

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 DAVID PETER MURRAY ON BEHALF OF
THE DIRECTOR-GENERAL OF CONSERVATION**

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Brief of evidence of DAVID PETER MURRAY

Introduction

1. My full name is David Peter Murray.
2. I am employed by the Department of Conservation (the department), Canterbury Conservancy, Twizel Area Office. Prior to the establishment of the department I was employed by the New Zealand Wildlife Service and I have had uninterrupted service in the conservation and wildlife management field since 1972.
3. I have 28 years field experience with wildlife management of braided river avian species in the Upper Waitaki Basin. My work has been primarily concerned with field management of the endangered Kaki/Black Stilt. This has included population monitoring and surveying, breeding season management and manipulation, wetland development and management, predator control and captive rearing and release. I have also been involved with various research projects related to Kaki management and habitat management.
4. I have had considerable direct and indirect input to matters of environmental concern which can adversely affect braided river and wetland habitats and the bird species which depend upon them at a local and international level. I was involved with the justification and establishment of Project River Recovery which was set up to mitigate some of the effects of hydro electric development in the Upper Waitaki Basin.
5. I am a member of the Kaki/Black Stilt Recovery Group. The Recovery Group comprises departmental officers, outside experts and interest groups. It is set up

to monitor progress of management and give advice to the department on matters relating to management of the species.

6. As a result of my duties I have an extensive knowledge of the braided river systems and their associated wetlands in the Upper Waitaki Basin and have had first-hand observations of environmental changes over time.

Scope of Evidence

7. My evidence will discuss the following avifauna issues in the Upper Waitaki basin:
 - the braided rivers of the Basin;
 - the riverbed and wetland birds in the Basin;
 - existing threats to riverbed and wetland birds;
 - the Kaki Recovery Programme and Project River Recovery; and
 - the implications of the current Applications for riverbed and wetland birds.
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 the following evidence and agree to comply with it when giving evidence before the hearing commissioners.

Braided rivers of the Upper Waitaki Basin

9. Braided rivers are uncommon worldwide and are recognised as a rare ecosystem in New Zealand (Williams et al. 2007). An important feature of New Zealand braided rivers is the range of threatened bird life specifically adapted to living in the unstable gravel beds formed by multi-stemmed rivers (Wilson 2007).

10. The upper Waitaki Rivers comprise 14 percent of all open braided river habitat in New Zealand (Wilson 2001). More importantly, the average size of open gravel patches in upper Waitaki braided rivers is over three times the size of other braided rivers in Canterbury, and six times that of other New Zealand braided rivers (Wilson 2001). It is these large areas of open riverbed that are important habitat for many specialised riverbed birds.
11. Maintaining this good braided habitat is dependent on appropriate natural flow regimes which allow for freshes and floods to provide the open bare shingle areas required for nesting as well as maintaining food resources and creating the barrier effect of swift flowing channels which help keep mammalian predators away from nesting islands.
12. Largely unmodified braided rivers of the upper Waitaki include the Macaulay, Godley, Tasman, Hopkins and Dobson, all situated upstream of the major glacial lakes. These rivers are of extremely high value to all of the braided river wading bird species. The Tekapo, Pukaki and Ohau Rivers have reduced flows as a result of hydro electric development and the Ahuriri in its lower reaches has lost considerable areas to weed invasion. Despite this these rivers still contain sections used by the braided river species. Most recent surveys of bird numbers in all upper Waitaki rivers (Maloney et al 1997) identify the Tekapo, Lower Ohau and Ahuriri rivers as supporting high numbers of black fronted tern and contributing significantly to the estimated national population of this species.
13. In the Environment Canterbury report "Significance of river and open water habitats in Canterbury for indigenous birds" (O'Donnell 2000), of the 34 sites ranked as being of national and international habitat significance in Canterbury, 41% of those sites occur in the upper Waitaki catchment. Dr O'Donnell considers that sites of this ranking are among the best examples of the habitat present in New Zealand, are relatively unmodified, of large size, have diverse microhabitats and water bird faunas and contain viable populations of all or

almost all species which are typical of the habitat type. The ranking is made up of assessments of representativeness, life supporting capacity, natural diversity, distinctiveness, intactness/naturalness and long term viability. Map 1 is entitled “Areas of Significant Bird Habitat”. It shows the significance of rivers and open water in the upper Waitaki catchment as habitat for birds as determined by Dr O’Donnell.

