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FRESHWATER FISHERIES ADVISORY SERVICE

INVESTIGATION REPORT

JOB NO. 68

ACCLIMATISATION SOCIETY DISTRICTS: WAIMATE & WAITAKI (NOW
WAITAKI VALLEY)

TITLE OF JOB: CREEL CENSUS WAITAKI RIVER 1965/66 FISHING SEASON

INTRODUCTION:

During the fishing season which opened on 1/10/65, and closed on 30/4/66, an angling census was carried out on the Lower Waitaki River.

DESCRIPTION:

The Waitaki is a large river rising in several branch tributaries having their sources on the Southern Alps, and draining in its upper basin the glacier Lakes, Ohau, Tekapo, and Pukaki. Below these lakes it receives the waters of numerous tributaries, and flows south-east wards to enter the South Pacific Ocean 14 miles northwards of Oamuru. The drainage area covers 3,750 square miles.

The river bed is approximately $\frac{1}{4}$ mile below the Waitaki Dam, up to $1\frac{1}{4}$ miles wide in the middle reaches and $\frac{3}{4}$ mile in the lower reaches. The bed is mainly loose shingle but a sandstone bottom occurs near Georgetown, and solid rock, with loose shingle over laying, occurs in the upper reaches, from the Kurow Cemetery to the Waitaki Dam. The river divides into many streams and some quite extensive islands are formed.

The islands and river banks in the survey area were often completely overgrown with willow, gorse, broom, and blackberry. During the survey, several large bulldozers under contract to the Ministry of Works were engaged in clearing all vegetation off a central strip of the riverbed. Groynes and stop-banks are being built, and it is planned to keep the river in the cleared area. This should improve river control; what effect this will have on fishing is not known.

The water levels in the Hakataramea and Maerewhenua Rivers fell steadily during the summer months, except for slight freshes after heavy rain. Water was also drawn off the Maerewhenua River for use in irrigation schemes. FIGURE 1 was derived from figures supplied by the N.Z.E.D. at Lake Waitaki, being an average daily outflow calculated over 7 day periods.

During the season the Waitaki River was in flood for two periods, the water being extremely discoloured, but glacial flows in suspension always colours the water. However, on occasions, the bulldozing mentioned earlier caused severe local discolouration, resulting in the anglers moving on to another area. The Hakataramea and Maerewhenua Rivers were usually clear, except after heavy rain.

HYDRO-ELECTRIC POWER

Water from the Waitaki River is used for the generation of Hydro-Electric Power. There are spillway gates to control the water levels of Lakes Tekapo and Pukaki, and dams and hydro-electric power stations at Tekapo, Benmore and Waitaki. Another power station and dam was under construction at Aviemore.

The Waitaki power station operates mainly at peak loading times and fluctuations, sometimes considerable, occur in the daily level of water in the survey area. Usually peak loading commences between 6.00 and 7.00 am and ends between 10.00 and 11.00 pm. The resulting change in the water level moves slowly down the river with a decrease in load, and more rapidly with an increase. It takes approximately 12 hours for a change in water levels below the Waitaki Dam to reach the vicinity of the road bridge in Area 6. Here the water level was low between approximately 9.00 am and 4.30 pm. Anglers, especially salmon fishermen, tend to wait for the low water and leave when the water rises. However, there can be irregular and substantial peaks at other times; local anglers are aware of these peaks and maintain a close watch on the water levels, but visiting anglers are sometimes taken unawares.

AREA SURVEYED

The survey area extended from the base of the Waitaki Hydro Dam, down-stream on both banks of the river to the mouth, a distance of approximately 43 miles. Also included were the two main tributaries

- (a) The Hakataramea River, from its junction with the Waitaki River, upstream for approximately 17 miles, to Rocky Point.
- (b) The Maerewhenua River, from its junction with the Waitaki River upstream for approximately 13 miles to the confluence of the north and south branches near Livingstone.

