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DATA ON THE RATE OF GROWTH OF PIKE PERCH (STIZOSTEDION VITREUM) AND SAUGER (S. CANADENSE) IN ONTARIO

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Introduction

The pike perch or pickerel (Stizostedion vitreum (Mitchill)) has not been, on the whole, of as great commercial importance as the whitefish, lake trout, or cisco, but the species has always been of very significant value to the Ontario fisheries. The annual catches throughout the last twenty years have fluctuated around two million pounds, the estimated values varying between the extremes of \$150,000 and \$415,000. Until 1925, when the cisco catch fell off badly, the pike perch was the fourth most valuable commercial fish in Ontario; since that time it has been in third place.

Commercial fishermen on Lake Nipigon take pike perch in considerable numbers during August and September (Dymond, 1926, p. 79), and receive a higher price per pound for them than for whitefish or trout. In Lake Abitibi the pike perch is the chief commercial fish throughout the year (Dymond and Hart, 1926, p. 16).

The sauger (Stizostedion canadense (Smith)) does not grow large enough in Lake Nipigon to be caught in the four and one-half inch gill nets used by the fishermen, but we took it very commonly in two and three inch nets set in some parts of the lake (Dymond, 1926, p. 80). Local fishermen have suggested special regulations to permit the capture of saugers for commercial purposes.

The purpose of the present study was to determine the rate of growth of the pike perch and sauger in Lake Nipigon

and the pike perch in Lake Abitibi, and from the growth curves to deduce the mesh of nets which should be used to be of the greatest advantage to the fishery.

MATERIAL AND METHODS

The material on which this study was based was taken by members of the Ontario Fisheries Research Laboratory during four summers (1921 to 1924) at Lake Nipigon and during June and July, 1925, at Lake Abitibi. For most of the specimens the following data were secured: (1) length in inches to the fork of the tail, (2) length in millimetres to the end of the vertebral column, (3) girth in inches, (4) weight in pounds and ounces, (5) means by which fish was taken. (6) date and locality of capture, (7) scales. Owing to the economic bearing of the study the length in inches has been used in plotting the graphs and in the discussion. In the case of either of the species dealt with in the present paper the length in millimeters to the end of the vertebral column may be obtained by multiplying the length in inches by 22.5.

Adamstone (1922) has applied the scale method of age determination to the yellow and blue pike perch of Lake Erie. In all essentials his method has been followed in the present study.

The number of annuli on the scales for each fish were counted by the use of a low-power binocular microscope, and specimens of the same age as determined by this method have been grouped together and the averages of the various measurements obtained for each age. These averages and the number of fish of each year group for the three series of fish are shown in table 1.

The length in inches and the weight in ounces of the individual fish have been plotted against the age for the three species. The resulting growth curves are shown in figs. 1, 2 and 3.

4	FOR PIKE	PERCH 1	FROM LAKE N	IPIGON AND	LAKE A	HOUS AGE	AGE GROUP FOR PIKE PERCH FROM LAKE NIPIGON AND LAKE ABITIBI AND FOR SAUGERS FROM LAKE NIPIGON.	MBER OF SP RS FROM LA	ECIMENS	BELONGI GON.	NG TO EACH
Pike perch—Lake Nipigon	Lak	S. Z.	pigon	Pike p	erch-L	Pike perch—Lake Abitibi	bi	S	auger-I	Sauger-Lake Nipigon	gon
Length Length We mm. in. 02	We	Weight oz.	No. of specimens	Length Length Weight mm. in. oz.	Length in.	Weight oz.	No. of specimens	Length mm.	Length Length mm. in.	Weight oz.	No. of specimens
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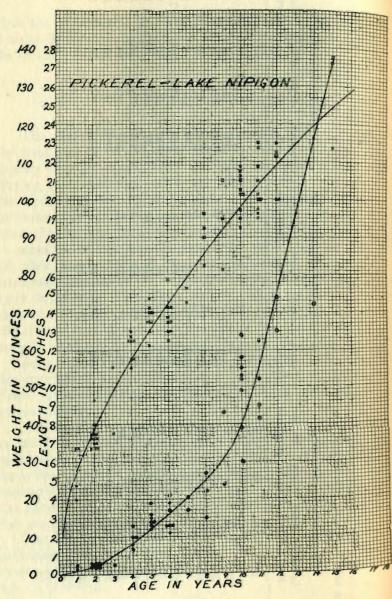
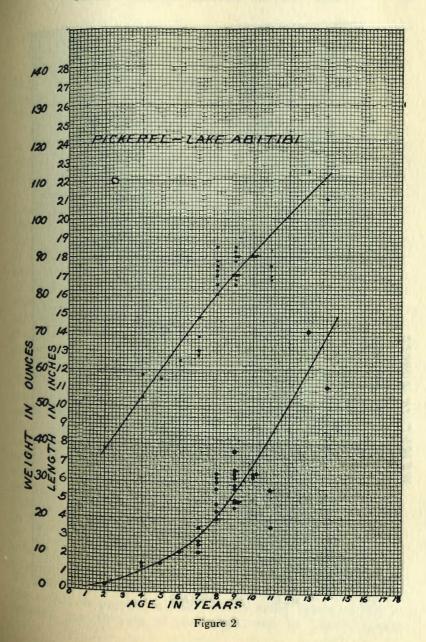


