Atlantic Spadefish

Chaetodipterus faber

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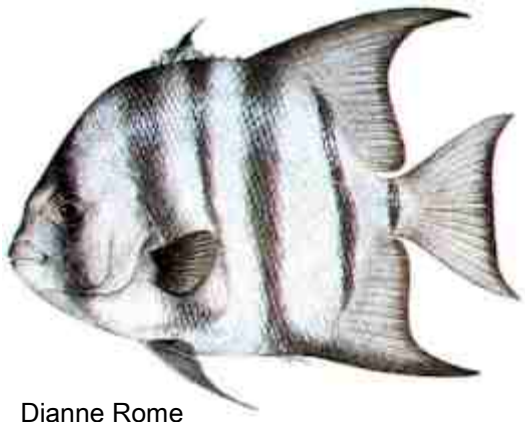

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DESCRIPTION

Taxonomy and Basic Description

The Atlantic Spadefish, Chaetodipterus faber, is in the Ephippidae family and is the only representative occurring in the western Atlantic Ocean.

The Atlantic Spadefish is a deep-bodied, compressed, disk-shaped fish of medium size, with 2 distinctly separated dorsal fins and a blunt snout. The first dorsal fin is spiny and the second rayed. The anterior rays of both the second dorsal and anal fins are prominently elongated, and the caudal fin is concave. The mouth is small, scales are ctenoid, and the gill coverings end in an obtuse point (Bohlke and Chaplin 1993; Smith 1997). Adult fish are silvery-gray, with 3 to 6 prominent black vertical bars along each side (Manooch 1984). These bars may fade with age. Juveniles are dark brown to black with white mottling (Randall 1996). Adults and sub-adults of the species bare no close resemblances to other species, but may mistakenly be referred to as angelfish (Pomacanthidae). Small juveniles may sometimes be misidentified as young Sheepshead (Archosargus probatocephalus).

Adult Atlantic Spadefish often occur in large schools in coastal waters; they are a popular, recreationally targeted species. Specimens as large as 91 cm (36 in.) in total length (TL) and 9 kg (20 lbs.) in weight have been documented in tropical waters (Robins and Ray 1986). In 2005, the state record for recreationally landed Spadefish in South Carolina was set at 6.4 kg (14.2 lbs.) (SCDNR 2012).

Atlantic Spadefish were found by Hayes (1990) to spawn off South Carolina between May and August, with most fish (97%) prepared to spawn in May. Some females were determined to have spawned more than once during this period. Maximum abundance of Spadefish larvae occurred in these coastal waters between June and August when water temperatures were greater than or equal to 28^{o}C (83°F) and where salinities ranged from 26.7 to 31.3 parts per thousand (ppt) (Hayes 1990).

Atlantic Spadefish are extremely generalized in their feeding habits, consuming a wide variety of benthic animals and plants, as well as organisms found throughout the entire water column. Their diverse diet has been shown to include sponges, polychaetes, tunicates, soft corals, algae, amphipods, various echinoderms, sabellid worms, and various crustacean larvae (Manooch 1984). Peak feeding time appeared to be mid-morning through early evening, particularly at mid-day. Hayes (1990) examined the stomach contents of 177 Atlantic Spadefish collected along the South Carolina coast. Hydroids, anthozoans, and polychaete feeding tentacles made up most of the diet of these fish. Stomach contents of fish taken from estuarine areas and offshore artificial

reefs indicate that these fish were eating mainly hydroids, while fish from nearshore marine areas fed mostly on anthozoans. All size classes of fish sampled in the study fed mostly on hydroids.

Status

Due to its close association with coastal wrecks, high and low relief bottom, oil platforms and artificial reefs, and its highly visible schooling behavior, the Atlantic Spadefish has become an increasingly popular target for a growing number of saltwater recreational anglers along the Atlantic and Gulf Coasts since about the mid 1970s. Its occurrence in significantly large numbers around oil rigs in the Gulf of Mexico has been well-documented over the years (Stanley and Wilson 2000); its presence on artificial reefs off South Carolina has been noted in studies dating back to the earliest days of the State's attempts to develop such areas along the coast (Parker et al. 1979).

The schooling, spawning and feeding behavior of adults of this species, and particularly their attraction to manmade structures, greatly increases the potential for relatively easy harvest. Because there is currently no specific management plan in place for the Atlantic Spadefish and the effects of current harvest levels are unknown, SCDNR considers it a species of concern and one that warrants further study. Spadefish ranks 15th among the saltwater species targeted by South Carolina recreational anglers (inshore and offshore waters) and 20th in what actually appears in catches observed during creel surveys at boat landings (E. Hiltz, SCDNR, pers. comm., May 2012).

POPULATION SIZE AND DISTRIBUTION

Atlantic Spadefish inhabit coastal waters from the mid-Atlantic states to southern Brazil, including the Gulf of Mexico and Bermuda (Johnson 1978). It is a common fish in South Carolina waters, and all life stages have been collected along the State's coast (Hayes 1990). Actual population estimates of Atlantic Spadefish in South Carolina's coastal and offshore waters do not exist. Limited information concerning the distribution and relative size of the Spadefish population in the State's waters can be inferred through examination of fishery-dependent data related to the small, but specialized, recreational fishery that exists primarily in federal waters from about May through September each year.

