COUNCIL REPORT
September 2023

Upper Clutha Catchment Land-locked Salmon Spawning Surveys

Introduction

Land-locked populations of Chinook salmon (*Oncorhynchus tshawytscha)* occur in Lakes Wakatipu, Wānaka and Hāwea where they form an important component of the sports fishery. Although the salmon are relatively small in size they can be easily caught so are popular with anglers. The landlocked salmon of the southern lakes also play an important role in the sea run salmon populations by assisting in recruitment. Previous studies using otolith microchemistry data, have predicted that on average over 61 % of the sea run salmon captured in the lower Clutha River were the progeny of landlocked populations located above the Roxburgh and Clyde Dams (Gabrielsson, 2019).

Landlocked salmon spawning areas in the Central Otago Lakes are not well known and there is a general lack of knowledge of the land-locked salmon fishery. The purpose of the spawning surveys is to research where salmon have been observed spawning in the past and revisit these areas and identify where salmon are currently spawning.

The salmon spawning surveys in autumn 2023 is the fifth year of conducting surveys within the tributaries of the Southern Lakes. The 2023 surveys concentrated effort in the Wakatipu tributaries in particular up the Rees River, significant effort was also afforded to the Makarora River. This interim report is part of a milestone activity identified in the Sports Fish and Game Management Plan for Otago Fish and Game Council (11.2.1.7 2020).

Methodology

Anecdotal information on past salmon spawning areas was provided by Fish & Game staff (past and present), landowners and anglers. The priority catchments are tributaries of Lake Wakatipu (Priority 1) and tributaries of Lake Wānaka (Priority 2). The historic spawning areas identified from previous information were surveyed first as a priority. Anecdotal observations of salmon spawning were obtained from tributaries of the Makarora River, and Rees River.

Foot Based Spawning Survey

Foot-based spawning surveys were used to check historic and likely spawning areas as well as locations which in previous years returned a positive salmon eDNA results. This year's surveys focused on the Wakatipu tributaries, in particular the Rees River and Dart River, as well as a section of the Makarora River above the Wilkin River. Surveys were conducted in May and June which were based on previous anecdotal records of when salmon have been observed spawning.

eDNA (Environmental DNA) Survey

Following on from eDNA surveys in 2020, 2021 and 2022 sampling this season concentrated on the Makarora and Rees rivers. Passive eDNA samplers (drouges) were deployed at two sites in the Makarora River, two sites in the Rees River and one site in the Wilkin River in May and June 2023 (Figure 1 & 2). Each site had triplicate samples collected over a 24 hour period. Single samples were collected at three sites within Lake Wakatipu's tributaries: Glacier Burn, Lake Sylvan outflow and Diamond Creek (Figure 2). For each sample a syringe was used to filter 500 ml of water on site and a DNA/RNA preservative solution was injected into the filter capsule keeping the genetic material stable at room temperature before it was transported to the lab for analysis. All sample kits were supplied by, and analysis conducted by Wilderlab NZ Ltd

