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Title

A study of the commercial fishery on Lake Winnipeg
during the winter season of 1951-1952

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INTRODUCTION

The investigation was a continuation of the study begun in 1949. Like the 1950-51 investigation, it commenced in January and continued through February, and the methods employed were the same (see Manuscript Report, Lake Winnipeg series, no. 3). In addition to the fishing grounds covered during 1950-51, the present study included the Sturgeon Bay fishery centred at Dauphin River. Because commercial fishing practically ceased during the latter part of January in Areas E and F, these two areas were omitted from the study during February.

ACKNOWLEDGEMENTS

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CATCH

During the investigation, 29 per cent of the recorded catch was sauger, Stizostedion canadense and 31 per cent was cisco, Leucichthys spp. Ciscoes were not found in quantity in all areas. More than 90 per cent of the season total for cisco was recorded from Area D. Yellow pikeperch, S. y. vitreum made

up 22 per cent, and burbot, Lota lota, 8 per cent of the total recorded catch, about 34 thousand pounds. Suckers, Catostomus spp. amounted to 4 per cent, yellow perch, Perca flavescens 3 per cent, pike, Esox lucius 2 per cent, and other species 1 per cent.

Only the three most abundant species, sauger, pikeperch, and cisco, are treated in detail in this report.

SIZE COMPOSITION OF THE CATCH

The samples of fish were selected at random at the basin holes, and weighed while still unfrozen. Table I shows that the average size of sauger remained at nearly 0.6 pounds in Area G through January and February. In Areas F and E, sampled only in January, the averages were nearly 0.5 pounds. In Area D, the average size of sauger was a little larger at nearly 0.7 pounds, and remained quite constant during the two months.

The average size of pikeperch is shown in Table III. The average figure for Area G, nearly 0.8 pounds during the first half of January, fell to about 0.7 during the next four weeks, and rose again to 0.8 pounds during the last half of February. This last average was calculated on a relatively small sample.

As in the case for saugers, Areas F and E were not sampled after January. The averages for pikeperch in these two areas varied from about 0.7 pounds for the largest sample (142) to 1.26 pounds which was calculated for 62 fish. In Area D the averages varied from about 1.9 pounds to 1.5 pounds.

Table V, showing the average size of cisco in the four areas, indicates a fairly stable average figure for Area G at nearly 0.4 pounds although the samples were small. Averages for Areas F and E showed more variance during January, and were calculated using small samples. In Area D where sample sizes were more adequate, averages varied from 0.5 pounds in January to 0.6 pounds in February.

Some reason for the apparent stability of the averages for the three species for Area G, and the apparent variance in the three other areas, is suggested in Table VII. The table shows the percentage mesh size composition of the gill-nets from which the random samples were taken. Samples from Area G were taken from three-inch mesh nets only, while in Areas F and E there was some variability in mesh size composition. The averages for the three species for Area D were considerably larger in most cases than in the 3 other areas. As shown in Table VII, the samples were drawn from nets the majority of which were of a mesh size greater than three inches. There is reason to believe, nevertheless, that the larger average figures for Area A indicate a population of a greater average size.

The frequency distribution of the samples for the three species is shown in Table II for sauger, and Tables IV and VI for pikeperch and cisco, respectively.

EFFORT

The season average lift interval for all areas was 8.8 days. The season averages for Area G and Area D were respectively 9.0 days and 7.1 days. The bulk of the data were collected from these two areas where fishing effort was most sustained. Almost no nets were lifted before 7 days except in Sturgeon Bay where the interval was usually 3 or 4 days.

A variety of mesh sizes and mesh depths were encountered in the gill-nets, ranging in size from $2\frac{1}{2}$ -inches to $4\frac{1}{4}$ -inches. More than 80 per cent of the nets encountered were of 3-inch mesh and less than 2 per cent were smaller. Of the 3-inch mesh nets, 66 per cent (37 thousand yards) of the total recorded yardage for the winter were cotton and 34 per cent (19 thousand yards) were nylon. The depth of the gill-nets, in meshes, varied from 14 to 80. The average depth was 54 meshes, nearly 82 per cent were from 50 to 60 meshes deep. About 14 per cent were less than 50 meshes deep, and the remainder were 80 meshes.

