

Gillnetting Survey of the Brunner Catchment Sportsfishery.

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Summary

The Brunner Catchment forms a significant part of the Grey River Catchment and receives the most angler effort on the West Coast. Current trends in the size, condition and relative abundance of the sports fish population were established and comparisons made with other West Coast locations. Two hundred brown trout (45 on Lake Poerua; 155 on Lake Brunner) were caught and measured over eight days (three days Lake Poerua; five days Lake Brunner). Brown trout on Lake Poerua had increased in size (length+32mm, weight+256g) and had similar abundance and condition factor to the last survey in 2012. Brown trout on Lake Brunner had decreased in size (length-67mm, weight-451g) but increased in condition factor and abundance compared to the last survey in 2011. Brown trout on Lake Poerua were on average much larger than those on Lake Brunner (length+97mm, weight+692g) while trout abundance on Lake Brunner was almost twice that on Lake Poerua (4.82 vs 2.82 fish/100m net/hr). There was no difference in condition factor.

Introduction

The Brunner Catchment (Lakes Brunner and Poerua and associated tributaries) forms a significant part of the Grey River catchment at the head of the Arnold Valley. With a hydro dam being built on the Arnold River at Kaimata in 1932 the upper Brunner Catchment was effectively isolated from the lower Arnold River. Brown trout, first liberated on the West Coast in 1876, are self-sustaining within the catchment, and form part of the West Coast's most significant fishery.

Lake Brunner is the largest lake in the West Coast Fish & Game Region (41 km²) and receives by far the most angler usage (14,420 angler days per annum, or about 25% of total West Coast angler days per annum) of any West Coast lake (Unwin, 2016). Being readily accessible from Christchurch, Moana and Greymouth it is a popular location for recreational activities such as boating, water skiing, walking, biking and fishing. The lake is relatively deep (109m) with numerous areas of shallow water, weed beds and wetlands. Inflowing tributary streams are relatively stable and ideal for spawning, the most notable being the Crooked, the Eastern Hohunu and the Orangipuku.

Lake Poerua is a small lake forming part of the Brunner catchment further upstream from Lake Brunner. It receives low to moderate angler usage (550 angler days per annum) making it the fourth equal most popular West Coast lake (Unwin, 2016). The lake is relatively shallow with areas of shallow water, weed beds, wetlands and small inflowing tributary streams. Lake Poerua is significant as it is the only lake on the West Coast that does not have an 'all year' open season. It is believed to be prone to over harvest being a small lake with valued spawning tributaries (Newton 2019). Lake Poerua is popular with boaties for shallow water harling, trolling and flyfishing. It is also a favourite of shore-based anglers because of its accessible shallows which offer exciting sight fishing for cruising brown trout.

The aim of the current survey was to:

- 1) assess trends in the size, condition and relative abundance of the Brunner Catchment 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 lakes Brunner and Poerua.
- 3) and make recommendations for future management of the fishery.

Survey Method

Thirty-six sites on Lake Poerua and seventy-two sites on Lake Brunner historically surveyed were located from a 14ft alloy boat by GPS and re surveyed over eight days in late October - November 2019 (Appendix). 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 2-3hrs to avoid net saturation and decrease variability in the method.

