Fishery Management Report

of the

Atlantic States Marine Fisheries Commission

DRAFT Interstate Fishery Management Plan for Black Drum

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For Board Review – Not intended for Public Comment

Interstate Fishery Management Plan for Black Drum

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Black Drum Plan Development Team

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This Plan was prepared under the guidance of the Atlantic States Marine Fisheries Commission's South Atlantic State/Federal Fisheries Management Board, Chaired by Dr. Louis Daniel of North Carolina and Aaron Podey of Florida. Technical and advisory assistance was provided by the Black Drum Technical Committee, the Black Drum Stock Assessment Subcommittee, the Law Enforcement Committee, and the South Atlantic Species Advisory Panel.

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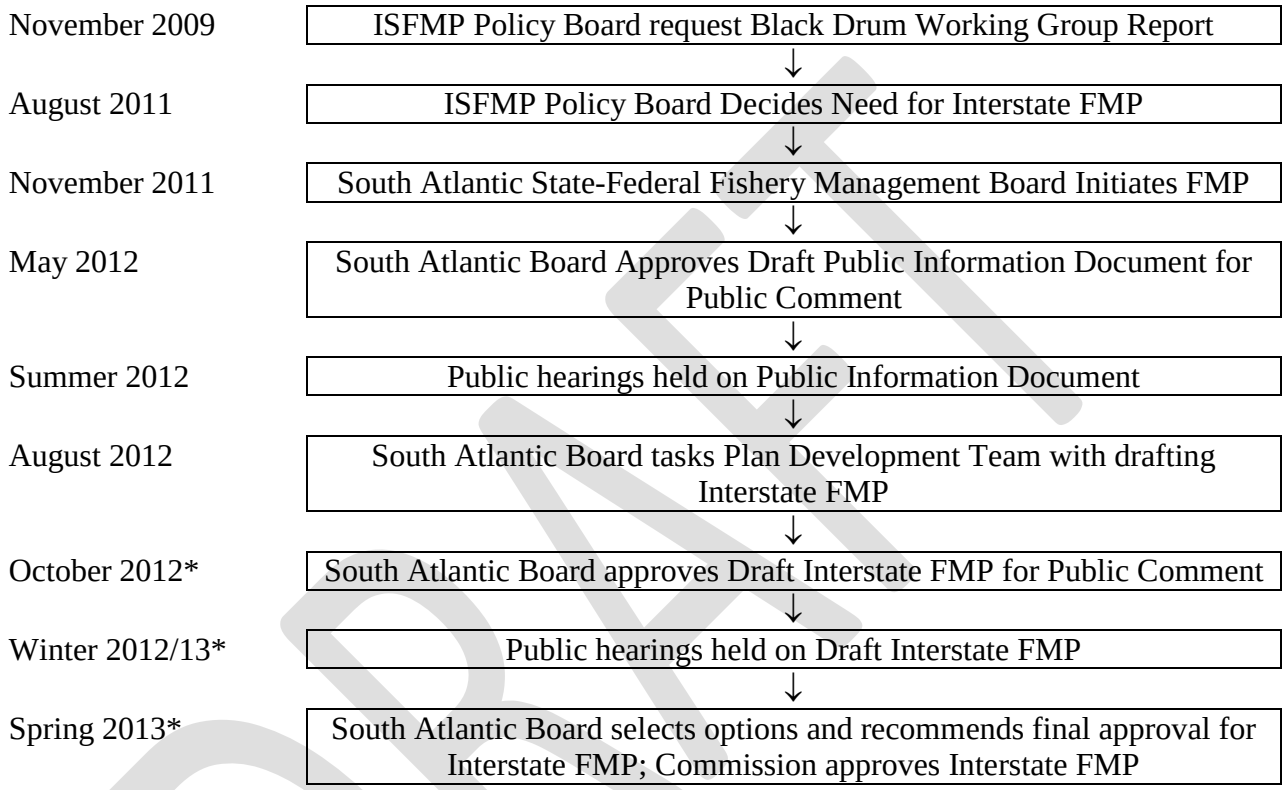
AMENDMENT PROCESS AND TIMELINE

In August 2011, the South Atlantic State/Federal Fisheries Management Board initiated the development of an interstate fishery management plan for black drum. This followed a report by the Black Drum Work Group to the Board on the status of biological and fisheries data, as well as policy recommendations. The diagram below depicts the Plan development process.



ACKNOWLEDGMENTS

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1. INTRODUCTION

1.1. Background Information

At the November 5th, 2009 meeting of the Interstate Fishery Management Program (ISFMP) Policy Board, Commissioners expressed an interest in determining the feasibility of developing a coastwide stock assessment and fishery management plan for black drum (*Pogonias cromis*). Concerns were raised because the status of the coastwide stock is unknown, and the black drum population may be vulnerable to fisheries directed at immature animals. Commission staff was tasked with contacting state biologists and identifying available fishery dependent and independent data sources for black drum along the Atlantic coast. Major data sources from New Jersey to Florida were summarized in a memo and presented to the Policy Board on February 3, 2010. Subsequently, the Board requested a more thorough data review from the state biologists as well as a recommendation on the feasibility of conducting a coastwide stock assessment. Given budget limitations, a data workshop was conducted via a series of webinars in spring 2011. The report was presented to the Policy Board at the August 2011 meeting and included the recommendation to initiate an interstate fishery management plan (FMP), although there were no immediate management or biological concerns. Upon review of the report, the Policy Board voted to initiate the FMP and assigned its development and administration to the South Atlantic State-Federal Management Board (Board), which administers the FMPs for red drum, Atlantic croaker, spot, spotted seatrout, and Spanish mackerel.

The Board initiated development of an FMP for black drum in November 2011 and approved the Public Information Document for public comment in May 2012. Public comment was received and hearings held in June and July of 2012, and the Board tasked the Plan Development Team (PDT) with developing a Draft FMP for Black Drum in August 2012.

1.1.1. Statement of the Problem

The black drum fishery is currently managed at the state level across its range in the United States. With the exception of North Carolina, state regulations have been implemented from New Jersey to Florida. As identified in the Public Information Document, there are four main reasons why the Board has considered black drum a species in which interstate management would benefit the fisheries. These include:

1. Tagging evidence suggests black drum migrate along the coast, and are thus an interstate species.
2. There is a lack of consistent coastwide regulations or management goals.
3. The targeted fishery in some areas may be on very young fish, which have yet to contribute to the population, and other areas may be more heavily targeting the established breeding stock.
4. An Interstate FMP establishes a management framework to address future concerns or changes in the fishery or population.

In the past years, harvest of black drum has increased substantially in both the commercial and recreational sectors. Although no trends indicated an immediate need for emergency action

(ASMFC 2011), a proactive approach to establishing an efficient management process allows for future changes to management, if needed.

1.1.2. Benefits of Implementation

1.1.2.1. Social and Economic Benefits

More sustainable management practices and policies for a long-lived species such as black drum can increase economic benefits and provide social stability in the fishing community while ensuring a fishery for future generations. Greater cooperation and uniform management measures among the states ensure that the conservation efforts of one state or group will not be undermined.

Historically, the commercial market has been local with residents the main end user for fillets and roe on the eastern shore of Virginia and Maryland during April and May (Jones et al. 1990), but little information exists on the current market. Continued availability of this local fair would be beneficial to local residents and fishermen.

Although the recreational season is short (April – June at most), it occurs before many other popular species are readily available, thus, supporting local business during that lull time (Jones and Wells 2001).

Setting forth coastwide management objectives will elucidate the potential differences between managing for maximum sustainable yield, as with most commercial fisheries, and managing for large, trophy fish, as may be desired within the black drum fishery. Increased production of larger fish occurs when fishing mortality is below the estimated maximum fishing mortality and when recruitment is high, whereas models are generally used in management to produce maximum sustainable biomass, sometimes at the expense of larger, recreationally-desired fish (Jones and Wells 2001). Agreement on management objectives may help to align management measures, balancing these potentially competing interests.

1.1.2.2. Ecological Benefits

Consistent management goals across jurisdictions can provide greater protections to a migratory stock. Black drum are long-lived (Murphy *et al*. 1998) and can have multiple opportunities to contribute to the population if allowed to reach older ages, which can be afforded by regulatory protections across the range of the population and age classes.

Jones and Wells (2001) modeled yield-per-recruit curves and found that, although black drum in the Chesapeake Bay were not likely subject to growth overfishing, black drum are vulnerable when heavy fishing is directed at young fish, which occurs in the southern portion of their range along the U.S. East Coast. Capture at young ages prior to maturity can also raise concerns for recruitment overfishing.

1.2. Description of the resource

1.2.1. Species Life History

Black drum, the largest members of the family Sciaenidae, can reach over 46" and 120 lbs. A long-lived fish, black drum can reach nearly 60 years of age (Murphy *et al*. 1998; Jones and Wells 1998; Campana and Jones 1998). Black drum are approximately 11”–14" at age 1, 15”–17" at age 2, and 19”–21" at age 3 (Murphy and Taylor 1989; Murphy and Muller 1995; Jones and Wells 1998). Jones and Wells (1998) found rapid growth until age 15, slowing by age 20. 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) (Joseph et al. 1964; Richards 1973; Silverman 1979). Females mature at age 4–6 years and are prodigious, multiple spawners. Jones and Wells (1998) concluded black drum add weight rapidly until approximately 6 years of age, near when maturity occurs. An average-sized female (13.4 lbs) may spawn 32-million eggs each year (Fitzhugh *et al.* 1993). Recruitment appears to be sporadic, with infrequent large events (Murphy and Muller 1995).

Black drum are primarily bottom feeders. Young black drum feed on small fish and invertebrates, such as copepods, annelids, and amphipods (Pearson 1929; Thomas 1971). Larger black drum in Texas estuaries eat mostly mollusks, crabs, and shrimps (Miles 1949).

Black drum eggs and larvae were shown to be subject to predation by ctenophores and hydromedusae in the Chesapeake Bay (Cowan et al. 1992), with potentially very high levels of predation during years where both predators had high abundances. As juveniles, black drum are prey to a wide range of estuarine piscivores (e.g., spotted seatrout, crevalle jack). Larger drum are probably subject to predation by sharks (Murphy and Muller 1995).

The range of black drum extends along the nearshore western Atlantic coast from the Gulf of Maine to Florida, into the Gulf of Mexico, and as far south as Argentina. Atlantic coast black drum conduct an age-specific inshore migration northward in the spring and southward in the fall (Jones and Wells 2001). Gold and Richardson (1991) suggested that there was little differentiation into subpopulations in U.S. waters; however, later work (Gold and Richardson 1998) emphasized a significant degree of clinal variation among black drum *mt*DNA haplotypes along the U.S. Gulf of Mexico coast, correlating with the isolation-by-distance model. Work by Rooker et al. (2004) on strontium concentrations deposited in otoliths supported movement into lower-salinity, estuarine environments during early life stages, followed by movement into more saline, oceanic conditions when older.

1.2.2. Stock Assessment Summary

There has not yet been a coastwide stock assessment on the black drum population. State stock assessments have been performed in Florida (1995). Murphy and Taylor (1989) qualitatively assessed the black drum life history and suggested the species was inadequate for an intensive or moderate fishery. They stated the long life-span of black drum suggests a low natural mortality rate and low surplus production, leaving little room for fishery removals. They predicted moderate levels of fishing could reduce abundance and truncate the age classes that make up the

spawning population. Both low and moderate levels of fishing, they noted, could lead to growth and recruitment overfishing, respectively.

For a coastwide stock assessment, it is important to identify the stock boundaries, as subpopulations may harbor important variations in phenotypes like growth or maturity rate, fecundity or disease resistance (Stepien 1995).

1.2.3. Abundance and Present Condition

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. Surveys with the best potential to track regional stock trends are the Delaware Bay Trawl Survey (juveniles), the Maryland Coastal Bays Seine Survey (juveniles), the North Carolina Independent Gill Net Survey (Program 915), the South Carolina trammel net survey (primarily juveniles), the Georgia Trammel Net Survey, the Northeast Area Monitoring and Assessment Program (NEAMAP), and Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMap). 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.

Past studies, such as Murphy and Muller (1995), predicted the stock was in good shape as of the mid-1990s, with low fishing mortality. Although Jones and Wells (1998, 2001) did not capture animals ages 1-5 in their estimation of age, implying either sustained failed recruitment or movement of these ages of animals out of the Chesapeake Bay, Murphy and Taylor's (1989) ageing work suggested less than 20% of the sampled animals were greater than four years old. Jones and Wells (1998) concluded, by looking at other older studies of the Chesapeake Bay that also did not sample young black drum (Frisbie 1961; Richards 1973), movement of these ages out of the Chesapeake Bay, and possibly to the southern areas like Florida, is likely.

1.3. Description of the Fishery

1.3.1. Commercial Fishery

Coastwide commercial landings of black drum reported by NMFS averaged approximately 368,000 lbs in the 1950s and 60s, then declined to an average of approximately 211,000 lbs in the 1970s and 80s (Figure 1). Since 1990, landings have slowly increased to an average of approximately 270,000 lbs. Since 2000, the majority of black drum harvested coastwide are landed in North Carolina and Virginia. A smaller portion of the coastwide black drum harvest is landed in Delaware, Florida, New Jersey, and Maryland. Landings reported from South Carolina are generally low and indicative of reported bycatch rather than a targeted fishery. Georgia, New York, Connecticut, Rhode Island, and Maine occasionally report small amounts of black drum landings as well; however, the magnitude of these landings is so small that the total annual state landings records are confidential. In recent years, gill nets and pound nets, similar to red drum commercial catches, have been the primary gear used coastwide (Table 1).

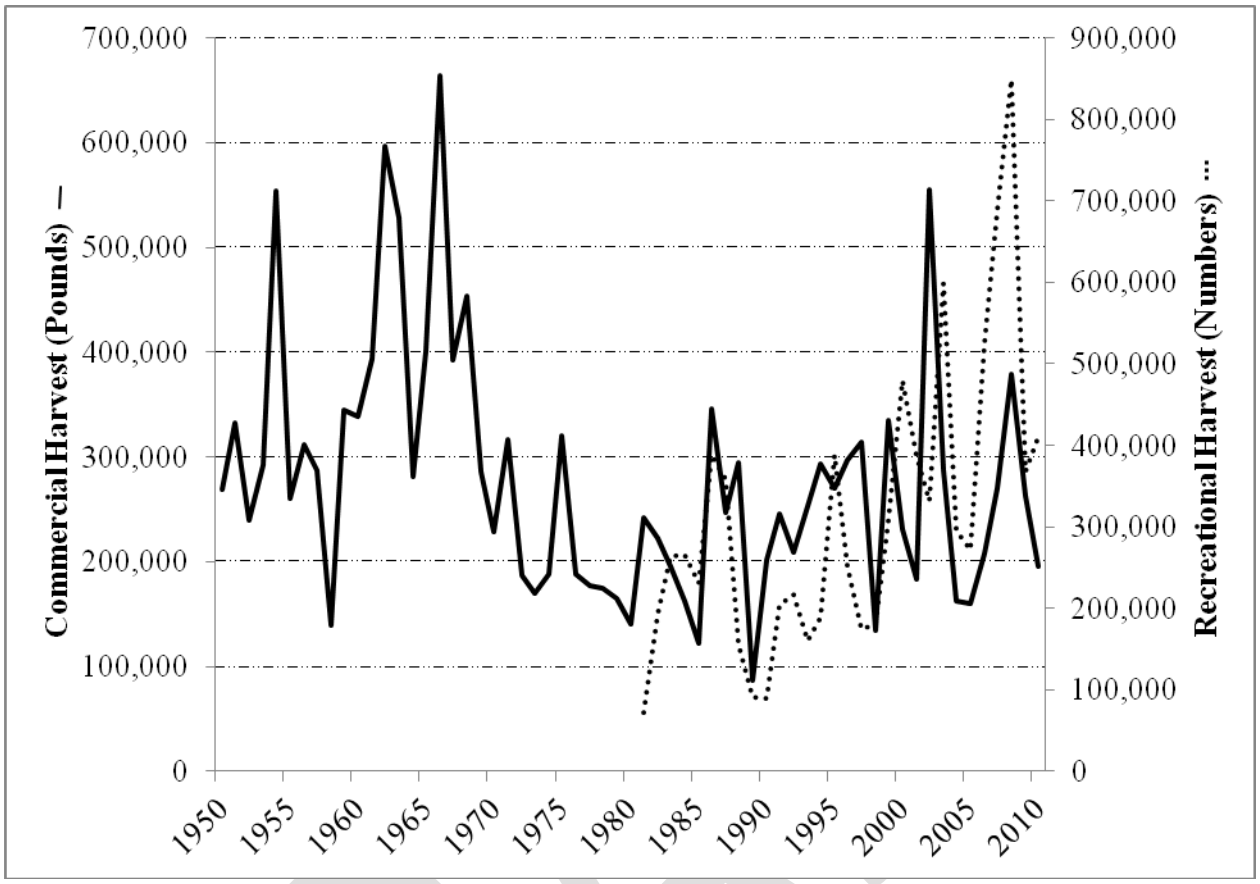

Figure 1. Commercial (pounds) and recreational (numbers of fish) harvest of black drum since 1950 and 1981, respectively (Personal Communication from the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD).

Table 1. Commercial harvest by gear type from 2000-2011 (Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD).

Gear	Harvest lbs (2000-2011)
Gill nets	1,944,836
Pound Nets	560,644
Otter Trawl - Bottom	140,787
Hand Lines	128,638
Haul Seines	109,294
Long Lines	64,639
Cast Nets	34,250
Not Coded	28,129
Pots and Traps	10,995
Spears	6,889
Rod and Reel	6,054
Combined Gears	3,099
Dredge	923
Otter Trawl - Midwater	556
Hand	394
Fyke and Hoop Nets	126
Dip Nets	108
Diving outfits	37
Beam Trawls	28

1.3.2. Recreational Fishery

Recreational harvest of black drum has increased along the Atlantic coast in the last decade (Figure 1). In 2009-2011, harvest was down from the time series peak observed in 2008. Although New Jersey, Delaware, Virginia, Georgia, and Florida have experienced apparent increases in black drum harvested by anglers, the majority of the recent coastwide increase in harvest comes from North Carolina (Figure 2); increased harvest in South Carolina also occurred until harvest restrictions were enacted in 2007. Florida and North Carolina fisheries comprise the majority of black drum harvested recreationally along the Atlantic Coast (Figure 2). Uncertainty in MRIP estimates, represented by average proportional standard error (PSE), generally decreased from north to south but remained high (> 20%) at the state level for all states except Florida (Figure 3). Length distribution information from MRIP is limited and likely unreliable. One concern with MRIP estimates of weight and length is that black drum angling in some states (e.g., Delaware) is conducted during the evenings and nighttime. If these times of day are not adequately sampled, as has been the case with the previous MRFSS protocol, dockside intercept samples may not be representative of the population. Also, black drum seasons in some states (e.g., Maryland and Virginia) are of short duration, so the number of angler intercepts during these time periods may not be adequate to characterize these pulse fisheries.

