Hoare B.

FRESHWATER FISHERIES ADVISORY SERVICE

MARINE DEPARTMENT

INVESTIGATION REPORT

JOB NO. 59

ACCLIMATISATION SOCIETY DISTRICT: West Coast

TITLE OF JOB: Spawning survey of Lake Brunner streams.

OBJECTIVES: To compare fish and conditions at the present time with those encountered during the 1934 and 1959 surveys.

INTRODUCTION

The job was carried out between mid-June and the first week of September 1963.

The physical features of the spawning streams have not changed since 1959 and are described in Job No. 14.

The fish population was sampled by trapping the spawning fish on their upstream migration in two of the Inchbonnie creeks, and spawning surveys were carried out from time to time in the streams draining the Inchbonnie plain.

Lake Poerua fish were not trapped on their way upstream nor were any of its tributary streams visited.

The Eastern Hohonu and the Crooked River the two largest tributaries of Lake Brunner were briefly examined during the stream surveys, likewise the upper Orangipuku Stream which has been

diverted into the Taramakau river.

METHODS

1. Trapping

Two-way traps were installed in Bruce and Pigeon Creeks.

(a) BRUCE STREAM

An iron standard and wire netting trap was built, ¼ mile above the site used by Eldon in 1959 and approximately 2½ miles from Lake Brunner.

All upstream moving fish were weighed, measured, sexed, and had their adipose fin removed.

Downstream fish were weighed, measured and sexed.

(b) PIGEON CREEK

The trap was constructed of the same materials as that at Bruce Stream, with an upstream and a downstream holding pen. It was situated 1½ miles above the latter and 300 yards from the road, on the property of Mr S.H. Lemm, in approximately the same position as in 1959. It operated between 18 June and 2 September but was not effectively catching fish until 1 July due to the large size of the wire-mesh used before that time.

Upstream fish were weighed, measured, sexed and the adipose fin was clipped if not already removed.

Downstream fish were weighed, measured, and sexed.

2. Spawning Surveys

Standard visual surveys were made.

FINDINGS

NOTE - Comparative figures for the 1959 season are given in brackets - throughout this report.

1. RAINFALL:

As trout seem to approach the spawning areas most freely during floods or freshes, and in fact can only run up some of the Inchbonnie creeks under these conditions, rainfall during the winter months must have an important bearing on the spawning run.

Rainfall records kept at Inchbonnie School and reproduced below, show some considerable variations in the monthly totals over the years. The maximum annual rainfall since 1940 was 250.31" recorded in 1942. The minimum was 152.26" recorded in 1947.

In recent years the rainfall has varied between a low of 154.80" in 1960 and a high of 232.79" in 1958. The total to September 1963 of 110.84" is almost the same as that for the same period of the past three years, which have been relatively dry years.

RAINFALL FIGURES - LAKE BRUNNER

1955	1956	1957	1958	1959	1960	1961	1962	1963	
23.61	5.66	19.87	44.16	4.35	16.66	6.70	20.41	22.77	MAY
15.85	20.42	15.03	11.28	14.62	10.07	20.63	11.17	14.92	JUNE
5.99	12.81	8.51	11.36	7.55	9.90	14.06	12.27	2.83	JULY
21.73	12.88	10.84	17.00	-?	7.97	7.10	16.47	15.47	AUGUST
			First three days of September					1.38	

2. WEATHER CONDITIONS AND RIVER TEMPERATURES

(a) BRUCE STREAM

A maximum-minimum thermometer recorded the water temperatures from 21 July to 2 September.

During that time temperatures ranged between 3.3o.C. and 11.1o.C. and 7.8o.C. respectively. Of 69 days between 25 June and 2 September, 35 were fine and the stream was low and clear, 23 were cloudy or with light showers and the stream low and clear, 11 were overcast and raining with the stream high or in flood. One day in July, 8 days in August, and 2 in September, 247 or 31% of the upstream fish were trapped during or directly after a fresh. During floods in August the trap was put out of action for three days and two nights. (10 days in June, 7 in July).

(b) PIGEON CREEK

Water temperatures were taken at odd times and ranged between 4.o.C. and 9.o.C. and averaged 6.5o.C. Temperatures

from Pigeon Creek were recorded between April and December 1934 and the range was 7.o.C. to 17.o.C.

3. TRAPPING RESULTS.

(a) BRUCE STREAM

This trap was in operation for 66 days between 25 June and 2 September (48 days between 1 June and 4 August) and during that time 800 upstream fish were trapped and 157 downstream (307 up and 9 down-netted as no downstream trap). The average length of browns was 17.7" (17.8) and average weight 21b and 3ozs (21b 4ozs).

(b) PIGEON CREEK

From 1 July to 2 September - 64 days - 199 fish were handled on their way upstream (6 July to 5 August)- 30 days - 171 fish upstream, 22 down and 17 were handled moving downstream.

The average length of browns was 17.6" (17.4") and average weight 21b 3ozs (21b).

(c) UPSTREAM FISH

From figures 1, 2 and 3, it may be seen that in both 1959 and 1963 the spawning runs both reached peaks at the same time.

Weather conditions at the time these peaks were reached are not recorded for 1959 but for 1963, weather was fine on five days, cloudy on three days, and rain on two days during the period July 6 - 15 when a peak of the 1963 run, and the highest peak of the 1959 run occurred. Streams were low and clear during this

time in 1963. The second peaks (highest in 1963, second highest in 1959) coincided at the period July 30 to August 4. Weather conditions were again not recorded for this period during 1959. In 1963 it rained on one day with streams rising approximately 1 ft. and clearing the next day, snow on one morning with a fresh during the night but clearing by mid-day, fine and frosty 4 days with stream low and clear.

