Growth and Food Habits of Age-0 Walleye × Sauger Hybrids in Thunderbird Reservoir, Oklahoma[1]

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Abstract: Ninety-eight thousand walleye (*Stizostedion vitreum vitreum*) × sauger (*S. canadense*) hybrid (saugeye) fingerlings were stocked in Thunderbird Reservoir, Oklahoma, in May 1985, and 129,400 fingerlings were introduced in April 1986 to evaluate the possibilities of a superior put, grow, and take fishery where previous walleye fry stockings have failed. Saugeye showed rapid growth rates; age-0 fish attained a mean length of 270.8 ± 8.2 mm (mean ± 95% CL) by October 1985, and 256.1 ± 11.2 mm by October 1986. Both year classes preferred inland silversides (*Menidia beryllina*) as a forage species, with 75% of the stomachs sampled containing inland silversides. Although ≤200 mm largemouth bass (*Micropterus salmoides*) also utilize inland silversides, they do so only during periods when other forage species are limited. Therefore, competitive interaction during saugeye early life history is not suspected. Saugeye demonstrated an outstanding potential for use in a put, grow, and take fishery for other Oklahoma impoundments.

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The saugeye, a hybrid of the walleye (*Stizostedion vitreum vitreum*) and sauger (*S. canadense*), is fast becoming popular among fisheries management personnel. This relatively new hybrid has many traits that contribute to its increasing popularity. Saugeye are reported to have rapid growth rates, superior to either of the parent fish, which allows them to attain a catchable size (>300 mm) within their first year of growth (Humphreys et al. 1984). They are an appealing sportfish, with angler success reported in Tennessee and Ohio (Humphreys et al. 1984, Smith 1985). The trend in saugeye food habits suggests a potential for utilization of forage fish at sizes unused by other predators (Humphreys et al. 1984).

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Currently, saugeye introductions are broadening; however, to data, little has been published on the subject. Most literature obtained was from Tennessee and Ohio fish and game agencies which have been stocking saugeye for 5 and 8 years, respectively. In these two states, all introductions of saugeye were in lakes with known or suspected walleye or sauger recruitment problems. Research in Tennessee and Ohio has been directed towards comparative growth and survival of saugeye to walleye in warm eutrophic conditions and interspecific competition between saugeye and other game species such as largemouth bass (*Micropterus salmoides*), striped bass (*Morone saxatilis*), and crappie (*Pomoxis* spp.). Both states have recorded saugeye as exceeding the walleye in adaptability, growth, and survival (Stroud 1948, Johnson 1981, Lynch et al. 1982, Humphreys et al. 1984). No detrimental effects to other sportfish have been documented (T. Wasson, pers. commun., Ohio Dep. Nat. Resour.).

From 1966 to 1969 approximately 1,750,000 walleye fry were introduced into Thunderbird Reservoir, Oklahoma. An estimated 7 million walleye fry were stocked from 1974 to 1976 to supplement the declining populations and to assess the potential of a naturally reproducing, self-sustaining walleye population (Mense 1979). Conclusions of Mense's evaluation were that too many egg predators, inadequate zooplankton densities during spawning and fry stocking periods, and an unfavorable ratio of spawning area to surface area impeded the lake from becoming a self-sufficient walleye fishery. Therefore, it was recommended that any subsequent stockings should be with fingerlings for put, grow, and take purposes only. Because saugeye enters the creel faster, appeals to anglers, and possibly increases utilization of an abundant, essentially unused forage base, it was felt that initiating a stocking program of fingerling saugeye would provide a highly beneficial put, grow, and take fishery. The objective of this study was to determine growth rates and food habits of saugeye and, further, to evaluate possible diet overlap between saugeye and other indigenous sport species.

