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MARGAREE SALMON AND TROUT INVESTIGATION

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MARGAREE SALMON INVESTIGATION

1937

Report No. I. An investigation of the Brook Trout in the Lake Ainslie District with Special Reference to Trout Brook.

By J. M. Corkill

Introduction.

The Trout fishing in Trout Brook, Nova Scotia has enjoyed a continent wide reputation for many years. Since 1926 there have not been as many fish coming into the Brook and many of those in the brook have died infested with the copepod "Argulus canadense". Huntsman (1934) explained that there is a concentration of the trout of the Margaree system in the mouths of Trout and MacKay Brooks during the summer months. A number of small streams such as MacInnis Brook in the south-west corner of the lake would appear to be favorable for the fish but the greater number congregate in the mouths of the brooks mentioned.

For a long period of years a nationally known resident of the district held the fishing rights on Trout Brook. To protect these rights an area of land from the mouth of the brook to the Trout Brook bridge was fenced off. There was much poaching and legal fishing by the people of the district and many Canadians and Americans who had come long distances by train and coach to enjoy a few days' sport in these famous waters.

At this time it is said the trout were crowded into the brook tier upon tier so closely that the backs of the fish in the top layer were partly out of water and it was impossible to see the bottom of the brook.

The Cape Breton coal miners received high wages during the

war years of 1914-18 and many bought motor cars which were growing in popularity about this time. At this time the miners began making trips to Trout Brook . Also the fence about the brook was removed and fishing privileges opened to the public. The miners went to the brook and camped in their cars or in tents and spent most of the time during the week-end trip in the water fishing. In order to take home a large number of fish unsportsmanlike methods such as jigging were employed. These men made many trips during the season and their whole method is in sharp contrast to the earlier fishermen who came once each season from distant points of Canada and United States and stayed at the local hotel during their holiday.

There was a reduction in the number of fish in the brook between 1924-1926 and the decrease has continued. In 1934 the fishing was so poor that in 1935 a study of the factors influencing the migration, and controlling the number, infestation and death of the fish in it was made from June 12 to September 1 by the Biological Board of Canada.

The Lake Ainslie and Trout Brook Area.

Huntsman (1934) has described Lake Ainslie "as an irregularly shaped body of water, with a length of about twelve miles in a northwest-southeast direction, and covering an area of twenty-two square miles. It would seem to be extremely uniform in depth as well as being shallow. The greatest depths found when the water was low late in the summer have been 30 ft. (Leim) and 30½ ft. (Smith), while 34 ft. is the deepest that I have heard mentioned, and these were all near the Narrows toward the southern end of the lake. In general, except near the shore the depths range from 24 to 29 ft.

(Leim) or from 26 to 28 ft. (Smith).

The lake is about 190 ft. above the sea, and its water flows out at the northwest corner into the Southwest Margaree River. The latter descends with frequent rapids and a number of contributory brooks for a distance of 13 miles, where at Margaree Forks it joins the Northeast Margaree River, which has a 50% greater volume to form the main Margaree River. The latter reaches the coast at Margaree Harbour in a distance of 8 miles, and is tidal in its lower half. The Northeast Margaree river is largely spring fed, with only very small lakes, and is in summer as much as 5°F lower in temperature than the Southwest Margaree. There are between one and two dozen streams or brooks discharging into Lake Ainslie, but none are very large. The principal one seems to be Trout Brook, which empties into the east side of the lake, toward the south end. At the very south end empties MacKay's Brook. Being fed by springs of considerable size, both of these have cold water, which at the height of the summer may be as much as 15°F lower in temperature than the water of the lake. There is a very definite pool in Trout Brook just inside the mouth. There are shifting gravel or sand bars on the lake outside the mouths of these brooks."

with frequent gravel bars and pools, and

The early condition of Trout Brook.

In the "olden days" Trout Brook opened into the lake through a single moderately wide channel about seven feet in depth. This channel was situated in the centre of the wide area which now makes up the mouth of the Brook and opens by three channels. Large quantities of gravel were taken from the banks near the mouth of the brook, and

the central opening of the brook began to fill in, with the final result that the main opening of the brook was along the north shore of the lake through the former banks of the brook. Thus there were two channels through which the water flowed at the mouth of the brook.

To keep the central channel from filling with gravel, washed into the mouth of the brook by storms from the north-west a breakwater extending into the lake was built in 1923. The breakwater was made of large stones and brush which were soon washed away by the waves. Now the remains of the breakwater shift a little. This tends to close the channel and the area of shallow water where breakers are formed is increased. Formerly there was a north branch of the brook which opened into the lake through a deep straight channel. The fishing was better in the lake outside the northern branch than outside the larger southern outlet. Now the northern branch is shallow and its outlet is closed by a gravel bar for the greater part of the summer.

The southern branch which will be referred to as Trout Brook in the remainder of the paper was formerly narrower and deeper inside the mouth than it is now. Its banks were overhanging with a dense growth of alders. The deep water shaded by alders extended for 400-500 yards from the mouth of the brook to the first rapids in which there are relatively deep channels. For some miles inland the stream was a succession of rapids, and deep pools formed by natural dams of fallen logs and brush. Many of these pools were from four to six feet deep and with their overhanging banks formed excellent resting and hiding places for the trout ascending the brook and the young developing there.

The Present Conditions in Trout Brook.

The effect of the 1927 flood.

During the summer of 1927 the high waters due to the heavy rains changed the course and conditions of the brook. The southern bank at the mouth of the brook was washed away, making a third channel opening into the lake. The northern channel is broad and shallow separated from the narrower and deeper central channel by an island which increases in size as the water becomes more shallow during the summer.

With the lowering of the water level during the summer the northern channel is eight inches deep, and the central one about twelve inches in the middle of August. The brook water flows into the lake through the three channels in the spring but only through the central and northern ones in July and August.

During the flood many alders were washed from the banks and deposited with much sand and gravel inside the channels at the mouth of the Brook. The area of water inside the channels was enlarged and filled in so that the Brook is much shallower at this point. It is now necessary to go up stream 50 yard to reach water from 5-7 feet deep while formerly it was this deep at the mouth. Part of a point of land has been submerged since 1927 and the area of shallow water greatly increased. Many of the alders along the banks of the Brook below the first rapids were washed away and now the fish shun the deeper waters unprotected by brush and gather in the shallower, warmer water under the remaining alders.

In the upper reaches of the stream the current washed away many of the natural dams, and in other places where the logs held the

bank, was washed away. The water now flows down over shallow, unprotected rapids and it is dry where formerly there were deep pools protected by brush and overhanging banks. In this way the number of pools where the adult fish may safely rest during their spawning migration and where the young may develop has been reduced,

Physico-Chemical Conditions in Lake Ainslie.

Thermal Stratification.

About June 20th the water of the lake had warmed up to a temperature of from 16.0°C - 17.0°C. Further warming did not take place until June 26th when the temperature rose to 20.0°C. From this date until observations were discontinued at the first of September the water was above 20.0°C. At the bottom of the lake at a depth of from 26-28 feet the water temperature was very little different from that of the surface.

The deepest water of the lake is found at the narrows where the shores of the South Arm are mountainous. In this area of the lake which is partly protected by MacLean's Point from the prevailing north-westerly winds no thermal stratification was found. In the whole lake it may be concluded that there is no thermal stratification.

Comparison of the Temperature in the Main Area of the lake and in the South Arm on August 17.

Main Area.		South Arm;	Bottom	Temperature
Surface	23.0°C	MacLean's Pt.	18 ft.	21.8°C
2 ft.	22.0°C	Between Mac-Lean's Pt. and		
6	21.7°C	the Narrows.	21 ft.	21.4°C
23	21.3°C	The Narrows	24 ft.	21.6°C

Daily Variation.

The temperature of the water from the surface to the bottom varies from day to day with the weather conditions. During a period of relatively calm, warm weather from August 17 to August 21 the temperature of the surface water rose from its usual level of 20.0°C - 22.0°C to about 25.0°C. The bottom water maintained its temperature of from 21.0°C - 22.0°c. During this period there was some degree of thermal stratification but in the following cool, rainy weather the surface water temperature became much lower but there was little change in the temperature of the bottom water so that on August 29 the temperature was the same at both levels.

Dissolved Oxygen Content.

Throughout the period of the investigation the water from the surface to the bottom of the lake was well oxygenated. Since the waters of the lake are in circulation and are mixed by the action of the wind it would be expected that the dissolved oxygen content of the lake would approximate the saturation value.

Physico-Chemical Conditions in Trout Brook.

Daily Temperature Variations.

The water temperature in early June varied from 10.0°C - 12.0°C. During the greater part of the summer when the weather was warmer the water temperature was somewhat higher and varied from 15.0°C - 18.0°C. Each day the temperature of the Brook went up about 3.0°C, but during the night the flow of the Brook had replaced the water and in the morning the temperature was low again.

The temperature of the whole Brook was raised to a higher level

from August 15 to August 21 during a period of very warm weather. Although there is a diurnal variation of from 2.0°C - 3.0°C (from 20.0°C - 18.0°C) the morning temperature is not as low as that of the ordinary summer weather in which the diurnal variation is from 18.0°C - 15.0°C.

Temperature variations within the Brook.

Different temperatures are observed at various locations in the Brook. A warming of the Brook water takes place in the broad shallow pool inside the channels by which the water enters the lake.

		9.30 AM	9.00 PM
North side of Brook below rapids		13.3°C	15.4°C
Just opposite under alders	Bot. 3 ft.	13.0°C	15.8°C
	Surface	14.6°C	16.2°C
Centre of Pool inside channels	at Bot. 1'6"	13.4°C	17.2°C
mouth of Brook	Surface	13.6°C	

Thermal Conditions at the Mouth of Trout Brook.

Description of the channels.

The water flows into the lake through three channels, which open from the shallow, expanded pool at the mouth of the Brook. During the spring and fall freshets water enters the lake through the shallow southern channel. In the summer little or no water passes through this channel and the water in it and the shallow sluggish part of the pool which it would tend to drain becomes warm.

The centre channel is separated from that on the south and north by gravel islands. In the spring the channel is wide with an expanse of shallow water on each side and a central channel from 3 -4 feet deep. The lower water level of the late summer reduces the channel to a width of 7 feet and a depth of about

1 ft 8 ins.

A large volume of water flows through this channel into the lake and it is the deepest passageway by which the fish may enter the Brook.

At flood time the northern channel is very broad but during the summer it is narrow and shallow. The greatest depth at this time being about 8 inches. This channel perhaps carries the greatest volume of water into the lake and in times of flood a distinct current is seen flowing out into the lake.

The effect of an offshore wind on thermal conditions.

When the winds are blowing offshore to the mouth of the Brook the current of the cold Brook water may be traced for some distance into the lake.

Date		Depth	Temp.
July 24 4.30 P.M.	Pool at Trout Brook Bridge	5 ft. Surf.	15.8°C 15.8°C.
	Brook end of the Centre Channel	1 ft. 8in. Surf.	16.0°C. 16.2°C.
	Lake end of the Centre Channel	2 ft. 3 in Surf.	16.6°C. 16.8°C.
	In the Lake 20 ft. from the island (Centre Channel)	2 ft. Surf.	16.9°C. 19.9°C.
	In the Lake 40 ft. from the island (Centre Channel)	3 ft.8 in. Surf.	21.7°C. 21.9°C.
	Lake	26 ft. Surf	21.6°C. 21.8°C.

The effect of an onshore wind on the thermal conditions.

The current of the Brook water can not be traced very far into the lake when the wind is blowing on the shore at the mouth of Trout Brook. The Brook water turns quite abruptly after passing through the channels and flows as a narrow stream in a northerly direction along the eastern shore of the lake.

The morning of July 25 was calm and the current of the cool brook water could be traced along the bottom for some distance into the lake. A strong north-west wind was blowing in the afternoon. The waves on the lake broke with a great mixing effect in the shallow water near the mouth of the brook. The current of brook water could not be traced into the lake very far. Onshore winds do not blow the lake water through the channels and cause a warming of the water in the pool at the mouth of the brook.

11 A.M.	Depth	Temp.	4.30 P.M.	Depth	Temp.
[. side of Brook	2 ft.	16.3°C.	N. side of Brook	2 ft.	18.0°C.
elow rapids	Surf.	16.4	below rapids	Surf.	18.2
rook end of	1 ft. 6 in	16.2°C.	Pool N. side of	4 ft.	19.0°C.
entre Channel	Surf.	16.4	brook at bridge	Surf.	19.3
ake end of Centre	2 ft.	16.3°C.	Brook end of	1 ft. 8 in.	19.2°C.
hannel	Surf.	18.5	Centre channel	Surf.	19.3
entre of Centre channel	2 ft.	17.0°C.	Lake end of Centre Channel	2 ft.	19.5°C.
6ft. out in lake rom Island	Surface	21.8		Surf.	22.3
entre of Centre Channel	3 ft. 6 in.	18.5°C.	Centre of Centre Channel	1 ft. 8 in.	21.2°C.
ft. out in lake rom Island	Surface	22.8	15 ft. out in lake from Island	Surf.	20.8
ake	24 ft.	21.6°C.	Centre of North Channel	2 ft.	23.9°C.
	Surf.	22.8	15 ft. out in lake	Surf.	23.9

The effect of the on shore wind on the distribution of temperature at the mouth of the brook is apparent in about fifteen minutes after the wind begins to blow. The morning of August 10 was calm until 10.45 A.M. and the cool brook stream could be traced some distance into the lake but at 11.00 A.M. the effect of the cool water was lost at any distance in the lake from the island.

Aug. 10 9 A.M.	Depth	Temp.
Creek end of Centre Channel	1ft.6in.	13.4°C.
	Surf.	13.6
Lake end of Centre Channel	2 ft.	13.6°C.
	Surf.	14.0
Centre of Centre Channel, 12 ft. out in lake from island	1 ft.	15.7°C.
	Surf.	19.8
Centre of Centre Channel 20 ft out in lake from island	1 ft.	17.3°C.
	Surf.	20.8
Centre of Centre Channel 25 ft out in lake from isld.	3 ft.	16.0°C.
Centre of Centre Channel 80 ft out in lake from isld.	5 ft.	18.0°C.
	Surf.	21.4
To south of Centre Channel 80 ft out in lake from isld.	5 ft.	20.6°C.
	Surf.	21.6
Lake	24 ft.	20.0°C.
	Surf.	20.9

Aug. 10, 11.00A.M.	Depth	Temp.
Centre of Centre Channel 60 ft. out in lake from Island	3 ft.	20.6°C.
Creek end of Centre Channel	2 ft.	15.0°C.
	Surf.	15.0°C.

The Brook Trout in the Lake Ainslie and Trout Brook Area.

The seasonal occurrence of the trout in this area.

Trout are caught during the winter, through the ice near the mouths of the small streams flowing into Lake Ainslie. Shortly after the spring break-up it is said that a large number of fish are taken on the north shore of the lake near the mouth of Hay River. Following this the fish appear at the South-west Margaree and soon after the fishing is good at the mouths of the larger tributaries of the lake.

The 1935 fishing season at Trout Brook.

The fishing season was very late in starting at Trout Brook in 1935. The first fish were caught in the lake near the north channel of the Brook on June 22. The fish were fairly large and were dark in color. Two of the fish were 29 cms. long and the third 35 cms. and they had been feeding on sticklebacks and insects. At this time the trout were generally distributed in the lake as indicated by a man who caught twenty-two fish in three days while angling at the mouths of the various brooks from Scotsville on the Margaree to Trout Brook.

On the evening of June 27 one large trout entered the brook but no other fish were seen between June 22 and 29. The local fishermen say that the trout used to come into Trout Brook about the first of June. But after the building of the breakwater in 1923 it has become later so that in 1935 it was not until June 29. The first fish to enter the brook were small females. The larger

fish and the males did not enter the brook until July 4. These fish were infested with the parasitic copepod "Argulus canadense". The stomachs and intestines of all the fish caught near the mouth of the brook during the rest of the fishing season were empty and contracted.

After entering the brook the trout remained under the protection of the alders over the deep pools between the rapids and the lake. The fish remained in these pools for a variable length of time and then migrated up the brook stopping at each deep, shaded pool.

By July 12 the fish had migrated above the first rapids and between this date and July 24 there were only a few small trout in the lower part of the brook. After the rains on July 24 and 30 a number of large trout came into the brook.

The effect of rainfall on the number of trout in the brook.

The fishermen say that there are more fish in the brook and that the fishing in a season of heavy rainfall than in a dry season. In the summer of 1927 the rainfall was very heavy. The current of brook water could be traced for some distance in the lake and there was excellent fishing in the brook and along this spathe.

In 1935 it rained from August 22 to August 25 and the level of Trout Brook went up eleven inches. The water was very dark with silt and humic acids and its current of water could be traced for some distance in the lake.

Trout could be caught in and along the current of fast water entering the lake from August 22 to August 25. On August 27 a number of trout had come into the brook. Each day more fish came in but the largest migration took place on August 29. The condition of high water levels in the Margaree system is a factor with which large numbers and another migration of trout into the Trout Brook is correlated.

The effect of a current of cool water on the migration of trout into the brook.

When the channels at the mouth of the brook have become shallow by filling in with sand and gravel it has become customary to deepen them by dredging in the late summer. It is said that a number of fish come into the brook after the deepening of the channel. In 1935 the centre channel, which was the deepest at the mouth of t e brook was only 1 ft. 8 ins. in depth on August 14. On this and the following day two men worked with a horse drawn scraper and made the channel two feet deep. Each morning after some work had been done trout had come into the brook during the night.

Observations made on August 11 show that temperature is a factor playing a part in the movement of the trout from the lake into the brook. This morning was very calm and trout were observed in a pool three feet deep on the lake side of the sand bar at the mouth of the brook. In this pool the water temperature was 16.0°C. This observation shows that trout may choose water of 16.0°C. when they can find it rather than the lake water of 20.0°C. and under the influence of certain other factors will follow it up into the brook itself.

The general conditions under which the trout enter the brook are when the temperature of the lake is above 18.0°C. and when the cool water of the brook may be traced for some distance into the lake or when the water level is high as after a rain. The cool brook water is traced farthest into the lake during calm weather or when there is an offshore wind. But this influence of calm weather may be regarded as a minor expression of the factor which brings the trout into the brook in periods of high water.

The reactions of the trout in the brook.

When the trout entered the brook they always went past the shallower pools near the mouth to one six feet deep under the bridge about one hundred yards farther on. The school took up a wedge-shaped position where the current strength was most favorable. Apparently the strongest current was chosen and so there was some difference in their school's location in the pool as the strength and direction of the current varied from day to day.

The position of the school was also changed when the direct rays of the rising sun hit their location. The fish moved back from places of more favorable current conditions to a more shaded place under the bridge.

These observations show that the trout migration into the brook and within the brook itself depend on a complexity of factors including water level, current, temperature and light concentration.

The Variations in the Markings of the fish.

The first trout which were caught in the lake were moderately dark in color with a much mottled back. The red spots on the side were not bright and their fins were not colored. The flesh of these fish was a light yellow in color.

The first fish that came into the brook looked much like those described above. Also there were trout which were very light in color with a silver sheen over their whole body and their backs were not mottled but were more of a uniform grey color. The spots on the sides were pale pink and there was little color in the fins. As these fish migrated up the brook during the summer they became darker in color. The silver sheen became less conspicuous and almost disappeared. The spots on the sides of the trout became a bright red and the pectoral fins were orange colored at the base and black at the end.

The trout in the lake or other parts of the Margaree system were changing their color similarly to those in the brook. The trout which came into the brook until the middle of August were progressively darker in color and were losing their silver sheen. The fins became orange colored at their base and the spots on their sides were a brighter red. The fish which came into the brook after the heavy rain at the end of August were silvery with pale markings similar to the first trout to enter the brook.

Somewhat smaller fish were caught in the deep pools above the rapids before the migrating fish had reached these areas.

These smaller trout were black on the back and sides, with bright red spots, no silvery sheen, and a deep orange color at the base of the pectoral and pelvic fins.

In the other small brooks of the district only the small highly colored trout were found. Some of these had a rather larger, softer abdominal region than the other fish in the same pool. One large trout of this variety was caught on July 2 in Trout Brook. This fish was very dark with orange markings on the fins and red spots on the sides. The rather sac-like abdominal region gave its body a different contour line from that of the other trout.

It has not been possible to study these differences in the color and contour of the trout body as responses to environmental or physiological changes to the advance of the spawning season or as specific characters of different varieties of this species.

The occurrence of Argulus.

As long as fifty or sixty years ago some of the local people can remember that some of the trout coming into Trout Brook were lousy. At that time too some of the fish were found dead but during the past several years especially in 1934 large numbers of trout died after entering the brook. All of the dead trout showed marks of having been infested with parasitic copepods and it was decided to investigate the part played by the parasite in killing the fish.

Conditions in 1935.

The trout were not infested with Argulus while they were in Lake Ainslie up until June 28. There were copepods on all the trout which entered the brook on June 29.

It is said that the trout came up the Margaree River from the ocean into Lake Ainslie. After entering the lake they proceed along the western shore to the south end and then circle back along the eastern shore to Trout Brook. Although there is no evidence of the route of movement it is interesting that a trout with a number of Arguli on it was caught in the southern end of Head Lake on June 21. The infested fish appeared one week earlier at the southern end of the lake than at Trout Brook. During the season several reports of lousy fish having been taken along the Margaree were received. If the fish come up the River the infestation takes place there, and in the lake before the fish are concentrated in Trout Brook. Doubtlessly the greater part of the infestation takes place in the lake.

A series of seine hauls around Trout Brook and in the south-west part of Lake Ainslie near MacInnes Brook showed the Argulus was general in distribution and infested the sticklebacks, suckers and less active species of minnows.

While the trout were not infested with Argulus until June 29 many lice were found June 24 on the head and tail of a dying sucker which was 13½ inches long. This fish was an unspawned female. The anus was swollen and enlarged and on the side of the fish there was a yellowish growth of saprolegnia. Several suckers which had been dead for some time were washed upon the lake shore between June 24 and July 1. No Arguli were found on these fish.