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 Poerua

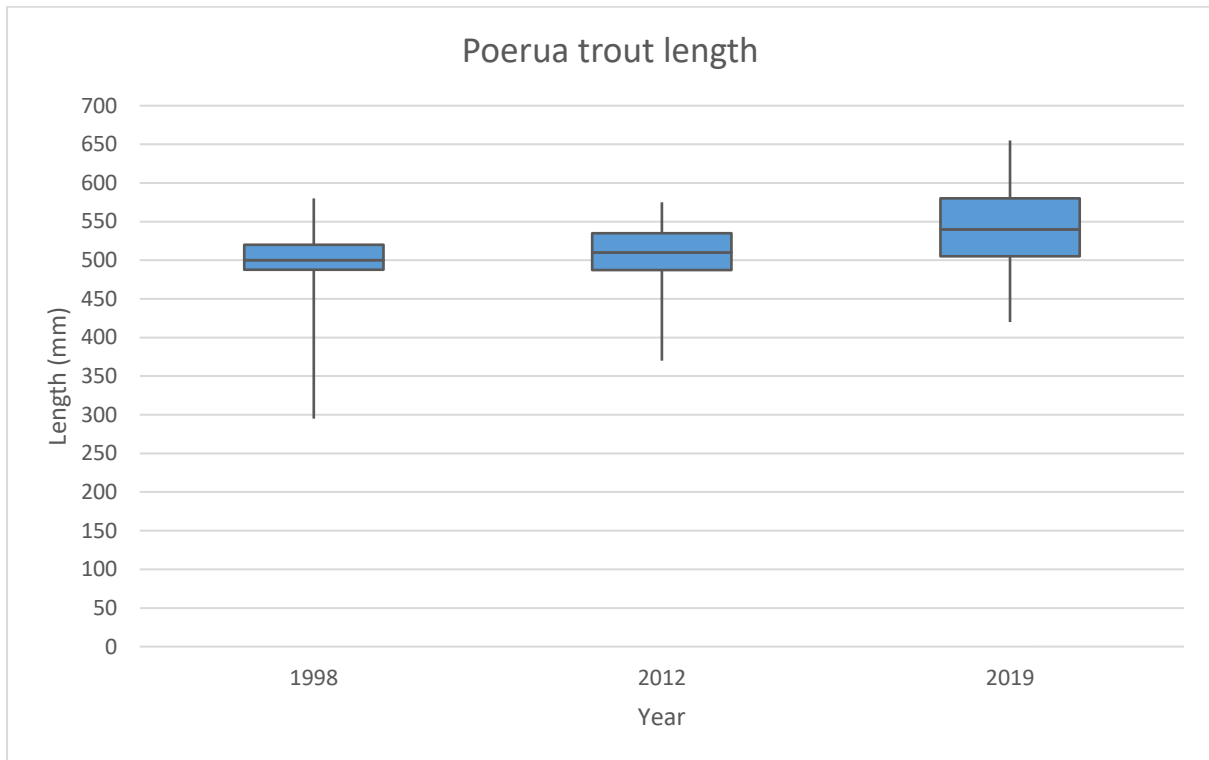


Figure 1. Box plot showing length of brown trout caught in gill nets at Lake Poerua in 1998, 2012 and 2019.

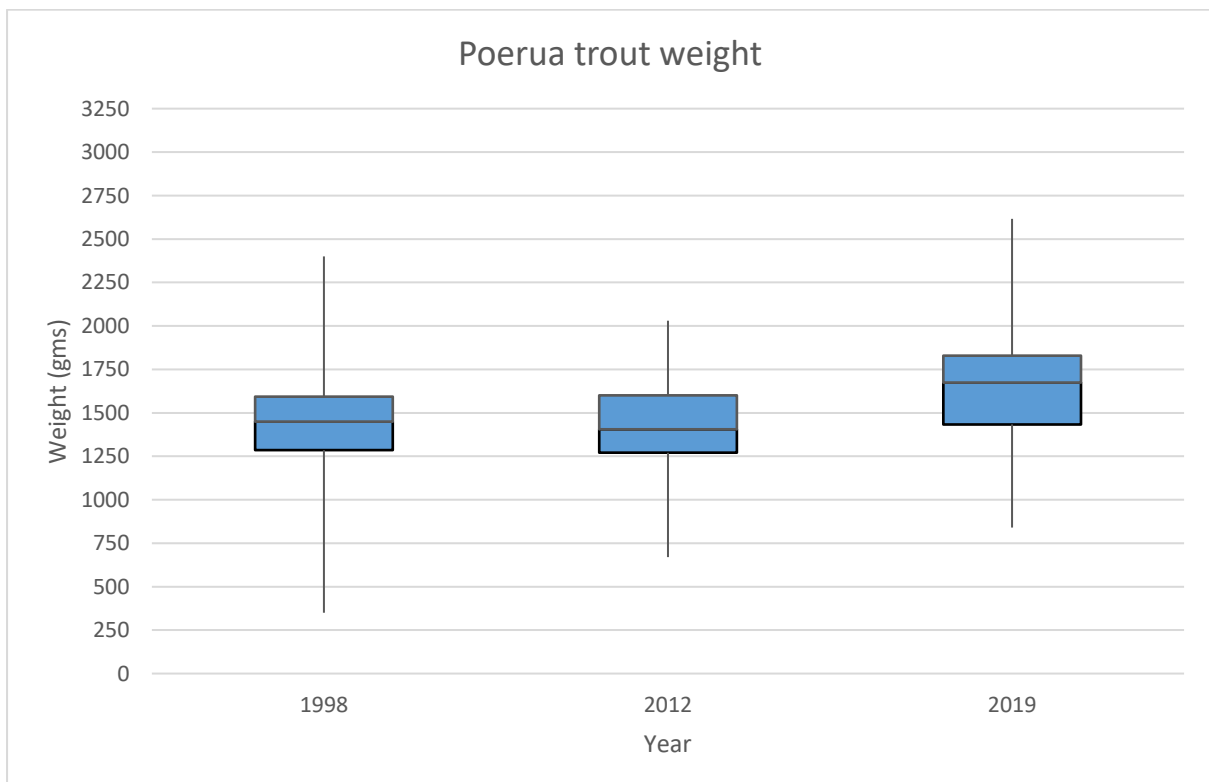


Figure 2. Box plot showing weight of brown trout caught in gill nets at Lake Poerua in 1998, 2012 and 2019.

