42-02

Report on the Preliminary Survey of Steelhead of Skeena River Drainage Streams

by

Gerry D. Taylor
Regional Fisheries Biologist
Prince George Region

March, 1968

TABLE OF CONTENTS

PURPOSE

A common complaint of the fishery manager is lack of information. Unfortunately we can only charge ourselves with the lack of information and not the want of the same. The purpose of this report is to draw together, under one cover, most of the information now available on steelhead of Skeena River Drainage Streams (Fig. 1). Information was hitherto scattered in files, unworked data collections and in other agency reports. This report is by no means a definitive summary. Figures, tables and appendices have been freely used to facilitate documentation.

INTRODUCTION

To implement any restriction of season, limit or area it is desirable to base decisions on factual information. In the case of steelhead the amount of information required is extremely great. Where steelhead run in the skeena drainage as a whole is not known. The runs of fish in parts of the system are known to some steelhead enthusiasts, but existence and extent of steelhead in upper Skeena River tributaries is still largely undetermined. In the Bulkley-Morice River system there is still confusion between steelhead and resident Rainbow trout. Steelhead have not been reported from the Skeena River above its junction with Sustut River. For the most part there is a distinct lack of well documented records of steelhead in most upper reaches of the watershed.

This above knowledge is important in any long term investigation of the significance of the commercial catch (and sport catch) to escapement of steelhead and their availability to the sport fishery of the Skeena system. For example, the commercial catch of steelhead at the mouth of the Skeena River is greatest in July and August, but subsequent movements of these fish is a matter of speculation. During August and September movements of steelhead have been recorded at Moricetown Falls on the Bulkley River. It appears that part of the run is tagged and/or enumerated at this time. There is no way of determining later movements into the Bulkley-Morice River system except by angler returns. The important point, however, is that even the most elementary information, such as distribution of steelhead, is lacking so that the significances of sport and commercial catches in July and August can not be assessed.

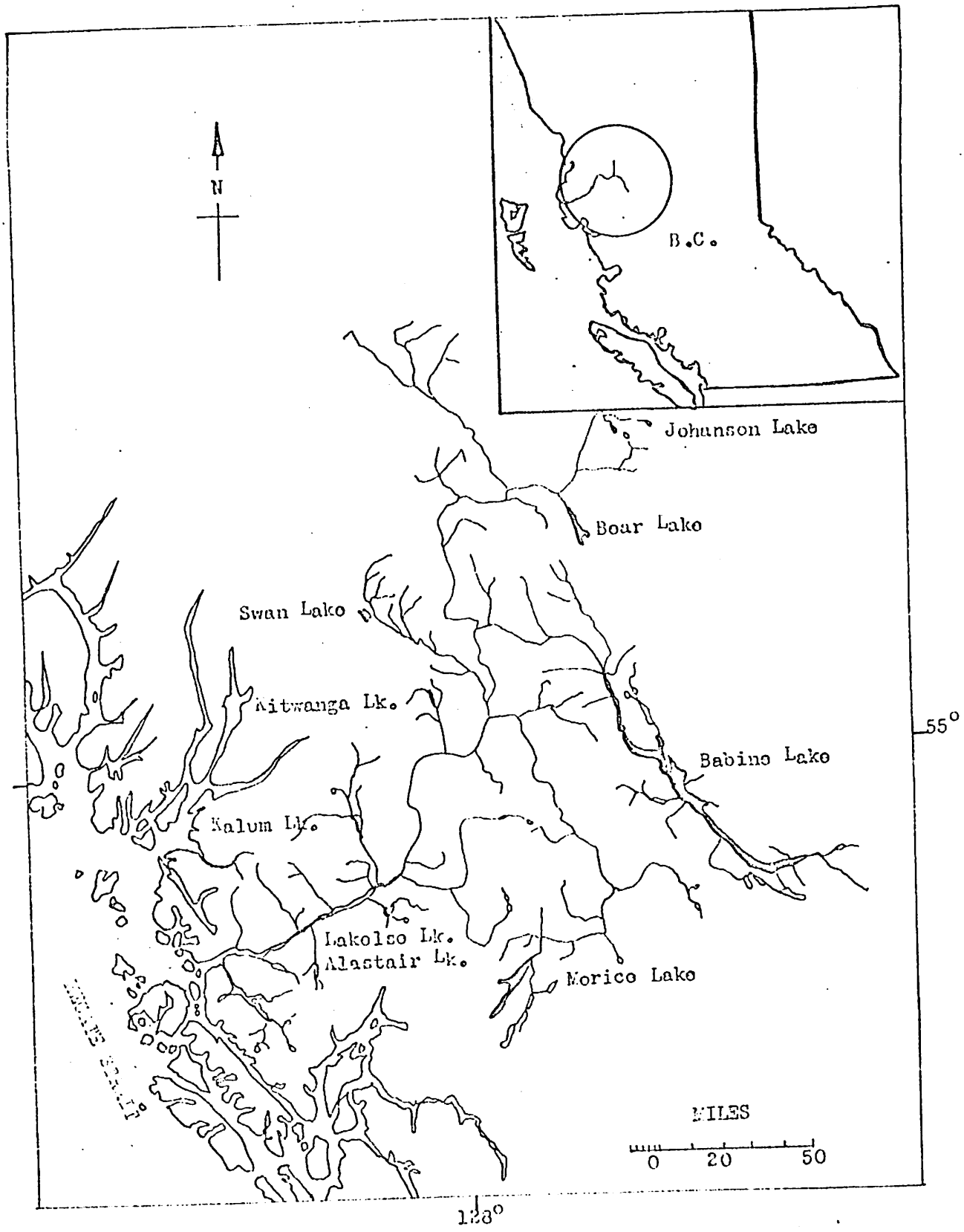

Fig.1. Skeena River drainage streams and major lakes.

Runs of steelhead to streams have generally been described as being "summer" or "winter" runs, the latter being more common. A winter run fish is one taken in a stream some time between November and April. A summer run fish is one which has not recently spawned, which is taken between May and October. Steelhead can be caught in some parts of the Skeena system from late July to late April. The relation between summer and winter run designation has not been investigated in streams of the north coast. Steelhead adults are present in streams in nearly every month of the year with spawning taking place in late winter and early spring.

The complicated and variable life-history of the steelhead implies difficulty in investigation. With the present scarcity of basic information it is even more important that long-term, large-scale and cooperative studies be undertaken with other fish agencies if satisfactory management practices are to be developed.

During the past winter season an attempt has been made to compile as much information as possible on the distribution, migration and life-history of steelhead of the Skeena system. Reference was made to regional files, Department of Fisheries publications, Fisheries Research Board of Canada reports and conversations with anglers a nd Conservation Officers. A fishery evaluation questionnaire was also prepared to establish some resource base lines for the Morice, Kispiox and Copper Rivers. Both recreational and economic factors were considered A report will follow in late 1968.

The fall and winter of 1967-68 was one of extremes. Steelhead fishing was restricted because of high water conditions and also ice flows and blockages. The Morice River and part of the Bulkley River near Houston supported probably the most significant fishery because of its stability (lake-headed). The Bulkley, Kispiox and Copper Rivers were lightly fished relative to the Morice-Bulkley system.

SUMMARY OF CREEL CENSUS FOR SOME SKEENA RIVER DRAINAGE STREAMS

A summary of 1967-68 creel census information obtained from scheduled road checks a nd randomized creel census programs is given in Table I.

Table I. Summary of 1967-68* creel census information for some tributary streams of the Skeena River.

Stream	Res.	Non. Res.	Total	Total Hours	Total Fish	C.U.E.	SH	Species D.V.	R.T.		Other
Babine		5	5	112	12	0.10	12				
Bulkley (Barrett)	88	9	97	606	107	0.17	94	7	2		4
Bulkley (Total)	107	10	117	652	116	0.17	96	8	2		
Copper	18		18	80	12	0.15	8	3			1
Kispiox	35	7	42	211	32	0.15	20	11			1
Morice	203	14	217	1263	156	0.12	101	22	32		1

*Data for April, May and June 1968 not included

Detailed creel summaries for 1967-68, past casual creel census and Cache Creek records are given in Appendix I. Serious thought should be given to methods now employed for data collected from (1) casual census, (2) randomized creel census, (3) Cache Creek records and (4) Provincial steelhead questionnaires. The relative worth of each collection method should be established and duplication, if any, avoided. Too many creel census' programs in the past have been conducted on a non-random, "I think I'll check the river today" basis.

COMMERCIAL CATCH OF STEELHEAD

Steelhead appear in the commercial catch of Area 4 (Skeena) in April, peak in July and August and drop off in late September and early October. Commercial fishing at the mouth of the Skeena River usually closes in October. More than 90% of the steelhead caught are gill netted, less than 8% are seined and the remainder are troll caught. From 1951 to 1954 the average Provincial catch was 48,000 while in the subsequent 13 year period the yearly average was 22,000. The commercial catch of steelhead has more than halved since 1954. Averages for 4 and 5 year periods commencing in 1955 are not significantly different from the 13 year average of 1955 to 1967. Fluctua-

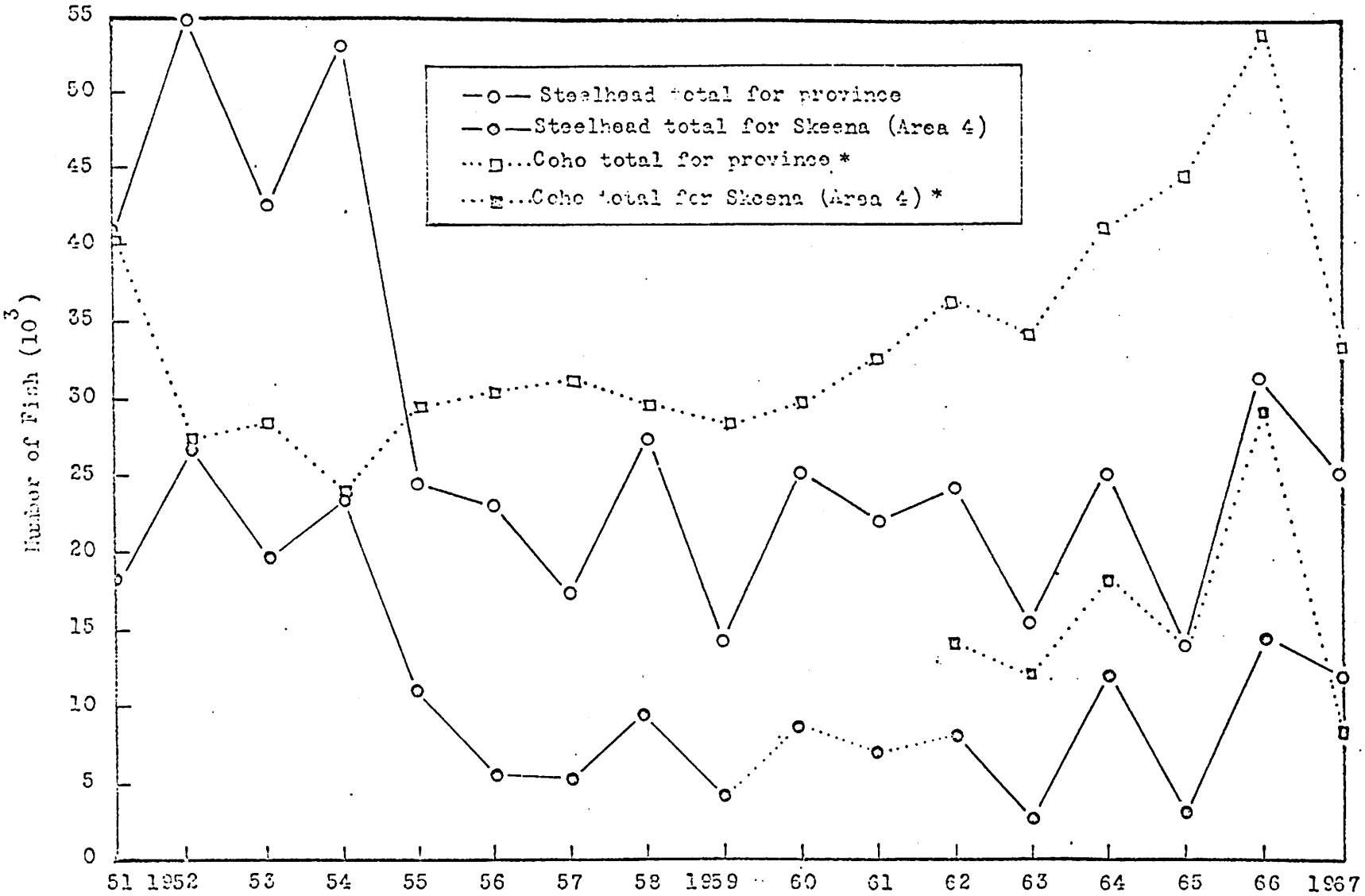

Fig.2 Annual commercial catch of steelhead and coho in the province and Skeena (Area 4). * Coho salmon totals raised (10^5).

tions in the number of steelhead caught in the Skeena area follow closely those of the Provincial totals (Fig. 2). Similarily there appears to be a correlation between Coho Salmon caught in the Skeena area and totals for the Province. Some correlation may exist between the numbers of steelhead and coho in the Skeena drainage system as indicated in the Skeena commercial catch (Fig. 2). Total provincial catches of coho, however, appear to have increased since 1960 while steelhead have fluctuated around a mean since 1954. Plots of chinook and pink salmon commercial catches show no possible correlations. From 1962 to 1967 some 19 to 47% of all commercial caught steelhead were taken from the Skeena area (Table II). Only 2 to 5% of all coho caught in the Province were taken from the Skeena area. Steelhead have constituted approximately 5 to 12% of coho numbers in the commercial catch of the Skeena area (Table II).

