



DRAFT

**2014 Review of the
1991 Chesapeake Bay Atlantic Croaker and Spot
Fishery Management Plan**

October 2014



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Acronyms

ASMFC	Atlantic States Marine Fisheries Commission
BRP	Biological Reference Point
DNR	Department of Natural Resources
F	Fishing Mortality
FMP	Fishery Management Plan
FS	Fisheries Service
MRIP	Marine Recreational Information Program
MSY	Maximum Sustainable Yield
PRFC	Potomac River Fisheries Commission
PRT	Plan Review Team
SAFMC	South Atlantic Fishery Management Council
SEFSC	Southeast Fisheries Science Center
SFAC	Sport Fisheries Advisory Commission
SSB	Spawning Stock Biomass
TAC	Total Allowable Catch
TFAC	Tidal Fisheries Advisory Commission
TLA	Traffic Light Analysis

Summary

The 1991 Chesapeake Bay Atlantic Croaker and Spot Fishery Management Plan was reviewed in 2014. The goal and objectives of the plan provide a framework for managing Atlantic croaker (*Micropogonias undulatus*) and spot (*Leiostomus xanthurus*) in the Chesapeake Bay. The plan contains four strategies and eight actions that address stock status, bycatch, monitoring, and habitat. The Fisheries Service Plan Review Team concurs that an annual update to the plan's implementation table is an appropriate way to show progress on meeting the plan objectives, strategies and actions. Maryland is currently in compliance with Atlantic States Marine Fisheries Commission guidelines and requirements. The Fisheries Service Plan Review Team concluded that the Chesapeake Bay Atlantic Croaker and Spot Fishery Management Plan is an appropriate framework for managing these species in Maryland and recommends that the plan be reviewed in 2017 after the completion of coastal stock assessments and the development of new management triggers.

Status of the Fishery Management Plan (FMP)

Date of FMP Approval:	1991
Amendments:	None
FMP Review Dates:	1995, 1998, 2000, 2005, 2014
FMP updates	2007 – present

Fishery management plans provide a framework for how a fishery resource will be managed based on a species life history, habitat, ecosystem considerations, fishery utilization and the goals and objectives for fisheries and the stock. Over time, the status of a resource can change and new issues arise. Strategies and actions within a plan need to be periodically reviewed and evaluated to ensure the management framework is still appropriate or amended/revised to address significant changes. For specific details on the process for reviewing plans and developing or amending plans, see Appendices 1 - 3.

In September, 2014, a Fisheries Service Plan Review Team (FS PRT) was convened to review the 1991 Chesapeake Bay Atlantic Croaker and Spot Fishery Management Plan (AC/S FMP). The FS PRT was comprised of staff from the FMP Program (Nancy Butowski, Rick Morin) and Estuarine and Marine Fisheries Division Chesapeake Finfish Program (Harry Rickabaugh). Additional staff from Fisheries Service participated in the review as well as members of the Sport Fisheries Advisory Commission (SFAC) and the Tidal Fisheries Advisory Commission (TFAC) (*Note: This draft does not yet incorporate input from SFAC or TFAC as their review is occurring now.*)

The goal of the 1991 Chesapeake Bay Atlantic Croaker and Spot FMP is:

Protect the Atlantic croaker and spot resources in the Chesapeake Bay, its tributaries, and coastal waters, while providing the greatest long term ecological, economic, and social benefits from their usage over time.

The objectives of the 1991 AC/S FMP are:

- 1. Follow the guidelines established by the Atlantic States Marine Fisheries Commission (ASMFC) for coastwide management of the Atlantic croaker and spot stocks and make Bay management actions compatible where possible.*
- 2. Maintain Atlantic croaker and spot spawning stocks at a size which minimizes the possibility of recruitment failure and determine the effects of environmental factors on year class strength.*
- 3. Promote harvesting practices which minimize waste and maximize the biological and economic return from the resources especially in non-directed fisheries.*
- 4. Promote studies to improve the understanding of economic, social, and biological aspects of the commercial and recreational fisheries.*
- 5. Continue to provide guidance for the development of water quality goals and habitat protection necessary to protect Atlantic croaker and spot populations within the Bay and coastal waters.*

Management strategies intended to meet the goal and objectives address four areas: 1) stock status; 2) harvest of small croaker and spot; 3) research and monitoring needs 4) habitat and water quality issues.

Atlantic croaker and spot are managed by the Atlantic coastal states through the Atlantic States Marine Fisheries Commission's (ASMFC) South Atlantic State/Federal Fisheries Management Board. An ASMFC Fishery Management Plan for Atlantic Croaker was developed in 1987. The plan was replaced by Amendment 1 to the Interstate Fishery Management Plan (2005) which defined fishing mortality and spawning stock biomass targets and thresholds. Addendum I (2011) modified the management area and revised the biological reference points (BRPs) based on the 2010 coastal stock assessment. The management unit for Atlantic croaker, as established by ASMFC Addendum I, is the Atlantic Coast from New Jersey through the east coast of Florida. Addendum II (August 2014) establishes a precautionary management framework as an interim approach to implementing management actions for data poor fisheries.

An ASMFC Fishery Management Plan for Spot was developed in 1987. At that time, no specific compliance requirements were defined for the coastal stock. An Omnibus Amendment to the Interstate Fishery Management Plans for Spanish Mackerel, Spot and Spotted Seatrout was approved in 2011. The omnibus amendment brought these species under the standards and procedures for managing stocks along the Atlantic coast and included triggers for management action. Addendum I to the Omnibus Amendment (August 2014) establishes a precautionary framework for managing spot. The management unit for spot is the entire coastwide distribution from the Gulf of Maine to Florida, with a primary management area from Delaware through eastern Florida. ASMFC requires the Atlantic coastal states to prepare compliance reports for both species (started in 2012).

Biological reference points (BRPs) were established for Atlantic croaker in the mid-Atlantic region in 2005 and were revised in 2011 (Addendum 1). The 2010 ASMFC stock assessment expanded the evaluation of the stock from the mid-Atlantic region to the entire coastwide population. The BRPs are used to set targets for fishing mortality and spawning stock biomass. Absolute estimates for croaker are not calculated because of the uncertainty in the stock assessment parameters especially the magnitude of discards from the shrimp trawl fishery. As a result, the BRPs are ratio-based. For the threshold, if the ratio $F/F_{MSY}=1$, overfishing is occurring. If $SSB/(SSB_{MSY}(1-M))=1$, the coastal stock is overfished. The ASMFC Atlantic Croaker Stock Assessment Technical Committee evaluated the stock assessment triggers in 2011 and did not recommend any changes in management ¹. The ASMFC Atlantic croaker plan review team accepted the 2011 review of the FMP in August, 2012.

