

BEFORE THE HEARING PANEL

IN THE MATTER OF the Resource Management Act
1991 ("the Act")

AND

IN THE MATTER OF applications for resource consent
by various applicants to take and
use water from the upper Waitaki
River catchment

**STATEMENT OF EVIDENCE OF PETER JAMES RAVENSCROFT ON
BEHALF OF THE DIRECTOR-GENERAL OF CONSERVATION**

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Brief of Evidence of PETER JAMES RAVENSCROFT

Introduction

1. My full name is Peter James Ravenscroft.
2. My experience is set out in my brief of evidence dated 16 September 2009. In addition to the experience set out in that brief I have a detailed knowledge of the freshwater fish values of the upper Waitaki basin.
3. My current role is Supervisor of the Otago Conservancy's Freshwater Operating Team. The team's main focus has been on determining the ecology and how to conserve the population of lowland longjaw galaxias located in North Otago. However, to assist in the understanding of the lowland longjaw in North Otago the Freshwater Team are as equally involved with survey work on lowland longjaw populations in the upper Waitaki. This allows for us to make comparisons between lowland longjaw behaviour and population dynamics in the two areas, and therefore potentially to gain a better understanding for the purposes of on-going management of this species in their respective locations.
4. My work has included extensive presence/ absence indigenous fish surveys of many of the tributaries in the upper Waitaki catchment. I have completed many of these surveys myself. In 2006 the Freshwater team established annual monitoring sites for both Bignose galaxias and lowland longjaw galaxias. I am responsible for preparing 'Management Plans' for all lowland longjaw populations in both upper Waitaki and North Otago.
5. I prepared an earlier brief of evidence in respect of this hearing (16 September 2009). This brief is supplementary to that brief. It particularly addresses the following matters in relation to lowland longjaw galaxias:
 - Comment on techniques for locating lowland longjaws;
 - Available information about each of the known populations;

- Additional comments on existing threats and on current work underway to conserve this species;
 - The implications for lowland longjaws and their habitat of the current applications.
6. In relation to Bignose galaxias this brief particularly addresses:
- Additional population distribution information;
 - Additional information on existing threats and on current work underway to conserve this species;
 - The implications for Bignose and their habitat of the current applications.
7. In preparing this evidence I have read the statements of evidence of Dr Richard Allibone, Mr Jonathan Bray and Mr Dave Murray.
8. I acknowledge that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court's Practice Note 2006. I have complied with the Code when preparing this evidence and agree to comply with it when giving evidence before the hearing commissioners.
9. I also cite in evidence where I have drawn upon evidence presented by expert witnesses for other parties to this hearing and Officers' reports.

Lowland longjaw galaxias

10. In my 16 September 2009 evidence I stated that lowland longjaw galaxias have been recorded at five locations in the upper Waitaki catchment (paragraph 20). This is not correct. Lowland longjaws have been recorded at six sites; Ahuriri River, Fraser River, Ruataniwha wetlands, Edward River, Otamatapaio River and Ohau River. There are two known populations of lowland longjaw galaxias located outside of the upper Waitaki in the Hakataramea and Kauru Rivers.

Appendix One : Lowland longjaw distribution

11. The department has an on-going freshwater programme in the upper Waitaki. This work includes: re-visiting all lowland longjaw records at least every three years, continuing presence/absence surveys, and monitoring the Fraser River and Ruataniwha wetlands populations. The department has undertaken a trout removal operation and installed a fish passage barrier in Fraser River spring. There is a draft proposal to conduct a similar operation in a small tributary of the Otamatapaio River.
12. The presence/absence survey data that is recorded is stored on the New Zealand Freshwater Fish Database (NZFFD).¹ The electric fishing method is considered the most acceptable method for surveying for presence and absence of most fish within streams. However, this methodology does have limitations. The reliability of the electric fishing method is a particular issue with lowland longjaws, as adult lowland longjaw tend to be cryptic in their habits.
13. As set out in my 16 September 2009 evidence lowland longjaws occupy unique habitat. All known MacKenzie Basin populations occupy springs and within these habitats they tend to occupy the 'head' of the spring, (where the water flows from the ground). Due to this specialised and very limited habitat, and to the fact that longjaws are an annual species, individual adult longjaw galaxias numbers within each of the populations can be very low.
14. Length/frequency data recorded during monitoring indicates that > 95% of lowland longjaw galaxias perish after a single year – potentially a few individuals may live to 3 years. In general, annual species can take advantage of favourable habitat conditions but equally are at risk to short term environmental events.
15. Lowland longjaws require several types of habitat to complete their life cycle. The lowland longjaw galaxias in the Kaurau River has an extended spawning