Table II. Summary of steelhead and coho taken commercial catches for the Province and Area 4 (Skeena) for the years 1951 to 1967.

Year	Total Steelhead in Prov. (000's)	Steelhead from Skeena catch area (00's)	Percent Skeena of Province (approx.)	Total Coho in Province (000's)	Coho From Skeena Catch Area (00's)	Percent Skeena of Prov. (approx.)	Percent Steelhead of Coho Skeena
1951	41			4008			
52	55			2745			
53	43			2894			
54	53			2445			
55	24			2970			
56	23			3050			
57	17			3138			
58	27			2990			
59	14			2897			
60	25			2030			
61	22			3297			
62	24	80	30	3626	1466	4	5.4
63	15	29	19	3422	1226	4	2.2
64	25	102	41	4149	1836	4	5.5
65	14	28	20	4443	1336	3	2.0
66	31	144	47	5412	2911	5	4.9
67	25	102	41	3302	811	2	12.3

Steelhead have consistently averaged 10 pounds in the commercial catch since 1951, have brought $0.23 to $0.29 perpound to the commercial fishermen and represented 0.1 to 0.2% of the total commercial catch of salmon species from 1962 to 1967 (Hourston and Campbell).

ENUMERATION AND TAGGING OF STEELHEAD

Twenty-eight miles upstream of the Bulkley-Skeena River junction, on the Bulkley River, lies Moricetown Falls, a natural place to enumerate and tag fish. Steelhead have been enumerated and/or tagged incidental to salmon tagging programs of the Department of Fisheries. Data summarized in Table III indicates that steelhead appear at Moricetown Falls during the first two weeks of August.

Table III. Enumeration of steelhead passing through Moricetown fishways*.

Year	Counting Dates	Total Counting Days	First Appearance of fish in fishways	Number
1959	11 Aug - 9 Sept.	30	12 August	600
61	17 July-10 Sept.	56	1 August	792
62	25 July-18 Aug.	25	3 August	206
67	2 Aug.- 3 Sept.	33	4 August	66

* Steelhead ascend Moricetown Falls in regions other than fishways

Table IV. indicates the number of fish tagged, tagging dates, sex ratios and recoveries.

Table IV. Summary of steelhead tagged and recovered from Moricetown Falls tagging programs.

Year	Date of Tagging	Fish Tagged Males	Females	Total	Tagged Recoveries Anglers	Other	Total
1961	25 Jul-25 Aug	23	123	146	8	33	41
62	8 Aug-17 Aug			17	3	-	3
64				6			0
65	28 Jul-27 Aug			86	7	6	13
66	27 Jul-21 Aug			42	6	2	8
67	2 Aug- 3 Sept	18	48	66	4	6	10*

* incomplete

In 1961 approximately 50% of tagged fish recoveries were made in the Indian food fishery at Moricetown Falls. Although recapture time varied from 1 to 4 weeks the average was 1.5 weeks. Some 30% of tagged fish recoveries were made in the commercial fishery downstream. Several fish (9) were recovered 11 months after tagging. Some fish were caught as kelts while others appeared to be on another spawning run. Of the 8 angler recoveries in 1961 a number were 100 miles upstream from the point of tagging. Anglers caught tagged fish from 1 to 7.5 months with an average of 3.5 months to recapture. Recapture of tagged fish in years subsequent to 1961 shows the Indian fishery to account for 25-50%, anglers 20-100% a nd commercial fishery 5-30%. There ha s been a 0 to 28% recapture rate on all steelhead tagged at Moricetown Falls with a 6 year average of 15%. Little validity can be applied to above figures due to small numbers of fish marked and recording of recaptures. Susceptibility of tagged fish to the Indian and sport fishery is unknown.

A bi-modal population is indicated in length frequency histograms of Figures 3 and 4. Dotted lines represent visual separation of size groups. In both 1961 and 1967 over 70% of steelhead tagged were females.

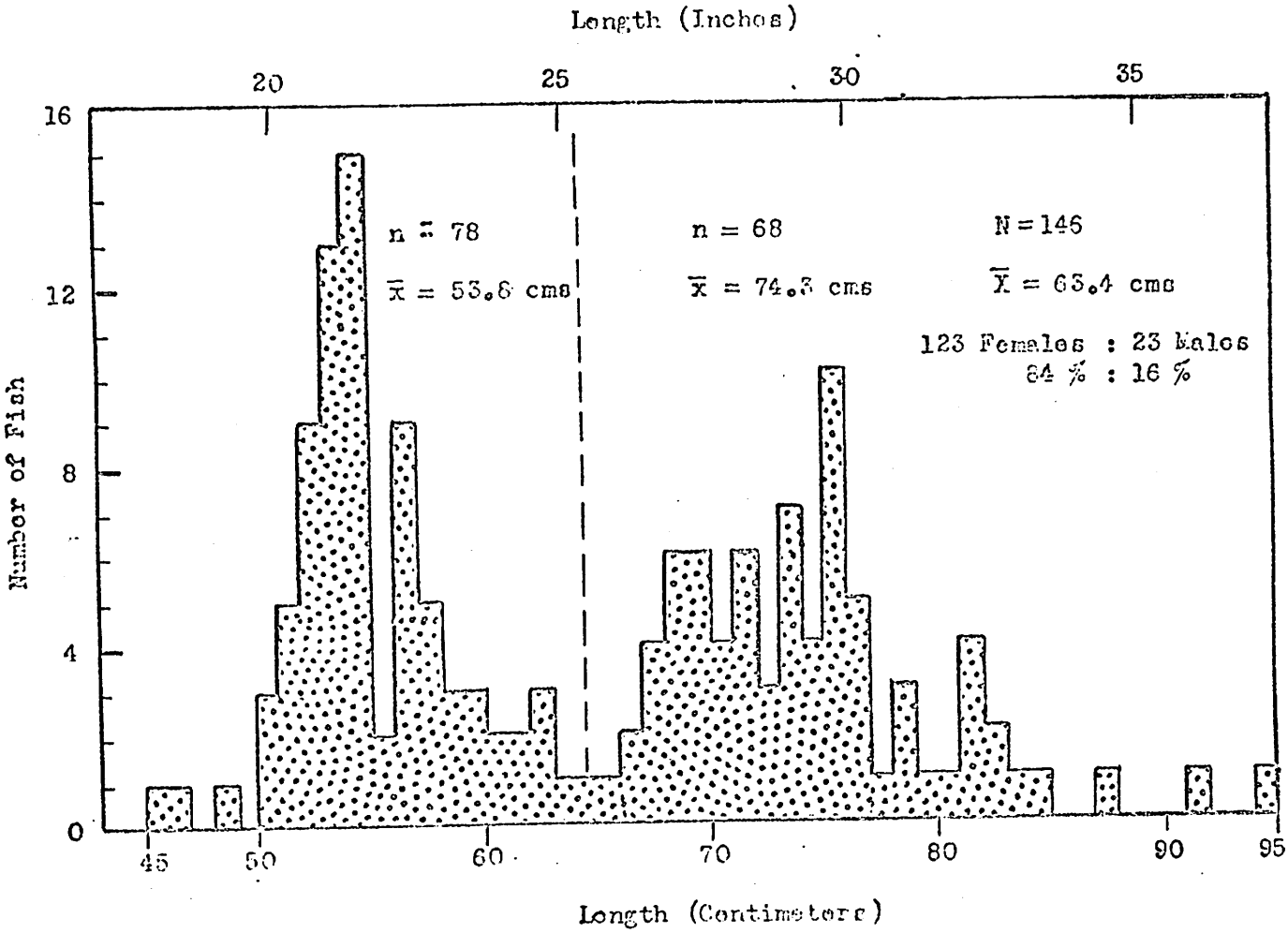

Fig. 3 Length-frequency of steelhead tagged at Hericotown Falls, July 27th to August 25th, 1961.

g.d.t.

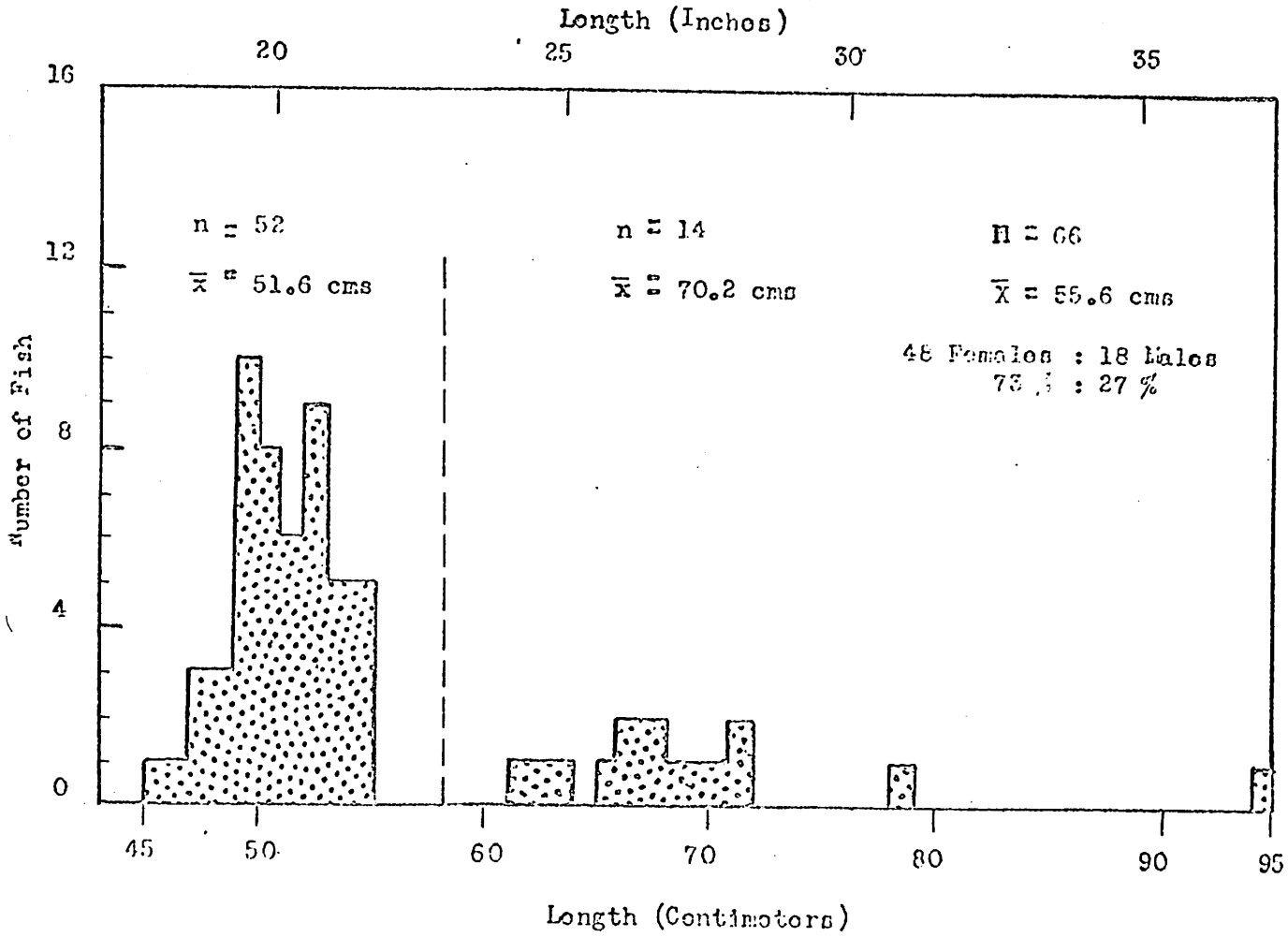

Fig. 4 Length-frequency of steelhead tagged at Moricetown Falls, August 2nd to September 3rd, 1967.

g.d.t.

ANALYSIS OF STEELHEAD-CATCH ON THE MORICE RIVER

Until the fall of 1967 little factual information of any worth had been collected on the Morice River. Most data available was in the form of non-random creel census.

The Morice River, and that part of the Bulkley River known as Barrett (hereafter considered to be the Morice River), is one of the most popular regions for steelheading in the upper Skeena River drainage. Although the river is near a forest development road access to the river is restricted to several dozen locations. The river is probably the most intensively fished of all streams in the Skeena drainage (June to May). This statement encompasses the Chinook salmon fishery.

Steelheading tends to concentrate at the outlet of Morice Lake and near the junction of the Bulkley and Morice Rivers at Houston. Good catches are made in runs and pools all the way from the mouth to the end of the west forest development road, a distance of more than 30 miles. Fishing starts for steelhead in August and peaks in October and November. In some years good weather conditions allow fishing to continue throughout the winter with good catches realized in March and April. Most fish are spawning at this time of year although kelts have been taken in early winter months (L.J. Cox, pers. comm.).

Length-weight frequencies of steelhead from the Morice River indicate at least two major size groups (Fig. 5 and 6). The smallest grouping from 18 to 23 inches has a 1:1.8 male to female ratio. A second visual grouping of fish from 25 to 29 inches has a 1:4 male to female ratio. Fish larger than 30 inches are predominately males. There is every likelihood this group of fish is closely allied to the 25-29 inch in age. There is a paucity of length-age relations as indicated in Figure 7. Scale readings indicate 2/1 and 2/2 age categories in about equal numbers. Several hundred scale readings should be read to establish life-history categories of Morice River steelhead. A large percentage of fish captured between 18 and 20 inches appear to be steelhead of the 2/1 age category. These fish have comprised 13 to 20% of the steelhead catch in recent years on the Bulkley-Morice River system.