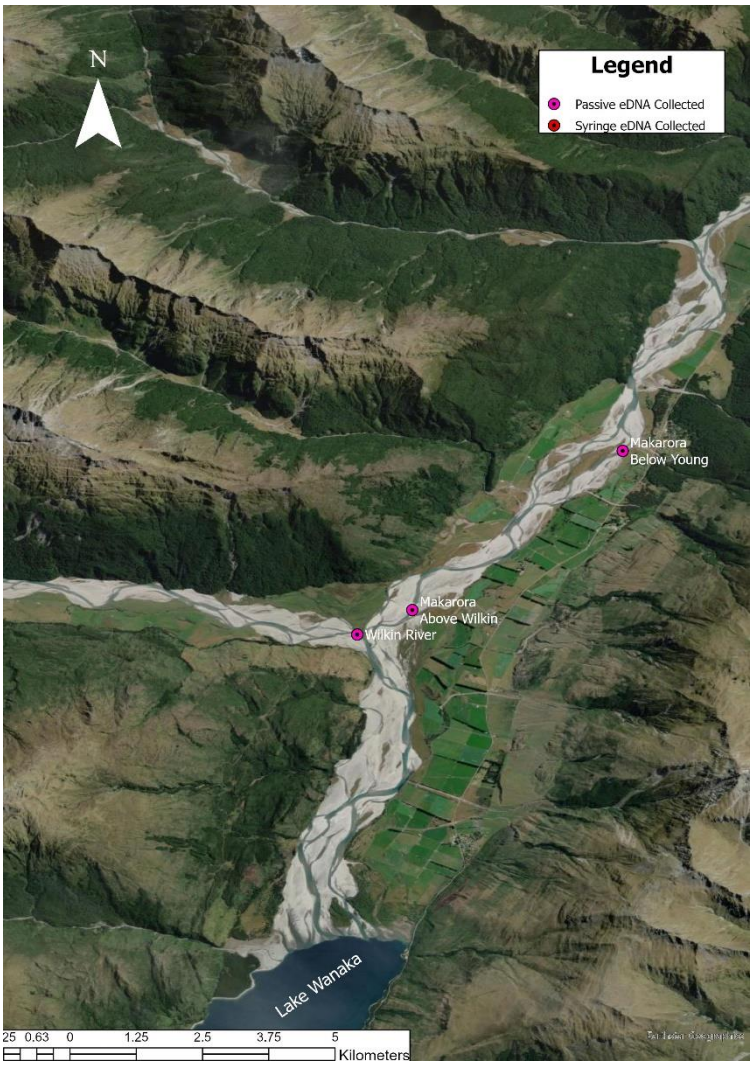

Figure 1. Three eDNA sampling sites located in the Makarora and Wilkin rivers in early May 2023.

