IN THE MATTER OF the Resource Management Act 1991

AND

IN THE MATTER OF applications by Central Plains Water Trust to:

Canterbury Regional Council for resource consents to take and use water from the Waimakariri and Rakaia Rivers and for all associated consents required for the construction and operation of the Central Plains Water Enhancement Scheme

Selwyn District Council for resource consents to construct and operate the Central Plains Water Enhancement Scheme

AND

IN THE MATTER OF a notice of requirement by Central Plains Water Limited to:

Selwyn District Council for the designation of land for works associated with the construction and operation of the Central Plains Water Enhancement Scheme

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SUPPLEMENTARY EVIDENCE OF RICHARD MARK ALLIBONE IN REPONSE TO S42A REPORTS

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Supplementary evidence in response to Environment Canterbury Review of CPWES assessment of effects on native fish.

INTRODUCTION

1. My full name is Richard Mark Allibone. My qualifications and experience, and the basis on which I prepared this brief, are set out in my main brief of evidence prepared for the Central Plains Water Enhancement (CPW) hearing (dated January 2008). I have prepared this supplementary brief of evidence to address matters raised in the Section 42A reports of Dr Adrian Meredith (Environment Canterbury) and Mr Mark Davis (Selwyn District Council).

The Waimakariri River fish habitat assessment

2. Dr Meredith notes in paragraph 50 of his evidence that changes in available habitat for various native fish change significantly over the flow range of 40 -80 m^3/s. He notes that three "*common native freshwater fish species (common and upland bullies, Canterbury galaxias) showed their greatest rate of increase in habitat in between 40 and 80 m^3/s."* An analysis of these model results has been provided in my main brief of evidence. In the following I outline in greater detail reasons for concluding the impacts of reduced flow are minor on most native fish.

3. The New Zealand Freshwater Fish Database (NZFFD) provides a good dataset to assess fish distributions, and it includes numerous records for the Waimakariri River. The distribution of Canterbury galaxias in the Waimakariri River is centred on tributary streams, mainly upstream of the Waimakariri Gorge. This species is also common in the Kowai River but barely extends its downstream range to the main stem of the river on the Canterbury Plains (Figure 1). Therefore I would consider its range only just extends into the area affected by flow regime changes associated with the CPW water takes. Therefore, because it is a non-migratory species and it is not common in the area affected by CPW flow changes, I do not consider Canterbury galaxias will be adversely affected by the CPW water takes.

4. Common bully has a distribution centred on the lower reaches of the Waimakariri River and the lower river tributaries with occasional records well upstream. The tributary populations will not be affected by the CPW abstraction and neither will any upstream populations. The main stem

population occurs in the lower reaches and will experience reduced flow. However, much of the area inhabited is also tidal and this will mitigate the effects of the reduction in flows. Common bully is also a migratory fish species, carrying out migration to and from the sea, and these migrations are not expected to be affected by the reduced flow in the Waimakariri River. Therefore the effects of the abstractions in the Waiamakariri River are minor.

5. Upland bully is the most widespread of the three fish occurring in the upper river and tributaries, intermittently in the main stem on the Canterbury Plains and in the lower river tributaries. This fish is widespread in New Zealand but is not considered a braided river specialist so its intermittent occurrence in the main stem is not unexpected. A reduction in habitat availability is apparent from the 2-D habitat analysis but the moderating effect of the CPW on smaller flood events is likely to be a positive effect on upland bully population dynamics as a reduction in flood size in summer will reduce larval fish displacement, spawning site disturbance and possibly adult mortality. Therefore I would consider the effects of the abstractions in the Waiamakariri River are likely to be minor.

6. In my opinion, the distributional data for Canterbury galaxias supports the conclusion that despite obvious changes in potential habitat availability (weighted useable area), the impacts of the CPW take are minor, as the majority of the population occur outside the area to be affected. For the upland and common bully the distribution does include areas affected by the low flow and there is a decline in available habitat. Improvements in habitat suitability and the more stable flows are however more positive aspects of the abstraction that are likely to benefit these fish species.

7. Dr Meredith also notes "*other native fish (torrentfish, bluegilled bullies, both eel species) showed linear increases in habitat throughout the modelled flow range*." This is correct but it fails to note the braided rivers are very poor habitat for either eel species. Both eel species are abundant in the lower river tributaries that will not be influenced by the CPW take. The main stem is most important as a migration pathway for eels moving to and from the upper river system. The CPW operations will not affect their fish passage.