FISH PRESENT

The survey area is populated by three species of acclimatised fish

- (a) Quinnat Salmon (*Oncorhynchus tshawytscha*)

- (b) Rainbow Trout (*Salmo gairdnerii*)
- (c) Brown Trout (*Salmo Trutta*)

The following native fish are also present:

- (a) Long finned eel (*Anguilla dieffenbachii*)
- (b) Several species of galaxias, the young of some species 'run' at the mouth of the river, as whitebait.
- (c) Several species of bullies.
- (d) Smelt in the tidal reaches. (*Retropinna* sp.)

BAG AND SIZE LIMIT

Ten trout or salmon, but not more than 6 sea run salmon, minimum length of fish kept, 12".

RESTRICTIONS

Artificial fly only in the Hakataramea and Maerewhenua Rivers. Taking salmon during April is prohibited in the Waitaki River and its tributaries between the Waitaki Hydro Dam and a line running in a South Westerly direction across the Waitaki River from approximately 500 yards below the mouth of the Hakataramea River to a notice board on the south bank of the Waitaki River, marked 'Salmon Fishing Limit'.

CREEL CENSUS SAMPLING AREAS

As the survey was to be conducted by one man, a stratified sampling programme was necessary. Originally, the river was divided into three areas

- (1) From the mouth of the river up both banks to a line across the river from Duntroon to Ikawai, including the Maerewhenua River.
- (11) From the same line across the river at Duntroon upstream to the Waitaki Hydro Dam.

(3) The Hakataramea River.

Two consecutive days were to be spent sampling each area.

METHOD

A random sampling programme was drawn up by a biologist (M. Flain) who divided the entire fishing season into two day periods, and, using a set of random numbers tables, allocated numbers,

6 & 5	to	Area 1
2 & 1	to	Area 2
3 & 4	to	Area 3
7	to	Days Off.

Weekends and Public Holidays were sampled whenever they occurred in the sampling programme with no extra consideration being given.

After a few days sampling, however, it became apparent that the areas as planned were too large for complete daily coverage. Thus from the 12th October, the original areas were reduced in size and three new areas created. The sampling areas then became (see Fig 2)

- (1) The North Side of the Waitaki River, from the Waitaki Hydro Dam down-stream to Okawai.
- (2) The Hakataramea River (as before)
- (3) The South Side, from the Waitaki Hydro dam downstream to Georgetown, including the Maerewhenua River.
- (4) The North Side, from the Waitaki Hydro Dam downstream to the upper limits of Glenavy Township.
- (5) The South Side, from Georgetown downstream to opposite the upper limits of Glenavy Township, i.e. approximately 100 yards above the road bridge on State Highway No. 1.

- (6) From approximately 100 yards above the road bridge, downstream on both sides to the Mouth.

The original sampling programme was amended to include the new areas. As before, two consecutive days were spent in each area. For the rest of the season this method was used, except on 11/1/66. This missing day was made up by working two half days on 13/1/66 and 14/1/66.

Note: To ease the processing of the collected data, the information collected during the first 12 days has been in the appropriate areas under the revised sampling programme.

A car was used to travel through the sampling area and, as the anglers usually parked their vehicles on the road or track close to where they intended to fish, one could determine their approximate position. From this point they were located on foot and interviewed. It should be noted that pedestrian anglers, or farmers fishing the river from their own land, could have been missed.

When the anglers were interviewed the following details were noted:

- (a) Name of angler and acclimatisation society licence held.
- (b) Date and time of interview.
- (c) Number of hours fished.
- (d) Survey area, this was also subdivided into localities, using landmarks and local names.
- (e) Method of fishing.
- (f) Species, sex, length, weight of any fish kept.
- (g) Number and species of any returned fish.
- (h) Weather at time of interview.

