Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass (*Micropterus dolomieu*), and Spotted Bass (*Micropterus puntulatus*) Management and Fishing in Pennsylvania

Pennsylvania Fish & Boat Commission fishandboat.com

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2020 Update

Goal: Maintain or enhance Largemouth Bass, Smallmouth Bass, and Spotted Bass sport fishing through harvest management of naturally sustained bass populations and through habitat preservation and enhancement. Judiciously stock Largemouth Bass and Smallmouth Bass in compatible new and reclaimed habitats.

Largemouth Bass and Smallmouth Bass occur throughout Pennsylvania and were originally indigenous to the Ohio River and Lake Erie Drainages. Spotted Bass, Pennsylvania's most rare black bass, occurs only in the Ohio River Drainage. The Ohio River Drainage includes the Ohio River, Allegheny River, and Monongahela River Drainages. Generally, in Pennsylvania, Largemouth Bass occur at lower densities in riverine (lotic) habitats compared to Smallmouth Bass. However, Largemouth Bass are frequently found at higher densities in shallow reservoir and shallow lake (lentic) habitats compared to Smallmouth Bass. Largemouth Bass and Smallmouth Bass both frequently occur in large and medium size deeper reservoirs. Smallmouth Bass are typically abundant in rivers, warm-water streams, and medium to large size lakes and reservoirs. In the Lake Erie Drainage, Largemouth Bass are largely confined to Presque Isle Bay; however, Smallmouth Bass are abundant in both Lake Erie and Presque Isle Bay. Smallmouth Bass and Largemouth Bass stocking by the Pennsylvania Fish and Boat Commission and other agencies over a century ago into the Delaware, Susquehanna, and Potomac River Drainages led to colonization of waters within these drainages, where both species are now self-sustaining. The Susquehanna River Drainage includes the West Branch Susquehanna River and Juniata River Drainages. The Delaware River Drainage includes the Lehigh River and Schuylkill River Drainages. Most natural warm-water lakes and man-made reservoirs throughout Pennsylvania contain self-sustaining Largemouth Bass and Smallmouth Bass populations. In the Delaware and Schuylkill Rivers, Smallmouth Bass predominate, with Largemouth Bass largely confined to the tidal portions of these rivers, where they typically outnumber Smallmouth Bass. In the Susquehanna River, Smallmouth Bass also predominate, whereas Largemouth Bass are found primarily in power dam pools at lower densities than Smallmouth Bass. Spotted Bass are most abundant within a 20-mile radius of the confluence of the Ohio, Allegheny, and Monongahela Rivers in western Pennsylvania.

Largemouth Bass and Smallmouth Bass populations are managed for sport fishing through harvest management, habitat management, habitat enhancement, and through stocking. Stocking Smallmouth Bass

and Largemouth Bass usually occurs in conjunction with establishing self-sustaining populations in newly filled or newly reclaimed reservoirs. Stocking Smallmouth Bass in warm-water streams and rivers takes place when water quality improvements will accommodate survival of black bass. Stocking is carried out from one to several years to establish a self-sustaining population. Largemouth Bass and Smallmouth Bass populations in Pennsylvania waterways are not sustained through annual maintenance stocking. In the years from 2013 to 2017, Largemouth Bass were stocked in 7 to 17 waterways, or water sections, per year. There were no Smallmouth Bass stocked within the same span of time. Spotted Bass stocking does not take place, and their occurrence in reservoirs and lakes in Pennsylvania is unknown. Annual stocking summary details are posted elsewhere on this website. Our Warmwater and Coolwater fishing map provides a broad selection of waters where black bass fishing opportunities can be found in Pennsylvania.

