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Activity Patterns of Some Clear Lake, Iowa, Fishes¹

By JAMES G. SIEH² AND JOHN PARSONS³

The fish populations in Clear Lake, in north central Iowa, are being studied annually by various members of the Iowa Cooperative Fisheries Research Unit to determine the changes in species composition, growth rates, condition, year class abundance, and other measures of value in fisheries biology (Bailey and Harrison, 1945; Lewis and Carlander, 1948; Cleary, 1949; Carlander and Cleary, 1949). In connection with these investigations, experimental gill nets were set in various parts of the lake. Since the nets were usually lifted at two-hour intervals, the times at which the fish were caught were recorded, thereby giving a measure of the activity of the fish at various periods. It is recognized that there may be several errors which may arise in the use of gill net catches as measures of activity, but the results in most cases are clear enough that the errors are probably of little significance. In some cases there was doubt as to whether the gill net catches indicated activity or merely local concentration of the fish.

Some data on the activity patterns of Clear Lake fishes have already been published (Carlander and Cleary, 1949). The present paper covers the results of the field work in 1948 and 1949. To ensure the capture of several sizes of fish, each gill net consisted of six 25-foot sections with the following mesh sizes: 1.5, 2, 2.5, 3, 4, and 6 inches, stretch measure. These nets would capture most fish over five inches long but rarely caught the smaller fish. The data therefore do not refer to young-of-the-year fish. The 6 inch mesh size was missing on some of the nets, but this is not believed to have influenced the results appreciably since very few fish were ever taken in this large mesh. The nets were always set with the lead line on the lake bottom and extended up into the water five feet. During the summer of 1948, the experimental gill nets were set a total of 1084.5 hours; in 1949, 1350 hours.

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² Now with the Iowa State Conservation Commission.

³ The senior author carried on the field work in 1948; the junior author in 1949; and each is responsible for the analysis of the data for the respective periods. The authors wish to express their appreciation to Dr. Kenneth D. Carlander for supervision and aid in the collection and interpretation of the data; to Keith Schreiner, Arden Gaufin, Lyle R. Bradley, Duane Hüey, and others for invaluable help in the field work; and to many others of Iowa State College and the Iowa State Conservation Commission for suggestions and encouragement.

Only five species were taken in the gill nets in sufficient numbers to study their distribution and activity: yellow pikeperch or wall-eye, *Stizostedion vitreum vitreum* (Mitchill); yellow perch, *Perca flavescens* (Mitchill); yellow bass, *Morone interrupta* Gill; white bass, *Lepibema chrysops* (Rafinesque); and black bullheads, *Ameiurus melas melas* (Rafinesque). White bass were sufficiently abundant only in the 1949 catches.

Clear Lake is a relatively shallow lake with a maximum depth of twenty feet, but the gill net catches were divided into shallow water catches, less than five feet deep, and deep water catches, over five feet deep, to indicate differences in the distribution of the fish (Tables 1 and 2). The catches in deep and shallow water may not be directly comparable since the slack nets in shallow water may be more efficient than the taut nets in deeper water.

There appears to be shift in the distribution of yellow bass. In 1947 practically no yellow bass were taken in shallow water (Car-

Table 1

Number of Fish of Each Species Caught in Gill Nets, Clear Lake, Iowa, 1948, in Water Shallower and Deeper than Five Feet

Species	Shallow (366 net hours)		Deep (718.5 net hours)	
	No. of Fish Caught	Fish Caught Per Hour	No. of Fish Caught	Fish Caught Per Hour
Yellow Bass	58	.16	363	.48
Yellow Perch	78	.21	259	.34
Yellow Pikeperch	94	.26	73	.10
Bullhead	31	.09	25	.03

Table 2

Number of Fish of Each Species Caught in Gill Nets, Clear Lake, Iowa, 1949, in Water Shallower and Deeper than Five Feet

Species	Shallow (660 net hours)		Deep (650 net hours)	
	No. of Fish Caught	Fish Caught Per Hour	No. of Fish Caught	Fish Caught Per Hour
Yellow Bass (all)	614	.93	361	.55
Yellow Bass (yearlings)	376	.57	135	.20
Yellow Bass (adults)	238	.36	226	.34
Yellow Pikeperch	493	.74	117	.18
Yellow Perch	4	.006	44	.068
White Bass	51	.077	3	.005
Black Bullhead	55	.083	7	.011
All Species	1255	1.90	563	.87

lander and Cleary, 1949). In 1948, three times as many yellow bass were caught per hour in water over five feet deep than in shallower water. In 1949, the catch in shallow water was greater than that in deep water. Analysis of the yellow bass data indicates that the yearlings (less than 143 millimeters) were taken almost three times as frequently in the shallow water as in the deep but even the larger yellow bass were taken about as frequently in shallow as in deep water in 1949. Most of the white bass were yearlings and were taken from shallow water sets. Most of the yellow perch were caught in deep water sets, while yellow pikeperch and bullheads were mostly caught in shallow water.

