

# Gillnetting Survey of the lakes Moeraki and Paringa Sportfisheries.

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January 2021

## Summary

Lakes Moeraki and Paringa are two regionally significant sports fisheries located in South Westland between Haast and Fox Glacier. Current trends in the size, condition and relative abundance of the sports fish population were established and comparisons made with previous surveys undertaken. One hundred and ten brown trout (46 in Lake Moeraki; 64 in Lake Paringa) were caught over five days (two days Lake Moeraki; three days Lake Paringa) but no salmon were caught. Brown trout in Lake Moeraki had decreased in size (length-30mm, weight-248g) and had similar abundance and condition factor to the last survey in 1999. Brown trout in Lake Paringa had increased in length (+15mm) but had not changed in weight meaning they had decreased condition factor (condition factor-0.06) but were still in similar abundance to the last survey in 2001. Brown trout in Lake Moeraki were on average heavier (weight+215g) and in better condition (condition factor+0.07) than those in Lake Paringa while there was no difference in length or catch rate.

## Introduction

South Westland has become an increasing popular location for angling on the West Coast, particularly south of the Glaciers. Estimated angling effort increasing from 2,220 angling days in 1994/95 to 9,100 angler days in 2014/15, a factor of 3.39 (Unwin 2016). Anecdotal evidence is that this popularity has continued with many anglers travelling from the Otago, North Canterbury, and CSI regions to fish (Nathan Høglund, Paringa Lodge *pers. comm*).

Lake Moeraki is a small lake (2.4km<sup>2</sup>) and received modest angler usage (360 angler days per annum) when compared to other West Coast lakes at the last estimate (Unwin, 2016). It is readily accessible from SH6 and has great fishing opportunities with abundant areas of shallow water and weed beds. Shore based sight fishing for cruising brown trout is possible at both ends of the lake as are opportunities for boat-based anglers. The main inflow and outflow, the Moeraki River, is relatively stable by South Westland standards and features good spawning habitat. A modest salmon run occurs each season. The lake was last surveyed in December 1999 (Hadland 1999).

Lake Paringa is a relatively small sized lake (4.7km<sup>2</sup>) and received modest angler (550 angler days per annum) when compared to other West Coast lakes at the last estimate (Unwin, 2016). It is readily accessible from SH6 and features a DOC campsite at Jamie Creek which increases its usage particularly by overnight campers going for a fish. It has some areas of shallow water mixed with extensive areas with steep drop offs into deep water close to the shoreline. Both natural and introduced weed beds occur although the lagarosiphon infestation is a concern as it is rapidly choking the lake making it hard for boats to move around the lake margins. Lake Paringa has several inflowing tributary streams suitable for spawning; the largest of these is the 'Windbag' which is the main spawning ground for the regionally significant salmon run that occurs. Lake Paringa is popular with boaties trolling for salmon

and brown trout but only provides limited options for shore-based anglers due to a mostly inaccessible shoreline. The lake was last surveyed in December 2001 (Hadland 2001).

The aim of the current survey was to:

- 1) assess trends in the size, condition and relative abundance of the lakes Moeraki and Paringa sports fish populations using the standardised procedures established during previous surveys.
- 2) to use trend data from other West Coast lakes as a comparison to that obtained from lakes Moeraki and Paringa.
- 3) and make recommendations for future management of the fisheries.

## Survey Method

Thirty-six sites on Lake Moeraki and 54 sites on Lake Paringa were located from a 14ft alloy boat by GPS and surveyed over five days in late December 2020 (Appendix). The sites were not the same as those completed in previous surveys as the location data wasn't recorded. Also, some experimental night sets were undertaken in previous surveys and this data was removed from the current analysis to avoid bias. Nine 20 m long sinking monofilament gill nets were used with stretched mesh sizes of 115mm (4.62") (3 nets), 87mm (3.5") (3 nets), and 70mm (2.5") (3 nets). Net size was randomly selected for each site with nets set with one end attached to the shore and positioned at tangents to the shoreline. The placement of the nets meant that online shoreline habitat was surveyed. Nets were mainly set in the morning for approximately 2hrs to avoid net saturation and decrease variability in the method (Appendix 1).

Each fish caught was weighed to the nearest 10gms using electronic scales and measured (fork length) to the nearest 5mm. Healthy fish were returned immediately to the water while dead fish were retained, and their otoliths removed for future research. Fish condition factor was calculated using the formula:

$$CF = \frac{W * 100,000}{L * L * L}$$

Where CF is condition factor, W is weight in grams and L is the fork length in millimetres.

Catch per unit effort (CPUE) was calculated for each net size and expressed as catch per 100m net per hour.

$$CPUE = N / T * 5$$

Where N is the number of fish caught and T is the time the net was set for in hours.