Course of Argulus infestation and death of the trout.

The argulus which infested nearly all of the first run of trout were concentrated at the base of various fins, but especially the caudal. When the argulus attacks another region such as the fish's ventral surface a red spot develops something like the black-fly bite on a human. If there are a number of lice in such a region the area becomes red looking like the spot of an arm a child has sucked for some time. The arguli may also attack the fish on the head or the snout and around the gills or eyes. In the inflamed areas saprolegnia develops. It grows as a white mucous growth on the fins or body. The growth of saprolegnia destroys the tissue and parts of the fins will disappear. The thin expanded part of the tail fin may be destroyed to the base of the caudal peduncle. The condition of the fish gradually becomes worse resulting finally in its death. The exact cause of the death was not ascertained. It is likely that the arguli and saprolegnia are secondary factors.

The first dead fish was seen floating down Trout Brook on July 5. In one case when a fish was about to die it began to swim very quickly here and there in the pool. Finally it swam upon some rocks in the shallow water and was completely exhausted. In other cases the fish came to the surface and did not seem to be able to go down again. If these fish were chased they went with a great deal of effort to the bottom but were unalble to stay there and in a short time were at the surface evidently dead.

The trout continued to die until July 18 over a period of thirteen days. The mortality rate was highest between July 5 and July 12. The dead fish were all very thin. Post mortems showed that their alimentary tract was empty. The stomach walls were

contracted and hard. Inside the stomach there was a thick mucous material. The intestine was often soft and contained a reddish fluid. The bile sac was greatly distended. There were many tapeworms in the pyloric caecae and that portion of the intestine.

A trout which had just come into the brook was caught on July 30. The tail of this fish had been partially destroyed by the action of arguli and saprolegnia. However the lesion had healed and the remaining tissue looked quite healthy although the fin was shorter than usual. The loss of sheen on this fish indicated that it had been in the upper part of the river system for sometime. Trout colored similarly were caught in the pools farther up Trout Brook. This shows that all the infested fish do not die but the general condition of the fish may improve and the lesions caused by the argulus and saprolegnia will heal.

Relation of the condition of the fish to infestation.

A number of trout came into the brook after the rain on July 30. Three of these fish were caught and one of them was infested with lice, one showed no evidence of ever having been attacked while the lesions had completely healed as described above. The fish with the lice could not completely close its mouth due to a deformity of the jaws. It would be very difficult for this fish to feed and it was thin and in poor condition.

On August 30 the water had become quite clear after the heavy rains. While standing on the bridge the physical condition of the fish below could be observed. Some of the fish were in good condition having wide backs and stout caudal peduncles. Other trout were

were thin with narrow backs and their heads appeared to be long in proportion to the total length. Three of the fish were caught and one very thin trout had four lice on it while another which was moderately thin had one and a fat chubby fish had no lice at all. Fish which are not in the best physical condition are subject to attacks of the argulus.

One of the older fishermen of the neighborhood noticed the difference in the condition of the trout about sixty years ago. Among the large number of fish that came into the brook in those days they noticed thin fish with big heads and nicknamed them "Slinks". They also noticed that the slinks were not active fish and often had lice on their bodies. The condition of lice on the fish is not new but the high mortality in the smaller number of fish in the first run is the startling feature.

Another of the local fishermen says that up until 1930 the early running fish were predominately chubby and fat but now he classifies them all as slinks. On June 29, in 1935 the trout at the Margaree Forks were fatter and more chubby than those which came into Trout Brook on that date. While differences in the fatness of the fish and the relative length of the head to the total length may be seen when a number of fish in the water are looked at from above there is no evidence of them in the fish taken. The ratio of the head length to the total length of a fish which was noticeably a slink was 1-4.18. In most of the other fish the ratio was from 1-4.5 to 1-4.7. In an infested fish the ratio was 1-4.2 but in the first dead fish it was 1-4.6.

Changes in the Alimentary tract.

The stomachs of the fish coming into the brook were contracted and the muscular walls were quite hard. The lumen was filled with a yellowish mucous material. Later the inner surface of the stomach became quite dry. The intestines were usually empty. Sometimes there were some remains in the lower end and usually the rest of the tube contained a reddish fluid. In the caecal region there were many tapeworms and often much mucous material.

In about three weeks the stomach walls began to become soft and relaxed and mucous again appeared on the inner surface. The number of tapeworms present was smaller. There was some change in the life cycle of the worms which were contracted and in some cases were small oval balls in the intestine. The worms were also nearer the posterior end of the tract.

The relaxation of the stomachs has continued and trout which entered the brook about the first of July are eating again on July 30. During the month some physiological adaptation has taken place so that the trout are feeding again and the number of tapeworms is becoming smaller. These fish, which were inactive when they entered the brook have become active and eagerly rise to the fly.

Discussion.

History tells of the many thousands of fish which entered Trout Brook in June. Many of these were taken and cured for family consumption later. Even sixty years ago, a number of thin fish would be seen. The heads of thin fish appeared to be larger in proportion to their bodies than those of the other trout in the brook. These trout, known as "slinks", were inactive, often infested with lice, and many died.

The presence of "lousy" trout and their death in Trout Brook is not of recent origin but the presence of such a small number of fish is new and the number has become smaller each year since 1926. It was shown during the summer of 1935 that the number of trout in the brook depended on the flow off from the land. A flood condition in the Margaree system and Trout Brook was correlated with the appearance of a large number of trout in the Brook.

The early condition of the brooks mouth has been changed by building an unsubstantial breakwater in 1933 and by the summer floods of 1927. The breakwater was built to protect the single opening of the brook's mouth from the filling in action of the north-west wind. The pile of stones which remains creates a large area of shallow water in which there are heavy breakers on the lake side of the brook's mouth.

The floods changed the course of the brook and deposited silt in the pool at its mouth. Formerly this pool was about six feet deep and now it is only about three feet in depth. The floods also made three channels by which the brook water may enter the lake. During the summer when the water level is low the deepest channel is only one foot, eight inches in depth while the others are only about eight inches.

The brook water flows straight into the lake when the weather is calm or when an offshore wind is blowing. The current of cold brook water may be traced some distance in the lake. When an onshore wind is blowing the brook water entering the lake tends to flow northward along the eastern shore and its influence can not be traced out in the lake.

Repeated examinations showed that the water was well oxygenated from the surface to the bottom of the lake and there was no thermal stratificarion. The temperature of the lake water was above 20.0°C. during July and August. This temperature is above the optimum quoted for Brook Trout and on one occasion trout were seen lying near the bottom of the lake in the stream of cold brook water. Trout tend to enter the brook when the influence of the cold water of the brook may be traced for some distance out in the lake. A greater factor influencing the migration is a condition of flood water in the brook.

The infestation of the fish with arguli commenced suddenly. Trout without lice were caught on June 22 in the lake near Trout Brook. All the fish entering the brook on June 29 were infested. It was reported that at Head Lake the trout were infested on June 22. It has been pointed out that in migrating

from Scotsville the trout follow the west shore of Lake Ainslie to Head Lake at the southern end and then along the southern shore to Trout Brook. It may have been that the migrating fish reached Head Lake on June 22 and Trout Brook on the 29th and they had been infested quite some time previous to these dates.

The arguli are generally distributed in the lake and infest sticklebacks and suckers which die in some cases. This would tend to indicate that the arguli infest the more sluggish fish. The trout entering the brook after the rain of August 22 showed that it was the thinner fish which were infested. These thin trout were not active but remained almost stationary in a place of suitable light and current conditions. The infestation of all the trout entering the brook in the first run in June may be correlated with the fact that nearly all the fish were inactive and not in the best condition.

The argulus was not the fatal agent, but they caused abrasions in which saprolegnia developed and often brought about the loss of an appendage which commonly was the caudal fin. The infestation was not always fatal and often the fish would lose the lice and the tail fin would heal. At the same time the general condition of the fish improved. The trout became active and food was found in the stomach whose muscular walls had relaxed and in which digestive juices were being secreted again. The tapeworm infestation was also clearing up.

The season's work has shown that the trout should leave the warming lake water and enter the cool brooks as early as possible. To induce the fish to do this the mouths of the brooks should be experimentally changed until the optimum conditions of current and temperature are found. At Trout Brook a single channel at least six feet in depth should be made to carry the water into the lake. The deep channel should extend into the lake and upstream in the brook to water of this depth.

MARGAREE SALMON INVESTIGATION

1937

Report No. II. Setting out of Drift Bottles;

By P. F. Elson.

1. June 28.

Drift bottles were set out on June 28 from 4.00 to 6.00 p.m. From the salmon fleet of Angus McKinnon a line was run approximately NW. for 40 minutes. Beginning after the lapse of 5 minutes from leaving the head of the net two bottles were thrown out every 5 minutes. The first two bottles were numbered 151 and 152. Those with odd numbers had a short wired drag about 5 feet from the bottle. Those with even numbers had a drag attached to 5 fathoms of cod line.

At bottles 165 and 166 (4.40 p.m.) the course was turned to NE. and kept for 10 minutes. Midway on this route 167 and 168 were thrown over. At 4.50 p.m. the course was changed to head towards AuCoin's northern fleet. Bottles 169 and 170 were thrown out here, and a pair every 5 minutes on this line until 183 and 184 were out. From this point it was a 10 mimute run along the same course to the head of the net.

The speed of the boat was about 6 miles per hour.

2. July 12.

A trip to set out drift bottles was made on July 12 from about 11.30 a.m. till 1.30 p.m. While it had been planned to set out this second lot of bottles about the middle of salmon tagging operations actually nearly 200 salmon had been tagged

by this date. In the previous week there had been a larger than usual run of fish, and windy weather prevented the setting out of bottles.

The course followed was similar to that taken on June 28. From the head of Angus McKinnon's net a line was run NW. The first bottles were thrown out at 11.49 - 5 minutes from the head of the net. These were bottles 187 and 188. As before the odd numbered bottles had a short drag and the even numbers a long drag (5 fathoms). At 12.24 bottles 201 and 202 were thrown out and the course turned to head towards a distant point of land (Cape Rouge?), the new course being approximately parallel to the shore line. Before making the turn it was observed that the boat had drifted somewhat to the northeast, due to current and also that a wind from the north necessitated some manoeuvring of the boat in this direction.

The course was held parallel to the shore for 10 minutes. Midway bottle 203 was thrown over. At 12.34 the course was again turned to head towards shore. Bottles 204 and 205 were thrown out. For the first 10 minutes on this run the course was towards Boat Harbour. When bottles 208 and 209 were thrown over the course was changed to head towards AuCoin's headland, and held so. Bottles 218 and 219 were thrown out at 1.09 p.m. The head of AuCoin's net was reached at 1.19 p.m.

The speed of the boat was about 6 miles per hour.

3. July 29

Drift bottles were set out the week after salmon tagging operations ceased on July 24. Fresh winds prevented the bottles being put out on the 26th as had been planned. On the morning of the 29th a large motorboat was procured and the bottles set out following a scheme similar to that used previously. A fresh wind was blowing from the north at the time. The boat used had a speed of about 8 miles per hour. However a head wind going out seemed to slow the boat somewhat while a fair wind coming in may have increased the rate of travel. Bottles were thrown over every four minutes, or about once in every half mile.

The course ran on a line NW from the head of Angus McKinnon's net, at 9.36 a.m. At 10.00 a.m. the first set of bottles M220 and M221 were thrown over. At 10.28 bottles M234 and M235 were thrown over and the course changed to ENE. Bottle M236 was thrown out at 10.32, and bottles M237, M238 at 10.36. The course was changed to ESE, leading for AuCoin's headland. The boat was stopped till 10.46 for refuelling, then the course continued ESE. Bottles M239, M240 were thrown out at 10.50, and a pair every 4 minutes thereafter till 11.10 when M249 and M250 were cast out. At 11.13 M251 and M252 were thrown out. The head of AuCoin's northern fleet was reached at 11.15.

MARGAREE SALMON INVESTIGATION

1937

Report No. III Weather Conditions at Margaree Harbour, May to September, 1937.

By P. F. Elson

Weather observations for the Margaree Salmon Investigation were carried on at Margaree Harbour much as in 1935 and 1936.

Air temperature and sky observations were made at the mouth of the Duck Cove Brook. Observations on the force of wind were also made here. Except when there was no wind at all the wind on the outer coast would be about 1 point stronger than actually indicated in the tables. The wind seemed to lose some of its force in being turned down into the river valley. The rain gauge was situated on an open hillside at the Duck Cove laboratory. It was raised 3 feet off the ground on a post.

Records were kept from May 20 to September 9.

The total rainfall for this period amounted to 6.5 inches. About one half of this fell between the middle of May and the end of June. August and September were rather dry, the rains being in the nature of light and rather sparse showers. From the middle of August to the fourth of September the Duck Cove Brook was so low that water actually flowed in the brook only about 2 hours a day, except on days immediately after a shower. In 1936 this brook flowed steadily all summer.

Most of the rainfalls were not sufficiently heavy to have much effect on the height of the river. The S. W. branches however showed a slight rise on two or three occasions. Rainstorms seemed to pass frequently along the coast but not to extend inland far enough to affect the rivers. Only on the 8th of September did the rain seem to be heavy enough inland to cause a considerable rise in the N. E. branch. This lack of heavy rains and consequent lack of freshets on the river was a noticeable feature.

Temperature conditions were on the whole quite moderate until the middle of July, varying between 12 C°and 24°C. roughly. There was a rise in the general level within the above range, beginning about May 30. From July 20 to August 13 noon temperatures average somewhat higher - about 23°C. to 30°C., with morning and evening temperatures falling only to around 20°C. High temperatures and scanty rainfall resulted in the last portion of the summer being rather dry so that while the level of the main river did not drop much small brooks near the harbour dried up leaving only a few pools, and many small fish in these died. Temperature fell to a distinctly lower level about the 4th or 5th of September.

The direction of the wind was recorded on a special instrument for that purpose and is discussed by Mr. Rogers. There were no heavy gales during the summer except on August 1st. On this day a violent windstorm from the east swept the district.

On June 21, July 10, 14, 28, 29, Aug. 6, 13, 17-18, and 22nd, the winds were quite brisk, sufficiently so to prevent local fishermen from venturing out. From September 4 to 9 a rather heavy wind blew quite steadily, principally from a westerly direction.

Margaree Harbour

Weather Conditions for May (16-31), 1937.

Day	WIND 7-8 a.m. F	D	1-2 p.m. F	D	7-8 p.m. F	D	SKY 7-8 a.m.	1-2 p.m.	7-8 p.m.	AIR TEMPERATURES 7-8 a.m.	1-2 p.m.	7-8 p.m.	RAIN 7-8 a.m.	7-8 p.m.	REMARKS
16															Cloudy in a.m. Rained in afternoon
17															Cloudy with rain all day
18															Intermittent rain all day
19												11.8			Fine
20	3	SSE	3	SSE	1	SSE	10	10	10	13.3	14.8	11.8		.08	
21	0						9	9	9	12.8	12.1	11.1	.125		
22										10	12.9	7.7			
23					0		10	4	6	9.7	10.9	15			Misty
24	3	SE	3	SSW	3	S	6	4	6	18	20	15.2			
25	0		2	SSE	2	SSE	9	9	9	12.7	10	7.1	.13		
26	3		3		0		7	7	7	12.6	11.6	9	.001		
27	2		2		0		6	6	8	12.8	14.8	11.2			
28	1		1		2		10	10	10	11	12.8	9	.15	.20	
29	1		1		1		9	0	0	9.8	11.0	8.5			
30	1		2		2		0	0	0	18.3	23	16.1			
31	2		1		2		0	9	8	17.8	21.8	25.7			

MARGAREE HARBOUR

Weather Conditions for June (1-15), 1937.

Day	WIND 7-8 a.m. F	WIND 7-8 a.m. D	WIND 1-2 p.m. F	WIND 1-2 p.m. D	WIND 7-8 p.m. F	WIND 7-8 p.m. D	SKY 7-8 a.m.	SKY 1-2 p.m.	SKY 7-8 p.m.	AIR TEMPERATURES 7-8 a.m.	AIR TEMPERATURES 1-2 p.m.	AIR TEMPERATURES 7-8 p.m.	RAIN 7-8 a.m.	RAIN 7-8 p.m.	Remarks
1	0		0		1		8	0	10	27.1	31	16.2	.05		
2	0		1		1		10	0	1	11.8	22.1	4.7		.13	
3	1		0		0		9	4	5	11.6	18	14.1			
4	3		3		2		9	9	10	11.9	15	14.6	.18	.185	
5	1		2		1		10	6	10	10.6	14.9	11.2	.044		
6	0		-		0		10	-	10	10.5	-	9.4	.432		
7	0		1		0		10	9	10	13.3	13.5	10.4	.01		
8	1		-		0		0	-	3	18.0	23.8	23.8			
9	1		1		0		10	10	10	18.5	20.1	21.4		.22	
10	1		1		1		1	5	10	20.1	22.7	14.6		.13	
11	1		1		1		10	10	6	11.0	13.8	9.8	.09		
12	2		2		1		0	3	5	13.4	15.0	10.2			
13	1		1		1		0	3	5	13.8	17.7	12.8			
14	3		2		2		5	1	8	19.6	24.3	12.5		.07	
15	1		1		1		10	10	10	16.8	17.8	14.8	.26		

Margaree Harbour

Weather Conditions for June(16-30), 1937.

ay	WIND 7-8 a.m. F	D	1-2 p.m. F	D	7-8 p.m. F	D	SKY 7-8 a.m.	1-2 p.m.	7-8 p.m.	AIR TEMPERATURES 7-8 a.m.	1-2 p.m.	7-8 p.m.	RAIN 7-8 a.m.	7-8 p.m.	REMARKS
5	1		1		1		1	0	2	14.9	17.8	13.7			
7	2		1		1		7	0	6	14.9	21.8	13.8		.07	
8	1		1		1		9	10	10	14.4	18.4	11.8	.43		
9	1		2		1		10	10	10	11.8	12.6	9.8	.14		
0	1		1		1		10	0	5	11.7	15.0	17.6			
.	2		4		2		1	3	8	14.6	19.5	15.7			
:	2		4		4		10	10	10	15.7	18.7	18.7			
3	1		2		1		8	10	10	18.5	16.8	14.1			
-	1		2		4		9	9	10	15.5	16.8	13.1			
5	2		1		0		7	8	8	13.9	19.3	19.3			
6	0		1		0		10	5	3	14.6	18.6	19.9			
7	0		1		2		0	10	8	18.9	19.0	19.1		.036	
8	3		3		2		8	8	7	20.1	22.1	22.5			
9	0		3		3		10	9	9	21.5	22.4	19.7	.03		
0	3		1		5		10	10	10	19.1	18.6	18.4	.03	.17	

Margaree Harbour

Weather Conditions for July (1-15), 1937.

Day	WIND 7-8 a.m. F	WIND 7-8 a.m. D	WIND 1-2 p.m. F	WIND 1-2 p.m. D	SKY 7-8 a.m.	SKY 1-2 p.m.	SKY 7-8 p.m.	AIR TEMPERATURES 7-8 a.m.	AIR TEMPERATURES 1-2 p.m.	AIR TEMPERATURES 7-8 p.m.	RAIN 7-8 a.m.	RAIN 7-8 p.m.	REMARKS
1	1		3	1	10	3	8	17.7	20.2	21			
2	2		2	0	6	0	5	18.2	26	20.6			
3	1		0	3	0	0	4	18.5	24.1	21.1			
4	1		1	1	0	1	4	21.8	28.5	19.3			
5	recorded on nemograph				1	2	2	19.8	30.8	22.5		.02	
6	"				10	10	10	20.0	19.4	18.6		.53	
7	"				9	3	3	16.4	23.5	19.4	.64		
8	"				9	7	9	18.2	23.0	19.5			
9	2		2	2	0	1	5	20.3	23.2	16.4			
10	3		4	3	2	0	1	19.6	22.9	14.0			
11	3		-	2	3	-	1	20.1	-	11.3			
12	2		2	1	1	1	1	18.7	22.1	17.6			
13	2		2	1	3	6	9	14.7	19.2	17.6			
14	1		4	4	6	1	1	15.8	19.0	17.6			
15	2		2	2	0	1	8	17.0	24.0	20.0			

Margaree Harbour

Weather Conditions for July (16-31), 1937.