Interviewing usually commenced about 8 am, normally continuing until sometime between dusk and 10.30 pm. Meal hours were varied. All parts of each area were visited as many times as possible during the day. For the earlier part of the season this was usually three visits, but, during the salmon fishing season, with the increased numbers of anglers, and the extra walking needed to reach the anglers at the salmon holes, coverage became more difficult. To avoid a sampling bias in the popular salmon fishing areas (6, 5 & 4) they were usually sampled from the top of the area to the bottom on the first day, and vice-versa on the second. A row boat was sometimes used to reach anglers on the islands at the mouth of the river.

* A 'salmon hole' is formed when the river scours a hole either when flowing around an obstruction, or when, curving away from a bank. These 'holes' are usually relatively deep flat water where the salmon tend to concentrate and rest during their upstream migration.

ACCESS

Whenever the river ran close to the road, or 'no-exit' roads ran down to the river, access was good. In all areas rough car tracks led down, through farmers paddocks to the river, and these were well used, especially during the salmon season. Rough car tracks also ran alongside the river from the access roads in some areas. There were walking tracks in most areas but they would have been hard for a visiting angler to find.

In some of the more popular areas, at the mouth, around the road bridges, at the Stone Wall, and towards the Hydro Dam, car parking was extremely limited.

The anglers could also climb down the steel ladders attached to the road bridge in Area 6, on to the islands there. The only other bridge across the river was between Hakataramea (Area 1), and Kurow (Area 3) and this gave access to the islands there also.

After anglers had established where the salmon holes for the season were, someone usually blazed a rough car track out to them. Some of these tracks extended across the river bed for several miles, and they were all extremely popular.

Except when salmon fishing, the anglers tended to fish only in those areas where access was good, or those which required the least amount of walking to reach a good fishing area. Access was good for parts of all areas, and the tracks being put in for river control work should open up many previously inaccessible places to the anglers.

BOATS

Approximately 60 row boats were seen on the river banks, concentrated mainly near the fishing camps in Area 6. Built to a local design, these boats were used by the anglers to reach the islands while trout fishing, and to a lesser degree, to reach the salmon 'holes' during the salmon fishing season.

Jet boats were seen on the river on several occasions. They were used mainly during the salmon 'run' as to means of reaching otherwise inaccessible salmon 'holes'. The boats were usually launched from a point below the Stone Wall (Area 1) and operated in the lower reaches of Areas 1 and 3, and the upper reaches of areas 4 and 5.

FINDINGS

As no significant differences have been found in the results from areas on opposite sides of the river, the results have been processed together.

I ANGLERS

If an angler changed his method of fishing, or shifted from one place to another within an area, he was considered to be another angler and a new interview sheet made up. For this reason, some of the anglers appeared on the sheets several times in one day. 2089 individual angler/visits were recorded but, by removing the anglers as above, the number of anglers interviewed reduces to 1152.

TABLE 1 shows from which Acclimatisation Society the anglers purchased their licences. Many of the anglers, holding local licences, actually came from other Acclimitisation Society Districts. 68.1% of the anglers held Waimate/Waitaki licences, and a further 24% held licences from the two bordering societies (i.e. South Canterbury and Otago). 77% of the anglers were males. As most of the anglers did not carry their licences, the number of unlicensed anglers could have been higher.

TABLE 2 gives the number of sampling visits made to each area, which day of the week the visits were made on, the number of anglers seen, and the number of fish kept (per day).

TABLE 3 gives the average No. of anglers and fish seen per day, for the season by sampling areas. There was no marked differences

between weekdays but there was a difference between weekdays and weekends.

TABLE 4 shows that angling pressure was greatest in the lower areas and there was a deviation between weekdays and weekends in the upper areas only. There was a higher average no. fish/angler in the upper areas. Probable reasons for this would have been the extra fishing pressure in the lower areas, caused by:

- (1) Relative closeness to two large towns, Oamaru and Waimate
- (2) The fishing camps, hotel and motel camps are all in Area 6.
- (3) State Highway No. 1 passes through Area 6, thereby attracting travelling anglers.
- (4) Fishing for 'sea-run' trout at the mouth of the river.
- (5) From January, fishing for salmon on their upstream spawning migration.