Water temperatures during this period ranged between 6.o.C. and 11.o.C. and an average maximum of 10.o.C. average minimum of 7.o.C. were slightly cooler than the average temperatures for the month of July. It is unknown whether the runs reached their peaks during the periods of greatest rainfall - mid June in 1959 and late August in 1963, as the strength of the traps was unequal to the weight of weed and water, no fish were trapped during the crucial periods.

The collection of a larger sample of downstream fish was attempted at Pigeon Creek, by adding a fish repellant compound (Copper acetate and fluorescene mixture) to the water as the stream was rising, in an attempt to frighten fish down into the trap. This had no apparent effect on any forms of life in the water and no further fish were obtained.

The same was attempted at Bruce Stream when as many as 30 spent fish were known to be waiting above the trap. Again there was no result.

As Pigeon Creek is more confined than Bruce Creek it often rose quickly and flowed over the top of the trap, this happened on 7 days out of the 64, i.e. during almost every fresh. On one occasion when the creek rose 1 ft. and receeded without flowing over the top of the trap, 58 fish were handled.

Figures 4 and 5 show the length frequencies of males and females for the 1959 and 1963 runs. The population shows little change with respect to average length, and the range of sizes of fish running to spawn.

For average length, weight and condition factors of Bruce Stream fish see Table 1 and for figures of fish trapped at Pigeon Creek see Table 2.

(d) DOWNSTREAM FISH

174 trout were trapped at both traps as follows:-

52 males	122 females
30%	70%

12 males were marked (23%) 62 females were marked (51%)

74 fish or 43% of the total were marked.

Length of unmarked fish ranged between -

38.3cm. (15.1) ins. AND averaged 44.0 cm. (17.4 ins) and 53.3cm. (21.0) ins. 43.6 was the average length (17.2 ins) of marked fish

Weight of unmarked fish ranged between

939 gms (1lb 3oz) and averaged 864 gms. (1 lb 14½ ozs) and while 764 gms. (1 lb 11 ozs) 1645 gms. (3 lb 10 oz) was the average weight of marked fish

of the total of 100 fish unmarked, 40 were males, 60 were females.

(e) POSSIBLE PREDATORS

Eels were observed in most of the Inchbonnie streams, especially among the weed beds of the Bruce Stream. Two were caught in Bruce trap upstream pound and one came into Pigeon Creek downstream pound on a fresh. This was a female of approximately 3½ lbs., it had an empty stomach and appeared to be migrating. On another occasion, while the Bruce trap was being installed at the end of June a splash was heard upstream and minutes later a medium sized eel was seen drifting downstream with its mouth fastened about the vent of a freshly dead female trout of approximately 2 lb. The trout was found to have lost all its eggs and some of its viscera and did not appear to have spawned.

A number of dead trout were recovered off the wire netting from time to time with lacerations about the vent.

Two long finned females eels were caught in Bruce trap, one of 5lb 9ozs contained 1 Koura and the remains of another, and two pieces of gravel. The other 3lb 8ozs contained 1 Caddis larvae, 1 Mayfly larva, and 11 adipose fins clipped from trout. A long fin female eel was killed in pigeon Creek soon after a fresh. It was not weighed but it contained many annelids.

Several large black shags were noticed about the streams, and larger numbers of white throated shags, in 1959.

A white heron was again noticed feeding in various creeks,

and an increased number of white faced herons were seen in the area.

(f) POLLUTION

Pollution of Pigeon and Homestead Creek by cow shed sewage does not appear to have increased, algal growth remains approximately the same, and bottom fauna is dense in the lower half of Pigeon Creek. The pollution may have increased its effect on the spawning fish, further studies would be necessary to determine this.

DISCUSSIONS

From the foregoing figures it can be seen that the 1963 spawning run of trout has increased in average weight by 1 to 2 ozs. improved in average condition factor by 2 points on the Corbett Table and 7 on the gram/centimetre table, while the average length has remained approximately the same for both seasons.

Numbers of fish differ somewhat for the two seasons and as the numbers depend on many variables e.g. weather, condition of stream beds, efficiency of the trap, time trapped, they can only be approximated. Eldon estimates in his 1959 report that over 1000 (1074) fish ran past the trap during the time it was in (63) days. Re-examination of his figures show an error in his working however, and this total was found to be incorrect, the actual figure being (767 total). The total was arrived at on

the basis that of the 307 handled at the Bruce trap and marked 47 turned up at Pigeon Creek along with 124 unmarked a ratio of 2½ unmarked fish to every marked one. (Eldon mistakenly arrived at a ratio of 3½, with its consequent incorrect total).

Similar calculations on 1963 figures gives 0.6 unmarked to 1 marked and an estimated total past Bruce Creek of 1280 fish in 70 days. If this was the case a far greater amount of spawning must be carried out in Bruce Stream itself and Waterfall, Black and Spring Creeks than was first imagined, as in both 1959 and in 1963 only 15% of the total marked fish were trapped again at Pigeon Creek.

According to visual counts Pigeon Creek above the trap in 1963 contained 33% of the redds in the Bruce system; Pigeon and Homestead Creeks together contained 62% of the total number of redds in 1959 and 82% in 1963. In the 1934 survey, Pigeon Creek, males comprised 34% of the upstream fish, 36% in 1959, and 34% in 1963. The number of downstream fish trapped at Pigeon Creek in 1963 was not enough to give a very accurate measure of the total number of fish using the creek, in addition the connecting channel between Homestead and Pigeon Creeks would make for an interchange between the two and make any calculations on the downstream fish at Pigeon Creek useless.