Day	WIND 7-8 a.m. F	WIND 7-8 a.m. D	WIND 1-2 p.m. F	WIND 1-2 p.m. D	WIND 7-8 p.m. F	WIND 7-8 p.m. D	SKY 7-8 a.m.	SKY 1-2 p.m.	SKY 7-8 p.m.	AIR TEMPERATURES 7-8 a.m.	AIR TEMPERATURES 1-2 p.m.	AIR TEMPERATURES 7-8 p.m.	RAIN 7-8 a.m.	RAIN 7-8 p.m.	REMARKS
16	1		2		1		10	10	10	16.0	16.7	17.5	.02	.05	
17	1		1		0		6	2	6	17.0	22.9	18.3		.16	
18	0		1		0		10	10	10	16.0	19.6	22.1		.01	Heavy mist in afternoon
19	3		4		4		2	4	3	17.1	26.0	19.2			
20	1		2		1		0	1	3	17.1	26.4	22.4			
21	1		1		1		0	1	1	24.2	29.0	21.1			
22	2		1		1		1	1	3	18.9	22.1	16.1			
23	1		1		1		0	0	0	18.2	26.3	19.3			
24	1		2		1		3	6	6	25.7	27.9	22.2			
25	1		1		1		8	7	4	23.3	23.5	22.7			
26	1		2		1		3	1	3	21.3	30.2	22.3			
27	3		4		1		4	6	10	25.8	33.4	26.3			
28	1		4		1		8	9	8	21.7	21.9	16.1	.225		
29	2		4		5		9	3	1	19.0	24.4	18.2			
30	2		3		1		3	4	9	16.1	24.4	16.8			
31	1		1		-		6	3	-	17.0	21.9				

Margaree Harbour

Weather Conditions for August (1-15), 1937

Day	WIND 7-8 a.m. F	WIND 1-2 p.m. F	WIND 1-2 p.m. D	WIND 7-8 a.m. F	WIND 7-8 a.m. D	SKY 7-8 a.m.	SKY 1-2 p.m.	SKY 7-8 p.m.	AIR TEMPERATURES 7-8 a.m.	AIR TEMPERATURES 1-2 p.m.	AIR TEMPERATURES 7-8 a.m.	RAIN 7-8 a.m.	RAIN 7-8 p.m.	REMARKS
1														Very heavy wind.
2				2				8			19.4	.052		
3	1	2			9	8			19.0	18.8		.048		
4	3	1		2	10	7		8	16.3	21.8	15.1	.060		
5	2	1		2	7	6		9	17.4	24.1	22.0			
6	5	4		2	5	6		6	20.7	26.4	16.2	.005		
7	m2	2		1	0	1		1	23.2	29.4	19.9			
8	1	2		2	2	4		4	23.3	25.5	24.2		.050	
9	1	2		1	6	3		5	25.6	25.4	22.9			
10	1	1		1	10	2		7	23.2	29.7	23.3			
11	0	0		1	10	5		3	22.8	26.1	26.7		.05	
12	3	3		2	1	2		6	25.0	28.9	24.1			
13	2	4		2	3	5		4	26.0		21.8			
14	2	1		2	6	8		3	19.8	23.1	15.0			
15	1			1	2			0	20.0		15.0			

Margaree Harbour

Weather Conditions for August(16-31), 1937

Day	WIND 7-8 a.m. F	D	1-2 p.m. F	D	7-8 p.m. F	D	SKY 7-8 a.m.	1-2 p.m.	7-8 p.m.	AIR TEMPERATURES 7-8 a.m.	1-2 p.m.	7-8 p.m.	RAIN 7-8 a.m.	7-8 p.m.	REMARKS
16	1		2		2		0	0	7	17.4	27.5	23.5			
17	4		3		2		0	8	9	25.3	27.1	22.1			
18	2		2		4		10	10	6	19.7	21.1	17.3	1066	.255	
19	3		2		3		3	1	6	15.6	21.1	18.5			
20	3		2		3		10	10	7	17.8	19.3	16.0	.094	.04	
21	2		2		3		6	3	10	19.4	23.9	20.5			
22	5		4		5		9	9	7	18.7	15.2	14.6	.262		Rain gauge was knocked over by horse but I think none was spilled.
23	2		3		3		8	9	7	10.6	17.0	13.6			
24	2		1		1		2	3	7	9.6	20.0	9.1			
25	1		2		1		9	3	3	10.3	18.0	9.4			
26	3		2		2		7	5	8	16.5	23.3	21.3			
27	1		2		2		4	6	8	22.6	23.5	20.2			
28	1		2		3		9	6	9	19.3	17.1	14.6			
29	0		1		1		0	1	4	16.9	28.5	18.1			
30	1		1		1		0	0	3	19.9	27.4	16.1			
31	2		3		2		6	3	10	19.7	23.5	16.1			

Margaree Harbour

Weather conditions for September (1-11), 1937.

Day	WIND 7-8 a.m. F	D	1-2 p.m. F	D	7-8 p.m. F	D	SKY 7-8 a.m.	1-2 p.m.	7-8 p.m.	AIR TEMPERATURES 7-8 a.m.	1-2 p.m.	7-8 p.m.	RAIN 7-8 a.m.	7-8 p.m.	REMARKS
1	1		1		1		10	10	10	15.3	17.2	14.8	.02	.31	Rain appears to move along coast, not working inland very much. Periodic showers all night.
2	3		2		2		10	10	10	16.8	17.4	20.1	.56		
3	2		3		2		8	3	5	19.9	25.9	23.0			
4	5		3		4		3	4	10	23.2	25.1	16.4	.295		Rain appears to be principally along the coast and in periodic s showers.
5	7		8		6		3	6	4	13.6	12.2	9.6			
6	4		5		3		1	3	4	13.4	15.1	7.7			
7	3		4		5		1	3	4	9.4	15.5	7.8			
8	4		7		7		8	10	10	12.2	10.1	7.3		.24	Heavy blow from north nearly all day. Steady rain in p.m.
9	6		5		5		7			11.8		4.5			Heavy northerly wind all night. Quite warm in p.m.
10															Fair and rather warm.
11															Steady rain all afternoon

MARGAREE SALMON INVESTIGATION

1937

Report No. IV. Salmon Catch

By P. F. Elson.

Grand Etang, 1937.

from books of Grand Etang Salmon Union.

Phillip Deveaux			Martin Doucet		
Date	No. of Salmon	Lb.	Date	No. of Salmon	Lb.
June 7	2	36	June 7	2	25
8	2	26	8	4	48
9	2	18	9	1	10
14	2	21	11	5	53
15	2	23	12	4	50
16	1	25	14	1	14
17	1	9	15	6	77
19	5	49	16	1	17
21	5	81	17	5	46
22	2	19	19	4	37
23	3	26	21	2	40
24	2	21	22	4	50
25	5	48	23	3	24
29	4	38	25	2	22
July 1	5	61	26	4	48
2	3	48	28	4	42
3	6	85	29	2	19
5	25	307	July 3	5	65
6	10	173	5	15	150
7	2	36	6	13	153
8	2	25	7	6	79
	3	38	8	8	93
9	2	33	9	3	30
10	1	11	10	8	103
12	11	157	12	6	69
13	1	10	13	3	41
14	4	63	14	6	92
15	2	20	15	1	8
16	2	28	16	6	74
17	6	66	17	4	60
19	2	21	19	1	18
20	5	66	20	4	60
21	2	20	21	4	53
22	11	160	23	4	66
26	1	32	27	1	24
27	3	46	31	3	40
30	1	12	Aug. 2	5	50
31-	1	19	3	3	51
Aug. 3	3	44	4	1	20
4	2	24	5	3	53
6	1	10		1	12
12	1	12	6	1	10
13	1	11	7	3	39
	157	2088	12	1	9
			14	1	15
				176	2169

John J. Cormier

Date	No. of Salmon	Lb.
June 3	4	52
5	1	11
7	2	17
9	7	99
14	4	42
15	1	11
16	3	43
17	4	64
19	3	48
22	1	17
23	1	10
25	6	85
26	4	38
28	3	31
29	3	40
30	1	10
July 2	2	19
3	18	218
5	17	170
6	15	210
7	3	35
8	6	82
10	3	27
12	3	45
13	1	11
15	5	86
16	7	93
17	1	26
19	2	34
20	1	10
21	4	83
22	1	8
23	1	11
26	1	19
28	1	21
30	1	10
Aug. 3	4	70
4	1	9
5	1	14
7	5	93
11	3	49
13	1	19
	156	2092

Emillian P. AuCoin

Date	No. of Salmon	Lb.
June 9	1	10
14	3	43
15	3	36
16	2	31
19	1	10
23	1	9
25	2	32
July 6	4	41
8	2	25
10	2	33
12	1	11
14	3	48
15	3	39
21	2	21
Aug. 7	1	19
	31	408

Joseph Doucet

Date	No. of Salmon	Lb.
June 3	1	8
5	1	16
8	2	28
9	2	18
	1	16
12	1	8
14	1	11
15	1	11
16	2	19
17	1	15
18	1	10
19	4	51
21	2	21
22	2	39
24	4	54
25	1	10
26	2	24
28	1	8
29	5	60
30	5	48
July 1	2	15
2	1	8
3	2	27
5	17	238
6	6	91
7	2	28
9	1	9
12	4	64
13	2	35
15	2	19
16	3	38

Joseph Doucet, continued:

Date	No. of Salmon	Lb.
July 17	2	30
20	3	44
Aug. 2	2	25
3	1	14
4	3	61
5	1	17
6	1	8
9	1	17
11	2	27
13	2	27
	100	1319

Arsene A. AuCoin

Date	No. of Salmon	Lb.
June 10	1	8
11	3	29
12	4	53
14	1	8
	1	8
15	1	8
16	3	35
17	1	10
18	1	12
19	1	8
21	2	38
22	2	16
23	1	9
26	2	29
30	1	20
July 1	4	53
3	8	95
5	13	150
6	3	44
7	6	84
8	1	13
9	2	26
	6	83
10	2	29
12	2	20
15	3	31
16	3	56
17	4	59
20	1	20
21	3	39
23	1	8
24	1	25
28	1	17
29	1	10
	90	1153

Paul LeBlanc[illegible], continued:

Date	No. of Salmon	Lb.
June 5	3	25
7	5	54
10	2	20
12	2	31
15	2	19
16	4	76
18	4	58
19	4	42
22	1	10
23	3	27
25	3	28
26	3	46
28	1	7
July 6	1	20
8	2	29
9	2	24
10	3	56
12	7	73
15	4	43
16	1	10
20	1	8
	58	706

Pepin Ramord

Date	No. of Salmon	Lb.
June 8	2	28
10	6	59
11	1	10
14	3	31
15	2	18
17	2	19
19	4	42
21	2	20
22	3	27
	1	10
24	4	41
26	1	9
July 5	1	8
6	3	31
7	1	9
9	2	42
12	6	79
13	4	43
14	6	91
19	1	21
20	2	19
22	4	62
23	5	63
24	4	64
30	1	10
31	1	14
	71	850

Fred L. Cormier

Date	No. of Salmon	Lb.
June 9	1	10
12	1	9
14	6	61
16	6	66
17	3	26
18	1	17
19	1	11
21	3	27
23	6	73
24	2	19
25	2	34
28	3	31
30	1	9
July 1	1	9
5	6	55
6	11	118
7	3	45
9	2	18
10	1	8
12	2	22
13	7	113
15	1	11
16	1	11
17	7	90
26	1	7
	79	900

Gabriel J. AuCoin

Date	No. of Salmon	Lb.
June 11	1	8
12	1	11
15	3	26
16	1	12
17	2	29
21	3	29
22	1	9
23	1	18
30	1	11
July 1	7	107
5	4	47
6	4	48
7	2	28
8	2	21
9	4	47
10	1	9
12	2	21
13	3	49

Gabriel J. AuCoin, continued:

Date	No. of Salmon	Lb.
July 14	3	27
15	2	20
17	7	89
19	3	41
20	2	22
22	2	27
23	1	8
26	1	10
Aug. 4	1	12
5	1	12
16	1	15
	67	813

Paul J. Deveaux

Date	No. of Salmon	Lb.
June 3	6	73
5	4	48
8	13	118
10	11	104
12	6	63
14	7	63
15	10	132
17	12	143
19	5	72
21	12	147
23	?	127
26	7	81
28	6	95
29	11	106
July 1	8	100
3	4	41
5	19	236
6	10	108
7	18	259
8	12	172
9	19	242
10	10	125
12	13	186
13	12	157
14	16	235
15	12	178
16	14	172
17	21	287
19	6	90
20	4	68
22	7	112
24	11	157
27	9	142

Paul J. Deveaux, continued:

Date	No. of Salmon	Lb.
July 29	6	102
30	1	15
31	8	118
Aug. 3	3	37
7	5	49
	4	55
10	1	18
14	1	14
	364+?	4847

Margaree Harbour, 1937

from records of W. S. Laurence.

Delphus Burns

Date	No. of Salmon	Lb.
June 21	2	16
July 6	3	29
7	1	20
9	2	18
10	2	33
13	1	11
14	5	61
15	2	20
	1	10
16	4	35
19	1	11
	2	49
20	5	75
21	1	12
22	2	21
26	2	32
27	1	20
30	4	54
31	2	34
Aug. 2	12	132
4	2	24
5	2	27
6	5	70
7	1	19
9	1	11
	66	844

Sylvester LeBlanc

Date	No. of Salmon	Lb.
June 10	1	18
	2	20
11	1	10
12	1	8
14	3	27
	2	21
15	3	39
17	3	29
18	2	28
19	2	20
21	3	40
25	5	100
26	3	29
28	3	29
30	1	10
July 3	2	22
5	8	80
6	8	122
7	2	31
8	9	111
9	1	10
10	4	53
12	7	96
13	6	70
14	3	26
15	2	31
16	4	54
17	2	19
19	1	11
21	2	23
22	3	44
24	1	11
26	3	34
27	1	10
31	2	28

Sylvester LeBlanc, continued:

Date	No. of Salmon	Lb.
Aug. 2	2	26
	1	8
3	6	76
5	5	92
6	1	16
7	4	70
9	1	31
10	2	36
11	1	21
	129	1690

John A. McKinnon

Date	No. of Salmon	Lb.
July 7	3	46
8	3	42
9	2	28
12	4	39
13	1	11
14	8	109
15	10	121
16	11	130
17	6	106
	1	18
19	1	25
20	7	96
21	3	51
22	2	38
23	1	20
24	2	22
31	1	10
	68	912

Howard McKay

Date	No. of Salmon	Lb.
June 12	1	20
18	1	11
23	3	32
26	1	13
28	1	9
July 9	1	12
10	1	11
12	2	22
14	2	45
15	2	31

Howard McKay, continued:

Date	No. of Salmon	Lb.
July 20	1	11
21	2	27
23	1	21
26	1	22
	20	287

Howard McKay (Laurence's Fleet)

Date	No. of Salmon	Lb.
July 10	3	42
12	4	67
13	3	52
14	2	23
15	1	10
16	10	139
17	2	20
20	1	14
	26	367

Chas. D. McLean

Date	No. of Salmon	Lb.
June 8	5	74
9	8	90
10	9	107
11	1	19
12	2	40
14	5	57
15	4	48
16	2	24
17	5	62
18	6	82
19	2	30
21	2	26
23	2	17
24	1	19
26	3	71
28	9	117
29	1	12
July 1	1	20
5	2	30
6	9	111
9	1	10
10	3	31
12	6	103
13	2	31

Chas. D. McLean, continued:

Date	No. of Salmon	Lb.
July 14	1	19
15	8	103
17	3	40
16	4	57
19	3	32
20	5	52
21	3	37
26	2	35
31	5	79
Aug. 4	1	11
7	2	45
	128	1741

Neil Day

Date	No. of Salmon	Lb.
June 14	1	10
15	1	9
16	4	55
17	4	45
18	5	52
19	1	9
21	3	39
23	2	17
24	1	12
26	2	19
28	5	56
30	1	11
July 6	2	22
7	2	28
9	1	8
10	1	20
13	1	11
14	1	11
15	2	21
17	2	23
20	5	85
21	1	19
	48	582

John McFarlane

Date	No. of Salmon	Lb.
June 29	3	40
July 6	15	201
15	2	32
17	3	45
20	4	63
	27	381

John McFarlane (Laurence's Fleet)

Date	No. of Salmon	Lb.
June 22	6	71
23	1	11
26	6	83
29	7	86
July 2	10	138
3	6	81
6	18	292
8	5	60
10	3	32
12	?	145
13	10	141
15	21	265
17	8	93
20	8	93
23	2	34
27	5	86
	116(?)	1711

Simon McKinnon

Date	No. of Salmon	Lb.
July 17	1	11
19	2	32
20	5	75
21	1	12
	9	130

Angus C. McKinnon

Date	No. of Salmon	Lb.
July 8	8	94
10	2	32
12	4	52
13	6	74
14	2	19
15	6	74
16	4	42
17	4	58
19	3	36
20	2	20
21	3	41
22	4	53
24	1	23
31	1	15
Aug. 2	8	104
4	6	81
6	1	11
7	2	23
	67	852

Margaree Harbour, 1937

from books of Margaree Salmon Union.

Thos. AuCoin

Date		No. of Salmon	Lb.
June	10	25	270
	12	2	19
	14	10	97
	15	6	54
	19	3	28
	21	8	97
	22	1	10
	23	4	45
	24	6	55
	25	2	27
	26	3	42
	28	7	84
	29	2	18½
	30	2	28
July	1	8	108
	2	3	29
	3	13	201
	5	21	262½
	6	13	185
	7	7	77½
	8	5	77
	9	4	40
	10	7	65
	12	17	227
	13	3	30
	14	11	168
	15	12	133
	16	20	269
	17	17	225½
	19	7	100
	20	6	94
	21	8	77
	22	2	33½
	23	1	21½
	24	3	50
	26	1	12
	27	2	21
	29	2	19½
	30	3	28
	31	7	84
Aug.	2	14	168½
	3	10	149
	4	9	116
	5	3	34½
	6	5	74
	7	12	190½
	9	1	13
	11	7	78
	12	6	86
	14	1	7½
	15	1	18
		353	4447½

Dominic LeBlanc

Date		No. of Salmon	Lb.
June	10	3	39
	11	1	18
	12	3	45
	14	2	32
	16	2	18½
	17	1	18
	19	2	32
	21	9	88
	22	5	81
	23	8	84½
	24	7	89
	25	1	9
	26	2	36
	28	4	48
	30	3	40½
July	1	1	19
	2	4	47
	3	4	51
	5	10	121
	7	3	44½
		1	8
	8	1	10½
	9	2	29
	10	4	45
	12	6	79½
	13	2	31
	14	4	54½
	15	2	21
	16	2	37
	17	2	23
	19	5	71
	20	2	19
	21	5	60½
	22	3	45
	26	1	9
	29	2	37
Aug.	5	1	15
		122	1587

Jim Arsenault

Date	No. of Salmon	Lb.
June 10	4	47
12	4	35½
14	1	10
15	2	20
16	4	62
19	2	19
21	1	9
22	1	9
23	1	9
24	1	10
26	3	32
28	7	103½
30	1	12
July 1	2	21
2	4	46
3	1	11
5	14	192
6	14	224
8	2	31
9	2	29
10	2	24
12	3	42½
13	6	91
14	1	10
15	1	19
16	4	51
17	3	34½
20	7	101½
21	6	84
22	6	75
23	2	20
27	1	18½
30	2	43
31	3	50
Aug. 2	2	37½
3	2	19
4	1	8½
	2	27
7	2	28½
	127	1716½

Haverstock MacLean

Date	No. of Salmon	Lb.
June 14	14	135
15	3	44½
16	4	55
17	2	19
18	10	114
19	6	64
21	10	112½

Haverstock MacLean, continued

Date	No. of Salmon	Lb.
June 22	6	82
23	2	16
26	12	163
28	8	97
29	15	180
30	3	45
July 1	4	53
2	7	76½
3	1	19
5	7	84
6	24	339
7	2	17
10	2	20
13	6	66
14	7	115
	10	113
15	10	127
17	6	57½
19	3	47
20	3	44½
21	2	28
31	2	28
Aug. 2	7	127
3	1	18½
5	1	10
11	1	21½
12	4	53
	205	2591½

Allen MacLean

Date	No. of Salmon	Lb.
June 14	2	15
15	1	7
18	3	27
19	2	18
21	2	23½
22	1	10½
26	3	28
28	5	52
29	2	26
30	3	39
July 2	12	110
3	1	9
5	3	43
7	5	46
9	2	31
10	5	61½
13	2	21
14	6	79
15	5	88
16	3	46
17	5	61½

Allen MacLean, continued:

Date	No. of Salmon	Lb.
July 19	3	36
20	2	24
21	1	7½
Aug. 5	2	19½
	81	929

Dan McKinnon

Date	No. of Salmon	Lb.
June 14	3	39
18	12	124
21	3	28
July 3	1	21
8	7	122½
12	2	34
13	2	26½
15	6	84
17	3	48
	39	527

John L. McKinnon

Date	No. of Salmon	Lb.
June 17	1	9
19	2	15
21	2	28½
22	1	22
July 5	3	23
	3	52
6	4	43
8	4	71
9	1	21½
10	3	31½
12	8	122½
13	4	49
14	2	24
15	4	55
19	3	41
20	5	94½
21	2	42
22	2	20
24	1	17½
28	4	73
30	1	10½
31	7	112

John L. McKinnin, continued:

Date	No. of Salmon	Lb.
Aug. 2	1	10
5	1	16
7	11	188
12	3	33
14	1	11½
	84	1182

Angus J. McKinnon

Date	No. of Salmon	Lb.
June 25	6	75
26	2	20
28	1	10
29	10	113½
30	1	19
July 1	2	19
3	1	10
5	2	22
6	1	8
8	1	7
9	1	12
	1	9½
10	6	53
12	2	39½
15	3	42
16	5	74
17	1	10
19	9	132½
20	2	24
	57	700

Wm. Dawson (Private)

Date	No. of Salmon	Lb.
June 16-22	10	131
24-30	6	72
July 1- 6	5	53
July 8- (		
Aug. 12 (	22	251
	43	507

Live fish taken from Angus McKinnon, John L. McKinnon, W. S. Laurence, AuCoins, Arsenault and Deveau are recorded elsewhere. The catch brought to the Margaree Salmon Union included about 40 soft fish not recorded with the above.

MARGAREE SALMON INVESTIGATION

1937

Report No. V. Salmon Tagged in 1937.

By P. F. Elson.

Salmon tagging operations were carried on at Margaree Harbour in June and July as in 1935 and 1936. Salmon were taken from two fleets south-west of the Harbour - those of John L. McKinnon (S1) and Angus M. McKinnon (S3), and from two fleets to the north-east during June - those of W. S. Laurence (N2 operated by J. D. Burns) and Thos. and Napoleon AuCoin (N5). Starting July 6 salmon were also taken from 1 fleet each of James Arsenault (N6), Phillip Deveaux (N9), and Dominic LeBlanc (N11), the fleet of the last named being within 1/2 mile of Friar Head Boat Harbour. Fish were taken from these nets because the owners of the berths had small mesh snares required for taking the salmon alive.

Fish were tagged at the head of the net where caught and liberated there also, except on two occasions when fish taken by Angus McKinnon were liberated off the Grey Cape.

In all 267 fish were tagged, two of these were taken again and liberated and one other was retaken and escaped before the tag number was recorded.

All fish were in fairly good condition when liberated and were all seen to swim away except one or two grilse. That the general run of fish were of small size seemed indicated by the

number of salmon which showed marks of having recently struggled through nets. On several fish the dorsal fin was broken off about 1/2 inch above its base. Twenty seven grilse were taken, this being a higher percentage than in the previous two years.

