2015 Maryland FMP Report (July 2016)
Section 24. largemouth bass (*Micropterus salmoides*) in Maryland Tidewater

Largemouth bass populations occur throughout Maryland's tidal freshwater. The populations differ in size and size structure, as well as productivity because of differing habitat quality and fishing pressure. Fishing pressure is an important consideration for the largemouth bass fishery even though it is primarily a catch-and-release fishery. Harvest, catch-and-release mortality and a daily possession of bass during tournaments can affect survival of adults and contribute to fishing mortality. Aside from fishing mortality, natural mortality and reproduction are affected by habitat quality or conditions. These habitat conditions may be influenced by pollution, invasive species, and climate change. Because of the roles of both fishing pressure and habitat quality on structuring largemouth bass populations, strategies and actions were developed to manage this nationally important fishery.

Strategies and management actions are described in the Fishery Management Plan (MDLB FMP) for Largemouth Bass in Maryland Tidewater (January 2014). The goal of the MDLB FMP is to describe objective reference points and provide management targets for populations in tidal freshwater habitats of the Maryland portion of the Chesapeake Bay watershed. It has become necessary to take management actions in many cases. These actions are taken to help conserve the population by minimizing negative impacts of intense fishing pressure and poor habitat quality. They have also been taken to identify at risk populations so that resources may be effectively appropriated. At risk populations are identified using a suite of indices calculated, in part, from surveys described in the Standard Operating Procedure (SOP) for the Tidal Bass Program (TBP). Other indices are calculated from tournament reporting. The methodology within the SOP has undergone external peer-review for at least 3 cases and results are reported annually within the Federal Aid Report (for federal and technical audiences) and Black Bass Annual Review (for general public). The FMP, SOP, short reports and fishery related data are posted on the TBP website: http://dnr.maryland.gov/fisheries/Pages/bass/index.aspx.
Largemouth bass have been widely introduced throughout the United States from beyond their initial Mississippi River drainage distribution. As populations thrived, commercial and recreational fisheries developed. Commercial sale of largemouth bass is illegal in Maryland and the recreational fishery includes pass-time fishing, live-release competitive sportfishing (or tournaments), and charter boat guiding. Year-class strength may depend on the number of offspring produced during spring, their survivorship throughout summer, and their survivorship during winter. In Maryland, the number of juveniles collected during fall is usually a good indicator of year-class strength. The oldest documented largemouth bass in Maryland tidal water of the Chesapeake Bay watershed was 13 years old; however, largemouth bass are known to reach 22 years so older individuals in the watershed are likely to exist.

Stock Status

Stock status for largemouth bass in the watershed in 2015 was determined using survey data from fishery independent and dependent surveys. Assessments were conducted for each riverine population, indices were compared with reference points (Table 1), and general conclusions were drawn based upon the suite of indices and their relationships to reference points. Catch in the upper Chesapeake Bay was below average, but reproduction and recruitment appear to have improved over previous years. While overall catch remains low in the Potomac River, the population has experienced greater annual survivorship, reproduction and recruitment in recent years. These improvements may lead to greater levels of catch in the next 3 - 5 years. The fishery in the Choptank River has poor natural sustainability. This may be a result of progressive changes in habitat suitability since 2000. Despite significant stocking of fish since 2009,

there has been little evidence of improving recruitment. Reproduction and recruitment appear to be significantly limited by habitat conditions so population growth rates will be highly sensitive to fishing mortality and should be minimized wherever possible.

The population in Wicomico River is small and capable of providing a small, sustainable fishery. While stocking conducted in 2012 may have helped to bolster young age classes in this population, natural reproduction was discernible and habitat conditions may be suitable to support both stocked fish and naturally reproduced fish. It is anticipated that older largemouth bass collected during this survey will spawn and contribute to natural reproduction. As habitat in Wicomico River becomes more suitable for largemouth bass in tidal freshwater areas near Salisbury (MD), it will be important to manage and monitor fishing mortality to ensure successful survival of adults.

The population from Marshyhope Creek does not appear to require any additional management actions. The population is actively fished and the population has not changed substantially since survey work began consistently in 2008. In general, survey results indicate a quality population in Marshyhope Creek with natural and effective reproduction, probably owed in part to quality, pristine habitat with minimally developed lands.

The Pocomoke River population survey yielded results that were similar to previous years, reflecting a small but sustainable population. Pristine forests of Pocomoke River help protect habitat for bass. Not as many fish were caught in 2015 as in 2014, which could simply reflect sampling bias. Many of the fish caught in 2014 were juveniles and subadults with good growth and condition. To provide a robust stock assessment for this population, a complete 10-year time series of data will be available in 2019 with population specific reference points available in 2020.

