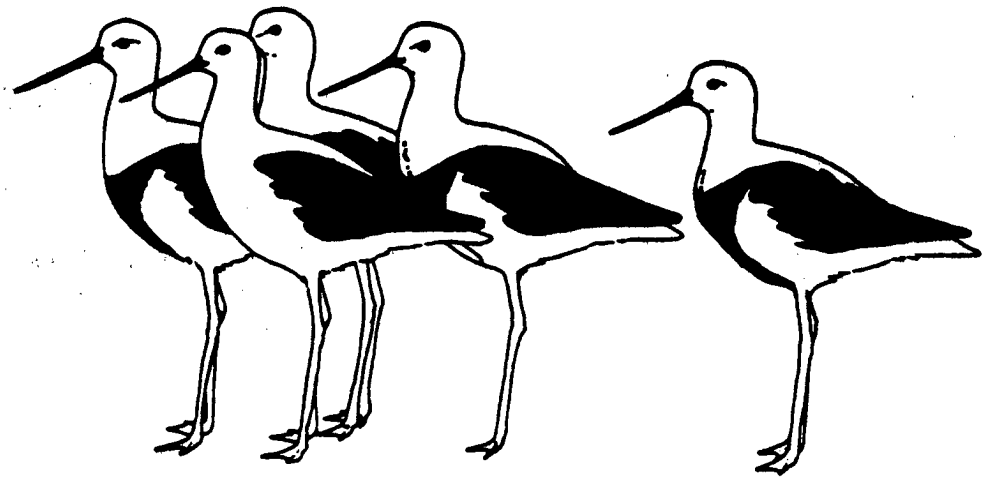
The Stilt



ISSN 0726-1888

BULLETIN OF THE AUSTRALASIAN WADER STUDIES GROUP

OF THE

ROYAL AUSTRALASIAN ORNITHOLOGISTS UNION

Number 16 **April 1990**

OBJECTIVES OF THE AUSTRALASIAN WADER STUDIES GROUP OF THE ROYAL AUSTRALASIAN ORNITHOLOGISTS UNION

1. To develop or assist with plans for wader research in Australasia in conjunction with other interested bodies

2. To co-ordinate and encourage counting, banding, feeding studies and other scientific programmes involving amateur and professional skills.

3. To encourage and assist with the publication of results.

4. To maintain effective communication between wader enthusiasts within Australasia and with similar groups overseas.

5. To formulate and promote policies for the conservation and management of waders and their habitat.

Subscriptions for 1990:

Australasia	AUS $15
Overseas	AUS $20
Libraries	AUS $25

ALL ENQUIRIES SHOULD BE DIRECTED TO
BRENDA MURLIS, ADMINISTRATIVE SECRETARY.

EDITORIAL

This is my second stint as Editor and I thank all those who have made favourable comments on the previous issue. Thanks are also due to Mark Barter and others who assisted with its production.

No changes have been made with this edition. As noted by Mark Barter elsewhere in this issue it is hoped to make *The Stilt* a publication of major importance within the Australasian-East Asian flyway. This will however take some time to bring about as a reliable communications network needs to be established in order to guarantee a continuing supply of suitable material.

I take this opportunity to make an appeal for more contributions to *The Stilt* from Australian readers from outside Victoria. At present a disproportionate number of authors submitting material are based in Victoria. Intending contributors are advised to take note of the current format of *The Stilt* when preparing papers.

Jeff Campbell

CHAIRMAN'S REPORT FOR 1989

1989 was an eventful year for the AWSG and the decisions taken should enable the Group to continue making a substantial contribution to wader conservation in the years ahead.

The major happenings were the RAOU Scientific Day, which was devoted to wader research and attracted 113 people, and the subsequent AWSG Workshop attended by 38 Government, non-Government and AWSG/RAOU representatives.

As 1989 was the tenth year of intensive wader studies in Australia, it was decided to use the Scientific Day to present a series of papers providing a cross section of the activities undertaken during the previous decade. We were fortunate to have Duncan Parish of the Asian Wetland Bureau (AWB) and Paul Sagar of the Ornithological Society of New Zealand (OSNZ) to broaden the coverage. The meeting was very successful.

The aim of the one-day Workshop was to review the work done during the previous ten years, identify shortcomings and gaps in our knowledge and develop a programme of activities for the next five years. The morning was devoted to formal presentations by Project Coordinators and representatives from Australian National Parks and Wildlife Service, AWB and OSNZ. In the afternoon, four workshops were held covering Resident Waders, Population Monitoring and Regular Counts, Feeding Studies and International Cooperation. The deliberations of the workshops have been summarised in *Stilt* 15. The AWSG Scientific Sub-Committee has met to consider the Workshop discussions and is currently formulating a programme for the next five years. This will be published in *Stilt* 17.

A further major activity of the AWSG commenced in late 1989 with the appointment of Doug Watkins to prepare a management plan for shorebirds in Australia. The work is being supported financially by World Wildlife Fund Australia and is due to be completed by September 1990. The report will provide Governments and Conservation Organisations with management advice for conservation of important wader habitats and, as a side benefit, will give further direction to AWSG activities. This should prove to be a landmark document.

To the future! Another expedition to north-western Australia will take place in March/April 1990. Expeditioneers will include three from Asia, coming under AWB auspices, who will be trained in wader study techniques. Previous trainees have done much to expand wader studies in Asia as evidenced by the considerable increase in recoveries of Australian-banded birds in the region. In a further attempt to increase recoveries and broaden coverage of the Flyway through sight records, the VWSG has recently commenced a pilot leg-flagging exercise. If this is successful, it is planned to flag large numbers of waders during the 1990-1991 season.

We plan to raise the profile and improve knowledge of the AWSG by placing regular articles on our activities in the bulletins and newsletters of associated organisations. Hopefully, this action will also serve to increase membership numbers which are currently static although, pleasingly, the numbers of complimentary copies going to Asians has increased considerably. We believe this service to those unable to subscribe, for one reason or another, to be an important function of our Group.

The Stilt has gone through a difficult period with the unfortunate illness of the Editor, David Thomas. The previous editor, Eric Woehler, did a great job with *Stilt* 14 at very short notice and Jeff Campbell produced *Stilt* 15 in a rather more leisurely manner. The layout of the latest issue is the most satisfying yet and is about as good as we can realistically hope to achieve at an acceptable cost. A suggestion was made at the May 1989 Meeting of the Asian Section of the International Council for Bird Preservation that *The Stilt* become the official wader study bulletin for the Australasian-East Asian Flyway. However, for *The Stilt* to become truly international it will be necessary to establish a steady flow of material for publication from contributors throughout the flyway. A good deal of effort will be needed to achieve this objective.

We are planning to work closely with AWB in a number of areas. Currently being discussed are such ventures as a series of Australian-staffed mini-expeditions to various Asian sites to train local people in catching, banding and counting techniques, collection of data on Eastern Curlew, Oriental Plover and Asian Dowitcher and cooperation with analysis of RAOU, AWSG and AWB count data. This latter venture will need the full-time paid services of one person

for at least six months. Recently, the RAOU, in conjunction with our Group and the AWB, has succeeded in obtaining funding for a study of waterbird hunting at three sites in south-east Asia. The initial work will take a year and it is hoped that further funding will be available to develop and implement guidelines for a sustainable harvesting programme.

The Group has been active in the conservation arena as can be seen from Jeff Campbell's report elsewhere in this issue.

Financially, the AWSG is in a sound position and there is unlikely to be any need to increase subscriptions in the foreseeable future. We are able to achieve a good deal at a remarkably low cost to the Group. The Treasurer's report can also be found elsewhere.

The RAOU is about to start on the preparation of Volume 2 of the Handbook which will be covering waders. This will be a mammoth task and will result in the publication of much of the data that has been obtained in the 1980s. Some of this information is still being held in personal files and it is important that it be made available to the Handbook editors. You will be reading various appeals for data in forthcoming *Stilts*.

We are always on the lookout for members who would like to take an active part in our work, such as various aspects of committee work, state or regional representation or project coordination. We would be particularly interested in hearing from non-Victorians! Please contact me if you would like to help.

As usual our thanks are due to the Committee, project coordinators and members for making 1989 as successful as previous years.

Mark Barter

1989 RESEARCH REPORT

Brett Lane, AWSG Research Co-ordinator

The last twelve months has been a very active and productive period in the development of the AWSG's research programme. This report briefly reviews the year's activities and discusses future activities.

The highlight of the 1989 calendar was the RAOU Scientific Day in late May which was held in Melbourne. It was the first meeting to be devoted entirely to waders since the 1981 Scientific Day in Sydney which saw the formation of the AWSG. Ten papers were given, presenting the results of both professional studies and volunteer-based research. There were contributions from most Australian states, New Zealand and South-East Asia. The subjects ranged from the marital affairs of oystercatchers in Tasmania and the even more intriguing family life of Banded Stilts at Lake Torrens, to the migration of waders through Moreton Bay, in Queensland, and the north-west coast of Australia. Other papers covered the ecology of waders on the Coorong, the use of satellite monitoring to local ephemeral inland habitats for waders and some fascinating results from two long-term census studies, in the Hobart area and at Westernport Bay in Victoria. Thank-you to all the paper presenters and others who assisted in making the day a great success.

Following the Scientific Day, the workshop "Wader Research in the 1990's" was held at Melbourne University. The aim of the workshop was to develop objectives and guidelines for the AWSG's research activities in the coming decade. In 1986, with the completion of the RAOU Wader Studies Program, the AWSG commenced a five-year research program. This year (1990) is the final year of that program and the workshop has greatly assisted the group in reviewing progress to date and in formulating its projects for the coming decade.

The Population Monitoring project, run very ably by Marilyn Hewish, has generated worthwhile results on changes in numbers of waders at a selection of sites over the last five years. Combined with the RAOU counts, we now have nine years of data from these sites. Because of the threats to waders, especially in east Asia, it was agreed that this project should continue with expanded coverage to include some additional sites in north-western Australia.

The Regular Counts, run by Richard Alcorn, have greatly expanded our knowledge of the timing and location of migratory movements of waders within Australia. This information has been of great value, together with similar data from east Asia, in piecing together the migration routes of many species throughout the East Asian Australasian migration system. The project has also greatly improved our understanding of the responses of our resident waders to the vagaries of rainfall across the continent.

Richard's interesting paper in this issue of *Stilt* shows the value of the technique. It was considered that regular counts had produced as much new information about the migrations and movements of waders as they were likely to, and that new, more precise information would only be forthcoming using other techniques, such as large-scale banding and colour-marking. The last regular wader count will thus occur in July 1990. However, if counters wish to continue their counts for their own purposes, or wish to continue to submit records, they are not discouraged from doing so, but because it will no longer be a project, they cannot expect the feedback from the group that they have had in the past.

We are currently preparing a proposal for consideration by the RAOU research committee for a full analysis of the first ten years of counts from the monitored sites and from the regular wader counts, as part of a joint AWSG, Asian Wetland Bureau, RAOU project to analyse all the count data from the Australasian-Asian migration system. The results of this analysis will be sent to all AWSG counters in due course.

The resident wader project, originally co-ordinated by David Thomas, has been shelved temporarily until a new co-ordinator can be found. David's illness has prevented him from running the project but we wish David a speedy recovery. If people are working on resident waders, we encourage them to continue to do so, as so little is known of their status and biology. Please write to me at the address below if you require assistance in developing a local project on resident waders.

The RAOU has established the Broome Bird Observatory, which promises to be one of the world's most significant wader research venues. It is located on the shores of Roebuck Bay, only a short "knot-hop" from some huge high tide roosts and some of Australia's richest wader feeding grounds. The AWSG will be assisting the RAOU in developing an on-going wader research programme for the observatory in which visitors can be involved. The group will also be promoting it as a field centre for local and overseas biologists. If you are interested in waders, the observatory is perhaps the most exciting place in Australia to stay and facilities are very comfortable. All members are encouraged to make a visit.

The AWSG's research program would not function without the dedicated support of many people. I am especially grateful to Marilyn Hewish and Richard Alcorn for their untiring efforts over the last five years. Both will be finishing their "stints" as project co-ordinators in mid-1990 and I wish them well in their future ornithological endeavours. The consistent efforts of counters throughout Australia have enabled the group's research to continue at a high level and I would like to take this opportunity to thank the counters for their valuable help. I hope that you have enjoyed being part of the group's projects and that you will continue to support them in the years ahead.

Finally, as a request: Marilyn is finishing as co-ordinator of the population monitoring counts and we need someone to carry on her excellent work. If you have an evening or two per month spare and would like to assist the group as its population monitoring count co-ordinator, please get in touch with me. Ideally, we would like someone to start by assisting Marilyn to organise her last count (in June 1990) and in the process learn the "ropes". If you would like further information about what the position involves, please contact me at the address or phone/fax number below.

Brett Lane,

12/262 Barkly Street
North Fitzroy Vic 3068
Ph/Fax (03) 481 6597

AWSG COMMITTEE FOR 1990 - 1992

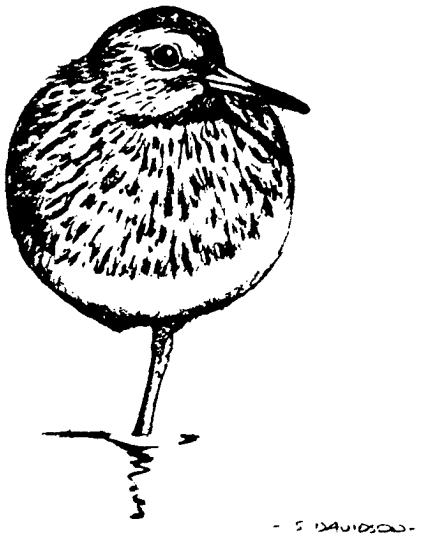
As no nominations were received for committee positions, and as all existing committee members, elected and co-opted, are willing to stand for the new term, the new committee to take office from 1st June 1990 for two years is:

Chairman	- Mark Barter
Administrative Secretary	- Brenda Murlis
Treasurer	- David Henderson
Research Co-ordinator	- Brett Lane
Membership and Liaison Officer	- Peter Haward
Editor	- Jeff Campbell
Committee Members	- Clive Minton
	- Mick Murlis
	- Dale Tonkinson (co-opted)
	- Hugo Phillipps (co-opted)

Brenda Murlis

NOTICE

It is intended to publish an AWSG Membership List in *Stilt* 17 (October 1990). Members who do not wish to have their name and/or address appear should notify the Membership Secretary as soon as possible



AWSG TREASURER'S REPORT FOR 1989

This year has seen a further consolidation of our financial position, with Income exceeding Expenditure by nearly $700 (taking into account the money we hold for subscriptions to the WSG).

Costs for *Stilt* 15 were only about two-thirds that for *Stilt* 14 because of the reduced amount of material received, and the improved print layout seen in *Stilt* 15 will lead to a substantial rise in costs in larger bulletins. We feel that the improved readability is worth the extra cost and, if we can maintain our current membership, we should be able to keep subscription rates at their present level for some time.

Although by far the bulk of our expenditure is related to the production of the bulletin, our position is sufficiently healthy for us to be able to consider the financing of other projects related to the study of waders.

We are very grateful for the continuing donations to the Research Fund, and here too our finances are sound, although it should be borne in mind that the end-of-year balance includes $500 from the AWSG account, deposited to maximise the interest rate for the Research Fund.

David Henderson

Australasian Wader Studies Group
Statement of Receipts of Payments for the Period
1st January 1989 - 31st December 1989

Receipts		Payments	
Balance B/F	3141.34	*Stilt - typing*	770.00
Subscriptions	3815.74	*- printing*	1434.00
Sale of *Stilt* back numbers	207.05	*- envelopes*	157.37
IPT/AWB subscriptions	324.50	*- postage*	910.95
Wader Study Group (UK)		*Other printing costs*	30.00
subscriptions	354.35	*Secretary's expenses*	166.24
Sale of IPT/AWB posters	30.80	*Chairman's expenses*	19.67
Bank Interest	332.49	*Treasurer's expenses*	35.03
		Hooded Plover survey	82.20
		IPT/AWB subscriptions	400.00
		Bank charges	24.00
		State Govt. tax	2.31
		Balance C/F	4174.52
	$8206.27		$8206.27

RAOU Research Fund (AWSG)
Statement of Receipts and Payments for the Period
1st January 1989 - 31st December 1989

Receipts		Payments	
Balance B/lF	1193.88	M Hewish: expenses	19.71
Donations	358.91	R Alcorn: expenses	130.39
Bank Interest	111.73	Printing Costs	55.00
		Bank Charges	5.20
		State Govt. Tax	0.23
		Balance C/F	1453.99
	1664.52		1664.52

AIDAB FUNDING FOR SUSTAINABLE WATERBIRD HARVESTING STUDY

The RAOU has been successful in obtaining funding from the Australian International Development Assistance Bureau for a study entitled "Toward sustainable harvesting of waterbirds in the East Asian Flyway." The aim of the project, which will be carried out by the Asian Wetland Bureau, is to assess the impact of harvesting on populations of migratory waterbirds at three locations in East Asia and to educate and train local communities and agencies in sustainable exploitation of this food resource. The locations chosen will be those where harvesting rates are very high, ie. between 50,000 and 300,000 birds per year.

COLOUR FLAGGING OF WADERS BY VWSG

The Victorian Wader Study Group has colour-flagged 450 Curlew Sandpipers as part of a programme to test flag manufacturing and application techniques and flag durability. The flags, which are orange in colour, are mostly located on the left tibia (above the knee) but some 70 were placed on the left tarsus.

If the trials are successful, it is hoped to flag large numbers of birds in future seasons and to extend the scheme to additional species and other locations in the flyway. The aim of the project is to obtain increased information on migration routes in regions where waders are not being caught, either for scientific purposes or for food.

Anyone sighting flagged waders should contact the Australian Bird Banding Scheme at GPO Box 8, Canberra, ACT 2601 or Clive Minton, 165 Dalgetty Road, Beaumaris, Vic 3193.

CONSERVATION NEWS

The past six months have again involved a good deal on the wader conservation front. The most significant news is undoubtedly the commencement of work by Doug Watkins on preparation of a management plan for Australia's waders and their habitat (see Chairman's Report elsewhere in this issue).

On other matters various submissions have been made including those to the Shire of Sutherland and to Newcastle City Council (NSW) on proposed developments effecting wader habitat and to CF&L (Vic) on a Draft Management Plan for the Jawbone Flora and Fauna Reserve, Williamstown. This plan is excellent in its conception and shows what can be achieved when marrying sensible development with conservation objectives. In essence this involves the sale of part of the old Merrett Rifle Range land for housing development and using the proceeds from that transaction to finance the management and protection of the nearby flora and fauna habitat.

Jeff Campbell

AUSTRALIAN MINI-EXPEDITIONS TO INDONESIA AND VIETNAM

The Asian Wetland Bureau (AWB) has asked the AWSG to send two training expeditions of experienced wader counters and banders to south-east Asia in the near future. The AWB will make on-the-ground arrangements - programme of activities, permits, introductions, internal travel arrangements etc., whilst the AWSG is responsible for staffing and successful completion. Both expeditions will have a duration of about four weeks.

Two people are required to go to the Indramayu - Cirebon region of west Java in October of this year to band and collect biometric data from waders caught by hunters. This activity will be done in conjunction with the relevant Indonesian conservation agency. The total annual waterbird harvest in the area is estimated to be 330,000 birds and of this Oriental Pratincoles represent some 45,000. The large number of Pratincoles caught indicates that the species may be over-harvested and there is an urgent need to obtain important management information on:

(1) migration routes, local movements and turn-over rates from analysis of marked birds,

(2) moult, weight, age and sex structure of the population.

Other waders commonly caught are Pintail Snipe, Painted Snipe, Wood Sandpiper, Lesser Golden Plover, Greenshank, Red-necked Stint and Curlew Sandpiper.

Three to six persons are needed for a four week expedition in March/April 1991 to train Vietnamese biologists in the Red River Delta in waterbird identification and counting techniques, and in catching and banding methods. The Delta is the first Ramsar site in south-east Asia and is an extremely important staging and wintering area for migratory waterbirds. The most numerous wader species are Black-tailed Godwit, Large Sand Plover, Eurasian Curlew and Dunlin. A wide variety of northern hemisphere duck also occur.

It is possible that some financial assistance may be available for both expeditions, but intending participants should be prepared to pay for their own fares and accommodation. This should not exceed $1500 for Java and $2000 for Vietnam.

I have Asian Wetland Bureau reports on hunting in Java and waterbird surveys in the Red River Delta and these can be borrowed by prospective participants.

Could those people who are interested in taking part in either expedition please contact me, as soon as possible, at:

21 Chivalry Avenue, Glen Waverley Vic 3150
Tel: (03) 233 3330 (home) (03) 607 1965 (work)

The deadline for Java applicants is 30th May.

Mark Barter

COLOUR-BANDED PIED AND SOOTY OYSTERCATCHERS

Reprinted from RAOU Newsletter No 83.

The Australasian Wader Studies Group of the RAOU has increased the research effort on 'resident' species of waders to complement the considerable knowledge now developing on migrant species. In consequence, the Victorian Wader Study Group is stepping up its activities on our resident waders, commencing with the Pied and Sooty Oystercatchers.

These species have been banded and colour-banded in Victoria by the VWSG on a small scale for a number of years. Results to date show that there is considerably more movement of Pied Oystercatchers along the Victorian coast and into and/or between Westernport and Port Phillip Bays than expected. Birds from the latter have, for example, been reported as far west as Port Fairy, as far east as Corner Inlet and as far south as King Island. There are not sufficient data to indicate whether these are regular or random movements, but, as some individuals have been known to make return journeys over distances up to 200 km, it is likely that a pattern will emerge (e.g. perhaps a movement of some coastal breeding birds into the Bays to moult in late summer/autumn).

The new study is a comprehensive long-term project which will ultimately cover not just movements but also survival and productivity rates, age of first breeding, pair-bond maintenance, etc. It will complement a similar study, by Mike Newman, of Pied Oystercatchers in the Hobart area, which has been in progress for ten years.

To assist the new study, the colour-banding scheme has been modified from the original one (a single colour to indicate handing location) to a comprehensive arrangement which enables each individual bird to be identified. This is practical because count data indicate that there are only about 1,500 Pied Oystercatchers in Victoria and probably not more than 250 Sooty Oystercatchers.

The Australian National Parks & Wildlife Service has provided, via the Bird Banding Scheme, some financial assistance with the cost of the initial colour bands for the new scheme (each bird requires a dollar's worth of colour bands!). In the past, the Bird Observers Club has also provided assistance with the cost of colour bands from its Bird Environment Fund.

The new colour band combinations are:

One leg: 2 bands of same colour (for visibility) over a metal band;

Other leg: colour bands.

The colour used on the leg with the metal band indicates the original banding location (i.e. blue for Werribee Sewerage Farm, pale green for Queenscliff, yellow for Corner Inlet, red for Stockyard Point, white for Long Island (Hastings), orange for Phillip Island and dark green for Inverloch).

The three colours on the other leg identify the bird individually (the above colours plus black are used).

It is important to note the order of the bands on the leg and also to distinguish between left and right legs if possible.

The use of this new colour-marking arrangement will enable the life histories of individual birds to be compiled without having to recapture the birds. We already have some birds which have lived for ten years and it is likely that some individuals could reach an age of twenty years or more. Every sighting of marked birds will add to the jigsaw, and therefore it would be most helpful if RAOU members could keep a lookout for colour-banded Oystercatchers and report any sightings to me. In this way you will be contributing to knowledge about two of our most delightful species of resident waders.

Clive Minton
Ph: (03) 589 4901
165 Dalgetty Road
Beaumaris, Vic. 3193

BANDED BANDED STILTS

Most Australian readers would be aware that thousands of Banded Stilts bred at Lake Torrens in northern South Australia during 1989. A number of adults and their young were colour-banded at the lake by Graham Carpenter and Keith Bellchambers. Birds were banded with an ABBBS numbered band on the tarsus and a single colour-band on the tibia. Observers sighting colour-banded Banded Stilts are requested to notify Graham Carpenter, South Aust. Ornithological Assoc., C/- The S.A. Museum, North Terrace, Adelaide, SA, 5000 or Ph. 08 278 2610 a.h. Please take note of the following information for the birds sighted: date, location, colour of band, left or right leg banded and presence or absence of a chestnut breast band.

It would also be appreciated if observers sighting Banded Stilts in areas where they have been absent for some time could keep counts of numbers as they arrive. It will be of interest to note how long it takes the birds to build up in numbers at various sites following the mass inland breeding. Please send information on dates and numbers of Banded Stilts arriving over the next month or two to the Editor (see inside back cover).

Jeff Campbell

WADER TITLES ADDED TO RAOU LIBRARY COLLECTION IN 1989

BAMFORD, J.J., 1988. *Survey of migratory waders in Kakadu National Park, Phase II, 1988.* RAOU, Melb. (RAOU Report No. 60).

CHAPMAN, A., P. DANN & D. LEGGE, 1987. *Anderson's Inlet - waders and waterbirds.* Sth. Gippsland Conservation Society.

DORWARD, D.F., 1976. *Sites of special scientific interest in the Victorian coastal region.* Report for Town & Country Planning Board. Melb.

FLINT, V.E. & P.C. TOMKOVICH (eds.), 1988. *Waders in U.S.S.R. : distribution, biology and protection of waders.* Proceedings of Third Conference, October 1987. Moscow, Navka. (in Russian)

HOWES, J. & D. PARISH, 1989. *New information on Asian shorebirds: a preliminary review of the INTERWADER Programme 1983-89 and priorities for the future.* 2nd edition. Asian Wetland Bureau. Kuala Lumpur.

JEHL, J.R., 1988. *Biology of the Eared Grebe and Wilson's Phalarope in the non-breeding season: a study of adaptions to saline lakes.* Cooper Ornithological Society. (Studies in Avian Biology No. 12)

PARISH, D. & R. BUCKINGHAM, 1985. *Migratory waders in East Asia - potential for a co-operative study.* Interim report to Aust. National Parks & Wildlife Service. ICBP Australian National Section.

