King Mackerel

Scomberomorus cavalla

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DESCRIPTION

Taxonomy and Basic Description

The king mackerel is a member of the family Scombridae, which includes the mackerels and tunas. This is a muscular, fusiform, laterally compressed fish. Its body color is typically dark blue to black dorsally with iridescent spots of blue and green counter-shaded by a silver ventral side. Juvenile king mackerel have yellow spots that fade as the fish ages, disappearing completely by maturity. It has two dorsal fins followed by 7-10 triangular dorsal finlets and, on the ventral side, paired pectoral and pelvic fins followed by a single anal fin and 7-10 ventral finlets. The body is tapered posteriorly, ending in a thin caudal peduncle marked by a fleshy keel, and bares a powerful lunate tail. The lateral line drops sharply towards the abdomen under the second dorsal fin jaw (Berrien and Finan 1977). This strong dip in the lateral line allows easy differentiation from Spanish mackerel (much more gradual drop in lateral line) at all sizes where the lateral line is apparent (generally >50 mm FL, personal observation). Like many members of their family, king mackerel are predators and have a large mouth filled with 40-60 sharp teeth per jaw (Berrien and Finan 1977).

Status

King mackerel in the waters off South Carolina are managed by the South Atlantic Fisheries Management Council (SAFMC) in accordance with The Fishery Management Plan for Coastal Migratory Pelagic Resources and its subsequent amendments (FMP 1983). Management is affected through the limited licensing of commercial vessels as well as the establishment of Annual Catch Limits (ACLs) and size restrictions across both the commercial and recreational fishery. The most recent assessment of king mackerel populations was completed in 2009 with the review of data presented at the Southeastern Data Assessment and Review (SEDAR) 2008 data workshop (SEDAR 2009). Data presented suggested that king mackerel were not overfished, but might be undergoing slight overfishing at that time, although reviewers offered reservations about the accuracy of this assessment due to uncertainties in stock structure and a lack of fishery independent data, particularly for older fish (>1 year). An updated assessment of the status of the king mackerel fishery was initiated in 2013 when the SEDAR data workshop was convened in Charleston, SC. The results of this workshop will be reviewed and an updated stock assessment will be presented in 2014.

POPULATION SIZE AND DISTRIBUTION

King mackerel in the western Atlantic range from the Gulf of Maine south through the Caribbean and Gulf of Mexico, extending into the coastal waters of Brazil (Briggs 1958; Godcharles and Murphy 1986). They occupy the northern portion of this range above Florida only during the warmer months of the year (Collette and Nauen 1983), and large aggregations can be found off the coast of North and South Carolina beginning in the late spring and continuing through the fall

(Godcharles and Murphy 1986). The South Atlantic Marine Fisheries Council and The Gulf of Mexico Marine Fisheries Council recognize two separate migratory stocks. King mackerel populations in the waters off South Carolina are part of the Atlantic stock which extends from North Carolina to southern Florida where it overlaps with the Gulf of Mexico stock (FMP 1985). Fish in the Atlantic stock migrate south to Florida beginning in the fall and return to South Carolina waters during the spring where they remain through the summer. Similarly, Gulf stocks move south from the northern Gulf of Mexico into warmer Florida waters in the fall and return to the Gulf during the spring and summer. Tagging studies have found a strong affinity for members of a particular stock to migrate within the geographic range that defines their stock; with stock overlap resulting from fish from both populations returning to warmer Florida waters during the colder months of the year (Sutter et al. 1991).

Males of the species reach maturity at 3 years with an average size of 718 mm (28 in.) while females reach maturity around 4 years with an average size of 819 mm (32 in.) (Beaumariage 1973). Both males and females grow rapidly early in life and show reduced growth rates beginning after the third year (Johnson et al, 1983). Females of the species typically live longer and can reach a larger maximum size of 1.4 m (4.6 ft.) as compared to 0.97 m (3.2 ft.) for males.

An estimate of absolute king mackerel population size in South Carolina waters is not available. Data reported from recreational (Fig. 1) and commercial (Fig. 2) fishing efforts show a decline in the number of pounds of king mackerel landed over a period of more than 20 years (1990-2012) (NMFS 2014).