14. Braided rivers are dynamic systems driven by flood events and sediment supply. When in a natural state and without flood control structures, they typically have large flood plains containing wetlands and small stable streams. These habitats, which are outside of the current active bed, provide essential feeding sites for braided river birds during times of flood. However, these floodplains can be modified by stock and enriched groundwater and can lose their natural wetland development processes when occasional flooding is reduced with flood protection works.

Upper Waitaki Riverbed and Wetland Birds

15. At least 26 species of wetland and riverbed birds have been recorded as being present in the Upper Waitaki River catchment (Maloney et al 1997). These are listed in Appendix 1.
16. Of the 26 species recorded as being present, 8 are considered to be threatened under the current New Zealand threat classification system (Miskelly et al 2008).

Table 1

Species	Threat status
Kaki/black stilt (<i>Himantopus novaezelandiae</i>)	Nationally Critical
Bittern (<i>Botaurus poiciloptilus</i>)	Nationally Endangered
Black-fronted tern (<i>Chlidonias albostratus</i>)	Nationally Endangered
Black-billed gull (<i>Larus bulleri</i>)	Nationally Endangered

Wrybill (<i>Anarhynchus frontalis</i>)	Nationally Vulnerable
Banded dotterel (<i>Charadrius bicinctus bicinctus</i>)	Nationally Vulnerable
Caspian Tern (<i>Hydroprogne caspia</i>)	Nationally Vulnerable
Southern crested grebe (<i>Podiceps cristatus australis</i>)	Nationally Vulnerable

17. In order of threat category **nationally critical** species are those that have a very small population, (usually less than 250 mature individuals) and are restricted to one geographical area of less than 100,000 ha. If current management ceases it is likely to move to a higher threat category - in the case of any species that are nationally critical, the next category is extinction.
18. **Nationally endangered** species either have a small population (< 1000 individuals in the whole country) and occur in small, widely scattered populations but may be stable as in the case of Bitterns OR they have a moderate sized population (1000 – 5000 mature individuals) but the population trend is declining (50-70% decline) such as Black-fronted tern and Black-billed gull.
19. **Nationally vulnerable** species such as wrybills have a moderate sized population (1000 – 5000 mature individuals) but the population trend is declining (10-50% decline) and they are restricted to specific habitats or geographical areas of less than 100,000 ha.
20. Other nationally vulnerable species have a moderate to large population (5000 – 20,000 mature individuals) but the population trend is declining (30-70% decline (Banded dotterel). Caspian tern are categorised as nationally vulnerable because they have a moderate population (1000 – 5000 mature individuals) that is stable but the population size is considered to be affected by unnatural causes. Southern crested grebe are nationally vulnerable because their population is unnaturally small (250 – 1000 individuals) but they are slowly increasing in numbers.

21. Of the above species, kaki/black stilt, black-fronted tern, black-billed gull, and wrybill have evolved on braided rivers and have specific adaptations for breeding and feeding on them (O'Donnell 2000). Kaki use braided riverbeds throughout the whole year as they remain inland throughout their life cycle whereas the other three species mentioned above move back to the coast after breeding is completed.