Anglers may be curious as to how large a certain species can grow in Pennsylvania waters. Pennsylvania's Current Pennsylvania state record fish provide perspective regarding maximum size attainable. Below, we illustrate the growth rate of black bass in Pennsylvania and note that it takes about 4 years for Smallmouth Bass and Largemouth Bass to reach 12 inches in length. Spotted Bass require about 6 years to reach 12 inches in length. It will take Smallmouth Bass and Largemouth Bass about 6 years to reach 15 inches in length, while most Spotted Bass would take more than 16 years to attain that same length in Pennsylvania (Figure 1). With respect to harvest management, inland regulations differ slightly between rivers and lakes. Current inland regulations can be found elsewhere on this website. Prior to 2000, a closed season existed from mid-April to mid-June, no bass fishing was permitted at that time. This period generally corresponded to the time of black bass spawning in Pennsylvania and there was concern that fishing during this period would reduce juvenile production, and ultimately adult bass density. Currently, there is no field study that conclusively indicates that catch and release fishing during the spawning period reduces density of adult bass at the population level. Many other fish species are pursued in Pennsylvania waters from mid-April to mid-June and black bass can be inadvertently or intentionally caught at that time, which ultimately leads to some catch and release loss or mortality. Recognizing that black bass would be accidentally caught and released from mid-April to mid-June, the Pennsylvania Fish and Boat Commission accommodated limited catch and immediate release bass fishing at that time. To mitigate anticipated loss, additional harvest restrictions were put in place in conjunction with the change. Specifically, greater harvest restrictions were put in place during cool and cold weather periods to mitigate or make up for losses. Greater cool and cold weather harvest restrictions were designed to ameliorate catch and release loss that was expected to occur in conjunction with catch-and-release fishing from mid-April to mid-June to yield no net loss. The Board of Commissioners sought to maintain bass density following accommodation of spring catch and release fishing. Analytical tools were used to coarsely identify how many bass were necessary to be preserved during that cool weather period to yield enough "savings" or "preservation" of adult black bass to make up for catch-and-release losses. Those tools showed that on lakes, it was expected that harvest restrictions during cool weather and during ice fishing periods would yield enough saving if restrictions began in November. On rivers, since field surveys showed limited fishing after November, we expected few bass would be saved after November. This knowledge was incorporated into analytical tools, which indicated that it was necessary to apply restrictions to rivers beginning in October so that enough bass were preserved to make up for catch and release loss. For lakes, as noted, application of restrictions in November was deemed sufficient to make up for losses. Thus, the 12-inch minimum size limit and 6 bass creel limit was applied from mid-June through September on rivers and through October on lakes. (Tip: to remember the last month of the "regular" bass season for inland waters, the "S" in September can be thought of as symbolizing a river or stream and the "O" in October can be thought of as symbolizing a lake). Harvest restrictions in the cold weather period include a 15-inch minimum size limit and 4 fish creel limit, which extends through the following year to mid-April. The restricted catch and release period from mid-April to mid-June requires immediate release of all bass caught, forbids anglers from repeatedly casting into a clearly visible bass spawning nest, and does not permit bass tournaments.

The restricted catch and release period for bass also applies to waters in the Big Bass Program, where harvest rules are more restrictive. These waters meet specific criteria with respect to resource productivity, bass growth, and bass exploitation characteristics. Specifically, more productive waters with "above average" bass length-at-age characteristics, and in which fishing pressure and harvest are above average, qualify for inclusion. The number of waters in this program now exceeds 60. Biologists have found that waters meeting these criteria can support greater densities of larger size Largemouth Bass and Smallmouth Bass, so the regulation imposes higher length limits that foster increased density of both bass species. For these waters

catch and release loss was accounted for differently. Generally, mitigation for catch and release losses was considered to occur “in advance” for lakes and reservoirs in the Big Bass Program. In other words, restrictive harvest was assumed to make up for losses that occurred when these regulations were initially applied. For these waters, a 15-inch minimum size limit and a creel limit of 4 fish applied from mid-June through the following mid-April. Pennsylvania Fish and Boat Commission biologists have documented increases in densities of Largemouth Bass and Smallmouth Bass over 15 inches in most waters where Big Bass Regulations apply, compared to densities prior to implementing these more restrictive regulations. Waters in this program have become popular destinations for bass fishing enthusiasts seeking larger size black bass.

Apart from inland harvest regulation programs, which have been applied and evaluated to sustain high quality black bass fishing, Pennsylvania Fish and Boat Commission biologists have also collaborated with biologists in neighboring states to develop harvest regulations that apply to border waters to sustain high quality fishing experiences. Border water regulations, described elsewhere on this web site, apply to the Delaware River and tributaries, Lake Erie and tributaries, Pymatuning Reservoir, and Conowingo Reservoir on the lower Susquehanna River. Anglers must consult and abide by Fishing Laws and Regulations applicable to boundary waters they fish.

