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FRESHWATER FISHERIES ADVISORY SERVICE

MARINE DEPARTMENT

INVESTIGATION REPORT JOB NO. 47

ACCLIMATISATION DISTRICTS: Southland and Southern Lakes.

TITLE OF JOB: Creel Census of the Waiau River System and of Lakes Manapouri and Te Anau during the 1962-63 angling season.

OBJECTIVES: Estimation of the value of these waters for sporting and recreational purposes.

INTRODUCTION.

During the 1962/3 angling season a creel census was carried out on the Waiau River and its major tributaries, within the Southland Acclimatisation District by staff of the Technical Field Service.

Also, at Lake Manapouri and Te Anau, including their major tributaries, within the Southern Lakes Acclimatisation District a similar ~~xx~~ survey was undertaken by Field Officers of the Department of Internal Affairs.

As the Waiau River, Lake Manapouri and Te Anau, will be affected to varying degrees by the COMALCO hydro-electric scheme, it was necessary to obtain information in the fisheries value, for recreational purposes. Integrated investigations were therefore undertaken within the Southland and Southern Lakes Acclimatisation

Districts and the information obtained is recorded within this report.

Data relating to the Waiou River and its tributaries downstream from the Lake Manapouri, principaIly within the Southland Acclimatisation District is given in Part I of the Report and data relating principally the fisheries administered by the Department of Internal Affiars, within Part II of this Report.

PART I = CREEL CENSUS, WAIAU RIVER AND TRIBUTARY

METHODS

A stratified random sampling procedure was designed to cover the Waiau River from the Mararoa River south to the mouth of the Waiau including the Mararoa River, Borland River, Monowai River, Wairaki River, Lilburn River, Orawia River and several other small tributaries,

The area was divided into six regions for the purpose of sampling (see Figure 1) and a technical field officers was assigned to sample these stations as completely as possible at predetermined dates.

The sample was so determined that each area was sampled 1 day in 7 throughout the whole season. Also each area was sampled 2 times for 2-day periods every 2 months, the sequence of sampling and days off were determined from a random numbers table.

It is estimated that the officer carrying out the survey sampled approximately 80% of the angling time in a given area

while he was working that area.

FINDINGS.

Sampling results are shown in table 1.

The field officers reported that during the census almost all anglers were very cooperative, the department would like to thank all the anglers interviewed.

12. FISHING SUCCESS.

ANGLING The following estimates are based in table 1 and conslusions drawn from the data.

(A) On the 810 angler/trips interviews showed that 89% had Southland licences and 8% held licences from other society districts, these being Otago, Wellington, Waitaki, North Canterbury, Marlborough, and Waimate (in order of commenness). Somewhat less than 3% had no licences. District 5 however, had over 10% of the anglers without licences. The majority of the people interviewed without licences were fishing during the holiday period and were probably very occasional fishermen. Some of these proved to be very successful, however.

(B) ANGLER:

As is the case in almost all creel censuses, the majority of the fish are cuaght by a minority of anglers, this was borne out in this investigation. As the data was not collected on an individual basis analysis by individuals is not possible. However, it was possible to divide anglers into classes i.e. those who caught more than 1 fish per trip and those who caught one or no fish. Using this division approximately 15.5% of the angler trips produced more than 1 fish/angler. and 84.5% trips produced

1 or 0 fish/angler. Angling success ranged from 0 fish/hour to 6 fish/hour, with 4 fish/hour not uncommon among experienced fishermen.

The information obtained is summarised in Table 1, by area sampled.

(C) METHOD:

The most successful method was fly fishing either wet or dry. This, however, was not because the fish took flies more readily but rather that the fly fisherman is usually the more experienced at fishing.

By far the most common method, threadline, had about half the success of fly, however, most be-ginners and occasional fishermen choose this method due to its ease in casting.

Experienced fishermen appeared to have as much success with a threadline as with a fly.

Worm and creeper fishing was not as common as either threadline or fly, and the catch/hour was similar to threadline. Live minnows were only used in area 6 near the mouth. Here they were as successful as worm fishing and more so than threadline, fly not being used to any degree. The note of catch, expressed as fish/hour by each area is shown in Graph 1.