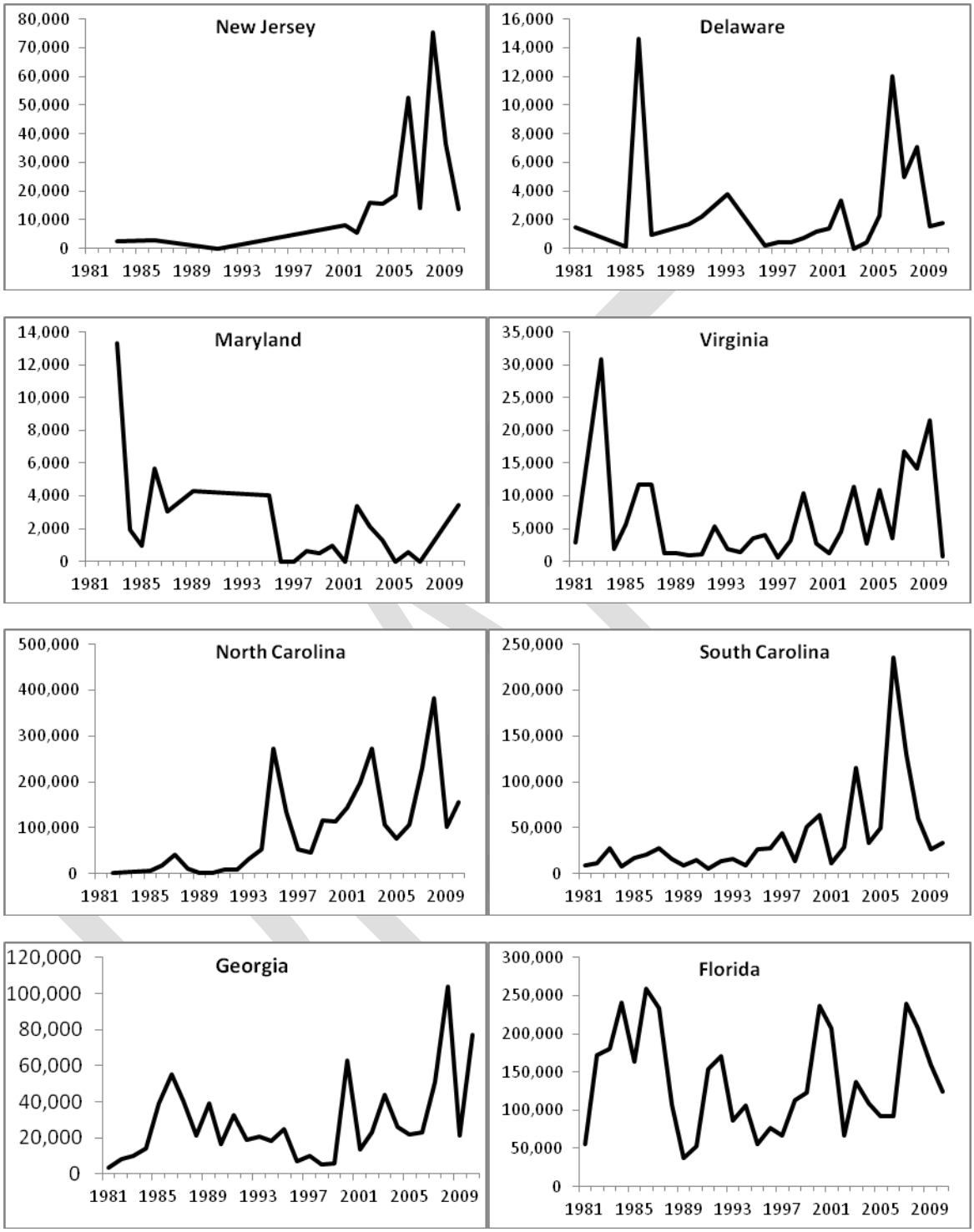

Figure 2. State trends in estimated recreational harvest (Type A + B1; in numbers) of black drum from 1981-2010 (MRIP, June 2011). Note differences in scale.

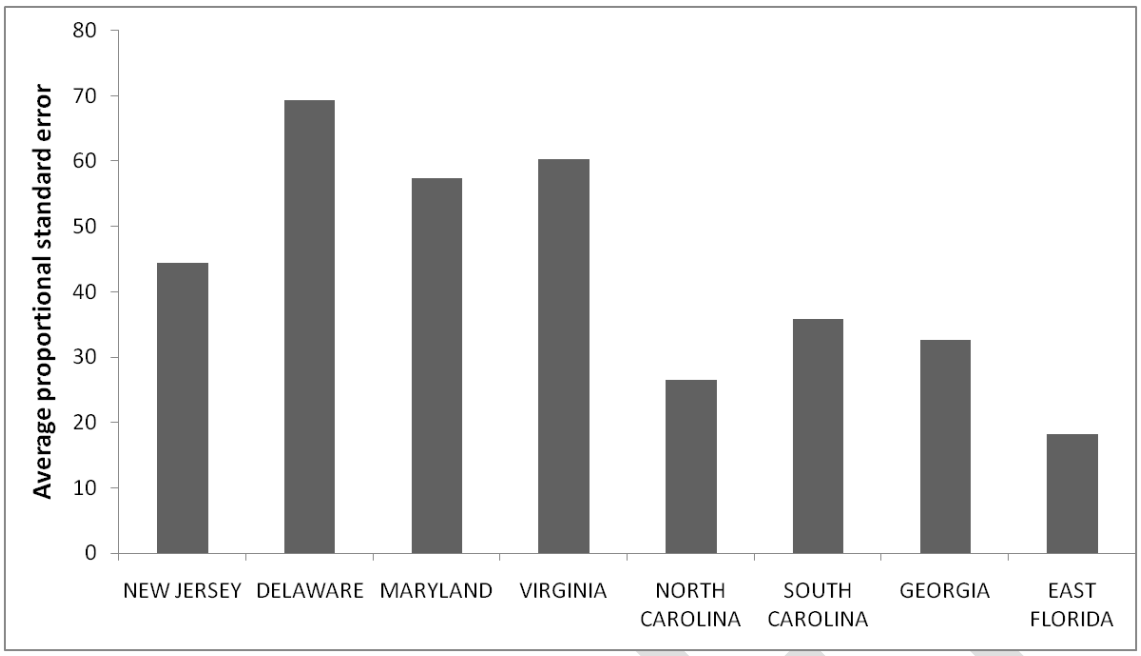

Figure 3. Average proportional standard error (PSE) of black drum harvest estimates by state from 1981-2010 (MRIP, June 2011).

1.3.3. Subsistence Fishery

Although many recreational anglers will catch black drum for their own consumption, there is some aversion to eating black drum. Large animals tend to have large pockets of worms. Although anecdotal accounts convey these pockets can be easily removed, the large presence of worms deters some fishermen from consuming black drum. Fishermen who target or are required to target, via regulation, smaller animals do not generally encounter these pockets of worms. Beyond the recreational aspect, there is no known subsistence fishery for black drum.

1.3.4. Non-Consumptive Factors

No non-consumptive factors were identified that were of significance to the black drum resource.

1.3.5. Interactions with Other Fisheries, Species, or Users

Unlike its relatives within the drum family, such as Atlantic croaker and spot, the black drum fishery tends to be a targeted fishery with little bycatch (J. Zimmerman, pers. comm.) in the northern range. In the southern range, fishing for black drum often coincides with other targeted species, such as sheepshead (T. Roller, pers. comm.). Large black drum have occasionally been caught in shrimp trawls off the Atlantic coast, although this is not a frequent occurrence (Murphy and Muller 1995).

Behavioral characteristics of black drum can make them highly susceptible to fishing, as they school up for spawning in the spring and can be easily captured by encircling gear (run-around gill nets, trammel nets, purse seines). Off the Gulf coast of Florida, historical adult black drum

purse seine catches had been estimated to be as great as 120,000 lbs. Off northeast Florida, shrimp trawlers historically made large catches of adults during the spring (Murphy and Taylor 1989).

Juveniles are likely prey for a wide range of estuarine species, including spotted seatrout and jack crevalle. Larger drum are likely susceptible to shark predation (Murphy and Muller 1995), although their size likely lends protection against predation by most species.

1.4. Habitat Considerations

1.4.1. Habitat Important to the Stocks

1.4.1.1. Description of the Habitat

Spawning: Black drum spawn from April to June in the northern range (Joseph et al. 1964; Richards 1973; Silverman 1979). Spawning occurs in the mouth of the Chesapeake Bay and seaside inlets on the Eastern shore (Chesapeake Bay Program 2004). The presence of a large spring/early summer fishery on spawners during this time period in the Delaware Bay also supports evidence of spawning occurring inshore and in the spring. Evidence in Florida suggests spawning occurs in deep waters inshore, from November through April, with peaks in February and March (Murphy and Taylor 1989). As in the northern range, these peaks in spawning had corresponded with peaks in Florida's catch (Murphy and Muller 1995).

Fitzhugh et al. (1993) noted the difference in sex ratios in Louisiana during the spawning season between fish caught offshore by trawls (dominated by males), and fish caught inshore by gillnet and haul-seines (dominated by females). These same skewed sex ratios were not found before or after the spawning period. The authors concluded the catches reflected a true segregation of the sexes during the spawning period, suggesting the use of different habitats.

Larval: Larval black drum tend to stay in the salt marshes and estuaries (ASMFC 2011). Peters and McMichael (1990) reported black drum larvae in the bays of Florida, where salinities ranged from 22 – 30 I. They found these larvae primarily feeding on copepods. Gold and Richardson (1998) characterized black drum as estuarine-dependent in the early years. Work by Rooker et al. (2004) on strontium concentrations deposited in otoliths supported movement into lower-salinity, estuarine environments during early life stages.

Young-of-year: Gill net sampling in Florida nearshore lagoons found high levels of young-of-the-year , indicating young-of-year black drum remain inshore. Gold and Richardson (1998) characterized black drum as estuarine-dependent in the early years for use in genetic studies. Work by Rooker et al. (2004) on strontium concentrations deposited in otoliths supports movement into lower-salinity, estuarine environments during early life stages.

Juvenile: Black drum juveniles have been found in salt marshes and estuaries along the coast, suggesting these areas serve as nurseries for larvae up to juveniles (ASMFC 2011; Murphy and Muller 1995; Pearson 1929). Beach seine sampling in Florida nearshore lagoons found high levels of juveniles , indicating juvenile black drum remain inshore. Juveniles can tolerate a wide

range of salinities and temperatures but have often been found, in Florida, in low to medium salinities and over unvegetated mud bottoms (Peters and McMichael 1990). As juveniles grow, they range into higher salinity areas, more similar to adult habitat (Rooker et al. 2004). Small juveniles primarily feed on amphipods, mollusks, polychaetes, and small fish (Peters and McMichael 1990). As juveniles grow, Peters and McMichael (1990) found their consumption of shrimp, crabs, fish, and mollusks became more dominant, with the crossover correlating with the development of pharyngeal molars. Richards (1973) correlated juvenile muddy, nutrient rich, marsh habitat during the first three months to rapid growth.

Murphy and Taylor (1989) noticed the capture of small drum throughout the year by recreational and commercial fishermen in Florida's nearshore areas, suggesting year-round occupation of these nearshore estuarine to marine habitats.

Adult: Evidence suggests adults are euryhaline, although high salinities tend to cause stress as do sudden drops in temperature (Simmons and Breuer 1962). Adults move between estuaries and nearshore shelf waters, although they tend to move to deeper channel areas as they grow and mature (ASMFC 2011). Evidence suggests an age-specific migration in the Mid-Atlantic: northward and inshore in the spring; southward and offshore in the fall (Jones and Wells 2001). Mollusks, decapods, fishes, and annelids dominate the diet for adults (Murphy and Muller 1995).

Black drum move offshore at sexual maturity and form large, offshore schools that can migrate extensively (Matlock 1987; Murphy and Taylor 1990; Simmons and Breuer 1962). Work by Rooker et al. (2004) on strontium concentrations deposited in otoliths supports movement into more saline, oceanic conditions when older.

1.4.1.2. Identification and Distribution of Habitat and Habitat Areas of Particular Concern

The following section is adapted from the Amendment 2 to the Red Drum FMP

Habitat Areas of Particular Concern (HAPCs) are defined by the Atlantic States Marine Fisheries Commission as areas within the species habitat which satisfy one or more of the following criteria: (1) provide important ecological function, (2) are sensitive to human-induced environmental degradation, (3) are susceptible to coastal development activities, or (4) are considered to be rarer than other habitat types. For black drum, this includes the following habitats: tidal freshwater, estuarine emergent vegetated wetlands (flooded saltmarshes, brackish marsh, and tidal creeks), estuarine scrub/shrub (mangrove fringe), submerged rooted vascular plants (sea grasses), oyster reefs and shell banks, unconsolidated bottom (soft sediments), ocean high salinity surf zones, and artificial reefs. These areas overlap with the designated HAPCs for red drum, designated in Amendment 2 to the Red Drum Fishery Management Plan (ASMFC 2002). These HAPCs include all coastal inlets, all state-designated nursery habitats (i.e. Primary Nursery Areas in North Carolina), sites where spawning aggregations of red drum have been documented and spawning sites yet to be identified, areas supporting submerged aquatic vegetation (SAV), as well as barrier islands off the South Atlantic states as they maintain the estuarine environment in which young black drum develop.

A species' primary nursery areas are indisputably essential to its continuing existence. Primary nursery areas for black drum can be found in estuaries, such as coastal marshes, shallow tidal creeks, bays, tidal flats of varying substrate, tidal impoundments, and seagrass beds. Since young black drum move among these varying environments, it is impossible to designate specific areas as deserving more protection than others. Moreover, these areas are not only primary nursery areas for black drum, but they fulfill the same role for numerous other resident and estuarine-dependent species of fish and invertebrates.

Similarly, juvenile black drum habitat extends over a broad geographic range and adheres to the criteria that define HAPCs. Juvenile black drum are found throughout tidal creeks and channels of southeastern estuaries, in backwater areas behind barrier islands and in the front beaches during certain times of the year. It is during this period that juveniles begin moving between low and higher salinity areas (Rooker et al. 2004). Therefore, the estuarine system as a whole, from the lower salinity reaches of rivers to the mouth of inlets, is vital to the continuing existence of this species.

Prior to transfer of management authority for red drum from the South Atlantic Fishery Management Council to ASMFC, the SAFMC reviewed the Essential Fish Habitat (EFH) and HAPC designations for red drum. The SAFMC concluded the EFH and HAPCs would still be protected, as similar areas had been designated for other federally managed species. As a result, these areas, which serve an important role in the black drum life cycle, have retained protection and are referenced here and in the Amendment 2 to the Red Drum FMP (ASMFC 2002).

The designated EFH includes tidal freshwater, estuarine emergent vegetated wetlands (flooded salt marsh, brackish marsh, and tidal creeks), estuarine scrub/shrub (mangrove fringe), submerged rooted vascular plants (seagrass), oyster reefs and shell banks, unconsolidated bottom (soft sediment), ocean high salinity surf zones, and artificial reefs (SAFMC 1998). The area covered ranges from Virginia through the Florida Keys, to a depth of 50 m offshore.

1.4.1.3. Present Condition of Habitats and Habitat Areas of Particular Concern

The following section is adapted from the Amendment 2 to the Red Drum FMP

Coastal Spawning Habitat: Condition and Threats
It is reasonable to assume that areas where coastal development is taking place rapidly, habitat quality may be compromised. Coastal development is a continuous process in all states and all coastal areas in the nation are experiencing significant growth. The following section describes particular threats to the nearshore habitats in the South Atlantic that meet the characteristics of suitable spawning habitat for black drum.

One threat to the spawning habitat for black drum is navigation and related activities such as dredging and hazards associated with ports and marinas. According to the SAFMC (1998), impacts from navigation related activities on habitat include direct removal/burial of organisms from dredging and disposal of dredged material, effects due to turbidity and siltation; release of contaminants and uptake of nutrients, metals and organics; release of oxygen-consuming substances, noise disturbance, and alteration of the hydrodynamic regime and physical

characteristics of the habitat. All of these impacts have the potential to substantially decrease the quality and extent of black drum spawning habitat.

Besides creating the need for dredging operations that directly and indirectly affect spawning habitat for black drum, ports also present the potential for spills of hazardous materials. The cargo that arrives and departs from ports includes highly toxic chemicals and petroleum products. Although spills are rare, constant concern exists since huge expanses of productive estuarine and nearshore habitat are at stake. Additional concerns related to navigation and port utilization are discharge of marine debris, garbage and organic waste into coastal waters.

Maintenance and stabilization of coastal inlets is of concern in certain areas of the southeast. Studies have implicated jetty construction to alterations in hydrodynamic regimes thus affecting the transport of larvae of estuarine-dependent organisms through inlets (Miller *et al*. 1984; Miller 1988).

Estuarine Spawning, Nursery, Juvenile and Subadult Habitat: Condition and threats
Coastal wetlands and their adjacent estuarine waters constitute primary nursery, juvenile and sub-adult habitat for black drum along the coast. Between 1986 and 1997, estuarine and marine wetlands nationwide experienced an estimated net loss of 10,400 acres. However, the rate of loss was reduced over 82% since the previous decade (Dahl 2000). Most of the decline resulted from urban and rural activities and the conversion of wetlands for other uses. Along the southeast Atlantic coast, the state of Florida experienced the greatest loss of coastal wetlands due to urban or rural development (Dahl 2000). However, the loss of estuarine wetlands in the southeast has been relatively low over the past decade although there is some evidence that invasion by exotic species, such as Brazilian pepper (*Schinus terebinthifolius*), in some areas could pose potential threats to fish and wildlife populations in the future (T. Dahl, pers. comm.).

Throughout the coast, the condition of estuarine habitat varies according to location and the level of urbanization. In general, it can be expected that estuarine habitat adjacent to highly developed areas will exhibit poorer environmental quality than more distant areas. Hence, environmental quality concerns are best summarized on a watershed level.

Threats to estuarine habitats of the southeast were described in Amendment 2 to the Red Drum FMP (ASMFC 2002). Due to the black drum's dependence on estuarine habitats throughout its early years, these same threats are likely to impact black as well as red drum.

Nutrient enrichment of estuarine waters throughout the southeast is a major threat to the quality of estuarine habitat. Forestry practices contribute significantly to nutrient enrichment in the southeast. Areas involved are extensive and many are in proximity to estuaries. Urban and suburban developments are perhaps the most immediate threat to black drum habitat in the southeast. The almost continuous expansion of ports and marinas in the South Atlantic poses a threat to aquatic and upland habitats. Certain navigation-related activities are not as conspicuous as port terminal construction but have the potential to significantly impact the estuarine habitat upon which black drum depend. Activities related to watercraft operation and support pose numerous threats including discharge of pollutants from boats and runoff from impervious surfaces, contaminants generated in the course of boat maintenance, intensification of existing

poor water quality conditions, and the alteration or destruction of wetlands, shellfish and other bottom communities for the construction of marinas and other related infrastructure.

Estuarine habitats of the southeast can be negatively impacted by hydrologic modifications. The latter include activities related to aquaculture, mosquito control, wildlife management, flood control, agriculture and silviculture. Also, ditching, diking, draining and impounding activities associated with industrial, urban and suburban development qualify as hydrologic modifications that may impact the estuarine habitat. Alteration of freshwater flows into estuarine areas may change temperature, salinity and nutrient regimes as well as alter wetland coverage. Studies have demonstrated that changes in salinity and temperature can have profound effects in estuarine fishes (Serafy *et al*. 1997) and that salinity partly dictates the distribution and abundance of estuarine organisms (Holland *et al*. 1996). Hence, black drum are probably as susceptible as any other estuarine organism to such changes in the physical regime of their environment.

Adult Habitat: Condition and Threats
Threats to the black drum's adult habitat are not as numerous as those faced by postlarvae, juveniles and subadults in the estuary and coastal waters. Threats to the nearshore and offshore habitats that adult black drum utilize in the South Atlantic include navigation and related activities, dumping of dredged material, mining for sand and minerals, oil and gas exploration, offshore wind facilities, and commercial and industrial activities (SAFMC 1998).

An immediate threat is the sand mining for beach nourishment projects. Associated threats include burial of bottoms near the mine site or near disposal sites, release of contaminants directly or indirectly associated with mining (i.e. mining equipment and materials), increase in turbidity to harmful levels, and hydrologic alterations that could result in diminished desirable habitat.

Offshore mining for minerals may pose a threat to black drum habitat in the future. Currently, there are no mineral mining activities taking place in the South Atlantic. However, various proposals to open up additional areas off the Atlantic coast to seabed mining have been introduced by the Federal Executive and Legislative branches.

Offshore wind farms may also pose a threat to black drum habitat in the future. Currently, there are no offshore wind farms established in the United States. However, the Atlantic coast is a potential candidate for future wind farm sites.

1.5. Impacts of the Fishery Management Program

1.5.1. Biological and Environmental Impacts

Adoption of coastwide management measures can provide protection to various size classes of black drum. Limits on catch can provide additional protection throughout its geographic range and support a sustained population and thus fishery.

Concerns about the fishery in the Chesapeake Bay Black Drum FMP (Chesapeake Bay Program 2004) cited a decline of citation-size fish and long-term fluctuations in population abundance, although a lack of accurate catch and effort data for the mid-Atlantic black drum fishery made it impossible to determine whether these changes were a result of natural variation in dominant year classes or over exploitation and population decline. Jones and Wells (2001) concluded from yield-per-recruit analyses that growth overfishing in Chesapeake Bay, where the majority of the catch is older fish, is not likely occurring.

1.5.2. Social Impacts

Regulatory changes in fisheries have social impacts. When regulations are created or made more restrictive on a fishery by way of size and bag limits, area closures, or season closures, ultimately the dynamic of the fishing regimen will change. For instance, areas once fished by locals and tourists alike may close, causing a shift in fishing location and thus a shift in lodging, fuel purchases, food consumption at local restaurants, etc., away from that economy. Regulatory changes though have positive social impacts as well, though many times, these impacts are seen in the future and not immediately. Regulations are put in place so a fishery may continue to be sustainable or recover to a sustainable level. This in turn increases fishing opportunities into the future and may bring people into these local areas, benefitting the economy.

Following are some considerations that could be used for assessments of social and economic impacts in the future.

There is very little information on fishermen, fishing-dependent businesses, or communities that depend on the black drum fisheries. In order to understand the impact that any new rules and regulations may have on participants in the any fishery, in-depth community profiles need to be developed that will aid in the description of communities, both present and historical, involved in a fishery. Limited social science research has been conducted by NMFS in communities in the South Atlantic. Until more research is completed, and in-depth community profiles are developed for sample communities, it is not possible to fully describe the possible impacts of any change in fishing regulations on any fishery.

