

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

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TO: Peter Stevens

FROM: Michael Seider

SUBJECT: 2010 Spawning Lake Trout Report

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2010 SPAWNING LAKE TROUT ASSESSMENT

INTRODUCTION

Recovery of historical spawning populations has been an essential component of lake trout rehabilitation in the Wisconsin waters of Lake Superior. Creation of refuges/special use areas adjacent to spawning shoals, more restrictive fishing regulations, stocking of fertilized lake trout eggs in astro-turf bundles, and sea lamprey control has increased lake trout abundance. Although wild lake trout abundance has increased dramatically since the 1960s and stocking was concluded in 1995 for WI-2, maintaining or continuing to increase spawner biomass is essential to a self-sustaining population. The objective of this assessment is to monitor lake trout abundance on historically important spawning shoals and to collect lake trout eggs for the Les Voight Fish Hatchery for lake trout and splake stocking programs.

METHODS

The standard index gang set on Gull Island Shoal (GIS) was 2,700 ft of 5.5-in and 6-in (stretch measure) monofilament mesh (6, 5.5, 6, 5.5, 6, 5.5, 6, 5.5, 6). Each net within the gang was 300 feet long. The standard index gang off Northeast Michigan Island (NMI) was divided: 1,500 ft (6, 5.5, 6, 5.5, 6) set off Michigan Island, and 1,200 ft (6, 5.5, 6, 5.5) set off Gull Island.

The standard index gang set on Sand Cut Reef (SCR) was 3,900 ft of graded monofilament mesh. Each net was 300 ft long and meshes were arranged in the following sequence: 6, 5.5, 7, 4.5, 6.5, 5, 6, 5, 6.5, 4.5, 7, 5.5, 6. On SCR the gang was divided between the two humps: 1,800 ft on the west hump and 2,100 ft on the east hump.

An index gang (3,900 ft of graded monofilament mesh) was set on Devils Island Shoal (DIS). Each net was 300 ft long and meshes were arranged in the following sequence: 6, 5.5, 7, 4.5, 6.5, 5, 6, 5, 6.5, 4.5, 7, 5.5, 6.

Length, sex, maturity, and presence of sea lamprey wounds, fin clip, and external tags were recorded for each fish. Live lake trout were marked with individually numbered t-bar tags and released. Otoliths were collected from the dead fish and used to estimate fish age.

RESULTS/DISCUSSION

GULL ISLAND SHOAL

In 2010, 1,120 lake trout were sampled on GIS and 98% were wild fish. Twenty-seven percent of the lake trout captured were female. Catch-per-unit-effort (CPUE) decreased slightly from 2009 to 2010 (Figure 1). Lake trout CPUE has increased dramatically since 1960, when no fish were caught during the spawning assessments (Figure 1). Mean length of male and female lake trout captured was 27.6 in (SD=2.8) and 29.3 in (SD=2.9), respectively.

NORTHEAST MICHIGAN ISLAND

In 2010, 333 lake trout were sampled on NMI. Wild fish constituted 98% of the catch and female lake trout comprised 28% of the catch. Mean length of male and female lake trout was 27.4 in (SD=2.5) and 28.7 in (SD=2.8), respectively.

GULL ISLAND SHOAL - MICHIGAN ISLAND COMPLEX

The GIS and NMI data for wild and hatchery-origin lake trout were combined to monitor trends. Lake trout CPUE decreased across all length categories of lake trout from 2009 to 2010 due to lower catches at the NMI sets (Table 1). Although variable between 1985 and 1995, the abundance of wild female lake trout has increased gradually since 1964 (Figure 2). The annual proportion of female lake trout in the catch is highly variable, likely due to the timing of our sampling and the sex ratio of returning cohorts (Figure 3). The annual proportion of hatchery lake trout in the catch continues to decrease, however hatchery fish were a large component of the catch during assessments in the 1960s and 1970s (Figure 4).

In 2010, twenty-three lake trout year classes were represented in the sample of the GIS complex (Table 2). Average age of spawning lake trout at GIS was 20 in 2010 and has gradually increased since 1986 (Table 2). Lake trout caught from GIS complex in 2008 through 2010 were combined to further evaluate age composition because our sampling does not capture the full range of age classes present (Figure 5).

