RESOURCE DEVELOPMENT BRANCH

MANUSCRIPT REPORT

No. 60-10

River Philip Salmon Survey

by

H.E. Edwards

FISHERIES SERVICE
DEPARTMENT OF FISHERIES AND FORESTRY OF CANADA
HALIFAX, N.S.

RIVER PHILIP SALMON SURVEY

by H. E. Edwards

LOCATION

River Philip is, for the most part, located in Cumberland County, Nova Scotia; only small portions of two headwaters streams reach out into Colchester County.

TIME AND EXTENT OF SURVEY

The stream was surveyed during the period August 20th-September 10th, inclusive, 1956. The survey covered the main river from the head of tidewater to the headwaters, approximately twenty-one miles and all major tributaries.

GENERAL DESCRIPTION

The main River Philip is approximately twenty-one miles in length from the headwaters to the head of tide and is almost entirely spring-fed. It has an estimated drainage area of 230 square miles. The river has a slight gradient, dropping 750 feet between the headwaters and the head of tide or about 1 foot in 150 feet.

The watershed is generally hilly. Large areas of open and/or cultivated land surround the downstream portion of the river; on the upstream half, particularly near the headwaters, the stream meanders through a heavily wooded area. The width of the stream approaches an average of 57 ft. The stream bottom, generally, is made up of small boulders, gravel and sand, with the occasional large boulder; above the dam at the Government Fish Hatchery, the stream is quite rough and large boulders predominate.

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The stream contained an estimated 40% pools to 60% riffles.

Four of the tributary streams which were surveyed were considered as important for nursery and/or spawning facilities; a description of these and others follows under "Nurseries".

There appeared to be an abundance of bottom fauna throughout the system - these included the following types: stoneflies (Plecoptera);mayflies (Ephemerida); midges (Chironomidae); and caddisflies (Trichoptera).

NURSERY AREAS (MAIN RIVER)

Nursery Area N-1 is located on the main river between the head of tidewater and Oxford Junction. In this area, the stream descends a sharp gradient and covers most of the stream 75 ft. average width of the stream. The depth of the stream, predominantly riffle water, averages 4-6 inches. Shade is only fair throughout the section; banks are quite high and wooded on the right side of the stream, while on the left they are quite low and open in some places.

There are about 40% pools to about 60% riffles. The stream bottom is made up mainly of coarse gravel with smaller percentages of small boulders, sand and bedrock with a few large boulders.

A number of salmon parr were found in thisarea, which contains an estimated 154,000 sq. yds. of good nursery facilities.

Nursery Area N-2 takes in the area of the main stream between Oxford Junction and Collingwood Corner. Here

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the main stream flows through mostly cultivated land - on the left bank of the stream, cultivated areas run right to the margin of the stream in most places, while some flat-grazing areas are also found. The surrounding country is, for the most part, flat, though some hilly areas appear on the downstream half of the area.

The banks maintain an average of 3 - 5 ft. in height and are quite rocky with some clay, sand and gravel also present.

The water velocity is quite fast over a slight gradient. The stream width approaches an average of 65 ft. covering the full width of the stream bed to a depth of 3 - 6 inches on the average. The stream bottom was composed of about 65% coarse gravel, 20% large boulders and 15% sand. Shade is only fair and at the time of the survey, one or two "tops" and "dead heads" left in the river were being put to good use by a number of salmon parr and smolt. Most of the pools were found in that part of the section between Spruce Brook and Oxford Junction; for the whole section, pools made up about 40% with the remaining 60% riffle water.

Salmon parr were present in this section in fair numbers. This area contained an estimated 286,000 sq.yds. of good nursery facilities.

Nursery Area N-3. This is an area of the main stream which extends from Collingwood Corner to the Hatchery dam. In this section of the main river the stream bed narrows to a 45 ft. average width. The stream covers the complete width of the stream bed to a depth of 4 - 6 inches in the riffle areas, which comprise about 65% of the stream.

