Gillnetting Survey of Lake Haupiri

Results of Lake Haupiri Gillnetting Survey, October 2023

West Coast Fish & Game Region

Baylee Kersten, Fish & Game Officer, November 2023

Field officer Dan Scoltock pulling in a gillnet, Lake Haupiri, October 2023.

Summary

Lake Haupiri is a regionally significant sport fishery located in the Haupiri River catchment, which is a second order tributary of the Grey River. Current trends in the size, condition and relative abundance of the sports fish population were established and comparisons made with previous surveys undertaken. Forty-three brown trout were caught over two days in October 2023 using standardised procedures established during previous surveys. Brown trout in Lake Haupiri had increased in length (+31mm) but had not changed in weight resulting in a decrease in condition (condition factor -0.10) but were still in similar abundance to the last survey in 2003. Staff recommendations: That the council receives the report. Maintains current regulations for Lake Haupiri. Lake Haupiri should only be gillnetted again in response to concerns being raised for the fishery. Complete a gillnetting survey on Lake Mapourika to obtain baseline data.

Introduction

The Grey River Catchment has become an increasingly popular location for angling on the West Coast. Estimated angling effort increasing from 11,940 angling days in 1994/95 to 25,400 angler days in 2014/15, a factor of 2.13 (Unwin, 2016). The Grey River catchment's lakes are heavily utilised by visiting anglers, in particular from North Canterbury and Nelson.

Lake Haupiri is a small lake (2.4km^2) and received modest angler usage (270 angler days per annum) when compared to other West Coast lakes at the last estimate (Unwin, 2016). Lake Haupiri lies within the Haupiri River catchment, which is a second order tributary of the Grey River. The lake is located 56km from Greymouth, access is available from the Kopara Road.

The lake is 2.38km^2 in area, and is rain fed by several small streams and direct run-off from the surrounding land. The lake is a typical tea colour from leached tannins from vegetation. The catchment vegetation is a combination of developed pastureland, indigenous forest and swampland. Vegetation, mainly Carex, Flax and Juncus grows right to the water's edge in most places, there are only two small gravel beaches showing. The lake was last surveyed in December 2003 (Kelly, 2004).

A limnological study carried out in 1976 by the Department of Scientific and Industrial Research (Paerl, Payne, McKenzie, Kellar, & Downes, 1976) concluded that productivity in West Coast lakes, such as Haupiri, is low due to two possible factors. The amber colouration due to leached tannins from decomposing vegetation was greatly restricting photosynthetic production and secondly that phosphorous is in extremely short supply which is an important biological growth nutrient.

Gillnetting has been carried out on three separate occasions in the past by the Marine Department (M (Moore, Galloway, & Lewall, 1963), the West Coast Acclimatisation Society (Tweed, 1985) and the West Coast Fish and Game (Kelly, 2004).

The aim of the current survey was to:

1) assess trends in the size, condition and relative abundance of the Lake Haupiri's sports fish population 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 Lake Haupiri.
3) and make recommendations for future management of the fishery.

Survey Method

Thirty-six sites on Lake Haupiri were located from a 14ft alloy boat by GPS and surveyed over two days in late October 2023 (Appendix). The sites were not the same as those completed in previous surveys due to no GPS data being available, but site selection was influenced by 2003 survey site descriptions. 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 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