SAND CUT REEF

In 2010, 143 lake trout were sampled on SCR. Wild fish comprised 95% of the catch. Catch-per-effort of spawning lake trout decreased from 2009 to 2010 (Figure 6). Mean length of male and female lake trout was 26.4 in (SD=2.8) and 27.9 in (SD=3.4), respectively

DEVILS ISLAND SHOAL

In 2010, 145 lake trout were captured from the DIS, 99% were wild fish. Lake trout CPUE decreased from 2009 to 2010 (Table 4). The CPUE was the lowest recorded since sampling was reinitiated in 2001 potentially due to timing of our sampling and/or a modified sampling location on the shoal in 2010. Although a single gill net lift each year provides useful biological data, it may not be adequate to follow the status of this spawning population. Thirty-eight percent of the lake trout captured were female. Mean length of male and female lake trout was 26.4 in (SD=3.2) and 29.0 in (SD=3.0), respectively.

SEA LAMPREY WOUNDING RATES

Fresh sea lamprey wounds (per 100 lake trout) were relatively similar at GIS, SCR, and DIS in 2010 (Table 3). In past years marking rates at SCR were much lower than at GIS.

2010 EGG HARVEST

Lake trout eggs were collected by the Les Voigt Fish Hatchery for the lake trout (144,410) and splake (171,257) stocking programs.