Tournament angling for black bass is a popular activity in Pennsylvania with over 1,000 permitted events hosted annually across the state each year. Anglers seeking to host a fishing event involving 10 or more anglers, or where facility rules require permission (State Parks, US Army Corps of Engineer facilities, and other municipal facilities) are required to secure a permit from the Pennsylvania Fish and Boat Commission and/or facility owners. Tournament fishing hosting requirements are posted elsewhere on this web site.

Biologists regularly monitor adult bass density and young bass density, and tabulate catch and harvest of bass by anglers in creel surveys. In association with these evaluations, growth of bass is also examined by measuring length, weight, and taking a scale sample to determine age. We have tabulated average ages and weights for a variety of lengths of Largemouth Bass, Smallmouth Bass, and Spotted Bass in Pennsylvania (Table 1). Anglers find these tables useful in approximating the weight and age of their catch. It should be known that weight and age based on length is variable to some extent between individuals and populations. Fish length at age depends on a variety of factors including habitat, gender, genetics, forage abundance, and other conditions. In standard biological collections, the decrease in relative or absolute number of black bass at each age can be used to describe their total annual mortality rate. On average, the total annual mortality rate for Largemouth Bass is 58 % loss per year and it is 60% loss per year for Smallmouth Bass. These include annual losses due to fishing and loss due to natural circumstances, such as predation and disease. Growth, production of young, and angler harvest of black bass represent some important elements that are used by biologists to develop management plans and regulation recommendations that produce sustainable and desirable fishing opportunities.

In 2005 and 2007, anglers and biologists noted significant mortality and disease (lesions, erosions) in collections of young-of-year Smallmouth Bass derived from the lower Susquehanna River and lower Juniata River. Collections of young bass have occurred annually, beginning in July on most rivers, since at least 1989. The purpose of collections is to index annual natural production of young-of-year Smallmouth Bass. Prior to 2005, observations of disease and mortality among young Smallmouth Bass were not documented in any river collection in Pennsylvania. Annual production of young-of-year (age 0) or yearling (age 1) are often used to coarsely forecast abundance of adults in subsequent years. Annual production of young in most naturally sustained healthy fish populations is quite variable. Prevailing weather or environmental conditions at the time of spawning, and early life, often influence production of young. In the case of river Smallmouth Bass, low or modest spring flow coupled with gradual spring warming usually yield high abundance of young. High flow may cause mechanical damage to eggs and fry. Cooler or fluctuating temperatures may lengthen incubation and delay hatching of fry, which accommodates an increase in egg predation and disease loss in both rivers and lakes. Thus, high flows and variable or cooler spring temperatures often lead to less production of young. Production of high abundance is infrequent, but important in maintaining high angler catch rates. It was noted in 2005 and 2007 that low flows and warm spring conditions yielded above average abundance of young Smallmouth Bass, but this observed abundance was also accompanied by observation of disease and mortality among those young. Mortality and disease were suspected to be caused by seasonally stressful water quality conditions (very warm conditions with episodes of low dissolved oxygen) in near shore habitats occupied by

young Smallmouth Bass. Circumstances leading to stress, disease, and mortality among Smallmouth Bass have been studied extensively along with a variety of human practices that impact the aquatic environment, coupled with invasive and natural pathogens considered the principal cocktail of circumstances leading to disease and mortality among young. More specific investigation into the precise cause of mortality was examined using techniques that simulated past river thermal conditions and exposed laboratory confined young-of-year Susquehanna River Smallmouth Bass to known river pathogens, including viruses. This investigation determined that thermal conditions at the time of past in-river mortalities (2005 and 2007), in the presence of known bacterial pathogens coupled with Largemouth Bass virus infection, resulted in mortality of young-of-year Susquehanna River Smallmouth Bass (Boonthai et al.2018).

