

VICTORIAN WADER STUDY GROUP



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STUDY GROUP

VICTORIAN WADER STUDY GROUP INC.

BULLETIN No 11

JULY 1987

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*A fascination for animals, an interest
in their small decisions and inscrutable*

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1986 WADER BANDING HIGHLIGHTS

1986 was the most successful year yet for the VWSG.

Firstly, some 9,201 birds were caught, beating the previous record of 7,922 (in 1979) and more than 50% above the average of 6,049 for the eight year period since cannon netting was first introduced in early 1979 (see the tables which follow this summary).

Secondly, the quality of the catches was the best ever. Notable totals for particular species were -

743 Doublebanded Plover	(previous best year 281; previous total 1,260)
341 Red Knot	(previous best year 208; previous total 727)
178 Bartailed Godwit	(previous best year 201; previous total 372)
132 Great Knot	(previous best year 79; previous total 168)
84 Lesser Golden Plover	(previous best year 29; previous total 79)
28 Greytailed Tattler	(previous best year 3; previous total 6)
14 Grey Plover	(previous best year 18; previous total 29)
6 Terek Sandpiper	(previous best year 4; previous total 19)

In almost all the above species the catch was the best annual total and added at least 50% to the previous grand total! Furthermore, many of the catches of these 'special' species were made in months for which previous samples were small or completely missing. The results certainly prove the success of the targetted fieldwork programme - each time the group goes into the field it has specific priorities designed to fill identified gaps in the data or to satisfy other particular objectives.

In contrast, no Pied Oystercatchers were caught - the first year this has occurred. It is planned to carry out a major study of this species in the future but this programme will only commence when the current high level of activity on Doublebanded Plovers has been reduced.

No Latham's Snipe, Rednecked Avocets, or Redkneed Dotterels were banded in 1986 either - and only one Eastern Curlew and three Masked Lapwings. As usual in the case of Eastern Curlew, it was not through lack of effort - their skill at detecting nets still exceeds ours at camouflaging them!

Another pleasing feature of 1986 was that more birds were caught at Yallock Creek (Westernport Bay), Queenscliff and Inverloch (Anderson's Inlet) than at Werribee - which has always been the core site of the study. This has improved the comprehensiveness of the wader data, both geographically and in terms of the less frequently caught species. However, the Werribee Sewerage Farm/Spit area remains the most important location for the long term population studies (annual variations in breeding success, annual survival/mortality) of the three major study species - Rednecked Stint, Curlew Sandpiper and Sharptailed Sandpiper. With banding there going back to 1976, it is pleasing that a number of 8, 9 & 10 year old birds are now being recaptured.

The 1986 breeding season in the Arctic seems to have been a poor one for most species (except Bartailed Godwit) - in contrast to the excellent breeding season in 1985. The percentage of young birds in the 1986/87 summer populations of the two main 'monitor' species - Rednecked Stint and Curlew Sandpiper - was unusually low at all four of the 'standard' sampling locations.

% Juveniles in Catches, December 1986 to February 1987

	Rednecked Stint		Curlew Sandpiper	
	Number Caught	% Juvenile	Number Caught	% Juvenile
Werribee S.F.	416	0.5%	806	3.2%
Queenscliff	195	0.5%	83	2.4%
Yallock Creek	478	1.0%	220	4.5%
Inverloch	466	17%	92	24%

The figures for Inverloch, though higher than the others, are much lower than normal. It is a location to which young birds preferentially locate (or are driven!).

It was an exciting year also for recoveries of banded birds. The phenomenal success of the co-operative study with New Zealand on Doublebanded Plovers is covered elsewhere in this Bulletin, with a paper analysing the trans-Tasman movements. From the first sighting of a New Zealand colour banded bird at Point Wilson, Werribee S.F., in 1979 the total of individual colour banded birds which have now been recorded crossing the Tasman Sea has grown to 229. 102 of these were seen in New Zealand in the 1986/87 summer and the total for the 1987 winter in Australia is now nearing 90 (not included in the 229 total). This has been a truly magnificent collaborative effort by ornithologists in both countries.

Co-operation between Australia and New Zealand has now spread to the Red Knot! A catch of 785 at the Kaipara Harbour (60 km N. of Auckland) contained four birds banded at Queenscliff - one only 3½ months previously. Future fieldwork on the Red Knot will be aimed at further delineating the link between the populations in the two countries.

Other notable recoveries included our first Lesser Golden Plover (Werribee to Queensland), our first Great Knot (Queenscliff to China), Rednecked Stints from Werribee to China and Vietnam, our first Curlew Sandpiper in Vietnam (from Werribee) and another in Hong Kong (banded at Queenscliff 3½ months earlier). The information on local movements within Victoria of a number of species was greatly expanded, from both retraps and sightings of colour-marked birds.

1987 has started well with 3,135 waders caught in the first half of the year. The "quality" was not up to the exceptional level of 1986 but there were some notable new successes. Pride of place goes to 47 (fat) Turnstones caught at Queenscliff on 28 March, just prior to their departure on northward migration. And although the level of catching activity on Doublebanded Plovers has been reduced, the catching success has been extraordinarily high - catches of 144, 74, 29, 61 and 139 (up to 12 July) giving a total of 447 at an average catch of 89 (twice the overall average). Hopefully the remainder of 1987 will see further successes.

WADER BANDING TOTALS - VICTORIA - 1986

	<u>NEW</u>	<u>RETRAP</u>	<u>TOTAL</u>
Masked Lapwing	3	-	3
Grey Plover	12	2	14
Lesser Golden Plover	84	-	84
Hooded Plover	3	-	3
Mongolian Plover	8	-	8
Doublebanded Plover	586	157	743
Large Sand Plover	2	1	3
Redcapped Plover	29	5	34
Blackfronted Plover	2	-	2
Ruddy Turnstone	21	3	24
Eastern Curlew	1	-	1
Greytailed Tatler	27	1	28
Terek Sandpiper	6	-	6
Bartailed Godwit	142	36	178
Red Knot	300	41	341
Great Knot	114	18	132
Sharptailed Sandpiper	127	6	133
Rednecked Stint	4,526	1,461	5,974
Curlew Sandpiper	1,151	326	1,477
	<u>7,144</u>	<u>2,057</u>	<u>9,201</u>

VICTORIAN WADER CATCHES
1975 TO 31 DECEMBER 1986

	<u>NEW</u>	<u>RETRAP</u>	<u>TOTAL</u>
Pied Oystercatcher	199	102	301
Sooty Oystercatcher	4	1	5
Masked Lapwing	125	3	128
Grey Plover	41	2	43
Lesser Golden Plover	152	11	163
Redkneed Dotterel	133	11	144
Hooded Plover	15	1	16
Mongolian Plover	64	2	66
Doublebanded Plover	1,740	263	2,003
Large Sand Plover	15	1	16
Redcapped Plover	406	139	545
Blackfronted Plover	52	4	56
Blackwinged Stilt	10	-	10
Rednecked Avocet	139	1	140
Ruddy Turnstone	105	5	110
Eastern Curlew	116	2	118
Whimbrel	1	-	1
Greytailed Tatler	33	1	34
Greenshank	1	-	1
Terek Sandpiper	15	1	16
Latham's Snipe	54	-	54
Bartailed Godwit	512	38	550
Red Knot	997	71	1,068
Great Knot	275	25	300
Sharptailed Sandpiper	2,606	64	2,670
Little Stint	1	-	1
Rednecked Stint	26,113	5,970	32,083
Longtoed Stint	1	-	1
Curlew Sandpiper	8,720	1,478	10,198
Sanderling	14	-	14
<u>30 Species</u>	<u>42,659</u>	<u>8,196</u>	<u>50,855</u>

In addition, the Group has been involved in handling a further 16,050 waders during joint operations with local groups in other States. If these are included the VWSG has now been involved in the catching of 66,526 waders.

ANNUAL WADER BANDING TOTALS BY
VWSG IN VICTORIA

<u>CALENDAR YEAR</u>	<u>NEW</u>	<u>RETRAPS</u>	<u>TOTAL</u>
1975	9	-	9
1976	616	4	620
1977	482	12	494
1978	1,296	42	1,338
1979	7,436	486	7,922
1980	6,121	1,206	7,327
1981	4,561	869	5,430
1982	3,774	796	4,570
1983	2,875	628	3,503
1984	4,272	1,045	5,317
1985	4,073	1,051	5,124
1986	7,144	2,057	9,201
Total catches in Vic. to end 1986	<u>42,659</u>	<u>8,196</u>	<u>50,855</u>

Average annual total for 1979 to 1986 period is 6,049.

LOCATION OF WADERS CAUGHT IN VICTORIA

	<u>TO DEC.</u> <u>1985</u>	<u>1986</u>	<u>TOTAL</u>
Werribee	22,850	1,513	24,363
Westernport Bay	7,648	2,865	10,513
Queenscliff/Pt. Lonsdale	7,246	1,910	9,156
Anderson's Inlet (Inverloch)	1,698	1,634	3,332
Corner Inlet	1,570	865	2,435
Altona	315	412	727
Bendigo (Sewage Farm)	143	-	143
Seaford Swamp	98	-	98
Mud Island	35	-	35
Geelong (Point Henry)	25	-	25
Seaspray (Lake Reeve)	18	-	18
Towong	8	2	10
	<u>41,654</u>	<u>9,201</u>	<u>50,855</u>

Totals include 42,659 newly banded birds and 8,196 retraps of 30 species.

"Processing" includes measuring wing length, bill length and/or total head length (as appropriate) and weight; also recording full details of primary wing feather moult (if any). Additional wing moult has been gathered on some birds which were not fully processed. The table below is used to plan fieldwork, with the object of obtaining usable samples (preferably on at least 50 birds) of data for each month of the year for all the main study species.

	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
Pied Oystercatcher	4	13	82	28	30	98	7	-	2	4	9	20	297
Sooty Oystercatcher	-	-	3	-	-	2	-	-	-	-	-	-	5
Masked Lapwing	4	2	77	-	-	13	-	-	-	2	18	11	127
Grey Plover	1	-	4	3	-	2	-	-	2	18	13	-	43
Lesser Golden Plover	9	26	30	1	-	-	-	-	-	-	40	39	145
Redkneed Dotterel	-	10	-	20	-	44	11	16	12	8	22	-	143
Hooded Plover	-	-	-	-	-	15	-	-	-	-	-	-	15
Mongolian Plover	46	-	5	7	1	1	1	-	-	-	1	-	62
Doublebanded Plover	-	-	94	113	293	353	491	556	1	-	-	-	1,901
Large Sand Plover	14	-	-	-	-	-	1	-	-	-	1	-	16
Redcapped Plover	8	46	22	108	165	59	58	11	8	10	8	3	506
Blackfronted Plover	-	7	-	-	11	16	6	9	2	-	4	7	62
Blackwinged Stilt	-	6	-	-	-	-	-	-	-	1	2	1	10
Rednecked Avocet	39	-	-	-	-	-	-	10	2	6	46	36	139
Ruddy Turnstone	15	-	28	27	-	6	-	-	10	7	1	14	108
Eastern Curlew	15	-	1	-	-	15	-	-	8	34	40	5	118
Greytailed Tatler	28	-	-	3	-	3	-	-	-	-	-	-	34
Greenshank	1	-	1	-	-	-	-	-	-	-	-	-	2
Terek Sandpiper	8	1	-	-	2	-	-	-	-	-	-	6	17
Latham's Snipe	29	44	-	-	-	-	-	-	-	1	4	8	86
Bartailed Godwit	72	-	15	1	-	6	-	-	34	28	124	266	546
Red Knot	107	33	56	34	2	39	73	-	8	256	234	170	1,012
Great Knot	96	-	3	-	-	4	-	-	15	20	36	127	301
Sharptailed Sandpiper	821	179	93	2	-	-	-	9	460	149	238	532	2,483
Little Stint	-	-	-	-	-	-	-	-	-	-	1	-	1
Rednecked Stint	1,232	684	3,400	1,632	233	143	244	206	431	863	2,272	1,889	13,229
Longtoed Stint	-	-	-	-	-	-	-	-	-	1	-	-	1
Curlew Sandpiper	402	612	923	126	85	5	113	142	149	245	482	700	3,984
Sanderling	11	-	-	-	-	-	-	-	-	1	-	2	14
Whimbrel	-	-	-	-	-	1	-	-	-	-	-	-	1
													25,408

The majority of the 1,327 birds caught in Tasmania (Nov. 1979), 820 birds in South Australia (Feb. 1980), 921 birds in New South Wales (Mar. 1981) and 12,982 in Western Australia (Aug./Sept. 1981, Aug./Sept./Nov. 1982, Oct./Nov. 1983, Mar./April 1985 and Aug./Sept. 1986) were also processed.

RECOVERIES OF BANDED BIRDSLesser Golden Plover

061-37792	Adult	7.1.84	Werribee	
	Found injured	23.9.86	Bundaberg, Queensland	1638 km NNE

This is our first recovery of this species and our first wader recovery in Queensland. The NNE direction may be significant (most other species tend to move in a direction west of north from Victoria) as the only overseas recovery relating to Australia was a bird from Alaska recovered in New South Wales.