TABLE 5 61.3% of the anglers were interviewed 1 or 2 times, and, the percentage of anglers successful increased as the number of times the angler was interviewed increased, and there was some evidence of increase in the number of fish/angler/interivew with those anglers interviewed more than once or twice.

II FISHING METHODS

The fishing methods noted were

- (a) WORM, any method of fishing using earthworms.
- (b) SPINNER, any form of spinning gear, artificial minnow, spoon etc.
- (c) SPINNER/SALMON, as 'b' above, generally with heavier rods, reel, hooks and line. Anglers fishing at a known salmon

'hole' with trout gear (lighter equipment) were asked if they were fishing for salmon exclusively, and if they were, it was recorded as SPINNER/SALMON.

- (d) LURE, in areas 1, 2, 3, 4 & 5 it was the feathered lure used with fly rods, but in Area 6 it was a large feathered lure tied to resemble the smelt (*retropinna* sp) and used with lure rods, fishing for sea-run trout. Only 1 angler was interviewed fishing with a salmon lure.
- (e) DRY AND WET FLY, the usual fly fishing methods, the tied nymph is also included, under wet fly.
- (f) SMELT, fishing at the mouth of the river only (Area 6) with either live or preserved smelt (*Retropinna* sp), and used with lure rods, fishing for sea-run trout.
- (g) OTHER METHODS, were usually combinations of earlier methods, which could not be classed as strictly one of the above methods.

TABLE 6 shows the number of anglers (% of total), the number of hours (% of total) and the mean daily hours for the census area, by the above fishing methods. 70% of the anglers fished with SPINNER, and SPINNER/SALMON gear. Although anglers only started fishing for salmon during the last week of December, fishing for salmon attracted 48% of the anglers, and 55.8% of the total hours. Fly fishing comprised only 6.2% of the total number of anglers seen. They were more difficult to locate and interview as they tended to fish mainly in the early mornings and evenings (some dry fly fishermen changing over to wet fly fishing at dusk, and fishing on in the dark). 90.8% of the fly fishermen were interviewed in the Hakataramea River (Fly fishing Only), and only one angler was interviewed in the Maerewhenua River (also Fly Fishing Only).

TABLE 7 gives the angling hours per method, and the fish per hour per method, by the sampling areas. Dry and Wet fly fishing caught the most fish per hour. The higher number of fish per hour for SPINNER/SALMON in Areas 1 and 3 (compared to 4, 5, & 6) was probably due to the regulations at the time allowing anglers to fish into the mouth of the Hakataramea river, which is a spawning river for the salmon.

TABLE 8 shows the success of the different fishing methods, the composition being expressed as a percentage of the number of fish kept or returned.

TABLE 9 summarises table 8, and shows the relative success of the different fishing methods. Fishing with spinners caught brown trout, and fishing with wet and dry fly caught rainbow trout. 72.8% of the fish caught on the dry fly, and 55% of the fish caught on the wet fly, were returned as undersized. Due to handling and rough treatment, many of these fish die. There was a high percentage of fish returned for all methods but SPINNER/SALMON. The oversize trout returned were in poor condition, two which were returned in Area 6 bore large fresh wounds, possibly teeth marks. The adult salmon was caught at the mouth of the Awakino River during April (A prohibited area - see restrictions Page 3).

TABLE 10 gives the average length, weight and condition factor of the fish kept. The condition factor was calculated using the equation.

$$CF = \frac{10^4 \times \text{WEIGHT (G)}}{\text{FORK LENGTH (CM)}^3}$$

As is to be expected, the quinnat salmom had lost condition by the time they had reached areas 1 and 3. The Rainbow and Brown Trout

had a good condition factor in all areas except 1 & 3. The average length of the brown trout was comparable in all areas.

FIGURE 3 plots the length frequency of 166 Rainbow Trout, 277 Brown Trout and 87 Quinnat Salmon. It is of interest to note that, even though the legal minimum takeable length was 12 inches, 9.63% of the rainbow trout, and 3.24% of the brown trout kept, were undersized.

