THE ALEXANDRA BLACK-FRONTED DOTTERELS: 1982/83 SEASON

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ABSTRACT

In the 1982/83 season 13 adults of the Black-fronted Dotterel were again found on the Manuherikia riverbed near Alexandra, the same number as in the previous season.

Details of breeding case-histories for five pairs are given. Breeding success was very low because of predation and atypical persistent flooding throughout the season — which was also a very extended one, lasting from territorial occupancy in October to final fledging in April.

The incubation period is not less than 23 days and is likely to average about 26. Some details of eggs, nests and territories, as well as some aspects of behaviour, are described.

Overwintering

In the 1981/82 season we found 13 adults of the Black-fronted Dotterel (*Charadrius melanops*) on the Manuherikia River above Alexandra, Central Otago (Child 1982). By the end of the summer we knew of five pairs having hatched chicks, and one of these pairs had another brood of three in late February. From these six clutches only one addled egg was found.

On 21 April 1982, 12 adults and 8 immatures were congregated and feeding on the wet muddy and silty islands and backwaters at the confluence of the Manuherikia and Clutha Rivers at Alexandra. By 11 May, when frosts were common and increasing in severity, only one (adult) bird could be found further upstream. June and July were very wintry with weeks of continuous frosts, the margins and shallows of the Manuherikia River being so frozen up that feeding in those traditional areas would have been impossible. It was only the fluctuating levels at the confluence of the two rivers that exposed sufficient areas of soft mud to enable some birds to remain there under such cold temperatures. There was no way that they could overwinter on the riverbed as they tend to do in the North Island (Heather 1973).

From mid-July on, only eight birds in adult plumage remained in the same area all winter. September was mild, and no dotterels were present at this spot on the 26th; presumably they had moved back upriver.

1982/83 SEASON: BREEDING CASE-HISTORIES

The 1981/82 season was characterised by dry mild weather with a low river throughout, and breeding success was high in this and other riverbed species (see below under "Breeding Success").

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By contrast the 1982/83 season was disastrous for Pied Stilt (*Himantopus h. leucocephalus*) and Black-billed Gull (*Larus bulleri*), and much less successful for the Black-fronted Dotterel. The main reasons for this were as follows:

- 1. River levels remained at high to flood for about $6\frac{1}{2}$ weeks between 4 November and 24 January (i.e. over the main breeding period), together with an exceptionally high unseasonal flood on 13 January. Black-fronted Dotterels typically nest on shingle banks high enough to escape flooding, but this last flood destroyed at least one nest of three eggs and one clutch of two very young chicks.
- 2: Potential predators were on the increase, including stoats, feral cats, hedgehogs, Black-backed Gulls (*Larus dominicanus*) and White-backed Magpies (*Gymnorhina tibicen hypoleuca*). Pied Stilts in particular suffered heavily from predation in the 1982/83 season.

In the 1982 spring we again found 13 adults (6 pairs and a loner), although we did not search as much of the river as in the previous season. The following is a brief summary of their breeding histories:

Pair 7	4 14/10/82:	Believed incubating; nest not found			
	7/11/82:	2 chicks, 2-3 days old			
	18/12/82:	1 new chick only, a few hours old (not in nest)			
	9/1/83:	No juvenile found: believed nesting for third time			
	10/1/83:	Third nest found, 3 eggs: bird incubating			
	14/1/83:	Flooded out on 13th: unseasonal very high flood			
	14, 15, 1	7, 21/1/83: Parents could not be found			
Pair E	· 7/11/82:	3 eggs, incubating			
	30/11/82:	All successfully hatched late in the evening			
	9/1/83:	3 flying juveniles; adults present, believed re-nesting			
	15/1/83:	1 egg in nest, cold; had been flooded on the 13th			
	17/1/83:	Still 1 egg in nest but warm!			
	21/1/83:	3 eggs, bird incubating			
	14/2/83:	All successfully hatched			
	11/4/83:	Only 2 juveniles and the parents in the vicinity			
Pair C	21/11/82:	Parents with 2 chicks about 3-4 days old			
	13/12/82:	Chicks fledged, one flying, other not yet able;			
		parents upriver			
	20/12/82:	Both juveniles flying			
	20/12/82:	Renested, 3 eggs, incubating (believed started on			
	10 11 10 7	$1/(\ln)$			
	10-11/1/83:	Hatching extended from about / p.m. to 10 a.m.			
		(2 healthy chicks)			
	14/1/83:	Could not find parents or chicks; chicks believed			
		lost in flood on 13th			
15, 17, 21, 23/1/83: Neither parents nor chicks could be found					

