

THE ESTABLISHMENT OF SPOTTED BASS FISHERIES IN SOME NORTHERN MISSOURI STREAMS

by

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ABSTRACT

Spotted bass were propagated and stocked by the Missouri Department of Conservation into 16 northern and central Missouri streams to establish spotted bass fisheries. Until recently, spotted bass in Missouri, were confined to the southern half of Missouri primarily in the lower reaches of large streams. A review of spotted bass habitat requirements as determined by earlier studies indicated that spotted bass might thrive in some of the northern Missouri streams which are too silty or turbid for the other black basses.

Seining and electro-fishing were used to determine the degree of success of these introductions. As a result of stocking more than 28,000 spotted bass fingerlings (1.2-5.5 inches in length) during the years 1961 through 1968, spotted bass fisheries were established in Lamine and Loutre rivers and Perche and Silver Fork creeks in central Missouri. Reliable reports from conservation agents indicate that fishermen catch substantial numbers of spotted bass from these streams.

Spotted bass apparently did not establish populations in the Grand River, Chariton River and Salt River in northern Missouri. Spotted bass in Sugar Creek, a tributary of Grand River near Trenton, produced at least 2 year-classes of spotted bass and at least 1 year-class of spotted bass was produced in the Mussell Fork of Chariton River. Grindstone and Big creeks in Daviess counties probably contain several year classes of spotted bass but only stocked bass were collected by electro-fishing.

Spotted bass were able to reproduce and thrive in unaltered streams with stable beds as exemplified by the Lamine and Loutre rivers and Silver Fork. Large portions of the watersheds of these rivers are protected by timber, pasture or hay. The Grand and Chariton basins are intensively farmed and most of the main stem channels have been channelized. The stream beds are shifting and unstable as a result of channelization and sedimentation. Spotted bass apparently were unable to adapt to these conditions.

It was recommended that tributaries of the larger rivers of north-central and north-western Missouri should be carefully considered for further black bass introductions. Some of these smaller streams contain habitat and have water conditions that are apparently of the quality required by spotted bass.

INTRODUCTION

The distribution of black bass in Missouri streams (Figure 1) was documented by Pflieger (1971). Smallmouth bass are most numerous in the Ozark Upland region of the Missouri, but isolated populations occur in the tributaries of the Mississippi River north of St. Louis to the Iowa line. Largemouth bass are widespread and may be found anywhere in Missouri. They are generally uncommon in streams but achieve relatively large local populations in streams near the limit of the range of smallmouth bass. Until about 1940 spotted bass were confined to extreme southern Missouri in the Spring, Elk, White, St. Francis, Castor and Little Black river systems and the southeast lowland ditches (Hubbs and Bailey, 1940). However, by the early 1940's, spotted bass were in the upper Osage River system and into the Moreau River.

The origin of the spotted bass that invaded and populated the Osage River system after 1940 is not known. However, the fact that they did, raised a question. What was the full potential of the streams of Missouri to produce black bass fishing? Possibly spotted bass could thrive where smallmouth bass and largemouth bass could not.

The ecological requirements of the spotted bass differ from those of either the smallmouth or largemouth bass. Trautman (1957) said, (in Ohio) "The Spotted Blackbass chiefly inhabited moderate or large-sized streams having gradients of less than 3 feet per mile, and long sluggish, rather deep pools. It appeared to be more tolerant to turbid waters and a silt bottom than were the Largemouths and Smallmouths". Since several north Missouri streams, which lacked bass, were turbid, I initiated a study to establish black bass (spotted bass) fisheries where stream black bass fishing has been poor to non-existent. I wish to acknowledge the encouragement of Mr. P. G. Barnickol, Assistant Director of the Missouri Department of Conservation who was Superintendent of Fisheries Research when this study was initiated. Mr. Ralph M. Steppe is Hatchery Manager at the Hunnewell Hatchery and his enthusiasm for raising spotted bass is greatly appreciated.

