THE STRIPED BASS × WHITE BASS HYBRID IN WEST POINT RESERVOIR[1]

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Abstract: The striped bass (♀) white bass (♂) hybrid (*Monroe saxatilis* × *chrysops*) was first stocked into West Point Reservoir in May of 1978. Fishermen interviews established that a fishery had developed as early as January of 1979. The hybrid bass were stocked at 2 rates over the period of study, 84 mixed fry and fingerlings per hectare in 1978 and 150 mixed fry and fingerlings per hectare in 1979. Fish in the 1979 year class had a mean length at annulus 1 which was 48 mm greater than those stocked in 1978; threadfin shad (*Dorosoma petenense*) made up most of the diet, and increased growth in 1979 was apparently due to an increased abundance of threadfin shad. Bluegills (*Lepomis macrochirus*), gizzard shad (*D. cepedianum*), and largemouth bass (*Micropterus salmoides*) were also found in the stomachs of hybrids that were longer than 100 mm. Hybrid bass that had not yet progressed to a piscivorous diet relied heavily on insect larvae of the family chironomidae. There was no significant relationship between prey size and hybrid mouthpart size or between prey size and hybrid length.

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Striped bass introductions into landlocked reservoirs in the Southeast have met with mixed success. In some cases, such as Santee Cooper Reservoir (South Carolina), a successful and self-sustaining fishery developed (Williams 1981). In several reservoirs, fisheries have developed but the populations are not self-sustaining and striped bass must be artificially spawned and stocked. Stocking programs are not always successful (Bishop 1967); recent evidence indicates that if a cool water haven with adequate oxygen is not present during summer months, striped bass survival may be severely reduced (Coutant and Carroll 1980).

Hybridization experiments with several *Morone* species were conducted in the mid-1960's. The 1 successful cross was accomplished by Stevens in 1965 by fertilizing the eggs of the striped bass with the sperm of the white bass; the resulting hybrid provided a higher hatching rate than striped bass (Bonn et al. 1976) and the hybrid fry were eaiser to raise to stockable size (Williams 1981). Adult hybrids survive better under hatchery conditions than either parent (Bishop 1967). The hybrid does not have the potential to grow as large as the striped bass, but hybrids in excess of 9 kg have been reported in Clark Hill Reservoir, South Carolina (Williams 1981).

Two primary reasons for stocking hybrid striped bass into Southeastern reservoirs are to establish fisheries for a large, open water game fish and to exert predatory pressure on the larger, underutilized gizzard shad.

The objectives of this study were to compare 2 stocking rates with respect to hybrid growth and to examine predator-prey size relationships.

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METHODS

West Point Reservoir is a main-stream, multi-purpose impoundment located in Alabama and Georgia on the Chattahoochee River. Designed and build by the Army Corps of Engineers, West Point Reservoir provides recreation, flood control, and hydroelectric power; in addition, domestic water is supplied for the towns of West Point and LaGrange, Georgia, and Lanett, Alabama. Full pool was reached in 1975 bringing the surface area to 10,121 ha with 845 km of shoreline.

The Georgia Department of Natural Resources began stocking hybrid striped bass into West Point Reservoir in 1978; both fingerlings and fry were stocked (Table 1) (Pers. Commun., F. Ellis, Ga. Dep. Nat. Resour., Manchester).

Table 1. Stocking rates for hybrid striped bass (no./ha), West Point Reservoir, 1978 — 1979.[a]

Year	Fry #	% Total	Fingerling #	% Total	Total #
1978	71	85	13	15	84
1979	105	70	45	30	150

[a] Stocking program for hybrid bass continued in 1980 and 1981.

Several sampling gears were used to provide hybrid bass for the study. Because of the limnetic habits of the fish, gill netting provided most of the specimens. Littoral sampling techniques, such as night electrofishing and shoreline rotenone sampling, provided small age 0+ to 1+ fish. Some age 0+ fish were collected in cove rotenone samples; trap nets and angling were also used to supplement gill net collecting.

Gill nets were of monofilament construction consisting of 5 7.6-m panels of 5 to 15 cm stretched mesh. Gill nets were set where hybrids were suspected of occurring based on the recommendations of local fishing guides. At any 1 time, 2 nets were set (one parallel to the shoreline and one perpendicular to the shoreline) for periods of 2 to 24 hours according to water temperature; efforts were made to remove the fish from the nets while they were still alive.

The electrofishing equipment used was of conventional design with pulsed D.C. current provided by a Coffelt model VVP-2c pulsator powered by a 3,500-watt Homelite A.C. generator. Electrofishing was only of limited importance in collecting adult fish, but it did provide most of the fish below 100 mm in length. Littoral rotenone samples (0.015 ha) were conducted by stretching a 30.5-m block-off net in a semi-circle on a randomly chosen section of shoreline and applying 1 ppm rotenone (Timmons et al. 1979). Cove sampling was conducted by setting a block-off net across the mouth of a cove and applying 1 ppm of rotenone. Trapnets (Great Lakes type, 1.5 m deep) were set perpendicular to shore with the lead line running toward shore to intercept fish moving parallel to the shoreline; the trapnets were checked and the fish removed once a week with the nets remaining out for a period of 1 month. Fish captured by angling were taken by trolling and by casting artificial baits to schools of hybrids which were feeding at the surface.