The Coastal Survey, of SCDNR and the South Atlantic component of the Southeast Area Monitoring and Assessment Program (SEAMAP-SA), conducts a fishery-independent trawl survey in coastal near-shore waters from Cape Hatteras, NC down to Cape Canaveral, FL. Data from this survey document the presence of juvenille king mackerel throughout the range (Fig. 3). Average annual catch per tow has generally been highest in waters south of SC (GA and northeast FL), though southern NC waters and SC waters have each also yielded the highest catch rate multiple years. High variability in this data complicates analysis; however, the

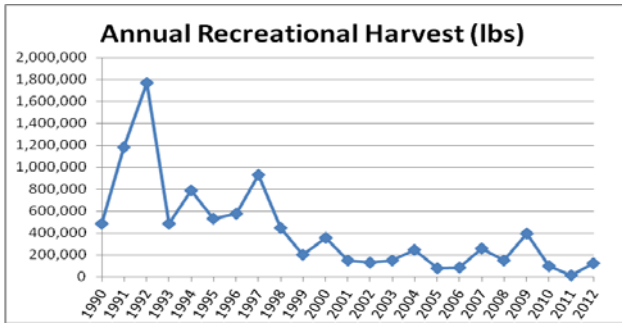

Fig. 1: Recreational harvest of King Mackerel landed in SC (1990-2012).
(Personal communication from NMFS, Fisheries Statistics Division Jan 14, 2014)

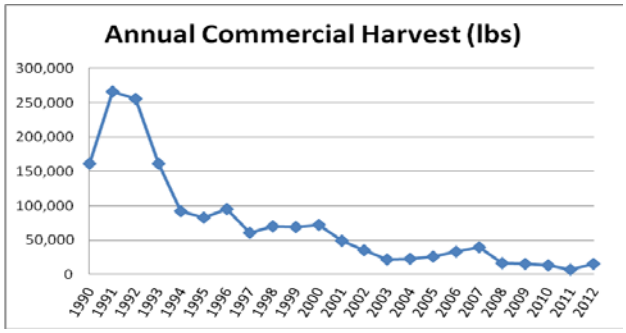

Fig. 2: Commercial harvest of King Mackerel landed in SC (1990-2012).
(Personal communication from NMFS, Fisheries Statistics Division Jan 14, 2014)

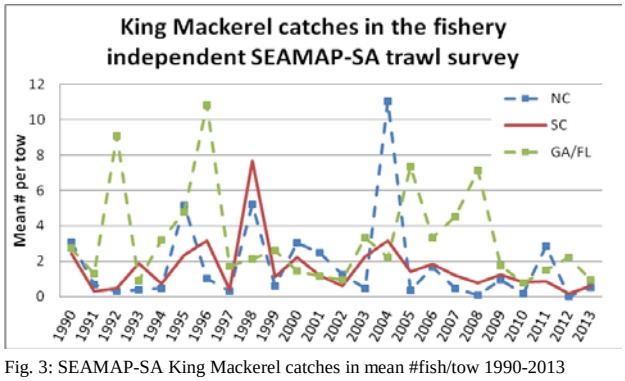

Fig. 3: SEAMAP-SA King Mackerel catches in mean #fish/tow 1990-2013
Data plotted for waters north of SC (NC), off SC (SC), and south of SC.
(SEAMAP-SA unpublished data)

overall trend across this time period (1990-2013) suggests a slight decline (SEAMAP-SA unpublished data).

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

King mackerel are epipelagic carnivores that inhabit offshore waters out to the continental shelf but will sometimes occur closer to shore near inlets (Berrien and Finan 1977). They prey on schooling finfish such as menhaden and anchovies as well as invertebrates including penaeid shrimp and squid (Godcharles and Murphy 1986). Spawning occurs in the coastal waters of the southeastern Atlantic and Gulf of Mexico with a protracted season that extends from May through October (Finucane, et al. 1986). Larvae are pelagic and found most commonly in the outer shelf region at depths of 41-200 meters (135-656 ft.). A concentration of larvae has been observed in the 32-33 degree latitudes in the vicinity of the Charleston Bump, suggesting that the upwelling created by this geologic feature provides an important spawning and nursery habit for these fish (Collins and Stender 1987).

