LPL 313

Norman Rockwell: *Old Man in Fishing Boat,* **1930**

BEAR LAKE
Oneida County, Wisconsin
Panfish Survey Results for 1996 and Evaluation of Panfish Removal Impacts from 1985 to 1996

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Acknowledgments

1996

I would like to thank all Bear Lake volunteers who contributed to this year's fish project. They include Dale and Phyllis Jalinski, Dick and Barb Lemanski, Jim and Gene Jacobi, Doc and Ruth Van Prooien, Frank Harris, John Winchell, and others.

1985-1996

Since this project first officially started 1985 a number of volunteers have contributed their time and effort over the years. I would like to acknowledge their help and support. Without their volunteer contributions this project would not have been possible.

Dale and Phyllis Jalinski:	1985-1996
Doc and Ruth VanProoien:	1985-1996
Barb Lemanski:	1985-1996
Dick Lemanski:	1985-1992, 1996
Mike Lemanski:	1985
Dave Lemanski:	1986
Ed Griffith:	1985-1989
Frank Harris:	1986-1989, 1996
John Winchell:	1987, 1992, 1996
Harry Theisen:	1988, 1989
Richard Ring:	1990-1992
Jim Jacobi:	1990-1996

In addition, WDNR - Woodruff fisheries ecologists were very helpful and included Dick Wendt and Ron Theis. We also thank them for loaning us fyke nets over the years.

In Rhinelander, Bob Young, WDNR, has monitored projects in 1991, 1993, 1995 and 1996 as part of the Wisconsin Lake Management Planning Grant Program.

BEAR LAKE, Oneida County, Wisconsin: Panfish Survey Results for 1996 and Evaluation of Panfish Removal Impacts from 1985 to 1996

Summary

This 1996 panfish survey and panfish removal project caps an effort that was first started in 1985. The Bear Lake Protection and Rehabilitation District, with assistance from the WDNR - Woodruff and from WDNR - Rhinelander committed itself to a long term fish improvement program that relied heavily on lake district volunteer labor. In 1985, the lake improvement objectives were two-fold: to increase the average size of the sunfish from four inches to over six inches and to increase the number of walleyes to levels found in Bear Lake in the 1950s (over 40 walleyes per trapnet lift, April, 1959).

The approach was to use fyke nets to trap and remove bluegill sunfish, pumpkinseed sunfish, and yellow bullheads. We wanted to sustain the effort for at least three straight years. The idea was that if we reduced the number of panfish, there would be reduced competition with young walleyes, which would allow more walleyes to reach a fish-eating size. Also by reducing sunfish numbers, the remaining sunfish would have more food and grow larger.

A summary of panfish removed from Bear Lake from 1985 through 1996 is shown in Table 1.

The first year, 1985, we used six fyke nets for four days. It turned out to be somewhat of a practice year in that we found good net locations, and also found that the net mesh size should be ½ inch or less. We removed 7,600 sunfish, but figured we needed to do better than that in the future, if we were to have an impact on the panfish. For the next three years we used 10 nets for a two week period in June (1986, 1987, and 1988). This was our major removal effort, and we removed over 100,000 sunfish.

The next four net-setting years (1989, 91, 93 and 96) were a combination of panfish and gamefish evaluation, as well as what we regarded as maintenance panfish removal.

The 1993 evaluation/removal was the first year we saw significant increases in the size of bluegills (Table 2). In 1985 only 4% of the bluegills were six inches or larger. In 1993, 49% registered six inches or larger and in 1996, 45% were in that category. We have had large bluegills for at least four years running (1993-1996). Pumpkinseed size increases may have started before the bluegills. In 1985, 14% of the pumpkinseeds were six inches or larger. In 1989, 45% were in that category. Results in 1996 indicate there are still big pumpkinseed in the lake with over 60% registering six inches or larger. For both species of sunfish, the number of fish per lift has declined since 1985. Bullheads appear to have remained at about the same numbers but they are slightly larger in 1996 compared to 1986.

Table 1. Pounds and numbers of bluegills, pumpkinseeds, and bullheads removed from Bear Lake since 1985.

	POUNDS						NUMBERS					
	Bluegill	Pumpkinseed	Total sunfish	Bullhead	Total pounds	Total pounds	Bluegill	Pumpkinseed	Total sunfish	Bullhead	Total fish	Fish per acre
1985[b]	?	?	688	0	688[a]	2.2	3,135	4,485	7,620	--	7,620	24
1986[c]	1,397	1,471	2,868	483	3,351	10.7	24,571	14,508	39,079	1,931	41,010	131
1987[c]	1,148	1,146	2,294	376	2,670	8.6	23,978	11,559	35,537	1,656	37,193	119
1988[c]	939	947	1,886	767	2,653	8.5	18,839	9,117	27,956	3,948	31,904	102
1989[d]	443	571	1,014	321	1,335	4.3	6,087	3,945	10,032	1,274	11,306	36
1991[e]	995	545	1,540	391	1,931	6.2	17,157	4,072	21,229	1,392	22,621	73
1993[f]	149	438	587	391	978	3.1	1,025	2,754	3,779	1,374	5,153	17
1996[g]	144	455	599	296	895	2.9	1,169	2,677	3,846	618	4,464	14
Total	**5,215**	**5,573**	**11,476**	**3,025**	**14,501**	**46.5**	**95,961**	**53,117**	**149,078**	**12,193**	**161,271**	**517**

[a] estimate of bluegill and pumpkinseed pounds removed
[b] 4 days, 6 nets, bullheads were not removed (24 lifts)
[c] 10 days, 10 nets, major removal effort (100 lifts)
[d] 6 days, 6 nets, this was intended as a sampling year not a full-blown fish removal year (36 lifts)
[e] 5 days, 10 nets (50 lifts)
[f] 5 days, 10 nets (44 lifts)
[g] 4 days, 10 nets (40 lifts)

Table 2. Percent of bluegills and pumpkinseed sunfish six inches or bigger based on June fyke net data.

Date	Bluegill	Sunfish	Temperature
1985	4	14	66
1986	7	18	62-70
1987	5	21	67-75
1988	2	17	67-74
1989	7	45	58-65
1991	10	30	70-74
1993	49	59	58-69
1996	45	60	62-64

The gamefish community has thrown us a couple surprises. First, the walleye community does not appear to have been enhanced by panfish removal (Table 3). Numbers of walleye per lift have been similar for the last 11 years. Although, our walleye objective apparently was not achieved, we did see dramatic increase in the number of largemouth bass. This is somewhat unexpected but not unwelcomed. The bass fishery is about as good as it has ever been.

Table 3. Number of gamefish and panfish caught for every fyke net set.