The tags used differed from those used in previous years. Small red tags were placed on either side of the dorsal fin, and as close to the body of the fish as possible. These were held in place by long nickel pins thrust through the tag and fin from the left side and securely twisted together over the tag on the right side. The twisted portion was clipped to about 1/8 inch long and bent flat along the tag. These tags could be attached quite firmly to fish with broken fins and to the dorsal fins of the grilse. They showed up very clearly as liberated fish swam away.

Fishermen were compensated on the basis of the length-weight ratios used in 1936 and mentioned in the reports for that year.

The boat used in tagging was supplied by Jos. P. Chaisson. Persons aiding in tagging coperations were Jos. P. Chaisson, Wm. S. Hoar and P. F. Elson.

List of Salmon Tagged in 1937, near Margaree Harbour.

Tag Number	Fleet	Length of fish cm.	Remarks
June 18/37			
0251	Aucoin Bros. 3rd fleet	90	
0252	"	75	
0253	"	74	Head cut over right eye
0254	"	67	
June 19/37			
0255	"	72	
0256	"	77	
0257	"	68	
0258	J. L. McKinnon Fleet	75	
0259	"	74	
June 21/37			
0260	Aucoin Bros Fleet	69	
0261	"	77	
0262	"	72	
0263	W.S. Laurence 2nd Fleet	75	
0264	"	72	
0265	"	67	
0266	"	73	
0267	"	70	
June 22/37			
0268	Aucoin Bros Fleet	55	Grilse
June 24/37			
0269	"	83	
0270	"	74	
0271	"	82	
0272	"	73	
0273	"	71	
0274	"	75	
0275	W. S. Laurence Fleet	79	
0276	"	71	

Tag Number	Fleet	Length of fish, cm.	Remarks
June 25/37			
0277	A. M. McKinnon Fleet	67	
0278	"	91	
0279	"	77	
0280	"	73	
0281	"	75	
0282	"	74	Deep wound on ventral post. part of body.
0283	"	72	
0284	"	76	
0285	"	78	
0286	"	75	
0287	"	72	
0288	AuCoin Bros Fleet	71	
0289	"	71	
0290	"	70	
0291	"	73	
0292	"	88	Fish somewhat bruised
June 26/37			
0293	"	75	
0294	"	51	Grilse
0295	"	68	
0296	"	49	Grilse
0297	W. S. Laurence II Fleet	85	
0298	J. L. McKinnon	72	
June 24/37			
0299	Aucoin Bros Fleet	78	
June 26/37			
0300	J. L. McKinnon	73	
0301	"	98	
0302	"	70	
0303	"	68	
0304	"	78	
0305	"	72	
0306	"	77	
0307	"	74	
0308	"	75	
0309	A. M. McKinnon	73	
0310	"	73	
June 28/37			
0311	AuCoin Bros. Fleet	71	
0312	"	72	
0313	"	57	Grilse
0314	J. L. McKinnon Fleet	90	
0315	"	70	

Tag Number	Fleet	Length of fish, cm.	Remarks
July 1/37			
0316	AuCoin Bros. Fleet	77	
0317	"	73	
0318	"	75	
0319	J. L. McKinnon Fleet	90	
0320	Angus McKinnon	94	
0321	"	92	
0322	"	78	
0323	"	76	
0324	"	72	
0325	"	71	
July 2/37			
0326	AuCoin Bros. Fleet	71	
0327	"	69	
0328	"	52	Grilse
0329	"	52	Grilse
July 3/37			
0330	"	72	
0331	"	73	
0332	"	78	
0333	"	88	
0334	"	96	
July 5/37			
0335	"	74	
July 6/37			
0336	"	73	
July 5/37			
0337	"	54	Grilse
0338	"	78	
0339	J. L. McKinnon Fleet	73	
0340	A. M. McKinnon Fleet	92	
0341	"	78	
0342	"	74	

Tag Number	Fleet	Length of fish, cm.	Remarks
July 6/37			
0343	W. S. Laurence Fleet	73	
0344	"	72	
0345	"	88	
0346	"	75	
0347	"	76	
0348	"	54	Grilse
0349	"	79	
0350	"	76	
0351	"	71	
0352	"	72	
0353	"	68	
0354	"	75	
0355	"	69	
0356	"	70	
0357	"	74	
0358	"	74	
0359	"	76	
0360	"	88	
0361	"	67	
0362	"	55	Grilse
0363	"	70	
0364	"	67	
0365	"	96	
0366	"	75	
0367	"	70	
0368	"	71	
0369	"	77	
0370	Dom. LeBlanc Fleet	70	
0371	"	71	
0372	"	77	
0373	"	71	
0374	"	71	
0375	"	92	
0376	"	77	
0377	"	67	
0378	"	74	
0379	"	72	
0380	"	73	
0381	"	76	
0382	"	72	
0383	"	72	
0384	"	87	
0385	"	91	
0386	"	94	
0387	"	89	
0388	"	75	
0389	"	74	

Tag Number	Fleet	Length of fish, cm.	Remarks.
July 6/37			
0390	Dom. LeBlanc Fleet	75	
0391	"	71	
0392	"	70	
0393	"	75	
0394	Jim Arseneault Fleet	81	
0395	AuCoin Bros. Fleet	57	Grilse
0396	"	74	
0397	"	73	
0398	"	73	
0399	"	74	
0400	J. L. McKinnon Fleet	89	
July 7/37			
0401	AuCoin Bros. Fleet	71	
0402	"	76	
0403	"	95	
0404	"	73	
0405	W. S. Laurence II Fleet	78	
0406	"	67	
0407	"	76	
0408	"	73	
0409	"	74	
0410	"	72	
July 8/37			
0411	Dom. LeBlanc Fleet	78	
0412	"	53	Grilse
0413	"	58	Grilse
0414	"	97	
0415	Jim Bill Arseneault	92	
0416	"	93	
0417	"	52	Grilse
0418	"	54	Grilse
0419	AuCoin Bros. Fleet	74	
0420	"	69	
0421	"	72	
0422	W. S. Laurence Fleet	52	Grilse
0423	"	52	Grilse
0424	"	68	
0425	"	93	
0426	"	72	

Tag Number	Fleet	Length of fish, cm.	Remarks
July 9/37			
0427	Dom. LeBlanc Fleet	77	
0428	"	73	
0429	"	68	
0430	"	77	
0431	Phil. Deveaux Fleet	76	
0432	"	68	
0433	Jim Bill Arseneault Fleet	91	
0434	AuCoin Bros. Fleet	75	
0435	"	73	
0436	"	76	
0437	W. S. Laurence Fleet	51	Grilse
0438	"	54	Grilse
0439	"	73	
0440	"	91	
0441	"	91	
0442	"	94	
0443	"	49	Grilse
0444	J. L. McKinnon Fleet	52	Grilse
0445	"	77	
0446	"	50	Grilse
0447	A. M. McKinnon Fleet	73	
0448	"	72	
0449	"	89	
0450	"	71	
July 10/37			
0451	Phil. Deveaux Fleet	48	Grilse
0452	"	87	
0453	"	78	
0454	AuCoin Bros. Fleet	77	
0455	"	78	
July 12/37			
0456	Dom. LeBlanc Fleet	73	
0457	"	83	
0458	"	85	
0459	Philip Deveaux	82	
0460	"	84	
0461	"	72	
0462	"	76	
0463	Jim Bill Arsneault	79	
0464	"	46	Grilse
0465	AuCoin Bros. Fleet	88	
0466	"	70	
0467	W. S. Laurence Fleet	73	
0468	"	76	

Tag Number	Fleet	Length of fish, cm.	Remarks
July 12/37			
0469	W. S. Laurence Fleet	74	
0470	"	73	
0471	J. L. McKinnon Fleet	76	
July 13/37			
0472	Jim Bill Arseneault	79	
0473	"	79	
0474	"	79	
0475	AuCoin Bros. Fleet	51	Grilse
0476	"	76	
0477	"	102	
0478	"	77	
0479	"	81	
0480	W. S. Laurence Fleet	94	
0481	"	54	Grilse
0482	"	53	Grilse
0483	"	56	Grilse
July 14/37			
0475	AuCoin Bros. Fleet		Fish reliberated
July 15/37			
0484	J. L. McKinnon Fleet	97	Shows evidence of having been previously, early life, tagged
0485	A. M. McKinnon Fleet	70	
0486	"	91	
0487	"	91	
0488	"	74	
0489	"	77	
0490	"	69	
0491	"	82	
0492	"	72	
0493	"	78	
0494	W. S. Laurence Fleet	50	
0495	"	71	
0496	"	89	
0497	"	73	
0498	"	54	
0499	"	89	

Tag Number	Fleet	Length of fish, cm.	Remarks
July 15/37			
0101	W. S. Laurence Fleet	50	
0102	Phil. Deveaux Fleet	64	
0103	"	54	
0467	W. S. Laurence Fleet		Reliberated
July 17/37			
0104	W. S. Laurence Fleet	74	
0105	Phil. Deveaux Fleet	88	
0106	A. McKinnon	73	
0107	"	74	
July 20/37			
0108	J. L. McKinnon Fleet	91	
0109	A. M. McKinnon Fleet	91	
0110	"	95	
0111	"	83	
July 21/37			
0112	AuCoin Bros. Fleet	78	
0113	"	75	
0114	"	50	Grilse
July 22/37			
0115	J. L. McKinnon Fleet	90	
0116	"	78	
0117	"	78	
0118	"	83	

MARGAREE SALMON INVESTIGATION

1937

Report No. VI. Smolts, Gaspereaux and Sea Trout.

By P. F. Elson.

1. Smolts at Margaree Harbour in 1937.

Smolts descending the river were first looked for on May 16. However none were seen at this date, and enquiry from small boys fishing at the Harbour failed to show the presence of any young salmon in the vicinity of the Harbour. Sea Trout, which seem to appear in the Harbour just before the smolts were, however, being taken at this time and were observed at the south west breakwater on May 20. On May 20 and 21 mergansers were observed feeding on the estuary above the bridge and also in Duck Cove in flocks of 5 or 6 together. Since during the next 3 weeks they were most frequently observed where smolts were known to be fairly abundant this might be taken as an indication that the smolts reached the lower estuary in fair numbers about May 20. On May 22 small boys fishing at the Retention Pond reported catching smolts, and one sample was collected there. They did not appear to be very abundant, but weather conditions were poor for observations at this time, it being dull and windy.

On May 24 1 smolt was taken at the S.W. breakwater and 3 were taken below the Harbour bridge. They did not appear to be particularly abundant, though small sea-run trout (about 10-12 inches) were fairly numerous.

Between May 28 and June 1st smolts could be seen at the S. W. breakwater over the rock-pile at most times except at high tide. They were not however nearly as numberous as a few days later, and did not rise well to the fly, so that only a few were taken. Some

smolts were taken by making a seine-sweep down stream, ending beside the pier, but the method was rather difficult in the strong outgoing tide. While smolts were not seen in great numbers during this period eels and sculpins were frequently seen on the rock pile where smolts usually were found, and mergansers were to be seen in the vicinity either inside or outside the two breakwaters at most times except around high tide. The birds were frequently seen feeding between the S. W. breakwater and a pile of rocks a little further west. Smolts were raised in here on several occasions. This would seem to indicate that some of the descending fish fall back towards shore once they are out of the Harbour, rather than being swept straight out to deeper water.

On June 1 smolts were much more numerous at the Harbour, though still not rising well enough to enable taking many samples. During a 2 hour period in the afternoon 4 mergansers were seen feeding at the Harbour mouth while 3 more pairs flew by from the direction of the Grey rocks and pitched in the lower Harbour. This would seem to indicate fairly good feeding at the Harbour.

On June 3 smolts were still abundant at the Harbour, principally seen at the S. W. pier. Here a sweep with the seine netted 7 smolts. They were much more numerous than this might indicate. While the tide was falling the smolts were observed to be slowly swept right out of the Harbour, though actually stemming the current all the time. It is perhaps of interest

to observe that when a smolt rose at a fly it would almost invariably be swept down stream a yard or more, then attempt to regain its original position at the bottom. Here they would lie chiefly behind stones or in eddies created by the planks of the breakwater. On one occasion a school of smolts was observed swimming downstream and thus passing right out of the harbour mouth. As the smolts increased in numbers from day to day the numbers of small sea-run trout at the Harbour seemed to fall off.

On June 4 a trip was made up to the Forks with Mr. Rogers to pick suitable sites for setting up hydrographs. An attempt to take smolts on the fly on both N. E. and S. W. branches failed to indicate the presence of smolts there. Nor could any signs of them be seen. Apparently they were not nearly as numerous here as in the lower estuary.

On June 5 they were very numerous at the Harbour mouth, 31 being taken on a single rod in a period of about 2 hours and a half. Mergansers were also much in evidence at the Harbour during the period. On the same afternoon smolts were quite plentiful at the Retention pond and at the Old Bridge site, indicating a general distribution throughout the lower estuary.

On the morning of June 7 I found smolts quite numerous at the Retention pond. As the tide was running out the small schools were feeding vigorously, frequently jumping clear of the water. They moved downstream at very nearly the same rate as the current flowed. In the afternoon they were extremely plentifull at the Harbour. At the S. W. breakwater there was a

continuous movement of smolts out to sea most of the afternoon, 44 specimens being taken between 3.30 and 6.00 p.m. It was a striking fact that during ebb tide most of the fish seemed to be heading downstream, while when the tide commenced to rise many of the fish head upstream and moved back into the estuary. At 6.00 p.m. the smolts disappeared rather suddenly, probably due largely to the rising tide.

In addition to eels and sculpins seen on the rock pile where smolts were abundant, a large fish, apparently a trout, was observed to charge into the school of smolts seize one and apparently swallow it, and then seize another before it disappeared into deep water. Shortly after a school of about 2 dozen fish about 2 to 3 times the size of gaspereau - taken for trout - was seen cruising about the Harbour mouth.

By June 10 the smolt run was very evidently falling off. Only about 10 smolts were taken on this day, though 2 rods fished for 2½ hours. There was a very strong ebb tide, and the water was rather dark and dirty at low tide. On the following day conditions were similar, few smolts being seen by the S. W. breakwater.

On June 12 smolts were observed at the head of tide hydrograph and a dozen were taken at the Harbour in the evening. After this date the smolt run seemed to be largely over, and no more specimens were taken on the fly. On June 15 a trip up the S. W. river revealed no smolts above the Chapel Bridge on the main river. (a 45 foot seine was used). On June 16 about half a dozen smolts were observed swimming about Laurences Wharf, but

attempts to take them were unsuccessful. These fish and 4 pair of mergansers on the lower estuary, both above and below the bridge, were the only indications of smolts being still in the estuary. On June 19 one abnormal specimen was taken at the head of tide, and on the same date some small fish were taken from the stomach of a cod caught in the salmon fleet of J. L. MacKinnon. These were the last indications of the smolt run at Margaree Harbour.

A few questionable specimens were taken below the Retention pond on June 29 with a seine, but there was no indication of a continued general migration at this time.

A short comparison of the smolt run to the condition of the tides is perhaps of interest. The first appearance of smolts at the Harbour was about the time of the last spring tides in May (Full moon on May 25, maximum south on May 26). After this period the amplitude of the tides decreased until June 4, and at the same time the concentration of smolts at the Harbour increased very noticeably. On June 5 the tidal amplitude increased again to over 2½ feet and to 3½ feet on June 8. During this period the concentration of smolts at the Harbour reached its maximum, and smolts could be observed passing out of the Harbour in large schools during ebb tide. By June 10 the tidal amplitude reached its maximum value for the summer (about 4 ft.). The smolts were very evidently diminishing in concentration at the Harbour, having been apparently flushed out by the rather large tides of the few days immediately preceding. It might be suggested that besides tidal amplitude

the height of tide at low water is important in moving the fish out of the Harbour. Any smolts appearing after this large spring tide in the first part of June might be classed as stragglers of the main run.

2. Smolt Trap Nets used at Margaree Harbour.

Trap nets designed on the plan of those used for the commercial fishery but on a much smaller scale were provided for taking smolts. Unfortunately the plans for their use were not completed early enough and the nets were not out for much of the run.

One net, which was not tanned or treated in any way was set at the west end of the cross channel just above the bridge on June 2. For leader about 20 ft of 3/4 inch mesh was used. While the net was being set a school of smolts was observed to swim right under the line for the leader. However this net took no smolts, and only one specimen - a Fundulus was recorded for the net. It was taken up on June 16.

Another net was set from the lower outside corner (NW) of the Retention Pond on June 12. The leader, about 18 feet of similar mesh was run downstream. This net had been tanned a dark brown with the material commonly used by the salmon fishermen. No smolts were taken in this net either. As will have been noted the greater part of the run was over by this time. It was visited regularly for the next week. At each visit one to four gaspereau were found in the net. About half of these were alive when found. Most of the dead fish were quite fresh, indicating that they had probably died after entering the snare. On the whole this net

seemed quite effective in taking gaspereau, which seemed to be the only fish common when it was set. On one occasion a live fish was seen to swim right out of the gate as the net was approached, indicating that the fish probably could escape from the snare without a great deal of trouble.

While no smolts were actually taken with the nets it appears probable they could be made to take smolts quite effectively.

3. Some Notes on Gaspereaux

The run of gaspereau at Margaree Harbour was very good when we arrived on May 15 and lasted for about 1 month after this time. No particular observations were attempted while the run appeared to be normal. In 1936 however, the fish had been observed to die very profusely during the later part of the run, and a similar condition was watched for in 1937.

On the morning of June 5 about 3.00 a.m., which was about the time that ebb tide commenced, gulls were heard crying on the flats by Duck Cove. This was the first time such a thing was noted and seemed to indicate some unusual happening. It was suspected that the clamour must be due to the sudden appearance of dying gaspereau, which provided a rather ready source of food for the gulls. The next morning this opinion seemed to be confirmed for 3 gaspereau were seen at the Harbour swimming about near the surface in the characteristic manner which seems to precede death under these circumstances. During the next few days the numbers of gulls, both herring gulls,

and black-backed gulls, increased tremendously. Every morning at about the time of the turn of high tide they could be heard clamouring on the flats opposite Duck Cove. This was observed to be the time when the gaspereau ascended the river through the estuary - and in fact, throughout ebb tide.

On June 7 many dead gaspereau were observed cast up on the bank by the Retention Pond. About 2 dozen of these were examined and all were found to be unspawned females. On June 9 an attempt was made to collect some gulls for stomach analysis, but was unsuccessful, the birds were observed just off shore in the Duck Cove. Apparently the weak fish drift in here during the early part of ebbing spring tide. Subsequently gulls were seen feeding over the shallow water inside the flats. Presumably there must have been quite a few fish that drifted in here. When feeding in here the gulls are usually observed sitting on the water, and scattered over the cove. Occasionally they would go under as though after prey. It was a more general thing to observe the gulls congregated on the channel side of the flats. When a school of gaspereaux went up, breaking water, they would then rise and fish over the channel - very noisily.

On June 10 gulls were observed crowded on the lower flats, previously the upper flats seemed to be the favorite resort - (this at low tide). June 10 to 12 were days of very low tide. Gaspereau were breaking water all around on falling tide and dead or dying gaspereaux were very much more in evidence than previously. A pail full of the fish was collected from one of the nets at the Harbour. All

of the fish had very pale gills, and in many cases the gills appeared "worn". While this might be expected of fish taken in a gill net it was in sharp contrast to the condition observed in similar fish taken in the latter part of May from the nets.

While in the Harbour the gaspereaux appeared to be very plentiful. There were reported to be hardly any above the head of tide after the 10th of June. On June 16 a trip up to Lake Ainslie showed practically no gulls up here, and the gaspereaux were reported as over. At Scottsville, the traps set for these fish were being taken up. Nevertheless on the same day I observed a rather small school - possibly 200 to 500 individuals, ascending the river just above the head of tide (head of tide hydrograph). On falling tide the shores around the Retention pond were white with dead gaspereaux. On rising tide these are picked up by the water and then carried down further on the next ebb. The gulls feed on the freshest of the cast up gaspereaux but apparently prefer to take the dying individuals right from the water, if they can.

On June 18 a small gaspereau about 8 inches long was taken from the smolt trap-net indicating that the younger fish are now entering the Harbour.

On June 19 an examination of all the cod stomachs brought into Laurence's fish-wharf indicated that unspawned gaspereau formed the principal item in the diet of the cod at this time. These cod are taken 2 to 3 miles off-shore.

On June 24 a series of 152 gaspereaux was taken from nets at the Harbour. These were classified as "Unspawned" if the gonads were large and ripe; "Immature" if the gonads appeared

to be of fair size but distinctly smaller than in the gravid individuals; "Spent" if they had already spawned, and "Juvenile" if they were small individuals with the gonads relatively undeveloped. They were distributed as indicated in the table.

Gaspereau from nets at Union wharf. June 24.

	Unspawned	Immature	Spent	Juvenile
Males	56	17	8	10
Females	32	19	1	9

This shows a preponderance of unspawned individuals. Also more males than females.

On June 25 a series of 30 gaspereau, either dying or lying on the bottom dead, and quite fresh, was taken from the river channel by the Duck Cove flats. They were divided as follows:

Gaspereau (dead) from the river channel June 25

	Unspawned	Immature	Spent	Juvenile
Males	8	1	0	0
Females	21	0	0	0

Here the females are in preponderance and with one possible exception all fish were gravid.

Apparently whatever the cause of death it affects principally gravid fish, and also has a greater effect on males than on females.

By June 25 the gaspereaux were very evidently falling off in numbers, both those seen alive and the number of dead observed. Also about this time there was a greater proportion of smaller fish observed. Most of the nets were raised about this time.

On June 30 a series of about 30 specimens was taken from the one remaining net at the Harbour. The specimens were preserved. Almost all were of a smaller size than those taken earlier.

The numbers of gulls present were noticed to be decreasing about this time. Also there seemed to be more competition for food than earlier. On July 2 I observed gulls diving for rather small fish below the Harbour bridge. They were much more active than when dying gaspereau were at their height. More frequently they were seen at the Harbour feeding on offal from the fish-wharves, too. By July 9 gulls were relatively scarce at the Harbour.