(D) WEATHER:

The effects of weather on angling success can be seen from graph 2. It can be seen that there is no one weather condition that is consistently better in terms of fish per hour/ Clear days (cloud cover 30% or less) lead in two areas, cloudy days (c.c. greater than 30%) lead in 3 areas, and rainy days in 1 area. In

wo areas there is little difference between all weather conditions (areas 3 and 6). In areas 1 and 5 clear days produced significantly higher catch/hour figures. In area 2 rainy days had a significantly lower catch, and in area 4 clear days were significantly lower.

As many other variables enter into weather and fishing (temp. time of day, wind etc.) the author would hesitate to place any real significance on any of the above conditions.

The individual anglers knows the conditions under which he is most successful and this is probably his best gauge.

(E)(AREA.

Graph 3 shows the analysis of the fishing by area.

Area 1 produced the lowest catch per hour, however, those fish caught were the largest both in terms of weight and length. This was true for both Rainbow and Brown Trout.

Area 2 had the highest catch/hour, the highest number of pounds/hour caught, and the second highest average length and weight of both Rainbow and Brown Trout.

Going downstream from area 2 there is a continually decreasing catch/hour, and a continuiously decreasing poundsx/hour (except in area 6). There is also a small decrease between areas 2 and 3 in both weight and length which is more or less constant over areas 3 and 5 inclusive, with a slight increase in average fish size in area 6.

Attentic salmon were taken in x very small numbers and only recorded from areas 2 and 6.

CATCH ESTIMATION:

The estimations based on table 1 are given in table 2.

From table 2 we can get an estimate of the average catch per hour over the whole area of the study i.e. $\frac{5.578 + 25}{15,915} = 0.35$ fish/ho -ur

In areas 1 through 4 Rainbow Trout dominated the catch, in area 5 Rainbow and Brown were caught in equal proportions.

Area 6 was the only one where Brown Trout were more common than Rainbow in the catch.

The ratio of Tainbow to Brown is as follows.

AREA	1	RAINBOW	15	BROWN	8	RATIO	RAINBOW/BROWN	i. 87:1
"	2	"	294	"	37	"	" "	7.94:1
"	3	"	78	"	60	"	" "	1.30:1
"	4	"	45	"	27	"	" "	1.61:1
"	5	"	21	"	19	"	" "	1.10:1
"	6	"	25	"	40	"	" "	0.63:1

SEX RATIO.

2. The sex ratio in the catch proved surprising. Using only the fish which the field officers gutted and examined for sex ratio of male rainbow to female rainbow was 1 male / 4.04 females, indicating that 80% of the Rainbow caught were females. In the case of Brown Trout the opposite occurred, there being 2.03 males to 1 female caught, or 67% of the catch was male.

The reason for these skewed sex relations the author is at a loss to explain.

The effects of such a distribution are unimportant as the total catch is a relatively small proportion of the fish population. Atlantic salmon do not add significantly to the fishery in the Waiau River as so few are caught, and are usually in poor condition. There appears to be relatively few in the system therefore, they are considered to be of minor importance.

3. GUT CONTENTS:

4. EVALUATION:

(A) PRESENT:

To make evaluation of an area as a sports fishing and recreational area in monetary terms is difficult, however, several methods have been used in the past (mostly U.S.A. & Canada). The most realistic methods is+one which estimates the amount of money spent on fish i.e. car depreciation, petrol, lodgings, licence, tackle, clothes etc. This method requires a great deal of information, however, that is beyond the scope of the creel census carried out.

On the other hand, other methods though giving a lower value can be used. The number of hours spent fishing and the earning power of those hours is one such method.

On the Waiau River an estimated 15.915 hours were fished, which is equivalent to 7.5 working years of one man (90% of the fishing time was done by males) . Taking the average income of

males in New Zealand as (995) this computes to a value (£7,462.5 per year). Using the average hourly earnings (9/7) the value totals (£7,625.9 per year). This gives us a value around (£7,500 per year) a low estimate which does not take into consideration the aesthetic or recreational value of the area.

(B) FUTURE:

The present Waiau River could take a much heavier angling pressure. The river is, if anything, overstocked with fish.

As there is a tendency in New Zealand to have an increase in the numbers of fishermen per year, it is reasonable to assume that in the future the value of the river, as a aports fishing area would increase substantially. Further as more roads are built and improved more anglers will tend to fish the areas and present inaccessible areas will become fishable.

(C) EFFECT OF DAM:

The dam will have the effect of wiping out the major existing fishery of the Waiau River.