Figure 1



140 130 110 100 90 80 70 OUNCES 20 10

Figure 3

DISCUSSION

An examination of these curves shows that the pike perch in Lake Nipigon grows considerably faster than the same species in Lake Abitibi, and that both grow much faster than the Lake Nipigon sauger.

The three growth curves are typical in that they all show a decreasing rate of increment in length and an increasing rate of increment in weight as the fish grows older. Although evident, this is least marked in the case of the sauger.

Adamstone (1922), dealing with the yellow pike perch of Lake Erie, showed that there was a marked acceleration in growth in weight occurring between the ages of two and three years. The weight of a two-year-old Lake Erie fish is about three ounces, that of a four-year-old fifteen ounces, and of a seven-year-old forty-three ounces. A comparison of these results with those of the present study shows that the rate of growth as a whole is much greater in Lake Erie, and that the acceleration occurs at an earlier age. In the two northern lakes, the whole life cycle of pike perch appears to be extended.

In view of the fact that there is an advanced period in the life of a fish when its rate of increase in weight is relatively much greater than it is during its earlier years, it appears advisable to allow it several years of this more rapid increase in weight before it is liable to capture in commercial nets. In the case of the pike perch of Lake Nipigon this more rapid increase in weight sets in about the beginning of the tenth year, when the fish is about 18 inches in length. A study of table 2, shows that 95 per cent. of the pike perch taken in four and one-half inch gill nets were over 18 inches in length and that 65 per cent. were over 20 inches in length or ten years of age. This means that 35 per cent. of the fish taken in four and one-half inch nets have not had the opportunity of more than one year of accelerated growth. This condition indicates that gill nets of this size are slightly too small to permit full advantage being taken of the increased growth rate of the pike perch in Lake Nipigon.

TABLE 2—Showing the numbers of pike perch and saugers of each length TAKEN IN NETS OF VARIOUS SIZED MESH: DATA FOR LAKE NIPIGON 1922. 1923, and 1924

			Pike l	Perch				Sa	uger	_
					Mes	h of net	- Carlotte		- O-L	
	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	41/2	$1\frac{1}{2}$	2	$2\frac{1}{2}$	
Length in inches		11-11-22	TANE						22	_
6						1.5				
$6\frac{1}{4}$									(*)*	
$6\frac{1}{2}$	1								22	
63	2								9.	1.0
7	10								***	-
74	5						1			
71/2	6								**	
73	1						1		13.5	
8									***	
81									28.28	
81/2	3						1			
83						4.	2			-
9	1			1			7			
91	2									
91/2							2			1
93							2	1		
10	1									
104							1			
101							1	1	1	
103							1			
11		3		1			2	1		
111			1					1		
111		1					4	3		
113		5						6	1	20
12		5		6			3	12	1	130
121		2		1			1	12		
121	1	11		2			1	14		121
123		10		1			1	4		114
13		3		6		1	2	18		
131		4		8				7		1
131		5		6				14		1
133		5		4				13	100	6
14		4		7				33	1	3
141		2		1				6		9
141		3	1	4				18		1
143		2		2				9		9
15		1		5				13	**	2
15}		1						5		
151		1						7	••	-

