

# LANDLOCKED ATLANTIC SALMON (*Salmo salar* L.) IN THE TERRA NOVA RIVER SYSTEM, NEWFOUNDLAND

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## INTRODUCTION

A SURVEY OF THE Terra Nova River and its tributaries was made by the author during June, July and August of 1952. The principal objective of the survey, conducted by canoe for the most part, was to furnish a report on obstructions to ascending sea-run Atlantic salmon (*Salmo salar* L.) and in a general way to report on the extent of spawning grounds suitable for this species. The results of the survey form the substance of reports already submitted to the Biological Station of the Fisheries Research Board of Canada, St. John's, Newfoundland.

During the course of the survey opportunity was afforded to collect data on landlocked Atlantic salmon (*Salmo salar* L.) commonly called ouananiche. The waters of the Terra Nova River system abound with this species especially in the area above Terra Nova Fall (Figure 1). This paper attempts to record growth characteristics, especially length and age relationships of the data thus obtained.

At the time of this survey no fish-way was in operation on the Terra Nova River and hence previous to the summer of 1952 no sea-run Atlantic salmon had penetrated the waters above the Fall which is about one mile below the town of Terra Nova. A modern fish-way was under construction at that time and it began operation during the late fall of 1952.

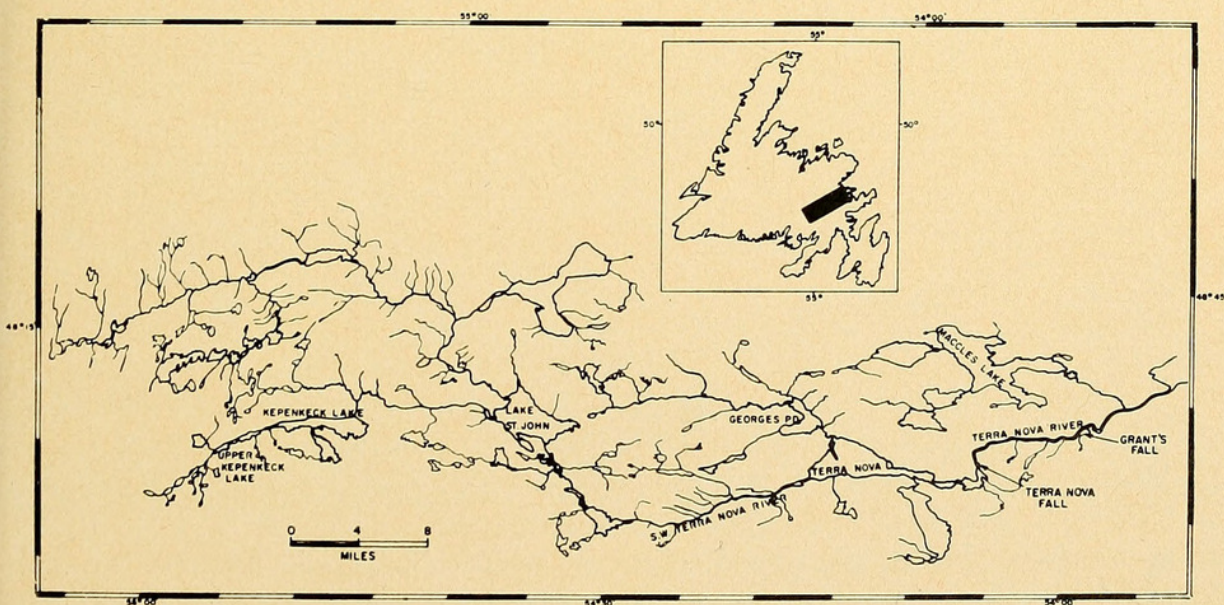


FIGURE 1. Map of the Terra Nova River System showing locations mentioned in the text.





FIGURE 2. Outlet of Kepenkeck Lake where ouananiche were plentiful, June, 1952.

TABLE 1. — Station list and number of fish collected at each station on the Terra Nova River system. Summer, 1952.