Current Management Measures/The Fishery

The number of largemouth bass caught, weighed, and released by tournament anglers is reported by permitted tournament directors. Not all tournaments are permitted, particularly those without a staged weigh-in area or those with less than 10 boats. There are no protocols in place to measure the number of largemouth bass caught and released by pass-time anglers or charter boat guide clients. A creel survey is being developed to measure fishing effort statewide. Once that survey is developed, fishing effort and total catch data will be available for stocks in specific Maryland tidal rivers of the Chesapeake Bay watershed. These data will improve the Department's ability to objectively assess the quality of the fishery from the perspective of the angler.

There is a minimum size limit of 12-inches for largemouth bass between June 16 and the end of February (inclusive) in tidewater. This minimum size limit essentially prevents smaller or younger fish from being harvested (~ 1 % of anglers) or from being moved around and experiencing handling stress during competitive sportfishing tournaments. Currently, there are no reliable statistics that indicate the proportion of tournament anglers within the bass fishery. Nonetheless, tournament anglers are considered a large, important group of anglers within the fishery. There is a 15-inch minimum size limit for largemouth bass between March 1 and June 15 (inclusive) in tidewater. The larger size limit was implemented in 1989 to reduce the number of sexually mature largemouth bass moved from their nests to a weigh-in station during the spawning season. These size limits do not prevent catch-and-release fishing which can be harmful during the spawning season and can also lead to mortality from excessive handling. There is no reliable estimate of catch-and-release mortality for any tidewater largemouth bass fishery in Maryland.

Focus Areas 2016-17

The TBP will focus on the following actions:

1) Continue Tidal Bass Survey so that at least a 10-year baseline of data is established for targeted tidewater areas populations and populations are monitored at least bi-annually. Continue surveys as specified in the Tidal Bass Program's Standard Operating Procedure (http://dnr2.maryland.gov/fisheries/Pages/bass/reports.aspx) during fall as funded with federal and state money.

2) Determine catch-and-release mortality for pass-time fishing using both long-term mark-recapture studies (at least 3 years) and short-term, hatchery pond experiments at Manning Hatchery using federal money.

3) Develop measures to determine angler satisfaction and relate those measures to fishery-independent and fishery-dependent indices. Angler satisfaction will be determined using statewide creel surveys and angler preference surveys conducted annually or semi-annually. These surveys are on-line surveys. Rewards are provided to a randomly selected subset of participants twice a year.

4) Determine economic impact of the fishery using statewide angler creel surveys and determine the economic impact of tournaments.

5) Proactively provide outreach information regarding handling bass, the use of additives, mechanisms to assure adequate live well maintenance, and factors that improve post-release survival of captured bass.

Fishery Management Plan for largemouth bass in Maryland Tidewater Implementation Table (updated 6/16)

Strategy	Actions	Dates	Comments
1.1 Annually conduct tidal bass surveys on targeted rivers, critically evaluate indices that are used to determine changes in the abundance, health, and life history of largemouth bass within tidewater areas of the Chesapeake Bay watershed, and develop new indices as necessary	1.1.1 Coordinate with regional managers to survey tidewater areas and collect data needed to develop indices	Sep - Oct 2015 On-going	Similar to 2014-2015 and previous years, **survey completed for 2015 (see Table 2 for survey results)**.
1.1 Annually conduct tidal bass surveys on targeted rivers, critically evaluate indices that are used to determine changes in the abundance, health, and life history of largemouth bass within tidewater areas of the Chesapeake Bay watershed, and develop new indices as necessary	1.1.2 Share results with anglers, stakeholders, and the general public via a Federal Aid Report, one-page summary sheets, and annual information booklet, and other forms as requested	March 2016 On-going	Similar to 2014-2015 and previous years, **Black Bass Annual Review completed and online** (http://dnr.maryland.gov/fisheries/Pages/bass/reports.aspx), Also disseminated among anglers and tournament directors. Federal Aid Report completed, but not provided on-line.
1.1 Annually conduct tidal bass surveys on targeted rivers, critically evaluate indices that are used to determine changes in the abundance, health, and life history of largemouth bass within tidewater areas of the Chesapeake Bay watershed, and develop new indices as necessary	1.1.3 Discuss indices with members of partner agencies, organizations, and universities to evaluate causes or consequences of changes in the indices	Feb 2016	Similar to 2014-2015, **presented data at Potomac River Fisheries Commission annual meeting on Potomac River bass population and conducted a black bass roundtable with partner agencies and stakeholders**.

