American Fisheries Society Symposium 82:99–122, 2015

A Historical Perspective of Black Bass Management in the United States

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Abstract.—The history of black bass management was traced back approximately 200 years beginning with the scientific description of Smallmouth Bass *Micropterus dolomieu* and Largemouth Bass *M. salmoides* in 1802. In the early years, black bass management centered on stocking and moving fish, especially into water bodies where pollution and overharvest had reduced fish abundance. The conservation movement at the turn of the 20th century led to the creation of state and federal laws intended to reduce the harvest of black bass, especially commercial harvest. Just prior to World War II, there were scientific descriptions of additional black bass species (e.g., Spotted Bass *M. punctulatus* and Redeye Bass *M. coosae*), some that were first described but rejected as valid species in the early 1800s. After the war, reservoir construction expanded, leading to increased rates of fish stocking, which expanded the range of some black bass species but at the expense of native habitat for others. The era of reservoir construction, along with the concomitant boom in black bass fishing, led many states to enact more restrictive rules regulating harvest. Angler groups helped reduce the impact of recreational harvest through the promotion of catch-and-release fishing, which has now become so successful that traditional approaches to black bass management, such as bag and minimum-size limits, have become less effective. Technological development and use of genetic tools resulted in the description of additional black bass species (e.g., Shoal Bass *M. cataractae* and Alabama Bass *M. henshalli*), typically occupying small ranges in watersheds adversely impacted by anthropogenic alterations. Similarly, genetics has identified incidences of hybridization and lost genetic integrity from past stocking actions. Currently, black bass conservation is increasingly focused on restoring native populations and native habitats requiring the use of additional tools not traditionally employed by fisheries managers to ensure continued success.

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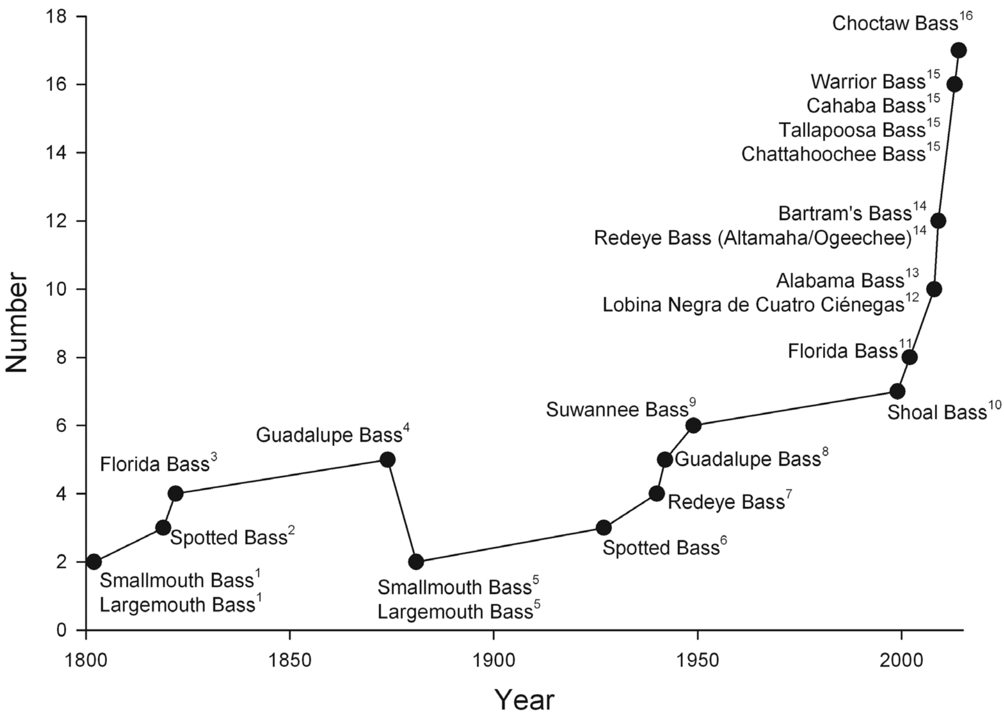
Exploration and Exploitation (1800–1900)

Smallmouth Bass *Micropterus dolomieu* and Largemouth Bass *M. salmoides* were the first of the black bass species scientifically described, in 1802 by Lacépède, and for the most part comprised the entirety of the black basses for a hundred years (Jordan 1877; Henshall 1881, 1904; Bollman 1891; Figure 1). In retrospect, other species were described during this time, such as Spotted Bass *M. punctulatus* by Rafinesque (1819), Florida Bass *M. floridanus* by LeSueur (1822), and Guadalupe Bass *M. treculii* by Vaillant and Bocourt (1874), but these were not accepted by many scientists until much later (e.g., Hubbs and Bailey 1940). Moreover, Smallmouth Bass and Largemouth Bass were often "discovered" multiple times and given a variety of scientific names, which prompted Henshall (1881) to correct the "most unsatisfactory" "scientific history of the black bass" that was labeled with at least eight different generic names (*Aplesion*, *Aplites*, *Calliurus*, *Doplites*, *Gristes*, *Labrus*, *Huro*, *Micropterus*, and *Nemocampsis*; Eschmeyer 2013). In Henshall's (1881) view, all of these previously described species were variants of but two species. His argument was apparently persuasive enough that for nearly a century and a half after scientific description, black bass consisted of two species and were often grouped together as such in writing and discussion.

Black bass are native to North America, east of the Rocky Mountains, but have been transplanted widely beginning with the actions of "public-spirit-



[1]Lacepèdé 1802; [2]Rafinesque 1819; [3]LaSueur 1822; [4]Vaillant and Bocourt 1874; [5]Henshall 1881; [6]Hubbs 1927; [7]Hubbs and Bailey 1940; [8]Hubbs and Bailey 1942; [9]Bailey and Hubbs 1949; [10]Williams and Burgess 1999; [11]Kassler et al. 2002; [12]Jelks et al. 2008; [13]Baker et al. 2008; [14]Staight et al. 2009; [15]Baker et al. 2013; [16]Tringali et al. This volume

Figure 1. Chronology of the number of recognized black bass species over time. The figure reflects how the scientific and management community recognized various species in relation to paradigms existing at the time. Superscripts denote the source we used to attribute the recognized common name status, often the original species description. Common names are used in lieu of scientific names for brevity, to avoid synonyms used in previous species descriptions (e.g., *Aplites*, *Huro*), and to allow for inclusion of recognized, yet undescribed species (e.g., Bartram's Bass [an as yet unnamed species similar to Shoal Bass], Lobina Negra de Cuatro Ciénegas [an as yet unnamed species similar to Largemouth Bass]).

ed individuals" (Henshall 1881) and later by government entities at all levels (county, state, and federal). Smallmouth Bass had been stocked outside their native range by private individuals beginning in least 1842 (Robbins and MacCrimmon 1974), by state fisheries commissions beginning circa 1870 (Milner 1874), and by the U.S. Fisheries Commission in 1892 (Robbins and MacCrimmon 1974). Except for Florida and Louisiana, Smallmouth Bass were known to occur in all U.S. states and several other countries (e.g., Brazil, Belgium, Germany, France, and Sweden) by 1916 (Robbins and MacCrimmon 1974). Largemouth Bass plantings were sanctioned by government actions beginning in 1871 and by 1900 were found in all conterminous states of the United States and several other countries (e.g., Austria, Finland, France, Italy, Mexico, and Poland; Milner 1874, Henshall 1881, Robbins and MacCrimmon 1974). This extension of the range of black bass created additional fisheries that could be exploited.

In the 1800s, fisheries were thought "inexhaustible" (Gabrielson and La Monte 1950; Clepper 1966) and black bass were harvested recreationally and commercially (Gabrielson and La Monte 1950). For example, the February 5, 1874 edition of *Forest and Stream* reported that "large numbers of black bass" were harvested "chiefly with nets" from the Delaware River, Pennsylvania (Anonymous 1874:407), and black bass from Virginia were selling for 18 cents at fish markets in 1875 (Anonymous 1875b). *The New York Times* reported that isolated lakes in Pennsylvania were being "depopulated of its fish" by those wishing to "fill his boat with fish" through the use of dynamite (Anonymous 1884). Such was the scale of fisheries harvest that Marsh (1867) described it as involving "the destruction of many more fish than are secured for human use," ending the notion that fisheries could be exploited ad infinitum. Thus, early conservation focused on curbing harvest and increasing stocking to fill the void. In 1898 in New York, for example, the daily creel limit for black bass was lowered to 24, the minimum size increased to 25 cm (10 in), and was considered a measure that would protect the fish "if no means are devised for the hatching of bass artificially" (Anonymous 1898). Fishing licenses were instituted after the Civil War to help fund fish propagation, and states and counties created commissions for managing fish and wildlife (Gabrielson and La Monte 1950). The federal government began to exert some control and coordination in 1871 with the establishment of the U.S. Fish Commission headed by Spencer Baird to "[inquire] into the causes of the decrease of…food-fishes" (Baird 1874), and the American Fish Culturists' Association was formed in 1870 (precursor to the American Fisheries Society; Gabrielson and La Monte 1950) as a way to share information related to artificial fish propagation and stocking, and one of the first topics to be discussed was black bass culture (Moffitt 2001).

Besides overharvest, pollution and fish passage were often cited as major detriments to fish populations. Marsh (1867) was one of the first to articulate the connection of upland resource extraction and land-use change with fish populations:

> When, in consequence of clearing the woods, the changes already described as thereby produced in the beds and currents of rivers are in progress, the spawning grounds of fish are exposed from year to year to a succession of mechanical disturbances: the temperature of the water is higher in summer and colder in winter than when it was shaded and protected by wood; the smaller organisms, which formed the sustenance of the young fry, disappear or are reduced in numbers and new enemies are added to the old foes that preyed upon them; the increased turbidness of the water in the annual inundations chokes the fish; and, finally, the quickened velocity of its current sweeps them down into the larger rivers or into the sea before they are yet strong enough to support so great a change of circumstances. Industrial operations are not less destructive to fish that live or spawn in freshwater. Milldams impede their migrations, if they do not absolutely prevent them; the sawdust from lumber mills clog their gills; and the thousand deleterious mineral substances, discharged into rivers from metallurgical, chemical, and manufacturing establishments, poison them by shoals.

The effects of fish obstruction in this distant past continued to the present, even for species only recently described. For instance, milldams built in the mid-19th century affected the distribution of Shoal Bass *M. cataractae* in the upper Chattahoochee River basin, Georgia (Long and Martin 2008) long before this species was described by scientists (Williams and Burgess 1999). In contrast, the widespread pollution and obstruction to fish passage prevalent in the 19th century also helped increase the distribution of black bass, at least for the two species known at the time. For example, trout (Salmonidae) and shad (Clupeidae) were mostly affected by these impacts, and black bass were thought to be suitable replacements (Baird 1874; Henshall 1881) because they did not require artificial hatching and would naturally reproduce after stocking. However, it was also known that there were limits to black bass increases in newly stocked waters (Baird 1874; Anonymous 1875a), such that any replacement would likely only provide a temporary increase in the fishery.

Supplying food and game fish (e.g., black bass) entirely new to many of the thousands of small lakes and streams throughout the country, as well as the creation of economically important commercial fisheries along the West Coast (e.g., American Shad *Alosa sapidissima* and Striped Bass *Morone saxatilis*), made stocking programs very popular (Bowers 1905). Furthermore, hatchery supervisors and fish and game department officials expended considerable effort to convince the public that hatchery fish were needed to maintain populations in face of advancing civilization, a drive that gave great impetus to the hatchery movement (Bennett 1970). By 1900, Largemouth Bass had been stocked outside of their native range in 26 states, and Smallmouth Bass in 20 states (Robbins and MacCrimmon 1974). In 1903 alone, 528,365 black bass were stocked from U.S. Fish Commission hatcheries (Bowers 1905).

Limitation and Conservation (1900–1940)

As the conservation age was beginning, circa 1900, with the installation of Theodore Roosevelt as President, the degree of exploitation of natural resources in the United States was beginning to be scrutinized and restricted (Stroud 1966; Nielson 1993; Hillstrom 2010; Figure 2). The Bureau of Fisheries, created within the Department of Commerce and Labor in 1903, was established after the dissolution of the U.S. Fish Commission (Bowers 1905), but still maintained a focus on producing fish from hatcheries. However, the Bureau of Fisheries began to become hesitant to operate black bass hatcheries or supply hatchery-reared fish to states that did not provide protection to those populations during the spawning season (e.g., Smith 1921). The Bureau of Fisheries was also fully engaged during this period in preventing the waste of food fishes stranded by recession of flood waters in sloughs of the Mississippi River and touted the numbers and types of food fish (including black bass) that were rescued, totaling 156,659,500 in 1919–1920 (Smith 1921). The first salvage operation for black bass actually took place in 1888 near Quincy, Illinois and was gradually expanded along the river until 1940 when the completion of navigation dams made the operation no longer feasible (Robbins and MacCrimmon 1974).