Date	Walleye	Northern Pike	Largemouth Bass	Yellow Perch	Bluegill	Pumpkinseed	Bullhead
1985*	0.3	0.2	1.9	3.4	131	187	18
1986	0.3	0.4	2.1	1.2	246	145	19
1987	0.5	0.6	0.9	1.0	240	116	17
1988	0.1	0.5	1.7	0.4	188	91	40
1986*	0.2	0.6	4.0	0.4	169	110	35
1991*	0.2	1.4	3.5	0.4	343	81	28
1993*	0.2	0.4	2.0	0.3	23	63	31
1996*	0.2	0.6	6.4	1.2	29	67	16

* netting conducted for one week period. Other years netting was conducted for 2 weeks.

In conclusion, the panfish removal efforts beginning in 1985 coincide with several changes in the fish community. The following was observed:

Species	Observations (comparing 1985 to 1996 fish status)
bluegill	**fewer, bigger**
pumpkinseed	**fewer, bigger**
bullheads	**numbers are the same, bigger**
largemouth bass	**increased numbers, bigger**
walleye	**no change**
northern pike	**no change**
yellow perch	**no change**

We would like to think that netting alone could account for positive changes in the fish community. However, length limits have been set by the WDNR for bass, walleye, and northern pike in 1994 and this may have had an influence on the fish community as well.

1. Introduction

Bear Lake is a 312 acre lake located in Oneida County, Wisconsin (Figure 1). Bear Lake is a glacial seepage lake with moderate phosphorus levels (15-25 ug/l) and relatively good secchi disc transparency (8-9 feet in summer). Bear Lake has an active Lake Protective District that has been working on projects since 1975. Wisconsin Department of Natural Resources (or Department of Conservation) has been working on Bear Lake since the 1930's, conducting fish surveys and stocking gamefish and panfish. A fish manipulation project was started in 1985 and was sponsored by the Bear Lake District and the Wisconsin DNR. The project goals were to reduce the stunted panfish population and to increase the gamefish population. The 1996 June panfish survey was a continuation of the fish manipulation project started in 1985.

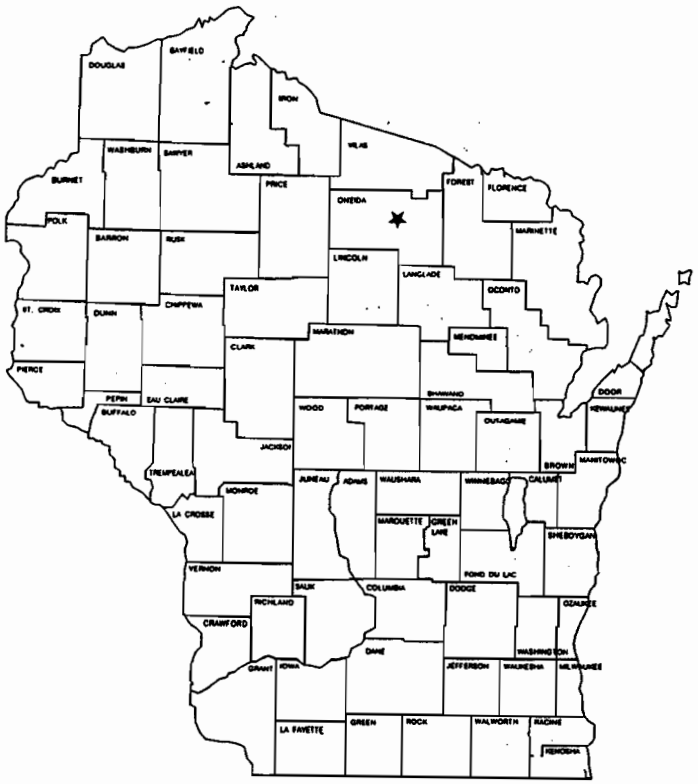


Figure 1. Location of Bear Lake, Oneida County, on a Wisconsin State map. The location of Bear Lake is shown with a black star.

2. Methods

From June 3-7, 1996 a panfish survey was conducted on Bear Lake using ten fyke nets. Fyke net locations are shown in Figure 2. A total of 40 lifts were completed. Mesh size for all nets was 3/4 inch or less.

Included with the fish survey was a panfish removal project. All the gamefish caught in the fyke nets were returned to the lake after being counted and measured. However, all sunfish (bluegill and pumpkinseed), less than eight inches, were removed from Bear Lake, were fin clipped and were transferred to Big Bearskin Lake. Bullheads were counted, weighed and removed from the lake and taken to the deep woods for disposal.

