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ABSTRACT: Two-day-old larvae of striped bass *(Morone saxatilis)* were trained to accept artificial feed. When the fish reached 10 g, 1080 were stocked in a 0.4-ha hatchery pond. The fish were stocked on 7 August 1976 and harvested 441 days later on 19 October 1977. They were fed daily through the fall of 1976 and again during the spring, summer, and fall of 1977. The fish stopped feeding in the fall when the water temperature fell to 7°C, and resumed feeding in the spring when the temperature reached 16°C. Once they began to feed, they fed well when the temperature was above 10°C, but poorly when the temperature was 29°C or higher. The fish were fed 291 of the 441 days during which they were held in the pond. The rate of growth was 2.03 g per fish per day; 980 kg/ha of striped bass were produced. Food conversion was 2.8 for the 85% of the population that ate the artificial feed. Survival was 91.8%.

A need exists for a species of fish that can be cultured as a pond-reared food fish at intermediate latitudes of the United States. The striped bass *(Morone saxatilis)*, which feeds well at low water temperatures and has optimum growth at 20°C (Koo and Ritchie 1973), may fill this need. The striped bass has other attributes that warrant its further study as a pond-reared fish: it can be trained to accept artificial feed, control of population density in ponds is highly feasible, and the rearing of fingerlings for stocking production ponds is practical. Since the striped bass is already recognized as a food fish of high quality, it should have good market acceptability.

In the present study, our objectives were to determine the growth and survival of striped bass in a warmwater pond after the fish had been trained to accept artificial feed, and to determine the feeding season for this species at the latitude of southern Illinois (37° North).

Materials and Methods

Fingerling striped bass used in the study were Hudson River stock obtained as 2-day-old larvae. They were held in tanks where they were trained to accept artificial feed and raised to an average weight of 10 g and a total length of 112 mm (Lewis et al. 1977).

On 5 August 1976, we stocked a 0.4-ha hatchery pond in Jackson County, Illinois, with 1080 of the fish. The average pond depth was 1.2 m, and the maximum was 2.1 m. Several days before stocking, the pond was drained to eliminate predators and to reduce the number of natural food organisms. We refilled the pond and maintained the water level by pumping water from a strip-mine lake. Oxygen concentrations were near saturation throughout the study, except for periods of low oxygen in January and May 1977. Alkalinity varied with the season from 36 to 90 mg/L as $CaCO_3$; pH ranged from 7.0 to 9.0

The striped bass were hand-fed daily for 291 days on Silver Cup #3 (a sinking feed), Purina Trout Chow #6 (a floating feed), or both. Feeding began 2 days after stocking and continued until the fish stopped feeding in early November. The fish were again offered feed in the spring of 1977 and fed until the study was terminated in mid-October. The feeding schedule is given in Table 1.

Water and air temperatures were recorded daily at feeding time to determine the temperature at which the fish exhibited the best feeding response. The feeding season was determined by counting the days between

Table 1. Feeding schedule of striped bass stocked in a pond and fed pelleted feed for 291 days between 7 August 1976 and 16 October 1977.

Date	Type of feed	Times fed/day A.M.	Times fed/day P.M.	Amount of feed /feeding (kg)
7 Aug. – 6 Sept.	Silver Cup	1	1	0.91
7 Sept. – 11 Sept.	Silver Cup and Purina	1	1	0.91
12 Sept. – 4 Nov.[a]	Purina		1	1.40
29 Mar.[b] – 11 Apr.	Silver Cup	1		1.80
12 Apr. – 21 May	Silver Cup and Purina	1		2.30
22 May – 16 Oct.[c]	Purina	1		2.7-9.9[d]

[a] Fish stopped feeding for the winter.
[b] Fish resumed feeding in the spring.
[c] Feeding terminated before harvest.
[d] Range of amount of feed the fish were fed daily to satiation (the amount increased about 1.4 kg per month).

the dates the striped bass started feeding in the spring and stopped feeding in the fall.

The fish were harvested on 19 October 1977. The pond was drained to one-third normal depth to facilitate seining, and then completely drained to ensure recovery of all the fish. All fish were weighed and measured at harvest. From these data we determined survival, growth rate, production, food conversion, and weight frequency distribution, and estimated the percentage of the population that accepted artificial feed.