There was a divergence of beliefs between scientists and hatchery workers during the early 20th century, a time period when Stephen A. Forbes and a group of scientists were studying the Illinois River (Bennett 1962). This group of scientists recognized that the loss of fish in sloughs during the recession of floodwaters was a natural phenomenon and that production of excessive numbers of Largemouth Bass and other species was necessary to produce year-classes that allowed the population to be "maintained at a constant level." Black bass were so abundant in these flooded areas that Presidents were known to fish for them, with catches of 100 bass per day reported (Bennett 1970).

Although fish were still largely seen as a source of food to be procured from nature, even if supplemented by hatchery additions, some prominent individuals and sportsman's organizations were starting to push for a halt to marketing black bass as a food fish and to view it instead as a species for recreational pursuit only. The Izaak Walton League was formed in 1922 to address the issues of deteriorating recreational fisheries (Merritt 2012) and sought to call a halt to the commercialization of the country's natural resource (Hough 1922), which tended to predominate the nation's policies at the federal level after Theodore Roosevelt left office (Hillstrom 2010). Herbert Hoover, Secretary of Commerce, spoke to the Izaak Walton League on the decline of fishing and how fishing clubs could aid fish stocking efforts (Anonymous 1927). Keil (1921) urged sportsmen to press their representatives in government to appropriate the funding necessary to ensure that fisheries would be restored, and the Izaak Walton League worked with state fish commissions to implement laws protecting black bass from harvest for markets (Van Ness 1933). Donald Stillman, associate editor for *Forest and Stream*, presented his "Eulogy on the Black Bass" (Stillman 1927) by declaring it "the most abused of all American game fish" and that it would take the unified efforts of sportsmen and fish commissioners to maintain this species in American waters (Figure 3).

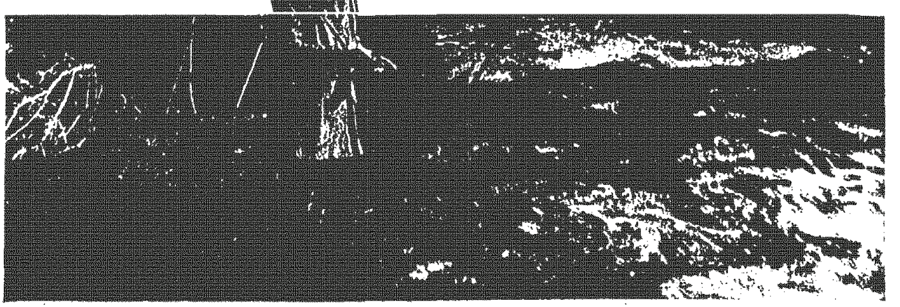
As a result of these grassroots organizations, states thus began to enact laws curbing the sale of

Figure 2. 1904 cartoon by J. N. "Ding" Darling published in the *Sioux City Journal* depicting the level of exploitation targeting black bass at the time. Titled "The spring fish story and its sequel." Reproduced courtesy of the "Ding" Darling Wildlife Society.

Eulogy on the BLACK BASS
By DONALD STILLMAN Associate Editor, Forest and Stream.
Forest and Stream; A Journal of Outdoor Life, Travel, Nature Study, Shooting, Fishing, Yachting ...Oct 1927; Vol. XCVII
American Periodicals
pg. 596

The black bass is found in the cold foaming waters of northern mountain streams and the tepid waters of marshy lowland ponds.

From a Talk Delivered August 10th, over Radio Station WABC, under the Auspices of the Brooklyn Chapter of the IZAAK WALTON LEAGUE OF AMERICA



Eulogy on the BLACK BASS

By DONALD STILLMAN
Associate Editor, Forest and Stream.

THE black bass is probably the most abused of all American game fish. Angled for by a vast majority of fishermen with tackle really suitable for much heavier species, it is surprising that the angling public in general, have accorded this fish a small portion of the extreme appreciation which is its due. Just

ticular reservoir system we realize that we are in effect transforming a stream country into a lake country. As this condition progresses we must, of necessity, transfer our stocking activities from stream- to lake-fish, and when we consider lake-fish our thoughts turn, naturally, to the small-mouth black bass.

Defrauding Ten Million Anglers

A Statement Addressed to the Anglers of the United States, The Conservation Commissions of Various States and the Members of Congress

By EDWARD C. KEMPER
Washington, D. C.

"BASED upon the number of fishing licenses issued in licensing states, the Bureau of Fisheries estimates that 10,000,000 people went game fishing in the year 1926."

Fishing as a sport is rapidly becoming more popular each year. The estimate above quoted can be accepted as *conservative* for 1929. The quotation is used and relied upon here because the words are those of Herbert Hoover, distinguished angler. The occasion was the 1927 Convention of The Izaak Walton League of America.

This estimate should be borne in mind in considering what is to follow. It was made by a Federal Bureau, which, for reasons not generally known, is not apt to overestimate the total of those who are amateur anglers.

The estimate is also valuable because it states in definite terms the number of American citizens who are interested in game fishing for the sake of sport and recreation, and *not* as a money-making proposition. This interest in game fishing is second to no other in the fishing world, under any tests you may choose to apply—be those tests aesthetic, social, or economic. This interest in fishing for sport is not even second in any respect to the interest of those who are engaged in commercial fishing as a money-making industry.

The commercial fishing interests of the United States have many representatives, in many places, but none so powerful, so adroit, so exclusive, and so successful as the Federal Bureau of Fisheries.

The time has come for the anglers of the United States, be they ten million or five million, to demand national recognition for the game fish of America; to demand that more of their tax money be devoted to the protection of game fish; to demand the establishment of an agency of the Federal government which will do as much for the game fish as the Federal Bureau of Fisheries has done, and is doing on a national basis, for the food fish, and for the private interests who are making money selling food fish —*and game fish*—for personal gain.

Senator James Couzens (Michigan), Sportsman and Conservationist, says:

"The Black Bass is really the national fresh water game fish of America. He is our one best bet in the years to come. He should be given the fullest measure of protection in every locality and under all conditions. The market sale of Black Bass is a disgrace to America."

Senator James Couzens (Michigan), Sportsman and Conservationalist, says:

"The black bass is undoubtedly the great American game fish and the favorite fish of millions of the rank and file of American anglers. It is found in all American fresh waters, ponds, lakes, and streams. The bass is to be found from Manitoba and the St. Lawrence, the Great Lakes region, through the entire extent of the Mississippi Basin, and in the waters on both sides of the Alleghenies.

"The black bass is different from any other American fresh-water fish. It selects its own spawning bed, and must be protected during this season.

"It has been demonstrated by scientists that artificial black bass hatcheries can not be made profitable for our State and National Governments, the cost of operation being too great when compared with the output.

"Black bass can not be artificially propagated the same as trout and other fishes, but must be given protection and permitted to reproduce under natural conditions.

"With good roads and the automobile annihilating distance and time, where formerly one person fished on our streams, rivers, and lakes, thousands now line their banks, requiring continual restocking and creating a new and tremendous drain upon the fish supply.

"Scientists state that the yearly toll of black bass in this country is so great compared with the yearly hatch that this greatest of American game fishes is certain to become extinct unless extraordinary efforts are made to protect it."

Time for the Truth

The time has come for a telling of the truth to the 10,000,000 anglers of the United States, and to those to whom they rightfully look for redress:

Truth which will be surprising and unpleasant.

Truth which the anglers are entitled to have and to act upon.

Truth which may not be accepted as such until the doubters have investigated for themselves.

Truth which will be denied vehemently by those whose double dealing in the field of game fish conservation, over a long period of years, is exposed.

Truth which the Public Press, the Membership and Chapters of the Izaak Walton League, the Conservation Commissions of the States, and the Members of the Congress of the United States are entitled to have.

Truth which has been covered up for years by camouflage of the cleverest kind, spread in ample quantities annually by the Federal Bureau of Fisheries as part of its devoted service to the commercial fishing interests of the United States.

Truth which is set forth herein after careful investigation, and for the sole purpose of saving from extermination the one great fresh water game fish which should be abundant in three-fourths of the states of the Union.

That game fish is the Black Bass which is now making a losing and gallant fight against the commercial fisherman —a fight which he cannot win so long as there is a price on his head—so long as he is sold in the markets of the big cities of many states at 30 cents a pound—more or less.

The Greatest Fresh-Water Game Fish

Let us examine this matter in orderly fashion. What sort of a fish is the Black Bass? What place does he occupy in the angling world? And why the concern about his existence?

THE Black Bass—the big mouth and the small mouth —are the premier fresh water game fish of the eastern United States from Maine to Florida, and of the Mississippi Valley from Minnesota to Louisiana. The Black Bass has been introduced in the Pacific Coast States in waters not suitable for trout and is becoming an important game fish in those States. The Bass is the one game fish in these great areas which thrives in spite of the encroachments of civilization. He can stand warm water, he has not succumbed, like the brook trout, to the evils of deforestation, he usually outwits the angler, and he holds his own in every stream, lake or pond which is not polluted beyond the line of decency. For these reasons, which most intelligent people know, the Black Bass is the hope of the average citizen who likes to fish, and who wants his boys and girls to have the same privilege. Trout fishing in many states has become the privilege of those who are wealthy enough to hold membership in reserved streams. In other states there are no trout, and the Black Bass is their one great game fish.

THERE are five bass fishermen to any other kind of fresh water angler. The big mouth bass is to this great angling fraternity what the wild duck is to the hunter. The small mouth bass is to the angler what the bob-white is to the hunter. Long ago the poultry markets of every state in the Union were closed to the sale of ducks and quail. How much longer will the 10,000,000 anglers, whose sportsmanship is as fine as any in the world, permit their greatest fresh water game fish to be sacrificed to commercial greed?

The Dishonor Roll

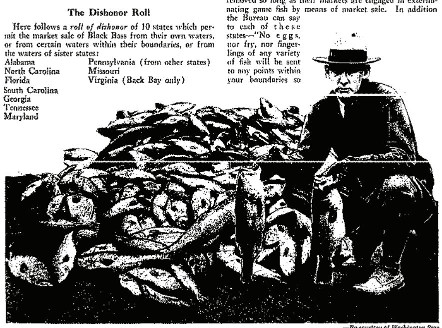
Here follows a *roll of dishonor* of 10 states which permit the market sale of Black Bass from their own waters, or from certain waters within their boundaries, or from the waters of sister states:

Alabama	Pennsylvania (from other states)
North Carolina	Missouri
Florida	Virginia (Back Bay only)
South Carolina	
Georgia	
Tennessee	
Maryland	

The question may well be asked, "Why do such conditions exist?" Here is the answer. They exist because the commercial fishing interests are stronger in organizations, in attorneys, and in money, than are the anglers. They exist because the commercial fishing interests have a powerful national Federal Bureau, whose appropriations of more than $2,000,000 a year are eighty per cent devoted to aiding the commercial fisherman, both fresh and salt water, and to the so-called science of "aquiculture." (This eighty per cent is after deducting money spent for "paper fish" hereinafter described.)

An Unused Power

AS has been pointed out to the Bureau of Fisheries, formally and informally, over a period of years, that the Bureau has the power and right to say to the ten states, now engaged in exterminating by market sale our one great remaining inland game fish, that all bass hatcheries, and trout hatcheries, and all food fish hatcheries, for the propagation of either game or food fish will be removed from the territories of such states and will be kept removed so long as their markets are engaged in exterminating game fish by means of market sale. In addition the Bureau can say to each of these states—"No eggs, nor fry, nor fingerlings of any variety of fish will be sent to any points within your boundaries so



—By courtesy of Washington Star

IN VIRGINIA. Illegal catch of Black Bass, seized on the Virginia side of the Potomac River. These bass were taken in trap nets. There were more than 700 in the haul, weight ranging from one to five pounds. Such methods are now depleting wide areas of the Potomac River. In reporting this outrage the Washington Star said, "The District of Columbia has a bass law prohibiting sale or offering for sale any of these game fish, so that the shipments probably were planned for Baltimore or Philadelphia."

Figure 3. Excerpts of articles published in *Forest and Stream* demonstrating the magnitude and effect of black bass harvest circa 1930. The top image was reproduced from the October 1927 issue (Stillman 1927) and the bottom from June 1930 (Kemper 1930).

black bass, but met with difficulties enforcing across state boundaries. Black bass were being bootlegged across state lines, sandwiched in barrels between layers of "rough fish" above and below (U.S. House of Representatives 1925; U.S. Senate 1926). Market fishing for black bass and bootlegging continued, and the federal government stepped in by enacting the Black Bass Act in 1926 (modeled after the Lacey Act of 1900, which protected interstate commerce of wildlife and birds) to cease the sale of fish caught illegally in one state and sold in another (Stroud 1966; Nielson 1993; Merritt 2012). To stress the gravity of this situation, documents cited the need for this law because the scale of the fishery was such that the extinction of the species was assured within 10 years if no action was taken (U.S. House of Representatives 1925; U.S. Senate 1926). But the original law was ineffective because it gave neither appropriations nor authority for enforcement of the act to the Bureau of Fisheries, an oversight that Kemper (1930) outlined in his scathing article denouncing the current federal policies. With persistence from sportsmen groups, the Black Bass Act was amended in 1930 to correct the earlier omissions (U.S. Senate 1930). Moreover, with additional species of black bass being recognized and described (e.g., Hubbs 1927), it was discussed that the Black Bass Act only covered Largemouth Bass and Smallmouth Bass specifically, leaving out these "new" species from protection from interstate commerce (Viosca 1931). Further amendments to the Black Bass Act (1935, 1947, and 1969) addressed these concerns by covering interstate commerce of all game fish, as defined by individual states, and commerce among nations. The act was finally repealed when its provisions were combined into the overall Lacey Act in 1981 (Anderson 1995). The ultimate effect of the Black Bass Act, thus, was to end the status of black bass as a commercial species and ensure its future as a game species.