Pair D 4/12/82: 3 eggs, incubating

- 18/12/82: 1 chick hatched, not found; other 2 eggs evidently infertile as no change up to 25th, when eggs still cold
 - 24/1/83: No sign of parents or juveniles but some footprints on mud
- Pair E 9/12/82: Believed breeding, but after 3 days watching and searching we gave up!
- Pair F 3/1/83: Evidently had chicks, almost on fledging, but not found. Watched copulation, trial nest-sitting and other behaviour
 - 5, 7, 8/1/83: No eggs in this nest and no birds sitting or nearby 7/1/83: 2 flying juveniles (from first clutch) up and down river
 - 8/1/83: New nest found (2 eggs) 60 m away; bird incubating
 - 24/1/83: Both eggs predated

An indeterminate pair which had 2 eggs in a very late (February) nest at a territory between those of A and C lost both to predation. It is possible that Pair A (who appeared to be inexperienced parents and who lost their third clutch of 3 in the mid-January flood) in fact nested a *fourth* time.

Breeding success

In the very favourable 1981/82 season, of the results known to us

- 1. Hatching success was 17 out of 18 = 94%, and
- 2. Fledging success was 12 out 17 = 71%.

This is much higher than that suggested by Heather (1973) for the birds on the Wairarapa rivers.

The 1982/83 season, however, revealed a very different story. Assuming the normal clutch of three eggs in each of three nests not found early in the season, we have the following results:

- Hatching success, 17 out of 31 = 55% Losses of eggs were: By flood, 3 = 10% Addled (deformed embryo), 1 = 3% Infertile, 2 = 6% Believed predated, 8 = 26%
- 2. Fledging success (i.e. fledged to hatched), 9 out of 16 = 56%The fate of one hatchling is unknown Losses of chicks were: By flood, 2 = 13%Believed predated, 5 = 31%
- 3. Maximum overall fledging success (i.e. fledged to eggs laid), 9 out of 31 = 29%, but if the one hatchling mentioned above lived to fledge success could have been 10 out of 31 = 32%. The contrast with the 1981/82 season is obvious.

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Incubation and hatching

Incubation period: It is certain that Frith's (1969) time of "about 18 days" is much too short, at least in New Zealand. The only New Zealand record (Hadden 1973) published gives 25-26 days for one nest in the Wairarapa. Our own observations on the Manuherikia give the following picture:

From Pair A, first clutch: Not less than 23 days From Pair B, first clutch: Not less than 24 days From Pair B, second clutch: Not less than 25 days; possibly 27 From Pair C, second clutch: Between 23 and 26 days

Further study in New Zealand is still needed. The difficulty on the Manuherikia is that there are too few pairs scattered along the extensive shingle reaches, and so the chance of finding an incomplete clutch is small. Furthermore, the birds are rather mobile, restless and reluctant to return to the nest vicinity until the clutch is complete and incubation has begun.

Hatching timetable: The sequence for the first clutch of Pair B was as follows:

28 Nov	1.30	p.m.:	No sign of pipping; no sounds from within
70 NI-	1 40		eggs
30 INOV	1.40	p.m.:	No sign of pipping; chicks peeping within
30 Nov	9.15	p.m.	(just on dark): One dryish chick: one chick
		1	just hatched; other egg unpipped; no egg-
			shell found
30 Nov	10.15	p.m.	(full moon): Third egg well pipped
1 Dec	7 50	0.000	(and almost a frast). Three abjects in next
I DCC	7.50	a.m.	(cool, almost a most). Three chicks in nest,
I Dee	7.50	a.m.	all dry; no eggshell seen; both parents
1 Dec	7.50	a.m.	all dry; no eggshell seen; both parents within 90 m of nest but no distraction dis-
1 Dec	7.50	a.m.	all dry; no eggshell seen; both parents within 90 m of nest but no distraction dis- play given
1 Dec	11.20	a.m.	all dry; no eggshell seen; both parents within 90 m of nest but no distraction dis- play given (sunny, mild): Nest empty; one parent in
1 Dec	11.20	a.m.	all dry; no eggshell seen; both parents within 90 m of nest but no distraction dis- play given (sunny, mild): Nest empty; one parent in weedy side-channel 10 m away, probably
1 Dec	11.20	a.m.	all dry; no eggshell seen; both parents within 90 m of nest but no distraction dis- play given (sunny, mild): Nest empty; one parent in weedy side-channel 10 m away, probably with the chicks; other parent feeding on

From the times of the observation and the state of the eggs and chicks we estimated 1-2 hours between 'normal' hatchings; later observations with the second clutch of pair C confirmed this.

For a precocial species there is an obvious survival advantage in hatching late in the evening, when predation is less likely, most of our predators being diurnal species, and chicks can be brooded overnight, allowing them to dry out and gain strength before moving from the nest and foraging with the parents the next morning. (In the above example, the cold dawn probably delayed departure from the nest.)