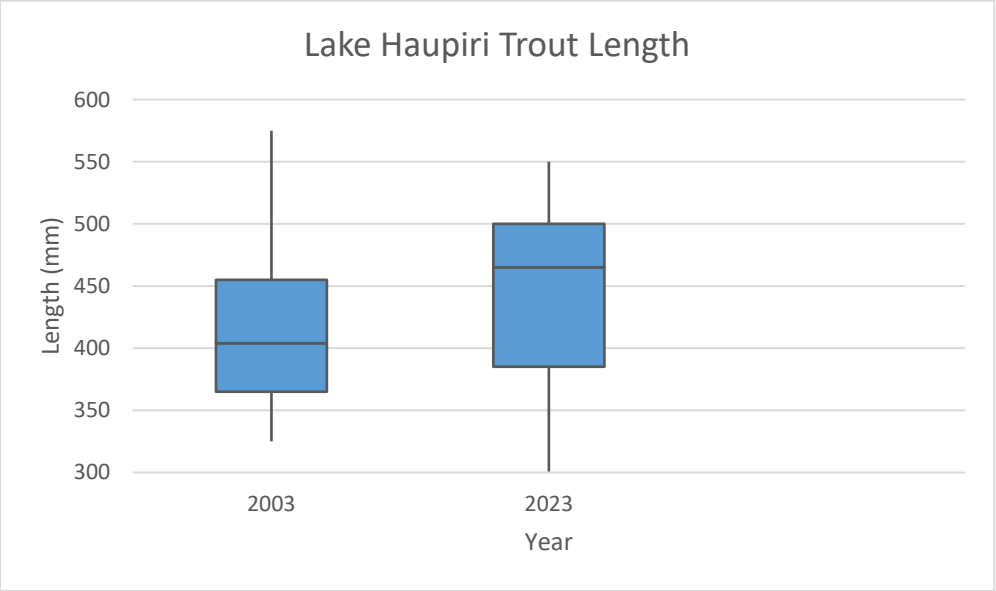

Figure 1. Box plot showing length of brown trout caught in gill nets at Lake Haupiri in 2003 and 2023.

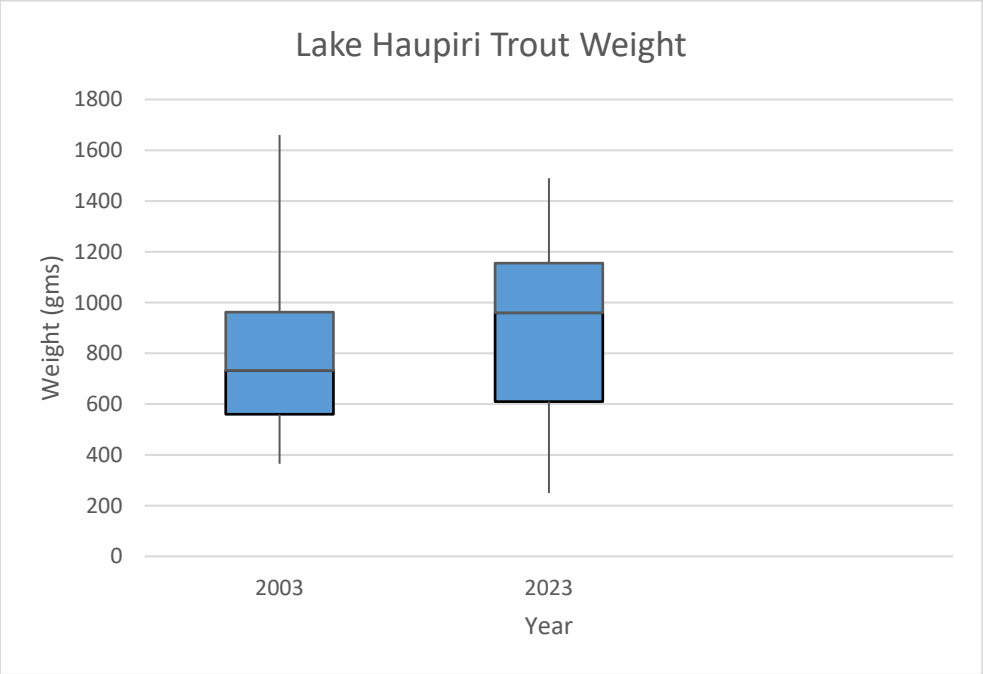

Figure 2. Box plot showing weight of brown trout caught in gill nets at Lake Haupiri in 2003 and 2023.