ANALYSIS OF STEELHEAD-CATCH ON THE BULKLEY RIVER

Since most steelhead data for the Bulkley River represents a small section of the stream all comments will necessarily be about the

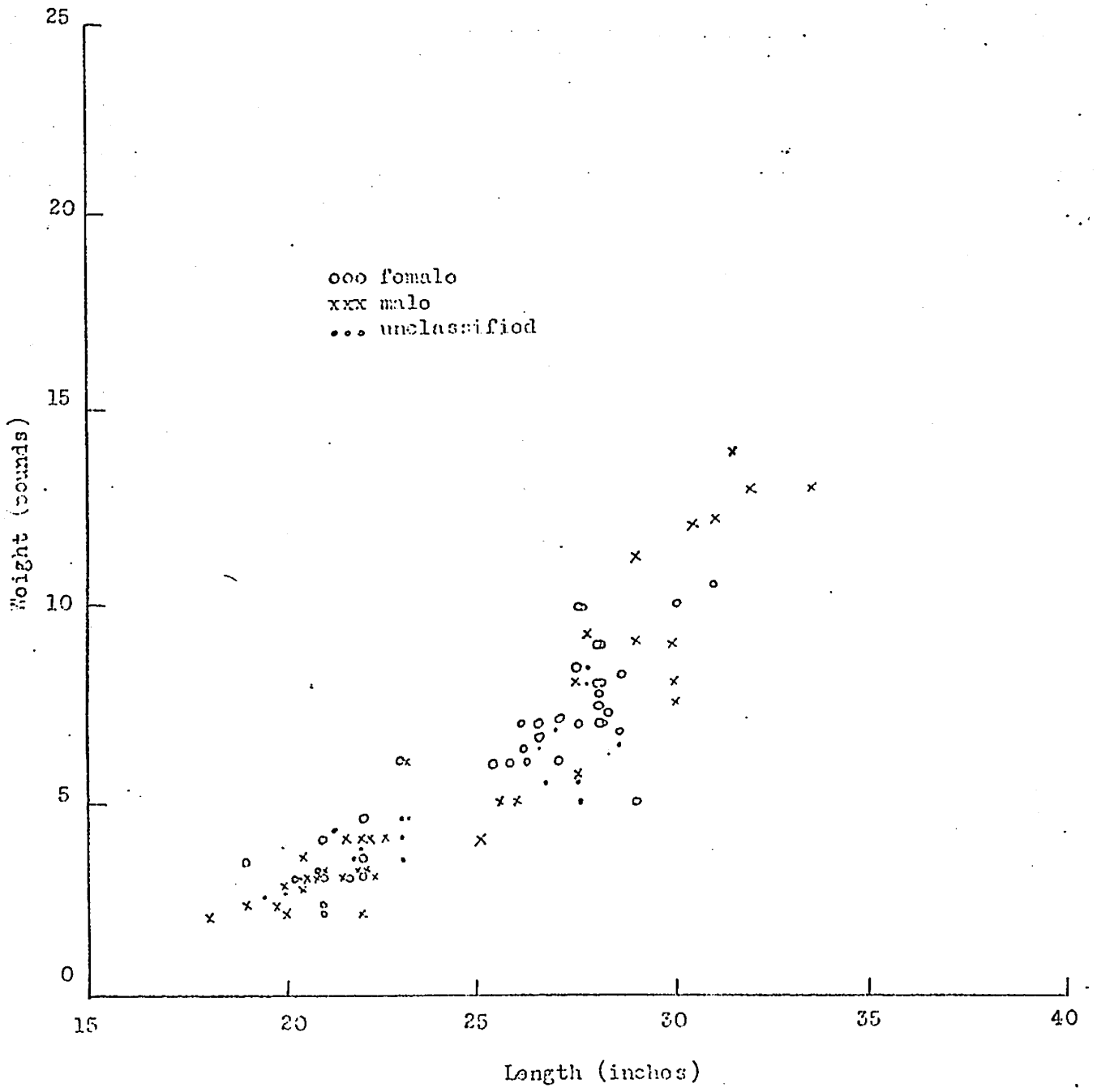

Fig. 5 Length-weight relation of Morico River steelhead, 1961 to 1963.

g.d.t.

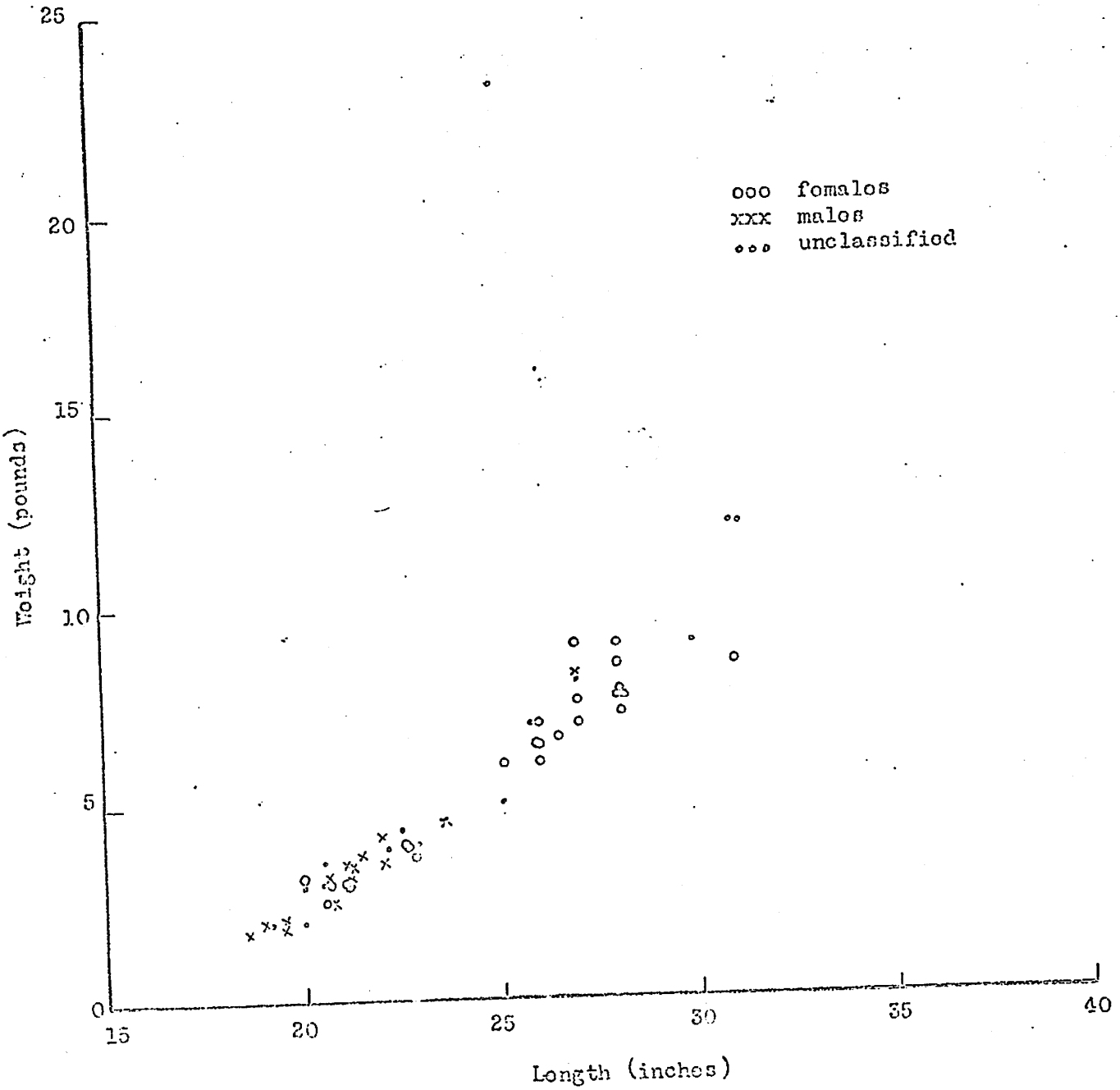

Fig. 6. Length-weight relation of stoolhead from the Morico River, September to December, 1967.

g.d.t

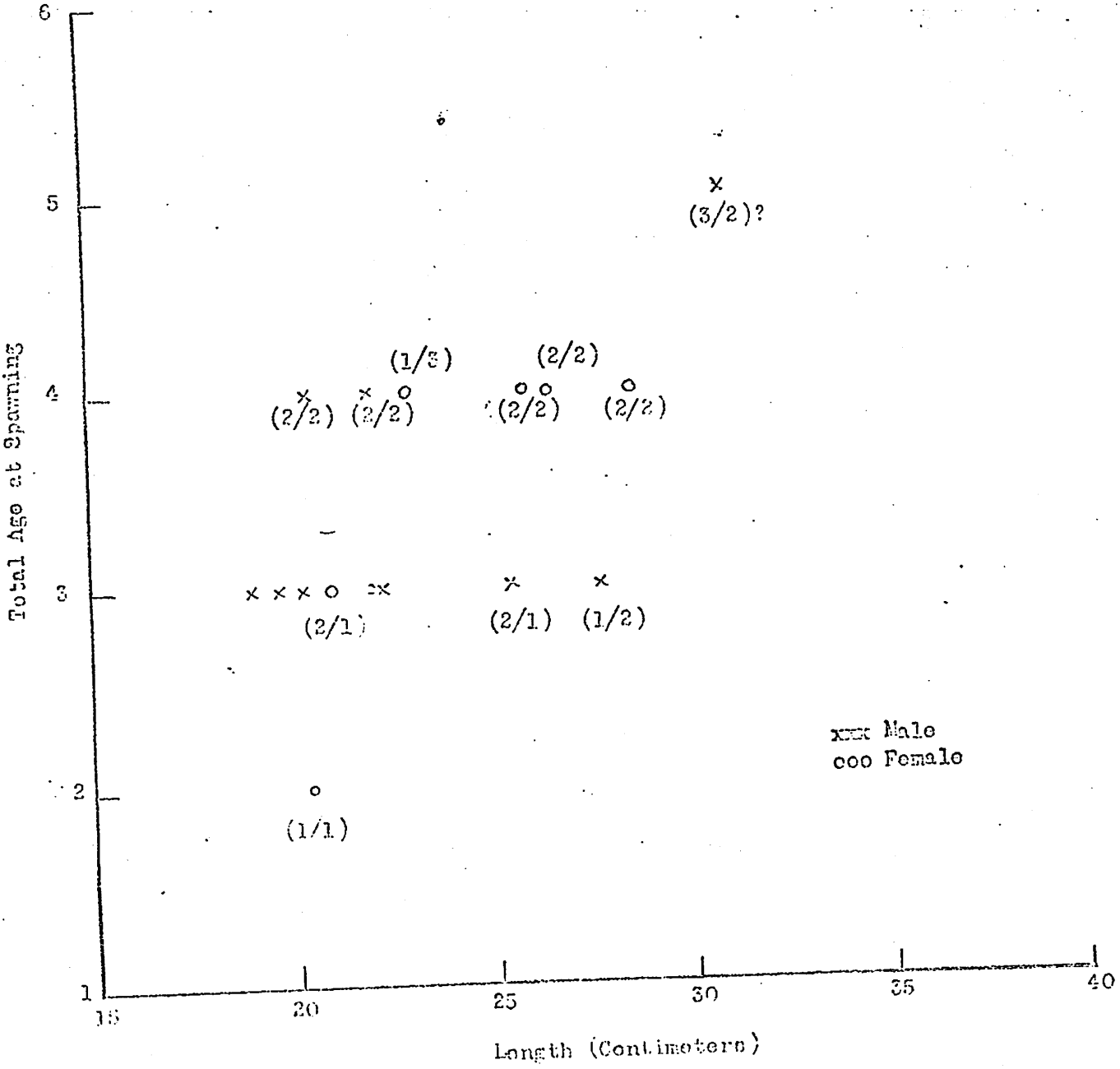

Fig. 7. Length-age relation of Morico River steelhead, February and March, 1963. All fish are first time spawners. A (2/1) indicates 2 years freshwater and 1 year saltwater growth.

g.d.t.

4 mile stretch of the Bulkley River downstream of the Bulkley-Morice River junction. The area is commonly known as Barrett. Because the Morice River, of the Morice-Bulkley River system, is by far the largest single contributor of water to the Skeena River the Bulkley River from Houston to Hazelton, a distance of more than 85 miles, should be known as the Morice River. It is essentially a first order tributary stream of the Skeena River from Morice Lake outlet to the Bulkley-Skeena River junction at Hazelton.

As with length frequencies relations for the Morice River, Bulkley River steelhead fall into two distinct size groups (Fig. 8 and 9). Fish less than 23 inches have a 1:1.28 male to female ratio while those greater than 24 inches but less than 29 inches have a 1:4 male to female ratio. Fish greater than 30 inches are decidedly males. Few scale sample readings are available for Bulkley River steelhead (Appendix 2). Statistical analyses (Students t-test) shows no significant difference at the 0.05% level between mean fork lengths of Morice River and Bulkley River steelhead caught near Barrett. Steelhead of the Bulkley River, upstream of Barrett, are considered to be similar to populations caught in the Morice River.