Strategy	Actions	Dates	Comments
1.1 Annually conduct tidal bass surveys on targeted rivers, critically evaluate indices that are used to determine changes in the abundance, health, and life history of largemouth bass within tidewater areas of the Chesapeake Bay watershed, and develop new indices as necessary	1.1.5 Improve sharing of data with other Department biologists and programs, such as the Blue Infrastructure Initiative and GIFS	June 2015 - June 2016	In 2014-2015, reviewed and critiqued GIFS. **Contributed to meeting on GIFS, data sharing, and improvement of the existing database. Also, worked toward developing an Inland Fisheries website that will be linked to the Tidal Bass Program page and provide greater cross-referencing with other inland fisheries.**
1.2 Annually assess data quality and effective usefulness of data collection	1.2.1 Conduct general assessments of variance within catch and other indices and ensure variance is considerably lower than the average point estimate	April 2016 On-going	**Coefficients of variation (CV) for indices computed to assess evaluates and determine if any were too high to yield productive indices; CVs ranged between 2% to 65%, with the most variable for catch indices; none varied beyond reasonable expectations (i.e., greater than 100%).**

Strategy	Actions	Dates	Comments
1.2 Annually assess data quality and effective usefulness of data collection	1.2.3 Allow internal and external peer-review of data collection and analysis to refine methods based on expert opinions	June 2015 - June 2016	Two papers were published in 2014-2015, **and one publication was externally reviewed and it contained details of the problems with the Potomac River bass fishery, as well as possible solutions.** The publication contained information on tidal bass survey collection methods, indices and interpretation, and analysis of catch data. Use of indices are appropriate for meeting objectives of this FMP.
1.2 Annually assess data quality and effective usefulness of data collection	1.2.4 Deliver technical reports to regional managers, other internal reviewers, and reviewers of refereed journals for review of methods and data analysis	Feb - May 2016 On-Going	**Federal Aid Report and the Black Bass Annual Review were provided to regional managers and senior staff for internal review. Two manuscripts, one regarding the Potomac River fishery and one regarding the age-at-length key, were internally reviewed by the Manager of Statewide Operations.**
1.2 Annually assess data quality and effective usefulness of data collection	1.2.5 Assess and/or improve sampling equipment for efficiency	August 2015, March 2016	QA/QC checks were performed on dataset after they were entered into the GIFS database. **Regional managers and Tidal Bass Program discussed and decided upon a routine maintenance schedule for boat electrofishers. Additionally, an oscilloscope was used to detect power output for eastern region vessels**, which was also done in southern region in 2014-2015, to ensure there was sufficient power output.

Strategy	Actions	Dates	Comments
2.1 Establish biological reference points for populations of tidewater largemouth bass and use them to assess population status	2.1.1 Compute 25th and 75th percentiles for each index from the reference dataset, which will be annual averages computed across a minimum of 10 years of data	2014	Reference points were re-evaluated and readjusted in the 2014 Tidal Bass FMP and **no work was done on this between June 2015 and June 2016.**
2.1 Establish biological reference points for populations of tidewater largemouth bass and use them to assess population status	2.1.2 Obtain additional data for populations surveyed less than 10 years and develop reference points	Sept - Oct 2015 On-going	Data were collected from Patuxent River to complete a base-line, 10 year dataset in 2014-2015. **Populations in Marshyhope Creek, Wicomico River, Pocomoke River, and Gunpowder River were surveyed to obtain data for populations with less than 10 years of data.**
2.1 Establish biological reference points for populations of tidewater largemouth bass and use them to assess population status	2.1.3 Use reference points from the peer reviewed literature, when possible, as comparisons to reference points, particularly for populations that do not have a reference dataset of at least 10 years	Feb 2015	Similar to that for 2014-2015, **reference points from the peer reviewed literature were used to assess populations without a 10 year reference dataset.**
2.1 Establish biological reference points for populations of tidewater largemouth bass and use them to assess population status	2.1.4 Adjust reference points as additional data are required for inter-correlations and importance in reflecting the status of populations	2014	No work was done on this action between June 2014 and June 2016.

Strategy	Actions	Dates	Comments

2.2 Compare current indices to the reference points and assess significant differences between current indices and historical reference points	2.2.1 Evaluate indices relative to all available reference points and historical data to determine which reference points describe a problem with the fishery	Nov-Dec 2015 On-going	Similar to 2014, **indices were compared to assess significant differences between current indices and historical reference points**
2.2 Compare current indices to the reference points and assess significant differences between current indices and historical reference points	2.2.2 Develop a management strategy for imperiled populations by constructing a framework of management actions for improving indices	June 2015- June 2016 On-going	Management actions were evaluated to help improve the Potomac River fishery and protect the upper Chesapeake Bay fishery. **Public input was received on various action options.** Spatial modeling was conducted in 2014 to determine the influence of catch-and-return areas. **Additional strategies such as targeting black bass anglers with conservation materials and developing reef habitat in the Potomac River occurred, but are not complete.**
2.2 Compare current indices to the reference points and assess significant differences between current indices and historical reference points	2.2.3 Conduct population modeling to determine if and how management actions will influence indices and the population	Dec 2015 - June 2016 On-going	Spatial modeling was conducted in 2014 to determine how catch-and-return areas would influence populations of largemouth bass in the Potomac River and upper Chesapeake Bay. **Assessments were conducted to evaluate existing spring-time regulations in tidal and non-tidal water and the expectations on their expansion to improve the fishery.**