Recent surveys indicate that disease associated loss of young Smallmouth Bass has been very low or absent in the past 5 years. However, lower abundance of young in the past has caused a reduction in the abundance of intermediate-sized Smallmouth Bass, beginning in approximately 2010. Abundance of young and intermediate-sized Smallmouth Bass (<15 inches), typically the most abundant in healthy black bass populations in Pennsylvania, became sufficiently sparse in the lower Susquehanna River and lower Juniata River to cause outcry among the angling community in 2010. To preserve and sustain quality bass fishing opportunities on these rivers, in 2011, more restrictive harvest rules were put in place, to mitigate past low production years and maintain, and potentially enhance, abundance. These rules were designed to make up for past years of low young production by limiting angler harvest, although angler take was never identified as a cause of reduced production in any analysis. Nonetheless, limiting angler take represented the only means to make up for past low production of young and preserve black bass that might otherwise have been taken. Angler harvest restrictions were put in place in 2011 and expanded in 2012. On the lower Susquehanna River and lower Juniata River, harvest of black bass is not permitted; however, catch and release fishing is permitted year-round, including during the period from mid-April to mid-June as detailed elsewhere on this website. As noted above, the period from mid-April to mid-June is the principal spawning and egg incubation period for black bass, a period when nest guarding males become more aggressive and become vulnerable to angler capture. Temporary removal of nest guarding males may lead to increased predation upon contents of a nest, depending upon the type of angling; however, population level changes have not been linked with such temporary removal in healthy self-sustaining black bass populations (Hanson et al. 2008). Diminished production of young in the lower Susquehanna River and lower Juniata Rivers have led to application of these restrictive rule changes which, in 2012, were extended one half mile into tributaries which join these river reaches. Again, these rule changes were designed to preserve, and potentially enhance abundance, while accommodating catch and release fishing during most of the year. Rule changes were not intended to represent a solution to conditions causing mortality and disease among young and intermediate-sized Smallmouth Bass. Other potential contributing circumstances associated with loss were examined in detail, with results posted elsewhere on this web site. Monitoring black bass abundance on these rivers is ongoing and incremental improvement in abundance is being documented. Anglers can contribute to improved abundance by quickly removing hooks from bass they intend to release and quickly returning fish to the water to ensure returned fish will survive to be caught again. Return of black bass to the water quickly is important to insure high post-release survival.

The PFBC has broadly summarized Susquehanna River management and monitoring goals in the Susquehanna River management plan and provided a historical synopsis of past findings. Goals in this document focus on monitoring and maintaining healthy aquatic communities in the Susquehanna River drainage. Additional information is available in the Susquehanna River Management Plan found elsewhere on this website. River black bass fishing is an important recreational activity in Pennsylvania. Management plans that focus upon healthy aquatic communities to sustain native or naturalized populations of black bass in major rivers are also broadly detailed in our Three Rivers Management Plan and Delaware River Management Plan.

In addition to Pennsylvania's abundant river bass populations, bass populations in reservoirs, lakes and ponds, are abundant and regularly monitored. In addition to harvest management, tournament management and habitat management are applied to reservoirs, lakes, and ponds. Habitat enhancement involves careful evaluation of a water body's physical, biological, and chemical characteristics. Habitat enhancement of a water body may mean identification of an acidified discharge or tributary that limits biological productivity and exploration of means to minimize its impacts. In considering reservoir habitats, high densities of aquatic vegetation may negatively affect Largemouth Bass size structure and abundance by limiting access to prey (too

much cover). Here, vegetation control through planned, over-winter partial draw-down will freeze and desiccate near shore vegetation and serve to restore predator and prey balance following refilling in spring. Assessments may show a lack of spawning or nursery habitat, in these instances artificial or natural materials may be added to create such habitat. The Pennsylvania Fish and Boat Commission has an active corps of volunteers that assist in placement of structures after an approved plan has been developed. We encourage organizations interested in volunteering time to contact our Habitat Unit to learn more.