As the country moved into the Great Depression in the 1930s, a series of projects to help alleviate the high unemployment rate as part of the New Deal resulted in the foundations of water development that would continue for several decades thereafter (Hillstrom 2010). Notably, these included the Tennessee Valley Authority (TVA) Act of 1933 and the Flood Control Act of 1936, which authorized the construction of dams to reduce flooding and improve navigation on many of the large rivers of the country (Hillstrom 2010; Figure 4). The primary response from the fisheries biologists was that these new large reservoirs would create "biological deserts" (Miranda 1996), and many reservoirs had fish hatcheries constructed on site to mitigate for this effect. Moreover, as a result of the construction of these large reservoirs, fisheries managers began investigating methods to increase fish production. The net result to black bass was the creation of new lentic habitats, at the expense of river habitats, and a focus on how to increase production and access to fisheries, particularly Largemouth Bass, which adjusted well to these new habitats.

Exploration, Exploitation, and Alteration (1940–1970)

As the country was pulling out of the Great Depression, additional black bass discoveries (and some rediscoveries) were being made (Figure 1). Principally, Carl Hubbs and Reeve Bailey made the largest strides in describing new species and developing an understanding of the phylogenetic relationships among the black bass species. In 1927, Hubbs described the Spotted Bass, which was quickly adopted by the scientific and management community (e.g., Viosca 1931), although also quickly corrected by Hubbs and Bailey (1940) to indicate primacy to Rafinesque (1819) who described the species as more than 100 years before. As a result of Hubbs and Bailey's work that included describing Redeye Bass *M. coosae* (Hubbs and Bailey 1940) and Suwannee Bass *M. notius* (Bailey and Hubbs 1949), the recognized number of species increased from two before 1900 to six before 1950, all within one genus (*Micropterus*).

The beginning of the dam construction, which began in the 1930s, reached its peak through the 1970s (Figure 4). Beyond sheer number, the size of water storage as a result of impoundment during this period was also among the largest of the dam-building era (Graf 1999). As more and larger dams were constructed, more reservoirs and their associated fisheries were created that needed active management (Jenkins 1970; Miranda 1996). In response, for example, the Office of River Basin Studies was formed in 1945, which was a federal office meant to provide information on fisheries to help inform reservoir construction (Bennett 1962), and the Reservoir Committee was formed in 1958 as a standing committee under the Southern Division of the American Fisheries Society as a forum for biologists to share information on these new fisheries (Jenkins 1970). The creation of these new habitats was very

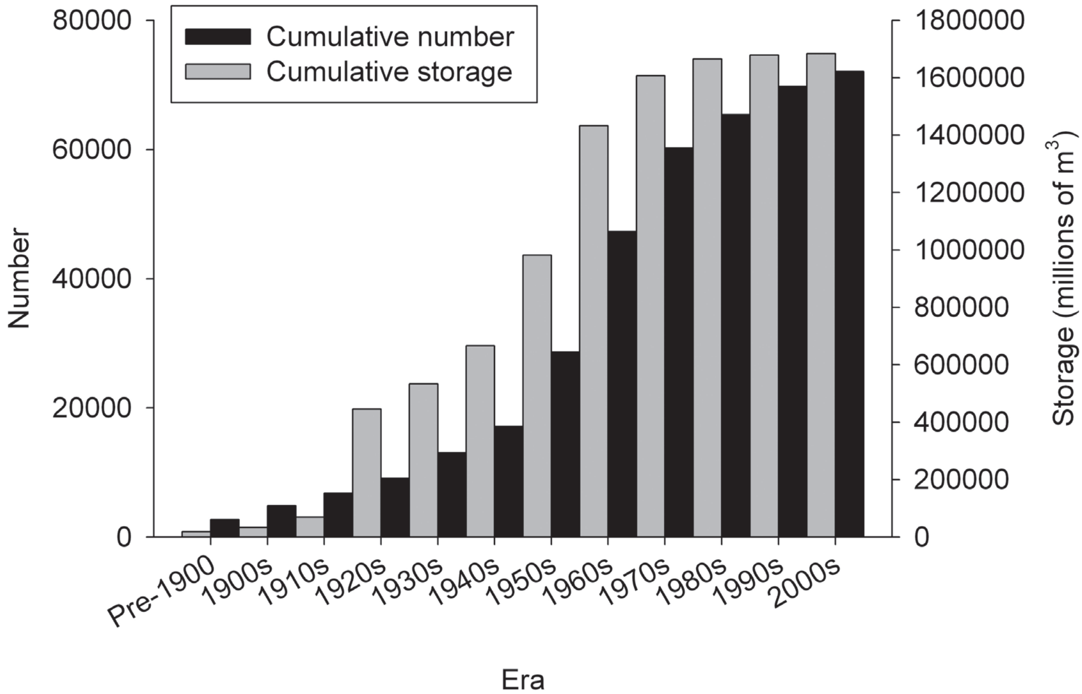


Figure 4. Cumulative number of dams and water storage in reservoirs in the United States from before 1900 through 2010. Data from the National Inventory of Dams (USACOE 2009).

beneficial to black bass fisheries because, by 1965, nearly one-fourth of all recreational angling in freshwater occurred in reservoirs (Jenkins 1970), slightly more than the 22% of freshwater anglers who fished in warmwater streams (Funk 1970). Moreover, the new reservoirs being constructed tended to have the best fisheries, as indicated by high harvest, and was considered by Jenkins (1970) to represent the main source of fisheries expansion for a population of anglers that had been increasing steadily since the close of World War II.

Besides large reservoirs, small farm pond construction was expanded as a result of the 1936 Flood Control Act and further accelerated by the Soil Conservation Service (e.g., Watershed Protection and Flood Prevention Act of 1954) as a tool to reduce soil erosion after the Dust Bowl of the 1930s (Bennett 1962; Swingle 1970; Hillstrom 2010). For example, 20,000 ponds were estimated to exist in 1934, but that number reached 2,000,000 (100× increase) by 1965 (Swingle 1970). This resulted in a large net increase in the amount of habitat and range of occurrence for Largemouth Bass in particular, the species most often stocked in ponds (Bennett 1952, 1962; Stroud 1966; Swingle 1970) and sometimes provided for free for stocking by some state agencies. By some estimates, ponds provide access to more than 10 million anglers to pursue fishing, mostly for Largemouth Bass (Willis et al. 2010).

Two research groups became active studying the relationship between black bass, forage fishes, and their habitats in small lakes and ponds: David Thompson and George Bennett and associates at the Illinois Natural History Survey, and Homer Swingle and Edwin Smith and associates at Auburn Polytechnic Institute (Swingle 1970; Bennett 1970). Their studies helped fishery scientists gain a better understanding of relationships between water fertility, plankton production, and carrying capacity of a pond or lake; predator–prey relationships; density-dependent growth of fishes; the problems with rooted aquatic vegetation in pond management; effects of fishing; and the suitability of various species of fishes stocked into ponds and small lakes. Their research findings had profound impacts on the future management of black bass.

Swingle (1970) determined that the Largemouth Bass–Bluegill *Lepomis macrochirus* combination was the optimal choice for providing a sport fishery in Alabama ponds, with the stocking rate defined by the fertility of the water. Other black bass species (e.g., Smallmouth Bass) and other forage fishes (e.g., Golden Shiners *Notemigonus crysoleucas*) were found to work better in other geographical areas (Bennett 1952; Swingle 1970; Dillard and Novinger 1975), but Swingle's basic principles of pond management are still used universally today.

As reservoirs and ponds were increasingly being constructed through the 1970s, black bass habitat in general and their fisheries increased[1] and the restrictive regulations that were promulgated through the 1930s became more relaxed (Paukert et al. 2007). Many authors (e.g., Stroud 1966; Jenkins 1970; Redmond 1986) point to studies conducted by the TVA on Norris Reservoir, Tennessee (Eschmeyer 1942; Eschmeyer and Manges 1945) in the 1940s as the birth of regulation liberalization during this period. During this time, black bass was the primary species targeted by anglers, composing 70% of the total catch (Eschmeyer 1942), and the fishing season opened on May 30 each year. In 1944, the Tennessee Department of Conservation allowed an experimental year without a closed season, and Eschmeyer and Manges (1945) concluded that the year-round fishery did not detrimentally affect the black bass population (i.e., reproduction was not affected) and yield was increased. The interpretation of these findings, thus, was that the Norris Lake was underexploited, that fish not harvested would probably die before being available for harvest later, and that a closed season should be abandoned at all TVA reservoirs (Eschmeyer and Manges 1945; Stroud 1966, Redmond 1986). As a result, Ohio and Nebraska liberalized their fishing regulations a year later in 1945, and two-thirds of all states had adopted this approach within by 1960 (Stroud 1966; Jenkins 1970).

To increase funds for states to manage these growing fisheries, the federal government enacted the Federal Aid in Sport Fish Restoration Act in 1950. Amended multiple times, the act generally provides a mechanism whereby fishing and boating-related items are taxed at the federal level and then distributed to the states. Thus, those who fish provide funds to conserve the very fisheries they exploit. Although nationwide data do not exist before 1991 to compare among anglers pursuing various species, black bass anglers have consistently ranked first among anglers fishing in freshwater exclusive of the Great Lakes since data have been available for comparison (Table 1), composing from 38% to 44% (U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census 1991, 1996, 2001, 2006, 2011). Among days spent fishing, black bass fishing again has consistently ranked first, composing from 37% to 39% of all days spent fishing in freshwater exclusive of the Great Lakes. As a result, angling for black bass has resulted in a great deal of funding for conservation, which has ranged from US$13 billion to $24 billion from 1991 to 2011, and probably the largest single source attributed to a group of fishes.

As black bass regulations were relaxed, increasing rates of exploitation ensued, at least for Largemouth Bass (Allen et al. 2008), the only species for which data exist but also the species most pursued by black bass anglers. Although peer-reviewed data are sparse, the studies compiled by Allen et al. (2008) show that annual exploitation rates for Largemouth Bass increased from a mean of 0.26 in the 1950s to 0.45 in the 1960s. Harvest, thus, was predominant among black bass anglers (Myers et al. 2008). As further evidence of the role of harvest in black bass fishing during this time period, Ted Kesting (1962), the editor of *Sports Afield*, stated "the best part of 'bassing' is the eating," indicating that bass during this time were meant to be caught for harvest in addition to sport. Further exploitation of black bass came in the late 1960s as fishing tournaments became organized. Probably the best known, or at least the longest lasting, was the tournaments started by Ray Scott in 1967. In 1962, it was noted that "no profession of sport fisherman" existed (Mills 1962). After tournaments became popular, this would change. Furthering the role of angler interest into bass fishing, the Bass Anglers Sportsman Society (B.A.S.S.) was formed by Ray Scott in 1968 (Figure 5). In response to what appeared to be a burgeoning amount of bass harvest, Ray Scott began the "Don't Kill Your Catch" program in 1972, in an effort to promote voluntary catch and release, which would soon become a paradigm that fisheries managers would have to contend with in the future. From the first tournament held by Ray Scott in 1967 that included 106 anglers, B.A.S.S. had a roster of more than 500,000 members in 2013 (Bassmaster 2013), demonstrating its longevity. Moreover, B.A.S.S. has helped provide resources for conserving black bass, such as a fact sheet on Largemouth Bass virus (B.A.S.S. Commu-

[1] Recognizing that one habitat is created (i.e., reservoir) at the expense of another (i.e., stream) so one resident species is benefitted while the other is negatively affected (e.g., Largemouth Bass in reservoirs and Smallmouth Bass in streams). With this view, reservoirs tended to expand black bass habitat in general even though some species were locally affected.

Table 1. Total number of anglers and days spent angling for freshwater fish (exclusive of the Great Lakes) with percent targeted at black bass species and ranked (1 = highest percentage) among other targeted species (e.g., crappies, catfish) in the United States since 1991 according to the recurring national surveys of fishing, hunting, and wildlife-associated recreation (available online at www.census.gov/prod/www/fishing.html). Trip and equipment expenditures targeted toward all freshwater fish exclusive of the Great Lakes is given but was not partitioned according to fish species.