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The stream bottom is made up of 35% large boulders, 35% coarse gravel with the remainder being equal proportions of fine gravel and sand. The gradient of the stream is sharp and the water velocity is fast. The stream is quite silty in this section, particularly following a rainy period. The stream banks remain in the vicinity of 4 - 6 ft. in height, sloping to hilly terrain throughout most of the section. Most of the surrounding country is woodland on the right bank and farm and grazing country on the left bank. Salmon parr were present throughout the section, which had an estimated 158,400 sq.yds. of good nursery facilities.

Nursery Area N-4 is the area of the main stream lying above the dam at the Government Fish Hatchery. The main stream originates in an extensive marshy area which is drained by a number of spring brooks, which converge to form the main stream roughly five miles above the dam. The stream was followed up for a distance of about three miles. The stream, above the dam, winds through a densely wooded, mountainous region. The gradient of the stream is quite sharp. The stream velocity is fast, reaching torrential proportions in a rocky gulch about two miles above the dam.

For the most part, the stream bed is composed of large boulders, small boulders, coarse gravel and sand. Coarse gravel predominates in the first mile or so above the dam gradually giving way to larger rocks and boulders above this point. The stream bed width approaches an average of 26 ft., the stream occupying most of that area. The depth of the stream averages about 8 inches. The stream is made up of 25% pools to

75% riffles. Commencing about two miles above the hatchery dam, there are a series of rockfalls, two large falls and three small falls. Above the section, the stream was very heavily shaded by brush and alders. A number of beaver dams was also found in the upper reaches above the section surveyed; these flood quite a large area. Rated as having only fair nursery facilities below the falls and nothing above, the area contained an estimated 30,506 sq.yds.

Nursery Area N-5. Approximately one mile of the Little River tributary offers limited nursery facilities; this is a section extending a mile upstream from its mouth. In this section, the stream covers to a depth of 2 - 4 inches, approximately 8 ft. of the 26 ft. average width of the stream bed. The stream flows slowly down a slight gradient, having about 90% riffle water. Shade is fair. The stream bottom is composed mainly of small boulders and sand with some coarse gravel. The estimated area contained was 4,693 sq.yds., and the quality was poor. A few salmon parr were found in this part of the stream.

Nursery Area N-6. Black River was the sixth nursery area to be surveyed. This stream was considered to have had good nursery facilities right from its mouth to the entrance of Glenville brook. Nothing of any particular value was found on Black River above this point, or on the tributaries of Glenville and Chase brooks.

Black River meanders through rolling country, which is heavily wooded in the upper half and is surrounded by pasture and open cultivated land on the lower half.

For the most part, the stream is spring-fed, draining only one or two small lakes. The stream gradient is generally

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quite sharp, and the water velocity is swift. The stream width approaches an average of 45 ft. The depth of the stream in the riffles was 2 - 3 inches. The stream bottom was composed mainly of small boulders and coarse gravel in the upper half of the stream, with coarse gravel predominating in the lower half. The banks, composed mainly of clay and small boulders, are quite high. There is a close succession of pools and riffles, with the larger pools being found on the lower reaches of the stream. Good nursery facilities were found right from the mouth of the stream to a point about 7½ miles upstream. The area contained an estimated 198,000 sq.yds.

Nursery Area N-7. Tillit brook is a spring-fed brook, receiving only intermittent drainage from one or two small lakes near the headwaters. It is a small stream averaging about 11 ft. in width. The stream flows with a moderate velocity over a slight gradient through stretches of open and wooded country. A considerable portion of the watershed in the headwaters region has been burned over. The stream bottom was composed mainly of large boulders and bedrock with smaller percentages of sand and coarse gravel in the lower half with sand, detritus and gravel predominating in the upper half. The average depth of the stream in the riffle areas was 3 inches. Riffle water made up 75% of the stream. Pools are generally small. The stream has fair nursery conditions from the mouth to the entrance of Burntland brook, an estimated 35,933 sq.yds.