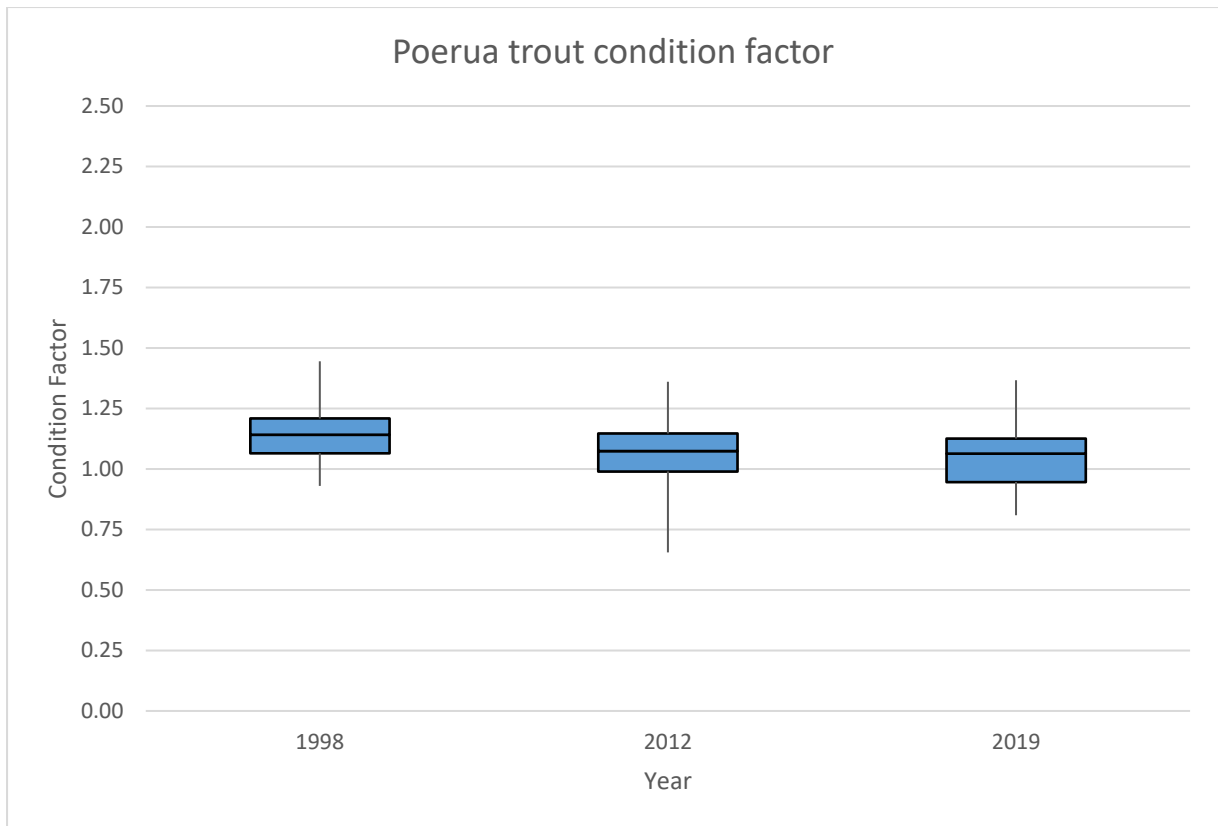


Figure 3. Box plot showing condition factor of brown trout caught in gill nets at Lake Poerua in 1998, 2012 and 2019.