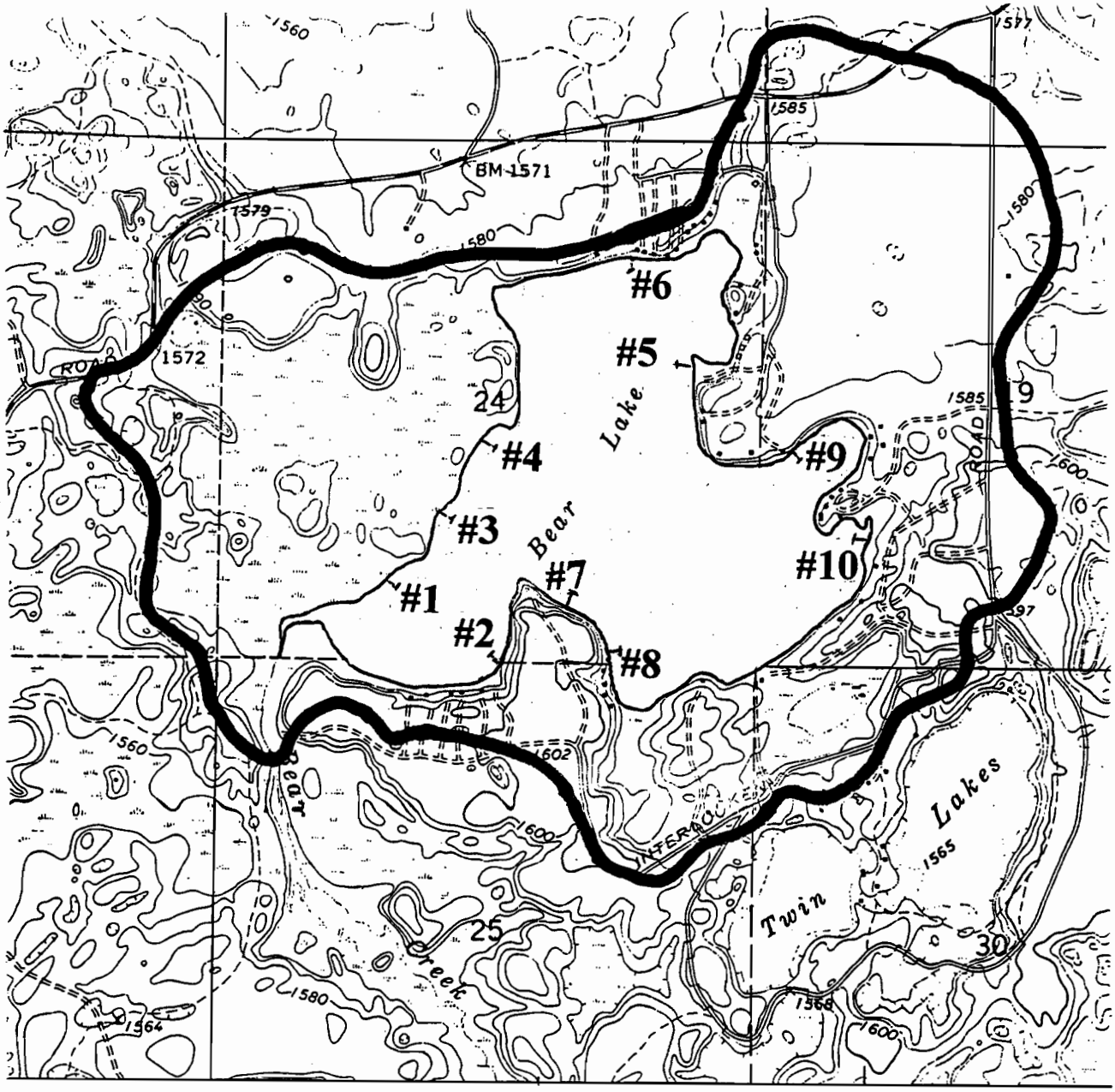


Figure 2. Location of the sample nets on Bear Lake for June 3-7, 1996.

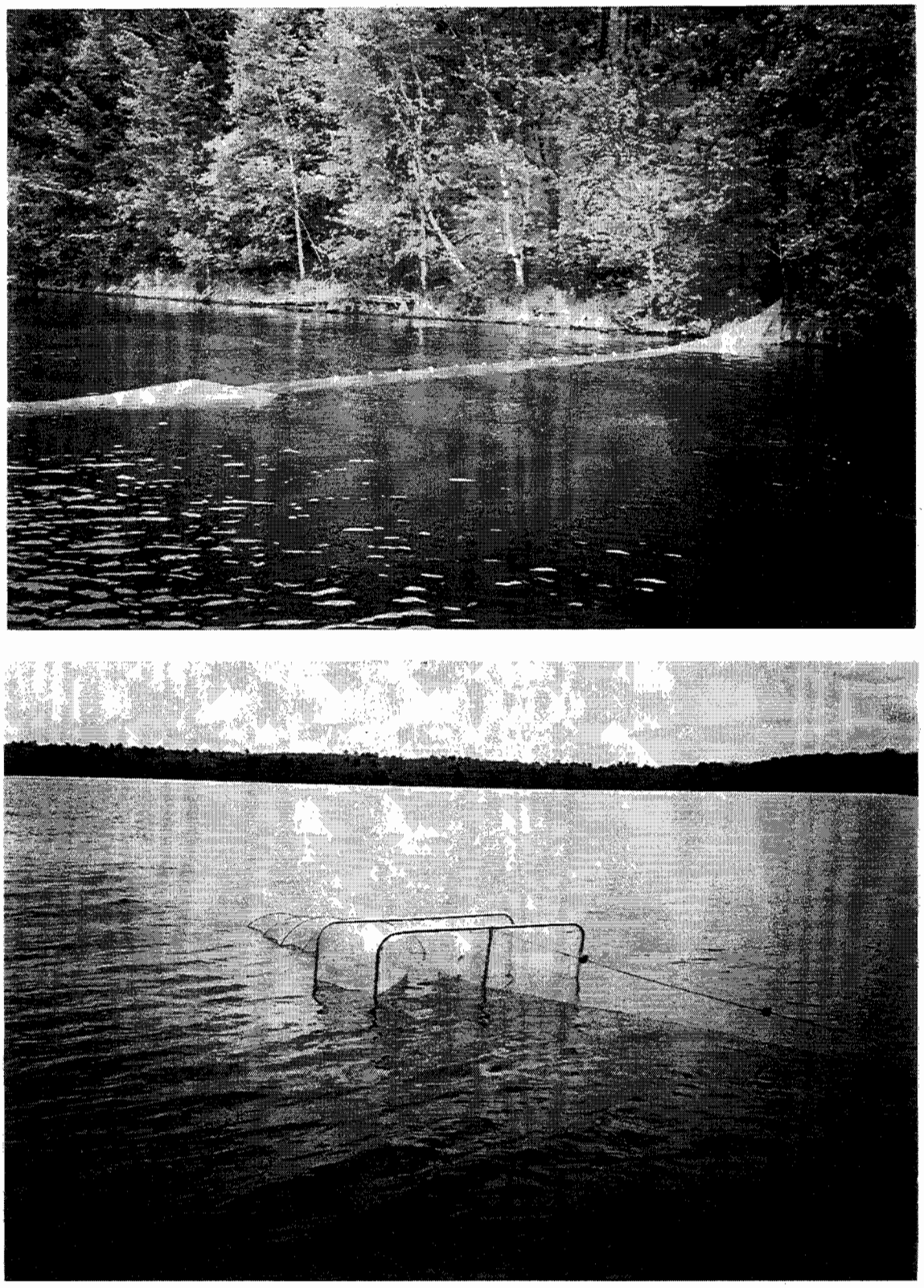


Figure 3. Wisconsin style fyke nets were used for the panfish survey. Sets were located in areas that had been used in previous surveys. Two locations are shown above. Site 9 (top) and site 4 (bottom) have been big producers since we started netting in 1985.