Table VIII shows the recorded fishing effort in hundred yard lifts. The unit is defined as one hundred yards of gill-net lifted once. The table indicates a decrease in recorded

effort after the middle of January which may or may not be proportional to the actual conditions. The figures showing fishing effort for each area are not necessarily a measure of the actual fishing effort. They probably reflect, more accurately the intensity of the investigation within the area for the time periods indicated.

AVAILABILITY

A heavy plankton pulse, composed almost entirely of a single filamentous diatom, Malosera varians appeared in all areas about mid-January and remained throughout the season. The nets became occluded within a short time, and were frequently rendered practically useless. In Areas E and F where currents are prevalent, commercial fishing practically ceased about the end of January. In view of these circumstances, the figures for availability of fish may have been more influenced by the efficiency of the gear than by the actual abundance.

The availability of sauger is shown in Table IX, and was highest for the "all areas" figure during the first half of January. The "all areas" figure remained at 6 or 7 pounds per unit effort the rest of the winter. Area G shows a steady decrease in availability from 14 to 4 pounds per unit effort which probably represents the actual condition in the fishery as a whole.

The same general pattern is evident in Table X which shows the availability of pikeperch. Taking all areas into account, the availability ranged from 9 pounds to 2 pounds, and averaged 6 pounds per unit effort for the season.

Table XI shows the availability of all species combined. It is interesting to note that in Areas G and F, although the figures are low, sauger and pikeperch account for the major part of the fish caught. The higher figures for Areas E and D are due, in a large measure, to a sustained run of cisco, and to a sizeable amount of suckers--neither species is particularly valuable in the fishery. The half-month figures for availability, calculated for all areas, dropped from 32 pounds to 15 pounds per unit effort through the season. The average figure for the winter was 26 pounds.

RELATED DATA

Limnological data were recorded from two stations during each of the two months, January and February. Water samples were taken 1 foot above the bottom and 2 feet below the surface of the lake, and vertical plankton hauls were made. The water samples were analysed for oxygen using Miller's method and for carbon dioxide, N/44 Na OH was titrated against a measured water sample, using phenolphthalein indicator. The results are given in Table XII.

A rod thermometer was immersed in the water sample jars, and held until the temperature reading became constant, a matter of a minute or more in most cases. Bottom temperatures from the two stations varied from 32°F to 35°F and surface temperatures were 33°F in 3 cases and 34° in one case.

Dissolved oxygen at the Loon Straits station remained higher than at the Gimli sampling point. Currents are more prevalent at the former, and the plankton bloom appeared heaviest at this point.

Dissolved carbon dioxide was fairly constant in 6 subsamples at about 13 p.p.m. In two subsamples, (one bottom sample and one surface sample) taken during January, the readings were 7 and 7.5 respectively. No explanation is apparent for these deviations.

Table I. The average size of sauger in pounds, round weight, and its standard error in random samples of fish from the Lake Winnipeg winter commercial catches for 1952. The number of fish is shown in parentheses.

Area	January 1-15	January 16-31	February 1-15	February 16-28
G	0.67±0.01 (168)	0.64±0.01 (326)	0.64±0.02 (134)	0.56±0.01 (179)
F	0.53±0.01 (457)	0.49±0.01 (168)	-----	-----
E	0.50±0.01 (51)	0.53±0.02 (56)	-----	-----
D	0.74±0.02 (98)	0.75±0.03 (63)	0.71±0.01 (260)	0.67±0.03 (80)

Table II. The frequency distribution of sauger, in round weights, in samples from the Lake Winnipeg commercial catches during the winter season of 1952.

