

# CHEQUAMEGON BAY ASSESSMENTS, 2007

## INTRODUCTION

The various fisheries of Chequamegon Bay are an important component of the sport fishery in Lake Superior. The “Bay” receives substantial fishing pressure during the open water and ice fishing seasons. Chequamegon Bay has a unique assemblage of fishes, which provides abundant fishing opportunities but also complicates management strategies. Monitoring the diverse fisheries of the “Bay” must be accomplished through a variety of assessments. The objective of this report is to briefly present data from the various assessments that are conducted within Chequamegon Bay.

## METHODS

1) Spawning northern pike (hereafter pike) in Fish Creek Sloughs (west of Ashland) were sampled daily with fyke nets from April 13-20. Netting locations were chosen based on previous sampling done in 2001 (Figure 1). Length, sex, and maturity were recorded for each pike. Scales were collected from a length-based subsample of pike. Pike were marked with individually numbered t-bar tags and fin clips to calculate a Schnabel mark-recapture population estimate (Kohler and Hubert 1999). Spawning pike data were also collected in 1982, 1993, and 2001.

2) From May 23<sup>rd</sup> to June 5<sup>th</sup>, 400 ft and 800 ft graded mesh monofilament gill net gangs (100 ft or 200 ft panels of 8, 10, 12, and 14 in meshes) were set along the Ashland shoreline near the breakwall (Figure 1). Lake sturgeon were measured (total length), implanted with passive integrated transponder (PIT) tags, marked with external t-bar tags, and weighed when conditions permitted.

3) Smallmouth bass were sampled by hook-and-line in early June, in the Kakagon and Sand Cut Sloughs (Figure 1). Wisconsin Department of Natural Resources (WDNR) personnel sampled areas with high concentrations of smallmouth bass preparing to spawn. Hook-and-line methods varied annually but included live bait (sucker minnows, leeches) and artificial baits (e.g. soft plastic, spinnerbaits). Smallmouth bass were measured (total length) and scales and dorsal spines were collected for age estimation. Smallmouth bass were marked with individually numbered t-bar tags.

4) On August 31<sup>st</sup> and September 17<sup>th</sup>, 17 index stations from Sand Cut Slough to Boyd Creek were seined to capture forage species and young-of-the-year smallmouth bass (Figure 1). Stations were sampled with a 50 ft bag seine (3/16 in mesh, 4 ft by 4ft bag) dragged along the shoreline. Species counts were done and a subsample of each species was measured (total length).

## RESULTS/DISCUSSION

1) During sampling 342 pike were tagged of which 158 (46%) were male (Table 1). The average size of male and female pike was 22.9 in and 26.4 in, respectively (Figure 2, Table 1). Size structure has increased gradually since 1982 (Table 1). Population estimates increased from 1982 to 2001 but then decreased from 2001 to 2007 (Table 1, Figure 3). Lake Superior water levels in 2007 were much lower than in previous years. Much of the vegetated habitat which pike use for spawning was without water and may have restricted spawning activity. Thus lower population estimates in 2007 may have been caused by fewer pike using the areas that were sampled. The potentially deleterious effect of low water levels on pike abundance and recruitment will need to be monitored through future surveys.

2) In 2007, 113 lake sturgeon were captured, which averaged 44.2 in (Range = 27.0-68.5) (Table 2). Catch-per-unit-effort (CPUE) of lake sturgeon from 8 and 10 in meshes increased from 1988 to 2007 (Figure 4). Six lake sturgeon captured in 2007 had been tagged previously by WIDNR personnel. In addition, lake sturgeon previously tagged in the Bad River and White River were recaptured in Chequamegon Bay. Although lake sturgeon do not spawn in the “Bay”, they inhabit the “Bay” between spawning events.

3) During spring sampling, 133 smallmouth bass were captured in the Sand Cut and Kakagon sloughs. Mean length of smallmouth bass was 17.3 in (SD = 2.4) (Figure 5). Mean length of smallmouth bass increased steadily from 1991 to 2002 but has leveled off more recently (Figure 6). Mean length-at-age has not changed noticeably since 1991 (Table 3). The number of age classes represented in the catch has increased over the past decade (Table 4). The 22 in minimum length limit has increased the number of larger smallmouth bass and allowed more year-classes to contribute to the fishery.

4) Nine species were captured during seining in 2007 (Table 5). Smallmouth bass per seine haul was relatively stable but yellow perch per haul has been much more variable since 1996 (Figure 7). Annual changes in vegetation/ woody structure and water levels in several of the sites in Chequamegon Bay are likely influencing forage catchability, thus influencing catch composition and species abundance.

## References

Van Den Avyle, M.J. and R.S. Hayward 1999. Dynamics of Exploited Fish Populations. Pages 127-166. *In* C.C. Kohler and W.A. Hubert, editors. *Inland Fisheries Management*, 2<sup>nd</sup> edition. American Fisheries Society, Bethesda, Maryland.