The proposed location of the dam will mean that area 1, the area where the largest fish are caught will be submerged. Area 2 with the highest catch per hour and heaviest fishing will be submerged in the upper half, and only consist of dam seepage in the lower half. The upper half of area 2 is the area where most fishing is done.

Progressing downstream from the Manowai River there will be more water entering the Waiau bed, however, it will never support

the fish population it presently supports. Another point of note, is that the river downstream of the dam will become unstable as far as water levels are concerned, as the tributaries, by and large, are not supplied by the existence of headwater lakes similar to Manapouri and Te Anau. This instability will have three effects; it will lower the water productivity, (i.e. trout food): It will make the remaining water more susceptable to biological pollution, i.e. the continual addition of nutrients from top dressing: and finally it will considerably reduce the beauty of the Waiau, as the river will have a relatively large flood plain, for a low, but fluctuating flow.

If, during high water some flow is released from the dam this will tend to make matters worse. On the other hand if the dam can hold water at high water and release during low water, considerable stability can be restored to the river.

At present, the Waiau River is a large river supporting a large trout population, after the dam is constructed the areas which support the best fishing will be totally removed, and rhe remains of the river will be much smaller, and support a smaller fish population, especially if the water level is allowed to fluctuate. Aesthetically what was once a large stable river of considerable beauty will become a meandering stream with a large flood plain and consequent loss of its original beauty.

Executed By:

Supervised BY:
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E. CUDBY
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) Technical Field Officers.

PART II = CREEL CENSUS LAKES MANAPOURI, TE ANAU UPPER WAIAU RIVER: AND TRIBUTARIES.

METHODS.

A stratified random sampling system was set up similar to that used on the Waiau River.

However, weather conditions and necessary boat repairs made it ~~impossible~~ impossible to carry this out. This system was divided into seven areas (see Figure 2) and these were sampled as completely as possible when weather and equipment allowed.

FINDINGS.

The results of the sampling are shown in table 3.

The ~~field officers~~ field officers for the Department of Internal Affiars reported that most anglers contacted during the survey were cooperative, and the assistance of anglers is gratefully acknowledged.

1. FISHING SUCCESS.

~~THE SUCCESS~~

(A) ANGLING:

As the data was kept by angler trips i.e. boat surveys to a large extent, no individual angler success results are possible. However, 36% of the boat surveys had fish.

The success of a boat ranged from 0 fish/hour to as high as 4.5 fish/hour. The average success on lake Manapouri including the Waiau in between Manapouri and Te Anau was 0.33 fish/hour.

The success on Lake Te Anau was considerably higher being 0.61 fish/hour. Two tributaries of Te Anau were successful, the Eglington and Upukeroa rivers, together they yielded only 0.19 fish/hour.

(B) METHODS.

Three fishing methods were found to be in use in this area. Trolling, including deep trolling, was the most successful method where it was legal, also the most common method of fishing. Spinning was next in both popularity and catch success. Fly fishing was relatively ~~x~~ unsuccessful in the lakes, it was commonly used with only moderate success in the area of the Waiau between Manapouri and Te Anau, and it was exclusively used on the Eglington and Upukerota rivers (by regulation) again with only moderate success.

(C) WEATHER:

The notes on weather and angling for this region are inconclusive during high winds very little fishing occurred due to the roughness of the lakes and the difficulty of fly fishing in the river.

IN 3 of 7 areas the best fishing was reported during fine weather.

In 3 of 7 areas the best fishing was reported during cloudy weather.

In 1 of 7 areas the best fishing was reported during rainy weather.

(D) AREA:

Graph 4 shows the fishing by area.

As can be seen from the graph and from the table 3, the

average catch/hour is 0.38 fish.

This isvery similar to the catch/hour found in the survey of the Waiau River and its tributaries.

The variations between areas was very great from 0.18 fish/hour in the Eglington River to 1.03 fish/hour in area 3 of Lake Te Anau. In order to have somewhat larger samples to work with the area was divided into three.

1. Manapouri - 0.33 fish/hour
2. Te Anau - o.61 fish/hour
3. Eglington and Upukeroa River - 0.19 fish/hour

This shows Te Anau as an exceptionally good fishing area.

Any area which produces more than 0.5 fish/hour can be considered excellent.

Manapouri, by New Zealand standards could be regarded as average, (by standards in other countries 0.33 fish/hour of the size involved is excellent).

Graph 5 shows the number of pounds/hour that were caught in the various regions, As the size of the fish were large the no. of pounds/hour caught was generally high. The shaded areas in graphs 4 and 5 are very small samples and little emphasis should be placed upon them.

