that its use as fertilizer be prohibited. While this request and later management recommendations were unsuccessful in preventing the overexploitation of red drum, the 2009 stock assessment indicates that interstate management has made significant strides in improving the population's condition since 1990. At that time, the stability of the stock was uncertain, with an exploitation level that was jeopardizing future recruitment. Through the implementation of more stringent regulations in the 1990s and 2000s, the stock is now no longer subject to overfishing and sufficient numbers of young fish are surviving to become breeding adults.

Despite this achievement, managers still face challenges with red drum. Due to data deficiencies regarding the adult population, it cannot be determined whether the stock is still overfished or rebuilt. This is because there is limited information on fish older than age 4 as a result of the fish's life history and regulations that restrict the harvest of fish greater than 27 inches. Due to these unknowns, managers are holding the course on red drum management for the time being, while continuing research efforts seek to provide missing data for future stock assessments.

#### Life History

The historic distribution of red drum 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 subadults 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

Atlantic coast commercial landings of red drum have been reported



#### Red Drum *Sciaenops ocellatus*

**Management Unit:** New Jersey - Florida

#### Interesting Facts:

\* The name is derived from their color and the fact that during spawning time males produce a drum-like noise by vibrating a muscle in their swim bladder.

\* Due to their unusual growth pattern, a 36" red drum may be anywhere from 6 - 50 years old.

\* Red drum have been successfully reared in hatcheries and released into South Carolina, Georgia and Florida estuaries in stock enhancement programs.

**Largest on Record:** 94 lbs. and 2 oz., Hatteras Island, North Carolina

**Stock Status:** Overfishing not occurring

since the 1880s. Since 1960, landings have fluctuated around 220,000 pounds, with a high of 440,445 pounds in 1980 and a low of 54,748 pounds in 2004 (Figure 1). No directed commercial fishery currently 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. In 1990, the South Atlantic Fishery Management Council prohibited harvest in federal waters (3 – 200 miles offshore) to prevent any directed fishery for red drum from developing.

The recreational fishery for red drum is a nearshore fishery, targeting small, “puppy drum” in shallow estuarine waters and large trophy fish along the Mid- and South Atlantic barrier islands. Harvest is restricted by minimum and maximum size limits and a daily trip limit. Due to strict commercial restrictions and the great popularity of red drum by anglers, recreational fishing has accounted

for over 87% of all Atlantic coast red drum landings (by pounds) since 1982. Annual harvest has generally ranged between 300,000 and 550,000 fish per year, with the exception of some larger harvests in the mid-1980s. Meanwhile recreational catch has increased over-time, meaning that the percentage of fish that are caught and released has in-

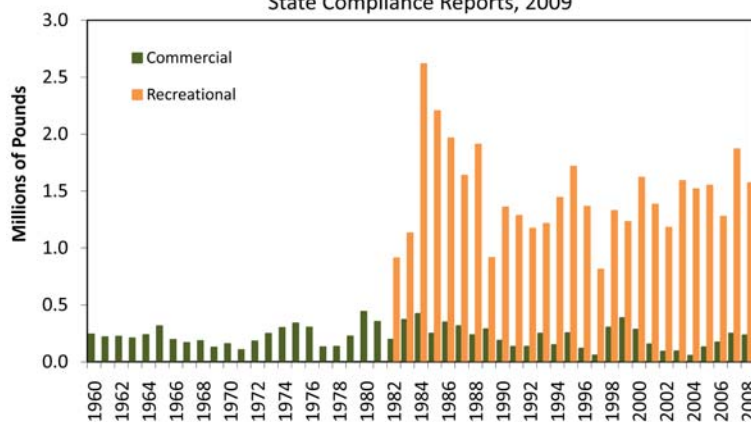
creased from about 4% in 1982 to more than 83% in 2008. Anglers from the four most southern Atlantic states tend to take about 90% of the coastwide recreational harvest.

### 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 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

**Figure 1. Atlantic Coast Red Drum Landings**  
Sources: Personal communication with NMFS Fisheries Statistics Division, Silver Spring, MD, 2009; State Compliance Reports, 2009



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 any-

## Red Drum Assessment Q&A

### Why 2 Stock Components?

Red drum are divided into two management areas along the Atlantic coast, a northern region (from New Jersey to North Carolina) and a southern region (from South Carolina to Florida). This division is based on differences in life history traits (such as growth rates and maximum observed ages) between the two regions, and information from tagging studies, which show that red drum rarely move between regions. Separate stock assessments were performed for each region.