Strategy	Actions	Dates	Comments
2.3 Establish reference points for angler exploitation of largemouth bass populations in tidewater	2.3.1 Coordinate with directors of competitive events to obtain information on catch and initial mortality of largemouth bass	Dec 2015 - Feb 2016	Most directors of tournaments are routinely required to provide catch data and data on initial mortality of largemouth bass via an on-line reporting system, as required by the permit they receive for staging a tournament. **Emails and phone calls were directed to directors who did not report findings so that we obtained a 100% reporting rate.**
2.3 Establish reference points for angler exploitation of largemouth bass populations in tidewater	2.3.2 Promote registration and activity reporting of tournament directors, for communication and compliance of permit restrictions	Feb 2016	**A letter was issued to past and current tournament directors that reminded them of the obligation to get a free permit and the requirements of the permit (i.e., reporting requirements, no leaking bags).**
2.3 Establish reference points for angler exploitation of largemouth bass populations in tidewater	2.3.3 Report results during an annual or semi-annual bass roundtable meeting that includes participants from tournaments and the recreational angling community	Feb - June 2016 On-going	A stakeholder roundtable meeting was held at the at DNR. The agenda and minutes from the meeting are provided on-line at, http://dnr.maryland.gov/fisheries/Pages/bass/reports.aspx. **This meeting has been formalized into a Black Bass Advisory Subcommittee that provides input to the Sport Fisheries Advisory Commission, which in turn advises the Department.**

Strategy	Actions	Dates	Comments
2.3 Establish reference points for angler exploitation of largemouth bass populations in tidewater	2.3.4 Perform angler creel surveys, as necessary, to determine angler satisfaction, catch, and harvest rates by recreational anglers	June 2015 - June 2016 On-going	A statewide creel survey was developed as an on-line Volunteer Angler Survey; **anglers who take this survey may win a raffle; licensed anglers are sent an email encouraging them to take the survey and every angler who submits to the DNR Angler's Log is encouraged to take the survey;** additional datasets were evaluated for their utility (USFWS; Chesapeake Catch, Angler's Log, MRFS), but most of these cannot be used for tidal freshwater habitats; **an intercept survey was developed to provide angler creel data that is comparable to past survey data from the 1980's and 1990's;** angler exploitation indices and reference points have not yet been fully developed.
2.3 Establish reference points for angler exploitation of largemouth bass populations in tidewater	2.3.5 Produce studies and provide guidance on live well operating procedures to reduce mortality of largemouth bass	Aug 2015 - June 2016	Reviewed and updated guidelines on live release and handling tips in the Maryland Fishing Guide 2015. **Additional work was done to obtain information from B.A.S.S. and begin developing videos that will be put on-line and provide short video clips of information to the larger black bass community - these clips are currently being considered by DNR's Office of Communications.** Provided funding and in-kind support for research on keeping adult largemouth bass alive in livewells at Mississippi State University. In December, clarified requirements on existing permits for tournament directors that help reduce handling stress on adults.

3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.1 Refine the habitat suitability index using important habitat variables for identifying and prioritizing suitable habitat for largemouth bass	Mar - May 2016	**Spatial data on watershed quality were obtained from MD DNR Fisheries Habitat and Ecosystem Program. These data were loaded to an on-line spatial database of suitable areas for largemouth bass. This database is accessed at: http://dnr.maryland.gov/fisheries/Pages/bass/recreational.aspx.**
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.2 Ensure that the most informative variables are being measured during the Tidal Bass Survey by conferring with MD DNR Fisheries Habitat and Ecosystem Program		No work was done on this action between June 2015 and June 2016.
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.3 Use a habitat suitability index and consult anglers and regional managers to identify habitats important for the spawning success and growth of largemouth bass	2015	Suitability of spawning coves were identified for several tidal rivers; an ArcGIS shapefile was created to illustrate the coves; the work was written up and will be published in fall 2015 by American Midland Naturalist. It conveys how coves were ranked according to their ability to support largemouth bass reproduction. No work was done on this between June 2015 and June 2016.