Data was compared statistically using a one-way ANOVA. Probability (P) values are given for all analyses and significant differences noted where values are 0.05 or below (95% Confidence).

## Results Lake Moeraki

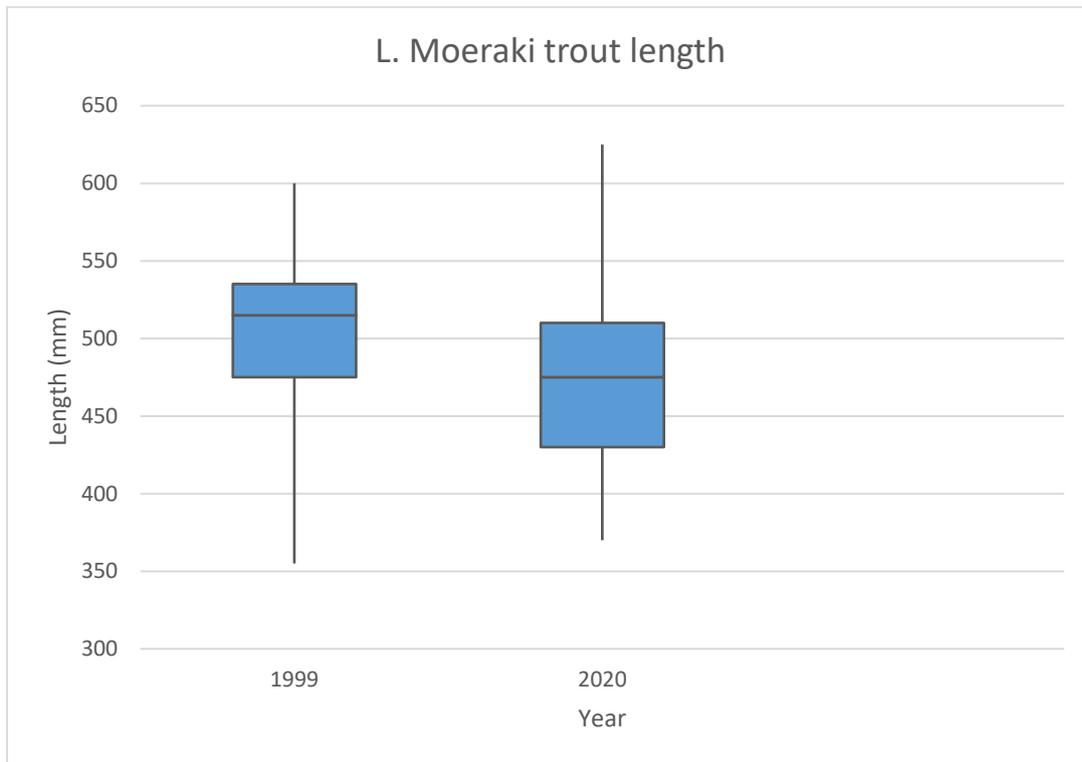


Figure 1. Box plot showing length of brown trout caught in gill nets at Lake Moeraki in 1999 and 2020



Figure 2. Box plot showing weight of brown trout caught in gill nets at Lake Moeraki in 1999 and 2020