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

Atlantic Spadefish occur in a diverse range of ecosystems: from mangroves and salt marshes to open nearshore waters and offshore reefs. Juveniles are commonly found in estuaries while adults are found offshore (Johnson 1978). Juvenile Atlantic Spadefish are known to utilize South Carolina estuaries, turning up in trawls, traps, and other fishing gear used in tidal harbors, rivers, and creeks. Their presence has been documented on subtidal oyster reef habitats in the southeastern United States (SAFMC 1998). Adults are found in nearshore and offshore waters along the entire coast where suitable bottom habitat exists. Grimes et al. (1982) noted their presence on shallow water live bottom habitats off North Carolina and South Carolina, where limited vertical relief and a rich invertebrate community often exist.

Spadefish readily recruit to all of South Carolina's marine artificial reefs, from 5 to 56 km (3 to 35 mi.) offshore. Smaller fish seem to be present on offshore reefs almost year-round, closely associating with reef structures (often inside), while larger adults, particularly in spawning condition, occur more seasonally throughout the range of reefs. These fish usually remain just above reef material or higher in the water column. Larger Spadefish are most abundant on the reefs from about May through September, apparently leaving the area when water temperatures begin to drop (M. Bell, pers. obs.).

Overall, the wide range of food items consumed by these fish, and the importance of fouling hydroids in their diet (Hayes 1990), seems to indicate a necessary or at least beneficial tie to natural or manmade hard bottom habitats and their associated sessile and motile organisms. Relatively low occurrences of Spadefish in SEAMAP trawl samples from stations along the South Carolina coast between 1990 and 2004 would also seem to indicate that Spadefish are relatively scarce in open soft bottom areas where trawl samples are typically taken (J. Boylan, SCDNR, pers. comm., Jan. 2005).

CHALLENGES

Declines of Atlantic Spadefish populations would most likely occur as a result of over-fishing, loss or degradation of essential fish habitat, degradation of water quality, or a combination of factors.

No commercial fishery for Atlantic Spadefish exists in South Carolina, but a relatively small, focused recreational interest that began in the late 1970s has grown in popularity and developed into somewhat of a specialized, directed fishery. Spadefish can be difficult to catch with recreational hook and line gear for the novice angler. However, some unique, and very effective, Spadefish angling techniques have been carefully worked out over the years (Moore et al. 1984). When hooked, especially on lighter tackle, Spadefish can be tremendous fighters. Just the experience of bringing several large Spadefish to the boat can be a satisfying enough experience for many recreational anglers (Moore et al. 1984). Some saltwater anglers have expressed concern in recent years that the fish's schooling behavior on artificial reefs makes them particularly vulnerable to over-exploitation.

While the recreational fishery for Atlantic Spadefish in South Carolina is not particularly large, it has been primarily retention-oriented since its inception. South Carolina Saltwater Recreational Fisheries Statistics Survey creel data from 2003 through 2011 indicate that anglers surveyed have traditionally retained almost all Spadefish landed. However, a consistent decrease in retention over the past 2 years might be indicative of a new trend towards a slightly more conservation-minded approach to this fishery.

2003	2004	2005	2006	2007	2008	2009	2010	2011
56.7%	56.0%	39.5%	56.3%	76.3%	70.6%	71.2%	80.4%	67.7%

Table 1: Percentage of Spadefish catch retained by recreational anglers intercepted at public boat landings in South Carolina by year (2003 -2011).

A significant increase has occurred in the number and size of artificial reefs in both State and Federal waters off South Carolina since the 1970s; 3 reefs were present in these waters in 1971 whereas 44 reefs exist today. This factor, along with the concurrent discovery by the recreational fishing community of Spadefish as a fun, technically challenging, readily available and desirable sportfish has established this species as a popularly targeted reef fish during the spring and summer months along the entire South Carolina coast (Ogle 1985; Braswell 2004). Growth in this fishery is certainly possible given the right circumstances.The majority of the recreational fishery takes place outside state jurisdiction in federal waters called the Exclusive Economic Zone (EEZ).

Any threats to the health of South Carolina's estuarine habitats, or impacts on water quality in these areas, could have negative consequences for the success of larval recruitment and settlement from the offshore spawning populations and the health of juvenile Spadefish inhabiting estuarine waters and bottoms. Degradation of water quality can adversely affect the health of many marine-spawning species like Spadefish that can only be successful if they are physiologically, thermally, and salinity adapted (Sea Grant 1976). The introduction of toxins and pollutants such as PCBs into coastal waters can also have a disruptive effect on juvenile fishes with potentially long-term impacts on life cycles (Thomas 1990).