Nursery Area N-8 Colonel brook is a small brook, which is tributary to Tillit brook, roughly 5½ miles from its mouth. It is a spring-fed stream which has an average width of 15 ft.,

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covering most of the full width of the stream bed to a depth of 2-4 inches, in the riffles which make up approximately 75% of the stream flow. In the lower half of the stream, small rocks and sand predominate; while in the upper half, small boulders and coarse gravel predominate. A few small pools were noted along the stream, principally in the lower reaches. Generally speaking, the stream appeared to have very good nursery conditions, extending from the mouth of the stream to a point about 4 miles upstream.The area contained an estimated 35,200 sq.yds.

Nursery Area N-9. Polly brook enters the main river approximately 7 miles from the head of tidewater. A section of the stream extending 5½ miles upstream from its mouth was considered to have had good nursery facilities. The stream covered at the time of the survey the full 30 ft. average width of the stream bed. The depth of the stream approached an average of 2 inches in the riffles, which made up about 70% of the stream. The stream which was well shaded flows swiftly over a sharp gradient, through a densely wooded, uncultivated country. The stream bottom was composed mainly of coarse gravel - 80% with 10% large boulders and 10% sand. The pools which do exist are quite small and shallow. The area has an estimated 130,133 sq.yds.

Nursery Area N-10. Davidson brook is another small, spring-fed stream which enters the main stream approximately ( ) miles from the head of tidewater. The gradient of the stream is quite sharp as it flows through a very hilly and heavily wooded country. The width of the stream approaches an

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average of 30 ft., covering the full width of the stream bed. The stream bottom is made up of 15% large boulders, 90% bedrock, 35% small boulders, 15% coarse gravel and 15% sand. The velocity of the stream was swift. Banks vary in height from a 3 - 5 ft. average on the lower half of the stream to a maximum height of 100 ft. on the upper half. Shade is excellent throughout the length of the stream. A number of small pools were found along the stream and the ratio of the pools to riffles was 40 - 60 percent.

Approximately two miles from the mouth of the stream, a number of rock falls were found. Since only a mile or so of precipitous stream lies above the falls, they are not of any great importance. The area below the falls to the mouth of the stream offers good nursery facilities. The estimated area of the section was 32,977 sq.yds.

Nursery Area N-11. Sherman brook originates in two small intermittent streams, which join the main brook about 2½ miles from its mouth. Below the confluence of the two streams, Sherman brook offers fair to good nursery facilities. The stream, lying in open country near the mouth, flows (for the most part) through hilly, heavily wooded country. The width of the stream bed approximates a 25 ft. average. The stream covered the full width of the stream bed to a depth of 2 - 4 inches. The bottom was made up of predominantly large and small boulders, with smaller percentages of coarse gravel and sand. The gradient of the stream was quite sharp and the water velocity was quite swift. The banks of the stream, quite high in the headwaters region, averaged 1 - 3 ft. in the lower reaches. Containing

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mostly riffle water, the area had an estimated 3,666 sq.yds.

Nursery Area N-12, West Branch River Philip, has its origin in one or two small lakes and a number of spring seeps draining the hilly regions to the south and to the west of Collingwood Corner. The gradient of the stream was sharp and the water velocity was fast. The stream bottom, below Wyvern, averaging about 36 ft. wide, was almost 100% coarse gravel. The stream covers the full width of the stream bed to a depth of about 4 - 6 inches. The stream was well shaded on the left bank and poorly shaded on the right. Above Wyvern, the stream bottom was made up of 40% sand, 40% coarse gravel and 20% large boulders. The stream had about 60% riffle to about 40% pools.

A few salmon parr were observed here but they were not plentiful. From the mouth of the West Branch to Wyvern, the stream had an estimated area of 63,360 sq.yds. of fair nursery conditions.