8. As noted previously only torrentfish and bluegill bully, braided river specialists, are expected to be affected by the reduced flows as a result of the water abstraction.

9. It is also important to note that the 2-D habitat modelling indicated that while habitat availability (weighted useable area) decreased habitat suitability (habitat suitability index) was either stable or increasing in the flow range being considered. The stable or increasing habitat suitability index indicates that the quality of habitat in the Waimakariri River for the native fish remains as same or improves as flow declines.

10. Dr Meredith in paragraph 73 provides a possible management regime for the Waimakariri in response to his concerns with regard to the effect of the CPW take on increasing the duration of low flows in the Waimakariri River. Dr Meredith suggests options to mitigate potential effects, including flow sharing and or no abstraction for the initial 12 or 24 hours of a fresh event. In my opinion, the restriction on abstraction during a period of increased flow would improve the likelihood of nuisance periphyton and fine sediment flushing and thereby maintain the quality of riverine habitat for native fish. I would support a management regime for the Waimakariri River that includes restrictions on the take of water during the onset of freshes.

Fish screens

11 Dr Meredith addresses fish screens in 74-81 of his evidence and I have addressed this in the main body of my evidence in sections 69–76. In summary, it is my opinion that the native fish that are most in need of screening from entering the intakes are adult torrentfish and eels that are migrating downstream. These are adult fish and could easily be screened from the intake using a 5 mm mesh screen. My assessment includes species that the Department of Conservation has indicated that it has downstream passage concerns for (eels) (Charteris 2006) and additionally adult torrentfish that are known to migrate downstream to spawn.

12 Adults of the smaller non-migratory fish upland bully and Canterbury galaxias would also be excluded with a 5 mm mesh. Larval individuals are more difficult to screen due to their very small size. However, the loss of larvae through the fish screen into the canal system would only result in a very localised decline in abundance. I would also note that these two species are not considered

threatened and any localised decline in abundance will not threatened the long-term viability of these two species.

Impacts on Canterbury mudfish

13. Dr Meredith and Mr Davis both comment on effects on Canterbury mudfish.

14. In section 159 of his evidence, Dr Meredith states with regard to the proposed mudfish mitigation that *"these mitigations are all largely beneficial"*. I would accept this statement with the removal of the *"largely"* as all the mitigation proposed is beneficial to Canterbury mudfish and some parts of the mitigation are also beneficial to biodiversity in general and to pest management goals too.

15. I believe it is also important when determining the value of the mitigation to consider the following facts. The mitigation proposal draws heavily on the New Zealand Mudfish Recovery Plan (Department of Conservation 2003). As an author and member of the Mudfish Recovery Group, I was part of the group that set up the goals, objectives and actions of the Mudfish Recovery Plan. It is important to note that the Recovery Group made a deliberate decision to write a plan with objectives to maintain mudfish into the foreseeable future. The plan included far more objectives and actions than we believed the Department of Conservation could achieve due to its limited resources, but we wished to indicate the level of activity actually required to secure the mudfish species.

16. The mitigation proposed by CPW undertakes all the required actions of the Mudfish Recovery Plan that are possible for the Hororata and Wainiwaniwa areas. Some of the proposed survey and monitoring mitigation will undertake work at more frequent intervals than the Recovery Plan requires, which will provide better data on the status of mudfish populations. The mitigation also undertakes to provide a mudfish rearing facility, a facility that will provide benefits to mudfish management across Canterbury and, depending on the need, would provide benefits for other mudfish and native fish conservation programmes.

17. Mr Davis notes that some of the proposed mitigation is unproven, although he does not refer to just what this is. In a similar vein Dr Meredith also indicates that there is some uncertainty of establishing new populations of mudfish.

18. With respect to the creation of new populations this has not always been successful in the past. O'Brien & Dunn (2007) provide a brief review of

translocations, their success and failure. However, in the summary of their mudfish review O'Brien & Dunn (2007) state the following amongst the requirements for conservation:

- Develop guidelines for identifying potential sites for establishing new populations;
- Improve the procedures for pre-translocation proposals and post-translocation monitoring of sites, and assimilation of knowledge to aid further translocations; and
- Investigate factors responsible for the success or failure to establish *Neochanna* populations.

In essence indicating a need for a greater understanding of translocations, something that is yet to be undertaken.