Comparing figures of upstream fish at Pigeon Creek for the years 1934, 1959, and 1963.

	Prior to July	July	After July
1934	42	132	140
1959	Trap not installed	100 (6th-31st)	71 (6 days)
1963	2	84	113

1963 shows a reduction on previous years, however the trap did not operate efficiently until the first of July when the wire netting was changed to a smaller mesh size. This increased trapping efficiency and other variables previously mentioned would have some effect on these figures.

The results show little change in average length, weight or condition in the 1959 and 1963 spawning runs.

3. SPAWNING SURVEYS

(a) BRUCE STREAM INCLUDING SPRING CREEKS

This area was first examined on 9, 10, 11 July when 18 redds and 3 fish were seen, 8 redds were counted below the trap, 10 above. On re-examining the area during the 23, 24, 25 August only 7 redds and 4 fish were seen. Counts were made under varying degrees of visibility and redds were difficult to distinguish due to the light colour of the river bed material and the amount of water.

However, a more apparent cause for the decrease, and this was particularly noticeable in several of the spring creeks, could be the cattle that frequently wander about in the river feeding on the water weeds. Up to 20 at a time were counted in 50 yards of stream, pulling up large clumps of weed. Floods also moved a certain amount of fine river bed material up to the size of pea gravel. This material, a light coloured granite rock was brought down off Mt. Te Kinga by a slip, in the headwaters of Black Creek. This, according to local information occurred in 1946, this material is slowly being washed down through Bruce Creek.

(i) BLACK CREEK

The first count on 11 July revealed 2 redds and 4 fish, the second count on 25 August revealed nothing. Two redds counted on the first visit were indistinguishable and no fresh redds were seen.

(ii) WATERFALL CREEK (BRUCE)

13 redds and 11 fish, of which number 3 had been marked as passing Bruce Stream trap were seen on 9 July. On the second visit 7 weeks later only 11 redds were counted.

(iii) JIMS CREEK

8 redds and 1 fish were seen on 11 July, and 8 redds and 2 fish on 24 August. The part of the stream where these redds were, was clear of weed and undisturbed by cattle.

(iv) TITWASH CREEK

Examined only once on 23 August, 14 redds were counted and 3 fish seen.

(v) PIGEON CREEK

Although several substantial floods occurred between surveys, the stream bed in this and nearby Homestead Creek did not alter. The figures obtained can thus be compared and used as a measure of the spawning run. The area below the trap was examined first on 3 July and again on 26 August, almost eight weeks later.

On the first visit 10 redds and 1 fish were seen, on the second 35 redds. The three miles of stream from the trap to MacArthurs Road were examined at these times and on the first visit 50 redds and 1 fish were counted (up to this time the trap had been in for 2 weeks and 5 fish had passed upstream and 2 downstream).

On the second visit 71 redds were counted and 8 fish seen, an increase of 28%, while 170 fish had passed upstream at this time and 16 downstream.

(vi) HOMESTEAD CREEK

First survey 14 July, 31 redds were counted and 4 fish seen. On the second survey 6½ weeks later 68 redds and 23 fish were seen. An increase of 37% in the

number of redds.

On the first survey a total of 114 redds were counted in Bruce Stream and its tributaries, of which 81 or 71% were in Pigeon and Homestead Creeks. On the second survey at the end of August, 214 redds were counted, including 14 redds from Titwash Creek which were uncounted on the first survey. Pigeon and Homestead Creeks with 106 and 68 respectively contained 81% of the total number of redds in the Bruce system, however, the percentage of fish trapped at Bruce and then again at Pigeon Creek make it probable that many redds were not counted in Bruce Stream.

Eldon at the beginning of August 1959 records a total of 450 redds in Bruce Stream and its tributaries of which 280 or 62% were in Pigeon and Homestead Creeks.

In several places in Pigeon and Homestead Creek superimposition of redds took place, but not to any marked extent.

(b) ORANGIPUKU RIVER

Examined on 1, 2, 3, July, 99 redds and 137 fish were counted. Unfortunately, time prevented a second survey being made of this important spawning stream.

(c) EASTERN HOHONU RIVER

Many fish run up this river to spawn, 61 were counted in

half a mile of river between the road bridge and the gorge on the 30 June, ten days after the last fresh. 110 fish were counted in this stretch on 29 June 1959 - five days after the last fresh.

Of this half mile perhaps 3% was gravel suitable for spawning. During mid July to mid August 3 different pairs of fish were seen spawning in a patch of sandy gravel, approximately 3 ft. long by 2 ft. wide beneath the road bridge.

(d) CROOKED AND EVANS RIVERS

On 22 August 4 fish were seen between the tope bridge on the Crooked and Evans river junction. No redds were seen. The Evans river was examined over half a mile but nothing was noted. Local reports have it that during the spawning season there are heavy concentrations of fish 2 or 3 miles up the Evans.

(e) UPPER ORANGIPUKU

This stream has been diverted into the Taramakau River. A brief survey was made on 10 August, 7 redds were counted and one fish was seen. From time to time sections of the stream were examined and, all told, 5 brown trout were seen. No rainbow trout were seen.

CONCLUSIONS

1. No significant change has taken place in Lake Brunner trout spawning in the Inchbonnie Creeks since 1959.

2. It is doubtful whether the weight and condition have changed at all.

3. Stream conditions do not appear to have changed.

4. The same proportion of fish trapped at Pigeon Creek in both years indicate that this stream's attraction has not decreased in spite of its pollution with cow shed waters.