	Number of anglers[a]		Days spent angling[a]		Trip and equipment
	Total	% toward	Total	% toward	expenditures
Year	(millions)	black bass (rank)	(millions)	black bass (rank)	(millions of dollars)[a]
1991	30.2	43% (1)	431.0	37% (1)	$13,800
1996	29.0	44% (1)	485.0	39% (1)	$22,400
2001	28.0	38% (1)	443.0	36% (1)	$20,000
2006	25.0	40% (1)	419.9	38% (1)	$24,600
2011	27.1	39% (1)	443.2	39% (1)	$23,800

[a] Freshwater, except Great Lakes.

Figure 5. Ray Scott (left; founder of the Bass Anglers Sportsman Society), Don Butler (center; first member of the Bass Anglers Sportsman Society), and Roland Martin (right) at the 1973 Arkansas Invitational Bass Tournament at Beaver Lake. Photo courtesy of Bassmaster and used with permission.

nications 2005) and a guide for keeping bass alive in livewells (Gilliland and Schramm 2009).

Although supplemental or corrective stocking of Largemouth Bass was not usually successful (Bennett 1970; Jenkins 1970), stocking new reservoirs was considered an essential step in establishing a good bass fishery (Dillard and Novinger 1975). Thus, the demand for hatchery fish was still high during the years when reservoirs were being constructed throughout the United States. Robbins and MacCrimmon (1974) reported that more than 35 million Largemouth Bass and 1.1 million Smallmouth Bass were stocked annually from 1966 to 1970.

The first published attempt at creating a trophy fishery by stocking Florida Bass occurred in May 1959, when a shipment of 20,400 fingerling Florida Bass was stocked into Otay Reservoir, San Diego County, California (Sasaki 1961; Dill and Cordone 1997). Subsequent stockings were made into Suterland Reservoir, Lake Wohlford, Lake Miramar, and El Capitan Reservoir, California, from 1960 to 1961. In the proceedings from the first black symposium, Chew (1975) discussed the sequence of California State records being broken several years after Florida Bass were stocked. Based on the consistency of these state records being broken incrementally each year, the superior growth observed by Florida Bass compared to resident Largemouth Bass in several California reservoirs was discussed and highlighted (Bottroff and Lembeck 1978). National publicity about the newly created trophy bass fishery in California prompted numerous other states to conduct pond experiments to evaluate Florida Bass in their geographical areas (Addison and Spencer 1972; Inman et al. 1977; Regier et al. 1978; Wright and Wigtil 1980; Isely et al. 1987; Philipp and Whitt 1991; Gilliland 1992) and/or to stock public reservoirs with Florida Bass (Dunham et al. 1992; Horton and Gilliland 1993; Forshage and Fries 1995; Hughes and Wood 1995; Hobbs et al. 2002; Neal and Noble 2002; Wilson and Dicenzo 2002; Hoffman and Bettoli 2005). The results of these subsequent Florida Bass stocking initiatives took years to unfold. Ironically, the bass shipped to California in 1959 and stocked into San Diego County reservoirs came from Florida's Blackwater (Holt) State Fish Hatchery (Pensacola, Florida), a hatchery that we realize with hindsight used only intergrade bass as broodfish during that time period (D. Krause, Florida Fish and Wildlife Conservation Commission, personal communication). Thus, California's Florida Bass program was likely built using fish that already had a mixture of Florida Bass and Largemouth Bass alleles.

Increasing Regulations and Managing Recruitment (1970–2000)

The first black bass symposium showed an emphasis on understanding the basics of bass biology, factors influencing recruitment processes in reservoirs, and advances in black bass culture (Stroud and Clepper 1975). The symposium also highlighted the effects of fishing on populations and early use of regulations to influence bass fisheries. All of these research areas were developed more fully during the 1970–2000 time period.

Construction of reservoirs had created a boom in bass fisheries, but evidence began to surface that fishing could influence the abundance and size structure of black bass populations. Maintaining adequate numbers of adult bass had long been a management goal to prevent overcrowding in Bluegill populations (Swingle 1950), but by the 1970s, fishery biologists recognized that liberal regulations had reduced fishing quality for black bass via overfishing (Redmond 1974; Fox 1975). Annual exploitation rates for Largemouth Bass in the 1970s commonly exceeded 40% (Redmond 1974; Allen et al. 2008), and fishing mortality rates of this level substantially truncate age and size structure for bass populations (Allen et al. 2008). Redmond (1974) noted that 40% exploitation rates could be obtained in only a few days of open harvest in new impoundments. Studies by Rasmussen and Michaelson (1974) and Ming and McDannold (1975) showed that Largemouth Bass fisheries were often overharvested, particularly soon after fishing began in new ponds and reservoirs. Thus, during the early 1970s, it became clear that fishing mortality could alter size structure and restrain the quality of black bass fisheries.

Management agencies responded with a variety of regulations to restrict black bass harvest (Fox 1975; Redmond 1986; Noble 2002). A total of 34 states had no size limit for black bass in the early 1970s, and minimum length limits, when used, were generally set at 300 mm total length or below (Fox 1975). Higher minimum length limits became common in the 1980s, and protected slot limits began to gain favor. Johnson and Anderson (1974) suggested the use of 305–381-mm protective slot limits to improve size structure and maintain adequate growth for Largemouth Bass on a Missouri reservoir. Eder

(1984) showed improved size structure using the same regulation at another Missouri lake. Following these successes, a wide range of larger minimum length limits and protective slot limits were implemented in many states through the 1970s to 1990s (Anderson 1978; Novinger 1984; Novinger 1990; Noble 2002), and it became common for state agencies to have both statewide minimum length limits for black bass as well as specialized size limits (e.g., protective slot limits) on some water bodies. Wilde (1997) conducted a meta-analysis of Largemouth Bass population responses to size limits and showed that both minimum length limits and protective slot limits influenced Largemouth Bass fisheries. Minimum length limits increased angler catch rates of Largemouth Bass, whereas protective slot limits were effective at changing both fish abundance and size structure (Wilde 1997). Thus, the 1970–1990 time period showed substantial increases in the use of regulations for black bass fisheries, and populations improved as a result.

Angler behavior with regard to harvest began to change in the 1980s. The first professional tournament organization (B.A.S.S.) was releasing all fish caught by 1972, probably as a means to reduce negative perceptions about harvesting fish (Holbrook 1975). By the late 1970s and early 1980s it was common for professional anglers to promote catch and release on television programs, and many agencies promoted catch and release as a way to improve bass populations. These efforts probably contributed to a substantial change in bass angler behavior, with more than 95% of states indicating an increase in voluntary release of black bass that were legal to keep (Quinn 1996). Myers et al. (2008) found that voluntary release of Largemouth Bass increased from 20–40% in the 1970s to more than 90% of all legal-to-harvest bass captured in some lakes by the early 2000s. This change in voluntary released reduced average annual exploitation rates for Largemouth Bass from about 35% to 18% by 2003, which was expected to substantially improve adult fish abundance and size structure (Allen et al. 2008). Thus, voluntary release of black basses probably increased fish abundance, but also reduced the utility of length limits to restructure bass populations (Allen et al. 2008). Recently, some fishery biologists have expressed concern that lack of harvest has increased density and reduced growth rates of black basses, possibly limiting the potential for trophy catches. Future work is needed to quantify how angler harvest practices can influence growth in black bass populations.

Starting in the 1970s, the application of basic physiological tools and techniques began influence management activities for bass, particularly related to angling. Work by Mazeaud et al. (1977) summarized specific changes to stress hormones (primary stress response) and metabolic disturbances (secondary stress response) that can arise during stressful situations such as hypoxia and activity. Later work by Gustaveson et al. (1991) utilized similar basic physiological tools with a specific angling focus and documented that not only did physiological disturbances (primary and secondary stress responses) correlate positively with angling duration in Largemouth Bass, but also that angling-related disturbances were greater at higher water temperatures.

A second major area of developing research and management during 1970–2000 focused on attempts to improve black bass year-class strength, mainly in reservoirs. Early work showed effects of reservoir inflows and available cover on black bass recruitment (Aggus and Elliot 1975; Houser and Rainwater 1975; Rainwater and Houser 1975; Summerfelt and Shirley 1978). Understanding recruitment patterns for black bass then expanded substantially to explore how reservoir water levels (e.g., Miranda et al. 1984; Ploskey 1986; Maceina and Bettoli 1998; Jackson and Noble 2000a, 2000b), aquatic vegetation abundance (Bettoli et al. 1992, 1993; Miranda and Pugh 1997), overwinter survival (reviewed by Garvey et al. 2002; Parkos and Wahl 2002), and predator–prey dynamics in early life (Olson 1996; Ludsin and DeVries 1997; Post et al. 1998) influenced bass year-class strength. Syntheses of such work by Garvey et al. (2002) and Parkos and Wahl (2002) provided a better understanding of the multifaceted factors that influence bass year-class strength. Efforts to improve black bass recruitment could then be informed by information about effects of reservoir water level and aquatic plant management.

Improved understanding of recruitment processes in black bass led to additional efforts to manage and improve bass habitat. Loss of woody debris owing to reservoir aging and sedimentation became common concerns among fishery biologists, but relatively few studies documented temporal changes in reservoir habitat (but see Patton and Lyday 2008). Advances in planting aquatic plants for fish habitat were developed (Smart et al. 1996) to improve fish habitat in reservoirs lacking complex woody debris.

The establishment of exotic plants such as hydrilla *Hydrilla verticillata* created fish habitat, but also caused conflicts among reservoir users. Stocking of Grass Carp *Ctenopharyngodon idella* and the new herbicide Fluridone made control of hydrilla economically feasible in large lake and river systems, but also caused large-scale loss of bass habitat and thus created conflicts with anglers. High-profile conflicts between bass anglers and homeowners after Grass Carp stocking at Lake Conroe, Texas (Bettoli et al. 1993) and some Tennessee River impoundments (Henderson 1996) where Fluridone was used caused fishery managers to be more cautious with aquatic plant control moving forward. Overall, advances in managing bass habitat proliferated during this period.

Public pressure for state agencies to stock bass into public waters appeared to be increasing again in the 1980s. Fishery managers understood the benefits of stocking bass into new or renovated waters or stocking in an attempt to supplement a year-class (Jenkins 1970). However, the merits of supplemental stocking were frequently questioned by scientists and managers. Loska (1982) reviewed results from 19 black bass stocking studies and reported that stocking had minimal beneficial impact on the waters studied. In this review, stocking larger sizes (i.e., 178–229 mm) of bass were more successful than stocking smaller fish. After this report, some state agencies attempted to stock larger sizes of hatchery fish. Noble (2002) indicated that 34 states had black bass hatcheries in 1999 and 18 raised advanced fingerling (>75 mm) bass. Survival or percent contribution of advanced sizes of stocked hatchery bass was often low in recipient water bodies, but varied (Crawford and Wicker 1987; Hoxmeier and Wahl 2002; Porak et al. 2002; Hartman and Janney 2006; Mesing et al. 2008). We believe the two most successful stocking programs had stocked advanced fingerling bass multiple years into recruitment-limited reservoirs to supplement year-class strength (Buynak and Mitchell 1999; Mesing et al. 2008). Timing of stocking was important to stocking success on Lake Talquin, because Florida Bass were stocked early enough to feed on age-0 shad *Dorosoma* spp.

Stocking Florida Bass into reservoirs at southern latitudes has been shown to influence the genetic composition of recipient populations (Kulzer et al. 1985; Gilliland and Whitaker 1989), which was followed by the development of trophy fisheries (Horton and Gilliland 1993; Forshage and Fries 1995; Hughes and Wood 1995; Wilson and Dicenzo 2002). Samples of trophy bass caught by anglers were genetically analyzed in Texas (n = 37) and Oklahoma (n = 251), revealing that most of the trophy bass had Florida Bass alleles (Horton and Gilliland 1993; Lutz-Carrillo et al. 2006). State records were broken several times following the introductions of Florida Bass in California, Texas, Oklahoma, and Louisiana; the largest trophy bass was angled from Lake Castaic, California and weighed 10.03 kg. Florida Bass did not perform well at northern latitudes (Philipp and Whitt 1991; Gilliland 1992; Philipp et al. 2002; Hoffman and Bettoli 2005). This is to be expected because Florida Bass were found to have different responses to temperatures (Fields et al. 1987; Carmichael et al. 1988) and had lower overwinter survival in colder climates compared to Largemouth Bass (Graham 1973; Philipp and Whitt 1991; Gilliland 1992). Conservation geneticists have cautioned fishery managers that stocking Florida Bass outside of their range into native populations of Largemouth Bass could have long-term negative impacts on fitness of recipient populations (Hoover et al. 1997; Philipp et al. 2002; Johnson and Fulton 2004; Ray et al. 2012).

The 1970–2000s period ended with a reduced concern that harvest was constraining fishing quality for black bass fisheries and substantially more information regarding habitat requirements in reservoirs and recruitment processes for Largemouth Bass. The next time period would reveal new stressors and identify new species needing conservation, creating different challenges to fishery managers, researchers, and anglers.