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MATERIALS AND METHODS

The selection of streams to be stocked with spotted bass was limited to central and northern Missouri because this is the area that would most benefit by the establishment of new stream bass fisheries. The major river systems which were selected for this study were the Grand River (north), Chariton River, Salt River, and Lamine River. In addition to these systems, four smaller systems

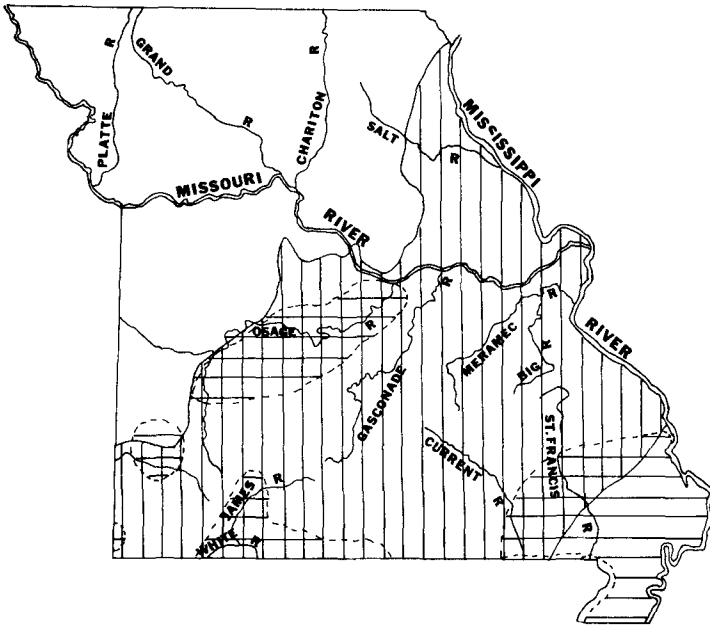


Figure 1. Approximate distribution of black basses in Missouri streams prior to 1960. Largemouth bass — Statewide in suitable habitat
 Smallmouth bass — Vertical Lines
 Spotted bass — Horizontal Lines

which are tributaries of the Missouri River were selected. These included the Petite Saline River, Perche Creek, Little Bonne Femme Creek, and Loutre River. Sixteen streams within the eight chosen stream systems were selected as streams to be stocked. The criteria used for the selection of streams and stocking sites included location, size, bottom type and turbidity. Stocking sites were visually inspected, and within each river system I attempted to select those sites which appeared to have the physical characteristics most nearly resembling "typical" spotted bass stream habitat.

Although Pflieger (1971) indicated that spotted bass in Missouri were confined to streams south of the Missouri River prior to this study, the fish populations in a number of streams were sampled. This was intended to eliminate the possibility of stocking spotted bass in streams which already contained substantial numbers of black bass.

Most of the spotted bass fingerlings used in this study were produced at the Missouri Department of Conservation's Hunnewell Hatchery. The fish were selectively removed periodically and stocked to prevent stunting and cannibalism. This also allowed us to raise some of them to the largest practical size. Growth was surprisingly uniform and there was no evidence of cannibalism.

Releases of hatchery reared spotted bass were made in 1960, 1961, 1962, 1964, 1965, 1966, 1968, and 1970 (Figure 2). Those stocked ranged from 1.0 to 5.0 inches in length. The timing of releases was largely governed by hatchery conditions.

The success of spotted bass introductions was initially evaluated by seining in late summer 2 years after stocking except for the 1970 releases. This was done to determine the production of young-of-the-year spotted bass in 1963, 1964, 1965, 1966, 1967, 1968, and 1970. The final evaluation of the stockings were made by electro-fishing in 1971, 1972, and 1973 to determine the relative abundance of spotted bass. Almost all of the release sites were seined but not all were sampled by electro-fishing.

RESULTS

Little Bonne Femme Creek

Little Bonne Femme Creek in Boone County was stocked with 67 spotted bass ranging from 6 to 14 inches in length in April and May, 1960. This stream was subsequently seined several times during the period 1962 through 1970 and no young-of-the-year spotted bass were taken. Therefore, it was assumed that this stocking attempt had failed and no other samples of the large fish population were collected.