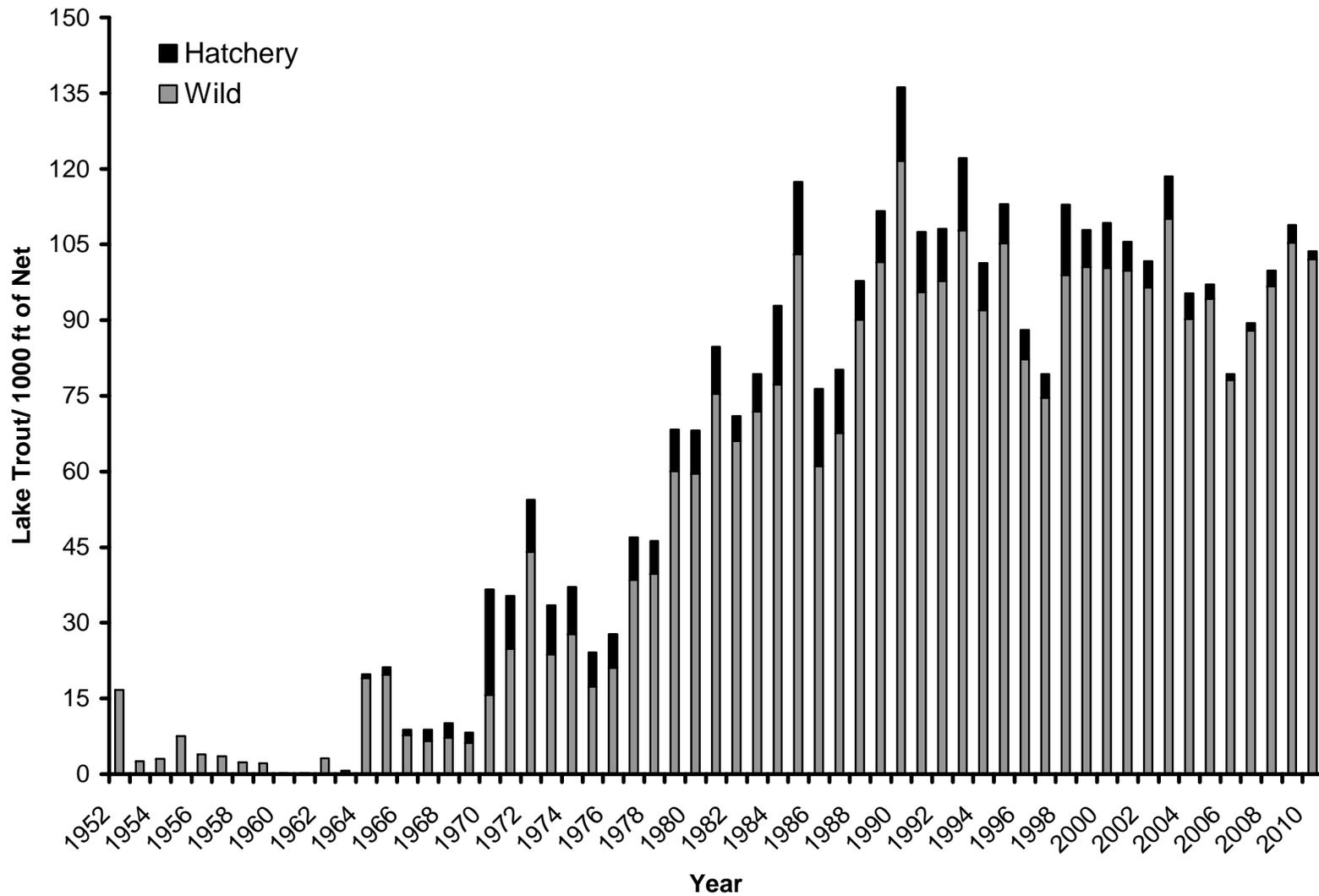


Figure 1. Catch-per-unit-effort of lake trout from spawning assessment at Gull Island Shoal, 1952-2010.