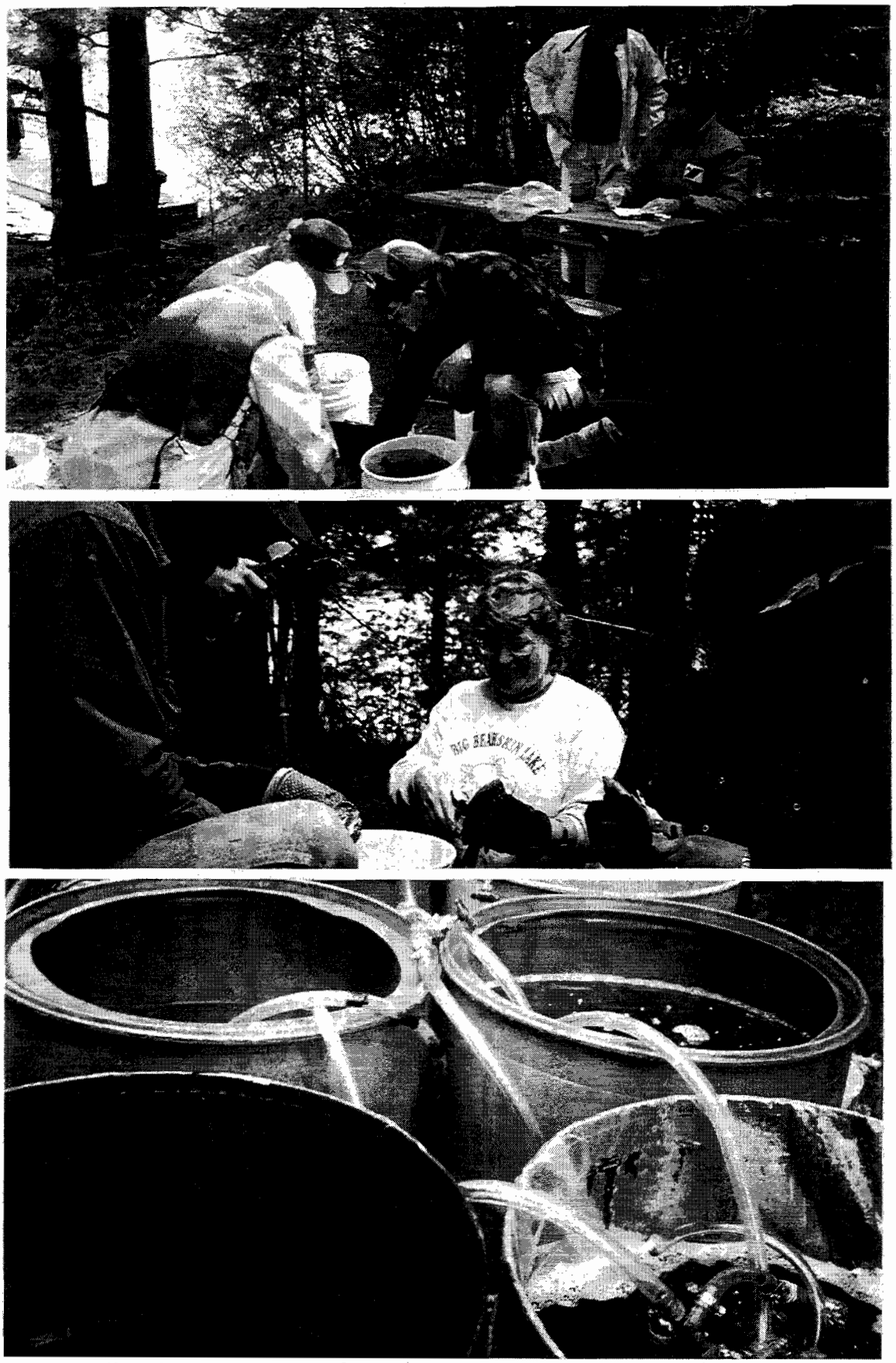


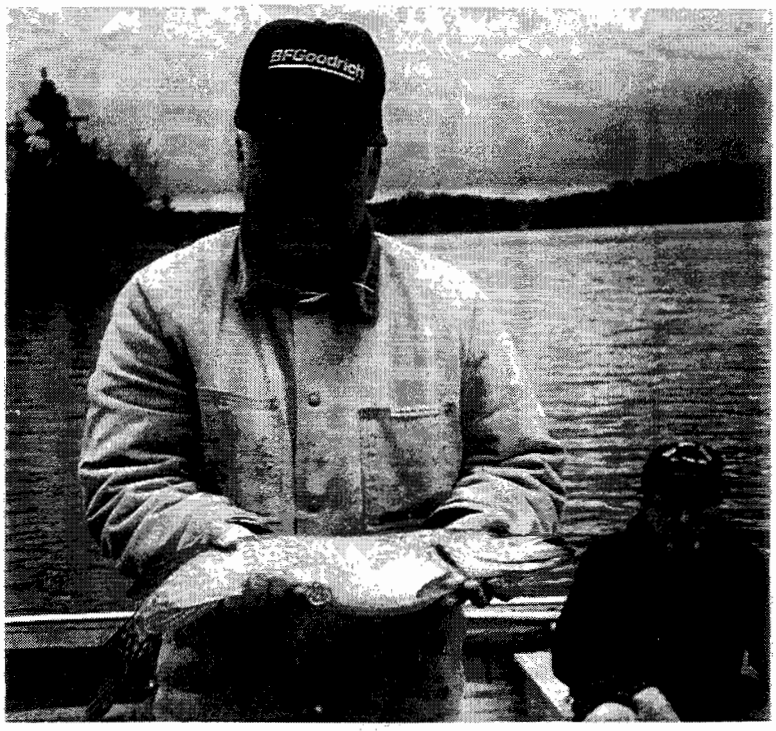
Figure 4. All panfish were counted and then weighed as a group . . . either bluegills or pumpkinseeds. A subsample from each net was measured. Approximately 10% of the panfish were measured to the nearest 1/4 inch (top). All panfish were finclipped (pelvic clip)(middle) and loaded into oxygenated barrels and hauled to Big Bearskin Lake, about 15 miles south of Bear Lake (bottom).

3. Results and Discussion

A variety of fish were caught in our June netting on Bear Lake (Figure 5). The number of fish caught from June 3-7, 1996 are shown in Table 1. The number of gamefish and preyfish caught per fyke net since 1985 are shown in Table 2. Results indicate walleyes and northern pike have stayed relatively constant, except for one year (1991) when the number of northern pike were three times higher than average. The largemouth bass population seems to fluctuate through the years, which may be an indicator that something is happening. Up until 1993, the largemouth bass population seemed to be increasing. In 1993, numbers dipped but in 1996 the population is at an all time high. The yellow perch population decreased until 1988 and has then leveled off with the highest catch per net in 1985 (3.4 fish per net) and the lowest number was in 1993 (0.3 fish per net). The bluegill and pumpkinseed population appears to be decreasing although the bluegills in 1991 indicate there are plenty of them out there. The bullhead population in 1996 (16 fish per net) is approximately half of what it was in 1993 (31 fish per net).

From 1985 to 1996, 14,805 pounds of bluegills, pumpkinseeds, and bullheads were removed from Bear Lake (Table 3). Tables 4 and 5 shows total pounds and numbers of fish removed from the lake since 1985.