The 2013 ASMFC Action Plan called for the development of an addendum to consider alternate croaker trigger mechanisms because existing management triggers (landings and survey data) did not effectively respond to changes in the fisheries. Likewise, the South Atlantic Board recognized the need for an improved management trigger for spot. The Atlantic Croaker Technical Committee and the Spot Plan Review Team recommended a new approach – a traffic light analysis (TLA), to evaluate and manage the fishery. The TLA incorporates multiple data sources into a single metric to provide management guidance. It is called a traffic light analysis because the colors (red, yellow and green) provide an indication of the condition of the population or fishery. As the harvest or abundance in a particular year increases relative to the long-term mean, the proportion of green will increase. When the harvest or abundance in a year decreases, the amount of red would increase. Proportional thresholds have been set at 30% (moderate concern with moderate management response) and 60% (significant concern with elevated management response). Figure 1 provides an illustration of a composite TLA using fishery independent surveys. The TLA is useful for data-poor species management and replaces past management triggers for croaker and spot. Using the TLA will result in the development of specific state management actions when harvest and abundance thresholds, as indicated by the proportion of red, are exceeded for three consecutive years for Atlantic croaker and two consecutive years for spot. State-specific management measures such as creel and size limits, time and area closures and gear restrictions could be utilized to reduce harvest. Management measures would remain in place for three years for Atlantic croaker and two years for spot to allow the population to respond to the measures.

The ASMFC Atlantic Croaker Technical Committee and the Spot Review Team met in July 2014 and evaluated the 2013 fishery dependent and independent data. The committee and team determined that the TLA management triggers for both species were not met. Both groups reaffirmed their support of the TLA approach given the uncertainty in detecting population trends in a timely way for both fisheries. The TLA was approved by ASMFC and the South Atlantic Federal/State Management Board as an addendum to Amendment 1 to Interstate Fishery Management Plan for Atlantic Croaker and Spot as an addendum to the Omnibus Amendment (August, 2014). The new TLA approach became effective immediately for both Atlantic croaker and spot and will serve as a precautionary, interim management framework until the 2016 stock assessments are completed.

Status of the Stock

According to the 2010 coastal benchmark stock assessment for croaker, overfishing is not occurring and it wasn't possible to determine whether the stock was overfished (ASMFC, 2010). Determining croaker biomass is problematic because of data limitations from the shrimp trawl fishery. Based on data from coastal fishery dependent and independent surveys, there are indications of increasing relative abundance and expanding age structure. Monitoring data from Maryland's portion of the Chesapeake Bay show similar trends: a broad and stable size and age structure. There is some indication that croaker age 6 and older have become less abundant since the mid-2000's (Tables 1 & 2). The next coastal benchmark stock assessment for croaker is scheduled for 2016.

Although there are some state-specific stock assessments for spot, there is no coastal or Maryland stock assessment. Consequently, the status of the spot stock is unknown. Maryland collects monitoring data for spot. Fishery independent data is used to calculate a juvenile trawl index for spot which has been variable throughout the time series (1950-2013). Fishery dependent data indicates that mean length has decreased since sampling began in 1993 (Table 3). Age one spot dominated the pound net catch from 2007 to 2011 (Table 4). Since there is some concern about decreasing trends in spot abundance among the Atlantic coastal states, a coastal stock assessment is scheduled in 2016.

Status of the Fishery

Atlantic croaker and spot support significant recreational and commercial fisheries in the South and mid-Atlantic regions and within the Chesapeake Bay. North Carolina, Virginia and Maryland account for the majority of total coastal landings. No management measures are required by ASMFC to restrict the commercial or recreational fisheries of Atlantic croaker or spot and no allocations between fisheries or among coastal states have been defined.

Maryland has a 9" total length minimum size requirement for both the recreational and commercial fisheries. Recreational anglers have a 25 fish creel limit and there are no harvest limits for the commercial fishery. The recreational season is year-round while the commercial season is from March 16 through December 31. The Potomac River Fisheries Commission (PFRC) has no size limit or season for Atlantic croaker but recreational fishermen are limited to a possession limit of 25. Virginia has no restrictions for recreational or commercial harvest of Atlantic croaker. The Chesapeake Bay jurisdictions do not require any size, creel or season limits for spot. Gear restrictions apply to the mixed species fisheries in which Atlantic croaker and spot are harvested.

Commercial harvest of Atlantic croaker from Maryland had been below the long-term average since 2005 except for the last couple of years. Maryland commercial harvest was 1.03 million lbs in 2012, close to the average, and preliminary harvest for 2013 is approximately 920,000 lbs. (Figure 2). Commercial harvest of spot from Maryland has been above the long-term (1950-2012) average of 171,539 lbs six of the last ten years (Figure 3). Spot harvest in 2012 was 100,347 lbs and preliminary harvest for 2013 is 251,544 lbs. The majority of spot harvest in 2012 was caught by gill net (60%) and fish pots (22%) (Rickabaugh 2013).

Recreational harvest is estimated by the Marine Recreational Information Program (MRIP). Estimates for both Atlantic croaker and spot in MD have proportional standard errors less than 50, which indicates the estimates are relatively precise. Historically, more Atlantic croaker and spot have been caught by recreational and commercial fishermen from Virginia waters than from Maryland. Recreational harvest is currently greater than commercial harvest in both states. In Maryland, estimated recreational croaker harvest increased to 1,155,539 fish in 2013 with an estimated 2,905,537 fish released (Figure 4). Virginia recreational estimated harvest of Atlantic croaker increased to 4,273,743 fish in 2013 with an estimated 5,968,340 fish released.

Estimated recreational harvest of spot increased to 945,972 fish in 2013 with an estimated 2,621,931 fish released (Figure 5). Virginia recreational fishermen harvested an estimated 4,332,620 spot in 2013 with an estimated 2,226,300 fish released.

Status of Chesapeake Bay Atlantic Croaker and Spot FMP Strategies

Stock Status: There is no stock assessment for either croaker or spot from the Chesapeake Bay. The ASMFC completed a stock assessment for croaker in 2010 and updated the biological reference points during a benchmark stock assessment in 2011. The next stock assessment for croaker will be conducted in 2016. The first coastal stock assessment for spot is also scheduled for 2016. The Chesapeake Bay jurisdictions continue to monitor the stocks and to participate in the ASMFC process. Maryland is represented on both the ASMFC spot PRT and the Atlantic croaker stock assessment technical committee.

Harvest of small croaker and spot: The major source of bycatch of Atlantic croaker and spot is from the southern shrimp trawl fishery (Peuser, 1996). The main purpose of the 1987 ASMFC plans for croaker and spot was to decrease the number of small fish caught as bycatch in the coastal shrimp trawl fishery. Bycatch reduction devices are required in the offshore coastal areas and have been successful at reducing the number of small fish caught in the trawl fishery. However, estimates of discards need to be improved for coastal stock assessments. Bycatch mortality is a less significant issue in Maryland. Pound nets in the Chesapeake Bay take croaker and spot as bycatch and are used as crab pot bait. Escape panels are required on pound nets by the PRFC. Hook and Release mortality is unknown.

Research and Monitoring Needs: Maryland conducts fishery dependent and independent monitoring of croaker and spot. Biological data is collected from commercial pound nets in the Chesapeake Bay. Catch per unit effort (CPUE) is obtained from Maryland Charter Boat fishery. Fishery independent data is collected from a gill net survey in the Choptank River. Juvenile data is collected from the blue crab summer trawl survey, the estuarine juvenile finfish seine survey, and the Coastal Bays seine and trawl surveys. Data collected from Maryland is used for the coastal stock assessments. Socioeconomic information continues to be needed on these species.