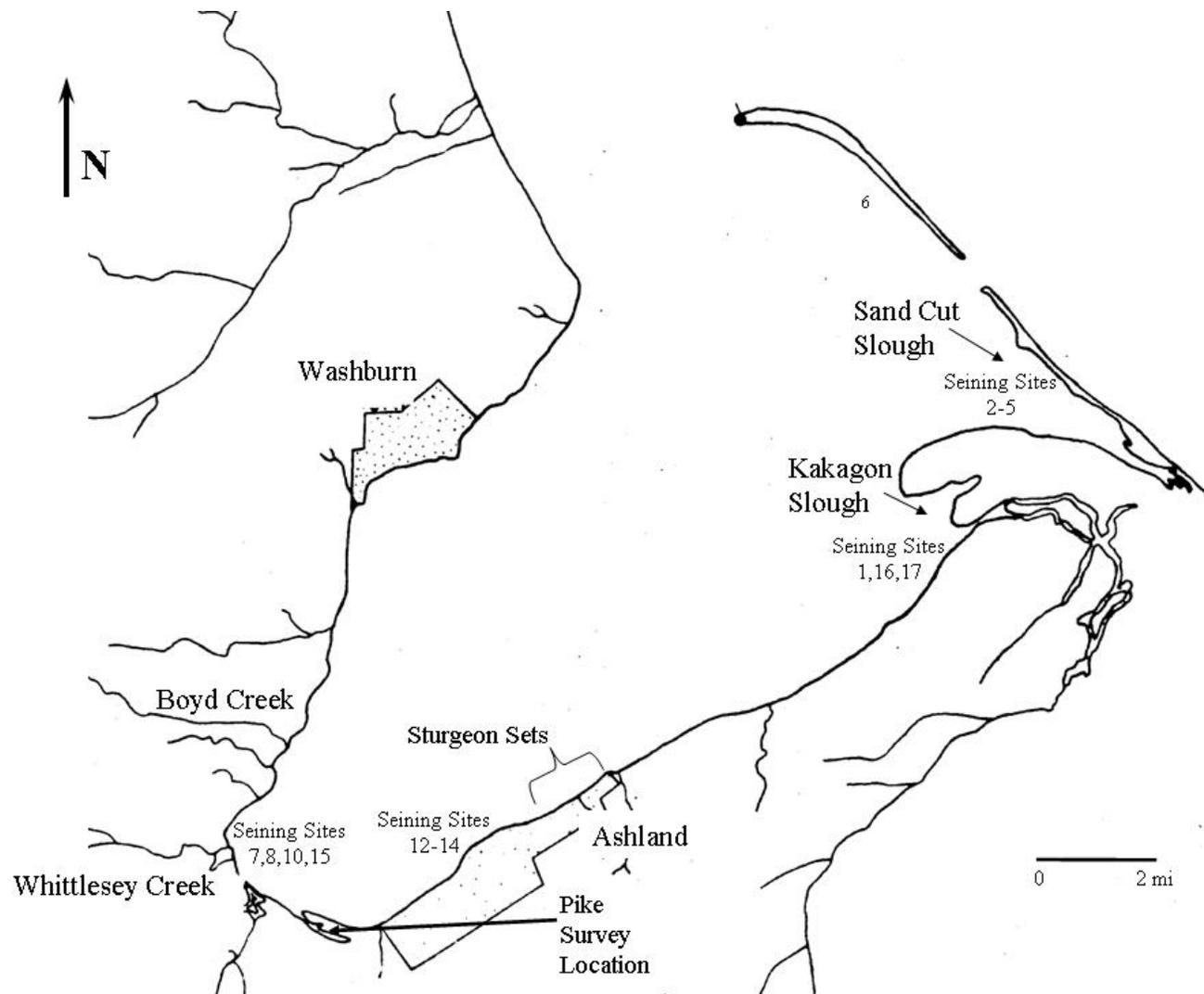


Figure 1. Map of Chequamegon Bay, Lake Superior with northern pike survey location, seining stations and lake sturgeon gill net sets, 2007.