Strategy	Actions	Dates	Comments
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.4 Consult published literature and experts to help identify valuable habitat for spawning success and growth of largemouth bass	Nov 2015 - May 2016	Published literature on spawning habitat for largemouth bass was summarized for stakeholders who are evaluating whether catch-and-return areas are viable options for promoting reproduction.
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.5 Generate and submit to GreenPrint spatial data reflecting valuable habitats for largemouth bass and anglers		No work was done on this action between June 2014 and June 2015.
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.6 Consider the effects of climate change on largemouth bass habitat and develop adaptive management to address possible changes	June 2015 - Dec 2016	The impacts of sea level rise on nursery habitats of largemouth bass was investigated and will be published in American Midland Naturalist in fall 2015. While some nursery habitats in Potomac River and the upper Chesapeake Bay will be negatively affected by sea level rise, the fisheries may be robust to changes because the species is likely to expand its range as water temperatures warm. **A spatial layer of spawning coves and potential impact by sea level rise was added to the Tidal Bass Program's website.**

Strategy	Actions	Dates	Comments
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.7 Utilize the proposed Climate Sensitive Areas for use in land-use planning and increased protection of vulnerable habitats especially in regards to largemouth bass habitat		No work was done on this action between June 2014 and June 2015.
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.8 Provide comments during permit review via MD DNR Environmental Review to help minimize ecological impacts on populations from tidewater of the Chesapeake Bay watershed and largemouth bass habitat	June 2015 - March 2016 On-going	Tidal Bass Program worked with Environmental Review to review consequences and draft a letter regarding the Department's position on coal ash discharge to Potomac River from a Virginia business, Dominion Power; Provided comments regarding construction projects proposed or conducted in upper Choptank, Pocomoke and Wicomico Rivers.
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.9 Write letters on official letterhead to stakeholders or on behalf of stakeholders to acknowledge and promote the significance of the fishery	Feb 2016, June 2016	**Official letters were written to tournament directors, those who target black bass in Maryland, and owners of Anchor Marina to thank stakeholders for participating in the fishery and to promote the bass fishery**

Strategy	Actions	Dates	Comments
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.10 Promote a level of imperviousness that is lower than 10% of the drainage	May 2016	**A map indicating watershed health, in part based on imperviousness levels, was added to an on-line spatial database of important bass habitats.**
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.11 Ensure that natural variability in stream discharge is maintained by encouraging "smart growth" and limiting channelization		No work was done on this action between June 2015 and June 2016.
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.12 Encourage lower levels of nitrogen and phosphorus waste from entering waterways via non-point and point sources	June 2015-2016 On-going	Letters were written in 2014 regarding eutrophication of Wicomico Rivers. **In 2015-2016, reviewed grant proposals for nutrient and sediment reduction from public and private lands. Provided comments on removal of nutrients from storm water for 2 State Highway projects on Route 40 at the Gunpowder/Little Gunpowder.**
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.13 Proactively work through a comprehensive plan renewal process to identify and protect important habitat features	June 2015-2016	Reviewed and commented on the proposed Mallows Bay National Marine Sanctuary. The main focus was to ensure that angler access to Mallows Bay would not be negatively impacted by the "Sanctuary" classification. We were ensured that anglers would retain full access to the water.

Strategy	Actions	Dates	Comments
3.1 Identify valuable habitat and habitat conditions for largemouth bass and promote their protection	3.1.14 Collect data on invasive species as habitat data is collected in order to better monitor changes in habitat conditions over time and evaluate how those changes would affect the largemouth bass fishery	June 2015 - June 2016 On-going	Data for invasive snakeheads were collected as part of the Tidal Bass Survey, which is on-going; **these monitoring data were presented at a USFWS interagency taskforce to discuss impacts of snakeheads in January.** Blue and flathead catfish are also considered invasive species and monitoring will begin on the Patuxent River in 2016. The commercial harvest of blue catfish is currently monitored on the Potomac River**. Data regarding expansion and impacts of invasive species on largemouth bass have been examined with stakeholder groups and during taskforce meetings**.
3.2 Improve habitat conditions for largemouth bass and species on which largemouth bass depend	3.2.1 Identify and determine the need for protected areas that are completely or temporarily closed to largemouth bass fishing either year-round or during the spawning season to prevent displacement or high levels of catch-and-release mortality	Nov 2015 - June 2016	**Public awareness on the importance of SAV for productivity of largemouth bass was discussed at the Potomac River Fishery Commission's inter-agency meeting in November 2015. A comprehensive review of existing spring-time and year-round possession restrictions was conducted and that information was used to generate several internal reports. One such report will be presented to the Black Bass Advisory Subcommittee, after its formation in June and during its first convened meeting in July.**