Habitat and Water Quality Issues: Maryland continues to work with other Bay jurisdictions through the Chesapeake Bay Program to address water quality and habitat issues. Adult Atlantic croaker and spot are found in the region from spring through fall. Early life stages use the inshore and estuarine habitats, where water quality is important to survival. Juveniles can remain in the Chesapeake Bay in the winter where they may be susceptible to winter cold shock. A

winter cold snap in Chesapeake Bay killed an estimated two million juvenile spot in late December 2010. The consequences of this mortality event are unknown, but illustrate the vulnerability of this species to sudden cold snaps in relatively shallow water.

Fisheries Allocation Policy

The Department of Natural Resources Fisheries Allocation Policy (Appendix 1) went into effect on September 1, 2012. The policy requires the FMP process to address the allocation among resource users and provides guidelines and procedures for review.

As stated by the Allocation Policy, overarching factors are to be considered in allocation decisions. These factors are linked to FMP objectives and are addressed to the extent supported by available information. The overarching factors include:

- Conservation;
- Management goal for the species;
- Social and cultural importance of maintaining fisheries and dependent industries;
- Environmental impact;
- Economic value of dependent fisheries;
- Economic viability of activity supported by the fisheries;
- Management resources;
- Historical trends and values; and
- Potential for new fisheries to develop.

Among the Allocation Policy procedures are triggers for an allocation review. In accordance with policy, the pre-assessment of triggers is reviewed internally by the FS PRT with input from the SFAC and TFAC. Triggers listed by the policy and a summarized assessment are as follows:

- Initial development or revision of a FMP;

Pre-assessment: The FS PRT concluded that the existing 1991 FMP continues to be an acceptable framework for managing Atlantic croaker and spot. Annual updates of the FMP are sufficient for tracking progress on management strategies and actions. The Bay jurisdictions are required to follow the management measures set forth by the ASMFC and the SAFMC. Currently, there are no interstate regulatory requirements for either Atlantic croaker or spot.

- Significant shift in fisheries harvest;

Pre-assessment: Over the last twelve years (2001-2012), an average of 60% (by weight) of the Maryland croaker harvest was caught by the recreational fishery and 40% of the harvest was caught by the commercial fishery. In 2011 and 2012, the percentage of catch by each fishery was reversed but does not indicate a trend at this point in time.

Over the last twelve years (2001-2012), an average of 67% (by weight) of the Maryland spot harvest was caught by the recreational fishery and 33% of the harvest was caught by the commercial fishery. Live spot have been used increasingly as bait for striped bass by recreational

fishermen and targets smaller spot. The harvest of spot as bait has not been estimated and it has not been possible to distinguish between the targeting of spot for bait or for food (Rickabaugh, 2013)

- Population shifts of target or non-target species;

Pre-assessment: Both species are migratory along the Atlantic Coast and no significant population shifts have been reported. A winter kill, associated with a sudden cold snap in late December 2010 in Chesapeake Bay, resulted in an estimated mortality of 2 million juvenile spot. The consequences of this juvenile mortality event are unknown but illustrate the vulnerability of spot to sudden cold snaps. Croaker are also vulnerable to extreme temperature-related environmental events.

- Threatened and endangered species issues;

Pre-assessment: In the Chesapeake Bay, Atlantic croaker and spot are caught by pound nets in a mixed species fishery. Marine mammals and sea turtles may occasionally become caught in pound nets. There are no known threatened and endangered species interactions with directed Atlantic croaker and spot fisheries in Maryland.

- Changing social patterns & values;

Atlantic croaker and spot are important species for recreational anglers. Their recreational value has not diminished and is unlikely to decrease in importance.

- Ecosystem needs;

Temperature and salinity are the prime factors that influence Atlantic croaker and spot distributions. Both species are considered to be opportunistic bottom feeders as adults, and consume polychaete worms, mollusks, and small crustaceans, and less commonly, small fish. The primary prey of post-larvae arriving to the Chesapeake Bay are zooplankton. Both species are consumed by larger fish predators such as striped bass, bluefish and weakfish. Increased temperatures due to climate change have the potential to shift the population distribution northward. Atlantic croaker is one species that may exhibit increased survival to adulthood due to climate change. A coupled climate change-population model has forecast both increasingly northern distribution and a 60-100% increase in average spawning biomass at current levels of fishing (Hare et al., 2010). Sea level rise may affect habitat for early life stages and rising water temperatures could affect distribution and abundance of all life stages. Since both species are bottom feeders, they are impacted by hypoxia especially during the summer in shallow, near-shore areas.

- Market dynamics;

Both Atlantic croaker and spot adults are available from spring through fall in the Chesapeake Bay. The timing of availability for these migratory species is determined largely by water temperature and salinity. The fish are sometimes available locally at seafood dealers.

- Management resources;

Management resources directed toward these species is commensurate to their importance by management agencies. Croaker and spot data are collected by the MD Chesapeake Bay blue crab survey, a Chesapeake Bay juvenile trawl survey, estuarine juvenile finfish seine survey, pound

net sampling, and beginning in 2013, a new summer gill net survey on the lower Choptank River designed to sample adults.

- New data;

Otoliths have replaced scales as the preferred structure for ageing croaker and have improved our understanding of population dynamics. Standard references list the age of croaker as ranging to six years. With the change to otoliths, age determinations are more accurate. Atlantic croaker collected from Chesapeake Bay have a broader age diversity than previously thought and live to 13 years and older (Table 2).

Conclusion

There were no requests to consider changes in allocation for either croaker or spot. The harvest limits currently in place for croaker are more restrictive than required by ASMFC and there are no restrictions on the harvest of spot. The traffic light approach adopted by ASMFC for both species may result in changes to management measures in the next few years.

Based on a review of the Allocation Policy parameters, no significant shifts in fisheries harvest have occurred. There are presently no established allocations and the FS PRT recommends no changes.

The FS PRT concluded that the 1991 Atlantic croaker and spot FMP is still an appropriate framework for managing the stocks in Maryland and recommends that the plan be reviewed again in 2017 after the coastal stock assessments are completed.

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Rickabaugh, H.W. Jr. 2013. Maryland Spot (*Leiostomus xanthurus*) Compliance Report to the Atlantic States Marine Fisheries Commission – 2012. Maryland Department of Natural Resources, Fisheries Service.

