

2005 SPAWNING LAKE HERRING ASSESSMENT

INTRODUCTION

Prior to the 1960s, lake herring were abundant and an important component of the commercial fisheries in Lake Superior. Although the cause of the decline is uncertain, commercial over harvest was likely a significant factor. Since the 1980s lake herring abundance has increased but appears to be dependent on sporadic recruitment. Lake herring are commercially harvested primarily in the fall, during the spawning season. Lake herring are valued for their roe; thus the fishery targets unripe females. Long-term effects of commercial harvest on the population are not well understood. The objective of this assessment was to monitor the abundance and age composition of spawning lake herring at one long-term index station.

METHODS

Lake herring were sampled on December 1, 2005 during the spawning period at the index station north of the Sand Island lighthouse. Gill nets were set on the bottom for 24-hours. The standard index gang consisted of 1,200 feet of monofilament net. Each net was 300 feet long and arranged in the following sequence:

2-1/2" - 1-1/2" - 2" - 3"

All lake herring were measured to the nearest 0.1 inch and sexed. Ages were estimated for 80 herring using scales and otoliths.

RESULTS AND DISCUSSION

In 2005, 187 lake herring were captured with a mean length of 11.9 in (SD=2.6) (Figure 1). Lake herring catch-per-unit-effort (CPUE) decreased from 2004 to 2005 (Table 1). Although variable since 1990, spawning lake herring abundance recently has been higher than in the 1970s and mid-1980s (Figure 2). Strong year classes in the late 1980's that dominated the spawning population are still a small proportion of the spawning population. They have been replaced by the 1998 and 2003 year classes which constituted 31% and 25% of the sample in 2005, respectively (Table 2). Although the lake herring catch in 2005 was the lowest since 1985 there have not been indications from other surveys such as Summer Index that herring abundance is declining. In fact spring trawling surveys by US Geological Survey indicated that the 2003 year class was larger than the 1998 year class and it is just beginning to enter the spawning population (Table 2).

Mean length-at-age was calculated from 80 lake herring (Table 3).

