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DURATION OF LARVAL LIFE OF SEA LAMPREYS

IN CARP LAKE RIVER, EMMET COUNTY, MICHIGAN

by

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One objective of a study of the sea lamprey (Petromyzon marinus) at the Carp Lake River in 1948-1961 was to determine the length of larval[1] life. Some of the earlier observations on duration of larval life in Carp Lake River were reported by Applegate (1961) and Stauffer;[2] additional data are presented here.

Materials for the study came from several sources: (1) collections (1948-1961) of substantial numbers of downstream-migrating ammocoetes and recently metamorphosed sea lampreys from an inclined-plane trap (designed to trap downstream migrants and block upstream migrants) near the mouth of the river; (2) annual inspection of the entire stream for sea lamprey redds in 1955-1961; (3) operation, in 1956-1961, of a weir with an upstream and downstream trap in the river near its source, Lake Paradise, to determine if there was any movement of sea lampreys between the stream and lake; and (4) semi-annual collections of ammocoetes (four species, see below) in 1955-1961 (collections were made with a direct-current shocker at three stations above the inclined trap).

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[1] The terms ammocoete and larvae refer to the sea lamprey unless stated otherwise.

[2] Thomas M. Stauffer. 1956 and 1960. An investigation of the continued capture of downstream-migrating recently transformed sea lampreys in the downstream trap of a weir on Carp Lake River, Emmet County, 1955. Duration of larval life and migration of sea lamprey ammocoetes in the Carp Lake River, Emmet County. Mich. Dept. Cons., Inst. Fish. Res. Rept. Nos. 1474 (1956) and 1595 (1960).

The continued capture of substantial numbers of larvae and newly metamorphosed sea lampreys in the inclined-plane trap (Table 1), and other observations, strongly suggest that the duration of larval life of the sea lamprey is longer than the 4 or 5 years assigned to it by Gage (1928) and Applegate (1950). Although escapement of mature sea lampreys at the Carp Lake River inclined trap no doubt occurred in 1948-1949 and undetected escapement at the inclined trap or from Lake Paradise may have occurred in 1950-1954 (no observations), such escapement almost certainly did not occur in 1955-1961. During 1955-1961, no sea lamprey redds or spawning adults (both of which are easily seen) were found above the inclined trap, no spent adults were caught in the inclined trap (escapement through weirs on other streams has been revealed by capture of adults in downstream traps), no movement of sea lampreys between Carp Lake River and Lake Paradise was observed (even though a few small sea lampreys were discovered on fish in Lake Paradise in 1955 and 1956), and no larvae shorter than 2.1 inches[3] (which are commonly taken where recruitment occurs) were collected above the inclined trap.

Additional evidence of the lack of recruitment was the drastic reduction of the larval population above the inclined trap. Here, the catch per hour of larvae with the direct-current shocker decreased from 336 in 1955 to less than 1 in 1961 at station A, from 118 to less

[3] Larvae shorter than 2.1 inches have been identified as age-groups 0 and I (Applegate, 1950; Wigley, 1959). The age of longer larvae was not positively determined.

Table 1.--Number of newly metamorphosed sea lampreys, number of larvae, and length of sea lamprey larvae caught in the Carp Lake River inclined-plane trap, 1949-1961 migration seasons

Migration season[1]	Number of newly metamorphosed sea lampreys	Number of ammocoetes (all species)[2]	Sea lamprey ammocoetes		
			Number measured	Total length (inches)	
				Range	Average
1949	7,969	499	...	...	...
1950	16,235	8,452	...	...	...
1951	15,103	12,649	...	...	...
1952	4,069	1,587	...	...	...
1953	6,861	2,838	...	...	...
1954	10,238	14,827	...	...	...
1955	3,893	3,725	...	...	...
1956	2,401	22,961	2,141	2.7-6.1	4.6
1957	2,640	4,881	3,875	2.3-6.9	4.8
1958	4,796	560	530	3.7-6.4	5.2
1959	4,796	5,640	5,365	3.7-6.8	5.2
1960	2,147	2,522	2,369	3.6-6.8	5.6
1961	8,925	707	663	4.9-7.2	6.3
Totals	90,073	81,848	14,943	...	...

[1] A migration season was arbitrarily considered to correspond to a fiscal year. For example, the 1950 season extended from July 1, 1949 to June 30, 1950.