Table 1. Atlantic croaker mean total length in mm, standard deviation and number sampled from the onboard pound net survey, 1993 – 2013. (Rickabaugh, 2014)

Year	Mean Length	Standard Deviation	n
1993	233	35	471
1994	259	34	1,081
1995	286	42	974
1996	294	31	2,190
1997	301	39	1,450
1998	310	40	1,057
1999	296	54	1,399
2000	302	45	2,209
2001	317	37	733
2002	279	73	771
2003	287	55	3,352
2004	311	43	1,653
2005	317	48	2,398
2006	304	66	1,295
2007	307	54	2,963

2008	298	62	1,532
2009	320	50	91
2010	295	34	1,970
2011	281	31	1,764
2012	274	42	1,842
2013	276	36	2,320

Table 2. Proportion at age, number of length samples and number of age samples for Atlantic croaker captured in commercial pound nets, 1999-2013. (Rickabaugh, 2014)

Year	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11	Age 12	Age 13	# Aged	# Measured
1999	0.0	34.0	22.5	3.3	9.4	4.2	16.0	6.0	4.2	0.4					180	1,399
2000	0.0	10.1	42.5	25.1	1.0	1.4	4.9	7.4	5.3	2.2					145	2,209
2001	No Data															
2002	18.4	4.0	10.1	8.9	29.4	24.0	1.0	0.0	3.0	0.5	0.6				66	771
2003	0.0	15.2	38.6	1.3	12.2	26.6	3.8	0.1	0.2	0.1	0.7	0.3	1.0		129	3,352
2004	0.0	0.6	54.9	5.0	5.4	6.9	23.3	3.1	0.0	0.2	0.0	0.6			161	1,653
2005	0.0	10.1	4.8	51.5	7.6	1.5	7.3	11.4	5.6	0.0	0.1	0.1			190	2,398
2006	16.7	6.3	18.1	4.8	36.8	2.3	3.2	5.0	5.2	1.8	0.0	0.0	0.0	0.1	253	1,295
2007	0.0	11.2	14.4	30.0	8.8	27.0	1.3	1.1	1.6	3.3	1.0	0.3			275	2,963
2008	5.5	7.2	28.3	14.0	19.0	4.5	17.6	1.0	0.4	0.5	1.7	0.3			288	1,532
2009	0.0	30.9	8.5	37.4	11.1	7.8	1.8	2.2	0.3						222	1,381
2010	0.0	1.2	25.7	8.7	36.5	15.8	9.4	0.9	1.3	0.3	0.0	0.3			267	2,516
2011	0.0	0.8	17.4	48.2	11.3	16.6	3.6	1.7	0.3	0.1					245	1,886
2012	10.2	0.9	22.5	21.8	34.1	6.5	2.8	0.9	0.3						255	1,842
2013	0.0	13.5	2.3	24.7	22.2	27.9	4.1	4.9	0.1	0.0	0.2				247	2,320

Table 3. Spot mean total length in mm, standard deviation and number sampled from the onboard pound net survey, 1993 – 2012. (Rickabaugh, 2013)

Year	Mean Length mm	Std. Deviation	n
1993	184	28	309
1994	207	21	451
1995	206	28	158
1996	235	28	275
1997	190	35	924
1998	230	16	60
1999	213	25	572
2000	230	21	510
2001	239	33	126
2002	184	36	681
2003	216	30	1,354
2004	208	36	882
2005	197	37	2,818
2006	191	29	2,195
2007	208	23	519

2008	198	21	1,195
2009	185	21	33
2010	201	22	51
2011	193	18	582
2012	179	24	1,508

Table 4. Proportion at age, number of length samples and number of age samples for spot captured in commercial pound nets, 2007-2012. (Rickabaugh, 2013)

Year	Age 0	Age 1	Age 2	Age 3	Age 4	Ages	Lengths
2007	21.26	75.03	3.32	0.00	0.39	98	519
2008	20.77	78.62	0.61	0.00	0.00	206	1,201
2009	7.75	90.70	1.55	0.00	0.00	232	614
2010	5.87	90.12	4.01	0.00	0.00	91	300
2011	0.37	99.39	0.23	0.01	0.00	173	582
2012	39.46	59.80	0.74	0.00	0.00	230	1,408

Figure 1. Composite TLA using Fishery-independent Surveys and Index for Atlantic Croaker with Management Thresholds of 30% and 60% Proportion Red (Base years 1996-2008). (ASMFC, 2014).

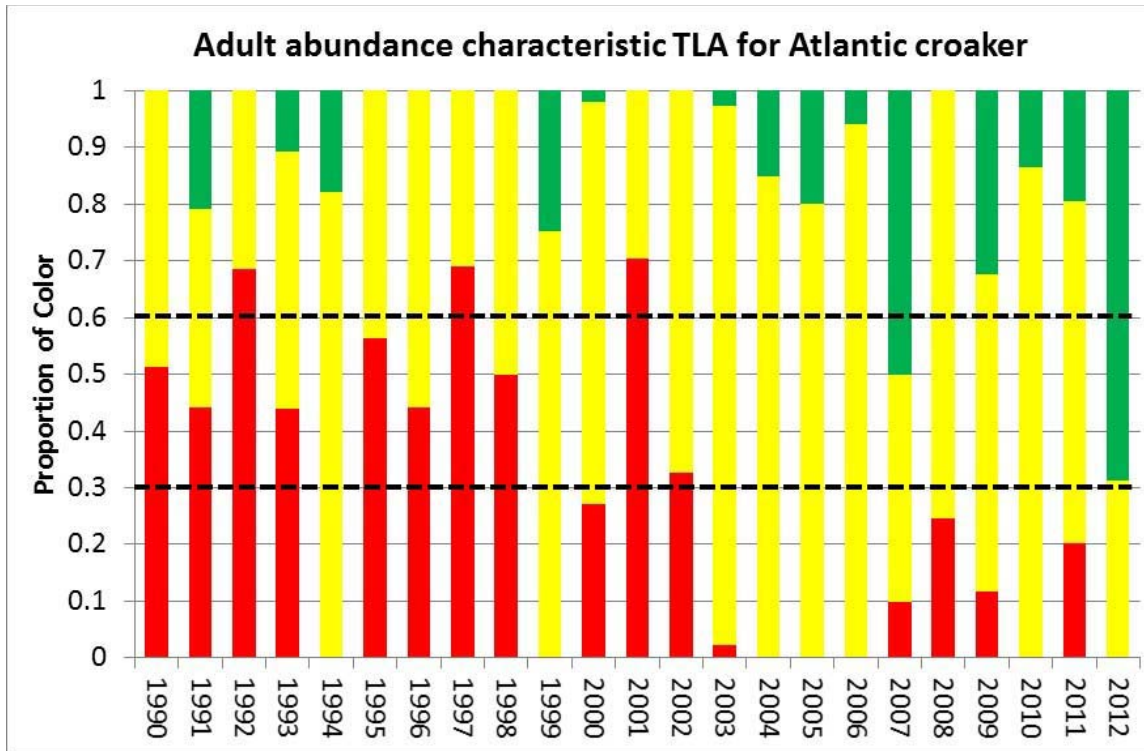


Figure 2. Maryland Atlantic croaker commercial landings from 1929 – 2013 (2013 landings preliminary) and time series mean. (Rickabaugh, 2014)