Miscellaneous

During the latter half of the summer quite a number of heron and several flocks of young mergansers were to be seen on the lower estuary. The former were in evidence more at low spring tides, while the ducks were seen at all times, especially, though during neap tides.

At the time when gaspereaux were dying most abundantly, dead eels were also observed at the Retention pond. They were reported to be seen up river, particularly on the S. W. branches. Two small eels were taken at this time in Duck Cove. One was covered with small irregular red patches and was picked up by hand. The other appeared exceptionally sluggish also.

4. Sea Trout.

Trout between 200 mm. and 300 mm. in length are of fairly frequent occurrence at the Harbour mouth in the latter part of May and early June, but particularly the former. These fish are invariably rather bright and silvery on the belly and rather slim in appearance. Unfortunately specimens were not weighed or a study of condition factor might be of interest.

On May 24, 2 rods took about 30 such fish in the 2 hours preceding low tide. This was the time of maximum abundance observed. Until June 7 from 2 to 5 trout would be taken for every 2 hours spent in fly-casting for smolts. They were much less in evidence toward the end of this time and none were observed after June 10. It is possible that this is the outgoing run of sea trout, corresponding to but slightly preceding the main smolt descent.

On June 7 a fish about 2 ft. long, and what appeared to be a trout was observed preying on the abundant smolts on the rock-pile at the S.W. breakwater. One trout of about this size rose to a spinner on the same occasion, but was not caught. A school of about a dozen fish of similar size was also seen at the Harbour mouth. On June 5, a 3 lb. trout was taken at Laurence's wharf, and similar trout were reported taken in the gaspereau nets about this time, though I did not actually see any.

On July 7 a 'bright' trout about 200 mm. long was taken at the head of tide hydrograph, and on July 18 some quite

bright trout were taken on the N.E. branch below Forest Glen brook. These were between 150 and 220 mm. long. These latter could not definitely be said to be sea-run trout, of course.

MARGAREE SALMON INVESTIGATION

1937

Report No. VII. Changes in Condition of the Margaree Salmon

By Wm. S. Hoar.

The degree of fatness of the Margaree salmon at different periods in its life history was followed again in 1937. As before, comparisons were made through a factor, the Condition Factor - $K = \frac{\text{weight in grams} \times 100}{(\text{length in c.m.})^3}$. The data collected this year serve to elaborate and substantiate that of 1936.

Materials.

The following report is based on the work of last year with additional study of 76 fry, 103 parr, 165 smolt, and 800 mature fish. Measurements were made as in 1936. Smolt were taken at the Harbour this year from the beginning of the run throughout the season, and also at Forest Glen brook. Thus, the smolt data of last year is extended to the early and the "up river" smolts. Four hundred and twenty-two mature salmon stomachs were analyzed and 140 scale samples read to relate the condition factor with the feeding and with the age of the fish. Detailed measurements are given in the appendices.

The sea run salmon were measured accurate to one centimetre and weighed to within one-half a pound. The following table prepared from four fish of representative lengths shows the extreme variation which we might expect to find in this data.

Length of fish	Weight of fish	Condition Factor	Factor if measurements change +1 c.m. -½lb.	-1 c.m. +½lb.
75 c.m.	10 lb.	1.07	0.98	1.17
85	15	1.10	1.03	1.19
95	21	1.11	1.05	1.18
105	26½	1.04	0.99	1.09

A series of parr and smolt studied last year showed that 10% formalin increases the factor of condition by from 10% to 25%. This year 12 smolt were measured before and after preservation in 10% formalin to check these data. The following table shows the results in detail.

Before Preservation			After Preservation			
Length	Weight	K	Length	Weight	K	% Increase
15.9	27.17	0.678	15.6	28.27	0.743	9.5
15.0	29.8	0.884	14.8	31.1	0.959	8.5
16.5	30.75	0.684	16.0	31.9	0.778	13.7
15.9	32.6	0.815	15.8	34.0	0.895	9.8
15.2	25.21	0.720	14.7	26.25	0.820	13.8
16.8	34.1	0.719	16.6	35.7	0.776	7.9
15.6	28.75	0.758	15.3	29.5	0.819	8.0
18.4	43.0	0.690	18.0	44.5	0.767	11.2
16.9	32.95	0.686	16.3	34.5	0.802	16.9
13.8	19.75	0.750	13.5	20.9	0.836	11.5
15.2	26.9	0.768	15.1	28.65	0.832	8.3
14.2	20.7	0.723	13.8	22.27	0.856	17.0

Preservation in formalin always raises the condition factor. The solution used in this case raised it by from 8% to 17%. Since the solutions used are never more than 10% this is the maximum increase we may expect.

Fry.

The condition factor of the fry studied ranged from 0.75 to 1.16. The changes for the different lengths, hence different aged fish, are shown graphically in figure 1 and the individual measurements tabulated in Appendix A.

It was demonstrated last year that the factor of the fry rises rapidly after hatching from about 0.75 to 1+ . This graph shows again the very steep curve. This rise apparently reaches its peak within about one month and thereafter the change is very slight or the factor may even fall. Thus, 16 fry taken at Doyle's bridge on July 5 had an average factor of 0.999, while 10 fish taken there on August 16 had an average factor of 0.992 and this in spite of the fact that they had increased from 3.9c.m. to 6.1 c.m. in length during the interval. This is in line with what will be pointed out for the mature salmon and the parr. There is a rapid spring accumulation of fat followed by steady growth and a falling off in fatness toward fall.

The data again show that the condition of the fry varies from place to place. Moreover, comparing the data of 1936 with that of 1937, it also varies considerably from year to year in the same place. The following table compiled from fish collected at Forest Glen brook on August 4 of these two years demonstrates this.

Location	Year	Condition Factor (average)
Campbell Place	1937	0.963
Stewart Place	1937	1.02
Glen brook	1937	0.99
(entire river)	1936	1.14

We would expect conditions in this brook to be reasonably uniform. The differences here are probably due to food supply. This is especially true in the 1936 and 1937 comparison since there have been more fish feeding there during the present season. Food is probably not responsible for differences observed in many other places (Belding - private communication - tells me that

temperature may change the contour of the fish) but it does appear to be the determining factor here.

Parr.

The data show again that the condition factor of parr is on the average one plus, that it rises as the fish becomes older, and that, for fish of any given age group, it varies with the location and the season. The data are shown graphically in figure 1 and tabulated in Appendix B.

The table given below shows the rise in condition which accompanies the growth of the fish.

Date	Location	1 year fish		2 year fish		3 year fish	
		No. of Specimens	K	No. of Specimens	K	No. of Specimens	K
July 14 to Aug. 4	Entire river	51	1.04	33	1.09	6	1.17
Aug. 4	Glen Brook	21	1.00	17	1.06	3	1.16
June 15 to 29.	Margaree River below Forks	18	1.09	7	1.11	--------	

Last year's data showed that the condition factor of the yearling parr was 6% lower than that of the 2-year olds. The present figures demonstrate that the condition factor of the yearlings is 4.8% lower than that of the 2-year fish and 7.3% lower than that of the 3-year fish.

The effect of environment was evident last year in a comparison of the parr from the North-east and South-west Margaree. This year fish were collected only from the North-east branch. The differences found are smaller and less easily interpreted. For example, 8 yearling parr taken at Doyle's bridge and Bochan

brook on July 5 and 7 showed an average factor of 1.04; while 8 yearling parr taken at Forest Glen brook on July 4 had a condition factor of 1.07. These small variations are probably of little significance since differences, equally great, appear in fish living under such similar conditions as are found in different parts of Forest Glen brook. We find the factor of 9 yearling parr at Campbell's Place averaging 1.03 against 6 at Turner's brook averaging 0.97. Moreover numerous examples can be found to show that fish of the same length (apparently growing at the same rate), taken at the same time and in the same place - hence preserved together - may have very different factors. The following examples serve to illustrate this:

Date	Place	Length of fish	Factors of different fish	
July 4	Glen brook	5.8 c.m.	1.03 and	1.10
Aug. 4	"	10.1	0.88	1.10
		11.4	0.99	1.06
		7.5	0.89	0.98
June 26	South-west Margaree	8.1	1.16	1.22

We should, of course, expect individual variations in the fatness among the animals of any group. The data simply show that we must be very careful in attaching a significance to these small variations of the average condition factor.

Comparing the 1936 with the 1937 parr of Forest Glen brook we find the same order of condition factor variation which was

pointed out in the section dealing with the fry. In this case 17 parr collected on August 4,'36 had an average factor of 1.08 as against 1.04 for 40 parr collected there on August 4,'37. This difference appears lower than it actually is since there were more yearling parr in the 1936 sample of fish and this would tend to lower the factor relatively. Since this order is repeated for the fish of the two age groups it seems significant and probably is due to the greater number of fish competing in the latter year.

It was stated last year that the highest conditioned fish were found latest in the season. This is true up to a certain point. As has been shown, the factor does rise throughout the early part of the season. After the middle of the summer, however, it tends to fall. The fish grow but cease to gain in weight after the middle of July. The same conditions was demonstrated for fry. The following table shows the facts:

Date	Location	1-yr parr Specimens	"K"	2-yr parr Specimens	"K"	3-yr parr Specimens	"K"
July 4	Forest Glen brook	8	1.07	5	1.13		
Aug. 4	do	21	1.00	17	1.06	3	1.16
June 15-June 29	Below Forks Margaree river	18	1.09	7	1.11		
July 11-July 17	do	5	1.03	2	1.10		

Smolt.

When we come to study the smolt condition factor and to compare it with the salmon in other age groups we find differences of such magnitude as to be of real significance. The smolt is certainly a thinner salmon than any other (kelts not studied). Lovern '34 finds that, during the smolt transformation, there is a change in the type of fat deposited. This probably accounts for the change in the factor of condition. Just what initiates this physiological metamorphosis in the smolt is not yet clear. Last year it was suggested that endocrine changes were probably responsible, and since that time we have collected data which indicate that this is true.

Figure 1 shows the relation of the smolt condition factor to that of the salmon in the other age groups. Appendix C gives the data in detail. The significant results obtained are summarized in the following table:

Date	Location	2-year fish		3-year fish	
		No. of Specimens	Average Factor	No. of Specimens	Average Factor
May 22-May 30	Harbour and Estuary	14	0.75	4	0.74
June 1-June 10	do	54	0.76	19	0.74
June 11-June 29	do	21	0.85	6	0.82
(All Harbour Smolts)		89	0.78	29	0.76
May 30-June 10	Glen brook	2	1.01	9	0.92
June 1-10	"	4	0.92	9	0.89
July 11-Aug. 7	"	6	0.79	11	0.81
(All Glen brook Smolt)		12	0.87	29	0.87
(All Smolts taken in 1937)		101	0.79	58	0.81

The very early smolt collections made this season substantiate last year's finding of a lower condition factor for the earliest fish to leave the harbour,- May fish had a factor of 0.75; June fish a factor of 0.85. Moreover, regular collections at Forest Glen brook, far distant from Margaree Harbour, show that the smolt loose weight as they descend the river. Thus again we find that the highest conditioned fish are those taken farthest up the river latest in the season. This is certainly due partially to the fact that the smolt transformation is gradual and that the fish fatten as the season advances, but it is probably true also that the fatter fish with better feeding linger in the river.

The later smolts in the river are then fatter. This is true up to a certain point. After the first part of July smolt forced to remain in the river become thinner. The Glen brook series shows this well. It might be suggested in this case that the feeding was poor, and indeed scale growth is very slow here. However, even in Lake Ainslie (mouth of Trout Brook) where very rapid scale growth takes place we found a smolt on August 2, 22.6 c.m. long, but with a condition factor of only 0.85. Grilse have a factor of over one. We do not know how rapid the post-smolt rise is but it would seem that smolt in fresh water do not grow as well as at sea (see also report on Scale Growth).

Last year it was pointed out that the 3-year smolts had a higher condition factor on the average than the 2-year fish. This difference was small - 0.89 as compared to 0.85 - and appears even

smaller this year - 0.79 as compared to 0.81. When we analyze the table above we see that differences between the two classes of fish are insignificant. In studying the other groups of salmon we find that the older fish have higher condition factors. It is strange that this does not hold true of the smolt, but it seems that this transformation initiates an entirely new period in the fish's life.

The data again show that the male smolts have a higher average condition factor than the females. The males do tend to be older fish, but ruling out this chance of an error there is still the same small difference in favour of the males. The following table shows this:

Sex	2 and 3 year fish		3-year fish	
	No. of fish	Factor	No. of fish	Factor
Males	19	0.78	11	0.78
Females	52	0.74	14	0.74

(Fish taken at Margaree Harbour, June 1-10)

Mature Salmon

The young salmon enters the sea a very thin fish in comparison with its river condition. In fact, it is quite as thin as at any time in its life; even considering the early days after emergence from the gravel. As it were the salmon is not only commencing a new chapter in its history, but commencing it as quite a different animal, quite a new animal.

We have noted how rapidly the condition factor of the fry rises after hatching. The same is true of the smolt. We have not had the opportunity of examining fish during their first year in the sea. The grilse, however, have a factor of one plus -

many of the individual fish having higher factors than the two year olds and since the condition factor of the Margaree mature salmon never rises any higher on the average than the parr, it is obvious that the smolt gains weight rapidly after going to sea.

Average figures for the last two years show that the grilse taken had higher factors than the 2-year fish. Since the Margaree river is not a grilse river, the fish coming within range of the nets may be exceptional fish approaching the river and not a true representation of the average condition.

The condition factor curve for the mature salmon prepared on the basis of length (fig. 1) shows again that the longer fish have the higher condition factors. Moreover, the curve again presents three distinct peaks, coming at approximately the 75 c.m., the 90 c.m., and the 100 c.m. marks. One hundred and forty scale samples were examined to relate the lengths of the fish with the years spent in the sea. The data show that 92.5% of the fish between the lengths of 75 and 85 c.m. are two year fish, that 100% of those between 85 and 95 c.m., and 100% of those between 95 and 100 c.m. are three year fish, and that 75% of the small number measuring over 100 c.m. are four or four plus year fish. The three peaks in our graph correspond to the three age groups in the sea. Moreover, these peaks correspond to maximum numbers of fish for the different lengths. That is, in considering a given group of salmon the greatest number of them are about 75 c.m. long, a small number are 85 c.m. long, and a larger number again are about 95 c.m. long. These data for a group of fish are graphed in figure 1. Thus it follows, that the majority of the fish of any sea year tend to have reached a length which varies

only within very narrow limits. Those fish which have not attained this length are thinner. Fish of 70 to 72 c.m. length are 2-year fish, those of 85 c.m. usually 3-year fish. These fish however are not as long as the average fish of that age and their condition factor is lower.

Figure 2 shows the changes which take place in the condition of the adult fish during the season. The data are found in appendix D. The graph was more carefully constructed this year, 50 to 100 fish being calculated every 5 days. It is essentially the same, however, as that of the last two years. The factor rises throughout the early part of the season but falls from the first of July onward. Last year it was suggested that the "poorer" fish came on the shore earlier. In other words this curve does not necessarily represent the fattening of the fish, but may show that the thin fish, or those getting less food, come on the shore and run the rivers earlier. This is very difficult to prove. Salmon stomachs were followed from June 14 to July 12, 422 analyses being made. Tape worms were recorded as present or absent from the intestine. These data are shown in figure 3, and tabulated in Appendix E. They show definitely that the salmon, during the present year, ceased to feed abruptly at about the first of July and that the condition factor commenced to decline at about the same time.# Thus the fall in condition commences when the fish cease feeding. Whether the fish coming on shore earlier are poorer than the average cannot be answered. However, the condition factor of parr rises little after the middle of June and if this be true for the mature salmon, it may still be that thin fish of the mass of salmon are the ones first taken.

#They show also that tape worms are dropped when feeding ceases, rather than when the salmon come into the fresh water as has been stated.

Summary.

Average condition factors of the Margaree salmon very considerably from place to place, from year to year, and from time to time during the same year. Minor variations are of little significance but the same sequence of variations repeated over the past two years leads to the following conclusions.

The condition factor of the fry on emerging from the gravel is less than one but rises rapidly during the first 4 or 5 weeks to remain constant or to fall off toward the latter part of the summer.

The factor of the parr is greater than one and as high as that of the salmon at any time in its life history. The older parr have the higher factors. This falls off toward the end of the season in a manner similar to that of the fry.

The smolt stage is marked by a distinct fall in the factor of condition. The lowest conditioned fish reach the sea earliest. Smolt far up the river show a lowering of the condition factor similar to those entering the sea. Smolt forced to remain in the river do not fatten up as those which reach the salt water do. Male smolts have a higher condition factor than the females. The smolt transformation initiates an entirely new period in the salmon's life as far as the factor of condition is concerned.

Mature salmon have a factor of over one, the older fish having the higher factors. The majority of the salmon of any age group are of a fairly constant length. Those which do not attain this length are thinner. The condition factor falls abruptly when the fish cease feeding.

Appendix A.

SALMON FRY DATA - 1937

No.	Date	Location	Length	Weight	Condition Factor
1	June 14	Silver brook	2.9c.m.	0.20grs.	0.833
2	July 4	Forest Glen brook	2.9	0.18	0.75
3			2.9	0.2	0.83
4	July 5	Doyle's bridge N. E. Margaree	4.6	0.99	1.01
5			3.6	0.55	1.16
6			4.0	0.62	0.968
7			4.3	0.80	1.01
8			3.9	0.58	0.983
9			4.6	1.00	1.03
10			4.6	0.96	0.989
11			4.4	0.85	1.00
12			3.9	0.57	0.966
13			3.6	0.47	1.00
14			3.9	0.60	1.01
15			3.8	0.55	1.00
16			3.8	0.56	1.01
17			3.1	0.27	0.9
18			3.7	0.53	1.03
19			2.0	0.25	0.926
20	July 7	Bochan brook	4.3	0.85	1.07
21			4.3	0.85	1.07
22			4.5	0.92	1.01
23			4.1	0.67	0.971
24			4.4	0.85	1.00
25			3.9	0.57	0.966
26			4.4	0.80	0.94
27			4.1	0.70	1.01
28			4.4	0.86	1.01
29			4.2	0.75	1.01
30			4.3	0.82	1.03
31			4.2	0.72	0.972
32			4.5	0.90	0.989
33			4.3	0.80	1.01
34	July 11	Little river	3.3	0.36	1.00
35			3.2	0.31	0.939
36			4.3	0.80	1.01
37	Aug. 4	Widow Lord's brook+	4.8	1.05	0.954
38			5.0	1.25	1.00
39			5.2	1.25	0.892
40			4.5	0.75	0.824
41			5.1	1.12	0.842
42	Aug. 4	Forest Glen brook (Campbell place)	3.8	0.56	1.01
43			4.2	0.75	1.01
44			3.6	0.46	0.978
45			3.9	0.53	0.898
46			3.6	0.45	0.959
47			3.2	0.31	0.939
48			3.8	0.57	1.03
49			3.8	0.56	1.01

Appendix A. continued:

No.	Date	Location	Length	Weight	Condition Factor
50	Aug. 4	Forest Glen brook (Campbell place)	4.0	0.58	0.906
51			3.9	0.60	1.01
52			3.6	0.40	0.851
53	Aug. 4	At first farm Stewart Place	4.2	0.77	1.04
54			4.3	0.75	0.949
55			4.3	0.85	1.07
56			4.3	0.80	1.01
57			4.4	0.87	1.02
58			4.3	0.80	1.01
59			4.2	0.77	1.04
60			4.2	0.75	1.01
61			4.1	0.71	1.02
62			4.2	0.77	1.04
63			4.6	0.96	0.989
64			4.6	1.00	1.03
65	Aug. 4	Turner brook	4.6	0.98	1.01
66			4.3	0.80	1.01
67	Aug. 16	Doyle's bridge N. E. Margaree	6.8	3.05	
68			6.0	2.2	
69			5.5	1.8	
70			6.2	2.3	
71			6.9	3.0	
72			5.2	1.4	
73			6.1	2.2	
74			6.4	2.95	
75			6.4	2.7	
76			5.8	1.75	

+ These fish were weighed fresh; hence the condition factor will be comparatively lower.

Appendix B.

SALMON PARR DATA - 1937.

No.	Date	Location	L. c.m.	W. grs.	S.	K.	History years	Growth of Scale 1st yr.	2nd yr.	Current year	Circuli added 1937	% increase 1937
1	May 22	Old Bridge Site	6.4	2.52	M	0.961	1+	1.6		0.3	1½	15
2			6.6	3.1	F	1.08	1-	1.4		0.25	1¾	17
3			6.5	3.0	F	1.09	1-	1.1		0.8	5	42
4			6.8	3.08	F	0.98	1-	1.6				
5	June 14	Silver brook	7.5	5.25	M	1.25	1-	1.2		0.8	5	40
6			6.6	3.0	F	1.04	1-	1.1		0.6	4½	35
7	June 15	S.W.Margaree	10.8	16.25	M	1.28	2-	1.0	1.8	1.7	8	37
8			9.0	8.57	M	1.17	1-	1.6		1.0	5½	38
9			8.4	7.12	M	1.20	1-	1.7		0.7	4	29
10		Chapel bridge	10.4	11.22	F	0.992	1-?	1.8		1.8	8	50
11			7.8	4.0	?	0.851	1-	1.5		1.0	5	40
12	June 19	Margaree ford	10.6	13.15	F	1.10	1-	2.0		1.7	8	46
13			10.1	12.75	F	1.23	1-	2.1		1.6	7½	43
14	June 25	W. Lord's brook	8.4	6.55	F	1.11	1-	1.8		1.2	6	40
15			7.9	5.25	F	1.07	1-	1.5		1.0	5	40
16			7.4	4.5	F	1.10	1-	1.5		1.0	4½	40
17			9.1	7.82	F	1.04	2-	0.9	1.3	0.5	4	18
18			10.5	12.62	F	1.09	2-	1.2	1.3	0.5	3½	14
19	June 26	Trout brook	6.7	2.99	M	0.996	1-	1.1		0.4	2½	26
20			6.5	2.99	M	1.09	1-	1.2		0.6	3	33
21			6.8	3.16	F	1.00	1-	(growth rings indefinite)				
22		Gillis brook	11.8	19.55	M	1.19	2-	1.1	1.5	0.9	4	25
23		S.W.Margaree	8.1	6.15	F	1.16	1-	1.8		1.2	5	40
24			8.1	6.55	F	1.22	1-	1.7		0.9	4½	35
25	June 29	Margaree Estuary	11.8	17.25	M	1.05	2-	1.2	1.4	1.9	9	42
26			10.2	12.2	F	1.15	2-	1.2	1.9	0.4	1½	11?
27			11.5	15.37	F	1.01	2-	1.0	1.1	2.4	11	53
28			9.9	10.55	F	1.08	1-	1.4		2.2	11	61
29	July 4	Glen brook	12.7	22.17	M	1.08	2-	2.0	2.0	1.4	8	26
30			13.8	30.8	M	1.17	2-	1.3	1.8	1.6	8	34
31		Ross Saw mill (up)	10.7	13.8	F	1.13	2-	1.6	1.1	1.0	5	27
32			12.1	21.5	F	1.21	2-	2.4	1.1	0.9	4	20
33			10.6	12.55	F	1.05	2-	1.7	1.9	0.8	5	18
34			6.6	3.0	M	1.04	1-	1.4		0.5	3½	26

Appendix B. (continued)

SALMON PARR DATA - 1937.

