Implications of a subdivision proposal near an important shorebird breeding site

R J Pierce
Department of Conservation
PO Box 842
Whangarei

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Abstract

This report contains abridged evidence given at a hearing. The Minister of Conservation had objected to a proposed District Plan Change which would have sanctioned extensive subdivision near the Waipu Spit Wildlife Refuge. The Minister's evidence focused on natural values of the area, including wildlife values, history of management at the site, and the implications of the proposed subdivision should it proceed. This report covers the latter evidence. It may be of use in developing similar cases for minimising impact on shorebirds elsewhere in New Zealand

1. Introduction and scope of evidence

The Waipu Spit and Estuary are internationally important habitats in that they support significant numbers of threatened shorebirds (Booth 1997, Hansen 1998). Although some species are present at the spit and estuary throughout the year, it is the breeding season which is the most sensitive period for all species.

My evidence focuses on:

(a) The significance of Waipu Spit and Estuary for shorebird breeding productivity. By "shorebirds" I refer to waders, gulls and terns of the order Charadriiformes, and at Waipu focus particularly on three threatened species - NZ fairy tern *(Sterna nereis davisae),* NZ dotterel *(Charadrius obscurus)* and variable oystercatcher *(Haematopus unicolor).*

(b) Impacts of people on nesting shorebirds at Waipu and elsewhere in the world.

2. Productivity of Waipu Spit shorebirds

In 1997 the Department reviewed the previous twelve years of shorebird protection in Bream Bay and Mangawhai based on the annual monitoring reports of wardens. This review is contained in Booth (1997) and includes data from Waipu. The data indicate a moderate - high average breeding success at Waipu Sandspit for all shorebird species. Hatching success averaged 40 - 60%, being highest for the NZ fairy tern (the highest ranked threatened species present). Fledgling success (proportion of hatched young that subsequently

fledged) averaged 33% to over 80% and was highest for NZ fairy terns and NZ dotterels, the two highest-ranked threatened species that breed here (Table 1).

At first, these figures seem adequate to maintain viable breeding populations at the sandspit, bearing in mind that individuals can survive and breed up to the age of ten years or more. These breeding success results have been achieved with little predator control, indicating that the site has some natural protection from predators. The figures also indicate that the food supply in the area for adults and chicks alike is more than adequate. They have, however, been achieved with substantial visitor management (Booth 1997, Hansen 1998).

It is with respect to NZ fairy terns, however, that I strongly caution optimism. The 1996/97 season, for example, was a complete failure for a variety of reasons. The world population of this Category A threatened bird is only about 30 individuals. They breed at only three sites, Waipu Sandspit, Mangawhai and South Kaipara Head. They often roost together in flocks outside the breeding season, also at only a few sites. A clumped distribution like this means that mortality or a disturbance event (e.g. shooting) is potentially catastrophic to the species because several individuals could die at once. With little control over those events, the prime direction of management effort then is to improve productivity at the three breeding sites. Accordingly, this is the focus of the NZ Fairy Tern Recovery Group. In 1997/98 improved and/or extended predator control, egg manipulation and people management, resulted in a significantly improved breeding success of NZ fairy terns at Waipu Sandspit and Mangawhai.

If protection at Waipu and other sites works, I expect the NZ fairy tern to increase in numbers and explore adjacent areas for nest sites. Waipu Sandspit offers potential future nest sites along its length, as long as these areas are not disturbed. It is therefore vital to the survival of the species.

3. Threats to Waipu shorebirds

At Waipu Sandspit, data on failed nests indicate that the management focus needs to be on people control, predator control and egg manipulation. The data on the causes of nesting failure for threatened species studied there between 1985 and 1996 are given in Table 2.

Human impacts and predation impacts will be underestimated in this sample. Human impact will have been the primary, but indirect cause in some of the "abandoned", "predation", "infertile/addled", and "unknown" failures. Furthermore, shorebirds seldom abandon nests unless unduly disturbed by people and their activities.

4. Human disturbance at other sites

At many other breeding sites in Northland, shorebirds fare very badly because of human disturbance. Some beaches and estuaries which offer good feeding and ideal physical sites for breeding, are too heavily frequented by people to enable successful breeding (Table 3).

Patterns of shorebird breeding success are mirrored by patterns of species abundances (Booth 1997). Thus, Waipu Spit and Mangawhai have maintained good populations of shorebirds since the 1980s with some upward trends. At the southern side of Ruakaka, however, NZ dotterels and variable oystercatchers have declined in numbers, almost certainly because of higher levels of disturbance there. On the north side of Ruakaka Estuary, however, where disturbance levels are lower, bird numbers have increased or remained relatively unchanged. Moreover, fairy terns have not nested on either side of Ruakaka Estuary since 1985, almost certainly because of higher disturbance levels there than currently at Mangawhai and Waipu.

A study of NZ dotterel breeding by Cumming (1991) showed that sites with low human disturbance were, on average, twice as productive as high-disturbance sites. He concluded that the differences in breeding success between high- and low-disturbance sites are large enough to be of biological significance and, needless to say, are relevant to resource managers.