A composite length frequency histogram for Morice and Bulkley (Barrett) Rivers is shown in Figure 10. The bimodiality of the sport catch is similiar to steelhead tagged at Moricetown Falls in 1961 and 1967 (Fig. 3 and 4). There is, however, a statistical difference at the 0.05 level in mean fork lengths of fish tagged in August 1967 and those subsequently caught in the Morice-Bulkley (Barrett) River fishery. The tagging program may be selective in taking early run fish which are small. The sport fishery, on the other hand, may take, in addition to the small fish, larger fish which are never sampled at Moricetown Falls in August and early September.

Tagging programs in 1961 and 1967 reveal that more females than males were tagged (Table V). It appears the sex ratio of sport caught fish in 1961 was 1:1 male to female while it was 1:1.37 from September 1967 to February 1968.

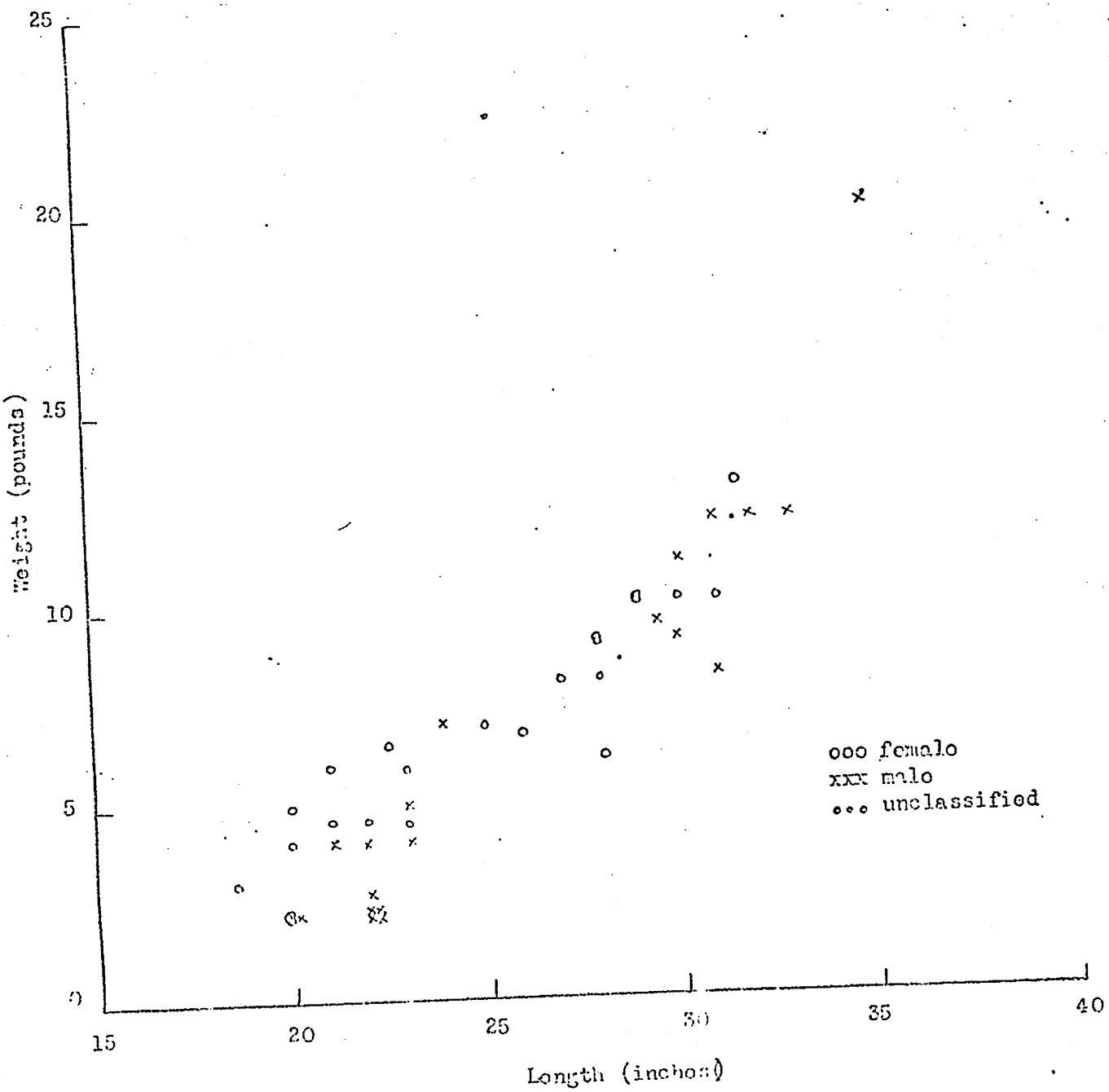

Fig. 8. Length-weight relation of Bulkley River steelhead, 1953-1954.

g.f.t.

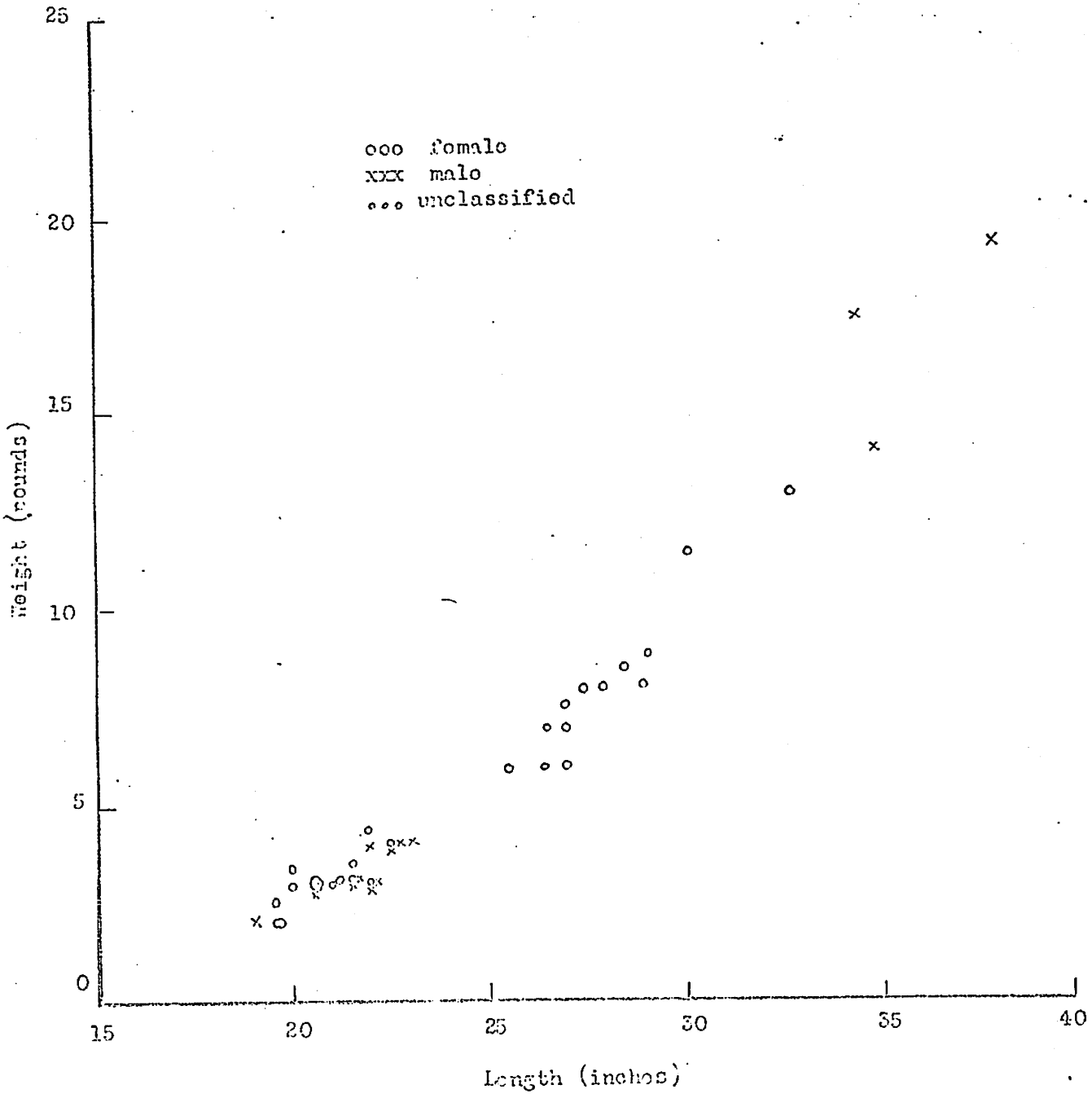

Fig. 9 Length-weight relation of Bulkley River steelhead caught between junction of Morice and Bulkley Rivers at Houston and C.N.R. bridge on the Bulkley River, September to December, 1957.

g.d.t.

Table V. Numbers and percent of steelhead tagged and those caught in sport fisheries of Bulkley and Morice Rivers.

Year	Tagged		Sport Caught	
	Male	Female	Male	Female
1961*	23 (16)	123 (84)	36 (50)	36 (50)
1967**	18 (27)	48 (73)	37 (42)	51 (58)

* some samples from 1963 in sport catch

** data incomplete for 1967-68 sport catch

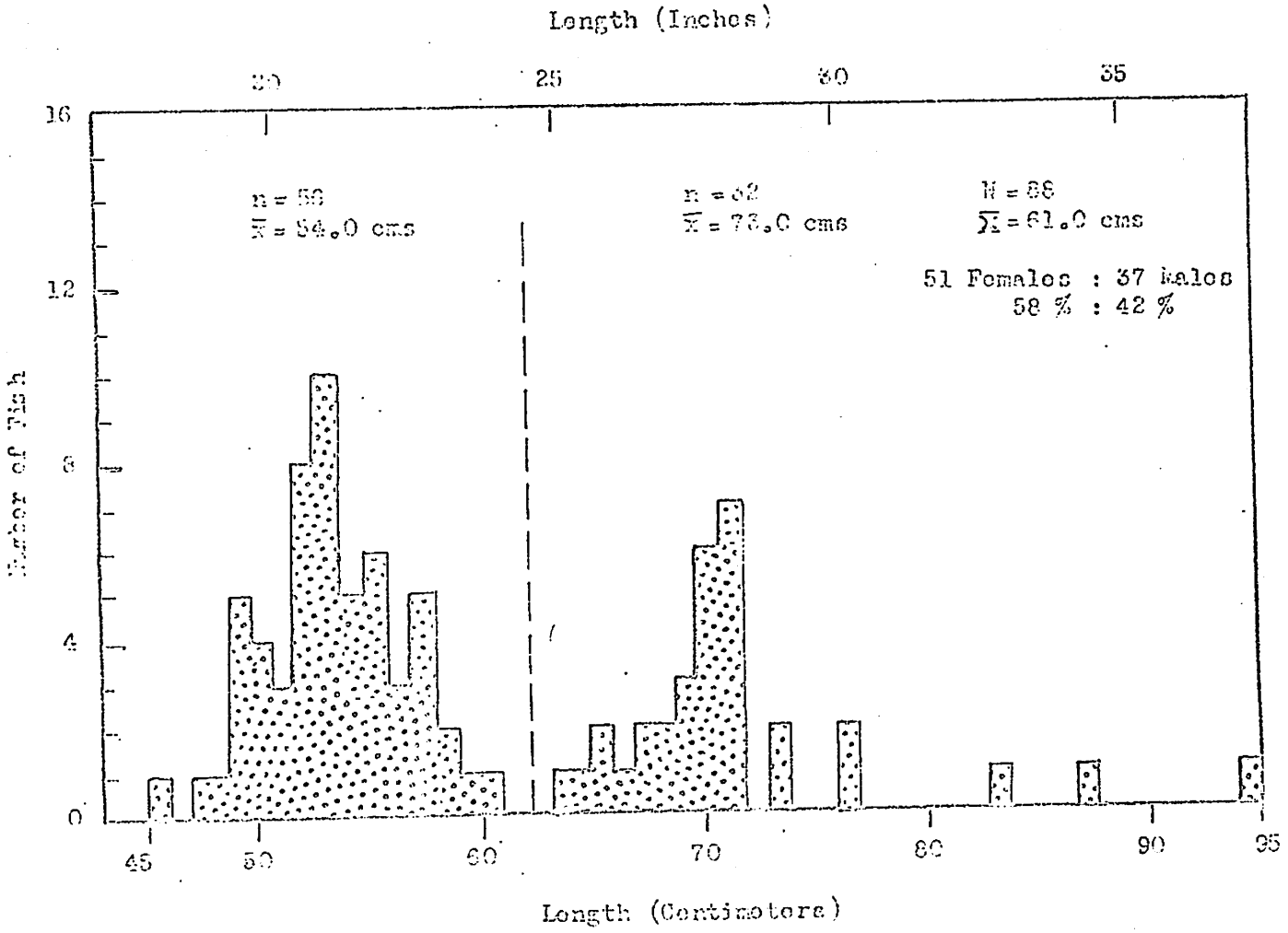

Fig.10 Length-frequency of steelhead taken in sport fishery of Lorne River and Bulkley River upstream of C.N.R. bridge, September 1967 to January 1968.

g.d.t.

ANALYSIS OF STEELHEAD-CATCH ON THE KISPIOX RIVER

Steelhead fisheries started about 15 years ago on the Kispiox- and Morice Rivers. Forest development roads have been responsible for most angler access. In 1958 only 14 miles of road were completed on the Kispiox River, by the end of 1959 some 40 miles of road bordered the river. In 1966 there was 55 miles of access road along the Kispiox River, however, in many cases, access to the river is restrictive because of road location and steep nature of the river containing banks. Angling, like that on the Morice River, is concentrated at the mouth, at point locations and at tributary stream junctions. Use of boats and rubber rafts for travel is gaining popularity on both the Kispiox and Morice Rivers.