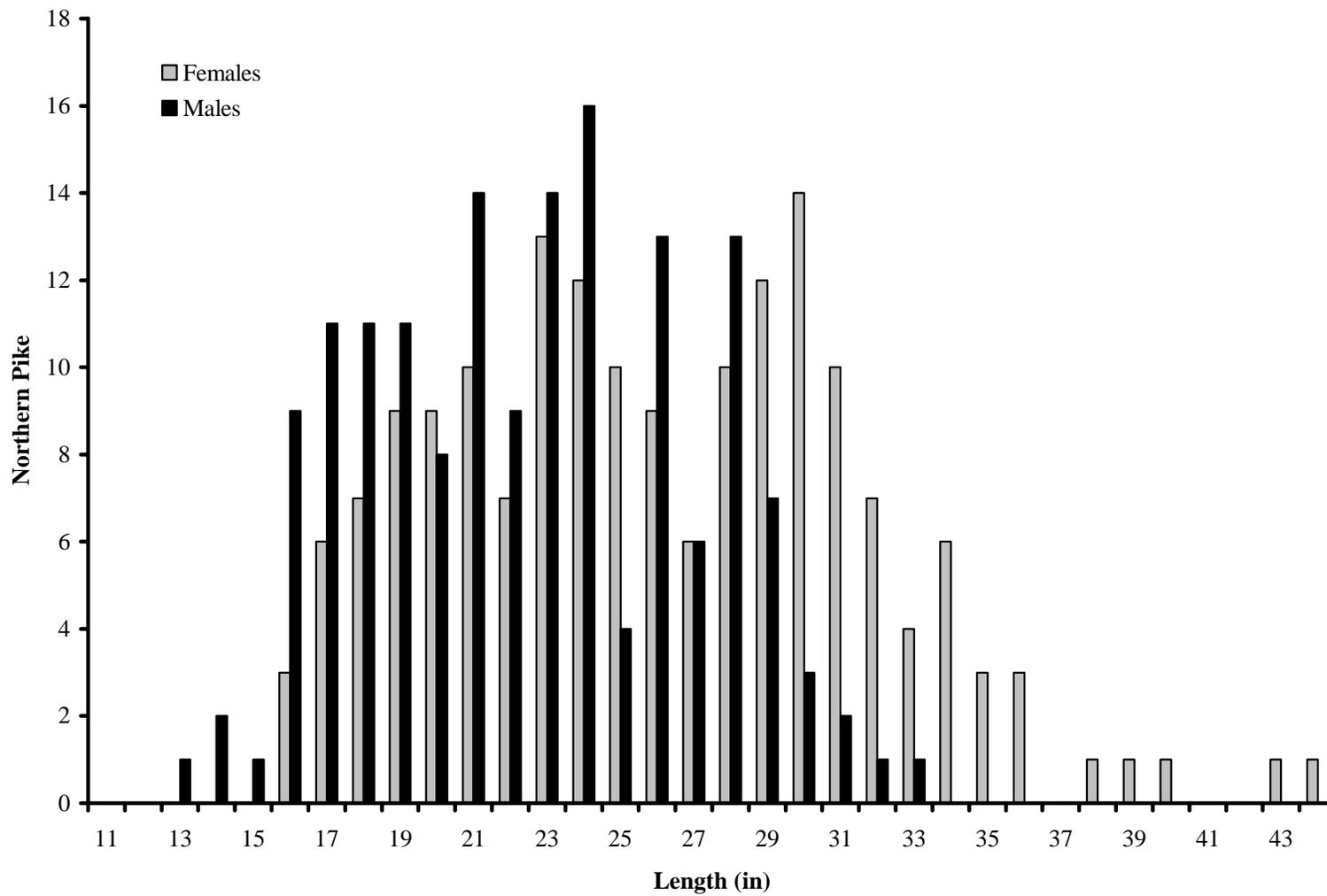


Figure 2. Length distribution of male female northern pike captured in Fish Creek Slough, 2007.