New Species and New Challenges (2000–2012)

Although fishing mortality had declined for Largemouth Bass, new concerns about the effects of fishing developed during this period. Removing adults from spawning beds, even temporarily, was clearly shown to reduce individual nest success via nest predators (Kieffer et al. 1995; Philipp et al. 1997; Ridgway and Shuter 1997; Suski et al. 2003). This had implications for catch-and-release fisheries, if brood success was reduced by angling, and for tournament fishing where fish were caught and transported to judging stations. This caused concern among anglers and biologists that black bass populations should be protected during spawning to improve recruitment. However, long-term trend data on black bass recruitment was rare particularly in northern states, and thus, it was difficult to infer whether impacts had occurred. Michaletz and Siepker (2013) found no long-term declines in Largemouth Bass and Spotted Bass recruitment in Missouri reservoirs and suggested that springtime angling had not caused problems to black bass populations there. However, the degree to which capture of spawning fish influenced recruitment in bass populations was unclear in 2013, and future work should identify the population-level effects of catching spawning fish on black bass fisheries. The topic generated healthy debates among professionals.

Work in the 2000s expanded on the basic tools and techniques developed in earlier decades and examined factors that induce physiological disturbances in angled fish (e.g., Mazeaud et al. 1977; Gustaveson et al. 1991). Furthermore, strategies were developed that could be implemented by anglers and managers to facilitate recovery of angled fish, particularly in catch-and-release scenarios. For example, Gingerich and Suski (2012) showed that larger Largemouth Bass had greater physiological disturbances and required longer recovery times than smaller Largemouth Bass. Similarly, Suski et al. (2004) showed that physiological disturbances during live-release angling tournaments could be minimized by reducing air-exposure times during the weigh-in, while both Suski et al. (2006) and Cooke et al. (2002a) showed that supersaturation of dissolved oxygen, additions of ice, and additions of livewell conditioners can all lead to elevated stress in Largemouth Bass and prolonged recovery times during livewell confinement.

The 2000s also saw advances of the use studies into the impacts of angling on the tertiary stress response of fish, including growth, survival, and population-level parameters. There are a number of ways that stressors associated with angling can potentially impact growth and/or fitness in fish, with results largely derived from hatchery settings, often with species other than bass. For example, the cumulative effects of prolonged activation of the primary and secondary stress responses, coupled with elevated energy allocation to stress and/or exercise, can lead to reduced egg sizes, reduced larval survival, impaired growth, inhibited sexual maturation, or reduced gamete viability work (Cooke et al. 2002b). To date, many of these processes have not been definitively assigned to angling events, and only a handful of studies have performed this work with bass. One example of such work comes from a study by Ostrand et al. (2004), who determined that Largemouth Bass exposed to a simulated catch-and-release angling tournament immediately prior to the spawning period produced fewer and smaller offspring than did control fish not experiencing tournament angling, likely due to tournament-related stressors. Pope and Wilde (2004) showed that Largemouth Bass repeatedly captured and released in a laboratory setting did not negatively impact weight gain, while a 27-year mark and recapture study of more than 1,000 wild Largemouth Bass in Wisconsin showed no negative impacts of catch-and-release angling on individual growth patterns (Cline et al. 2012). In contrast, work by Clapp and Clark (1989) documented an inverse relationship between growth rate and capture frequency for wild Smallmouth Bass. A seminal paper by Philipp et al. (2009) showed that vulnerability to angling was a heritable trait, with individuals more likely to be captured by anglers passing this trait to their offspring. More importantly, vulnerability to angling appears to be correlated with a suite of physiological traits, including elevated metabolic rate (Redpath et al. 2010) and increased activity during parental care (Cooke et al. 2007), and fish that are vulnerable to angling produce significantly more offspring in a reproductive bout than fish less vulnerable to angling (Sutter et al. 2015). The topic of angler impacts on fish populations, as well as management activities to protect fish populations from such stressors, should be an active area of research in the future.

In a summary of the rare black bass species, Koppelman and Garrett (2002) wrote, “It seems there has not been a lot of work done on the four species [since the 1975 bass symposium] and the inference could be made that there is little interest from either a fishing or conservation aspect.” By the early 2000s, there was a growing realization that some populations of these species were becoming at risk of imperilment (Birdsong et al. 2010). The conservation of these species was threatened by changes in land use due to development and urbanization, increases in water withdrawals, dams, and introductions of nonindigenous species leading to degraded habitats, fragmentation of populations, and declines in genetic diversity and integrity. As a result, fisheries scientists began to place a much higher priority on researching and filling data gaps about certain aspects of the biology, life history, behavior, and genetics of Guadalupe Bass, Redeye Bass, Shoal Bass, and Suwannee Bass populations in their native habitats (Birdsong et al. 2010). Concurrently, there was an increasing segment of the angling population that became interested in fishing for these species, in part due to the growing popularity of kayak fishing. B.A.S.S. also promoted what they called the B.A.S.S. Slam, a program that encouraged anglers to fish for all the different species of black bass. Using Web and magazines articles, B.A.S.S. educated the angling public about the life history strategies of black bass, where to find them, and how to catch them.

Moreover, taxonomists and molecular geneticists began to reevaluate the phylogenetic relationships among black bass and, in some cases, to redefine taxa of black bass (Kassler et al. 2002; Near et al. 2004; Figure 1). Williams and Burgess (1999) described the Shoal Bass, a species that had previously been considered a unique form of Redeye Bass. Three years later, Kassler et al. (2002) recommended that both the Alabama Bass *M. henshalli* and the Florida Bass be elevated to species status. The Alabama Bass was thus formally described (Baker et al. 2008) and appeared to be accepted without debate. Florida Bass, on the other hand, was hotly debated, considered valid by some (Near et al. 2003; Barthel et al. 2010; Ray et al. 2012) but not readily accepted by the scientific community as a whole (Nelson et al. 2004; Page et al. 2013). Additional, undescribed species are currently thought to exist but have yet to be formally described and accepted by the scientific community: Bartram's Bass in Georgia (Freeman et al. 2015, this volume), Lobina Negra de Cuatro Ciénegas in southwest Texas and Mexico (García De León 2015, this volume), and Choctaw Bass *M. haiaka* in Gulf Coast streams of northwest Florida and Alabama (Tringali et al. 2015a, this volume). The focus of black bass management in the United States thus appears to be coming full circle to another era of discovery with new species descriptions and a focus on conserving this new diversity.

Part of conserving Micropterus diversity is now focused on managing current and past stocking practices. Interspecific hybridization among the black bass species has been well documented (Edwards 1979; Philipp et al. 1983; Whitmore 1983; Maciena et al. 1988; Morizot et al. 1991; Dunham et al. 1992; Gilliland 1992; Koppelman 1994; Forshage and Fries 1995; Gelwick et al. 1995; Pierce and Van Den Avyle 1997; Pipas and Bulow 1998; Barwick et al. 2006; Alvarez et al. 2015, this volume; Tringali et al. 2015b, this volume; Barthel et al. 2015, this volume), as have stocking practices of black bass species by state and federal management agencies and anglers (Robbins and MacCrimmon 1974; Jackson 2002). After more than a century of indiscriminant stocking of black bass, state fish and wildlife agencies had finally taken a precautionary approach to avoid stocking nonindigenous species into drainages of rare black bass species with limited ranges (e.g., Maine [Jordan 2001] and Florida [FWCC 2011]). In an effort to prevent further loss of indigenous species and genetics, managers have even begun a practice of conservation stocking in an attempt to restore lost populations or genetic alleles (e.g., Guadalupe Bass in Texas [Koppelman and Garrett 2002; Garrett et al. 2015, this volume] and Shoal Bass in Georgia [Porta and Long 2015, this volume]).

Future

As we look to the future, the nature and science of black bass management is likely to continue its renewed focus on discovery and conservation of native populations. The use of genetic tools, which has become increasingly more economically feasible and robust, looks to become more commonplace, aiding the management of these species. Expect to see a continued emphasis on maintaining genetic diversity and integrity, which includes reducing the impact from nonnative introductions. Effects expected due to climate change will mean that managers will become more focused on keeping native populations intact and coping with the spread of nonnative introductions (e.g., Smallmouth Bass expanding northward; Dunlop and Shuter 2006; Sharma and Jackson 2008). Similarly, a focus on restoring native habitats, particularly rivers, will likely become a dominant theme in the near future. Multistate conservation agendas, such as the business plan for the conservation of native black bass species in the southeastern United States (Birdsong et al. 2010), will probably become an increased focus for natural resource agencies. However, we also expect for the focus of black bass as sport fish to continue and for angling groups, such as B.A.S.S. and The Smallmouth Alliance, to become increasingly involved with management and research agencies in order to ensure the sustainability of black bass wherever they occur. While the past 200 years have yielded a great quantity of data and publications relevant to black bass management, the number of questions appears ever abundant. We expect the future of black bass management to continue to reinvent itself as it has in the past, responding to the needs of anglers and conservationists alike.

Acknowledgments

We thank D. Philipp for constructive comments provided on an advanced copy of this manuscript; Sidney Huttner and Kathryn Hodson (University of Iowa) for their help obtaining and using the cartoon drawn by Ding Darling; and Cara Clark, communications manager at Bassmaster, for providing the image of Ray Scott and others. The Oklahoma Cooperative Fish and Wildlife Research Unit is a cooperative venture between Oklahoma State University, the Oklahoma Department of Wildlife Conservation, U.S. Geological Survey, U.S. Fish and Wildlife Service, and the Wildlife Management Institute.

References

Addison, J. H., and S. L. Spencer. 1972. Preliminary evaluation of three strains of Largemouth Bass, *Micropterus salmoides* (Lacepèdé), stocked in ponds in south Alabama. Proceedings of the Annual Conference Southeastern Association of Game and Fish Commissions 26:366–374.

Aggus. L. R., and G. V. Elliot. 1975. Effects of cover and food on year-class strength of Largemouth Bass. Pages 317–322 *in* R. H. Stroud and H. Clepper, editors. Black bass biology and management. Sport Fishing Institute, Washington, D.C.

Allen, M. S., C. J. Walters, and R. Myers. 2008. Temporal trends in Largemouth Bass mortality, with fishery implications. North American Journal of Fisheries Management 28:418–427.

Alvarez, A. C., D. Peterson, A. T. Taylor, M. D. Tringali, and B. L. Barthel. 2015. Distribution and amount of hybridization between Shoal Bass and the invasive Spotted Bass in the lower Flint River, Georgia. Pages 503–521 *in* M. D. Tringali, J. M. Long, T. W. Birdsong, and M. S. Allen, editors. Black bass diversity: multidisciplinary science for conservation. American Fisheries Society, Symposium 82, Bethesda, Maryland.

Anderson, R. O. 1978. New approaches to recreational fishery management. Pages 73–78 *in* G. D. Novinger and J. G. Dillard, editors. New approaches to the management of small impoundments. American Fisheries Society, North Central Division, Special Publication 5, Bethesda, Maryland.

Anderson, R. S. 1995. The Lacey Act: America's premier weapon in the fight against unlawful wildlife tracking. Public Land and Resources Law Review 16(27):27–85.

Anonymous. 1874. Fish culture: practical fish culture, no. 4. Forest and Stream 1(26):406–407.

Anonymous. 1875a. The culture of fish. Meeting of the Fish Culturists' Association. The New York Times (February 11):6.

Anonymous. 1875b. Sea and river fishing: fish in season in January. Forest and Stream 3(24):378.

Anonymous. 1884. Killing fish with dynamite. The New York Times (August 31):3.

Anonymous. 1898. New laws on fishing. The New York Times (May 31):11.

Anonymous. 1927. Hoover laments decline of fishing. The New York Times (April 10):27.

Bailey, R. M., and C. L. Hubbs. 1949. The black basses (*Micropterus*) of Florida, with description of a new species. Occasional papers of the Museum of Zoology University of Michigan 516.

Baird, S.F. 1874. Report of the commissioner for 1872 and 1873, United States Commission of Fish and Fisheries. Government Printing Office, Washington, D.C.

Baker, W. H., R. E. Blanton, and C. E. Johnston. 2013. Diversity within the Redeye Bass, *Micropterus coosae* (Perciformes: Centrarchidae) species group, with descriptions of four new species. Zootaxa 3635:379–401.

Baker, W. H., C. E. Johnston, and G. W. Folkerts. 2008. The Alabama Bass, *Micropterus henshalli* (Teleostei: Centrarchidae), from the Mobile River basin. Zootaxa 1861:57–67.

Barthel, B. L., D. J. Lutz-Carrillo, K. E. Norberg, W. F. Porak, M. D. Tringali, T. W. Kassler, W. E. Johnson, A. M. Readel, R. A. Krause, and D. P. Philipp. 2010. Genetic relationships among populations of Florida Bass. Transactions of the American Fisheries Society 139:1615–1641.

Barthel, B. L., W. F. Porak, M. D. Tringali, and D. P. Philipp. 2015. Range-wide genetic evaluation of the Suwanee Bass reveals divergent lineages and evidence of small founding populations. Pages 659–677 *in* M. D. Tringali, J. M. Long, T. W. Birdsong, and M. S. Allen, editors. Black bass diversity: multidisciplinary science for conservation. American Fisheries Society, Symposium 82, Bethesda, Maryland.