5. 999 fish were trapped upstream at both traps, their total weight was 2198 lbs. 14 ozs. - almost 1 ton.

ACKNOWLEDGEMENTS

For their help and hospitality thanks are duly accorded to:-

Mr and Mrs T. Hartley Smith, Department of Internal Affairs

Mr T. C. Rothery, Inchbonnie

Mr and Mrs S. H. Lemm, Inchbonnie

Mr J. Shaffrey, Inchbonnie

Messrs Inchbonnie Sawmills Ltd.

Mr Pittams, Inchbonnie School

Mr A.M.R. Burnet, for help with the computations.

Executed by:- E. Cudby Technical Field Officer

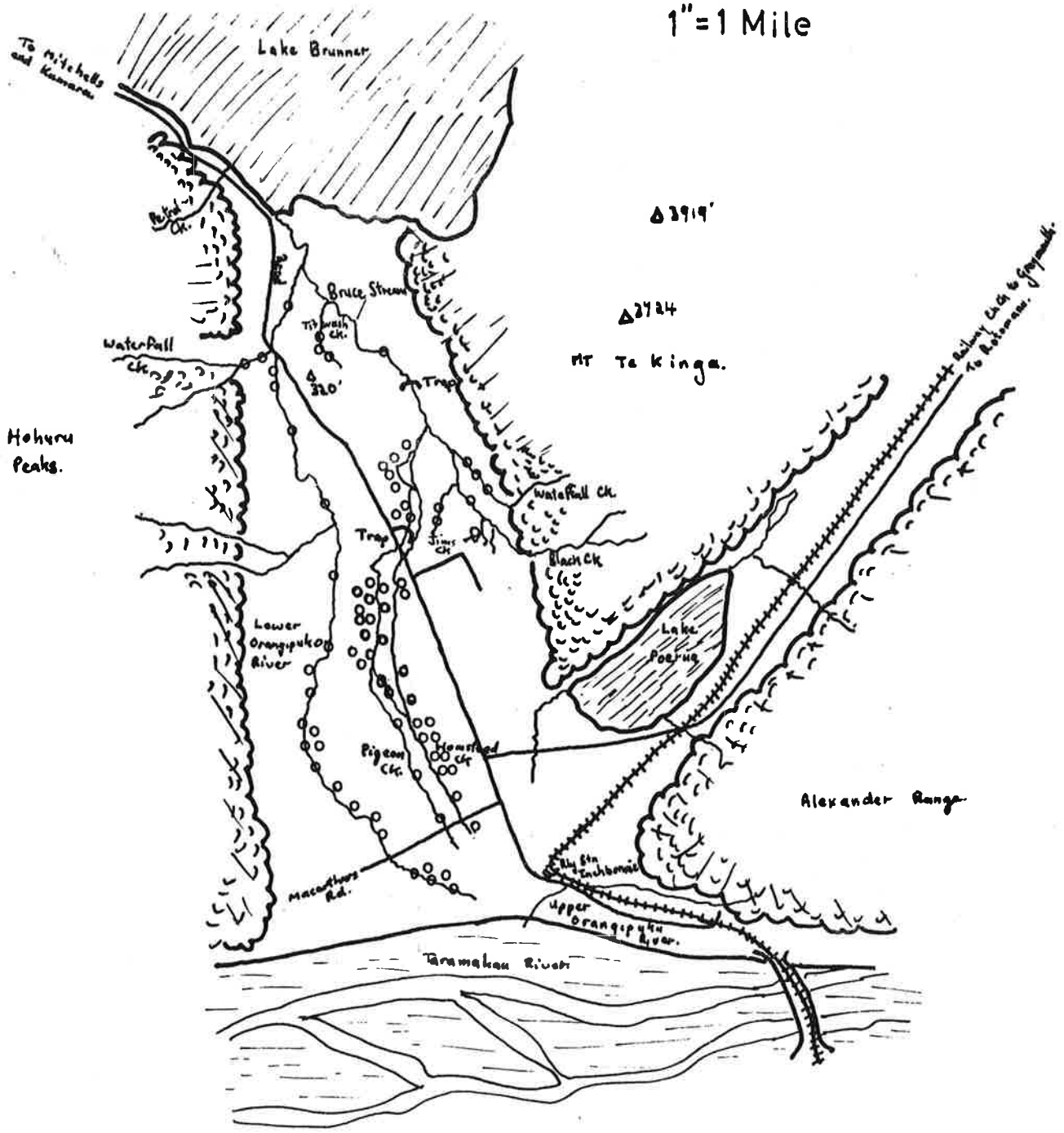
E. Moore Technical Field Officer

Supervised by - E. Lewall, Fisheries Investigating Officer.

References:

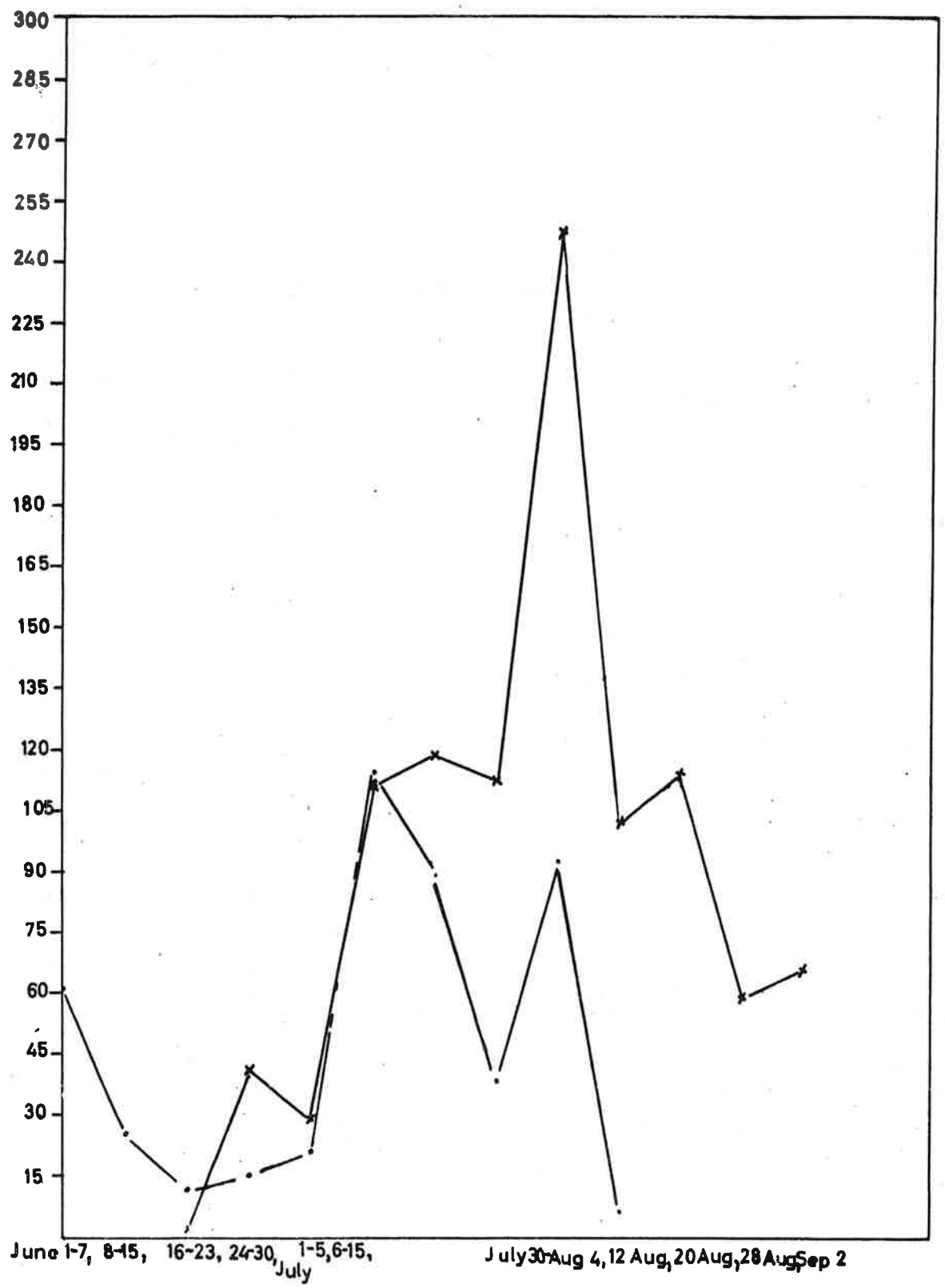
Investigation of the trout population and condition - Lake Brunner Streams. Job No. 14.

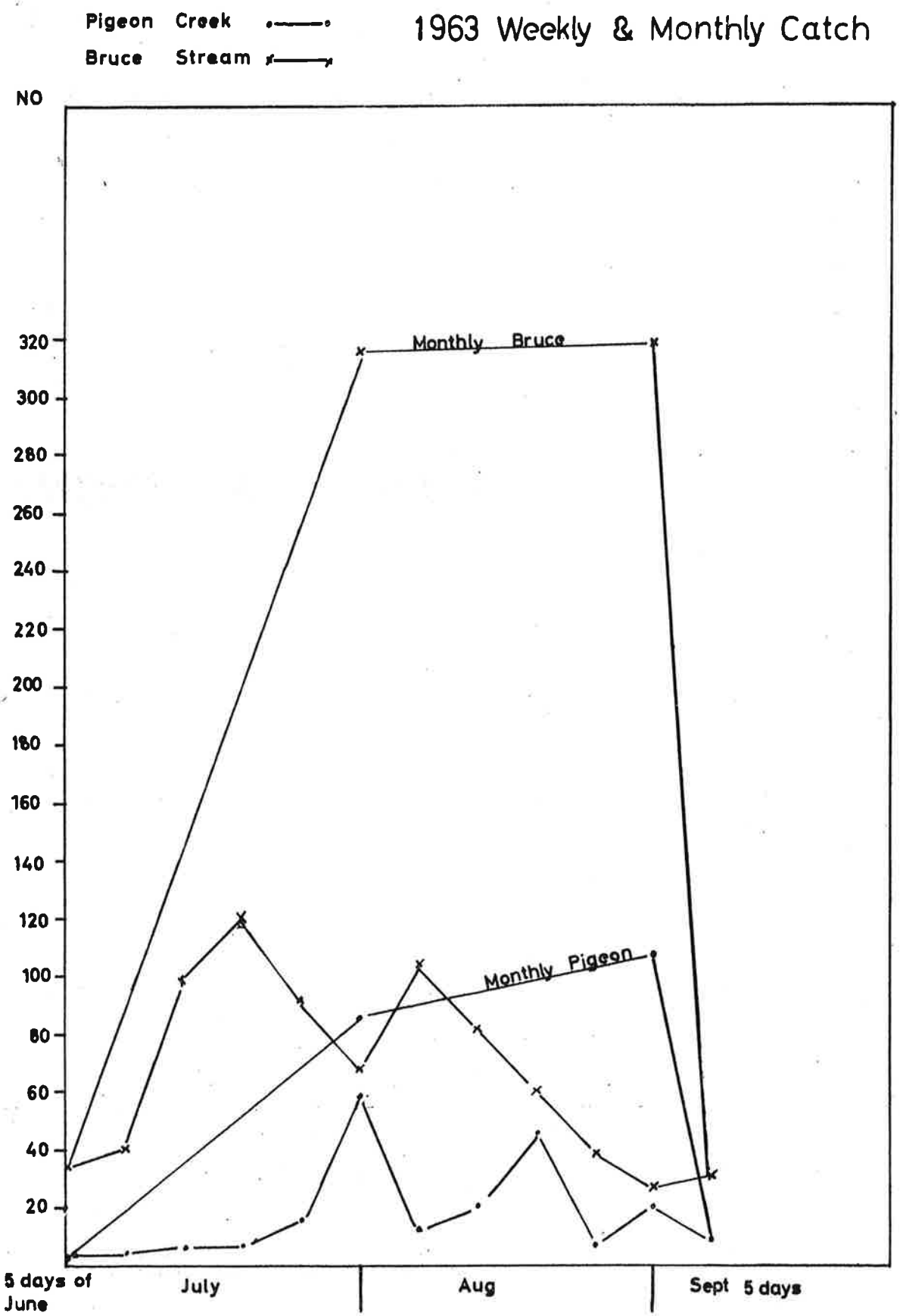
Issued August 1965.