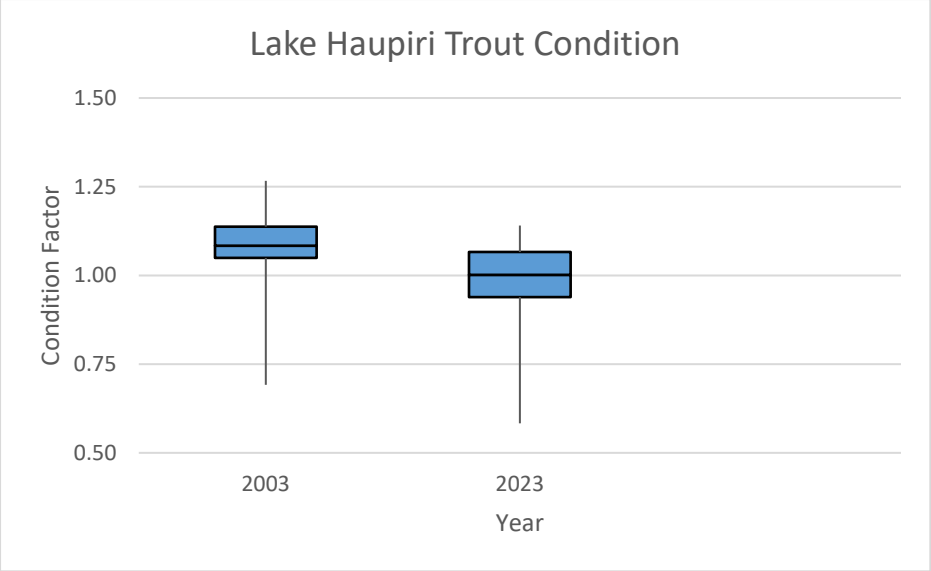

Figure 3. Box plot showing condition factor of brown trout caught in gill nets at Lake Haupiri in 2003 and 2023.

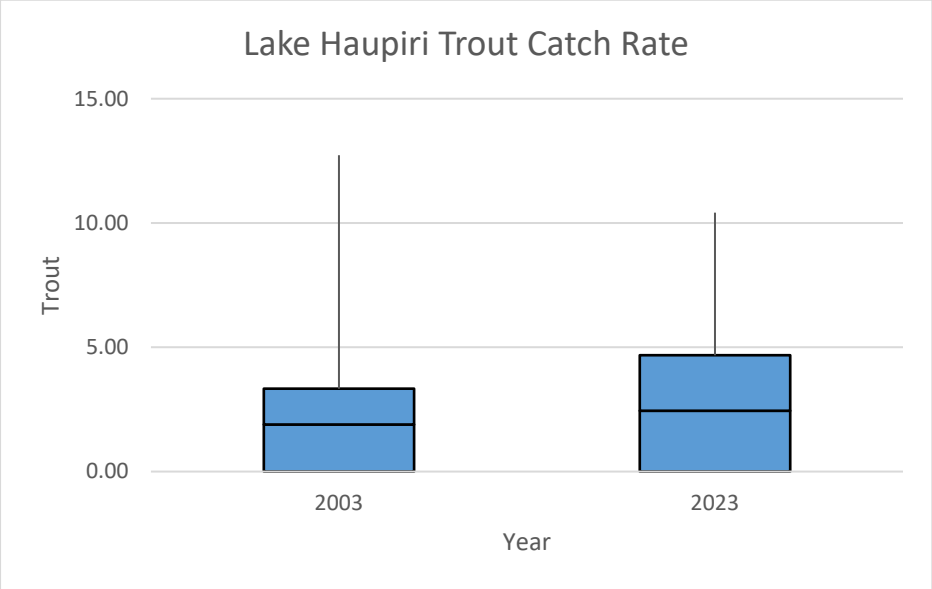

Figure 4. Box plot showing catch rate of brown trout caught in gill nets at Lake Haupiri in 2003 and 2023

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

Variable	Survey year	
	2003	**2023**
Mean Length (mm)	411	442
Mean Weight (g)	777	898
Mean Condition (cf)	1.08	0.98
Mean CPUE (#/100m/hr)	2.51	2.75
Fish Caught (n)	52	43

There was a significant increase in length (p=<0.01) and decrease in condition factor (p=< 0.001) of brown trout between the two surveys at Lake Haupiri. Weight (p=0.08) and catch rate (p=0.73) were not significantly different between the two surveys.