While not an in-depth ethnographic study, a project employing rapid assessment was completed to document the location, type and history of fishing communities in the South Atlantic region. South Atlantic Fishery Management Council staff worked collaboratively with the University of Florida to describe fishing communities in a broad manner (for example, whether the community is characterized mostly by commercial fishing, for-hire, recreational or some combination of all sectors), and link on-the-ground fieldwork with the collection of as much secondary data as possible. The secondary data included U.S. Census records, landings, permits, and state information. All of this information is used to form a baseline dataset to assist in the measurement of social and economic impacts. [1]

1 Jepson, M., K. Kitner, A. Pitchon, W.W. Perry, and B. Stoffle. 2006. Potential fishing communities in the Carolinas, Georgia, and Florida: An effort in baseline profiling and mapping. SAFMC and NMFS-SERO, Fisheries Social Science Branch.

1.5.2.1. Recreational Fishery

The recreational sector of the black drum fishery is much larger than the commercial sector and black drum is an important species for recreational anglers and the for-hire sector. MRIP estimates indicate that the private recreational sector is the dominant component of the black drum recreational fishery (Figure 4), and most landings are associated with New Jersey, Virginia and Florida in recent years.

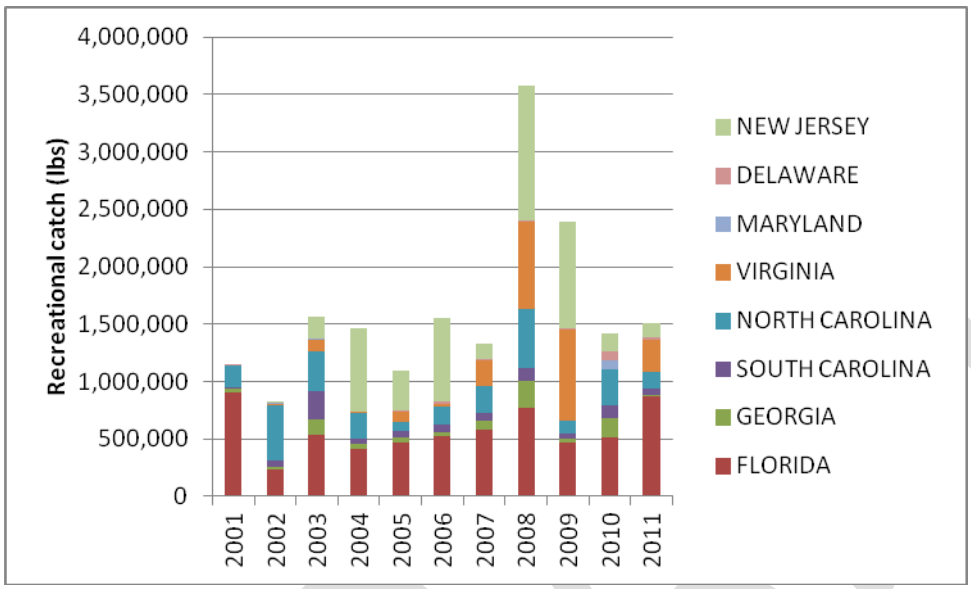

Figure 4. Recreational catch estimates for black drum for the private recreational (private/rental boats and land-based). Data source: MRIP.

Establishment of the black drum FMP would not be expected to impact the recreational sector at this time, but similar to the commercial sector, changes in access to other fisheries through regulations or availability may increase the importance of black drum to the for-hire fleet and private anglers. Specifically it is likely that impacts would be the most significant for recreational fishermen and for-hire businesses in New Jersey, Florida, and Virginia. Implementation of future management measures for black drum could result in reduced participation of recreational anglers, and may affect for-hire businesses that depend on access to black drum. However, the FMP would also allow management to maintain stock health and recreational participation, in addition to consistency in regulations between all states.

1.5.2.2. Commercial Fishery

Virginia instituted limited entry in its commercial fishery in 1994 (Chesapeake Bay Program 2004). Maryland closed its commercial fishery in the Chesapeake Bay and coastal bays and tributaries beginning in 1999, and limited total allowable catch from the Atlantic side to 1500 pounds. The Potomac River Fisheries Commission adopted a one fish, 16” size limit for commercial (and recreational) fisheries. Florida set regulations for its black drum commercial fishery in 1989, creating a minimum size limit of 14 inches and a maximum size limit of 24 inches with a vessel limit of 500 pounds per day.

Historically, the commercial market has been local with residents the main end user for fillets and roe on the eastern shore of Virginia and Maryland during April and May (Jones et al. 1990). Continued availability of this local fair would be beneficial to local residents and fishermen.

The black drum commercial fishery has a lower level of landings and economic value relative to other commercial fisheries in the Atlantic region. Landings are primarily in North Carolina and Virginia, although Florida, New Jersey, Maryland and Delaware also have reported landings in recent years (Figure 5).

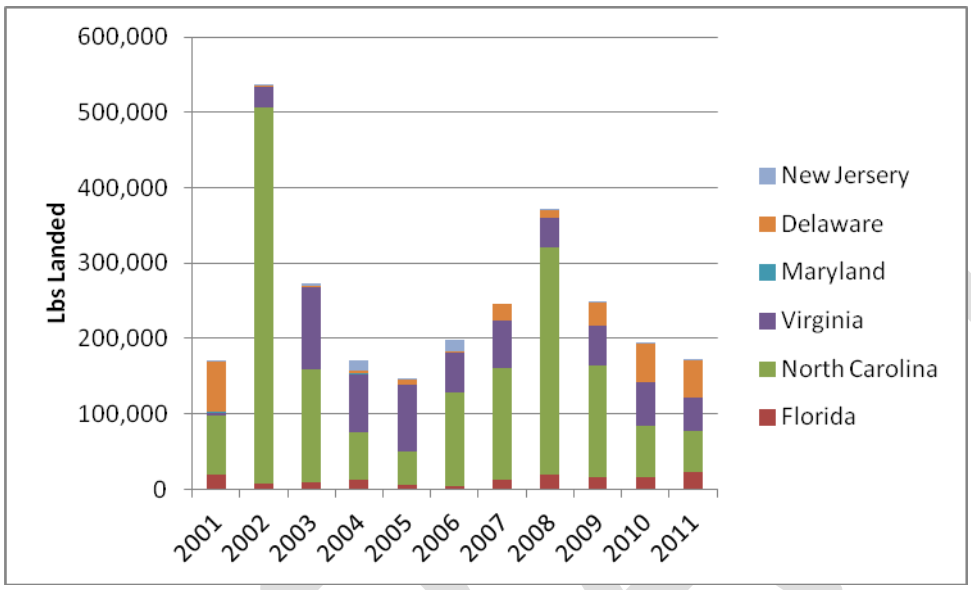

Figure 5. Black drum commercial landings. Data source: ACCSP.

In North Carolina, a majority of commercial landings of black drum are reported in Dare, Carteret, Hyde, and Pamlico Counties, and most harvest is with gillnet and fixed net. Accomack and Northampton Counties make up most of Virginia's reported landings, and almost all landings are with gillnet. While gillnets are the dominant gear type for harvest, hook and line, dip nets, and cast nets are also used to catch black drum in other states (ACCSP, confidential dealer reports).

Many commercial fishermen in these areas fish multiple fisheries and target different species throughout the year based on regulations, availability, and market demand. It is likely that fishermen who harvest black drum will switch fisheries as needed, and participation in the fishery may be a minimal component of the income for the commercial fleet. In general, establishment of the black drum FMP would not be expected to result in negative impacts on commercial fishermen and associated communities and businesses at this time. However, as new regulations in other commercial fisheries are implemented, specifically lower catch limits, limited entry programs or catch share programs, and other management measures, the black drum commercial fishery may become more important if access to other fisheries is restricted.

Establishment of the black drum FMP would be expected to produce broad social benefits for the commercial sector. Management measures implemented to address changes in the stock, effort,

or other factors that may impact the fleet could minimize risk of overfishing of black drum. Interstate management of the migratory stock will also benefit the commercial sector through consistent management measures along the Atlantic coast.

1.5.2.3. Subsistence Fishery

Although many recreational anglers will catch black drum for their own consumption, there is some aversion to eating black drum. Large animals tend to have large pockets of worms. Although anecdotal accounts convey these pockets can be easily removed, the large presence of worms deters some fishermen from consuming black drum. Fishermen who target or are required to target, via regulation, smaller animals do not generally encounter these pockets of worms. Beyond the recreational aspect, there is no known subsistence fishery for black drum.

1.5.2.4. Non-consumptive Factors

No non-consumptive factors were identified that were of significance to the black drum resource.

1.5.3. Economic Impacts

1.5.3.1. Recreational Fishery

Desfosse (1987) reported the recreational fishery on black drum to be important to Virginia, with the need to set a catch limit so as to protect the fishery for years to come. He reported large support across the charter and recreational participants for a limit on the recreational and the commercial fisheries.

Black drum recreational fishing contributes to the tourism industry on the Eastern Shore of Virginia (Chesapeake Bay Program 2004). Although the recreational season is short (April – June at most), it occurs before more popular fish enter the Chesapeake Bay, supporting local business during that lull time (Jones and Wells 2001).

Black drum are an important species in the complex of recreational species targeted or caught by anglers in the mid-Atlantic and South Atlantic region. Fisheries Economics of the U.S. 2009,[2] shows that in these two regions combined, recreational fishing resulted in trip and durable equipment expenditures of $9.3 billion. In addition to the economic impacts created by angler spending on recreational fishing, the fishing activity creates net economic benefits to participating fishermen. Several studies on this economic value of recreational value have been conducted in the mid-Atlantic and South Atlantic (McConnell and Strand 1994; Whitehead et al. 2000), but none estimate the specific value for black drum fishing.

Although the recreational season is short, it occurs before more popular fish enter the Bay, and the fishery supports local business at that time (Jones and Wells 2001). Jones et al. (1990)

2 National Marine Fisheries Service. 2010. Fisheries Economics of the United States, 2009. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-F/SPO-118, 172p. Available at: https://www.st.nmfs.noaa.gov/st5/publication/index.html

reported the black drum fishery being important to the economies of the two poorest counties in Virginia, located on the Eastern Shore.

1.5.3.2. Commercial Fishery

The highest yearly estimate of black drum commercial landings on the Atlantic coast occurred in 2009, with total landings of 259,006 pounds, nominally worth $320,338 (Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD). In 2009, Virginia had the highest value of landings on the Atlantic coast at $223,143 (70%), but North Carolina landed the highest poundage at 149,057 (58%).

In real terms, using 2011 as the base year and adjusting for inflation by the consumer price index, the lowest price per pound on the Atlantic coast occurred in 2002 at $0.31, while the highest occurred in 1998 at $1.85 (Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD). The highest year of total value, 2009, was the fourth highest price at $1.30.

From 1950 up until 2008, and with the exception of the anomalous record price in 1998, black drum prices have fluctuated around a fairly narrow range with a mean price of $0.48. From 2008-2011, prices have risen steadily from $0.88 per pound in 2008 to a $1.55 per pound in 2011.

1.5.3.3. Subsistence Fishery

Although many recreational anglers will catch black drum for their own consumption, there is some aversion to eating black drum. Large animals tend to have large pockets of worms. Although anecdotal accounts convey these pockets can be easily removed, the large presence of worms deters some fishermen from consuming black drum. Fishermen who target or are required to target, via regulation, smaller animals do not generally encounter these pockets of worms. Beyond the recreational aspect, there is no known subsistence fishery for black drum.

1.5.3.4. Non-consumptive Factors

No non-consumptive factors were identified that were of significance to the black drum resource.

1.5.4. Other Resource Management Efforts

1.5.4.1. Artificial Reef Development/Management

Approximately 120,000 acres (155 nm^2) of ocean and estuarine bottom along the south Atlantic coast have been permitted for the development of artificial reefs (ASMFC 2002). The Georgia Department of Natural Resources is responsible for the development and maintenance of a network of man-made reefs both in estuarine waters and in the open Atlantic Ocean. Funding for the artificial reef program is provided by Federal Aid in Sport Fish Restoration, fishing license revenues, and private contributions. To date, there are 15 reefs within the estuary proper, which are constructed of a variety of materials including concrete rubble, metal cages, and

manufactured reef units. These provide habitat for juvenile black drum and several other species of recreationally important fishes. In 2001, three "beach" reefs were constructed in locations within Georgia's territorial waters just off the barrier island beaches. These are experimental in nature, but should provide some habitat for juvenile and adult black drum. There are 19 man-made reefs in the EEZ ranging from depths of 40 to 130 feet. These reefs are constructed of a variety of materials including surplus vessels, concrete rubble, barges, bridge spans, and manufactured reef units. Both juvenile and adult black drum are known to use these reefs.

The Florida Fish and Wildlife Conservation Commission's (FWC) Division of Marine Fisheries Management administers a state artificial reef program that provides financial and technical assistance to coastal local governments, nonprofit corporations and state universities to develop artificial reefs and to monitor and evaluate these reefs. To date, there are 919 artificial reefs located in the Atlantic off Florida with 38 of these reefs being located within estuarine waters. The estuarine reefs are located in two Florida counties one being Dade County which has 32 and Palm Beach County which has 6. Artificial habitats off Florida range in depth from 6 feet to 420 feet of water and consist of a variety of materials i.e. concrete culverts, bridge spans, barges, and decommissioned military ships such as the Hoyt Vandenberg which has become a very popular dive destination. Oyster shells are also used to create artificial habitat in Florida waters, but the FWC does not keep track of these reefs. These artificial habitats should provide habitat for juvenile and adult black drum off Florida's Atlantic coast.

New Jersey has also developed and invested in an artificial reef program, with the state agency involved since 1984. Similarly, Delaware has invested in an artificial reef program, with 14 sites within Delaware Bay. Artificial reef construction is especially important in the Mid-Atlantic region, where near shore bottom is usually featureless sand or mud.

States should continue support for habitat restoration projects, including oyster shell recycling and oyster hatchery programs as well as seagrass restoration, to provide areas of enhanced or restored bottom habitat.

1.5.4.2. Bycatch

Murphy and Muller (1995) indicated that black drum were rarely caught in shrimp trawls, although small numbers were caught during the late winter to early summer when adults occur in nearshore shelf waters. All shrimp trawlers in the South Atlantic, since passage of Amendment 2 to the Federal Shrimp Fishery Management Plan in 1996, are required to use bycatch reduction devices, which has greatly reduced the interactions.

Maryland's pound net fishery has caught black drum, both targeted and bycatch, although these fish likely have a high survival rate, as these fish were used in tagging studies in the mid to late 1990s (H. Rickabaugh, pers. comm.). Approximately 20% of those tagged were recaptured within 100 days, supporting these observations.

1.6. Location of Technical Documentation for FMP

1.6.1. Review of Resource Life History and Biological Relationships

The Black Drum Work Group compiled a life history on black drum and the available data in two reports provided to the ASMFC Interstate Fishery Management Program Policy Board (ASMFC 2010, 2011).

1.6.2. Stock Assessment Document

No coastwide stock assessment has yet to be performed.

1.6.3. Economic Assessment Document

Economic value of commercial catches was taken from National Marine Fisheries Service, Fisheries Statistics Division, in Silver Spring, Maryland.

1.6.4. Law Enforcement Assessment Document

The Commission's Law Enforcement Committee has developed a guidelines document for evaluation of potential management measures in Commission FMPs. This document will be used to provide recommendations to the South Atlantic Board concerning the enforceability of proposed measures.

2. GOALS AND OBJECTIVES

2.1. History and Purpose of the Plan

2.1.1. History of Prior Management Actions

No coastwide management program, whether among the states or at the federal level, currently exists for black drum on the Atlantic coast. At present, six states have implemented harvest regulations for black drum (Table 2).

New Jersey: New Jersey currently has a 10,000 pound commercial trip limit and a 65,000 pound annual quota. Anglers in the recreational fishery may take three black drum ≥16 inches. The state is considering adoption of new commercial (5,000 pound trip limit and 50,000 pound annual quota) and recreational (two fish ≥ 32 inches) regulations for harvest of black drum. If adopted, similar regulations will be considered by Delaware in the Delaware River and Bay areas.

Delaware: The Delaware Division of Fish and Wildlife entered a joint management plan with the state of New Jersey for black drum in the Delaware Bay in March 2010. This bi-state fishery management plan established the same recreational size and bag limits and commercial quota as New Jersey.

Maryland: Prior to 1994 Maryland had no restrictions on the harvest of black drum. In 1994 regulations were adopted including a 30,000 pound Chesapeake Bay commercial quota, a 1 fish per angler recreational creel limit, and a 16 in total length size limit for both commercial and recreational fisheries. In 1998 the Chesapeake Bay commercial fishery was closed except for scientific studies and a 1,500 pound per year cap was placed on the Atlantic Ocean commercial fishery. Also, a 6 fish per boat limit was added to the recreational fishery in addition to the one fish per person creel limit.

Virginia: The minimum size limit for black drum in Virginia's commercial fishery has been 16 inches (total length) since 1987. In 1992, a one fish possession limit (recreational and commercial) was established for any person using hook and line, rod and reel, or hand line. The commercial Black Drum Harvesting and Selling permit was created in 1987. This permit is required to land more than one black drum per day for commercial purposes. Until 1993, any commercial fisherman was able to attain a permit, but by 1993 that fisherman was required to be a registered commercial fisherman. In 1994, the harvesting and selling permit was tied to specific previous permit and documentation of harvest requirements for the 1988-1993 period. In addition, any fisherman active in 1992 or 1993 was required to have reported that activity in order to maintain a permit in 1994; weekly mandatory reporting of daily activity has been required since 1987. Since 2002, the annual commercial quota has been 120,000 pounds in order to cap landings.

North Carolina: Currently, there is no commercial quota, trip limit, or size limit for black drum in North Carolina; however, since 1994 all black drum commercial landings have required documentation in the North Carolina Division of Marine Fisheries Trip Ticket Program. Recreationally, smaller black drum are harvested while larger drum are typically caught and released for sport. Currently, this is no recreational size or bag limit.

South Carolina: Commercial landings in South Carolina reported by NMFS are generally low and indicative of reported bycatch rather than a targeted fishery. Section 50-5-360 of the South Carolina Code requires that anyone, who buys, receives or handles any live or fresh saltwater fish or any saltwater fishery products taken or landed in the state for sale, must obtain a wholesale dealers license. Prior to 2007, there were no recreational management regulations for black drum in South Carolina. In 2007 the South Carolina legislature amended section 50-5-1705 of the South Carolina Code creating a slot limit of 14 to 27 inches total length and a daily bag limit of 5 fish per person that applies to both commercial and recreational fisheries.

Georgia: Black drum were not regulated in Georgia until April 1998, when the current fifteen fish bag limit and 10-inch minimum total length regulations were enacted. Commercial regulations are the same as those for the recreational fishery.

Florida: With the increase in popularity of blackened redfish dishes in the 1980s, concerns were raised about subsequent overfishing of drums. Therefore, regulations were established in Florida in 1989, including a minimum size limit for both recreational and commercial black drum fisheries of 14 inches and a maximum size limit of 24 inches. Possession of one fish over 24 inches is allowed for recreational fishers only. The recreational fishery has a daily limit of 5 fish per day, and the commercial fishery has a limit of 500 pounds per day.

Table 2. Current state regulations for black drum.

State	Recreational		Commercial			Notes
	Size limit	Bag limit	Size limit	Trip Limit	Annual Quota	
ME->NY	-	-	-	-	-	
NJ	16” min	3/person/day	16” min	10,000 lbs	65,000 lbs	
NJ Proposed	32” min	2/person/day	32” min	5,000 lbs	50,000 lbs	
DE	16” min	3/person/day	16” min	10,000 lbs	65,000 lbs	
MD	16” min	1/person/day 6/vessel (Bay)	16” min		1,500 lbs Atlantic Coast	Ches Bay closed to commercial harvest
VA	16” min	1/person/day	16” min	1/person/day*	120,000 lbs	*without Black Drum Harvesting and Selling permit
NC	-	-	-	-	-	
SC	14” min 27” max	5/person/day	14” min 27” max	5/person/day		Commercial fishery primarily bycatch
GA	10” min	15/person/day	10” min	15/person/day		
FL	14” min 24” max	5/person/day	14” min 24” max	500 lbs/day		One fish >24” allowed for recreational fishers

2.1.2. Purpose and Need for Action

Currently there is no immediate management or biological concerns for black drum, but four main reasons have been identified as to why/how interstate management would benefit the fishery:

1) Tagging evidence suggests black drum migrate along the coast;
2) There is lack of consistent regulations and goals;
3) The targeted fishery in some areas may be very young fish while others areas may target the breeding stock; and
4) An Interstate FMP establishes a framework to address future concerns or changes in the fishery or population.