Station	Number of fish
1. Terra Nova Lake	64
2. Terra Nova River at Lake St. John Dam	66
3. George's Pond	32
4. South West Terra Nova River	3
5. Maccle's Lake	17
6. Kepenkeck Lake	41
7. Upper Kepenkeck Lake	8
TOTAL	231

#### MATERIALS AND METHODS

A total of 231 fish were collected from several stations on the Terra Nova River system as listed in Table 1. The locations of all points listed are shown in Figure 1. The fish were collected by means of gill nets, fyke nets, angling and the use of a small handseine which measured about 3 ft. x 3 ft., leaded along the footrope, and equipped with two wooden handles. One of the most successful angling locations was at the outlet of Kepenkek Lake (Figure 2) where 41 fish ranging in size from 9.9 cm. to 29.8 cm. were angled during one



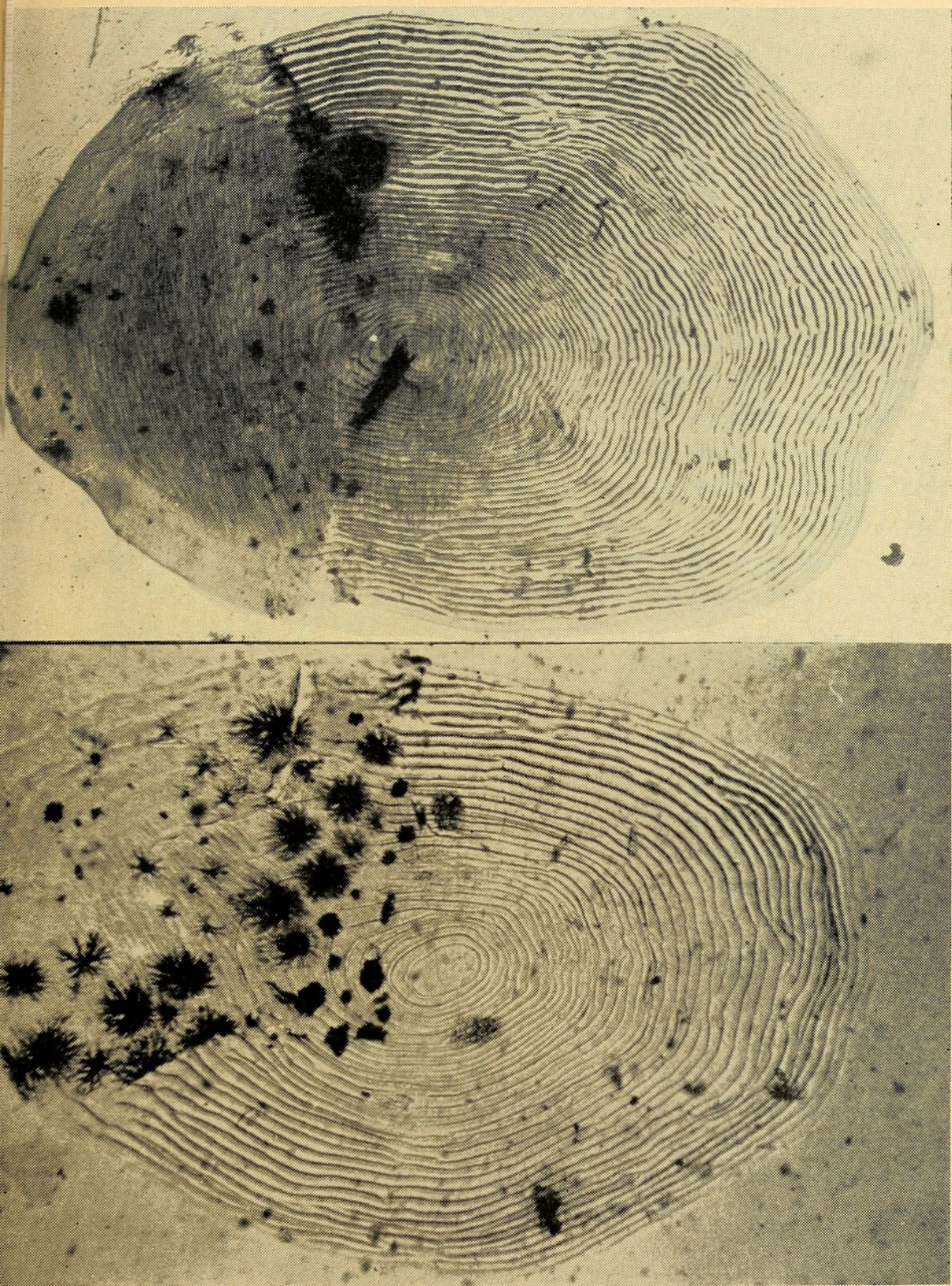


FIGURE 3. Scales from landlocked salmon, Terra Nova River; left 2 + year-old, right 3 + year-old.



Table 2. — Age-length relationship of landlocked salmon in the Terra Nova River system. Summer, 1952. Figures in parentheses indicate number of fish in each age group.