### What Data Were Used?

The red drum stock assessment used both fisheries-dependent and fisheries-independent data, including information on red drum biology and life history.

Specific fishery-dependent data included:

- **Commercial harvest** data from Massachusetts through the east coast of Florida.
- **Biological samples from the commercial catch** in Florida, North Carolina, and Virginia. Samples were used to calculate the number of fish of each age in the commercial catch (the catch-at-age). The model used data from 1989 – 2007 since the biological sampling was only adequate to describe the catch-at-age from 1989 onwards.
- **On-board observer data** from North Carolina's commercial gillnet fishery to estimate discard mortality.
- **Recreational catch** and effort data from the Marine Recreational Fisheries Statistics Survey (MRFSS) for 1989 – 2007. Recreational catches are divided into Type A catch (fish that are landed and able to be measured), Type B1 catch (fish that are killed but unavailable to be measured – filleted, discarded dead, etc.), and Type B2

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where 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 preadult 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 for the southern region. Therefore, only general conclusions about trends in stock status could be provided for the southern region.

In the northern region, abundance of age 1 – 3 red drum increased during 1990 – 2000 after which it widely fluctuated (Figure 2). The initial increase in abundance of these age groups can be explained by the reduction in exploitation rates in the early part of the time series with relative stability since then. Fishing pressure appears to be stable, and there is a high probability that the stock is not subject to overfishing.

In the southern region, the relative trend in abundance of age 1 – 3 red drum increased during 1989 – 1992, declined during 1992 – 1998 and has fluctuated thereafter (Figure 3). As with the northern stock, the

initial increase in abundance of these age groups can be explained by the reduction in exploitation rates in the early part of the time series. There appears to have been a slight increase in exploitation rates since 1990. It is likely that the stock is not subject to overfishing.

### Atlantic Coastal Management

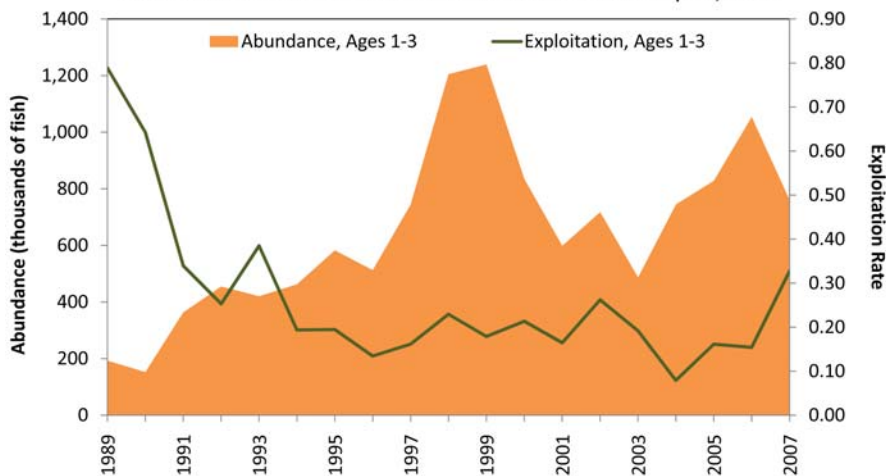
For close to two decades, red drum were jointly managed in state and federal waters by the Atlantic States Marine Fisheries Commission and the South Atlantic Fishery Management Council. The first interstate plan was developed in 1984. In 1990, the Council's plan closed federal waters to red drum harvest, and a 1998 amendment revised definitions for optimum yield and overfishing. Amendments to the interstate plan oc-

curred in 1991 and 2002, partly in response to the Council plan and amendment. Following the implementation of Amendment 2 in 2003, the Council recommended transferring the authority for managing red drum in federal waters to the Commission. Two reasons for this decision were that all harvest is taken in state waters and that, due to data deficiencies, a rebuilding schedule for the federal plan could not be set as required by law. The transfer of authority became effective in late 2008. It does not affect the red drum harvest prohibition in federal waters.

The primary management goal of Amendment 2 is to achieve and maintain the stock's spawning potential at a level capable of sustaining the population. To achieve this goal, the plan further restricted the recreational fishery and maintained existing commercial regulations. The management regime is intended to increase the escapement of inshore juvenile fish to the offshore adult population, and protect the adult population from exploitation. Atlantic coast states from Florida through New Jersey implemented appropriate bag and size limits as required, including a maximum size limit of 27 inches total length or less. The Amendment also encourages those states outside the management unit (i.e., New York through Maine) to implement supportive measures to protect the red drum resource.

