BEFORE THE COMMISSIONERS ON BEHALF OF THE OTAGO REGIONAL COUNCIL

Consent No.	**RM20.003**
	RM20.007.01, RM20.007.02
	RM20.005

BETWEEN	**Rockburn Wines Limited** **Smallburn Limited** **Wakefield Estates Limited, Rockburn Wines Limited, Pisa Holdings Limited, Mark II Limited, Stuart Douglas and Phillipa Mary Hawker, Albany Heights Limited and Chard Farm Trustees Limited.** **Applicants**
AND	**OTAGO REGIONAL COUNCIL** **Consent Authority**

EVIDENCE OF RICHARD MARK ALLIBONE

Introduction

1. My full name is Richard Mark Allibone.
2. I am the Director and Principal Ecologist of Water Ways Consulting Limited. I hold the following tertiary qualifications; a BSc (Zoology and Geology), an MSc (Zoology) and PhD (Zoology), all from the University of Otago. I am also a certified resource consent hearing commissioner.

3. I specialise in freshwater ecological research and management of native freshwater fish. I have been a freshwater fisheries specialist for the Department of Conservation, a Post-Doctoral Fellow and fisheries scientist at NIWA, and a Species Protection Officer in the Department of Conservation's Biodiversity Recovery Unit. Since 2004 I have worked as a consultant; firstly, at Kingett Mitchell Limited, then Golder Associates (NZ) Ltd. In November 2014 I formed the company Water Ways Consulting Limited where I am a director and the principal ecologist.

4. My PhD conducted the first research into the ecology, distribution and conservation threats of four of non-migratory galaxiids in the Taieri River catchment, Taieri flathead (*G. depressiceps*), Central Otago roundhead galaxias (*G. anomalus*), Eldon's galaxias (*G. eldoni*) and Clutha flathead (*G. spD*) found in the Taieri River (Allibone 1997). Since completing my PhD I have conducted further research on the effects of water abstraction and salmonid impacts on non-migratory galaxiids in Otago (e.g. Allibone 2000a, b). I have also continued to be involved in the Department of Zoology, University of Otago's research as a co-supervisor of PhD, MSC and PostGrd Dip Wildlife Management students working of galaxiid related thesis studies.

5. I am a recognised expert with regard to the conservation management of New Zealand's freshwater fish. I have been a member of the expert panel that conducts the conservation status assessments (threat rankings) for freshwater fish since 2001, including being the chair of this panel in 2009. While working for the Department of Conservation I was the lead author on three freshwater fish recovery plans (DOC 2003, 2004, 2005) and while these plans have now lapsed they are still the only recovery plans written and only guidance the Department of Conservation has produced for threatened fish management in New Zealand.

6. My experience with irrigation schemes and deemed permit water takes began in 1992 during my PhD studies and has continued to the present day. I have assessed the potential impact of irrigation takes in Otago for the Department of Conservation (Allibone 2000a, b).

As a consultant in the last 15 years I have undertaken freshwater ecological assessments for a range of irrigation schemes, either working for the applicant, reviewing applications on behalf of Regional Councils or as an expert working for submitters including the Department of Conservation and Forest & Bird. These irrigation schemes include large schemes such as Central Plains and Hunter Downs irrigation schemes down to small individual farm based irrigation schemes including application for deemed permit replacement resource consents

7. I confirm that I have read and agree to comply with the Environment Court Code of Conduct for Expert Witnesses (Consolidated Practice Note 2014). This evidence is within my area of expertise, except where I state that I am relying on the evidence or information provided by another parties. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Scope of Evidence

8. My evidence addresses:

    a. Freshwater fish values of the Park Burn and Amisfield Burn;

    b. Fish screens for water takes; and

    c. Residual flows for water takes.

9. I have read the applications and S92 information provided by the applicants and the ORC Staff Officer's reports.

Fisheries values in the Park Burn and Amisfield Burn

10. I have conducted two fisheries surveys in the Park Burn and Amisfield Burn. In January 1996 I led a Department of Conservation tenure review fisheries survey of the Park Burn and Amisfield Burn. The data from this survey has been stored in the New Zealand Freshwater Fish Database.