Age (years)	Length (cm.)	Calculated length (cm.) $Y = 4.5X + 2.4$
1	9.9(1)	6.9
2	11.3(27)	11.4
3	17.6(44)	15.9
4	21.7(44)	20.4
5	25.0(57)	24.9
6	28.1(24)	29.4
7	32.0(12)	33.9
8	38.5(4)	38.4
9	38.2(3)	42.9

half hour at sunset on June 22, 1952. The dam site at Lake St. John was another very successful angling location.

Measurements are given as fork lengths to the nearest millimeter and ages were determined by the scale method. Typical scales taken from the area between the lateral line and the adipose fin, are shown in Figure 3. The scales were preserved in blotting paper, removed in the laboratory and washed; they were then mounted on glass slides and read using a standard microprojector.

## RESULTS

### *Length distribution*

The ouananiche ranged in size from 6.5 to 48.5 cm. (Figure 4) with a modal length of 24.5 cm. Included in the modal length-group were 42 fish or 25.4 per cent of the sample. Absence of fish smaller than 6.5 cm. is attributed to the collecting technique where fish smaller than 6.5 cm. could pass through the meshes of the nets used or they were too small to angle. The largest fish (48.5 cm.) was taken by gill net in Terra Nova Lake and a second ouananiche measuring 40.8 cm. was also taken by gill net in Terra Nova Lake. Scott and Crossman (1964) report the largest ouananiche taken in their sample in Lake St. John, Newfoundland, at 48.1 cm., fork length, with a live weight of approximately 2½ pounds. The largest fish taken in Lake St. John in our sample was 37.5 cm.

### *Age frequency*

Ages ranged from 1 + to 9 + years with the modal age at 4 + years as shown in Figure 5; 66 fish or 27.5 per cent of the sample were contained within this modal group. The mean age of the total sample was 4.4 years.

### *Age-length relationship*

Mean lengths for each age-group are shown in Table 2 and Figure 6. Growth demonstrates a straight line relationship

$$Y = aX + b$$





FIGURE 4. Length distribution of landlocked Atlantic salmon in the Terra Nova River system, summer, 1952.

where  $Y$  = length,  $X$  = age,  $a$  = slope, and  $b$  =  $y$  intercept. The values of  $a$  and  $b$  have been calculated at 4.5 and 2.4 respectively; thus the equation

$$Y = 4.5X + 2.4$$

fits the observed data.



TABLE 3. — Age-length relationship of young salmon in the upper (S. W. Gander River) Gander River. May-August, 1951. Figures in parentheses indicate the number of fish in each age-class. (Andrews, 1965).

Age in years completed	Actual length	Calculated length ( $Y = aX + b$ . see text)
1+	7.1(15)	7.1
2+	9.8(91)	9.2
3+	11.3(54)	11.3
4+	13.5(3)	13.4
5+	21.9(2)	15.5
6+	21.0(3)	17.6
7+	33.4(1)	19.3

For comparison age-length data (Table 3) for parr and post-smolts of sea-running Atlantic salmon from the upper Gander River (South West Gander River) have been included in Figure 6. This data also shows a straight line relationship where the equation

$$Y = 2.1X + 5.0$$

fits the observed data. The slopes of the lines indicate a faster rate of growth for landlocked salmon in the Terra Nova River as compared with parr of sea-running Atlantic salmon from the nearby Gander River. Thus age 2+ sea-running salmon in the upper Gander River average 9.2 cm. and landlocked salmon in the Terra Nova River average 11.4 cm.; at 3+ years Gander River salmon average 11.5 cm. whereas landlocked salmon in the Terra Nova River average 15.9 cm. The difference continues to increase with increasing age; thus 6+ year-old salmon in the upper Gander average 17.6 cm. as compared with 29.4 cm. for landlocked salmon in the Terra Nova River. The difference is small at the end of 1+ years but the regression of the lines (Figure 6) indicates that the fry of landlocked salmon are smaller than the fry of sea-running Atlantic salmon, the y intercept of the former being 2.4 cm. and for the latter 5.0 cm.

#### DISCUSSION

Many of the inland ponds, lakes, rivers, and streams of Newfoundland support well established populations of landlocked salmon and the Terra Nova River system, including its several associated ponds and lakes is no exception. The species is an excellent game fish although it does not reach the size commonly attained by adult Atlantic salmon which migrate upstream from the sea. Maximum length in the Terra Nova River system ranges from 30 to 45 cm. and the maximum weights between 2 and 3 pounds. Scott and Crossman (1964) report that "Generally speaking, the larger waters seem to carry the