Barwick, D. H., K. J. Oswald, J. M. Quattro, and R. D. Barwick. 2006. Redeye Bass (*Micropterus coosae*) and Alabama Spotted Bass (*M. punctulatus henshalli*) hybridization in Keowee Reservoir. Southeastern Naturalist 5:661–668.

B.A.S.S. Communications. 2005. Largemouth Bass virus (LMBV) fact sheet. Available: www.bassmaster.com/news/largemouth-bass-virus-lmbv-fact-sheet. (December 2013).

Bassmaster. 2013. Program & media guide. Bassmaster, Birmingham, Alabama. Available: www.bassmastermedia.com/files/pdfs/2013BassmasterMediaGuide.pdf. (December 2013).

Bennett, G. W. 1952. Pond management in Illinois. Journal of Wildlife Management 16:249–253.

Bennett, G. W. 1962. Management of artificial lakes and ponds. Reinhold Publishing, New York.

Bennett, G. W. 1970. Management of lakes and ponds, 2nd edition, Van Nostrand Reinhold Company, New York.

Bettoli. P. W., M. J. Maceina, R. L. Noble, and R. K.

Betsill. 1992. Piscivory in Largemouth Bass as a function of aquatic vegetation abundance. North American Journal of Fisheries Management 12:509–516.

Bettoli, P. W. M. J. Maceina. R. L. Noble, and R. K. Betsill. 1993. Response of a reservoir fish community to aquatic vegetation removal. North American Journal of Fisheries Management 13:110–124.

Birdsong, T., D. Krause, J. Leitner, J. M. Long, S. Robinson, and S. Sammons. 2010. A business plan for the conservation of native black bass species in the southeastern U.S. National Fish and Wildlife Foundation, Washington, D.C.

Bollman, C. H. 1891. A review of the centrarchidae, or fresh-water sunfishes, of North America. Government Printing Office, Washington, D.C.

Bottroff, L. J., and M. E. Lembeck. 1978. Fishery trends in reservoirs of San Diego County, California, following the introduction of Florida Largemouth Bass, *Micropterus salmoides floridanus*. California Fish and Game 64(1):4–23.

Bowers, G. M. 1905. Report of the commissioner for the year ending June 30, 1903, U.S. Commission of Fish and Fisheries. Government Printing Office, Washington, D.C.

Buynak, G. L., and B. Mitchell. 1999. Contribution of stocked advanced-fingerling Largemouth Bass to the population and fishery at Taylorsville Lake, Kentucky. North American Journal of Fisheries Management 19:494–503.

Carmichael, G. J., J. H. Williamson, C. A. Caldwell Woodward, and J. R. Tomasso. 1988. Responses of Northern, Florida, and hybrid Largemouth Bass to low temperature and low dissolved oxygen. The Progressive Fish-Culturist 50:225–231.

Chew, R. L. 1975. The Florida Largemouth Bass. Pages 450–458 *in* R. H. Stroud and H. Clepper, editors. Black bass biology and management. Sport Fishing Institute, Washington, D.C.

Clapp D. F., and R. D. Clark, Jr. 1989. Hooking mortality of Smallmouth Bass caught on live minnows and artificial spinners. North American Journal of Fisheries Management 9:81–85.

Clepper, H., editor. 1966. Origins of American conservation. The Ronald Press Company, New York.

Cline, T. J., B. C. Weidel, J. F. Kitchell, and J. R. Hodgson. 2012. Growth response of largemouth Bass (*Micropterus salmoides*) to catch-and-release angling: a 27-year mark–recapture study. Canadian Journal of Fisheries and Aquatic Sciences 69:224–2030.

Cooke, S. J., J. F. Schreer, K. M. Dunmall and D. P. Philipp. 2002b. Strategies for quantifying sublethal effects of marine catch-and-release angling: insights from novel freshwater applications. Pages 121–134 *in* J. A. Lucy and A. L. Studholme, editors. Catch and release in marine recreational fisheries. American Fisheries Society, Symposium 30, Bethesda, Maryland.

Cooke S. J., J. F. Schreer, D. H. Wahl and D. P. Philipp. 2002a. Physiological impacts of catch-and-release angling practices on Largemouth and Smallmouth Bass. Pages 489–512 *in* D. P. Phillipp and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Cooke, S. J., C. D. Suski, K. G. Ostrand, D. P. Philipp, and D. H. Wahl. 2007. Physiological and behavioural consequences of long-term artificial selection for vulnerability to recreational angling in a teleost fish. Physiological and Biochemical Zoology 80:480–490.

Crawford, S., and M. A. Wicker. 1987. Recruitment of stocked Largemouth Bass fingerlings into a central Florida fishery. Florida Scientist 50(4):211–215.

Dill, W. A., and A. J. Cordone. 1997. History and status of introduced fishes in California, 1871–1996. California Department of Fish and Game, Fish Bulletin 178, Sacramento. Available: http://content.cdlib.org/view?docId=kt8p30069f&query=&brand=calisphere. (December 2013).

Dillard, J. G., and G. D. Novinger. 1975. Stocking Largemouth Bass in small impoundments. Pages 459–474 *in* R. H. Stroud and H. Clepper, editors. Black bass biology and management. Sport Fishing Institute, Washington, D.C.

Dunham, R. A., C. Turner, and W. Reeves. 1992. Introgression of the Florida Largemouth Bass genome into native populations in Alabama public lakes. North American Journal of Fisheries Management 12:494–498.

Dunlop, E. S., and B. J. Shuter. 2006. Native and introduced populations of Smallmouth Bass differ in concordance between climate and somatic growth. Transactions of the American Fisheries Society 135:1175–1190.

Eder, S. 1984. Effectiveness of an imposed slot length limit of 12.0–14.9 inches on Largemouth Bass. North American Journal of Fisheries Management 4:469–478.

Edwards, R. 1979. Report of Guadalupe Bass (*Micropterus treculi*) × Smallmouth Bass (*Micropterus dolomieui*) hybrids from two localities in the Guadalupe River, Texas. Texas Journal of Science 31:233–238.

Eschmeyer, R. W. 1942. The catch, abundance, and migration of game fishes in Norris Reservoir, Tennessee, 1940. Journal of the Tennessee Academy of Science 17:90–115.

Eschmeyer, R. W., and D. E. Manges. 1945. Effect of a year-round open season on fishing in Norris Reservoir. Journal of the Tennessee Academy of Science 20:20–34.

Eschmeyer, W. N. 2013. Catalog of fishes. Available: http://research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. (November 2013).

Fields, R., S. S. Lowe, C. Kaminski, G.S. Whitt, and D. P. Philipp. 1987. Critical and chronic thermal maximum of Northern and Florida Largemouth Bass and their reciprocal F_1 and F_2 hybrids. Transactions of the American Fisheries Society 116:856–863.

Forshage, A., and L. Fries, T. 1995. Evaluation of the Florida Largemouth Bass in Texas. Pages 484–491 *in* H. Schramm, Jr., and R. Piper, editors. Uses and effects of cultured fishes in aquatic ecosystems. American Fisheries Society, Symposium 15, Bethesda, Maryland.

Fox, A. C. 1975. Effects of traditional harvest regulations on bass populations and fishing. Pages 392–398 *in* R. H. Stroud and H. Clepper, editors. Black bass biology and management. Sport Fishing Institute, Washington, D.C.

Freeman, B. J., A. Taylor, K. J. Oswald, J. Wares, M. C. Freeman, J. Quattro, and J. K. Leitner. 2015. Shoal basses: a clade of cryptic identity. Pages 449–466 *in* M. D. Tringali, J. M. Long, T. W. Birdsong, and M. S. Allen, editors. Black bass diversity: multidisciplinary science for conservation. American Fisheries Society, Symposium 82, Bethesda, Maryland.

Funk, J. L. 1970. Warm-water streams. Pages 141–152 *in* N. G. Benson, editor. A century of fisheries in North America. American Fisheries Society, Special Publication 7, Bethesda, Maryland.

FWCC (Florida Fish and Wildlife Conservation Commission). 2011. Black bass management plan (2010–2030). FWCC, Tallahassee, Florida.

Gabrielson, I. N., and F. La Monte. 1950. The fisherman's encyclopedia. Stackpole and Heck, Harrisburg, Pennsylvania.

García De León, F. J., R. I. Rodríguez-Martínez, and D. A. Hendrickson. 2015. Genetic analysis and conservation status of native populations of Largemouth Bass in northeastern Mexico. Pages 635–657 *in* M. D. Tringali, J. M. Long, T. W. Birdsong, and M. S. Allen, editors. Black bass diversity: multidisciplinary science for conservation. American Fisheries Society, Symposium 82, Bethesda, Maryland.

Garrett, G. P., T. W. Birdsong, M. G. Bean, and R. McGillicuddy. 2015. Guadalupe Bass Restoration Initiative. Pages 379–385 *in* M. D. Tringali, J. M. Long, T. W. Birdsong, and M. S. Allen, editors. Black bass diversity: multidisciplinary science for conservation. American Fisheries Society, Symposium 82, Bethesda, Maryland.

Garvey, J. E., R. A. Stein, R. A. Wright, and M. T. Bremigan. 2002. Exploring ecological mechanisms underlying Largemouth Bass recruitment along environmental gradients. Pages 7–24 *in* D. P. Philipp and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Gelwick, F. P., E. R. Gilliland, and W. J. Matthews. 1995. Introgression of the Florida Largemouth Bass genome into stream populations of Northern Largemouth Bass in Oklahoma. Transactions of the American Fisheries Society 124:550–562.

Gilliland, E. R. 1992. Experimental stocking of Florida Largemouth Bass into small Oklahoma Reservoirs, Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 46:487–494.

Gilliland, E. R., and H. Schramm. 2009. Keeping bass alive: a guidebook for tournament anglers and organizations, 2nd edition. BASS, Lake Buena Vista, Florida.

Gilliland, E. R., and J. Whitaker. 1989. Introgression of Florida Largemouth Bass introduced into Northern Largemouth Bass populations in Oklahoma reservoirs. Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 43:182–190.

Gingerich, A. J., and C. D. Suski. 2012. The effect of body size on post-exercise physiology in Largemouth Bass. Fish Physiology and Biochemistry 38:329–340.

Graf, W. L. 1999. Dam nation: a geographic census of American dams and their large-scale hydrologic impacts. Water Resources Research 35:1305–1311.

Graham, L. K. 1973. The introduction of Florida Largemouth Bass in Missouri ponds. Missouri Department of Conservation, Final Report, Sport Fish Restoration Grant F-1-R-22, Jefferson City.

Gustaveson, A. W., R. S. Wydoski, and G. A. Wedemeyer. 1991. Physiological response of Largemouth Bass to angling stress. Transactions of the American Fisheries Society 120:629–636.

Hartman, K. J., and E. C. Janney. 2006. Relative persistence and dispersal of age-0 and age-1 Largemouth Bass stocked into two Ohio River embayments. Journal of Freshwater Ecology 21:627–637.

Henderson, J. E. 1996. Management of nonnative aquatic vegetation in large impoundments: balancing preferences and economic values of angling and nonangling groups. Pages 347–356 *in* L. E. Miranda and D. R. DeVries, editors. Multidimensional approaches to reservoir fisheries management. American Fisheries Society, Symposium 16, Bethesda, Maryland.

Henshall, J. A. 1881. Book of the black bass, comprising its complete scientific and life history together with a practical treatise on angling and fly fishing and a full description of tools, tackle and implements. Robert Clarke & Company, Cincinnati, Ohio.

Henshall, J. A. 1904. Book of the black bass. Robert Clarke & Company, Cincinnati, Ohio.

Hillstrom, K. 2010. U.S. environmental policy and politics: a documentary history. CQ Press, Washington, D.C.

Hobbs, B., C. Horton, L. Claybrook, B. Shinn, and D. Swann. 2002. Largemouth Bass management plan. Arkansas Game and Fish Commission, Little Rock.

Hoffman, K. J., and P. W. Bettoli. 2005. Growth, dispersal, mortality, and contribution of Largemouth Bass stocked into Chickamauga Lake, Tennessee. North American Journal of Fisheries Management 25:1518–1527.

Holbrook, J.A. 1975. Bass fishing tournaments. Pages 408–415 *in* R. H. Stroud and H. Clepper, editors. Black bass biology and management. Sport Fishing Institute, Washington. D.C.

Hoover, R. S., J. J. Ney, E. M. Hallerman, and W. G. Kittrell, Jr. 1997. Comparison of Florida, Northern, and intergrade juvenile Largemouth Bass in a Virginia reservoir. Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 51:192–198.

Horton, R. A., and E. R. Gilliland. 1993. Monitoring trophy Largemouth Bass in Oklahoma using a taxidermist network. Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 47:679–685.

Hough, E. 1922. Time to call a halt. Izaak Walton League Monthly 1(1):1.

Houser, A., and W. C. Rainwater. 1975. Production of Largemouth Bass in Beaver and Bull Shoals Lakes. Pages 310–316 *in* R. H. Stroud and H. Clepper, editors. Black bass biology and management. Sport Fishing Institute, Washington. D.C.