SCALE AND OTOLITH SAMPLES

A small sample of scales and otoliths was taken from fish caught by anglers. Time did not permit the taking of a large sample so no definite conclusions can be drawn. However from the sample available we find that

- (a) RAINBOW TROUT - 17 FISH
- SCALES; 56% of the sample was 3 years old
 31% of the sample was 4 years old
 13% of the sample was 6 years old.

1 male and 1 female fish (both 4 years old) showed spawning erosion on the scales at the end of the 3rd year, and two male fish (both 6 years old) showed spawning erosion at the end of the 4th year.

- (b) BROWN TROUT - 10 FISH
- SCALES; 11% of the sample was 3 years old
 11% of the sample was 4 years old
 11% of the sample was 5 years old
 67% of the sample was 6 years old.

Most of the fish in this sample were caught at the mouth of the river.

TROUT OTOLITHS; the otoliths taken from the trout proved virtually impossible to read with any degree of confidence.

(c) QUINNAT SALMON - 17 FISH

SCALES; 20% of the sample was 2 years old

40% of the sample was 3 years old

40% of the sample was 4 years old.

OTOLITHS; otoliths were taken from the same fish as the scale samples and analysis confirmed the scale readings.

TABLE 11 is information supplied by 6 anglers who used jet boats as a means of transport to reach a fishing area. It should be remembered that this data is a complete daily record for these anglers as they were interviewed at the boat launching sites while packing up.

TABLE 12 During the opening weeks, approximately 200 angler diaries were distributed to individual anglers to obtain their complete season information. It was intended to use this information as supplementary data in estimating the angling pressure on the river, and the total number of fish caught. However, only 4 anglers returned their diaries. As a result of this poor return, it was necessary to make a return visit to the survey area during the 1966-67 fishing season. On this visit the following information was collected

(a) Name of angler.

(b) Acclimatisation society licence held during 1965-66 season

(c) No. of visits made to river during 1965-66 season.

(d) No. of trout caught and kept during 1965-66 season.

(e) No. of Salmon caught and kept during 1965-66 season.

76 Anglers were interviewed, and, as is to be expected, 19 of these anglers (25%) had not been interviewed during the creel census.

TABLE 13 gives the results of the return visit to the river, compared with the information collected from the same anglers

during the creel census.

ANGLING PRESSURE

The fishing season covered 212 days, 30 days were not sampled (Days off), leaving 182 days sampling for the season. As there were 6 Sampling Areas, this gave an average of 30.2 sampling days per area. Therefore the chances of recording the total no. of visits by any one angler =

NO. OF DAYS IN SEASON

$$\frac{\text{NO. OF DAYS IN SEASON}}{\text{NO. OF DAYS SAMPLING IN EACH AREA}} = \frac{212}{30.2} = 7.02$$

Therefore, if the information collected from the anglers during the return visit is divided by 7.02 the creel census results should have recorded.

300.56 visits for 191.74 fish

but the creel census figures only show

228 visits for 69 fish.

This is 75.85% of the angler/visits, but only 35.98% of the total number of fish caught. This is because the anglers were interviewed while fishing, and not at the end of the day.

Therefore:

- A. The total number of angler/visits in the survey area during the season was
- (1) From the creel census sheets - 2089 Angler/visits
 - (2) This figure is only 75.85% of the actual figures - 2754
 - (3) Multiplied by 7.02 to obtain full season figures -
19,333 Angler/Visits.

B. The total number of fish caught and kept in the survey area was

- (1) From the creel census sheets - 635 fish
- (2) This figure is only 35.98% of the total - 1765 fish
- (3) Multiplied by 7.02 to obtain full season figures - 12,390 fish.

TABLE 14 gives the composition and total weight of the fish taken in the census area during the 1965-66 fishing season.