Steelhead and coho fisheries were greatly curtailed in the fall of 1967 due to high water conditions. Many non-residents returned home with a concomitant reduction in the 'famous' Kispiox fall fishery. Ice conditions usually do not favour a good winter steelhead fishery. Some isolated fishing for trout and whitefish is conducted by natives of Kispiox Indian village.

Length frequency of sport caught steelhead in the Kispiox River during September 1961 indicates primarily a unimodal population (Figure 11). The average size fish was 80 cms and weighed close to 14 pounds. The sex ratio was 1:1.7 male to females with most fish under 80 cms females and those greater males (Figure 12). Approximately 65% of the fish were of the 3/2 age category while 20% were 3/3 and 14% were 2/2 (appendix 2). One fish was 7 years old and had spawned twice prior to capture. Nearly half of the 6 year old fish had spawned once. Only 3 of the 33 five year fish had previously spawned (Fig. 13). Length-weight relations of 1961 and 1966-67 are similar (Fig. 12 and 14).

ANALYSIS OF STEELHEAD-CATCH ON THE COPPER (ZYMOETZ) RIVER

The Copper River, near Terrace, has a private logging road bordering its lower 20 miles. Because of the nature of access fishing is necessarily concentrated in lower most reaches of the river. The stream is subject to numerous, violent fall floods and fishing is often greatly reduced. Good combination catches of coho and steelhead may be had in fall months. In some years steelhead are caught in fair numbers by residents in March, April and May.

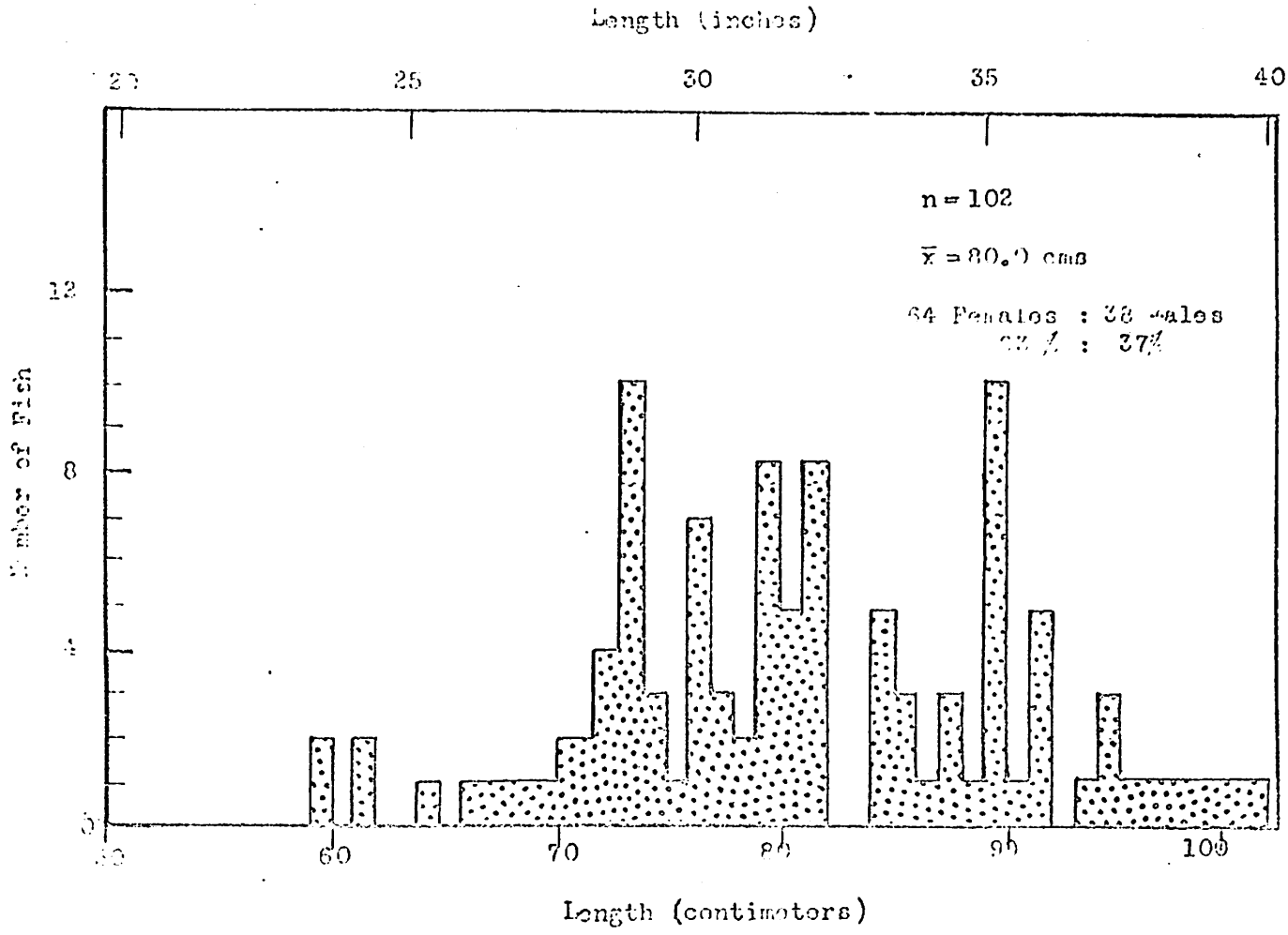

Fig. 11 Length/frequency of sport caught steelhead in Kispiox River during September 1961.

g.d.t.

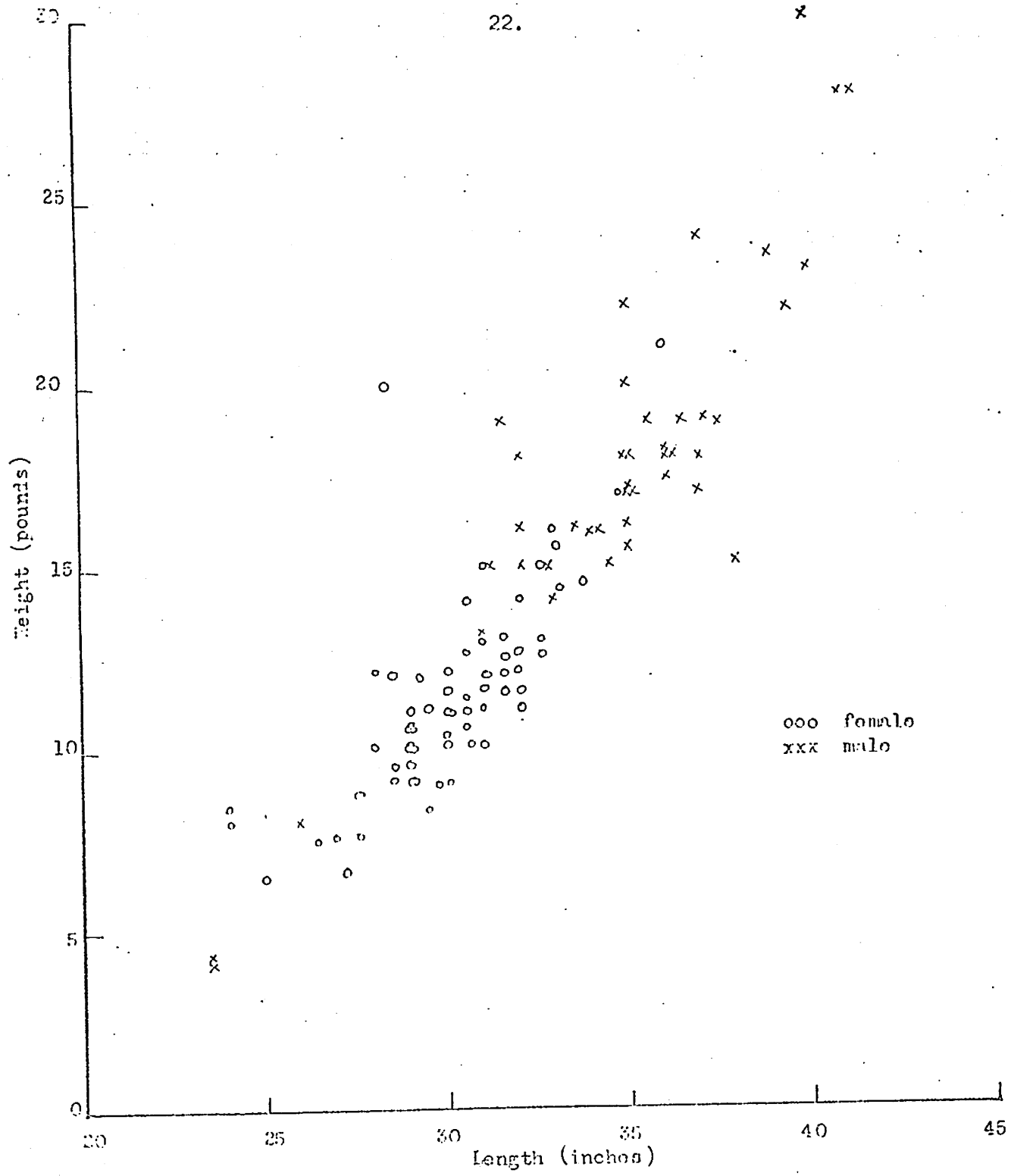

Fig. 12 Length-weight relation of Kispiox River steelhead, 1961 (20 September to 2 October)

r.d.t.

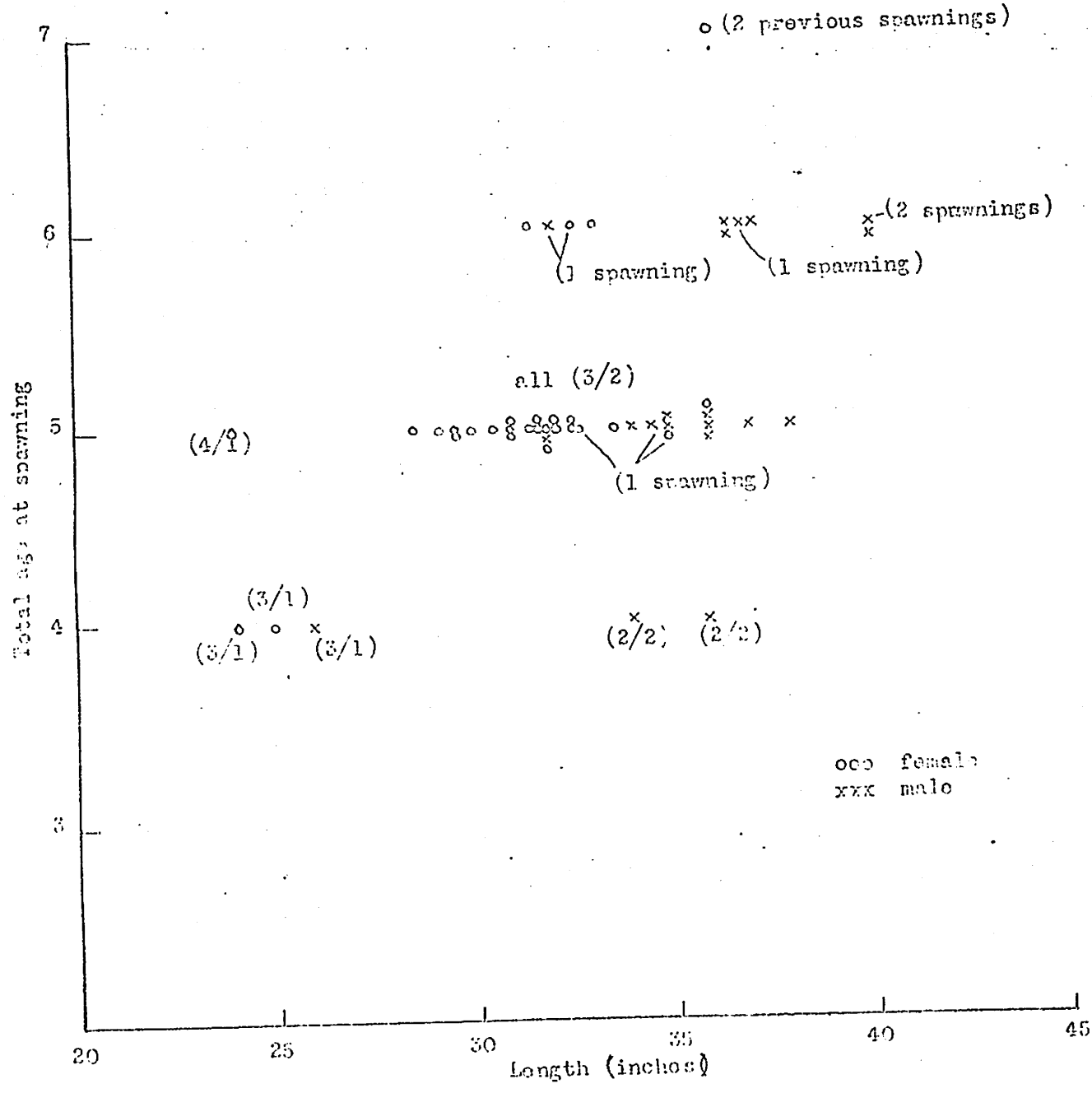

Fig. 11. Length-age relation of Kispiox River steelhead, 1961. All fish not noted are first time spawners. A (3/1) indicates 3 years freshwater growth and 1 saltwater with a total age of 4 at spawning.

g.d.t.

