[Proceedings of the Iowa Academy of Science](https://scholarworks.uni.edu/pias)

Volume 68 | Annual Issue Article 38

1961

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An Analysis of an Alternate-Year Walleye Fry Stocking Program in the Cedar River in Iowa

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Abstract. Year-class analysis of walleye, *Stizostedion v. vitreum* (Mitchill), taken by anglers in a portion of the Cedar River in Iowa indicated that alternate-year stocking of 3,500 fry per mile of river did not influence year-class abundance. Despite the short duration of the project, 1951-1958, a reasonably direct relationship between spring floods and spring air temperatures and year-class abundance was evident. Disparity in year-class abundance between samples taken 5 miles apart and within 3 months of each other, but by different methods (angling and chemical kill), indicates either a sampling selectivity or a relative discreteness or stability of portions of an assumed homogeneous population of river walleyes, or both.

Indications of the success of a walleye, *Stizostedion v. vitreum* (Mitchell), fry stocking program in Iowa lakes (Rose, 1955) led to the expansion of this program to some of the major rivers in Iowa in 1951. Substantial fry stockings were made in known "walleye waters" on an alternate-year basis. A picked group of anglers was solicited to save scales from their walleye catches in the hope that year-class analyses of an angler sample could be used to evaluate the success of this program.

Despite general angler cooperation it soon became evident that the scope of the project was too broad to furnish suitable comparative data on several rivers. Thereafter, special consideration was given to age-class analysis of that portion of the walleye population caught by anglers in upper reaches of the Waterloo-Cedar Rapids pool of the Cedar River. Milo Gerry, Ture Johnson, and Phil Duker, all of Waterloo, Iowa, furnished most of the scales that served as the basis for this project.

A total of 901 walleyes from the study area were aged and assigned to year classes. Each angler year was used as a separate entity, and it was possible to trace year-class strength from year to year (Table 1).

The study was terminated several years short of its desired span by a serious and decimating pollution kill in January of 1958. Shortly after the kill, a 300-yard section of river bank was walked and 67 dead walleyes were processed for age and growth determinations (Table 1). This sample served as an interesting and revealing comparison with the angler sample taken during the 8 months prior to the kill.

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Table 1. Year Class Assignments of Walleyes in Waterloo-Cedar Rapids Pool Angler Sample, Cedar River, Iowa

	Year of Collection											
	1953		1954		1955		1956		1957		1958*	
Year Class	No. in Yr. Class	Percent in Sample	No. in Yr. Class	Percent in Sample	No. in Yr. Class	Percent in Sample	No. in Yr. Class	Percent in Sample	No. in Yr. Class	Percent in Sample	No. in Yr. Class	Percent in Sample
1957	..	..	..	..	..	..	..	..	0	0	0	0
1956	..	..	..	..	..	..	0	0	1	(T)**	1	1
1955	..	..	..	..	0	0	26	14	18	12	7	11
1954	..	..	1	(T)	0	0	4	2	33	22	5	7
1953	0	0	15	5	1	(T)	40	22	16	11	7	11
1952	0	0	20	7	102	67	62	34	11	7	11	16
1951	46	78	155	54	37	24	38	21	9	6	26	39
1950	6	10	90	34	11	7	13	7	28	19	2	3
1949	3	5	7	2	1	(T)	1	(T)	12	8	6	9
1948	1	2	0	0	0	0	0	0	5	3	2	3
1947	0	0	1	(T)	0	0	0	0	10	7	0	0
1946	0	0	0	0	0	0	0	0	1	(T)	0	0
1945	0	0	1	(T)	0	0	0	0	2	1	0	0
1944	3	5	1	(T)	0	0	0	0	2	1	0	0
Totals	59		291		152		184		148		67	

* The fish comprising the 1958 sample (kill sample) were obtained fro ma 300-yard bank pick-up of dead walleyes.
** Trace (less than 1 percent).

Year-Class Abundance

The alternate-year walleye fry stocking was begun in 1951 when 250,000 fry were stocked. In each odd-numbered year, 1953, 1955, and 1957, an additional 250,000 fry were stocked in the study area. Stocking was completely restricted to newly hatched fry, and any significant change in the year-class abundance as manifested by the hook and line fishery could not be expected until the fish were at least 2 to 3 years old.

The study was started too late to assay adequately the importance of the pre-1950 year classes. The 1950 year class was most apparent in the 1954 angler sample, at which time it amounted to 34 percent of the catch.

The 1951 year class was undoubtedly the most successful of any during the study period. In 1955, it was replaced as the dominant group in the anglers' harvest and remained the subdominant year class until 1956, despite the fact that the fish were 5 years old and approaching the normal life expectancy for the species.

The 1952 year class, occurring in a non-stocking year, also was important to the walleye angler. In 1955, 67 percent of the catch was from this year class. However, it was not generally as abundant through the years as the 1951 year class.

The stocking year, 1953, apparently did not produce large numbers of catchable fish. This year class was not important to the angler until 1956 when 22 percent of the walleye catch came from this age group. Subsequent year classes lacked the necessary longevity in the study to allow for analyses of their over-all importance.