2.2. Goals

The goal of the Black Drum Interstate FMP shall be to provide for an efficient management structure to implement coastwide management goals in a timely manner.

2.3. Objectives

1) Provide a flexible management system to address future changes in resource abundance, scientific information, and fishing patterns among user groups or area.
2) Promote cooperative collection of biological, economic, and sociological data required to effectively monitor and assess the status of the black drum resource and evaluate the management efforts.
3) Manage the black drum fishery to protect both young individuals and established breeding stock.
4) Develop research priorities that will further refine the black drum management program to maximize the biological, social, and economic benefits derived from the black drum population.

2.4. Specification of Management Unit

The management unit is defined as the black drum (*Pogonias cromis*) resource throughout the range of the species within U.S. waters of the northwest Atlantic Ocean from the estuaries eastward to the offshore boundaries of the EEZ. The selection of this management unit is based on the distribution of the species along the Atlantic coast, as noted in tagging studies from Maryland, Virginia, South Carolina, and Georgia, and historical harvest patterns that have identified fisheries for black drum from Florida north through New Jersey.

2.4.1. Management Areas

The management area shall be the entire Atlantic coast distribution of the resource from the east coast of Florida north through New Jersey.

2.5. Definition of Overfishing

As no coastwide stock assessment has yet to be performed, there is no definition of overfishing for black drum. A definition of overfishing along with absolute values may be established, following a stock assessment, through adaptive management.

2.6. Stock Rebuilding Program

The status of the black drum population is unknown, and therefore a specific rebuilding program and schedule cannot be determined. Most catch data indicate that the stock is currently healthy, but status of the stock can only be determined after a coastwide stock assessment is conducted.

3. MONITORING PROGRAM SPECIFICATIONS/ELEMENTS

The South Atlantic Species Advisory Panel will meet as necessary to review the stock assessment, once available, for black drum and all other relevant data pertaining to stock status. The Advisory Panel will forward its report and any recommendations to the Management Board.

The Black Drum Technical Committee will meet annually, or as necessary, to review state management program changes, developments in the fishery, or other changes or challenges in the fishery. The Black Drum Stock Assessment Subcommittee will generally meet every five years to review and update or perform a benchmark stock assessment on the black drum stock. This schedule may be modified as needed to incorporate new information and consideration of the black drum biology.

The Black Drum Plan Review Team (PRT) will annually review implementation of the management plan and any subsequent adjustments (addenda), and report to the Management Board on any compliance issues that may arise. The PRT will also prepare the annual Black Drum FMP Review and coordinate the annual update and prioritization of research needs (see Section 6.2).

3.1. Assessment of Annual Recruitment

Annual juvenile recruitment (appearance of juveniles in the ecosystem) of black drum is measured through various fishery-independent, state and federal surveys in order to provide an indication of future stock abundance. When low numbers of young-of-year (age-0) fish are produced in a given year, recreational and commercial catch from that year-class may be lower when surviving fish become available to the fisheries. Recruitment is measured by sampling current year juvenile fish abundance in nursery areas.

The FMP recommends the continuation of surveys from which black drum juvenile abundance indices are, or could be, developed. These indices are required in order to tune future stock assessments for this species. Efforts should be made to validate the ability of juvenile abundance indices to predict future year-class strength, as these indices can play a pivotal role in setting future catch levels and predicting trends in stock status.

3.2. Assessment of Spawning Stock Biomass

Black drum are caught in various fishery-independent, state and federal surveys. Survey results are used to develop estimates of relative biomass or abundance. Relative abundance/biomass indices provide an indication of current stock size, and may be used to tune future stock assessment. The FMP encourages the continuation of surveys from which adult abundance indices are, or could be, developed.

3.3. Assessment of Fishing Mortality Target and Measurement

As no coastwide stock assessment has occurred, no coastwide estimates of fishing mortality are available. Fishing mortality method of measurement, target, and threshold may be updated following a coastwide stock assessment.

3.4. Summary of Monitoring Programs

The FMP includes no requirements regarding fishery-dependent monitoring programs, but encourages all state fishery management agencies to pursue full implementation of the standards of the Atlantic Coastal Cooperative Statistics Program (ACCSP). The Management Board recommends a transitional or phased-in approach be adopted to allow for full implementation of the ACCSP standards. Until the ACCSP standards are implemented, the Management Board encourages state fishery management agencies to initiate implementation of specific ACCSP modules, and/or pursue pilot and evaluation studies to assist in development of reporting programs to meet the ACCSP standards. The ACCSP partners are the 15 Atlantic coast states from Maine through Florida, the District of Columbia, the Potomac River Fisheries Commission, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the three fishery management councils, and the Atlantic States Marine Fisheries Commission. Participation by program partners in the ACCSP does not relieve states from their responsibilities in collating and submitting harvest/monitoring reports to the Commission as required under the FMP.

3.4.1. Catch, Landings, and Effort Information

Commercial Catch and Effort Data

The ACCSP's standard for commercial catch and effort statistics is mandatory, trip-level reporting of all commercially harvested marine species, with fishermen and/or dealers required to report standardized data elements for each trip by the tenth of the following month. Refer to the ACCSP Program Design document for more details on standardized data elements.

Recreational Catch and Effort Data

The ACCSP has selected the Marine Recreational Information Program (MRIP) as the base program for recreational fishing data collection for shore and private boat fishing. The MRIP provides statistics for finfish, but does not cover shellfish fisheries, which will require development of new surveys. The MRIP combines data from two independent surveys to produce estimates of fishing effort, catch, and participation.

Household Telephone Survey for Effort Data

For private/rental boats and shore, fishing effort data should be collected through a random digit-dialed telephone survey of recreational marine fishing license holders. A "wave" is a two-month sampling period, such as January through February (Wave 1) or March through April (Wave 2). The random-digit dialing survey for effort data is conducted in two-week periods that begin the last week of each wave and continue through the first week of the next wave.

Intercept Survey for Catch Data

Catch data for private/rental boats and shore fishing should be collected through an access-site intercept survey. State Partners are encouraged to increase their involvement in conducting the intercept survey. The ACCSP is addressing transition of conduct of the intercept survey for catch from a contractor to a cooperative agreement involving states at varying levels.

For-hire Catch and Effort Data

The ACCSP has selected the NOAA Fisheries For-Hire Survey as the preferred methodology for collecting data from charterboats and headboats (partyboats), also called the "for-hire" sector. The For-Hire Survey is similar to the MRIP with two major improvements; it uses: 1) a telephone survey to collect fishing effort data from vessel representatives and 2) a validation process for the self-reported data. Catch data are collected in conjunction with the MRIP with the addition of on-board samplers for headboats.

The independent survey components of the For-Hire Survey include: 1) a vessel effort survey; 2) an effort validation survey; 3) an access-site intercept survey for catch data; and 4) at-sea samplers on headboats for catch data. Using the data collected through these surveys, NOAA Fisheries generates catch and effort estimates for for-hire fisheries.

Vessel Telephone Survey for Effort Data

The vessel effort survey is a mandatory survey for for-hire vessels that uses a coastwide directory of such vessels as the sampling frame for for-hire fishing effort. The directory is continually updated as intercept and telephone interviewers identify changes in the fleet. Optimal sampling levels will be determined following evaluation of the Atlantic coast For-Hire Survey results from the first three years. Until the optimal sampling level is determined, a minimum of 10% of for-hire vessels or three charterboats and three headboats (whichever is greater), will be randomly sampled each week in each state. A vessel representative, usually the captain, is called and asked to provide information on the fishing effort associated with that vessel during the previous week. Vessel representatives are notified in advance that they have been selected for sampling and an example form is provided. To be included in the sample frame for particular wave, a vessel record must include: 1) at least one vessel representative's telephone number; 2) the name of the vessel or a vessel registration number issued by a state or the U.S. Coast Guard; 3) the county the boat operates from during that wave, and 4) designation as either a charter or guide boat (both called "charter") or headboat.

Validation Survey for Effort Data

To validate the self-reported effort data collected through the vessel telephone survey, field samplers periodically check access sites used by for-hire vessels to observe vessel effort. Interviewers record the presence or absence of a for-hire vessel from its dock or slip, and if the

vessel is absent, they try to ascertain the purpose of the trip. Those observations are compared to telephone data for accuracy and to make any necessary corrections.

Catch Data

Vessels that meet the ACCSP definition of a charterboat, "typically hired on a per trip basis," are sampled for catch data through an intercept site survey of anglers at access points, similar to the MRIP. The intercept survey has been in progress since 1981.

Some Partners collect for-hire effort data using VTRs, which are mandatory for some vessels and contain all minimum data elements collected by the For-Hire Survey. In areas where the survey runs concurrently with VTR programs, captains selected for the weekly telephone survey are permitted to fax their VTRs in lieu to being interviewed by phone.

At-sea Sampling of Headboats

At-sea samplers collect catch data aboard headboats, defined by the ACCSP as "any vessel-for-hire engaged in recreational fishing that typically is hired on a per person basis." Samples collected at-sea are supplemented by dockside sampling.

3.4.2. Biological Information

The ACCSP has set standards for how biological data should be collected and managed for commercial, recreational, and for-hire fisheries. Trained field personnel, known as port agents or field samplers, should obtain biological samples. Information should be collected through direct observation or through interviews with fishermen. Detailed fishery statistics and/or biological samples should be collected at docks, unloading sites, and fish houses. Biological sampling includes species identification of fish and shellfish; extraction of hard parts including spines and otoliths; and tissue samples such as gonads, stomachs, and scales.

3.4.3. Social and Economic Information

Commercial Fisheries

The ACCSP is testing its sociological and economic data collection standards for commercial harvesters. Standards for these kinds of data for dealers and fishing communities are in development with the Committee on Economics and Social Sciences. The ACCSP should collect baseline social and economic data on commercial harvesters using the following voluntary surveys:

- An annual fixed cost survey directed at the owner/operator,
- A trip cost survey to evaluate variable costs associated with a particular vessel's most recent commercial fishing trip to be directed at the vessel captain, and
- An annual owner/captain/crew/survey to gather sociological information.

Surveys may also be conducted using permit and registration data and vessel trip reports or sampling frames.

Recreational and For-hire Fisheries

The ACCSP's sociological and economic data for recreational and for-hire fisheries should come from periodic add-ons to existing telephone and intercept surveys. The standard is voluntary surveys of finfish fisheries conducted at least every three years.

3.4.4. Observer Programs

No specific observer programs are in place to monitor the black drum fishery. Observer programs already in place, whether state or federal, may observe capture of black drum in other monitored fisheries or specific gear types.

3.5. Stocking Program

No current stocking program for black drum is currently underway.

3.6. Bycatch Reduction Program

Bycatch is defined as "portion of a non-targeted species catch taken in addition to the targeted species. It may include non-directed, threatened, endangered, or protected species, as well as individuals of the target species below a desired or regulatory size" (ASMFC 2009a). Bycatch can be divided into two components: incidental catch and discarded catch. Incidental catch refers to retained or marketable catch of non-targeted species, while discarded catch is the portion of the catch returned to the sea because of regulatory, economic, or personal considerations.

The ACCSP's bycatch standards include both quantitative and qualitative components. The quantitative components include at-sea sampling programs and collection of bycatch data through fisherman reporting systems. The qualitative components include sea turtle and marine mammal entanglement and stranding networks, beach bird surveys, and add-ons to existing recreational and for-hire intercept and telephone surveys. Specific fisheries priorities will be determined annually by the Bycatch Prioritization Committee.

Unlike its relatives within the drum family, such as Atlantic croaker and spot, the black drum fishery tends to be a targeted fishery with little bycatch (J. Zimmerman, pers. comm.) in the northern range. In the southern range, fishing for black drum often coincides with targeting other species, such as sheepshead (T. Roller, pers. comm.). Large black drum have occasionally been caught in shrimp trawls off the Atlantic coast, although this is not a frequent occurrence (Murphy and Muller 1995). All shrimp trawlers in the South Atlantic are required to use bycatch reduction devices, as of the 1996 Amendment 2 to the Federal Shrimp Fishery Management Plan. Maryland's pound net fishery has caught black drum, both targeted and bycatch, although these fish likely have a high survival rate, as these fish were used in tagging studies in the mid to late 1990s (H. Rickabaugh, pers. comm.). Approximately 20% of those tagged were recaptured within 100 days, supporting these observations.

3.7. Habitat Program

Particular attention should be directed toward black drum habitat utilization and habitat condition (environmental parameters). A list of existing state and federal programs generating environmental data such as sediment characterization, contaminant analysis, and habitat coverage (marsh grass, oyster beds, submerged aquatic vegetation) should also be produced and updated as new information arises. Habitats utilized by black drum range from the fresh water dividing line out to and likely beyond, the shelf break. Thus, virtually any study generating environmental data from estuarine or coastal ocean systems could be of value.

4. MANAGEMENT PROGRAM IMPLEMENTATION

4.1. Recreational Fisheries Management Measures

Options for Recreational Fisheries Management include a range of options and sub-options. Except for Options 1 and 2, the options are not exclusive to one another. The sub-options incorporate current state management measures as well as additional options for consideration.

Option 1: Minimum size

Sub-option 1a: No coastwide minimum size (status quo)
Sub-option 1b: 10" minimum size (Georgia)
Sub-option 1c: 14" minimum size (South Carolina and Florida)
Sub-option 1d: 16" minimum size (New Jersey, Delaware, Maryland, Virginia)
Sub-option 1e: 32" minimum size (under consideration by New Jersey and Delaware)

Option 2: Slot Limit

Sub-option 2a: No coastwide size limits (status quo)
Sub-option 2b: 14" minimum, 24" maximum (Florida)
Sub-option 2c: 14" minimum, 27" maximum (South Carolina)
Sub-option 2d: 16" minimum, 32" maximum (public comment)
Sub-option 2e: 30" minimum, 48" maximum (public comment)
Sub-option 2f: 10" minimum, 24" maximum (mix of Georgia and Florida)

Option 3: Trophy allowance

Sub-option 3a: No retention of a "trophy fish" above the maximum size limit (status quo)
Sub-option 3b: One "trophy fish," a fish exceeding the maximum size limit, is allowed to be retained, per person, per day.

Option 4: Bag Limit

Sub-option 4a: No coastwide bag limit (status quo)
Sub-option 4b: 1 per person, per day (Maryland and Virginia)
Sub-option 4c: 2 per person, per day (under consideration by New Jersey and Delaware)

Sub-option 4d: 3 per person, per day (New Jersey and Delaware)
Sub-option 4e: 5 per person, per day (South Carolina and Florida)
Sub-option 4f: 15 per person, per day (Georgia)

Option 5: Vessel Limit

Sub-option 5a: No coastwide vessel limit (status quo)
Sub-option 5b: 6 per vessel per day (Maryland)
Sub-option 5c: 12 per vessel per day
Sub-option 5d: 20 per vessel per day

Option 6: Maintenance of current recreational management measures

All states shall maintain their current level of restrictions, i.e. no relaxation of current recreational fisheries management measures. [This approach may be used in conjunction with other options or requirements.]

4.2. Commercial Fisheries Management Measures

Option 1: Minimum size

Sub-option 1a: No coastwide minimum size (status quo)
Sub-option 1b: 10" minimum size (Georgia)
Sub-option 1c: 14" minimum size (South Carolina and Florida)
Sub-option 1d: 16" minimum size (New Jersey, Delaware, Maryland, Virginia)
Sub-option 1e: 32" minimum size (under consideration by New Jersey and Delaware)

Option 2: Slot Limit

Sub-option 2a: No coastwide size limits (status quo)
Sub-option 2b: 14" minimum, 24" maximum (Florida)
Sub-option 2c: 14" minimum, 27" maximum (South Carolina)
Sub-option 2d: 16" minimum, 32" maximum (public comment)
Sub-option 2e: 30" minimum, 48" maximum (public comment)
Sub-option 2f: 10" minimum, 24" maximum (mix of Georgia and Florida)

Option 3: Trip Limit

Sub-option 3a: No coastwide commercial trip limit (status quo)
Sub-option 3b: 5 per person, per day (South Carolina)
Sub-option 3c: 15 per person, per day (Georgia)
Sub-option 3d: 500 pounds per vessel per day (Florida)
Sub-option 3e: 5,000 pounds per vessel per day (Proposed for New Jersey)
Sub-option 3f: 10,000 pounds per vessel per day (New Jersey and Delaware)
Sub-option 3g: Bycatch allowance of XX% is allowed (fleet may not catch often but will catch a large number when do)

Option 4: Limited entry

Sub-option 4a: No requirement for limited entry (status quo)
Sub-option 4b: States are required to implement a limited-entry permit system, by which a limited number of permits shall be issued for commercial harvest of black drum. In setting the maximum number of permits to be issued, the states shall consider that the goal of this policy is to prevent expansion of the current commercial fishery.

Option 5: Maintenance of current commercial management measures

In order to avoid the establishment of any new commercial fisheries for black drum, all states shall maintain their current level of restrictions, i.e. no relaxation of current commercial fisheries management measures. [This approach may be used in conjunction with other options or requirements and is based on the approach taken in Amendment 2 to the Red Drum FMP.]

4.3. Habitat Conservation and Restoration

1. Where sufficient knowledge is available, states should designate black drum habitat areas of particular concern for special protection. These locations should be accompanied by requirements that limit degradation of habitat, including minimization of non-point source and specifically storm water runoff, prevention of significant increases in contaminant loadings, and prevention of the introduction of any new categories of contaminants into the area.
2. Where habitat areas have already been identified and protected, states should ensure continued protection of these areas by notifying and working with other federal, state, and local agencies. States should advise these agencies of the types of threats to black drum and recommend measures that should be employed to avoid, minimize, or eliminate any threat to current habitat quality or quantity.
3. States should minimize loss of wetlands to shoreline stabilization by using the best available information, incorporating erosion rates, and promoting incentives for use of alternatives to vertical shoreline stabilization measures, commonly referred to as living shorelines projects.
4. All State and Federal agencies responsible for reviewing impact statements and permit applications for projects or facilities proposed for black drum spawning and nursery areas should ensure that those projects will have no or only minimal impact on local stocks. Any project that would result in the elimination of essential habitat should be avoided, if possible, or at a minimum, adequately mitigated.
5. Each State should establish windows of compatibility for activities known or suspected to adversely affect black drum life stages and their habitats. Activities may include, but are not limited to, navigational dredging, bridge construction, and dredged material disposal, and notify the appropriate construction or regulatory agencies in writing.
6. Each state should develop water use and flow regime guidelines, where applicable, to ensure that appropriate water levels and salinity levels are maintained for the long-term protection and sustainability of the stocks. Projects involving water withdrawal or interrupt water flow should be evaluated to ensure that any impacts are minimized, and

that any modifications to water flow or salinity regimes maintain levels within black drum tolerance limits.

7. The use of any fishing gear that is determined by management agencies to have a negative impact on black drum habitat should be prohibited within habitat areas of particular concern. Further, states should protect vulnerable habitat from other types of non-fishing disturbance as well.
8. States should work with the U.S. Fish and Wildlife Service's Divisions of Fish and Wildlife Management Assistance and Ecological Services, and National Marine Fisheries Service's Offices of Fisheries Conservation and Management and Habitat Conservation, to identify hydropower and water control structures that pose significant threats to maintenance of appropriate freshwater flows (volume and timing) to black drum nursery and spawning areas and target these dams for appropriate recommendations during FERC re-licensing.
9. States should conduct research to evaluate the role of submerged aquatic vegetation (SAV) and other submersed structures in the spawning success, survival, growth and abundance of black drum. This research could include regular mapping of the bottom habitat in identified areas of concern, as well as systematic mapping of this habitat where it occurs in estuarine and marine waters of the states.
10. States should continue support for habitat restoration projects, including oyster shell recycling and oyster hatchery programs as well as seagrass restoration, to provide areas of enhanced or restored bottom habitat.
11. Water quality criteria for black drum spawning and nursery areas should be established, or existing criteria should be upgraded, to ensure successful reproduction of these species. Any action taken should be consistent with Federal Clean Water Act guidelines and specifications.
12. State fishery regulatory agencies, in collaboration with state water quality agencies, should monitor water quality in known habitat for black drum, including turbidity, nutrient levels, and dissolved oxygen.
13. States should work to reduce point-source pollution from wastewater through such methods as improved inspections of wastewater treatment facilities and improved maintenance of collection infrastructure.
14. States should develop protocols and schedules for providing input on water quality regulations and on Federal permits and licenses required by the Clean Water Act, Federal Power Act, and other appropriate vehicles, to ensure that black drum habitats are protected and water quality needs are met.

4.4. Alternative State management Regimes

Once approved by the South Atlantic State/Federal Fisheries Management Board, states are required to obtain prior approval from the Management Board of any changes to their management program for which a compliance requirement is in effect. Changes to non-compliance measures must be reported to the Management Board but may be implemented without prior Management Board approval. A state can request permission to implement an alternative to any mandatory compliance measure only if that state can show to the Management Board's satisfaction that its alternative proposal will have the same conservation value as the measure contained in this amendment or any addenda prepared under Adaptive Management

(***Section 4.5***). States submitting alternative proposals must demonstrate that the proposed action will not contribute to overfishing of the resource. All changes in state plans must be submitted in writing to the Board and to the Commission either as part of the annual FMP Review process or the Annual Compliance Reports.