Fledging period

There seems to be a wide variation in this time interval, perhaps governed by such factors as the parents' experience in raising a brood and their degree of attachment to a later nest. The only two periods which we could define were of 40 days and 27 days, both with chicks of first clutches. Both pairs were renesting, but in the first case the parents continued to associate closely with their offspring for several days after they had started to incubate the second clutch. This same pair again showed devoted attachment to their offspring of the second clutch, being still on territory with the two surviving juveniles on 11/4/83, 57 days after hatching, but as this was the end of the 'season' perhaps this time interval is atypical. Further observation is needed.

Eggs and nests

From the two seasons we have now seen a total of 10 clutches, eight being full clutches of 3 eggs and two being late-season clutches of 2. The measurements of the 28 eggs are

	Length	Width
Range	27.3 - 31.4	20.4 - 21.7
Mean	28.75	21.15
SD	0.99	0.35

Background colour varied from stone-cream through creamy buff to a fairly bright buffy yellow, superimposed with fine light brown, dark brown and greyish purple or mauve spots and pencillings all over, sometimes forming a distinct wide darker band near the broad end; the general appearance from a distance was thus greyish stone, dun, or yellowish khaki. Eggs of one particular clutch are usually remarkably uniform both in size and coloration (cf. Maclean 1977).

On this riverbed a typical nest is in surface gravels of mixed grades, stones being 1-10 cm across — not the uniformly large cobbles favoured by the Black-fronted Tern (*Sterna albostriata*) or the homogeneous sandy or gritty substrate sometimes used by the Banded Dotterel. From the nest site there is always a clear view up and down the river, although two nests were surprisingly close (less than 5 m) to marginal vegetation (willows in one case and gorse in the other).

From ten nests, the average distance to the nearest point of the river margin was 32 m (range 11-60 m), while the average distance to the nearest water of any kind (including backwaters, side channels, etc., i.e. more favoured feeding habitats) was 23 m (range 5 - 48 m).

The nest is a shallow saucer-like depression, about 10 cm in diameter, sometimes partly sheltered by a large stone or two, and with its base lined with fine pebbles about 0.5 cm across. It sometimes contains a few very fine dry twigs, and also shrivelled willow catkins and leaves that have probably been blown in.

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Since the eggs are so protectively coloured and hundreds of similar small depressions are along each extensive shingle stretch, the chances of finding a nest casually are very slim.

Territory size and features

Because the dotterel population is sparse and the shingle reaches of the riverbed are discontinuous, we cannot tell what is the minimum territorial requirement. However, the pairs we studied this season occupied stretches of riverbed from about 145 m to 380 m in length (in a direct line). The average of 9 measured was 216 m. Width on this riverbed, including the river itself, varies from about 30 m to 220 m.

As well as a suitable shingle terrace, bar or island for a nest site, sections of both sides of the river itself are used for feeding, as are these most important subhabitats: very shallow riffles, silty or muddy pool-sides and shallows, stagnant backwaters, seepages and small side-channels. Thus, in general, there are two major feeding substrates: still or slow-moving water shallow enough for probing and fossicking among stones or algae; and damp surfaces of mud, silt or sand.

In changeable, rainy seasons (such as we have just experienced) chicks which were hatched on islands were more likely to become flood victims than those reared on the relatively safer bars and higher terraces bordering the river. When alarmed, chicks often use the sparsely vegetated environs of the subhabitats listed above in which to hide, their cryptic coloration making them very inconspicuous among the stones and weeds. Sometimes the (breeding) adult also stands motionless, back to observer, among these weedy borders. During incubation the off-duty parent is typically found feeding on the opposite side of the river from the sitting bird, and may be up to 100 m or so from the nest.

Differences between male and female

From Pair F, where copulation was observed several times (see below), we concluded that, in comparison with the male the female had

- 1. Slightly larger body build heavier, more robust, wider in cross section through the breast region when viewed from in front;
- 2. Upper surfaces rather more tawny brown then grey-brown;
- 3. The black arms of the Y broader up the sides of the neck;
- 4. The black on the carpal bend more pronounced; and
- 5. The chestnut on the scapulars wider and deeper in shade.

These differences were confirmed with Pair B from as close as 15 m.

However, much of this may be due to an age difference, the male in each case perhaps being a first breeder not yet having acquired the full richness of plumage of mature adulthood. Sexes of the other pairs we studied could not be distinguished at a distance in such a manner, but we were unable to view them at such close range. Much further study, with banding, is needed to shed some light on the subject.

SOME OBSERVATIONS ON BEHAVIOUR

Copulation: Copulation of Pair F was seen four times.' Compare with Maclean (1977).