11. In 1996 we recorded brown trout at two survey sites in the Park Burn and brown trout, koaro and upland bully in the Amisfield Burn and tributaries.

12. The second survey I conducted was on the 18 April 2019 as part of the ecological survey work for these consent applications. We visited fifteen sites spread from across the two stream catchments (Water Ways Consulting 2019) with three sites in the Amisfield Burn catchment and twelve in the Park Burn. All the sites either had no fish present or brown

trout aside from the most downstream site in the Park Burn that had brown and rainbow trout present.

13. The fish survey we conducted in April 2019 found brown trout throughout the Park Burn but the fish numbers were low when trout were found and at six sites had no fish present. The no fish sites included small ephemeral tributaries of the Park Burn that I would expect to be fishless and also some sites along the larger reaches of the stream and its tributaries. The absence of fish at sites in the mid and lower Park Burn appeared to be due to the low densities of fish present meaning our encounter rates when fishing was low.

14. The rather complex arrangement of water abstractions, stream conveyance of water and retaking of water means the Park Burn has varying flows both along the stream and temporally. This will limit the abundance of fish in the stream.

15. The low density of fish, brown trout, also appears due to natural factors, at least in some areas. In the upper most sites fish in the Park Burn have natural flows and very little riparian habitat modification. This area, while providing what appeared to be excellent habitat had very few brown trout (an no other fish). This would indicate that while water abstraction activities alter the Park Burn flows, there are also natural limitation on the trout population in the un-modified areas.

16. The largest brown trout we caught was 219 mm long and this was present in pool in a relatively dewatered section of the Park Burn (Figure 1). The next largest brown trout was also caught in a small tributary stream (Figure 2, 3). This indicates that while the brown trout population is small the larger individuals present are utilising small stream or low flow habitat.

17. I would categorise the fish population of the Park Burn as a brown trout dominated fish community that is composed of stunted fish that occur sporadically around the catchment.
18. I fished two sites in Breakneck Creek and one in the Amisfield Burn. I recorded the brown trout population at the sample sites in the mid-reaches of Breakneck Creek as abundant. However, the fish lengths were limited to fish under 250 mm length (Figure 4).
19. Fish surveys at in the vicinity of the upper most water take locations in Amisfield Burn and Breakneck Creek found no fish. I fished the Amisfield Burn site during the April 2019 survey and despite fishing 100 m^2 no fish were encountered. This was significantly different to the fish populations at downstream sites. The Amisfield Burn at this upper most site appears to provide high quality habitat and the absence of trout indicates a downstream barrier. The

stream has steep cascades in the vicinity of the take (Figure 5) and these may be the barriers, but in my experience, these do not appear large enough to form trout passage barriers.

20. Previous fishing of Breakneck Creek in 2018 found no fish present at the intake location. I have not visited this site but assume that Breakneck Creek, like the Amisfield Burn has, most likely a fish passage barrier between the sites we have fished and the intake location.
21. I expect that brown trout occupy all of the Amisfield Burn and Breakneck Creek from the fish passage barriers (downstream of the upper water takes) all the way downstream to the drying reach. Trout will also occupy or move through the drying reach when there is surface flow.
22. In this most recent survey of the Amisfield Burn we did not encounter any native fish. Previously I did catch a single large koaro in the Amisfield Burn, at a site very near to the Breakneck Creek site fished in 2019. However, any koaro population in this stream catchment is small as the capture rate is very low.
23. None of the fish surveys conducted in the Amisfield Burn and Park Burn have found any Clutha flathead galaxias. This threatened fish is present in Pisa Range streams north and south of these two streams. The absence of this fish even from areas of Amisfield Burn and Breakneck Creek where brown trout are absent indicates the Clutha flathead is absent from these two catchments or if present the populations are present well upstream of any water abstraction infrastructure and the fish survey locations.