Petite Saline River

The Petite Saline River was stocked with 360 spotted bass (2.3 inches) in June and 510 (4.2 inches) in September, 1961. The release sites were seined in 1965 and 1966 but no spotted bass were taken. No spotted bass reproduction was documented and therefore no electro-fishing was done to determine the status of the spotted bass population. This stocking attempt was an apparent failure.

Silver Fork Creek

Silver Fork Creek, a tributary of Perche Creek contained a variety of substrates, gradients and pool types. It was stocked in June, July and August, 1961 with a total of 1,517 spotted bass fingerlings. They ranged in length from 1.5 inches in June to 3.5 inches in August. Bass were released at six sites in the lower 8 miles of the stream.

Silver Fork Creek was seined in 1963, 1964, 1965, 1966, 1967, 1968, 1969, and 1970 to determine if surviving spotted bass had reproduced. Young-of-the-year spotted bass were abundant except in 1965, 1967, and 1969. During the period 1963 to 1970 spotted bass extended their range from Silver Fork Creek downstream into Perche Creek (Figure 3).

Electro-fishing was not used to evaluate the status of spotted bass in Silver Fork Creek. A minimum of 25 stream miles in this system contains a self-sustaining spotted bass population as determined by seining. This stocking was deemed moderately successful. I fished this stream on numerous occasions and found the distribution of adult spotted bass to be irregular. They seem to be abundant in deep rocky pools and rare in shallow pools containing fine gravel or sand bottoms.

Salt River

In 1961, 1,135 spotted bass (1.8-5.5 inches) were stocked in Elk Fork of the Salt River during the period June through August at six sites. Middle Fork of Salt River was stocked with 468 spotted bass (1.8 inches) in July, 1961 and 72 spotted bass (3.5 inches) were stocked in Lick Creek in July, 1961. In July, 1962, 800 spotted bass (3.0 inches) were stocked in the Elk Fork of Salt River and 700 (3.0 inches) were stocked in the Middle Fork of Salt River.

Seining in Elk Fork of the Salt River in July, 1963 produced 16 young-of-the-year hybrid bass (spotted bass × smallmouth bass) but no spotted bass (Figure 3). This was in the same section stocked in 1961 and 1962. Additional sampling in this section in October produced 38 hybrid bass and 1 spotted bass, all young-of-the-year. A severe fish kill occurred on March 24, 1964 and killed fish to the mouth of Elk Fork of Salt River. Subsequent seining in 1965 produced one hybrid bass and seining in 1970 produced no bass. Electro-fishing in Elk Fork of Salt River in 1972 produced no spotted bass. No spotted bass were taken in either the Middle Fork of Salt River or Salt River.

Lamine River

Lamine River was stocked in September 1962 with 6,200 spotted bass (4.2 inches). Approximately equal numbers were released at six crossings. Extensive seining for young-of-the-year spotted bass in 1964, 1965, 1966, 1967, and 1968 indicated abundant reproduction each year except in 1965 when high water made seining impractical. Spotted bass reproduction occurred at least 30 miles upstream from the most upstream release point. Spotted bass moved into the lower reaches of Richland Creek and Muddy Creek (Figure 3).

Electro-fishing at three stations in Lamine River in the summer of 1971 revealed that spotted bass had become a significant component of the fish population (Figure 4). Spotted bass comprised 6% and 4% of the total weight of the samples, respectively at two sites. Spotted bass comprised 45% and 48%, respectively of the total weight of centrarchids at two sites. At a site on the lower Lamine River largemouth bass comprised 10% of the weight of the total sample and 76% of the weight of all centrarchids in the sample. Conservation Agent Paul Wunderlich reported that many spotted bass up to 2.0 pounds in weight were caught from Lamine River in 1974.