¹ NZFFD is a database that has close to 29,000 records, (I personally have been involved 10% of these records). This a national database where various agencies (including universities, local and central government) can deposit and access information collected from presence/ absence field surveys. The level of detail given for each record differs However all records will have what species of fish are present.

period May – September with May appearing to be the peak spawning month. A spawning site has never been recorded for the upper Waitaki populations but based on the observations of the appearance of larvae; their spawning period may be a month or two later (July – August). Spawning occurs 200mm deep within the bed at the head of the up-welling of a spring. At this location they lay 2mm dia. eggs which appear to be scattered (rather than laid in clumps) some being loose, others adhered to rocks. Upon hatching (after approximately 6 weeks) the tiny 7mm larvae seek slow moving water velocity areas, such as backwater and side edges. They remain in this backwater, pool type of habitat for 4 – 6 months or until they obtain a size of 34 – 40mm. After this period they change their behaviour from being pelagic and seek out benthic habitat (or adult habitat) and then they become cryptic. Adult habitat is best described as riffle type habitat where the water percolates through the rocks.

16. The diet of the Lowland longjaw galaxias in the Kauru River is made up of principally (80%) of the mayfly *Deleatidium*.
17. From survey records the population at each known location is shown to fluctuate with fish individual numbers ranging as follows:
 - a) **Ruataniwha wetlands** 1 – 19;
 - b) **Fraser River** 7 – 67;
 - c) **Ahuriri River** very difficult to assess, but there have been 10 records for lowland longjaws within this system. Four fish was the highest number of lowland longjaw recorded for any of the ten records;
 - d) **Edward Stream** there are 13 records for the stream. Seventeen fish being highest the number recorded at any of the 13 sites; and
 - e) **Ohau River** lowland longjaws were last recorded here in 2003; they have not been located at this site since, despite considerable effort.
18. The number of lowland longjaw galaxias captured during recent monitoring (November 2009) at Ruataniwha, Fraser River, Edward River and the tributary of Corbies Creek plus the lower Ahuriri River sites totalled 33 individuals.

19. These low numbers suggest that this fish could be referred to as the 'kakapo' of New Zealand freshwater fish, the one major difference is, that the data is indicating that kakapo numbers are increasing where as the lowland longjaw numbers are declining.
20. Dr Allibone set out threats to galaxiid fish generally as:
- "Predation and competition with introduced fish;
 - Habitat modification via land development;
 - Habitat modification or loss via water abstraction;
 - Habitat modification due to invasive plants and algae;
 - Degradation of habitat and food resources due to declining water quality; and
 - Impact of drought and floods." (Allibone, evidence in chief, para 41)
21. The lowland longjaws of the upper Waitaki face all of these threats. For example, one existing threat is the potential of in-filling of habitat. The removal of the corridor between surface and subsurface flows, whether by increase of sedimentation or increase in in-stream macrophytes, is of conservation concern as longjaws require this passage to complete their life cycle.
22. The issue is that we are unsure of the levels of algae or in-stream macrophytes which need to occur before there is a corresponding decline in lowland longjaw numbers due to the removal of this corridor between surface and subsurface flows. However as stated in my 16 September 2009 evidence we are observing an increase of sediment at two locations Ruataniwha wetlands and Otamatapaio tributary with the increase in presence of the plant monkey musk. Recent monitoring conducted in November 2009 captured no lowland longjaws at Ruatinawha and only 3 bignose galaxias.