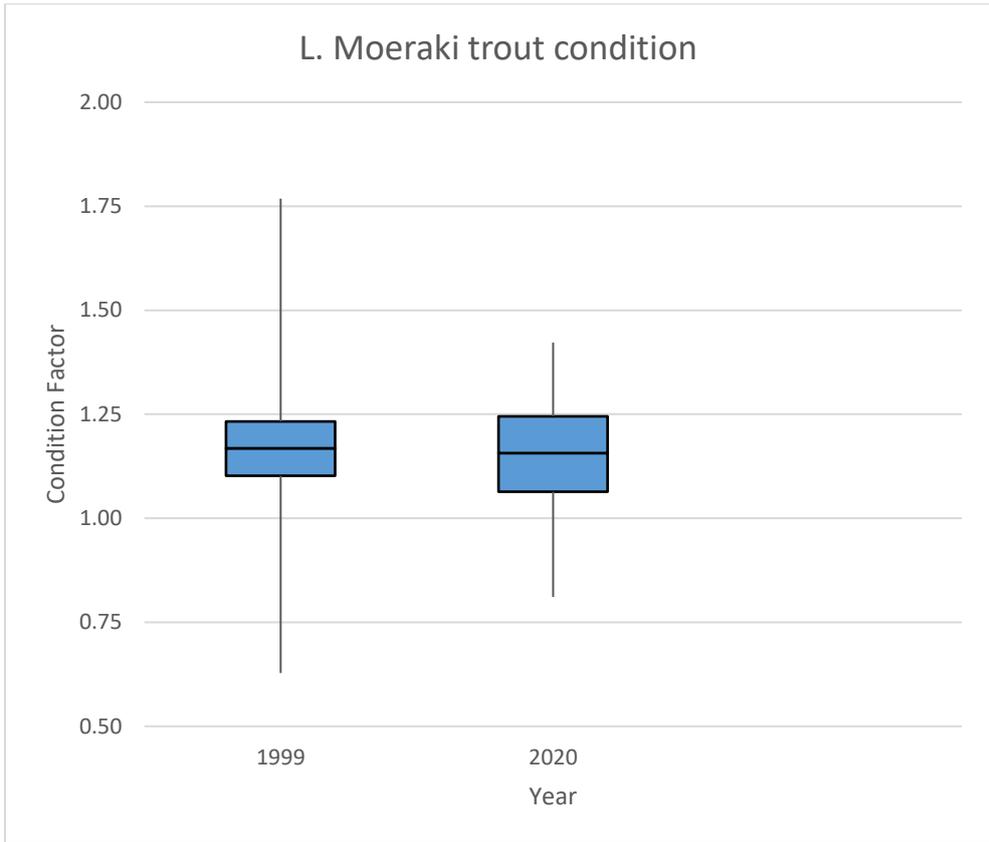


Figure 3. Box plot showing condition factor of brown trout caught in gill nets at Lake Moeraki in 1999 and 2020

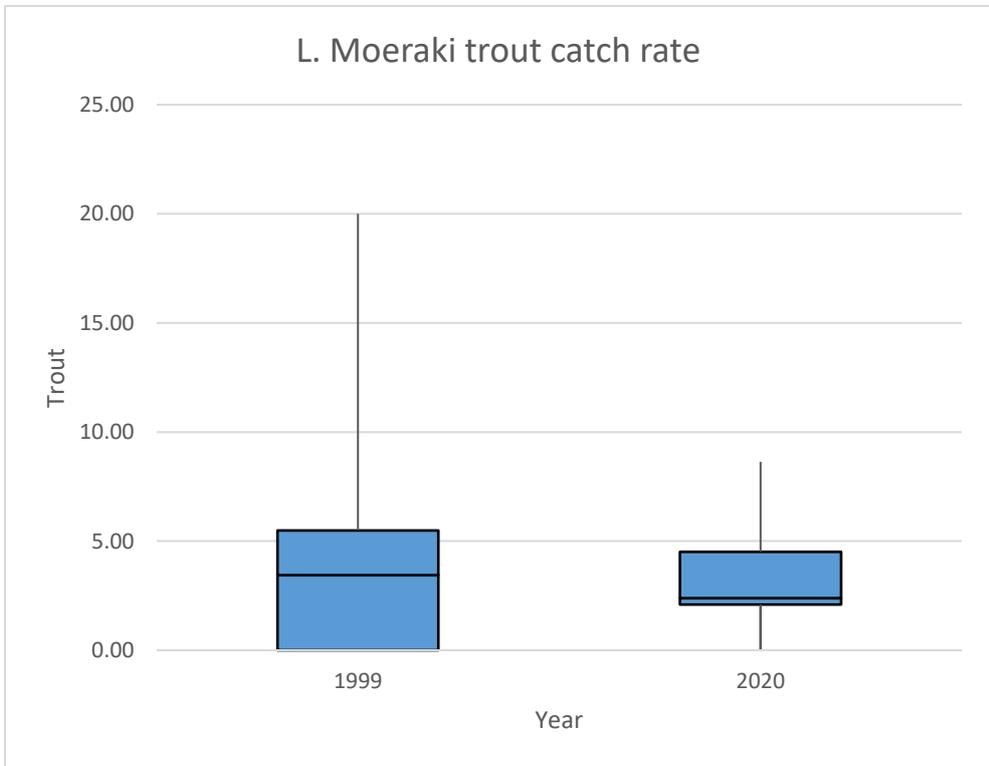


Figure 4. Box plot showing catch rate of brown trout caught in gill nets at Lake Moeraki in 1999 and 2020

Table 1. Summary data of brown trout observed in Lake Moeraki in 1999 and 2020.

Variable	Survey year	
	1999	2020
Mean Length (mm)	504	474
Mean Weight (g)	1499	1251
Mean Condition (cf)	1.16	1.16
Mean CPUE (#/100m/hr)	4.11	2.93
Fish Caught (n)	81	46

There was a significant decrease in length ( $p < 0.01$ ) and weight ( $p < 0.001$ ) of brown trout between the two surveys at Lake Moeraki. Condition factor and catch rate were not significantly different between the two surveys.