Nursery Area N-13. Bullmer brook is a small spring-fed stream, tributary to the main river, approximately 3 miles above Collingwood Corner. It descends a gentle gradient with a moderately swift velocity. The width of the stream bed approaches an average of 8 - 10 ft. The stream at survey time covered approximately 6 ft. of the stream to a depth of 2 - 3 inches. The stream bottom was made up mainly of coarse gravel and small boulders. Apart from open areas near the mouth, the stream is well shaded. A section of the stream extending 1½ miles upstream from the mouth, had fair nursery facilities. The area contained was an estimated 5,280 sq.yds.

/Nursery

Nursery Area N-14. Sugarloaf brook is tributary to mountain brook about a mile from its mouth. The stream, at survey time, occupied about one-third of the 26 ft. average width of the stream bed. The stream bed was composed mainly of sand and fine gravel with a sprinkling of coarse gravel and large boulders. Approximately 1/2 to 3/4 of a mile upstream, begins a series of old beaver dams, quite old, which virtually cut off the flow creating deep stillwater areas in the gully through which the stream flows. The stream is surrounded by intermittent stretches of flat and hilly areas. In the low areas, there is considerable marshland, which is thickly covered with windfalls and dead trees. Considerable debris covered the stream bed, which consists mainly of fine gravel and sand with some rocks and large boulders. Should the stream be cleaned out, fair nursery conditions would exist in a 30,506 sq.yd area.

Nursery Area N-15. Mountain brook is a small spring-fed stream which, at survey time, occupied about 5 ft. of the average 10 ft. width of the stream bed. The stream bed is made up predominantly of small rock, fine gravel and sand, with a smattering of large boulders and bedrock. The stream was predominantly riffle water, averaging about 2 inches deep. The gradient of the stream was gentle and the water velocity was moderately fast. Shade along the stream was good from a dense growth of alders which crowd the stream margins in most places. A section extending upstream, approximately 2 miles from the mouth, has fair nursery conditions for under-yearling parr. The area contained an estimated 5,866 sq.yds.

NURSERY AREAS

Nursery Area	Nursery Length in Miles	Av. Width feet.	Est. Area in sq. yards	Quality
N-1	3½	75	154000	good
N-2	7½	65	286000	good
N-3	6	45	158400	good
N-4	2	26	30506	fair
N-5	1	8	4693	poor
N-6	7½	45	198000	very good
N-7	5	11	35933	fair to good
N-8	4	15	35200	very good
N-9	5½	30	130133	good
N-10	2	30	32977	good
N-11	2.5	25	3666	fair
N-12	3	36	63360	fair to good
N-13	1.5	6	5280	fair
N-14	2	26	30506	fair
N-15	2	5	5866	fair
Totals	55 miles		1,174,520 sq. yards	

RIVER PHILIP

TEMPERATURE RECORD

Date 1956	Place	Water °C	Water °F	Air °C	Air °F	pH	Miles from tide head
	Main river	19	66.2	20	68	6.7	1½
Sep.1	Main river west br.	11	51.8	19	66.2	-	near its mouth
1	Main river west br.	14	57.2	20	68	-	2 miles from mouth
Aug.25	Main river	16	60.8	18	64.4	6.7	3 miles from head of tide
23	Tillit Bk.	13	55.4	16	60.8	6.4	5½ miles from its mouth
23	Burntland Bk.	15	59.0	22	71.6	6.7	near its mouth
Sep. 3	Colonel Bk.	10	50.0	15	59.0	6.7	1 mile from its mouth
Aug.24	Black River	16	60.8	18	64.4	-	7 miles from mouth
25	Black River	18	64.4	22	71.6	-	2 miles from mouth
28	Polly Bk.	15	59.0	19	66.2	6.8	near its mouth
28	Polly Bk.	16	60.8	15	59.0	-	2 miles up from mouth
30	Mountain Bk.	14	57.2	23	73.4	6.4	near its mouth
28	Sherman Bk.	12	53.6	19	66.2	6.8	near its mouth
Sep. 3	Little River	17	62.6	23	73.4	-	2 miles from its mouth

SPAWNING AREAS

Spawning Area S-1, is located on the main stream between the head of tidewater and Oxford Junction. This area is probably one of the best spawning areas on the system. Good spawning bottom makes up approximately 35% of the stream bottom. At least one-half dozen good pools were counted in the area, which were longer and wider than the average width of the stream.