Food and habitat requirements

22. Different bird species use the braided rivers of the upper Waitaki in different ways. For example, a study of black-fronted tern habitat use on the Wairau River, (O'Donnell and Sedgeley 2006) a large braided river in Marlborough, showed that they fed on aquatic insects both in the water column and above it and on small fish. They were dependent on aquatic habitats within the active river channel for feeding during the breeding season and avoided farmland and other terrestrial habitats for feeding at this time although they are known to feed over farmland at times. Most feeding by black-fronted terns was in smaller river channels and in shallow, relatively slow water in these channels. Any management that changes the form and availability of these aquatic habitats is likely to have an adverse effect on black-fronted terns.
23. Pierce (1979) and Hughey (1997) found that wrybill are opportunistic feeders but they have very specific needs and specific habitats from which to obtain food i.e. feeding occurs within a narrowly defined range of preferred habitats, primarily within or near to shallow water edges. Their predominant prey items were shown to be mayfly larvae (*Deleatidium* sp.) which only inhabit clean, stony, fast-flowing waters. They make use of their curved bill to forage for these small aquatic insects under small stones in shallow braids.
24. The two stilt species are far more opportunistic in their feeding habitats obtaining food from wherever it is most available at the time. During nesting this food

supply must be at or close to optimum safe nesting habitat. Black Stilts are the only wading species which remain in the Upper Waitaki all year and need to obtain sustenance from different places in different seasons. Within the Upper Waitaki they are found from the Godley/McCauley Rivers in the North to the Ahuriri River in the south. Although predominantly a braided river bird they will feed in a variety of shallow water habitats including small stable streams, ephemeral tarns, and ponds. At times they will take terrestrial insects. Nesting season is the critical time in their life cycle when they must find both nesting and feeding habitat at the one site. Fledging can take up to 50 days and incubation about 23 days so they are dependent on these sites for about 73 days.

25. Simply put, all of the threatened and endangered braided river birds have evolved various feeding techniques which are adapted to the environment in which they live. Changes to the physical habitat (e.g. reducing flows or shallow braids as a result of water abstraction) or changes to the chemical habitat (e.g. nutrient increase causing increased algae or pollution by chemical discharge causing decreased invertebrate fauna) will have a flow on effect to the bird life living and feeding in that environment. The same principle applies to species such as bittern, crakes, grebes and waterfowl which occupy wetlands and lakes.

Existing Threats to Riverbed Birds

26. The upper Waitaki braided rivers have already suffered combined impacts of loss of habitat through hydroelectric power development, competition by exotic plant species and impacts of mammalian predators.

27. The existing threats to riverbed birds in the upper Waitaki include:

- 27.1 **Predation:** Braided river and wetland birds are in almost all cases ground nesting species. These endemic species have evolved in the absence of

mammalian predators and have not developed good predator avoidance behaviour during nesting and chick rearing.

27.2 Weed invasion: Introduced weeds such as Crack Willow, Gorse, Broom and Russell Lupins have invaded braided rivers creating stable islands and reducing the area of shallow braids required as feeding habitat for riverbed wading species. Rank vegetation reduces nesting sites and provides cover for predators thus increasing the predation threat.

27.3 River Engineering Works: As riverside farmland is developed and increased in value there is an increased desire to protect against floods and erosion which is a natural feature of the dynamic geomorphology of the ecosystem. Flood protection works reduce braiding, increase channelisation and limit the successional establishment of floodplain wetlands.

27.4 Recreational Activity: There is an increasing pressure on riverbed nesting bird species from recreational activities, in particular the number of 4WD and off road vehicles. Peak human activity overlaps with nesting and chick rearing periods. Apart from the direct threat of running over eggs and chicks there is a considerable indirect risk of breeding failure as a result of disturbance.

27.5 Riverbed Farm Activity: As the productivity of farms adjacent to braided rivers increases the number of farm animals with access to the active riverbed also increases. This is particularly the case in the Godley, Cass and Tasman rivers where grazing stock pose a threat to ground nesting birds. When large numbers of sheep or cattle are mustered the easiest route is often down the open riverbed and trampling can be devastating.