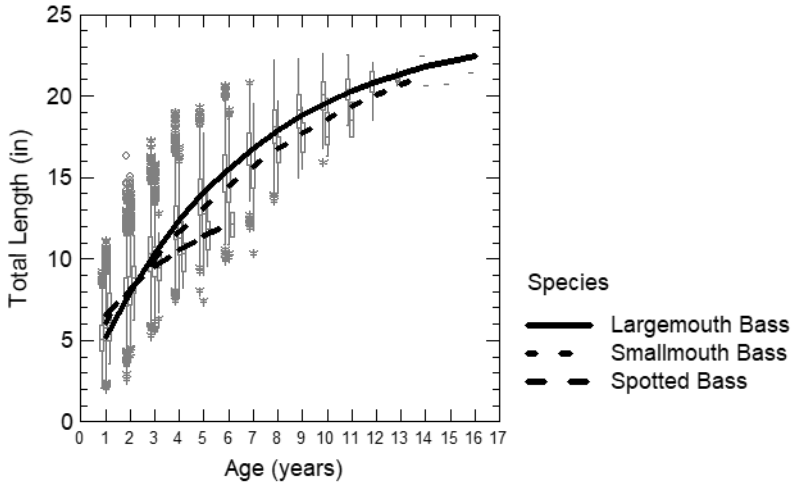

Figure 1. Average length of Largemouth Bass (March-June), Smallmouth Bass (July-September), and Spotted Bass (March-October) collected by Fisheries Biologists in assessment gear in Pennsylvania

Table 1. Average weight and average age of Largemouth Bass (March-June), Smallmouth Bass (JulySeptember), and Spotted Bass, at a given length, collected by fisheries biologists in Pennsylvania (March-October)

	Largemouth Bass		Smallmouth Bass		Spotted Bass	
Inches	*Pounds*	*Years*	*Pounds*	*Years*	*Pounds*	*Years*
4	0.1	0.6	0.1	0.1	< 0.1	< 0.1
4.5	0.1	0.8	0.1	0.3	< 0.1	< 0.1
5	0.1	1	0.1	0.5	0.1	0.2
5.5	0.1	1.1	0.1	0.7	0.1	0.5
6	0.1	1.3	0.1	0.9	0.1	0.7
6.5	0.1	1.5	0.1	1.2	0.1	1
7	0.1	1.7	0.2	1.4	0.2	1.3
7.5	0.2	1.8	0.2	1.7	0.2	1.5
8	0.2	2	0.2	1.9	0.2	1.9

8.5	0.3	2.2	0.3	2.2	0.3	2.2
9	0.3	2.4	0.3	2.4	0.4	2.6
9.5	0.4	2.7	0.4	2.7	0.4	3
10	0.5	2.9	0.5	3	0.5	3.4
10.5	0.5	3.1	0.5	3.3	0.6	3.9
11	0.6	3.3	0.6	3.6	0.7	4.5
11.5	0.7	3.6	0.7	3.9	0.8	5.1
12	0.8	3.8	0.8	4.2	0.9	5.9
12.5	0.9	4.1	0.9	4.5	1	6.7
13	1.1	4.4	1.1	4.9	1.1	7.9
13.5	1.2	4.7	1.2	5.3	1.3	9.3
14	1.4	5	1.3	5.6	1.4	11.6
14.5	1.5	5.3	1.5	6	1.6	16.3
15	1.7	5.6	1.7	6.4	1.8	> 16.3
15.5	1.9	6	1.8	6.8	2	> 16.3
16	2.1	6.4	2	7.3	2.2	> 16.3
16.5	2.3	6.8	2.2	7.7	2.4	> 16.3
17	2.6	7.2	2.4	8.2	2.6	> 16.3
17.5	2.8	7.6	2.7	8.8	...	...
18	3.1	8.1	2.9	9.3	...	...
18.5	3.4	8.7	3.2	9.9	...	...
19	3.7	9.2	3.5	10.5	...	...
19.5	4	9.9	3.8	11.2	...	...
20	4.3	10.6	4.1	11.9	...	...
20.5	4.7	11.4	4.4	12.7	...	...
21	5.1	12.3	4.7	13.5	...	...
21.5	5.5	13.3	5.1	14.4	...	...
22	5.9	14.6	5.5	15.5	...	...
22.5	6.4	16.1	5.9	16.6	...	...
23	6.8	> 16.1	6.3	> 16.6	...	...
23.5	7.3	> 16.1	6.7	> 16.6	...	...
24	7.9	> 16.1	7.2	> 16.6	...	...
24.5	8.4	> 16.1	7.7	> 16.6	...	...
25	9	> 16.1	8.2	> 16.6	...	...
25.5	9.6	> 16.1	...	...	...	...