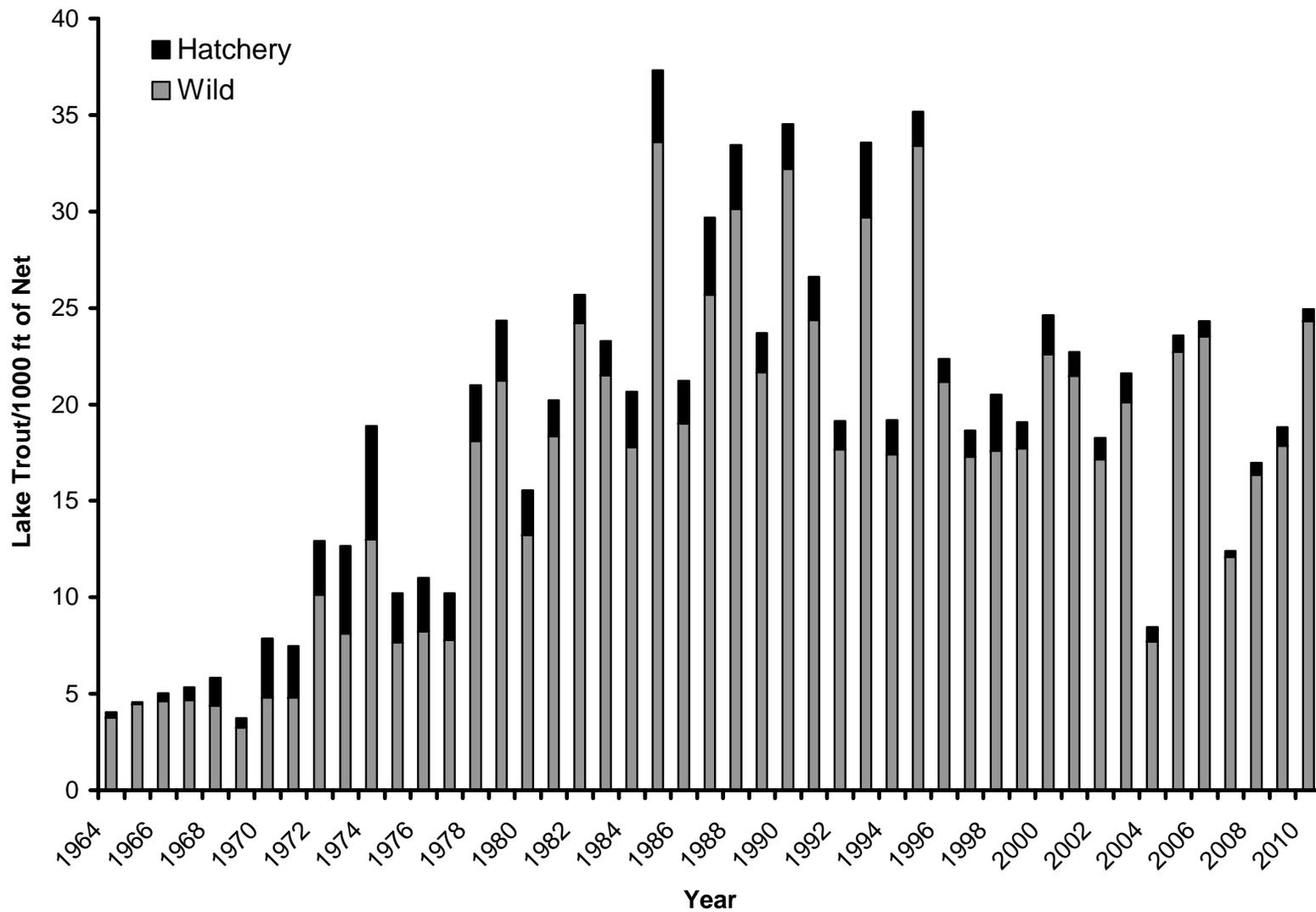


Figure 2. Female lake trout catch-per-unit-effort from spawning assessment at Gull-Michigan Island Complex, 1964-2010.

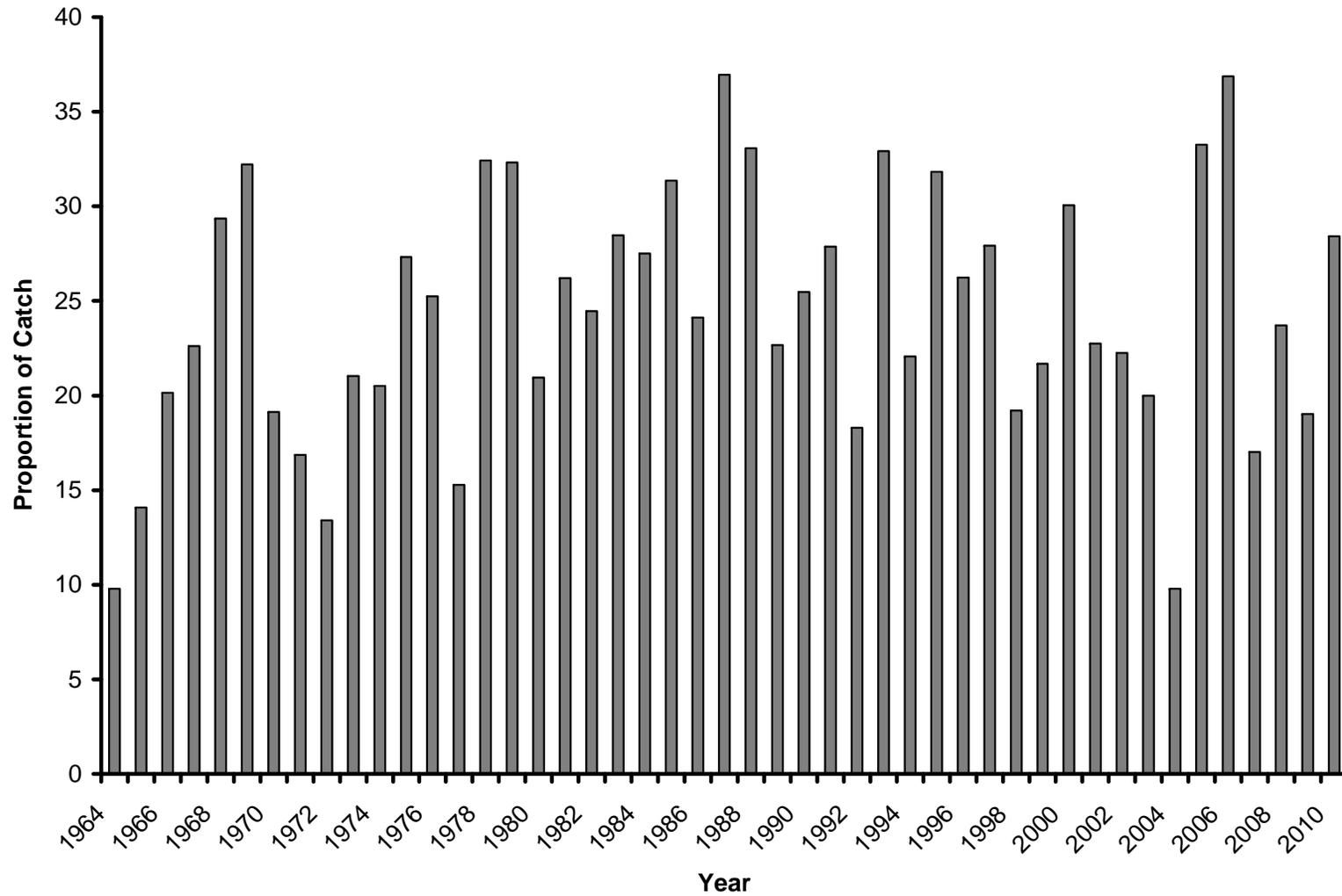


Figure 3. Mean proportion of female lake trout in the catch from the Gull-Michigan Island Complex during the spawning assessment, 1964-2010.