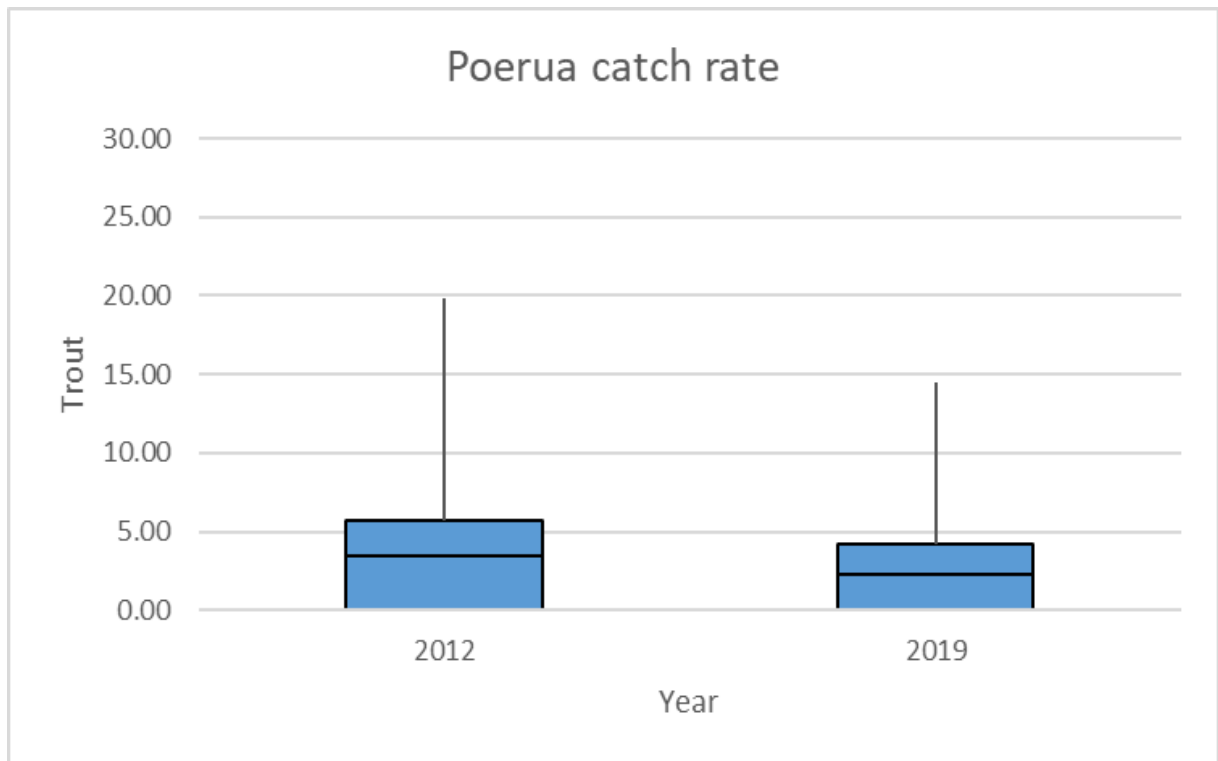


Figure 4. Box plot showing catch rate of brown trout caught in gill nets at Lake Poerua in 2012 and 2019 (no catch rate obtained in 1998).

Table 1. Summary data of brown trout observed in Lake Poerua from 1998, 2011 and 2019.

Variable	Survey year		
	1998	2012	2019
Mean Length (mm)	492	510	542
Mean Weight (g)	1394	1417	1673
Mean Condition (cf)	1.15	1.07	1.05
Mean CPUE (#/100m/hr)	n/a	3.95`	2.82
Fish Caught (n)	55	68	45

There was a significant increase in length ($p=0.05$) and weight ($p<0.01$) of brown trout across all survey years. Condition factor of brown trout in 2019 was significantly lower than in 1998 but not different to that in 2012. Catch rate was not significantly different.