DISCUSSION OF THE ACTIVITY PATTERN OF VARIOUS SPECIES

The five species show considerable differences in the rates at which they are caught during different hours of the day (Figures 1 and 2). Yellow pikeperch and yellow bass were caught in greater numbers at night than during the daytime whereas yellow perch were caught in greater numbers during the day.

Yellow bass displayed their greatest activity during the periods just after sunset and just before sunrise with a more pronounced and prolonged decline in activity during the day than at night.

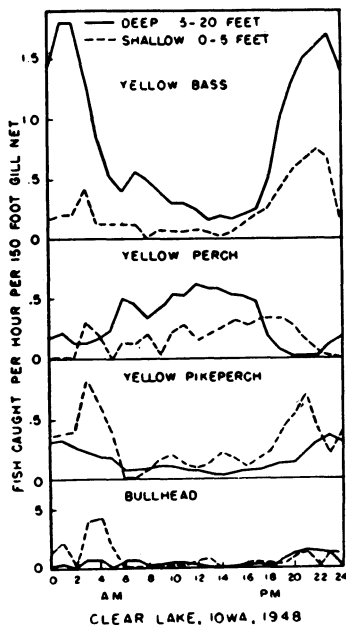


Fig. 1. Numbers of fish caught in gill nets at various hours of the day, Clear Lake, 1948.

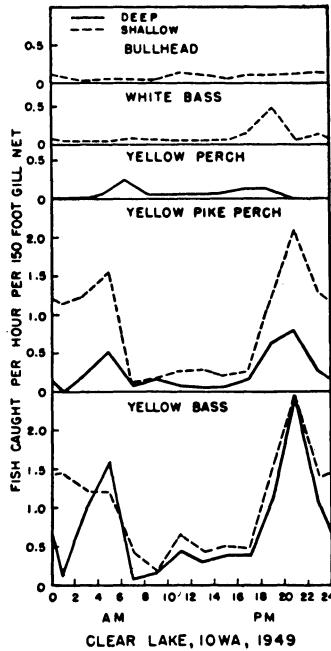


Fig. 2. Numbers of fish caught in gill nets at various hours of the day, Clear Lake, 1949.

Similar studies in Clear Lake in 1947 (Carlander and Cleary, 1949) indicated that the yellow bass were more active in the daytime but showed some tendency to come into shallow water during the night. The reason for the difference between 1947 and the other two years is not evident at this time.

The yellow pikeperch also showed their greatest activity at sunset and sunrise, but the changes in catch were much greater in shallow water than in the deep water, suggesting that the pikeperch come into the shallow water at night. Successful deep water catches at night were usually near the minimum deep water depth. Stomach analysis of the pikeperch suggested that these fish came to shore at night to feed. The activity of the yellow pikeperch was very similar to that reported for the species in Clear Lake in 1947 and in Lake of the Woods (Carlander and Cleary, 1949) and in some Ontario Lakes (Hart, 1941).

The yellow perch were most active during daylight hours. In 1949 no perch were caught during the hours of darkness. The highest period of activity was between 6:00 and 8:00 a.m. in the morning with little variation during the other hours of the day. In 1948 more perch were caught in the deep water than in the shallow

except just before sunrise and just after sunset. It is possible that reduced light may have caused some perch to move inshore during these periods. Another possibility is that the activity of the perch in the shallows does not decrease as soon in the evening and starts up earlier in the morning than the perch in the deep water. Webster (1943) and Hasler and Bardach (1949) have shown that yellow perch move into shallow water in the evening.

Bullheads were caught rather uniformly throughout the twenty-four hour period and the catches do not give any indication of periodicity in their activity.

FISH MOVEMENT AND BAROMETRIC TENDENCY

Many fishermen believe that good angling is coincident with a rising barometer. On the assumption that angling and fish activity are correlated, the fish activity in 1948 was compared with barometric tendency to determine any plausible correlation between barometric change and fish movement. By separating the total numbers of each species into those caught during a rising, falling, and steady barometer, and then dividing each of these three totals by the corresponding number of hours fished, the average catches per hour on a rising, falling, and steady barometer were calculated (Table 3).

There is a suggestion of increased activity of the yellow bass during periods of a rising barometer and decreased activity during periods of a falling barometer.⁴ The opposite was the case with the yellow perch which showed increased activity during periods of a falling barometer, and decreased activity during periods of a rising barometer. Walleye and bullhead activity appeared almost constant during the three periods of barometric tendency.

An attempt was made to correlate wind direction, wind velocity, sky cover or cloudiness, and thundershowers or rain with fish ac-

⁴ To determine whether these observed differences were significant, mean and standard deviations of the data were determined for the yellow bass and yellow perch. The differences between the catch on a rising and a falling barometer were not statistically significant in either case:

	Rising barometer	Falling barometer
Yellow bass		
Number of sets	131	182
Mean catch per hour	1.37	.88
Standard deviation	1.39	
t of difference =	1.29	probability = 0.20
Yellow perch		
Number of sets	131	182
Mean catch per hour	.59	1.11
Standard deviation	1.48	
t of difference =	1.58	probability = 0.11

Table 3
 Catch Per Gill Net Per Hour Arranged According to Barometric Readings, Clear Lake, 1948

Barometric Tendency	Hours of Fishing	Yellow Bass	Perch	Walleye	Bullhead
Rising	131	1.37	.59	.45	.17
Steady	88	1.0	.97	.45	.15
Falling	182	.88	1.11	.39	.12

tivity. The data indicated that none of these variables could be correlated with movement phenomena.