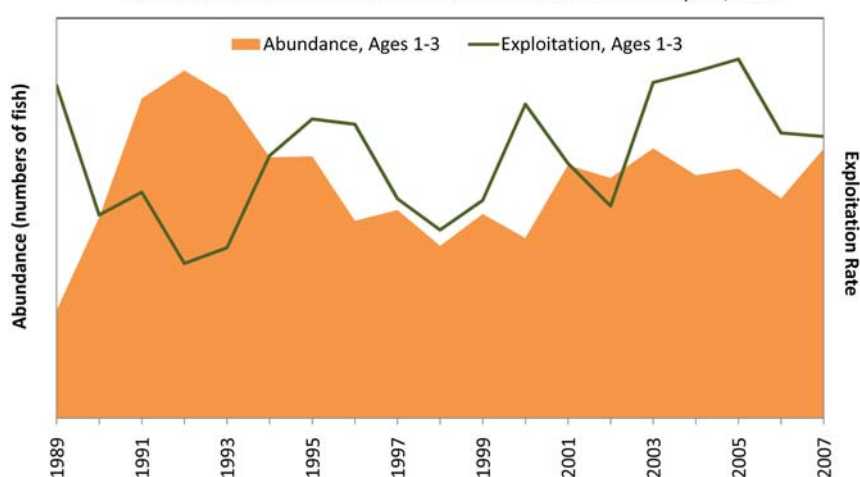
**Figure 2. Estimates of Abundance and Exploitation for the Northern Stock Component of Red Drum, Ages 1 - 3**

Source: SEDAR 18 Atlantic Red Drum Stock Assessment Report, 2009



**Figure 3. Trends in Abundance and Exploitation for the Southern Stock Component of Red Drum, Ages 1 - 3**

Source: SEDAR 18 Atlantic Red Drum Stock Assessment Report, 2009



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## Red Drum Assessment Q&A (continued from page 2)

catch (fish that are released alive). MRFSS surveyors measure the Type A fish they encounter to develop a length-frequency of the recreational catch which can then be used to make recreational catch-at-age.

- Estimates of number of angler-trips were used to calculate yearly **catch-per-unit-effort** (CPUE), which provided information on trends of relative abundance in each region.

- Several studies were used to estimate **survival rates of recreationally caught and released red drum**; the assessment assumed that 8% of all fish released alive die as a result of being caught.

The red drum assessment used a number of different fishery-independent datasets that provide information on trends of relative abundance for different age classes. Specific fishery-independent data included:

- **2 North Carolina surveys** – a gillnet survey that caught age 1 and 2 fish, and a seine survey that caught fish that were less than 1 year old.

- **3 South Carolina surveys** – an electrofishing survey that caught age 1 fish, a trammel net survey that caught age 2 and 3 fish, and a longline survey that caught adult red drum age 6 and older.

- **1 Georgia survey** – a trammel net survey that caught age 1 fish.

- **2 Florida surveys** – a small seine survey that caught age 1 fish, and a haul seine survey that caught age 2 and 3 fish.

- **North Carolina's extensive tagging program** provided important information about fishing mortality and the age composition of the fish released alive by

recreational anglers. These data proved essential to the assessment, helping to reduce uncertainty in the northern region. Although tagging data exist for the southern region, the necessary analyses were not available to provide similar information for the south.

### What Model Was Used?

A statistical catch-at-age (SCA) model was used to assess the red drum stocks. An SCA model combines the catch-at-age data from the commercial and recreational fisheries with information from fishery-independent surveys and biological information such as growth rates

(SPR); the 3-year average of the SPR was used to determine the status of the stock. Because of the limited data on adults, the model groups all fish age seven and older into a single “plus group.”