19. The proposed translocation mitigation will allow these requirements to be addressed. The CPW mitigation also proposes creation of new habitat. This is a vital conservation factor to add to the requirements promoted by O'Brien & Dunn (2007). Currently as noted by Dr Meredith a population of mudfish is under threat in the Selwyn stock water race system. Other populations elsewhere in Canterbury face similar habitat loss threats. A lack of knowledge with regard to translocations to existing wetland and water way habitats or for the creation of new habitat limits managers when attempting to manage these populations. In my opinion, the proposed CPW mudfish mitigation and associated monitoring with help improve our understanding of mudfish translocation requirements and the parameters required for the creation of new mudfish habitat. The value of this to the long-term management of mudfish is significant and perhaps only limited by the subsequent application of this knowledge. Mr Davis and Dr Meredith indicate this mitigation is uncertain. However, O'Brien & Dunn (2007) noted that one of the successful translocations was a translocation carried out into an "*artificially constructed 8.3 ha wetland*" in 2002, indicating that the mitigation proposed by CPW is possible even if a full understanding of the reasons for success are currently absent.

20. In sections 161 and 162 of his evidence, Dr Meredith describes a scenario where headwater Canterbury mudfish populations provide larvae that disperse downstream to populate or repopulate downstream habitats. He indicates via

this scenario that the Waianiwaniwa Valley population is important to maintain the populations across the Canterbury Plains to Lake Ellesmere. Dr Meredith also notes that Canterbury mudfish have low genetic diversity and cites a comment that this indicates they are genetically *well mixed* to support the idea of larval dispersal across the Plains.

21. Although this scenario is perhaps credible, it is in conflict with other published data. Harding et al (2007) in their assessment of the Waianiwaniwa Valley population conclude that one of the major reasons that the Waianiwaniwa Valley population contains sites with high mudfish densities and large adults is the absence of predators, eels and brown trout. They conclude that one of the major factors excluding eels and trout from the Waianiwaniwa Valley is the dry Waianiwaniwa River downstream of the valley that makes upstream fish passage extremely unlikely. If one accepts this conclusion, then the downstream passage of larval Canterbury mudfish is also unlikely, for the same reason, that the river downstream of the valley is generally dry. In my opinion, there is scope for both scenarios to be correct, if upstream and downstream fish migration occurs during flood events. This would limit, but not preclude predators from accessing the Waianiwaniwa Valley and would also allow downstream dispersal of larvae if floods occur in spring.

22. Published genetic research on the Canterbury mudfish also has a bearing on the relationship of the Waianiwaniwa Valley population to downstream Hororata populations. Davey et al (2001) report the results of a DNA study from Canterbury mudfish at seven sites throughout Canterbury. This study concluded that Canterbury mudfish had low levels of within-population and between-population diversity. Low genetic diversity itself does not allow the conclusion that the populations and the species are well mixed, rather that there are few genetic markers available to determine population structure.

23 The analysis by Davey et al (2001) shows some genetic structure amongst populations, especially between northern and southern populations. Of interest is that a population of mudfish described by Davey et al (2001) from the Waianiwaniwa Valley (at Auchenflower Road) has different haplotypes to the downstream Hororata population studied. The small sample sizes in the study may have precluded the detection of rare haplotypes that may be present in populations as result of intermittent dispersal, but the data available to date would indicate dispersal from the Waianiwaniwa Valley to the lower Hororata is

either not occurring or it occurs very rarely. This published data leads me to conclude that Dr Meredith's scenario of long distance dispersal of mudfish larvae downstream is not supported by the available data and therefore maintaining exclusion of predators rather than allowing larval dispersal would be a key objective of CPW.

24. The proposed mudfish mitigation plan for CPW, includes a captive management facility. This facility would hold adult mudfish and rear larval fish for release and will allow any natural dispersal, colonisation and recolonisation processes to be supplemented or replaced by managed releases. This would allow, for instance, Waianiwaniwa fish to be reared and released downstream in the Hororata area if desired without relying on hypothesised rare natural dispersal events that have the additional risk that predators access the upstream areas. The managed release of mudfish would also speed up the recolonisation process as it does not rely on natural flood events to disperse larvae and allows mudfish managers to be more proactive with the management of Canterbury mudfish. This would address concerns raised by Dr Meredith in paragraph 163 regarding larval dispersal.