Trish White

RECENT LITERATURE

The following is a selection of publications dealing with waders from periodicals published in 1989.

AMBROSE, S.J. & V. FAZIO, 1989. Monitoring populations of waterbirds in New England, New South Wales: How important are small wetlands? *Corella* 13: 155-160.-seasonal fluctuations of wader numbers at small inland wetlands.

BARLOW, M., 1989. Establishment of Black-fronted Dotterel in Southland. *Notornis* 36: 24-26.

BUICK, A.M. & D.C. PATON, 1989. Impact of off-road vehicles on the nesting success of Hooded Plovers *Charadrius rubricollis* in the Coorong region of South Australia. *Emu* 89: 159-172.

CASTRO, G. & J.P. MYERS, 1989. Flight range estimates for shorebirds. *Auk* 106: 474-476.

ERIKSON, H.J., 1989. Deserts and waterbirds: surprising aspects of birdlife in Oman. *Birds International* 1: 37-41. - much on waders.

HUGHEY, K.F.D., 1989. The status of the Red-capped Dotterel in New Zealand. *Notornis* 36: 24-26.

PHILLIPS, W.J., 1989. Life atop the lilypads. *Birds International* 1: 18-24. - *Irediparra gallinacea.*

PIERCE, R.J., 1989. Breeding and social patterns of Banded Dotterels *Charadrius bicinctus* at Cass River. *Notornis* 36: 13-23.

RICHARDS, A.O., 1989. Cox's Sandpiper at Stockton, Newcastle. *Aust. Birds* 22: 91-92.

ROBERT, M. & R. McNEIL, 1989. Comparative day and night feeding strategies of shorebird species in a tropical environment. *Ibis* 131: 69-79.

ROBERT, M., R. McNEIL & A. LEDUC, 1989. Conditions and significance of night feeding in shorebirds and other waterbirds in a tropical lagoon. *Auk* 106: 94-101.

SMITH, L.E. & C.J. CHAFER, 1989. A White-rumped Sandpiper at Windang, N.S.W. *Aust. Birds* 22: 86-87.

Jeff Campbell

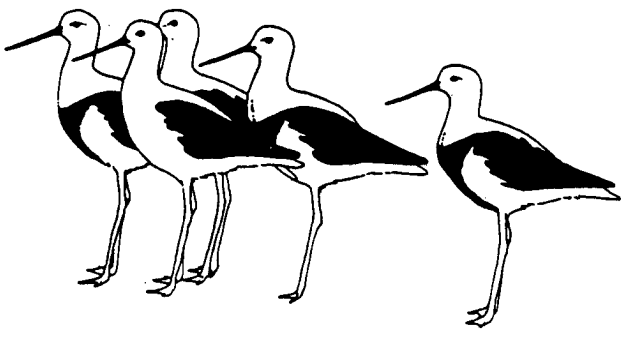
BACK ISSUES OF *THE STILT*

Back issues of *The Stilt* are available from Brenda Murlis (see inside back cover for address).

Prices are: $3.50 each within Australia
$5.00 each posted overseas.

Limited quantities only of Nos. 5 and 6 are available.

Stilt No. 7 contains the Index for Nos. 1-6 and
Stilt No. 13 the Index for Nos. 7-12.



REQUEST FOR ASSISTANCE

Recording of Wader Calls

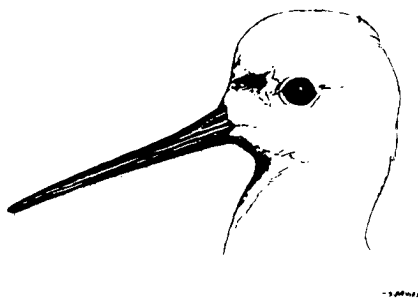
I am compiling a series of six cassettes covering the calls of about 550 birds of Papua New Guinea. Migrant waders listed for PNG are largely Palearctic species similar to those recorded in Australia. As very few tape recordings exist from PNG I will mostly have to use Australian recordings.

I would like to hear from anyone who has taped Little-ringed and Oriental Plovers, Bristle-thighed Curlew, Wandering Tattler, Spotted Greenshank, Green Sandpiper, Pin-tailed Snipe, Rufous Woodcock, Asian and Long-billed Dowitchers, Hudsonian Godwit, Pectoral Sandpiper, Little Stint, Sanderling, Buff-breasted and Broad-billed Sandpipers, Ruff and Red-necked Phalarope.

Some of the above I can obtain from recordists in the USA, Europe and Asia although I have had no response from the USSR. I would however, prefer to use tapes from birds away from their breeding grounds, since display, breeding or nest calls are rarely or never heard from our over-wintering birds.

Although I have haunted parties of cannon and mist netters I usually tape more of the excited calls of banders than of the banded birds. Nevertheless I would make a plea to wader banders and observers to carry a small cassette recorder along with other gear. It may also be useful to you as the calls of some waders are distinctive enough to be used for identification.

Ray J Swaby
79 Cambridge Terrace
Malvern, SA, 5061



BROOME BIRD OBSERVATORY REPORT

Unlike our beaches which are full of waders, this report, written in haste just before we go on holidays is likely to be a little patchy in places. We are looking forward to the visit of the AWSG Expedition during March and April this year, when there will undoubtedly be large numbers of birds banded on Roebuck Bay. Following that we plan to hold our first course from April 21st to 27th to quite literally "Wave the Waders Goodbye". We still have a few vacancies and this is a unique and moving experience.

Broome still provides exciting wader viewing with the occasional totally unexpected sighting. In September we had a Little Ringed Plover at the Pearl Coast Wildlife Park and another at the Sewerage Ponds. The Sewerage Ponds bird soon disappeared, but the other has been with us for five months so far, and has recently completed its moult from what we took to be immature to full breeding plumage.

When people have asked us what proportion of Mongolian Plovers we had in comparison with the Large Sand Plover, we've always quoted a figure of about 100 to 1 or less. We were surprised therefore on December 30th to find a flock of birds that were almost all Mongolians. We found about 200 of them and only 10 Large Sand Plovers. How does this compare with previous sightings?

Another bird that excites great interest around Australia, but turns up here every year, although in small numbers is the Long-toed Stint. We are confident of seeing them at Lake Eda or the Sewerage Ponds from about November until January. Due to a late start to the Wet we've seen very few Oriental Pratincoles this season but were delighted to find a flock of 2000+ on Roebuck Plain and later hawking around the Observatory on January 17th. We saw 1000+ two days later. The fact that a large percentage of the birds were in magnificent breeding plumage suggests that they were ready to leave. Last year we saw an estimated 50,000 further north on Roebuck Plain in mid-February.

We now have our course and general brochures available so you can procure these by writing to The Wardens, RAOU Bird Observatory, PO Box 1313, Broome 6725 or by ringing us on (091) 935 5600.

Gail Hooper and Brice Wells

REGULAR COUNTS PROJECT REPORT

Richard Alcorn, 17 Lawrence St., Horsham, Vic. 3400

This report describes new developments in the analysis of the Regular Counts Project data, the seasonal patterns that are emerging for some resident waders, and the effect on wader numbers of the heavy and widespread rains that fell in eastern Australia in 1988 and the first few months of 1989.

SITE GROUPS

In my previous report in *Stilt* April 1989 I arbitrarily grouped sites into several broad geographical regions. The aim of this was to detect any periodic changes in the numbers of selected species within each region, and secondly to see how the regions compared. The regions chosen were:

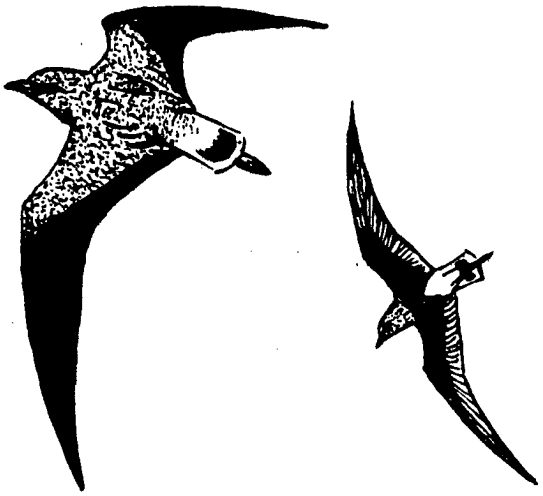
Eastern Coastal
South-eastern Coastal
South-western Coastal
South-eastern Inland
South-western Inland
Central

Although this approach seemed to work fairly well, Dr Mike Fleming (who counts Alice Springs Sewage Works) suggested using the birds themselves to group the sites. The idea here is that sites with a similar association of wader species will be placed in the same group.

Regular Wader Count Project data was fed into a statistical software package (PATN), which compared and grouped the sites. Included in this analysis were all sites counted in at least twelve different months in the period January 1986 to June 1989. The results are summarized in Table 1 which shows which species were observed at associated sites and associated species grouped together. PATN identified seven site groups, listed across the top of Table 1, and seven species groups. Site details are listed in Table 2.

Another analysis performed by PATN determined which species were usually found together. This resulted in seven species groups, listed on the left side of Table 1.

Since the PATN analysis was performed, count data for the last six months of 1989 has been received. In this report I have assumed that the same site groupings identified by PATN hold with the extra data.



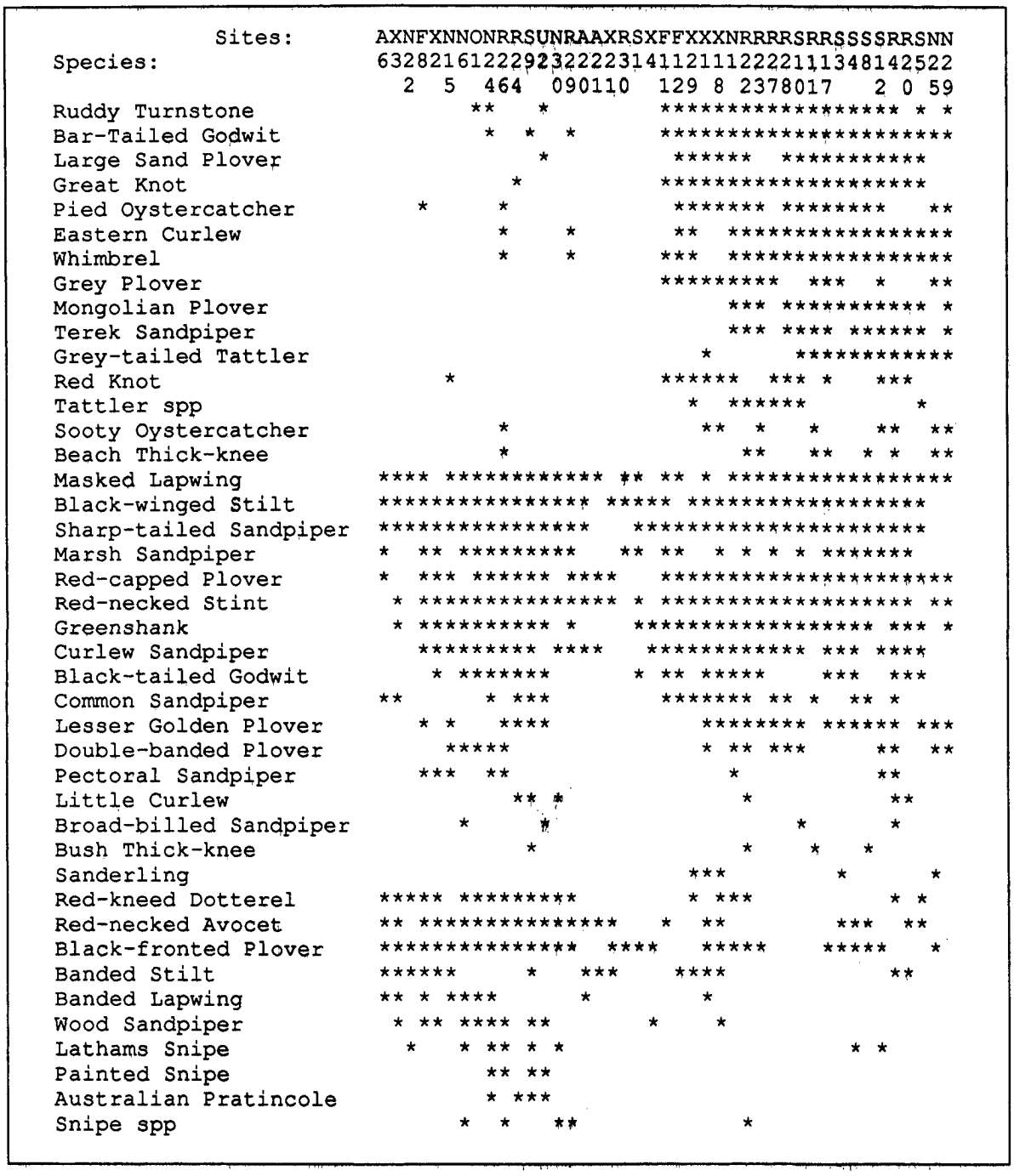


TABLE 1: PATN analysis grouping of sites and species

Key		Site	Lat.	Long.
Lakes/marshes association				
A 6	Vic	Hattah Lakes	34.45	142.15
X 3	WA	Lake Yangebup	32.07	115.50
N22	NSW	Jerrabomberra wetlands	35.18	149.07
F 8	SA	Lake Merreti	34.01	140.45
X 2	WA	Lake Forrestdale	32.09	115.56
N15	NSW	Lake Bathurst	35.03	149.42
N 6	NSW	Parkes Sewage Farm	33.10	148.12
O 1	NSW	Nericon Swamp	34.13	146.02
N24	NSW	Five Bough Swamp	34.32	146.26
R26	Qld	Young Ave, Kinka Beach	23.25	150.08
R24	Qld	Toomba Lake	21.01	145.35
S 9	Qld	Reeves Lake	21.01	145.35
U 2	NT	Alice Springs Sewage Farm	23.44	133.50
N30	NSW	Dubbo Sewage Ponds	32.14	148.36
R29	Qld	Moreton Bay, Fitzroy St	27.32	153.16
Ephemeral association				
A20	Vic	Bitter Swamp	37.05	141.46
A21	Vic	White Lake	37.04	141.45
X21	WA	Roules Lagoon	30.26	120.51
Low Diversity association				
R30	Qld	Woolwash (Serpentine Lag)	23.26	150.31
S 1	Qld	Murray Lagoon	23.24	150.29
X 4	WA	Banjup Swamp	32.08	115.52
Coastal association				
F11	SA	Port Parham	34.25	138.15
F12	SA	Port Prime	34.00	138.00
X29	WA	Oyster Harbour	34.58	117.57
X 1	WA	Kanidal Beach (west)	32.15	126.13
X18	WA	Wilson Inlet	35.00	117.24
N 1	NSW	Prospect Estate	28.51	153.34
R22	Qld	Bakers Creek / Far Beach	21.08	149.12
R23	Qld	Armstrongs Beach	21.26	149.18
R27	Qld	Moreton Bay, Thorneside 1	27.29	153.12
R28	Qld	Moreton Bay, Thorneside 2	27.29	153.12
S10	Qld	Moreton Bay, Thorneside 3	27.29	153.12
R11	Qld	Finlayson Point	20.53	148.57
R17	Qld	Ross River mouth	19.16	146.51
S 3	Qld	Bowen Salt works	20.00	148.15
S 4	Qld	Blakeys Crossing	27.25	153.10
S 8	Qld	Kinka Beach & creek	23.25	150.08
S12	Qld	Boonooroo	25.40	152.46
R 4	Qld	Cairns mudflats	16.55	145.46
R20	Qld	Deception Bay	27.10	153.05
S 5	Qld	Moreton Bay (Lytton - 1)	27.25	153.10
N25	NSW	Red Rock Estuary	29.59	153.15
N29	NSW	Pelican Island south end	32.25	152.54

TABLE 2: Major site groups

SITE ASSOCIATIONS

The seven site groups in Table 1 were consolidated into the following four broad associations.

Lakes/marshes association - Groups 1 and 2

Group 1 sites did not have the smattering of coastal birds seen in Group 2 sites. This is probably explained by the fact that Group 1 sites were generally not counted as often as Group 2 sites, lowering the chance of recording infrequent visitors.

Groups 1 and 2 together account for the majority of the non-coastal sites. The only inland sites not included are those in groups 3, 4 and 5 which for various reasons have recorded only a limited variety of species. Sites included in this association are those very close to the coast (eg Young Ave Lagoons at Kinka Beach) as well as sites far inland (eg Alice Springs Sewage Farm). The one tidal site in this group (Moreton Bay, Fitzroy St) is surrounded by "bush and mangroves" and is undergoing active reclamation.

There is no evidence of a sub-grouping of sites based on broad geographic regions.

Ephemeral association - Group 3

Group 3 represents two adjacent sites in western Victoria and one site, Roules Lagoon, near Kalgoorlie. Of the Victorian sites White Lake is an ephemeral hypersaline lake and Bitter Swamp is a smaller brackish marsh.

Roules Lagoon is an ephemeral freshwater lake. It may be in the wrong group here because the Banded Stilt records are for young birds released at the lagoon after being picked up walking through the streets of Menzies in 1986. These records should probably be removed from the database.

Although these sites record only a limited range of species, the number of birds recorded can at times be very large, particularly numbers of Banded Stilt, Red-necked Avocet and Red-capped Plover.

Low Diversity association - Groups 4 and 5

Groups 4 and 5 represent inland sites with low numbers both in numbers of birds and the variety of species. Group 4 represents two adjacent sites in Queensland, and group 5 is just one site on the south-western coastal plain. All three sites are heavily-vegetated with little exposed mud.

These wetlands support small numbers of a limited range of species, but are probably representative of a large amount of wader habitat in Australia important to the species involved, particularly Black-winged Stilt, Masked Lapwing and Black-fronted Plover.

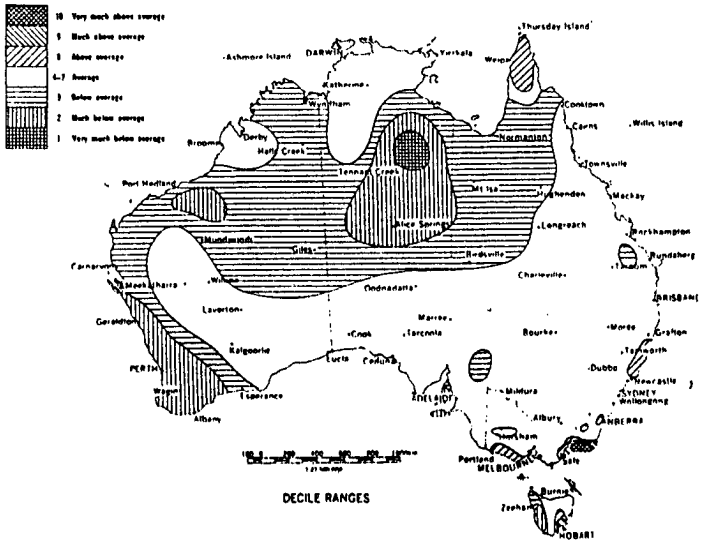
Coastal association - Groups 6 and 7

Groups 6 and 7 represent virtually all coastal sites. Group 7 sites do not exhibit the range of species found at group 6 sites.

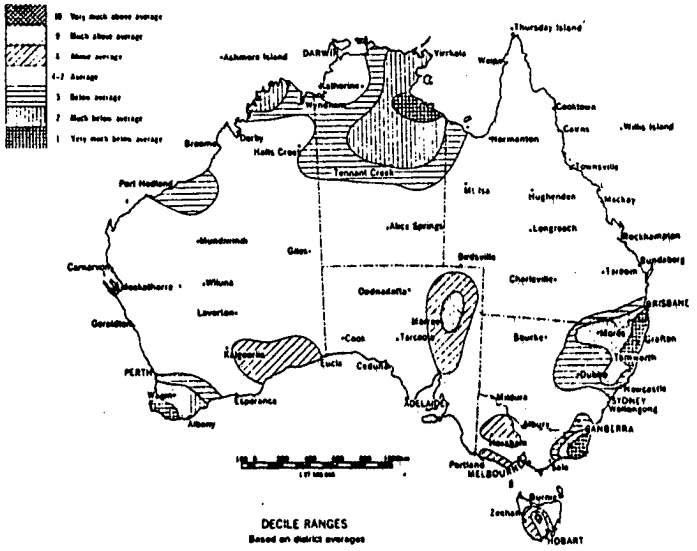
Group 6 actually displays a sub-grouping of eastern coastal sites on the one hand, and South Australian and south-western coastal sites on the other. (It is a pity that there are no Victorian or Tasmanian coastal sites to tell with which sub-group they are most closely associated.)

The above broad site associations will be used as the basis for the rest of this report.

Figure 1: Annual Rainfall

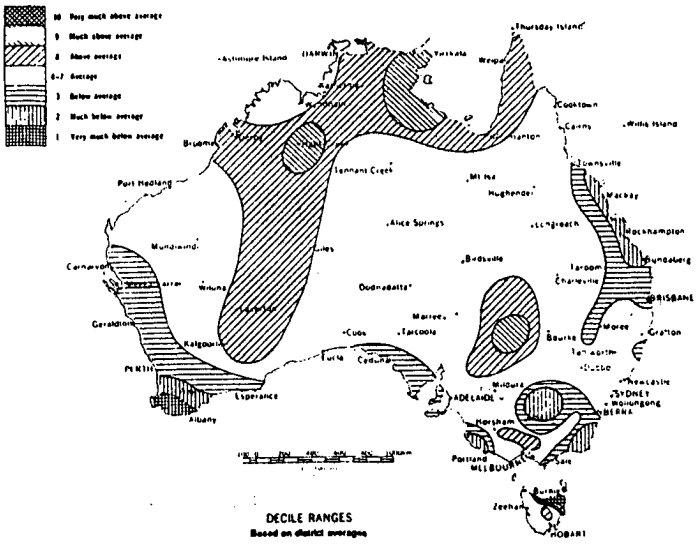


a) Annual Rainfall 1985

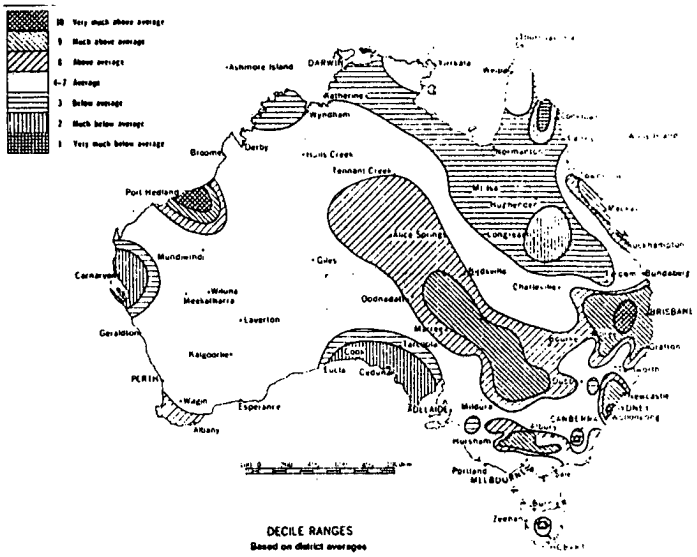


b) Annual Rainfall 1986

Figure 1: Annual Rainfall cont...



c) Annual Rainfall 1987



d) Annual Rainfall 1988

SPECIES GROUPS

Coastal waders - Group 1

Group 1 represents waders usually found on coastal sites.

Ubiquitous waders - Group 2

Group 2 waders are cosmopolitan, occurring on a wide range of wetlands, coastal and inland, fresh and saline.

Inland waders - Group 5

Group 5 waders prefer non-coastal sites, although most are seen at times on coastal sites.

Infrequently recorded waders - Groups 3, 4, 6 and 7

The remaining groups represent species only occasionally reported, some from coastal sites and some from inland sites. They do not form a coherent group.

THE WEATHER REPORT

Figure 1 shows rainfall maps for Australia for 1985 to 1988. These maps show areas of above- and below-average rainfall in each year. In very broad terms these maps show:

1985	Widespread drought in northern half of continent and western Australia.
1986	Drought continued in northern and south-western Australia, drought also in eastern NSW.
1987	Dry conditions continued in south-western Australia but northern coastal areas and western inland areas received above average rains. Below average rain over much of the eastern coast.
1988	Dry conditions extended over northern Australia and most of Queensland. Large areas of central and eastern Australia had above average rainfall

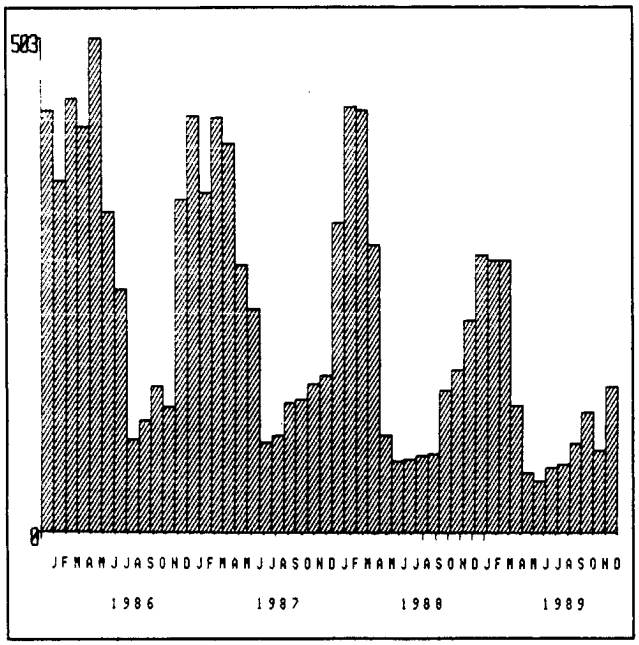
Newspaper reports indicated widespread rains in the eastern inland in the first six months of 1989. Lake Eyre, Lake Torrens and Lake Frome filled.