Doublebanded Plover

New Zealand B52921	Chick	3.11.84	Cass River, Lake Tekapo NEW ZEALAND	
	Seen	15.6.85	Yallock Creek	2187 km W
	Seen	14.6.86	Yallock Creek	
	Recaptured	28.6.86	Yallock Creek	
New Zealand B54259	Adult F	1.11.85	Rees River, NEW ZEALAND	
	Recaptured	28.6.86	Yallock Creek	2043 km W
	Recaptured	16.8.86	Yallock Creek	
New Zealand B54203	Adult M	22.9.85	Matukituki River, NEW ZEALAND	
	Seen	12.7.86	Queenscliff	2119 km W
	Recaptured	20.7.86	Queenscliff	
New Zealand B53670	Chick	23.11.85	Ashburton River, NEW ZEALAND	
	Recaptured	9.8.86	Inverloch	2239 km W
New Zealand B54138	Adult F	2.10.85	Oreti River, NEW ZEALAND	
	Seen	27.7.86	Inverloch	2027 km W
	Recaptured	10.8.86	Inverloch	
041-17992	Juvenile	28.6.86	Yallock Creek	
	Recaptured	31.10.86	Lake Tekapo, NEW ZEALAND	2187 km E
041-16439	Adult	28.3.86	Queenscliff	
	Recaptured	15.11.86	Ashley River, NEW ZEALAND	2390 km E
041-15432	Juvenile	20.7.85	Queenscliff	
	Recaptured	17.11.86	Cass River, NEW ZEALAND	2249 km E
041-01280	Adult	23.5.81	Werribee	
	Recaptured	21.11.86	Cass River, NEW ZEALAND	2269 km E
New Zealand B53566	Chick	24/12/84	Cass River, NEW ZEALAND	
	Recaptured	18.5.85	Werribee	2269 km W
	Recaptured	31.5.87	Werribee	

This further extensive list of recoveries of birds moving between Australia and New Zealand is an indication of the intensive collaborative study which has taken place in the last few years. There have been many additional sightings of colour banded birds. An analysis of the pattern of movements is presented elsewhere in this bulletin.

Red Knot

051-02342	Adult	31.10.82	Queenscliff	
	Recaptured	28.2.87	Kaipara Harbour, NEW ZEALAND	2924 km E
051-16166	1st Year	3.6.84	Queenscliff	
	Recaptured	28.2.87	Kaipara Harbour, NEW ZEALAND	2924 km E
051-18305	Adult	19.10.85	Queenscliff	
	Recaptured	28.2.87	Kaipara Harbour, NEW ZEALAND	2924 km E
051-15386	Adult	8.11.86	Queenscliff	
	Recaptured	28.2.87	Kaipara Harbour, NEW ZEALAND	2924 km E

These four Queenscliff-banded birds were all recaptured in a cannon net catch of 785 Red Knot at Kaipara, 60 km N. of Auckland. The three adult birds were all banded in the October/November period - the first proof of the suspected passage of New Zealand birds through Queenscliff. Note that 051-15386 was banded and recovered in the same 'season'. The bird banded as a first year in June 1984 is the second from that catch to be recovered in New Zealand.

There have now been six recoveries in New Zealand of Red Knots banded in Port Phillip Bay, and eight recoveries in total linking the populations in Australia and New Zealand.

Great Knot

061-39973	Adult	5.1.86	Queenscliff	
	Trapped	20.4.86	Hangzhou Bay, Shanghai, CHINA	8015 km NNW

This is the VWSG's first recovery of a Great Knot. It is in a similar region of China to recoveries of Great Knot banded in N.W. Australia.

Sharptailed Sandpiper

040-77229	Fullgrown	21.3.81	Stockton, Newcastle, N.S.W.	
	Found dead	3.1.87	Altona	840 km SW

This bird was found by Angela Jessop when taking her dog for a walk! It is the third Sharptailed Sandpiper banded on 21.3.81 at Stockton to have subsequently been recovered on Port Phillip Bay - strongly indicative that many Sharptailed Sandpipers which spend the summer in Victoria depart in a NE direction for the first stage of their journey to their arctic breeding grounds.

Rednecked Stint

032-35435	1st Year	24.7.82	Werribee	
	Trapped	-6.84	Chongming Island, Shanghai, CHINA	8079 km NNW
032-46139	Juvenile	27.3.83	Queenscliff	
	Recaptured	15.2.86	Werribee	25 km NNW
032-46830	Juvenile	29.12.84	Queenscliff	
	Recaptured	1.3.86	Inverloch	103 km ESE
032-46916	Juvenile	29.12.84	Queenscliff	
	Recaptured	1.3.86	Inverloch	103 km ESE

032-22550	Juvenile	2.1.83	Hobart, Tasmania	
	Recaptured	2.3.86	Barry Beach	487 km N
032-54300	Adult	23.3.85	Queenscliff	
	Recaptured	2.3.86	Barry Beach	158 km ESE
032-42118	Juvenile	24.11.84	Inverloch	
	Recaptured	2.3.86	Barry Beach	56 km E
032-23004	Fullgrown	23.11.79	Hobart, Tasmania	
	Recaptured	10.10.82	Hobart, Tasmania	
	Recaptured	2.3.86	Barry Beach	484 km N
032-26374	Adult	9.11.80	Werribee	
	Recaptured	12.1.86	Hobart, Tasmania	604 km SSE
032-42019	Adult	28.11.84	Inverloch	
	Recaptured	28.3.86	Queenscliff	103 km WNW
032-42284	Adult	24.11.84	Inverloch	
	Recaptured	28.3.86	Queenscliff	103 km WNW
032-46531	Adult	4.9.83	Werribee	
	Recaptured	28.3.86	Queenscliff	25 km SSE
032-41958	Adult	24.11.84	Inverloch	
	Recaptured	28.3.86	Queenscliff	103 km WNW
032-17581	Juvenile	11.3.79	Werribee	
	Trapped	20.4.86	Quinhon, VIETNAM	6816 km NW
032-44664	Juvenile	9.3.86	Hobart, Tasmania	
	Recaptured	10.5.86	Inverloch	509 km NNW
032-54960	Juvenile	18.1.86	Yallock Creek	
	Recaptured	6.12.86	Hobart, Tasmania	558 km SSE
032-35610	Adult	2.10.82	Werribee	
	Recaptured	5.3.83, 26.2.84, 26.1.85, 23.2.85,		
	and	28.3.86	Queenscliff	25 km SSE

Curlew Sandpiper

040-97417	Adult	26.1.80	Werribee	
	Recaptured	8.3.80	Werribee	
	Shot	26.4.83	Ho Chi Minh, VIETNAM	6680 km NW
041-13220	Adult	2.10.83	Hobart, Tasmania	
	Recaptured	19.10.85	Queenscliff	579 km NNW
041-13697	Adult	2.11.83	80 Mile Beach, Western Australia	
	Recaptured	19.1.86	Yallock Creek	3134 km SE
041-24668	Adult	3.1.87	Queenscliff	
	Recaptured	24.4.87	HONG KONG	7446 km NNW

A paucity of recoveries compared with some years. The recovery in Vietnam was the first of an Australian-banded Curlew Sandpiper. The recovery in Hong Kong was one of two from Australia (the other was banded in Tasmania) in a catch of 120 waders by David Melville. 041-13697 was the second Curlew Sandpiper movement involving NW Australia and Victoria.

Caspian Tern

091-06130	Chick	14.12.85	off Mann's Beach, Corner Inlet	
	Found dead	2.10.86	Brunswick Heads, N.S.W.	1276 km NNE

Our second Caspian Tern recovery well up the east coast of Australia.

Fairy Tern

041-05143	Chick	7.1.84	Werribee	
	Retrapped	30.3.86	Queenscliff	25 km SSE

Several previous Werribee-banded chicks have been recaptured at Queenscliff.

Crested Tern

071-70654	Chick	15.12.85	Coorong, South Australia	
	Recaptured	16.3.86	off Mann's Beach, Corner Inlet	702 km ESE

SIGHTINGS OF COLOUR-DYED WADERS

Waders were colour-dyed yellow on their underparts in January-March 1985 (2,000) and January-March 1980 (3,000) at Werribee S.F., Queenscliff and Yallock Creek as part of the "Northward Migration Project" (see VWSG Bulletin No. 9 of May 1985). Further sightings have included -

16.2.85	Black Rocks	2 Rednecked Stint (195 present)	Margaret Cameron
17.2.85	Moolap Saltworks	1 Rednecked Stint (2,456 present)	Margaret Cameron
17.2.85	Hospital Lake	4 Rednecked Stint (4,630 present)	Margaret Cameron
5.4.85	Coorong, S.A.	1 Rednecked Stint (10 present)	B.L. Smith & D.A. Macilwain
14.4.85	Black Rocks	4 Rednecked Stint	Tim Reid
20.4.85	Tortoise Head	1 Rednecked Stint	Richard Loyn
29.3.86	Lake Connearre	3 Curlew Sandpipers (900 present)	Bob Swindley
		2 Rednecked Stint (1,300 present)	

The sighting in the Coorong was particularly interesting.

FURTHER SIGHTINGS OF COLOUR-MARKED BIRDS

This list of sightings of colour-banded and/or colour-dyed birds away from their banding locations follows that in VWSG Bulletin No. 9 of May 1985.

Pied Oystercatcher

- 16.2.87 Long Island, Westernport Val Curtis & N. Watson
The three colour banded birds seen in the same area on 30.6.84 were again present - a 'blue' bird from Werribee (moved 67 km ESE), a 'red' bird from Yallock Creek/Stockyard Point (25 km W) and an 'orange' bird from Rhyll (17 km NNW).
- Mud Islands Peter Menkhorst
11.2.84 1 'blue' bird from Werribee (32 km SE) - 12 birds present
9.9.84 1 'blue & green' bird from Werribee & Queenscliff - 13 birds present
26-28.11.84 2 'blue' birds from Werribee & a 'blue & green' bird (again) - 16 birds present
17.2.85 3 'blue' birds from Werribee - 14 birds present
11.9.85 1 'blue' bird from Werribee - 14 birds present
9.2.86 2 'blue' birds from Werribee - 23 birds present
22.6.86 1 'blue' bird from Werribee - 11 birds present
27.7.86 1 'blue' bird from Werribee - 10 birds present
Several 'green' birds from Queenscliff were seen on each occasion.
- 18.8.85 Pt. Cook, Altona Brett Lane
2 'blue' birds from Werribee (30 km NE) in a flock of 12 (2 others metal-banded only)
- 7.12.85 Queenscliff John Pratt
1 'red' bird from Yallock Creek/Stockyard Point (70 km E)
- 29.6.86 Werribee Clive Minton
4 'green' birds from Queenscliff (25 km NNW) in a flock of 25
- 16.1.87 Werribee Brett Lane
3 'green' birds from Queenscliff (25 km NNW) & 1 'orange' bird from Rhyll (82 km NW) in flock of 14
- 25.1.87 Avalon Saltworks Bob Swindley
2 'red' birds from Yallock Creek/Stockyard Point (67 km WNW) in a flock of 5
- 2.5.87 Queenscliff Gail Gibbs & Clive Minton
1 'red' bird from Yallock Creek/Stockyard Point (70 km E), 1 'blue & green' bird from Werribee (25 km SSE) and Queenscliff, and 17 'green' birds from Queenscliff in a flock of 50

Sooty Oystercatcher

- 16.2.85 Long Island, Westernport Val Curtis & N. Watson
The black colour banded bird from Seal Rocks (chick, 4.1.80), previously seen on 1.8.81 & 30.6.84, was again present.

Doublebanded Plover

Sightings of VWSG colour-banded birds away from their banding location.

<u>Colour Bands</u>		<u>Sighting</u>		<u>Origin</u>		<u>Movement</u>	<u>Observer</u>
<u>Left</u>	<u>Right</u>	<u>Date</u>	<u>Place</u>	<u>Date</u>	<u>Place</u>		
BBWW	RR	29.3.86	Lake Connewarre	Winter 1985	Werribee	20km SSW	Bob Swindley
B	W	10.5.86	Inverloch	Winter 1985	Barry Beach	55km W	Clive Minton
RB	W	27.7.86	Inverloch	26.4.86 (dyed)	Barry Beach	55km W	Clive Minton & Bruce Male
BBWW	RR	3.8.86	Lake Connewarre	5.7.86 (dyed)	Werribee	20km SSW	Rob MacKenzie
GGWW	RR	18.4.87 to 27.5.87 (4 times)	Werribee	Winter 1986	Queenscliff	25km NNW	Bob Swindley Clive Minton Peter Howard
GGWW	RR (2 birds)	10.5.87	Rye Back Beach	Winter 1986	Queenscliff	10km SSE	Norman McKinley
BBRR	BB	12.4.87 & 6.6.87	Altona	Winter 1986	Inverloch	120km NW	Mark Barter
BWW	-	6.6.86	Queenscliff	Winter 1985 or before	Werribee	25km SSE	Mark Barter
BR	B	7.6.87	Lake Murdaduke	Winter 1985	Inverloch	165km WNW	Bob Swindley

The increased level of banding, and looking for colour bands, in 1986 and 1987, has led to an increase in records of birds appearing at different locations within Victoria. Two were within the same season, but most were in a subsequent year. However, the majority of sightings of colour banded birds (and retraps) were at the original banding location indicating that most Doublebanded Plovers remain at a particular site throughout the winter & return to the same sight in subsequent winters.