25. An additional benefit of the captive mudfish facility not noted by Dr Meredith and Mr Davis is that it can be used to hold mudfish from populations undergoing severe drought-related impacts. This would be especially beneficial for populations that contain unique or rare genetic diversity. This facility could also be used to hold other native fish species when the need arises, a management option that in my experience has generally been lacking for the conservation management of native fish.

26 In conclusion, aside from the general habitat management provisions and population protection proposed, the mitigation will provide key management tools and knowledge of Canterbury mudfish. The captive rearing facility and improvement of knowledge with regard to translocations and habitat creation for mudfish will allow a much more proactive stance to be taken with the conservation of Canterbury mudfish. The value of this mitigation is difficult to quantify compared to the habitat lost in the Waianiwaniwa Valley, but I consider the proposed mitigation measures represent a significant step forward for management of this nationally endangered species.

Richard Allibone

February 2008

Reference

Charteris, S.C. 2006: native fish requirements for water intakes in Canterbury. Department of Conservation, Canterbury. 52p.

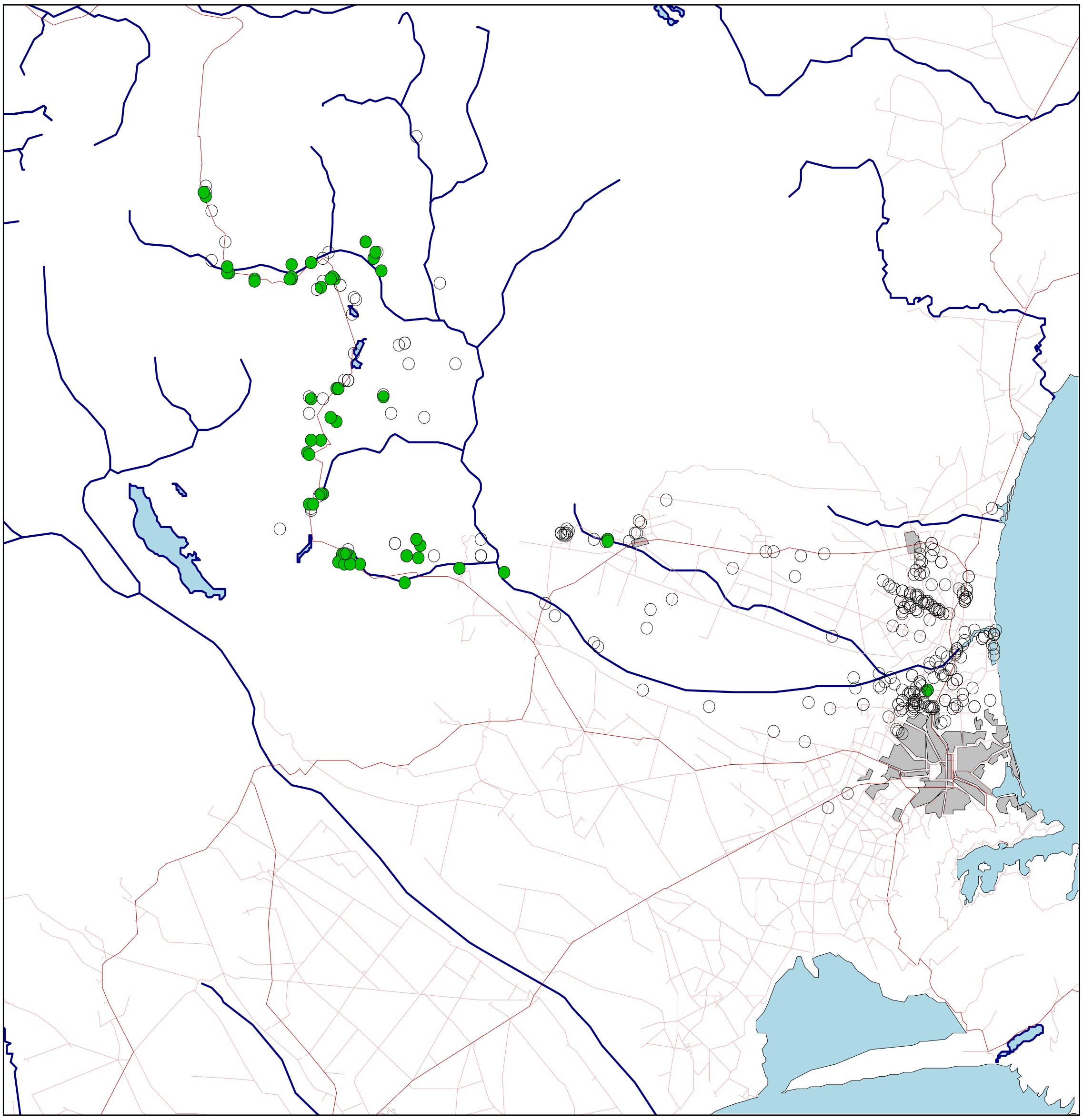

Figure 1. The distribution of Canterbury galaxias in the Waimakariri River. Filled circles indicate species present, open circles indicate no target species present. Data are from the New Zealand freshwater fish database and are courtesy of NIWA.