Spawning Area S-2 is located between Oxford Junction and Collingwood Corner. In this area, good spawning makes up about 65% of the stream bottom. A number of good pools were also found in this area; the pools make up approximately 40% of the stream; they were generally wider and longer than the average width (65 ft.) of the stream.

Spawning Area S-3. Limited spawning facilities were found between Collingwood Corner and the Hatchery Dam. Good spawning bottom makes up an estimated 35% of the stream bed with the remainder being 35% large boulders, and smaller percentages of sand and fine gravel. Riffle water makes up about 90% of the stream flow.

Spawning Area S-4. A fourth spawning area was found on Black River. Good spawning facilities were found in an area extending about 4½ miles upstream from the mouth. Good spawning bottom makes up about 60% of the stream bed. In the area also, pools and riffles were found in a fifty to fifty-percent relationship.

/Spawning

Spawning Area S-5. Polly brook affords limited spawning facilities in a section extending roughly four miles upstream from the mouth. The stream bottom in the section was composed of 80% coarse gravel. In this section, however, pools are scarce, making up only 30% of the stream flow.

BARRIERS

No barriers of importance were found on the River Philip system. On the main river, approximately 16 miles from the head of tidewater, a storage dam is owned and operated by the Department of Fisheries.

A barrier mill dam, on Polly brook, was located near the headwaters. While the pond created by the dam might be of some value for a trout fishery, the streams flowing into it are virtually unsuitable for fish life.

A number of rock falls were found on Davidson brook, but these were so close to the headwaters as to be relatively unimportant.

POLLUTION

Preliminary water tests indicated healthy stream conditions on both the main river and tributaries.

PREDATOR BIRDS

A number of Mergansers (Merginae) were observed on the river at the time of the survey.

SPECIES OF FISH

The following species of fish were observed at the time of the survey - salmon (Salmo salar); speckled trout (Salvelinus fontinalis); suckers (Catostomus commersonii); Notropis minnows, gaspereau (Pomolobus pseudoharengus); sticklebacks (Gasterosteus aculeatus); and shad (Alosa sappidissima).

ANGLING

Reports received during the survey indicated that speckled trout (Salvelinus fontinalis) affords good angling for a short time in the spring. Late summer angling was reported to be bad.

Salmon (Salmo salar) angling has been poor, particularly in recent years. Very few salmon enter the fresh water areas of River Philip until after the close of the angling season October 15.

SALMON ANGLING AND TRAP RECORD

	1950	1951	1952	1953	1954	1955	1956
Salmon Angling record	313	161	111	17	-	-	6
Salmon taken in trap	756	607	97	669	678	340	122

River Philip

Salmon	Egg Collection at River Salmon Pond
Year	Numbers of Eggs
1935	4573100
1936	3579940
1937	5227300
1938	5951850
1939	2512800
1940	7337790
1941	5804544
1942	7306580
1943	6724990
1944	7131000
1945	1025700
1946	1624850
1947	3675620
1948	6253000
1949	4491900
1950	4518751
1951	3971200
1952	250752
1953	3661200
1954	3860456
1955	1873044

DEPARTMENTAL USE OF RIVER PHILIP

Located about three miles above the approximate head of tidewater is the Department's dam and fishway. At the head of the fishway is a trap where salmon are collected; close to the trap is a retaining pond where the salmon are held prior to "stripping."