The many sightings of New Zealand colour-banded birds in Australia (& vice versa) are not detailed here. A separate article on trans-Tasman movements appears elsewhere in this Bulletin.

MORPHOMETRICS OF VICTORIAN GREAT KNOT (*Calidris tenuirostris*)

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1. SUMMARY

Results are presented of the analysis of morphometric data obtained from 301 Great Knot caught between 1979 and 1986 in Victoria, mainly during the months of September to January. The results are discussed and are also compared to data previously published for museum specimens and for live Great Knot caught in north Western Australia. Mean wing-lengths of the three age groups in Victoria are significantly different from each other, but are not so for bill and total head-length. Wing-lengths of Victorian Great Knot are significantly longer than for the same age group in north Western Australia, bill-lengths are significantly shorter and total head-lengths are not significantly different. These results can be explained by greater feather wear in the north. Average total head and bill-lengths were calculated for the adult sexes and sexing criteria, based on total head-length, were obtained. All age groups in Victoria are considerably heavier than their counterparts in the north. The cooler and more variable climate in Victoria could be the cause of this difference. Victorian adults commence primary moult in late September, some three to four weeks after adults in north Western Australia, whilst second-year birds in Victoria commence moulting about one month before adults, but probably later than the second-years in the north. Adult moult duration in Victoria is about 141 days. Total head-length appears to be the most suitable sexing criterion on the basis of good reproducibility and a small coefficient of variation.

2. INTRODUCTION

This paper presents the results of a preliminary analysis of morphometric data obtained from Great Knot caught by the Victorian Wader Study Group from December 1979 to November 1986. During this period 301 birds were processed to varying extents, the numbers caught by month being:

January	96	October	20
March	3	November	36
June	4	December	127
September	15		

Previous biometric information on Great Knot is summarized in Table 1, which is taken from Barter 1986a. The earlier paper also contains the results of an analysis of data obtained from Great Knot caught in north Western Australia (NWA) from 1981 to 1985 and in this paper comparisons, where appropriate, are made between the Victorian and north Western Australian results and also with museum specimen measurements.

3. METHODS

All the Great Knot were caught by cannon-netting. Morphometric information was obtained using standard methods.

Birds were aged by plumage and primary feather wear and the following codes were used:

3+	-	in third year or older
2+	-	in second year or older
2	-	in second year
1	-	in first year

Second-year Great Knot become indistinguishable from 3+ birds when primary moult has been completed and all 2 and 3+ birds then become 2+. Ages change on the 1st August.

Percentage cumulative frequency analysis (PCF) was used to estimate the mean total head-length and bill-length of the sexes and to establish sexing criteria.

4. RESULTS AND DISCUSSION

4.1 WING LENGTH

The frequency distribution of adult wing-lengths is shown in Fig 1. Sample sizes for second and first-year birds were too small to allow satisfactory histograms to be prepared for these age groups.

The adult wing-length histogram does not exhibit bimodality although it is known that females have longer wings than males. The cause may be due to the differences being hidden by variations in measurement techniques.

The means and standard deviations of wing length for the three age groups are given in Table 2. The NWA data is included for purposes of comparison.

The mean wing-lengths for all age groups in Victoria are significantly different from each other ($p < 0.05$), with adult wing-lengths (191.5mm) being longer than second-years (189.1mm) which in turn are longer than those of first-year birds (184.7mm). Victorian birds also have significantly longer wings than the same age groups in NWA ($p < 0.05$). These regional differences are probably caused by the greater abrasion which occurs in NWA where feather degradation, due to the higher incidence of ultra-violet light, would be more severe. The situation is accentuated for first-year birds due to their having less abrasion resistant feathers than adults.

The greater average wing-length of Victorian second-year birds, compared to first-years, can only be explained if the second-years have undergone at least a partial outer primary moult, and renewed P10, when in their first year. On this basis the mean wing-length of 189.1mm is reasonably consistent with that of NWA first-years (186.0mm) which have moulted P10, if increased

feather wear in the north is allowed for. Interestingly the only non-breeding season catch of first-year birds in Victoria had an average wing-length of 174.3mm (n=3, sd=3.8) and had not moulted P10, although they had moulted from four to nine inner primary feathers. This length is much less than that for NWA first-years with old P10 (179.3mm, n=33, sd=5.8).

Possibly first-year Great Knot, spending the non-breeding season in Victoria, do not undergo a partial outer primary moult, whilst those included in the Victorian second-year sample have spent the non-breeding season in northern Australia, or further north still, and have undergone a necessary primary moult to replace heavily worn flight feathers. NWA moult data for first-year birds indicates that the great majority of this age group undergoes partial primary moult and moults P10. The difference in wing-length between the first-year birds in the two areas is difficult to explain and more data is required to confirm that the trend is real.

In general, the mean Victorian wing-lengths for all ages were at, or longer than, the upper range for museum specimens (see Table 1) indicating, perhaps, that the specimens were taken from areas where feather abrasion is more severe.

4.2 TOTAL HEAD-LENGTH

The frequency distribution of adult total head-lengths (THL) is shown in Fig 2. Sample sizes for first- and second-year birds were too small to allow satisfactory histograms to be prepared. The adult histogram shows evidence of bimodality and cumulative frequency analysis gave THLs of 76.5mm (sd=0.89mm) for females and 74.1mm (sd=0.86mm) for males, if the assumption is made that the coefficients of variation (sd/mean) are the same for both sexes. The fit between the observed and calculated distributions is good ($\chi^2=3.97$, df=10; $p<0.05$). At the 95% confidence level, birds with $THL \geq 76.2$ mm can be classified as females and those with $THL < 74.2$ mm as males. On this basis 58.7% of the population can be sexed correctly, whilst 0.6% are sexed incorrectly.

The Victorian THLs are similar to those obtained for Great Knot caught at Broome (76.9 mm and 74.3 mm) but not at Anna Plains (75.7 and 73.0 mm)

The means and standard deviations of THL for the three age groups are given in Table 3. NWA data for adult and second-year birds is also included. The difference between the age-groups in Victoria is not significant, nor is that between adults and second-year birds in the two areas. No THL data was obtained from first-year birds in NWA.

4.3 BILL LENGTH

The means and standard deviations of bill length for the three age groups are given in Table 4, together with NWA data. The mean bill lengths are not significantly different for the three age groups in Victoria ($p>0.05$). The average bill lengths of Victorian adult and second year birds (43.6 mm and 43.0 mm,

respectively) are significantly less than those of the same age groups in NWA (44.1 mm and 43.9 mm) ($p < 0.005$ and $p < 0.05$, respectively), whilst those for first-year birds are similar. The differences could be due to less feather wear in Victoria or different sex ratios in the two areas. The mean adult bill-length is in the upper part of that quoted for museum material (see Table 1), whilst that for first-year birds is considerably longer. These differences could be due to bill-shrinkage in museum specimens.

The frequency distribution of adult bill lengths, shown in Fig. 3, exhibits bimodality. Cumulative frequency analysis gave bill length data of 45.1 mm (sd=1.24 mm) for females and 42.7 mm (sd=1.17 mm) for males, assuming the same coefficient of variation for both sexes. The degree of overlap is considerable and bill-length is unsuitable for sexing purposes. Overlap problems are compounded by measurements being made to the nearest 1 mm, rather than 0.1 mm. The calculated bill length of both sexes is greater than that quoted for museum material.

4.4 WEIGHT

Weight data for the three age groups is given in Table 5. Comparison with NWA weights shows that Victorian adult and second-year birds are about 20g heavier on average than their NWA counterparts. The NWA data is for the October-November period when adult and second-year Great Knot would be expected to be at, or close to, their stable non-breeding weights. There is a greater difference between first-years but this is exaggerated by the heavy weight of the Victorian birds, compared to the other age groups, and the possibly low weight of NWA first-years that may have only recently arrived and not yet attained their normal weight. However, NWA first-years in the March-April period weighed 143.4g (n=76, sd=15.4) which is still considerably less than Victorian birds in Dec/Jan (180.4g) or June (174.3g, n=3, sd=3.8).

The weight differences can be explained by the fact that NWA birds would need to carry only minimum fat reserves because of the warmer climate, and also because the more stable climate in that region would ensure a higher probability of successful foraging compared to Victoria where the climate, although mild, is changeable and can be very windy.

There is some evidence that adult Great Knot are commencing to gain weight between the October-November and December-January periods (ie. 162.8g vs 170.3g). This suggestion is further supported by the percentage weight frequency histograms in Fig 4, which show a number of birds putting on additional weight in late December and early January. It is possible that some birds are fattening prior to an early departure for northern Australia. Use of the Summers and Waltner (1979) equation indicates that birds weighing 200g could fly 4200 km, which would allow them to comfortably reach the Gulf of Carpentaria or north-Western Australia. A number of birds in the late January/early December period have attained, or are close to, this level.

The three adult birds caught in late March had an average weight of 267.2g (range 245-282g) which is considerably higher than birds caught at the same time in NWA (eg. at Broome, mean=204.2g, range 150-261g, n=54). Birds weighing 270g are estimated to be able to fly a distance of 8000 km, which will enable them to reach the southern Chinese coast in one hop.

Data from adult retraps (all in different years) did not show any particular pattern (see Fig 5), with weights both declining and increasing during the late September to early January period.

4.5 PRIMARY MOULT

The median primary moult scores (MPMS) for Victorian adult and second-year birds are given in Table 6. Comparison with NWA data (see Table 7 from Barter 1986a) shows that Victorian adults commence primary moult in late September, some three to four weeks after those in NWA, and during the middle stages of moult are around 10 PMS points behind their northern counterparts. Very limited data is available for second-year birds in Victoria but the indication is that they commence moulting at least one month earlier than Victorian adults but, perhaps, later than NWA second-years, which are well advanced in moult (MPMS 20) by the end of August. These results are consistent with the later arrival of adult birds in Victoria compared to NWA, and perhaps also of second-year birds.

The increase in the MPMS of adults and second-year birds with time is shown graphically in Fig 6, as also is the percentage of adults which have commenced, or completed, moult. Moult scores for retraps (all in different years) are shown in Fig 7.

Regression analysis, using data where $0 < \text{MPMS} < 50$, gives a moult duration of 141 days. This estimate is likely to be too high as moult rate is generally non-linear, with birds moulting initially at a faster rate than during the middle stages. The estimate of 141 days compares to a similarly calculated value of 154 days for Curlew Sandpiper (*Calidris ferruginea*) in Southern Tasmania (Barter 1968b), which in turn compares with a duration of 125 days if median start and finish dates are used, which method generally gives a more realistic estimate of moult duration.

There is insufficient data in the first half of October and second half of January periods to allow adult moult duration in Great Knot to be estimated from median start and finish dates.

The 141 day moult duration estimate is reasonably consistent with the retrap data shown in Fig 7.

Adults sexed by total head-length had very similar median primary moult scores indicating that the sexes probably arrive in Victoria at the same time.

Only four first-year Great Knot have been caught during the breeding season (in June) and all had moulted some of their inner primary feathers, the number varying from four to nine. In this regard Victorian first-years appear to moult in a similar manner

to Broome Great Knot where moult also commences at P1. At Anna Plains, moult was found to start at P7 or P8. None of the Victorian birds were in active moult and, therefore, do not appear to undergo a complete primary moult, unlike the first-years in NWA where a large percentage do so.

4.6 REPRODUCIBILITY OF MEASUREMENTS

Analysis of data from retraps gave average variations between measurements, for the same bird, of 2.57 mm (n=7) for wing-length, 0.73 mm (n=15) for bill-length and 0.30 mm (n=10) for total head-length.

Wing-length measurements could be expected to vary due to wear but the differences, in two instances, of 5 and 9 mm are probably caused by measurement errors.

The bill-length variation, which represents 1.7% of the average bill-length, is probably due to measurements being taken to the nearest 1 mm, compounded, possibly, by apparent changes in bill-length due to feather wear at the base of the bill. As the bill-length range is only 40 to 47 mm, it is essential that measurements be taken to the nearest 0.1 mm if the data is to have potential use for sexing of Great Knot.

The variation in total head-length only represents 0.4% of the average total head-length, which makes this measurement the most reproducible of the three. This is to be expected considering the positive nature of the measurement which does not suffer from the limitations of technique, in the case of wing-length, or feather wear, for bills.

Total head-length is also to be favoured as a potential sexing criterion because of the lower coefficient of variation (sd/x) which is 0.024, compared to 0.026 for wing-length and 0.039 for bill-length.