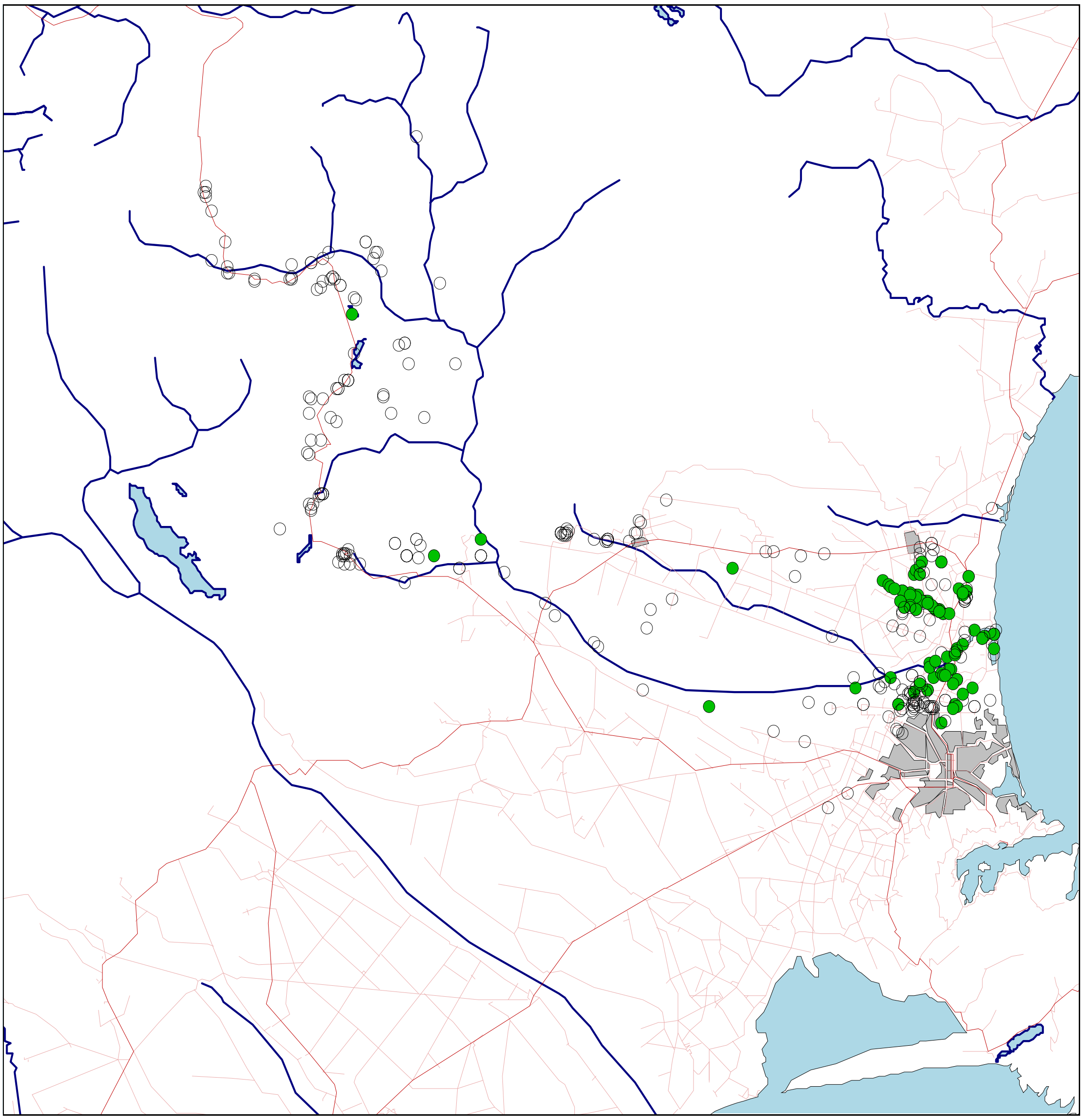

Figure 2. The distribution of common bully in the Waimakariri River. Filled circles indicate species present, open circles indicate no target species present. Data are from the New Zealand freshwater fish database and are courtesy of NIWA.