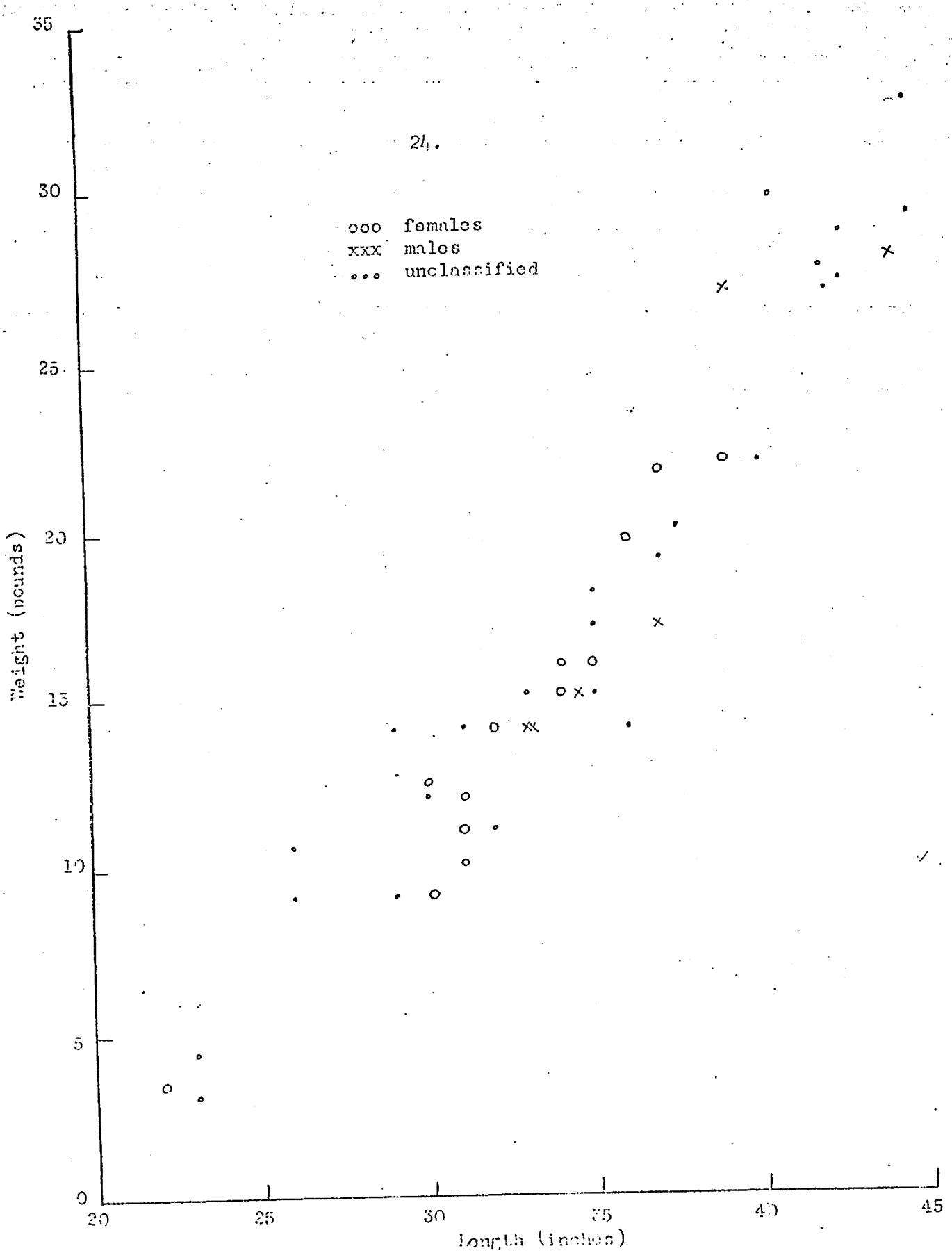

Fig. 14 Length-weight relation of Kispiox River steelhead, 1956-1957.

g.d.t.

There is a paucity of data on the Copper River. Length frequency histograms and length-weight relations indicate essentially a bimodal popula tion with fish under 27 inches comprising one group and those greater another (Fig. 15 and 16). Length-age relations indicate that most fish under 27 inches are age 4 (Fig. 17). The average size fish is 72 cms and weighs 9-10 pounds. The sex ratio is 1:2.33 males to females from data available. From limited scale readings of 1957-58 (Appendix 2) age composition appears to be 37 percent 3/2's, 27 percent 2/2's, 20 percent 3/1's and the remaining 16% spread among five age categories. No information is available on numbers and percent of previous spawnings.

ANALYSIS OF STEELHEAD-CATCH ON THE BABINE RIVER

In January 1968, Dr. D.W. Narver, of the Fisheries Research Board of Canada, forwarded a report titled "Age and Size of Steelhead of the Babine River, British Columbia" to the Regional Fisheries Biologist in the Prince George Region. Prior to this report little or no information was available on steelhead of Babine River. A brief graphical and written summary of the report is given in this section.

Steelhead pass through a Federal Fisheries counting fence on the lower Babine River in late August and increase in numbers through September. From 1952 to 1966 the mean accummulating count of steelhead on September 13 was 53 with a range of 20 to 114. Presumably this was only the early portion of the total run. Steelhead have been observed to spawn in March, April and May between the counting fence and Nilkitkwa Lake.

Length frequency of 52 sport caught steelhead in the fall of 1967 indicates essentially a unimodal population (Fig. 18). Fish averaged 81 cms and weighed between 13 and 14 pounds. A ratio of 1:1.3 male to females was indicated. Whether this reflects the true sex ratio of returning fish or selectivity in the sport fishery is unknown. Sex ratios reported for sport caught steelhead were only slightly higher (1:1.4 to 1:1.8) from coast areas of southern British Columbia and Oregon (Withler, 1966).

Most fish under 14 pounds were females while most fish greater were males (Fig. 19). The most common total age was 3/2 (65%) while the second most common group was 3/3 (12%). Remaining age classificatio were spread among 5 age categories (Appendix 2). Three of the 61 scal

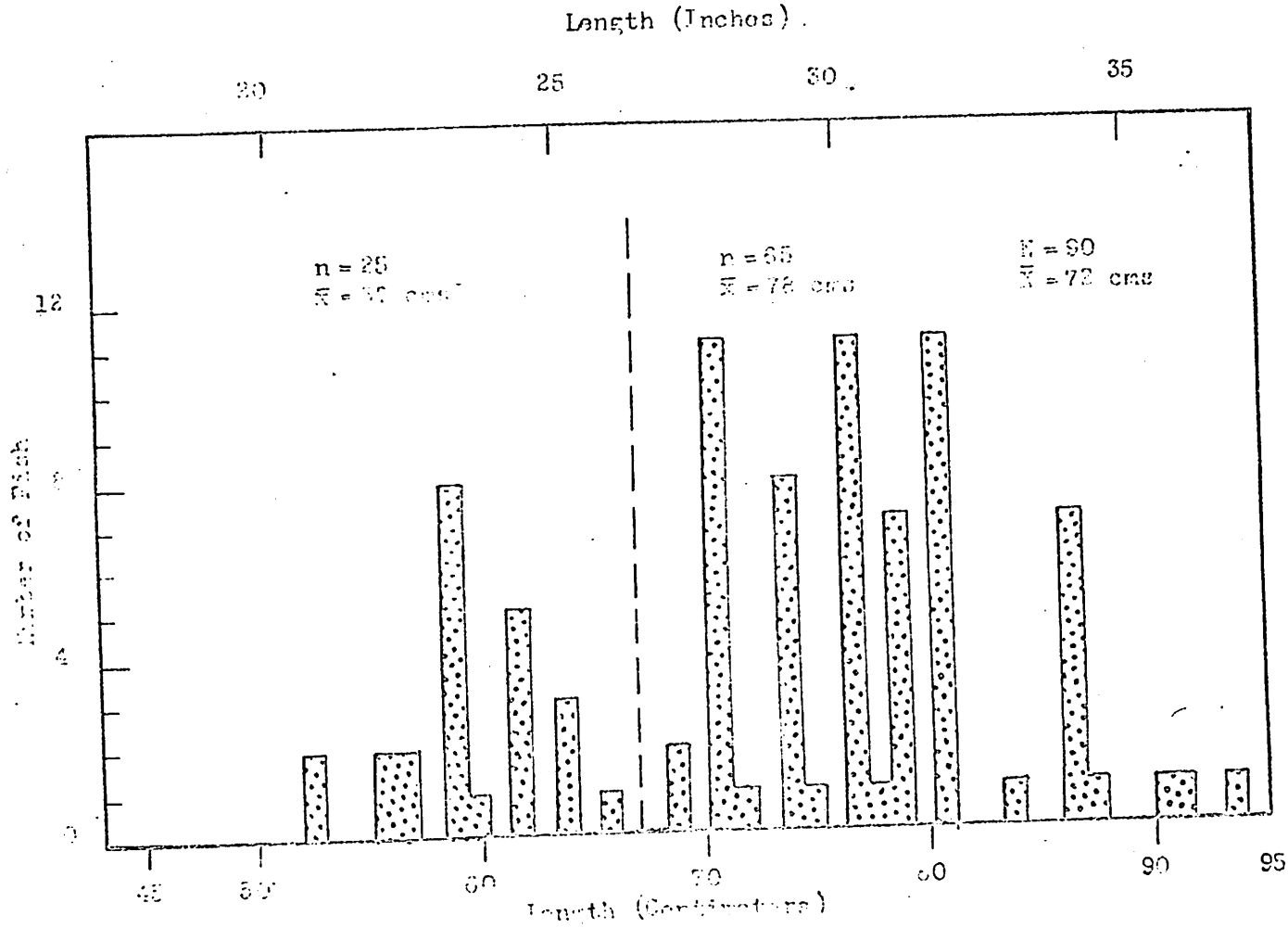

Fig. 15 : Length-frequency of female (Upper Eel) River steelhead for the years 1957-58 and 1963-65. Sample of 90 females to 36 males and 36 unclassified.

g.d.t.

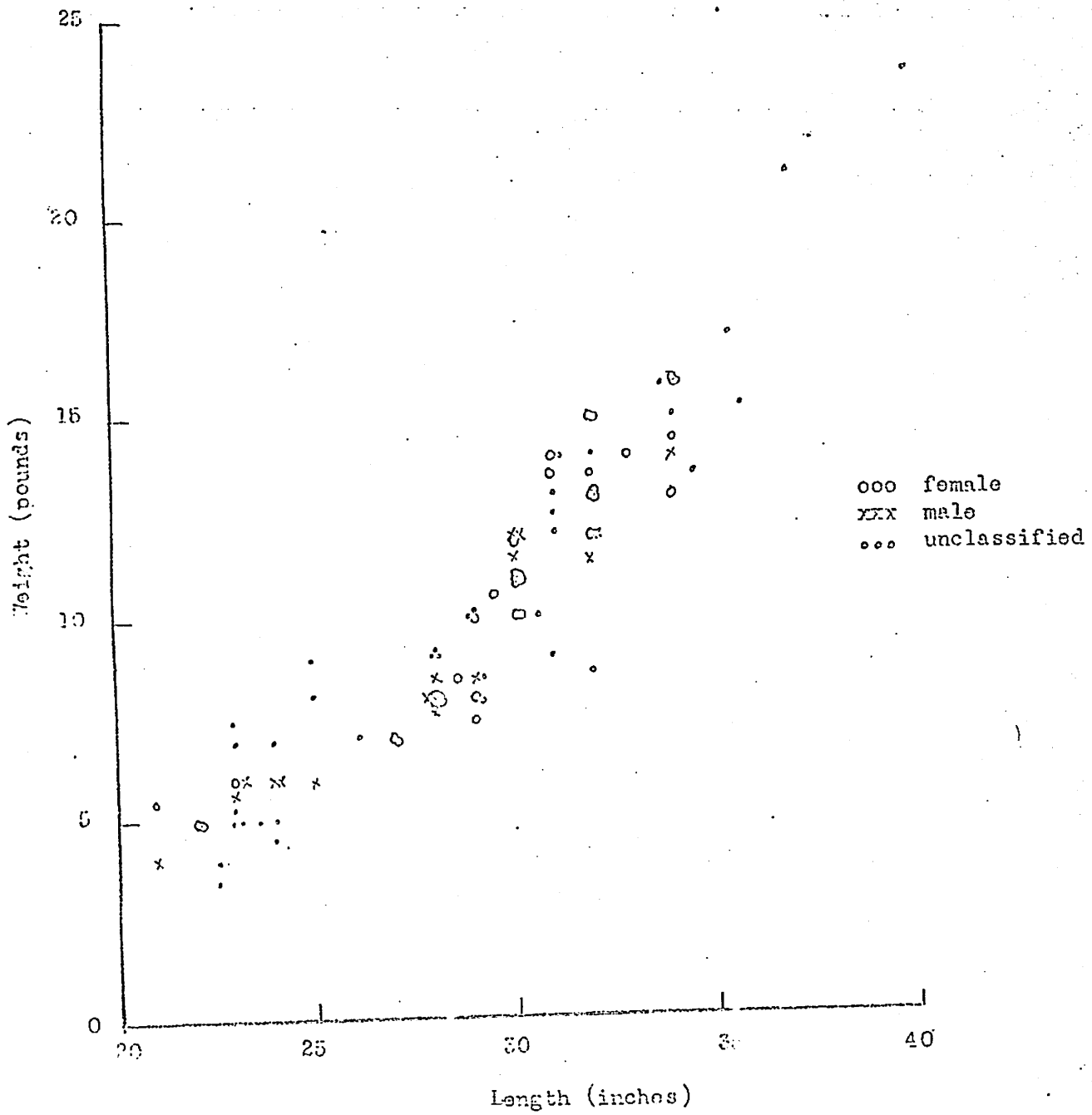

Fig.b length-weight relation of Copper (Zymoetz) River steelhead, 1957, 1958, 1963, 1964 and 1965.