The survey results for 1996 may be slightly biased toward bigger panfish. Water temperatures were slightly cooler compared to other sample years and sunfish (bluegills and pumpkinseeds) were in prespawn conditions. Our nets probably picked up larger sunfish compared to the average for the whole lake population because of the weather pattern (Tables 6, 7 and 8).



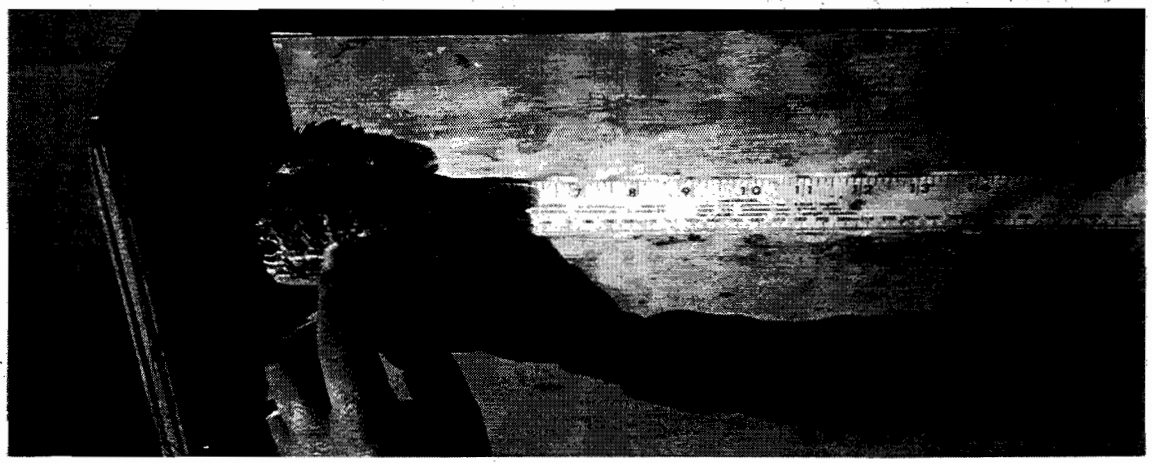


Figure 5. Besides panfish, northern pike were caught (top) as well as walleyes (middle). The big news, though, is that the pumkinseed and bluegills are bigger than when panfish removal started in 1985.

Table 1. Species of fish and number caught in June 1996.

	Totals	Number/lift
Bluegill	1169	29.2
Sunfish	2677	66.9
Yellow Bullhead	618	15.5
Yellow Perch	47	1.2
Black Crappie	349	8.7
Largemouth Bass	257	6.4
Northern pike	24	0.6
Walleye	8	0.2
White Sucker	7	0.2
Golden Shiner	56	1.4

Table 2. Number of gamefish and panfish caught for every fyke net set.

Date	Walleye	Northern Pike	Largemouth Bass	Yellow Perch	Bluegill	Pumpkinseed	Bullhead
1985*	0.3	0.2	1.9	3.4	131	187	18
1986	0.3	0.4	2.1	1.2	246	145	19
1987	0.5	0.6	0.9	1.0	240	116	17
1988	0.1	0.5	1.7	0.4	188	91	40
1986*	0.2	0.6	4.0	0.4	169	110	35
1991*	0.2	1.4	3.5	0.4	343	81	28
1993*	0.2	0.4	2.0	0.3	23	63	31
1996*	0.2	0.6	6.4	1.2	29	67	16

* netting conducted for one week period. Other years netting was conducted for 2 weeks.

Table 3. Pounds of bluegills, pumpkinseeds, and bullheads removed from Bear Lake since 1985.

	Bluegill	Pumpkinseed	Total sunfish	Bullhead	Total pounds	Pounds per Acre
1985[b]	?	?	688	0	688[a]	2.2
1986[c]	1,397	1,471	2,868	483	3,351	10.7
1987[c]	1,148	1,146	2,294	376	2,670	8.6
1988[c]	939	947	1,886	767	2,653	8.5
1989[d]	443	571	1,014	321	1,335	4.3
1991[e]	995	545	1,540	391	1,931	6.2
1993[e]	149	438	587	391	978	3.1
1996[e]	144	455	599	296	895	2.9
Total	**5,215**	**5,573**	**11,476**	**3,025**	**14,501**	**46.5**

[a] estimate of bluegill and pumpkinseed pounds removed
[b] 4 days, 6 nets, bullheads were not removed
[c] 10 days, 10 nets, major removal effort
[d] 6 days, 6 nets, this was intended as a sampling year not a full-blown fish removal year
[e] 5 days, 10 nets
[f] 4 days, 10 nets

Table 4. Total pounds of fish removed for 1985-1996. The sunfish heading refers to bluegills and pumpkinseed sunfish combined.

Date	POUNDS			NUMBERS		
	Sunfish	Bullheads	TOTAL	Sunfish	Bullheads	TOTAL
1985[a]	688 est	--	688	7,620	--	7,620
1986[b]	2,868	483	3,351	39,079	1,931	41,010
1987[b]	2,294	376	2,670	35,537	1,656	37,193
1988[b]	1,886	767	2,653	27,956	3,948	31,904
1989[c]	1,014	321	1,335	10,032	1,274	11,306
1991[d]	1,540	391	1,931	21,229	1,392	22,621
1993[d]	587	391	978	3,779	1,374	5,153
1996[e]	599	296	895	3,846	618	4,464
TOTAL	11,476	3,025	14,501	149,078	12,193	161,271

[a] 4 days, 6 nets, bullheads were not removed
[b] 10 days, 10 nets, major removal effort
[c] 6 days, 6 nets, this was intended as a sampling year
[d] 5 days, 10 nets
[e] 4 days, 10 nets

Table 5. Average weight of bluegills and pumpkinseeds captured in Bear Lake in June, 1985-1993.

Number of days fished	Total lifts	Date (year)	BLUEGILLS			PUMKINSEEDS		
			Weight (pounds)	Numbers	Avg. Wt. (ounces)	Weight (pounds)	Numbers	Avg. Wt. (ounces)
4	24	1985	ND	3,135	ND	ND	4,485	ND
10	100	1986	1,397	24,571	0.91	1,471	14,508	1.62
10	100	1987	1,148	23,978	0.77	1,146	11,559	1.59
10	100	1988	939	18,839	0.80	947	9,117	1.66
6	36	1989	443	6,087	1.17	571	3,945	2.32
5	50	1991	995	17,157	0.93	545	4,072	2.14
5	44	1993	149	1,025	2.32	438	2,754	2.54
4	40	1996	144	1,169	1.98	455	2,677	2.72

Table 6. Frequency distribution of bluegill and pumpkinseed sunfish for June fyke net data for Bear Lake 1985-1996.

