BEFORE THE OTAGO REGIONAL COUNCIL

IN THE MATTER OF **the Resource Management Act 1991**

AND

IN THE MATTER OF **Proposed Plan Change 5A (Lindis: Integrated Water Management) to the Regional Plan: Water for Otago**

Evidence of Daniel Chisholm Jack

On Behalf of the Director-General of Conservation

Dated 18 March 2016

Department of Conservation

South Island RMA Planning

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Evidence of Daniel Chisholm Jack

Introduction

1. My full name is Daniel Chisholm Jack. I am employed by the Department of Conservation (the Department), Dunedin Office as a Biodiversity Ranger (Freshwater). I have sixteen years experience of survey and monitoring of freshwater fish throughout waterways in the South Island and East Coast of the North Island of New Zealand.

2. I have a Post-Graduate Diploma in Wildlife Management from the University of Otago (2008). During my studies I assisted with research using mitochondrial DNA analysis of endemic fish taxa to investigate relationships between biological evolution and geomorphological processes (Craw et al. 2007, Burridge et al. 2007, Burridge et al. 2008a). I am a contributing author to the scientific paper that was produced from this research (Burridge et al. 2008b).

3. My previous employment for the Department of Conservation was as a Biodiversity Ranger in the Nelson-Marlborough region during the period 1998 – 2003. My primary role at that time was to undertake freshwater fish surveys of New Zealand migratory galaxias species, brown mudfish, and to monitor and survey a variety of endemic terrestrial cryptic fauna species.

4. Since 2005, I have been involved on behalf of the Department in conducting freshwater fish distribution surveys in rivers and wetlands throughout Otago, Canterbury and Southland, researching critical habitats, life histories, and population monitoring of a suite of non-migratory galaxias species endemic to these regions. I have also undertaken Tenure Review surveys for freshwater fauna and am a contributing author to Conservation Resources Reports on pastoral lease properties in Marlborough, Canterbury, Otago and Southland.

5. In my present position I am responsible for actively managing freshwater habitats of New Zealand freshwater fish and obtaining up-to-date information on the distribution and conservation status of non-migratory

galaxias species. This work directly assists with the New Zealand Threat Classification process.

Scope of Evidence

6. My evidence will address the following fisheries issues:
   - 6.1 New Zealand Threat Classification System
   - 6.2 Native fish community of the Lindis River catchment
   - 6.3 Clutha flathead galaxias (Clutha River) – *Galaxias* 'species D'
   - 6.4 Longfin eel – *Anguilla dieffenbachii*
   - 6.5 Koaro – *Galaxias brevipinnis*
   - 6.6 Conclusion

New Zealand Threat Classification System

7. The New Zealand Threat Classification System (the System) is a national system led by the Department of Conservation. It is a robust tool that uses objective criteria and information drawn from a wide range of experts to rigorously assess the risk of extinction faced by New Zealand plants, animals and fungi. Each taxon is placed in a category that reflects the level of risk it faces. The System is specifically designed to be relevant to New Zealand's unusual ecological and geographic conditions.

8. The System is used to assess the status of any plant, animal or fungus that has a wild population established in New Zealand and for which there is sufficient information available. It uses the best available information on the population trend (rate of decline or increase) and the size of the population (or, if population size cannot be measured, the area occupied by the population) to place each taxon into a category that directly reflects the rate of extinction it may face. All listings are reviewed every three years to detect changes in status of taxa over time.

9. The first version of the System was published in 2002 (Molloy et al. 2002). Following rigorous review, a revised manual was published in 2008 (Townsend et al. 2008). This revised System introduced a range of improvements and better reflects the type of management action required

for taxa in the different categories. The current System is summarised in Figure 1.