Lake Brunner

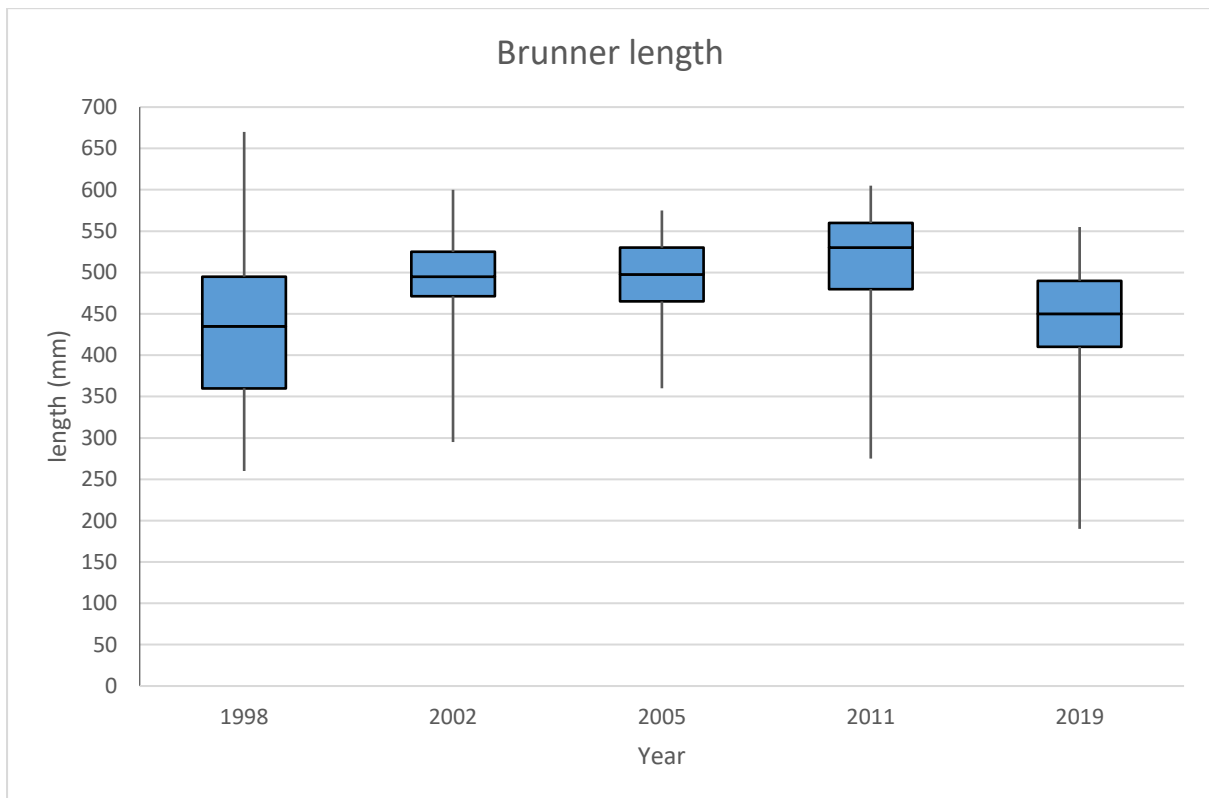


Figure 5. Box plot showing length of brown trout caught in gill nets at Lake Brunner in 1998, 2002, 2005, 2011 and 2019.