Total length	*Percent Occurrence*							
(inches)	*1985*	*1986*	*1987*	*1988*	*1989*	*1991*	*1993*	*1996*
BLUEGILL								
2.5	3	0	0	0	0	0	0	0
3.0	4	3	0	0.3	1	0	0	0
3.5	4	6	5	2	1	12	1	2
4.0	34	22	55	45	7	43	1	1
4.5	11	25	18	32	19	18	4	4
5.0	26	28	13	15	30	8	9	20
5.5	14	9	6	4	35	9	36	27
6.0	0	1	0.1	0.4	0	2	30	36
6.5	0	1	0.1	0.4	0	2	13	9
7.0	0	0	0	0	0	1	5	1
7.5	0	0	0	0	0	0	1	0
PUMPKINSEED								
2.5	0	0	0	0	0	0	0	0
3.0	0	0	0	0.3	0	0	1	0
3.5	2	2	0.8	0.8	1	1	0	0
4.0	11	8	12	7	3	14	1	0
4.5	12	12	19	17	3	17	3	1
5.0	36	32	27	33	14	16	5	11
5.5	25	30	21	23	34	22	32	28
6.0	12	15	17	12	36	21	31	36
6.5	2	2	3	4	8	6	21	16
7.0	0	1	0.6	0.8	1	2	4	8
7.5	0	0	0	0	0	1	2	0

Table 7. Percent of bluegills and pumpkinseed sunfish 6 inches or bigger based on June fyke net data.

Date	**Bluegill**	**Sunfish**	**Temperature**
1985	4	14	66
1986	7	18	62-70
1987	5	21	67-75
1988	2	17	67-74
1989	7	45	58-65
1991	10	30	70-74
1993	49	59	58-69
1996	45	60	62-64

Table 8. Morning water temperatures in spawning bed areas (2-3 feet water depths, near shore area). The dates under the year represents the starting dates.

Netting Days	1985 Jun 11	1986 Jun 10	1987 Jun 8	1988 Jun 6	1989 Jun 6	1991 Jun 3	1993 Jun 7	1996 Jun 3
1	--	--	70	74	65	74	58	62
2	66	ND	68	72	64	72	58,58	ND
3	ND	62	67	69	64	70	59	64
4	ND	64	67	67	--	71	60,61	ND
5	ND	64	69	68	--	72	62,63,69	ND
6	--	ND	74	72	63	--	--	--
7	--	70	72	71	60	--	--	--
8	--	67	74	71	58	--	--	--
9	--	70	75	70	--	--	--	--
10	--	68	ND	69	--	--	--	--

Sunfish Sizes

Both species of Bear Lake sunfish have shown increases since 1985. For bluegills (Figure 6) and pumpkinseed (Figure 7), the occurrence of four inch fish has decreased and six inch fish have increased.

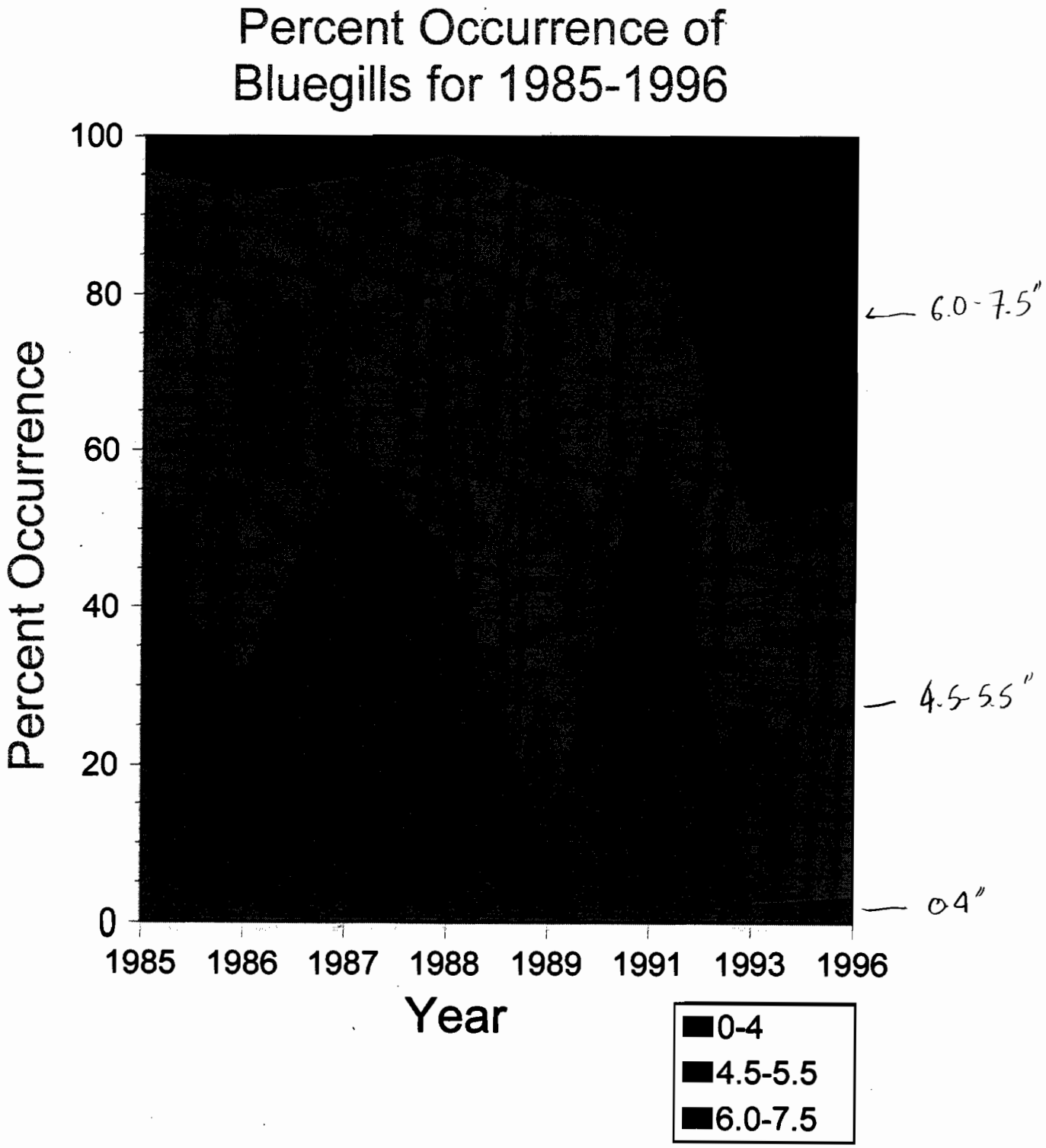


Figure 6. Percent occurrence for bluegills for 1985-1996. The occurrence of 4-inch bluegill have decreased and 6-inch fish have increased.