Appendix Two : Monkey musk showing root binding the bed

23. There has been recent trout invasion to a number of lowland longjaw populations, with a risk of causing localised extinction. These being the Fraser River spring and a tributary of tributary of Corbies Creek, Ruatinawha wetlands and a spring of the Ahuriri River.
24. Of the known population of lowland longjaw galaxias, the population most at risk from any potential change in water quality is located in the Ahuriri River near the township of Omarama, as this is where longjaw populations exist downstream from the proposed takes.

Appendix Three : Ahuriri River Spring

25. The springs which these fish occupy and the main stem of the Ahuriri River appear to be hydrologically connected. I am of this opinion because of their relative location, with all longjaw records being located within 200 metres of the main stem of the Ahuriri River. If this is correct any change in water quality and potential subsequent change in periphyton or macrophyte growths will have a direct influence on these sites.
26. While the nutrient run-off from a single property may not greatly impact these sites, the particular concern comes from the accumulated impact of the proposed land development. As stated in my evidence of 16 September 2009, springs rarely receive flushing flows and therefore can not regularly clean themselves from any such build up of algae and/or sedimentation and the accumulated impacts could become an issue. The clogging of interstitial spaces within springs occupied by lowland longjaws galaxias will directly impact on the life cycle and the diet of this species.
27. I agree with Dr Allibone's evidence (paragraph 64) where he states his concern that "Changes in water quality that lead to reduction in *Deleatidium*, in particular, will have a secondary effect of reducing the preferred prey of all the galaxiids". As mentioned, 80% of the Kauru River lowland longjaw galaxias diet is made up of *Deleatidium*.

28. The remaining known populations of lowland longjaw galaxias appear to be outside or above the proposed areas of development. However, because only limited fish information has been provided by some applicants and there are difficulties in finding this species of fish it is difficult to assess impacts. Additional survey work is required before a proper assessment of the risk of such activities can be made.

Bignose galaxias

29. As set out in my 16 September 2009 evidence, Bignose galaxias is endemic to the MacKenzie Basin. Bignose galaxias have wider distribution than that of the lowland longjaw in the MacKenzie Basin and a number of populations are located downstream of proposed land development. They are relatively easy to survey as they are easily captured by both electric fishing and by trapping.

Appendix Four : Bignose galaxias distribution

30. As noted in my 16 September evidence, little is known about this species. The threats to glaxiids generally noted by Dr Allibone would, in my opinion, apply to this species.
31. Information from monitoring conducted in November 2009 in the Ruataniwha wetlands (same site as the longjaw) showed an alarming decrease in bignose galaxias numbers. Previous observations had revealed large numbers of fish (100s) swimming within pool sections. This latest survey captured only 3 fish, there were no visible adult fish nor larvae observed and I would have expected to see both. It appears the same threats of in-filling of habitat and trout pressure are having a detrimental impact on this species as well as the lowland longjaw.
32. Of the known populations of bignose galaxias, the single most at risk from any potential change in water quality are located in the Ahuriri River, near the township of Omarama as this is where bignose populations exist downstream from the proposed takes.

33. With these sites the concerns about water quality are the same as I have discussed for the lowland longjaw galaxias habitats.

Conclusion

34. The lowland longjaw galaxias and bignose galaxias are already vulnerable and presently suffering from multiple threats, information shows populations are declining. Lowland longjaw galaxias numbers in particular are becoming dangerously low, to the level where they are of significant conservation concern.
35. Known populations of both species that are most at risk are those located in the Ahuriri River. In my opinion surviving populations are likely to be sensitive to nutrient loading. Further survey work is required in respect of some applications.

Peter Ravenscroft

November 2009

Appendix One : Lowland longjaw distribution

Appendix Two : Monkey musk showing root binding the bed

Appendix Three : Ahuriri River Spring

Appendix Four : Bignose galaxias distribution