DISCUSSION

As will be seen from Figure 1, the Waitaki River was in flood from the 24th December to the end of January. As many New Zealanders are on holiday over this period, the flood must have resulted in reduced angling pressure at a time when a peak should have been expected. The other period of high water (February-March) would probably have coincided with the height of the salmon spawning migration (another peak for angling pressure). When the river level returned to normal after the period of high water, areas of quicksand were exposed; these could have been a danger to anglers, especially the elderly and the young.

Jet boats appeared to have use to anglers, as a method of reaching otherwise inaccessible areas. Probably more jet boats would be used if decent launching facilities were provided. The roughness of the present launching sites would virtually rule out launching a boat from behind a car. The sites were not signposted and would have been hard for a visiting angler to find.

For a visiting angler, unused to fishing a river used for the generation of hydro-electric power, the fluctuating river levels

could have been a real hazard to life. Some form of warning should be printed on every Acclimatisation Society Licence.

In view of high percentage of fish returned as undersized, anglers should be informed of the correct way to handle and release fish unharmed. It is possible that, at present, many of these fish fail to recover.

MODIFICATIONS

Between the survey and publication, the following changes in the regulations have taken place

- (1) The Waitaki and Waimate Acclimatisation Societies have merged to form the Waitaki Valley Acclimatisation Society.
- (2) The bag limit has been reduced to 10 TROUT, and 4 SALMON but not more than 14 fish in all.
- (3) The northern limit of taking, for salmon, in April has been moved South-eastwards to new line.

SUMMARY

- (1) Most of the anglers were locals.
- (2) 77% of the anglers were males.
- (3) There was no marked difference between the numbers of anglers seen from one weekday to another, within an area, but more anglers were seen in the same area in weekends.
- (4) More anglers were found in the lower areas.
- (5) Most of the anglers interviewed made infrequent visits to the river.
- (6) The regular anglers caught the most fish.
- (7) Fishing with SPINNING GEAR, attracted the most anglers.
- (8) SPINNER/SALMON, most popular method, but least productive.
- (9) FLY FISHING, one of least popular, but most productive.
- (10) SPINNER caught brown trout. FLY FISHING rainbow trout.
- (11) For all methods but SPINNER/SALMON, high percentage undersized fish returned.
- (12) Salmon in the season were large - average weight 18.2 lbs.
- (13) The trout had a good condition factor in all areas but 1 and 3.
- (14) 13.87% of the trout kept were undersized.
- (15) Approx. 12,390 fish caught during 1965-66 fishing season.
- (16) Approx, 19,333 Angler/visits were made to the river during the 1965-66 season.

ACKNOWLEDGEMENTS

Our thanks must go to the following people who helped with the preparation of this report.

Mr M. Keillor, for pointing out the access points, popular fishing areas, and assisting with laying out the census areas.

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The Honorary Rangers and Members of the Acclimatisation Society for their help in the field work.

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Finally, to the anglers without whose wholehearted co-operation, such a census would have been impossible.

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REFERENCES

- Boud, R. A survey of Salmon Sport Fishery in the Rangitata,
Rakaia, and Ashburton Mouths (1957).
Freshwater Fisheries Advisory Service Investigation
Report No.3
- Cudby, E., Galloway, J. Limnological & Biological Survey
of Lake Waitaki
Freshwater Fisheries Advisory Service Investigation
Report No. 45.
- Cudby, E., Galloway, J., Hutchinson, R., Creel Census
Waiau River.
Freshwater Fisheries Advisory Service Investiagion
Report No. 47.

MARINE DEPT (UNPUBLISHED)
- Wing, J., Johnson, W. Lake Coleridge Creel
Census 1965/66.
Freshwater Fisheries Advisory Service Investigation
Report No. 71

MARINE DEPT (UNPUBLISHED)
- Weidlein, W.D., Cordone, A.J., & Franty, T.C., Trout catch
and angler use at Tahoe in 1962.
California Fish and Game 51(3) P.P. 187-201.