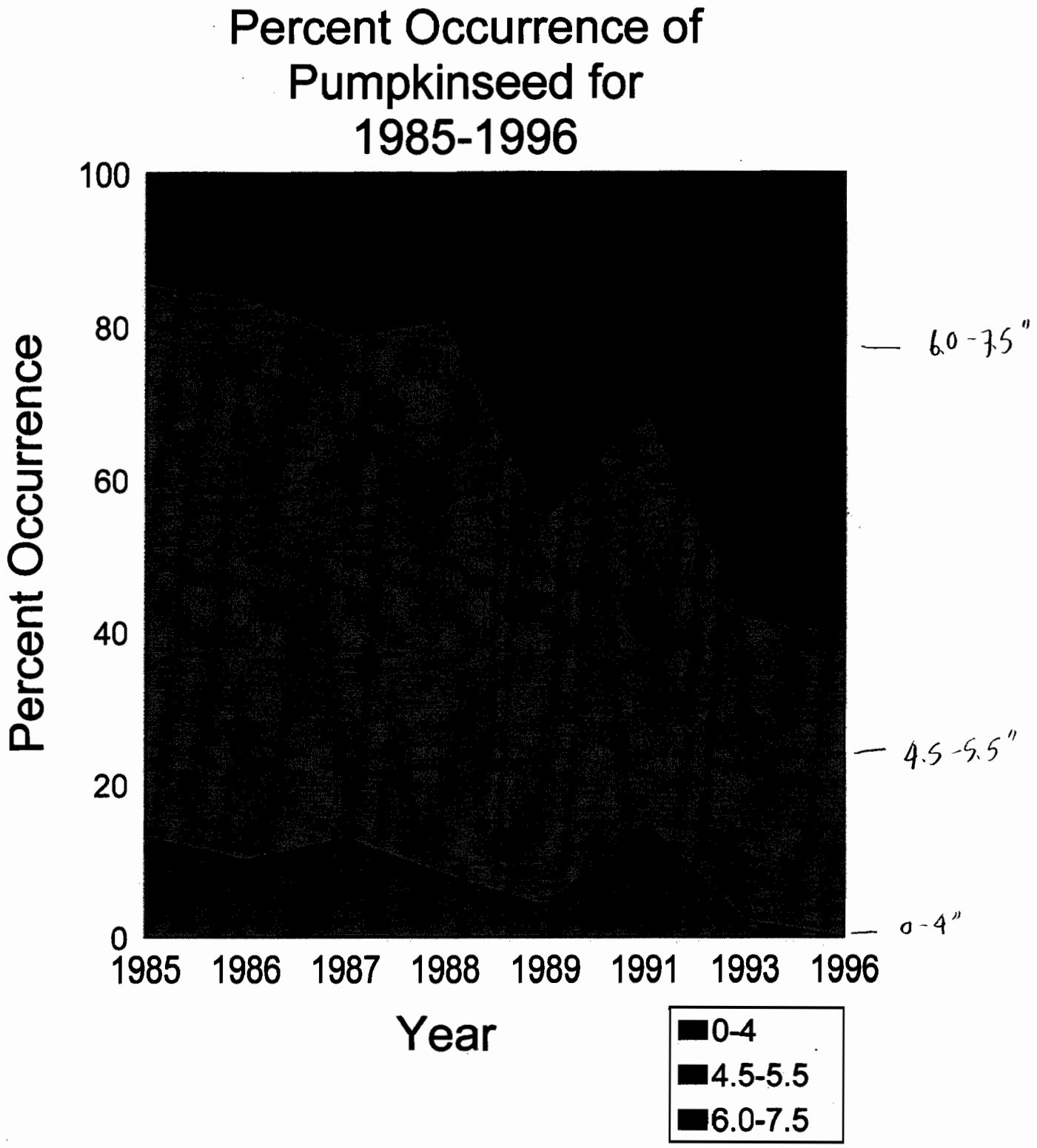


Figure 7. Percent occurrence for pumpkinseed for 1985-1996. Like the bluegills, the percent occurrence of 4-inch pumpkinseed have decreased and 6-inch fish have increased.

4. Conclusions: Fish Removal and Water Quality

Water quality n Bear Lake over the fish removal period has not declined. Water transparency has fluctuated, but generally has been better than the 1977 benchmark year, when a year-long comprehensive study was completed. A summary of secchi disc readings is shown in Table 9 and is graphically shown in Figure 8. Growing season averages (May-Sept) have not been less than the 1977 reference year.

Total phosphorus readings for spring and fall have also fluctuated over the last 11 years (Table 10). In spring they have been below 25 ppb or less except for 1995. In fall they have been over 30 ppb on two occasions but not since 1991. Orthophosphorus has been less than 20 ppb in spring and fall since 1986.

Has fish removal had any impacts on the lake ecosystem? I would say yes. Panfish are bigger and largemouth bass appear to be more numerous. The algae (using the secchi disc transparency as a guide) may be slightly impacted in that transparency may be better, indicating algae numbers would be down. However, phosphorus levels do not appear to be increasing or decreasing, but rather may be influenced by rainfall and runoff. The nutrient status is somewhat stable, but the fish community has responded to panfish removal efforts.

Table 9. Water clarity summary: secchi disc readings for Bear Lake. Data collected by Dale Jalinski, Bear Lake resident.