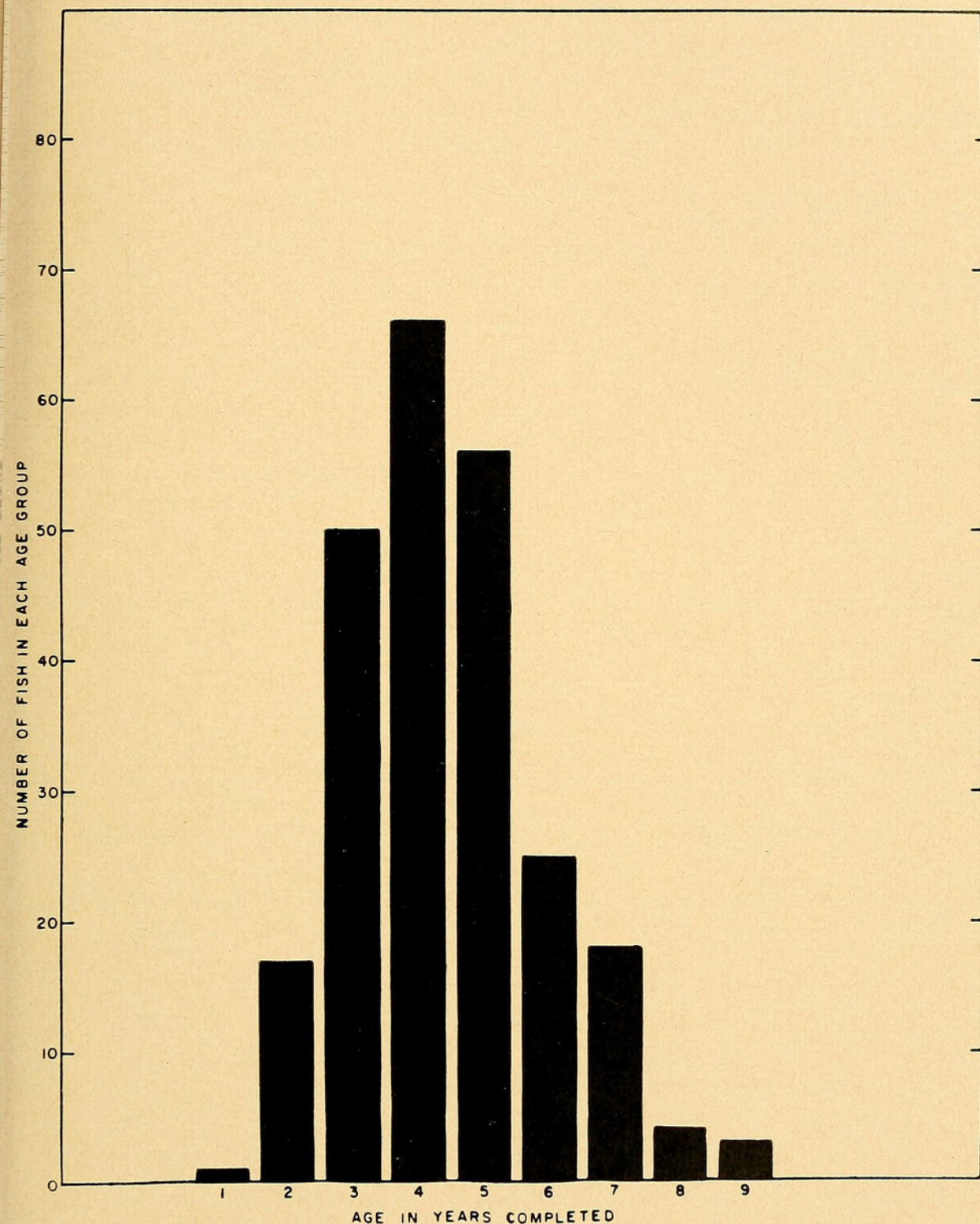


FIGURE 5. Age composition of landlocked Atlantic salmon in the Terra Nova River system, summer, 1952.

larger ouananiche.” They also report (1964) ouananiche of 7.0 and 8.5 pounds weight from Kaegudeck Lake, Bay du Nord River, and Red Indian Lake, Exploits River, respectively.