AVERAGE MONTHLY COUNTS

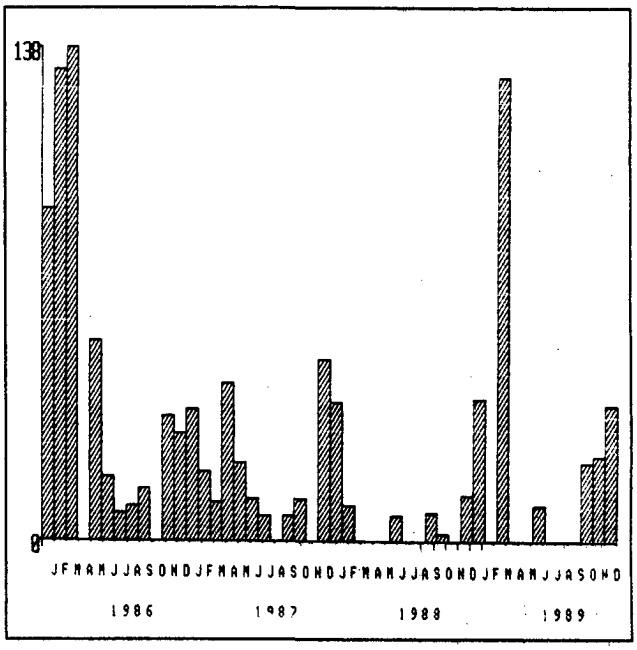
The data for each site were expressed as average monthly counts for each species. The average monthly counts were added for all sites in an association, and histograms of the results drawn.

The results for selected resident species are discussed below.

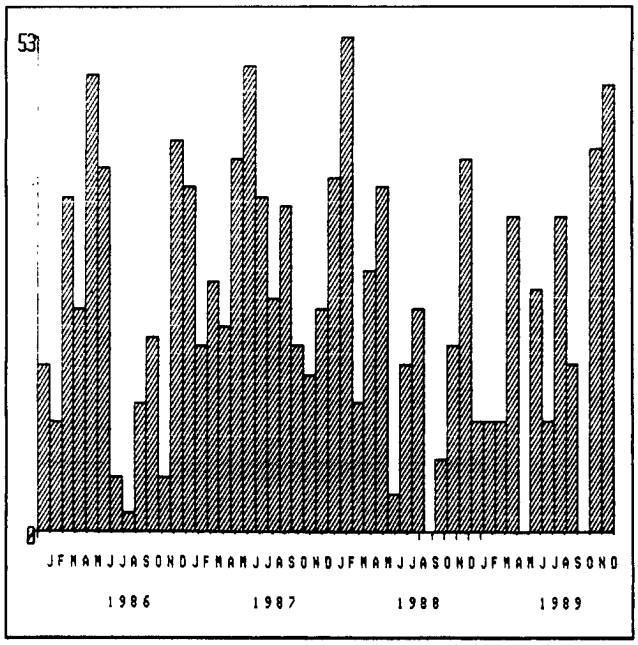
Figure 2: Masked Lapwing - average monthly counts



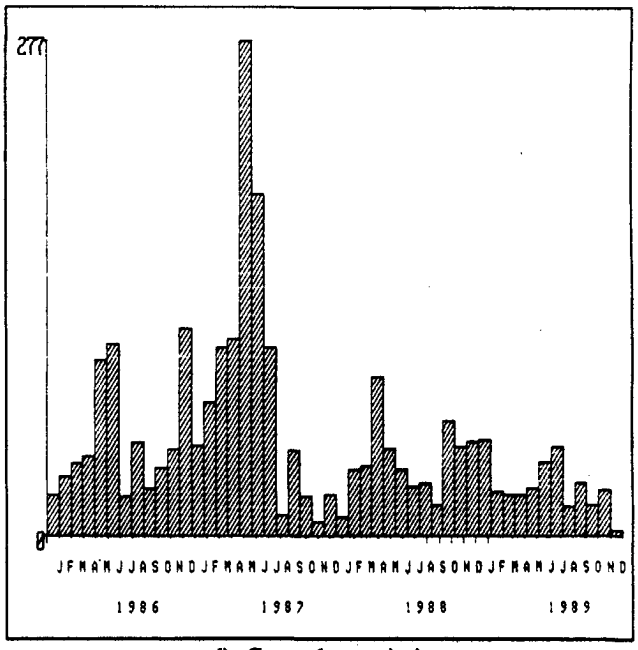
a) Lakes/marshes association



b) Ephemeral association



c) Low Diversity association



d) Coastal association

MASKED LAPWING

Masked Lapwing were recorded frequently in all four site associations (Figure 2).

Lakes/marshes association

Figure 2a) shows a regular seasonal pattern, with basically an early summer congregation and a late autumn dispersal. Influxes usually occurred rapidly:

Influxes: December 1986
January 1988
December 1988

Dispersals extended over one or two months:

Dispersals: June/July 1986
May/June 1987
April 1988
April 1989

Ephemeral association

These sites show a similar seasonal pattern to the Lakes/marshes association, with pronounced summer peaks.

Low Diversity association

There is no apparent seasonal pattern. Masked Lapwing are normally present for most months of the year. If this is the case, do they nest at these sites?

Coastal association

Influxes occurred in autumn, except in 1989 when no marked influx occurred:

Influxes: May 1986
May 1987
April 1988

Dispersals quickly followed the autumn influxes:

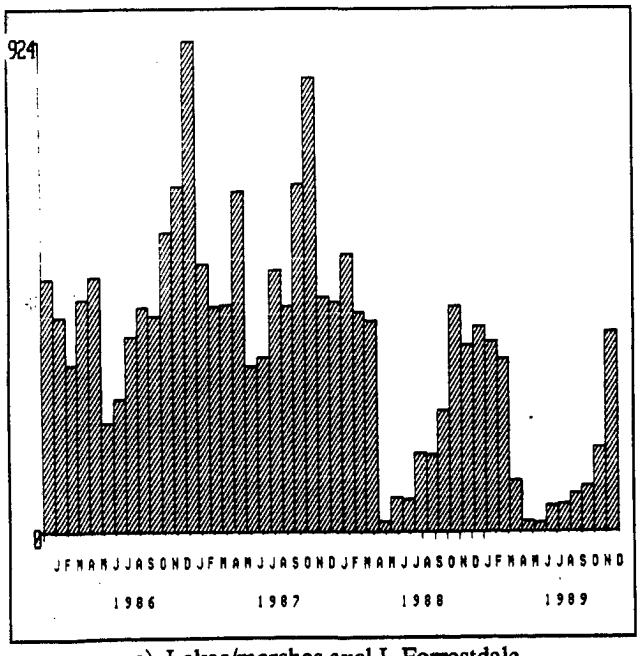
Dispersals: July 1986
June/July 1987
May 1988

These movements suggest that Masked Lapwing retreat to coastal sites as their over-summering wetlands dry up, the extent of this movement depending greatly on the annual rainfall.

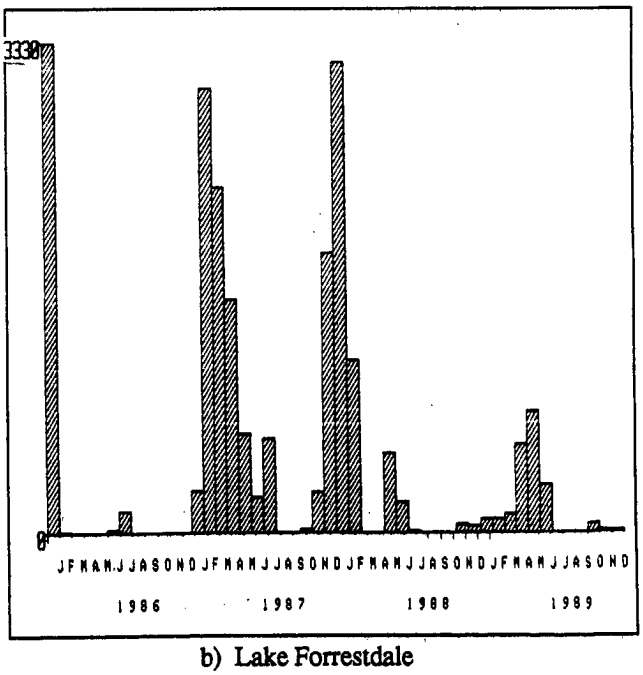
The 1987 autumn influx was particularly large, and coincided with below average rainfall in eastern NSW in 1986 extending over much of the eastern coast in 1987. The usual autumn influx did not occur in 1989, presumably because of the extensive wet conditions over eastern Australia at that time.

Masked Lapwing disperse from coastal sites in late autumn or early winter at about the same time as they disperse from other sites.

Figure 3: Black-winged Stilt - average monthly counts

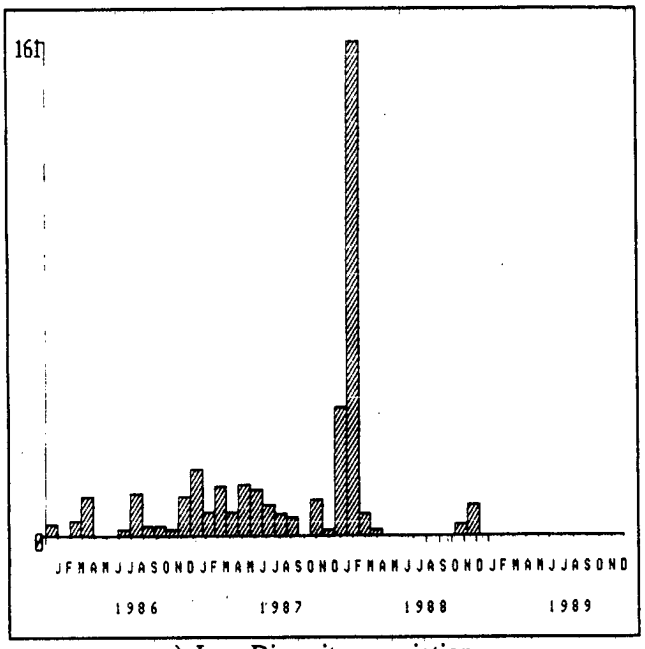


a) Lakes/marshes excl L Forrestdale

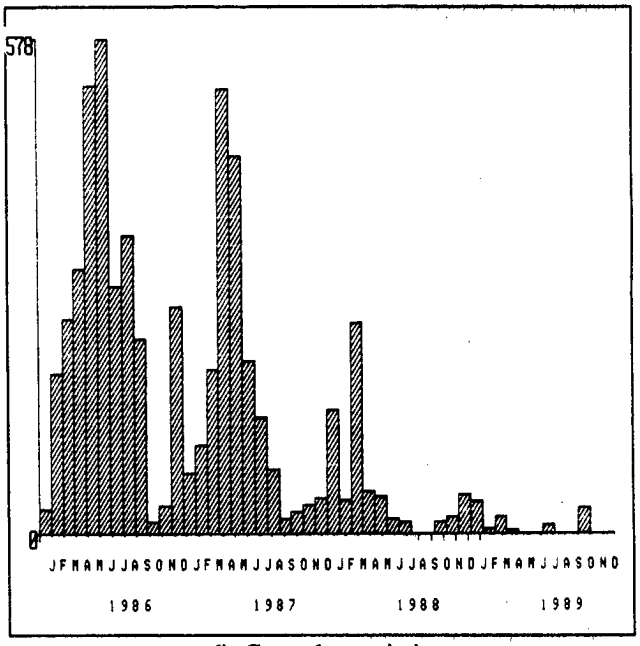


b) Lake Forrestdale

Figure 3: Black-winged Stilt - average monthly counts cont...



c) Low Diversity association



d) Coastal association

BLACK-WINGED STILT

Black-winged Stilt were recorded frequently and in substantial numbers from many sites except those in the Ephemeral association where counts of four or fewer birds were occasionally recorded. Peak numbers at Lake Forrestdale (X2) in WA dwarfed those from all other sites. (Figure 3).

Lakes/marshes association

Large numbers of Black-winged Stilts descended on Lake Forrestdale each summer as the lake dried, except in 1988/89 when it was very full and did not dry sufficiently to attract large numbers.

At other sites a similar summer peak occurred:

Peaks:	January 1987
	November 1987
	November 1988
	December 1989?

However at these sites stilts were also present in fairly constant numbers throughout 1986 and 1987.

In April/May 1988 stilts virtually disappeared, returning in November in moderate numbers. Again in April 1989 stilts departed dramatically. These marked departures coincided with the wet conditions across eastern Australia in these years, suggesting that Black-winged Stilts moved either far inland or dispersed locally.

Low Diversity association

Black-winged Stilts were recorded on these wetlands in most months, with a suggestion of a summer influx. No birds were recorded in 1989.

Coastal association

Black-winged Stilts moved into coastal sites at about the same time as departures from sites in the Lakes/marshes association. Influxes occurred in autumn in 1986, 1987 and 1988:

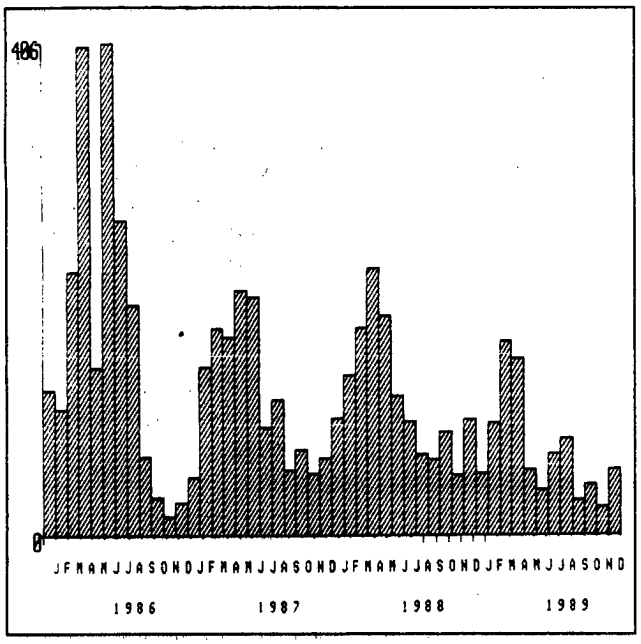
Influxes:	February-April 1986
	December 1986
	March-April 1987
Departures occurred soon after:	
Departures:	July-September 1986
	June-August 1987
	April 1988

Few stilts could be found on coastal sites after April 1988.

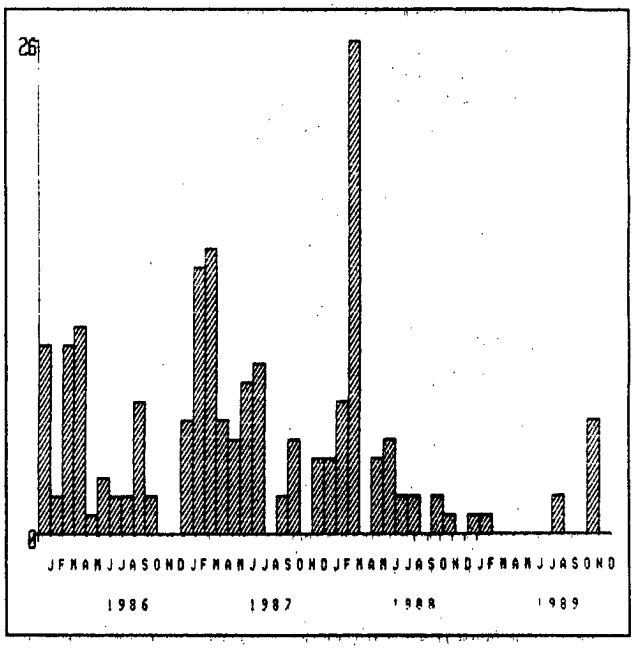
These results suggest that in 1986 and 1987 a substantial portion of the stilt population in eastern Australia moved from inland sites to coastal sites in late summer and autumn. These birds then left coastal sites almost completely in mid-winter and early spring, returning to the lakes and marshes.

However in 1988 Black-winged Stilts did not move to coastal sites in autumn, but instead moved to other habitats in eastern Australia created by the wet conditions. This movement was even more pronounced in 1989 when Black-winged Stilts were virtually absent from coastal sites for the whole year.

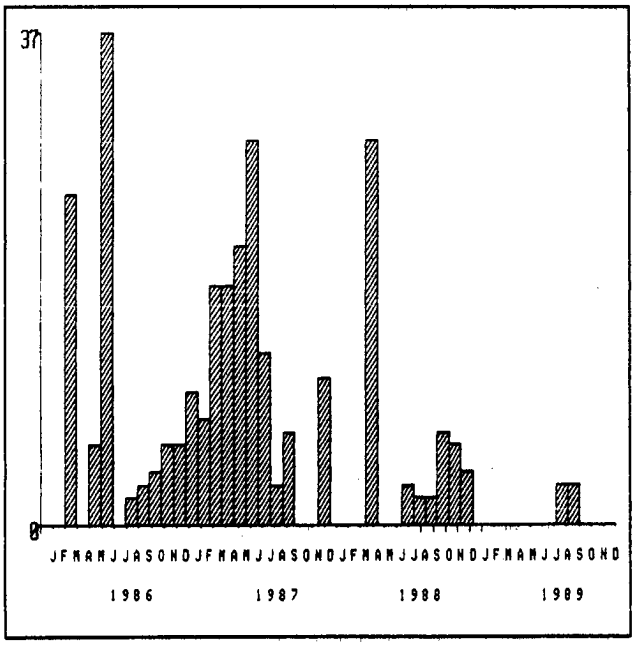
Figure 4: Black-fronted Plover - average monthly counts



a) Lakes/marshes association



b) Low Diversity association



c) Coastal association

BLACK-FRONTED PLOVER

Black-fronted Plover were regularly recorded from many sites in the Lakes/marshes association. Much smaller numbers were recorded from sites in the Coastal and Low Diversity associations, and there was only one observation of one bird in the Ephemeral association. (Figure 4).

Lakes/marshes association

Black-fronted Plover numbers regularly built up on these wetlands in late summer:

Influxes: March 1986
February 1987
February/March 1988
February 1989

The big peaks April-July 1986 were the result of particularly large numbers occurring at Hattah Lakes, Victoria.

Each year numbers remained fairly steady until winter when birds dispersed, presumably to local, smaller wetlands to breed.

Dispersals: July/August 1986
July 1987
May/June 1988
April 1989

Dispersals were earlier in 1988 and 1989, presumably because of the wetter conditions in eastern Australia in those years.

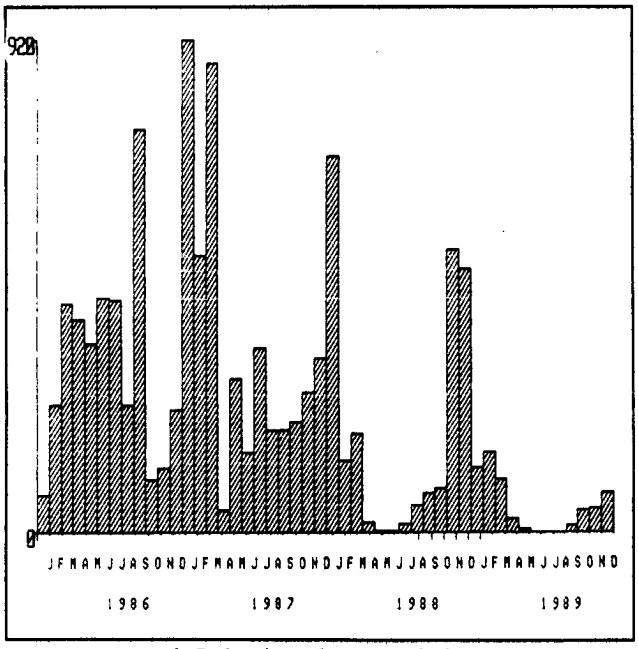
Low Diversity association

Far fewer numbers of birds were observed on these wetlands, but the overall pattern appears to be the same as for sites in the Lakes/marshes association, ie a late summer influx followed by a winter/spring dispersal, with lower than average numbers recorded after April 1988.

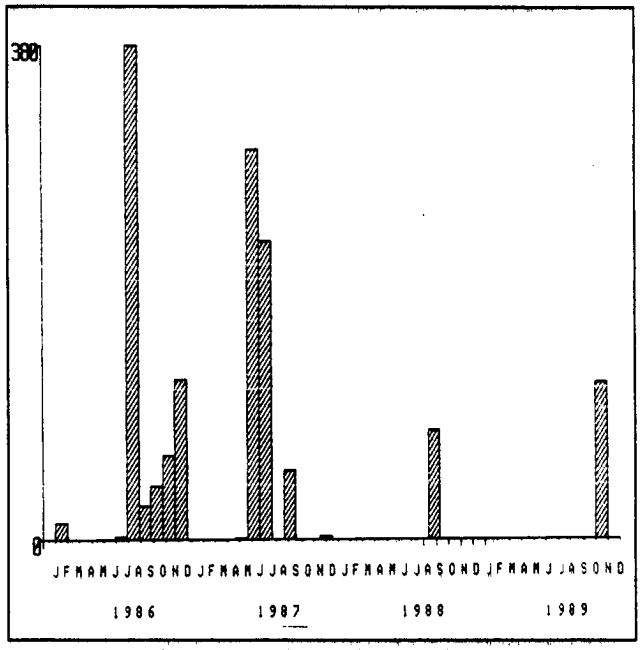
Coastal association

Low numbers and no apparent pattern make it difficult to conclude anything about the movements of Black-fronted Plover on coastal wetlands.

Figure 5: Red-necked Avocet - average monthly counts

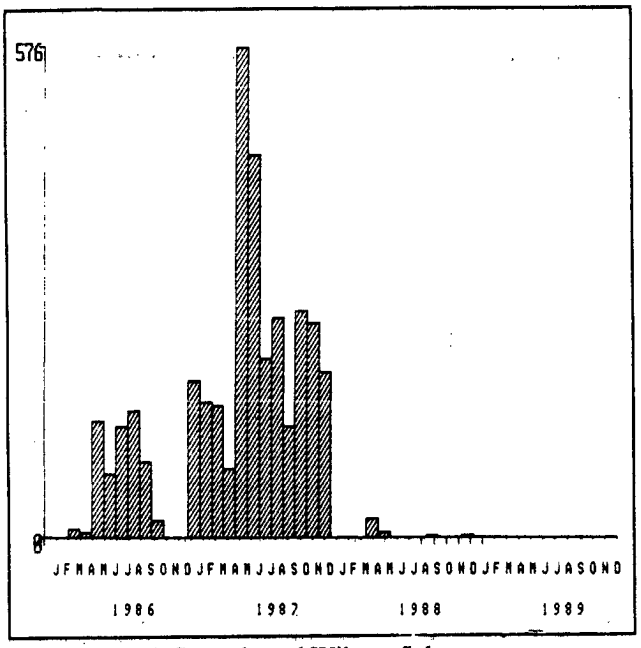


a) Lakes/marshes association

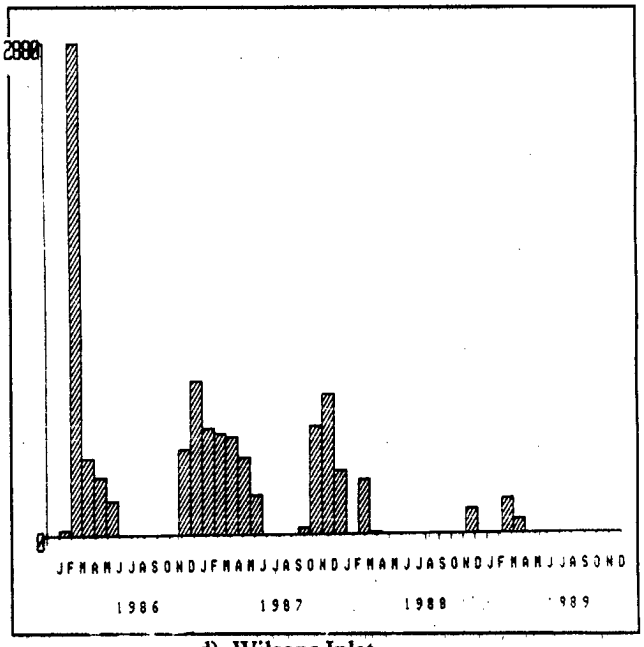


b) Ephemeral association

Figure 5: Red-necked Avocet - average monthly counts cont...



c) Coastal, excl Wilsons Inlet



d) Wilsons Inlet

RED-NECKED AVOCET

This species was often recorded from sites in the Coastal, Lakes/marshes and Ephemeral associations, but never from sites in the Low Diversity association. (Figure 5)

Coastal association

At Wilsons Inlet (X18) much larger numbers of avocets were seen than all other coastal sites combined, so this site is treated separately.

Red-necked Avocet usually appeared in large numbers at Wilsons Inlet in summer and remained for several months. Influxes occurred between November and March, and departures between March and June.

The late influx in 1986 occurred in the middle of two dry years (1985-86), but why this should result in a late arrival of birds is not evident - perhaps the inlet was not providing suitable habitat earlier in the summer. The very small influx in 1988-89 can probably be attributed to very high levels in the inlet resulting in unsuitable habitat until late in the season.

Almost all other records for coastal sites were from those along the eastern coast - only occasional records of very small numbers of Red-necked Avocets were made from Kanidal Beach (X1) and Port Parham (F11). Hence the graph basically shows the numbers of avocets at eastern coastal sites.

Red-necked Avocets are not normally found east of the Great Dividing Range. The graph restates a previous finding (Alcorn 1989) of two separate invasions of Red-necked Avocets into eastern coastal sites - the first in 1986 from May to October and a second, larger invasion from January to December 1987.

The cause of these invasions is not obvious from the rainfall maps. There was a drought in north-eastern NSW in 1986, from which the birds may have been retreating, but average rains fell in that region in 1987. In 1987 there was drought in south-eastern NSW and the eastern coastal region of Queensland, so perhaps the birds were continuing their retreat. Conditions were wet over most of eastern and south-eastern Australia in 1988 and 1989, which explains why Red-necked Avocets subsequently disappeared from eastern coastal sites.