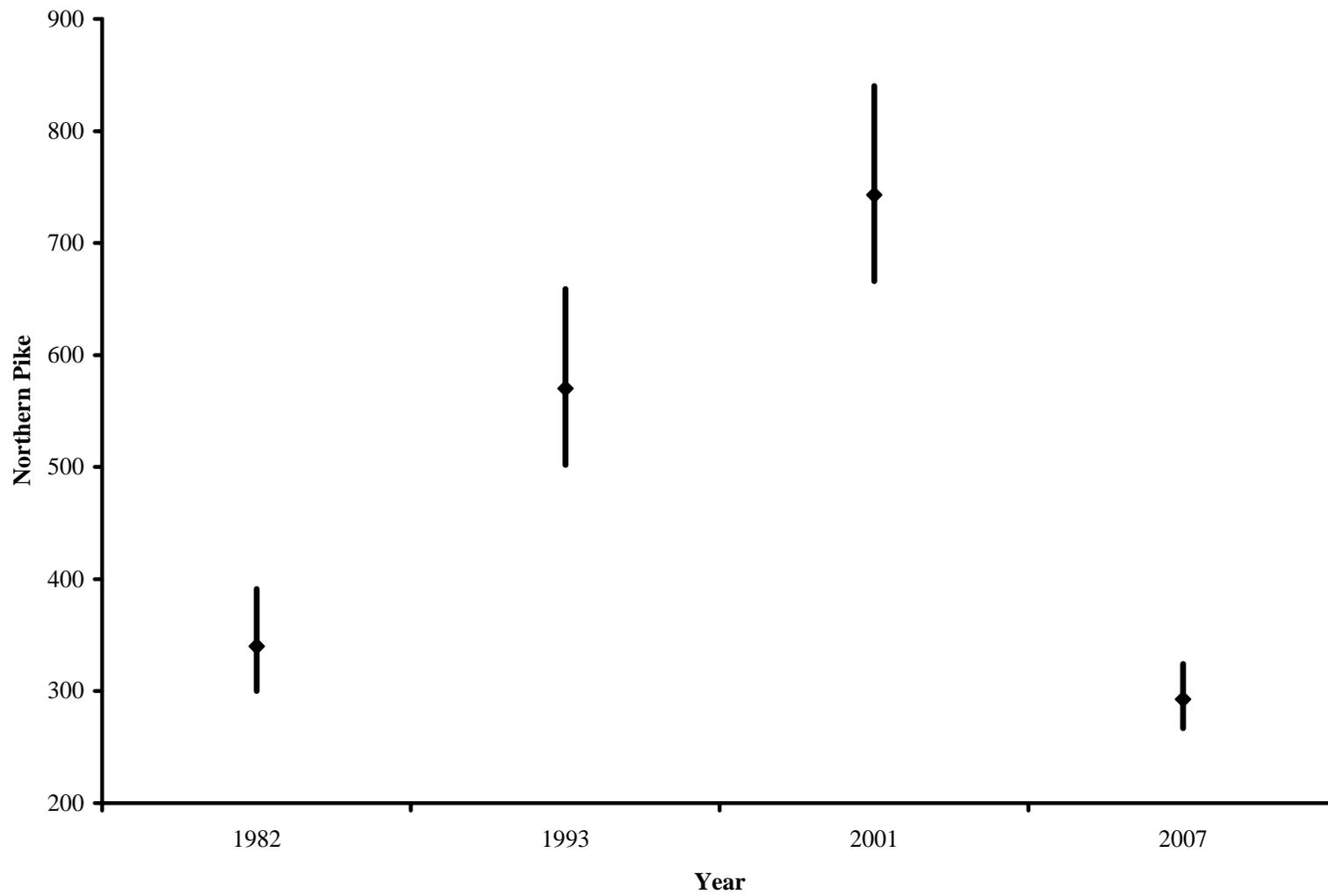


Figure 3. Northern pike population estimates (95% confidence intervals) Fish Creek Sloughs 1982-2007.

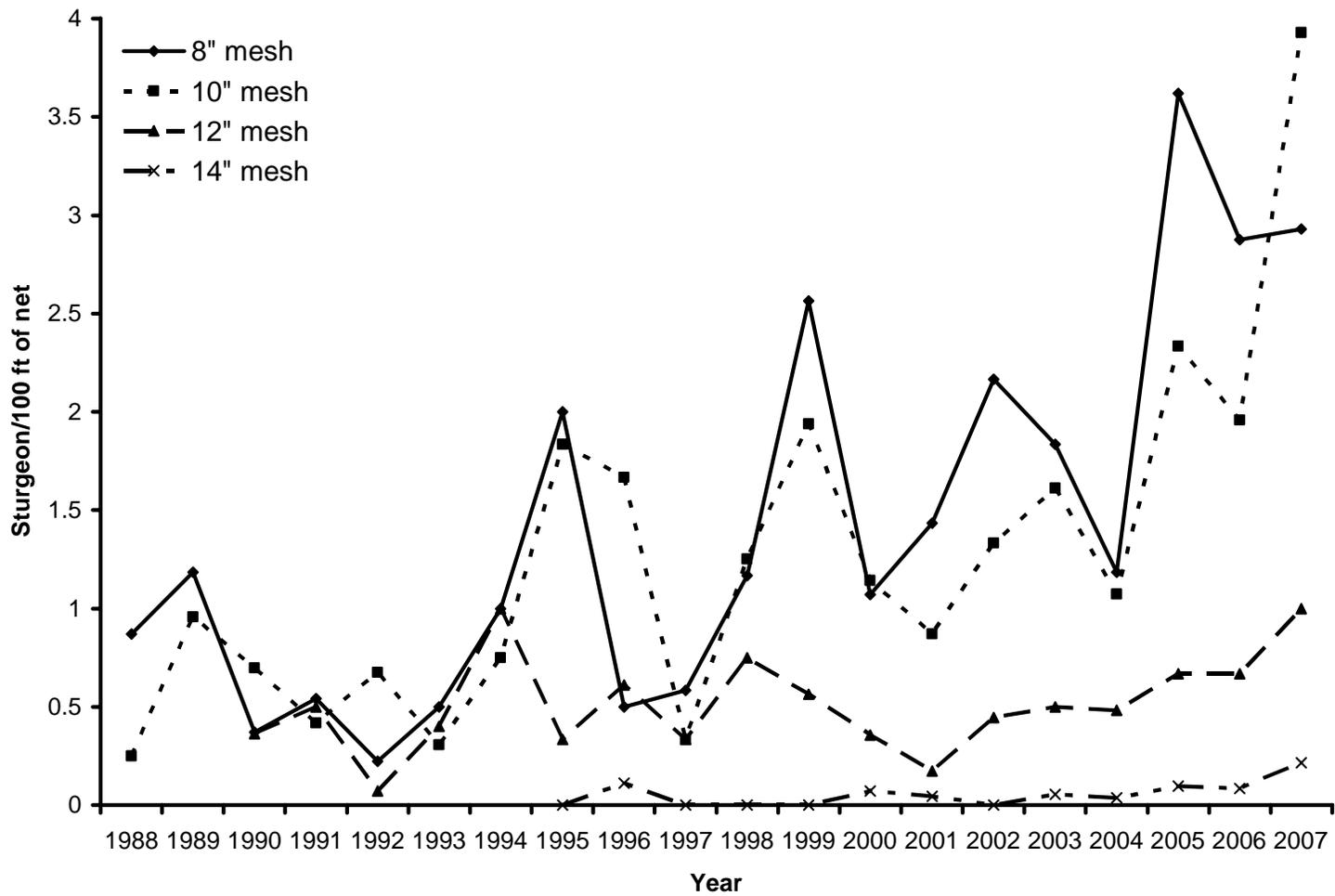


Figure 4. Catch-per-unit-effort of lake sturgeon from spring Chequamegon Bay assessment, 1988-2007. Twelve inch mesh was added to the assessment in 1990 and 14 inch mesh was added in 1995.