Fish Screens

24. The Staff Report recommends no fish screens for the water intakes as the ORC Science Resource Group assessment notes the water takes, streams and water races are interconnected and there is no benefit to the brown trout population by placing fish screens at the water intakes. I would agree with this assessment.

25. The Staff Report does recommend a 3x3 mm mesh for the fish screens at the outlets of the water storage ponds. This is to prevent the death of fish entering the irrigation systems from the storage ponds.

26. The ORC Staff report recommends a 3x3 mm mesh for fish screens in storage ponds. These fine mesh screens are designed to exclude very small fish. In the case of brown trout this would be freshly emerging alevins (Figure 6) and young fry. These are fish that are found at or near to spawning sites. As some, or all, of the water races are dry in winter which is the

spawning period, any brown trout colonising the storage ponds will be individuals that have move downstream from spawning areas in the natural streams. Therefore, alevins (the smallest brown trout life history stage) are unlikely to be found in the storage ponds.

27. The small life history stages of salmonids, although less so for brown trout, will migrate downstream as small individuals in migratory populations as juvenile fish move to adult habitat. In my experience, migratory brown trout begin out migrations in late summer or autumn as larger juvenile fish.

28. However, the brown trout populations in the Park Burn and Amisfield Burn are not migratory, as they do not migrate to and from Lake Dunstan. Therefore, any downstream movements are the result of population pressure and displacement during flood events. As noted in the fish surveys the upper take sites on all three streams have either no brown trout or very few trout so movement from the upper catchment is unlikely and brown trout will only likely to enter the race system at the lower takes or retakes. Some fish movement can be expected in the mid and lower reaches of both streams, but I would expect this to occur months after hatching and to be undertaken by trout 60 mm in length or larger. To screen these fish a coarser mesh screen with mesh in the order of 20x20 mm would be appropriate if screens are required.

29. At this time the trout population of storage pond is unknown. There are two potential trout populations, for ponds that are drained at any time of year there will be few if any trout as the habitat in the pond is not permanent. In this case, I would not require screens as the ponds will not support fish life year-round. The second alternative is that the ponds retain water year-round and a permanent trout population has established in the ponds. These permanent populations will still not include alevins or fry as spawning will not occur in the ponds. If the offtakes already have debris screens, I expect these to be sufficient to screen larger trout. If there is a need to screen smaller trout, I would recommend a mesh size in the order 20x20 mm mesh for the screen.

30. The Staff Report also recommends the storage pond outlet fish screen is a rotating drum. I would recommend, if fish screens are required, that the applicant design screens suitable for the offtake locations as rotating drums may not be possible at all sites.

Fish Screens – Rockburn Wines

31. Rockburn Wines has two water takes, one in the lower reaches of the Park Burn and the second from a Park Burn tributary. Our fish survey found the fish population in this area was

a low-density population of brown trout. Therefore, out migration and possible entrainment into the Rockburn Wines water races is likely to be low. Mr Campbell, from the ORC recommends that fish should be able to move freely in the interconnected streams and race system. I agree with this and as such I do not recommend a fish screen at the Park Burn water take.

32. Rockburn Wines also empty their storage pond each year over winter for maintenance and at this time any resident fish are lost. Therefore, the need for screens will reflect the colonisation rate of brown trout into the race system and the storage pond. Providing fish screens at the storage pond will have little benefit as fish in the pond will be lost when the pond is drained.

Fish Screens - Smallburn

33. The Smallburn intake in the Breakneck Creek is in a reach of stream where no fish were located. In the absence of fish, I would not require a fish screen at the Breakneck Creek water take.
34. The Amisfield Burn take point is between the upstream survey location with no fish and downstream locations with brown trout and koaro. The water race that conveys water from this take point conveys water to a trout occupied area of the Park Burn. Mr Campbell, from the ORC recommends that fish should be able to move freely in the interconnected streams and race system. I agree with this and as such I do not recommend a fish screen at the Amisfield Burn water take.
35. The Park Burn water take is from within the brown trout occupied areas of the stream. Mr Campbell, from the ORC recommends that fish should be able to move freely in the interconnected streams and race system. I would agree with this and as such I do not recommend a fish screen at the Park Burn water take.