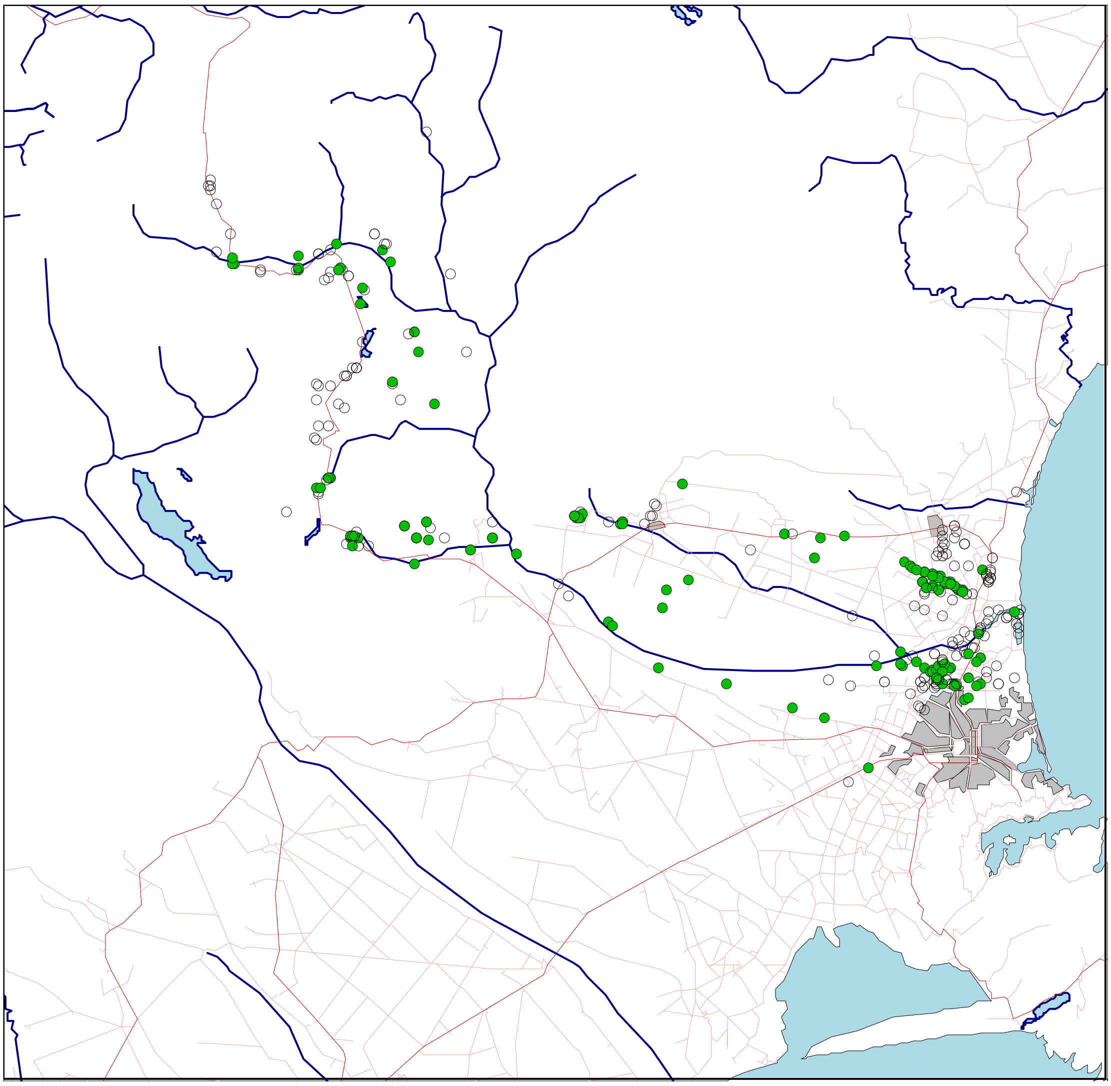

Figure 3. The distribution of upland bully in the Waimakariri River. Filled circles indicate species present, open circles indicate no target species present. Data are from the New Zealand freshwater fish database and are courtesy of NIWA.