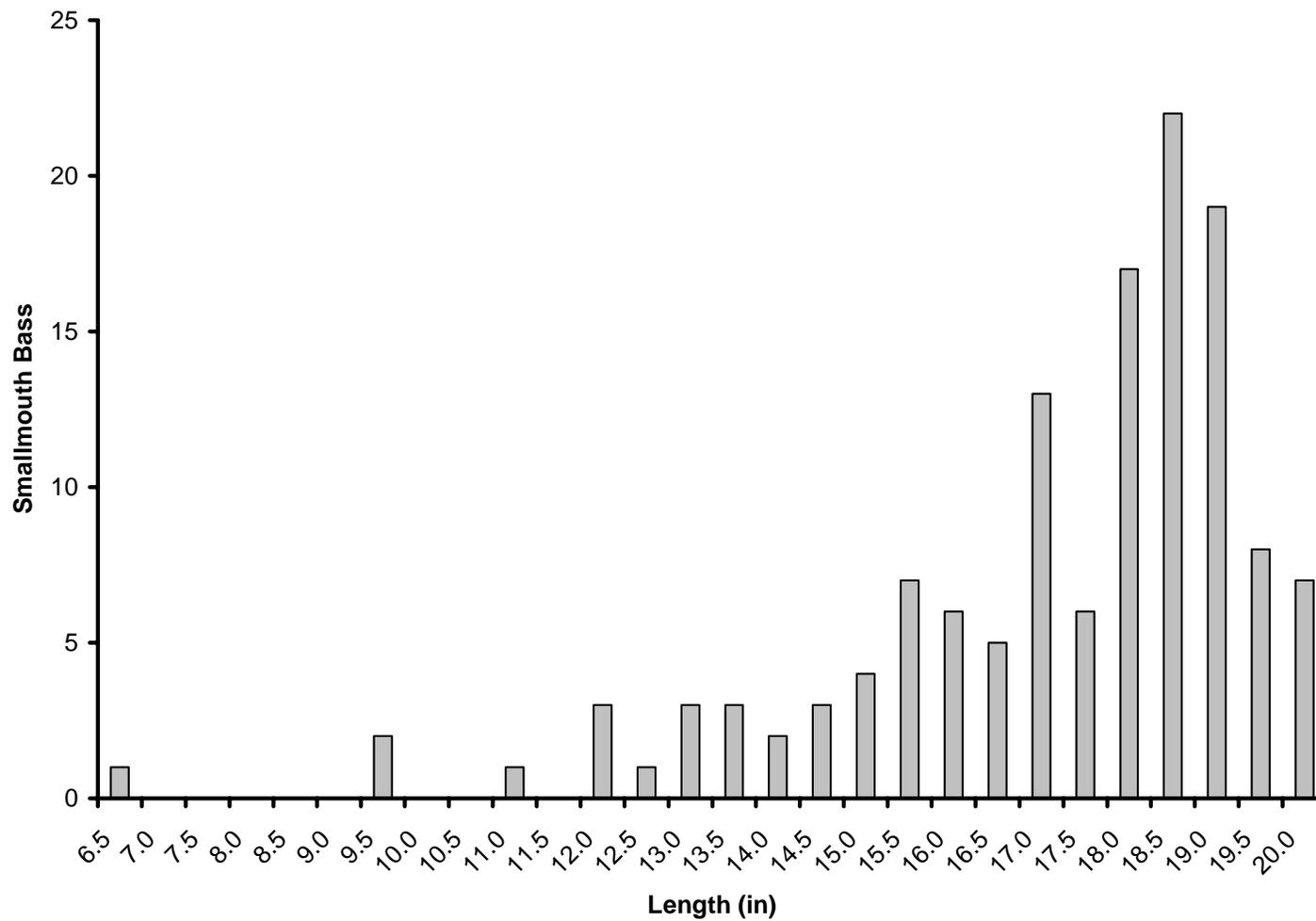


Figure 5. Length distribution of smallmouth bass captured during spring assessment in Chequamegon Bay, 2007.