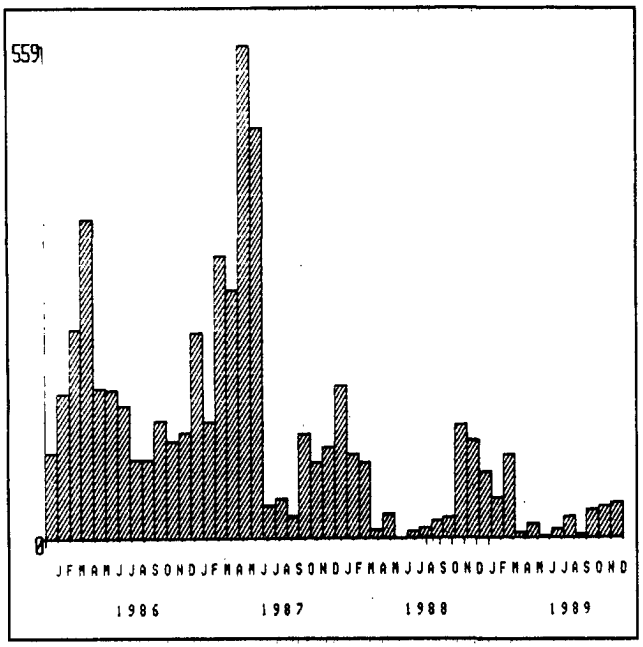
Ephemeral association

Red-necked Avocets usually appeared at these sites in substantial numbers in the latter half of the year. This is the period in which these lakes fill due to winter and spring rains.

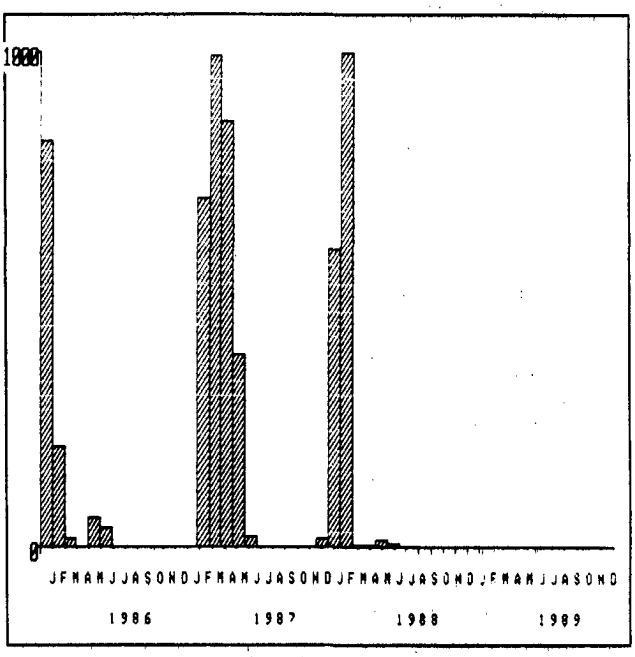
Lakes/marshes association

Red-necked Avocet numbers generally peaked in summer on these sites. The influx in 1986 appears to be very late compared with those in the three summers following. Very few avocets were recorded in the periods April-July 1988 and April-September 1989, presumably because they moved to more remote sites in eastern Australia in these wet years. In fact not one avocet was recorded from any site from June to August 1989.

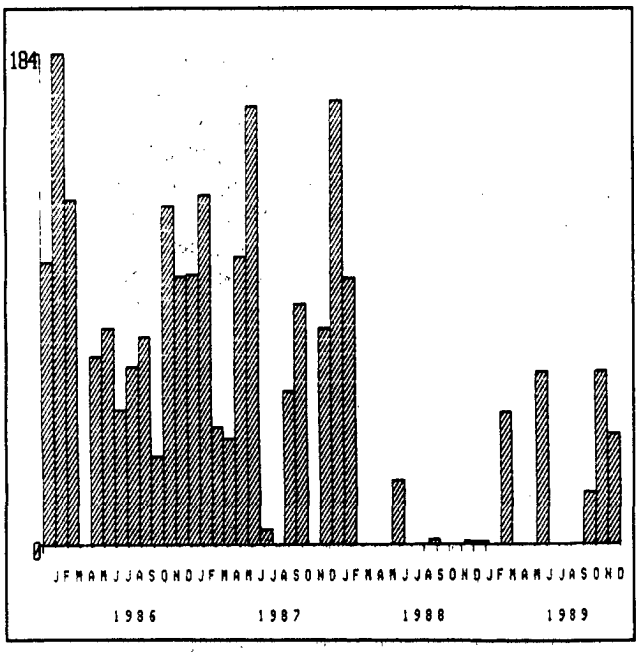
Figure 6: Red-capped Plover - average monthly counts



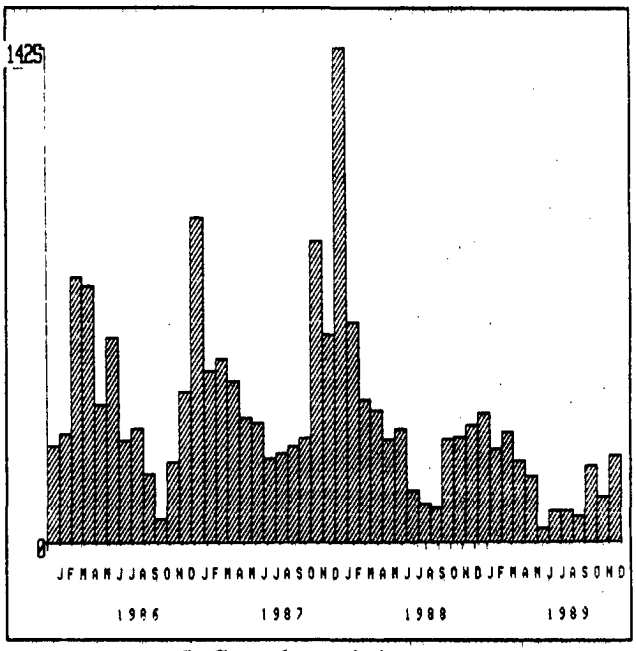
a) Lakes/marshes excl L Forrestdale



b) Lake Forrestdale



c) Ephemeral association



d) Coastal association

RED-CAPPED PLOVER

Red-capped Plovers occur in a wide variety of habitats, including ocean beaches, fresh and saline lakes, and even wet fallow paddocks. In this project they were recorded on most sites except those in the Low Diversity association. (Figure 6)

Coastal association

Red-capped Plovers usually build up in numbers at coastal sites in summer.

Influxes: February 1986
Nov/Dec 1986
Nov/Dec 1987
October 1988

The influx in 1986 was later than in other years. The influx in the summer of 1988/89 was subdued compared with earlier years, corresponding with the wet years in eastern inland Australia in 1988/89.

Departures occurred in the winter in 1986 and 1987, and earlier in the autumn in 1988 and 1989:

Departures: May-July 1986
June 1987
Feb/March 1988
March 1989

The winter/spring numbers were lower in 1988 and 1989 than in other years, again showing the effect of the wet years.

Lakes/marshes association

Lake Forrestdale is graphed separately from other sites in this association because much larger numbers of Red-capped Plover were seen on this wetland. However the same general pattern of a summer influx and winter-spring dispersal applies. The absence of Red-capped Plover in 1989 is accounted for by the abnormally high water levels that year.

Red-capped Plover numbers changed on other sites in the Lakes/marshes association in a manner more or less synchronized with coastal sites, ie summer/autumn peaks and winter/spring lows.

In 1986 and 1987 numbers built up in the autumn, with peak numbers recorded in March (1986) and May (1987). In 1988 and 1989 these autumn peaks did not occur, but instead Red-capped Plovers departed in February/March.

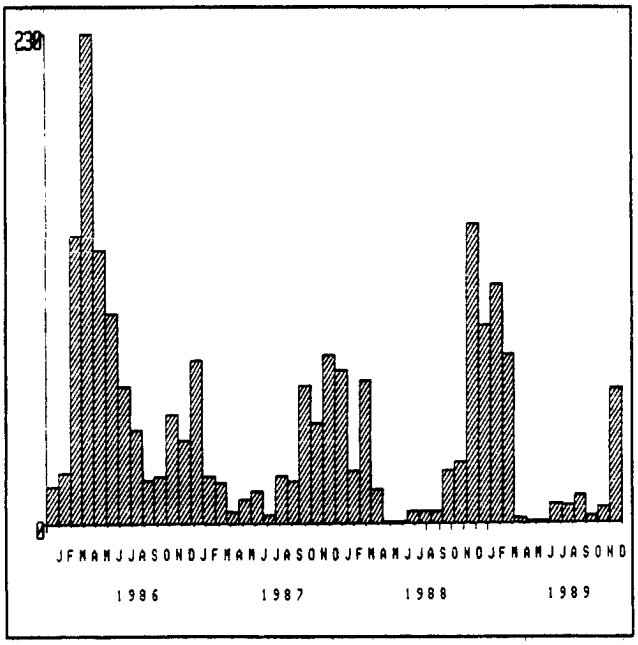
It appears that in eastern Australia Red-capped Plovers dispersed in winter and spring from both coastal and inland sites. In 1988 and 1989 dispersals occurred earlier due to the wet conditions, and few Red-capped Plovers remained at the counted sites.

Ephemeral association

Red-capped Plover are one of the few wader species typical of the three wetlands in this association. The ability of Red-capped Plovers to utilize these highly variable wetlands illustrates their ability to move large distances and in large numbers onto suitable seasonal habitats.

Overall the number of Red-capped Plover were much lower after February 1988 than they had been previously, corresponding with the onset of wet conditions in inland eastern Australia.

Figure 7: Red-kneed Dotterel - average monthly counts



a) Lakes/marshes association

RED-KNEED DOTTEREL

Red-kneed Dotterel were usually observed only on sites in the Lakes/marshes association. Very few records were made of Red-kneed Dotterel on other sites. (Figure 7)

Influxes of Red-kneed Dotterel occurred in early summer in most years culminating in a summer peak in numbers. The peak in 1986 was much later, occurring in April.

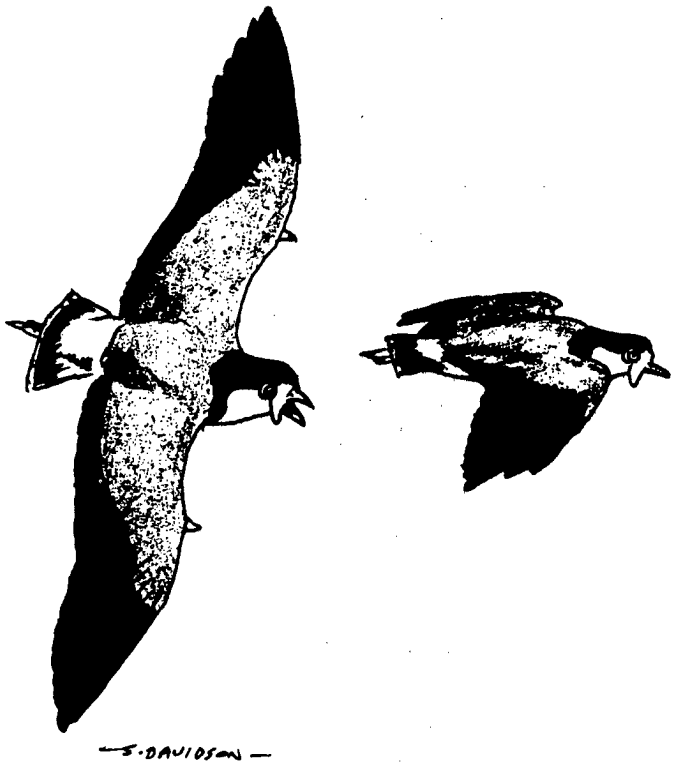
Influxes: March 1986
November 1986
October 1987
November 1988
December 1989

Numbers usually dropped in early autumn, except in 1986 when departures were later.

Departures: May-August 1986
February 1987
April 1988
March 1989

The late influx and extended departure in 1986 is not readily explained by the rainfall patterns across the continent.

Following wet inland conditions in 1981 Red-kneed Dotterel took somewhere between six and twelve months to return to near-coastal sites (Lane 1987). In contrast the wet conditions in eastern inland Australia in 1988/89 do not appear to have had a marked effect on the regular appearance of Red-kneed Dotterel. There is only a suggestion in the data that the winter exodus was a little more complete and the summer influx a little delayed compared to previous years.



Acknowledgements

I would like to thank the project participants for their great efforts in counting their wetland(s) each month. Dr Mike Fleming kindly processed the data using the PATN software and helped analyze the results.

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THE SUMMER 1989 POPULATION MONITORING COUNT: Increasing Numbers Of Bar-tailed Godwits At Monitored Sites In Eastern Australia, 1982-1989.

Marilyn Hewish, 74 Wellington St., Bacchus Marsh, Vic. 3340

The summer 1989 wader count was held on the weekends of 4/5th and 11/12th February. Wader species and numbers at 22 monitored sites are given in Table 1. Unfortunately, counts from the Darwin Area were not available. A total of 96 count sheets was returned, listing 44 species and 202,232 individuals. The count included 175,400 migratory waders from the northern hemisphere, 24,194 resident waders, 85 Double-banded Plovers and 2553 unidentified waders.

Since this project began in 1986, the total summer count has declined from 260,000 stabilizing at about 200,000 birds since 1988. The count of migratory waders declined steadily from 199,000 in 1986 to 150,000 in 1988, but has partly recovered in 1989 to reach 175,000. The 1986 count was probably exceptionally high and reflected the good breeding season for the common waders in 1985. Since then there have been no exceptional breeding years (Victorian Wader Study Group, pers. comm.) and this is reflected in the falling counts. Counts of resident waders have varied widely from year to year, mainly because of fluctuations in the numbers of Banded Stilts at our sites. The Banded Stilt count in 1989 was the lowest so far; 10,900 compared with the 1986-1988 counts of 45,600-22,000. 1986 was the year when record high counts of Banded Stilts were recorded at several sites, probably because of large-scale breeding in 1984 after flooding inland. Between 1984 and this count, dry conditions inland have presented no opportunity for breeding, and so a gradual decline in population size would be expected by natural mortality. The picture is confused however by movement to and from the coast, where monitored sites are concentrated. It will be interesting to see the effect of 1989's flooding inland, with proven breeding, after the birds return to the coast. I would expect to see counts returning to the level of 1986 or beyond.

In my first wader count report (Hewish 1986), preliminary analysis indicated that numbers of Bar-tailed Godwits at monitored sites had increased from 1981-1986. Since then, I have watched their numbers with interest as our data bank has grown and now take the opportunity to look at the data more closely. The results are presented below.

Bar-tailed Godwits

Count coverage

Since the Population Monitoring project began in 1986, summer counts of Bar-tailed Godwits have ranged from 20,000 to 24,000, high in comparison with most other wader species. Lane (1987) lists the top 20 sites for Bar-tailed Godwits; we monitor 9 of them, which is reasonable considering that we monitor only 23 sites in total. However, our total counts represent only 15-18% of the estimated minimum population in Australia (134,000; Lane 1987). This poor coverage arises from the concentration of our monitored sites in eastern Australia. Of the top 20 sites listed by Lane (1987), 13 are in eastern Australia (Qld, NSW, Vic., Tas.); we monitor 7 of them. Total counts from the eastern states have ranged from 20,000 to almost 24,000, or a staggeringly high proportion (58-71%) of the estimated population present in the east (34,000; Lane 1987). By contrast, our coverage in the west is woeful. WA holds three of the top 20 sites, including the two most important sites in the country (Roebuck Bay, Eighty Mile Beach) and we monitor none of them; our WA summer counts have never exceeded 100 birds. Even if the central states (SA, NT; holding 4 important sites) are included with the west, we only pick up a further two sites, with counts usually in the hundreds; this from a population in western Australia estimated to be at least 100,000 birds (Lane 1987).

Increasing numbers in eastern Australia, 1982-89.

In eastern Australia (Qld, NSW, Vic., Tas), where our monitoring of Bar-tailed Godwits is most effective, nine sites have been surveyed consistently in every summer count since 1982. The total counts from these can be used to follow year-to-year changes in numbers. They are Corner Inlet, Westernport, Port Phillip Bay (Vic), Moreton Bay, Cairns (Qld), Hunter Estuary, Botany Bay (NSW), Derwent/Pittwater and Cape Portland (Tas.). Results from 1981 have been excluded as this was the first year of counts and some wader roosts and feeding areas had not been discovered.

In Figure 1, the total count from these nine sites shows an upward trend from 1982-89. A sharp increase from 1982-83 was followed by relative stability between 1983-86, and a steady increase of 9-12% in each year since. The latest count (1989) is now more than double that in 1982. This upward trend over the eight years is statistically highly significant (Spearman's Rank Correlation Coefficient, r_s = 0.93; <0.01).

To determine whether the increase in eastern Australia was a widespread phenomenon or localized to one or a few sites, the total counts from consistently-surveyed sites in each eastern state are plotted separately; counts from individual sites where no summer counts were missed are also shown (Figure 2). Cape Portland is omitted as it rarely held more than 10 birds. Observations and conclusions are given below.

Vic. total, consistently-counted sites (Corner Inlet, Westernport, Port Phillip Bay).

Victorian monitored sites held greater numbers of Bar-tailed Godwits than those from any other state (7000-14000 birds; since 1986, 54-59% of the total Aust. summer count), mainly because of the huge numbers at Corner Inlet. Vic. counts showed a marked upward trend, increasing steadily to double from 1982-89 (statistically significant; r_s = 0.98; P<0.01).

Corner Inlet. This is easily the most important of our monitored sites for Bar-tailed Godwits, holding 6000-13000 birds. A marked upward trend can be seen, counts doubling from 1982-89 (statistically significant; $r_s = 0.91$; $P<0.01$); although possibly there were periods of stability between 1983-85 and 1987-89.

Westernport. This site held 260-470 birds, counts showing a consistent upward trend from 1982-89, ($r_s = 0.71$; $P<0.05$). Although numbers were comparatively low, this site is important as the focus of a continuing series of surveys from 1973 onwards by the Bird Observers' Club of Australia (Loyn *et al.* 1989). The wader count results have generously been made available to us since the beginning of the RAOU National Wader Counts. The longer-term results are at present being analysed for publication by BOCA organizers.

Port Phillip Bay. Summer counts have varied greatly from 1982-89, ranging from 170-730, and have shown no consistent trend upwards ($r_s = 0.36$; $P>0.05$).

NSW total, consistently-counted sites (Hunter estuary, Botany Bay).

Counts have trebled from about 1000 to 3000 from 1982-89. However, the upward trend ($r_s = 0.74$; $P<0.05$) has not been steady, with large increases between 1983-84 and between 1987-88, and perhaps a decline in the intervening period, 1985-87.

Hunter Estuary. This site accounted for most of the NSW total above (600-2400 birds), and so shows a similar upward trend from 1982-89 ($r_s= 0.76$; $P<0.05$), with large increases between 1983-84 and between 1987-88, and an intervening decline.

Botany Bay. Counts have ranged from 250-1000 birds. Figure 2 suggests that numbers have increased since 1982, but this trend is not statistically significant ($r_s =0.62$; $P>0.05$).

Shoalhaven estuary. One summer count (1985) was missed. Numbers usually fluctuated between 200 and 500, but counts in 1988 and 1989 were unusually high (1200, 750 respectively). However, there has been no significant upward trend ($r_s = 0.36$; $P>0.05$).

Clarence/Richmond estuaries, Paramatta River. Coverage was not complete or consistent at Paramatta River until 1984 and at Clarence/Richmond until 1985. The count series is therefore too short to detect general trends. Counts from both sites, however, will be valuable for monitoring Bar-tailed Godwit populations in future, as Clarence/Richmond estuaries have held up to 1500 birds and Paramatta River up to 500.

Qld total, consistently-counted sites (Moreton Bay, Cairns)

Counts have varied greatly from year to year, with no apparent upward of downward trend ($r_s = 0.10$; $P>0.05$).

Moreton Bay held most of the Qld total above (1000-5000 birds); no significant trend was detected ($r_s = 0.10$; $P>0.05$).

Cairns held low numbers of birds (50-160) and showed no upward trend ($r_s = 0.21$; $P>0.05$).

Mackay. Coverage was not complete or consistent until 1985. Subsequent counts have varied from 1000-3000.

Tas. total, consistently-counted sites (Cape Portland, Derwent/Pittwater).

Tas. monitored sites held low numbers of Bar-tailed Godwits compared with those in other eastern states, and numbers seem to have been stable.

Derwent/Pittwater held between 50-100 birds, and no trend is apparent ($r_s = 0.57$; $P>0.05$). This is another site of long-term counts from 1965 onwards (Patterson 1989), the results from 1981 being made available to the RAOU and AWSG for this study.

Cape Portland usually held fewer than 10 birds.

Therefore, even though Bar-tailed Godwits have increased greatly at monitored sites in eastern Australia from 1982-89, patterns have varied at individual sites. The increase was confined to the major part of the birds' range in Vic. and NSW, but even there not all sites were affected. Numbers increased particularly at Corner Inlet, Westernport, Hunter Estuary and, perhaps, Botany Bay. Corner Inlet and the Hunter Estuary are important sites for Bar-tailed Godwits, ranking second and sixth among the top sites in the eastern states (Lane 1987). But other important sites, Port Phillip Bay (Vic.), Shoalhaven estuary (NSW) and Moreton Bay (Qld) showed no increases. And sites in Queensland and Tasmania, near the limits of the range and most carrying lower numbers of birds, were unaffected.

Over-wintering percentages

For most species of migratory waders, first-year birds remain in the non-breeding range for the southern winter after the adults have returned to breed. Therefore, the over-wintering percentage in Australia (winter count as a percentage of summer count in any year) is thought to provide a measure of the proportion of first-year birds in the population and hence of breeding success in the previous year in the northern hemisphere. For Red Knots, for instance, trends in this measure correspond broadly with trends in breeding success determined from catch data in Australia, counts elsewhere and observations at the breeding grounds (Hewish 1987).

Over-wintering percentages (1982-88) for Bar-tailed Godwits in eastern Australia (Qld, NSW, Vic., Tas.) are presented in Figure 3. In any year, sites not counted consistently in summer and winter were excluded from the calculations. These results are compared with other possible measures of breeding success; the proportion of first year birds in summer catches in Victoria, 1982, 1985, 1986 (Barter 1989b) and over-wintering percentages from New Zealand counts, 1984-88 (Sagar 1983-89).

Surprisingly the three potential measures of breeding success show no correlation. The average over-wintering percentage in eastern Australia was 16%; in most years it was quite high at around 20%. Over-wintering percentages in New Zealand were on average lower (12%) and the percentage of first-year birds in Victoria catches was lower still (average 7.5%; Barter 1989b). The stability of the eastern Australian over-wintering percentages since 1985 contrasts strongly with the very variable catch results, in which a record-high percentage of first-year birds in 1985 was followed by a very low percentage in 1986. Nor are the highest- and lowest-ever winter counts in New Zealand in 1987 and 1988 reflected in the Australian results.

The over-wintering percentages of Bar-tailed Godwits in each eastern Australian state are plotted separately in Figure 4. It is possible that the graphs for Tas., Vic. and Qld show similar patterns, with peaks occurring in at least two of these three states in 1982, 1985 and 1988; but the results from NSW correspond in no way to those from the other three states. Over-wintering percentages in NSW (average 32%; range 19-47) were in general considerably higher than for the other states: Tas., 20% (8-44); Vic., 12% (4-19); and Qld 15% (10-25). In NSW, high over-wintering percentages (30%) were a feature of all sites except the Clarence/Richmond estuaries: Shoalhaven, average over-wintering percentage, 60%; Botany Bay, 34%; Paramatta River, 31%; Hunter estuary, 36%. At Paramatta River in 1986, winter numbers almost equalled summer numbers (over-wintering percentage, 98%), and at Shoalhaven in 1987, winter numbers exceeded summer numbers (137%).

Discussion

Because of our poor coverage of Bar-tailed Godwit sites in WA, results and analyses from our Population Monitoring counts for this species are useful only for the eastern part of the country. Studies of the biometrics of Bar-tailed Godwits caught in north-western Australia and in south-eastern Australia indicate that these areas support different populations; the as yet unaccepted subspecies *menzbieri* perhaps migrating to the western part of the country (WA, and possibly S.A. NT) from breeding grounds in north central Siberia, and a different subspecies perhaps migrating to eastern Australia and New Zealand from breeding grounds in Alaska (Barter 1989a). Our coverage of the subspecies using eastern Australia is exceptionally good. NZ, which holds large numbers of possibly the same subspecies, is also well-covered in regular counts. But coverage of the other population in WA has been almost non-existent in this five-year phase of our project.

However, as a result of the AWSG workshop, 'Wader Research in the 1990s' held in May 1989, arrangements are being made to include important sites in WA in the next five-year phase of our monitoring programme. We are aiming for coverage of any or all of Roebuck Bay, part of 80 Mile Beach, Port Hedland Saltworks, and Useless Loop Saltworks. Thanks to the efforts of Doug Watkins and the staff of the RAOU's Broome Bird Observatory, the first counts from Roebuck Bay are already in (summer 1990). Coverage of Roebuck Bay and 80 Mile Beach, the two top Australian sites for Bar-tailed Godwits (Lane 1987), will ensure that the Western subspecies, the most numerous in Australia, will be adequately monitored and will enable comparisons with the eastern subspecies using different breeding and non-breeding areas.

As in all worthwhile science, the monitoring count results above raise more questions than they answer: why is this upward trend occurring; why at some sites and not at others, how long has it been going on; what will happen in the future; why is there no correlation between trends in the three potential measures of breeding success? We do not have definite answers to most of these questions, but speculating can be fun.

What is causing the upward trend? The effect is not limited to a single site of small area, and a widespread rather than local cause is probably involved. The simplest explanation is that the increase at our monitored sites reflects a real increase in the total population of birds, either from sustained successful breeding in the northern hemisphere or increased survival of adults and/or young in the migration flyway or the non-breeding range. However, we cannot eliminate other effects acting within the non-breeding range, perhaps a change in distribution favouring particular sites on the eastern and south-eastern seaboards.