Data were analyzed using the Statistical Analysis System (Helwig and Council 1979), and correlation analyses were performed on several aspects of the age, growth and food habit data. For age and growth, total fish length was regressed against scale radius, and a slope and intercept were established for use in back calculating the lengths at annuli formation. Three hundred and five fish from 80 to 501 mm in total length provided values for back calculating the lengths used to compare growth at the 2 stocking rates. The scale radius body length relationship used was LENGTH = 56.3912 + 1.2179 (RADIUS). Mouthpart size (from inside to inside surface of the cleithrum) was measured and substituted into an equation (Lawrence 1957) to calculate the maximum possible size of prey that could be eaten. Using actual stomach data, prey total length was regressed against hybrid total length to establish the actual predator-prey size relationship. Log transformations were used to provide a better fit to linear plots. Data from summer cove sampling were compiled to provide prey availability information for the two years under consideration.

RESULTS AND DISCUSSION

Although preliminary analysis of cove sampling data suggested that the 1978 year class had a better growth rate than the 1979 year class (Shelton et al. in press), analysis by back-calculation of length at annulus formation showed that fish from the 1979 stocking rate of 150 mixed fingerlings and fry per hectare grew significantly better than fish stocked in 1978 at a rate of 84 mixed fingerling and fry per hectare. The mean length at annulus 1 for the 1978 year class was 242 mm (mean weight = 0.17 kg) compared to 290 mm (mean weight = 0.31 kg) for the 1979 year class. Stocking rates and growth rates were within the ranges reported in other southeastern and southwestern reservoirs (Bishop 1967, Ware 1974, and Williams 1981). It is possible that the better growth observed for the 1979 year class can be correlated with a higher standing stock of threadfin shad 89 mm or less in length. Cove sampling (4 coves) in the summer of 1978 showed a mean value of 303 threadfin shad per hectare while in the summer of 1979 there were 1,880/ha. It is reasoned that the greater abundance of threadfin shad in 1979 contributed to the greater growth of the hybrid in that year.

Stomach analysis showed a preponderance of threadfin shad in the diet. For hybrids over 150 mm, approximately 83% of the food items identifiable by species were threadfin shad; approximately 10% were gizzard shad, and the remaining 7% were yellow perch (*Perca flavescens*), bluegill, and fingerling largemouth bass (Table 2). Mean length of fish prey found in these hybrid stomachs was 65 mm. Small hybrids in the 100 to 150 mm length range fed on centrarchids 15 to 20 mm in length; stomachs of hybrids less than 100 mm were found to contain only insect larvae (Table 3).

Regression of prey length on hybrid length (Fig. 1) from stomach data showed very little ($r^2 = 0.09$) relationship. When the maximum hypothetical prey size that hybrids can gulp is plotted along with the actual lengths of prey consumed (Fig. 1), it is apparent that the hybrids were not utilizing prey items in accordance with the relationship, but were instead feeding upon individuals of approximately 65 mm regardless of their ability to gulp larger-sized fish. Cove rotenone samples taken over the 2 years of study (8 coves) showed an average of 5,594 gizzard shad per hectare at an average length of 156 mm indicating that ample numbers of larger-sized prey were available. Hybrid mouthpart size was strongly associated with total

Table 2. Items found in stomachs of 275[a] hybrid bass 151 to 501 mm in total length.

Food Item	Total # of each item (all stomachs)	% of Food Item
Threadfin shad	125	48.6
Gizzard shad	15	5.8
Shad[b]	31	12.1
Digested fish	77	30.0
Other	9	3.5

[a] One hundred twenty-three of the 275 stomachs were empty.
[b] Too badly decomposed to identify by species.

Table 3. Items found in the stomachs of 30[a] hybrid bass 80 - 150 mm.

Food Item	Total # of each item (all stomachs)	% of Food Item
Insect larvae	24	92.3
Bluegill	1	3.8
Other	1	3.8

[a] Fourteen of the 30 stomachs were empty.

hybrid length ($r^2 = 0.86$), thus the regression of prey length on hybrid mouthpart size did not show any greater association than the regression of prey length on hybrid length.