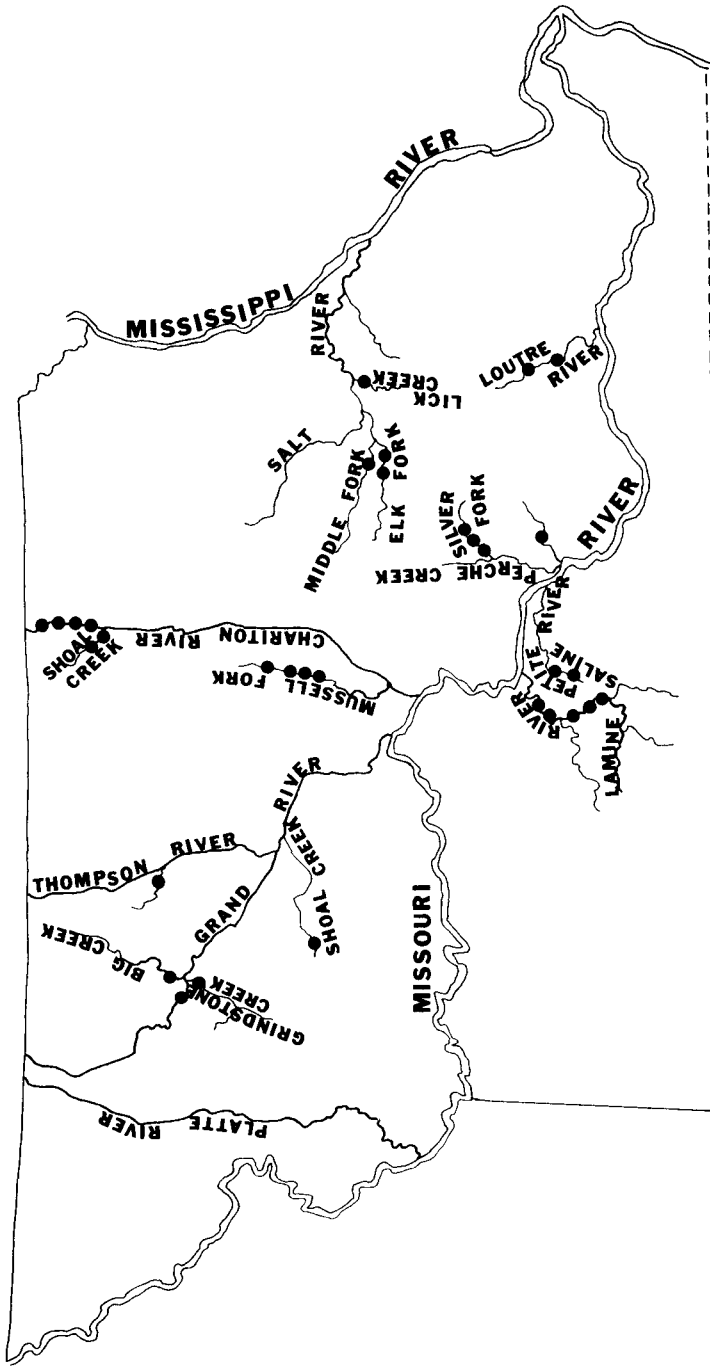


Figure 2. Approximate location (dots) of release sites for spotted bass in northern Missouri streams, 1960-1971.