It seems unlikely that the increases noted arose from a distribution shift in eastern Australia. Few areas could supply the 12,000 birds by which the eastern Australian counts have increased since 1982, and certainly no site near, for instance, Corner Inlet holds anywhere near enough birds to account for its increase (6000). In addition, such large numbers would have to come from important sites, many of which we have been monitoring with no sign of marked downward trends. A larger-scale shift in the non-breeding range remains a possibility, with birds moving gradually to the Australian coast from New Zealand where they occur in large numbers. But counts in New Zealand since summer 1983 have shown no decrease to correspond with our increase; in fact, if anything, numbers there have also been climbing (Sagar 1983-89). Another factor against a large-scale re-distribution is the extreme faithfulness of adult Bar-tailed Godwits to their non-breeding sites, both in Australia (Barter 1989b) and overseas (Cramp & Simmons 1983). Gradual shifts from one site to another have been noted for Bar-tailed Godwits in the United Kingdom (Moser & Kirby 1987) and for other migratory wader species in Australia (Patterson 1989), but only over comparatively short distances. A shift of the magnitude and rapidly observed in eastern Australia would be unprecedented.

Has there been increased survival because of favourable factors in the non-breeding range? There is no reason to think that conditions for Bar-tailed Godwits have improved markedly in Australia. Along the eastern Coast much of their favoured estuarine habitat has been destroyed of degraded and two of the sites where increases have occurred, Hunter estuary and Botany Bay, are near major population centres and are increasingly disturbed. the best that can be said is that some important sites have not deteriorated.

On the migration flyway, habitat destruction is a continuing problem. On southward migration, Bar-tailed Godwits may take a trans-Pacific route (Barter 1989a), thus avoiding the worst of the hunting pressure on waders in south-east Asia. But this factor acting consistently in their favour can hardly explain recent major changes in numbers, although it does ensure that increases for other reasons are unlikely to be negated by losses to hunters.

This leaves a real increase in numbers because of favourable factors acting at the breeding grounds as the most likely explanation for our results. Wader counts since 1971 in the United Kingdom have also detected a gradual increase in numbers of Bar-tailed Godwits (Moser & Kirby 1987, Prys-Jones & Kirby 1989). It is tempting to suggest that these increases in the UK and Australia reflect excellent conditions for breeding over a wide area of the Arctic, encompassing the breeding grounds of the two populations (European Arctic for UK birds; probably Alaska for Aust. birds). However, there have been differences in timing and magnitude of the trends in the two areas. The UK increase has been long-term and gradual; if the data over the shorter period, 1982-89, is examined, the trend is not detectable. By contrast, the increase in numbers in eastern Australia is probably a recent phenomenon. Two of our sites where increases have been found have been noted until recently for the stability of their summer counts of Bar-tailed Godwits; Westernport holding about 300 birds from 1973-83 (BOCA Westernport Survey, pers. comm.) and Corner Inlet, 5000-7000 birds from 1975-82 (Martindale 1982). In addition, the increase in eastern Australia has been much more dramatic than in the UK. Therefore, although the long-term trends in both areas probably indicate a real increase in the population, perhaps through changes at the breeding grounds, the causes may be different. And even if they are similar, they have differed in magnitude and timing.

Why are there increases in numbers at some sites and not at others? Again, wader studies in the UK provide the precedent with studies of another wader species. Wintering numbers of Grey Plovers increased in Britain up to 1987, but patterns of increase varied on individual estuaries (Prys-Jones 1987). Our sites have shown patterns for Bar-tailed Godwits similar to those for Grey Plovers in the UK; sustained increases (Westernport, Botany Bay) initial increases followed by levelling off (Corner Inlet, perhaps Hunter est.), or no upward trend (most other sites). Patterns at individual sites probably depend on a combination of factors; particularly their attractiveness to Bar-tailed Godwits and their carrying capacity. Preferred sites probably fill first but may already be carrying birds to near capacity, so that a plateau is reached early. Sites with sustained increases do not carry near capacity in normal years, but are good enough to accommodate the 'extra' birds when conditions overall are crowded. Sites which show no upward trend may either be the best sites already carrying at capacity in normal years or the poorest sites that do not attract the 'extra' birds; measurements of bird densities would distinguish between these alternatives. It will be interesting to follow future trends at these sites and overall. The upward trend in Bar-tailed Godwit numbers in the UK has continued inexorably for 18 years, but if our trend continues for that long at the present rate we will be knee-deep in birds. Only by continuing our counts can we determine whether numbers will continue to rise, whether they will stabilize at a new higher level, or whether this is part of a long-term cycle in which numbers will eventually return to the original level.

Unfortunately, it is not easy to determine from Australia what has been happening on the breeding grounds while this increase has been occurring. We cannot investigate breeding success as we did, for instance with Red Knots, as there seems to be no simple correlation between the three potential measures of breeding success: over-wintering percentages in eastern Australia, percentages of first-year birds in summer catches in Victoria; and over-wintering percentages in New Zealand. Even within Australia, trends in over-wintering percentages correlate poorly between states.

Central NSW sites in particular carry higher over-wintering percentages than sites in other states. It is possible that, even in summer, first-year birds are concentrated in central NSW. There is no concrete evidence for or against on this point. Summer catching studies in Victoria have shown that the proportion of first-year birds in flocks varies between areas, but that differences are largely local. Over a large area (central Vic.) not all sites show the same trend (Victorian Wader Study Group, pers. comm.). It therefore seems unlikely that all 4 sites in central NSW would each carry a higher than expected proportion of first-year birds in summer. The other and more likely possibility is that first-year birds move into central NSW between the summer and winter counts. Unlike adults, first-year migratory waders are mobile in the non-breeding range (Minton 1981; Fletcher *et al.* 1982; Paton *et al.* 1982; Newman *et al.* 1985; Hewish 1988). Bar-tailed Godwits fit this pattern in Europe (Cramp & Simmons 1983). Over-wintering percentages approaching or exceeding 100% (Paramatta River in 1986, Shoalhaven in 1987) certainly support the suggestion of an influx of first-year birds between summer and winter.

Lane and Jessop (1983) suggested that juvenile Bar-tailed Godwits move north within Australia during winter, because in 1983 over-wintering percentages were very low in Tas. and Vic. and much higher in NSW and Qld. Unfortunately 1983 seems to have been an atypical year. Our results over 8 counts indicate that central NSW is the only area with consistently and exceptionally high over-wintering percentages. In Tas. and Vic., average over-wintering percentages are comparable or even slightly higher than the percentages of juveniles in summer catches (average 7.5%), indicating that first-year birds are not leaving the southern states *en masse* between summer and winter. Further north, in Qld and even in northern NSW (Clarence/Richmond), the over-

wintering levels are similar to those in southern states, rather than maintaining in increasing the NSW levels. High over-wintering percentages are therefore not just a function of latitude. A systematic movement of first-year birds in central NSW seems to be the most likely scenario, rather than a general movement north.

How many? The approximate number of 'excess' wintering birds at Shoalhaven, Hunter Estuary, Paramatta River and Botany Bay can be roughly calculated as about 170-700 birds, from the difference between the maximum expected winter count (about 20% of total summer count) and the actual winter count each year.

From where? We have no evidence of an appreciable movement of first-year birds away from areas to the north or south of NSW, and an exodus of 700 first-year birds from any of our monitored sites would certainly make a noticeable dent in its over-wintering percentages. Perhaps they come from important sites we do not monitor; perhaps from many sites along the eastern seaboard, each contributing small numbers; or, to range more widely, perhaps from New Zealand. The loss of our excess birds would hardly be noticed from the huge numbers counted in winter in New Zealand (6400-16,500; Sagar 1983-89).

And why? First-year birds of many wader species are more mobile in the non-breeding range than their adult counterparts, particularly between their first southern summer and winter. This may enable them to cope with changing habitats and conditions in winter, when higher tides, shorter hours or daylight and lower temperatures limit feeding opportunities and affect prey abundance and availability (Parry in Loyn 1978; Martindale 1982). And young birds may take advantage of the adults' departure on migration to search for better quarters, from which they were excluded by competition with adults in summer.

In the past, in assessing the conservation needs of waders, rankings of important sites have been made on the basis of summer counts. However, sites important for first-year birds spending their first winter in the non-breeding grounds must also be protected in the species is to flourish. Given the mobility of first-year waders, these sites may not always be identical to the favoured summer sites. In particular, the central NSW sites assume greater importance in winter than in summer. This is confirmed by ranking the monitored sites in terms of average summer and winter counts. The only sites which improve their rankings by more than one place in winter are in NSW; Hunter estuary ranks fourth in summer and second in winter; and Shoalhaven ranks seventh in summer and fourth in winter. The importance of central NSW sites for first-year birds should therefore be taken into account when considering conservation strategies for this species.

In long-term studies at Langebaan Lagoon, South Africa, breeding success or Bar-tailed Godwits as measured by over-wintering percentages followed a three-year cycle, which appears to be the norm for Arctic-breeding waders. Peaks followed decreased nest predation by Arctic Foxes in lemming years (Summers & Underhill 1987; Underhill 1987). Australian/New Zealand and South African Bar-tailed Godwits originate from different breeding grounds but both are Arctic and lemmings and Arctic Foxes occur throughout. A similar, though probably not synchronous, cycle should operate in Australian birds. No such cycle is detectable in eastern Australia, at least from 1985-89, during which over-wintering percentages have remained high and stable. Even in New Zealand, which holds a large population, no three-year cycle is evident. It is however, possible that Victorian catch results show this cycle, with high proportions of first-year birds in 1982 and 1985, but lack of data for the intervening years is a problem.

If individual states are considered, over-wintering percentages in Tas. and Qld each show a possible three-year cycle, with peaks in 1982, 1985 and 1988. Vic over-wintering percentages may also follow the same cycle up to 1985. The peaks in 1982 and 1985 coincide with years of high percentages of first-year birds in catches, lending support to the idea that these patterns are meaningful. However, the NSW results and the Vic. results since 1986 cannot be reconciled at all with a regular cycle. Tas., like Langebaan Lagoon, is near the southern end of a migration flyway. Such places may be ideal for following trends in over-wintering percentages, as fluctuations are more pronounced than in the more northern states (see Figure 4); winter numbers may be very low in poor years, when most birds 'fit' into sites to the north, and very high is good years when overflow occurs. This may in fact be true of any borderline site, which can support birds in winter but is not generally favoured enough to hold large numbers. Perhaps the sites most preferred by first-year waders (e.g. central NSW) are the worst places for attempting to follow changes in over-wintering percentages, as they may often be occupied to near capacity, with birds moving in from elsewhere even in poor years.

Some favoured areas in Vic. and NSW may already be near or at their winter capacity. If the adult population is very high, as it has been recently, even a year of fairly poor or average breeding success may produce large numbers of young. Then winter counts at favoured sites may appear stable, as there are always enough first-year birds to move in and fill them to capacity. Over-wintering percentages in Vic. since 1985 and NSW since 1986 have followed this pattern, reaching and maintaining high levels, in contrast with the wide variations in previous years. It is possible to imagine a situation where winter capacity has been reached but summer numbers continue to climb, so that over-wintering percentages slowly decline. Could this be happening in NSW since 1986 and in Vic. since 1985?

But even if these speculations are correct, we cannot claim to understand how count data relates to breeding success until we know why the Australian and New Zealand results disagree. New Zealand over-wintering percentages show no peak coinciding with the possible Australian peak in 1985, and yet extremely high counts in winter 1988 show that in 1985 New Zealand sites were not carrying even close to capacity.

If my wishes could be granted, I would ask for 10 or even 20 years more Bar-tailed Godwit data from our monitored

sites in eastern Australia and from New Zealand, and concurrent observations on nesting success in the northern hemisphere. In Australia and New Zealand, that would ideally include summer and winter counts; a long series of summer catch data on percentages of first-year birds at **several** sites in both countries, but especially in central NSW; and studies on movements of colour-dyed or colour-flagged first-year birds. Similar information from other Bar-tailed Godwit populations, such as those using western Australia, Europe or Africa would be useful for comparison. But for now, I must be content with some intriguing observations and some guesswork. One of the joys of a long-term project such as this is that, while each year increases our knowledge and understanding, the supply or questions never runs dry.

Retraction

The record of 30 Lesser Golden Plovers in Westernport, Vic., mentioned in the report on the winter 1988 wader count (Hewish 1989) has been retracted as a positive record by the observer.

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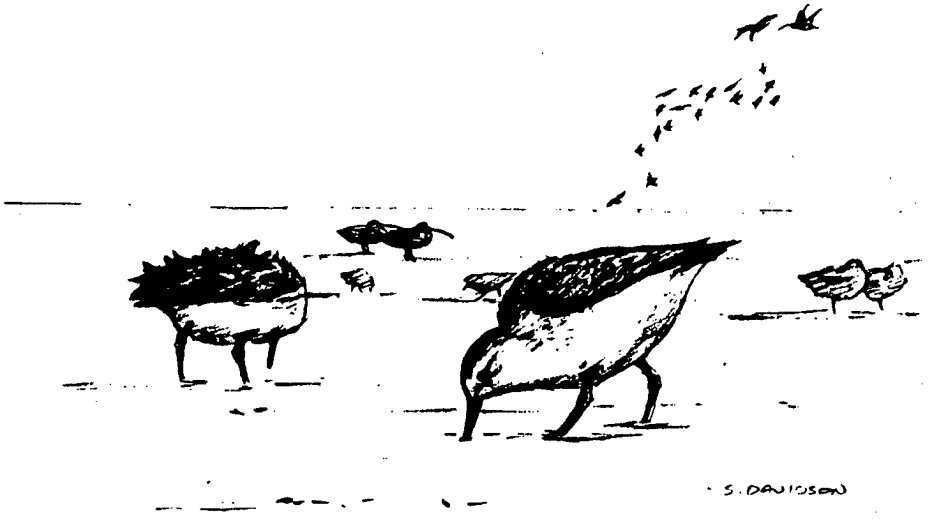


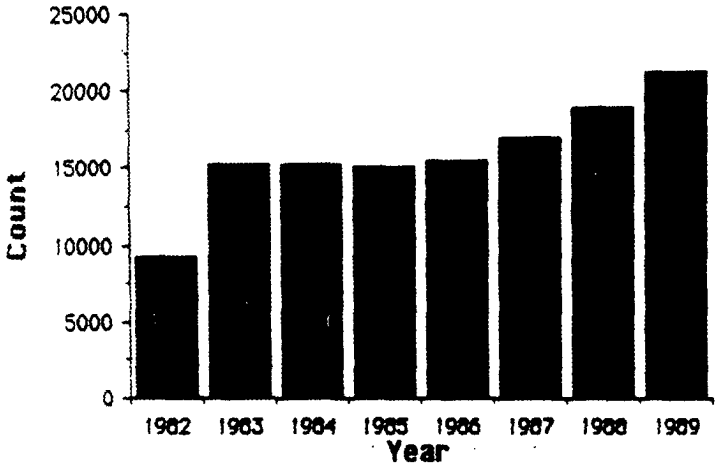
Table 1: Results of the Summer 1989 Wader Count at 22 selected sites

	N.S.W.					VICTORIA					NT	
	Clarence/Richmond	Hunter Estuary	Paramatta River	Botany Bay	Shoalhaven Estuary	Corner/Shallow Inlets	Westernport	East Port Phillip Bay	Altona	Werribee/Avalon	Bellarine Pen/Mud Is.	Darwin Area
Bush Thick-knee												
Beach Thick-knee												
Painted Snipe												
Pied Oystercatcher	8	2		18	12	805	157		3	108	64	
Sooty Oystercatcher				3	4	210	2					
Masked Lapwing	54	14	24	4	48	53	334	95	45	257	439	
Banded Lapwing												
Grey Plover			1			590					178	
Lesser Golden Plover	118	420	25	74	233	76	162		10	28	171	
Red-kneed Dotterel	3	2	4					18		24	1	
Hooded Plover						22	1					
Mongolian Plover	34	84		34	10	23	7				15	
Double-banded Plover	1			2	4	7	52				9	
Large Sand Plover	13					11	1				1	
Oriental Plover												
Red-capped Plover	10	110		39	29	83	74	10	45	55	350	
Black-fronted Plover	1		5		9			4	1	19	4	
Black-winged Stilt	20	191	24	19				171	72	160	505	
Banded Stilt											1200	
Red-necked Avocet		320							1	294	450	
Ruddy Turnstone	25	21		38		161	74			16	169	
Eastern Curlew	111	320		25	206	1354	937			12	197	
Whimbrel	54	10			2	31	1				2	
Little Curlew												
Wood Sandpiper								7		4		
Grey-tailed Tattler	62	30		63		1	9			1	36	
Wandering Tattler	1											
Tattler sp.												
Common Sandpiper		1						1		1		
Greenshank	35	35			30	267	254	1	38	87	655	
Marsh Sandpiper	9	115					1	7	5	27	15	
Terek Sandpiper	18	80		8			1					
Latham's Snipe	3							28		1	50	
Snipe sp.												
Black-tailed Godwit	91	450			4					1	1	
Bar-tailed Godwit	490	2400	287	650	750	12767	475			3	629	
Red Knot	5	80				5908	30			1	477	
Great Knot	15	8				470					352	
Sharp-tailed Sandpiper	215	1065	41	59	6	213	812	2200	491	5037	5222	
Pectoral Sandpiper										5		
Red-necked Stint	22	136	11	221	265	12467	5783	2	697	10202	8033	
Long-toed Stint	1								1	1		
Curlew Sandpiper	129	950	241	113	1	2211	4424	5	385	8450	2731	
Sanderling	18					156						
Ruff or Reeve									1			
Broad-billed Sandpiper		1										
Oriental Pratincole												
Australian Pratincole												
Cox's Sandpiper										1		
Red-necked Phalarope												
Unidentified small									2500		51	
Unidentified medium												
Unidentified large											2	
TOTAL	1566	6845	663	1370	1613	37886	13591	2549	4925	24795	22009	

Table 1: cont,.. Results of the Summer 1989 Wader Count at 22 selected sites

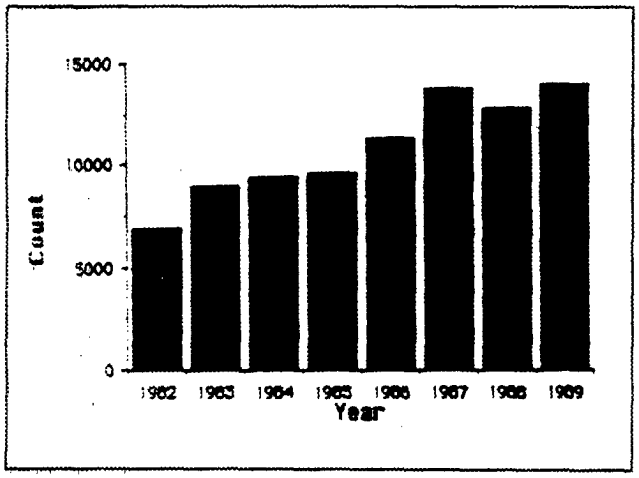
	QLD			S.A.			W.A.		TAS.			
	Cairns Area	Mackay Area	Moreton Bay	Western Eyre Pen	South East Coast	Gulf St. Vincent	Albany Area	Swan Coastal Plain	East Derwent/Pittwater	Marion Bay	Cape Portland	TOTAL
Bush Thick-knee		3										3
Beach Thick-knee		2										2
Painted Snipe												
Pied Oystercatcher	2	113	71		2	7	50	16	459	105	18	2020
Sooty Oystercatcher		4							1	10	12	246
Masked Lapwing	37	36	18		33	26			328		36	1881
Banded Lapwing												
Grey Plover		59		11		218	74	31			1	1163
Lesser Golden Plover	1	87	2163		28	1	28		93		184	3902
Red-kneed Dotterel						53						105
Hooded Plover									4	11	3	41
Mongolian Plover	56	1254	23	4		5			1		1	1551
Double-banded Plover			1		3				4		2	85
Large Sand Plover	36	50	2				35					149
Oriental Plover									1			1
Red-capped Plover		80	3030	51	104	1055	73	20	53	13	70	5354
Black-fronted Plover					2	2					1	48
Black-winged Stilt		8	277			532		47				2026
Banded Stilt						9746						10946
Red-necked Avocet						450		7				1522
Ruddy Turnstone		82	157	19	391	67	3				102	1329
Eastern Curlew	4	559	489	1	5	125	1		120	5	1	4468
Whimbrel		306	418			2			2	1	2	832
Little Curlew	1	20										20
Wood Sandpiper						4						15
Grey-tailed Tattler		11	528	2							3	749
Wandering Tattler	3											1
Tattler sp.		187	5002		3		14					5206
Common Sandpiper						1	1	1				6
Greenshank		57	94	12	4	378	129	2	46			2129
Marsh Sandpiper	5					88	1					268
Terek Sandpiper		115	171									442
Latham's Snipe	49											82
Snipe sp.												
Black-tailed Godwit		243	102		3							932
Bar-tailed Godwit	37	972	4181			563	69	2	104		4	24514
Red Knot	68		34			264	520	24	9		40	7392
Great Knot		336	554			350	260	100				2575
Sharp-tailed Sandpiper	130	167	131	135	173	9040	20	14	20			25062
Pectoral Sandpiper	1					2			2		5	14
Red-necked Stint		1041	144	420	747	22600	1137	200	1315		816	66679
Long-toed Stint	220											3
Curlew Sandpiper			148	90	590	4080	127	113	752	200	177	25733
Sanderling	18		2							1		177
Ruff or Reeve						1						2
Broad-billed Sandpiper												2
Oriental Pratincole	1											
Australian Pratincole												
Cox's Sandpiper												1
Red-necked Phalarope						1						1
Unidentified small												2551
Unidentified medium												
Unidentified large												2
TOTAL	669	5792	17740	745	2088	49761	2542	577	3312	346	1478	202232

Figure 1: Total summer counts of Bar-tailed Godwits in 9 consistently-counted sites in eastern Australia, 1982-89.

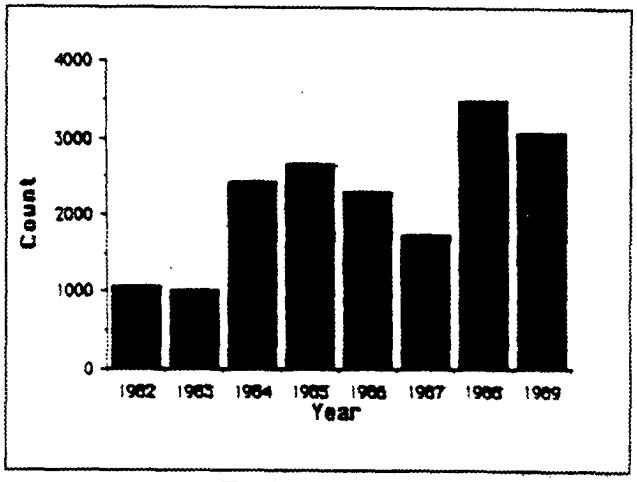


E. Aust. total, 9 sites

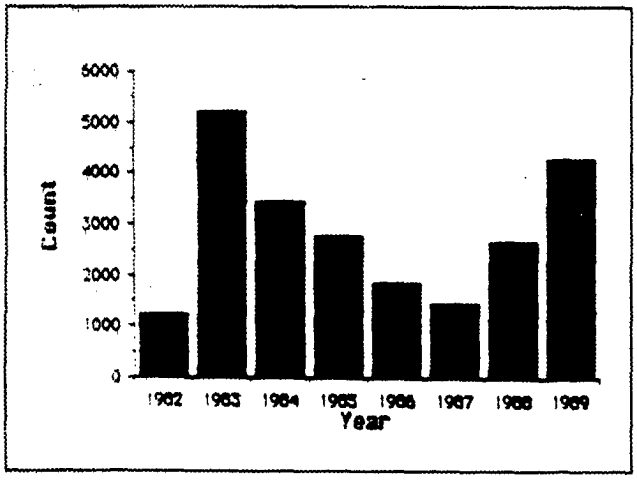
Figure 2: Total summer counts of Bar-tailed Godwits in each eastern Australian state (Vic., NSW, Qld and Tas.) and in selected sites, 1982-89.



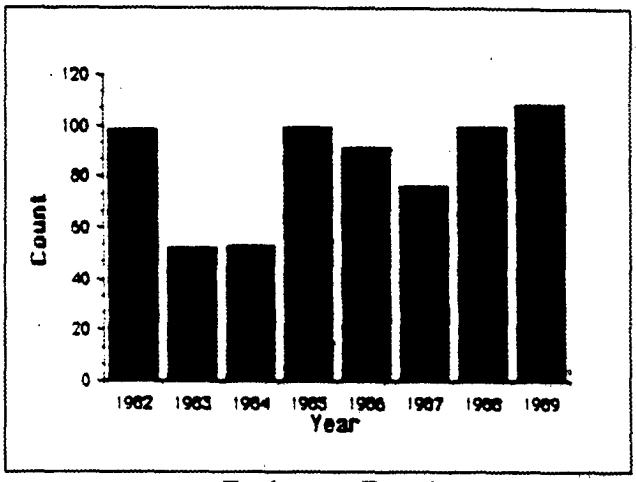
Total count, Vic. sites



Total count, NSW sites



Total count, Qld sites



Total count, Tas. sites

Figure 2 cont...