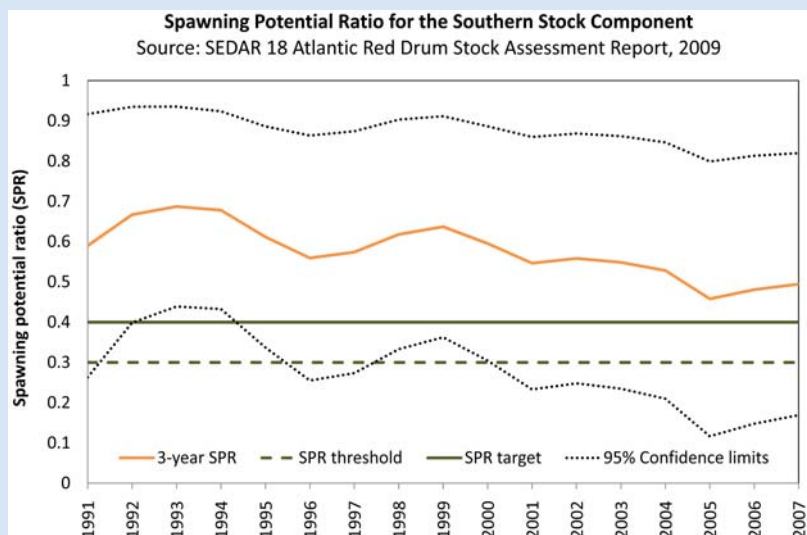
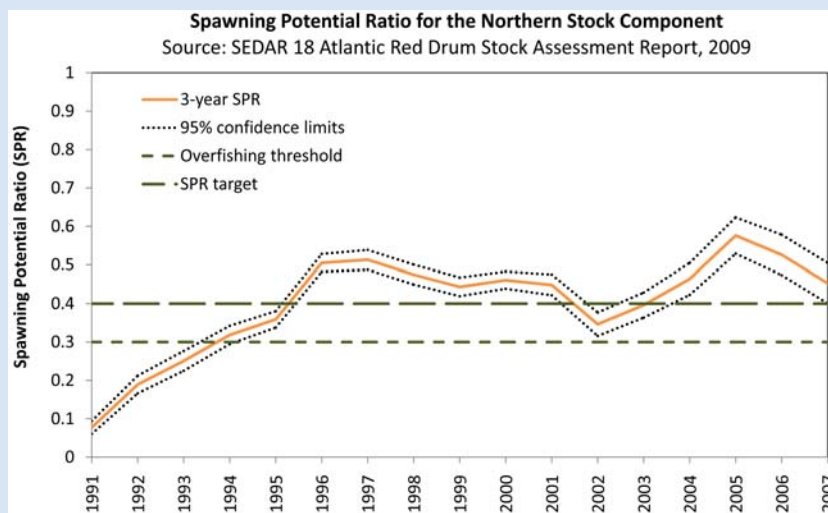
### What is the Status of the Stock?

The Commission assesses red drum relative to SPR benchmarks. SPR measures the reproductive potential of a fished stock relative to that of an unfished stock. The overfishing threshold is an SPR of 30%; an SPR below 30% indicates that overfishing is occurring, because not enough fish are surviving to reproduce and contribute to the population. The target SPR is 40%.

The assessment determined that overfishing was not occurring in either the northern or the southern stock. The 3-year average of the SPR was above the overfishing threshold of 30% SPR in both regions, indicating sufficient numbers of young fish are surviving to join the adult spawning population.

The 3-year average of the SPR in the north was 45.3%, above both the overfishing threshold and the target SPR. The 3-year average of the SPR in the south was 49.5%, but due to a higher degree of uncertainty in that estimate, it could not be determined whether

that stock was above the target as well. This uncertainty can be seen in the width of the confidence intervals around the SPR estimates.



and natural mortality rates to estimate the size of each age class and the exploitation rate on the population. The model also provides information used to calculate spawning potential ratio

## Species Profile: Red Drum (continued from page 3)

Further action to revise the interstate management plan was not initiated in response to the 2009 stock assessment. Although the stock is no longer subject to overfishing, managers were hesitant to liberalize any regulations without knowing if the stock is rebuilt. In fact, the southern states have expressed concern regarding the trend of increasing exploitation on the southern stock component, and it is possible that some states may elect to implement more conservative management measures as a result. In the interim, all involved states agreed to maintain the current management regime and continue to support data collections efforts to improve future stock assessments. To this end, a new research survey using long line vessels to capture older red drum was initiated in 2006. This survey is providing data on the sizes and ages of red drum for which there is not information from the fisheries or other research surveys.

## Red Drum Assessment Q&A (continued from page 4)

### Why Greater Uncertainty for the Southern Region?

The northern stock assessment had a lower degree of uncertainty because the tagging data provided important external information on fishing mortality. Similar information was not available for the southern stock. The southern model was more sensitive to changes in the assumptions and input data, making the results more uncertain.

A more thorough overview of the red drum stock assessment results can be found on the Commission website [www.asmfc.org](http://www.asmfc.org) under Breaking News.