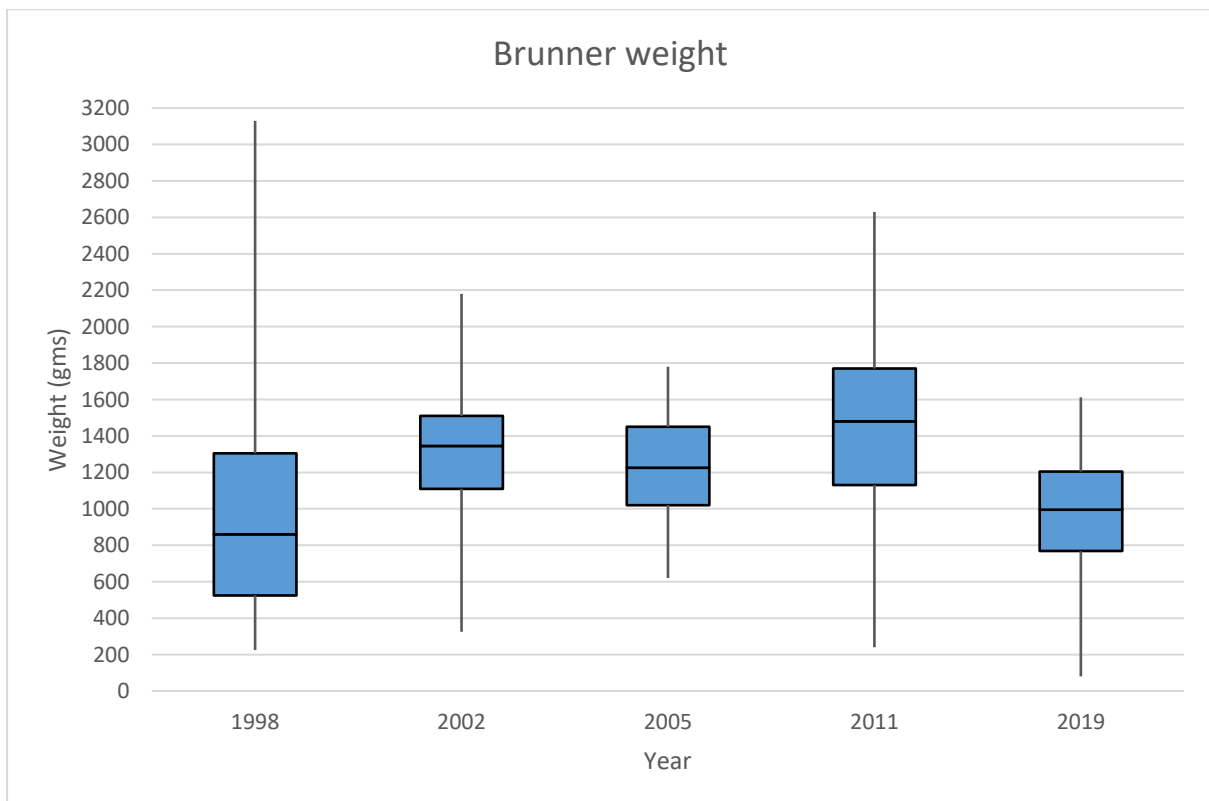


Figure 6. Box plot showing weight of brown trout caught in gill nets at Lake Brunner in 1998, 2002, 2005, 2011 and 2019.

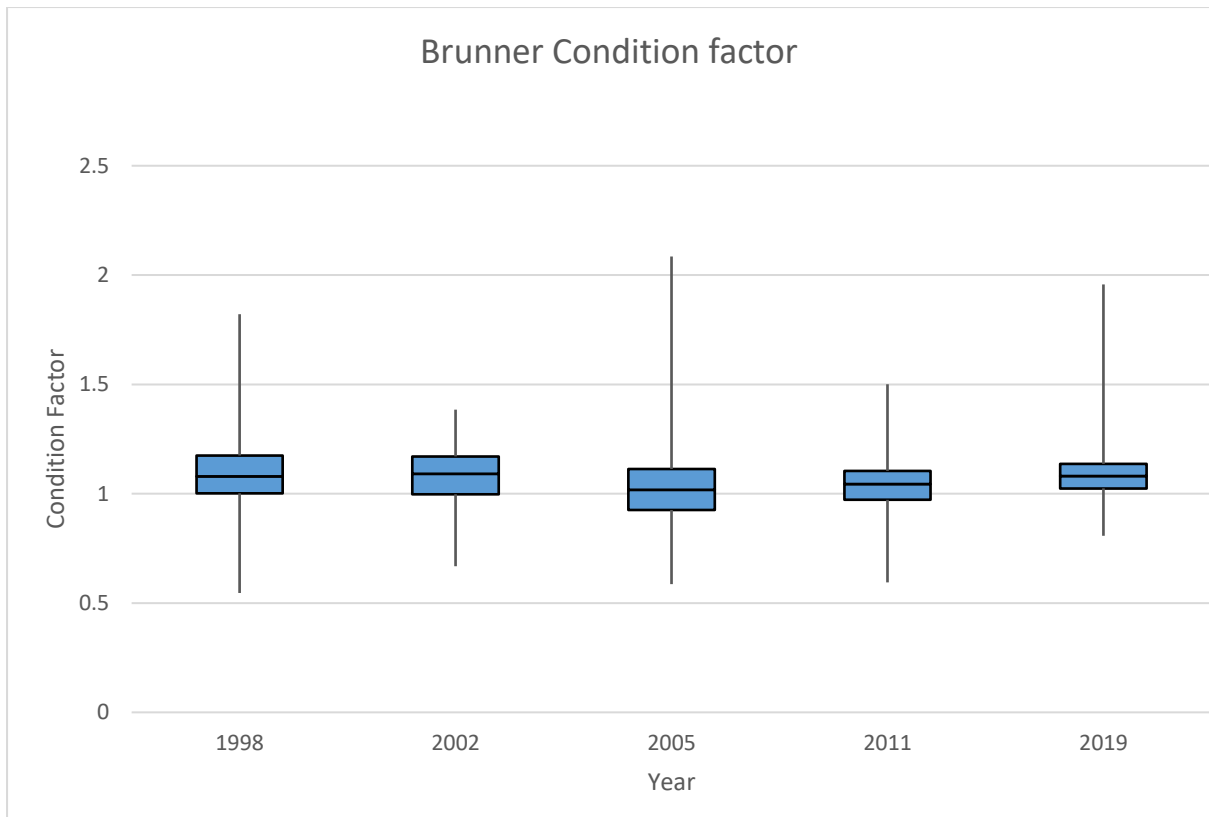


Figure 7. Box plot showing condition factor of brown trout caught in gill nets at Lake Brunner in 1998, 2002, 2005, 2011 and 2019.