5. CONCLUSIONS

The results show that:

- (a) The mean wing-lengths of Victorian Great Knot are significantly different for the three age groups, with adults having longer wings than second-years (191.5 vs 189.1 mm), which in turn are longer than first-years (184.7 mm). Victorian birds have significantly longer wing-lengths than the same age group in NWA. The regional difference is probably due to the occurrence of greater abrasion in NWA. Victorian wing-lengths are generally long compared with museum specimens. The wing-length distribution is not bimodal probably due to measurement technique problems.
- (b) The mean total head-lengths for all three age-groups are not significantly different to each other (75.1, 74.9, 73.8 mm in decreasing age order), nor are they significantly different to the same age groups in NWA. The adult distribution is bimodal and PCF analysis gave THLs of 76.5

mm for females and 74.1 mm for males. At the 95% confidence, 58.7% of the population can be sexed correctly using the criteria:

Females \geq 76.2 mm
Males \leq 74.2 mm

- (c) The mean bill-lengths for the three age groups in Victoria are not significantly different (43.6, 43.0, 44.0 mm in decreasing age order), although both adult and second-year Victorian birds have significantly shorter bills than NWA birds. The differences can be explained by greater feather abrasion in NWA and/or variations in sex ratio between the two regions. The adult bill-length distribution is bimodal. However the degree of overlap is considerable and the measurement cannot be used for sexing purposes. PCF analysis give bill-lengths of 45.1 mm for females and 42.7 mm for males. In future all bill-lengths should be measured to 0.1 mm in order to increase the usefulness of the data.
- (d) All age groups in Victoria are considerably heavier than their NWA counterparts. Victorian birds may need to carry more fat because of the detrimental effect that the cooler and more variable climate in Victoria has on energy requirements and potential foraging success. There is some evidence that Victorian birds are starting to gain weight in the late December-early January period, and a number of birds had enough, or nearly enough, fat to fly to northern Australia. The three adult birds caught in late March are much heavier than those in NWA at the same time and have a potential flight range of around 8000 km.
- (c) Victorian adults commence primary moult in late September some three to four weeks after NWA adults, whilst second-years in Victoria commence moulting about one month before adults, but probably after second-year birds in NWA. These results are consistent with the later arrival dates of adults in Victoria than in NWA, and perhaps of second-years also. Regression analysis indicates moult duration of 141 days for adult birds. There does not appear to be any difference in moult timing between the adult sexes. A sample of four first year Great Knot caught in June had all moulted their inner primaries, with the number of feathers moulted varying from four to nine. All appear to have ceased moult.
- (f) Reproducibility of measurements, obtained from retrap data, indicate that total head-length could be measured most accurately, followed by bill-length and wing-length. Total head-length also had the smallest coefficient of variation and is therefore to be preferred as a sexing criterion. Bill-lengths need to be measured to the nearest 0.1 mm if this measurement is to have potential use as a sexing criterion.

6. ACKNOWLEDGEMENTS

My thanks go to the Victorian Wader Study Group for making their data available for analysis and to all those members of the Group who were involved in collecting the data, in fair weather and fine. I would also like to express gratitude to Ken Rogers for calculating the adult bill- and total head-lengths for the sexes and for providing the total head-length sexing criteria. Finally, my thanks also goes to Karen Barter for typing the draft and final paper.

7. REFERENCES

Barter, M. A. 1986a. Great Knots Partly Undone. The Stilt. No. 9, 5-20.

Barter, M. A. 1986b. Primary moult in adult Curlew Sandpipers (*Calidris ferruginea*) wintering in the Hobart area. An Occasional Stint. No. 4, 1-12.

Cramp, S. and Simmons, K. E. L. (eds) 1983. The Birds of the Western Palearctic. Vol. 3. Oxford University Press.

Prater, A. J., Marchant, J. H., and Vuorinen, J. 1977. Identification and Ageing of Holarctic Waders. BTO Guide 17. Tring, U.K.

Summers, R. W. and Waltner, M. 1979. Seasonal variations in the mass of waders in Southern Africa, with special reference to migration. Ostrich 50:21-37.

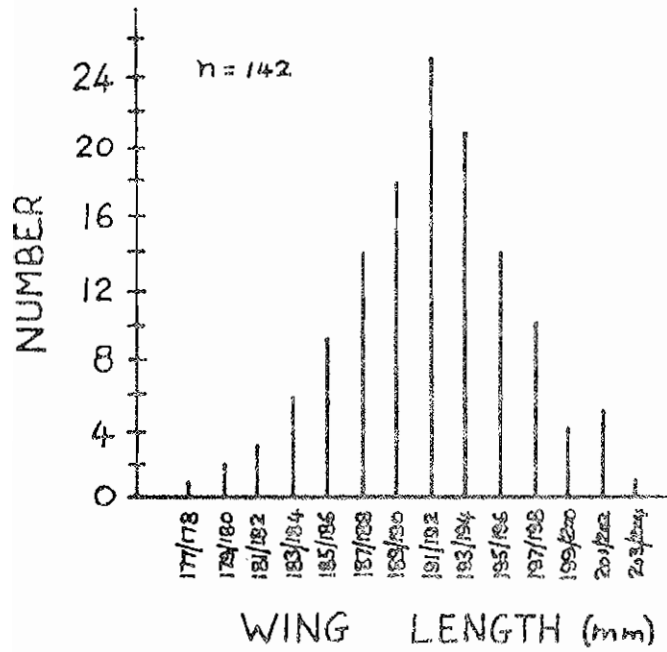


Fig 1. Wing-length histogram for adults.
(n =sample size)

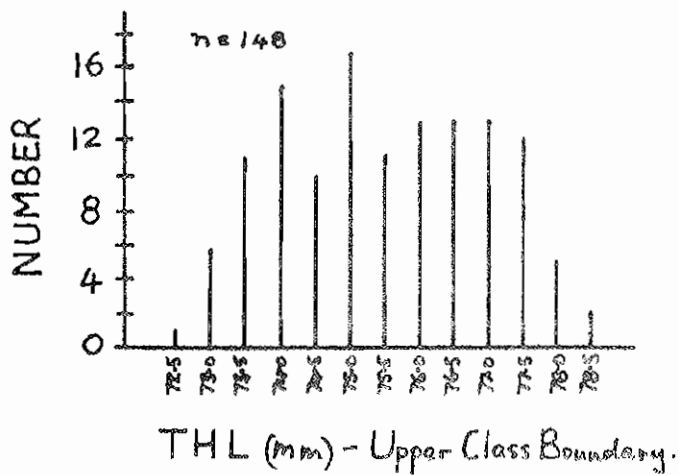


Fig 2. Total head-length histogram for adults.

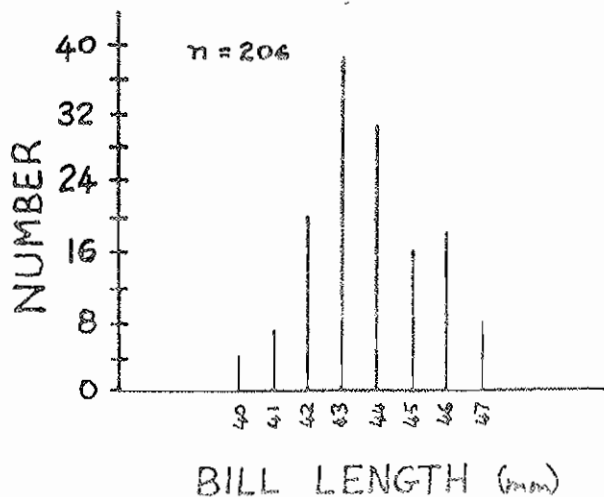


Fig 3. Bill-length histogram for adults.

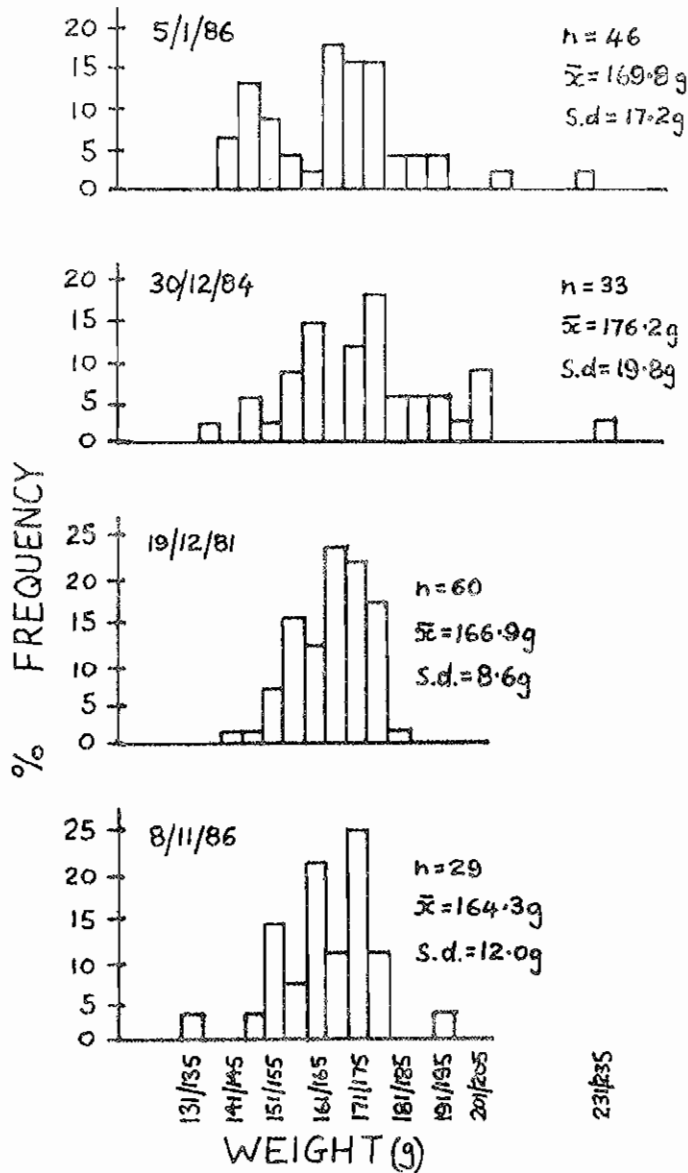


Fig 4. Weight frequency % histograms for adults on different dates.

(\bar{x} =mean weight
 $s.d.$ =standard deviation)

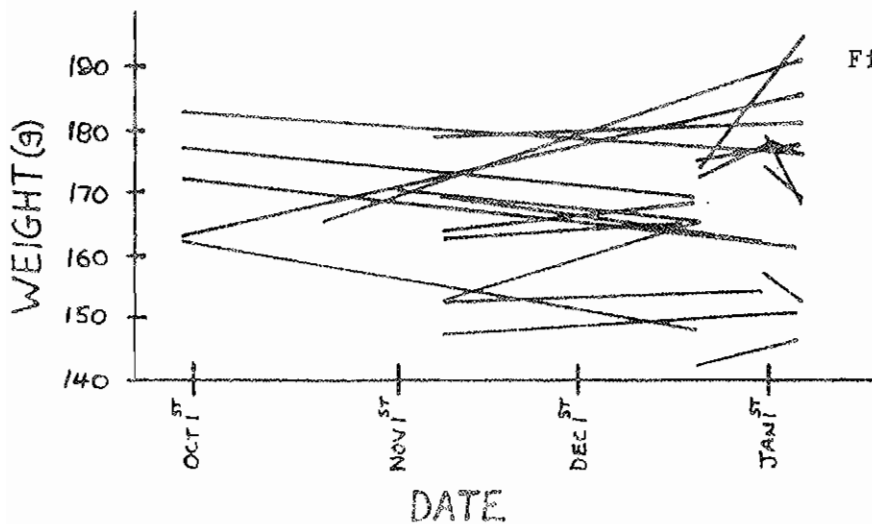


Fig 5. Weight changes of re-trapped adults (different years)