[2] Sea lampreys are believed to represent about 95 percent of the total, based on identification of representative samples of ammocoetes in 1956-1961.

than 1 at station B, and from 47 to 0 at station C (Table 2). At the three stations, 29 to 79 percent of the larvae collected[4] in July 1955 were sea lampreys; by October, 1961, this percentage had decreased to less than 1. Average length of sea lamprey larvae increased from 4.0 (July, 1955) to 5.5 inches (July, 1960) at station A, from 3.6 (July, 1955) to 5.6 inches (November, 1959) at station B, and from 4.2 (July, 1955) to 5.1 inches (October, 1958) at station C.

In summary, the age of larvae in Carp Lake River in 1961 almost certainly was not less than 7 years (1954 year class).

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[4] Larvae of Lampetra lamottei, Ichthyomyzon fossor and I. unicuspis were also present in the stream. Except for I. unicuspis, the inclined trap presumably interfered but little with the reproduction of these species.

Table 2.--The total number, catch per hour, and length of sea lamprey ammocoetes collected in Carp Lake River with a direct-current shocker, 1955-1961

Station,[1] and date of collection	Number of ammocoetes collected (all species)	Sea lamprey ammocoetes				
		Number collected	Percentage of total collection	Number caught per hour of shocking	Total length (inches)	
					Minimum	Average
A						
July 10, 1955	713	562	79	336	2.2	4.0
Oct. 2, 1955	335	218	65	109	2.9	4.2
June 26, 1956	358	147	41	37	2.1	4.2
Oct. 11, 1956	432	137	32	68	3.1	4.2
July 9, 1957	246	87	35	23	3.3	4.8
Nov. 6, 1957	195	79	40	45	3.6	5.0
July 1, 1958	282	167	59	84	3.8	5.1
Oct. 17, 1958	179	92	51	48	3.3	5.2
June 30, 1959	264	106	40	51	3.5	4.9
Nov. 23, 1959	300	162	54	78	3.4	5.1
July 18, 1960	158	37	23	37	5.0	5.5
Oct. 3, 1960	88	7	8	5	5.1	5.6
June 22, 1961	141	9	6	6	5.5	5.9
Oct. 11, 1961	103	1	<1	<1	5.7	5.7
B						
July 8, 1955	260	118	45	118	2.6	3.6
June 27, 1956	310	175	57	88	2.9	3.7
July 8, 1957	206	97	47	39	3.3	3.9
Nov. 7, 1957	292	139	48	93	3.3	4.1
July 3, 1958	318	158	50	79	2.9	4.7
Oct. 17, 1958	86	37	43	37	4.0	4.9
June 30, 1959	105	27	26	23	4.4	5.0
Nov. 25, 1959	111	21	19	10	4.4	5.6
July 19, 1960	40	6	15	8	5.2	5.4
Oct. 4, 1960	16	2	12	1	5.2	5.4
June 22, 1961	96	2	2	2	6.1	6.2
Oct. 12, 1961	94	1	<1	<1	5.5	5.5
C						
July 7, 1955	175	51	29	47	3.2	4.2
July 9, 1957	214	22	10	7	3.9	4.8
Nov. 7, 1957	303	42	14	39	3.6	4.7
July 1, 1958	449	36	8	31	4.0	4.9
Oct. 16, 1958	402	45	11	36	4.1	5.1
June 29, 1959	150	2	1	1	4.8	4.8
Nov. 24, 1959	38	0	0	0	...	...
July 19, 1960	129	0	0	0	...	...
Oct. 4, 1960	117	0	0	0	...	...
June 21, 1961	189	0	0	0	...	...
Oct. 10, 1961	121	0	0	0	...	...

[1] Station A was 1/2 mile above the inclined trap; station B, 2 miles; and station C, 4.5 miles.

Literature cited

Applegate, Vernon C. 1950. Natural history of the sea lamprey (Petromyzon marinus) in Michigan. U. S. Dept. of Int., Fish and Wildlife Serv., Spec. Sci. Rept., Fish. No. 55, 237 pp.

_____ 1961. Downstream movement of lampreys and fishes in the Carp Lake River, Michigan. U. S. Dept. of Int., Fish and Wildlife Serv., Spec. Sci. Rept., Fish. No. 387, 71 pp.

Gage, Simon H. 1928. The lampreys of New York State . . . life history and economics. In Biol. Surv. of the Oswego River System. State of New York Cons. Dept., Suppl. to 17th Ann. Rept., 1927: 158-191.

Wigley, Roland L. 1959. The life history of the sea lamprey of Cayuga Lake, New York. Bull. U. S. Dept. Int., Fish and Wildlife Serv., Vol. 59, No. 154: 561- 617.

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