THE SOLUNAR THEORY IN RELATION TO GILL NET CATCHES
 AT CLEAR LAKE

The possibility that fish activities may be influenced by the position of the sun and moon in relation to the earth has been expressed by many fishermen and authors. "The Solunar Tables," by John Alden Knight (1947, 1948, and 1949) are widely used and are published in local papers to inform fishermen as to the periods in each day the fish are most apt to be active. An attempt was made to correlate the catch of fish by gill net in Clear Lake in 1947 and 1949 with the solunar and intermediate periods of fish activity (Table 4).

Table 4
 Catch of Fish Per Gill Net Hour During Solunar and Intermediate Periods in Clear Lake, Iowa, 1947 and 1949 Combined

	Time Period		
	Major	Minor	Intermediate
Yellow pikeperch			
night	1.02 (.95)	1.45 (.140)	1.03 (1.53)
day	.17 (.31)	.19 (.34)	.19 (.39)
Yellow bass			
night	1.33 (.94)	1.55 (1.39)	1.36 (1.53)
day	.51 (.59)	.46 (.61)	.55 (.57)
Yellow perch ¹			
night	.17 (.36)	.381 (.52)	.72 (1.36)
day	2.00 (2.71)	6.81 (5.73)	5.86 (5.88)
All fish			
night	2.67 (1.47)	3.07 (2.50)	2.75 (1.58)
day	1.12 (1.47)	1.45 (2.50)	1.23 (1.99)
All fish			
all hours	1.83 (1.52)	2.10 (2.62)	1.69 (2.01)

Standard deviation in parenthesis.

¹ Based on 1947 data only.

The 1947 and 1949 combined data was based upon 1,299 gill net hours and the capture of 2,313 fish.

According to Knight the fish are more active during the major and minor periods which usually occur four times a day and last from one to two hours. In this paper "intermediate" is used for any time other than solunar periods.

The gill nets were usually examined at two hour intervals and to aid in the analysis, the solunar periods were also used on a two-hour basis. Although the solunar periods may have been somewhat longer or shorter than two hours, the results of the analysis should not much be affected. Knight states that solunar tables are most important during the odd hours between the normal periods of activity of dawn and dusk. It has already been indicated in this paper that yellow pikeperch and yellow bass are most active near dawn and dusk. To account for this, the analysis of the catch of fish per hour by activity periods was done for both day and night, based upon the hours 7:00 a.m. to 7:00 p.m. and 7:00 p.m. to 7:00 a.m. respectively. Since the data were taken during the summer months, no dawn or dusk fishing appears in the data for the day period.

There does not appear to be the purported correlation between the catch of fish in the gill nets and the solunar periods. In fact the catches during the major solunar periods were usually lower than the catches at other times. Application of Student's *t* test and the Chi Square test both indicate that the variations between periods are not statistically significant.

SUMMARY

1. Gill net catches indicate that most of the yellow perch are caught in water over five feet deep in Clear Lake, while most of the yellow pikeperch and bullheads were caught in shallower water. Yellow bass were also more frequently taken in deeper water, but there was a trend toward shallower from 1947 to 1949, associated with an increase in the catch of younger fish.

2. Yellow pikeperch and yellow bass were most active at dawn and dusk and apparently were more active during the night than in the daytime.

3. Yellow perch were most active during the daylight hours.

4. No correlation could be detected between the periods of activity of the fish and barometric changes, wind, sky cover, or solunar periods.

Literature Cited

- Bailey, Reeve M. and Harry M. Harrison, Jr. 1945. The fishes of Clear Lake, Iowa. Iowa State Coll. Jour. Sci. 20(1) : 57-77.
- Carlander, Kenneth D. and Robert E. Cleary. 1949. The daily activity patterns of some freshwater fishes. Amer. Midl. Nat. 41(2) : 447-452.

- Cleary, Robert E. 1949. Life history and management of the yellow pike-perch, *Stizostedion vitreum vitreum* (Mitchill), of Clear Lake, Iowa. Iowa State Coll. Jour. Sci. 23(2) : 195-208.
- Hart, J. L. 1931. On the daily movements of coregonine fishes. Canadian Field Naturalist, 45 : 8-9.
- Hasler, Arthur D. and John E. Bardach. 1949. Daily Migrations of perch in Lake Mendota, Wisconsin. Jour. Wildl. Mgt. 13(1) : 40-50.
- Knight, John Alden. 1947. Solunar tables. 13th Annual Edition. Published by John Alden Knight, Williamsport, 30, Pa. 30 pp.
1948. Solunar tables. 14th Annual Edition. 30 pp.
1949. Solunar tables. 15th Annual Edition. 30 pp.
- Lewis, William M., and Kenneth D. Carlander. 1948. Growth of the yellow bass, *Morone interrupta* Gill, in Clear Lake, Iowa. Iowa State Coll. Jour. Sci. 22(2) : 185-195.

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