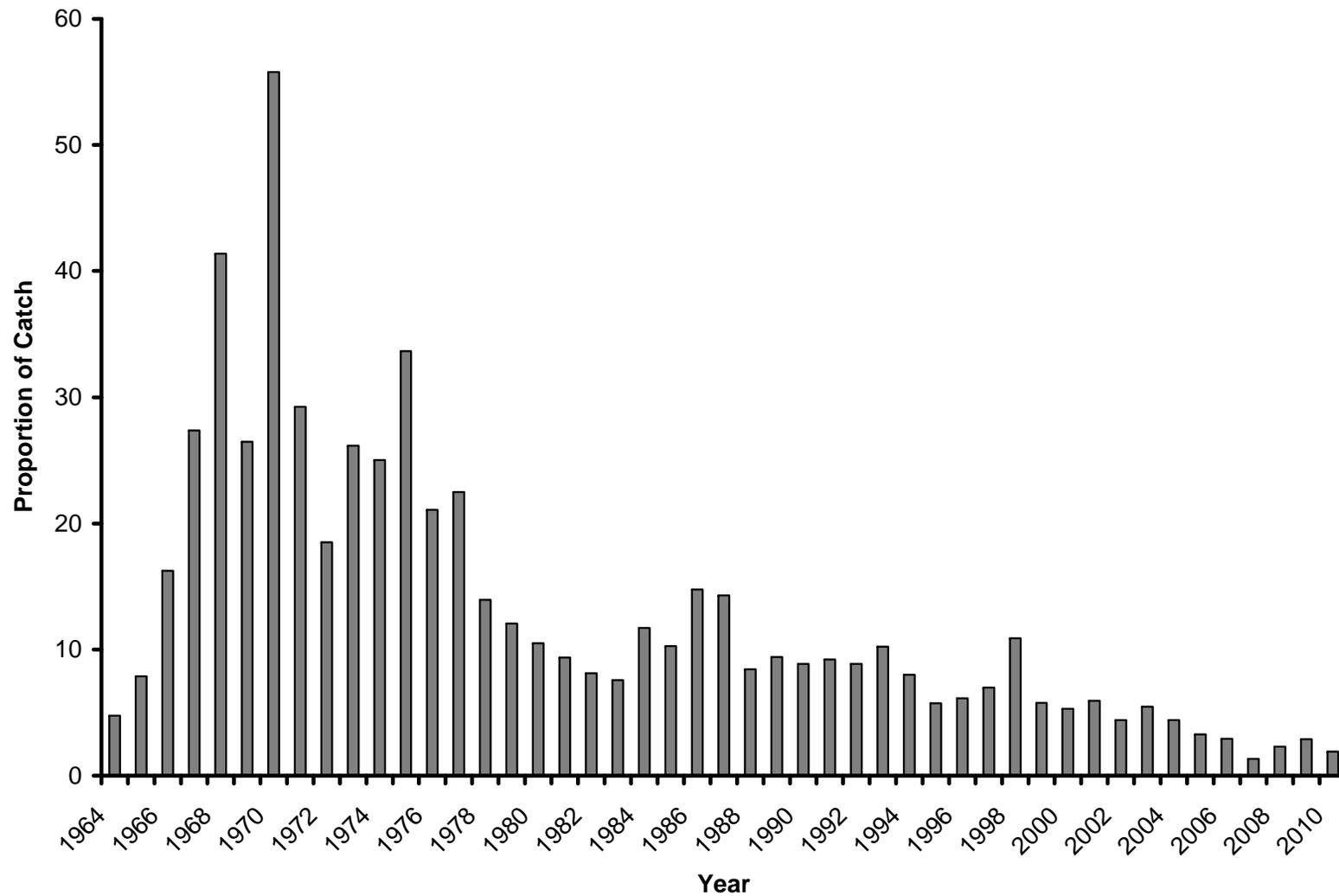


Figure 4. Mean proportion of hatchery lake trout in the catch from Gull-Michigan Island Complex during the spawning assessment, 1964-2010.