Results

The striped bass fingerlings accepted commercial dry feed within 2 days after being stocked and continued to feed until the water temperature fell to 7°C on 4 November 1976 (Table 1). The fish fed well when the water temperature was 10°C or higher. In March 1977, when the water temperature began to rise, feed was again offered, but the striped bass did not begin to feed again until the water temperature reached 16°C (Table 1). They continued to feed well during the spring and summer except when the water temperature was 29°C or higher.

The striped bass survived two short periods of low oxygen. In late January, oxygen concentrations ranged from 1.5 to 3.5 mg/L and remained relatively low until the ice melted in mid-February. Low oxygen concentrations were caused by thick ice cover, cloudy days, and an abundance of filamentous algae. Oxygen concentrations also dropped to a low level in May 1977. The fish aggregated in an area with an oxygen concentration of 1.2 mg/L; other parts of the pond had oxygen readings of 0.9 mg/L or less.

At the end of the study 991 striped bass were harvested (91.8% survival). On the basis of weight frequency distribution (Fig. 1), we concluded that 85% of the surviving fish ate the artificial feed, and that 15% apparently subsisted on natural food. Growth of the fish that accepted artificial feed was 2.13 g per fish per day; food conversion was 2.8. The mean standard length, total length, and weight for both groups are given in Table 2.

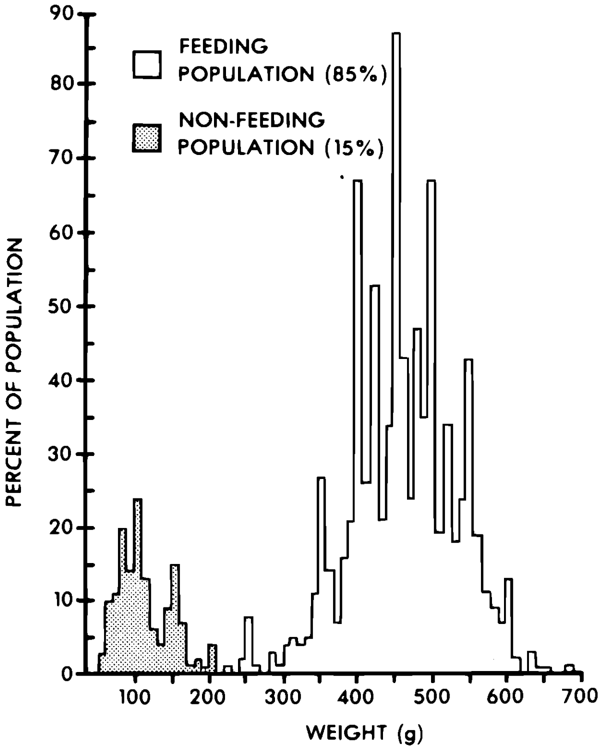

Fig. 1. Weight frequency distribution of striped bass stocked in a 0.4-ha hatchery pond and fed pelleted feed for 291 days in a 441-day study.

Discussion

Survival of the stocked fingerling striped bass was good, considering that they overwintered in the production pond and experienced critically low oxygen on two occasions. It is also encouraging that most of the fish (85%) continued to eat artificial feed after being stocked in the pond. Our conclusion that the bimodal weight frequency distribution indicates that a part of the population ate the artificial feed and a part did not seems justified, inasmuch as this phenomenon has been consistently encountered by investigators attempting to

Table 2. Average standard and total length, average weight, growth rate, production, and food conversion of the surviving (91.8%) striped bass stocked in a 0.4-ha hatchery pond and fed pelleted feed.[a]

Population	Length (mm) Standard	Length (mm) Total	Weight (g)	Growth rate (g/day)	Production[b] (kg/ha)	Food conversion[c]
Total	252	300	406	1.79	981.7	2.66
Feeding (85%)	268	318	459	2.03	944.4	2.80
Nonfeeding (15%)	165	198	107	0.24	37.3	–

[a] Fish in pond 441 days; feeding period, 291 days.
[b] Standing crop less weight at stocking.
[c] Food conversion = total amount of feed supplied (g)/total weight gain (g).

train predator fishes to accept artificial feed (Lewis et al. 1969; Nelson et al. 1974; McCraren 1974; Snow 1975; Edelen 1977).