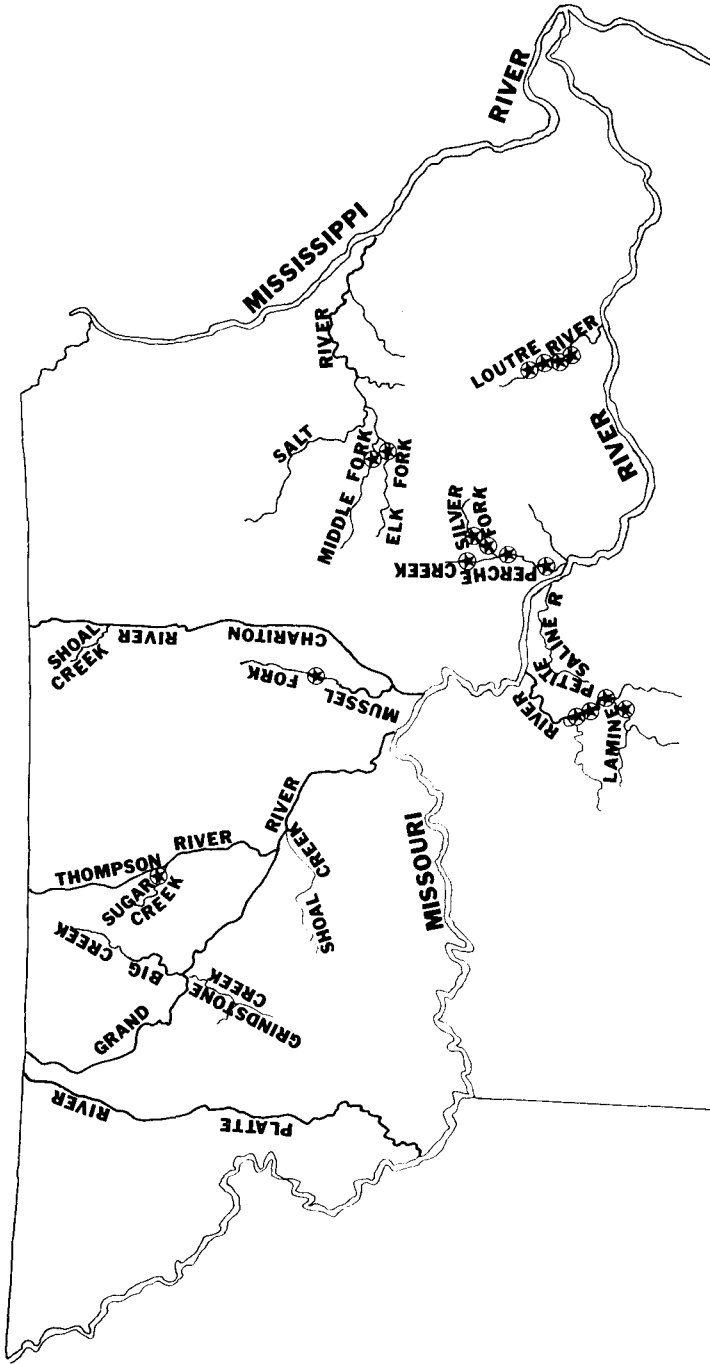


Figure 3. Approximate location (circled stars) of northern Missouri stream sites where spotted bass reproduction was documented by seining.