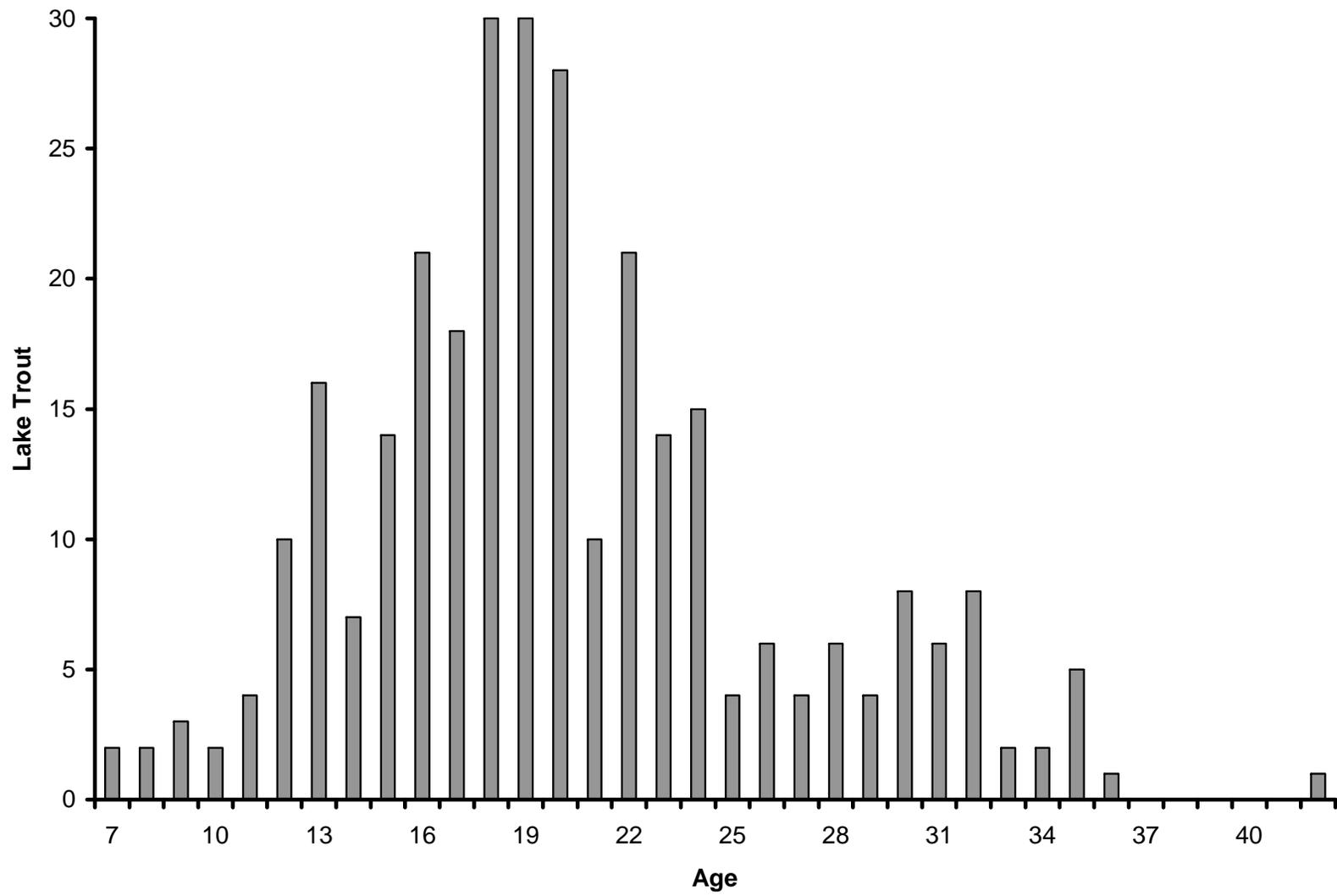


Figure 5. Age distribution of lake trout sampled during spawning assessment at Gull Island Shoal, 2008 through 2010.