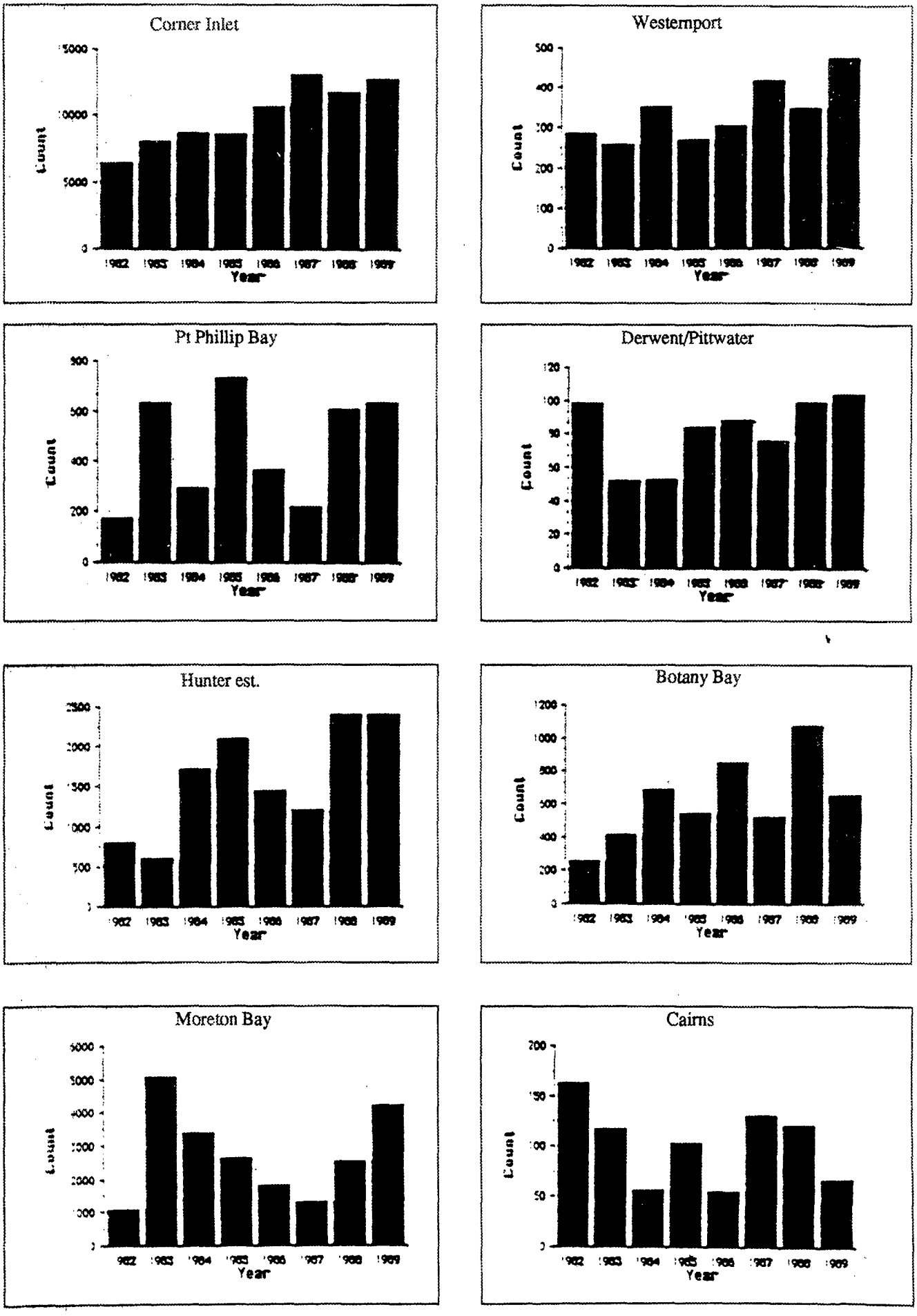
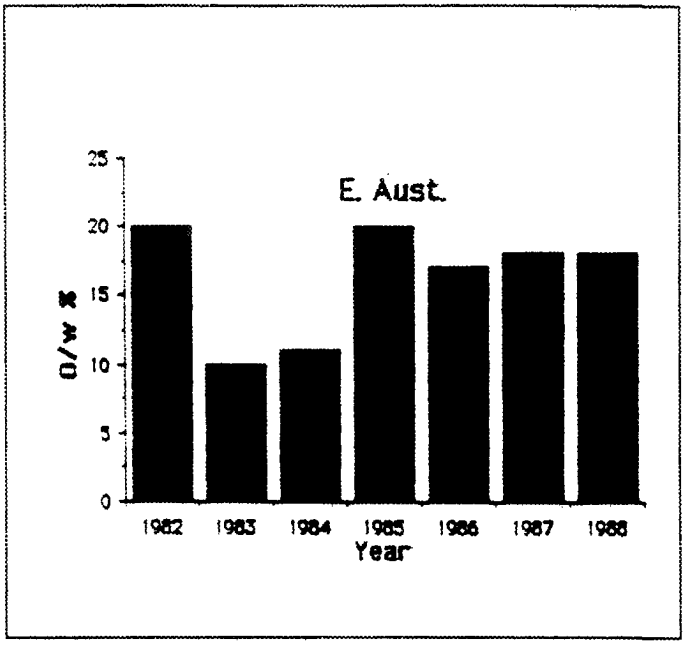
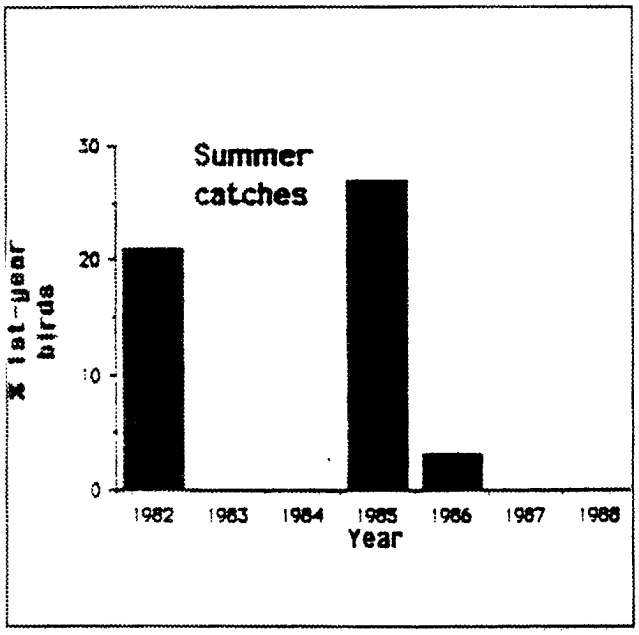


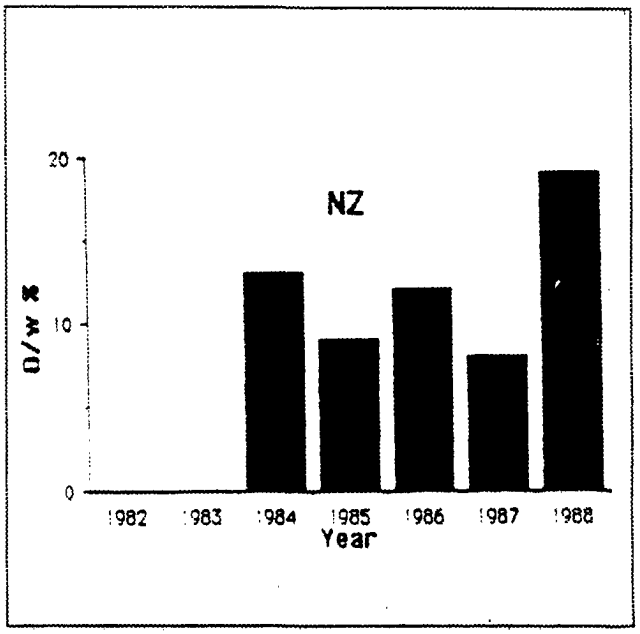
Figure 3: Three potential measures of breeding success in Bar-tailed Godwits:



1: Over-wintering percentages in east Australia, 1982-88

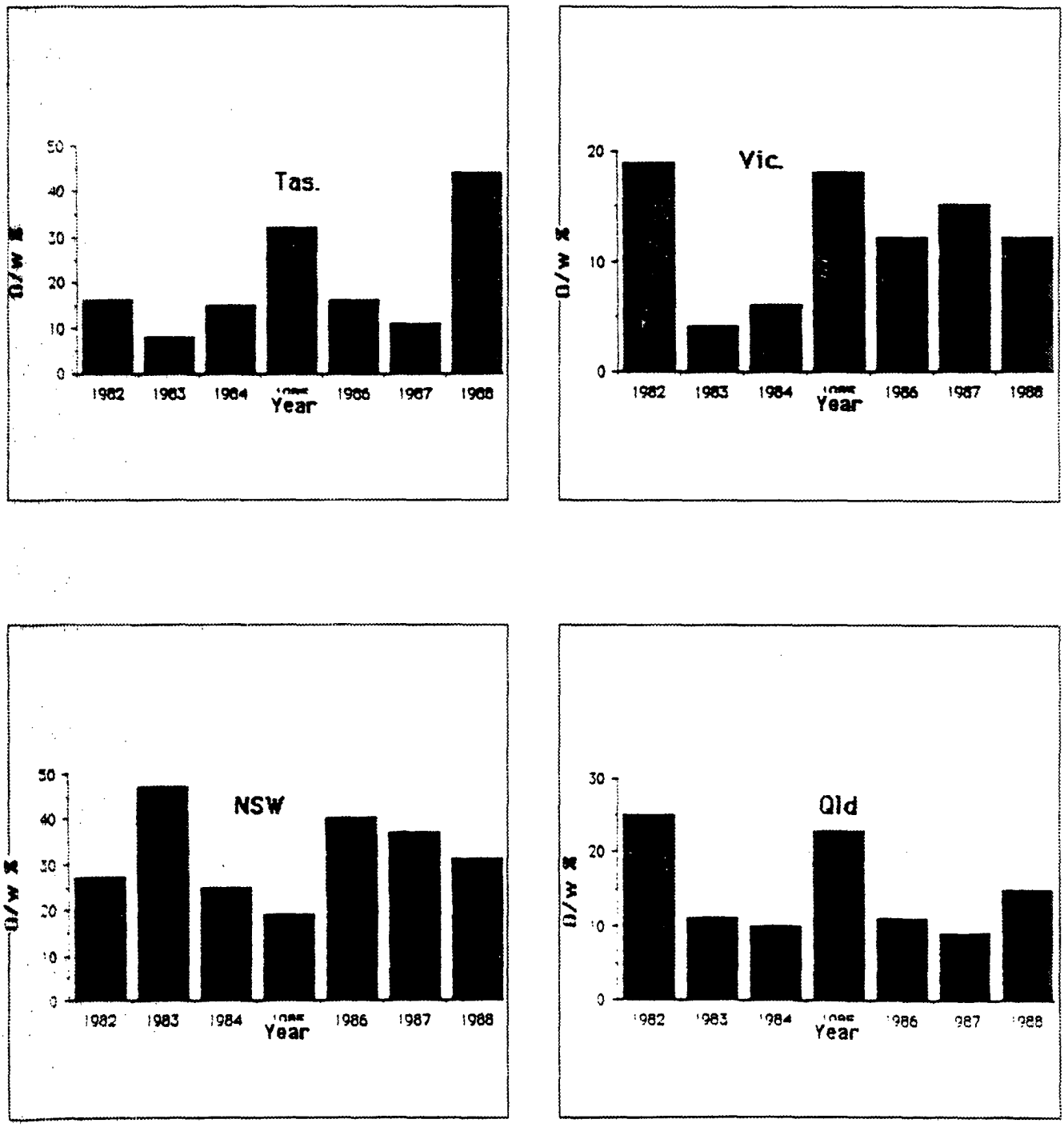


2: Percentages of first-year birds in Victorian catches, 1982, 1985 and 1986 (Basrter 1989b)



3: Overwintering percentages in New Zealand, 1984-88 (Sagar 1983-89)

Figure 4: Over-wintering percentages of Bar-tailed Godwits in each eastern Australian state, 1982-89.



MORPHOMETRICS OF THE EASTERN CURLEW *Numenius madagascariensis*

Mark Barter, 21 Chivalry Avenue, Glen Waverley, Vic. 3150

SUMMARY

Bill, total-head (THL) and wing length, and weight and primary moult data have been analysed for 178 Eastern Curlew caught in Victoria during the 1979-1989 period. Eastern Curlew are strongly sexually dimorphic and average adult bill and total-head lengths have been estimated using the percentage cumulative frequency technique (bill: male 150.9mm, female 183.6mm; THL: male 199.5mm, female 232.7mm). Sexing criteria were established at the 95% confidence level for bill and THL (bill: male<=160mm, female>=173mm; THL: male<=208mm, female>=223mm) and use of these enabled wing length, weight and moult to be analysed separately for the sexes. Mean adult wing lengths for males are 311.2mm and for females 323.6mm. During the non-migratory period, average adult males weigh 704.5g and females 815.8g; juveniles are lighter. The adult male proportion of the population was estimated to be 36%. No difference was found between the primary moult status of males and females. Primary moult duration appears to be about four months and adult moult commences in the second half of August, following arrival in Victoria. Eastern Curlew appear to first breed a year later than most palearctic species, ie. at the end of their third year of life.

INTRODUCTION

The Eastern Curlew is the largest of the three big curlews, the others being the Eurasian Curlew *N. arquata* and Long-billed Curlew *N. americanus*.

The Eastern Curlew, of which there are no known sub-species, breeds on the Kamchatka Peninsular, in northern Mongolia and Manchuria and south-eastern Siberia (AOU 1983).

It is unlikely that the world population exceeds 20,000 birds and of these at least 12,000 occur in Australia during the northern winter, mainly along the south-eastern coastline (Lane 1987). There may be also be birds present during the non-breeding season in Indonesia, Papua New Guinea and The Philippines.

The species is classified as rare (RAOU,in press; Howes and Parish 1989). There has been a substantial decline in numbers at some of the south-east Australian sites, but it is not known whether this is due to a fall in population or a change in non-breeding range (Close and Newman 1984; Dann, Loyn and Bingham, in prep.).

The large size of the Eastern Curlew would make it an attractive target for hunters in south-eastern Asia, but little is known about the degree to which it is taken during migration through the region although Parish and Howes (1989) estimate the total annual wader harvest to be between 450,000 and 1,700,000 birds.

There is little published biometric information on the species. Prater *et al* (1977) give average wing, bill and tarsus measurements for the combined sexes (see Table 1). They also provide average bill lengths for small samples (n=4) of sexed adults (Table 1), showing that females have longer bills than males, and also state that the sexes are fairly similar in wing and tarsus lengths.

Rogers (1982) analysed one of the early Victorian Wader Study Group (VWSG) catches and showed that sexual dimorphism exists. He stated that THL was likely to be the most effective sexing criterion, but felt that wing and bill lengths could also be useful, especially when the THL lay in the overlap range. He found tarsal length to have too much overlap to be useful. Rogers' estimates for wing, bill, total-head and tarsus lengths for males and females are listed in Table 1.

This paper records average bill, total-head, wing and tarsus length data for sexed birds caught in Victoria from 1979 to 1989. Sexing criteria are given based on bill and total-head length. Information is also provided on primary moult and maturity.

METHODS

The VWSG has an on-going catching programme to band and collect biometric information from Eastern Curlew. However, the extreme wariness of the species makes it very difficult to catch reasonable numbers on a regular basis. During the 1979/1989 period, Curlews have been caught on 14 occasions with the largest catch being 40, but most catches numbered 15 or less. There have been a number of unsuccessful forays during the period.

The great majority of birds have been caught by cannon-netting and the 178 Eastern Curlew captured comprise 152 adults, 12 second-year and 14 first-year birds. Monthly totals are:

January	15	September	8
March	1	October	73
June	15	November	59
August	2	December	5

Biometric data was obtained using standard methods and birds were aged by primary feather wear and plumage pattern. The ageing convention used is that of the Australian Bird and Bat banding Schemes:

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

It is generally possible to separate 3+ and second-year birds in the August to November period. However, this cannot be done following completion of primary moult in either age group and both are then aged as 2+. Three+ and 2+ birds are often referred to as adults and first-year birds as juveniles.

A computerised method (Rogers, in prep.) was used to estimate average adult male and female bill and THL lengths (based on the Griffiths (1968) percentage cumulative frequency technique (PCF) and assuming coefficients of variation to be equal). Sexing criteria were calclated using bill and THL (Rogers 1976).

RESULTS AND DISCUSSION

Bill and total-head lengths

Measurements were taken to the nearest mm. and frequency histograms for adults are shown in Figs. 1 and 2. It is evident that both measurements are sexually dimorphic and there appear to be more females than males (NB. Males have shorter bills).

Adult male and female bill and total-head lengths were estimated according to Rogers (in prep.) giving the results in Tables 2 and 3. Use of the chi-squared test confirmed that the estimated size distributions are good fits of the actual distributions (both p>O.O5).

The average female bill length of 183.6mm is some 33mm longer than the male average of 15O.9mm. The difference between the average THLs is also around 33mm (ie. 232.7 vs. 199.5mm) indicating that the head size is similar for both sexes. The estimate of the male proportion in the population is 36% for both measurements, and this confirms the visual assessment of the histograms.

The bill and total-head length estimates agree reasonably well with those of both Prater *et al* (1972) (bill) and Rogers (1982) (bill and THL), which were obtained from much smaller samples (see Table 1).

Sexing criteria were calculated using the technique described by Rogers (1976) and the results are given in Tables 4 and 5. Out of 75 adults that could be sexed by both bill and total-head length, only two gave conflicting results and there is reason to believe that these birds were incorrectly measured.

Contrary to Rogers' (1982) comments, bill length is a more useful sexing criterion than THL as more birds can be sexed by the former, ie. 89 vs. 84%.

Direct calculation of bill and total-head lengths for birds sexed using the criteria in Tables 4 and 5, gave very good agreement with the values obtained from the PCF method, even though 11 and 15%, respectively, of the birds in the overlap range were omitted as they could not be sexed. The differences between the means, using the two methods, ranged from O.2 to O.9%.

Wing-length

Wing-lengths were measured to the nearest mm. The frequency histograms are shown in Fig 3, indicating a large overlap between the sexes. Average wing-lengths for the two sexes were obtained directly from sexed birds and are given in Table 6. Justification for ignoring unsexed birds in the calculation is based on the good agreement obtained when using the PCF and direct calculation methods for bill and total-head lengths. The wing-length estimates will tend to be on the low side for males and high side for females because of the missing unsexed birds in the overlap region.

Average wing-length estimates are 311.2mm for males and 323.6mm for females. There is a relatively small difference of 12.4mm between the sexes, compared to that of 33mm for bill and total-head lengths.

The wing-length estimates are similar to those obtained by Rogers.

Tarsus length with foot

Tarsus length data for sexed birds is given in Table 7. The variation between these measurements and those given by Prater et al (see Table 1) is explained by different measuring techniques, which in Victoria involved gently bending the foot downwards and measuring from the notch at the 'knee' to the 'ankle', rather than from the intertarsal joint to the last undivided scale before the toes diverge.

Weight

The majority of birds were caught during October and November and the average weights during this non-migratory period are shown in Table 8. Average adult males and females weighed 7O4.5 and 815.8g, respectively, and first-year males and females were lighter at 673.3 and 8O6.1g.

Only one bird, a female, was caught during the premigratory season in mid-March and the weight was 125Og indicating a 5O% weight gain on the October-November average. Interestingly, five birds caught at the end of January also showed weight gains, the averages being 837.5g for males (n=2) and 1O61.7g for females (n=3).

Primary moult

There was no detectable difference in the primary moult of adult male and female birds and median primary moult scores were calculated using all adults in a catch. The results are plotted in Figure 4. Birds were well into moult by late September and moult appears to commence in the second half of August. Moult completion starts in late December. The estimate of a four months moult cycle agrees well with similar data for other palearctic breeding species, eg. Curlew Sandpiper (Barter 1986), Red-necked Stint (Paton and Wykes 1978), Red Knot (Barter *et al* 1988), Bar-tailed Godwit (Barter 1989), Great Knot (Barter 1987) and Lesser Golden Plover (Barter 1988). However, the estimated starting date is a month or two ahead of the other species and this

reflects the earlier return of curlew to Victoria. The completion date is also earlier and this, together with the relatively early weight gain (see above), indicates the possibility of curlew making an early departure on northward migration. This suggestion is supported by the finding of Starks and Lane (1987) that "in southern Australia the greatest decline in numbers occurred in the third week of February." Additionally, Alcorn (1988) states that Curlew leave "between late February and late March."

Primary moult in second-year birds is generally in advance of adults and two birds caught in early August were in active moult.

Out of 11 first-year birds caught in early June, one was in active moult (score = 39) and one had suspended with five new inner feathers. The remainder had not commenced primary moult. None of three first-years caught in late January had commenced moult.

Breeding age

Four second-year birds were present in a catch of 15 birds in early June indicating that Eastern Curlew remain on the non-breeding grounds until late in their third year. Most palearctic breeding waders breed for the first time late in their second year.

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Table 1. Published data for bill, total-head, wing and tarsus lengths (mm).

Measure	Age	Sex	n	x	sd	Range	Source
Bill	A	-	23	175.1	-	128-201	(1)
	J	-	22	145.9	-	105-186	(1)
	A	M	4	155	-	128-170	(1)
	A	F	4	184	-	154-201	(1)
	2+	M	12	147.9	7.18	-	(2)
	2+	F	10	185.7	10.18	-	(2)
THL	2+	M	12	200.1	6.84	-	(2)
	2+	F	11	237.5	10.80	-	(2)
Wing	A	-	23	316.9	-	290-333	(1)
	J	-	22	294.8	-	281-314	(1)
	2+	M	12	314.1	4.27	-	(2)
	2+	F	10	327.3	3.56	-	(2)
Tarsus	A	-	23	88.6	-	81-95	(1)
	J	-	22	85.3	-	77-92	(1)
	2+	M	12	101.3	3.05	-	(2)
	2+	F	11	105.1	2.75	-	(2)

KEY: A = adult, 2+ = in second year or older, J = juvenile.
n = sample size, x = mean, sd = standard deviation.
(1) = Prater *et al* (1977), (2) = Rogers (1982).

Table 2. Bill length data (mm) for 3+/2+ Eastern Curlew as determined by the PCF technique.

Sample size	Male x	Male sd	Female x	Female sd	Estimated % male
142	150.9	7.20	183.6	8.75	36

Table 3. Total-head length data (mm) for 3+/2+ Eastern Curlew as determined by the PCF technique.

Sample size	Male x	Male sd	Female x	Female sd	Estimated % male
83	199.5	8.33	232.7	9.71	36

Table 4. Sexing criteria for 3+/2+ Eastern Curlew at the 95% confidence level, based on bill length.

Male	Female	% sexed correctly	% sexed wrongly
=<160	=>173	89.0	0.2

Table 5. Sexing criteria for 3+/2+ Eastern Curlew at the 95% confidence level, based on total-head length.

Male	Female	% sexed correctly	% sexed wrongly
=<208	= >223	84.2	0.4

Table 6. Wing length data (mm) for 3+/2+ Eastern Curlew using sexed birds.

Sample size	Male x	Male sd	Female x	Female sd
113	311.2	9.47	323.6	10.03

Table 7. Tarsus length with foot data (mm) for 3+/2+ Eastern Curlew using sexed birds.

Sample size	Male x	Male sd	Female x	Female sd
18	100.8	2.79	105.5	3.06

Table 8. Weights of 3+/2+ and first-year Eastern Curlew using sexed birds (g).

Age	Sample size	Male x	Male sd	Female x	Female sd
3+/2+	108	704.5	55.29	815.8	44.42
1	12	673.3	46.19	806.1	41.21

Fig. 1. Adult bill length histogram.

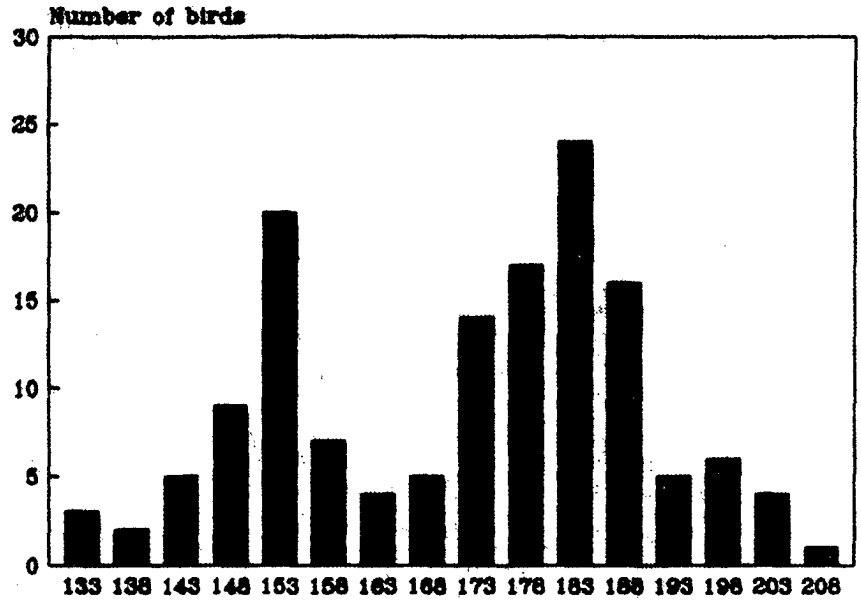


Fig. 2. Adult THL histogram

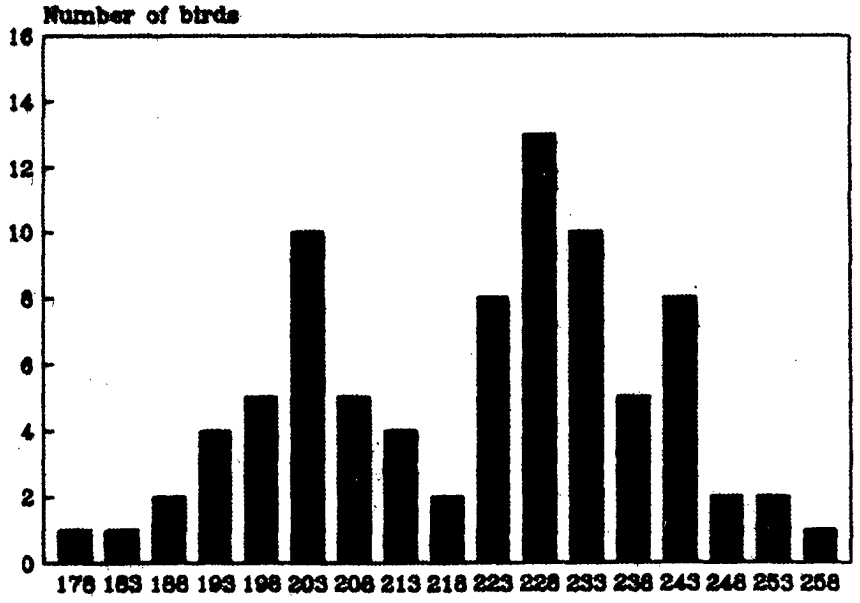


Fig. 3. Adult wing length histogram.