Wt. in lbs.	Area G				Area F		Area E		Area D			
	January		February		January		January		January		February	
	1-15	16-31	1-15	16-28	1-15	16-31	1-15	16-31	1-15	16-31	1-15	16-28
0.1	--	-	-	-	-	-	-	1	-	-	-	-
0.2	-	-	-	8	-	3	-	0	-	-	-	-
0.3	-	6	6	11	26	14	-	2	-	1	2	3
0.4	4	13	7	24	112	47	13	10	3	5	7	11
0.5	34	77	32	53	157	53	28	24	15	11	57	21
0.6	45	110	33	45	86	33	6	10	23	6	35	9
0.7	51	66	29	19	42	10	4	7	22	9	73	11
0.8	20	20	7	9	17	5	-	1	10	11	41	9
0.9	6	14	13	2	12	3	-	0	6	11	16	3
1.0	4	12	3	5	2	-	-	0	6	0	8	3
1.1	1	3	2	1	3	-	-	1	5	3	8	7
1.2	0	1	0	0	-	-	-	-	6	3	9	1
1.3	1	2	1	1	-	-	-	-	1	2	2	1
1.4	1	0	1	0	-	-	-	-	1	1	0	0
1.5	1	2	-	0	-	-	-	-	-	-	2	0
1.6	-	-	-	0	-	-	-	-	-	-	-	0
1.7	-	-	-	0	-	-	-	-	-	-	-	0
1.8	-	-	-	1	-	-	-	-	-	-	-	0
1.9	-	-	-	-	-	-	-	-	-	-	-	0
2.0	-	-	-	-	-	-	-	-	-	-	-	1

Table III. The average size of pikeperch in pounds, round weight, and its standard error in random samples of fish from the Lake Winnipeg winter commercial catches for 1952. The number of fish is shown in parentheses.

Area	January 1-15	January 16-31	February 1-15	February 16-28
G	0.77±0.02 (164)	0.72±0.01 (307)	0.74±0.02 (139)	0.83±0.08 (32)
F	0.69±0.01 (142)	0.82±0.05 (71)	-----	-----
E	0.42±0.02 (4)	1.26±0.03 (62)	-----	-----
D	1.69±0.03 (71)	1.89±0.02 (122)	1.50±0.02 (189)	1.51±0.02 (164)

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Table IV. The frequency distribution of pikeperch in round weights, in samples from the Lake Winnipeg commercial catches during the winter season of 1952.

Wt. in lbs.	Area G		Area F		Area E		Area D	
	January 1-15	February 16-31	January 1-15	February 16-28	January 1-15	February 16-31	January 1-15	February 16-31
0.3	-	-	1	-	1	-	-	-
0.4	1	2	1	1	2	6	3	-
0.5	8	40	20	4	27	10	1	-
0.6	33	69	23	8	37	8	-	-
0.7	65	88	51	4	43	14	7	1
0.8	28	59	15	5	14	9	5	0
0.9	10	20	11	1	10	5	6	3
1.0	9	9	6	2	4	4	-	-
1.1	1	7	5	2	0	1	12	1
1.2	2	7	4	0	1	1	5	5
1.3	1	4	1	1	2	2	12	7
1.4	1	2	0	0	2	1	4	4
1.5	1	0	0	0	1	1	3	3
1.6	0	-	1	0	1	1	13	14
1.7	0	-	0	0	0	0	1	5
1.8	1	-	0	0	1	1	4	8
1.9	2	-	1	1	1	1	10	12
2.0	1	-	0	0	0	0	12	6
2.1	0	-	1	1	0	0	5	8
2.2	0	-	-	-	0	0	8	8
2.3	0	-	1	-	0	0	8	9
2.4	0	-	-	-	0	0	5	6
2.5	1	-	-	-	1	1	7	3
2.6	-	-	-	-	0	0	1	3
2.7	-	-	-	-	0	0	6	1
2.8	-	-	-	-	0	0	5	4
2.9	-	-	-	-	0	0	5	3
3.0	-	-	-	-	0	0	3	3
3.1	-	-	-	-	0	0	3	3
3.2	-	-	-	-	0	0	3	3
3.3	-	-	-	-	0	0	3	3
3.4	-	-	-	-	0	0	3	3
3.5	-	-	-	-	0	0	3	3
3.6	-	-	-	-	0	0	3	3
3.7	-	-	-	-	0	0	3	3
3.8	-	-	-	-	0	0	2	2
3.9	-	-	-	-	0	0	2	2
4.0	-	-	-	-	0	0	1	1
4.1	-	-	-	-	0	0	1	1
4.2	-	-	-	-	0	0	1	1
4.3	-	-	-	-	0	0	1	1
4.4	-	-	-	-	0	0	1	1
4.5	-	-	-	-	0	0	1	1
5.0	-	-	-	-	0	0	0	1
5.5	-	-	-	-	0	0	0	1
5.6	-	-	-	-	0	0	0	0
6.5	-	-	-	-	0	0	0	0
7.0	-	-	-	-	0	0	1	0
7.6	-	-	-	-	0	0	1	0