Kaki Recovery Programme and Project River Recovery

28. It may be useful for the Committee to have a general overview of the types of the Department's work in relation to Kaki Recovery and Project River Recovery.
29. Kaki is one of the worlds most endangered wading species. In 1999 the population of adults in the wild was 31 with only four wild breeding pairs.
30. Kaki is subject to an intensive management regime as part of the department's Kaki Recovery Programme (Maloney and Murray, 2001). The Recovery Programme has the specific aims of avoiding extinction of the species and increasing the wild population to a point where active intensive management can be reduced or eliminated. The current wild population is 94 adults including 10 productive breeding pairs (Internal report: Kaki/Black Stilt Population Update, numbers as at 31st August 2009).
31. Management involves both the wild and captive population. Wild breeding pairs are located throughout the Waitaki Basin and eggs are removed for incubation and chick rearing at the Twizel Aviary. Two or more clutches of eggs can be taken from each pair in a season. Eggs are also produced by captive pairs. The resulting offspring are released back to the wild at either 3 or 9 months of age. Release sites are selected on their habitat value and safety from predators. The managed habitat of Mailbox Inlet is a site regularly used.
32. Project River Recovery is responsible for running an ecosystem-focused and catchment-focused river and wetland conservation programme aimed at maximising conservation benefits in rivers and wetlands throughout the entire Upper Waitaki.
33. Key aspects of the Kaki Recovery Programme and Project River Recovery are:

- 34.1 **Predator Control:** Predator control at various levels has been undertaken as part of Black Stilt management since 1981. Often this has been localised to nesting sites and when finance has allowed has been more extensive.
- 34.2 **Predator control research:** Prior to 1981 research showed that intensive local predator control could result in improved nesting success in some seasons. A number of analyses of management trapping since then have confirmed this. In conjunction with the Kaki Recovery Project a number of studies have been undertaken to improve predator management techniques and methods. A major 5 year study is near completion in the Tasman Riverbed to refine long-term predator reduction techniques and monitor the effect this has on riverbed bird nesting success. This could benefit all riverbed species including native invertebrates and lizards.
- 34.3 **Weed control:** Apart from a number of research initiatives this project is successfully maintaining the weed free status of the Godley, Tasman and Upper Ahuriri Rivers.
- 34.4 **Habitat Development:** Both the Black Stilt Recovery Project and Project River Recovery have actively developed and maintained wetland habitats for species which have been adversely affected by hydro-electric development. These include Micks Lagoon (Godley Peak Station, Lonestar Farms), Mailbox Inlet (Glenmore Station), Waterwheel Wetland (alongside Pukaki-Ohau Canal), Ruataniwha Wetland (immediately south of High Country Rosehip Orchards).

Micks Lagoon and Mailbox Inlet are sites owned by the Department and managed intensively for black stilts. Water levels are manipulated to maximise food production and available nest sites and predators are controlled with electric fences and trapping. Captive reared birds are

released into these habitats and wild nesting pairs are managed for egg production.

- 34.5 **Recreation Management:** The department has actively advocated to minimise the impact of human activities within riverbeds and wetlands. Signage warning of the danger of vehicles and pets to riverbed nesting birds has been placed at strategic access points. Pamphlets have been prepared and distributed to appropriate recreational groups and direct contact has been made to riverbed users by department field staff. Despite these educational efforts, human disturbance of nesting sites is increasing.

