

Determining growth rates of Rainbow trout (*Oncorhynchus mykiss*) and Brown trout (*Salmo trutta*) in lakes Te Anau, Manapouri, Poteriteri and the Upper Waiau River.

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Rainbow trout (*Oncorhynchus mykiss*) and Brown trout (*Salmo trutta*) have been purposely introduced in many regulated lakes and rivers throughout New Zealand, with inadvertent impacts on the natural environment and local economies. This study looks at trout growth rates and how they can be used to determine potential effects from artificially manipulated lakes and rivers used to maximise generation potential for hydroelectric schemes. Quantitative data was deduced from trout otoliths (ear bones) which were used in otolith microstructural analysis to determine length-at-age growth rates. Otolith samples were collected from specimen captured across four waterbodies. Three of the waterbodies, Lakes Te Anau, Manapouri and the Upper Waiau River are artificially controlled, while, the fourth waterbody, lake Poteriteri has a natural regime. Species dynamics of trout in the controlled catchments show brown trout dominate the two controlled lakes where rainbow trout are the dominant species in the Upper Waiau River. Brown trout made up a large portion of the population in the natural Lake of Poteriteri. Due to the commercial sensitivity of lake level data from Meriden energy lake levels were taken over a one-year period from September 2018 to September 2019. Age estimates ranged from 4 years to 15 years for all fish, although 39 of the 181 collected otoliths were not legible for different reasons. There were strong variations in length and age as isometric growth was observed. The data showed variability for growth in length across all four waterbodies. There was more evidence for variation in the growth in the asymptotic length from water properties rather than artificial lake fluctuations. These patterns may be consistent with strong seasonal variation in water temperature. Ultimately, when comparing the four waterbodies, individual growth parameters indicate the highest growth rates occurred in the controlled catchments while the slowest growth was seen in the uncontrolled lake. Although future validation may be necessary, the results of this study provide insight into an important life history process of this valuable resource of the southern lakes of Fiordland.