## Results Lake Paringa

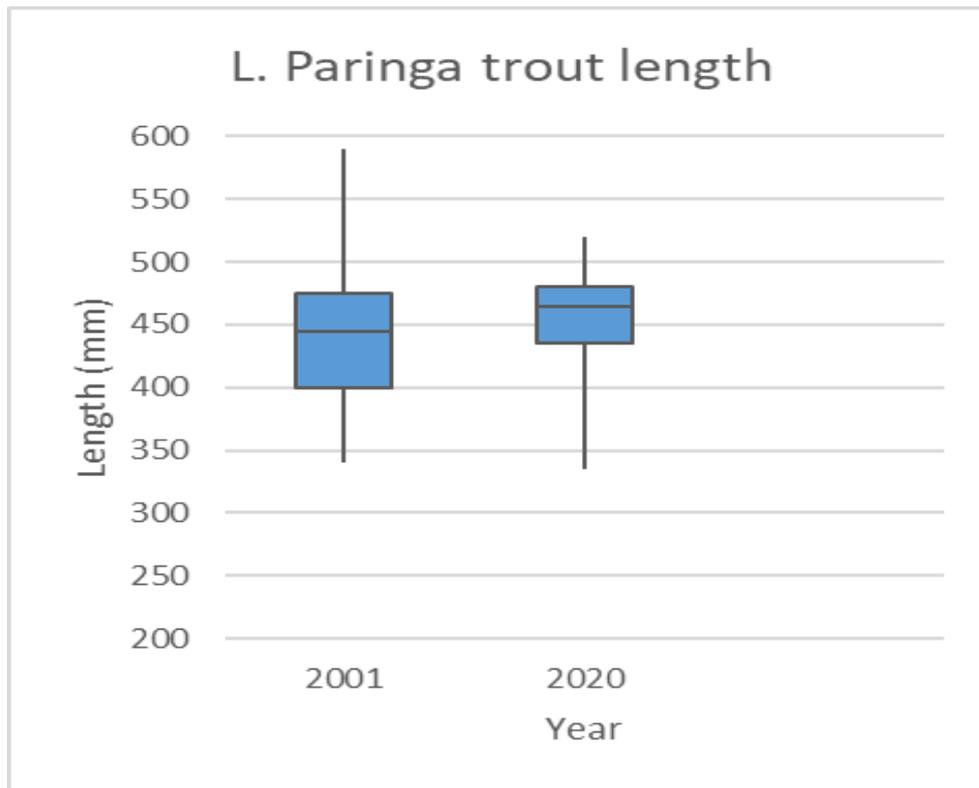


Figure 5. Box plot showing length of brown trout caught in gill nets at Lake Paringa in 2001 and 2020.

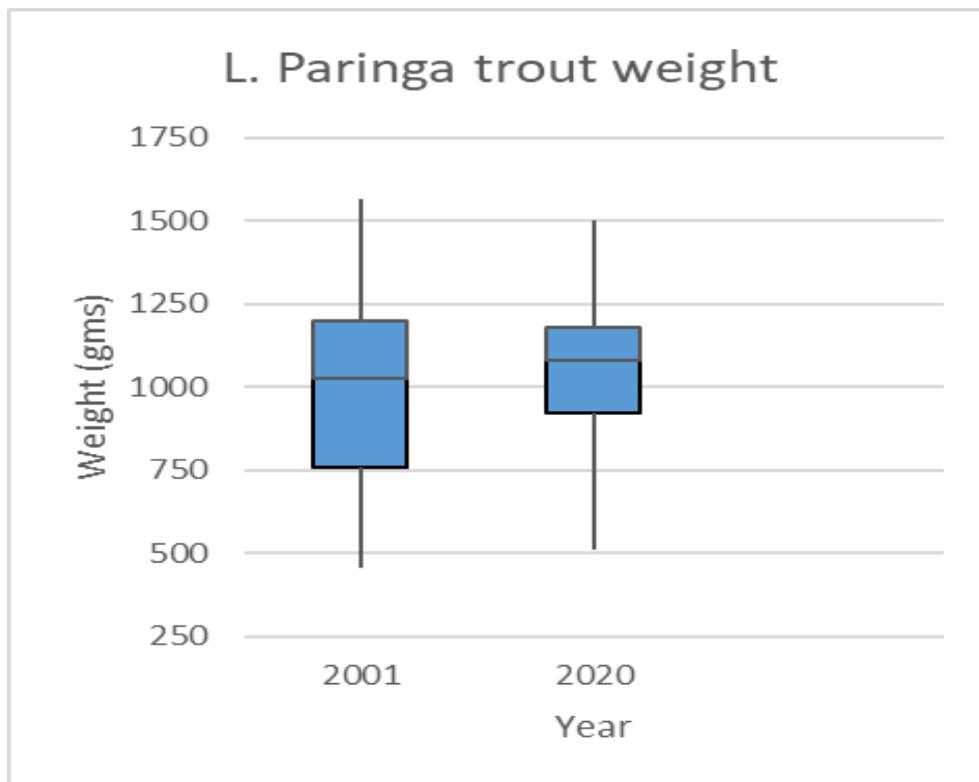


Figure 6. Box plot showing weight of brown trout caught in gill nets at Lake Paringa in 2001 and 2020.