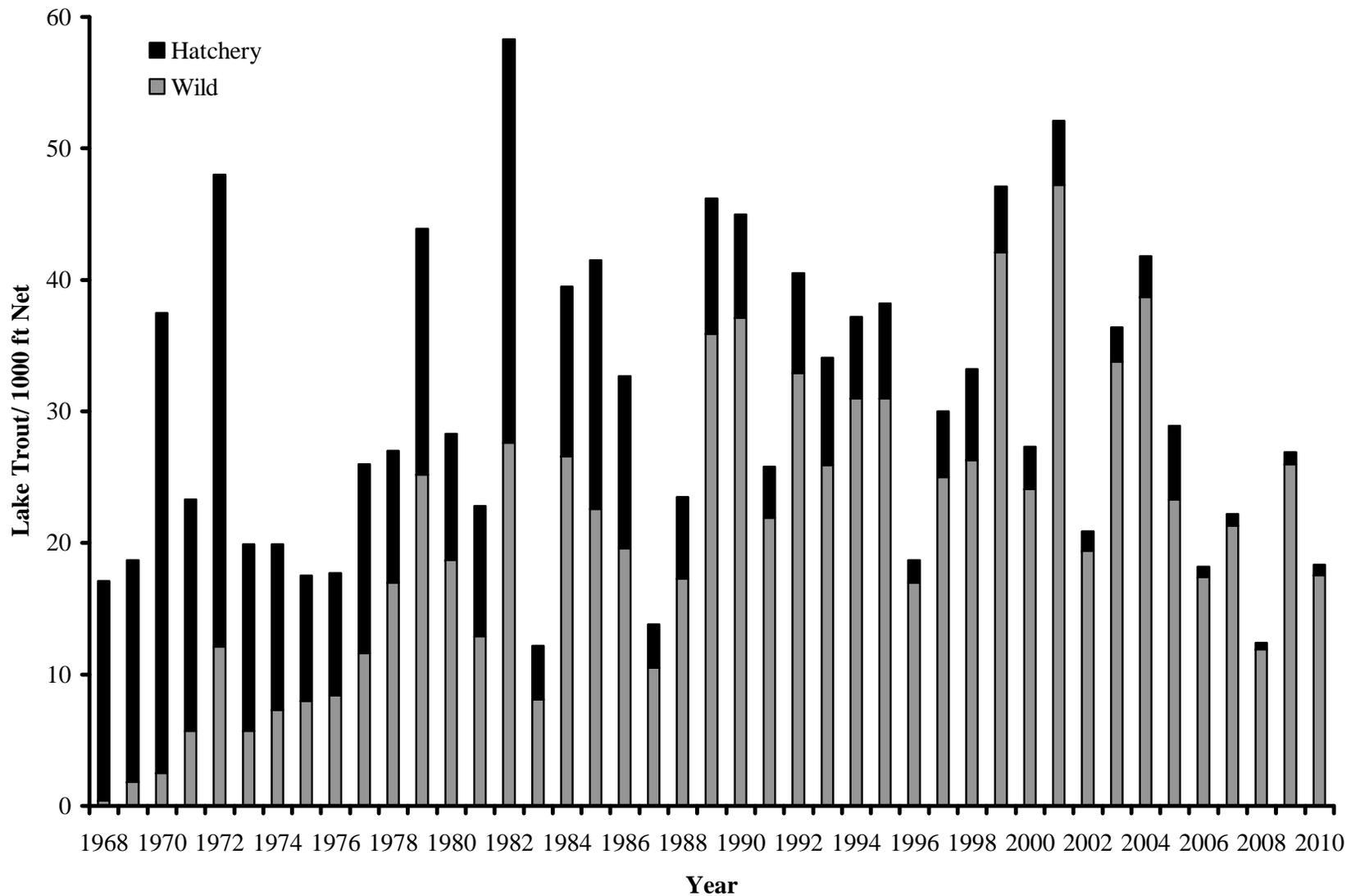


Figure 6. Catch-per-unit-effort of lake trout from spawning assessment at Sand Cut Reef, 1968-2010.

Table 1. Effort (ft) fished, lake trout catch, and lake trout catch per 1,000 feet of net (CPUE) from 5.5-in and 6-in mesh nets on the Gull-Michigan Island Complex, 1982-2010.