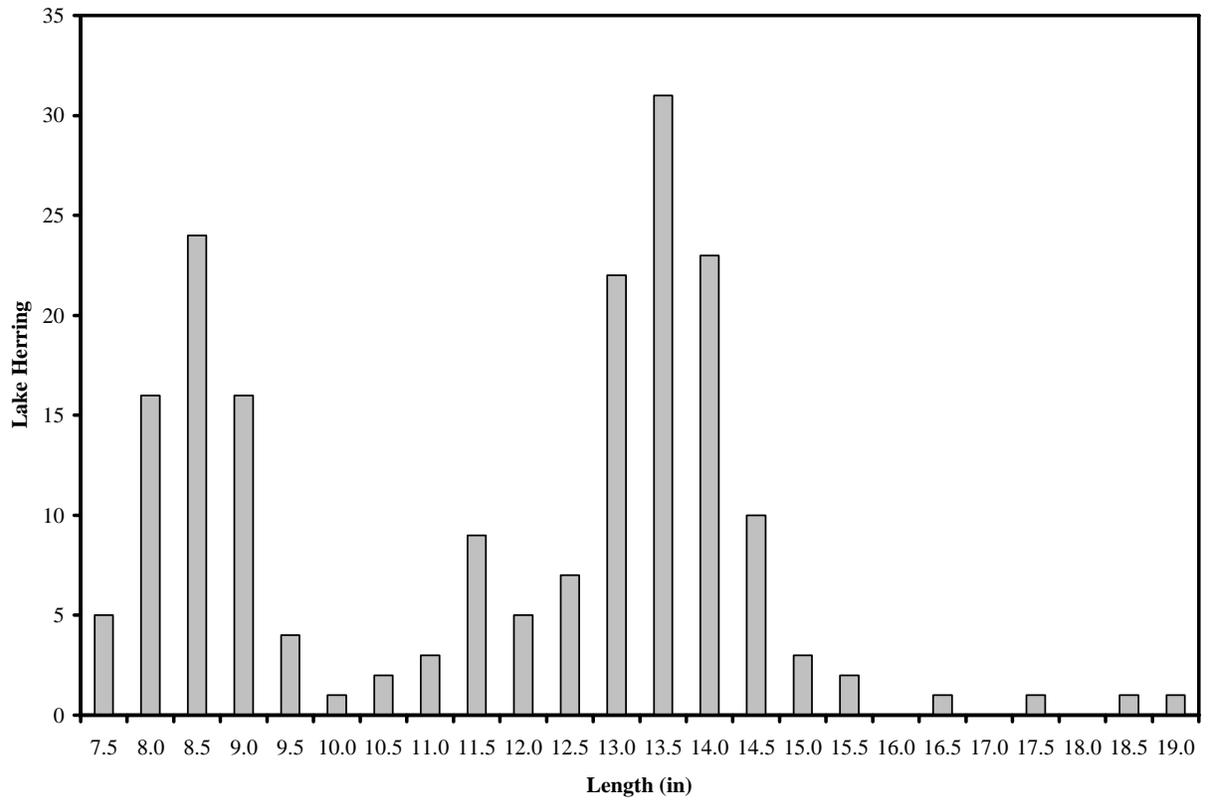


Figure 1. Length distribution of lake herring catch from spawning assessment at Sand Island index station, 2005.

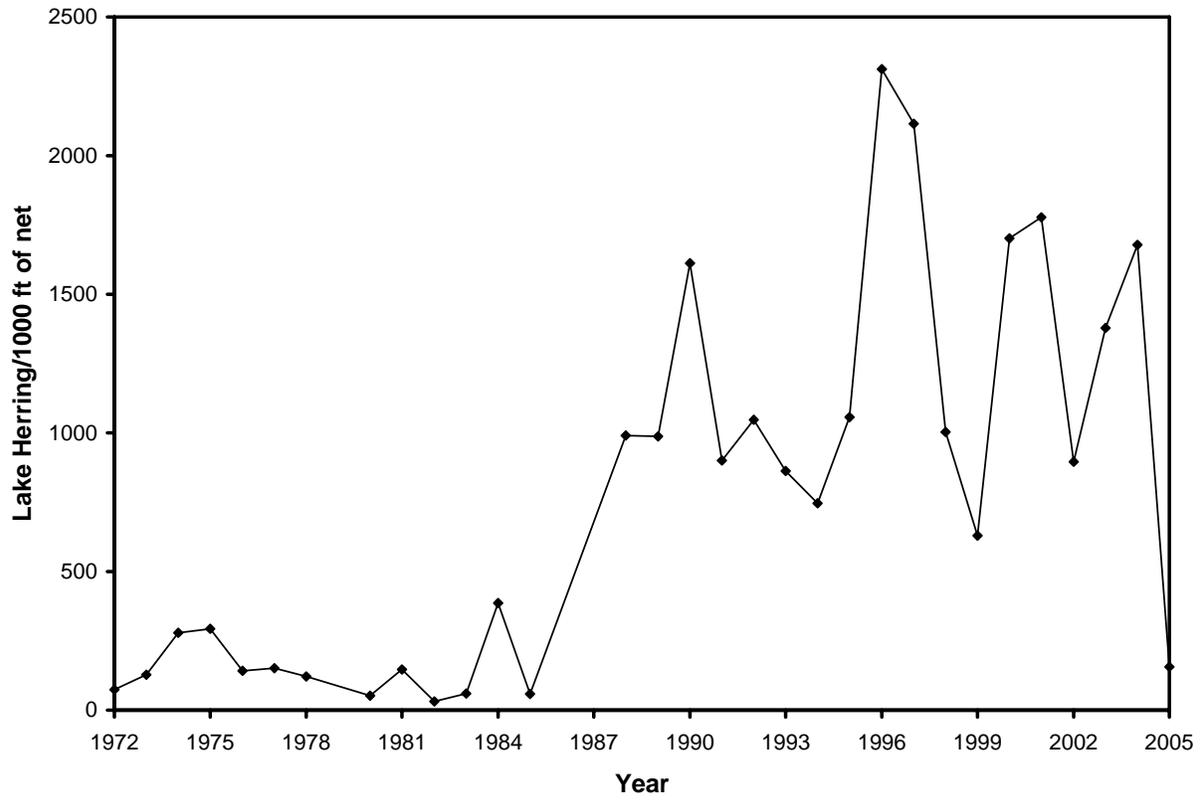


Figure 2. Spawning lake herring catch-per-unit-effort from Sand Island Shoal index station, 1972-2005.