In those areas where over then fish were recorded the ratio of Rainbow/Brown is fairly equal, and in the total of all areas of about 45% of the catch was Brown trout and 55% Rainbow.

This is a fairly large percentage of Browns in the catch

compared to most areas where both species exist together. For example it is quite a bit higher than in the Waiau River downstream.

SEA RATIO.

(D) The sex ratio in Rainbow followed a similar pattern to that of the Waiau River there being more females caught than males. The ratio worked out to 2.24/1 female. As in the Waiau, river, the brown trout show the opposite sex ratio female 1/1.93 males. Why these sex ratios should differ from the expected 1/1 ratio and why they should differ between the two species is inexplicable.

ATLANTIC SALMON.

(E) Atlantic salmon represented only 6.25% of the fish caught, and are relatively unimportant in the fishery.

Salmon compared to the trout are small averaging only 2.3 lbs.

2. EVALUATION.

(A) Present: The survey was not complete enough to place a monotary value on the fishery. The present value of this fishery would be fairly low, however, the fishing pressure at present is considerably below that possible for this region.

(B) FUTURE:

If the present rate of increased fishing, and increased tourist travel extends into the future, the possibility of Lake Manapouri and Te Anau becoming an important sports fishing x centre are very real. At present Te Anau and Manapouri are among the best known tourist centres in New Zealand, that is to people from

North America. For this reason, with proper management, the future of the region as a fishing centre is bright.

(C). EFFECT OF THE DAM

As far as the rivers flowing into Lake Te Anau are concerned the dam would have little effect.

A fairly small portion of the spawning and fishing areas would be flooded. The effect on Lake Te Anau would not be as great as that on Manapouri with respect to the Waiau River between the ~~lk~~ lakes, however, this would depend on the nature of the flow through this river.

The main cause for worry would be the forest and scrub around the lake shore which would be flooded, thus leaving the devoid of beaches over much of the lake, devoid of shore fishing spots due to the dead trees, which would also comprise a navigation hazard. A plan similar to that carried out on the Campbell River system in British Columbia would rectify the situation. This plan is discussed below in respect of Lake Manapouri.

Lake Manapouri and the surrounding countryside will cease to exist as it is today. The raising of the water level could reduce substantially the spawning beds ~~of~~ for the trout in that portion of the Waiau River between the lakes, also the spawning beds of the lower portions of the river which run into Lake Manapouri.

Initially, however, the loss of these beds, may, in part be made up by the increased nutrients available in the water due to the leaching of the ~~flooded~~ flooded soil.

Ultimately the equilibrium condition may be one where the fishing is not as good as present in terms of fish size or numbers, however, the decrease may not be great.

The greatest hazard to fishing, navigation, and general recreational use of the area after the dam is constructed and flooding is complete will be the dead trees and scrub along the new shoreline. When Campbell Lakes and Buttle Lake levels were raised in British Columbia a similar ~~sixuk~~ situation arose, and in response to popular demand, those concerned with the dam cut andrremoved all terrestial vegetation that would be flooded. This was done to a level 3" below the ground. If such an operation were carried out by those ~~xxxxx~~ involved in damming the Waiau River the area would assume a reasonable degree of slightlyness in a minimum of time after the flooding, and would soon regain its value as a recreation centre, unlike Lake Monowai. The usable timber could go to the dam concern to help defray the cost of total vegetation removal to some distance below the present ground level. If total clearing were undertaken on both Lake Te Anau and on Manapouri, compensation for decreased fishing could not justifiably be asked for as the most reasonable compromise between industry and recreation would seem to have been met. The ~~x~~ clearing cost would be high; however, as the South Lakes area around Te Anau and Manapouri are one of the best known New Zealand tourist centres, the long term returns would probably warrant the cost.

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Supervised byL

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ACKNOWLEDGEMENTS.

I would like to thank Messrs E. Cudby and J. Galloway who, even under the most dreadful conditions, concientiously carried out the survey on the Waiau River.

Also, thanks are due to officers of the Department of Internal Affairs, Southern Lakes District, especially Mr R.T. Hutchinson, who concientiously carried out the sampling programme after under very trying weather conditions.

Also the Southland Acclimatisation Society, especially Mr C. Broad Rangers Ward Beer and Roger Sutton.

Without the help of these people this survey could not have been carried out.