THE NEED FOR CONTROL OF EXOTIC WEEDS IN BRAIDED RIVER BEDS FOR CONSERVATION OF WILDLIFE

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Summary. Exotic weeds impact on wildlife values in braided riverbeds, especially in Canterbury (New Zealand). The objectives of the study were:

- To summarise wildlife values for key river systems, key habitat needs, and the role of exotic weeds in braided riverbeds.

- To list research requirements for control of exotic weeds.

The following observations and recommendations are made:

- Nesting habitat available for birds is substandard as a result of rapid colonisation of braided riverbeds by exotic weeds. The amount of adjacent vegetation has made potential nesting habitat increasingly prone to predation.

- Immediate control of Russell lupin (*Lupinus hybrid*)can be achieved with picloram granules (outlying areas) and triclopyr (main riverbed populations). In the long- term some form of biological control is recommended.

- Tree lupin (*Lupinus arboreus*)is the major weed problem in the active riverbed of the Ashley. Herbicides can be used for immediate control, but the introduction of biological control agencies is thought to be the appropriate long-term measure. The best technique for its control may be the introduction of the fungus *Colletotricum gloeosporioides* from the infected lupin stands further downstream.

Research requirements include:
- studies of Russell lupin and associated control with herbicides
- introduction of "seed feeders" for containment of Russell and tree lupin spread
- environmental impacts of the use of herbicides and their effect on water quality, and re-establishment of native flora
- the impact of riverbed weed control on predator populations. The effects of this on bird nesting and chick survival needs to be investigated for at least a 5-year period.

INTRODUCTION

Braided rivers occur throughout much of New Zealand, with the biggest and most geographically significant examples being in Canterbury. The wide, multi- channelled, shingle-bottomed, and unstable rivers provide habitat for numerous species of plant and animal life. Many Canterbury rivers (and others in Marlborough and Hawke's Bay) are considered nationally important for fish, wildlife, and recreation because of the braided river habitat, which is rare on a world-wide scale, and the special ecological features present. This conservation significance is recognised by the National Water Conservation Orders placed on the Ahuriri and Rakaia, two braided rivers in Canterbury.

WILDLIFE VALUES OF BRAIDED RIVERBEDS

Wildlife conservation values

O'Donnell & Moore (6) and Robertson *et al.* (9) have determined wildlife conservation values for most braided rivers in the eastern South Island. From the Waitaki in the south, north to the Wairau River (Fig.1) 10 river systems contain significant wildlife populations (8) with their

associated conservation values Table1). Key wildlife are wrybill, black stilt, black-fronted tern, banded dotterel, black-fronted dotterel, and black-billed gull, plus a wide range of other endemic, native and introduced birdlife (Table2). Several of these species are either of endangered (blackstilt) or threatened (black- fronted tern and wrybill) conservation status (1).

Habitat needs

While the habitat needs of species differ greatly in detail, general patterns of habitat use have been described (1;5) simply in terms of nest site needs, spatial need, and feeding requirements. Briefly, the needs of waders (e.g., wrybill and pied stilt), gulls (e.g., black-billed gull), and terns (e.g., black-fronted tern) for nest sites are bare shingle riverbed islands with little or no significant vegetation. For feeding, birds forage mainly aquatically with waders in small channels and terns over large channels. Spatially territorial birds like wrybill, banded dotterel, and South Island pied oystercatcher require large areas (several hectares) while colonial birds need much smaller areas. Waterfowl such as paradise shelduck nest more in protected riparian areas amongst vegetation and feed on vegetated areas.

Impact of exotic plants

Historical considerations. Most waders, gulls, and terns will not nest in areas of significant upright vegetation growth. Since the arrival of Europeans in New Zealand the riverbeds have changed (2) as a result of the spread of introduced plants, especially gorse (*Ulex europaeus*), broom (*Cystisis scoparius*), tree lupin, and willow (*Salix* spp.).