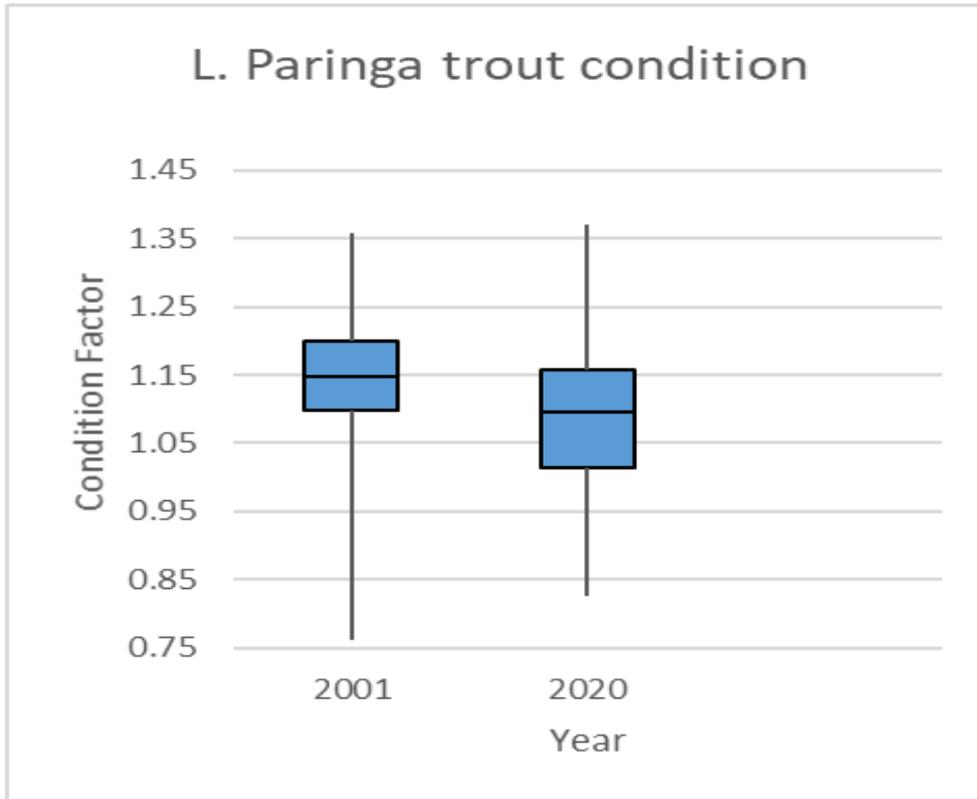


Figure 7. Box plot showing condition factor of brown trout caught in gill nets at Lake Paringa in 2001 and 2020.

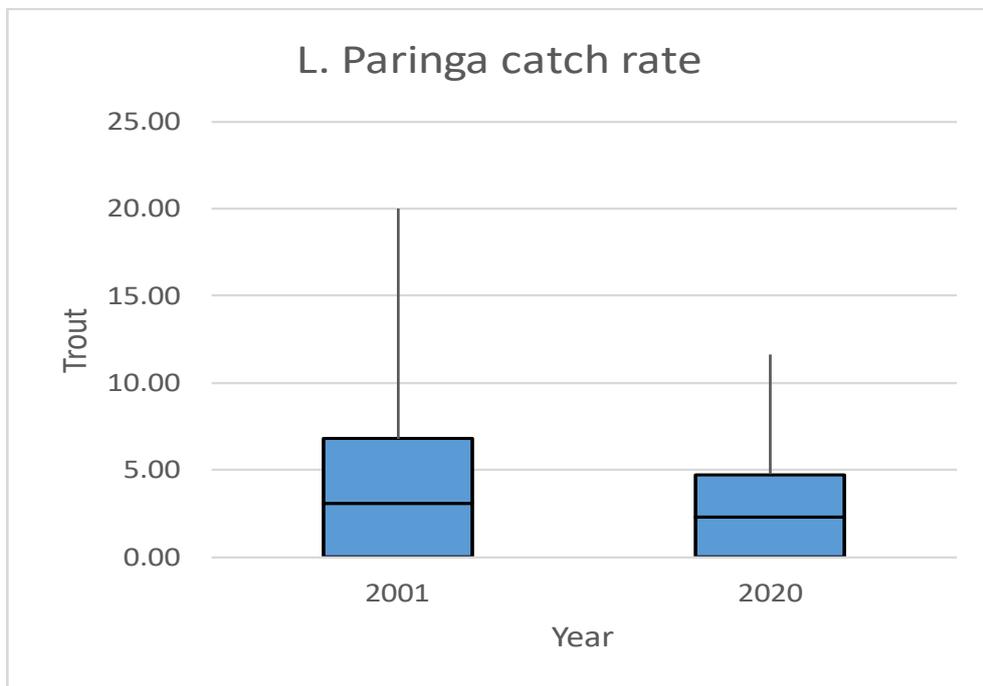


Figure 8. Box plot showing catch rate of brown trout caught in gill nets at Lake Paringa in 2001 and 2020.