Human activity has also been shown to impact on the feeding patterns of NZ dotterel chicks. Lord et al. (1997) found that when people were present, chicks spent less time than normal in the intertidal zone, which is in fact the preferred feeding area. They concluded that fledgling success of chicks may be enhanced if human access to feeding areas is reduced during the chick-rearing phase of the breeding season.

Overseas data also show clear relationships between human disturbance levels and the breeding failure rates of shorebirds. For example, an International Ecosystems Research Project in western Europe has documented the demise of breeding shorebirds caused by increased human disturbance and development at coastal sites (Table 4).

Overseas data also demonstrate the mechanisms of disturbance-related failures better than New Zealand data do. Although direct impacts do sometimes occur (e.g. standing on nests or desertion), most disturbance impacts are indirect. These include death of embryo due to excessive exposure to sunshine or chilling (the former can occur in 30 minutes) through the parent being kept continuously off the nest; they also include predation of eggs through nest sites becoming more visible to aerial predators such as gulls, because the repeated disturbance has brought about greater numbers of bird tracks going back and forth to and from the nest site (Flemming et al. 1988, Schultz & Stock 1993).

Increasingly, birds are being shown to suffer high stress levels (corticosterone response) from disturbance, although there is little overt sign of that stress. The increased energetic demands of that stress can lead to increased breeding failures and site desertion (WBM OceanicsAustralia & Claridge 1997).

5. Implications of proposed plan change for shorebirds

In southern Australia, the Australian fairy tern (*S. n. nereis)* and little tern (*S. albifrons)* have disappeared from many former nesting areas because of human disturbance. Both species survive only in intensively managed sites. With its much smaller population, however, the NZ fairy tern is in a far more desperate plight than either of the Australian close relatives.

The proposed plan change and subsequent development would result in increased human use of the Waipu Sandspit and estuary. Any increase in human activity will inevitably bring about increased failure rates of shorebirds. These failures can be through direct or indirect causes as explained above.

The proposed Government Purpose Reserve for wildlife management at Waipu would enable the most sensitive section(s) of the reserve to be closed to the public during the shorebird nesting season. However, this alone will not preclude visitors from illegal entry. In my experience these sorts of areas are likely to continue to attract people. This problem is common at sites throughout the world (Piersma 1996). Since I have been working for the Department of Conservation in Whangarei, I know that wardens at Waipu have had problems with people (including locals) in the bird nesting areas (Booth 1997, Hansen 1998). Because we anticipate this problem will increase over the years, the Department has approved a research programme to examine ways of minimising visitor impact on nesting shorebirds at Waipu Sandspit.

In conclusion, the real issue for shorebirds at Waipu is that the number of visitors to the site is gradually increasing. Those increased visitor numbers and the cumulative impacts on productivity over the years could be the undoing of NZ dotterels and NZ fairy terns in particular. The population dynamics of NZ fairy terns are very tenuously balanced between mortality and survival. The proposed plan change could therefore impact severely on this species.

7. Acknowledgements

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Table 1. Breeding success for threatened species nesting at Waipu Sandspit 1985 to 1996 (from Booth 1997).

Conservation status[1]	NZ fairy tern Category A	NZ dotterel Category B	Variable oystercatcher Category C
No. eggs studied	26	131	200
No. hatch	16	58	79
% hatch	62%	44%	40%
No. chicks studied	16	60	160
No. chicks fledge	12-14	≥34	52-54
% fledge	75-88%	≥57	33-34%
Overall breeding success	47-55%	≥25%	13-14%

[1] After Molloy & Davis 1994

Table 2. Causes of nesting failure at Waipu (from Booth 1997).

	NZ fairy tern	NZ dotterel	Variable oystercatcher	Total
Weather/tides	2	2	5	9(14%)
Abandoned		4		7(11%)
Human			2	2(3%
Infertile/addled	2	1	2	5(8%)
Dog		1		1(2%)
Predation	1	1	4	6(9%)
Unknown		17	19	36(55%)
Total	5	26	35	66

Table 3. Shorebird breeding sites in Northland.

Site	Managed	Human disturbance	Shorebird breeding success
Mangawhai[1]	Yes	Low	Mod/High
Waipu Spit[1]	Yes	Low/Med	Mod/High
Ruakaka[1]	Yes	Med	Mod/High
Urupukapuka[2]	No	High	Low
Takou Bay South[2]	No	High	Zero-low
Rarawa Beach[3]	No	High	Zero-low

Data from: ' Booth 1997, Cumming 1991, (refer also Table 1), 2 M McGlynn pers. COMM., 3 M Brown, B Waddell pers. comm.

Table 4. Relationship between disturbance intensity and number of nests lost in German kentish plovers (from Schulz & Stock 1993).

Parameter	Disturbance intensity (person hours/day)			
	0-2	2-4	4-10	>10
No. nests	20	21	22	22
% lost	10	13.6	28.6	36.4