WAITAKI RIVER FLOWS: 1.10.65 - 30.4.66 J68

	<u>1965</u>			<u>1966</u>			
	October	Nov.	Dec.	Jan.	Feb.	March	April
1	9530	9130	10480	16970	14030	32400	13270
2	9350	10390	9670	26270	14720	24920	16170
3	9550	11150	10370	34060	16130	21320	15870
4	9000	10970	8290	35800	15580	20050	13010
5	10700	11160	7680	38030	20300	23510	13660
6	12560	10320	9340	40800	20860	26160	12650
7	12090	9150	9450	40250	14590	15670	11470
8	8100	8850	10010	43130	5470	10570	9830
9	9460	10400	9550	43410	4150	11910	9180
10	8280	9950	9950	44620	5890	12900	11040
11	9950	9150	7770	45550	5030	9740	18100
12	11620	8010	6570	44790	6270	9690	18400
13	11600	10360	8690	45240	9430	8390	17450
14	11800	12420	9040	44870	15970	10090	15580
15	11540	15520	8610	45210	15340	10620	12830
16	11110	11040	7990	45770	15380	11130	9660
17	11110	10590	9460	44620	18830	11250	10740
18	10130	12560	14520	45550	23500	10700	14280
19	10730	12090	13950	44790	26080	8180	10560
20	11340	11610	12110	45240	27520	7370	10880
21	10110	10630	9470	44870	26840	9630	11090
22	11880	10260	9020	45210	22150	10280	11070
23	10090	9680	9040	45770	25880	10200	12860
24	9740	9800	12020	36000	32060	10250	5370
25	9140	9100	16020	31800	41230	10210	9130
26	10420	8730	18540	29720	43580	9890	11610
27	10530	9210	21060	21900	39100	9750	11160
28	11280	7740	20480	17050	33190	9960	14290
29	11330	9340	21480	16390	-	10650	8440
30	9170	10030	18620	17390	-	10870	7420
31	8900	-	16470	13080	-	10180	-