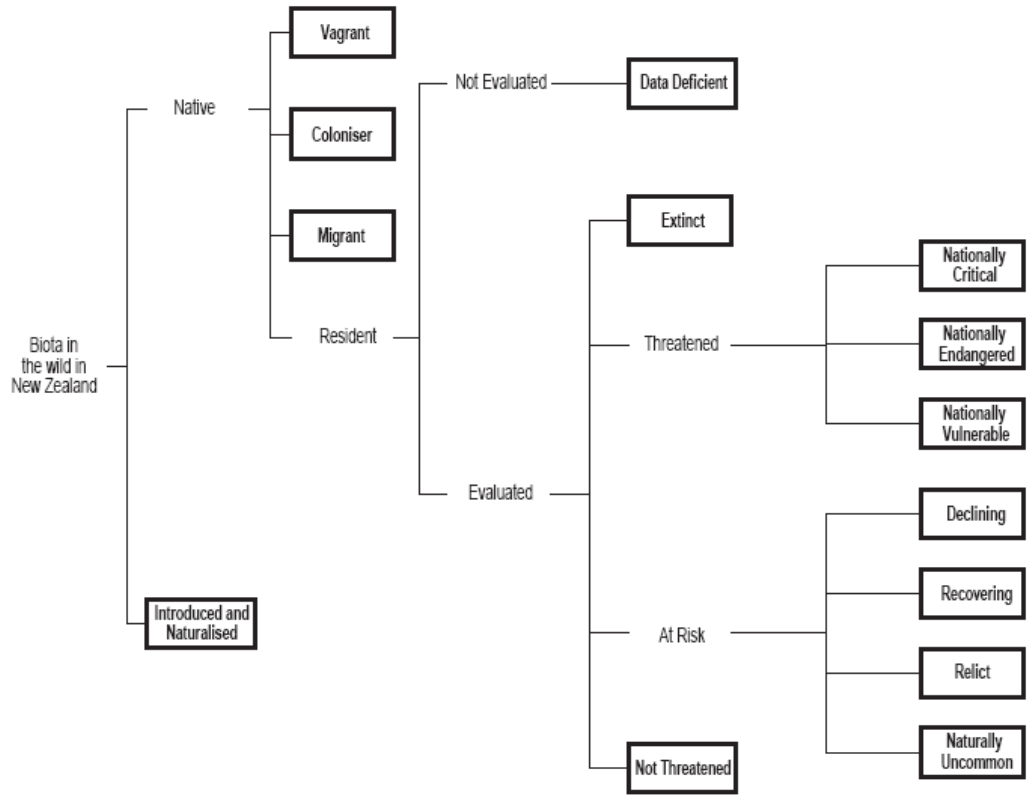

Fig. 1 New Zealand Threat Classification System (after Townsend et al. 2008).

10. Species listed in the super category 'Threatened' are grouped into three categories: 'Nationally Critical', 'Nationally Endangered', and 'Nationally Vulnerable'. Taxa in these three categories are facing a very high risk of extinction in the wild.

11. Species listed in the super category 'At Risk' are grouped into four categories: 'Declining', 'Naturally Uncommon', 'Recovering' and 'Relict'. Declining taxa do not qualify as 'Threatened' because they are buffered by a large total population size and/or slower decline rate. However, if the declining trends continue, these taxa may be listed as 'Threatened' in future listings.

12. The most recent listing of Freshwater fish under the New Zealand Threat Classification System was published in 2014 (Goodman et al. 2014).

Native fish community of the Lindis River catchment

13. The Lindis River is occupied by five native fish species based on data from New Zealand Freshwater Fish Database (NZFFD) as of 1 March 2016. Table 1 on page 10 of this evidence summarises the scientific and common names, and conservation status of these species.

14. The upland bully (Canterbury) and common bully occur in gravelly streams, rivers and wetlands throughout the South Island and New Zealand respectively. Although these species may at times be negatively affected by low flow conditions they both are widespread, have large stable populations and are considered 'Not Threatened'.

15. I would like to focus my evidence on the other three native fish species which are of conservation concern in the Lindis catchment, these being the Clutha flathead galaxias (Clutha River), longfin eel and koaro.

Clutha flathead galaxias (Clutha River) – *Galaxias* 'species D'

16. Clutha flathead galaxias is a small, scale-less fish endemic to the Clutha/Mata-Au River. It is non-migratory species, spending its entire life history within freshwater.

17. The distribution of Clutha flathead galaxias is confined to tributaries of the Cardrona and Lindis Rivers; three small tributaries in the Bannock Burn, several tributaries of the lower Manuherikia River and two tributaries of the Benger Burn.

18. The Clutha flathead galaxias are found in a variety of freshwater habitats within tributaries of the Lindis River. They may occupy riffles in gravelly clear flowing streams (Short Spur Creek), rapids and pools in high velocity boulder streams (Big Spur Creek), low gradient slow velocity runs meandering through tussock wetlands (Coal Creek), or weedy pastoral creeks (Cluden Stream tributary).

19. Clutha flathead galaxias rarely occur in the primary channel (mainstem) of the Lindis River due to the presence of sports fish, and any present there are likely to be expatriates washed down from populations in the tributaries.

20. The Clutha flathead galaxias (Clutha River) is an indeterminate species, meaning it is yet to be formally described. This potential species forms part of the wider non-migratory galaxias species group, commonly referred to as the *Galaxias vulgaris* complex (McDowall 2010).

21. An analysis of the genetic relationships within the populations of Clutha flathead galaxias strongly suggests an additional genetic partitioning between upper Clutha/Mata-Au River populations (tributaries of the Cardrona River, Lindis River and Bannock Burn), and the Manuherikia River populations (tributaries of the Pool Burn and Manor Burn). This suggests a significant period of isolation has occurred between these two groups therefore creating two Evolutionary Significant Units (ESUs). Further morphological analysis between these two groups may find they warrant individual species status.