Showing Spawning Density in Inchbonnie Creeks near end of 1963 Spawning Season. Each o represents approx 4 redds.
Those on the Orangipuku are taken from figures collected during early July while the other streams were done in August when the run was virtually over

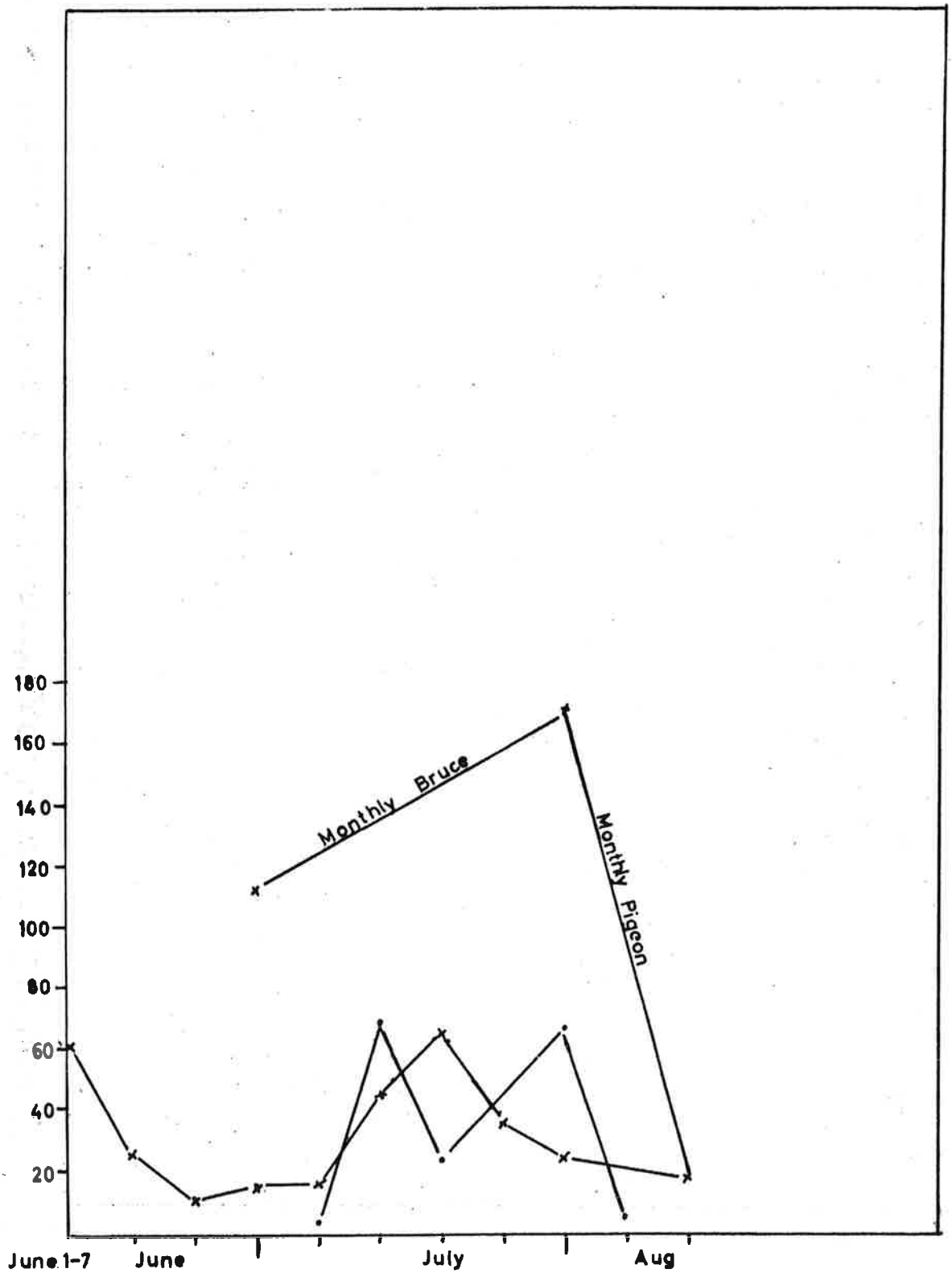
Nos Upstream Fish Bruce Stream & Pigeon Creek Combined