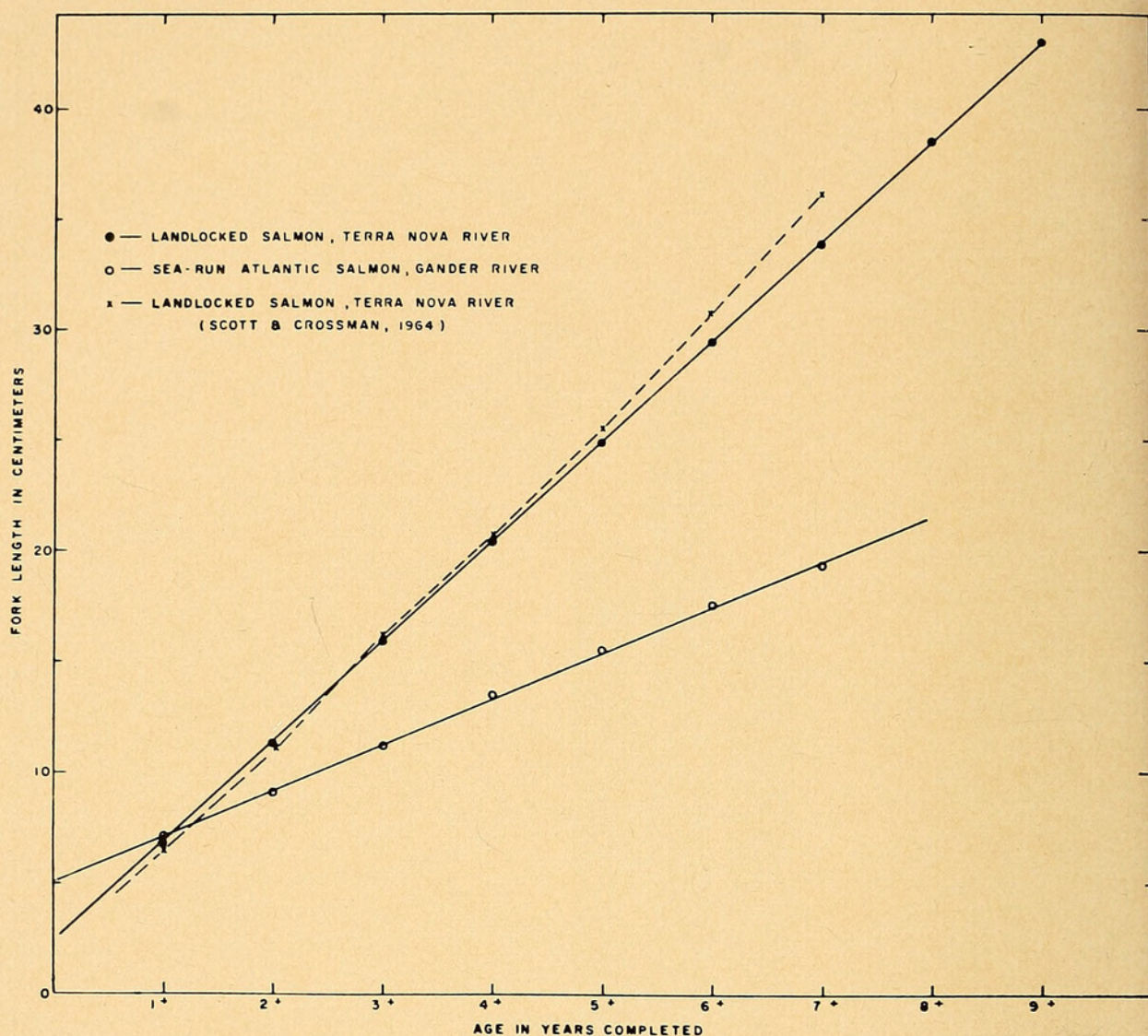


FIGURE 6. Mean length in centimeters of different age-groups; landlocked Atlantic salmon in the Terra Nova River system, summer, 1952.

TABLE 4. — Age-length relationship of 41 landlocked salmon from Terra Nova River system. (Scott and Crossman, 1964, p. 43).

Age	Mean fork length (mm.)	Mean back calculated F.L. from scales (mm.)
1	123	66.5
2	153	112.5
3	208	161.5
4	235	203.8
5	290	255.8
6	319	307.8
7	374	361.2
8	464	418.0



Scott and Crossman (1964) collected 41 landlocked salmon from the Terra Nova River in 1960. Data from this collection are shown in Table 4 and plotted in Figure 6 for comparison with the 1952 data of this paper. Their back calculations from scales for age-length relationships are remarkably similar to our calculated age-length relationships based on the equation

$$Y = 4.5X + 2.4$$

Their direct measurements show a higher rate of growth for each year class. This, they report "may be due to the small sample size. It may also be due to the fact that only the bigger members of the younger age groups were taken in the mesh sizes used."

To conclude, it may be said that the landlocked salmon population of Newfoundland inland waters represent an angling resource which has been little utilized in the past. Its rate of growth in the Terra Nova River system, at least, where "pan sized" fish of 20 cm. (8 inches) or more is reached in from 3 to 4 years indicates that greater utilization, from a biological point of view, may be warranted.

#### ACKNOWLEDGEMENT

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