TABLE 2—Showing the number of pike perch and saugers of each length TAKEN IN NETS OF VARIOUS SIZED MESH: DATA FOR LAKE NIPIGON 1922,

		Pik	e Per	h			Sa	uger		-
	-	2 11			Mesh o	of not	0,0	2801	-	
	11/2	2	Ŏ1		$3\frac{1}{2}$	4 ¹ / ₂	11/2	2	01	0
Contract Con	12	2	$2\frac{1}{2}$	3	32	45	13	2	21/2	3
ength in inches										
153		1			1			5		2
16								5		2
161								2		2
161/2		1		1				1		1
163			٠,							
17				1		1		3		
171				1		1				
171				1						
173		1								
18		1		1		1				
181				1						
181						3				
183				1		3				
19	1			1		2				٠.
191		-								
191	1.			1		2				
194						1				
20	2	٠.		1		5				
201	4		• •					1.		
201				• •	• •	1				
203			11	٠.		5				
21						2				
211		1	٠.			6				
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22		٠.		1						
221				٠.		2	* *			, .
221						2	++			
223			1		1	1				
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234	1100				1	1		**		
231	100									
234						1				
24										
24	111.1					1				
241						1.4				
244										
25	1000									٠.
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HART: RATE OF GROWTH OF PIKE PERCH

Conclusions

Nets of four and one-half inch stretched mesh, however, are large enough to avoid doing extensive damage to the fishery. Accordingly, it would appear advisable to continue the use of nets of this size if they are found suitable for the whitefish and lake trout fishery.

Although for the pike perch of Lake Abitibi the growth is on the whole slower than that in Lake Nipigon, the acceleration in growth occurs at the age of about seven years. As these fish do not reach a length of 18 inches until they are ten years of age, 95 per cent. of the specimens have had the advantage of three years of accelerated growth before they are liable to capture in four and one-half inch nets. However, as the growth rate is comparatively slow, the stock will be replaced more slowly. Accordingly, the amount of net permitted in the fishery should be rigidly controlled.

Unfortunately, no data as to the minimum spawning age of pike perch are available, but it is altogether likely that the present regulations permit the fish at least one opportunity of spawning before they are liable to capture in commercial nets in either Lake Nipigon or Lake Abitibi.

The smallest spawning female sauger taken in Lake Nipigon measured 14 inches in length. Reference to table 2 shows that 48 per cent. of the saugers taken in two inch nets and 15 per cent. of the saugers taken in three inch nets are under this size. It is evident therefore that no net of a smaller size than three inch mesh should be used for taking saugers. However, from the evidence of our operations it is apparent that even nets of this size are certain to do very considerable damage to young whitefish and pike perch. For this reason and because the sauger, owing to its inferior quality, does not command a good price, it appears inadvisable to take any steps towards fishing them in Lake Nipigon under present conditions.

The greater average length of saugers over pike perch taken in the same nets as shown in table 2 is, no doubt, related to the slightly greater compression of the former species (Dymond, 1926, pp. 78 and 80).

1. The four and one-half inch gill nets in current use in Lake Nipigon allow pike perch on the average one year of rapid growth in weight. Although this condition is not ideal, four and one-half inch nets might be continued if found satisfactory for other species.

2. Four and one-half inch gill nets allow pike perch three or more years of accelerated growth in Lake Abitibi. This should ensure a continued fishery if the amount of net

is not unduly increased.

3. The establishment of a sauger fishery in Lake Nipigon is not advisable at present. If conditions should ever make such a fishery desirable a three inch net is indicated.

LITERATURE CITED

Adamstone, F. B. 1922. Rates of Growth of the Blue and Yellow Pike Perch (Stizostedion vitreum) in Lake Erie. Univ. of Toronto Studies: Biological Series, Pub. Ontario Fisheries Research Lab., No. 5.

Dymond, John Richardson 1926. The Fishes of Lake Nipigon. Univ. of Toronto Studies: Biological Series, Pub. Ontario Fisheries Research Lab., No. 27.

Dymond, John R. and Hart, John L. 1927. The Fishes of Lake Abitibi (Ontario) and Adjacent Waters. Univ. of Toronto Studies: Biological Series, Pub. Ontario Fisheries Research Lab., No. 28.