Strategy	Actions	Dates	Comments
3.2 Improve habitat conditions for largemouth bass and species on which largemouth bass depend	3.2.2 Use ecosystem-based management to provide management options that protect growth or survival of largemouth bass and accounts for competition or predation by invasive species		No work was done on this action between June 2014 and June 2015.
3.2 Improve habitat conditions for largemouth bass and species on which largemouth bass depend	3.2.3 Tidal Bass Program staff may work with Artificial Reef Program staff (MARI) as needed to develop reefs and other artificial habitat for largemouth bass	Jun 2015 - Jun 2016	An artificial reef ball project is proposed, **fully funded**, and may be permitted for Smoots Bay (National Harbor). **Permits from Maryland have been obtained and should be obtained from Army Corps of Engineers.** This project should be completed in 2016. It will compensate for grass lost from the area in the last decade. **The collaboration with MARI will help ensure that future projects have a framework that details the process of artificial reef placement from design to implementation.**

Strategy	Actions	Dates	Comments
3.2 Improve habitat conditions for largemouth bass and species on which largemouth bass depend	3.2.4 Develop innovative storm water management techniques, promote storm water management retrofits where applicable, creation of wet marshy conditions throughout watersheds, and reconnect streams to riparian areas		No work was done on this action between June 2015 and June 2016.
3.2 Improve habitat conditions for largemouth bass and species on which largemouth bass depend	3.2.5 Upgrade and improve semi-natural landscape elements, such as man-made wetlands, ponds, and recreated natural lands		No work was done on this action between June 2016 and June 2016.

Strategy	Actions	Dates	Comments
3.2 Improve habitat conditions for largemouth bass and species on which largemouth bass depend	3.2.6 Promote low sedimentation of streams	June 2015 - June 2016	**Reviewed and commented on the following projects: Zekiah Swamp State Highway Administration (SHA) project designed to repair degraded shoreline stabilization materials; Rt 210 over upper Piscataway Creek, SHA project to repair rip-rap and storm gutters; Stoney Run – just upstream from the tidal lagoons in Patapsco River, SHA project to repair roadside drains and sediment traps.** **Our comments emphasized the importance of functional sediment controls and continuous monitoring of those put in place. Flash flooding occurs frequently in all these places and heavy sediment loads, even temporary ones, negatively impact black bass young of year and their forage.** **Provided comments on 2 State Highway projects on Route 40 at Gunpowder/Little Gunpowder to limit sedimentation and maintain fish passage in order to protect the popular tidal largemouth bass fishery.**

Strategy	Actions	Dates	Comments
4.1 Generate a decision making process to resolve identified problems with the population and fishery as they relate to significant departures of indices from reference points	4.1.1 Hold public meetings to determine angler behavior and perceptions on the quality of the fishery	Nov 2015 - Jun 2016	Similar to that in 2014, **public meetings were held with Potomac River Fisheries Commission**. A public meeting was also held local town hall style in North East (MD). Similar to 2014, **meetings also included a black bass roundtable in Annapolis and with tournament organizations during their registration meeting.**
4.1 Generate a decision making process to resolve identified problems with the population and fishery as they relate to significant departures of indices from reference points	4.1.2 Evaluate the adequacy of current regulations in supporting the sustainability and quality of the fishery	Nov 2015 - Jun 2016	Catch and return areas were evaluated in 2014 and early 2015. **Current possession regulations were also evaluated by MDDNR staff to determine what changes may be made to improve the sustainability of the Potomac River and upper Chesapeake Bay fisheries. Additionally, past regulations such as a 15" limit during spring was evaluated for its effectiveness.**
4.1 Generate a decision making process to resolve identified problems with the population and fishery as they relate to significant departures of indices from reference points	4.1.3 Establish relationships between fishery independent data, angler catch, and angler satisfaction		No work was done on this action between June 2015 and June 2016. Data regarding angler satisfaction will be collected in 2016.

Strategy	Actions	Dates	Comments
4.2 Enhance fish populations by releasing hatchery raised largemouth bass, when natural reproduction or recruitment is deemed insufficient for sustaining a fishery	4.2.1 Target tidewater areas that require stocking of largemouth bass that are determined to be at risk and would be expected to suffer a decline in the quality of the fishery without stocking efforts	June 2016 On-going	Stocking is a routine annual event. **In June, largemouth bass were released to the Potomac River, where populations have suffered recruitment declines.**
4.2 Enhance fish populations by releasing hatchery raised largemouth bass, when natural reproduction or recruitment is deemed insufficient for sustaining a fishery	4.2.2 Generate a stocking strategy with an objective to either support or improve the fishery	Feb 2016	In accordance with the stocking policy (2015), key areas were identified for stocking and include Potomac River, Middle River, and the upper Chesapeake Bay; **money was requested from federal aid to purchase largemouth bass juveniles when stocking to an environment from which brood stock are not obtained.**