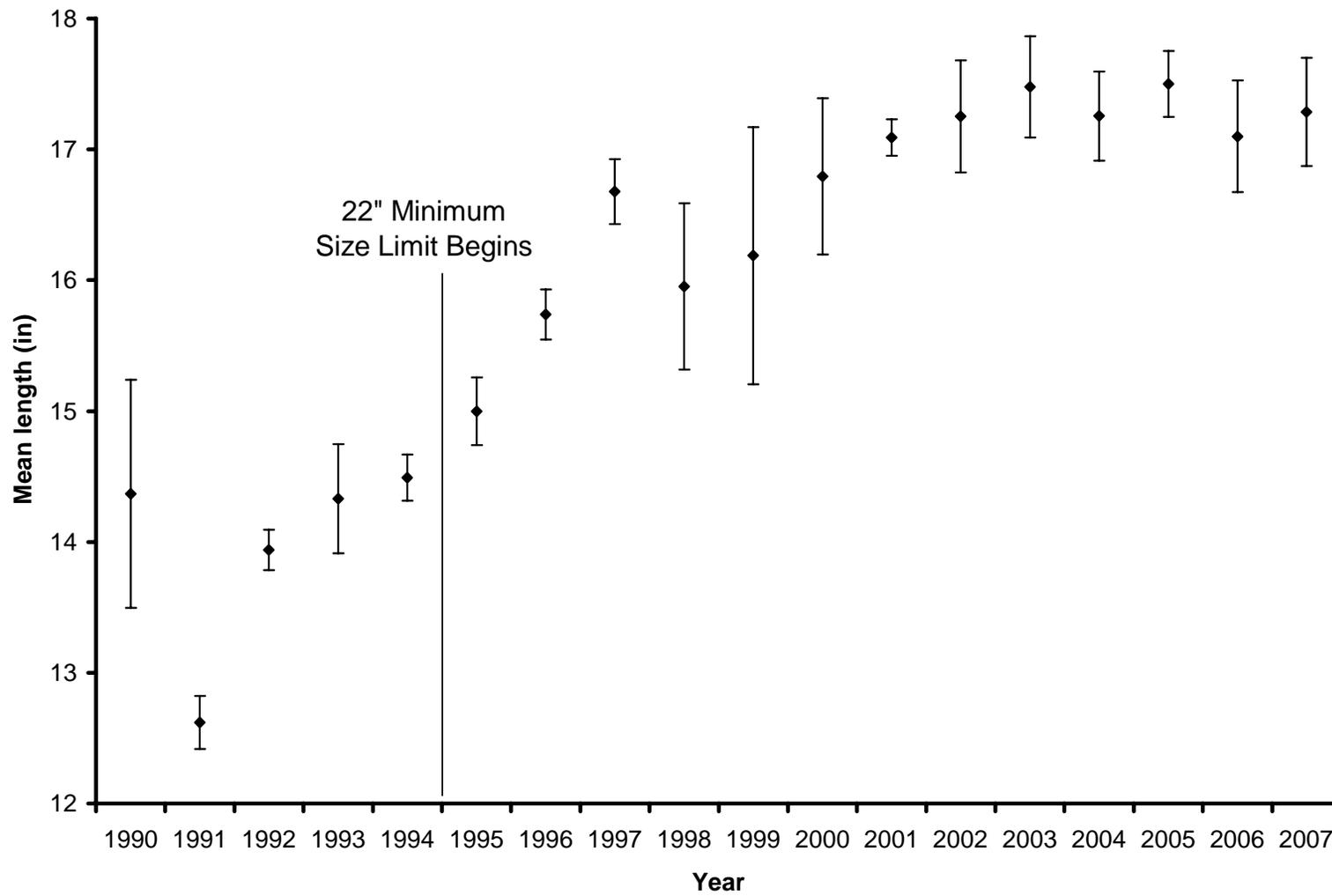


Figure 6. Mean length (in) of smallmouth bass from spring assessment in Chequamegon Bay, 1990-2007.