Fish Screens- Rockburn Wines Limited, Pisa Holdings Limited, Wakefield Estates Limited, Mark II Limited, Stuart Douglas and Phillipa Mary Hawker, Albany Heights Limited and Chard Farm Trustees Limited.

36. The intake in the Amisfield Burn is in a reach of stream where no fish where located. In the absence of fish, I would not recommend a fish screen is required at the Amisfield Burn water take. Furthermore, the race system extending from this fishless take point, does not collect any further water from the Amisfield Burn or Park Burn. Therefore, fish do not have access to this water distribution system and any storage ponds on this system. A fish screen on storage ponds outflows in this scheme would serve no purpose.

Residual flows

37. Both the Amisfield Burn and Park Burn have lower reaches that dry naturally at flows at or above the 7dMALF. Providing residual flows at the points of takes for all takes will not prevent this drying of the lower reaches. Therefore, fish passage cannot be provided by setting residual flows and will only be available when flows are sufficient to exceed the losses to ground water.

38. Residual flow in the Amisfield Burn and Park Burn can be set to provide for aquatic habitat in the reach in the vicinity of the water takes. This will provide for flow connectivity in the upper and mid-reaches of the streams and provide habitat for all aquatic species.

39. The existing intake structures I visited do not take all the flow of the Park Burn and Amisfield Burn and as such provide a residual flow. This flow while less than the natural flow will mimic the natural changes in flow through the irrigation season. As long as the connecting flow is provided at all takes the status quo will provide sufficient residual flows to provide for flow connectivity and some aquatic habitat through the point of take.

Summary

40. The fish communities of the Amisfield Burn and Park Burn are dominated by brown trout.

41. Native fish, koaro and upland bully, have only been recorded in the Amisfield Burn.

42. No threatened native fish have been recorded at any time in these two catchments.

43. The relatively natural upper reaches of Park Burn has a very low-density brown trout population and the mid and lower reaches have a low density rather sporadically distributed brown trout population. This brown trout population has no sports fishing value.

44. The upper reaches of the Amisfield Burn and Breakneck Creek have no fish and the mid-reaches have a moderate to high density brown trout population. However, this population is composed of stunted brown trout of no sport fishery value.

45. Fish screens, as recommended by the Staff Report at the storage pond outlets will provide no benefit to the sports fish. In my opinion it is not necessary to establish fish screens at all. However, if it is considered necessary to screen the pond outlets I would recommend larger

mesh size in the order of 20x20 mm mesh is used because the fish that would be screened will be larger fish in the order of 60mm.

46. The residual flows at the water take points can provide flow connectivity and some aquatic habitat in the immediately downstream reaches but will have very little benefit once the Amisfield Burn and Park Burn begin to flow across their natural drying reaches. I consider the configuration of the intake as providing an adequate flow past it.