Table 2. Summary data of brown trout observed at Lake Paringa in 2001 and 2020.

Variable	Survey year	
	2001	2020
Mean Length (mm)	441	456
Mean Weight (g)	994	1036
Mean Condition (cf)	1.15	1.09
Mean CPUE (#/100m/hr)	4.24	2.71
Fish Caught (n)	100	64

There was a significant increase in length ( $p < 0.05$ ) of brown trout between the two surveys at Lake Paringa. Weight and catch rate of brown trout were not significantly different between the two surveys. Condition factor had significantly decreased between the two surveys ( $p < 0.001$ ).

### Comparison of brown trout in Lakes Moeraki and Paringa.

Table 3. Comparison of brown trout observed in Lakes Moeraki and Paringa 2020.

Variable	Brown trout 2020	
	Moeraki	Paringa
	Mean	Mean
Length (mm)	474	456
Weight (g)	1251	1036
Condition Factor	1.16	1.09
Catch rate (n/100m/hr)	2.93	2.71

Brown trout in Lake Moeraki were significantly heavier ( $p < 0.001$ ) and in significantly better condition ( $p < 0.01$ ) than those in Lake Paringa. There was no difference in length or catch rate.

## Comparison of brown trout at West Coast lakes.

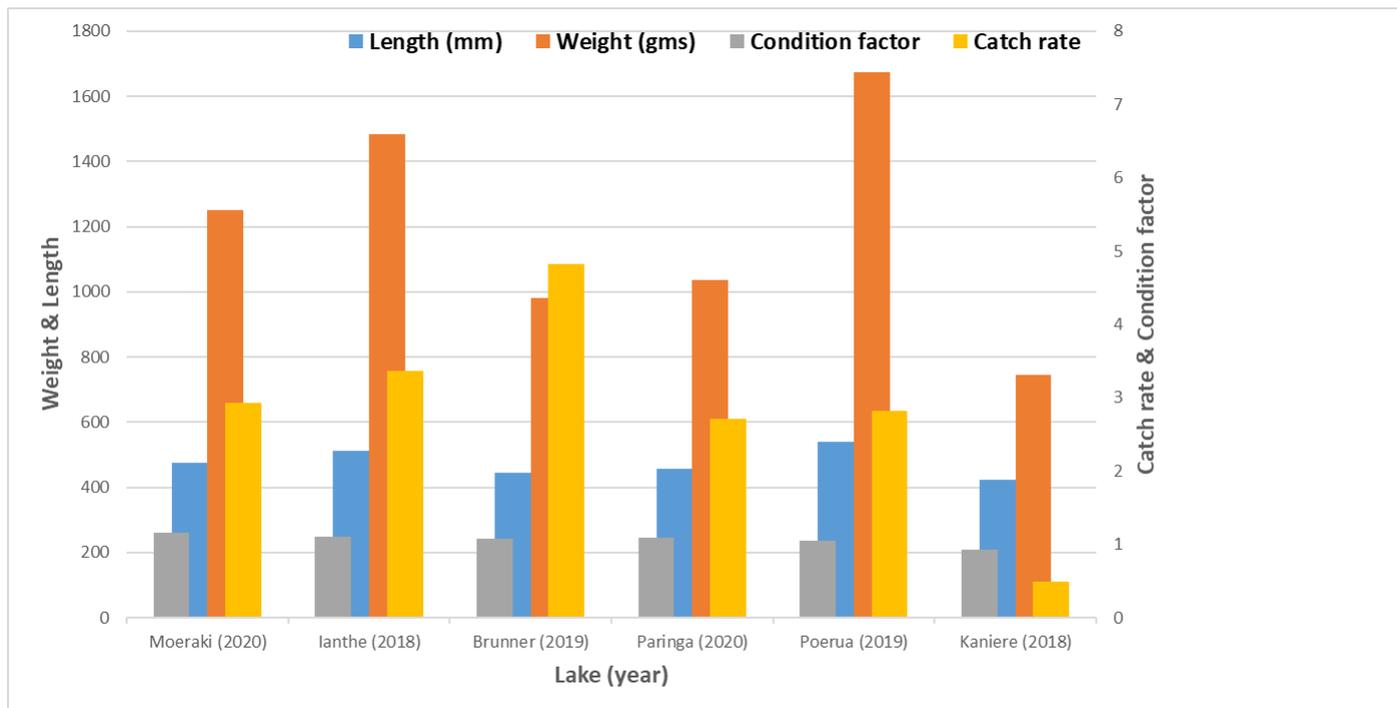


Figure 9. Comparison of average size, condition and catch rate of brown trout caught in gillnets in West Coast lakes.