Year		1977	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Month	wk#	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
April	3	10.9		10.5	12.5	14.2	12.0	12.5						
	4		9.0	8.5					10.5			15.0	11.3	
May	1	11.0	9.0	10.0			10.0	15.3				14.5	12.5	
	2		9.5	10.5	14.0	14.7			12.5	7.5	9.5		11.3	
	3	12.3	10.0	10.5	16.0		14.0	14.0	15.3	10.0		16.0	11.3	
	4		12.0	14.0	15.5	14.7				12.5	11.5	14.5	10.0	
June	1	10.0	11.0	14.0			14.0	15.0	14.0		12.0	15.3	12.0	
	2		9.5	12.0	13.5	15.5		11.5		11.5	13.5	13.3	11.3	
	3	9.0	9.0	10.5			11.5		9.0			11.3	10.0	
	4		8.0	10.5	8.0	8.0		11.0			10.0	7.0	14.5	
July	1	9.0	9.0	10.5	9.0					10.5	9.0	8.0	11.0	
	2		9.0	8.5		8.5	11.0	10.0	10.3	13.5		6.8	9.0	
	3	8.3	8.5		7.5			12.0			8.0	8.5	12.3	
	4		7.5	8.0		10.5	9.0	9.0	7.5	11.8	6.5		13.5	
Aug	1	9.0	8.5	7.5	8.0	9.5	8.0	9.0	9.0	11.3	6.0	10.5	10.8	
	2		8.5	8.0					8.0	11.0	6.5	13.3	9.0	
	3	8.0	8.0	8.0	8.0	9.5	7.8	9.5		11.0	6.8	13.5	7.3	
	4		9.0	8.0			7.8		9.0		6.3	10.5	8.4	
Sept	1	8.5	9.0	9.0	12.0	10.5		8.8	8.8	10.8			9.5	
	2			9.0			9.3	8.0			12.5	12.5	11.3	
	3	8.5	10.0	10.2		13.5			11.5	12.0	10.5	10.8	11.5	
	4		10.5	11.5	11.5		13.0	12.0	10.5				11.3	
Oct	1	8.0	11.0	12.0					12.0	14.0		11.8	11.0	
	2		11.0	12.0	14.0	13.7	15.8	11.0			15.3		11.0	
	3	11.0	9.0	12.5			15.0	15.5		15.0	13.0	13.5	11.0	
	4		9.5		14.5	12.5			11.0	16.0	13.3		9.0	
Nov	1		9.0	12.5			16.8	15.5				14.0		
May-Sept Ave		9.4	9.2	10.0	10.6	11.4	10.8	11.3	10.7	11.2	9.6	11.6	10.9	

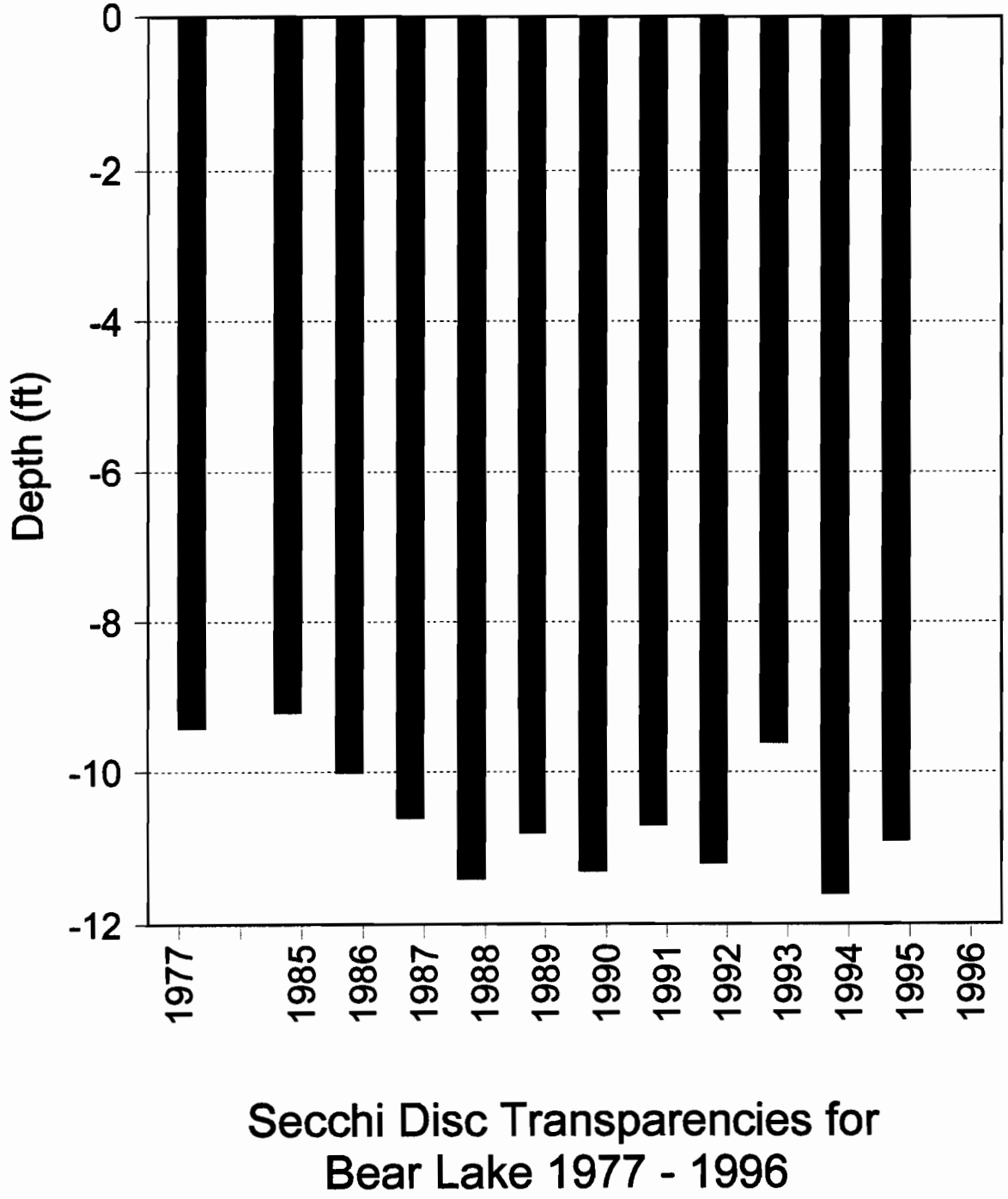


Figure 8. Average secchi disc transparency for 1977 - 1996.

Table 10. Water quality summary: total phosphorus and orthophosphorus for spring and fall, secchi disc, fish removal and rainfall for the fish removal period with 1977 serving as a benchmark.

	TP (ppb)		OP (ppb)		Secchi disc (ft) Growing Season	Fish Removal	Rainfall (May-Oct)
Year	Spring	Fall	Spring	Fall	(May-Sept)	(lbs/ac)	(inches)
1977	17	18	--	--	9.4	0	22
1985	25	28	22	25	9.2	2.2	32.4
1986	10	8	2	2	10.0	10.7	24.0
1987	8	10	2	2	10.6	8.6	19.4
1988	6	15	2	10	11.4	8.5	19.3
1989	25	35	2	2	10.8	4.3	16.8
1990	15	12	2	8	11.3	0	30.5
1991	15	32	10	8	10.7	6.2	28.3
1992	20	15	10	15	11.2	0	21.6
1993	15	10	2	5	9.6	3.1	26.0
1994	16	8	3	5	11.6	0	33.3
1995	58	21	8	5	10.9	0	25.6
1996	14	--	9	--	--	2.9	--