Richard Allibone

21 August 2020

Figures

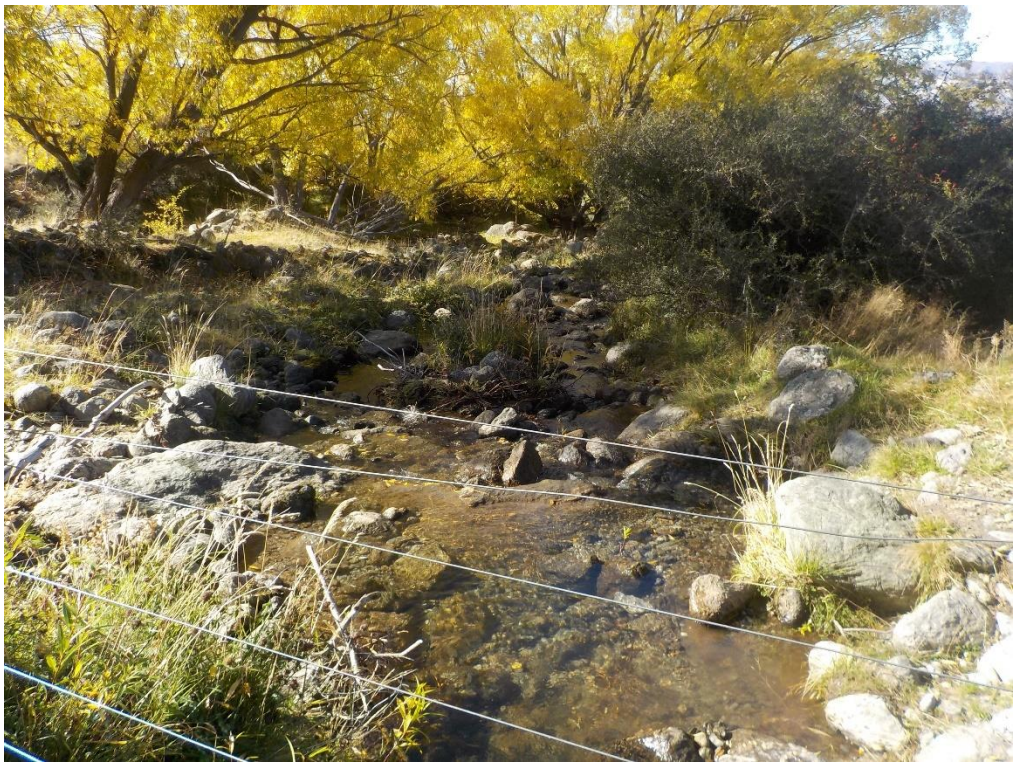

Figure 1. The Park Burn where the largest brown trout was caught.

Figure 2: The second largest brown trout caught from the Park Burn.

Figure 3. The Park Burn tributary where the fish in Figure 2 was caught.

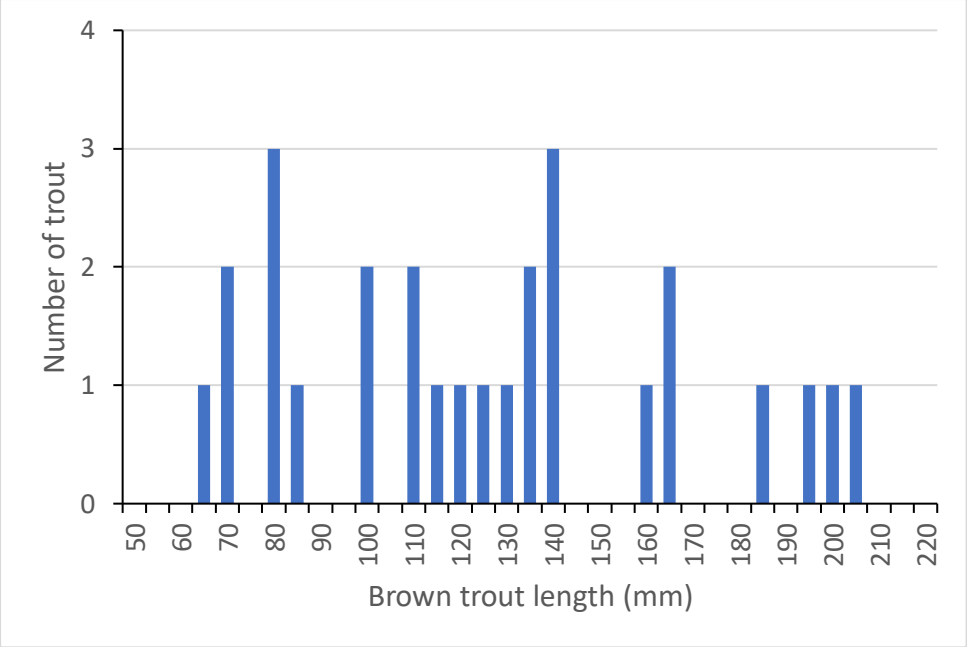

Figure 4: The length range and length frequency of brown trout from Breakneck Creek survey sites in April 2019.

Figure 5: The steep cascade below the upper Amisfield water take.

Figure 6: Brook char fry captured late October, approximately 30 mm long, 3 mm high

References

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