4.4.1. General Procedures

A state may submit a proposal for a change to its regulatory program or any mandatory compliance measure under the Black Drum Fishery Management Plan to the Commission, including a proposal for *de minimis* status. Such changes shall be submitted to the Chair of the Plan Review Team, who shall distribute the proposal to the Management Board, the Plan Review Team, the Technical Committee, the Stock Assessment Committee, and the Advisory Panel.

The Plan Review Team is responsible for gathering the comments of the Technical Committee, the Stock Assessment Committee and the Advisory Panel, and presenting these comments as soon as possible to the Management Board for decision.

The South Atlantic State/Federal Fisheries Management Board will decide whether to approve the state proposal for an alternative management program if it determines that it is consistent with the "target fishing mortality rate applicable" and the goals and objectives of this FMP.

4.4.2. Management Program Equivalency

The Black Drum Technical Committee, under the direction of the Black Drum Plan Review Team, will review any alternative state proposals under this section and provide to the South Atlantic State/Federal Fisheries Management Board its evaluation of the adequacy of such proposals.

Following the first full year of implementation of an alternate management program, the Black Drum Plan Review Team will have the responsibility of evaluating the effects of the program to determine if the measures were actually equivalent with the standards in the FMP or subsequent amendments or addenda. The Black Drum PRT will report to the Management Board on the performance of the alternate program.

4.4.3. *De minimis* Fishery Guidelines

The ASMFC Interstate Fisheries Management Program Charter defines *de minimis* as "a situation in which, under the existing condition of the stock and scope of the fishery, conservation, and enforcement actions taken by an individual state would be expected to contribute insignificantly to a coastwide conservation program required by a Fishery Management Plan or amendment" (ASMFC 2009b).

States may petition the South Atlantic State/Federal Fisheries Management Board at any time for *de minimis* status. Once *de minimis* status is granted, designated states must submit annual reports including commercial and recreational landings to the Management Board justifying the

continuance of *de minimis* status. States must include *de minimis* requests as part of their annual compliance reports.

***De Minimis* Criteria Options**

Option 1: Recreational and Commercial separate de minimis status

States may apply for *de minimis* status, if for the preceding three years for which data are available, their average commercial landings or recreational landings (by weight) constitute less than ***X*** percent of the average coastwide commercial or recreational landings for the same period. A state that qualifies for *de minimis* based on their commercial landings will qualify for exemptions in their commercial fishery only, and a state that qualifies for *de minimis* based on their recreational landings will qualify for exemptions in their recreational fishery only.

Sub-option 1a: X = 1%
Sub-option 1b: X = 2%
Sub-option 1c: X = 3%

Option 2: Recreational and Commercial combined de minimis status

States may apply for *de minimis* status, if for the preceding three years for which data are available, their average combined, commercial and recreational landings (by weight) constitute less than ***X*** percent of the average coastwide combined, commercial and recreational landings for the same period.

Sub-option 2a: X = 1%
Sub-option 2b: X = 2%
Sub-option 2c: X = 3%

4.4.4. *De minimis* Exemptions

States who qualify for *de minimis* are not required to implement the following requirements: **XXXXXX**.

4.5. Adaptive Management

The South Atlantic State/Federal Fisheries Management Board may vary the requirements specified in this amendment as a part of adaptive management in order to conserve the black drum resources. Specifically, the Management Board may change target fishing mortality rates and harvest specifications, or other measures designed to prevent overfishing of the stock complex or any spawning component. Such changes will be instituted to be effective on the first fishing day of the following year, but may be put in place at an alternative time when deemed necessary by the Management Board.

4.5.1. General Procedures

The Black Drum Plan Review Team (PRT) will monitor the status of the fisheries and the resources and report on that status to the South Atlantic State/Federal Fisheries Management Board annually or when directed to do so by the Management Board. The PRT will consult with the Black Drum Technical Committee, Stock Assessment Committee, and South Atlantic Species Advisory Panel, in making such review and report. The report will contain recommendations concerning proposed adaptive management revisions to the management program.

The South Atlantic State/Federal Fisheries Management Board will review the report of the PRT, and may consult further with the Technical Committee, Stock Assessment Committee, or Advisory Panel. The Management Board may, based on the PRT Report or on its own discretion, direct the PRT to prepare an addendum to make any changes it deems necessary. The addendum shall contain a schedule for the states to implement its provisions.

The PRT will prepare a draft addendum as directed by the Management Board, and shall distribute it to all states for review and comment. A public hearing will be held in any state that requests one. The PRT will also request comment from federal agencies and the public at large. After a 30-day review period, the PRT will summarize the comments and prepare a final version of the addendum for the Management Board.

The Management Board shall review the final version of the addendum prepared by the PRT, and shall also consider the public comments received and the recommendations of the Technical Committee, Stock Assessment Committee, and Advisory Panel; and shall then decide whether to adopt or revise and, then, adopt the addendum.

Upon adoption of an addendum implementing adaptive management by the Management Board, states shall prepare plans to carry out the addendum, and submit them to the Management Board for approval according to the schedule contained in the addendum.

4.5.2. Measures Subject to Change

The following measures are subject to change under adaptive management upon approval by the South Atlantic State/Federal Fisheries Management Board:

(1) Fishing year and/or seasons;
(2) Area closures;
(3) Overfishing definition, MSY and OY;
(4) Rebuilding targets and schedules;
(5) Catch controls, including bag and size limits;
(6) Effort controls;
(7) Bycatch allowance
(8) Reporting requirements;
(9) Gear limitations;
(10) Measures to reduce or monitor bycatch;

(11) Observer requirements;
(12) Management areas;
(13) Recommendations to the Secretaries for complementary actions in federal jurisdictions;
(14) Research or monitoring requirements;
(15) Frequency of stock assessments;
(16) *De minimis* specifications;
(17) Management unit;
(18) Maintenance of stock structure;
(19) Catch allocation; and
(20) Any other management measures currently included in the FMP.

4.6. Emergency Procedures

Emergency procedures may be used by the South Atlantic State/Federal Fisheries Management Board to require any emergency action that is not covered by or is an exception or change to any provision in the FMP. Procedures for implementation are addressed in the ASMFC Interstate Fisheries Management Program Charter, Section Six (c)(10) (ASMFC 2009b).

4.7. Management Institutions

The management institution for black drum shall be subject to the provisions of the ISFMP Charter (ASMFC 2009b). The following is not intended to replace any or all of the provisions of the ISFMP Charter. All committee roles and responsibilities are included in detail in the ISFMP Charter and are only summarized here.

4.7.1. ASMFC and the ISFMP Policy Board

The ASMFC and the ISFMP Policy Board are generally responsible for the oversight and management of the Commission's fisheries management activities. The Commission must approve all fishery management plans and amendments, and must make all final determinations concerning state compliance or non-compliance. The ISFMP Policy Board reviews any non-compliance recommendations of the various Management Boards and Sections and, if it concurs, forwards them on to the Commission for action.

4.7.2. South Atlantic State/Federal Fisheries Management Board

The South Atlantic State/Federal Fisheries Management Board was established under the provisions of the Commission's ISFMP Charter (Section Four; ASMFC 2009b) and is generally responsible for carrying out all activities under this FMP.

The South Atlantic State/Federal Fisheries Management Board (Management Board) establishes and oversees the activities of each species' Plan Development and Plan Review Team, Technical Committee and Stock Assessment Subcommittee, and the South Atlantic Species Advisory Panel. Among other things, the Management Board makes changes to the management program under adaptive management and approves state programs implementing the amendment and

alternative state programs under ***Sections 4.4* and *4.5***. The Management Board reviews the status of state compliance with the management program, at least annually, and if it determines that a state is out of compliance, reports that determination to the ISFMP Policy Board under the terms of the ISFMP Charter.

4.7.3. Plan Development Team and Plan Review Team

The Plan Development Team (PDT) and Plan Review Team (PRT) for black drum will be composed of a small group of scientists and/or managers whose responsibility is to provide all of the technical support necessary to carry out and document the decisions of the South Atlantic State/Federal Fisheries Management Board. An ASMFC FMP Coordinator chairs the PDT and PRT. The PDT and PRT are directly responsible to the Management Board for providing information and documentation concerning the implementation, review, monitoring and enforcement of the species management plan. The PDT and PRT shall be comprised of personnel from state and federal agencies who have scientific and management ability and knowledge of the relevant species. The Black Drum PDT is responsible for preparing all documentation necessary for the development of the FMP, using the best scientific information available and the most current stock assessment information. The PDT will either disband or assume inactive status upon completion of the FMP. Alternatively, the Board may elect to retain PDT members as members of the species-specific PRT or appoint new members. The PRT will provide annual advice concerning the implementation, review, monitoring, and enforcement of the FMP once it has been adopted by the Commission.

4.7.4. Technical Committee

The Black Drum Technical Committee will consist of representatives from state and/or federal agencies, Regional Fishery Management Councils, Commission, university or other specialized personnel with scientific and technical expertise and knowledge of the relevant species. The Management Board will appoint the members of a Technical Committee and may authorize additional seats as it sees fit. Its role is to act as a liaison to the individual state and federal agencies, provide information to the management process, and review and develop options concerning the management program. The Technical Committee will provide scientific and technical advice to the Management Board, PDT, and PRT in the development and monitoring of a fishery management plan or amendment.

4.7.5. Stock Assessment Subcommittee

The Black Drum Stock Assessment Subcommittee will be appointed and approved by the Management Board, with consultation from the Black Drum Technical Committee, and will consist of scientists with expertise in the assessment of the relevant population. Its role is to assess the species population and provide scientific advice concerning the implications of proposed or potential management alternatives, or to respond to other scientific questions from the Management Board, Technical Committee, PDT or PRT. The Black Drum Stock Assessment Subcommittee will report to the Black Drum Technical Committee.

4.7.6. Advisory Panel

The South Atlantic Species Advisory Panel was established according to the Commission's Advisory Committee Charter. Members of the Advisory Panel are citizens who represent a cross-section of commercial and recreational fishing interests and others who are concerned about the conservation and management of black drum, as well as Spanish mackerel, spot, and spotted seatrout, red drum, and Atlantic croaker. The Advisory Panel provides the Management Board with advice directly concerning the Commission's management program for these six species.

4.7.7. Federal Agencies

4.7.7.1. Management in the Exclusive Economic Zone (EEZ)

Management of black drum in the EEZ is within the jurisdiction of the Mid Atlantic and South Atlantic Fishery Management Councils under the Magnuson-Stevens Fishery Conservation and Management Act, as amended (16 U.S.C. 1801 et seq.). In the absence of a Council Fishery Management Plan for black drum, management of this species is the responsibility of the National Marine Fisheries Service (NMFS) as mandated by the Atlantic Coastal Fisheries Cooperative Management Act (16 U.S.C. 5105 et seq.).

4.7.7.2. Federal Agency Participation in the Management Process

The Commission has accorded the United States Fish and Wildlife Service (USFWS) and the NMFS voting status on the ISFMP Policy Board and the South Atlantic State/Federal Fisheries Board in accordance with the Commission's ISFMP Charter. The NMFS and USFWS may also participate on the Management Board's supporting committees described in *Sections 4.7.3-4.7.6*.

4.7.7.3. Consultation with Fishery Management Councils

In carrying out the provisions of this FMP, the states, as members of the South Atlantic State/Federal Fisheries Management Board, shall closely coordinate with the Mid Atlantic and South Atlantic Fishery Management Councils to cooperatively manage the Atlantic coast population of black drum. In accordance with the Commission's ISFMP Charter, a representative of the South Atlantic Fishery Management Council shall be invited to participate as a full member of the South Atlantic State/Federal Fisheries Management Board.

4.8. Recommendations to the Secretaries for Complementary Actions in Federal Jurisdictions

[Recommendations to the Secretaries for complementary actions in federal jurisdictions will be developed by the South Atlantic State/Federal Fisheries Management Board upon selection of management options for implementation in state waters.]

4.9. Cooperation with Other Management Institutions

At this time, no other management institutions have been identified that would be involved with management of black drum on the Atlantic coast. Nothing in the FMP precludes the coordination of future management collaborations with other management institutions should the need arise.

5. COMPLIANCE

Full implementation of the provisions of this FMP is necessary for the management program to be equitable, efficient and effective. States are expected to implement these measures faithfully under state laws. Although the ASMFC does not have authority to directly compel state implementation of these measures, it will continually monitor the effectiveness of state implementation and determine whether states are in compliance with the provisions of this fishery management plan. This section sets forth the specific elements states must implement in order to be in compliance with this fishery management plan, and the procedures that will govern the evaluation of compliance. Additional details of the procedures are found in the ASMFC Interstate Fisheries Management Program Charter (ASMFC 2009b).

5.1. Mandatory Compliance Elements for States

A state will be determined to be out of compliance with the provisions of this fishery management plan, according to the terms of Section Seven of the ISFMP Charter if:

- Its regulatory and management programs to implement *Section 4* have not been approved by the South Atlantic State-Federal Fisheries Management Board; or
- It fails to meet any schedule required by *Section 5.1.2*, or any addendum prepared under adaptive management (*Section 4.6*); or
- It has failed to implement a change to its program when determined necessary by the South Atlantic State-Federal Fisheries Management Board; or
- It makes a change to its regulations required under *Section 4* or any addendum prepared under adaptive management (*Section 4.6*), without prior approval of the South Atlantic State-Federal Fisheries Management Board.

5.1.1. Mandatory Elements of State Programs

To be considered in compliance with this fishery management plan, all state programs must include harvest controls on black drum fisheries consistent with the requirements of *Sections 4.1, 4.2, 4.3*; except that a state may propose an alternative management program under *Section 4.5*, which, if approved by the South Atlantic State-Federal Fisheries Management Board, may be implemented as an alternative regulatory requirement for compliance.

5.1.1.1. Regulatory Requirements

Each state must submit its required black drum regulatory program to the Commission through the ASMFC staff for approval by the South Atlantic State-Federal Fisheries Management Board.

During the period from submission until the Board makes a decision on a state's program, a state may not adopt a less protective management program than contained in this amendment or contained in current state law. The following lists the specific compliance criteria that a state/jurisdiction must implement in order to be in compliance with this FMP:

[Will be included once final options are selected]

Once approved by the South Atlantic State-Federal Fisheries Management Board, states are required to obtain prior approval from the Board of any changes to their management program for which a compliance requirement is in effect. Other measures must be reported to the Board but maybe implemented without prior Board approval. A state can request permission to implement an alternative to any mandatory compliance measure only if that state can show to the Board's satisfaction that its alternative proposal will have the same conservation value as the measure contained in this amendment or any addenda prepared under Adaptive Management (*Section 4.6*). States submitting alternative proposals must demonstrate that the proposed action will not contribute to overfishing of the resource. All changes in state plans must be submitted in writing to the Board and to the Commission either as part of the annual FMP Review process or the Annual Compliance reports.

5.1.1.2. Monitoring Requirements

There are requirements for additional monitoring.

5.1.1.3. Research Requirements

The Plan Development Team and Technical Committee have prioritized the research needs for black drum (*Section 6.2*). Appropriate programs for meeting these needs may be implemented under Adaptive Management (*Section 4.6*) in the future.

5.1.1.4. Law Enforcement Requirements

All state programs must include law enforcement capabilities adequate for successfully implementing that state's black drum regulations. The adequacy of a state's enforcement activity will be monitored annually by reports of the ASMFC Law Enforcement Committee to the Black Drum Plan Review Team. The first reporting period will cover the period from January 1, 20XX to December 31, 20XX.

5.1.1.5. Habitat Requirements

There are no mandatory habitat requirements in the FMP, although requirements may be added under Adaptive Management (*Section 4.6*). See *Section 4.4* for Habitat Recommendations.

5.1.2. Compliance Schedule

States must implement the FMP according to the following schedule:

Month XX, 20XX:	States must submit programs to implement the FMP for approval by the South Atlantic State-Federal Fisheries Management Board. Programs must be implemented upon approval by the Management Board.
Month XX, 20XX:	States with approved management programs must implement FMP requirements. States may begin implementing management programs prior to this deadline if approved by the Management Board.

Reports on compliance must be submitted to the Commission by each jurisdiction annually, no later than Month XX, beginning in 20XX.

5.1.3. Compliance Reporting Content

Each state must submit an annual report concerning its black drum fisheries and management program for the previous calendar year. A standard compliance report format has been prepared and adopted by the ISFMP Policy Board. States should follow this format in completing the annual compliance report.

5.2. Procedures for Determining Compliance

Detailed procedures regarding compliance determinations are contained in the ISFMP Charter, Section Seven (ASMFC 2009b). Future revisions to the ISFMP Charter may take precedence over the language contained in this FMP, specifically in regards to the roles and responsibilities of the various groups contained in this section. The following summary is not meant in any way to replace the language found in the ISFMP Charter.

In brief, all states are responsible for the full and effective implementation and enforcement of fishery management plans in areas subject to their jurisdiction. Written compliance reports as specified in the Plan (or subsequent Amendments and/or Addenda) must be submitted annually by each state with a declared interest. Compliance with the FMP will be reviewed at least annually. The South Atlantic State-Federal Fisheries Management Board, ISFMP Policy Board or the Commission, may request that the Black Drum Plan Review Team conduct a review of plan implementation and compliance at any time.

The South Atlantic State-Federal Fisheries Management Board will review the written findings of the PRT within 60 days of receipt of a State's compliance report. Should the Management Board recommend to the Policy Board that a state be determined to be out of compliance, a rationale for the recommended non-compliance finding will be included addressing specifically the required measures of the FMP that the state has not implemented or enforced, a statement of

how failure to implement or enforce the required measures jeopardizes black drum conservation, and the actions a state must take in order to comply with the FMP requirements.

The ISFMP Policy Board shall, within thirty days of receiving a recommendation of non-compliance from the South Atlantic State-Federal Fisheries Management Board, review that recommendation of non-compliance. If it concurs in the recommendation, it shall recommend to the Commission that a state be found out of compliance.

The Commission shall consider any FMP non-compliance recommendation from the Policy Board within 30 days. Any state which is the subject of a recommendation for a non-compliance finding is given an opportunity to present written and/or oral testimony concerning whether it should be found out of compliance. If the Commission agrees with the recommendation of the Policy Board, it may determine that a state is not in compliance with the FMP, and specify the actions the state must take to come into compliance.

Any state that has been determined to be out of compliance may request that the Commission rescind its non-compliance findings, provided the state has revised its black drum conservation measures or shown to the Board and/or Commission's satisfaction that actions taken by the state provide for conservation equivalency.

5.3. Recommended (Non-Mandatory) Management Measures

The South Atlantic State-Federal Fisheries Management Board, through Amendment 2, requests that those states outside the management unit (New York through Maine, and Pennsylvania) implement complementary regulations to protect the black drum spawning stock.

5.4. Analysis of Enforceability of Proposed Measures

[Law Enforcement Committee analysis]

6. MANAGEMENT AND RESEARCH NEEDS

Characterized as High (H), Medium (M), or Low (L) priority, these management and research needs will be reviewed annually as part of the Commission's FMP Review process. The annual Black Drum FMP Review will contain an updated list for future reference.

6.1. Stock Assessment and Population Dynamics

A coastwide stock assessment has yet to be completed for black drum but is considered a high priority need. As such, a coastwide stock assessment, led by ASMFC, is currently in progress. The assessment will provide much needed data on the status of the black drum resource, establish reference points, as well as contribute to recommendations for additional management needs, if any.

6.2. Research and Data Needs

6.2.1. Biological

- Conduct studies to estimate catch and release mortality estimates.
- Obtain better estimates of harvest from the black drum recreational fishery (especially in states with short seasons).
- Increase spatial and temporal coverage of age samples collected regularly in fishery dependent and independent sources. Analyze existing otoliths that have been collected but not aged. Prioritize collection of adult age data from fishery independent sources in states where maximum size regulations preclude the collection of adequate adult ages.
- Collect genetic material (i.e., create "genetic tags") over long time span to obtain information on movement and population structure, and potentially estimate population size.
- Conduct a high reward tagging program to obtain improved return rate estimates. Continue and expand current tagging programs to obtain mortality and growth information and movement at size data.
- Continue to collect and analyze current life history data from fishery independent programs, including full size, age, maturity, histology workups and information on spawning season timing and duration. Any additional data that can be collected on adult black drum would be highly beneficial.
- Conduct studies to estimate fecundity-at-age coastwide and to estimate batch fecundity (especially for adults in South Atlantic).
- Obtain better estimates of bycatch of black drum in other fisheries, especially juvenile fish in South Atlantic states.
- Obtain estimates of selectivity-at-age for black drum through observer programs or tagging studies.
- Monitor adult abundance estimates

6.2.2. Social

- Obtain better coverage of shore and nighttime anglers.