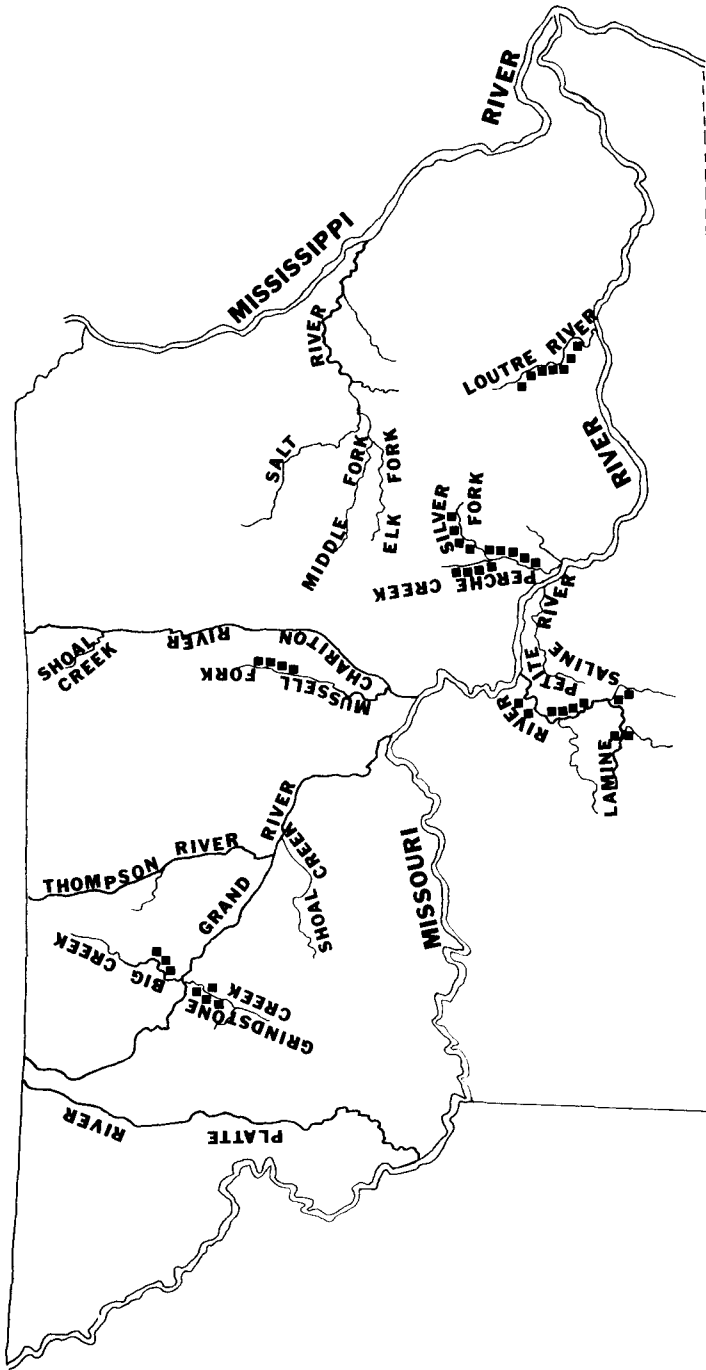


Figure 4. Approximate location of northern Missouri stream segments which contained adult spotted bass 2 or more years after stocking with spotted bass fingerling (squares indicate adult spotted bass present).

Loutré River

A total of 7,905 spotted bass (3.0 inches) were released in Loutré River in July 1962 at five sites. The number released at each site varied from about 500 to nearly 1,500.

The Loutré River was seined at all the stocked sites in 1964, 1965, 1966, 1967, and 1968. Young-of-the-year spotted bass were common at all stations in each of the years (Figure 3). Reproduction and expansion of spotted bass in the Loutré River was very rapid and comparable to the successful stocking of the Lamine River system.

The Loutré River was sampled by electro-fishing at two sites in the summer of 1971 to determine the status of the spotted bass population in the fish community (Figure 4). Spotted bass comprised a larger numerical proportion of the fish sample at both sites but the weight was almost identical to that of the largemouth bass. Spotted bass may have been more important in Loutré River than our sampling indicated since spotted bass prefer deeper water in streams whereas largemouth bass often cruise at the surface. Conservation Agent Floyd Ficken reported that substantial numbers of spotted bass were caught from Loutré River since 1964.

Grand River

Sugar Creek, a small tributary of the Thompson River (a major tributary of Grand River) was stocked with 213 spotted bass (4.2-5.2 inches) in July 1965 (Figure 2). No more spotted bass were stocked in the Grand River system until October, 1968 when 700 spotted bass (5.0 inches) were stocked in Grand River near Pattonsburg and 300 (5.0 inches) were released in Shoal Creek in Caldwell County. In September, 1970 Big Creek, Grindstone Creek and Grand River were stocked with 2, 3, and 4 thousand spotted bass (3.5 inches), respectively. Shoal Creek received 3,500 spotted bass (3.5 inches) in 1970. In 1971 an additional 12,000 spotted bass (4.0 inches) were stocked in the Grand River system at the same sites stocked in 1970.

Seining for young-of-the-year spotted bass in Sugar Creek in Harrison County was done in 1967, 1968, and 1969. Numerous young spotted bass were found in 1967, very few in 1968, and none in 1969 (Figure 3). I was very much encouraged by the excellent spotted bass reproduction in Sugar Creek in 1967. This demonstrated that there are stream conditions in some parts of northwestern Missouri suitable for spotted bass reproduction.

In the summer of 1972 extensive sampling (about 7 miles) of the upper Grand River by electro-fishing did not produce any black bass. Approximately 2 miles of the lower Grand River was sampled by electro-fishing in 1972 and no black bass were taken. Evidently spotted bass have not survived or remained in the main stem of the Grand River in significant numbers.

In 1973 Big Creek and Grindstone Creek, two tributaries of Grand River, were sampled by electro-fishing to determine whether these tributaries contained stocked spotted bass. Spotted bass were taken in both creeks. These bass were aged and it was determined that they were bass stocked in 1970 and 1971. Growth and condition was excellent. Shoal Creek was also sampled by electro-fishing in 1973 but no spotted bass were taken. It is apparent that certain tributaries of Grand River such as Sugar Creek, Big Creek, Grindstone Creek, and the headwaters of Shoal Creek are more suitable to centrarchids than the Grand River.