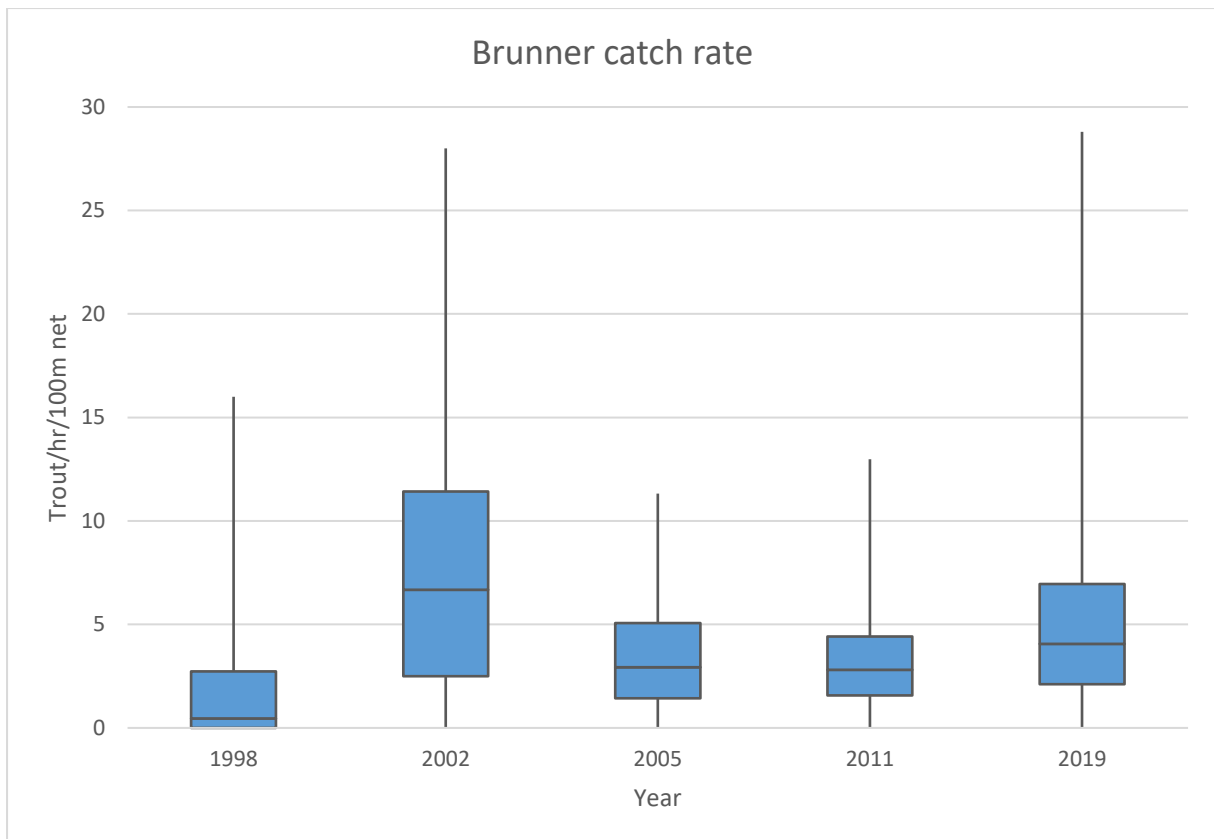


Figure 8. Box plot showing catch rate of brown trout caught in gill nets at Lake Brunner in 1998, 2002, 2005, 2011 and 2019.

Table 2. Summary data of brown trout observed in Lake Brunner from 1998 to 2019.

Variable	Survey year				
	1998	2002	2005	2011	2019
Mean Length (mm)	431	493	494	512	445
Mean Weight (g)	932	1302	1226	1432	981
Mean Condition (cf)	1.08	1.08	1.01	1.04	1.08
Mean CPUE (#/100m/hr)	2.03	7.2	3.53	3.43	4.82
Fish Caught (n)	269	202	146	177	155

There was a significant decrease in length and weight of brown trout from 2011 to 2019. Abundance and condition factor of brown trout in 2019 was significantly higher than in 2011.

Comparison of brown trout at Lakes Brunner and Poerua.

Table 3. Comparison of brown trout observed in Lakes Brunner and Poerua 2019.

Variable	Brown trout 2019		Difference (P-Value)
	Brunner	Poerua	
	Mean	Mean	
Length (mm)	445	542	yes (0.00)
Weight (g)	981	1673	yes (0.00)
Condition Factor	1.08	1.05	no (0.39)
Catch rate (n/100m/hr)	4.82	2.82	yes (0.00)

Brown trout on Lake Brunner were significantly smaller than those on Lake Poerua but were significantly more abundant. There was no difference in condition factor.

Comparison of brown trout at West Coast lakes.