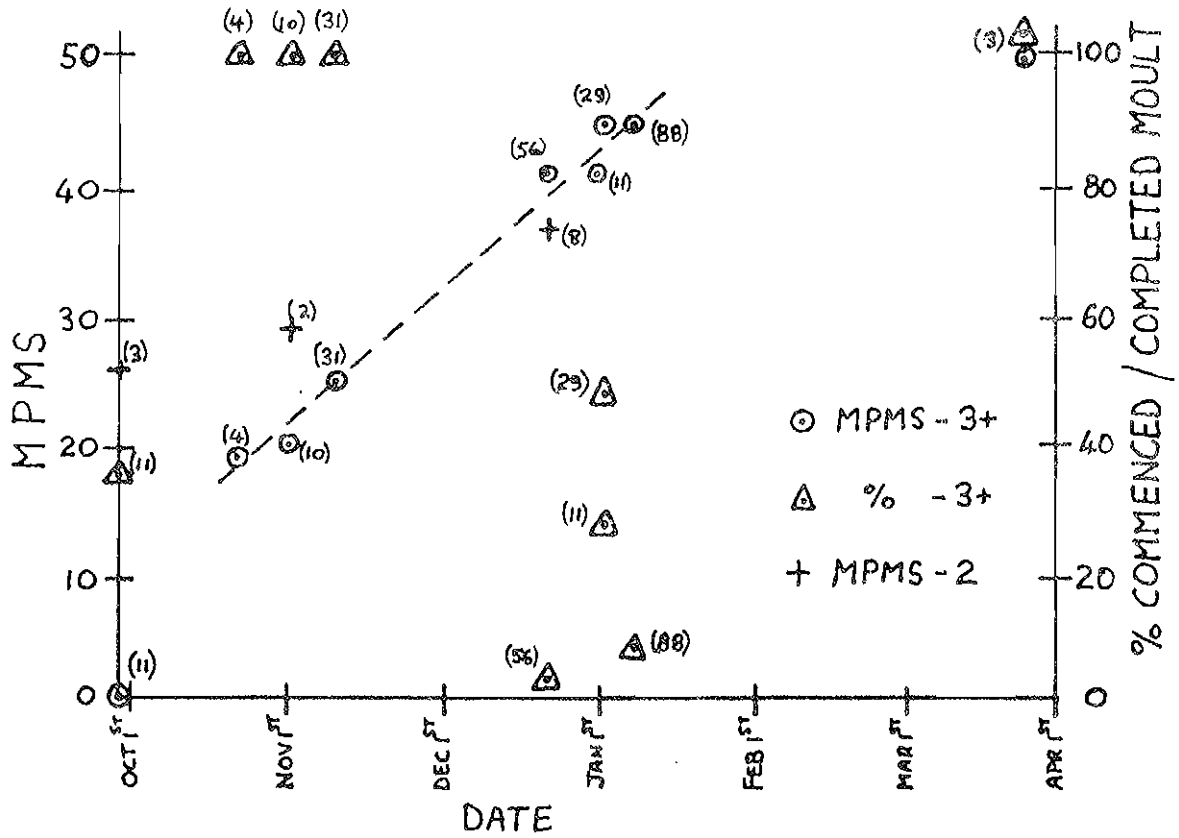


Fig 6. Molt data for adult and second-year birds.

() = sample size

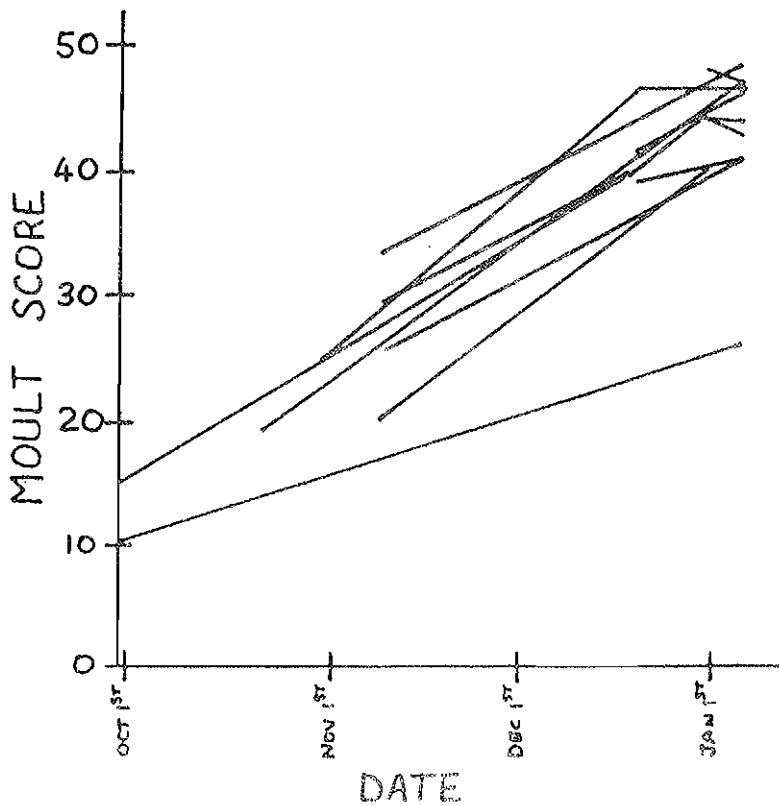


Fig 7. Molt score changes in retrapped adults (different years)

Measurement	Age	Male			Female			Source		
		n	\bar{x}	sd	R	n	\bar{x}		sd	R
Wing-length	2+	7	185	2.48	181-189	8	192	5.80	186-203	Cramp (1983)
	2	8	182	2.03	179-186	7	187	2.97	182-189	Cramp
	1	14	175	3.00	170-179	14	185	3.38	177-190	Cramp
	2+	14	185.7	-	179-193	21	190.7	-	181-198	Prater (1977)
Bill	1	16	176.3	-	170-184	11	180.4	-	171-189	Prater
	-	31	42.1	1.78	39-45	36	43.8	0.96	41-47	Cramp
	2+	13	42.4	-	39-45	18	43.9	-	41-47	Prater
Tarsus	1	12	42.3	-	40-45	11	41.5	-	39-43	Prater
	3+	n = 47, \bar{x} = 34.7, R = 32-38							Prater	
	1	n = 39, \bar{x} = 34.4, R = 32-36							Prater	

Table 1. Published biometric data on wing-length, bill and tarsus in mm. (n = number of birds, \bar{x} = means, sd = standard deviation, R = range. 2+ = two years and older, 2 = second-year birds, 1 = first-year birds). (from Barter 1986a)

Region	n	3+/2+		2			1		
		x	sd	n	x	sd	n	x	sd
Victoria	142	191.5	4.9	17	189.1	7.1	17	184.7	4.6
NWA	347	189.1	5.3	29	186.0*	3.8	33	179.3*	5.8

Table 2. Winglength data in mm for the three age-groups (n=sample size, x=mean, sd=standard deviation, *=new P10).

Region	n	3+/2+		2			1		
		x	sd	n	x	sd	n	x	sd
Victoria	148	75.1	1.8	12	74.9	2.2	7	73.8	2.7
NWA	232	75.1	2.0	56	74.5	2.0	-	-	-

Table 3. Total head-length data in mm for the three age-groups.

Region	n	3+/2+		2			1		
		x	sd	n	x	sd	n	x	sd
Victoria	206	43.6	1.7	14	43.0	1.6	11	44.0	2.0
NWA	263	44.1	1.9	46	43.9	1.8	53	43.9	1.9

Table 4. Bill-length data in mm for the three age-groups.

Region	Period	3+/2+			2			1		
		n	x	sd	n	x	sd	n	x	sd
Victoria	Oct/Nov	44	162.8	12.2	-	-	-	-	-	-
Victoria	Dec/Jan	177	170.3	14.0	10	159.4	10.5	11	180.4	15.7
Broome	Oct/Nov	175	147.7	12.2	25	140.7	12.1	23	128.5	12.6
Anna Plains	Oct/Nov	342	137.1	10.3						

Table 5. Weight data in g for the age-groups.

Date	3+	2+
28/09/80	0 ¹¹ (36)	263 (100)
19/10/82	19 ⁴ (100)	
30/10/82	20 ¹⁰ (100)	29 ² (100)
08/11/86	25 ³¹ (100)	
19/12/81	41 ⁵⁶ [4]	37 ⁸ (100)
29/12/79	41 ¹¹ [100]	
30/12/84	45 ²⁹ [24]	
05/01/86	45 ⁸⁸ [9]	
22/03/80	50 ³ [100]	

Table 6. Median Primary Moulting Scores in Victoria on different dates.

Key: x^n (Y) or [Y] x = MPMS
 n = number of birds
 (Y) = % commenced moulting
 [Y] = % completed moulting

Date	Place	3+	2
24/8/82	Anna Plains	0 ²⁹ (26)	20 ³⁰ [0]
30/8-2/9/81	Broome	2 ⁸¹ (58)	38 ⁴⁴ [7]
2-4/9/82	Broome	-	32 ¹⁴ [14]
7-8/9/82	Anna Plains	0 ¹⁴ (36)	-
22/10/83	Broome	29 ³² (100)	-
25/10/83	Broome	28 ²⁶ (100)	-
27/10/83	Broome	30 ²⁶ (100)	-
28/10/83	Broome	30 ⁹⁴ (100)	-
31/10/83	Anna Plains	22 ²⁷⁸ (100)	31 ¹⁵ [7]
7-10/11/83	Port Hedland	34 ¹⁴ (93)	-

Table 7. Median Primary Moulting Scores of adults and second-year birds for different dates in north-western Australia (Barter 1986a)

Trans-Tasman Movements of Doublebanded PloversIntroduction

The VWSG commenced a major study of the Doublebanded Plover in 1979 and this has continued with increasing intensity and effectiveness up to the present time. One of the principal objectives was to investigate the migratory movements of this species, the only New Zealand land bird known to migrate regularly to Australia. This paper summarises these results. Other aspects of the study (biometrics, weight changes, sex & age composition, assumption of breeding plumage, site fidelity and migration periods) have already been reported in *The Stilt* (Vol. 10, pages 9-14, April 1987). Further work is continuing on survival rates, annual productivity monitoring and population estimates (as derived from a combination of banding and count data).

Methods

The majority of catches were made with cannon nets at high tide roosts on beaches or adjacent grassland. Because plovers tend to space themselves out more than other waders, catch sizes were quite small (average 38), with a total of 2,003 birds being caught up to the end of 1986 (Table I).

TABLE IANNUAL BANDING TOTALS OF DOUBLEBANDED PLOVERS BY VIC. W.S.G.

<u>YEAR</u>	<u>NEWLY BANDED</u>	<u>RETRAPS</u>	<u>TOTAL</u>
1976	6	-	6
1979	86	-	86
1980	157	1	158
1981	260	21	281
1982	91	4	95
1983	154	29	183
1984	156	30	186
1985	244	21	265
1986	586	157	743
TOTAL	1,740	263	2,003

Catches were made at 7 sites - regularly at Pt. Wilson/Werribee SF, Queenscliff, Yallock Creek and Pt. Cook/Altona and occasionally at Pt. Smythe/Inverloch, Barry Beach and Stockyard Pt. (Table II).

TABLE II

YEARLY TOTALS OF DOUBLEBANDED PLOVERS CAUGHT AT EACH SITE

Year	1976	1979	1980	1981	1982	1983	1984	1985	1986	TOTAL
Werribee S.F./										
Pt. Wilson	6	86	2	146	2	58	53	99	52	504
Queenscliff	-	-	107	5	2	5	65	23	261	468
Yallock Creek	-	-	-	-	28	23	68	21	191	331
Altona (Pt. Cook)	-	-	49	130	50	49	-	2	55	335
Inverloch	-	-	-	-	-	-	-	79	160	239
Barry Beach	-	-	-	-	2	-	-	41	24	67
Stockyard Pt.	-	-	-	-	11	48	-	-	-	59
TOTAL	<u>6</u>	<u>86</u>	<u>158</u>	<u>281</u>	<u>95</u>	<u>183</u>	<u>186</u>	<u>265</u>	<u>743</u>	<u>2,003</u>

Catches were made throughout the March to mid-August period in which Doublebanded Plovers are present in Australia.

All birds were colour banded with three different colours, each site having a specific combination (but no differentiation being made between years). In addition, most birds were dyed yellow on their underparts and underwings to facilitate easy recognition in the field. This plumage dye (picric acid in alcohol) turned orange within a few weeks when exposed to sunlight, but remained until birds carried out their main body moult in December/January.

In New Zealand banding (and colour banding) of breeding adult Doublebanded Plovers and their chicks has been carried out by Ray Pierce in the Cass River/Lake Tekapo area - in the centre of South Island - since 1977. This effort has been greatly expanded since 1985 to cover most of the main breeding habitats throughout the South Island and into North Island, with over 700 birds being banded in both the 1985/86 and 1986/87 breeding seasons. Individual colour band combinations were used for birds in the main study area, with location/age/sex/year specific combinations for most other sites.

In both countries banding efforts have been supplemented by systematic and intensive searches of populations for colour banded birds (colours are easily determined with a telescope, and often with binoculars alone).

Results

Sightings

Results from the colour banding accumulated slowly at first. After the excitement of the initial sighting of a New Zealand colour banded bird at Pt. Wilson/Werribee Sewerage Farm in June 1979 - which in itself acted as a great catalyst for the study - only one more such bird was seen in the next four winters. The first Australian colour banded birds were not seen in New Zealand until the 1981/82 breeding season. By contrast, 102 were seen in the 1986/87 breeding season!

Up to March 1987, a total of 229 trans-Tasman movements of colour banded birds have been reported (Table III). The considerable benefits of the colour banding programme are illustrated by the fact that 206 of these were sightings of colour banded birds, whilst only 23 involved actual recaptures. It is interesting to note the almost equal tally of sightings in both countries in most years. However, Australia will be stretched to meet the massive 1986/87 New Zealand total of 102. We are up to 80 as I write this - on 29 June - thanks particularly to a mammoth effort by Kiwi Ray Pierce himself who walked the Tasmanian coasts for 3½ weeks this month and found 30 different N.Z.-banded birds!