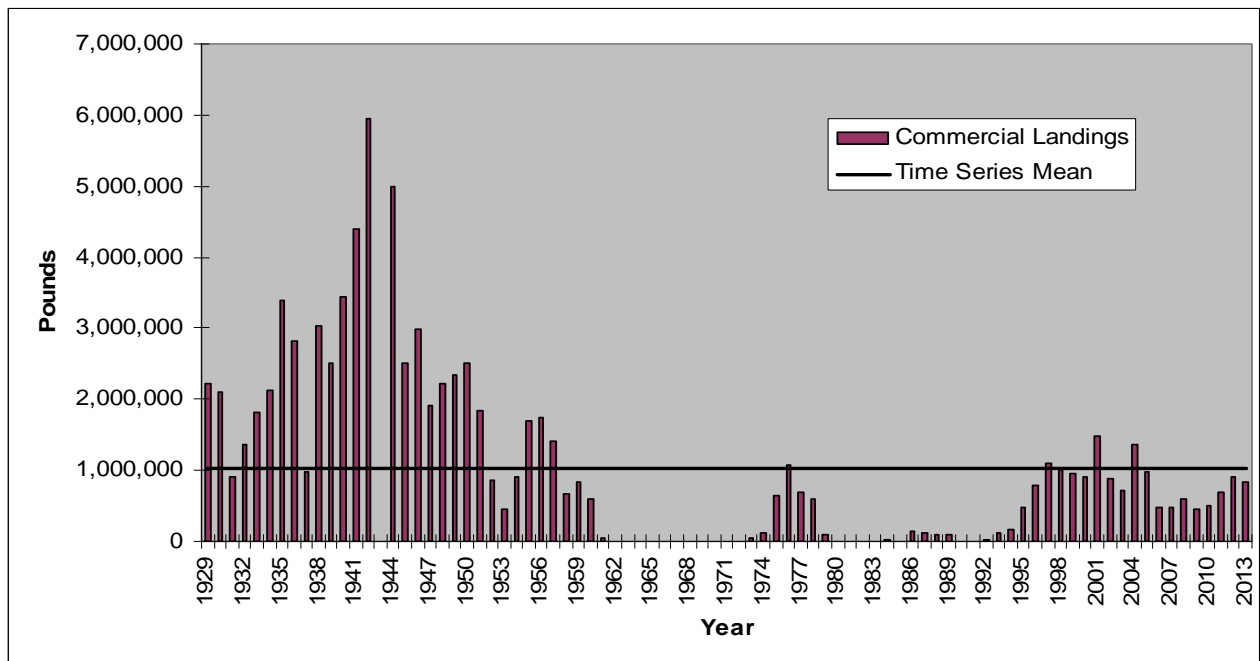


Figure 3. Maryland commercial spot landings from 1929-2013 (MD DNR data).

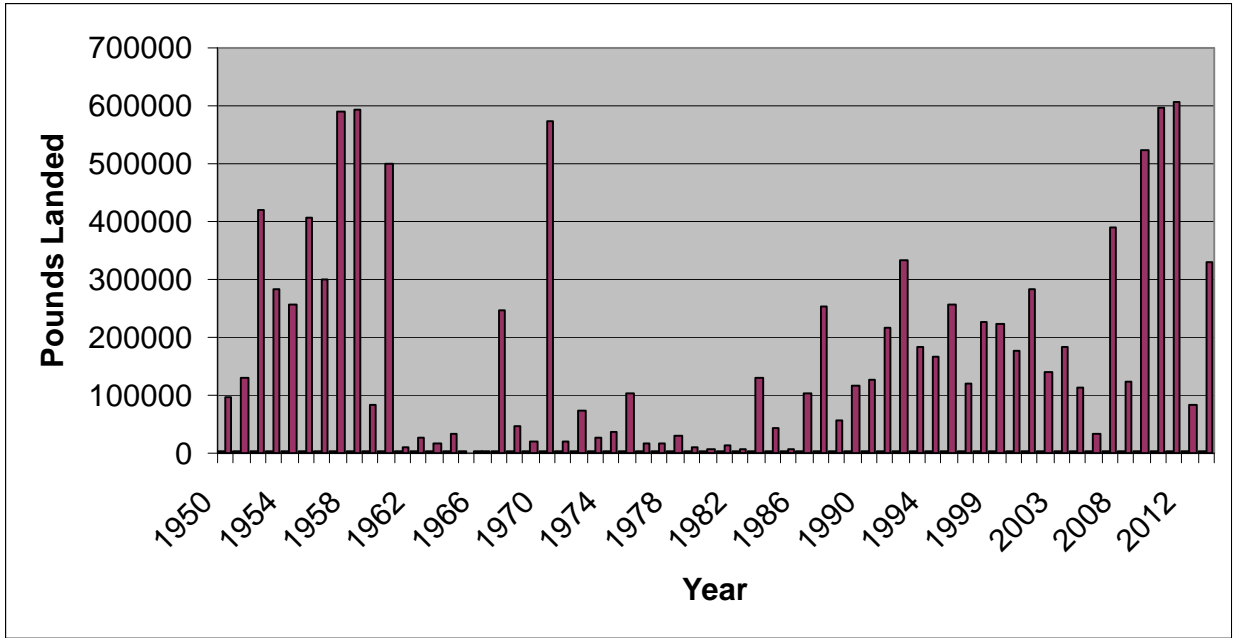


Figure 4. Maryland recreational Atlantic croaker harvest MRIP estimates and release estimates, 1981-2013. (Rickabaugh, 2014)