Table VII. The percentage mesh size composition of the gill-nets used by Lake Winnipeg fishermen from which random samples of fish were weighed during the winter season of 1952.

Area	Mesh size (inches)	January		February	
		1-15	16-31	1-15	16-28
G	3	100	100	100	100
F	under 3	43	29	---	---
	3	57	71	---	---
E	under 3	100	0	---	---
	3	0	40	---	---
	over 3	0	60	---	---
D	3	7	27	43	22
	over 3	93	73	57	78

Table VIII. The recorded fishing effort in hundred yard lifts (unit effort) exerted by Lake Winnipeg fishermen who were interviewed on the ice during the winter season of 1952.

Area	January		February		All winter
	1-15	16-31	1-15	16-28	
G	109	150	206	157	622
F	132	141	0	0	273
E	9	113	0	0	122
D	79	68	127	52	326
All Areas	329	472	333	207	1343

Table IX. The availability of sauger in pounds, round weight per unit effort, to Lake Winnipeg fishermen during the winter season of 1952. An asterisk indicates a value based on less than 100 units of effort.

Area	January		February		All winter
	1-15	16-31	1-15	16-28	
G	14	6	3	4	6
F	10	7	-	-	8
E	14*	4	-	-	5
D	6*	8*	14	11*	10
All Areas	10	6	7	6	7

Table X. The availability of pikeperch in pounds round weight per unit effort, to Lake Winnipeg fishermen during the winter season of 1952. An asterisk indicates a value based on less than 100 units of effort.

Area	January		February		All winter
	1-15	16-31	1-15	16-28	
G	10	7	2	2	5
F	6	6	-	-	6
E	2*	5	-	-	5
D	13*	13*	3	3*	7
All Areas	9	7	3	2	6

Table XI. The availability of combined species of fish, in pounds round weight per unit effort, to Lake Winnipeg fishermen during the winter season of 1952. An asterisk indicates a value based on less than 100 units of effort.

Area	January		February		All winter
	1-15	16-31	1-15	16-28	
G	26	16	6	10	13
F	18	15	--	--	17
E	25*	30	--	--	30
D	64*	73*	52	30*	56
All Areas	32	27	24	15	26

Table XII. Limnological data recorded during the Lake Winnipeg commercial fishery investigation, winter of 1952.

Station	Temp. (°F.)	January		Temp. (°F.)	February	
		O ₂ (c.c./litre)	CO ₂ (p.p.m)		O ₂ (c.c./litre)	CO ₂ (p.p.m)
<u>Gimli</u>						
Surface sample	33	8.7	7.0	35	9.5	14
Bottom sample	33	9.1	13.5	33	8.7	12
<u>Loon Straits</u>						
Surface sample	34	10.3	7.5	33	10.2	13
Bottom sample	34	11.5	13.5	32	11.6	13

Table II. The availability of sampled species of fish in
 various years within the Lake Winnebago
 drainage during the winter season of 1922. All
 species included a value based on least one
 mile of effort.

Area	January		February		All winter
	1-10	10-31	1-15	15-28	
C	20	18	5	10	13
E	28	15	—	4	17
B	22	30	—	—	30
D	64	72	29	30	4
All Areas	32	35	34	17	28

Table III. Diel fishery data recorded during the Lake Winnebago
 commercial fishery investigation, winter of 1922.

Station	January		February	
	1922 (% of total)	1922 (% of total)	1922 (% of total)	1922 (% of total)
Surface sample 23	0.7	0.0	0.0	0.0
Bottom sample 23	0.1	11.7	3.7	8.7
Surface sample 24	10.7	—	—	10.0
Bottom sample 24	11.8	11.8	3.7	11.6