TABLE III

TRANS-TASMAN MOVEMENTS OF DOUBLEBANDED PLOVERS

<u>Breeding Season</u>	<u>No. of Australian-banded birds reported in New Zealand</u>	<u>Winter</u>	<u>No. of New Zealand banded birds seen in Australia</u>
1978/79	-	1979	1
1979/80	-	1980	-
1980/81	-	1981	-
1981/82	4	1982	1
1982/83	2	1983	-
1983/84	5	1984	3
1984/85	14	1985	12
1985/86	49	1986	54
1986/87	102	1987	
No. of Birds Reported	<u>176</u>		<u>71</u>
less no. also reported in previous year	13		5
Total no. of individual reports	<u>163</u>		<u>66</u>
Sight records	148		58
Banding recaptures	15		8

New Zealand-banded birds recorded in Australia

The 66 different New Zealand-banded birds reported in Australia up to the end of the 1986 winter were seen in -

Victoria	52
Tasmania	6
New South Wales	4
South Australia	4

This distribution may be partially influenced by the intensity of effort in Victoria, but the count data from the RAOU Wader Studies Programme does also indicate that Victoria is the prime wintering area (see p.66 in Brett Lane's book, Shorebirds in Australia). However, the 1987 efforts of Ray Pierce show that the importance of Tasmania as a wintering area is under-represented. It is interesting that there has also been the first sighting of a NZ-colour banded bird in Queensland in the 1987 winter.

The map (Map 1) shows the banding locations in New Zealand of the 66 birds subsequently reported in Australia. Although the Doublebanded Plover breeds throughout New Zealand the population coming to Australia for the winter seems to come exclusively from the high ground in the central and southern parts of the South Island. There was no difference in the origin of birds banded as chicks or as breeding adults. The Cass River/Lake Tekapo area - Ray Pierce's principal study site - was the origin of the greatest number of birds (19).

Data collected in winter in New Zealand by Ray Pierce and his colleagues indicates that a small proportion of the population breeding in the central region of South Island does overwinter (a few close to the breeding grounds; others as far away as the northern part of North Island). However, the majority of the population from this region (probably c.90%) appears to emigrate to Australia.

Australian-banded birds recorded in New Zealand during the breeding season

103 of the 163 Australian-banded birds subsequently seen or recaptured in New Zealand were reported during the breeding season - the majority actually on their breeding territories. The distribution of these (Map 2) is very similar to the previous map, i.e. the majority being from the high ground in the centre of the South Island.

The greatest concentration was again in the Cass River/Lake Tekapo area (25) and the adjacent Tekapo River (18). This may partly be an artifact of the longevity of the study in that area. However, the breeding population throughout the whole of New Zealand has been intensively scrutinised in the last two summers (85/86 and 86/87) and this indicates that the distribution is representative of the selective origin of birds moving to Australia for the winter.

There are no indications that birds returning to New Zealand from Australia in August go to pre-breeding season assembly areas (in either country). It seems more likely that many return direct to their breeding locations - there are several records of sightings of Australian colour banded birds on the breeding grounds in late August.

Australian-banded birds recorded in New Zealand after the breeding season

The breeding season of Doublebanded Plovers in New Zealand finishes in December/January. Adult birds then carry out a complete moult (including their primaries) before migrating to Australia in March/April.

60 Australian-banded birds have been reported in New Zealand in this post-breeding period. Their distribution (Map 3) is very similar to that in the breeding season except for the concentration of 13 at Lake Ellesmere - on low ground on the east coast of the South Island, near Christchurch. It appears that a proportion of the population therefore moves to this area for the moulting period prior to the migration to Australia (adding in the process a further 160 km to the 2,000+ km journey subsequently undertaken), whereas other birds remain close to their breeding areas throughout the moult.

Regularity of movements

The 263 recaptures of VWSG-banded Doublebanded Plovers show that individual birds largely remain at the same location throughout each winter and that, furthermore, they return to the same site in subsequent winters. The same conclusion is supported by observations of Australian colour banded birds (see elsewhere in this Bulletin for records of the small proportion of birds which did change their wintering location).

Observations on individually colour banded birds confirm that birds move between the same breeding grounds and the same wintering grounds year after year. The best example illustrating this was a bird banded as a chick (and subsequently returning as a breeding adult) on the Cass River, Lake Tekapo, New Zealand which was then regularly seen wintering in Australia (off Mann's Beach, Corner Inlet). The full history of this bird was -

Banded as chick	November 1981	New Zealand
Wintering	March 1982	Australia
Breeding	November 1983	New Zealand
Wintering	July 1984	Australia
Breeding	October 1984	New Zealand
Wintering	June 1985	Australia
Breeding	December 1985	New Zealand
Moultng	February 1986	New Zealand

Discussion

Count data has shown that in winter the Doublebanded Plover population is divided (probably fairly equally) between Australia and New Zealand (June 1985: 5,600 in Australia, 6,850 in New Zealand - quoted in Brett Lane's book). However, the banding results conclusively show that the Doublebanded Plovers wintering in Australia came exclusively from the populations breeding in the central region of the South Island in New Zealand.

A difference in migratory behaviour between different segments of the population of a species is quite normal, though often difficult to prove in migratory waders because breeding season recoveries are usually so scarce (because of the typically remote breeding locations). In birds breeding in the northern hemisphere, it is also normal for those breeding at the northernmost extremes of the range to migrate the furthest, i.e. to winter furthest south by a 'leapfrog' migration over the less migratory segments of the population.

The migratory behaviour of the New Zealand Doublebanded Plover population is equivalent since those birds breeding on the high ground in the centre of South Island are presumably occupying the habitat which is least able to sustain birds during the cold winter months. Since these birds have the greatest need to migrate they migrate the furthest.

One can only speculate how such a migratory pattern actually evolved. One possibility is that birds moving out of the central breeding grounds in autumn found the remaining habitats on the lower ground and coasts already occupied by other birds. Food supply limitations and feeding ground competitiveness/territoriality may then have forced them to move on - ultimately resulting in the development of a regular migratory movement to Australia. Presumably there they found a satisfactory climate and habitats in which to obtain the necessary food supply - exploiting a niche not fully utilised by other birds present in Australia at that time.

The future

Now that the trans-Tasman migratory movements of Doublebanded Plovers have been satisfactorily explored, the (expensive) VWSG colour banding programme has been terminated. Colour banding will however continue for another season in New Zealand in an effort to fully determine the movement patterns of the segments of the population which do not migrate to Australia. So a continuing search for New Zealand colour banded birds will still be worthwhile in Australia in the 1988 winter as there will still be time for these to be added into the joint paper currently being prepared for publication in 'Notornis' (the journal of the New Zealand Ornithological Society).

Future VWSG fieldwork on Doublebanded Plovers will concentrate on catching 50-100 birds each winter at those sites with the longest history of banding (Werribee SF/Pt. Wilson, Queenscliff & Yallock Creek) and the best opportunity of making sizeable catches (Inverloch/Pt. Smythe). This programme should enable the annual survival rates of birds to be determined (from capture/recapture data) and estimates to be made of variations in annual breeding success (from the proportion of juveniles in the population).

Acknowledgements

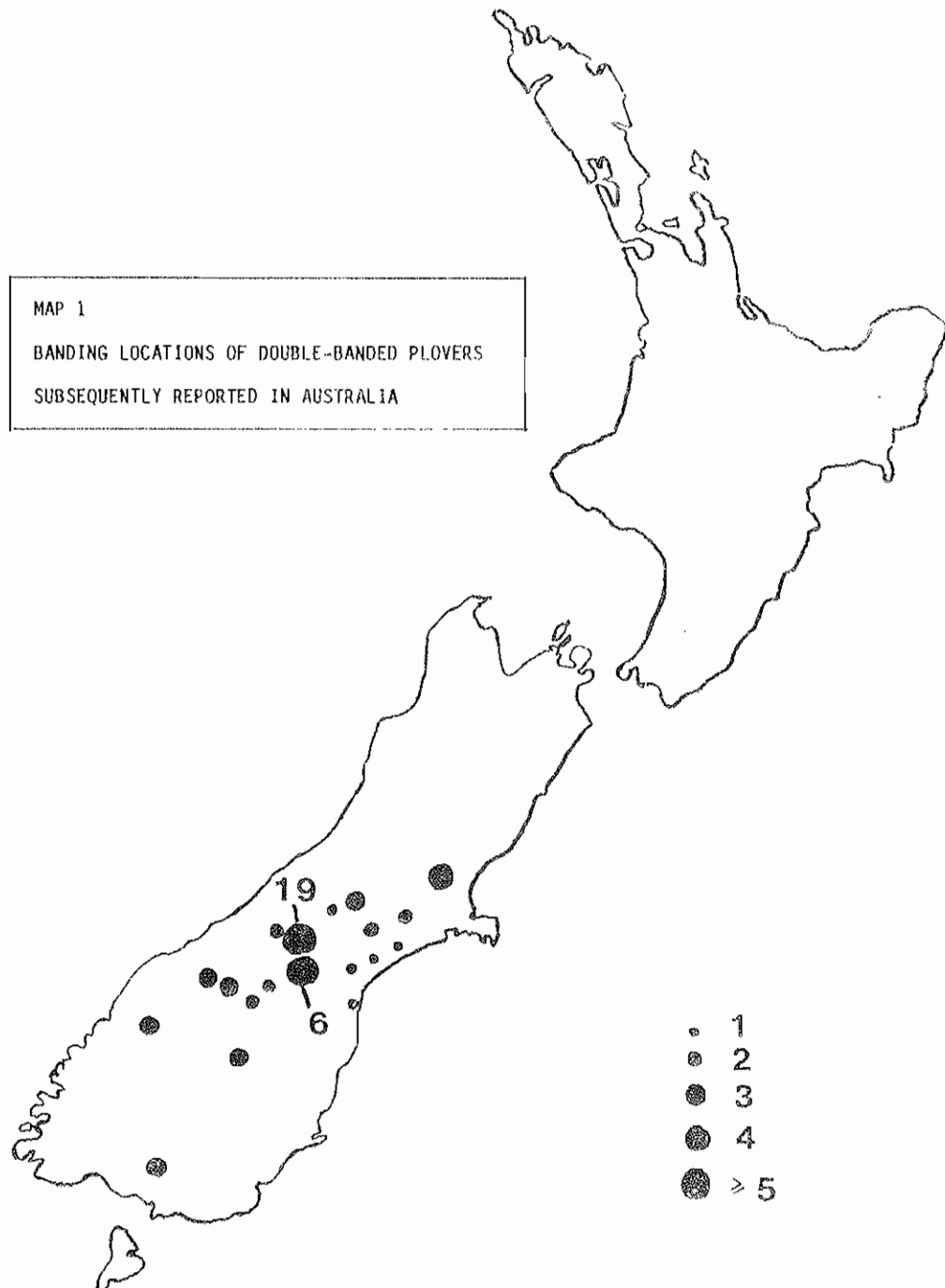
The success of this study is an excellent example of international co-operation and of what can be achieved by co-ordination of the efforts of a large number of people.

Particular thanks are due to -

- (a) Ray Pierce and all the other participants in New Zealand who banded birds there and who walked many, many miles of river valleys and other breeding habitats searching for colour banded birds from Australia;