CHALLENGES

King mackerel remain a popular commercial and recreational fish and subsequently are certain to experience continued fishing pressure from both of these sources. SAMFC does not currently consider stocks to be overfished. However, the council also acknowledged the absence of fishery-independent monitoring data for this species as a substantial challenge not only to the determination of appropriate management practices, but also to the establishment of meaningful future population benchmarks for stock assessment (SEDAR 2009).

King Mackerel populations also face challenges in the form of shifting climatic conditions. The most important of these include meteorologically significant seasonal weather patterns, e.g. historically cold winters, regionally significant climatological events (e.g. El Nino and La Nina events), and regionally significant summer upwelling events that are particular to the South Atlantic Bight located off South Carolina (Barile 2013). All of these phenomena result in lower sea surface temperatures which may alter king mackerel spawning and migration by limiting their northern range and forcing Atlantic stock further south into the Florida mixing zone where they overlap with Gulf of Mexico stock. This increased overlap may result in greater competition for resources within the mixing zone and consequently enhanced competitive pressure on both stocks.

CONSERVATION ACCOMPLISHMENTS

The Fishery Management Plan for Coastal Migratory Pelagic Resources has developed substantially throughout its history and has been amended many times since its introduction in 1982 (FMP 1983). Subsequent amendments have sought to enhance fish stocks through the restriction of particularly harmful fishing gear, including purse seines and drift gill nets which are no longer permitted in the fishery. Additional amendments provide Allowable Catch Limits (ACLs) for both commercial and recreational fishermen—which translate to daily bag limits and seasonal fishing quotas—and to licensing requirements for commercial fishermen and recreational charter boats. The plan also imposes seasonal restrictions to reduce potential impacts on mating and spawning opportunities for king mackerel. Further refinement of the plan through the amendment process has resulted in minimum size restrictions and efforts to reduce by-catch and waste within the fishery. Geographic management boundaries have also been expanded in an attempt to include as many members of the stock in management efforts as possible. The goal of

these efforts is to maintain healthy stocks of king mackerel by keeping ACLs below the determined Maximum Sustainable Yield (MSY) for the population as well as to optimize the age structure of the population resulting in a higher MSY. Conservation efforts have also focused on the identification and protection of essential fish habitat throughout the coast with the goal of enhancing recruitment of juvenile fish into the stock.

Fishery-independent catch and size data on the species has been collected through the SEAMAP-SA near shore trawl survey since 1989. A more detailed effort to collect age, reproduction, and diet data of king mackerel began in 2011 with goals of refining the understanding of age structure in survey catches, verifying size and age at maturity, and investigating the diet of juveniles along the Atlantic Coast of the Southeastern US, to better inform future stock assessments. While size, age, and maturity data are critical to proper generation of abundance indices, diet data is essential to describing trophic relationships and tracking energy flow—key to ecosystem level management, which is increasingly emphasized by fishery management plans.

Implementation in 1996 of by-catch reduction devices (BRDs) on shrimp trawls fished in the Exclusive Economic Zone (EEZ) of the southeastern US should be improving survivorship of juvenile king mackerel as BRDs have been demonstrated to reduce retention rates for this species in shrimp trawls (Watson et al. 1993).

CONSERVATION RECOMMENDATIONS

- Continue monitoring of commercial and recreational catches of king mackerel coupled with appropriately set ACLs that are maintained through enforceable regulation.
- Expand research and life history data collection from fishery-independent sources, particularly for adult fish which are rarely caught in current fishery-independent monitoring efforts.
- Enhance research efforts focused on king mackerel diet.
- Further investigation of migratory patterns through tagging and otolith micro-chemistry to better define Atlantic and Gulf stock boundaries as well as the area of seasonal overlap.

MEASURES OF SUCCESS

- Sufficient fishery-independent data is available to generate stock estimates with confidence.
- Diet data are available for all size classes for each managed area.
- The stock(s) can be clearly defined and identified.
- Estimates of abundance of age 1+ Atlantic stock fish increase.
- Estimate of spawning stock biomass (SSB) of Atlantic stock increases.
- Ideally, stock structure would improve to a point that calculations of maximum sustainable yield (MSY) result in total allowable catch (TAC) levels that can accommodate demand for commercial and recreational harvest.

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