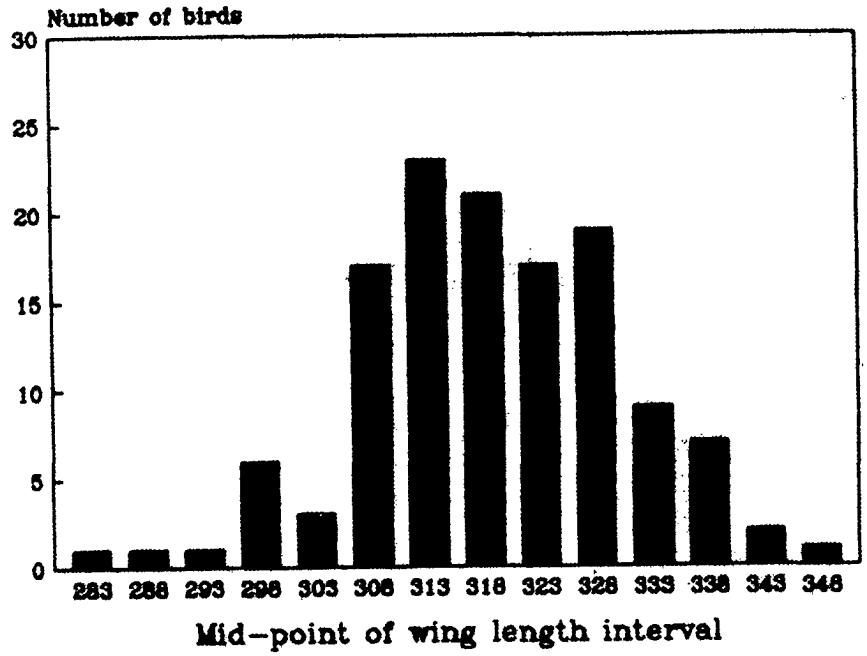
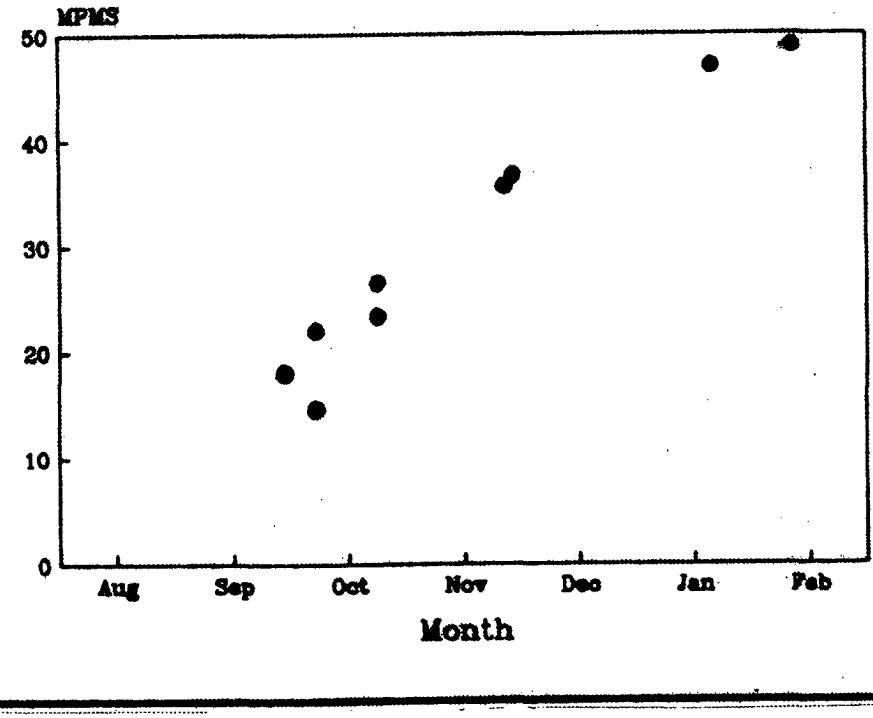


Fig. 4. Median Primary Moult Score



AGEING PALEARCTIC WADERS IN THE HAND IN AUSTRALIA

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INTRODUCTION

The ability to successfully age waders greatly increases the value of the biometric data obtained during the banding operation. For example, important information can be determined such as flock age-structure, indications of breeding success, differences in age-related biometrics and variations in moult and migration strategies between the age groups.

So, how are waders aged? Fortunately, there are some basic rules which will take the novice a long way down the path to successful ageing. Practice and experience will make perfect - almost!

The ageing process involves two steps:

1. The preliminary estimation of age by inspection of the primary wing feathers for moult status (ie. numbers and location of new, missing and old feathers), degree of fading and wear.

2. Confirmation of the estimated age by presence of age-related plumage features.

Step No. 1 is the critical one in the ageing process and this means that a good understanding of primary moult strategies for the different species is important. Fortunately, the adults of most palearctic wader species in Australia have similar moult strategies. However, there may be differences between the species in the case of first-year birds. Feathers fade and wear with age and their condition is an important factor in the ageing process, especially as the primaries of first-year birds deteriorate more quickly than those of adults.

The various wing feather groups are shown in Fig. 1. The primaries are the ten outermost flight feathers and are conventionally numbered from inside to outside, ie. P1,...P10. Another feather group which is often of considerable importance in confirming age is the median coverts, especially the innermost ones which are protected from fading and wear by the scapulars.

The ageing convention used is that of the Australian Bird and Bat Banding Schemes:

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

The age anniversary is August 1st.

In the next section general primary moult strategies for the different age-groups are outlined. The following section covers the Ageing Method.

GENERAL PRIMARY MOULT STRATEGIES

In the great majority of cases there are differences in the primary moult strategies of adult, second-year and first-year birds and these differences, together with those in wear and fading, can allow the three age groups to be separated in the hand. General comments on the moult strategies of the age groups are given below and should be read in conjunction with Fig. 2.

ADULT palearctic waders (age codes 3+ and 2+) breed annually in China, Siberia and Alaska during June and July, making an annual round trip of up to 28,000 km in the process. They replace worn primaries with a completely new set of feathers once each year, starting at the innermost primary. These enable them to maintain flight efficiency and, therefore, to migrate and breed successfully. Primary moult is undergone during the least stressful time, that is when birds have arrived at the non-breeding grounds and the task of surviving is a comparatively easy one as the dangers undergone during migration and breeding have finished for the year. **Moult starts shortly after arrival at the permanent non-breeding site (Fig. 2).** As an example, consider the primary moult strategy of adult Red Knot *Calidris canutus rogersi*. This sub-species occurs in numbers in north-western and south-eastern Australia and New Zealand. Knot in the north-west commence primary moult in late August/early September immediately after arrival, whilst those in the south-east commence in October, again shortly after their later arrival in the more southerly area. None of the adult Red Knot caught in south-eastern Australia which have later been recaptured in New Zealand have been in wing moult; commencement is delayed until they reach New Zealand. Thus, the start of primary moult occurs at later and later dates the further south the bird travels to a permanent non-breeding site. **Primary moult is always completed before departure for the breeding grounds in March and April.**

Most waders do not breed until they are almost two years old and they remain on, or near, the non-breeding grounds until they are around 20 months of age. **SECOND-YEAR BIRDS** (age code 2), undergo a complete primary moult, which in the majority of cases is their first. **Moult generally starts before that of adults as the second-years either arrive at, or are present on, the non-breeding grounds before adults** (Fig. 2). For example, at any particular time during primary moult second-year Red Knot can be up to 8 weeks ahead of that of adults. Some are even completing moult as late starting adults are commencing.

FIRST-YEAR (JUVENILE) BIRDS (age code 1) grow a complete set of primaries before leaving the breeding area. They generally arrive in the non-breeding areas some four to six weeks after the adults. Juvenile feathers are less resistant to abrasion and fade more quickly than those of adults and differences in wear and colour can be useful in age estimation. **Juveniles may commence a complete or partial primary moult when around six months old** (Fig 2), in order to maintain flight efficiency as the juvenile feathers wear. For example, more than half of first-year Red Knot undergo some degree of primary moult in the February-April period, with 10-20% of juveniles replacing all primary feathers.

AGEING METHOD

The ageing technique described here involves inspection of the primaries (see Parts A and B), followed by age confirmation using plumage features (see Part C). It is important to note that the moult status' given in the illustrative Figures 3 to 9 are only indicative. There will often be variations in the moult status of individual birds within an age group at any particular time during the moult cycle.

A. PRIMARY MOULT STATUS

1. **Shortly after adult arrival** (eg. late September/early October in Victoria - earlier further north)

Ages present: Adult (3+) and second-year (2).

(a) **adults** may not have commenced moult and will have ten moderately worn primaries **or** they may have lost some inner feathers prior to growing new primaries (see Figs 3a and b).

(b) **second-year birds** have probably commenced moult and will be ahead of adults, with some new inner primaries present. There will probably be some retained juvenile primaries which will be **very** worn and faded (Fig 4a) unless the bird, as a juvenile, has undergone a complete primary moult, when the relatively new older feathers (grown in January to April of the current year) will be slightly worn and faded (Fig 4b). If the bird has only moulted some of its outer primaries as a juvenile, there may be feathers of three different ages in the wing - **inner:** unworn new; **centre:** very worn and faded original juvenile (from July of previous year) and **outer:** slightly worn and faded juvenile partial outer primary moult (January to April of current year) (Fig 4c).

2. **Well into adult moult.** (eg. November in Victoria - earlier further north).

Ages present: adult (3+), second-year (2) and first-year (1).

(a) **adults** will now have some fresh inner primaries, a gap where new feathers are being grown and moderately worn outer primaries (Fig 5).

(b) **second-year** birds will have renewed additional inner primaries (Fig 6a). If a partial outer primary moult has taken place there is the likelihood that the original juvenile feathers will have been replaced during the current moult cycle, but the presence of slightly worn and brown, or faded, outer primaries indicates a second-year bird (Fig 6b).

It is unlikely that there will be feathers of three different ages (as earlier in the season) at this stage of the year.

(c) **first-year birds** will have a complete set of primaries which will be very slightly worn and are generally browner and lighter in colour than adult primaries (Fig 7).

3. **Towards end of primary moult** (eg. January to February in Victoria - earlier further north).

Ages present: Adult (2+) and first-year (1)

(a) **adults** will have grown additional new primaries since November (Fig 8).

N.B. Second-year birds become indistinguishable from adults when the tenth primary is dropped, ie. evidence is lost of very old juvenile or worn partial outer primary moult feathers. The inseparable adults and second-year birds are now both aged as 2+.

(b) **first-years** will have slightly more worn feathers than in November (Fig 9a). Some species may have commenced a partial or complete primary moult (Fig 9b). This is easily distinguished from adult moult which is complete, or nearly so, at this time.

B. JUVENILE PRIMARY MOULT STRATEGIES

Juvenile moult details for those species for which we have Australian data are listed below:

(1) **Lesser Golden Plover** ***Pluvialis dominica fulva***
First-year birds do not undergo any primary moult.

(2) **Large Sand Plover** ***Charadrius leschenaultii***
In north-western Australia, more than 50% undergo some degree of primary moult starting at the innermost primary. Up to seven feathers can be replaced with the most common number being three.

(3) **Ruddy Turnstone** ***Arenaria interpres***
Limited data available. In north-western Australia most undergo primary moult commencing at P1. Indications are that those moulting replace all, or almost all, primary feathers.

(4) **Eastern Curlew** ***Numenius madagascariensis***
Limited Victorian data indicates that possibly 20% moult some of their inner primaries.

(5) **Grey-tailed Tattler *Tringa brevipes***
In north-western Australia, more than 80% undergo some degree of primary moult generally starting at P5 or 6 (92%), the remainder commence at P1. Very few appear to undergo a complete moult, many suspend with one to three central feathers replaced.

(6) **Bar-tailed Godwit *Limosa lapponica***
In Victoria, approximately 50% of birds undergo a complete primary moult and 25% do not moult at all. North-western Australian data are limited but indicate that a greater percentage undergo a full moult.

(7) **Red Knot *Calidris canutus rogersi***
Majority undergo some degree of primary moult with, perhaps, 10-20% replacing all feathers in both Victoria and north-western Australia. Starting point is variable. Moult commences in January in Victoria.

(8) **Great Knot *Calidris tenuirostris***
Majority undergo primary moult, with up to 50% having replaced all primary feathers by the end of March in north-western Australia. Little data are available for Victoria but these indicate a similar situation to the north-west although, possibly, few birds undergo a complete moult.

(9) **Sharp-tailed Sandpiper *Calidris acuminata***
Undergo partial outer primary moult of four to six feathers during December to February.

(10) **Red-necked Stint *Calidris ruficollis***
In Victoria, less than 10% undergo partial outer primary moult with up to six feathers being replaced, most commonly three or four. Moult commences in February in Victoria.

(11) **Curlew Sandpiper *Calidris ferruginea***
Approximately 80% undergo partial outer primary moult in both Victoria and north-western Australia, with up to ten feathers being replaced (less than 5% of birds), but most commonly four. Moult commences in January in Victoria.

(12) **Broad-billed Sandpiper *Limicola falcinellus***
Undergo partial outer primary moult of four feathers in north-western Australia.

C. PLUMAGE FEATURES

Often, waders will have some plumage feature(s) which will help to confirm the age estimated from inspection of primary feathers.

Adults may be showing evidence of breeding plumage, although care must be taken not to confuse these birds with some first-years which may develop a degree of breeding plumage during the breeding season.

On the other hand, **lack of breeding plumage**, when adults would be expected to have some, ie. March/April and August/September in Australia, **would probably indicate that the bird is a first or second-year.**

First-year birds often arrive in Australia with some juvenile plumage but this is generally quite worn and is soon replaced with "first non-breeding" plumage which is, normally, similar to adult non-breeding plumage. However, in many cases the juvenile wing coverts are retained and the more protected, and thus less worn, inner median coverts can often be used to confirm age up to April and May (Fig. 10 and 11).

Diagnostic first-year bird plumage features are as follows:

(1) **Lesser Golden Plover**
Bright yellow spots on dark-grey brown covert, tertial, scapular and mantle feathers.

(2) **Large Sand Plover**
Buff fringes on medium-brown covert feathers.

(3) **Eastern Curlew**
Inner primary coverts dark grey-brown with white spots.

(4) **Bar-tailed Godwit**
Buff fringes on brown coverts, buff spots on brown tertials and white and brown barring on the central tail feathers. Wear is rapid but wear pattern on tertials is obvious. About 10% achieve traces of breeding plumage during the breeding season.

(5) **Red Knot**
Dark grey-brown sub-terminal bands and off-white fringes on light grey-brown coverts. Seventy to eighty percent of first-years gain traces of breeding plumage whilst remaining in Australia during the breeding season.

(6) **Great Knot**
Buff fringes or tips on medium grey-brown coverts.

(7) **Sharp-tailed Sandpiper**
Bright chestnut crown. Tertials and scapulars blackish-brown, fringed chestnut, bright buff and off-white.

(8) **Red-necked Stint**
Buff fringes on medium grey-brown coverts.

(9) **Curlew Sandpiper**
Buff fringes on medium grey-brown coverts.

(10) **Broad-billed Sandpiper**
Edged pale buff on light brown coverts.

SUMMARY

Palearctic waders can be aged by inspection of the primary wing feathers in conjunction with the use of confirmatory plumage information. Typically, primary moult status and primary feather colour and wear, together with diagnostic first-year inner median covert patterns, will allow adults, second- and first-year birds to be separated.

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The great majority of the ageing data presented in this paper has resulted from the analysis of information obtained during the banding operations of the Australasian Wader Studies Group and the Victorian Wader Study Group. Our thanks are due to both organisations for allowing us to use their data and to their members for so dilligently collecting it.

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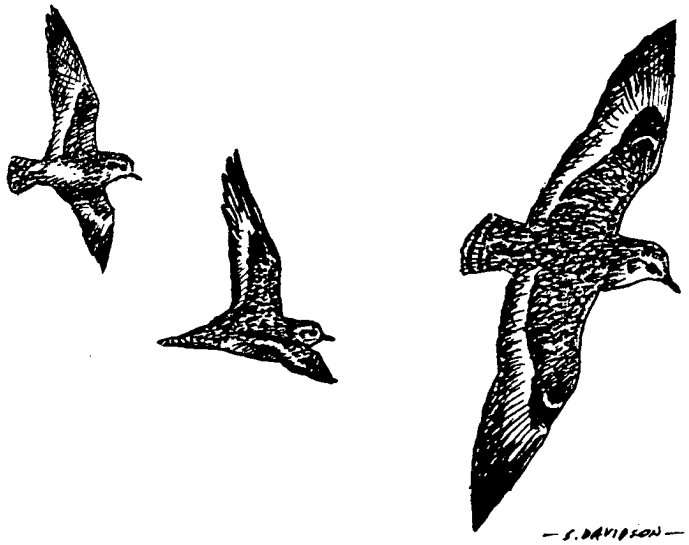


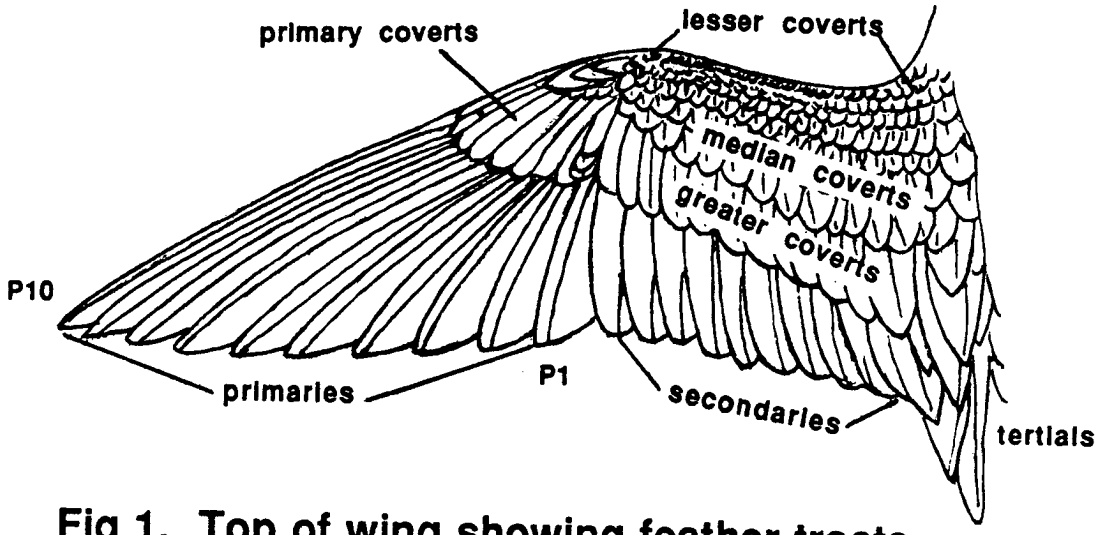


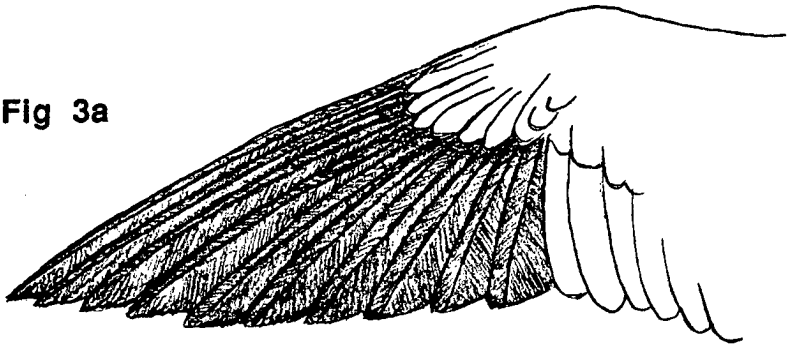
Fig 1. Top of wing showing feather tracts

AGE	FIRST-YEAR	SECOND-YEAR	THIRD-YEAR	FOURTH-YEAR
ACTIVITY	FL SM IN NON-BREEDING AREA NM B	SM IN NBA NM B	SM IN NBA NM B	
MONTH	JASONDJFMAMJJ	ASONDJFMAMJJ	ASONDJFMAMJJ	ASONDJFMAMJJ
PRIMARY MOULT	-- FL; ----- NIL, PARTIAL OR COMPLETE	------- FULL MOULT	------ FULL MOULT	------ FULL MOULT

Fig 2. Generalised primary moult regime for first four years of life of a palearctic wader in Australia, in relation to age and activity.

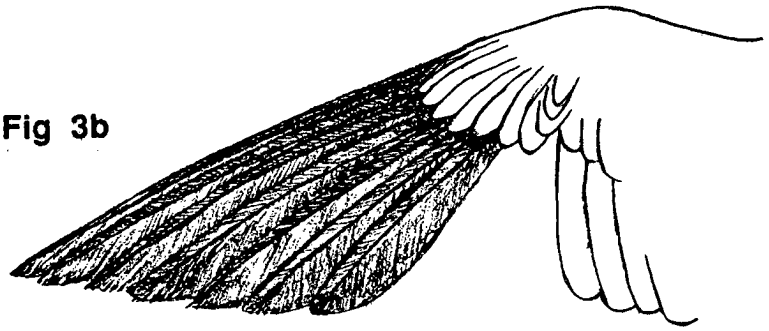
KEY:
FL = Fledging
SM = Southward migration
NM = Northward migration
B = Breeding
NBA = Non-Breeding Area

Fig 3a



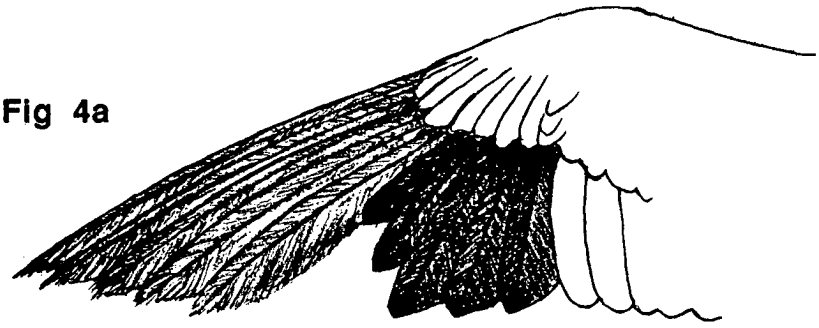
Adult wing showing ten moderately worn primaries

Fig 3b



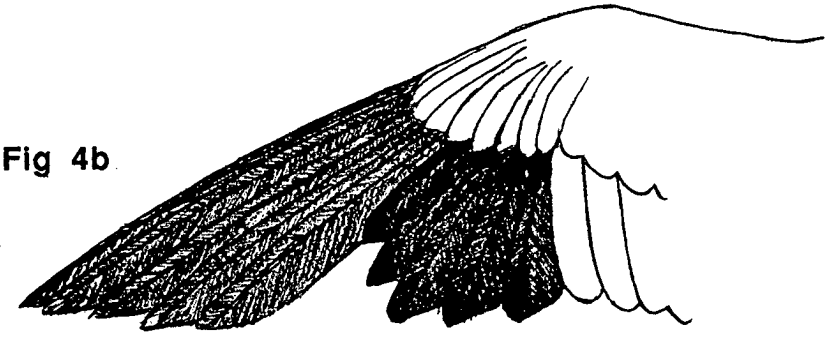
Adult wing showing missing P1 to 3 and moderately worn P4 to 10

Fig 4a



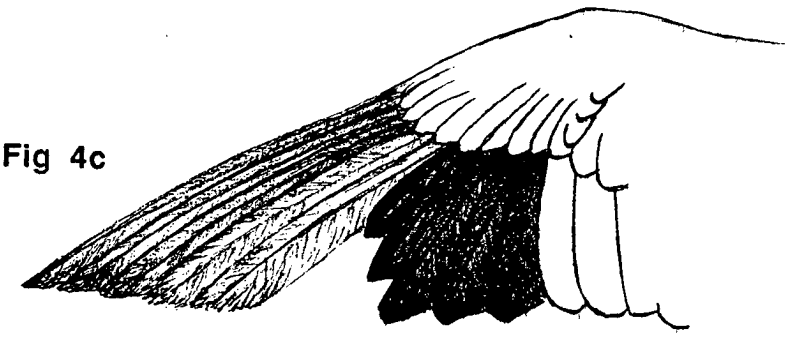
Second-year bird wing showing new P1 to 3, growing P4 and 5, and very worn and faded P6 to 10

Fig 4b



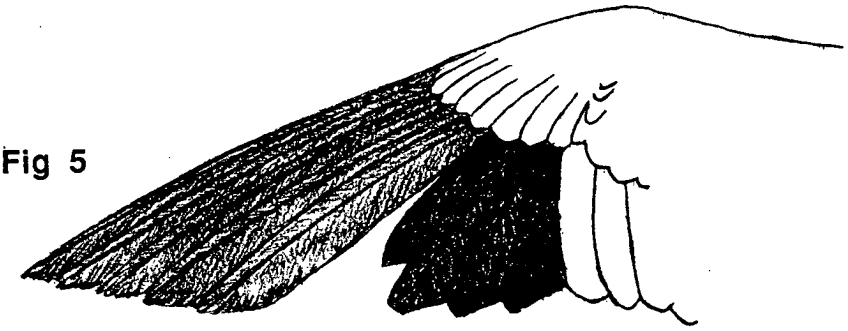
Second-year bird wing showing new P1 to 3, growing P4 and 5, and slightly worn and faded P6 to 10