The average daily increase in weight of fish that ate the artificial feed was 2.03 g, compared with 2.52 g per fish per day for channel catfish *(Ictalurus punctatus)* stocked at a similar density and fed a similar feed (Meyer et al. 1973). Water temperatures remained at the optimum for growth of striped bass–20°C or above (Koo and Ritchie 1973)–from May through September (Fig. 2). Considering only the fish that ate the artificial feed, gross food conversion was 2.8, compared with 1.7 for channel catfish raised under similar conditions (Meyer et al. 1973).

On the basis of the present study, it appears that the striped bass merits further study for use as a commercially produced food fish.

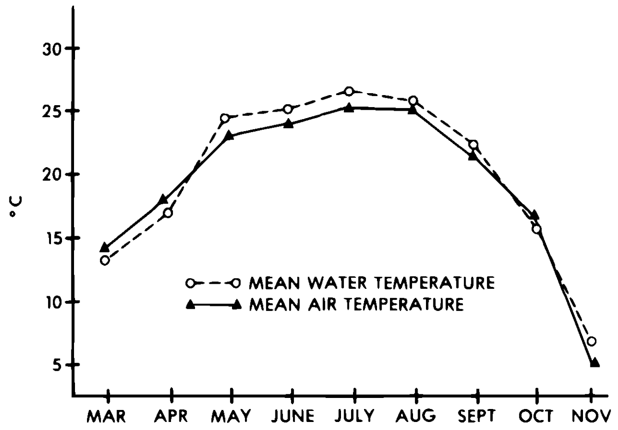

Fig. 2. Mean monthly water and air temperatures during the 221-day feeding season that was determined by the times when striped bass in Jackson County, Illinois, began to feed and stopped feeding. Temperatures above 20°C represent optimum temperatures for feeding and growth.

References

Edelen, R.W. 1977. Artificial diets for largemouth bass. M. S. thesis. Colorado State University, Fort Collins. 42 pp.

Koo, T.S.Y., and D.E. Ritchie. 1973. Growth of juvenile striped bass, *Morone saxatilis,* as determined by tagging and recapture. Proceedings of a workshop on eggs, larval and juvenile stages of fish in Atlantic Coast estuaries. U. S. Natl. Mar. Fish. Serv. Tech. Publ. No. 1:124-125.

Lewis, W.M., R. Heidinger, and B. Tetzlaff. 1977. Striped bass rearing experiments 1976. Report to Consolidated Edison Company of New York. 197 pp.

McCraren, J.P. 1974. Hatchery production of advanced largemouth bass fingerlings. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 54:260-270.

Meyer, F.P., K.E. Sneed, and P. T. Eschmeyer, editors. 1973. Second report to the fish farmers. Res. Publ. 113, U. S. Fish Wildl. Serv., Washington, D.C. 123 pp.

Nelson, J.T., R.G. Bowker, and J.D. Robinson. 1974. Rearing pellet-fed largemouth bass in a raceway. Prog. Fish-Cult 36(2):108-110.

Snow, J.R. 1975. Hatchery propagation of the black basses. Pages 334-356 *in* H. Clepper, ed. Black bass biology and management. Sport Fishing Institute, Washington, D. C.

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Cleaning Raceways with a Concrete Grinder

Algal growth and fish fecal matter can be problems in hatchery raceways. Unclean raceways may stress resident fish, making them susceptible to a variety of diseases (Shepherd and Poupard 1975). The system described here reduces time and effort in raceway cleaning.

Modification of the dam boards used in most raceway systems (Figs. 1, 2) enables the use of power equipment for cleaning. Two small wood blocks 5.1 × 10.2 cm (2 × 4 in.) effectively separate two dam boards by 9.6 cm (3.75 in.). A board, 5.1 × 15.2 cm (2 × 6 in.), is bolted to the top dam board in one corner and acts as a drain when lifted.

Fish are crowded into the lower half of the raceway section and the water level lowered gradually, which prevents a fish panic. Fine steel wire brushes cut to fit a concrete grinder are used to remove all waste and algal growth from the floor of the upper half of the raceway. The fish are then crowded into the upper end of the raceway and the cleaning is completed. Sides are