Loss or degradation of limited nearshore hard bottom areas through anthropogenic or natural causes such as trawling, oil spills, ship groundings, and hurricanes could impair the success of Spadefish populations locally as these fish attempt to transition from estuarine habitats to offshore reefs. While impacts can often be localized, as in the case of ship groundings, larger areas of ocean bottom and, in turn, more of the fish population, can be affected by major hurricanes (Bell and Hall 1994). Although events such as hurricanes cannot be prevented, the long or short term impacts they might have on certain populations of fish that are critically linked to essential hard bottom habitat destroyed or severely impacted might be at least partially mitigated through creative management practices involving either man-made or naturally occurring areas of coastal hard bottom.

CONSERVATION ACCOMPLISHMENTS

Atlantic Spadefish rely on a wide range of habitats throughout their life history, including estuarine oyster reefs, nearshore and offshore hard bottom reefs, and man-made reefs. In developing a comprehensive habitat plan essential to the health and success of all managed marine fishery species within the entire South Atlantic region, the South Atlantic Fishery Management Council (SAFMC) has characterized and documented the importance of the various habitat types essential to all managed finfish species within the region, including Atlantic Spadefish (SAFMC 1998).

Due to their close association with offshore and coastal hard bottom habitats and reefs, Atlantic Spadefish have been included in the SAFMC Snapper Grouper Management Complex. As such, they are managed within the context of the SAFMC Snapper Grouper Management Plan. Under existing federal fishery regulations resulting from implementation of this plan, Spadefish are included in a 20 fish per person per day aggregate bag limit in federal waters for species in this management unit not having another specific daily bag limit.

Spadefish are afforded an additional degree of protection on all offshore artificial reefs off South Carolina that have been designated (at the request of the SCDNR) as Federal Special Management Zones (SMZ). It is unlawful to use certain commercial-type gears on these SMZs, some of which might prove particularly effective if employed to target Spadefish during their frequent schooling behavior. While no commercial fishery for Spadefish exists, these restrictions may be a significant impairment to any future overly efficient fishery, should one become established.

Spadefish occurring in South Carolina waters likely receive some degree of protection from restrictions placed on trawl-net fisheries in which Spadefish would be a component of the by-catch. Most of the state's sounds and bays were closed to shrimp trawling in 1986, thus minimizing incidental fishing mortality of juvenile and young adult Spadefish in these areas. Additionally, by-catch reduction devices are required in all shrimp trawl nets.

CONSERVATION RECOMMENDATIONS

- Need better quantify fishing mortality and catch per unit effort for the recreational Atlantic Spadefish fishery off South Carolina.
- Determine age frequency of Spadefish occurring within the State's fishery and population trends of locally occurring Atlantic Spadefish stocks.
- Examine the extent to which Spadefish occur as by-catch in commercial gear.
- Determine significance of spawning activities of Spadefish occurring on South Carolina's artificial reefs to the health of local and regional stocks.
- Examine Atlantic Spadefish larval distribution, settlement, and recruitment to estuarine systems, and determine the importance of estuarine habitats in supporting Spadefish populations in South Carolina's coastal waters.
- Better define seasonal movement patterns and habitat utilization for adult Atlantic Spadefish. Determine emigration patterns of young adult Spadefish and recruitment to near/offshore habitats.
- Examine the ability to use juvenile Spadefish as a finfish indicator species in monitoring the health of estuarine habitat.
- Examine the possible impacts of degraded estuarine water quality.
- Determine which environmental factors affect abundance and health of Atlantic Spadefish stocks and the consequences of those factors on Spadefish.
- Recommend that the SAFMC adopt a more conservative recreational bag limit for Atlantic Spadefish within the EEZ, and request that the SAFMC adopts specific bag limits on the harvest of Spadefish within the boundaries of designated SMZ artificial reefs off the coast of South Carolina.
- Investigate the potential of removing Atlantic Spadefish from the SAFMC's Snapper Grouper Management Complex to allow states to more easily implement more stringent fishery regulations if desired.
- Work with appropriate federal, state, and local partners/stakeholders to better protect water quality by implementing better coastal planning policies, assess and improve current policies/regulations involving the introduction of various biocides and other potentially harmful chemicals into estuarine and coastal waters, and requiring stricter

monitoring and tighter restrictions on storm-water runoff and wastewater treatment effluents.

- Protect water quality in marine ecosystems by encouraging municipalities to use Best Management Practices (BMPs) to reduce runoff from highways, agricultural fields, and housing developments. Improve BMPs in areas already impacted by non-point source pollution.
- Work with appropriate federal agencies and others to develop realistic strategies, plans, and policies to protect limited areas of essential fish habitat (EFH) as designated by the SAFMC Essential Fish Habitat Management Plan.
- Manage the use of marine artificial reefs in South Carolina's coastal and offshore waters to provide additional EFH where most appropriate to improve the chances of reaching fishery management and conservation goals established for applicable finfish species.

MEASURES OF SUCCESS

The measurement of success will be stable Spadefish populations in State coastal waters, which will be documented by continuing current fishery-dependent and fishery-independent monitoring programs.

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