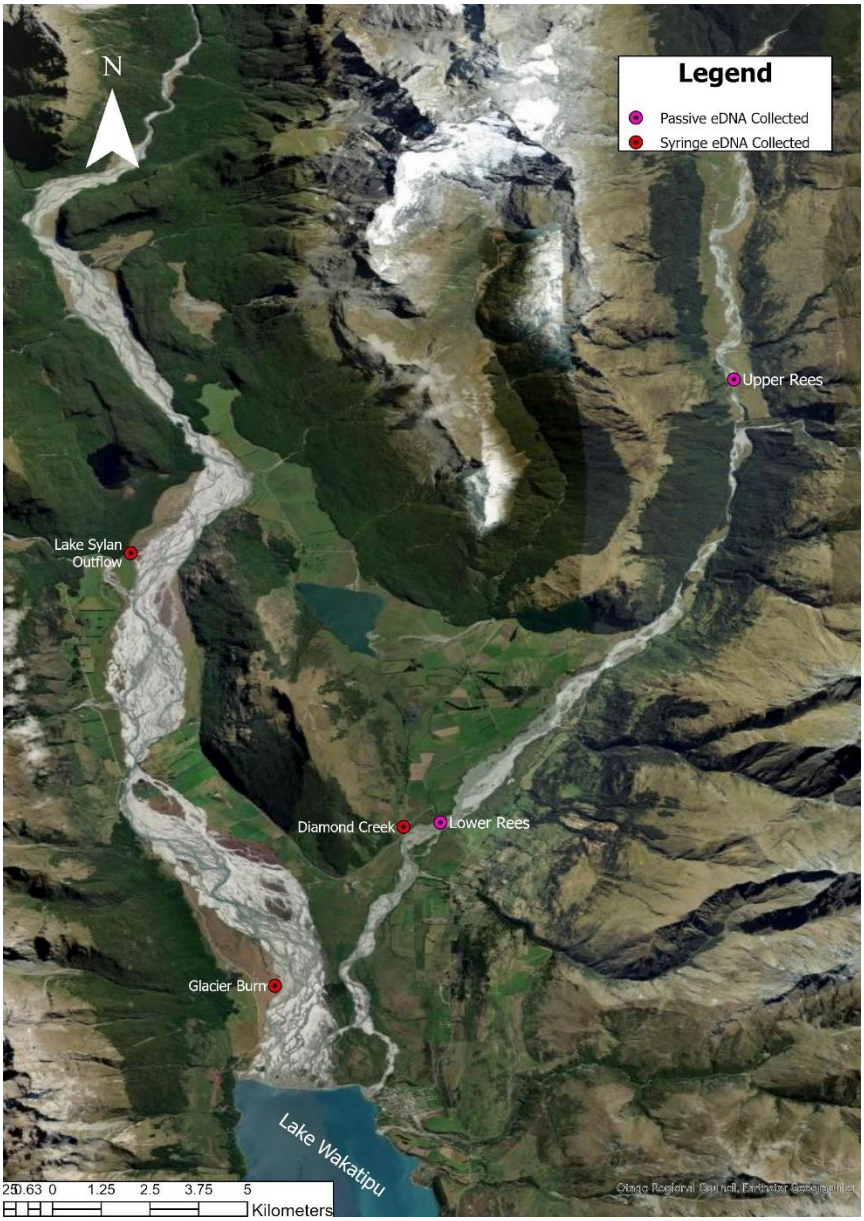

Figure 2. Five eDNA sampling sites located in the tributaries at the top of lake Wakatipu in late May 2023.

Results

Foot Based Spawning Surveys

Spawning Salmon were only observed at two locations throughout the surveys, an unnamed spring creek located on the true right of the Makarora river just above Teil Creek (Figure 5) and in Diamond Creek a tributary of the Rees river (Figure 6).

No salmon or salmon carcasses were observed during the walking survey in Upper Rees and tributaries, Glacier Burn or the Lake Sylvan outflow (Figures 3 & 4). Brown trout and brown trout spawning redds were observed in every one of the surveys. These were recorded and entered into the spawning database.