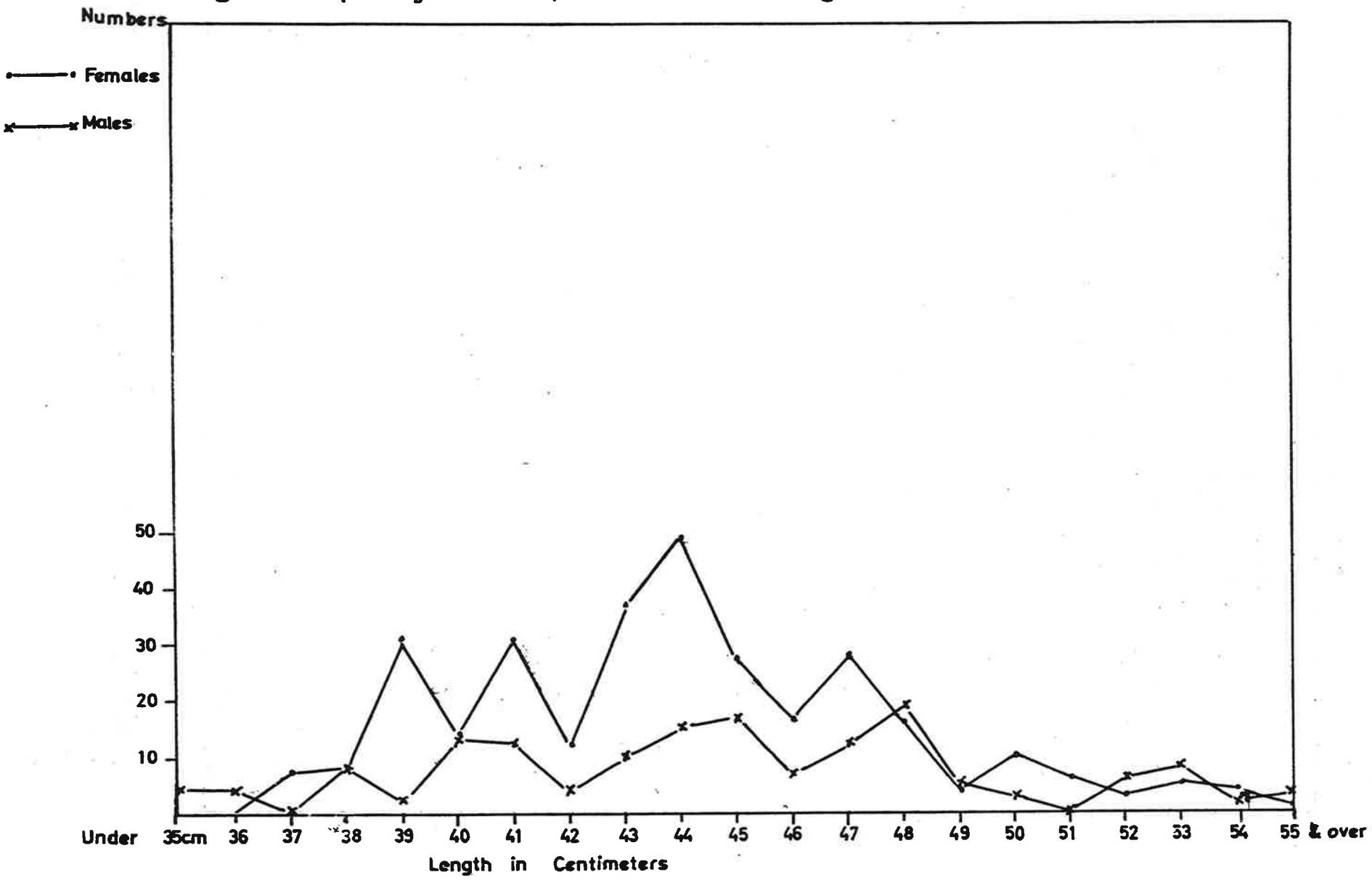

Pigeon Creek
Bruce Stream
1963 Weekly & Monthly Catch
NO
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
Monthly Bruce
Monthly Pigeon
5 days of June
July
Aug
Sept 5 days