In 2020 brown trout netted in Lake Moeraki were relatively large with a catch rate comparable to the average found in most other West Coast lakes surveyed in the last three years. In 2020 brown trout netted in Lake Paringa were of average weight with a marginally lower catch rate in comparison to most other West Coast lakes surveyed in the last three years.

## Discussion

From the data collected for brown trout on both lakes Moeraki and Paringa there were no trends detected that might impact angler success warranting further investigation. The survey showed there are still good numbers of fish; the absence of larger fish and decrease in average weight of fish caught during the Moeraki survey is a potential concern. However, since the surveys are a one-off check undertaken 21 years apart it would be unwise to draw too many conclusions from the data. Another observation was the relatively warm water surface water temperature in Lake Paringa with temperatures reaching 20°C while Moeraki peaked at 16.8°C during the surveys.

Anglers talked to during the surveys were very positive and reported good catches of mostly well-conditioned fish although some jack were noticeably slabby which matched our observations. Most had travelled considerable distances from out of region to fish the lakes and valued the landscape, relatively low numbers of anglers and high-water quality as important factors enhancing their enjoyment of the fishery. They had all noticed the increasing presence of lagarosiphon in the lake and while concerned didn't think it impacted on their angling experience.

The lagarosiphon at present levels provides additional cover for bait fish and several brown trout were observed lying in ambush adjacent to the weedbeds along with good numbers of eels. Potentially it

may be beneficial to the trout population; however, several areas of the shoreline could not be reached by boat due to the thick weed beds. Some nets had to be set from the edge of weed beds out into the lake rather than from the shoreline. Several times a day it was necessary to stop the boat and clear the engine of weed so work could proceed. With the rapid spread of the weed in the lake anglers will find it increasing hard to fish. The risk of weed being spread to other adjacent 'weed free' lakes (ie Moeraki, Mapourika) is high if it hasn't already done so. Many people visit multiple lakes during their travels.

## **Recommendation**

- That the council receives the report.
- Maintain current regulations on Lakes Moeraki and Paringa.
- Support the control of lagarosiphon to enable good boat access around Lake Paringa and to avoid transfer to other adjacent lakes.

## **Acknowledgements**

Thanks goes to Baylee Kersten for helping complete fieldwork and for providing comments on the draft report.

## **References**

- Hadland, I. 1999. Gillnetting survey data from Lake Moeraki. Fish & Game Internal Report. *Fish & Game West Coast*.
- Hadland, I. 2001. Gillnetting Survey data from Lake Paringa. Fish & Game Internal Report. *Fish & Game West Coast*.
- Unwin, M. 2016. Angler usage of New Zealand lake and river fisheries. Results from the 2014/15 National Angling Survey.
- Fish & Game Operational Workplan (2020/2021). Fish & Game Internal Report. *Fish & Game West Coast*.

## Appendix 1 – Net Sets

### Lake Moeraki

Date	Set #	Site #	Mesh size	Time set	Time in	Total hrs	# Trout
14/12/2020	1	7	small	8:00	10:05	2:05	1
14/12/2020	2	8	large	8:05	10:10	2:05	0
14/12/2020	3	9	medium	8:12	10:15	2:03	2
14/12/2020	4	10	medium	8:22	10:21	1:59	2
14/12/2020	5	11	large	8:26	10:32	2:06	1
14/12/2020	6	12	small	8:32	10:36	2:04	2
14/12/2020	7	13	medium	8:40	10:43	2:03	2
14/12/2020	8	14	large	8:44	10:50	2:06	2
14/12/2020	9	15	small	8:50	10:56	2:06	1
14/12/2020	10	16	small	11:13	13:15	2:02	1
14/12/2020	11	17	large	11:17	13:20	2:03	2
14/12/2020	12	18	medium	11:25	13:28	2:03	1
14/12/2020	13	19	small	11:30	13:40	2:10	1
14/12/2020	14	20	large	11:36	13:45	2:09	1
14/12/2020	15	21	medium	11:40	13:55	2:15	2
14/12/2020	16	22	medium	11:45	14:00	2:15	3
14/12/2020	17	23	large	11:47	14:10	2:23	1
14/12/2020	18	24	small	11:54	14:15	2:21	0
15/12/2020	19	34	small	7:45	9:59	2:14	1
15/12/2020	20	35	large	7:49	10:03	2:14	0
15/12/2020	21	36	medium	7:54	10:07	2:13	2
15/12/2020	22	1	medium	8:00	10:14	2:14	2
15/12/2020	23	2	large	8:06	10:20	2:14	1
15/12/2020	24	3	small	8:10	10:28	2:18	2
15/12/2020	25	4	medium	8:20	10:35	2:15	0
15/12/2020	26	5	large	8:25	10:40	2:15	2
15/12/2020	27	6	small	8:31	10:45	2:14	1
15/12/2020	28	33	small	10:53	13:08	2:15	0
15/12/2020	29	32	large	10:59	13:13	2:14	1
15/12/2020	30	31	medium	11:06	13:19	2:13	2
15/12/2020	31	30	small	11:11	13:30	2:19	4
15/12/2020	32	29	large	11:18	13:42	2:24	1
15/12/2020	33	28	medium	11:22	13:47	2:25	1
15/12/2020	34	27	medium	11:27	13:52	2:25	0
15/12/2020	35	26	large	11:32	13:55	2:23	0
15/12/2020	36	25	small	11:38	14:00	2:22	1