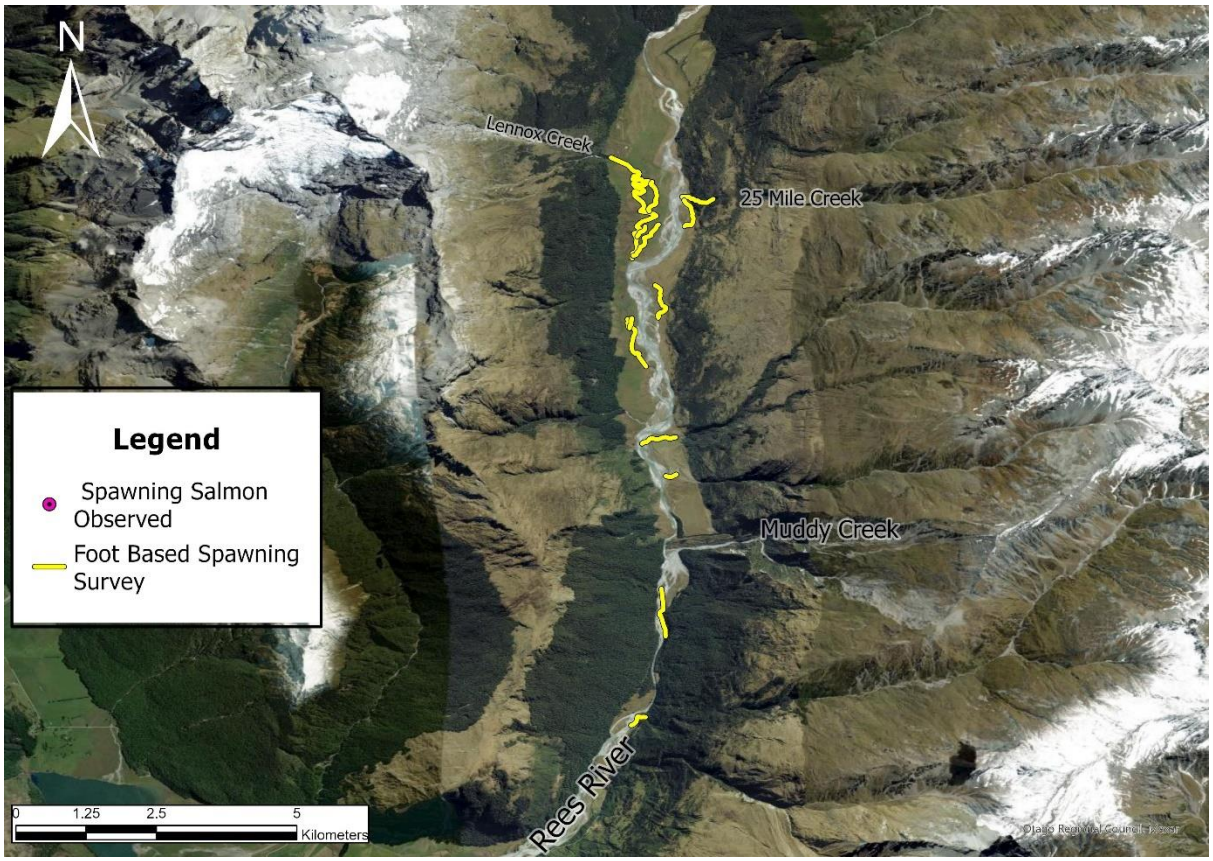

Figure 3. Foot based spawning survey of the upper Rees River conducted in May- June 2023

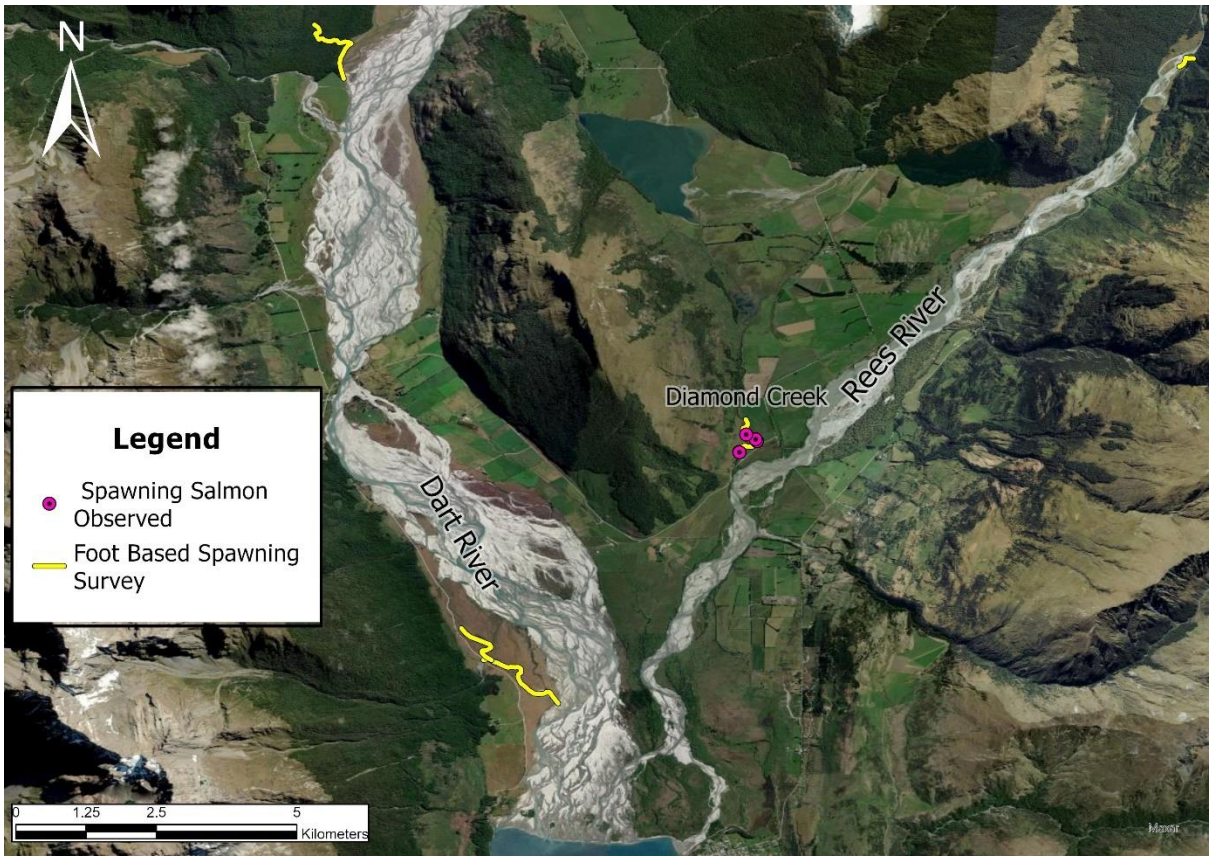

Figure 4. Foot based spawning surveys of the lower Dart and Rees rivers conducted in May 2023