No.	Date	Location	L. c.m.	W. grs.	S.	K.	History years	Growth of Scale 1st yr.	2nd yr.	Current year	Circuli added 1937	% increase 1937
35	July 4	Ross saw mill (up)	5.8	2.16	?	1.10	1-	1.0		0.9	5	47
36			6.5	2.99	?	1.09	1-	1.4		1.0	5	42
37			6.0	2.2	?	1.01	1-	0.9		0.6	3	40
38			5.9	2.4	?	1.17	1-	0.9		0.9	4	50
39			5.6	1.9	?	1.07						
40			5.7	1.96	?	1.05						
41			5.8	2.02	?	1.03						
42		Campbell bridge	11.6	18.77	M	1.20	3-?	1.1	1.6+	0.7	4	16
43	July 5	Doyle's bridge	13.0	22.95	F	1.04	2-	1.3	0.9	2.3	12	53
44			10.4	11.77	F	1.05	1-	1.7		2.2	11	56
45			10.9	13.9	F	1.07	1-	1.7		1.3	6	43
46			11.1	15.8	F	1.14	1-	1.4		1.9	9½	57
47			10.3	11.42	M	1.04	1-	2.0		2.2	10	52

+ Third year = 0.9

Appendix B. (continued) SALMON PARR DATA - 1937.

No.	Date	Location	L. c.m.	W. grs.	S.	K.	History years	Growth of Scale 1st yr.	2nd yr.	Current year	Circuli added 1937	% increase 1937
48	July 7	Bochan brook	8.2	5.57	F	1.01	1-	0.9		1.2	7	57
49			9.5	9.3	F	1.08	1-	2.0		1.1	6	35
50			7.7	4.6	F	1.00	1-	1.6		0.3	2	15
51			7.2	3.65	M	0.978	1-	1.2		0.6	3½	36
52	July 11	Robert's brook	15.4	46.5	M	1.27	3-	1.5	1.2+	1.3	7½	21
53		(Chetticamp)	11.9	18.65	M	1.09	2-	1.8	1.9	1.6	8	30
54			9.2	8.25	F	1.06	1-	1.8		1.4	8	43
55	July 12	Glen brook	12.9	24.1	F	1.12	2-	2.0	1.8	0.8	4	17
56	July 22	Glen brook	13.2	26.2	M	1.14	3-	1.0	1.5+	1.7	9	31
57	Aug. 4	Glen brook	7.9	4.9	M	1.00	1-	1.3		1.0	6½	43
58		Campbell place	11.0	16.05	M	1.20	2-	1.8	1.4	1.5	8	31
59		(up)	9.5	9.15	M	1.06	1-	1.4		1.6	8	53
60			7.2	4.07	F	1.08	1-	1.3		1.0	5½	43
61			9.8	10.1	M	1.07	2-	1.0	1.0	0.7	4	25
62			10.1	9.1	F	0.883	2-	0.8	1.2	1.2	7	37
63			7.2	3.55	F	0.951	1-	1.0		1.2	6	54
64			10.2	9.27	F	0.874	2-	1.2	1.1	0.8	4	25
65			6.6	2.8	F	0.975	1-	1.0		0.8	6	44
66			10.1	11.35	M	1.10	2-	1.3	1.2	0.9	4½	26
67			6.2	2.52	M	1.06	1-	0.8		1.1	7	57
68			6.9	3.3	F	1.00	1-	1.1		0.9	5½	45
69			7.3	4.4	M	1.13	1-	1.0		1.4	7½	58
70			6.6	2.9	F	1.01	1-	1.2		0.9	5	43
71			9.3	8.65	M	1.08	2-	1.0	0.9	0.9	5½	32
72	Aug. 4	Glen brook	11.5	14.55	F	0.957	2-	1.9	1.6	1.2	6	25
73		First farm	7.9	5.27	F	1.07	1-	1.0		0.9	6	47
74		(Stewart)	8.3	5.7	F	1.00	1-	1.7		1.3	6	43
75			11.4	15.75	F	1.06	2-	2.0	1.2	1.3	6	29
76			11.4	14.6	F	0.986	2-	1.3	1.5	1.7	8	38
77			10.3	10.7	M	0.999	2-	1.6	1.2	1.0	6	27
78			7.5	4.1	F	0.976	1-	1.1		0.9	5	45
79			7.5	3.75	F	0.892	1-	1.2		0.9	6	43
80			10.8	13.5	M	1.07	2-	1.6	1.5	0.9	5	25

Appendix B. (continued)

SALMON PARR DATA - 1937.

No.	Date	Location	L. c.m.	W. grs.	S.	K.	History years	Growth of Scale. 1st yr.	2nd yr.	Current year	Circuli added 1937	% increase 1937
81			9.1	7.92	M	1.06	1-	1.5		1.2	7	44
82			8.6	6.35	M	0.998	1-	1.7		1.2	7	41
83	Aug. 4		9.8	10.7	M	1.14	2-	1.4	1.2	1.1	5	29
84		Turner brook	12.9	22.15	M	1.03	3-	1.7	1.0+	1.1	6½	21
85			7.9	4.55	F	0.928	1-	1.7		0.9	5	35
	+ Third year = 2.0											
	Third year = 1.3											
	Third year = 1.3											
86	Aug. 4	Turner brook	7.0	3.3	M	0.97	1-	1.1		1.2	7	36
87			7.6	4.15	F	0.943	1-	1.4		1.0	6	41
88			11.0	16.7	M	1.25	2-	1.6	1.4	0.8	5	21
89			10.6	11.8	F	0.991	2-	1.5	1.1	0.9	5	26
90			12.0	23.1	M	1.33	3-	1.6	1.5+	1.1	5	19
91			11.5	16.1	M	1.05	2-	2.0	1.3	1.2	5½	26
92			10.4	11.65	M	1.03	2-	1.6	1.4	0.9	5	23
93			10.5	12.8	M	1.38	2-	1.6	1.2	1.0	4½	26
94			8.0	4.9	M	0.96	1-					
95			7.8	4.5	F	0.957	1-	1.4		0.9	5	39
96			8.5	6.42	M	1.05	1-	1.9		1.1	6	36
97	Aug. 7	Glen brook	12.6	23.5	M	1.17	2-	1.2	1.4	1.6	9	38
98	Aug.16	Doyle's bridge	13.6	21.4								
99			13.5	25.8								
100			10.4	12.25								
101			11.1	14.7								
102			10.7	13.5								

+ Third year = 1.4

Appendix C.

SALMON SMOLT DATA - 1937

No.	Date	Location	L. c.m.	W. grs.	S	K.	History years	Growth of Scales 1st. yr.	2nd. yr.	3rd. yr.	current year	circuli added 1937	% increase 1937
1	May 22	Retention pond	14.0	24.15	F	0.880	2-	1.8	2.5		0.5	2	10
2	May 24	Harbour bridge	15.0	27.8	M	0.823	2-	1.6	1.9		1.3	5	27
3			14.3	22.5	F	0.769	3-	1.4	1.6	1.5	0.3	1	6
4			14.1	22.57	F	0.800	2-	2.0	1.0		0.1	½	3
5			16.3	?	F	?	2-	2.0	3.1		0.4	2	7
6		S.W.break-water	14.5	23.55	F	0.777	2-	1.7	2.5		0.6	2	12
7			22.5	91.25	F	0.801	3-	1.3	1.8	4.3	0.9	3	10
8	May 26	Harbour mouth	15.4	?	F	?	2-	1.6	3.5		0.6	3	10
9	May 28	Duck cove	13.4	16.65	F	0.693	2-	1.8	2.4		0.6	2	12
10			12.7	15.57	F	0.767	2-	1.8	2.1		0.5	2	12
11	May 29	S. W. break-water	19.6	56.7	F	0.755	2-	2.3	4.8		0.7	3	9
12			14.2	20.9	F	0.73	2-	1.6	2.2		0.9	4	19
13			15.5	28.75	M	0.734	2-	1.5	2.9		0.6	3	12
14			15.5	25.12	F	0.670	3-	1.7	2.1	2.1	0.0	0	0
15			15.4	26.25	F	0.719	2-	1.7	2.2		0.9	4	18
16			16.0	29.59	F	0.722	2-?	2.5	2.0		0.9	4	16
17			14.6	22.56	F	0.705	2-	2.1	2.8		0.5	2	11
18	May 30	Harbour mouth	17.2	37.85	F	0.743	3-	1.4	2.5	2.1	1.0	4	14
19			14.3	21.9	F	0.748	2-	1.6	2.1		1.2	5	24
20			15.7	25.55	M	0.66	2-	1.4	3.5		1.1	4	18
21			14.3	22.32	F	0.763	2-	1.4	1.5		1.3	5	30
22	June 3	S. W. break-water	14.5	23.35	F	0.762	2-	2.1	1.6		0.7	3	15
23			16.6	37.07	M	0.830	3-	1.3	2.0	2.5	0.6	3	9
24			15.9	34.55	M	0.859	2-	1.5	2.6		1.1	4	21
25			13.7	20.67	F	0.804	2-	1.2	1.4		1.3	4½	29
26			14.9	24.77	F	0.75	2-	2.0	2.3		1.0	4	19
27			15.9	31.2	M	0.776	3-	1.1	1.0	2.0	0.8	3	16
28			14.3	21.76	F	0.745	2-	1.7	1.8		1.2	4½	25
29			14.4	22.75	F	0.762	2-	1.2	2.5		1.5	5	29
30			15.6	34.6	M	0.95	2-	1.9	1.6		1.2	4	25
31			15.0	26.6	M	0.788	2-	2.3	2.4		1.3	4	21
32			13.2	18.09	F	0.786	2-	1.9	1.7		0.8	4	18

Appendix C (continued)

SALMON SMOLT DATA - 1937

No.	Date	Location	L. c.m.	W. grs.	S.	K.	History years	Growth of Scale 1st. yr.	2nd. yr.	3rd. yr.	Current yr.	Circuli added 1937	% increase 1937
65	June 5	S.W.Breakwater	14.2	21.2	F	0.741	2-	1.9	2.3		1.3	6	22
66			13.2	18.0	F	0.782	2-	1.7	1.3		1.0	4	25
67			14.7	22.25	F	0.70	2-	1.9	2.6		0.9	3	11
68	June 7		14.0	23.55	F	0.877	2-	1.5	2.1		0.9	3½	20
69			16.0	28.65	F	0.699	2-	2.9	2.1		1.4	5	21
70			15.0	24.57	F	0.722	2-	1.6	1.3		1.3	5	31
71			15.2	29.5	F	0.785	2-	1.3	2.5		1.0	3½	21
72			13.3	18.85	F	0.685	2-?	1.6	2.2		1.0	3	21
73			13.9	19.5	F	0.722	2-	1.3	2.2		1.0	4	22
74			15.1	22.6	F	0.657	3-	1.0	1.5	2.1	1.1	4½	19
75			13.2	18.8	F	0.817	2-	1.3	2.2		1.0	4	22
76			17.5	39.99	M	0.747	3-?	1.5	1.4	1.7	1.3	6	22
77			16.0	30.75	M	0.748	3-	1.4	1.9	1.2	1.2	5	21
78			15.1	27.1	F	0.787	3-	2.3	1.1	0.7	0.5	2	11
79			16.4	34.55	M	0.785	2-?	1.6	3.2		1.6	5½	25
80			13.6	19.55	F	0.782	2-	1.8	2.3		0.9	4	18
81			16.0	30.75	M	0.748	3-	2.5	1.3	1.5	0.7	3	11
82			15.2	26.12	M	0.746	2-	2.1	2.6		1.8	6	27
83			14.3	22.7	M	0.756	2-	1.4	1.2		1.4	5½	35
84			15.2	24.1	F	0.688	2-	2.1	1.8		1.5	5	28
85			13.3	21.65	M	0.787	2-	1.5	1.6		1.8	6	37
86			13.3	18.2	M	0.661	2-	1.9	1.4		1.0	4½	23
87			14.9	13.2	M	?	2-	1.5	1.6		1.8	6	37
88	June 11		15.1	28.65	F	0.832	2-	1.8	3.0		0.8	3½	14
89			13.8	22.27	F	0.856	2-	1.5	1.1		1.6	6	38
90			13.5	20.9	F	0.836	2-	1.3	1.4		1.0	4	27
91			15.7	34.8	F	0.892	3-	0.9	1.5	1.7	1.8	6½	13
92			16.3	34.5	F	0.802	3-	1.1	1.8	0.9	1.3	5	25
93			15.3	29.5	F	0.819	2-	2.0	1.5		1.4	5	28
94			18.0	44.5	F	0.767	3-	1.9	1.7	2.0	1.1	3½	16
95			15.8	34.0	M	0.895	3-	1.4	1.5	1.7	1.1	5	19
96			15.6	28.27	M	0.743	2-	1.8	2.2		1.8	6	31
97			14.7	26.25	M	0.82	2-	1.6	1.9		1.8	7	34
98			16.6	35.7	F	0.776	3-	1.3	1.2	1.3	1.5	5½	28
99			16.0	31.9	F	0.778	3-?	2.1	1.9	1.1	1.4	4½	21

Appendix C (continued)

SALMON SMOLT DATA - 1937

No.	Date	Location	L. c.m.	W. grs.	S.	K.	History years	Growth of Scale Circuli 1st. yr.	2nd. yr.	3rd. yr.	Current yr.	added 1937	% 1937 increase
100	June 11	S.W.Breakwater	14.8	31.1	M	0.959	2-	1.8	2.2		1.4	5	26
101	June 16	Laurence's Wharf	14.4	27.9	F	0.949	2-	1.8	2.0		1.6	6	29
102	June 29	Margaree Estuary	15.1	29.75	M	0.864	2-	1.8	2.5		2.2	11	33
103	June 15	Chapel bridge	15.5	28.9	F	0.776	2-	2.1	2.8		1.2	5	19
104	July 4	Glen brook	16.5	32.65	F	0.727	3-	1.7	1.8	2.5	1.0	5	14
105	June 10		15.1	32.02	M	0.93	3-	0.7	1.0	0.6	0.7	4	23
106			14.0	22.6	F	0.825	3-	2.0	1.3	1.1	0.5	3	10
107			13.0	21.2	F	0.963	2-	1.2	0.9		0.3	3	12
108			12.8	16.8	F	0.80	3-	1.5	1.3	1.2	0.3	2	7
109			12.5	18.05	F	0.925	3-	1.0	1.3	1.0	0.3	1½	8
110	Aug.2	Trout brook	22.6	98.2	?	0.854	4-	0.9	1.1	0.8+	2.0	17	29
111	July 1	Glen brook	15.8	31.9	F	0.83	3-	1.7	1.7	2.0	1.2	5	18
112			14.4	25.8	M	0.865	3-	1.3	1.7	1.1	1.2	5½	23
113	June 9	Duck Cove	15.2	27.37	M	0.782	2-	1.9	1.8		1.6	7	30
114	June 12	Harbour mouth	14.4	23.65	F	0.793	2-	1.6	2.3		1.9	5½	32
115			14.8	27.97	F	0.863	2-	1.7	2.0		1.2	4½	24
116			15.4	32.77	M	0.897	2-	2.0	1.8		1.8	5	32
117			15.4	30.0	F	0.821	2-	1.4	1.6		1.4	4½	32
118			15.8	35.5	M	0.924	2-	1.7	1.5		1.7	5½	35
119			14.4	27.25	F	0.914	2-	1.8	1.8		1.4	5	28
120			14.2	25.3	F	0.884	2-	1.7	1.8		1.5	5	30
121			13.2	21.05	F	0.915	2-	1.4	2.1		1.3	5	27
122			15.1	26.65	F	0.774	2-	2.3	2.4		1.1	4½	19
123			15.0	27.4	F	0.813	3-	1.4	1.2	1.1	1.2	5	24
124			14.8	27.85	F	0.859	2-	2.0	1.8		1.2	4	24
125	June 10		14.6	23.25	F	0.775	2-	1.7	2.1		1.0	4	21
126			15.6	29.1	F	0.766	2-	0.9	2.2		1.8	6	37
127			14.5	24.45	M	0.815	2-	1.2	2.2		1.8	6	34
128			15.1	31.1	M	0.901	3-?	2.9	1.2	1.2	0.3	1?	5
129			15.4	29.5	F	0.808	2-	1.8	2.5		1.5	5	31

+4th Year = 2.1 Measurements made with low power objective.
Fish weighed before preservation.

Appendix C (continued)

SALMON SMOLT DATA - 1937

No.	Date	Location	L. c.m.	W. grs.	S.	K.	History years	Growth of Scale 1st yr.	2nd. yr.	3rd. yr.	Current yr.	Circuli added 1937	% increase 1937
130	June 10	Harbour Mouth	14.8	25.1	F	0.774	3-	0.7	1.5	0.9	1.8	6	37
131			15.2	27.95	F	0.798	3-	1.3	1.5	1.2	0.6	2	13
132			15.0	24.15	F	0.716	2-	2.0	2.4		1.5	5	25
133			15.5	32.45	F	0.877	3-	1.8	1.4	1.2	1.1	4	20
134	Aug. 7	Glen brook	15.2	27.2	F	0.744	2-	2.9	2.1		1.5	7½	26
135			15.7	34.05	F	0.879	3-	1.3	1.6	1.3	1.7	8	28
136			15.2	27.4	?	0.782	3-	0.9	1.3	1.3	1.8	10	34
137	May 30	Forest Glen trap	15.0	32.3	F	0.958	3-	1.5	2.1	1.9	0.4	1	7
138			13.7	22.8	M	0.887	3-	1.6	1.7	1.7	0.4	1½	7
139			11.2	14.95	F	1.07	3-	1.0	1.1	1.2	0.2	1	6
140			12.5	18.6	F	0.953	3-	1.2	1.5	2.3	0.5	2	9
141			15.5	34.8	F	0.935	3-	2.1	1.7	2.0	0.3	1	5
142			11.2	14.1	F	1.07	2-	1.6	2.2		0.7	2	15
143	June? 15		14.5	23.3	F	0.766	3-	1.5	1.4	1.7	1.4	6	23
144			14.6	22.7	F	0.756	2-	1.8	2.2		1.0	4½	20
145			13.6	19.65	F	0.786	3-	1.0	0.9	1.4	0.7	3½	17
146			15.7	28.3	F	0.733	3-	1.1	1.2	1.5	0.8	5	17
147			16.0	30.55	F	0.745	3-	1.7	1.7	2.0	1.4	6½	20
148			15.8	29.2	F	0.768	3-	1.9	1.3	2.1	0.8	4½	12
149			13.0	16.85	F	0.769	2-	1.8	2.2		1.0	5	20
150			14.4	22.8	F	0.765	2-	2.0	1.5		1.7	7	33
151			13.8	23.2	M	0.892	2-	1.7	1.9		1.3	6	26
152	July 6		14.4	27.3	F	0.916	3-	1.3	1.7	1.7	0.8	3½	14
153			15.8	40.2	M	1.05	3-	1.6	1.5	2.4	0.9	3½	14
154			11.4	15.2	F	1.03	2-	1.7	1.7		0.7	3	17
155			14.2	22.7	M	0.793	3-	1.7	1.5	0.9	0.4	3	9
156			12.6	18.1	M	0.905	3-	1.0	1.3	1.2	0.5	2	12
157			11.8	14.6	F	0.89	2-	1.5	1.4		0.9	4	23
158			12.2	16.2	M	0.90	3-	1.3	1.2	0.9	0.6	3	15
159			13.3	22.05	F	0.801	2-	1.7	1.8		1.0	4	22
160			13.4	22.9	F	0.954	2-	1.8	1.7		1.1	3	24

Appendix C (continued)

SALMON SMOLT DATA - 1937

No.	Date	Location	L. c.m.	W. grs.	S.	K.	History years	Growth of Scale 1st. yr.	2nd. yr.	3rd. yr.	Current yr.	Circuli added 1937	% increase 1937
161	July 6	Forest Glen Trap	14.9	32.55	M	0.986	4-	1.3	1.1	0.9+	0.5	2	10
162	July 22	Glen brook	14.3	23.7	F	0.817	3-?	0.9	1.0	1.6	1.8	7	34
163		bridge pool	14.4	26.1	M	0.875	3-	1.8	1.6	1.2	1.9	9	29
164			13.7	21.55	F	0.838	3-	1.6	1.0	1.7	0.7	5	14
165			14.6	28.1	F	0.936	3-?	1.2	1.2	2.0	1.6	8	26
166			14.2	23.3	F	0.814	2-	1.7	2.1		1.2	7	24

+ 4th year = 1.0

Appendix D.

MATURE SALMON DATA - 1937.