Guthrie-Smith (2) suggested that the introduced plants "would hardly affect the wrybill's existence" as they occupy areas previously occupied by "equally dense beds of native vegetation". A comparison of past information of the lower river with today shows a major increase in exotic vegetation cover. The rapid rate of colonisation by these exotic plants and their rapid growth rates far outstrip those of native plants likely to dwell on riverbeds.

Ecological impact of exotic plant invasion. Pierce (7) and Hughey (5) showed that riverbed islands which lack any substantive plant growth have higher levels of breeding success for birds than heavily vegetated islands. The latter contain a full predator-prey community, including rabbits, cats, and ferrets, in their vegetated areas. The predators, however, also impact on the vegetation-free nesting areas of birds, whereas on vegetation-free islands the "prey" base to support predators is much smaller, predator numbers are lower, and the impact on nesting birds is not so great.

It seems there is much less potential nesting habitat now available to birds than in the late 19th century. Much of the remaining habitat is substandard as it is at a lower cross-sectional level, making it more subject to flooding. The amount of vegetation on adjacent sites has made potential nesting habitat increasingly prone to predation.

Geographic extent of exotic plant invasion. All low country rivers are affected by plant encroachment, but so far only a few high country catchment areas have been significantly affected. Generally, tree lupin, gorse, and willow are the main problem species on large braided rivers such as the Rakaia and Rangitata. On smaller rivers like the Opihi and Ashburton, broom is a major problem as well as the species already mentioned. In high country areas of the Mackenzie Basin Russell lupin is a major problem on the Ahuriri River, and is spreading into the upper Waimakariri River. Willow is also a problem on some high country rivers. Table 3. summarises the main species on each river and a gives subjective impact rating.

On some rivers, plant encroachment can take up most of the potentially available habitat, e.g., Opihi and Lower Waitaki rivers. For others the problem is moderately severe, e.g., Lower Rakaia, Ashburton, and Ashley rivers, and on some rivers there is little or no present problem, e.g., Cass and Dobson rivers in the Mackenzie Basin.

Future prospects for birdlife with effective plant control. There are no existing large-scale weed control programmes intended for the benefit of wildlife in braided riverbeds. Wildlife managers would benefit from a range of management actions:

a) If complete areas of riverbed can be cleared of exotic plant growth, major benefits to native riverbed bird species will occur, i.e., breeding success will improve, habitat area will increase, and the prospects for saving endangered species will be enhanced, e.g., black stilts on the Ahuriri River.
b) Substantial partial clearance of vegetation will also be beneficial and will lead to similar if not such large benefits as complete clearance. This option would be cheaper and it could be applied over larger areas of riverbed than complete clearance.
c) Control on individual plant species such as tree lupin, Russell lupin, and willow would be beneficial where such species are the key management concern. It may be cheaper and more effective to target one species than the whole community. Benefits would be similar to (a) and (b).

RESEARCH NEEDS AND MONITORING

- The biology and ecology of Russell lupin needs to be studied so that the ability of this plant to occupy other sites is understood, and to determine its likely limits of spread.

- In conjunction with this, an attempt should be made to identify weaknesses in the plants' growth cycle where appropriate applications of herbicide(s) may give good control with minimal environmental impact.

- In conjunction with any major spray programme in the Ahuriri River, an environmental monitoring programme should be set up to determine impact on water quality, aquatic life, and effects of any chemical residue in the riverbed soils on re-establishment of native flora.

- A preliminary investigation on the value of Russell lupin in the high country and the likely impact of biological control agents in containing Russell lupin spread should be set up.

- The introduction of *Colletotricum* to swards of tree lupin in the major riverbeds could hasten its spread and control of the lupin.

- Populations of predators should be identified and counted and their proximity to bird nesting sites should be measured before and after weed control programmes.

- The benefits any weed control programme may have on bird nesting and surviving chick numbers should be studied (5-year programme).

- A long-term monitoring programme (5 years) should be set up to determine changes in riverbed flora as a result of weed control programmes.

- Biological control agents are being introduced into NZ to reduce the vigour of both gorse and broom, and the Department of Conservation should consider a policy of active support for this programme.

Table 1. Summary of wildlife conservation ratings and overall conservation values for the main river systems along the eastern South Island (from the Waitaki north).