- 1. Both preened for a few minutes on high shingle after feeding on mud; the male then made a fast run to the female (about 3 m away), which adopted a low horizontal soliciting posture. The male mounted immediately; contact lasted only a few seconds; the male dismounted on her left side. stood and stretched his wings upwards; then both trotted quickly back to the edge of the river and resumed feeding.
- 2. Another day: Both had been feeding among stones at the river's edge; the female then ran towards the male, who walked quietly about 1 m to meet her, and mounted. After contact for a few seconds he dismounted at the rear, moved away and stood still about 0.5 m away.
- 3. One minute later: She crouched; he walked up and stood on her back; she rose and took two or three steps; he stayed on, copulated quickly and then stepped off behind. She moved off upriver feeding, and bathed. He stayed put, preened and bobbed, and after a few minutes, continued feeding. Five minutes later he flew off down river and returned 8 minutes later.
- 4. Sixteen minutes later: She crouched on the shingle; he ran about 2 m and mounted again. After copulation they stood close together, preened and then began feeding. A few minutes later he flew off down river again to what later proved to be a 'false' nest-site. It seemed by subsequent behaviour at this site that he was trying to entice her to lay there, but in fact she later laid two eggs in a nest about 50 m further down river.

No calls were heard during these four encounters.

During incubation: The male of Pair B took very long periods, 24-52 minutes, to return to the nest after being flushed. By contrast the female took only 2-10 minutes to return. (On two other occasions a bird from each of pairs B and F took $1\frac{3}{4}$ hours to return to the nest!) During incubation the off-duty bird stayed considerable distances from the nest (up to 90 m, and occasionally nowhere to be seen), feeding, preening and just standing still among the shingle.

While on the nest (as observed from a hide 5 m off) the adult was often restless, with much head-turning, shuffling about on the eggs, ruffling the dorsal feathers, opening and closing the mandibles; at other times 'dozing' with eyes closed, and uttering very quiet

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'chittery' noises. On two occasions the bird crouched over the eggs for lengthy periods as if shading them, although the day was not particularly warm. During brooding of two newly hatched chicks and incubating of the third egg, one bird (the male?) of pair C was much less attentive, more nervous and shuffly on the nest than his mate; this restlessness seemed to be transferred to the chicks, which periodically distracted him from incubation by straying off; by contrast the female(?) was able to gather in the chicks much better and keep them calm and quiet for much longer periods.

Brooding intervals: From the second clutch of pair C, where two chicks were being brooded while awaiting the third egg to hatch, and over an observation period of more than four hours, the 'male' averaged 22 minutes per brooding and the 'female' 44 minutes. The overall average for both parents was 32 minutes.

Awareness of potential predator: On one occasion the flushed bird of pair B had almost returned to the nest when a Black-backed Gull appeared, flying down-river about 15 m above the shingle. The dotterel immediately turned 180° and ran very quickly 20 m or so towards the bordering willows. After the gull had passed out of sight the dotterel walked at a cautious steady pace to settle on the nest.

Attachment to brood: An adult of pair C was brooding the two young chicks and incubating the third egg; when PC went out at 11 p.m. to check the state of incubation it remained firmly on the nest while he approached by torchlight, and he was able to pick it up with the two chicks well held by the underwing feathers! This is in marked contrast to their usual timid and furtive behaviour in daylight hours.

Disposal of egg-shell: On one occasion at pair D territory, egg-shell (presumably from the first egg hatched) was found on mud among a clump of sedges 56 m from the nest. (The other two eggs from this clutch were infertile). On another occasion (third egg, pair C) the adult flew 25 m downstream with the shell, seemed to drop it on the shingle or in the water, and returned immediately to the nest.

Attempted 'takeover' by a stranger: During the brooding and incubation of Pair C's second clutch these events were recorded:

- 0731: A strange adult (believed to be the unmated loner from upriver) walked in from the edge of the river with much 'chipping' and attempted to take over the nest from the sitting bird. Much squabbling ensued on the ground, followed by an aerial chase.
- 0736: The stranger appeared again on the shingle close to the car (which was our observation hide c. 15 m from the nest) and the off-duty bird chased it away downstream.
- 0834: Again the strange adult was chased away at the edge of the river by the off-duty bird.

Possible competition with Banded Dotterel: By contrast with the conclusion reached by Heather (1973) on the Wairarapa riverbeds, we have the distinct feeling that the Banded Dotterel has suffered on the Manuherikia since its colonisation by the Black-fronted. In fact, in the 1982/83 season we found no Bandeds at all on the stretches of shingle and old adjoining river terraces where there were small numbers a few years ago. Although there has been some deterioration of habitat for this species (encroachment of weeds, disturbance by humans and stock) this could hardly explain their total absence, as some drier pockets of suitable terrain (which the Black-fronted Dotterel does not favour) still remain.

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