Strategy	Actions	Dates	Comments
4.3 Promote the survival and abundance of older, larger fish	4.3.1 Adjust creel limits or size limits for promoting survival of older fish when: 1) there are few adults in the population for enabling sufficient recruitment that sustains the population; or b) catch rates for adults are too low to provide a quality fishery		No work was done on this between June 2015 and June 2016.
4.3 Promote the survival and abundance of older, larger fish	4.3.2 Improve and promote angler awareness that increases survivorship of largemouth bass during catch-and-release fishing	June 2015 - June 2016	Provided funding and in-kind support for research on keeping adult largemouth bass alive in live-wells at Mississippi State University. Black bass anglers were targeted with current information on reducing handling stress of bass that anglers intend to keep alive in February and June. Catch-and-release areas are also being considered to help promote the survivorship of older, larger fish.

Strategy	Actions	Dates	Comments
4.3 Promote the survival and abundance of older, larger fish	4.3.3 Engage in meaningful studies that benefit the angling community by informing them on methods to improve survivorship		No work was done on this action between June 2015 and June 2016.
4.3 Promote the survival and abundance of older, larger fish	4.3.4 Enforce restrictions on holding more than 5 bass/angler/day by specially permitted release boat captains	June 2015 - June 2016	**Tournaments with release boats were attended by staff.** Oxygen and temperature conditions required in the permit were measured by MDDNR staff. When problems occurred, they were solved by the release boat crew and MDDNR staff. **Staff developed a datasheet to record oxygen and temperature routinely throughout the day; the max and min are provided the tournament director at the end of the day to aid in their data reporting.**
4.3 Promote the survival and abundance of older, larger fish	4.3.5 When necessary, discourage the transportation of largemouth bass among river systems or to an uninterrupted area greater than 30 km from its area of capture	October 2016	Initially discouraged at meetings with stakeholders, **limiting redistribution of fish from distant streams was encouraged as a best management practice in the permitting system for most black bass tournaments in Maryland.**

Strategy	Actions	Dates	Comments
4.4 Protect, enhance and improve important angler access points to the tidewater largemouth bass fishery	4.4.1 As part of the Chesapeake Bay Watershed Access Plan, 300 public access sites will be developed in the watershed and important angler access points to the tidewater largemouth bass fishery should be provided	June 2015 - June 2016	An angler access map describes fishing spots for anglers in Maryland. **It was referenced in phone calls and conversations with stakeholders throughout the year.** No work was done on this action between June 2015 and June 2016. **Mallows Bay is considered as a national marine sanctuary and if approved, will be advertised as a valuable access point to the tidewater largemouth bass fishery on Potomac River. Hallowing Point, Cedar Point, and a new free fishing area in Federalsburg (see Action 4.4.4) will be added or edited in the angler access map.**
4.4 Protect, enhance and improve important angler access points to the tidewater largemouth bass fishery	4.4.2 Determine crowding of angler access points and mitigate, when possible		No work was done on this action between June 2015 and June 2016.
4.4 Protect, enhance and improve important angler access points to the tidewater largemouth bass fishery	4.4.3 Encourage public or DNR Fisheries to identify potentially new access areas for motor boats		No work was done on this action between June 2015 and June 2016.

Strategy	Actions	Dates	Comments
4.4 Protect, enhance and improve important angler access points to the tidewater largemouth bass fishery	4.4.4 Create and/or advertise new angler access points to the tidewater largemouth bass fishery	June 2015 - June 2016	The Angler Access map, which is available on-line, was noted in correspondence with several anglers who were interested in fishing in Maryland; also, a map of approved release sites for tournaments is available on-line, advertised to directors, and is used to highlight access points for competitive sport fishing. **Reviewed and commented on two Project Open Space (POS) projects with the potential to increase angler access to tidal bass waters. Hallowing Point on the Calvert County side of the Benedict Bridge is being expanded to include additional boat launches, shoreline fishing and, possibly, a fishing pier. Cedar Point Wildlife Management Area will expand waterfowl access to hunter in southern Charles County, but there will be ample shoreline access for anglers as well.**
4.4 Protect, enhance and improve important angler access points to the tidewater largemouth bass fishery	4.4.5 Promote small craft and shore based angler access		**Worked with the Town of Federalsburg to create a new "free fishing area" along Marshyhope Creek.** **See Section 4.4.4. for additional boat access at Hallowing Point. Additionally, all POS submissions that are received in the Southern Region office are reviewed with additional angler and boat access being the primary point of interest.**