6.2.3. Economic

- Obtain better data on the economic impacts of recreational and commercial black drum fishing on coastal communities.

6.2.4. Habitat

- If possible, expand existing fishery independent surveys in time and space to better cover black drum habitats (especially adult fish).
- Conduct otolith microchemistry studies to identify regional recruitment contributions.
- Conduct new and expand existing acoustic tagging programs to help identify spawning and juvenile habitat use and regional recruitment sources.

7. PROTECTED SPECIES

In the fall of 1995, Commission member states, the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) began discussing ways to improve implementation of the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) in state waters. Historically, these policies have been only minimally enforced in state waters (0-3 miles). In November 1995, the Commission, through its Interstate Fisheries Management Program (ISFMP) Policy Board, approved amendment of its ISFMP Charter (Section Six (b)(2)) so that interactions between ASMFC-managed fisheries and species protected under the MMPA, ESA, and other legislation, including the Migratory Bird Treaty Act be addressed in the Commission's fisheries management planning process. Specifically, the Commission's fishery management plans describe impacts of state fisheries on certain marine mammals and endangered species (collectively termed "protected species"), and recommend ways to minimize these impacts. The following section outlines: (1) the federal legislation which guides protection of marine mammals, sea turtles, and marine birds; (2) the protected species with potential fishery interactions; (3) the specific type(s) of fishery interactions; (4) population status of the affected protected species; and (5) potential impacts to Atlantic coastal state and interstate fisheries.

7.1. Marine Mammal Protection Act (MMPA) Requirements

Since its passage in 1972, one of the primary goals of the MMPA has been to reduce the incidental serious injury and mortality of marine mammals permitted in the course of commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate. Under the 1994 Amendments, the MMPA requires the National Marine Fisheries Service (NMFS) to develop and implement a take reduction plan to assist in the recovery or prevent the depletion of each strategic stock that interacts with a Category I or II fishery. Specifically, a strategic stock is defined as a stock: (1) for which the level of direct human-caused mortality exceeds the potential biological removal (PBR)[3] level; (2) which is declining and is likely to be listed under the Endangered Species Act (ESA) in the foreseeable future; or (3) which is listed as a threatened or endangered species under the ESA or as a depleted species under the MMPA. Category I and II fisheries are those that have frequent or occasional incidental mortality and serious injury of marine mammals, respectively, whereas Category III fisheries have a remote likelihood of incidental mortality and serious injury of marine mammals. Each year, NMFS publishes an annual List of Fisheries which classifies commercial fisheries into one of these three categories.

Under the 1994 mandates, the MMPA also requires fishermen participating in Category I and II fisheries to register under the Marine Mammal Authorization Program (MMAP), the purpose of which is to provide an exception for commercial fishermen from the general taking prohibitions of the MMPA for non-ESA listed marine mammals. All fishermen, regardless of the category of

[3] PBR is the number of human-caused deaths per year each stock can withstand and still reach an optimum population level. This is calculated by multiplying “the minimum population estimate” by “½ stock’s net productivity rate” by “a recovery factor ranging from 0.1 for endangered species to 1.0 for healthy stocks.”

fishery they participate in, must report all incidental injuries and mortalities caused by commercial fishing operations within 48 hours.

Section 101(a)(5)(E) of the MMPA allows for the authorization of the incidental taking of individuals from marine mammal stocks listed as threatened or endangered under the ESA in the course of commercial fishing operations if it is determined that (1) incidental mortality and serious injury will have a negligible impact on the affected species or stock; (2) a recovery plan has been developed or is being developed for such species or stock under the ESA; and (3) where required under Section 118 of the MMPA, a monitoring program has been established, vessels engaged in such fisheries are registered in accordance with Section 118 of the MMPA, and a take reduction plan has been developed or is being developed for such species or stock. Currently, there are no permits that authorize takes of threatened or endangered species by any commercial fishery in the Atlantic. Permits are not required for Category III fisheries; however, any serious injury or mortality of a marine mammal must be reported.

7.2. Endangered Species Act (ESA) Requirements

The taking of endangered sea turtles and marine mammals is prohibited and considered unlawful under Section 9(a)(1) of the ESA. In addition, NMFS or the USFWS may issue Section 4(d) protective regulations necessary and advisable to provide for the conservation of threatened species. There are several mechanisms established in the ESA to allow exceptions to the take prohibition in Section 9(a)(1). Section 10(a)(1)(A) of the ESA authorizes NMFS to allow the taking of listed species through the issuance of research permits for scientific purposes or to enhance the propagation or survival of the species. Section 10(a)(1)(B) authorizes NMFS to permit, under prescribed terms and conditions, any taking otherwise prohibited by Section 9(a)(1)(B) of the ESA, if the taking is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Finally, Section 7(a)(2) requires federal agencies to consult with NMFS to ensure that any action that is authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species. If, following completion of consultation, an action is found to jeopardize the continued existence of any listed species or cause adverse modification to critical habitat of such species, reasonable and prudent alternatives will be identified so that jeopardy or adverse modification to the species is removed and section 7(a)(2) is met (see Section 7(b)(3)(A)). Alternatively, if, following completion of consultation, an action is not found to jeopardize the continued existence of any listed species or cause adverse modification to critical habitat of such species, reasonable and prudent measures will be identified that minimize the take of listed species or adverse modification of critical habitat of such species (see Section 7(b)(4)). Section (7)(o) provides the actual exemption from the take prohibitions established in Section 9(a)(1), which includes Incidental Take Statements that are provided at the end of consultation via the ESA Section 7 Biological Opinions.

Under Section 7 of the Endangered Species Act of 1973, as amended, a review of listed species and designated critical habitat(s) known to occur in the area of proposed action(s) and potential impacts to these species and habitat(s) is required of federal FMPs. Although not required for Commission FMPs, the following is included for informational purposes.

Marine listed species and critical habitat designations in the eastern U.S.

Endangered

Blue whale	*Balaenoptera musculus*
Humpback whale	*Megaptera novaeangliae*
Fin whale	*Balaenoptera physalus*
North Atlantic right whale	*Eubalaena glacialis* (Critical Habitat Designated)
Sei whale	*Balaenoptera borealis*
Sperm whale	*Physeter macrocephalus*
Leatherback sea turtle	*Dermochelys coriacea*
Hawksbill sea turtle	*Eretmochelys imbricata*
Kemp's ridley turtle	*Lepidochelys kempii*
Green turtle*	*Chelonia mydas*
Shortnose sturgeon	*Acipenser brevirostrum*
Atlantic sturgeon[+]	*Acipenser oxyrinchus oxyrinchus*
Atlantic salmon	*Salmo salar* (Gulf of Maine Distinct Population Segment)
Smalltooth sawfish	*Pristis pectinata*

*Note: Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. Atlantic and Gulf of Mexico waters.

[+]Note: Five distinct population segments (DPS) of Atlantic sturgeon are listed on the ESA, four of which are listed as endangered (New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs).

Threatened

Loggerhead turtle (Northwest Atlantic Ocean DPS)	*Caretta caretta*
Atlantic sturgeon[+]	*Acipenser oxyrinchus oxyrinchus*
Gulf sturgeon	*Acipenser oxyrinchus desotoi*
Johnson's seagrass	*Halophilia johnsonii* (Critical Habitat Designated)

[+]Note: Five distinct population segments (DPS) of Atlantic sturgeon are listed on the ESA, one of which is listed as threatened (Gulf of Maine DPS).

Proposed Species

False Killer Whale	*Pseudorca crassidens*

Proposed Critical Habitat

None

Candidate Species

Alewife	*Alosa pseudoharengus*
Blueback Herring	*Alosa aestivalis*
Nassau grouper	*Epinephelus striatus*
Scalloped Hammerhead Shark	*Sphyrna lewini*

Species Under U.S. Fish and Wildlife Service Jurisdiction:

West Indian manatee	*Trichechus manatus* (Critical Habitat Designated)
American crocodile	*Crocodylus acutus* (Critical Habitat Designated)

7.3. Migratory Bird Treaty Act (MBTA) Requirements

Under the Migratory Bird Treaty Act it is unlawful "by any means or in any manner, to pursue, hunt, take, capture, [or] kill" any migratory birds except as permitted by regulation (16 USC. 703). Section 50 CFR 21.11 prohibits the take of migratory birds except under a valid permit or as permitted in the regulations. USFWS Policy on Waterbird Bycatch (October 2000) states, "It is the policy of the US Fish and Wildlife Service that the Migratory Bird Treaty Act of 1918, as amended, legally mandates the protection and conservation of migratory birds".

7.4. Protected Species Interactions with Existing Fisheries

The majority of directed harvest of black drum occurs in recreational fisheries. Bottlenose dolphins, in particular, interact with hook and line gear by taking catch/ bait off the gear or waiting nearby to feed on undersized thrown-back fish. Bottlenose dolphin stranding data document serious injuries and deaths from entanglement in and ingestion of hook and line gear. Recreational fisheries may catch sea turtles and marine birds incidentally. Black drum may occur as bycatch in some commercial fisheries that have been identified as having interactions with protected species (e.g. gillnets, haul seines, stop nets, and pound nets). Those interactions are described in those species' respective fishery management plans.

There are numerous protected species that inhabit the range of the black drum management unit covered under this FMP. Nineteen species are classified as endangered or threatened under the ESA, while the remaining species are protected by the MMPA.

Listed below are ESA and MMPA protected species found in coastal and offshore waters of the Atlantic Ocean within the range of black drum fisheries which operate only in state waters. USFWS species of management concern that have the potential to interact with black drum fisheries are also listed. Species of management concern are protected under the MBTA, but lack the protections mandated by the ESA.

ESA – Endangered

Atlantic sturgeon *(Acipenser oxyrinchus oxyrinchus)*, NY Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs
Fin whale (*Balaenoptera physalus)*
Humpback whale (*Megaptera novaeangliae)*
North Atlantic right whale (*Eubalaena glacialis)*
Sei whale (*Balaenoptera borealis)*
Green sea turtle[4] (*Chelonia mydas*)
Hawksbill sea turtle (*Eretmochelys imbricata)*
Kemp's ridley sea turtle *(Lepidochelys kempii)*

4 The breeding populations of green turtles in Florida and on the Pacific coast of Mexico are listed as endangered; the remainder of the population is listed as threatened. http://www.nmfs.noaa.gov/pr/species/esa/turtles.htm

Leatherback sea turtle (*Dermochelys coriacea)*
Shortnose sturgeon (*Acipenser brevirostrum)*
Bermuda petrel (*Pterodroma cahow*)
Roseate tern *(Sterna dougallii dougallii*), *NY, NJ, VA, NC*

ESA – Threatened
Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), Gulf of Maine DPS
Elkhorn coral (*Acropora palmata*)
Green sea turtle (*Chelonia mydas)*
Johnson's seagrass *(Halophila johnsonii)*
Loggerhead sea turtle[5] *(Caretta caretta)*, Northwest Atlantic Ocean DPS
Roseate tern *(Sterna dougallii dougallii*), *SC, GA, FL*
Piping plover *(Charadrius melodus)*
Staghorn coral *(Acropora cervicornis)*

MMPA – Protected
Includes all marine mammals above in addition to:
Atlantic spotted dolphin *(Stenella frontalis)*
Bottlenose dolphin *(Tursiops truncatus)*
Gray seal *(Halichoerus grypus)*
Harbor porpoise *(Phocoena phocoena)*
Harbor seal *(Phoca vitulina)*
Minke whale *(Balaenoptera acutorostrata)*

ESA – Species of Concern
Alewife (*Alosa pseudoharengus)*
Barndoor skate *(Dipturus laevis)*
Blueback herring *(Alosa aestivalis)*
Dusky shark *(Carcharhinus obscures)*
Mangrove rivulus (*Rivulus marmoratus)*
Nassau grouper (*Epinephelus striatus)*
Night shark *(Carcharinus signatus)*
Opossum pipefish *(Microphis brachyurus lineatus)*
Porbeagle shark *(Lamna nasus)*
Rainbow smelt *(Osmerus mordax)*
Sand tiger shark *(Carcharias taurus)*
Speckled hind (*Epinephelus drummondhayi)*
Striped croaker *(Bairdiella sanctaeluciae)*
Warsaw grouper *(Epinephelus nigritus)*

5 A distinct population unit, or DPS, is a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. The ESA provides for listing species, subspecies, or DPS of vertebrate species.

MBTA—USFWS Species of Management Concern
Canvasback (*Aythya valisineria*)[6]
Redhead (*Aythya americana*)[5]
Greater scaup (*Aythya marila*)[5]
Lesser scaup (*Aythya affinis*)[5]
Surf scoter (*Melanitta perspicillata*)[5]
White-winged scoter (*Melanitta fusca*)[5]
Black scoter (*Melanitta americana*)[5]
Long-tailed duck (*Clangula hyemalis*)[5]
Common goldeneye (*Bucephala clangula*)[5]
Red-throated loon (*Gavia stellata)*
Black-capped petrel (*Pterodroma hasitata)*
Greater shearwater (*Puffinus gravis*)
Audubon's shearwater (*Puffinus lherminieri*)
Band-rumped storm-petrel (*Oceanodroma castro*)
Masked booby (*Sula dactylaria*)
Brown booby (*Sula leucogaster*)
Pied-billed grebe (*Podilymbus podiceps*)
Horned grebe (*Podiceps auritus*)
Magnificent frigatebird (*Fregata magnificens*)
Least tern (*Sternula antillarum*), non-listed Atlantic coast subspecies
Gull-billed tern (*Gelochelidon nilotica*)

7.4.1. Marine Mammals

Marine mammal interactions have been recorded in the following fisheries targeting black drum: Mid-Atlantic gill net and Virginia pound net (see chart below derived from the 2012 MMPA List of Fisheries). Fisheries with past but no recently documented interactions include: Chesapeake Bay inshore gill net; Delaware River/Bay gill net; and Mid-Atlantic hook-and-line. These fisheries are primarily Category II, except the Mid-Atlantic gill net fishery is Category I.

The chart below provides the marine mammal species and stocks documented as incidentally killed or injured in each fishery. Subsequent sections discuss the number of documented interactions with the following species of concern described in the 2012 List of Fisheries: bottlenose dolphin, harbor porpoise, and humpback whale. These bycatch reports do not represent a complete list, but represents those available, mainly from the US Atlantic and Gulf of Mexico Marine Mammal Stock Assessment Reports. It should be noted that without an observer program for many of these fisheries and/or very low observer coverage, accurate numbers of interactions are likely not reflected.

6 *These waterfowl species are USFWS Birds of Management Concern*

Fisheries for black drum and the marine mammal species and stocks incidentally killed or injured (Source: 2012 MMPA List of Fisheries).

Fishery Description	Marine Mammal Species and Stocks Incidentally Killed/Injured
CATEGORY I	
Mid-Atlantic gill net	Bottlenose dolphin –Northern Migratory coastal, Southern Migratory coastal, Northern NC estuarine system, Southern NC estuarine system, WNA offshore; common dolphin – WNA; gray seal – WNA; harbor seal – WNA; harp seal –WNA; long-finned pilot whale – WNA; short-finned pilot whale – WNA; White-sided dolphin – WNA; humpback whale – GME; harbor porpoise – GME/BF

Fishery Description	Marine Mammal Species and Stocks Incidentally Killed/Injured
CATEGORY II	
Virginia pound net	Bottlenose dolphin – Northern Migratory coastal, Southern Migratory coastal, Northern NC estuarine

Mid-Atlantic Gill Net

The Mid-Atlantic Gillnet Fishery utilizes both drift and sink gillnets, including nets set in a sink, stab, set, strike, or drift fashion. Black drum may be targeted, and landings records from 2000-2010 indicate gill nets account for the largest portion of black drum landings along the Atlantic Coast (National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD). The fishery is classified as Category I because the total annual mortality and serious injury of bottlenose dolphin stocks (Northern Migratory coastal, Southern Migratory coastal, Northern NC estuarine system, Southern NC estuarine system, SC/GA coastal, Central FL coastal, Northern FL coastal, WNA offshore) in this fishery is greater than 50% of the stocks' PBR level. Documented interaction with harbor porpoise, white-sided dolphin, harbor seal, gray seal, harp seal, estuarine bottlenose dolphin, coastal bottlenose dolphin, offshore bottlenose dolphin, common dolphin, minke whale (Canadian East Coast stock), humpback whale (Gulf of Maine stock), Risso's dolphin, and long-finned and short-finned pilot whale were reported in this fishery. Estimated observer coverage from 1995-2007 ranges between one and five percent annually (Waring et al. 2012).

Bottlenose Dolphin

From 1995 to 2008, a total of 19 coastal bottlenose dolphin takes were observed in the Mid-Atlantic gillnet fishery (Waring et al. 2012). The Mid-Atlantic gillnet fishery is a combination of small vessel fisheries that target a variety of fish species, including black drum, bluefish, croaker, spiny and smooth dogfish, kingfish, Spanish mackerel, spot, striped bass and weakfish (Steve et al. 2001). It operates in different seasons targeting different species in different states throughout the range of coastal bottlenose dolphins.

The Mid-Atlantic gillnet fishery has the highest documented level of mortality of bottlenose dolphins, and the North Carolina sink gillnet fishery is its largest component in terms of fishing effort and observed takes. Of 12 observed mortalities between 1995 and 2000, 5 occurred in sets targeting spiny or smooth dogfish, 1 was in a set targeting "shark" species, 2 occurred in striped bass sets, 2 occurred in Spanish mackerel sets, and the remainder were in sets targeting kingfish, weakfish or finfish generically (Rossman and Palka 2001). From 2001-2008, 7 additional bottlenose dolphin mortalities were observed in the mid-Atlantic gillnet fishery. Three mortalities were observed in 2001 with 1 occurring off of northern North Carolina during April and 2 occurring off of Virginia during November. Four additional mortalities were observed along the North Carolina coast near Cape Hatteras: 1 in May 2003, 1 in September 2005, 1 in September 2006 and 1 in October 2006. Because the Northern Migratory, Southern Migratory, Northern North Carolina Estuarine System and Southern North Carolina Estuarine System bottlenose dolphin stocks all occur in waters off of North Carolina, it is not possible to definitively assign all observed mortalities, or extrapolated bycatch estimates, to a specific stock. (Waring et al. 2012)

Harbor Porpoise

In the mid-1980s, using rough estimates of fishing effort, NMFS estimated that a maximum of 600 harbor porpoises were killed annually in this fishery. Before 1998, most of the documented harbor porpoise takes from US fisheries were from the Northeast sink gill net fishery as NMFS started an observer program for this fishery in 1990 (Waring et al. 2002). Although takes were likely occurring in the Mid-Atlantic gillnet fishery as well, an observer program was not established for this fishery until 1993, and it was not until 1995 that observer coverage was present in this fishery when harbor porpoises are present in this region (Waring et al., 2002). Annual average estimated harbor porpoise mortality and serious injury from the mid-Atlantic gillnet fishery during 1995 to 1998, before the Take Reduction Plan, was 358. The average annual harbor porpoise mortality and serious injury in the mid-Atlantic gillnet fishery from 2005 to 2009 was 318. The NMFS Sea Sampling Program has observed harbor porpoise mortalities related to this fishery, with estimates of annual bycatch ranging from 2,900 animals in 1990 to 270 animals in 1999 (post implementation of the HPTRP), and 591 animals in 2009 (Waring et al. 2012).

In July 1993, NMFS initiated an observer program in the Mid-Atlantic coastal gill net fishery. This fishery, which extends from North Carolina to New York, is a combination of small vessel fisheries that target a variety of fish species; some of the vessels operate right off the beach, some use drift nets and others use sink nets. From 1995 to 2000, 114 harbor porpoise were observed taken (Waring et al. 2002). During that time, fishing effort was scattered between New York and North Carolina from the beach to 50 miles from shore. After 1995, documented bycatch was observed from December to May. Annual average estimated harbor porpoise mortality and serious injury from the Mid-Atlantic coastal gill net fishery before implementation of the HPTRP (1995-1998) was 358 animals. Following implementation of the HPTRP and other fishery management plans for groundfish, fishing practices changed during 1999 (Waring et al. 2002), and the average annual harbor porpoise mortality and serious injury in this fishery fell to 65 animals (2000-2004). The average annual harbor porpoise mortality and serious injury in the mid-Atlantic gillnet fishery from 2005 to 2009 was 318 (Waring et al. 2012).

Humpback Whale

Assessing the level of interactions between humpback whales and fisheries has been difficult and is derived from two primary sources -- observed takes and non-observed fishery entanglement records, including strandings records. Between 2005-2009 (U.S. and Canada), there were 19 documented humpback whale interactions with fishing gear (6 mortalities and 13serious injuries) (Waring et al. 2012). Unfortunately, most of the records do not contain the detail necessary to assign entanglements to a particular fishery or location because often times a whale is carrying a piece of line that cannot easily be attributed to a specific fishery. Additionally, observing a humpback whale or other large whale becoming entangled in fishing gear is extremely rare. More information is needed on fisheries interactions with humpback whales, specifically the location of the interaction and types of gear involved.