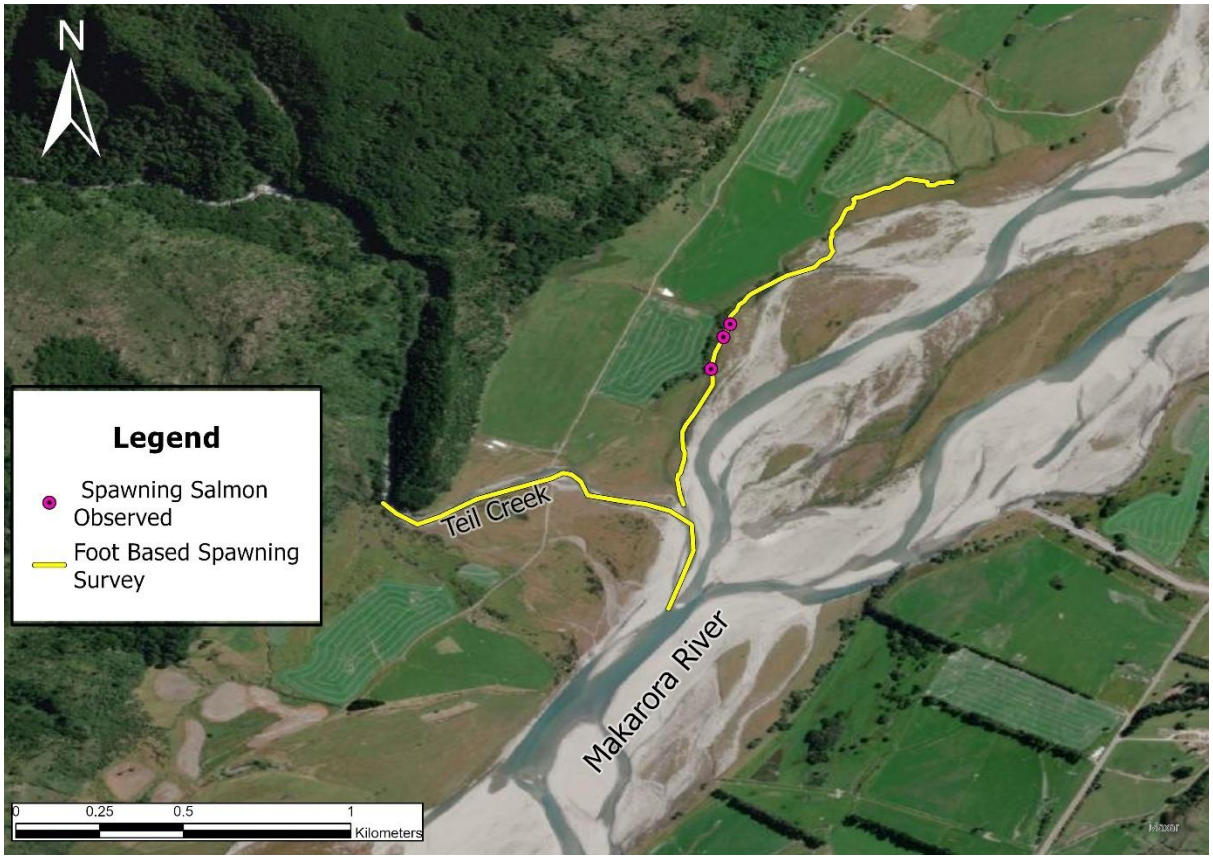

Figure 5: Foot based spawning surveys of Teil Creek and Unnamed Spring Creek located true right of the Makarora River, conducted June 2023

eDNA Sampling

Wilkin River
Sample locality Wilkin 001 (Samples 402140, 402141,402142), 22 May 2023 is just upstream from the confluence of the Makarora River. No salmon eDNA was detected in any of the three samples deployed at this site.

Makarora River
Sample locality Makarora 001 (Samples 402145,402146,402148), 22 May 2023. This site was surveyed on the true left of the Makarora River just upstream from the confluence with the Wilkin River all three samples detected salmon eDNA.