River	Wildlife habitat value[2]	Protected water rating[3]
Waitaki system[1]	Outstanding	Group 1 (Ahuriri draft NCO)
Opihi	High	Group 2
Rangitata	Outstanding	Group 1
Ashburton	Outstanding	Group 2
Rakaia	Outstanding	Existing NWCO
Waimakariri	Outstanding	Group 1
Ashley	Outstanding	Group 2
Waiau	High	-
Hurunui	High	Group 1 and 2
Conway	High	-
Clarence	Moderate	Group 1
Wairau	High	-

KEY:

[1] Includes lower Waitaki, Ahuriri, Cass, and Tasman rivers.

[2] Wildlife habitat ratings are (see (6) for definitions): Outstanding; High; Moderate - High; Moderate; Potential. Outstanding is defined as: a) Presence of a breeding population of a highly endangered or rare endemic species; b) Presence of a population of an endemic species of very restricted distribution and which could become endangered; c) Areas essential to species from (a) and (b) for purposes other than breeding; d) Areas of vital importance to internationally uncommon species (breeding and/or migratory); e) Areas of vital importance to internally migrating species with very limited distribution of abundance; f) Largely unmodified ecosystem or example of original habitat type not represented elsewhere in the country, of large size and containing viable population of all or almost all species which are typical of the ecosystem or habitat type.

[3] Protected Waters ratings (8): Group 1 : those rivers which must be included on any protected waters schedule - anything less would provide an inadequate representation; Group 2 : rivers that should be considered for the first group if it is considered Group1 provides inadequate representation; Group 3 : as for Group 2, but clearly of lesser consideration for inclusion.

Table 2. Occurrence of threatened and endangered species, and species of conservation and recreational interest on eastern South Island braided rivers (from the Waitaki north).

River	Threatened/endangered	Conservation/recreational interest
Upper Waitaki	BS, WB, BFT	BD, BBG, PSD, CG
Lower Waitaki	BFT, WB	BBG, BD, CG, MLD
Opihi	BFT	BFD, BBG, MLD
Rangitata	WB, BFT	BD, BBG, CG
Ashburton	BFT, WB	BFD, BD, BBG, MLD
Rakaia	WB, BFT	BD, BBG, CG
Waimakariri	WB, BFT	BD, BBG, CG
Ashley	BFT, WB	BD, BBG
Waiau	BFT	BD, BBG
Hurunui	BFT	BD, BBG
Conway	BFT	BD, BBG
Clarence	BFT	BD
Wairau	BFT	BD, BFD, BBG

Key: Threatened/endangered species: BS - black stilt; WB - wrybill; BFT - black-fronted tern. Species of conservation and recreational interest: CG - Canada goose; PSD - paradise shelduck; MLD - mallard; BD - banded dotterel; BFD - black-fronted dotterel; BBG - black-billed gull

Table 3. Summary of problem weed communities and key problem species on each major braided river system[1].

River	Community weed species	Main plant of concern[2]
Ahuriri	Russell lupin, willow, gorse	Russell lupin
Tekapo	Willow	Willow
Tasman	Russell lupin,	Russell lupin
Lower Waitaki	Willow, tree lupin, broom	Community
Opihi	Gorse, broom	Broom
Rangitata	Willow, tree lupin, broom	Broom
Ashburton	Willow, tree lupin, broom	Community
Rakaia	Tree lupin, gorse, willow	Tree lupin
Upper Waimakariri	Russell lupin, tree lupin	Russell lupin
Lower Waimakariri	Tree lupin	Tree lupin
Ashley	Tree lupin, broom, gorse, willow	Community
Waiau	Tree lupin, gorse, broom, willow	Community
Hurunui	Tree lupin, gorse, broom, willow	Community
Conway	Gorse, broom	Community
Clarence	Gorse, broom	Community
Wairau	Gorse, broom	Community

Key:

[1] Much of the information is based on anecdotal observation. Little is known of problem weeds on Central Otago rivers, and this needs to be included.

[2] Where the problem is considered community-based, the full community is identified as the major problem species.

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