It is speculated that there is very little size selection involved when a school of hybrids feeds on a school of forage fish, regardless of the size range of individual members in the hybrid school. Schooling and subsequent herding behavior of the hybrid bass on forage fish may make the hybrids more efficient predators than if selectively capturing individual prey items. A few hybrids in the 400-mm and above length range had eaten gizzard shad of 100 to 150 mm in length, but this occurrence was rare compared to hybrids of the same size that were feeding on smaller threadfin shad. Hybrids may feed to a greater extent on threadfin shad because of the pelagic habits of both species and the predatory efficiency of hybrid schooling behavior. It is possible that in the future, when hybrids in West Point Reservoir reach larger sizes, they may begin to feed more actively on the gizzard shad as a group, but given their size range during this study, hybrids were not exerting significant predatory pressure on the gizzard shad in West Point Reservoir.

In conclusion, it is suggested that a stocking rate as high as 45 fingerlings and 105 fry per hectare does allow growth of hybrid bass similar to that reported in other southeastern reservoirs, assuming adequate threadfin shad abundance. It might be advantageous in future stocking programs to lower stocking rates after a very severe winter if threadfin shad populations are adversely affected. In this respect, it might be possible to develop guidelines for hybrid stocking rates based on indices of threadfin shad abundance. A fishery has developed for the hybrid striped bass at West Point Reservoir with some anglers fishing exclusively for this fish, but at their present size, there is no evidence to suggest that hybrids in the size range represented in this study are providing any beneficial effect in utilizing gizzard shad in the 150 mm and greater size range.

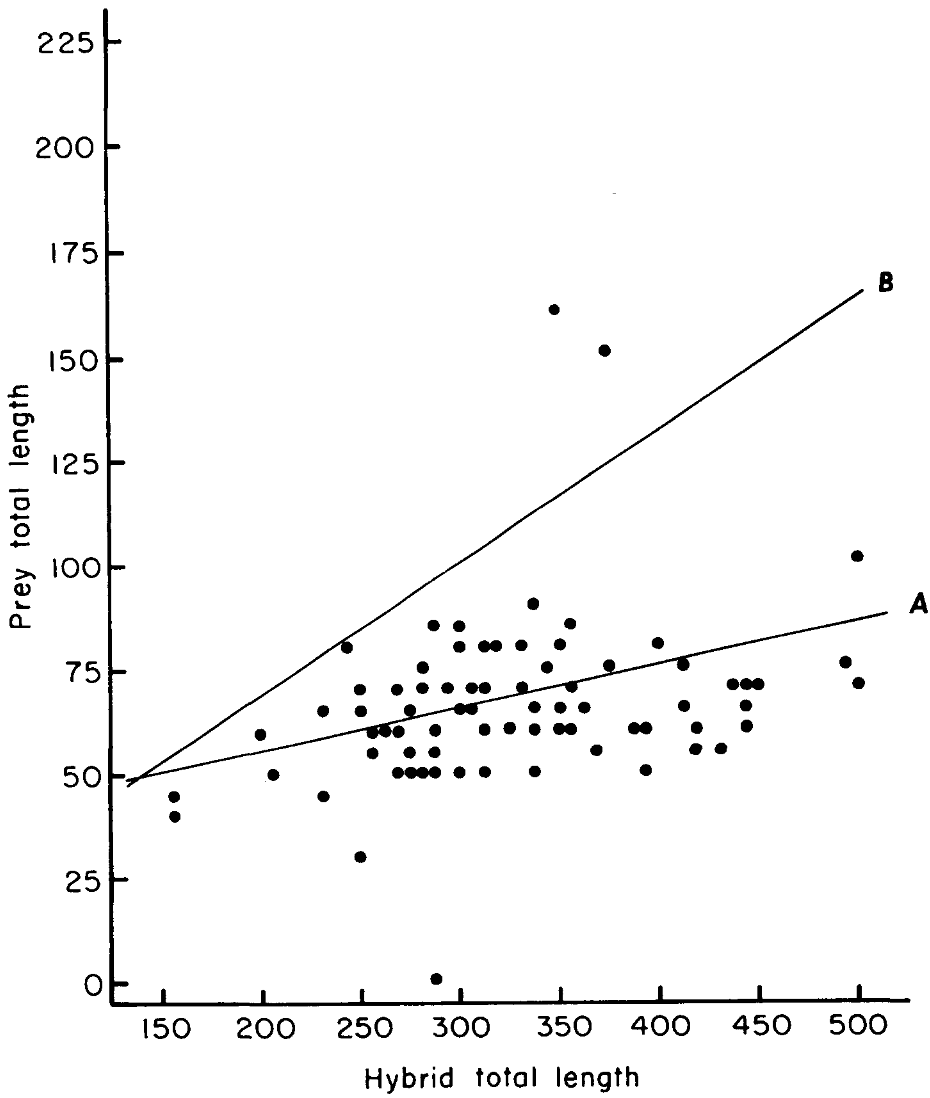

Fig. 1. A regression of prey total length on hybrid total length (line A). Points represent lengths of prey as measured from hybrid stomachs. Line B represents the hypothetical maximum length of gizzard shad which could be swallowed by a hybrid of a given length based on size relationship of Lawrence (1957). One hundred fifty-three observations are hidden.

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