Table 1. Lake herring spawning assessment catch data from Sand Island, 1980-2005. No data were collected in 1986 and 1987.

Year	Effort (Feet)	Lake Herring	CPUE/1,000'
1980	2,700	142	52.6
1981	2,700	394	145.9
1982	2,700	87	32.2
1983	2,700	162	60.0
1984	2,700	1,042	385.9
1985	2,700	156	57.7
1988	2,700	2,675	990.7
1989	1,500	1,482	988.0
1990	1,500	2,417	1,611.3
1991	1,500	1,350	900.0
1992	485	508	1,047.4
1993	1,500	1,294	862.7
1994	1,500	1,120	746.7
1995	1,500	1,586	1,057.3
1996	1,500	3,468	2,312.0
1997	1,500	3,173	2,115.3
1998	1,200	1,203	1,002.5
1999	1,200	755	629.2
2000	1,200	2,042	1,701.7
2001	1,200	2,133	1,777.5
2002	1,200	1,075	895.8
2003	1,200	1,654	1,378.3
2004	1,200	2,013	1,677.5
2005	1,200	187	155.8

Table 2. Age distribution of spawning lake herring at Sand Island, 1989-2005. Percentages in bold indicate dominant year classes.

Year	Age																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1989	7.1		4.9	21.3	65.3	1.3											
1990	0.2	10.5	0.8	32.6	17.2	37.4	1.3										
1991	0.5	21.6	18.2			6.6	45.4	7.1				0.3	0.3				
1992		3.0	29.9	9.8	3.0	0.9	4.1	45.0	3.8		0.3			0.3			
1993		2.1	20.5	29.3	5.6	1.9	6.4	1.3	31.5	0.8		0.5					
1994			0.9	19.8	30.6	18.2	8.6	2.2	0.6	15.7	1.2	1.9					
1995				3.4	3.4	23.4	22.8	20.0	13.8	3.4	5.3	3.4	0.9				
1996						9.2	52.7	16.7	6.7		1.7	11.7		1.3			
1997						2.2	24.8	35.6	18.5	1.5	1.5	3.7	12.2				
1998					1.2		1.2	3.6	64.3	15.5	1.2			11.9	1.2		
1999	1.8								14.0	66.7	5.3	5.3		3.5	3.5		
2000		19.4							0.0	8.1	54.8	9.7	1.6				6.5
2001		4.7	46.5						1.2	4.7	7.0	23.3	7.0		3.5	1.2	1.2
2002			3.2	54.3	6.4	3.2		1.1	2.1	2.1	6.4	10.6	4.3	6.4			
2003				13.1	63.6	3.0					1.0	4.0	8.1	5.1	2.0		
2004		6.3		2.5	5.1	68.4	1.3					3.8	1.3	11.4			
2005		25.0		1.3	2.5	5.0	31.3	15.0			2.5			3.8	2.5	10.0	1.3

Table 3. Mean length-at-age of lake herring from spawning survey at Sand Island, 2005.

Age	Mean Length (in)	Std. Dev.	Sample
2	8.7	0.5	20
3	-	-	0
4	9.8	-	1
5	9.0	1.1	2
6	13.1	0.3	4
7	13.2	1.2	25
8	13.8	0.3	12
9	-	-	0
10	-	-	0
11	14.2	0.7	2
12	-	-	0
13	-	-	0
14	13.9	0.1	3
15	14.3	0.0	2
16	16.0	1.8	8
17	18.5	-	1