Anglers furnishing scale samples for this study confined their activities to an area 5 to 6 miles above the area where the dead walleyes were sampled. The 1958 kill sample is therefore assumed to be from a relatively unfished portion of the river's population, and as such should present year-class abundance in its true relationship.

The difference in year class abundance in these two methods of sampling a supposedly homogeneous river population indicates: (1) A certain discreteness or stability of portions of the river population as evidenced by the year-class disparity (1957 Angler Sample and January 1958 Kill Sample) of two almost adjacent portions of the river population; or, (2) that the angler sample is indicative only of the catchable portion of the total population, with the less vulnerable, slower-growing specimens going unsampled in a given year as they increase in age.

Effect of Stocking

To compare year-class abundance in a total sample collected over several years, it was necessary to derive a common comparative index. Although the walleyes entered the anglers' catch as 1- and 2-year-old fish, it was not until they were 3-year-olds or older that their numbers became significant. Therefore, the comparative index chosen for this evaluation was the percent of the total catch that 3-year-old fish of a given year class constituted in the angling year in which they reached their fourth growing season.

Table 2. Index of Abundance by Age Class and Year Class

Year Class	Percent of total catch at age classes II	III	IV	V	VI
1950	..	10 (5)	34 (1)	7 (2)	7 (1)
1951	78 (1)	54 (2)	24 (2)	21 (1)	6 (2)
1952	7 (2)	67 (1)	34 (1)	7 (2)	
1953	T*(4)	22 (3)	11 (3)		
1954	2 (3)	22 (3)			
1955	T				
Number of samples	71	336	205	60	22

* Trace (less than 1 percent).

The index column in Table 2 is the column under age class III. No clear-cut superiority is seen in this column in the year classes from odd-numbered years. (The year classes are comparatively ranked within the age classes. Rankings are in parentheses.)

Other Factors Affecting Year-Class Abundance

Since no definite correlation could be established between fry stocking in rivers and year-class abundance, it was assumed that the superiority of the 1951 and 1952 classes was the result of some natural phenomenon.

Records as to daily river discharge and air temperature were available and were thought to be among the most important climatic factors governing spawning success and survival, as they are with other stream species (Allen, 1951; Starrett, 1951; Cleary, 1956; and Brown, 1960).

Since it is generally assumed that the walleye spawns in April and May in most flowing waters of this latitude, it was also assumed that a critical period in the life cycle came at this time. It was further supposed that walleye spawning areas in rivers need rejuvenation similar to that of smallmouth bass spawning areas in tributary streams (Cleary, op. cit.). Therefore, the month of March, with the renovating action of its ice floods, was included with April and May in determining river discharge and temperature data.

There is a reasonably direct relationship between year-class abundance and high water and high temperature (Figure 1). During this period of the year, high temperatures may cause either rapid melting of snow cover and/or increased precipitation, which in turn cause increased river flow. It is therefore questionable whether these two climatic variables are cofunctions of year-class abundance or that one (high water) is the function of the other (high air temperature) and the result is year-class fluctuations.

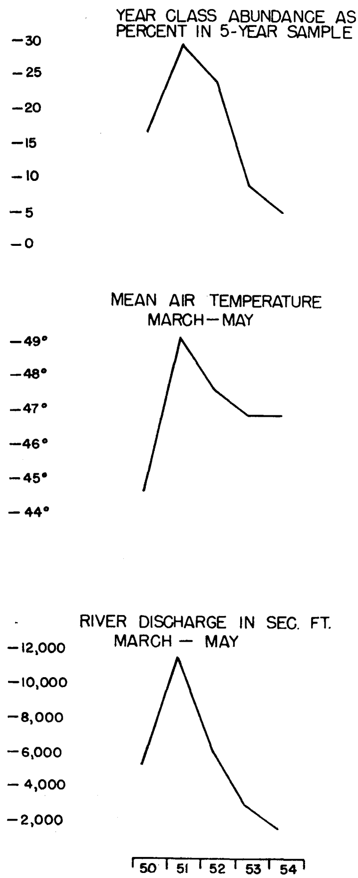

Figure 1. Comparison between year-class abundance of walleyes and air temperature and water stage of the Cedar River in Iowa.

Literature Cited

Allen, K. Radway. 1951. The Horokiwi Stream, a study of trout population. New Zealand Dept. Fish. Bull. No. 10: 1-231.

Brown, Edward H., Jr. 1960. Little Miami River Headwater Stream investgation. Ohio Dept. of Nat. Resources, Div. of Wildlife Publication, pp. 1-143.

Cleary, Robert E. 1956. Observation on factors affecting smallmouth bass production in Iowa. J. Wildl. Mgmt. 20: 353-359.

Rose, Earl T. 1955. The fluctuations in abundance of walleyes in Spirit Lake, Iowa. Proc. Iowa Acad. Sci. 62: 567-575.

Starrett, William C. 1951. Some factors affecting the abundance of minnows in the Des Moines River, Iowa. Ecology 31: 13-27.