Comparison of brown trout in West Coast lakes

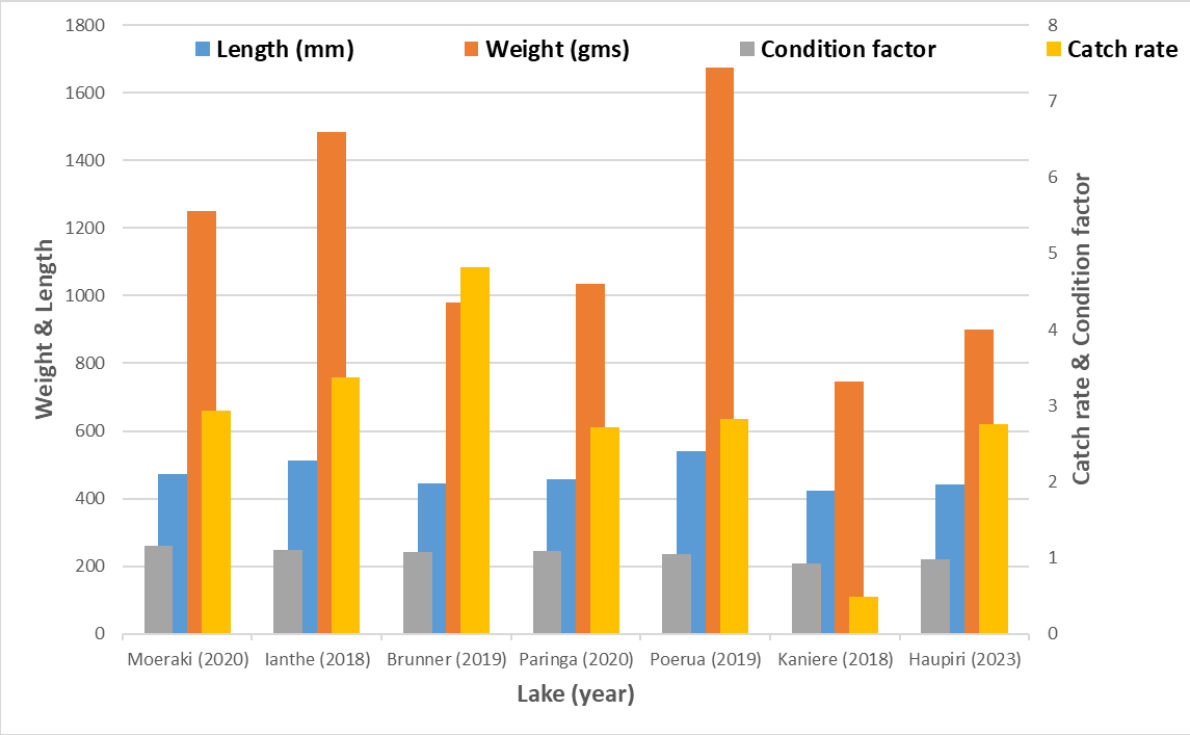

Figure 5. Comparison of average size, condition and catch rate of brown trout caught in gillnets in West Coast lakes.

In 2023 brown trout netted in Lake Haupiri were below average in size and condition. Lake Haupiri has a marginally lower catch rate in comparison to most other West Coast lakes.

Discussion

From the data collected for brown trout in Lake Haupiri, there were no trends detected that might impact angler success warranting further investigation. The survey showed there are still good numbers of fish and size has increased from the last survey. The poor condition of Lake Haupiri trout in this survey is a potential concern but can likely be explained by completing the survey in October when trout are still gaining condition after spawning rather than December. In addition to this, during the previous La Nina summers, data provided by West Coast Regional Council has shown water temperatures exceeding 23°C, greatly impacting feeding (Hay, Hayes, & Young, 2006).

Previous reports have highlighted the influence of water temperature on trout activity and how it likely influences catch rates. During the 2023 survey, the water temperature varied between 12.6°C and 14.5°C which is approaching the optimum for brown trout (14 °C – 17 °C) (Hay, Hayes, & Young, 2006). When the last survey was completed in December 2003, it was reported that the warm water

temperatures experienced during the survey was influencing trout distribution (Kelly, 2004). This may have led to a higher catch rate this survey proportional to the number of trout present in the fishery. It is recommended that when the next survey of Lake Haupiri is completed, it is done in later half of spring to improve comparison with the benefit of lower casualties with mild water temperatures.

Seven Brown trout died during this survey. Their otoliths were removed and kept for research, followed by their gut content being examined. The trout had largely been eating dragonfly and damselfly nymphs, with the occasional backswimmer or bully and in one instance, a mouse.