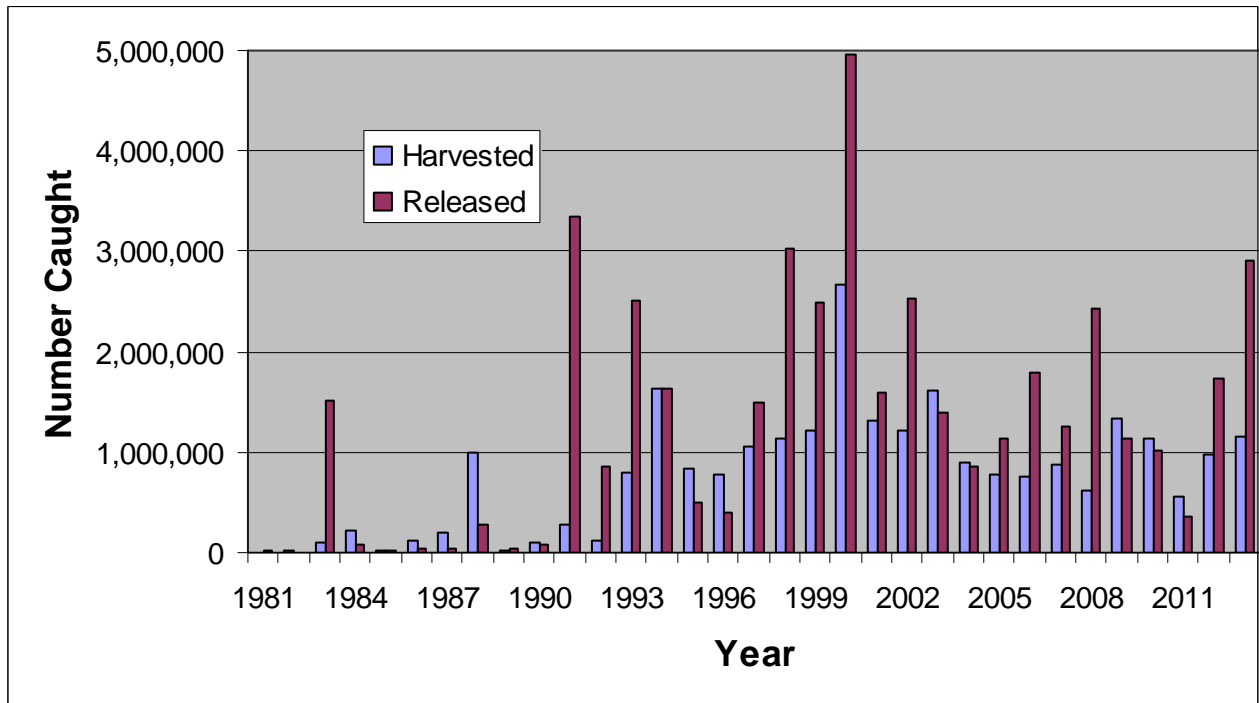
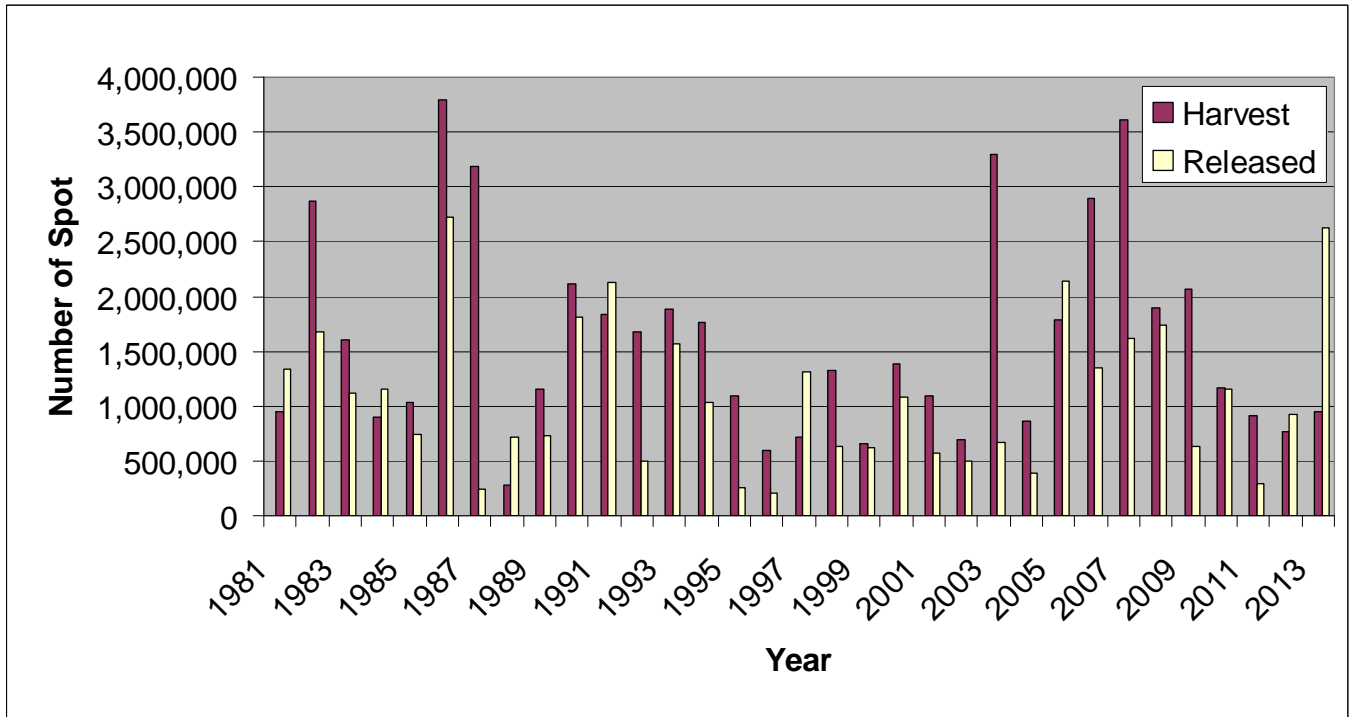


Figure 5. Maryland recreational MRIP spot harvest and release estimates, 1981-2013.
(MRIP data)



1991 Chesapeake Bay Program Atlantic Croaker and Spot Fishery Management Plan Implementation (updated 09/14)

Problem Area	Action	Date	Comments
Stock Status Annual abundance of Atlantic croaker and spot is highly variable from year-to-year. Little information is available on the causes of stock fluctuations.	Action 1.1 CBP jurisdictions will continue to participate in scientific and technical meetings for managing Atlantic croaker and spot along the Atlantic coast and in estuarine waters.	2005 2009 Continue	CBP jurisdictions will continue to monitor Atlantic croaker and spot stocks and cooperate with the ASMFC to manage stocks through inter-jurisdictional management measures. BRPs were adopted for the coastal croaker stock in 2005 and updated in 2010. Estimates of F and SSB indicate that the croaker stock is healthy and overfishing is not occurring (ASMFC 2010). Based on the most recent benchmark stock assessment (2012), overfishing is not occurring. The uncertainty associated with the SSB estimate resulted in the inability to determine stock size. The status of the coastal spot stock is undeterminable. No stock assessment has been completed and available data indicate contradictory trends. The ASMFC Spot PRT has been monitoring stock status through reports to the South Atlantic Management Board, including development of management triggers. Beginning in August 2014, a traffic light approach, TLA, to management was implemented as a precautionary framework. Data from the MD Estuarine Juvenile Finfish Survey is one of five state and regional indices considered during stock assessments. The omnibus amendment also adopted the TLA for spot. Annual compliance reports to ASMFC are required for both species.
	Action 1.2.1 A) MD and the PRFC have a minimum size limit for Atlantic croaker. B) VA does not have a minimum size limit for Atlantic croaker.	Continue 1993	MD has a 9" minimum size limit for the croaker recreational and commercial fisheries. MD & PRFC also have a 25 fish/person/day creel limit. MD has an open commercial season from March 16 through December. VA does not have any restrictions.
	Action 1.2.2 CBP jurisdictions will evaluate the need to implement a minimum size limit for spot.	1992 2009 Continue	No recommendations have been made. There is some concern over declining juvenile abundance. Georgia is the only coastal state with a minimum size limit (8"). The ASMFC omnibus amendment, approved in 2011, did not require any additional management criteria. Adoption of the TLA approach and/or the results of the 2016 stock assessment may lead to some definitive management measures if necessary.