Approximately 16 miles from the head of tidewater, near the village of Jackson, the Department operates a fish "hatchery." This establishment is responsible for the culture of brown trout (Salmo trutta), speckled trout (Salvelinus fontinalis) and salmon (Salmo salar). Some indication of the size of the operations may be had from the number of fish distributed. Last year,1956, the following distributions were made:-

1. 931,751 speckled trout - these included 193,000 advance fry.
2. 68,600 brown trout.
3. 245,858 Atlantic salmon

The distributions shown for speckled trout and brown trout for 1956 show distributions which are approximately typical. Those shown for Atlantic salmon were far below the 5,528,990 figure, which is considered a typical year.

/Conclusions

CONCLUSIONS

From the information collected during the survey of River Philip, the following conclusions may be drawn:-

1. River Philip is free from pollution and any serious obstructions.

2. Approximately 598,400 sq.yds. of good nursery conditions were found on the main river, with about 432,243 sq.yds. of good nursery facilities on the tributary streams. About 45% of the main river between the hatchery dam and the head of tide was classed as good spawning bottom. On the tributary streams of Black River and Polly brook, good spawning bottom is found on sections of the streams extending roughly four miles upstream from their mouths.

3. From the number of salmon taken at the Department's salmon trap each fall, it appears that the runs of salmon have been small and are declining. It is also evident that the salmon enter the fresh water late and very few of them are taken by anglers.

4. The percentage of returns to River Philip, from the salmon eggs collected in the fall, has been low.

5. Most of the late run salmon entering River Philip to spawn do so as a general rule after the close of the spawning season.

6. Reports received during the survey indicate that the

/river

river is heavily poached, especially in that section between the mouth of the river and the Department's dam near Oxford Junction. Net fishing is to be very profitable in spite of the fact that the Department pays for an excellent protection service on the river.

The crux of the problem appears to be the impunity with which even persistent violations are met. The imposition of fines ranging from five to twenty dollars on habitual violators of the Act would seem to be far too inadequate, in view of the maximum penalties permitted for such violations.