Chariton River

Spotted bass were released at four sites on the upper Chariton River in June, 1966. These bass were about 2.0 inches long and a total of 1,720 were divided about equally among four sites. In 1968, 1,690 additional spotted bass were released at these sites during the period July through October. They ranged from 3.0 to 5.0 inches. Shoal Creek, a tributary of Chariton River was stocked in June, 1968 with 1,600 spotted bass (1.2 inches). Mussell Fork, the largest tributary of Chariton River in Missouri was stocked with 2,500 spotted bass ranging in length from 1.2 to 4.5 inches in June and October, 1968.

Sampling by seining at all the stocked stream sections of Mussell Fork, Shoal Creek, and Chariton River in 1968, 1969, and 1970 failed to produce any young-of-the-year spotted bass.

Although no spotted bass reproduction in the Chariton River system was documented, two sites on the Mussell Fork in Macon County were sampled by electro-fishing in the summer of 1973. A spotted bass was taken from Mussell Fork and it was in its third year of life. The most recent stocking of spotted bass was in 1968; 5 years before this spotted bass was caught. Evidently spotted bass in Mussell Fork produced offspring in 1971.

DISCUSSION

This project was intended to establish spotted bass stream fisheries in northern Missouri where stream black bass fishing was either absent or insignificant. The invasion of the Osage River system by spotted bass during the period (approximately) 1940 to 1960 provided the original stimulus for our effort to expand the range of spotted bass into selected northern Missouri streams. Spotted bass differ from the other black basses native to Missouri (smallmouth and largemouth bass) in their ecological requirements and tolerance of certain environmental factors. Like the smallmouth bass, they thrive in streams but are believed to be more tolerant of turbidity, high water temperature, and low gradients. These conditions, high turbidity, warm water, and low gradients are common in the streams of northern Missouri. Largemouth bass are partial to slow-moving, weedy, relatively clear, and warm waters. The lack of aquatic vegetation and high turbidity in the typical stream of northern Missouri is not conducive to substantial production of largemouth bass.

Rearing, harvesting, and stocking of spotted bass was relatively easy. However, the results of our attempts to establish spotted bass fisheries as measured by reproduction and abundance of adults were extremely variable. Greatest success was achieved in streams which apparently most nearly approximated optimum spotted bass streams described by other observers. These streams had large deep pools and well defined riffles and were warm and turbid in the summer. None of the streams in which spotted bass became established had been extensively altered by channelization or bank clearing. These unaltered streams were typified by the *Lamine* and *Loutre* rivers.

Spotted bass failed to become established in the main stems of the Grand and Chariton rivers. Very extensive channelization has reduced these rivers to the status of large ditches. The banks of these streams are unstable and the stream beds are composed of shifting sand. Even these streams have tributaries which are apparently unaltered and contain much habitat similar to the streams in which spotted bass become established. A moderate number of spotted bass survived in several of these tributaries and a small amount of reproduction was documented. Sugar Creek, Grindstone Creek, and Mussell Fork of Chariton River are typical tributaries where this happened.

The watersheds of those streams where spotted bass were least successful are the most intensely farmed because they lie entirely within the "cornbelt" and the soil is naturally productive. Intensive farming results in such an enormous amount of soil erosion that the larger streams are hardly able to transport all of it to the Missouri River. By comparison, the smaller tributaries flush rapidly and the stream beds are relatively stable.

The watersheds of the *Lamine* and *Loutre* rivers are in less productive regions of the state. More of these watersheds are protected by timber, pasture and hay and consequently there is much less soil erosion and stream siltation than in the Grand and Chariton basins.

The prospect for future extensions of the range spotted bass in northern Missouri is very limited because only a relatively small mileage of unstocked streams suitable for black bass remain. These streams are tributaries of the Grand and Platte rivers and some small tributaries of the Missouri River. Some of these small streams may be suitable for either spotted or smallmouth bass.

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