Hoxmeier, R. J. H., and D. H. Wahl. 2002. Evaluation of supplemental stocking of Largemouth Bass across reservoirs: effects of predation, prey availability, and natural recruitment. Pages 639–648 *in* D. P. Philipp and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Hubbs, C. L. 1927. *Micropterus pseudaplites*, a new species of black bass. Occasional papers of the Museum of Zoology University of Michigan 184.

Hubbs, C. L., and R. M. Bailey. 1940. A revision of the black bass (*Mictopterus* and *Huro*) with descriptions of four new forms. Miscellaneous publications of the Museum of Zoology University of Michigan 48.

Hubbs, C. L., and R. M. Bailey. 1942. Subspecies of Spotted Bass (*Micropterus punctulatus*) in Texas. Occasional Papers of the Museum of Zoology University of Michigan 457.

Hughes, J. S., and M. G. Wood. 1995. Development of a trophy Largemouth Bass fishery in Louisiana. Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 49:58–68.

Inman, C. R., R. C. Dewey, and P. P. Durocher. 1977. Growth comparison and catchability of three largemouth strains. Fisheries 2(5):20–25.

Isely, J. J., R. L. Noble, J. B. Koppelman, and D. P. Philipp. 1987. Spawning period and first-year growth of Northern, Florida, and intergrade stocks of Largemouth Bass. Transactions of the American Fisheries Society 116:757–762.

Jackson, D. A. 2002. Ecological effects of Micropterus introductions: the dark side of black bass. Pages 221–232 *in* D. P. Philipp and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Jackson, J. R., and R. L. Noble. 2000a. First-year cohort dynamics and overwinter mortality of juvenile Largemouth Bass. Transactions of the American Fisheries Society 129:716–726.

Jackson, J. R., and R. L. Noble. 2000b. Relationships between annual variations in reservoir conditions and age-0 Largemouth Bass year-class strength. Transactions of the American Fisheries Society 129:699–715.

Jelks, H. L., S. J. Walsh, N. M. Burkhead, S. Contreras-Balderas, E. Díaz-Pardo, D. A. Hendrickson, J. Lyons, N. E. Mandrak, F. McCormick, J. S. Nelson, S. P. Platania, B. A. Porter, C. B. Renaud, J. J. Schmitter-Soto, E. B. Taylor, and M. L. Warren, Jr. 2008. Conservation status of imperiled North American freshwater and diadromous fishes. Fisheries 33:372–407.

Jenkins, R. M. 1970. Reservoir fish management. Pages 173–182 *in* N. G. Benson, editor. A century of fisheries in North America. American Fisheries Society, Special Publication 7, Bethesda, Maryland.

Johnson, D. L., and R. O. Anderson. 1974. Evaluation of a 12-inch length limit on Largemouth Bass in Philips Lake, 1966–1973. Pages 106–113 *in* J. L. Funk, editor. Symposium on overharvest and management of Largemouth Bass in small impoundments. American Fisheries Society, North Central Division, Special Publication 3, Bethesda, Maryland.

Johnson, R. L., and T. Fulton. 2004. Incidence of Florida Largemouth Bass alleles in two northern Arkansas populations of Largemouth Bass, *Micropterus salmoides* Lacepede. American Midland Naturalist 152:425–429.

Jordan, D. S. 1877. Contributions to North American ichthyology, no. 2. Bulletin of the United States National Museum 10. Government Printing Office, Washington, D.C.

Jordan, R. M. 2001. Black bass management plan. Maine Department of Inland Fisheries and Wildilfe, Augusta.

Kassler, T. W., J. B. Koppelman, T. J. Near, C. B. Dillman, J. M. Levengood, D. L. Swofford, J. L. Van Orman, J. C. Claussen, and D. P. Philipp. 2002. Molecular and morphological analyses of the black basses: implications for taxonomy and conservation. Pages 291–322 *in* D. P. Philipp, and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Keil, W. M. 1921. To all who desire better fishing. The American Angler 6:314–318.

Kemper, E. C. 1930. Defrauding ten million anglers: a statement addressed to the anglers of the United States, the conservation commission of various states and members of Congress. Forest and Stream 63:414–417, 439–444.

Kesting, T. 1962. Bass fishing. Thomas Nelson & Sons, New York.

Kieffer, J. D., M. R. Kubacki, F. J. S. Phelan, D. P. Philipp, and B. L. Tufts. 1995. Effects of catch-and-release angling on nesting male Smallmouth Bass. Transactions of the American Fisheries Society 124:70–76.

Koppelman, J. B. 1994. Hybridization between Smallmouth Bass, *Micropterus dolomieu*, and Spotted Bass, *M. punctulatus*, in the Missouri River system, Missouri. Copeia 1:204–210.

Koppelman, J. B., and G. P. Garrett. 2002. Distribution, biology, and conservation of the rare black bass species. Pages 333–341 *in* D. P. Philipp and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Kulzer, K. E., R. L. Noble, and A. A. Forshage. 1985. Genetic effects of Florida Largemouth Bass introductions into Texas reservoirs. Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 39:56–64.

Lacepèdé, B. G. E. 1802. Histoire naturelle des poissons. [Natural history of fish.] Chez Plasson, Paris.

LeSueur, C. A. 1822. Descriptions of the five new species of the genus Cichla of Cuvier. Journal of the Academy of Natural Sciences of Philadelphia 2:214–221.

Long, J. M., and C. Martin. 2008. The evolution of fisheries management of the upper Chattahoochee River in response to changing water management. Pages 21–36 *in* M. S. Allen, S. M. Sammons, and M. J. Maceina, editors. Balancing fisheries management and water uses for impounded river systems. American Fisheries Society. Symposium 62, Bethesda, Maryland.

Loska, P. M. 1982. Stocking bass to improve your fishing—is it the key to better fishing? Bass Research Foundation, Special Report, Starkville, Mississippi.

Ludsin, S. A., and D. R. DeVries. 1997. First year recruitment of Largemouth Bass: the inter-dependency of early life stages. Ecological Applications 7:1024–1038.

Lutz-Carrillo, D. J., C. C. Nice, T. H. Bonner, M. R. J. Forstner, and L. T. Fries. 2006. Admixture analysis of Florida Largemouth Bass and Northern Largemouth Bass using microsatellite loci. Transactions of the American Fisheries Society 135:779–791.

Maceina, M. J., and P. W. Bettoli. 1998. Variation in Largemouth Bass recruitment in four mainstream impoundments of the Tennessee River. North American Journal of Fisheries Management 18:998–1003.

Maciena, M. J., B. R. Murphy, and J. J. Isely. 1988. Factors regulating Florida Largemouth Bass stocking success and hybridization with Northern Largemouth Bass in Aquilla Lake, Texas. Transactions of the American Fisheries Society 117:221–231.

Marsh, G. P. 1867. Man and nature; or, physical geography as modified by human action. Charles Scribner & Company, New York.

Mazeaud, M. M., F. Mazeaud, and E. M. Donaldson. 1977. Primary and secondary effects of stress in fish: some new data with a general review. Transactions of the American Fisheries Society 106:201–212.

Merritt, D. 2012. The Roaring 20s: a call to action. Outdoor America (winter):24–33.

Mesing, C. L., R. L. Cailteux, P. A. Strickland, E. A. Long, and M. W. Rogers. 2008. Stocking of advanced- fingerling Largemouth Bass to supplement year-classes in Lake Talquin, Florida. North American Journal of Fisheries Management 28:1762–1774.

Michaletz, P. H., and M. J. Siepker. 2013. Trends and synchrony in black bass and crappie recruitment in Missouri reservoirs. North American Journal of Fisheries Management 142:105–118.

Mills, H. B. 1962. Foreword. Pages v–vi *in* G. W. Bennett, editor. Management of artificial lakes and ponds. Reinhold Publishing, New York.

Milner, J. W. 1874. The progress of fish culture in the United States. Pages 523–558 *in* S. F. Baird. Report of the commissioner for 1872 and 1873, United States Commission of Fish and Fisheries. Government Printing Office, Washington, D.C.

Ming, A., and W. E. McDannold. 1975. Effects of length limits on overharvested Largemouth Bass populations. Pages 416–424 *in* R. H. Stroud and H. Clepper, editors. Black bass biology and management. Sport Fishing Institute, Washington, D.C.

Miranda, L. E. 1996. Development of reservoir fisheries management paradigms in the twentieth century. Pages 3–11 *in* L. E. Miranda and D. R. DeVries, editors. Multidimensional approaches to reservoir fisheries management. American Fisheries Society, Symposium 16, Bethesda, Maryland.

Miranda, L. E., and L. L. Pugh. 1997. Relationship between vegetation coverage and abundance, size, and diet of juvenile Largemouth Bass during winter. North American Journal of Fisheries Management 17:601–610.

Miranda. L. E. W. L. Shelton, and T. D. Bryce. 1984. Effects of water level manipulation on abundance, mortality, and growth of young-of-year Largemouth Bass in West Point Reservoir, Alabama–Georgia. North American Journal of Fisheries Management 4:314–320.

Moffitt, C. M. 2001. Reflections: a photographic history of fisheries and the American Fisheries Society in North America. American Fisheries Society, Bethesda, Maryland.

Morizot, D. C., S. C. Calhoun, L. L. Clepper, M. E. Schmidt, and G. J. Carmichael. 1991. Multispecies hybridization among native and introduced centrarchid basses in central Texas. Transactions of the American Fisheries Society 120:283–289.

Myers, R., J. Taylor, M. Allen, and T. F. Bonvechio. 2008. Temporal trends in voluntary release of Largemouth Bass. North American Journal of Fisheries Management 28:428–433.

Neal, J. W., and R. L. Noble. 2002. Growth, survival, and site fidelity of Florida and intergrade Largemouth Bass stocked into a tropical reservoir. North American Journal of Fisheries Management 22:528–536.

Near, T. J., D. I. Bolnick, and P. C. Wainwright. 2004. Investigating phylogenetic relationships of sunfishes and black basses (Actinopterygii: Centrarchidae) using DNA sequences from mitochondrial and nuclear genes. Molecular Phylogenetics and Evolution 32:344–357.

Near, T. J., T. W. Kassler, J. B. Koppelman, C. B. Dillman, and D. P. Philipp. 2003. Speciation in North American black basses, *Micropterus* (Actinopterygii: Centrarchidae). Evolution 57:1610–1621.

Nelson, J. S., E. J. Crossman, H. Espinosa-Perez, L. T. Findley, C. R. Gilbert, R. N. Lea, and J. D. Williams. 2004. Common and scientific names of fishes from the United States, Canada, and Mexico. American Fisheries Society, Special Publication 29, Bethesda, Maryland.

Nielson, L. A. 1993. History of fisheries management in North America. Pages 3–31 *in* C. C. Kohler and W. A. Hubert, editors. Inland fisheries management in North America. American Fisheries Society, Bethesda, Maryland.

Noble, R. L. 2002. Reflections on 25 years of progress in black bass management. Pages 419–432 *in* D. P. Philipp and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Novinger, G. D. 1984. Observation on the use of size limits for black basses in large impoundments. Fisheries 9:2–6.

Novinger, G. D. 1990. Slot length limits for Largemouth Bass in small private impoundments. North American Journal of Fisheries Management 10:330–337.

Olson, M. H. 1996. Ontogenetic niche shifts in Largemouth Bass: variability and consequences for first year growth. Ecology 77:179–190.

Ostrand, K. G., S. J. Cooke, and D. H. Wahl. 2004. Effects of stress on Largemouth Bass reproduction. North American Journal of Fisheries Management 24:1038–1045.

Page, L. M., H. Espinosa-Pérez, L. T. Findley, C. R. Gilbert, R. N. Lea, N. E. Madrak, R. L. Mayden, and J. S. Nelson. 2013. Common and scientific names of fishes from the United States, Canada, and Mexico, 7th edition. American Fisheries Society, Special Publication 34, Bethesda, Maryland.

Parkos, J. J., III., and D. H. Wahl. 2002. Towards an understanding of recruitment mechanisms in Largemouth Bass. Pages 25–46 *in* D. P. Philipp and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Patton, T., and C. Lyday. 2008. Ecological succession and fragmentation in a reservoir: effects of sedimentation on habitats and fish communities. Pages 147–168 *in* M. S. Alllen, S. Sammons, and M. J. Maceina, editors. Balancing fisheries management and water uses for impounded river systems. American Fisheries Society, Symposium 62, Bethesda, Maryland.

Paukert, C., M. McInerny, and R. Schultz. 2007. Historical trends in creel limits, length-based limits, and season restrictions for black basses in the United States and Canada. Fisheries 32:62–72.

Philipp, D. P., W. F. Childers, and G. S. Whitt. 1983. A biochemical genetic evaluation of the Northern and Florida subspecies of Largemouth Bass. Transactions of the American Fisheries Society 112:1–20.