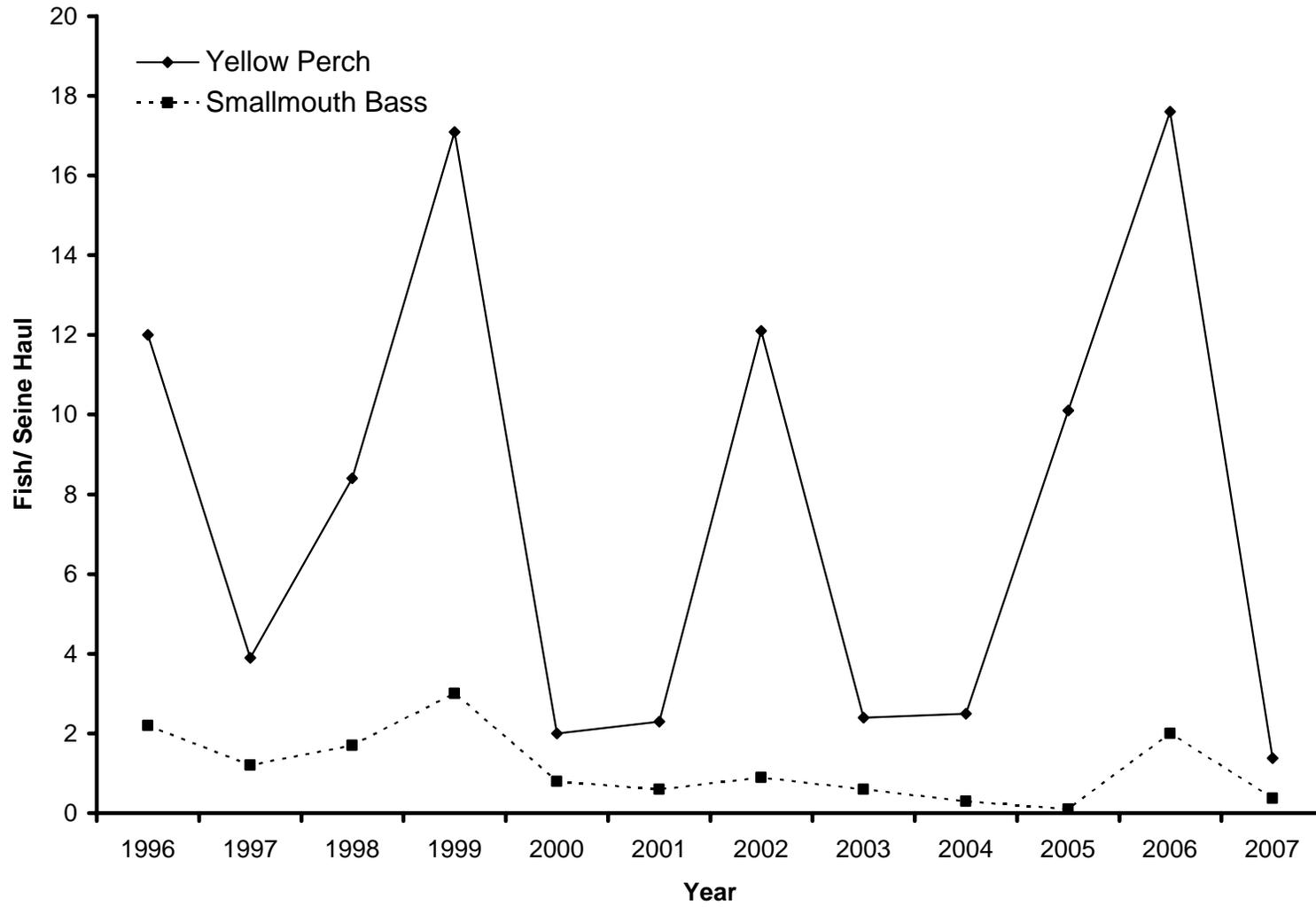


Figure 7. Smallmouth bass and yellow perch per seine haul in Chequamegon Bay, 1996-2007.

Table 1. Catch statistics and population estimates of spawning northern pike from Fish Creek Sloughs, 1982-2007.

	Year			
	1982	1993	2001	2007
<i>Catch</i>				
Male	140	146	408	175
Female	77	180	149	158
Unknown	0	23	8	9
Total	217	349	565	342
<i>Average Length (st. dev)</i>				
Male	23.4 (3.3)	22.6 (4.2)	24.3 (2.2)	22.9 (4.5)
Female	25.4 (5.2)	26.3 (6.4)	28.4 (3.6)	26.4 (5.7)
Total	24.1 (4.2)	24.0 (6.1)	25.2 (3.5)	24.6 (5.5)
<i>Percent of Catch &gt; 26"</i>				
Males	14	22	22	29
Females	47	59	77	51
Total	26	40	36	40
<i>Population Estimate (CI)</i>				
Total	340 (300-391)	570 (502-659)	743 (666-840)	293 (267-324)

Table 2. Lake sturgeon catch and effort data from Chequamegon Bay assessment, 1988-2007.

YEAR	EFFORT	DAYS	NUMBER OF STURGEON					CPE/100'	# OF DNR RECAPS	LENGTH (IN)			WEIGHT (LBS)		
			TOTAL	8"	10"	12"	14"			MIN.	MAX	AVE	MIN.	MAX	AVE
1988	5,900	6	34	27	7	na	na	0.58	1	34.9	55.9	43.1	na	na	na
1989	4,750	3	51	29	22	na	na	1.07	0	27.5	59.0	42.4	6.0	51.0	20.0
1990	14,200	10	74	20	46	8	na	0.52	5	25.2	65.5	48.0	5.5	100+	27.6
1991	5,200	4	27	13	10	4	na	0.52	4	26.2	65.7	43.7	4.5	62.0	23.4
1992	9,000	7	36	8	27	1	na	0.40	6	28.0	60.0	45.0	6.0	57.0	23.0
1993	9,200	6	37	18	11	8	na	0.40	4	26.7	65.9	47.2	8.0	80.0	29.3
1994	2,400	4	22	8	6	8	na	0.87	0	33.2	65.3	48.2	8.5	62.0	31.2
1995	2,400	3	25	12	11	2	0	1.04	2	28.8	64.0	41.6	4.5	55.0	18.9
1996	7,200	7	52	9	30	11	2	0.72	5	32.2	60.0	47.7	8.0	61.0	27.4
1997	4,800	5	15	7	4	4	0	0.31	1	24.8	59.2	47.3	5.0	56.0	27.1
1998	4,800	7	38	14	15	9	0	0.79	5	31.5	57.9	45.0	14.0	52.0	26.9
1999	6,400	8	81	41	31	9	0	1.27	2	24.0	62.4	42.5	3.0	70.0	20.7
2000	5,600	5	37	15	16	5	1	0.66	3	24.0	64.6	45.3	3.5	58.0	23.9
2001	9,200	9	58	33	20	4	1	0.63	2	31.0	60.0	45.5	7.0	53.0	25.2
2002	7,200	6	71	39	24	8	0	0.99	6	23.6	67.0	43.2	3.0	100+	22.5
2003	7,200	6	72	33	29	9	1	1.00	3	26.2	67.1	43.7	4.5	71.0	22.9
2004	10,800	9	75	32	29	13	1	0.69	5	23.6	68.8	43.9	2	52	22.4
2005	8,400	7	141	76	49	14	2	1.68	11	18.6	67.2	44.2	1	82	23.5
2006	9,600	8	135	70	47	16	2	1.41	13	27.9	64.5	45.6	4	55	24.7
2007	5,600	5	113	41	55	14	3	2.02	6	27.0	68.5	44.2	4.5	85	23.5
Total	139,850	125	1,194	545	489	147	13	0.85	84						

Note: Lake sturgeon were weighed when conditions permitted. Thus the lake sturgeon in length for a particular was not always the largest fish in weight.