Implications of the Current Applications for Riverbed and Wetland Birds

34. Changes to water quality can have a detrimental effect on the environment and the wildlife which inhabits it. Dr Allibone's evidence (paragraphs 64-66 in particular) discusses the potential impact of increased nutrients on receiving waters as a result of irrigation discharge. The effect on invertebrates and native fish he discusses is directly applicable to the riverbed and wetland birds which rely on them for food.
35. I note Dr Allibone's and Mr Bray's evidence that the implications of reduced water quality on ecological values of the waterbodies of the Upper Waitaki Basin do not appear to have been comprehensively investigated. In my opinion given the importance of the basin for these species such a comprehensive assessment is justified. In relation to water quality, from my observation reduced flows can result in loss of braids and increased weed establishment and can reduce the quality of the habitat of threatened bird species.
36. In paragraph 87 Dr Allibone sets out that should some or all of these consents be granted any consent conditions should specify nutrient limits and minimum flows for all streams and downstream areas. I fully support Dr Allibone's evidence on

this point. Such measures would be required to ensure bird as well as fish values are not adversely affected by the activities covered by the current consent applications. Robust monitoring would also be required.

37. One of the key risks to ground nesting river and wetland birds is riverbed farm activity. It is anticipated that increased farm development as a result of irrigation will result in an increase in stock numbers. Some applicants have indicated that they intend to fence command areas to keep stock out of adjoining riverbeds. This is important but on its own will do little to restrict the increased number of animals accessing the river on other parts of the farms. My opinion is, if the consents are granted, all braided riverbed boundaries should be fenced, and fenced laneways created to allow access to all blocks but thereby avoiding the need to move stock through the riverbed to get there.
38. If consent is to be granted specific and rigorous conditions will be required to address the possible adverse effects of them on riverbed and wetland birds. These include:
- restricting construction of water intakes to avoid the main bird breeding season August to January;
 - requiring that any works or excavation not occur within 100 metres of birds, while nesting or rearing their young;
 - requiring that vehicles and machinery shall, as far as practicable, not enter river channels containing flowing water and that machinery be thoroughly cleaned prior to entering the work sites to avoid introduction of weeds.
39. Conditions to address the concerns relating to water quality will also be required but I am not qualified to specify these.
40. Glenmore Station's Limited original proposal to continue with a border dyke irrigation system created issues with the Department's management of black stilt

habitat at Mailbox Inlet. I understand the applicant now proposes to use spray irrigation. This will address the Department's concerns in this regard.

41. The managed habitat is predator fenced and the wetland is manipulated to best advantage for the birds by means of three weirs. The Department's concern was that the existing irrigation system creates fluctuating discharges into the wetland during the nesting season causing unnatural rises and falls in the pond levels. Black Stilts and other species which begin nesting close to water level just before the irrigation season are particularly at risk when water levels suddenly rise to flood nests. Later nesters can be discouraged from the habitat because of the frequent water level changes.

Conclusions

42. Braided rivers and their associated wetlands have high habitat significance at a national and international level. The braided rivers and wetlands of the upper Waitaki provide an important habitat for at least 26 bird species, 8 of which are considered threatened.
43. The riverbed and wetland birds in the upper Waitaki already face a number of conditions which threaten their viability. The Kaki Recovery Project and Project River Recovery attempt to address these threats.
44. The key concerns I have in relation to the current applications relate to the possible reduction in water quality and the possible increased risk of stock interference with ground nesting birds. If some or all of the consents are granted conditions to minimise the disturbance in riverbeds (particularly at key nesting times) will be essential.

Dave Murray
November 2009

References

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Appendix 1 Wetland birds recorded during surveys of 11 rivers of the Upper Waitaki Basin 1991 – 1994 (from Maloney et al. 1997)

Black Shag	Little Shag
White-faced Heron	Black Swan
Canada Goose	Paradise Shelduck
Mallard	Grey Duck
Grey Teal	NZ Shoveler
NZ Scaup	Pukeko
S.I. Pied Oystercatcher	Pied Stilt
Black Stilt	Banded Dotterel
Black-fronted Dotterel	Wrybill
Spur-wing Plover	Eastern Curlew
Black-backed Gull	Black-billed Gull
White-winged Black Tern	Black-fronted Tern
Caspian Tern	Arctic Tern

Appendix 2: Map - Areas of significant bird habitat