Recommendation

- That the council receives the report.
- Maintains current regulations for Lake Haupiri.
- Lake Haupiri should only be gillnetted again in response to concerns raised for the fishery.
- Complete a gillnetting survey on Lake Mapourika to obtain baseline data.

References

Hay, J., Hayes, J., & Young, R. (2006). *Water Qaulity Guidelines To Protect Trout Fishery Values.* Cawthron.

Kelly, D. (2004). *Gillnetting Survey data from Lake Haupiri.* West Coast Fish & Game.

Moore, E., Galloway, J., & Lewall, E. F. (1963). *Limnological Survey of Lake Haupiri.* Freshwater Fisheries Advisory Service, Marine Department Investigation Report.

Paerl, H. W., Payne, G. W., McKenzie, A. L., Kellar, P. E., & Downes, M. T. (1976). *Limnology of nine Westland beech forest lakes.* Ecology Division, Freshwater Section, Department of Scientific and Industrial Research.

Tweed, A. D. (1985). *The Lake Haupiri Fishery.* West Coast Acclimatisation Society.

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Appendix 1 – Net Sets

Date	Set #	Site #	Mesh size	Time set	Time in	Total hrs	# Trout
19/10/2023	1	1	small	7:02	9:02	2:00	0
19/10/2023	2	2	large	7:07	9:07	2:00	1
19/10/2023	3	3	medium	7:12	9:16	2:04	2
19/10/2023	4	4	small	7:20	9:23	2:03	1
19/10/2023	5	5	large	7:25	9:28	2:03	2
19/10/2023	6	6	medium	7:30	9:36	2:06	2
19/10/2023	7	7	medium	7:39	9:45	2:06	2
19/10/2023	8	8	large	7:42	9:50	2:08	0
19/10/2023	9	9	small	7:48	9:55	2:07	1
19/10/2023	10	10	small	10:07	12:07	2:00	0
19/10/2023	11	11	large	10:11	12:15	2:04	3
19/10/2023	12	12	medium	10:15	12:26	2:11	2
19/10/2023	13	13	medium	10:20	12:36	2:16	2
19/10/2023	14	14	large	10:24	12:42	2:18	2
19/10/2023	15	15	small	10:29	12:47	2:18	3
19/10/2023	16	16	medium	10:35	12:53	2:18	2
19/10/2023	17	17	large	10:40	13:04	2:24	1
19/10/2023	18	18	small	10:46	13:10	2:24	5
20/10/2023	19	19	small	7:00	9:02	2:02	1
20/10/2023	20	20	large	7:04	9:05	2:01	0
20/10/2023	21	21	medium	7:10	9:10	2:00	0
20/10/2023	22	22	small	7:16	9:16	2:00	0
20/10/2023	23	23	large	7:21	9:21	2:00	0
20/10/2023	24	24	medium	7:25	9:25	2:00	0
20/10/2023	25	25	medium	7:30	9:30	2:00	0
20/10/2023	26	26	large	7:34	9:34	2:00	1
20/10/2023	27	27	small	7:39	9:41	2:02	0
20/10/2023	28	28	small	9:49	11:52	2:03	2
20/10/2023	29	29	large	9:51	11:59	2:08	0
20/10/2023	30	30	medium	9:56	12:03	2:07	1
20/10/2023	31	31	medium	10:03	12:10	2:07	1
20/10/2023	32	32	large	10:08	12:14	2:06	2
20/10/2023	33	33	small	10:12	12:21	2:09	2
20/10/2023	34	34	medium	10:19	12:29	2:10	0
20/10/2023	35	35	large	10:24	12:33	2:09	0
20/10/2023	36	36	small	10:28	12:37	2:09	2

Appendix 2


Lake Haupiri
Gillnetting Sites 2023
Legend
Net Sites
Hau 28
Hau 30
Hau 31
Hau 29
Hau 27
Hau 32
Hau 33
Hau 26
Hau 34
Hau 35
Hau 25
Hau 36
Hau 1
Hau 24
Hau 2
Hau 23
Hau 22
Hau 3
Lake Haupiri
Hau 21
Hau 4
Hau 20
Hau 19
Hau 18
Hau 5
Hau 16
Hau 17
Hau 13
Hau 12
Hau 15
Hau 8
Hau 6
Hau 14
Hau 7
Hau 9
Hau 11
Hau 10
Google Earth
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