Methods

Thunderbird Reservoir, located in Cleveland County in central Oklahoma, is 2,456 ha in size. It was constructed by the Bureau of Reclamation in 1965 and serves as a water supply for Norman, Midwest City, and Del City. Slightly turbid and nutrient rich, Thunderbird is known for its excellent largemouth bass fishery but stunted crappie population. Gizzard shad (*Dorosoma cepedianum*), threadfin shad (*D. petenense*), and inland silversides (*Menidia beryllina*) are the main forage base (Summers 1984).

In April 1985, 256,000 eyed saugeye eggs were obtained from the Hebron State Hatchery in Ohio. An in-state hybridization occurred in 1986 by capturing male sauger from the Arkansas River Navigation System and crossing them with female walleye from Canton Reservoir. The eggs were hatched at Byron State Fish Hatchery in Oklahoma in 1985 and in 1986 and pond cultured to 37 mm fingerlings prior to stocking. Approximately 98,000 saugeye fingerlings were introduced to

Thunderbird Reservoir on 15 May 1985. A total of 129,400 fingerlings were stocked on 29 April 1986. Because of limited pond space for adequate fingerling culture, 96,000 fry were stocked on 31 March 1986.

Initially, night shoreline seining was the method of saugeye capture, but this technique was of limited success. Previous research on sampling young-of-the-year walleye (Gilliland 1986) concluded night electrofishing to be the best sampling technique. This method, once initiated, was successful in increasing capture of age-0 saugeye. Night electrofishing was conducted monthly from August through October 1985 and September through October 1986. Lengths (TL) and weights (g) were recorded for all fish and the fish were preserved immediately in 10% formalin. Stomachs were excised in the laboratory and all contents were removed, identified, enumerated and volumetrically measured. Frequency of occurrence, relative abundance by number, and volume were calculated monthly. Also, the Index of Relative Importance (IRI) (Pinkas et al. 1971) was computed and rank assigned to each food item for that month.

Results

Through night electrofishing observations, age-0 saugeye were found most often along fine sandy substrate areas and near points of coves. They seemed inclined to avoid back portions of coves and preferred close proximity to open water.

Rapid growth rates for age-0 saugeye were observed for both years, with mean TL of 270.8 ± 8.2 mm (means ±95% CL) by October 1985, and 256.1 ± 11.2 mm by October 1986 (Fig. 1). These hybrids exhibited a mean monthly growth increment of approximately 35 mm.

Saugeye fingerlings were assumed piscivorous at the time of stocking (Buckley et al. 1976). Throughout their first year, they showed a distinct preference for inland

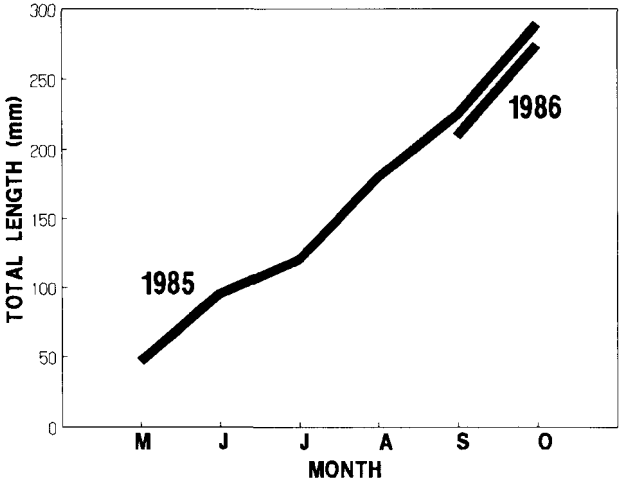

Figure 1. Mean total length by month of 2 saugeye year classes, 1985 and 1986, from May through October in Thunderbird Reservoir, Oklahoma.