Strategy	Actions	Dates	Comments
5.1 Improve habitat for largemouth bass	5.1.1 Control and manage invasive species that threaten the health or sustainability of largemouth bass populations	June 2015 - June 2016	Incentive programs, such as the statewide invasive species record, were promoted to help control and manage invasive species (Northern snakehead). **A fishing derby aimed at raising awareness of northern snakehead was held in partnership with National Park Service and U.S. Fish and Wildlife Service in C&O Historical Park.**
5.1 Improve habitat for largemouth bass	5.1.2 Monitor, protect or enhance the availability of prey for largemouth bass by partnering with other agencies or other programs within MD DNR	March 2015	A monitoring strategy was implemented within the Tidal Bass Program for documenting the availability of prey. **Availability of forage was investigated for Middle River by developing a fish forage index, which will be computed from Tidal Bass Program data in select streams and spatially referenced on-line using ArcGIS.**
5.1 Improve habitat for largemouth bass	5.1.3 Control or limit pollution sources to impaired waterways in order to improve the sustainability of largemouth bass populations		**Reviewed new power plant proposal (the 3rd in the greater Waldorf area). The smokestacks of this plant appear to be relatively short, causing additional concern over chemical compounds that would be precipitated from the smokestack.**

Strategy	Actions	Dates	Comments
5.2 Maintain important aspects of ecosystem function to maintain habitat for largemouth bass	5.2.1 Identify components of ecosystem function essential for the sustainability of largemouth bass populations	June 2015 - June 2016.	**A macroinvertebrate index of biotic integrity was developed and compared between Vallisneria dominated habitats and Hydrilla dominated habitats. This index reflects the diversity of the macroinvertebrate community and is being related to bass health and body condition.**
5.2 Maintain important aspects of ecosystem function to maintain habitat for largemouth bass	5.2.2 Identify possible threats to the maintenance and function essential for the sustainability of largemouth bass		Ecosystem threats to the fishery in the Potomac River and upper Chesapeake Bay were largely identified as ones related to loss of SAV in 2014. No work was done on this action between June 2015 and June 2016.
5.2 Maintain important aspects of ecosystem function to maintain habitat for largemouth bass	5.2.3 Preserve ecosystem components that are essential and potentially threatened		No work was done on this action between June 2015 and June 2016.

Acronyms: GIFS = Geographic Inland Fisheries Survey System MDDNR = Maryland Department of Natural Resources QA/QC = quality assurance/quality control SAV = Submerged Aquatic Vegetation

Table 1. Stock assessment of largemouth bass populations in 2015 for targeted drainages of the Chesapeake Bay watershed using indices and metrics reflecting changes in population biology. When a metric falls below the 25th percentile computed for available data for that river, the ▼ symbol is given. When a metric falls above the 75th percentile computed for available data for that river, then the ▲ symbol is given. nc = value falls within the 25th and 75th percentiles. For tidal rivers where 25th and 75th percentiles for populations were not available, values were compared to general, reference point-estimates established for non-Maryland populations; 👍 = values similar to reference point-estimate and 👎 = values much different than reference point. Abbreviations for indices are in text. NA = Not Available

River	N	CPUE	Cor-CPUE	CPUE, 1+	PSD_{305}	PSD_{381}	-Z	GR-EXPrise	GR-VBGF	LW-Slope	W_r	K_n	JuvCPUE	JUVPSD	JUV%OCC (N)
Upper Bay	28	38.07 ▼	4.77 ▼	19.31 ▼	0.63	0.58 ▲	NA	57.61 ▼	57.80 ▼	3.18	1.07 ▲	1.05 ▲	26.90 ▼	0.58	0.74 (19)
Potomac	53	35.10 ▼	3.77 ▼	9.41 ▼	0.65	0.36 ▲	0.56 ▼	66.48	66.72	3.24	1.09 ▲	1.07 ▲	26.38 ▲	0.71	0.79 (34)
Patuxent[1]	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Choptank	37	5.70 ▼	2.94 ▼	7.09 ▼	0.83 ▲	0.57 ▲	NA	60.06 ▼	60.26 ▼	3.25	1.04 ▲	1.03 ▲	11.87 ▼	0.12	0.10 (30) ▼
Wicomico	24	16.32	4.98	12.49	0.65	0.31 👍	0.47 👎	62.18 👎	62.44 👎	3.31 👍	1.03 👍	1.00	12.13	0.31	0.41 (17)
Marshyhope	24	36.53	8.60	32.93	0.65	0.28	0.56	65.83	62.24 👎	3.15 👍	0.99	1.03 👍	25.79	0.19	0.12 (16)
Pocomoke	30	13.55	3.71	11.23	0.47 👎	0.21	0.63 👍	60.42 👎	60.58 👎	3.21 👍	0.99	0.96 👎	11.83	0.24	0.20 (20)
Gunpowder	19	8.39	8.25	3.25	0.86 👍	0.64 👍	NA	NA	NA	2.92	1.03 👍	0.93 👎	0.00	0.00	0.00 (15)

[1]Patuxent River was not sampled (NS) in 2015.