.d.t.

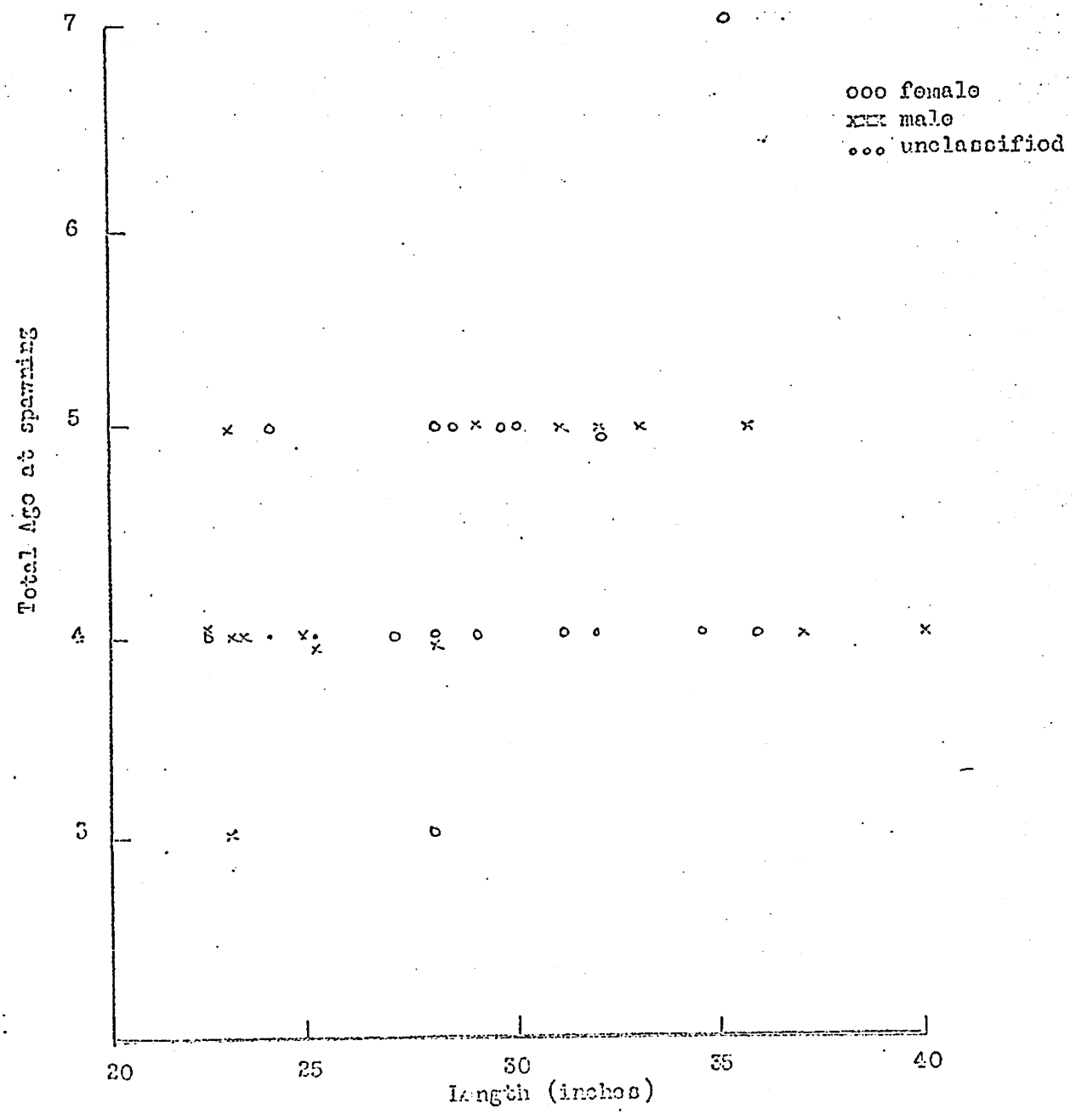

Fig. 17 Length-age relation of Copper (Zymoetz) River steelhead, 1957-1958 (September to May).

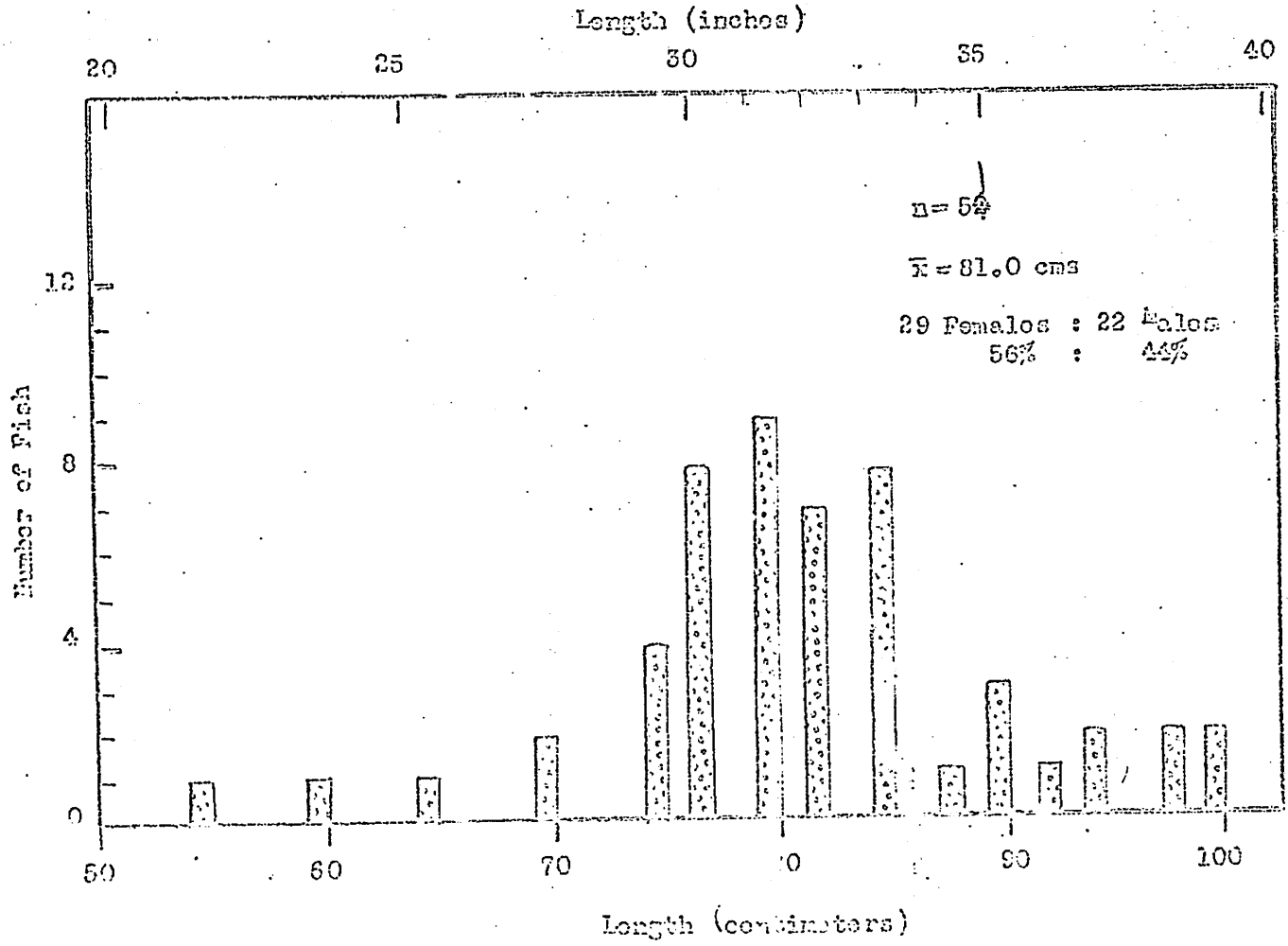

Fig. 18 Length-frequency of sport caught steelhead below counting fence on lower Babine River during September and October 1937.

Pencil 9 Sept - 23 Oct/68

(♂ 42 28
♂ 41.0 , 24.5 lbs)
(42.75", 27.75 lbs.)

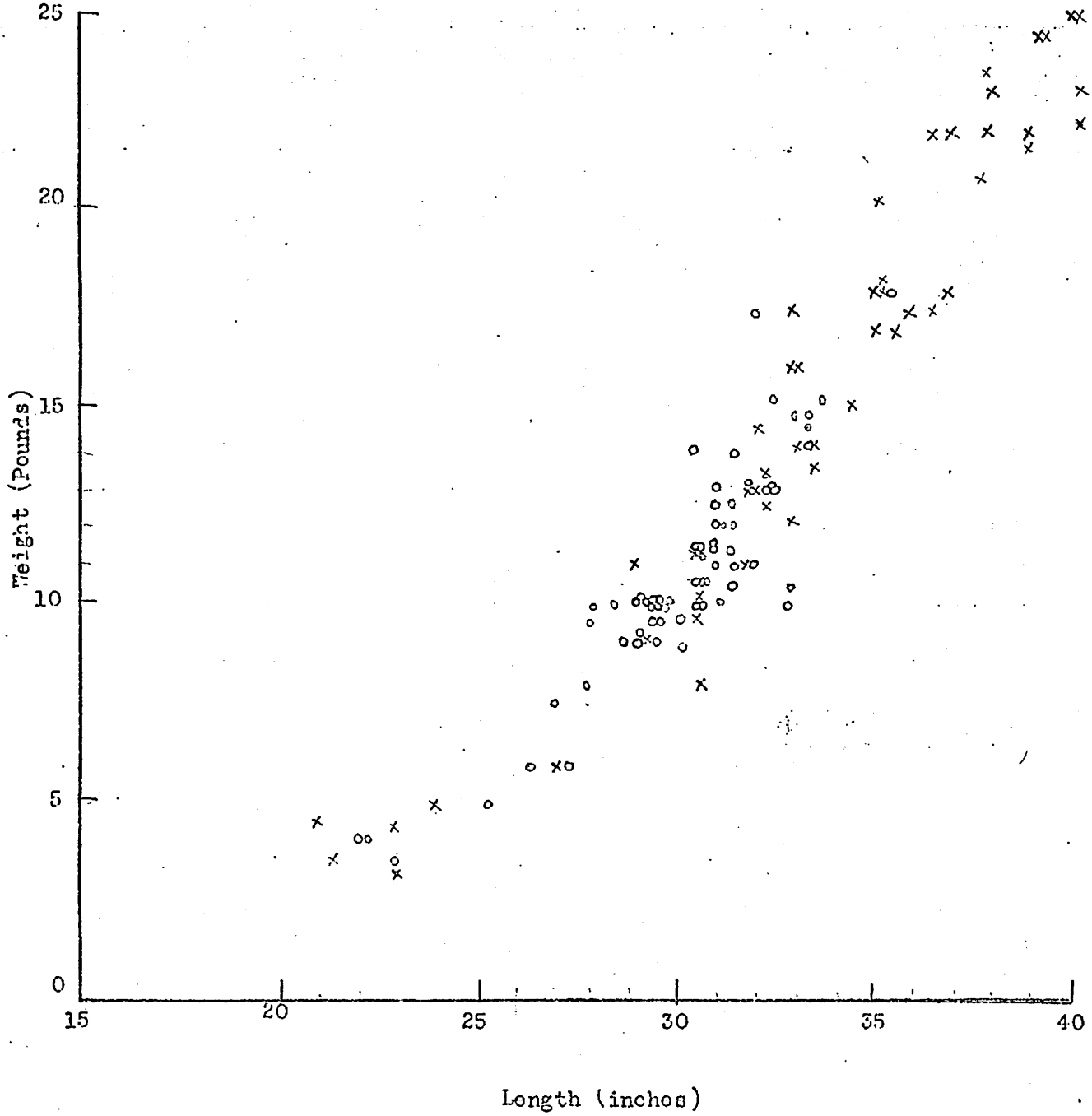

Fig. 19 Length-weight relation of Babine River steelhead, September and October, 1967. Fish caught mainly below counting fence on lower Babine River.

g.d.t.

Samples read were from fish that had spawned the previous spring and were returning for a second time (4.9%). They were females of 2 and 3 years ocean residence and a male of 3 years ocean residence. The percentage of repeat spawners in sport fishery samples from Lower Mainland streams of B.C. ranged from 4.4 to 6.3 for "summer" steelhead in three streams a nd 5.0 to 31.3 for "winter" steelhead in eight streams (Withler, 1966).

Most juvenile steelhead in the Babine River migrate to the ocean after three winters in fresh water. No gross differences in calculated smolt length was apparent between sexes.

There was a tendency for males to remain longer both in fresh water and the ocean than females. Distribution of weight by sex within the sample of 61 steelhead was dosely related to ocean life.

Babine and Kispiox River steelhead appear to have similar percentages of the most common total age category (3/2). The high percentages of 65.3 in 1967 and 64 in 1961 for the Babine and Kispiox Rivers respectively is comparable to the "summer" steelhead age category percentages of 48 to 63 indicated by Withler (1961).

Length-weight frequencies, sex ratios and percentages of age categories of the Babine and Kispiox Rivers are quite similar.