Estimation of catch and harvest by anglers from various waterways (rivers, streams, reservoirs, lakes, and ponds) is essential in developing harvest regulations. Information derived from these creel surveys is of interest to anglers since seasonal peaks in catch occur for most species. Black bass can be caught at most any time of year, generally though, highest catch per hour occurs in spring through fall, with highest catch rates occurring in fall on medium and large size reservoirs (Fig. 2 and 3). On rivers, Smallmouth Bass catch rates are highest in summer (Fig. 4). With fishing destinations identified in detail from maps on this site and information describing the best seasons to catch black bass illustrated below, anglers need only select an effective bait or lure. For Largemouth Bass, Smallmouth Bass, and Spotted Bass, all top predators, there are a plethora of bait and lure options that include live shiners, live worm rigs, and a host of artificial baits. Artificial baits are the mainstay of many bass anglers and range from jigs, rubber worms, spinners, plugs, crank baits, and stick baits. These can be fished or rigged to attractively present the bait to the bass in both shallow and deep water, and in either open water or in cover. Local tackle shops, guides, outdoor writers, and local bass clubs have the most knowledge about baits and presentations that are most effective in waters that are in their 'backyard'. With modest perseverance, any angler willing to experiment with baits and presentations can be very successful in catching bass on any water in which they occur in Pennsylvania. Catch and release bass fishing is a popular practice among bass anglers in Pennsylvania.

Additional information that can be helpful to answer some questions that an angler may have can be found on the Fishing FAQs page located elsewhere on this website.

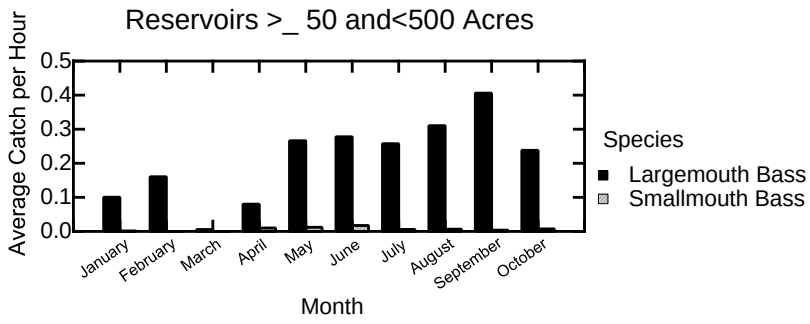

Figure 2. Average catch per angler hour, by month, of Largemouth Bass and Smallmouth Bass from medium size Pennsylvania reservoirs

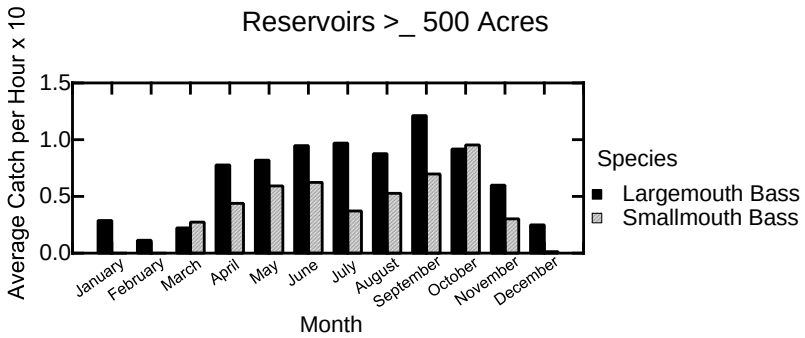

Figure 3. Average catch per angler hour, by month, of Largemouth Bass and Smallmouth from large size Pennsylvania reservoirs

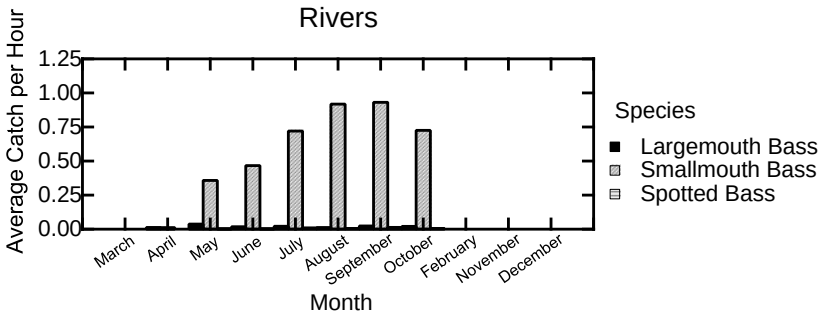

Figure 4. Average catch per angler hour, by month, of black bass (Largemouth Bass, Smallmouth Bass, and Spotted Bass) from Pennsylvania rivers

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