Date	Location Fleet	L. c.m.	W. lb.	S. ?	K.
June 10	AuCoin Bros.	94	10½	F	1.12
	Arsenault	92	18	M	1.04
		76	9	F	0.929
		76	10	F	1.03
		70	7½	F	0.989
		76	10½	?	1.08
June 14	D. MacKinnon	78	10½	M	1.00
		90	19	F	1.18
		77	9	M	0.894
June 15	AuCoin Bros	76	8½	M	0.879
		76	9	?	0.929
		72	7	M	0.85
		76	7	F	0.724
		82	11½	M	0.946
		77	11	M	1.09
	Arsenault	74	8	M	0.895
		80	11	F	0.974
	A. MacLean	74	7	M	0.784
	H. MacLean	88	16	M	1.06
		92	19	M	1.07
		72	7	F	0.85
		76	9½	M	0.981
June 16	D. LeBlanc	72	8	F	0.971
		80	9½	F	0.842
	H. MacLean	76	8½	F	0.879
		78	8½	F	0.814
		96	20	M	1.03
		90	17½	F	1.09
June 17	Chimney Corner	89	18	M	1.16
		76	9	F	0.931
		78	11	F	1.05
		88	18	F	1.20
		75	9	M	0.968
		78	9	F	0.864
		73	9	M	1.05
		91	18	F	1.08
		78	11	F	1.05
		75	9	F	0.968
		76	11	F	1.13
		76	11	M	1.13
	Margaree Harbour	77	9	F	0.894
		77	10	M	0.995
		78	11	F	1.05
		78	12	F	1.15
		78	10	F	0.955
		75	11	M	1.18
	Arsenault	76	10	F	1.03
		90	20	F	1.24
		98	22½	M	1.08

Appendix D. (cont'd) MATURE SALMON DATA - 1937

Date	Location Fleet	L. c.m.	W. lb.	S.	K.
June 17	D. LeBlanc	100	18	M	0.816
	J. MacKinnon	76	9	M	0.929
	H. MacLean	78	10	F	0.955
June 18	Chimney Cor.	83	10	F	0.793
		75	11	M	1.18
		78	10	F	0.955
		92	19	F	1.07
		88	17	F	1.13
		72	9	F	1.09
	Margaree Harbour	77	10	F	0.995
		87	18	F	1.24
	Broad Cove Marsh	74	9	F	1.00
		79	11	F	1.01
		90	21	F	1.30
		78	11	F	1.05
		75	11	F	1.18
		78	11	M	1.05
		82	13	M	1.07
	A. MacLean	72	7½	M	0.911
		72	9	F	1.09
		78	10	M	0.955
	H. MacLean	78	10	F	0.955
		76	8½	M	0.88
		76	8½	F	0.88
		72	7	M	0.85
		84	11½	M	0.881
		80	12	M	1.06
		90	20	F	1.24
		92	18½	F	1.08
		74	7½	M	0.839
		74	8½	M	0.951
	D. MacKinnon	82	10	M	0.821
		72	8½	F	1.03
		76	9½	F	0.981
		80	10	M	0.885
		72	7	F	0.85
		84	12½	F	0.958
		94	20	M	1.09
		74	9	F	1.00
		76	9	F	0.929
		72	7½	M	0.911
		76	10	F	1.03
		76	10	F	1.03
June 19	Chimney Corner	76	9	F	0.929
		92	22	F	1.28
		79	10	F	0.919
	Arsenault	78	8½	F	0.814
		74	8	F	0.905
	D. LeBlanc	79	10	M	0.918
		94	21	F	1.14
	J. MacKinnon	72	7½	M	0.911
	A. MacLean	78	8½	F	0.814
		73	9½	F	1.10

Appendix D (continued)

MATURE SALMON DATA - 1937

Date	Location Fleet	L. c.m.	W.(lb.)	S. ?	K.
June 19	H. MacLean	79	11½	M	1.04
		71	7	M	0.889
		92	19	F	1.10
		78	9½	F	0.91
		73	8	F	0.931
		78	9	M	0.81
June 21	Chimney Corner	95	20	F	1.06
	Margaree Harbour	91	19	F	1.14
		79	12	M	1.10
		74	9	F	1.00
		78	11	F	1.05
	AuCoin Bros.	74	8½	F	0.951
		74	7½	F	0.839
		95	20	F	1.06
		80	11½	F	1.10
		87	10	F	0.689
		77	10	M	0.995
		88	17	F	1.13
	Arsenault	76	8½	M	0.879
	D.LeBlanc	73	7	F	0.815
		76	9½	M	0.981
		75	8	M	0.861
		72	7½	M	0.911
		86	14	F	0.997
		74	8½	F	0.725
		81	11	F	0.939
		80	11	F	0.974
		76	9	M	0.929
	J. MacKinnon	90	18½	M	1.15
		74	9½	F	1.06
	D. MacKinnon	76	9	F	0.929
		78	10	F	0.955
		75	9	F	0.969
	A. MacLean	75	7½	F	0.806
	H. MacLean	89	15	F	0.966
		72	7½	F	0.91
		76	8	F	0.826
		91	19	F-	1.14
		74	8	F	0.895
		75	9	F	0.969
		78	9	?	0.862
		102	22	F	0.942
		72	7	M	0.85
		74	9	F	1.00
		87	10½	F	0.724
June 22	Broad Cove Marsh	77	11	F	1.09
		84	13	F	0.995
		91	19	F	1.14
		76	10	M	1.03
		78	11	F	1.05
		76	10	F	1.03
	MacLean's Cove	78	10	F	0.957
		79	11½	F	1.06
		76	11	F	1.14

Appendix D (continued) MATURE SALMON DATA- 1937.

Date	Location Fleet	L. c.m.	W. lb.	S. ?	K.
June 22	MacLean's Cove	86	16	F	1.14
	D. LeBlanc	92	19½	F	1.13
		95	23	F	1.21
		76	10	F	1.03
		80	10	M	0.886
		91	18½	F	1.11
	Arsenault	74	9	F	1.00
	AuCoin Bros.	77	10	F	0.995
	J. MacKinnon	101	22	M	0.968
	H. MacLean	82	11½	F	0.945
		96	24	F	1.23
		78	10½	F	1.00
		80	10	M	0.886
		85	15	F	1.11
		81	12	F	1.02
		77	10½	F	1.04
June 23	D. LeBlanc	79	10	F	0.919
		82	13	F	1.06
		77	9½	F	0.944
		80	10½	M	0.931
		80	11½	F	1.01
		81	11½	F	0.982
		76	9	F	0.929
		74	9	F	1.00
		78	11	F	1.05
	Arsenault	74	9	F	1.00
	AuCoin Bros.	83	11	M	0.872
		79	9½	M	0.873
		92	18½	F	1.08
		72	7	F	0.85
	H. MacLean	72	7	F	0.85
		78	9	M	0.861
	Chimney corner	70	8	F	1.05
		80	11	F	0.972
		73	8	F	0.931
		76	10	M	1.03
		83	12	F	0.952
	MacLean's Cove	78	9	F	0.86
		76	9	F	0.93
		82	11½	M	0.946
June 24	Chimney Corner	81	12	F	1.02
	MacLean's Cove	89	19	F	1.22
	D. LeBlanc	76	11½	F	1.19
		92	20	F	1.16
		80	10	M	0.886
		78	12	M	1.15
		94	18½	M	1.01
	Arsenault	76	10	M	1.03
	AuCoin Bros.	75	9	M	0.969
		73	7	F	0.815
		72	8	M	0.973
		76	10	F	1.03
		78	11	F	1.05
		76	9½	F	0.981

Appendix D. (continued) MATURE SALMON DATA - 1937.

Date	Location	L. c.m.	W. lb.	S. ?	K.
June 25	Margaree Hbr.	78	10	F	0.956
	AuCoin Bros.	90	17	F	1.06
	A. MacKinnon	92	16	F	0.933
		94	23½	F	1.28
		78	9	M	0.861
		70	6	F	0.794
		74	10	F	1.12
		78	8	F	0.972
June 26	Chimney Corner	74	10	F	1.12
		94	19	F	1.04
		75	10	F	1.07
		79 ← 79	10 ← 11	F ← M	0.92 ← 1.01
	Broad Cove Marsh	85	14	F	1.03
		83	12	M	0.954
		75	9	F	0.969
		92	22	F	1.28
		101	23	M	1.01
	MacLean's Cove	95	23	F	1.22
	Margaree Harbour	110	31		
		74	7½	F	0.839
		88	19	F	1.26
		95	22	M	1.16
		75	9	F	0.969
		82	14	F	1.15
		80	13	F	1.15
	D. LeBlanc	96	20½	F	1.05
		85	16	F	1.18
		76	9	F	0.929
	Arsenault	82	13	F	1.07
		74	9½	F	1.06
		75	10	F	1.07
	AuCoin Bros.	77	12	M	1.19
		94	23	F	1.25
		78	11	F	1.05
		71	6½	M	0.825
		77	10	F	0.994
	A. MacKinnon	80	10½	F	0.93
		76	10	F	1.03
	M. MacLean	97	25	F	1.24
		78	11	F	1.05
		76	9	F	0.931
		91	19	F	1.14
		91	16	M	0.964
		79	10½	M	0.914
	A. MacLean	72	9	?	1.09
		76	9	?	0.931
June 28	Chimney Corner	75	9	F	0.969
		76	10	F	1.03
		83	13	M	1.03
		76	10	F	1.03
		74	8	F	0.896

Appendix D. (continued)

MATURE SALMON DATA - 1937.

Date	Location Fleet	L. c.m.	W. lb.	S. ?	K.
June 28	Chimney Corner	78	11	M	1.05
		77	10	F	0.994
		76	9	F	0.931
		72	8	F	0.972
		80	11	M	0.974
	MacLean's Cove	74	9	F	1.01
		98	20	F	0.964
		92	18½	F	1.08
		92	17	F	0.992
		83	12	M	0.952
		82	10	F	0.822
		92	16	F	0.932
	D. LeBlanc	75	9	F	0.969
		77	12	F	1.19
		77	10	F	0.994
		92	18	F	1.05
	Arsenault	90	15	M	0.936
		73	8	F	0.932
		97	23	F	1.14
		90	17	M	1.06
		77	10½	F	1.04
		78	10½	F	1.00
		96	19	F	0.976
	AuCoin Bros.	84	11	F	0.842
		92	20	F	1.16
		72	11	M	1.33
		78	10	F	0.956
		80	10	M	0.886
		80	10½	F	0.93
		80	10	F	0.886
	A. MacKinnon	74	9	F	1.01
	H. MacLean	88	16	F	1.06
		87	22	F	1.09
		80	12	F	1.06
		94	18	F	0.984
		74	8	M	0.896
		76	10	F	1.03
		77	10	M	0.993
		76	11½	F	1.19
		78	10½	M	1.00
		77	11	F	1.09
		75	8½	F	0.915
	A. MacLean	80	10	M	0.886
		88	14½	M	0.965
		78	11½	F	1.10
		76	8½	M	0.879
		74	9	F	1.01
		77	9½	F	0.994
		74	9	F	1.01
		76	9	F	0.993

June

Appendix D. (continued)

MATURE SALMON DATA - 1937.

Date	Location Fleet	L. c.m.	W. lb.	S. ?	K.
June 29	Chimney Corner	99	22	M	1.03
		81	13	F	1.11
	Broad Cove Marsh	77	12	F	1.19
		78	12	F	1.15
		70	9	F	1.19
		84	14	M	1.07
		79	12	F	1.10
		80	12	M	1.06
		92	22	M	1.28
		74	9	F	1.01
	MacLean's Cove	77	10	F	0.994
	A. MacKinnon	78	10	F	0.956
		75	8½	M	0.915
	H. MacLean	72	11	F	1.33
		97	25	F	1.24
		78	10	F	0.957
		96	21	M	1.08
		80	10½	F	0.93
		74	9	F	1.01
		75	9	M	0.969
		73	8½	F	0.992
		74	10	F	1.12
		82	13	F	1.07
		77	10½	M	1.04
		77	10	M	0.992
		80	12½	F	1.10
		80	11	M	0.974
		70	6½	F	0.859
		79	11	F	1.01
	A. MacLean	79	10½	F	0.964
		87	16	F	1.10
June 30	Chimney Corner	78	9½	F	0.909
		81	11	M	0.949
	D. LeBlanc	78	10	F	0.956
		79	11½	F	1.06
		91	19	F	1.14
	Arsenault	81	12	F	1.02
	AuCoin Bros.	72	8	F	0.973
		76	10½	F	1.18
		94	19	M	1.04
		77	9½	F	0.944
	A. MacKinnon	88	20	F	1.33
		78	11½	F	1.10
		97	19	F	0.944
		74	10	F	1.12
		76	11	M	1.13
		84	15	M	1.15
		76	9½	M	0.982
		72	9	F	1.09
		71	8½	M	1.08
	H. MacLean	84	11½	M	0.882
		74	10	F	1.12
		78	10	M	0.957
		99	25	F	1.17

Appendix D. (continued)

MATURE SALMON DATA - 1937.

Date	Location Fleet	L. c.m.	W. lbs.	S. ?	K.
June 30	A. MacLean	80	10½	F	0.934
		77	10	F	0.993
		92	18	F	1.05
July 1	D. LeBlanc	91	19	F	1.14
	Arsenault	75	10	F	1.07
		80	11	F	0.974
	A. MacKinnon	76	11½	F	1.19
		72	7½	M	0.912
	H. MacLean	72	8	F	0.972
		73	9½	F	1.11
		78	9½	M	0.912
		79	10½	F	0.964
		100	22	F	1.00
		92	20	F	1.16
July 3	Margaree Harbour	86	14	F	1.11
		75	9	F	0.969
		80	12	M	1.06
		87	20	F	1.38
		70	7¾	F	1.02
	Broad Cove Marsh	80	10	M	0.885
		83	12	M	0.955
		91	20	F	1.20
		86	11	F	0.785
		78	12½	F	1.19
		81	16	M	1.36
		95	22	F	1.16
		91	20½	F	1.23
		78	11	F	1.05
		72	8¾	F	1.06
		76	10	F	1.03
		71	9	F	1.14
	D. LeBlanc	83	12½	M	0.992
		79	11½	F	1.05
		81	10½	M	0.894
		91	16	F	0.965
	Arsenault	81	11	F	0.938
	AuCoin Bros.	89	15½	M	1.00
		96	18	M	0.924
		84	14	F	1.07
		76	10	F	1.03
		75	8	F	0.862
		79	9	M	0.827
		80	10½	M	0.930
		94	21	F	1.14
		98	22	F	1.01
		89	16	F	1.03
		78	10	F	0.956
		97	21½	F	1.06
		73	7	M	0.795
		79	10½	F	0.964
	A. MacKinnon	79	10	F	0.918

Appendix D. (continued)

MATURE SALMON DATA - 1937

Date	Location Fleet	L. c.m.	W. lbs.	S. ?	K.
July 3	H. MacLean	96	19	F	0.975
	A. MacLean	75	9	F	0.969
	D. McKinnon	95	21	F	1.11
July 6	Margaree Harbour	78	12	F	1.15
		84	11½	M	0.881
		100	27	F	1.22
		99	25	F	1.17
		96	17	M	0.874
		94	15	M	0.82
		81	11	M	0.939
		73	9	F	1.05
		95	23	F	1.22
		93	21	F	1.18
		73	9	F	1.05
		78	10	F	0.957
		80	11	M	0.975
		82	13	M	1.06
		80	9	M	0.80
		81	10	M	0.854
		76	11	F	1.14
		76	10	F	1.03
	Chimney Corner	82	13	M	1.07
		80	12	F	1.07
		74	10	M	1.12
		77	11	M	1.09
	Arsenault	78	10	F	0.956
		106	26½	F	1.01
		90	17½	F	1.09
		79	10	F	0.922
		77	9	F	0.895
		93	20	F	1.13
		77	9	M	0.895
		103	27½	F	1.14
		88	16	F	1.06
		90	16	F	1.00
		97	21½	F	1.06
		92	16	M	0.923
		82	11½	F	0.946
		76	9½	F	0.984
		74	9	F	1.01
		94	20	F	1.09
	AuCoin Bros.	97	22	F	1.09
		96	23	F	1.18
		81	13	F	1.11
		74	9	F	1.01
		78	11	F	1.05
		94	20	F	1.09
		76	9	M	0.93
		76	8	M	0.827
		75	9	M	0.967
		74	10	F	1.12
		99	19	M	0.89
		92	15½	F	0.904

Appendix D. (continued) MATURE SALMON DATA - 1937.

Date		L. c.m.	W. lb.	S ?	K.
July 6	J. MacKinnon	73	8½	F	0.991
		79	11	F	1.01
		78	10½	M	1.00
		78	11½	F	1.10
		74	9½	M	1.06
	A. MacKinnon	74	8	F	0.895
	H. MacLean	110	34	F	1.15
		96	20	F	1.03
		97	20	F	0.995
		88	15½	F	1.03
		80	10½	M	0.93
		92	18	M	1.05
		95	22	F	1.16
		83	13	F	1.03
		92	20	F	1.16
		83	13	F	1.03
		97	20½	F	1.02
		81	12	F	1.02
		77	10½	F	1.04
		76	9	F	0.932
		72	7½	M	0.91
		77	10	F	0.992
		76	10	F	1.03
		76	8½	F	0.88
		74	9	F	1.01
		78	10	F	0.959
		88	13½	M	0.90
		72	8	F	0.972
		77	9	F	0.893
		80	11	F	0.975
		76	8½	F	0.88
July 12	Margaree Harbour	82	12	F	0.985
	Chimney Corner	78	10	F	0.96
		77	9	F	0.892
		79	11	F	1.01
		96	18	F	0.925
		94	18	F	0.984
		77	10	F	0.99
		75	9	F	0.966
		79	10	F	0.919
	MacLean's Cove	84	12	F	0.92
		76	10	F	1.03
		95	20	M	1.06
	Margaree Harbour	95	22	F	1.16
		74	9	F	1.00
		85	15	F	1.10
		80	12	M	1.06
		76	11	F	1.14
		77	11½	F	1.14
		77	10½	F	1.04
	D. LeBlanc	74	10	F	1.12
		77	10	F	0.99
		75	9	F	0.966
		78	9½	M	0.911

Appendix D (continued)

MATURE SALMON DATA - 1937.

Date		L. c.m.	W. lb.	S. ?	K.
July 12	D. LeBlanc	78	10½	M	1.00
		78	12	F	1.15
	Arsenault	55	3½	?	0.955
		94	18½	F	1.01
		84	13	F	0.995
		79	10½	F	0.966
		74	8	F	0.895
		78	10½	F	1.00
	AuCoin Bros.	74	8½	F	0.952
		76	10	F	1.03
		74	7½	M	0.839
		78	10	M	0.956
		74	8½	M	0.952
		73	9	F	1.04
		98	21	M	1.01
		95	24	F	1.27
		90	18	M	1.12
		93	21	F	1.18
		89	16½	F	1.06
		90	16	F	0.995
		85	14½	F	1.07
		79	10½	F	0.965
		72	7	M	0.849
		80	10	F	0.884
		77	8½	M	0.845
		80	11	F	0.975
		81	13½	F	1.15
		76	10	F	1.03
		78	9	M	0.86
	J. McKinnon	74	9	F	1.00
		94	22	F	1.20
		78	10	F	0.958
		77	9½	F	0.944
		81	12½	F	1.06
		95	20	F	1.05
		98	23	F	1.10
		68	6	M	0.865
		98	21	M	1.01
	A. McKinnon	79	11	F	1.01
		73	7	M	0.816
		73	7½	M	0.874
		88	19	F	1.26
		103	27½	M	1.14
	H. MacLean	80	12	M	1.06
		81	11	F	0.939
		73	8½	M	0.99
		74	8½	F	0.952
		78	11	F	1.05
		76	11	F	1.14
	A. MacLean	75	9	F	0.969
		98	21	F	1.01
	D. McKinnon	105	25	M	0.986
		78	10	F	0.957

Appendix D. (continued)

MATURE SALMON DATA - 1937.

Date	Location Fleet	L. c.m.	W. lb.	S. ?	K.
July 19	Margaree Harbour	93	27	M	1.58
		95	21	F	1.11
	Chimney Corner	96	21	F	1.07
		80	12	F	0.974
		93	19	F	1.07
		78	10	F	0.956
		99	25	F	1.17
		100	19	M	0.861
		78	10	M	0.956
		82	12	F	0.984
		79	12	F	1.10
	MacLean's Cove	81	12	F	1.02
		84	14	F	1.07
	D. LeBlanc	73	8	F	0.934
		81	11½	F	0.98
		83	12½	F	0.99
	AuCoin Bros.	82	11	F	0.904
		74	10	F	1.12
		76	9½	F	0.98
		82	12	F	0.986
		92	15½	M	0.904
		77	10½	F	1.04
		83	12	F	0.95
		99	23	F	1.07
		88	17	F	1.13
		94	21	F	1.14
	A. McKinnon	56	3½	M	0.902
		95	21	M	1.11
		72	7	M	0.85
		80	11½	F	1.02
		91	18	F	1.08
		74	8	M	0.894
	H. MacLean	77	7	M	0.695
		81	11	F	0.936
		80	10½	F	0.93
		78	10	M	0.956
		77	10	F	0.99
		79	10½	F	0.964
		70	7	M	0.924
	A. MacLean	94	20	F	1.09
		99	22½	M	1.05
		73	7½	M	0.874
		83	14	F	1.11
		78	9½	F	0.91
		76	9½	F	0.984
		77	8	M	0.794
July 22	Margaree Harbour	84	10	F	0.715
		81	11	F	0.936
		106	29	F	1.10
		86	14	F	1.00
	MacLean's Cove	78	10	F	0.957
		79	10	F	0.92

Appendix D. (continued)

MATURE SALMON DATA - 1937.