Sample locality Makarora 002 (410011, 410012,402129), 22 May 2023. This site was surveyed on the true left of the Makarora River downstream from the confluence of the Young River and above the confluence with Teil Creek all three samples detected salmon eDNA.

Diamond Creek
Sample locality Diamond Creek 001 (503808) 15 May 2023, this site was surveyed on the true right of the creek next to the Otago Fish & Game Hut. A strong presence of salmon eDNA was detected.

Rees River
Sample locality Rees 001 (402132,402137,402138) 23 May 2023, this site was surveyed on the true left of the river just above the confluence with Muddy Creek. No presence of salmon eDNA was detected in any of the samples.

Sample locality Rees 002 (402087,401780,401781) 24 May 2023, this site was surveyed on the true right of the river below the main highway bridge that crosses the Rees. A small presence of salmon eDNA was detected in one of the three samples.

Glacier Burn
Sample locality Glacier Burn 001 (503791) 16 May 2023, this site was surveyed on the true right of the river above the confluence with the Dart River. No presence of salmon eDNA was detected with this sample.

Lake Sylvan Outflow
Sample locality Lake Sylvan Outflow 001 (501159) 16 May 2023, this site was surveyed on the true right of the river above the confluence with the Dart River. No presence of salmon eDNA was detected with this sample.

Discussion

Land-locked salmon in Lake Wānaka over the past 7 years can be described as "sparse" when compared to the salmon population of the other southern lakes (Hāwea and Wakatipu). However, there are signs that the number of fish present in the lake is slowly increasing with anecdotal comments from anglers regarding large catches at the Makarora River mouth during the months of April and May.

The discovery of spawning salmon in the unnamed spring creek above Teil Creek is of particular importance as this is the first document spawning of Lake Wānaka landlocked salmon population within the last ten years. With that discovery there are now recorded spawning locations in each of the three main lakes tributaries, with Diamond Creek (Wakatipu), Hunter River (Hāwea) and now the unnamed spring creek (Wānaka). It is unknown if salmon located in Lake Dunstan travel up the Kawarau or the Clutha River to the top other lakes to spawn. A foot-based spawning survey was also carried out on the Arrow River after public reports of salmon captures; however, no evidence of salmon was observed.

The eDNA results show that there was a detection of Salmon eDNA in the Makarora River above the spring creek in which the salmon were observed indicating that there may be another population spawning further upriver (Figure 1). The eDNA sample taken from the lower Rees detected salmon eDNA above Diamond Creek in one of the three samples, this may be due to the close nature to Diamond Creek with the sampling site located approximately 700 metres from Diamond Creek confluence, or it could be that there is a small population spawning in the spring creeks located in the true right of the lower Rees River.

Otago Fish & Game staff have reached out to the owners of Mt Albert Station in order to explore the idea of enhancing the spring creek in which the salmon were located spawning,

through the use of a grant from the HERF (habitat enhancement and research fund). Site visits are organised for late September.
The comprehensive salmon spawning surveys also identified extensive brown trout spawning activity in all of the tributary streams surveyed, with brown trout often observed spawning within metres of salmon.

Future Salmon Spawning Surveys

The use of eDNA should be continued to work out the upper limit of salmon presence in the Makarora River as well as identify possible spawning locations in the Dart Catchment. Foot Based spawning surveys should be continued in tributary streams of the lower Makarora in particular monitoring around the recently discovered spawning creek on Mt Albert Station with the aim of locating and documenting more spawning grounds in similar locations. Further work is also required in the Dart River to determine if Diamond Creek is the only spawning location within Lake Wakatipu tributaries.

References

Sowry, B. 2022. Council Report. Project 1122 – Creel surveys of Lake Wanaka, June 2022. Unpublished Report, Otago Fish and Game Council, Dunedin.

Gabrielsson, R. 2019. *Progeny from self-sustaining Chinook salmon populations landlocked above hydropower dams increases the resilience of anadromous Chinook salmon in a regulated river system without fish-passage structures through source-sink dynamics. Unpublished chapter for doctorate of philosophy.* University of Otago

van Klink, P. A. 2021. *Interim Council Report Upper Clutha Catchment Land-locked Salmon Spawning Surveys September 2021.* Otago Fish and Game Council, Dunedin.

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Recommendation
That this report is received.

Mason Court
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September 2023