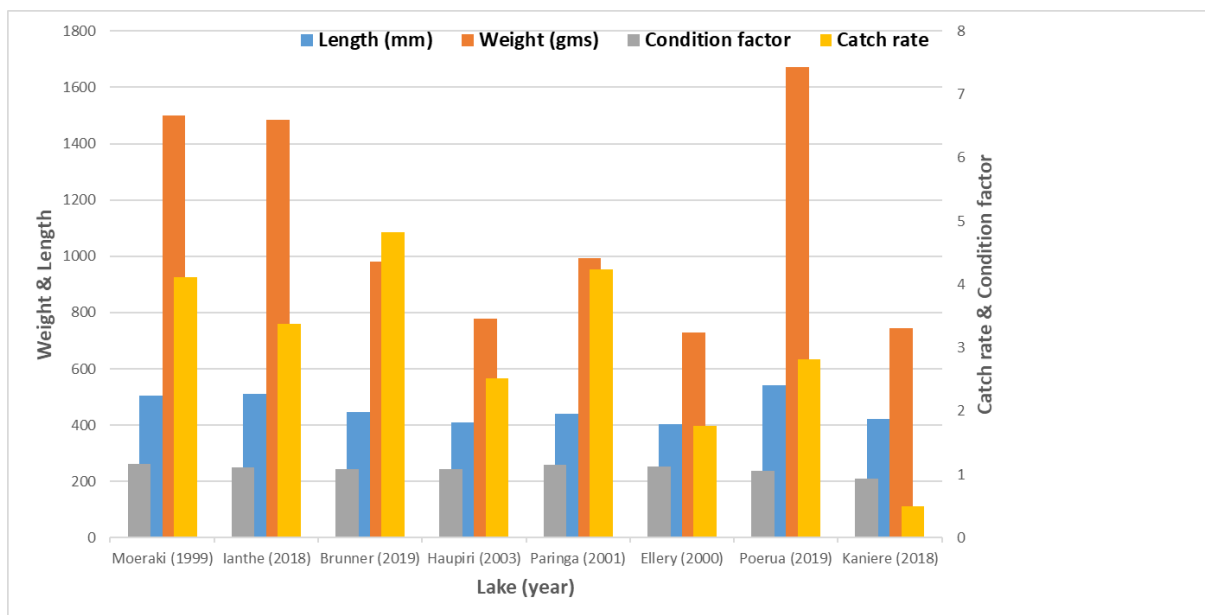


Figure 9. Comparison of average size, condition and catch rate of brown trout caught in gillnets on West Coast lakes.

In 2019 brown trout abundance in Lake Brunner was higher than that historically recorded on other West Coast lakes. In 2019 brown trout weight and length in Lake Poerua was higher than that historically recorded on other West Coast lakes.

Discussion

Of the variables collected for brown trout on Lake Brunner most fluctuate considerably over the various surveys. Size and abundance of fish is inconsistent, and while no obvious trends are apparent fish abundance has generally been moderate to high offering good angler opportunity. Of note is condition factor which is relatively consistent even in years when trout abundance is high (eg 2002). This suggests food is not a limiting factor on the lake and that other variables, potentially environmental conditions may be most influential. The absence of larger fish being caught during the surveys may be of concern. Back in 1998 fish in excess of 3kg were still being caught during the surveys while in the current survey the largest fish was only 1.6kg. However, the current trend of relatively high numbers of small, well-conditioned trout compared to other West Coast lakes is ideal for anglers in the West Coasts most popular fishery.

Interestingly the variables collected for brown trout on Lake Poerua are more consistent and trends are apparent. However, it should be noted that only three surveys have been completed on Poerua since 1998 compared to five on Brunner and fluctuations may have been missed. The size of fish on Poerua has increased over the surveys, particularly from 2012 until 2019, while condition factor has declined from 1998 to 2019. Catch rate appears to be stable but has only been collected over two surveys. Fish on Poerua are now on average the largest recorded for a West Coast Lake with fish up to 2.6kg (anglers report >3kg fish pers. comm.) and the average weight of 1.7kg exceeding the maximum size caught on Lake Brunner during the surveys. The current trend of moderate numbers of larger trout (by West Coast standards) aligns well with anglers expectations of the lake and maintaining the winter closure (Newton 2019).

Recommendation

- That the council receives the report.
- Maintain current bag limit on Lake Brunner but reassess following the next survey.
- Maintain current winter closure on Lake Poerua.
- That the lake netting survey be completed on both lakes Brunner and Poerua in 5-7 years' time.

Acknowledgements

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References

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