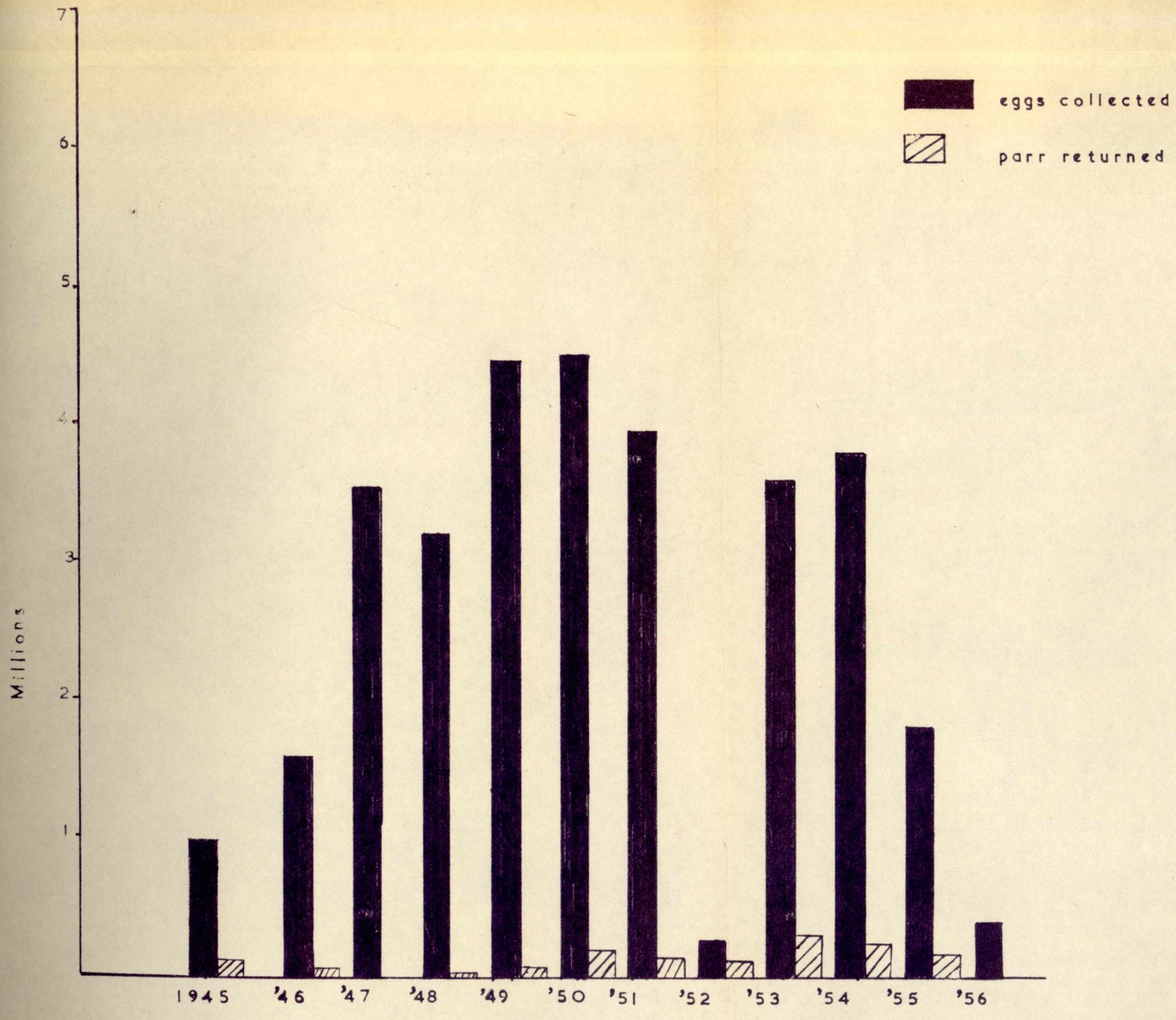
RECOMMENDATIONS

1. It is recommended that the number of salmon parr, annually allotted to River Philip, be increased.

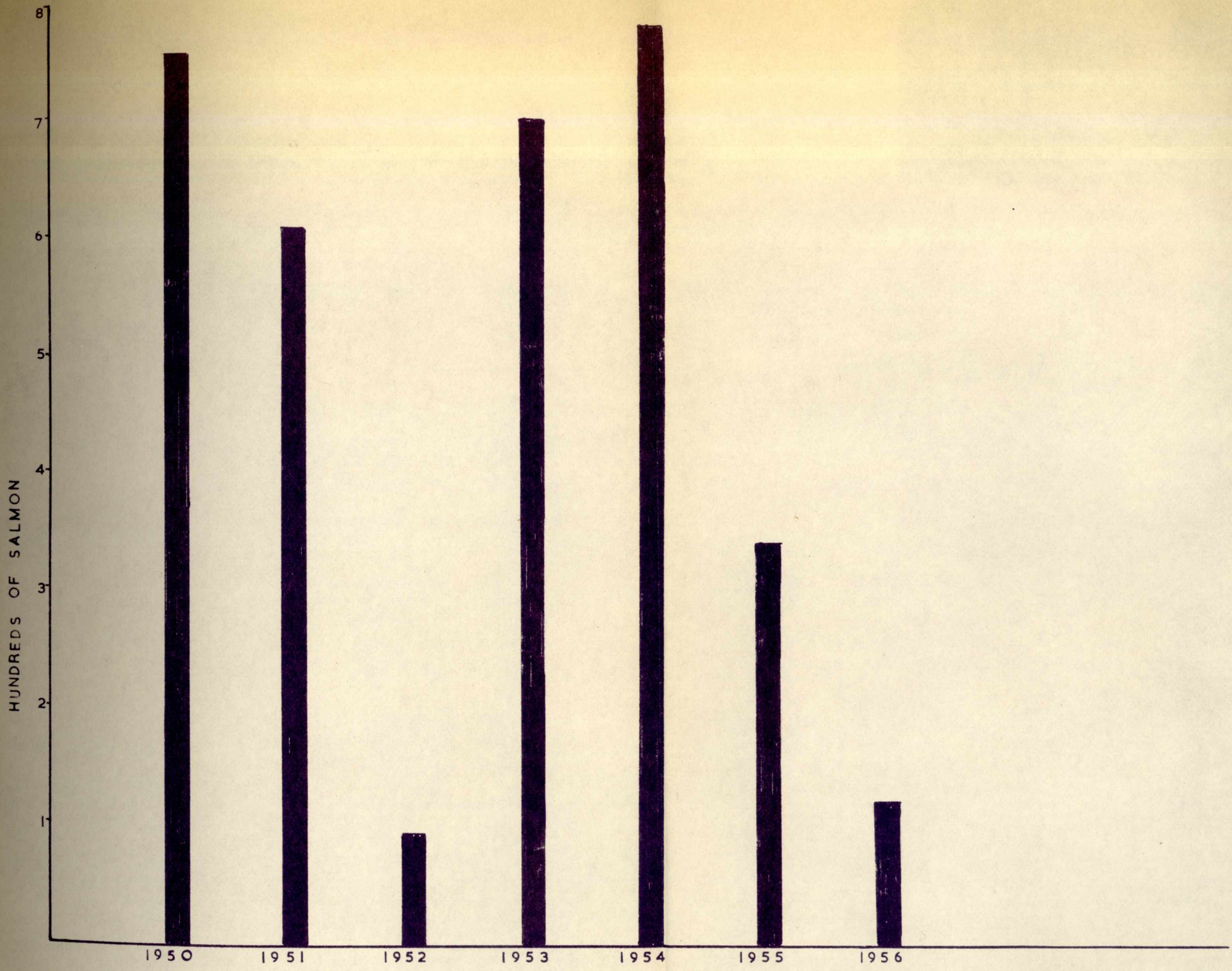
2. That consideration be given to an extension of the salmon angling season beyond the present October 15th closing date and/or provision allowing for the angling for "black salmon".

3. It is urgently advised that the impunity which has characterized any legal action against violators, in the past, be removed.

HE/mfm



Histogram showing salmon egg collection at RIVER PHILIP fishway and trap also numbers of salmon parr returned to the river.