Table 3. Mean length-at-age of smallmouth bass from spring assessments in Chequamegon Bay, 1991-2007. No age data were collected in 1993.

Age	Year															
	1991	1992	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2																9.6
3	10.5						8.0		12.4	11.2		11.1	11.4	10.8		11.0
4	12.2	12.9	11.0	11.6		11.0	11.5	11.8		12.9	12.3	13.5	12.5	13.6		12.9
5	12.9	14.7	11.8	12.6	13.3	12.0	13.6	13.8	13.8	14.4	14.9	14.7	14.4	14.2	13.9	14.0
6	15.7	15.6	14.0	14.4	13.9	14.1			16.0	15.0	15.2	15.8	15.8	15.9	14.5	15.2
7	16.5	17.1	15.3	15.4	15.2	15.6	15.3	15.5	15.8	16.0	15.3	16.1	16.6	16.2	16.4	17.0
8		17.8	15.7	16.2	16.0	16.4	16.3	15.9	17.9	17.2		16.6	16.8	16.7	17.0	17.6
9	18.4	17.9	17.5	17.1	16.5	16.8	16.8		17.8	16.3	17.0	16.6	17.3	17.7	17.7	17.6
10		18.8	17.7		16.7	17.1	17.0	16.8	17.2	16.5	17.7	18.0	18.6	17.8	17.8	18.4
11		20.5			17.5		17.7	17.7	17.6	17.4	17.8	18.5	18.2	18.2	18.0	18.7
12								17.7	18.0	17.5	17.9	18.5	18.6	18.7	17.7	19.5
13									19.4	18.8	18.8	18.4	18.5	18.5	17.9	
14										19.3	18.6	19.2	19.0	19.1	19.2	19.0
15		19.8									18.8	19.7	19.0	18.5	18.7	
16												19.2	19.6	18.8	18.5	19.9
17														19.0	18.6	18.6
18														19.4	18.9	19.2
19														19.0		19.8
20																19.8
Sample	131	67	109	48	90	31	45	16	26	74	54	73	106	120	59	43

Table 4. Age distribution (%) of spring catch for smallmouth bass from Chequamegon Bay, 1991-2007. No age data collected in 1993. Highest proportion in bold and border for each year.

Age	Year															
	1991	1992	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
2							4.4									2.3
3	16.0						6.7		7.7	14.9		1.4	1.9	0.8		2.3
4	<b>74.8</b>	17.9	4.6	4.2		3.2	11.1	6.3		9.5	11.1	5.5	0.9	2.5		9.3
5	6.9	<b>49.3</b>	8.3	4.2	4.4	6.5	6.7	18.8	3.8	8.1	3.7	6.8	7.5	4.2	8.5	4.7
6	0.8	6.0	31.2	<b>33.3</b>	13.3	3.2			15.4	9.5	7.4	2.7	<b>19.8</b>	5.8	10.2	9.3
7	0.8	7.5	<b>49.5</b>	27.1	15.6	12.9	8.9	6.3	7.7	<b>20.3</b>	1.9	15.1	8.5	<b>15.0</b>	15.3	<b>11.6</b>
8		9.0	1.8	27.1	<b>34.4</b>	9.7	8.9	6.3	3.8	5.4		2.7	3.8	9.2	<b>18.6</b>	4.7
9	0.8	6.0	0.9	4.2	25.6	<b>54.8</b>	13.3		11.5	2.7	5.6	2.7	10.4	5.0	6.8	7.0
10		1.5	3.7		4.4	9.7	<b>26.7</b>	18.8	11.5	2.7	9.3	9.6	3.8	10.8	10.2	7.0
11		1.5			2.2		17.8	12.5	<b>26.9</b>	5.4	<b>16.7</b>	12.3	8.5	5.8	1.7	4.7
12								<b>31.3</b>	7.7	2.7	14.8	<b>21.9</b>	4.7	2.5	1.7	4.7
13								3.8	6.8	9.3	6.8	10.4	12.5	1.7		
14									12.2	9.3	5.5	6.6	8.3	6.8	7.0	
15		1.5									11.1	6.8	10.4	5.8	8.5	
16												2.7	2.8	8.3	3.4	4.7
17														0.8	3.4	7.0
18														0.8	1.7	<b>11.6</b>
19														1.7	0.0	2.3
20															1.7	

Table 4. Catch data from summer seining stations in Chequamegon Bay, 2007.

Station	Yellow Perch	Smallmouth Bass	Bluntnose Minnow	Johnny Darter	Rock Bass	Common Shiner	P. seed	Bluegill	Sand Shiner
1								1	
2									
3									
4									
5									
6									
7				6					
7B		1			2				
8	1			2	1				
10									
12	11	1	115		2	8	1	4	4
13	10		138				4		
14		2							
15									
16		1							
17		1		1					
Sum	22	6	253	9	5	8	5	5	4