22. The conservation status of the Clutha flathead galaxias has risen from Gradual Decline (Hitchmough et al. 2007), to Nationally Vulnerable (Allibone et al. 2010) and currently Nationally Critical due to the ongoing and predicted decline of the total population (Goodman et al. 2014). As noted above the threat classification of Nationally Critical is the status given to New Zealand's most threatened species. The changes in the species' conservation status are in recognition of the population decline due to displacement by sports fish and landuse intensification that create additional pressures on their freshwater habitats.

23. This species is now becoming confined to small 2nd and 3rd order waterways above waterfalls and environmental barriers where sports fishes may not colonise.

Longfin eel (Tuna) - *Anguilla dieffenbachii*

24. The longfin eel is endemic to New Zealand. It is a relatively long lived species maturing approximately between 25 - 35yrs (McDowall 2000).

25. Longfin eel breed just once. Mature eels migrate to sea during the autumn/winter period, and travel to their spawning grounds located near Tonga. Upon hatching juveniles return to New Zealand on the ocean currents, taking approximately 18 months before entering our rivers in spring as transparent glass eels (60 – 75 mm).

26. Smaller sized eels may seek refuge amongst interstitial spaces of substrate particles in streambeds, as well as utilising other in-stream debris. Therefore gravel particle size plays a significant role at this stage of their lifecycle.

27. Critical refugia for larger sized eels are pools with undercut banks. Eels may move out of these pools at night to forage in swallow riffle and run habitats.

28. The conservation status of the longfin eel is ranked as 'At Risk' – 'Declining' (Goodman et al. 2014). It has qualified for this ranking as Conservation Dependent, which means without ongoing management intervention this species potentially will decline further and trigger the 'Threatened' species category.

29. The formation of the Roxburgh and Clyde hydro-electrical generation dams has reduced approximately 65% of available waterway from the longfin eel in the Clutha/Mata-Au River.

30. The presence of longfin eel have been recorded in the Lindis River on 15 occasions between 1980 and 2003 (NZFFD data). No new records have been submitted since 2003 suggesting they are slowly becoming absent due to recruitment failure because of river impoundments.

Koaro - *Galaxias brevipinnis*

31. Koaro belong to a group of large bodied migratory galaxias species that contribute to the national whitebait fishery (McDowall 1970). They readily

develop lake locked populations, completing their life cycle entirely within a freshwater environment (McDowall 1990).

32. Adult fish occupy vegetated streams where they spawn during elevated flows amongst damp substratum along the stream banks (Allibone and Caskey 2000). Larvae hatch on proceeding high water flows and are washed downstream into the lake where they feed on plankton. It has been observed that juvenile koaro migrate from lakes into tributaries during the spring and summer months (McDowall 1990). The creation of Lake Dunstan has provided a substantial habitat for juvenile koaro.

33. Koaro are classified as 'At Risk' – 'Declining' (Goodman et al. 2014). The decline in the national koaro population has been attributed to deforestation and displacement by sports fish (McDowall 2006).

34. Based on NZFFD records the contribution of koaro to the freshwater fish fauna of the Lindis River catchment is minor. It must be noted that large sections of the upper reaches of the Lindis River remain un-surveyed. Suitable habitat for koaro may occur there.

Conclusion

35. The Lindis River provides limited habitat for 'Threatened' or 'At Risk' New Zealand freshwater fish taxa.

36. Clutha flathead galaxias distribution is restricted to above waterfalls and environmental barriers in the tributaries.

37. Longfin eel only contribute a minor component to the Lindis River freshwater fauna.

38. Juvenile koaro may utilise the primary channel of the Lindis River for migration from Lake Dunstan into tributaries during the spring and summer period. Therefore a surface flow must be maintained to allow fish passage for migrating fish.

39. In my opinion the recommended minimum flows of 750 litres per second (1 October – 31 May) and 1600 litres per second (1 June – 30 September) will provide adequate passage for juvenile koaro in the river's lower reaches and provide for ecological values in the Lindis River.

Daniel Jack

18 March 2016

Table 1. Summary of native freshwater fish species present in the Lindis River catchment (NZFFD data) and their Conservation Status ranking criteria specified by Townsend at el. (2008).

Conservation Status	Threat Category	Species
Threatened	Nationally Critical	Clutha flathead galaxias (Clutha River), *Galaxias* "species D"
At Risk	Declining	Longfin eel, *Anguilla dieffenbachii*
At Risk	Declining	Koaro, *Galaxias brevipinnis*
Not Threatened		Upland bully (Canterbury), *Gobiomorphus breviceps*
		Common bully, *Gobiomorphus cotidianus*

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