Histogram showing adult salmon collection at the RIVER PHILIP trap — three miles above the head of tide

RIVER PHILIP SALMON SURVEY

River Philip Hatchery ponds and buildings

Hatchery buildings with entrance to premises to the left

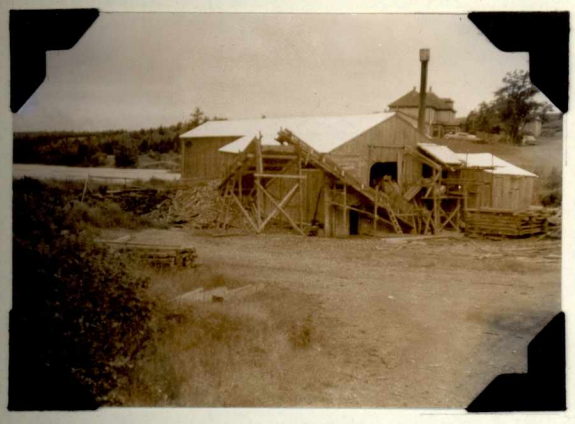
River Philip Hatchery residence

RIVER PHILIP FISHWAY

THREE MILES FROM THE HEAD OF TIDEWATER

1956

RIVER PHILIP SALMON SURVEY (TRIBUTARIES)



Polly Brook- headwaters

Polly brook - near the mouth

Davidson Brook

Little river

Little river

Davidson brook