Virginia Pound Net

Pound Nets are a stationary gear fished in nearshore coastal and estuarine waters of Virginia (Waring et al. 2012). The gear consists of a large mesh lead posted perpendicular to the shoreline extending outward to the corral, or "heart", where the catch accumulates. Black drum may be targeted. Occasional interactions with coastal bottlenose dolphins have been observed while monitoring for sea turtle interactions in both the commercial and experimental fisheries. Three takes of coastal bottlenose dolphins were observed in 2003, 2004, and 2009. Stranded bottlenose dolphins have also shown evidence of interactions with pound nets. From 2002 to 2009, 21 bottlenose dolphins were removed dead from Virginia pound nets, and 4 dolphins were disentangled alive (Personal Communication, S. Barco, Virginia Aquarium, 2012). Data from the Chesapeake Bay suggest that the likelihood of Bottlenose Dolphin entanglement in pound net leads may be affected by the mesh size of the lead net (Bellmund *et al.* 1997), but the information is not conclusive (Waring et al. 2012). The fishery has been defined as a Category II fishery in the 2011 List of Fisheries (75 FR 68468, November 8, 2010) and is managed under the Bottlenose Dolphin Take Reduction Plan.

7.4.2. Sea Turtles

Gill Nets

The mid-Atlantic represents important foraging habitat for several species of sea turtles. Stranded loggerhead, Kemp's ridley, and green sea turtles have been partially or completely entangled in gillnet material, and are most likely to come in contact with the gear in shallow coastal waters. Loggerhead, Kemp's ridley, green, and leatherback sea turtles have been captured in the Mid-Atlantic gill net fishery. Leatherbacks are present especially when warmer waters bring jellyfish, their preferred prey, into coastal areas. Hawksbill sea turtles are only rare visitors to the areas where fishing effort occurs; preferring coral reefs with sponges for forage, so interaction would be limited. However, entanglement in gillnets has been identified as a serious threat for hawksbills in the Caribbean (NMFS and USFWS 1993).

Spring and fall gillnet operations have been strongly implicated in coincident sea turtle stranding events from North Carolina through New Jersey. On average, the highest numbers of interactions occurred in spring, followed by summer and fall. The southern states appear to have had more spring interactions, while the northern states had more summer interactions, probably due to the northern migration of sea turtles in the warmer months.

Gill net gear found on stranded turtles varied widely, from 2 - 11.5" (5-29 cm) stretch mesh, and ranged from small, cut pieces of net, to lengths (up to 1200' (365m)) of abandoned net. Gill net gear was of various materials including nylon, cotton, and propylene, and in various colors including blue, black, and green. Gear type included monofilament, twine, gillnets, pound nets, trammel nets, seines, sink nets, and nets attached to anchors, cork floats, and buoys.

Virginia Pound Net

Most of pound net fishery interactions result in live releases and are documented primarily from North Carolina, Virginia, New York (Long Island), and Rhode Island. In Chesapeake Bay, Virginia, turtles become entangled in pound nets starting in mid-May with increasing numbers of entanglements until late June. The construction of leaders in pound nets has been found to be a significant factor in these entanglements (Musick et. al. 1987). NMFS has documented that fishing with pound net leaders results in lethal and non-lethal take of sea turtles. The NEFOP began observing effort in this fishery in 2001. In 2002 and 2003, NMFS monitored pound nets in Virginia. The 2002 and 2003 monitoring results documenting sea turtle entanglement in and impingement on pound net leaders with less than 12 inches (30.5 cm) stretched mesh appeared to be more of a significant problem than originally assessed. NMFS continued to monitor pound nets during the 2004 spring season. In 2004, NMFS characterized 88 nets, 51 of which were active. Out of 1,190 surveys conducted, 4 sea turtles were observed to have been impinged or entangled in pound net leaders. Out of the four turtles that interacted with the pound net gear, one was released alive. In 2004 and 2005 an experimental fishery was conducted in an area of the Chesapeake Bay that was closed to commercial pound net fishing effort from May to July for sea turtle conservation. The results from these studies determined a modified pound net leader could be used for pound net fishing while providing sea turtle conservation benefits (Waring et al. 2012). NMFS issued a final rule on May 5, 2004 (69 FR 24997), which prohibited the use of offshore pound net leaders in a portion of the Virginia Chesapeake Bay. The 2004 rule also prohibited the use of 12 inches (30.5 cm) and greater stretched mesh and stringers in nearshore pound net leaders in Pound Net Regulated Area I and all pound net leaders employed in the remainder of the Virginia Chesapeake Bay. A recent study conducted by Barco et al. in 2009 examined the use of modified pound net leaders adopted for sea turtle conservation because they believed it would also be effective in reducing bottlenose dolphin interactions in pound net leads. The study took place in the lower Chesapeake Bay and evaluated the effect of modified pound net leaders on finfish bycatch to ensure it maintained catch efficiency. Results show modified pound net leader had similar or greater catches of finfish compared to traditional leaders (e.g., leaders that were not modified for sea turtle conservation) (Waring et al. 2012).

7.4.3. Atlantic Sturgeon

Data from the NEFSC Sea Sampling (Observer) Program Database and the USFWS tag reports (Eyler et al. 2004) identify sink gillnets as the principal source of Atlantic sturgeon bycatch and bycatch mortality. Sink gillnet fisheries are numerous along the Atlantic coast, targeting both large and small species in inshore and offshore waters (ASMFC 2007). The Mid-Atlantic Gillnet Fishery utilizes both drift and sink gillnets, including nets set in a sink, stab, set, strike, or drift fashion. This fishery is described above in 7.4.1.

ASMFC sponsored a workshop in 2007 to conduct a focused assessment of the NEFSC Observer Database, which principally covers fisheries in New England and the Middle Atlantic state waters. During the period 2001-2006, 511 Atlantic sturgeon were observed in gillnet fisheries. On a proportionate basis of all observed trips, 2.9 to 6.1% of gillnet trips encountered sturgeon (ASMFC 2007). Means to reduce bycatch mortality in the monkfish sink gillnet fishery and other sink gillnet fisheries through modification of gear deployments (e.g., soak time, presence of tiedowns) could result in substantial reductions in sturgeon deaths.

7.4.4. Sea Birds

The roseate tern, Bermuda petrel, and piping plover are the only ESA listed bird species within the mid-and south-Atlantic maritime regions. The roseate tern and Bermuda petrel are uncommon in inshore and coastal waters of the mid- and south-Atlantic and thus, have relatively low likelihoods of interacting with black drum fisheries. Nevertheless, exceptional efforts to avoid deleterious interactions with these species are warranted as they are rare and highly vulnerable to even minimal levels of mortality. The piping plover could be impacted by shore-based fishing activity if individuals were disturbed or killed by vehicles related to fishing efforts. However, during the nesting season, when plovers are highly vulnerable to beach disturbance, sensitive areas are posted and beach access is often restricted.

Over 50 species of non-ESA-listed coastal and marine birds occur within areas fished for black drum. These include marine waterfowl (e.g., ducks and brant), loons, petrels, shearwaters, storm petrels, cormorants, gannets, jaegers, alcids, and various species of terns and gulls. Someof these bird species breed along the northern and central Atlantic coast during the boreal summer, using inshore, coastal, and offshore waters of the western Atlantic during this period. Several others breed elsewhere, but forage in inshore, coastal, and offshore waters of the western Atlantic during March through September. Many marine bird species spend winter non-breeding periods in inshore, coastal, and offshore waters of the western Atlantic where black drum fisheries occur. All of these birds are protected under the ESA or the most recently amended version of the MBTA (CFC 50, section 10; www.fws.gov/migratorybirds/RegulationsPolicies/mbta/mbtintro.html).

Accurate abundance and distribution estimates are unavailable for many coastal and marine birds. While data exist for more intensively managed species such as diving ducks (Aythyini) and seaducks (Mergini), current research programs only monitor select populations, and robust monitoring efforts are lacking for most non-hunted species, such as loons, grebes, gannets, etc.

An unknown, but possibly significant, number of migratory birds are drowned each year by gillnets in inshore, nearshore, and offshore marine waters of the mid- and south-Atlantic regions.While gillnet fishery observer coverage is scarce, a recent study estimated that nearly 1,500 red-throated and common loons are caught annually in commercial mid-Atlantic gillnet fisheries (Warden 2010). Another study, conducted in nearshore coastal waters between New Jersey and Virginia, estimated that over 2,000 marine birds, primarily loons and cormorants, were killed in anchored gillnets within a three-month observation period (Feb-April; Forsell 1999). Such high incidental gillnet mortality is corroborated with data from National Wildlife Health Center in Madison, Wisconsin, which indicates that many thousands of loons and sea

ducks are killed each year. Most bird-fisheries interactions occur during January through April from North Carolina to New Jersey. South Carolina banned anchored gillnets in their coastal fishery because of excessive bird mortalities, and other south Atlantic states have limited their usage.

A list of MTBA protected bird species with the greatest potential to interact with black drum fisheries is provided below. Most of the species listed are pursuit or plunge divers which take fish below the surface of the water or feed on benthic invertebrates. Fish eating birds are especially vulnerable to drowning in gillnets because they forage for prey underwater. Additionally, fish eating birds may be attracted to the vicinity of nets, which are sometimes deployed for days at a time, to feed on forage fish feeding near the nets. Most of the birds listed are present along the Atlantic coast from October through April, depending on weather and timing of migration.

I. MBTA protected birds found in coastal and nearshore marine waters that could interact with black drum fisheries:

Long-tailed duck (*Clangulahyemalis*)
Black scoter (*Melanittanigra*)
Surf scoter (*Melanittaperspicillata*)
Red-breasted merganser (*Mergusserrator*)
Common loon (*Gaviaimmer*)
Red-throated loon (*Gaviastellata*)
Horned grebe (*Podicepsauritus*)
Red-necked grebe (*Podicepsgrisegena*)
Northern gannet (*Sula bassanus*)
Double-crested cormorant (*Phalacrocoraxauritus*)
Great cormorant (*Phalacrocoraxcarbo*)
American brown pelican (*Pelicanuserythrorhynchos*)
Gulls (*Larus spp.*)
Least tern (*Sternulaantillarum*)
Gull-billed tern (*Gelochelidonnilotica*)
Common tern (*Sterna hirundo*)
Caspian tern (*Hydroprognecaspia*)
Royal tern (*Thalasseusmaximus*)
Sandwich tern (*Thalasseussandvicensis*)
Forster's tern (*Sterna forsteri*)
Parasitic jaeger (*Stercorariusparasiticus*)
Razorbill (*Alcatorda*)

II. MBTA protected birds found in coastal bays that could interact with black drum fisheries:

Redhead (*Aythyaamericana*)
Canvasback (*Aythyavalisineria*)
Greater scaup (*Aythyamarila*)
Lesser scaup (*Aythyaaffinis*)
Red-breasted merganser (*Mergusserrator*)

Common goldeneye (*Bucephalaclangula*)
Bufflehead (*Bucephalaalbcola*)
Long-tailed duck (*Clangulahyemalis*)
Black scoter (*Melanittanigra*)
White-winged scoter (*Melanittafusca*)
Surf scoter (*Melanittaperspicillata*)
Common loon (*Gaviaimmer*)
Red-throated loon (*Gaviastellata*)
Pied-billed grebe (*Podilymbuspodiceps*)
Horned grebe (*Podicepsauritus*)
Double-crested cormorant (*Phalacrocoraxauritus*)
Great cormorant (*Phalacrocoraxcarbo*)
Gulls (*Larus spp.*)
Tern species (see list I above)

7.5. Population Status Review of Relevant Protected Species

7.5.1. Marine Mammals

Marine mammal species are known to co-occur with or become entangled in gear used by black drum fisheries, such as coastal bottlenose dolphin, humpback whale, and harbor porpoise. These species are classified as strategic stocks under the MMPA. Additionally, the humpback whales are listed as endangered under the ESA.

The status of these and other marine mammal populations inhabiting the Northwest Atlantic has been discussed in great detail in the US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments. Initial assessments were presented in Baylock et al. (1995) and were updated in Waring et al. (2012). The report presents information on stock definition, geographic range, population size, productivity rates, PBR, fishery specific mortality estimates, and compares the PBR to estimated human-caused serious injury and mortality for each stock.

7.5.1.1. Bottlenose Dolphin

The coastal morphotype of bottlenose dolphins is continuously distributed along the Atlantic coast of the United States in both coastal nearshore and inshore estuarine waters. Specifically, the morphotype extends from Florida-New Jersey during the summer months and in waters less than 20 meters deep, including both inshore estuarine and nearshore waters. South of Cape Lookout, North Carolina, there are lower densities of animals over the continental shelf in waters between 20-100 meters deep, and the coastal morphotype overlaps spatially with the offshore morphotype. The coastal and offshore morphotype are morphologically and genetically distinct (Waring et al. 2012).

Scott et al. (1988) hypothesized a single coastal migratory stock (Western North Atlantic coastal stock) that ranged seasonally along the Atlantic coast. Recent studies, however, indicate this single migratory stock hypothesis is incorrect, with instead, a more complex mosaic of stocks. Therefore, re-analysis of stranding data, genetic, and satellite telemetry indicate fourteen stocks

comprise the coastal morphotype, five coastal stocks, and nine bay, sound, and estuary stocks. (Waring et al. 2012) The five coastal stocks include: (1) Northern Migratory; (2) Southern Migratory; (3) SC/GA coastal; (4) Northern FL coastal; and (5) Central FL coastal. The nine bay, sound, and estuary stocks include: (1) Northern North Carolina Estuarine System stock; (2) Southern North Carolina Estuarine System stock; (3) Charleston Estuarine System stock; (4) Northern Georgia/Southern South Carolina Estuarine System stock; (4) Southern Georgia System stock; (4) Jacksonville System stock; (4) Indian River Lagoon Estuarine System stock; (8) Biscayne Bay Estuarine System stock; and (9) Florida Bay Estuarine System stock.

Under the MMPA, 13 of the 14 stocks comprising the coastal morphotype of bottlenose dolphins are strategic and listed as depleted. The stock is designated as depleted under the MMPA due to mortality caused during the 1987-88 die-off and high incidental commercial fishery-related mortality relative to PBR. There are data suggesting that the population was at an historically high level immediately prior to a 1987-88 mortality event (Keinath and Musick 1988); however, this mortality event was estimated to have decreased the population by as much as 53%.

Abundance estimates from the 2011 Marine Mammal Stock Assessment for six coastal bottlenose dolphin stocks are outlined in the following chart (Waring et al. 2012).

Best estimates of abundance for six management units of the Western North Atlantic Coastal Bottlenose Dolphins (Waring et al. 2012).

Stock	**Abundance Estimate**
Northern Migratory	9,604
Southern Migratory	12,482
South Carolina/Georgia	7,738
Northern Florida	3,064
Central Florida	6,318
Southern North Carolina Estuarine System	2,454

7.5.1.2. Harbor Porpoise

The Gulf of Maine/Bay of Fundy stock of harbor porpoises were proposed to be listed as threatened under the ESA on January 7, 1993, but in 1999 NMFS determined this listing was not warranted (NMFS 1999). NMFS removed this stock from the ESA candidate species list in 2001. The harbor porpoise is considered a strategic stock under the MMPA because the average annual human-related mortality and serious injury exceeds the stock's PBR level. The PBR for the harbor porpoise is 701 animals (Waring et al. 2012). The total fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR, which means the human induced mortality is not approaching zero mortality and serious injury rate. For many years before 1999, the total fishery-related mortality and serious injury exceeded the PBR, and thus it was considered a strategic stock. After implementation of the HPTRP in 1999, serious injuries and mortalities due to fishing interactions fell below the stock's PBR; however, bycatch levels consistently began rising soon after and the 2007 Stock Assessment Report indicated that these levels were again above PBR (Waring et al. 2007). Bycatch continues to occur above the PBR level, with an estimated mean annual mortality rate of 877 animals taken from 2005-2009 in the Northeast sink gillnet and Mid-Atlantic gill net fisheries (Waring et al. 2012).

The harbor porpoise can range from Labrador to North Carolina. The Atlantic stock of harbor porpoise is referred to as the Gulf of Maine/Bay of Fundy stock and generally spends its winters in the Mid-Atlantic region, but also occurs in New England waters during this time. Harbor porpoise are generally found in coastal and inshore waters, but will also travel to deeper, offshore waters. The status of the harbor porpoise stock in US waters is unknown (Waring et al. 2009). There is insufficient data to determine the population trends for this species because they are widely dispersed in small groups, spend little time at the surface, and their distribution varies unpredictably from year to year depending on environmental conditions (NMFS 2002). The best estimate of abundance for the Gulf of Maine/Bay of Fundy harbor porpoise is 89,054 (CV= 0.47). The minimum population estimate is 60,970 individuals (Waring et al. 2012).

7.5.1.3. Humpback Whale

Humpback whales are listed as endangered under the ESA and are also protected by the MMPA. Recent abundance estimates indicate continued population growth of the Gulf of Maine stock. However, there are insufficient data to determine population trends of North Atlantic humpbacks and this particular stock may still be below its optimum sustainable population. Continued human-caused mortality, especially in the Mid-Atlantic region, may be limiting recovery. The Gulf of Maine stock is a strategic stock because the average annual human-related mortality and serious injury exceeds PBR, and because the North Atlantic humpback whale is an endangered species (Waring et al. 2012).

In the western North Atlantic, humpback whales feed during spring, summer and fall over a geographic range encompassing the eastern coast of the United States (including the Gulf of Maine), the Gulf of St. Lawrence, Newfoundland/Labrador, and western Greenland (Katona and Beard 1990). In the winter, most humpbacks migrate to the West Indies to mate and breed, while others have been observed at higher latitudes in the waters off the Mid-Atlantic and southeast U.S. The best estimate of abundance for Gulf of Maine humpback whales is 847 animals (CV=0.55) and PBR for the Gulf of Maine humpback whale stock is 1.1 whales (Waring et al. 2012).

The major known sources of mortality and injury of humpback whales include entanglement in commercial fishing gear, such as sink gillnet gear, and ship strikes. Based on photographs of the caudal peduncle of Gulf of Maine humpback whales, Robbins and Mattila (1999) estimated that between 48% and 78% of animals exhibit scarring caused by entanglement. Several whales have apparently been entangled on more than one occasion. Glass et al. (2010) note the greater concern of animals never observed. Humpback whale scar evidence suggests that only 3-10% of entanglements are witnessed and reported (Robbins and Mattila 2004). These estimates are based on sightings of free-swimming animals that initially survive the encounter with the gear. Because some whales may drown immediately, or free themselves of the gear before they are observed entangled, the actual number of interactions may be higher. In addition, the actual number of species-gear interactions is contingent on the intensity of observations from aerial and ship surveys. Humpback whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources resulting from a variety of activities including the operation of commercial fisheries. Because entanglements and vessel

collisions have been documented in both U.S. and Canadian waters, estimated human-caused mortality and serious injury are divided between the U.S. (4.8) and Canada (0.4) for a total of 5.2 per year (Waring et al. 2012). The Atlantic Large Whale Take Reduction Plan (ALWTRP) established measures that attempt to reduce interactions between large whales (right, humpback, and fin whales) and commercial fishing gear in U.S. waters.

During the past several years there has been a fourfold increase in the number of strandings of humpback whales in the mid-Atlantic region, many with indications of fishing gear entanglement. Between 1989 and 1992, 31 humpback whales stranded from New Jersey through Virginia (Wiley et. al. 1994). Significantly more strandings occurred between Chesapeake Bay and Cape Hatteras, North Carolina. Strandings increased from February through April and 25 percent had scars consistent with net entanglement. Between 1990 and 1996, there were 10 humpbacks stranded in Virginia. Three of the animals showed evidence of rope abrasion consistent with entanglement. Between 1996 and 2000 (U.S. and Canada), there were 14 documented humpback whale interactions with fishing gear (two mortalities and 12 serious injuries). Two of the 12 seriously injured humpbacks were observed entangled in gillnet gear in the Bay of Fundy, Canada. For the period 2000 through 2007, there were 11 mortalities attributable to fishery interactions and 19 cases of serious injuries coast-wide (Waring et al. 2009). In 2008 there were 3 humpback whales observed as incidental bycatch, 2 of these in gillnet gear. Unfortunately, most of the records do not contain the detail necessary to assign entanglements to a particular fishery or location because often times a whale is carrying a piece of line that cannot easily be attributed to a specific fishery. More information is needed on fisheries interactions with humpback whales, specifically the location of the interaction and types of gear involved.