1991 Chesapeake Bay Program Atlantic Croaker and Spot Fishery Management Plan Implementation (updated 09/14)

Problem Area	Action	Date	Comments
<p>Harvest of Small Croaker and Spot Incidental bycatch and discard mortality of small croaker and spot in non-directed fisheries is substantial and has the potential to significantly impact croaker and spot stocks.</p>	<p>Action 2.1 A) Through the ASMFC, the jurisdictions will promote the development and use of trawl efficiency devices (TEDs) in the southern shrimp fishery and promote the use bycatch reduction devices (BRDs) in the finfish trawl fishery. B) Virginia will continue its prohibition on trawling in state waters. Virginia will maintain its 2⁷/₈ inch minimum mesh size for gill nets C) Maryland will continue its 4-6 inch gill net restriction during June 15 through September 30 and implement a 3 inch minimum mesh size along the coast. D) PRFC will continue its prohibition on gill net fishing in the summer.</p>	<p>Continue Continue 1992 Continue</p>	<p>Commercial trawling is prohibited within the Chesapeake Bay in both MD and VA. The 2004 Croaker Stock Assessment indicated that the coastal states were successful at reducing mortality on age 1 fish. The commercial & recreational catch-at-age data showed an increasing age distribution. The 2010 stock assessment indicated that stock relative abundance has increased and age structure has expanded. The shrimp bycatch estimates are important to consider for stock assessments but there needs a more comprehensive evaluation. ASMFC encourages states to use bycatch reduction devices (BRDs). MD currently allows attended gill nets with a stretched mesh size of 3 1/8 to 3 1/2 inches from January 1 through March 15 and 2 1/2 to 3 1/2 inches between March 16 and December 31 in the Chesapeake Bay and tributaries, with location restrictions during striped bass spawning seasons. The minimum stretched gill net mesh size in MD waters is 2 1/2 inches. Virginia has a minimum gill net stretched mesh of 2 7/8". Maryland is evaluating its gear regulations, including fish pot mesh sizes, for baitfish harvest.</p>

1991 Chesapeake Bay Program Atlantic Croaker and Spot Fishery Management Plan Implementation (updated 09/14)

Problem Area	Action	Date	Comments
	Action 2.1.2 CBP jurisdictions will investigate the magnitude of the bycatch problem and consider implementing bycatch restrictions for the non-directed fisheries in the Bay	1992 On-going	CBP jurisdictions have evaluated the effectiveness of bycatch reduction panels in pound nets and PRFC requires reduction panels for all pound nets. Some coastal states are using panels to reduce bycatch of small fish.
Research and Monitoring Needs There is a lack of stock assessment data for both Atlantic croaker and spot stocks in the Chesapeake Bay.	Action 3.1 VMRC stock assessment program will continue to analyze size and sex data from Atlantic croaker and spot collected from the VA commercial fishery.	Continue	The amount of data available for croaker improved and provided the basis for the 2003/2004 coastal stock assessment. The 2010 ASMFC coastal stock assessment update (benchmark) concluded that the coastal Atlantic croaker population is a single stock. Addendum 1 to the ASMFC FMP changed the management unit to a single stock and modified the BRPs. Stock assessment data for Atlantic croaker and spot is collected by the MD Estuarine Juvenile Finfish Survey, and VIMS Juvenile Abundance Surveys (formerly known as the VIMS Trawl Survey and the VIMS Juvenile Seine Survey), NEAMAP and ChesMMAP.

1991 Chesapeake Bay Program Atlantic Croaker and Spot Fishery Management Plan Implementation (updated 09/14)

Problem Area	Action	Date	Comments
	<p>Action 3.2 A) MD and PRFC will encourage research to collect data on croaker and spot biology, especially estimates of population abundance, recruitment, and reproductive biology. B) VA will continue to fund its stock assessment research conducted by the conducted by VIMS and ODU, specifically designed to provide the estimates of population abundance, recruitment, and reproductive biology.</p>	<p>Continue Continue</p>	<p>An Atlantic Croaker Ageing Workshop was held in October 2008 and resulted in a standardized ageing procedure. High priority research & monitoring recommendations include: determining migratory patterns; collecting life history information; evaluating bycatch and discard practices; and examining reproductive strategies. Spot up to age 3 are regularly represented in the commercial fishery. Commercial catch-at-age data has contracted the last several years. Length-at-age and weight-at-age have decreased for ages 1-3. Spot age 4 to 6 years are not seen every year and when present, account for a small percentage of harvest. Recommendations for spot in the 2011 omnibus amendment include: monitoring data and gear studies on discards from the shrimp, recreational and commercial fisheries; expanding sampling; assessing BRDs; continuing development of fishery-dependent and fishery-independent size and sex specific relative abundance estimates; evaluating juvenile indices to predict year class strength; improving catch and effort statistics; and developing stock assessment analyses such as a yield-per-recruit analysis and determining the onshore vs offshore components of the fishery.</p> <p>Commercial pound net sampling in Maryland's portion of the Chesapeake Bay was conducted bi-weekly from May through September, 2013. Atlantic croaker mean total lengths increased slightly in 2013 from 274mm to 276mm (n=249). Ages of croaker collected from pound nets ranged from 1 to 8 years. Twenty-eight percent were age 5, 25% were age 3, 22% were age 4, 14% were age 1 and 5% were age 7. Croaker of age 6 and greater appear to be less abundant than during the mid-2000's. Gill net samples (n=571) were larger and averaged 296mm and were likely a result of gear selectivity. The Coastal Bay trawl survey in 2013 showed a geometric mean catch per hectare of 1.01 fish, below the 25 year time series mean value of 1.62. Maryland seine surveys showed decreased Chesapeake Bay and Coastal Bay geometric means for juvenile croaker in 2013³.</p>

1991 Chesapeake Bay Program Atlantic Croaker and Spot Fishery Management Plan Implementation (updated 09/14)

Problem Area	Action	Date	Comments
<p>Habitat and Water Quality Issues Habitat alteration and water quality impact the distribution of finfish species in the Chesapeake Bay</p>	<p>Action 4.1 CBP jurisdictions will continue to set specific objectives for water quality goals and review management programs established under the 1987 Chesapeake Bay Agreement. The Agreement and documents developed pursuant to the Agreement call for: A) Developing habitat requirements and water quality goals for various finfish species. B) Developing and adopting basinwide nutrient reduction strategies. C) Developing and Adopting basinwide plans for the reduction and control of toxic substances. D) Developing and adopting basinwide management measures for conventional pollutants entering the Bay from point source and non-point sources. E) Quantifying the impacts and identifying the sources of atmospheric inputs on the Bay system. F) Developing management strategies to protect and restore</p>	<p>Continue 2000 on-going</p>	<p>Water quality and living resource commitments were updated and renewed in the Chesapeake Bay 2000 Agreement. These activities include the discharge of toxic pollutants or excessive nutrients into the Chesapeake Bay and its tributaries, interruption or changes in water discharge patterns, deposition of solid waste, sewage sludge or industrial waste into the Bay (which may lead to anoxic conditions), rapid coastal development, unregulated agricultural practices, net coastal wetland loss or the dredging of contaminated sub-aqueous soils. Scientists projected that 58% of the pollution reduction efforts needed to achieve the Bay restoration goals have been implemented since 1985. Excess nitrogen, phosphorus and sediment are the major pollutants. The greatest challenge to achieving restoration is population growth and development which destroys forests, wetlands and other natural areas. Habitat and water quality objectives and actions were delineated in the President’s Executive Order (2009) and provided more strategies for managing resources in the Chesapeake Bay. Estuaries are designated as Habitat Areas of Particular Concern (HAPC) for spot by ASMFC. A new Chesapeake Bay Program Watershed Agreement was ratified in 2014: http://www.chesapeakebay.net/documents/FINAL_Ches_Bay_Watershed_Agreement.withsignatures-Hires.pdf . The new agreement defines new goals and outcomes for water quality and habitat.</p>

