Changes in the Abundance of Goldeye, Hiodon alosoides (Rafinesque), in Lake Texoma, Oklahoma[1]

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The goldeye, a member of the family Hiodontidae, is an elongate, silvery fish with prominent teeth on various bones of the mouth. The eye is large and yellowish-golden in color. Its food is predominately insects. It is one of the few freshwater fishes that produce pelagic or semi-pelagic eggs (Battle and Sprules, 1960). Primarily a lake dweller, it is reported to ascend streams to spawn.

The abundance of goldeye in Lake Texoma has undergone dramatic changes since completion of the dam. In the collections of Martin (1952) for 1948 and 1949, goldeye were very numerous (Table I). Dowell (1956) found as late as 1952 that goldeye was the second most abundant nettable fish in Buncombe Creek arm. Riggs and Bonn (1959) stated that goldeye were abundant, but had decreased during the previous three years. J. Teague Self (personal communication) indicated that efforts to obtain goldeye in the summer of 1960 were practically futile. Bobby G. Grin-

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TABLE I. COMPARISON OF SELECTED MONTHLY LAKE LEVEL MINIMA AND MAXIMA WITH GILL NET CAPTURE OF GOLDEYE.

	Lake Level*			Catch Data**			
	February	March	April				
Year	Low-High	Low-High	Low-High	Net-days†	Number of fish	Catch/Net-day	Source
1945	- -	610 - 624	625 - 628				
1946	616 - 617	616 - 616	616 - 616				
1947	612 - 615	612 - 612	612 - 617				
1948	612 - 613	614 - 616	614 - 615	7	89	12.7	Martin, 1952
1949	607 - 611	610 - 611	611 - 612	27 (7)	970 (143)	35.9 (20.4)	Martin, 1952
1950	613 - 614	613 - 614	612 - 613				
1951	610 - 611	611 - 611	610 - 611				
1952	608 - 609	608 - 608	608 - 610				
1953	601 - 602	601 - 603	603 - 605	[ ]	[ ]	[ ]	[ ]
1954	610 - 611	608 - 610	607 - 608	Net-hours	1184	8.2	Dowell, 1956
1955	604 - 604	604 - 604	604 - 605	[ ]	[ ]	[ ]	[ ]
1956	606 - 606	604 - 606	603 - 604				
1957	599 - 600	500 - 600	600 - 620	[ ]			[ ]
1958	613 - 614	613 - 614	614 - 616		Abundant but declined		Riggs and Bonn, 1959
1959	610 - 610	608 - 608	608 - 608	[ ]			[ ]

TABLE I, continued

1960	614 - 614	614 - 614	614 - 614		Rare		Self, Pers. Comm.
1961	613 - 613	613 - 615	614 - 616				
1962	613 - 613	613 - 613	613 - 614	[ ]	[ ]	[ ]	[ ]
1963	612 - 612	612 - 613	613 - 613	[448]	[41]	[0.16]	[Grinstead, Unpub.]
1964	603 - 604	603 - 604	603 - 603				
1965	610 - 610	610 - 610	609 - 609	8	0	0	Tabor, Unpub.
1966	611 - 613	612 - 613	613 - 616	8	0	0	Tabor, Unpub.
1967	603 - 604	602 - 603	602 - 611		Common		Self, Pers. Comm.
1968	610 - 610	611 - 616	617 - 617	11	98	8.9	Shelton
				33	60	1.8	Smith, Unpub.

*Lake level — Information from U. S. Army Corps of Engineers. (Normal 617 ft above mean sea level).

**All fish were captured in Buncombe Creek area except those netted by Martin. Martin's data from Buncombe Creek are in parentheses. Gill nets were of various designs but of comparable mesh sizes and usually of a common length.

†Net day—A single gill net set for 24 hr or adjusted to 24 hr.

stead (unpublished data) captured very few goldeye in one full year of gill netting, 1962 to 1963. During 1965 and 1966 no goldeye were captured by Charles A. Taber (unpublished data) in his netting operations. In the summer of 1967 the parasitology class of the University of Oklahoma Biological Station captured several goldeye (Self, personal communication). During the spring and summer of 1968, Harold J. Smith (unpublished data) and I, in separate netting operations, captured goldeye with predictable regularity. Thus, it appears that in the 24 years since the lake was first impounded there has been a decrease in the goldeye population with a subsequent increase.

Many factors can be responsible for a population decline, but when large mortalities are not involved, some factor interfering with reproductive success is probably indicated. Goldeye are reported to ascend streams to spawn. Kennedy and Sprules (1967) reported spawning in streams and backwaters of lakes in Canada. Actual spawning observations have not been reported but recovery of the semipelagic eggs in rivers and near mouths of rivers by Canadian workers indicates at least some spawning occurs in the rivers. The eggs in the lake could have been deposited there or could have drifted from adjacent streams. If it is necessary that goldeye ascend streams to spawn, then low lake levels could adversely affect reproductive success and consecutive years of such conditions could considerably reduce the population.

Spawning in Canada occurs when the mean water temperature reaches 50-55F (Kennedy and Sprules, 1967). In Lake Texoma this temperature range normally is reached in March; thus, goldeye probably spawn during March and possibly into April. Neither eggs nor larvae have been taken in Lake Texoma but nearly ripe females have been captured in late February.

The population decline followed a period of 6 years, 1952 to 1957, of low lake levels during the probable spawning months (Table I). The subsequent increase has occurred in a nearly continuous period of lake levels nearer to normal during the spawning months. In impoundments, lowering of the lake level exposes silted mouths of tributaries and can effectively prevent upstream fish migration. At lake levels below 610 ft, m.s.l., Buncombe Creek is separated from the lake arm, as are other tributaries such as the Washita River at Cumberland Cut.

If low lake levels have adversely affected spawning success in goldeye, then the importance of this factor in predicting the success of other potamodromous fishes should be considered.

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