HELICOPTER COUNTS OF STEELHEAD

Since 1963 spawning steelhead populations have been enumerated on a random basis in the Morice, Copper (Zymoetz) and Lakelse Rivers. Ice conditions, stream level, stream colour and weather have resulted in a 'hit-and-miss' type of enumeration. Table VI indicates dates of past enumerations and numbers of steelhead counted.

Table VI. Summary of helicopter counts of spawning steelhead.

Morice River	Copper River	Lakelse River
22 Mar 63 (1500)	9 Apr 63 (-)	
	6 Apr 64 (-)	
14 Apr 65 (≥102)	18 May 65 (4)	18 May 65 (66)
	6 Apr 67 (183)	6 Apr67 ( )

Regardless of the difficulties involved in obtaining numbers of spawning steelhead, flights have partially defined area of major spawning. Most steelhead appear to spawn beyond Lamprey Creek junction

on the Morice River, around Clore River junction on the Copper River and between Lakelse Lake and Coldwater Creek junction on the Lakelse River. Future helicopter counts should establish if steelhead spawn in Thautil River (a tributary of Morice River), in areas close to headwater lakes on the Copper River and along most of the Lakelse River. Plans should be made to enumerate the Kispiox, Bear, Sustut and upper Skeena Rivers as well as Johanson Creek, in the very near future.

STEELHEAD GUT SAMPLING

In the fall of 1967 a gut sampling program was initiated to better understand the 'feeding' habits of adult steelhead in fresh water. Sampling will continue until May 1968 to complete one spawning period. Most samples collected since September 1967 have been shipped to Mr. Bill Duff, a student at Notre Dame University in Nelson, B.C. The analyses will be used for a graduating essay and reports will be made available to our Branch. The results of this study will be objectively used to better understand contentions of anglers that roe is the most efficient way of catching steelhead, particularly those near spawning.

Preliminary analysis by the author of 31 steelhead samples collected from March 1967 to January 1968 indicate that when free eggs from spawning fish (salmon, dolly varden char, Rocky Mountain whitefish, Rainbow trout including steelhead) are available they show up in 30 to 45% of the steelhead gut samples. Over 65% of steelhead gut samples analyzed had food of some type in the gullet, stomach or intestines. Recent findings by Peterson and Lyons (1968) on the Qualicum River also indicate steelhead were feeding in fresh water. There was some suggestion that females feed to a greater extent in freshwater than males in their study.

PRELIMINARY DATA FROM STEELHEAD PUNCHCARD QUESTIONNAIRE ANALYSIS (1966)

In 1967 the steelhead punchard questionnaire was sent to anglers buying a steelhead licence for the 1966-67 season. A preliminary summary of steelhead data for some streams of the Skeena drainage is shown in Table VII.

Table VII. Preliminary summary of steelhead data for some streams of the Skeena River drainage realized from Steelhead Punchcard Questionnaire.*

	Morice	Bulkley	Kispiox	Babine	Copper	(Kitimat)
No. of fish	525	704	434	454	258	75
Resident caught	353	561	112	39	178	74
Non-res. caught	172	143	322	415	80	1
No. of anglers	335	326	329	100	211	102
Resident	237	241	149	18	173	85
Non-resident	98	85	180	82	38	17

* The above figures represent a 22% return on questionnaires. Apply a factor of 4.5 to estimate total fish and anglers.

It should be noted that the above figures are probably biased because of the higher rate of returned questionnaires by non-residents (68%) than by residents (50%). The estimated number of fish and anglers should therefore be lowered for rivers on which non-residents predominated and elevated on rivers where residents predominated.

The Morice, Bulkley (mostly near Barrett), Copper and Kitimat Rivers are fished mainly by residents while non-residents predominate on the Kispiox and Babine Rivers. Numbers of fish caught are closely related to percentages of resident and non-resident anglers except on the Kispiox River where non-residents (55%) take 74% of the catch.

SUMMARY

There is a paucity of information with which to even attempt management of distinct populations of steelhead in the Skeena River system. Little or no biological data is available on what could be considered unique steelhead runs on the Pacific Coast.

Records from Fisheries Research Board of Canada indicate that several hundred streams in the Skeena drainage area support salmon and, in particular, chinook and coho (Smith and Lucop, 1966). The existence of steelhead in many of these streams is suggested because of similar enviromental conditions for early life and spawning requirements. Relatively few documentations of steelhead distributions have been made in the Skeena drainage area. The Steelhead Punchcard Questionnaire has given us, for the first time, however, some indication as to where steelhead are caught.

There is an obvious need to establish a resource inventory of game fish in the Skeena system. The Fish and Wildlife Branch is presently not in a position to outline stocks, use or potential of streams except in an unacceptable, obtuse manner. If this Branch is to fare at all in resource use it must be able to discuss realistically the resource with which it is charged. In most cases there is little or no information available, or ways of obtaining the same, when in positions of making recommendations regarding water use (pulp mills, mining) and logging practices.

Recreational and economic value of streams and their fisheries should be documented now and on a continuing basis. At present the steelhead, chinook and coho salmon are the most important sport fish species. There is every likelihood that fresh water fisheries for chinook and coho salmon will be reduced in the future. This branch should anticipate an increase in steelhead fisheries of Pacific north coast streams.

The Fish and Wildlife Branch must be in a position to know what it has in order to manage the fish resource. At present there is virtually no stream management in British Columbia. There is still a very good opportunity of establishing several good management areas in the Prince George Region. Division of the region must be made soon to establish more realistic management areas. The biggest need, however, is for the establishment of some resource base profiles, some basic biology of fish (particularly steelhead) and implementation of some sound management practices.

LITERATURE CITED

Houston, W.R. and B.A. Campbell. 1951-1967. British Columbia Catch Statistics. Dept. of Fish. of Can.

Narver, D.W. 1968. Age and Size of Steelhead in the Babine River, British Columbia, Unpubl. report (File No. 19-8), Fish. Res. Bd. Can., Nanaimo, B.C., pp 1-7.

Peterson, G.R. and J.C. Lyons. 1968. A preliminary study of steelhead in the Big Qualicum River. Fish. Man. Report No. 56., Fish and Wildlife Branch, Victoria, B.C. pp 1-46.

Smith, H.D. and J. Lucop. 1966. Catalogue of salmon spawning grounds and tabulations of escapements in the Skeena River and Department of Fisheries statistical Area 4. Man. Report Series (Biological) No. 882, Sections 1-5., Fish. Res. Bd. Can.

Withler, I.L. 1966. Variability in life history characteristics of steelhead trout (Salmo gairnderi) along the Pacific coast of North America. J. Fish. Res. Bd. Can. 23 (3) : 355-393.

Appendix 1. Summary of casual and Cache Creek Creel Census records for some streams tributary to the Skeena River.

Babine River - Casual

YEAR	PERIOD	RES.	NON - RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1963	May-Jun			8	36	28	0.80			28	
1965	Oct			23	114	57	0.50	48		9	
1966	June			49		149					
1967	Oct		5	5	112	12	0.10	12			

Babine River - Cache Creek

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1951		2		2		30					
1960			2	2	72	15	0.20				
1961		1	10	11	384	43	0.11				
1962			12	12	304	130	0.40				
1963			5	5	114	23	0.20				
1964		6	19	25	749	274	0.37				
1966			19	19	474	152	0.30	62	8	57	25*
1967		12	27	39	1581	377	0.24	61	9	290	1*

* Coho

Bulkley River - casual

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1962	Dec			2	4	3	0.75	1	2		
1963	Feb-Mar			71	187	42	0.22	22	11	9	
1964	Sept			5	15	3	0.20	3			
1966	July-Aug			168		82		5	1		76*
1967	Oct-Feb	107	10	117	652	116	0.17	96	8	2	

* Coho and Chinook

Appendix 1. (continued)

Bulkley River - Cache Creek

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	SPECIES STEEL.	D.V.	R.T.	OTHER
1951		2		2		13					
1953		2	2	4		17					
1954			2	2	50	12	0.24				
1961		8	10	18	170	44	0.26				
1962		10	8	18	187	30	0.20				
1963		9	16	25	310	47	0.14				
1964		12	21	33	538	71	0.13				
1965		16	8	24	624	100	0.15				
1966		11	23	34	755	250	0.33	46	8	26	170*
1967		13	50	63	1102	77	0.07	36	5	17	19*

* Coho and Chinook

Copper River - casual

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	SPECIES STEEL.	D.V.	R.T.	OTHER
1967	Nov	18		18	80	12	0.15	8	3		1

Copper River - Cache Creek

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	SPECIES STEEL.	D.V.	R.T.	OTHER
1961			1	1	8	-					
1963		2		2	16	5	0.31				
1964		6	7	13	201	13	0.06				
1965		3	8	11	339	38	0.11				
1966		5	26	31	1217	195	0.16	58	12	45	80
1967		6	20	26	313	56	0.18	21		2	33

Appendix 1. (continued)

Kalum River - casual

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	SPECIES R.T.	SPECIES OTHER
1963	Aug			281	646	33	0.05		6		27
1967	Oct	1		1	6	2	0.33	2			

Kispiox River - Casual

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	SPECIES R.T.	SPECIES OTHER
1961	Se -Oct			83	388	34	0.09	29	5		
1962	Mar-Apr			23	58	8	0.13	4		4	
1962	July-Oct			372	2635	355	0.13	264	4		85
1963	Mar-Apr			91	390	82	0.21	64	2		14
1964	Nov			7	45	19	0.40	12	7		
1965	April			16	39	6	0.15	4	2		
1965	Aug-Sept			96	239	53	0.22		5		48
1966	Aug-Oct			282	1151	186	0.16	88			98
1967	Oct-Nov	35	7	42	211	32	0.15	20	11		1

Kispiox River - Cache Creek

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	SPECIES R.T.	SPECIES OTHER
1954			55	5	86	108	1.26				
1958		1	20	21	1088	155	0.14				
1960		9	40	49	1464	293	0.20				
1961		19	68	87	3313	365	0.11				
1962		51	111	162	4769	598	0.13				
1963		10	85	95	2983	272	0.09				
1964		26	126	152	3865	308	0.08				
1965		6	25	31	877	114	0.13				
1966		21	80	101	2833	297	0.11	161	9	10	117
1967		18	82	100	2096	267	0.12	100	13	107	47

Appendix 1. (continued)

Lakelse River - casual

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1963	Jun-Jul			81	115	181	1.57		61	9	131*
1964	Apr			80	225	198	0.88	5	49	44	123
1967	Apr-May			65	152	114	0.75	9	1		14
1967	Oct			5	15	5	0.33	1			3

* Cutthroat

Lakelse River - Cache Creek

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1961		1		1	0.5	1					
1962		10	11	21	128	39	0.30				
1963		5		5	42	3	0.07				
1964		4	6	10	166	11	0.66				
1966		5	4	9	32	4	0.13	1			3

Morice River - casual

YEAR	PERIOD	RES.	NON - RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1957	Mar-Apr			77	79	30	0.40				
1961	Oct			2	36	7	0.18	7			
1962	Oct-Apr			227	859	150	0.17	112	27	8	3
1963	Aug-Jan			68	191	35	0.12	19	8	5	3
1965	Apr			35	160	39	0.24	29	9		1
1965	Oct			9	27	11	0.40	11			
1966	Jun-Nov			155	560	125	0.22	50			75
1967	Oct-Feb	203	14	217	1263	156	0.12	101	22	32	4

Appendix 1. (continued)

Morice River - Cache Creek

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	SPECIES STEEL.	D.V.	R.T.	OTHER
1958		1	1	2	25	6	0.24				
1960		10		10	184	73	0.40				
1961		6	6	12	517	41	0.08				
1962		18	26	44	1105	251	0.23				
1963			16	16	551	92	0.17				
1964		14	30	44	950	72	0.08				
1965		4	5	9	204	25	0.12				
1966		7	42	50	1256	185	0.15	52	64	24	45
1967		13	35	50	1047	151	0.14	44	11	78	18

Appendix 2. Summary of steelhead age categories for streams of the Skeena River Drainage.

Freshwater/Saltwater Age

Stream	Data Years	Sex	1/1	1/2	1/3	2/1	2/2	2/3	2/4	2/5	3/1	3/2	3/3	3/4	4/1	4/2	4/3	4/4	5/1
Babine*	Oct 1967	male										10	4		3	1	1		
		female						1				22	2			4			1
Bulkley		m					1												
		f										2		1					
Copper	1957,58	m			1	1	2				5	4							
		f					6	1		1	1	6			1				
Kispiox*	Oct 1961	m					2	2			1	12	4			4		1	
		f			1		5		1		4	24	1	1	1	3			
Kitwanga		m					1	1				1			1				
		f					1			1						1			
Morice	Mar 1963	m		1		5	2					1		1					
		f	1		1	1	3												

* Fisheries Research Bd. of Canada information

Addenda to Appendix 1. Summary to casual and Cache Creek Creel Census records for some streams tributary to the Skeena River.

Bulkley River - Casual

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1968	Jan	2		2	32	11	0.32	11			
1968	Mar	11		11	47	0					

Copper River - Casual

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1968	Mar	31		31	124	16	0.13	14	2		

Kispiox River - Casual

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1968	Mar-Apr.	80		80	218	43	0.19	29	10	3	1W

Lakelse River - Casual

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1968	Apr-May	43		43	111	87	0.79	7	13		59 C.T. 8 W.

Morice River - Casual

YEAR	PERIOD	RES.	NON-RES.	TOTAL	TOTAL HOURS	TOTAL FISH	C.U.E.	STEEL.	SPECIES D.V.	R.T.	OTHER
1968	Mar-Apr	83	2	85	326	40	0.12	25	14		1 W.