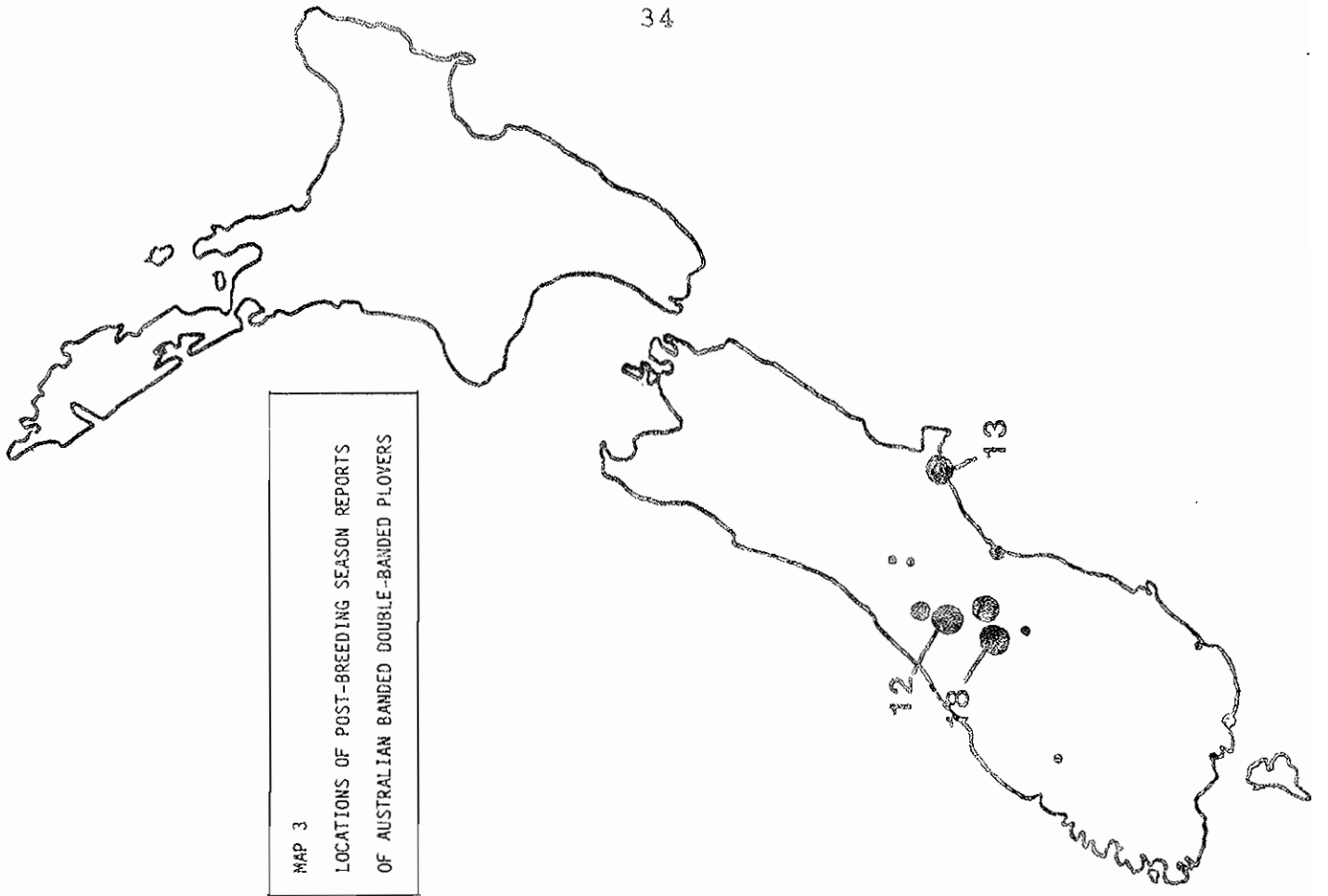
- (b) the many members of the VWSG who have participated in the banding of Doublebanded Plovers over the last 10 years and who have also spent many hours searching for colour banded birds from New Zealand;
- (c) the members of the Australasian Wader Studies Group, the RAOU, and other ornithological bodies in Australia who have also searched widely for colour banded birds. Special thanks are due to Bob Swindley for his painstaking efforts in regularly examining every bird at a number of locations, resulting in him finding more New Zealand colour banded Doublebanded Plovers in Australia than anyone else.

Clive Minton



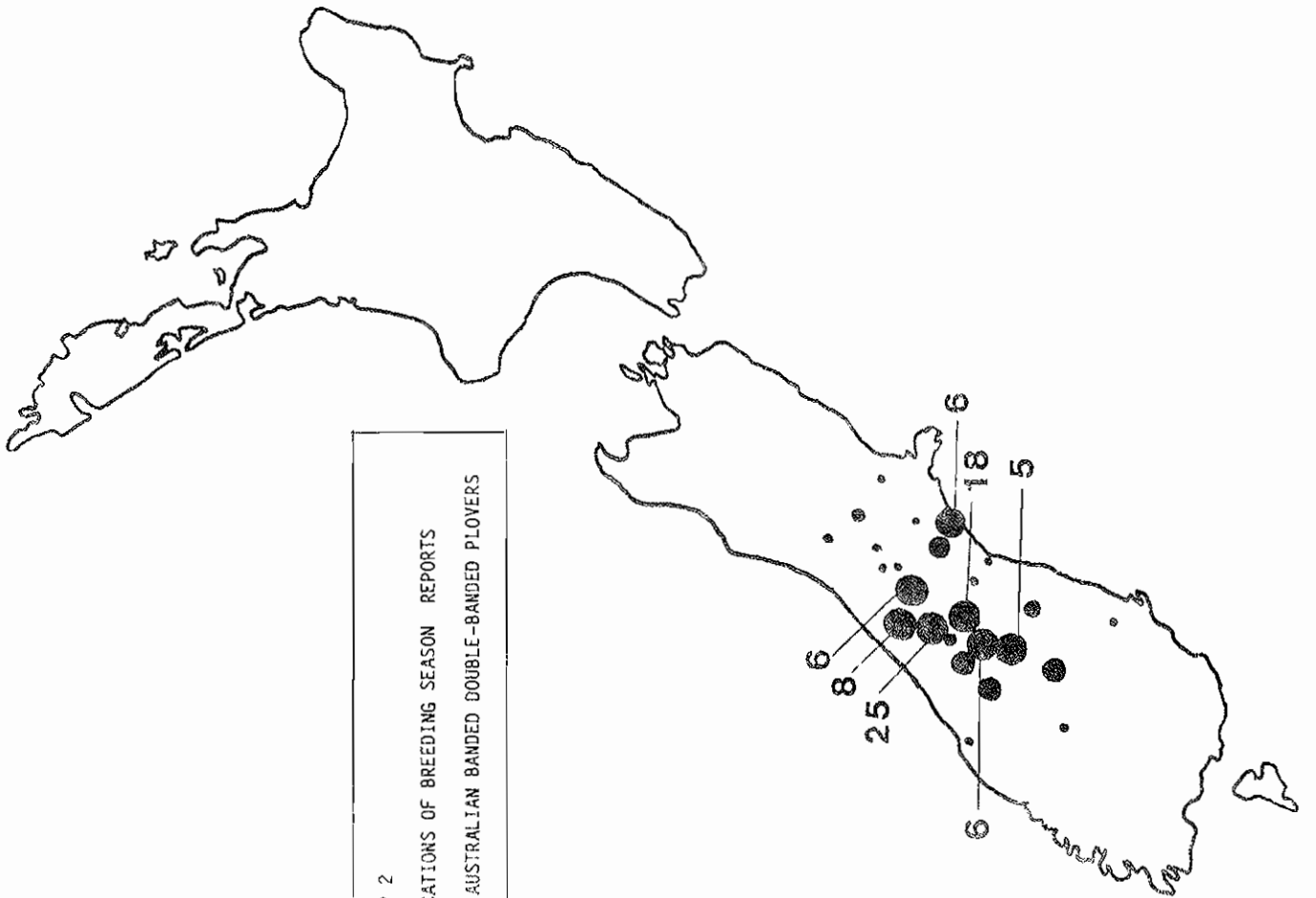
MAP 3

LOCATIONS OF POST-BREEDING SEASON REPORTS
OF AUSTRALIAN BANDED DOUBLE-BANDED PLOVERS



MAP 2

LOCATIONS OF BREEDING SEASON REPORTS
OF AUSTRALIAN BANDED DOUBLE-BANDED PLOVERS



TERNs

The VWSG includes "the study of terns in Victoria" in its objectives. To date, the principal activities have been -

- (a) annual maintenance work on the breeding habitat of Fairy Terns on South Spit at Werribee S.F. (see previous VWSG Bulletins);
- (b) annual banding of Fairy Tern chicks (144) at the Werribee S.F. colony, and of Caspian Tern (71) and Crested Tern (185) chicks on one of the islands off Mann's Beach in Corner Inlet;
- (c) cannon netting of Fairy Terns (191), Little Terns (28) and Crested Terns (132) - mainly at high tide roosts on Swan Island, Queenscliff - and of Common Terns (once, 41) at Corner Inlet. 15 Whiskered Terns (at Werribee S.F.) and 2 Caspian Terns have also been cannon netted;
- (d) observations of band numbers (with a telescope) of Crested Terns roosting at Rickett's Point, Beaumaris.

In 1986 the study was expanded to include the banding of 484 Crested Tern chicks in the colony on Mud Island. When the visit was made on 21 December, 1986, it is estimated that 7-800 pairs of Crested Terns were present, with perhaps 800-1,000 chicks. Subsequently, a "working bee" on 17 May, 1987 cleared a 25x20m area of saltbush at one end of the colony to provide nesting space for the 1987 season. This, the only remaining area on Mud Island still suitable for terns to nest, was rapidly becoming overgrown.

The Werribee S.F. Fairy Terns did not breed in 1986 in spite of the nesting habitat still appearing to be in a suitable condition. A few pairs were seen around the area in December (and January 1987), and some scrapes were made, but no eggs were laid. At this period unusually large numbers (150+) were present in the Altona Saltworks area (though breeding is not known to have occurred). It may be that there was insufficient food available in the Werribee S.F. area to support a breeding effort in 1986. Habitat maintenance work will again be carried out in September 1987 in the hope that the Fairy Terns return.

Although the Crested Terns have almost ceased to nest off Mann's Beach in the last three years (only 1 nest seen in 1986/87) - due to the colony regularly being washed out by the occasional storm tide each November - the Caspian Terns continue to breed successfully (some 30-50 pairs). They have an extended breeding season - possibly also caused by some nest failures due to flooding - with birds on eggs in mid-October but with some unfledged young still present the following February. 23 Chicks were banded on 31 January, 1987.

The band numbers of 40 Crested Terns were read with a telescope by Clive Minton at Rickett's Point, Beaumaris, between 3 February and 7 March, 1987. Nearly a third of these were chicks banded at Mud Island in December 1986 - indicating that many of these birds move around Port Phillip Bay before setting off on their eastwards (and then northwards) migration. The remainder were mainly birds banded at colonies in South Australia (as were most of the 200+ banded birds seen in previous years at Rickett's Point).

Some further interesting recoveries of terns banded or retrapped by the VWSG during the past year are (as usual) included in the "Recoveries" section of this Bulletin.

"MISSION HALLEY"

Manns Beach - Shallow Inlet - 15-16 March 1986

To the men and women of the 1st Battalion VWSG - Volunteer Reserve this was just another day, another mission and, while the people of Australia slept the cunning and endurance of this elite squad would be tested to the full.

Our mission was to travel through the difficult terrain of Shallow Inlet and to arrive undetected on a remote beach. We would then capture as many as possible of our allies from the 'feathered force', gain statistics from them and attach to them a metal band so their movements could be monitored anywhere in the world. Finally, we would release them.

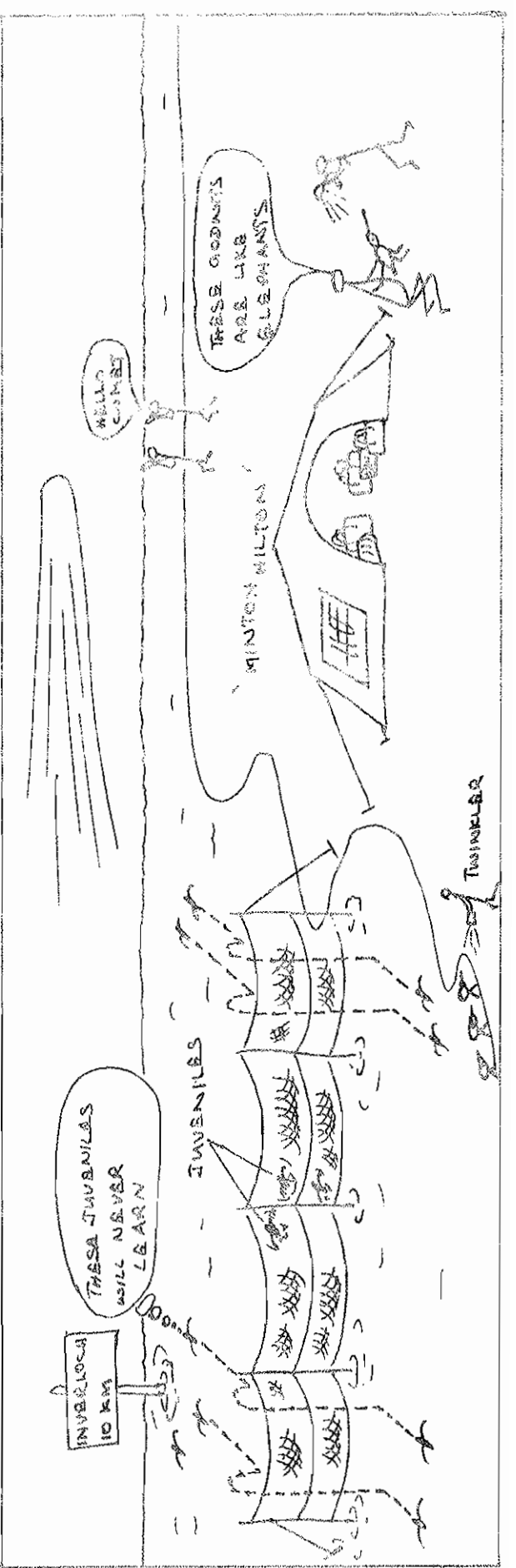
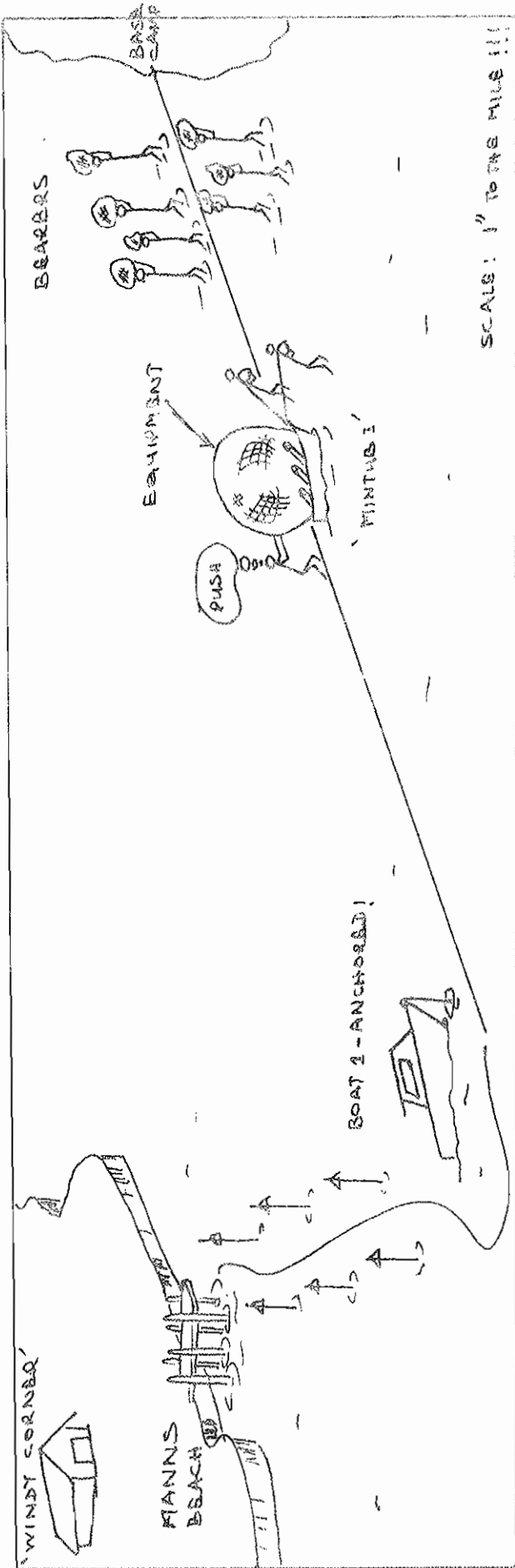
The members of the battalion travelled from far afield to reach the 1500 hr rendezvous at Manns Beach. I journeyed directly from leave in East Gippsland and had already changed out of my civvies into our unique uniform. Rank was denoted by the number of holes in ones outfit. I wore the insignia of a corporal with two holes on left elbow, one on right and a left big toe visible through my boots. Only officers are authorised to expose a right toe.