7.5.2. Sea Turtles

All sea turtles that occur in US waters are listed as either endangered or threatened under the ESA. The Kemp's ridley (*Lepidochelyskempii*), leatherback (*Dermochelyscoriacea*), and hawksbill (*Eretmochelysimbricata*) are listed as endangered. The Northwest Atlantic Ocean Distinct Population Segment of loggerhead turtles (*Carettacaretta*) and the green turtle (*Cheloniamydas*) are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific coast of Mexico, which are listed as endangered. All five of these species inhabit the waters of the US Atlantic and Gulf of Mexico.

Atlantic coastal waters provide important developmental, migration, and feeding habitat for sea turtles. The distribution and abundance of sea turtles along the Atlantic coast is related to geographic location, reproductive cycles, food availability, and seasonal variations in water temperatures. Water temperatures dictate how early northward migration begins each year and are a useful factor for assessing when turtles will be found in certain areas. Sea turtles can occur in offshore as well as inshore waters, including sounds and embayments.

7.5.3. Atlantic Sturgeon

There are only two Atlantic sturgeon populations for which size estimates are available - the Hudson River and the Altamaha River populations. In 1995, sampling crews on the Hudson

River estimated that there were 9,500 juvenile Atlantic sturgeon in the estuary. Since 4,900 of these were stocked hatchery-raised fish, about 4,600 fish were thought to be of wild origin. The mean annual spawning stock size (spawning adults) was estimated at 870 (600 males and 270 females). The Altamaha River supports one of the healthiest Atlantic sturgeon populations in the Southeast, with over 2,000 subadults captured in research surveys in the past few years, 800 of which were 1 to 2 years of age. The population appears to be stable. (http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm#status)

In February 2012 NMFS determined Atlantic sturgeon in the New York Bight, Chesapeake Bay, Carolina, and South Atlantic distinct population segments (DPSs) should be listed as endangered under the Endangered Species Act (ESA). This listing indicates that NMFS has reviewed the status of the species and conservation efforts being made to protect the species, considered public and peer review comments, and have made their determination that these DPSs are in danger of extinction throughout their ranges, and should be listed as endangered, based on the best available scientific and commercial data. The Gulf of Maine DPS was determined by NMFS to be threatened under the ESA as well. This listing requires NMFS to issue protective regulations under section 4(d) of the ESA. Such protective regulations are ones deemed ‘‘necessary and advisable for the conservation of the species”. The expected result of extending such prohibitions will be to protect the GOM DPS of Atlantic sturgeon from direct forms of take, such as physical injury or killing, and from indirect forms of take, such as harm that results from habitat degradation while still allowing scientific research as well as salvage of dead fish and rescue of injured fish by experienced personnel. These actions are intended to help preserve and recover the GOM DPS of Atlantic sturgeon by addressing the negative effects from stressors impeding recovery of the DPS.

7.5.4. Sea Birds

The ranges of three ESA-listed species of birds, roseate tern (estimated Atlantic population: < 4,000 individuals), Bermuda petrel (estimated world population: < 200 individuals), and piping plover (estimated world population: < 8,000 individuals) overlap areas fished for black drum. However, the potential for interactions between these fisheries and roseate terns and Bermuda petrels is small, as primary distributions of these endangered birds are largely beyond fishery boundaries. Nevertheless, exceptional efforts to avoid deleterious interactions with roseate terns and Bermuda petrels are warranted as they are rare and highly vulnerable to even minimal levels of mortality. The piping plover could be impacted by shore-based fishing activity if individuals were disturbed or killed by vehicles related to fishing efforts. However, during the nesting season, when plovers are highly vulnerable to beach disturbance, sensitive areas are posted and beach access is often restricted.

The world population of black-capped petrels is thought to be less than 4,000 individuals. While black-capped petrels mostly occur farther offshore than most black drum fisheries, exceptional efforts to avoid deleterious interactions with the species are warranted as it is rare and highly vulnerable to even minimal levels of mortality. Black-capped petrels are protected under the MBTA and are a USFWS species of management concern. In addition, a petition for ESA listing of the species is currently under review by the USFWS.

Several other MBTA-listed bird species have a greater potential to interact with black drum fisheries. Many of these species are also USFWS species of management concern. Based on their distributions, behavior, and documented bycatch in mid- and south-Atlantic fisheries, loons and diving ducks are among avian taxa most likely to interact with black drum fisheries. The red-throated loon is a USFWS species of management concern. While accurate population estimates are unavailable, it is likely that at least 50,000 individuals winter in U.S. Atlantic waters (Lee 2009). This species is threatened by many human activities, particularly gillnet fishing (Warden 2010). Atlantic populations of common loons are more numerous, thus the species is not currently a USFWS species of management concern. However, common loons occur within fishery boundaries and are subject to multiple threats including bycatch, mercury and lead poisoning, poaching, disturbance, and loss of habitat. The cumulative impact of all these sources of mortality combined with bycatch mortality is a concern for these populations. More accurate population estimates exist for intensively managed diving duck and seaduck species, such as scaup and scoters, that could interact with black drum fisheries. While populations of most of these species are thought to be relatively high in U.S. Atlantic waters, current monitoring programs only survey a subsample of areas, and these duck species face numerous threats, including poaching.

Populations of several other MBTA-listed seabirds, including gannets, cormorants, and some gulls, which could interact with black drum fisheries, are large and not declining. However, accurate population and status estimates are unavailable for most of these species and their bycatch rates have not been evaluated in most commercial fisheries.

7.6. Existing and Proposed Federal Regulations/Actions Pertaining to Relevant Protected Species

7.6.1. Bottlenose Dolphins

A Take Reduction Plan is required under the MMPA to reduce dolphin serious injury and mortality below PBR because strategic stocks of the coastal morphotype of bottlenose dolphins interact with Category I and II fisheries. PBR is defined as the maximum number of human-caused deaths per year each stock can withstand and still reach or maintain an optimum sustainable population level. NMFS convened the Bottlenose Dolphin Take Reduction Team (BDTRT) in 2001 to provide consensus recommendations in developing the Bottlenose Dolphin Take Reduction Plan (BDTRP).

NMFS issued a final rule implementing the BDTRP on April 26, 2006 (May 26, 2006 effective date) based on the BDTRT's consensus recommendations. The BDTRP includes regulatory and non-regulatory management measures to reduce the incidental mortality and serious injury (bycatch) of the several stocks comprising the coastal morphotype of bottlenose dolphins in Category I and II commercial fisheries operating within the dolphin′s distributional range. The BDTRP measures implement gillnet effort reduction, gear proximity requirements, gear or gear deployment modifications, and outreach and education measures to reduce dolphin bycatch below the marine mammal stock′s PBR. NMFS amended the BDTRP on December 19, 2008, (January 20, 2009 effective date) based on the BDTRT's 2007 consensus recommendations to extend nighttime medium mesh gillnet prohibitions in North Carolina during the winter that were

due to expire. NMFS amended the BDTRP again on July 31, 2012 (August 30, 2012 effective date) based on the BDTRT's 2009 consensus recommendations to permanently include the nighttime medium mesh gillnet prohibitions in North Carolina during the winter.

Based on the 2012 LOF, the BDTRP affects the following fisheries via regulatory or non-regulatory components: the mid-Atlantic gillnet; North Carolina inshore gillnet; Southeast Atlantic gillnet; Virginia pound net; North Carolina long haul seine; mid-Atlantic haul/beach seine; Atlantic blue crab trap/pot; North Carolina roe mullet stop net; Southeastern U.S. Atlantic shark gillnet; mid-Atlantic menhaden purse seine; and Southeastern U.S. Atlantic, Gulf of Mexico stone crab trap/pot.

For additional information, please contact the National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division F/SER3, 263 13th Avenue South, St. Petersburg, FL 33701 or online at: http://www.nmfs.noaa.gov/pr/interactions/trt/bdtrp.htm

7.6.2. Harbor Porpoise

On December 2, 1998, NMFS published a final rule to implement the Harbor Porpoise Take Reduction Plan (HPTRP) for the Gulf of Maine and the Mid-Atlantic waters (63 FR 66464). The Northeast sink gillnet and Mid-Atlantic gill-net fisheries are the two fisheries regulated by the HPTRP. Among other measures, the HPTRP uses seasonal time/area closures in combination with the deployment of acoustic deterrent devices (pingers) in Northeast waters (Maine through Rhode Island), as well as seasonal time/area closures along with gear modifications for both small mesh (greater than 5 inches (12.7 cm) to less than 7 inches (17.78 cm)) and large mesh (greater than or equal to 7 inches (17.78 cm) to 18 inches (45.72 cm)) gillnets in Mid-Atlantic waters (New York through North Carolina). Although the HPTRP predominately impacts multispecies (groundfish), spiny dogfish, and monkfish fisheries due to high rates of porpoise bycatch, other gillnet fisheries are also managed under the HPTRP depending on where these fisheries operate.

In response to increases in harbor porpoise bycatch and non-compliance in the years following the implementation of the HPTRP, NMFS published a final rule on February 19, 2010 (75 FR 7383) amending the HPTRP to include additional conservation measures to reduce harbor porpoise bycatch to levels below the stock's PBR. In New England, these measures included an expansion of seasonal and temporal requirements within existing management areas, the incorporation of two new management areas with seasonal pinger requirements, and the establishment of a consequence closure strategy to encourage compliance with pinger requirements in areas with historically high levels of bycatch. In the Mid-Atlantic, new measures include the establishment of a new management area (which includes a seasonal gillnet closure and more stringent gear modification requirements) and a slight change to a gear modification requirement for the use of tie-downs in large mesh gear. Other technical corrections were made to the HPTRP as well.

Additional information regarding HPTRP regulations, outreach guides, and related information can be accessed at: http://www.nero.noaa.gov/prot_res/porptrp/.

7.6.3. Humpback Whale

The Atlantic Large Whale Take Reduction Plan (ALWTRP; 50 CFR 229.32) addresses the incidental bycatch of large baleen whales, North Atlantic right whales, fin whales and humpback whales, in several trap/pot and gillnet fisheries, including the Mid-Atlantic gill net, Southeast Atlantic gillnet, and Atlantic mixed species trap/pot.

The ALWTRP is an evolving plan that relies on a suite of measures to meet its goals under the MMPA, including modifications to gear and fishing practices, research on fishing gear and whale biology, outreach, and disentanglement. The ALWTRP specifies both universal gear modifications and area- and season-specific gear modifications and closures from Maine through Florida. The Atlantic Large Whale Take Reduction Team continues to identify ways to reduce possible interactions between large whales and commercial gear. In response to the continued serious injury and mortality of large whales from entanglement in commercial fishing gear, the ALWTRP was modified in 2007 to incorporate additional trap/pot and gillnet fisheries, establish new broad-based gear modification requirements such as requiring the use of sinking groundline, establish marking requirements, and implement other regulatory changes. This broad-based gear modification strategy includes expanded weak link and sinking groundline requirements; additional gear marking requirements; changes in boundaries; seasonal restrictions for gear modifications; expanded exempted areas; and regulatory language changes for the purposes of clarification and consistency. NMFS, in conjunction with the ALWTRT, is currently discussing a strategy for further reducing entanglement risk due to vertical lines.

For more information on the ALWTRP and its components, visit the ALWTRP website at http://www.nero.noaa.gov/whaletrp.

7.6.4. Sea Turtles

Under the ESA, and its implementing regulations, taking sea turtles – even incidentally – is prohibited, with exceptions identified in 50 CFR 223.206. The incidental take of endangered species may only legally be authorized by an incidental take statement or an incidental take permit issued pursuant to section 7 or 10 of the ESA, respectively. Incidental take of sea turtles in the North Carolina Pamlico Sound flounder fishery has been authorized via an incidental take permit since 2000. North Carolina is in the process of applying for a new permit to authorize take of sea turtles in all inshore gillnets.
Existing NMFS regulations specify procedures that NMFS may use to determine that unauthorized takings of sea turtles occur during fishing activities, and to impose additional restrictions to conserve sea turtles and to prevent unauthorized takings (50 CFR 223.206(d)(4)). Restrictions may be effective for a period of up to 30 days and may be renewed for additional periods of up to 30 days each. In 2007, NMFS issued a regulation (50 CFR 222.402) to establish procedures through which each year NMFS will identify, pursuant to specified criteria and after notice and opportunity for comment, those fisheries in which the agency intends to place observers (72 FR 43176, August 3, 2007). NMFS may place observers on U.S. fishing vessels, either recreational or commercial, operating in U.S. territorial waters, the U.S. exclusive economic zone (EEZ), or on the high seas, or on vessels that are otherwise subject to the jurisdiction of the U.S. Failure to comply with the requirements under this rule may result in civil or criminal penalties under the ESA.

Sea turtle-related regulations have been implemented since 2001, which impact the use of large mesh gill nets (>8 inches) throughout Virginia and North Carolina. These regulations include one permanent area closure and three seasonal area closures. To protect migrating sea turtles, NMFS published a final rule on December 3, 2002 (67 FR 71895), establishing seasonally-adjusted gear restrictions by closing portions of the mid-Atlantic exclusive economic zone (EEZ) to fishing with gillnets with a mesh size larger than 8–inch (20.3–cm) stretched mesh. In this final rule, NMFS revised the large mesh size restriction from the current greater than 8–inch (20.3–cm) stretched mesh, as defined in the 2002 final rule, to 7–inch (17.8–cm) stretched mesh or greater. NMFS issued a final rule on May 5, 2004 (69 FR 24997), which prohibited the use of offshore pound net leaders in a portion of the Virginia Chesapeake Bay. The 2004 rule also prohibited the use of 12 inches (30.5 cm) and greater stretched mesh and stringers in nearshore pound net leaders in Pound Net Regulated Area I and all pound net leaders employed in the remainder of the Virginia Chesapeake Bay. On July 6, 2004, NMFS implemented additional regulations for the Atlantic pelagic longline fishery to further reduce the mortality of incidentally caught sea turtles (69 FR 40734). These measures include requirements on hook type, hook size, bait type, dipnets, lineclippers, and safe handling guidelines for the release of incidentally caught sea turtles.

http://www.nmfs.noaa.gov/pr/species/turtles/regulations.htm

7.6.5. Atlantic Sturgeon

The Commission and federal government implemented a coastwide moratorium on sturgeon harvest in late 1997 and early 1998 that will go through at least 2038. Bycatch remains an important issue in the recovery of Atlantic sturgeon populations throughout their range (ASMFC 2007). This issue is also given highest priority by the National Marine Fisheries Service (NMFS) Proactive Program for Atlantic sturgeon restoration. A status review by NMFS has led to an endangered listing for the DPSs within the black drum fishery range.

7.6.6. Seabirds

Under the ESA and its regulations, take of Bermuda petrels, roseate terns, and piping plovers, even incidentally, is prohibited. The incidental take of an ESA listed species may only be legally authorized by an incidental take statement or incidental take permit issued pursuant to section 7 or 10 of the ESA. No incidental takes of ESA listed bird species is currently authorized for black drum fisheries.

Under the MBTA it is unlawful to "pursue, hunt, take, capture, [or] kill" migratory birds except as permitted by regulation (16 USC. 703). Many migratory waterbirds occur within the boundaries of black drum fisheries (see section 7.5.3.). USFWS Policy on Waterbird Bycatch (October 2000) states "It is the policy of the US Fish and Wildlife Service that the Migratory Bird Treaty Act of 1918, as amended, legally mandates the protection and conservation of migratory birds. The USFWS seeks to actively expand partnerships with regional, national, and international organizations, States, tribes, industry, and environmental groups to address seabird bycatch in fisheries, by promoting public awareness of waterbird bycatch issues, and facilitating

the collection of scientific information to develop and provide guidelines for management, regulation, and compliance."

Section 116(c) of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (2006) authorizes the Interior and Commerce Departments to undertake projects, in cooperation with industry, to improve outreach about seabird bycatch in commercial fisheries and to reduce seabird-fisheries interactions, through information sharing and technology. USFWS seeks to partner with State, regional, and Federal agencies; industry; tribes; and NGOs to facilitate outreach and improve information and technology to reduce seabird bycatch in fisheries within state and Federal waters.

7.7. Potential Impacts to Atlantic Coastal State and Interstate Fisheries

Regulations under all three take reduction plans for Atlantic large whales (which includes humpback whales), harbor porpoises, and bottlenose dolphins have the potential to impact gill net fisheries that harvest black drum. Effort patterns in the Mid-Atlantic gillnet fishery are heavily influenced by marine mammal time/area closures and /or gear restrictions under the ALWTRP, HPTRP, and BDTRP; and gear restrictions due to fish conservation measures (Waring et al. 2012).

7.8. Identification of Current Data Gaps and Research Needs

7.8.1. Bottlenose Dolphin Research Needs

- Determine the stock identity of bottlenose dolphin observed takes, or strandings, with evidence of fisheries interaction by matching dorsal fin images to Mid-Atlantic Bottlenose Dolphin Catalog or obtaining genetic samples (required to be provided by observers).
- Obtain reliable abundance estimates per stock to ensure PBR is accurately determined and in order to place animals in the correct stock.
- Refine the understanding of the distribution of the NNCES stock in: (1) Pamlico Sound during the summer using genetics; and (2) ocean waters, especially where there is an overlap with other stocks and observed takes can be applied to more than one stock.
- Expand observer coverage. Enhance observer documentation of dorsal fin photos and collection of biopsy samples from observed takes. If possible, collection of the whole carcass should be the priority for observed bottlenose dolphin takes to maximize data collection. The local stranding networks can help coordinate carcass collection. The U.S. Coast Guard may also be an asset to help tow in the carcass if the fisherman's vessel is too small.

7.8.2. Harbor Porpoise Research Needs

The following research needs have been identified by the Harbor Porpoise Take Reduction Team, NMFS, and through suggestions received during NMFS' recent HPTRP outreach meetings. Additional research needs, including those for species covered under the ALWTRP,

can be found by visiting the NMFS Northeast Region's Protected Resources Division Research Priorities and Needs website (http://www.nero.noaa.gov/prot_res/research/).

- Research on testing the effectiveness of alternative methods of reducing incidental take of harbor porpoises such as pingers of higher frequencies than are currently required, as well as different gear modifications (e.g., thicker twine, reflective gillnets), and compare the effectiveness of these methods to currently required bycatch reduction methods.

7.8.3. Sea Turtle Research Needs

Research needs for sea turtles can be found in the following report for loggerhead sea turtles, but can be expanded to other sea turtle species with respect to gill net research: http://www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_loggerhead_atlantic.pdf

7.8.4. Atlantic Sturgeon Research Needs

The following recommendations were formulated at a Sturgeon Bycatch Workshop held in 2007 (ASMFC 2007):

- Highest research priority should be given to evaluation of relative population contributions to regions of high bycatch. Molecular approaches are currently available to estimate these population contribution rates, but such studies should be undertaken through careful sampling designs to insure that genetic samples are representative of intercepted sturgeon.
- Abundance and vital rate estimates are required for populations contributing to coastal bycatch to evaluate whether bycatch rates are sustainable on a population-specific basis.
- The bycatch GENMOD modeling approach developed here should be used for analysis of historical bycatch (the 1989-2000 period). The model will need to be re-parameterized and refit. Also, changes in how data have been recorded by observers and within the vessel trip report (VTR) data prior to 2000 will need to be carefully considered.
- State effort statistics related to sink gillnet and other fisheries that retain sturgeons should be combined with the VTR database to permit improved expansion of observer-based bycatch rates.
- A detailed GIS analysis should be performed on the distribution of observed sturgeon bycatch to compare recent patterns of coastal habitat use by Atlantic sturgeon to historical ones (1989-2000). Although most sturgeon were caught as bycatch in waters <40 meters in gillnet and trawl fisheries, this depth association is expected to vary between New England and Mid-Atlantic regions and deserves additional analysis. The observer database (1989-present) could support habitat suitability mapping for Atlantic sturgeon in coastal waters of New England and the Mid-Atlantic.
- Controlled mesocosm-scale experiments on sink gillnet interactions and retention of sturgeon, such as those recently conducted at VIMS (C. Hager, pers. comm.),

should continue to investigate gear factors associated with bycatch. Gear retention studies could be conducted in semi-field systems (large ponds) and permit estimates of catchability applicable to the field.

7.8.5. Seabird Research Needs

- Initiate and expand observer coverage/bycatch monitoring and collection and analysis of bird bycatch data to better understand extent of bird bycatch and identify bycaught bird species within the target fisheries (state waters).
- Collaborate with fishermen to develop and test gear and identify deployment practices that reduce bird bycatch within the target fisheries (state waters).
- Conduct outreach activities to facilitate sharing of bird bycatch information in the target fisheries among agencies, industry and the public.

A Memorandum of Understanding between NMFS and the USFWS (July 2012) describes additional collaborative efforts recommended to better understand and reduce bird bycatch in fisheries (Section VI; http://www.fws.gov/migratorybirds/Partnerships/NMFS%20MOU.pdf).

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