Acronyms:

ASMFC = Atlantic States Marine Fisheries Commission;

BRPs = Biological Reference Points

CHESFIMS = Chesapeake Bay Fishery Independent Multispecies Fisheries Survey

ChesMMAP = Chesapeake Bay Multispecies Monitoring and Assessment Program;

CBP = Chesapeake Bay Program

FMP = Fishery Management Plan;

ODU = Old Dominion University;

PRFC = Potomac River Fisheries Commission

PRT = Plan Review Team

VIMS = Virginia Institute of Marine Science

Appendix 1

Fishery management plans (FMPs) provide a framework for how a fishery resource will be managed based on a species life history, habitat, and fishery utilization over time. Maryland law (Natural Resources Article §4-215) contains a statutory mandate for the development of FMPs for a given list of species. Legislation enacted in 2010 expanded MD Department of Natural Resources' (MDNR) authority to prepare FMPs for additional fish species. MDNR no longer needs to go to the General Assembly to justify adding new species to the list. FMPs can be prepared for species based on specific concerns about the status of a species and after consultation with the Tidal Fisheries Advisory Commission (TFAC) and the Sport Fisheries Advisory Commission (SFAC).

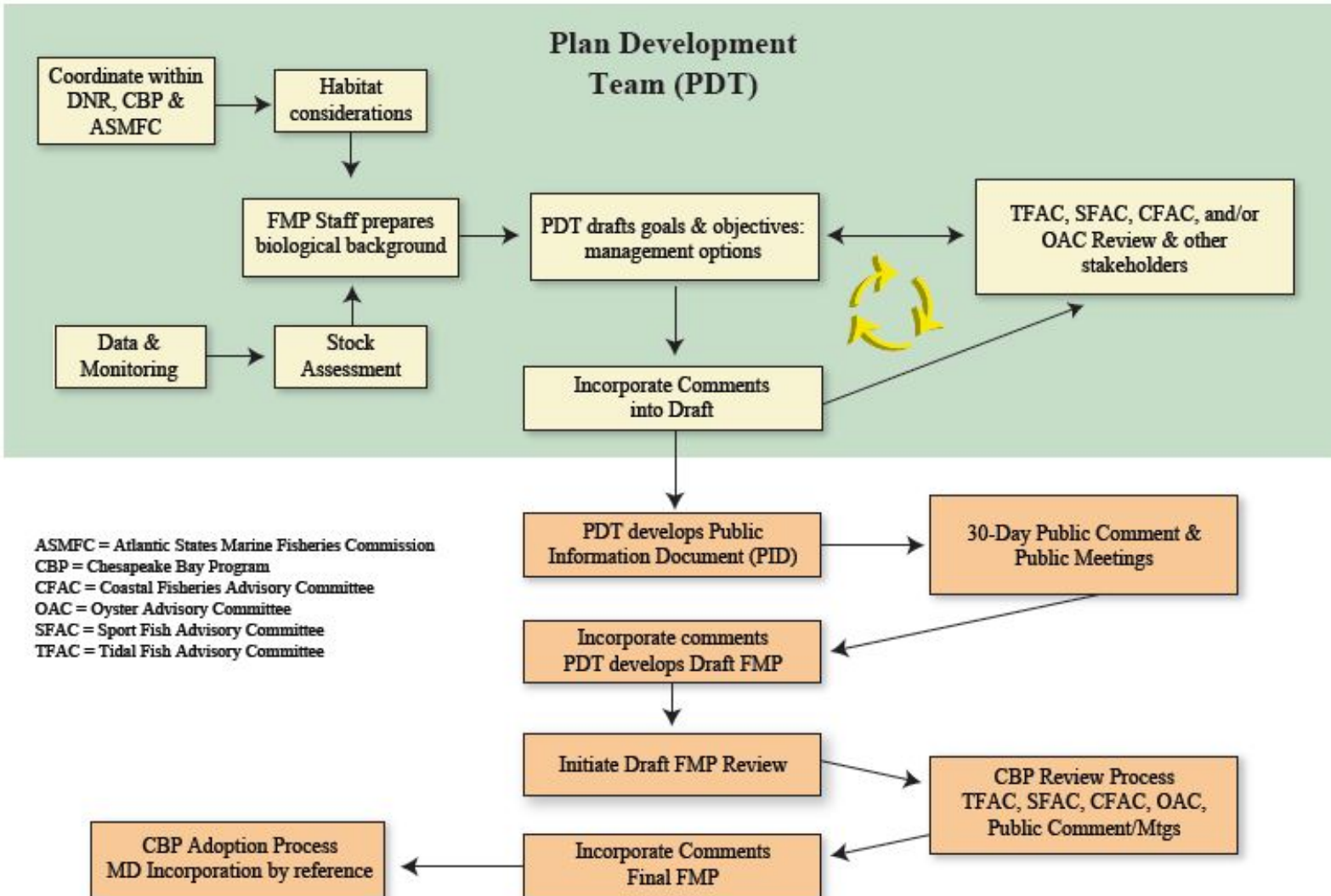
A Maryland Task Force on Fishery Management (Task Force) was convened in 2008 to review the current fishery management planning process and recommend improvements to the process that would increase stakeholder input and transparency during all stages of the FMP development and review process (Appendices 4 and 5 for flowcharts of the FMP Development Process and the FMP Review Process). The FMP staff developed a time line to review FMPs for 26 species. It is used to delineate an annual work plan.

FMP review begins with the designation of a Plan Review Team (PRT) by the Fisheries Service (FS) Director. The FS PRT evaluates the FMP goal, objectives, management strategies, and actions for their implementation status and applicability to current management needs. Depending on the particular species, the FMP review could also include the Chesapeake Bay Program and/or coordination with the Atlantic States Marine Fisheries Commission (ASMFC). After reviewing the components of the FMP and providing comments on the status of the management actions, the FS PRT recommends one of three pathways: 1) continue implementing the plan; 2) develop an amendment to significantly change or add to the FMP; or 3) revision of the FMP. The FS PRT drafts a FMP review report for review by the Fisheries Service Senior Management Team. The draft is also sent to the TFAC and SFAC for their review and input. The final, revised FMP review report is submitted to the Fisheries Service Director who makes the final decision regarding which of the three options to pursue: status quo, amendment, or revision.

In 2008, the Task Force emphasized the need for ecosystem-based management for all state managed fish species, including ASMFC managed species such as striped bass. The Task Force recommended MDNR continue research on the influence of habitat on fish populations, factors that impair fish habitat, participation in the environmental review process, updating regulations, transparent management framework, and outreach to County, local, and public entities. Chesapeake Bay jurisdictions are developing quantitative ecosystem-based management tools that will supplement traditional management tools currently in use. Ecosystem-based tools will address habitat, food web, stock assessment, and socioeconomic issues.

Appendix 2. Schematic of the fishery management plan development process in Maryland.

Fishery Management Plan (FMP) Development Process



Appendix 3. Schematic of the fishery management plan review process in Maryland.

Fishery Management Plan (FMP) Review Process