Philipp, D. P., J. E. Claussen, T. W. Kassler, and J. M. Epifanio. 2002. Mixing stocks of Largemouth Bass reduces fitness through outbreeding depression. Pages 349–363 *in* D. P. Philipp and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Philipp, D. P., S. J. Cooke, J. E. Claussen, J. B. Koppelman, C. D. Suski, and D. P. Burkett. 2009. Selection for vulnerability to angling in Largemouth Bass. Transactions of the American Fisheries Society 138:189–199.

Philipp, D. P., C. A. Toline, M. F. Kubacki, D. B. F. Philipp, and F. J. S. Phelan. 1997. The impact of catch-and-release angling on the reproductive success of Smallmouth Bass and Largemouth Bass. North American Journal of Fisheries Management 17:557–567.

Philipp, D. P., and G. S. Whitt. 1991. Survival and growth of Northern, Florida, and reciprocal F_1 hybrid Largemouth Bass in central Illinois. Transactions of the American Fisheries Society 120:58–64.

Pierce, P. C., and M. Van Den Avyle. 1997. Hybridization between introduced Spotted Bass and Smallmouth Bass in reservoirs. Transactions of the American Fisheries Society 126:939–947.

Pipas, J. C., and F. J. Bulow. 1998. Hybridization between Redeye Bass and Smallmouth Bass in Tennessee streams. Transactions of the American Fisheries Society 127:141–146.

Ploskey, G. R. 1986. Effects of water level changes on reservoir ecosystems, with implications for management. Pages 86–97 *in* G. E. Hall and M. J. Van Den Avyle, editors. Reservoir fisheries management: strategies for the 80's. American Fisheries Society, Southern Division, Reservoir Committee, Bethesda, Maryland.

Pope, K. L., and G. R. Wilde. 2004. Effect of catch-and-release angling on growth of Largemouth Bass, *Micropterus salmoides*. Fisheries Management and Ecology 11:39–44.

Porak, W. F., W. E. Johnson, S. Crawford, D. J. Renfro, T. R. Schoeb, R. B. Stout, R. Krause, and R. A. DeMauro. 2002. Factors affecting survival of Largemouth Bass raised on artificial diets and stocked into Florida lakes. Pages 649–666 *in* D. P. Philipp and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Porta, M. J., and J. M. Long. 2015. Evaluation of a five-year Shoal Bass conservation-stocking program in the upper Chattahoochee River, Georgia. Pages 169–180 *in* M. D. Tringali, J. M. Long, T. W. Birdsong, and M. S. Allen, editors. Black bass diversity: multidisciplinary science for conservation. American Fisheries Society, Symposium 82, Bethesda, Maryland.

Post, D. M., J. F. Kitchell, and J. R. Hodgson. 1998. Interactions among adult demography, spawning date, growth rate, predation, overwinter mortality, and the recruitment of Largemouth Bass in a northern lake. Canadian Journal of Fisheries and Aquatic Sciences 55:2588–2600.

Quinn, S. 1996. Trends in regulatory and voluntary catch and release fishing. Pages 152–162 *in* L. E. Miranda and D. R. DeVries, editors. Multidimensional approaches to reservoir fishery management. American Fisheries Society, Symposium 16, Bethesda, Maryland.

Rafinesque, C. S. 1819. Prodrome de 70 nouveaux genres d'animaux découverts dans l'intérieur des États-Unis d'Americanérique, durant l'année 1818. [Presentation of 70 new types of animals discovered in the interior of the United States during the year 1818.] Journal de Physique de Chimie et d'Histoirenaturelle 88:417–429.

Rainwater, W. C., and A. Houser. 1975. Relation of physical and biological variables to black bass crops. Pages 306–309 *in* R. H. Stroud and H. Clepper, editors. Black bass biology and management. Sport Fishing Institute, Washington. D.C.

Rasmussen, J. L., and S. M. Michaelson. 1974. Attempts to prevent Largemouth Bass overharvest in three northwest Missouri lakes. Pages 69–83 *in* J. L. Funk, editor. Symposium on overharvest and management of Largemouth Bass in small impoundments. American Fisheries Society, North Central Division, Special Publication 3, Bethesda, Maryland.

Ray, J. W., M. Huseman, R. S. King, and P. D. Danley. 2012. Genetic analysis reveals dispersal of Florida Bass haplotypes from reservoirs to rivers in central Texas. Transactions of the American Fisheries Society 141:1269–1273.

Redmond, L. C. 1974. Prevention of overharvest of Largemouth Bass in Missouri impoundments. Pages 54–68 *in* J. L. Funk, editor. Symposium on overharvest and management of Largemouth Bass in small impoundments. American Fisheries Society, North Central Division, Special Publication 3, Bethesda, Maryland.

Redmond, L. C. 1986. Management of reservoir fish populations by harvest regulation. Pages 186–195 *in* G. E. Hall and M. J. Van Den Avyle, editors.

Reservoir fisheries management: strategies for the 80's. American Fisheries Society, Southern Division, Reservoir Committee, Bethesda, Maryland.

Redpath, T., R. Arlinghaus, C. D. Suski, and S. J. Cooke. 2010. The metabolic and biochemical basis of vulnerability to recreational angling after three generations of angling-induced selection in a teleost fish. Canadian Journal of Fisheries and Aquatic Sciences 67:1983–1992.

Regier, P. W., R. C. Summerfelt, and G. E. Gebhart. 1978. Catchability of Northern and Florida Largemouth Bass in ponds. Progressive Fish-Culturist 40(3):94–96.

Ridgway, M. S., and B. J. Shuter. 1997. Predicting the effects of angling for nesting male Smallmouth Bass on production of age-0 fish with and individual-based model. North American Journal of Fisheries Management 75:568–580.

Robbins, W. H., and H. R. MacCrimmon. 1974. The black bass in America and overseas. Biomanagement and Research Enterprises, Sault Ste. Marie, Ontario.

Sasaki, S. 1961. Introduction of Florida Largemouth Bass into San Diego County. California Fish and Game, Inland Fisheries, Administrative Report No. 61–11, Sacramento.

Sharma, S., and D. A. Jackson. 2008. Predicting Smallmouth Bass (*Micropterus dolomieu*) occurrence across North America under climate change: a comparison of statistical approaches. Canadian Journal of Fisheries and Aquatic Sciences 65:471–481.

Smart, R. M., R. D. Doyle, J. D. Madsen, and G. O. Dick. 1996. Establishing native submersed aquatic plant communities for fish habitat. Pages 347–356 *in* L. E. Miranda and D. R. DeVries, editors. Multidimensional approaches to reservoir fisheries management. American Fisheries Society, Symposium 16, Bethesda, Maryland.

Smith, H. M. 1921. Report of the United States Commissioner of Fisheries for the fiscal year 1920 with appendixes. Government Printing Office, Washington, D.C.

Stillman, D. 1927. Eulogy on the black bass. Forest and Stream 97(10):596–597, 624.

Straight, C. A., B. Albanese, and B. J. Freeman. 2009. Fishes of Georgia. Georgia Museum of Natural History, University of Georgia, Athens. Available: http://fishesofgeorgia.uga.edu. (November 2013).

Stroud, R. H. 1966. Fisheries and aquatic resources. Pages 57–73 *in* H. Clepper, editor. Origins of American conservation. The Ronald Press Company, New York.

Stroud, R. H., and H. Clepper, editors. 1975. Black bass biology and management. Sport Fishing Institute, Washington, D.C.

Summerfelt, R. C., and K. E. Shirley. 1978. Environmental correlates to year class strength of Largemouth Bass in Lake Carl Blackwell. Proceedings of the Oklahoma Academy of Sciences 56:54–63.

Suski, C. D., S. S. Killen, S. J. Cooke, J. D. Kieffer, D. P. Philipp, and B. L. Tufts. 2004. Physiological significance of the weigh-in during live-release angling tournaments for Largemouth Bass. Transactions of the American Fisheries Society 133:1291–1303.

Suski, C. D., S. S. Killen, J. D. Kieffer, and B. L. Tufts. 2006. The influence of environmental temperature and oxygen concentration on the recovery of Largemouth Bass from exercise: implications for live-release angling tournaments. Journal of Fish Biology 68:120–136.

Suski, C. D., J. H. Svec, J. B. Ludden, F. J. S. Phelan, and D. P. Philipp. 2003. The effect of catch and release angling on parental care behavior of male Smallmouth Bass. Transactions of the American Fisheries Society 132:210–218.

Sutter, D. A. H., C. D. Suski, D. P. Philipp, T. Kleforth, D. H. Wahl, P. Kersten, S. J. Cooke, and R. Arlinghaus. 2015. Recreational fishing selectively captures individuals with the highest fitness potential. Proceedings of the National Academy of Sciences 109:20960–20965.

Swingle, H. S. 1950. Relationships and dynamics of balanced and unbalanced fish populations. Agricultural Experiment Station of the Alabama Polytechnic Institute, Bulletin No. 274, Auburn, Alabama.

Swingle, H. S. 1970. History of warmwater pond culture in the United States. Pages 95–105 *in* N. G. Benson, editor. A century of fisheries in North America. American Fisheries Society, Special Publication 7, Bethesda, Maryland.

Tringali, M. D., B. L. Barthel, S. Seyoum, and J. R. Knight. 2015a. The Choctaw Bass: an undescribed species of *Micropterus* in the Gulf Coastal Plain rivers of Florida. Pages 421–448 *in* M. D. Tringali, J. M. Long, T. W. Birdsong, and M. S. Allen, editors. Black bass diversity: multidisciplinary science for conservation. American Fisheries Society, Symposium 82, Bethesda, Maryland.

Tringali, M. D., P. A. Strickland, R. A. Krause, S. Seyoum, B. L. Barthel, A. Alvarez, and C. Puchulutegui. 2015b. Conservation status of Shoal Bass in the Chipola River, Florida: the threat of hybridization with native and nonnative congeners. Pages 523–536 *in* M. D. Tringali, J. M. Long, T. W. Birdsong, and M. S. Allen, editors. Black bass diversity: multidisciplinary science for conservation. American Fisheries Society, Symposium 82, Bethesda, Maryland.

USACOE (U. S. Army Corps of Engineers). 2009. National inventory of dams. U.S. Department of Defense, Washington, D.C. Available: http://geo.usace.army.mil/pgis/f?p=397:1:2538046770831382. (September 2009).

U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census. 1991. National survey of fishing, hunting, and wildlife-associated recreation. U.S. Fish and Wildlife Service, Washington, D.C.

U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census. 1996. National survey of fishing, hunting, and wildlife-associated recreation. U.S. Fish and Wildlife Service, Washington, D.C.

U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census. 2001. National survey of fishing, hunting, and wildlife-associated recreation. U.S. Fish and Wildlife Service, Washington, D.C.

U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census. 2006. National survey of fishing, hunting, and wildlife-associated recreation. U.S. Fish and Wildlife Service, Washington, D.C.

U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census. 2011. National survey of fishing, hunting, and wildlife-associated recreation. U.S. Fish and Wildlife Service, Washington, D.C.

U.S. House of Representatives. 1925. Regulating interstate transportation of black bass. House Report 31 (69th Congress, 1st session).

U.S. Senate. 1926. Transportation of black bass. Senate Report 612 (69th Congress, 1st session).

U.S. Senate. 1930. Transportation of black bass. Senate Report 75 (71st Congress, 2nd session).

Vaillant, L. L., and M. F. Bocourt. 1874. Études sur les poissons.[Fish studies.] In Mission scientifique au Mexique et dans l'Amérique Central. Quatrième partie. [Scientific mission in Mexico and Central America. Fourth part.] Imprimerie Nationale, Paris.

Van Ness, V. 1933. Rod and gun. The New York Times (February 23):23.

Viosca, P. 1931. The southern small-mouth black bass. Transactions of the American Fisheries Society 61:95–105.

Whitmore, D. H. 1983. Introgressive hybridization of Smallmouth Bass (*Micropterus dolomieui*) and Guadalupe Bass (*M. treculi*). Copeia 1983:672–679.

Wilde, G. R. 1997. Largemouth Bass fishery responses to length limits. Fisheries 22:14–23.

Williams, J. D., and G. H. Burgess. 1999. A new species of bass, *Micropterus cataractae* (Teleostei: Centrarchidae), from the Apalachicola River basin in Alabama, Florida, and Georgia. Bulletin of the Florida Museum of Natural History 42(2):80–114.

Willis, D. W., R. D. Lusk, and J. W. Slipke. 2010. Farm ponds and small impoundments. Pages 501–543 *in* W. A. Hubert and M. C. Quist, editors. Inland fisheries management in North America, 3rd edition. American Fisheries Society, Bethesda, Maryland.

Wilson, D. M., and V. J. Dicenzo. 2002. Profile of a trophy Largemouth Bass fishery in Briery Creek Lake, Virginia. Pages 583–592 *in* D. P. Phillipp and M. S. Ridgway, editors. Black bass: ecology, conservation, and management. American Fisheries Society, Symposium 31, Bethesda, Maryland.

Wright, G. L., and G. W. Wigtil. 1980. Comparison of growth, survival, and catchability of Florida, Northern, and hybrid Largemouth Bass in a new Oklahoma reservoir. Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 34:31–38.