LAKE WAITAKI OUTFLOWS

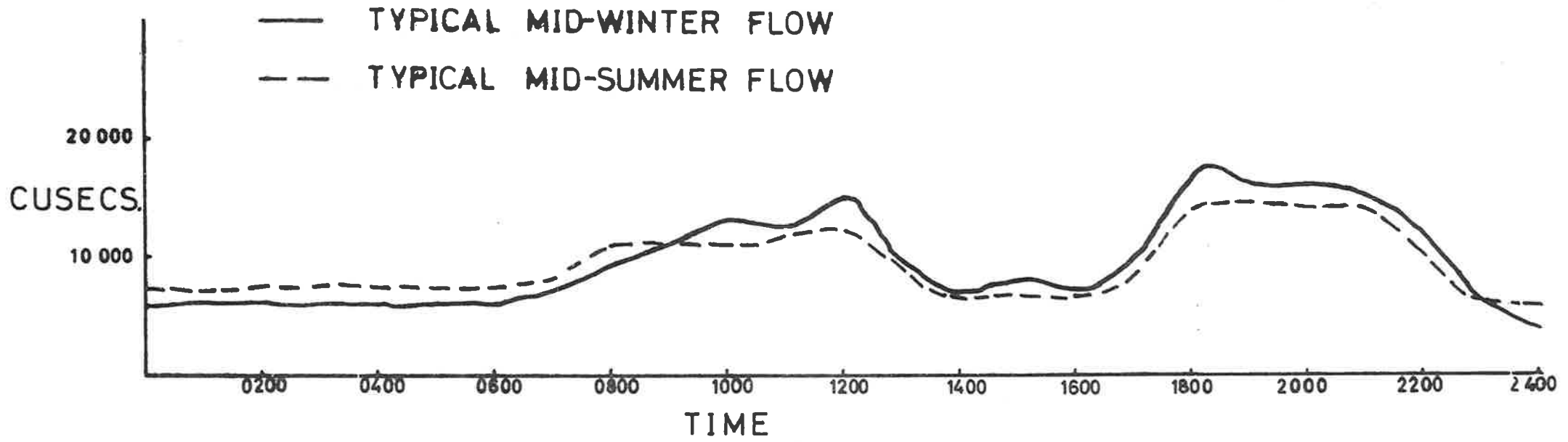


TABLE I J68

ANGLERS LICENSING DISTRICTS

<u>Acclim.Society</u>	<u>Men</u>	<u>%</u>	<u>Women</u>	<u>%</u>	<u>Children</u>	<u>%</u>	<u>Total</u>	<u>%</u>
Waitaki	379	32.9	58	5.0	49	4.3	485	42.1
Waimate	209	18.1	54	4.7	36	3.1	299	26.0
Sth.Canterbury	62	5.4	2	0.2	10	0.9	74	6.4
Otago	165	14.3	24	2.1	16	1.4	205	17.8
Nth.Canterbury	27	2.3	3	0.3	2	0.2	32	2.8
Southland	33	2.9	1	0.1	1	0.1	35	3.0
No Licences	2	0.2	1	0.1	3	0.3	6	0.5
Wellington	4	0.3	-	-	-	-	4	0.3
Ashburton	4	0.3	-	-	1	0.1	5	0.4
Sthn.Lakes	2	0.2	-	-	-	-	2	0.2
Nelson	1	0.1	-	-	1	0.1	2	0.2
Marlborough	1	0.1	-	-	-	-	1	0.1
Auckland	1	0.1	-	-	-	-	1	0.1
<u>TOTAL</u>	890	77.3%	143	12.4%	119	10.3%	1152	100%

WAITAKI CREEL CENSUS

TABLE 2
1968

<u>Areas 1 & 3</u>			<u>WEEKDAYS</u>			<u>WEEKENDS AND HOLIDAYS</u>		
Day of Week	No. Visits	No. Ang.	No. Fish	Day	No. Visits	No. Ang.	No. Fish	
Monday	5	1	Nil	Sat.	9	99	62	
Tuesday	8	7	2	Sun.	10	184	101	
Wednesday	8	15	6	Hol.	2	18	7	
Thursday	7	9	2					
Friday	7	29	32					
Total	35	61	42	Total	21	301	170	

<u>Area 2</u>			<u>WEEKDAYS</u>			<u>WEEKENDS AND HOLIDAYS</u>		
Day of Week	No. Visits	No. Ang.	No. Fish	Day	No. Visits	No. Ang.	No. Fish	
Monday	3	9	1	Sat.	7	36	30	
Tuesday	2	4	Nil	Sun.	5	35	12	
Wednesday	Nil	Nil	Nil	Hol.	2	14	12	
Thursday	4	5	Nil					
Friday	9	18	19					
Total	18	36	20	Total	14	85	54	

<u>Areas 4 & 5</u>			<u>WEEKDAYS</u>			<u>WEEKENDS AND HOLIDAYS</u>		
Day of week	No. Visits	No. Ang.	No. Fish	Day	No. Visits	No. Ang.	No. Fish	
Monday	7	101	28	Sat.	5	40	13	
Tuesday	8	120	15	Sun.	7	96	18	
Wednesday	13	161	9	Hol.	3	11	1	
Thursday	11	105	16					
Friday	2	Nil	Nil					
Total	41	487	68	Total	15	147	32	

<u>Area 6</u>			<u>WEEKDAYS</u>			<u>WEEKENDS AND HOLIDAYS</u>		
Day of Week	No. Visits	No. Ang.	No. Fish	Day	No. Visits	No. Ang.	No. Fish	
Monday	6	188	14	Sat.	3	60	23	
Tuesday	6	165	52	Sun.	6	345	58	
Wednesday	6	174	44	Hol.	Nil	Nil	Nil	
Thursday	2.5*	73	24					
Friday	2.5*	22	9					
Total	23	622	143	Total	9	405	81	

* Two Half-day surveys done to make up for 11.1.66.
Thursday - Morning, Friday - Afternoon

BASIC ANALYSIS OF RESULTS OF CREEL CENSUS