## Lake Paringa

Date	Set #	Site #	Mesh size	Time set	Time in	Total hrs	# Trout
16/12/2020	1	49	small	8:55	10:59	2:04	0
16/12/2020	2	50	large	8:59	11:02	2:03	0
16/12/2020	3	51	medium	9:03	11:06	2:03	0
16/12/2020	4	52	medium	9:08	11:10	2:02	2
16/12/2020	5	53	large	9:13	11:17	2:04	0
16/12/2020	6	54	small	9:17	11:21	2:04	1
16/12/2020	7	1	medium	9:24	11:26	2:02	0
16/12/2020	8	2	large	9:29	11:29	2:00	0
16/12/2020	9	3	small	9:35	11:36	2:01	0
16/12/2020	10	13	small	11:48	13:46	1:58	1
16/12/2020	11	14	large	11:58	13:58	2:00	1
16/12/2020	12	15	medium	12:08	14:10	2:02	0
16/12/2020	13	16	small	12:12	14:15	2:03	0
16/12/2020	14	17	large	12:19	14:20	2:01	0
16/12/2020	15	18	medium	12:39	14:41	2:02	0
16/12/2020	16	19	medium	12:47	14:47	2:00	3
16/12/2020	17	20	large	12:51	14:54	2:03	0
16/12/2020	18	21	small	12:57	14:59	2:02	3
17/12/2020	19	4	small	6:02	8:08	2:06	0
17/12/2020	20	5	large	6:08	8:12	2:04	0
17/12/2020	21	6	medium	6:15	8:16	2:01	0
17/12/2020	22	7	medium	6:20	8:22	2:02	0
17/12/2020	23	8	large	6:25	8:27	2:02	0
17/12/2020	24	9	small	6:30	8:32	2:02	4
17/12/2020	25	10	medium	6:35	8:41	2:06	2
17/12/2020	26	11	large	6:42	8:50	2:08	0
17/12/2020	27	12	small	6:51	8:54	2:03	1
17/12/2020	28	22	small	9:01	11:15	2:14	1
17/12/2020	29	23	large	9:06	11:19	2:13	1
17/12/2020	30	24	medium	9:15	11:29	2:14	5
17/12/2020	31	25	small	9:19	11:42	2:23	4
17/12/2020	32	26	large	9:24	11:53	2:29	1
17/12/2020	33	27	medium	9:30	12:05	2:35	4
17/12/2020	34	28	medium	9:34	12:15	2:41	3
17/12/2020	35	29	large	9:41	12:23	2:42	0
17/12/2020	36	30	small	9:45	12:29	2:44	2
17/12/2020	37	31	small	12:41	14:41	2:00	3
17/12/2020	38	32	large	12:45	14:48	2:03	0
17/12/2020	39	33	medium	12:50	14:54	2:04	1
17/12/2020	40	34	medium	13:03	15:03	2:00	1
17/12/2020	41	35	large	13:07	15:08	2:01	1
17/12/2020	42	36	small	13:11	15:14	2:03	2
17/12/2020	43	37	medium	13:16	15:25	2:09	2
17/12/2020	44	38	large	13:20	15:30	2:10	1
17/12/2020	45	39	small	13:24	15:36	2:12	1
18/12/2020	46	40	small	6:17	8:22	2:05	1
18/12/2020	47	41	large	6:22	8:28	2:06	1
18/12/2020	48	42	medium	6:28	8:33	2:05	2
18/12/2020	49	43	small	6:33	8:42	2:09	5
18/12/2020	50	44	large	6:37	8:56	2:19	3

18/12/2020	51	45	medium	6:43	9:04	2:21	1
18/12/2020	52	46	medium	6:51	9:15	2:24	0
18/12/2020	53	47	large	6:57	9:19	2:22	0
18/12/2020	54	48	small	7:02	9:22	2:20	0

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## Appendix 2