1959 Weekly & Monthly Catch

Bruce Stm ✗——✗
Pigeon Stm •——•



Length Frequency–1959–Upstream Fish—Pigeon & Bruce Combined



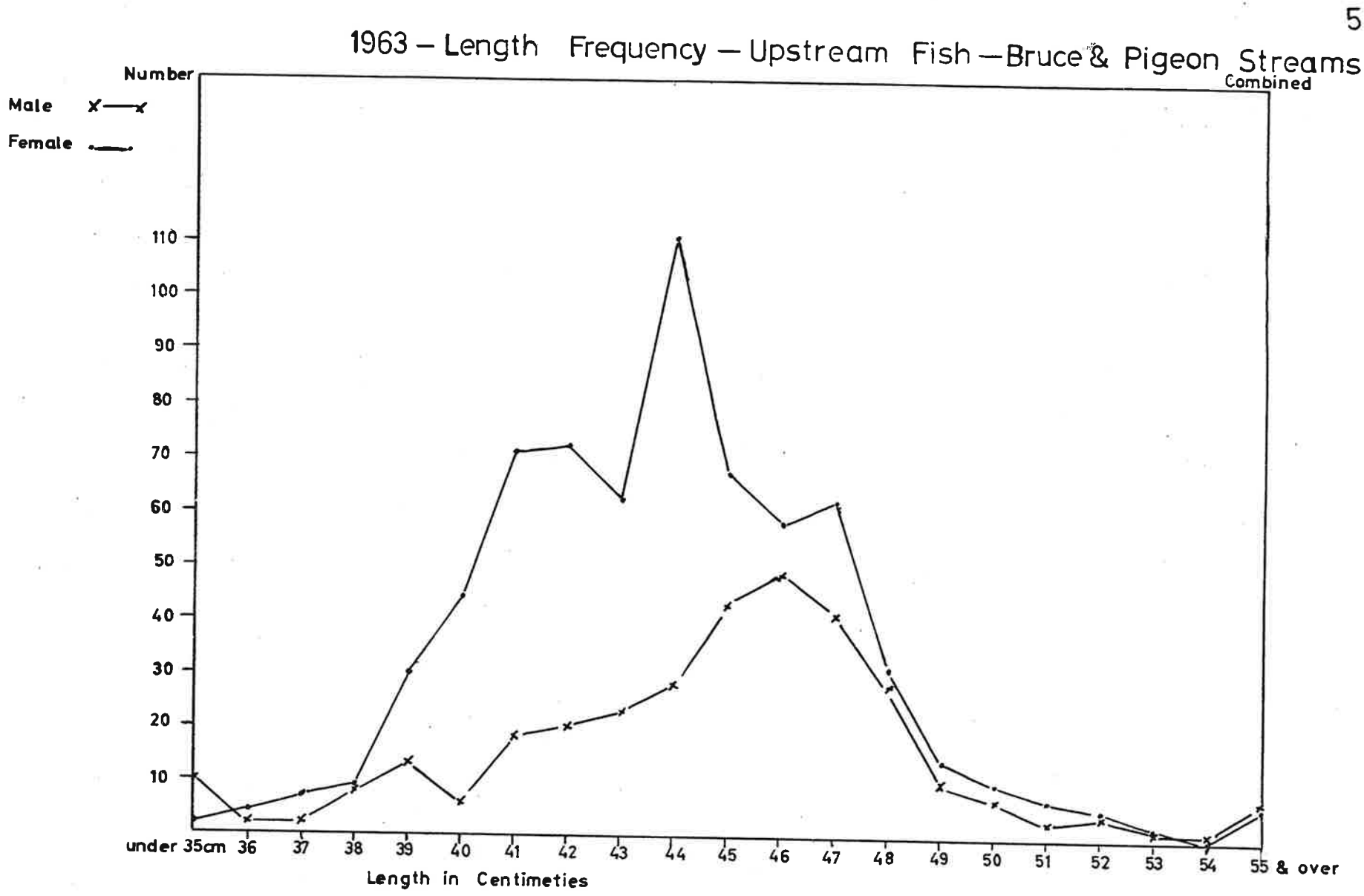

1963 – Length Frequency – Upstream Fish – Bruce & Pigeon Streams
Combined
Number
Male
Female
110
100
90
80
70
60
50
40
30
20
10
under 35cm
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55 & over
Length in Centimeties

TABLE 1

BRUCE STREAM

Lengths are given in centimetres and inches, weights in grams and pounds & ounces, 1959 figures for upstream fish are given in a separate column.

No downstream fish were trapped in 1959.

UPSTREAM FISH		1959
Number trapped	Male 258 or 32%	99 or 32%
	Female 542 or 68%	208 or 68%
	Total 800	307
Length: range	33·4cm to 63·0cm.	32·4cm. to 14·2cm.
	13·2in. to 24·8in.	12·75in. to 17·6in.
Average: Male	45·7cm. or 18·0in.	46·2cm. or 18·4in.
Female	44·3cm. or 17·5in.	44·2cm. or 17·6in.
m+f.	44·8cm. or 17·7in.	m+f. 45·0cm. or 17·8in.
Weight: range	440gm. to 2213gm.	426gm. to 1649gm.
	15·5oz. to 4lb.14oz.	15oz. to 3lb.7oz.
Average: Male	987gm. or 2lb 2·5oz.	1050gm. or 2lb 5oz.
Female	1009gm. or 2lb. 3·5oz.	936gm. or 2lb. 1oz.
m+f.	1002gm. or 2lb. 3oz.	m+f. 965gm. or 2lb. 2oz.

DOWNSTREAM FISH.		
Number trapped	Male 43 or 27%	Marked Male 8 or 13%
	Female 114 or 73%	Female 55 or 87%
	Total 157	Total 63 or 40% of downstream fish
Length: range	33·1cm. to 53·3cm.	
	13·0in. to 21·0in.	
Average: Male	46·6cm. or 18·3in.	
Female	43·9cm. or 17·4in.	
m+f.	44·7cm. or 17·7in.	
Weight: range	454gm. to 1645gm.	
	1lb. to 3lb.10oz.	
Average (male & female)	848gm. or 1lb.14oz.	

CONDITION FACTOR UPSTREAM FISH ONLY

Condition factors were computed on the gram/centimetre scale.

Corbett scale equivalents are given in brackets.

A well conditioned trout gives a reading of 40 on the Corbett scale and 110 on the gram/centimetre scale.

Male: Range 63(23) to 130(46)

Average 1963 104(37) 1959 100(36)

Female: Range 70(25) to 181(65)

Average 1963 116(42) 1959 105(38)

Condition factors of all fish ranged between,

63(23) male 43·2cm.(17·1in) x 511gm.(1lb. 2oz.) ——— 181(65) female 42·2cm(16·6in.) x 1334gm.(2lb.15oz.)

and Averaged 112(40)

1959 Average 105(38)