Year	Effort (Ft)	21 – 24.9"		25 – 28.9"		29" ≤	
		Catch	CPUE	Catch	CPUE	Catch	CPUE
1982	12,000	63	5.3	721	60.1	380	31.7
1983	18,600	171	9.2	838	45.1	519	27.9
1984	18,000	242	13.4	898	49.9	417	23.2
1985	10,800	191	17.7	862	79.8	286	26.5
1986	16,200	199	12.3	1,035	63.9	308	19.0
1987	16,200	171	10.6	823	50.8	351	21.7
1988	16,200	228	14.1	1,139	70.3	294	18.1
1989	16,200	292	18.0	1,259	77.7	213	13.1
1990	10,800	201	18.6	1,047	96.9	247	22.9
1991	16,200	155	9.6	945	58.3	505	31.2
1992	16,200	206	12.7	948	58.5	506	31.2
1993	16,200	111	6.9	1090	67.3	707	43.6
1994	16,200	73	4.5	946	58.4	464	28.6
1995	13,500	118	8.7	1,034	76.6	441	32.7
1996	13,500	73	5.4	646	47.9	452	33.5
1997	16,200	88	5.4	542	33.4	518	31.9
1998	16,200	104	6.4	786	48.5	808	49.9
1999	16,200	219	13.5	724	44.7	632	39.0
2000	16,200	158	9.8	687	42.4	683	42.2
2001	16,200	182	11.2	790	48.8	619	38.2
2002	16,200	144	8.9	677	41.8	623	38.5
2003	16,200	175	10.8	916	56.5	716	44.2
2004	16,200	102	6.3	736	45.4	575	35.5
2005	16,200	97	6.0	620	38.3	582	35.9
2006	16,200	127	7.8	521	32.2	483	29.8
2007	16,200	150	9.2	770	47.5	411	25.4
2008	16,200	137	8.4	752	46.1	505	31.2
2009	16,200	195	12.0	937	57.8	622	38.4
2010	16,200	166	10.2	869	53.6	418	25.8

Table 2. Age composition of spawning lake trout at the Gull Island Complex, 1986-2010.

Year	Sample Size	# of Year Classes	Lake Trout Age			
			Mean	St. Dev.	Min.	Max.
1986	12	7	11	2.7	8	17
1987	37	9	11	2.4	7	17
1988	33	11	12	2.7	8	20
1989	140	13	10	2.6	5	19
1990	279	20	12	3.3	6	28
1991	91	14	12	3.8	7	26
1992	77	17	13	4.1	6	22
1993	107	17	15	4.3	8	29
1994	179	20	13	4.1	7	28
1995	82	17	14	4.1	7	24
1996	63	18	15	4.7	7	34
1997	92	18	15	4.4	7	26
1998	113	21	16	4.5	6	27
1999	93	21	16	4.9	7	30
2000	176	24	18	4.9	9	36
2001	141	20	16	4.4	9	32
2002	96	19	17	5.0	9	38
2003	87	24	19	6.2	9	40
2004	67	23	21	6.1	9	38
2005	158	22	18	5.0	8	33
2006	77	19	19	5.4	10	39
2007	91	22	17	5.5	9	33
2008	93	26	20	6.2	7	42
2009	146	29	20	5.9	7	35
2010	65	23	20	6.1	9	36

Table 3. Fresh sea lamprey wounds (A1-A3) per 100 lake trout (sample size) captured during spawning assessments, 2010.

Location	Length Category (in)		
	21-24.9	25-28.9	>28.9
Gull Island Shoal Complex	0.0 (166)	2.5 (869)	9.6 (418)
Sand Cut Reef	0.0 (31)	3.4 (89)	9.1 (22)
Devils Island Shoal	0.0 (41)	6.8 (59)	6.7 (45)

Table 4. Effort (ft) fished, catch per 1,000 feet of net (CPUE), and catch composition of lake trout from spawning assessment at Devils Island Shoal, 1974-2010.

Year	Effort (ft)	CPUE	% Female	% Wild
1974	3,900	0.5	0.0	0
1975	3,900	0.8	0.0	0
1978	7,800	0.6	0.4	38
2001	3,900	93.3	10.0	97
2004	3,900	67.9	1.0	98
2006	3,900	53.1	31.4	98
2009	3,900	71.7	35.0	98
2010	3,900	37.2	37.9	99