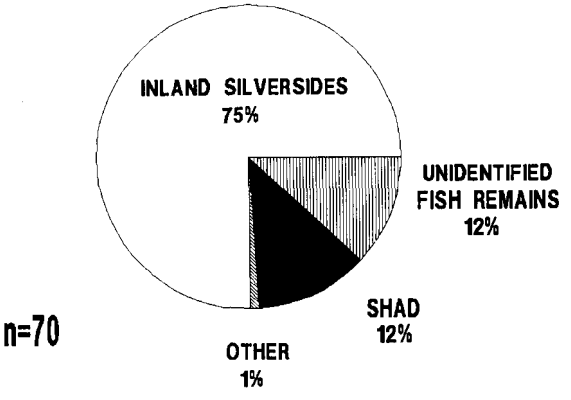

Figure 2. Relative volume of stomach contents of age-0 saugeye in Thunderbird Reservoir, Oklahoma, 1985–1986.

silversides which comprised 75% of the total diet by volume (Fig. 2). Monthly diet trends revealed that inland silversides were highest in frequency of occurrence, relative numbers, and relative volume. Accordingly, inland silversides ranked first in IRI for all months. Also, gizzard shad appeared in only 1 month's sample during each year and only in saugeye >225 mm total length. Other incidental items found in saugeye stomachs consisted of invertebrates, mosquito fish (*Gambusia affinis*), and white crappie (*P. annularis*).

Discussion

Fingerling saugeye stocked into Thunderbird Reservoir showed exceptional growth rates. With a mean monthly growth increment of 35 mm, the slight growth differential between year classes could probably be attributed to the time of month the sample was taken. In comparison to other lakes where saugeye have been introduced, growth rates in Thunderbird were among the best reported (Lynch et al. 1982, Humphreys et al. 1984; Fig. 3).

Saugeye utilized inland silversides almost exclusively their first year. Humphreys et al. (1984) found *Dorosoma* spp. to be the most numerous food item in the diet of age-0 saugeye in Cherokee Reservoir, Tennessee. Because the 2 species of *Dorosoma* occur in Thunderbird Reservoir, this implies a strong preference for *Menidia* even when these shad species are present. The appearance of shad in the diet of saugeye >225 mm TL was possibly due to an optimal forage size of shad after the second spawn of the season.

Serious diet overlap with other game species is not suspected of saugeye during early life history. In evaluating diet overlap between other game species, studies in Thunderbird Reservoir by Boxrucker (1986, 1987) showed the only predators to utilize inland silversides as a significant forage species were largemouth bass ≤200 mm. Inland silversides were essential in the diet only at certain times of the year for smaller largemouth bass when abundance of other prey species were limited,

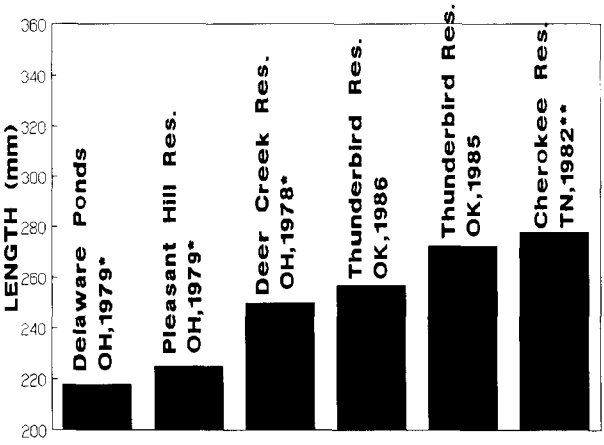

Figure 3. Mean length, by October, of age-0 saugeye from various reservoirs.

*Lynch et al. (1982), **Humphreys et al. (1984).

indicating a negative preference. Therefore, age-0 saugeye appeared to take advantage of the abundant, underutilized inland silversides forage source.

Preliminary data indicate that saugeye continue to exhibit rapid growth rates during their second year; by November 1986, individual lengths exceeded 475 mm TL and weights greater than 1 kg. There appears to be a shift from inland silversides toward gizzard shad in the diet of age-$\geq$1 saugeye.

The ultimate management goal of any sportfish introduction is to provide a superior fish for the angler. The findings from this study suggest saugeye have the potential to satisfy this requirement when a put, grow, and take walleye-type fishery program is justified.

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