On arrival I was greeted by our GOC-in-C, Gen.C.D.T.Minton, staff officers and other recruits. Many of the battalion were engaged in a weather study which involves lying flat on ones back and watching the clouds to determine the approach of bad weather. Some, the more experienced, were performing this amazing skill with eyes closed!

Refreshments were available from 'Windy Corner', a ritzy little canteen serving welcome cold drinks and delicacies such as gourmet crisps, bait etc;.

Our first hitch was, 'one of our boats is missing'. Frantic calls to Melbourne revealed that the enemy had blown a tyre on the trailer which carried our boat. Emergency repairs were promptly carried out and the crew, with boat, arrived safely one hour late.

When united we began to load our equipment into the boats and it was all systems go. We had two boats, one to take us accross the deep water and the other, known as 'Mintub I' would be used to ferry equipment through the shallow water. The remainder of the journey was on foot, wading ashore and towing 'Mintub I' - this was no job for the weak! As soon as the equipment was ashore we erected our tent which provided a welcome relief against the fresh wind. We then sorted out the nets, keeping cages etc; and our photographic officer for the mission, especially recruited from Sri Lanka, took pictures of the feathered force. The photographs would be used at a later date for promoting the cause to protect these wonderful creatures.



To catch our quarry we would use 10 french mist nets, obviously green peace forgiven types. These were placed offshore in a line, supported by bamboo poles, non-european. A strong wind made it quite difficult to secure the nets and one pole broke, however, aside from that incident the traps were set with the minimum of fuss and we returned to shore to enjoy our rations of hot soup and sardine sandwiches, then to prepare for the early morning start.

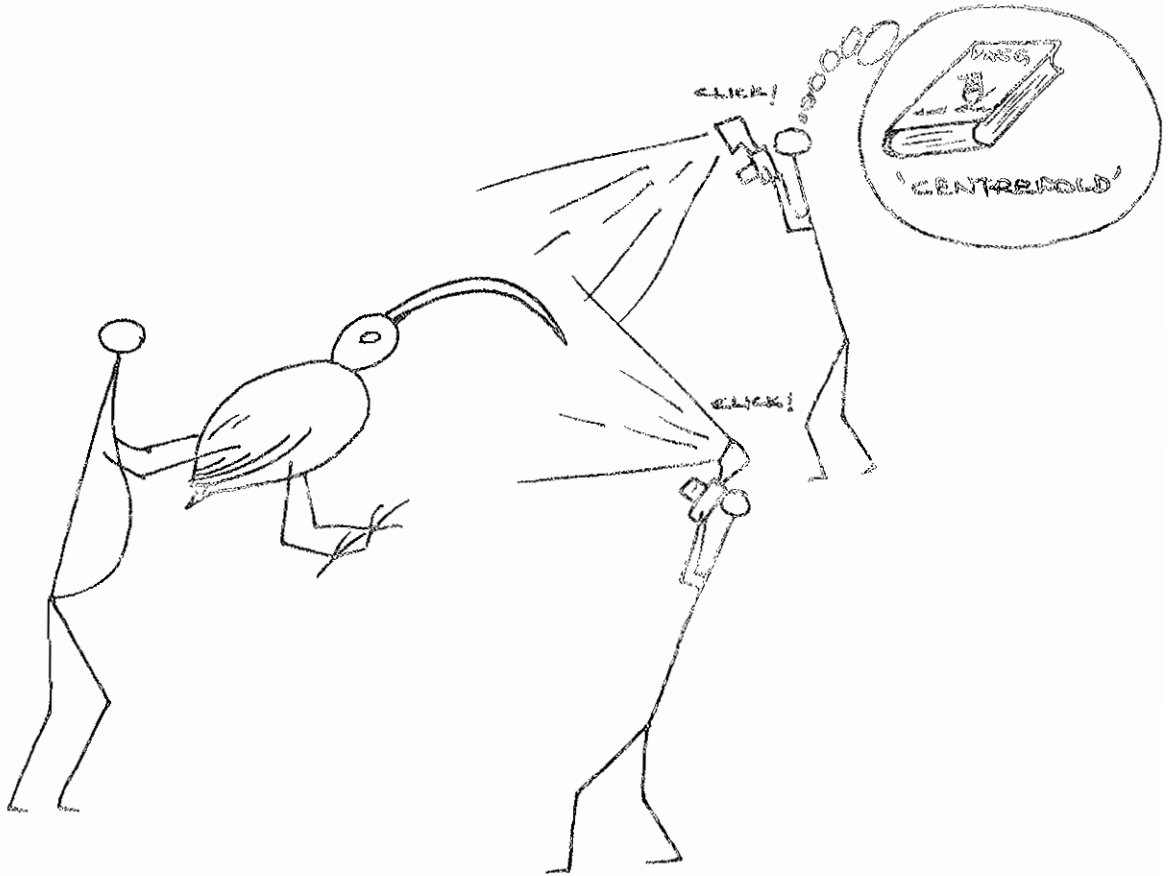
Our sleeping arrangements were cosy, to say the least and, it would be fair to say there was not a knots kneecap of spare space available to sleep in. With intermissions of the Gen., snoring, rest was welcome and the following morning we rose at 4am with cries of 'Hello Comet'. The usual pleasantries were exchanged enquiring how everyone slept and GSO 1, Lt-Col., J.G.Dawson,Ed., remarked "I was asleep in between waking up" -this has to be a catch phrase!

The views of Halleys Comet were spectacular and the tail was very visible, even with the naked eye. I think we were fortunate to witness such clear views of this timeless phenomenal visitor.

Next, work began and with refreshments over there were shouts of 'twinkle that comet' (early morning wit - anon). A few twinklers were sent out in the dark armed with torches which could just locate their next footstep. It was their job to notify 4000 waders where the nets were but, surprisingly, there must have been a communication breakdown, as we shall see.

Around 5am we walked out to the nets knee deep in cold water but warm with enthusiasm. We were prepared to collect hordes of waders from the nets, however the twinklers must have met a language barrier because only 19 birds managed to find their way to the pick-up point. 15 of these were Godwits - Tailed & Bar, so we concluded their knowledge of english must be greater than the other allied species. If only Godwits could speak Knot, Curlew, Sandpiper or Plover then the message would no doubt have got through and many more waders would have been captured. A lone, obviously Godwit speaking, Curlew did find its way and was rewarded with lots of photographs and promises of a contract as centrefold in 'Bird of the Month'. 3 Crested Terns made up our total catch and we decided to process the birds in the hand and have another go.

Experts in all bird languages were sent out again as twinklers but alas something must have been lost in translation and our feathered friends headed for Inverloch or thereabouts.



By this time daylight was breaking and 'Halley' was still visible further to the north. It was time to retreat and everyone was excited at the prospect of carrying equipment out to 'Mintub I', which at this time was even further from the shore. Supplies were now very low and thoughts of a slap up feast of a mars bar & coke at 'Windy Corner' seemed appetising.

On departing, excellent views of thousands of waders, many in beautiful breeding plumage, ensured that the position of tail-end-charlie was well contested.

Soon it was all over and I suppose the comment by our officer from HQ, Maj., B,A,Lane, that it was a semi-worthwhile exercise, summed up our thoughts. As always the event, company and spirit was excellent which proves again that it is the participation rather than the results which makes the occasion memorable.

A wonderful weekend and the troops sped off in various directions to showers, sleep and civilisation?

Comment; these godwits are like elephants(CDTM) - a statement thought to compete with Iras' classic - cows are like dotterels.

Moto; banders do it knee deep in water. - Anon.

VICTORIAN WADER STUDY GROUPDATES FOR FIELDWORK AUGUST - DECEMBER, 1987

<u>DATE</u>	<u>PLACE & OBJECTIVE</u>	<u>TIME</u>	<u>TIDE</u>	<u>HEIGHT</u>
Aug. 8 (Sat.)	<u>Pt. Wilson, Werribee</u> Doublebanded Plovers	1419		0.8m
Aug. 9 (Sun.)	<u>Yallock Creek</u> Doublebanded Plovers	1221		2.7m
Sept. 12 (Sat.)	<u>Yallock Creek</u> Eastern Curlew	1612		2.9m
Sept. 27 (Sun.)	<u>Queenscliff</u> Red Knot, Grey Plover, Bartailed Godwit	1431**		1.5m
Oct. 10 (Sat.)	<u>Queenscliff</u> Red Knot	1355**		1.5m
Oct. 31 (Sat.)	<u>Werribee S.E.</u> Lesser Golden Plover & Rednecked Avocet	1024		0.9m
Nov. 28-29*	<u>Inverloch</u> Eastern Curlew & Rednecked Stints	Sat. 0603 Sun. 0649		1.6m 1.6m
Dec. 5 (Sat.)	<u>Yallock Creek</u> Large catch of small waders	1251		2.5m
Dec. 27 (Sun.)	<u>Werribee S.E.</u> Large catch of small waders	0843		1.0m

* These weekends involve camping. Please try and come for the whole weekend.

** Time of tide at Port Phillip Heads - two hours later in Swan Bay.

The normal meeting time will be 5 hours before high tide. Please, however, phone Clive Minton or Mark Barter a few days before each planned date to advise of your availability and to obtain final details of the rendezvous time and location. It is most desirable that people do phone in this way rather than waiting for the organisers to make 20 or 30 phone calls before each fieldwork weekend.

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VICTORIAN WADER STUDY GROUP

Financial Statement from 1/7/86 to 30/6/87

<u>INCOME</u>	\$	<u>EXPENDITURE</u>	\$
Subscriptions	1275.00	Printing - Bulletin	370.00
Sale of Bulletins	111.00	Colour Bands	193.42
Aust. Bat and Bird Banding Scheme - re-imbusement for colour bands	148.67	Incorporation Expenses	135.53
R.A.O.U. - hire of equipment	200.00	Postage	118.45
Donations	74.00	Stationery	31.20
Proceeds of Trading Table at A.G.M.	42.35	Radio Parts & Batteries	99.11
Bank Interest	59.46	Equipment & Repairs inc: Screwdrivers Plasticine Glue Elec. Blocks Projectiles	57.04
		Repairs to Trailer	38.00
		Fuses	206.20
		Gunpowder	240.00
		State Taxes	.32
	<hr/>		<hr/>
	1910.48		1489.27
Cash in Bank at 1/7/86	199.66	Cash in bank at 30/6/87	630.42
Cash/cheques in hand at 1/7/86	70.70	Cash in hand at 30/6/87	61.15
	<hr/>		<hr/>
	2180.84		2180.84
	=====		=====

Brenda Murlis,
Hon. Treasurer.

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