Date	Location	Fleet	L. c.m.	W. lb.	S. ?	K.
July 22	MacLean's Cove		93	19	M	1.07
	St. Rose		80	11	F	0.97
			78	10	F	0.958
			85	16	F	1.18
			92	16	M	0.934
		D. LeBlanc	96	21½	F	1.10
			84	13	M	0.994
			79	11½	F	1.05
		Arsenault	86	15	M	1.06
			90	17½	F	1.09
			92	19	F	1.10
			77	10½	F	1.04
			76	10	F	1.03
		AuCoin Bros.	95	20½	F	1.08
		J. McKinnon	78	9	M	0.862
			77	11	F	1.09
			95	20½	F	1.08
		H. McLean	78	10	F	0.956
July 23	Margaree Harbour		82	11	F	0.904
	Broad Cove Marsh		78	11	M	1.05
			95	24	M	1.27
			97	22	F	1.09
		Chimney Corner	92	20½	M	1.20
		Arsenault	80	10	F	0.885
			77	9½	F	0.944
			85	13	F	0.964
			96	19½	F	1.00
			76	9	F	0.93
			82	12	F	0.987
			76	9½	F	0.984
			79	10½	M	0.965
			83	13	F	1.03
		AuCoin Bros.	96	21½	F	1.10
July 24	Margaree Harbour		82	11	M	0.904
			90	16	M	0.995
July 26			107	29½	M	1.09
			94	16	M	0.875
		Chimney Corner	78	10	F	0.956
			99	21	M	0.984
			91	17	M	1.02
			81	11	F	0.939
		McLean's Cove	94	20	M	1.09
		D. LeBlanc	76	9	F	0.93
			82	10½	F	0.862
		AuCoin Bros.	100	23	M	1.04
			79	10½	F	0.967
			91	18	F	1.08
July 27	Margaree Harbour		84	14	M	1.07
			76	10	F	1.03
		J. Arsenault	93	18½	M	1.04
		AuCoin Bros.	80	12	F	1.06
			76	8	M	0.85
July 28			85	13	F	0.96
			98	19	F	0.915

Appendix D (continued) MATURE SALMON DATA - 1937.

Date	Location	Fleet	L. c.m.	W. lb.	S. ?	K.
July 28		J. McKinnon	82	11	F	0.905
			99	21	M	0.983
			98	20½	F	0.985
July 29	Margaree Harbour		96	20	M	1.03
			81	13	F	1.10
			93	19	M	1.07
		D. LeBlanc	75	8½	F	0.915
			81	12	F	1.02
			99	24	F	1.12
		AuCoin Bros	76	9½	F	1.00
			78	9	F	0.862
July 30	Margaree Harbour		87	13½	M	0.93
			87	15	M	1.03
			87	15	M	1.03
			81	10	M	0.853
		J. Arsneault	96	21½	F	1.10
			95	21½	F	1.13
		AuCoin Bros.	83	11½	M	0.913
			78	9½	F	0.91
			73	7	M	0.795
		J. McKinnon	82	10½	F	0.865
Aug. 3	Margaree Harbour		88	17	F	1.13
			77	10	F	0.994
			98	19	M	0.914
			78	10½	M	1.00
			76	10	M	1.05
			78	9½	F	0.91
			73	8	F	0.931
			79	10½	M	0.966
			80	11	F	0.974
			80	12	M	1.06
			93	17	M	0.961
		J. Arsneault	81	10	M	0.854
			77	9	F	0.894
		AuCoin Bros.	81	12	M	1.02
			77	9	F	0.894
			78	9	M	0.86
			85	14	F	1.03
			93	17½	F	0.989
			96	17	M	0.874
			75	8	M	0.86
			78	10	M	0.956
Aug. 4	Margaree Harbour		83	12½	F	0.99
			81	11½	F	0.98
		J. Arsneault	76	8½	M	0.88
			20	10	F	0.884
			93	17	M	0.96
		AuCoin Bros.	96	21	F	1.08
			92	18	?	1.05
			77	9	M	0.894
			110	34	M	1.16
			80	9½	M	0.841
			75	8½	M	0.914
			90	16	F	0.997

Appendix D. (continued) MATURE SALMON DATA - 1937.

Date	Location	Fleet	L. c.m.	W. lb.	S. ?	K.
Aug. 4		AuCoin Bros.	76	9	M	0.933
			78	10	M	0.956
			76	8½	F	0.88
			78	10	F	0.958
		H. McLean	94	18½	F	1.01
Aug. 7		J. Arsneault	79	9½	M	0.874
			95	19	F	1.00
		AuCoin Bros.	82	12½	F	1.02
			76	10	F	1.03
			81	11	F	0.936
			76	9	F	0.932
			78	10	M	0.957
			96	19½	F	1.00
			85	15½	F	1.14
			81	10	M	0.854
			101	24½	F	1.08
		J. McKinnon	98	23	F	1.10
			95	18½	M	0.84
			80	10½	F	0.93
			75	9½	F	1.02
			96	20½	F	1.05
			96	18	F	0.924
			81	10½	M	0.896
Aug. 9		AuCoin Bros.	88	13	M	0.865
			93	18½	F	1.04
			94	18½	M	1.01
			89	16½	M	1.06
			101	25½	F	1.12
		J. McKinnon	102	25	M	1.07
			84	14	F	1.07
			80	10	F	0.885
			95	19	F	1.00
			94	19	F	1.04
Aug. 10		AuCoin Bros.	90	16	M	0.995
		J. McKinnon	93	19	F	1.07
		A. McLean	74	9	F	1.01
Aug. 11		Margaree Harbour	94	21	M	1.14
		AuCoin Bros.	76	7½	M	0.774
			75	8	F	0.86
			97	18	M	0.893
			87	13	F	0.896
			81	9	M	0.768
			80	10	F	0.885
		H. McLean	100	22	F	1.00
Aug. 12		AuCoin Bros.	89	14	M	0.90
			81	9	M	0.768
			95	19½	F	1.03
			84	12	F	0.92
			84	14½	F	1.11
			94	16	F	0.874
			80	10	F	0.885
		J. McKinnon	78	9	F	0.86
			81	11	F	0.94
			80	11	F	0.975

Appendix D (continued) MATURE SALMON DATA - 1937

Date	Location	Fleet	L. c.m.	W. lb.	S. ?	K.
Aug. 12	H. McLean		99	18	M	0.843
			76	8½	F	0.88
			75	9	F	0.97
			88	16½	F	1.10
July 9	J. McKinnon		56	3½	M	0.786
July 10	A. McKinnon		68	6	F	0.855
			67	5½	F	0.831
			55	4	M	1.09
July 13	D. Burns		56	4½	?	1.16
15	H. McLean		63	6	F	1.09
17	A. McKinnon		58	3	M	0.70

Appendix E.

SALMON STOMACH ANALYSES - SUMMARY, 1937

Date	No. of Specimens	Males	Females	% Males	Stomachs empty	Stomachs with food	% feeding	% with tape-worms
June								
14	55				49	6	10.9	94
16	17	7	10	41.2	12	5	29.4	92
17	12	2	10	16.6	10	2	16.6	92
19	34	10	24	29.4	30	4	11.7	94
21	51	11	38	22.5	47	4	7.8	96
22	15	5	10	33.0	15	0	0.0	93
24	15	5	9	34.3	13	2	13.3	100
26	4	1	3		3	1		100
28	14	1	13	7.1	13	1	7.1	14+
29	22	10	11	47.6	12	10	45.4	77
30	13	3	10	23.0	10	3	23.0	23+
July								
2	30	3	22	12.0	30	0	0.0	37+
5	52	11	41	21.0	52	0	0.0	25+
7	19	1	16	5.8	19	0	0.0	16+
9	41	11	27	28.2	41	0	0.0	19+
12	28	4	24	14.3	27	1	3.5	29+
TOTAL and AVERAGE:	422	85	268	24.0%	383	39	Not significent	

+ These percentages are actually high, since in most cases the majority of the tape worms had been dropped and only small ones in small numbers remained. Tape worms were recorded as present if they were found at all.

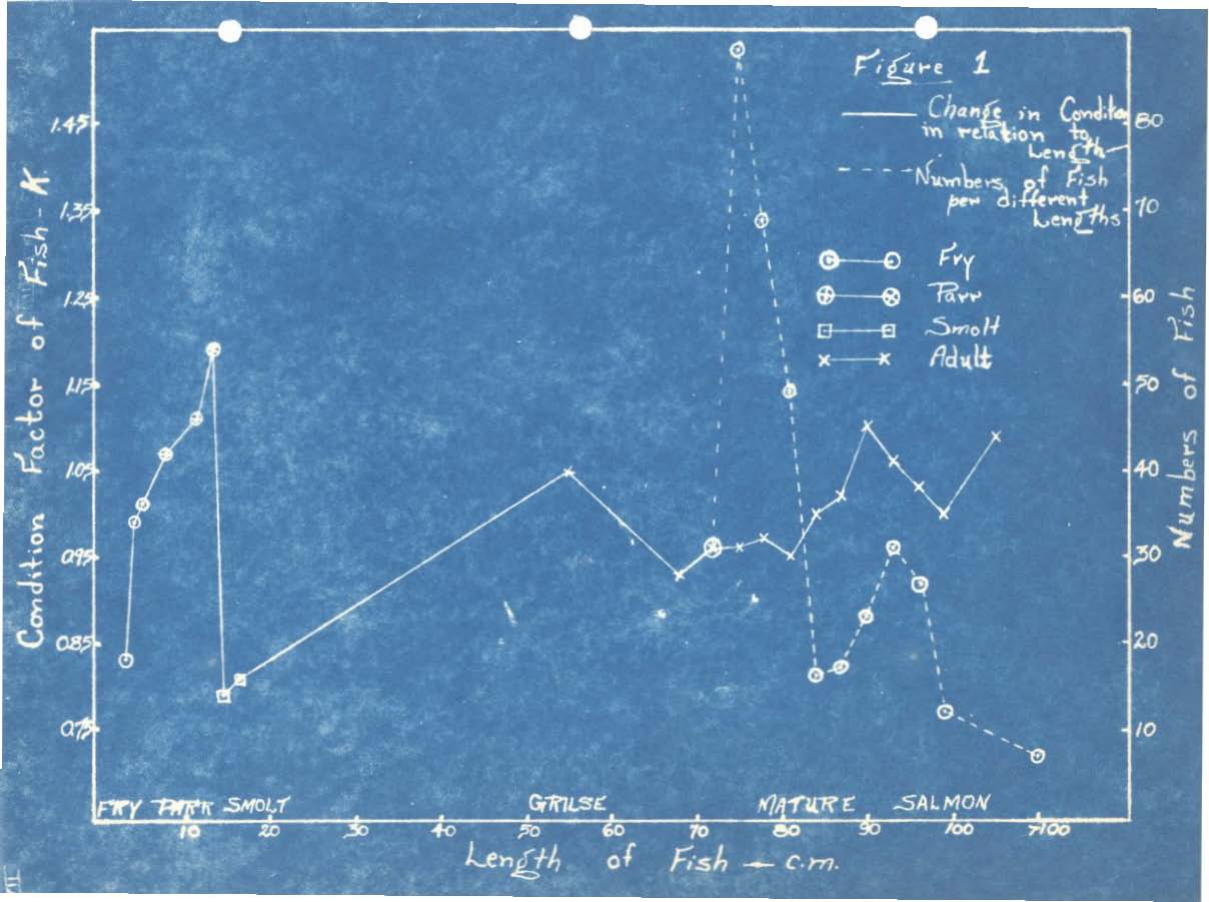
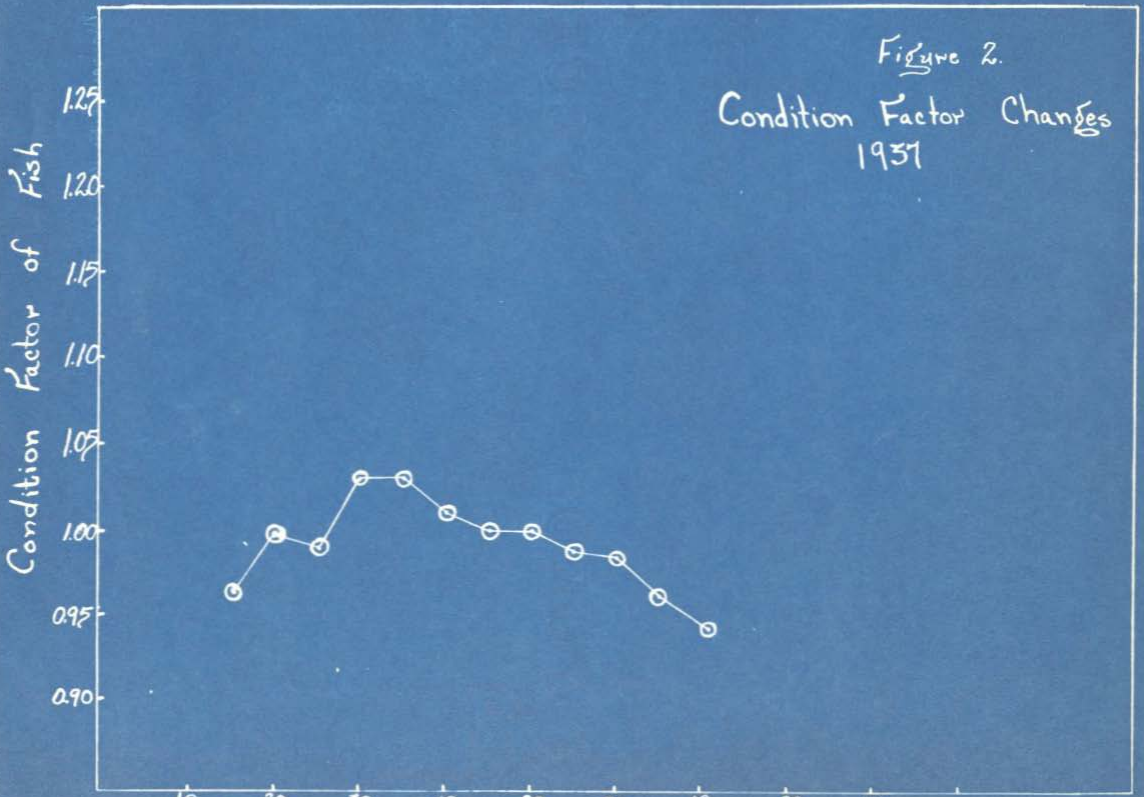


Figure 1
Change in Condition in relation to Length
Numbers of Fish per different Lengths
Fry
Parr
Smolt
Adult
Condition Factor of Fish - K
1.45
1.35
1.25
1.15
1.05
0.95
0.85
0.75
Numbers of Fish
80
70
60
50
40
30
20
10
FRY
PARR
SMOLT
GRILSE
MATURE SALMON
10
20
30
40
50
60
70
80
90
100
100+
Length of Fish — c.m.

Figure 2.

Condition Factor Changes
1937



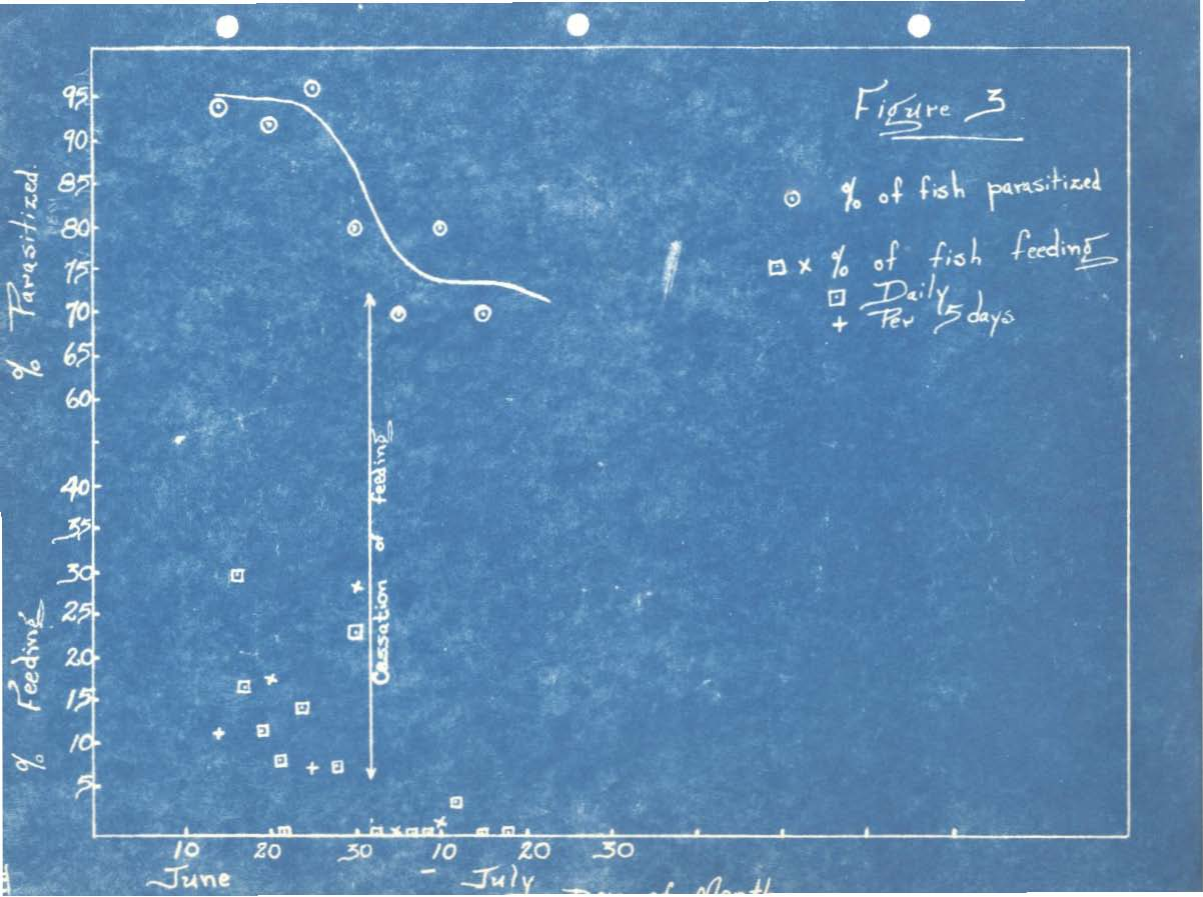


Figure 3
⊙ % of fish parasitized
⊡ × % of fish feeding
⊡ Daily
+ Per 5 days
% Parasitized
% Feeding
95
90
85
80
75
70
65
60
40
35
30
25
20
15
10
5
Cessation of feeding
10
20
30
10
20
30
June
July

MARGAREE SALMON INVESTIGATION

1937

Report No. VIII. Sex Ratios at Different Stages in the Life History of the Margaree Salmon.

By Wm. S. Hoar.

Differences in the ratios of the male and female salmon have been noted repeatedly. Since any great disparity in numbers might conceivably have an effect on the fry production of a river the Margaree data has been analyzed to learn of the conditions which prevail there. The results are given below in tabulated form. Ovaries or testes of all fish recorded have been examined.

Stage in life	Location	1936			1937		
		No. of males	No. of females	% of males	No. of males	No. of females	% of males
1-yr. parr	River system	18	32	36	14	23	38
2-yr. parr	"	18	15	55	9	4	69
All parr	"	43	49	47	24	28	46
2-yr. smolt	"	18	64	22	24	79	23
3-yr. smolt		10	15	40	34	62	35
All smolt	Margaree Harbour	19	52	27	35	88	28
"	Forest Glen B.	--	--	--	10	30	25
"	River system	19	52	27	28	80	26
Mature salmon	Margaree Harbour June 16-30				50	139	26
	July 1-12				30	130	19
	June and July				80	269	23

The numbers of specimens studied are small, but since the percentages are uniform and the same order is repeated in the data of 1936 and 1937 we may assume that the results are reasonably accurate.

The most obvious fact arising from this table is the pronounced decrease in the number of male salmon between the parr and smolt stage. Three explanations are suggested. The male salmon may be less resistant than the females to general conditions. The males may remain in the river longer, their chances of survival from enemies being correspondingly decreased. The sexual maturing of the male parr may be fatal to many. These explanations will be considered in the light of the above data.

If the males were generally less resistant than the females we should expect a progressive decrease in their numbers during the different stages; fry, yearling parr, 2-year parr, smolts and adult fish. This is not the simple condition. We have no data on the fry, but on a purely theoretical basis we should expect about equal numbers of males and females. The yearling parr, however, are only 36 to 38% males. If then we assume that the equal numbers were produced there may very well be a progressive decline in the males during the parr stages. This decline, if a reality, is obscured in the table by the fact that the males remain in the river longer - see below - and that there are actually more 2-year males than 1-year males in the river. Further, this decline in the males cannot be due simply to a less resistant animal, since there is little or no decrease in males between the smolt and mature salmon.

Both the parr and smolt data show that the male salmon remain in the river longer than the females. Sixty-nine percent of the 1937 2-year parr were males as against 38% of the yearlings. Moreover, 35% of the 3-year smolt were males as against 23% of the 2-year fish. This extra year in the river will account for the loss of many of the males, since it is reasonable to suppose that the larger fish will be more readily picked up by birds and other enemies.

This extra year in the river is probably caused by the fact that male parr tend to become sexually mature. This latter condition in itself may put extra demands on the animal, leaving it more susceptible to diseases and the rigors of the winter.

It is suggested, then, that since the male salmon remain in the river longer, i.e. are larger, they are more often taken by their enemies than the females; and that the sexual maturing of the males may decrease their numbers. Whatever may be the explanation, it is certain that there are fewer male salmon going to sea and fewer male salmon returning from the sea than there are females; and that there is a smaller percentage of male salmon going to sea than there are male parr in the river. Whether equal numbers of male and female larvae are produced is not known.

About 25% of the salmon going to sea are males. A somewhat smaller number of males return. Any real difference here is probably due to the fact that the male grilse are more apt to come on shore and run the river than the females, (any grilse we have examined have been males).

Some workers have found that the male salmon return to the rivers later than do the females. Our data do not show this but indicate the reverse. It was not collected over a sufficiently long period to warrant a conclusion.

Summary.

1. The numbers of male salmon decrease throughout the parr stage.
2. The male parr remain in the river longer than do the females.
3. About 25% of the salmon going to sea are males. The percentage returning is about the same.
4. It is suggested that the extra year which the male parr spend in the river is largely responsible for the decrease in their numbers. This is possibly linked in some way with the fact that these fish become sexually mature.