Fig 4c



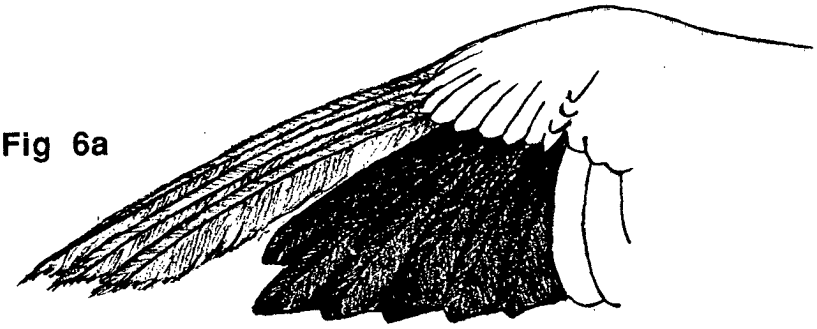
Second-year bird wing showing new P1 to 3, growing P4 and 5, very worn and faded P6 to 7, and slightly worn and faded P8 to 10

Fig 5



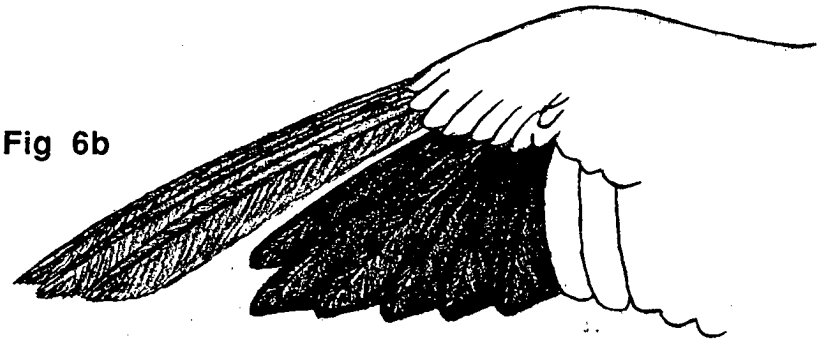
Adult wing showing new P1 to 3, growing P4, missing P5, and moderately worn and faded P6 to 10

Fig 6a



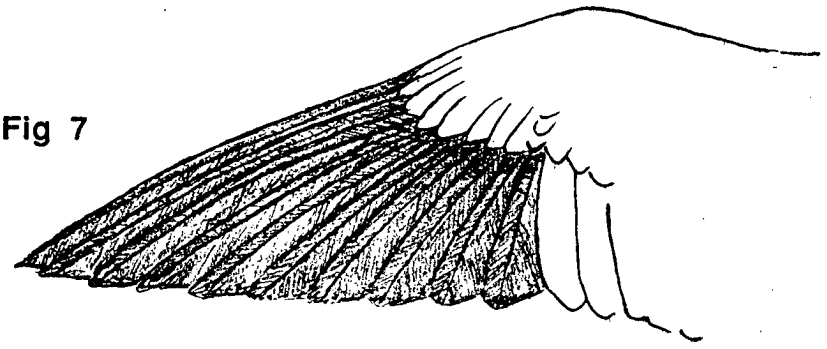
Second-year bird wing showing new P1 to 5, growing P6, missing P7, and very old and faded P8 to 10

Fig 6b



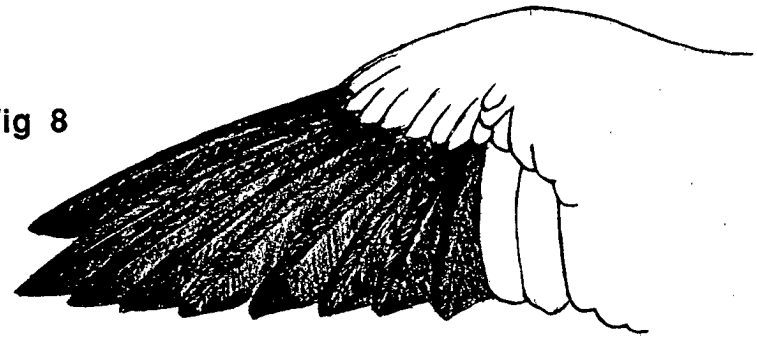
Second-year bird wing showing new P1 to 5, growing P6, missing P7, and moderately worn and faded P8 to 10

Fig 7



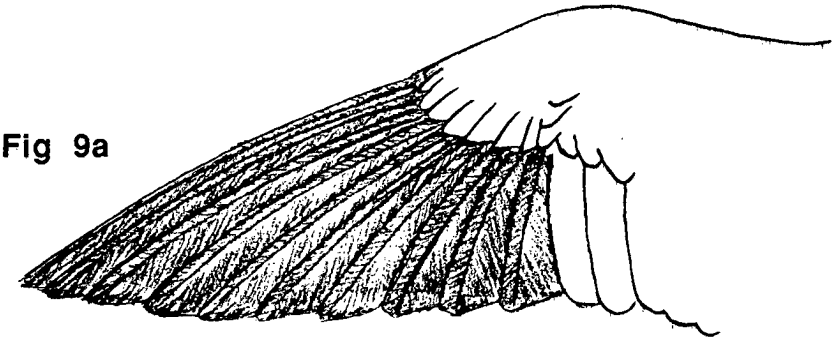
Juvenile wing with complete set of slightly worn and faded primaries

Fig 8



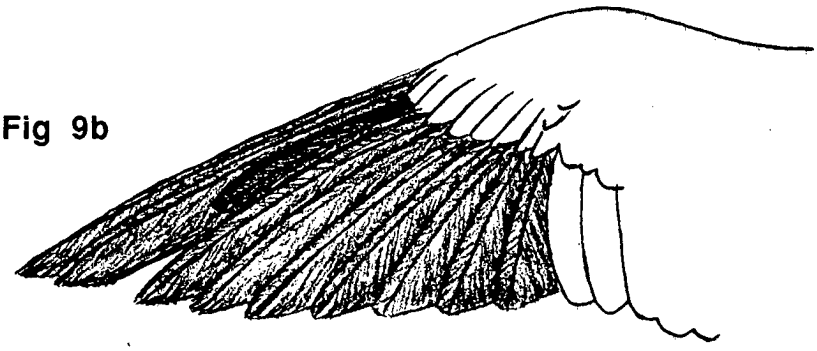
Adult wing showing new P1 to 8, growing P9, and missing P10

Fig 9a



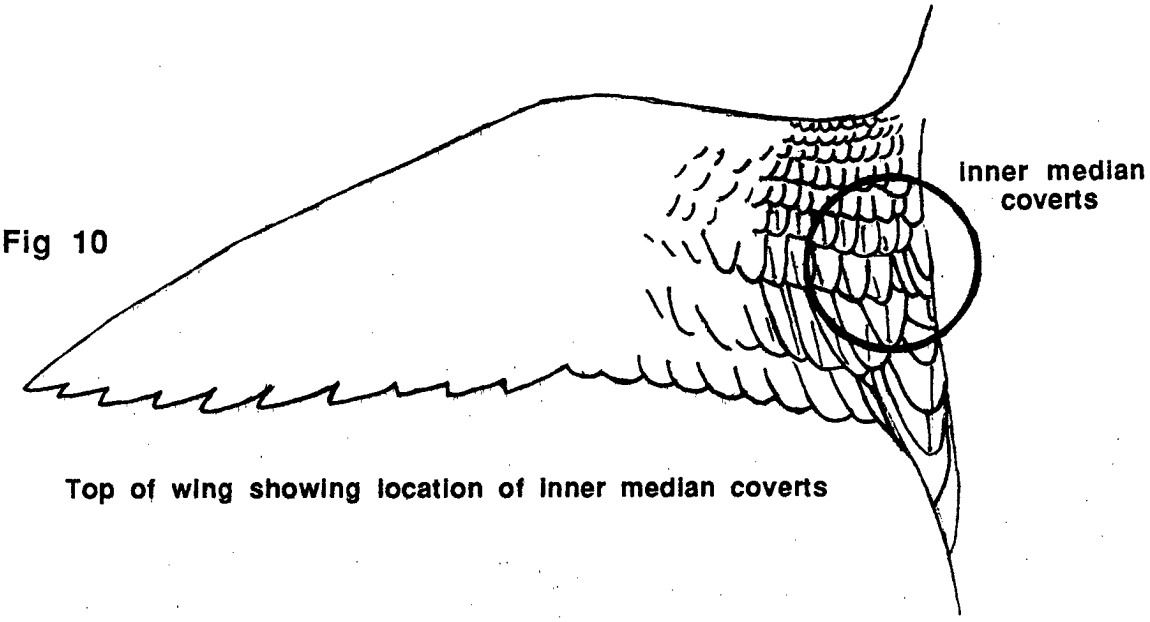
Juvenile wing, as in Fig 7, but a little more worn

Fig 9b



Juvenile wing showing moderately worn P1 to 7, growing P8, and moderately worn P9 and 10

Fig 10



Top of wing showing location of inner median coverts

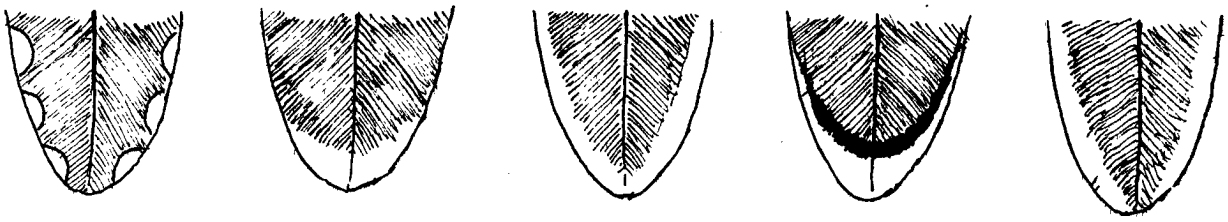


Fig 11 Different feather markings

REPEAT SURVEY OF THE WADERS OF SOUTH-WEST TASMANIA

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INTRODUCTION

In late 1983 I undertook a survey of the waders present on all the beaches on the south coast of Tasmania from South East Cape west to South West Cape (with the exception of a short section at New Year Bay - 43°32 S, 146°23 E) and on the west coast (with the exception of the short pebble beach at McKays Gulch - 43°32 S. 146°02 E) north to Port Davey entrance, and two bays (Spain Bay and Hannant Inlet) on the south side of Port Davey (refer to Schulz and Menkhorst 1984). A repeat survey covering exactly the same coastline was undertaken in late December 1988 and early January 1989. Results were compared to see if any marked differences in numbers were apparent and whether this could be attributed to the increase in human visitation to the region by bushwalkers.

METHODS

A similar system of censusing waders was employed to Schulz and Menkhorst (1984) where each beach was systematically traversed and the rocky coastline on either side of the beaches scanned for waders. Where nests or runners were found these were recorded. The survey was conducted between the 30 December and the 9 January 1989.

RESULTS AND DISCUSSION

In all a total of six species and 221 individuals were recorded. The most common species observed was the Hooded Plover, representing 35.7% of the total waders present (Table 1). The Pied Oystercatcher (31.7%) and Sooty Oystercatcher (27.6%) were the other species observed in numbers. Only one single Whimbrel and one Bar-tailed Godwit were recorded.

Although the total number of waders recorded in the two counts were similar (Chi-square Test, $p > 0.05$, $df = 1$) several differences were apparent:

1. The Latham's Snipe was not observed in the 1988-89 count. In 1983 four were flushed from sedgeland at several creek mouths on the west side of Hannant Inlet, one flushed by the side of a creek at Spain Bay, and four flushed from the edge of Freney Lagoon behind Cox Bight (Table 1). In the 1988-89 count these areas were searched without any snipe flushed.

2. The Pied Oystercatcher was the most frequently recorded wader (34.7% of all waders counted) in 1983, while in 1988-89 the Hooded Plover was the most frequently recorded species (35.7%).

3. In the 1988-89 census a single Whimbrel and Bar-tailed Godwit were observed. These were not recorded in 1983, although Luckman and Luckman (1972) recorded the latter species at Kelly Basin on the north side of Port Davey. In 1983 a single Red-necked Stint was seen at the mouth of the New River Lagoon on Prion Beach. This species was not recorded in the 1988-89 survey. In both surveys the Double-banded Plover was not recorded. However, on a visit to the region in April 1986 small numbers were observed on Prion Beach and Louisa Bay (pers obs.).

The Hooded Plover had increased in the 1988-89 survey (Table 2). Beaches in which the Hooded Plover had increased were Prion Beach (by 3), Louisa Bay (by 3), Deadman's Bay (by 4), Wilson Bight (by 2) and Noyhener Beach (by 3). The only beach where a marked decrease had occurred was Stephens Beach (5 more seen in 1983).

In contrast the Pied Oystercatcher, Sooty Oystercatcher and Masked Lapwing had declined. In the 1988-89 survey no Masked Lapwings were observed at Rocky Boat Inlet and New Harbour. The largest differences between the two counts for the oystercatchers was at Hannant Inlet and Cox Bight for the Pied Oystercatcher and Noyhener Beach, Cox Bight and South Cape Bay for the Sooty Oystercatcher.

The differences in numbers between the two surveys are difficult to explain. The surveys were conducted in the same manner at about the same time of the year. Therefore I feel these factors cannot explain the differences.

A possible explanation is the increased usage of the area by bushwalkers. At present approximately 1000 bushwalkers register for the South Coast Track each year and the numbers are rising at a fairly low rate (P. Brown, pers comm.). Increased usage is especially noticeable along the west coast south of Port Davey and on the south coast west of New Harbour. Here some tracks not discernible or difficult to follow in 1983 were pronounced in 1988-89. The campsites were more extensive and more groups of bushwalkers were met on the 1988-89 survey.

The Hooded Plover is considered a vulnerable species that is particularly susceptible to human disturbance during the breeding season (August to February)(Schulz and Bamford 1987). This is the period when most bushwalkers visit the south-west coast of Tasmania. If bushwalkers have an adverse effect on waders of this region of Tasmania the Hooded Plover would probably be the first species affected. Certainly nests containing eggs were found on Wilson Bight, Osmiridium Beach and South Cape Beach high up on the beach where many sets of footprints had narrowly missed the nests. Judging from the direction and gait of the footprints in all cases no attempt had been made to deviate or avoid the nest area and probably the nests were not even seen. Not all Hooded Plover nests located were on the beach. Some nests were found in primary sand dunes. In 1983 one nest was found in a large blowout in the midst of an extensive aboriginal midden high above and some distance back from Stephens Beach. At Hidden Bay a pair of Hooded Plover

nested on a rocky outcrop close to where the walking track left the beach. On some beaches the Hooded Plover nested on wide sections adjacent to creek or lagoon mouths eg. Prion Beach. Here due to the increased width of the beach the chance of accidental trampling by bushwalkers is reduced.

Since the Hooded Plover is probably the most susceptible of the breeding waders in the region and bushwalker visitation to the area is increasing, a decrease in this species would be expected. However, this was not the case with thirteen more observed in the 1988-89 survey.

The Pied and Sooty Oystercatchers are probably less susceptible to human disturbance during the breeding season. this is due to the fact that the Sooty Oystercatcher tends to nest on offshore rock stacks and islands. The former, although mostly close to the shore, are by in large difficult to visit due to breaking surf, rip currents and submerged rocky reefs. The Pied Oystercatcher tends to nest in primary sand dunes (eg. New Harbour) or high up on beaches where there is a wide area of sand due to the presence of a creek or lagoon mouth (eg. Prion Beach). Some nests are also situated on rock stacks (eg. Noyhener Beach).

However, these species have declined. I suggest that this decline is not due to increased human visitation. In the Sooty Oystercatcher it may be explained by individuals occurring along sections of rocky shoreline that were not surveyed in the 1988-89 count. The decline in the Pied Oystercatcher numbers may be attributed to the movements of this species around Port Davey entrance. The area which accounted for much of the difference between the two surveys was at Hannant Inlet. In the past I have observed small groups of this species flying north towards Payne Bay from Hannant inlet and the lower numbers in the 1988-89 survey may be attributed to such movements.

No satisfactory explanation can be forwarded for the absence of the Latham's Snipe and the decline in Masked Lapwing numbers. Gee and Fenton (1978) noted that the Latham's Snipe had declined in recent years.

The effect of human disturbance on breeding shorebirds (particularly the Hooded Plover) must inevitably increase with rising visitation to the region. To counter this it is suggested that signs be erected to explain how each visitor to the beaches of the region can make an effort to avoid disturbing or destroying nests. These signs should be placed strategically at the main starting points of the walking tracks into the region, such as at Cockle Creek, Cox Bight, Melaleuca Inlet and Scotts Peak Dam. Department of Land Parks and Wildlife staff should also monitor shorebird numbers in the future.

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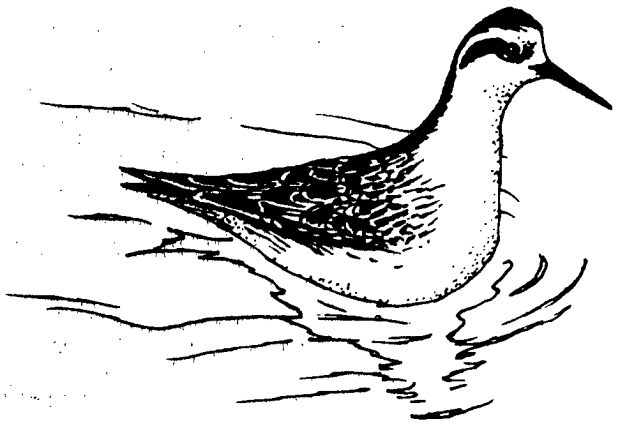

	P.O.		S.O.		M.L.W.		H.P.		R.N.S.		L.S.		Wh		B.T.G.	
South Cape Bay	5	(6)	10	(4)	-		5*	(4)	-		-		-		-	
Granite Beach		(2)	4		-		-		-		-		-		-	
Surprise Bay	2	(2)	2*	(4*)	-		2*	(2*)	-		-		-		-	
Osmiridium Beach	2	(2)	-		-		4*	(4*)	-		-		-		-	
Rocky Boat Inlet	-		2	(1)		(2)	-		-		-		-		-	
Prion Beach	9*	(10)		(2)	-		10*	(7)		(1)	-		-		-	
Deadmans Bay	5	(6)	2	(2)	-		4		-		-		-		-	
Lousy Bay	-		-		-		-		-		-		-		-	
Louisa Bay	4	(6)		(1)	-		9	(6)	-		-		-		-	
Louisa Island	-		4	(6*)	-		-		-		-		-		-	
Louisa Ck mouth	2	(1)	1	(2)	-		2	(2)	-		-		-		-	
Unnamed Ck mouth	-		2	(2)	-		-		-		-		-		-	
W. Louisa Beach	2	(2*)	2	(2)	-		-		-		-		-		-	
Cox Bight	4	(11*)	1	(4)	1		6	(7)	-			(4)	-		-	
New Harbour	4	(4*)	2	(2)		(2)	4	(4*)	-		-		-		-	
Hidden Bay	3*	(3)	2	(2)	-		2*	(2)	-		-		-		-	
Unnamed Bay	-		2		-		-		-		-		-		-	
Ketchem Bay	1			(2)	-		2*	(2)	-		-		-		-	
Wilson Bight	5	(2)	4*	(4*)	2	(2)	4*	(2)	-		-		-		-	
Window Pane Bay		(1)	1	(2)	-		4	(1)	-		-		-		-	
Island Bay	-		2	(1)	-		-		-		-		-		-	
Noyhener Beach	8*	(2)	10	(15)	2	(2)	8	(5*)	-		-		1		1	
Stephens Beach	4	(4)	2*	(4)	-		9		-		-		-		-	
Spain Bay	2	(2)	2	(2)	-		(14*)		-			(1)	-		-	
Hannant Inlet	8	(17)	4	(2)	4	(6)	4	(4)	-			(4)	-		-	
							-									
TOTAL	70	(83)	61	(66)	9	(14)	79	(66)	0	(1)	0	(9)	1	(0)	1	(0)

Table 1: A comparison of waders recorded on each beach in the 1983 and 1988-89 surveys.

The first number given is the 1988-89 result and the bracketed number is the 1983 result. A dash indicates no individuals seen and * indicates a breeding record.

Bird Symbols: P.O. - Pied Oystercatcher; S.O. - Sooty Oystercatcher; M.L.W. - Masked Lapwing: H.P. - Hooded Plover; R.N.S. - Red-necked Stint; L.S. - Latham's Snipe; Wh - Whimbrel; B.T.G. - Bar-tailed Godwit.

SPECIES	TOTAL RECORDED 1983	1988-89	SIGNIFICANCE *
Pied Oystercatcher	83	70	NS
Sooty Oystercatcher	66	61	NS
Masked Lapwing	14	9	NS
Hooded Plover	66	79	NS

Table 2. Comparison of the totals of the four most frequently recorded waders.
NS = Not significant using Chi-square Test (df = 1).

PIN-TAILED SNIPE *Gallinago stenura* IN SOUTH-WESTERN AUSTRALIA

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The occurrence of Pin-tailed Snipe *Gallinago stenura* in the Pilbara region of north-western Australia has been known for some time (Serventy & Whittell 1976, Storr 1984). However, occurrence of *Gallinago* snipe, including *G. stenura*, in south-western Australia, has been reported only in the last decade and is not widely known outside Western Australia. The following is a summary of records made by myself and a large number of other observers, most of which have been reported in several issues of the RAOU newsletter *Western Australia Bird Notes*.

During the period from summer 1982-3 to summer 1988-9, there were 19 sightings of *Gallinago* snipe in south-western Australia, whereas there were no previous records from this region (Table 1). On average there were three sightings each summer from 1983-4. Sightings were made in two or three successive years at two localities. Sightings usually involved a single bird, but in three instances, two birds were seen.

Records were from 16 localities. Most localities were freshwater swamps on the coastal plain between Perth and Cape Naturaliste, including six within the Perth metropolitan area, but three were coastal swamps farther east and two were inland sewage ponds. Short, dense vegetation was present in or adjacent to the wetland at most localities.

Recent publications (Taylor 1984, Hayman *et al.* 1986) have improved the knowledge of field identification of *Gallinago* snipe. However, several species, notably Pin-tailed Snipe and Swinhoe's Snipe *G. megala*, remain among the most difficult of shorebirds to identify. From my field experience (Australia and South-east Asia) with these two species, based on confirmed sightings (bird in hand), I attempted to develop a key for separation of *stenura* and *megala*, using calls (frequency, quality) and flight (style, path), but this proved invalid when more than a few sightings were compared. I have heard and seen each species call and fly quite differently in different parts of their ranges, at different types of wetland, in different seasons and under different weather conditions. Even the extent of white in the tail and of toe projection beyond the tail seem to vary, and though these probably are the most useful characters, perfect views must be obtained. I would encourage observers who have obtained good field notes to confirm their points of identification by mist-netting the birds that they have described.

The identity of only one of the 19 recent sightings in south-western Australia has been confirmed. A bird caught in mist-nets (in daylight) near Osborne Park in March 1984 was a Pin-tailed Sniple *G. stenura* : it had eight pin-like feathers, each only 1-2mm wide, on each side of its tail (G. Shannon, S. Keeling, P. Curry *et al.* unpublished notes and photographs).

Some or perhaps most of the other birds sighted probably were *G. stenura* : the diminutive build, stubby tail and long toe/foot projection of each bird support this conclusion (cf. Hayman *et al.* 1986, p. 394). However, some other birds showed a relatively long extension of the tail beyond the tip of the primaries or tertials and therefore may have been Latham's Snipe *G. hardwickii*. Swinhoe's Snipe also may occur in the south; it has been recorded reliably in the Pilbara (Storr 1984).

The major programs of waterbird surveys in the south-west, begun by the RAOU in 1981, caused an increase in observer activity and awareness of waders, which may have led to the increase in sightings of snipe. However it is possible that the Pin-tailed Snipe is extending its range, due to changes in climate or habitat in South Asia and/or Australia.

Acknowledgement:

I wish to express thanks to the 22 observers involved in sightings of snipe in South-western Australia, for allowing me to publish their records here, and to those who assisted with attempts to mist-net snipe on several occasions.

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Table 1: Sightings of Gallinago Snipe in South-Western Australia

	Year	Month	Lat/Long	Locality	Birds
1	1982-3	Dec	33/123	Thomas River	1
2	1983-4	Jan	35/117	Seppings Lake	1
3	1983-4	Feb	32/115	McLarty Lake	1
4	1983-4	Mar	31/115	Osborne Pk Swamp	2
5	1984-5	Oct	32/126	Cocklebiddy Sewerage Ponds	1
6	1984-5	Jan	30/121	Boulder Sewerage Ponds	1
7	1984-5	Jan	33/121	Shark Lake	1
8	1985-6	Nov-Dec	33/115	Dunsborough Swamp	1
9	1985-6	Jan	33/115	Vasse 'Estuary'	1
10	1985-6	Jan	32/115	Bibra Lake	1
11	1986-7	Jan	33/115	Dunsborough Swamp	1
12	1986-7	Jan-Mar	32/115	Bibra Lake	1
13	1987-8	Oct	29/115	Logue Lale	1
14	1987-8	Dec	32/115	Banjup Swamp A	1
15	1987-8	Dec	33/115	Dunsborough Swamp	1
16	1987-8	Mar	33/115	Capel Lake	1
17	1988-9	Jan	32/115	Kogolup Lake	1
18	1988-9	Jan	32/115	Banjup Swamp B	2
19	1988-9	Apr	31/115	Herdsman Lake	2

Further details of these sightings, including names of observers, can be found in the quarterly RAOU newsletter *Western Australian Bird Notes* Nos. 29-50.

BANDED STILTS ON WIMMERA WETLANDS IN 1990

This note is to record the occurrence of Banded Stilts on saline wetlands in the Wimmera region of western Victoria in 1989. This was of particular interest to us given the filling of the inland lakes of South Australia in April 1989 and the subsequent mass breeding on Lake Torrens.

Monthly counts of Banded Stilts were made on a chain of shallow saline wetlands which stretch from north of Natimuk to Douglas. Most of the 40+ wetlands in this chain were surveyed, including the three largest - Lake Wyn Wyn, Mitre Lake and White Lake. In this survey we identified 28 different sites, a site being a single wetland, or several small wetlands in close proximity. Since there are few other saline wetlands in the Wimmera, this chain of wetlands represents the principal habitat for Banded Stilts in the region.

In previous years, while conducting casual counts, we have observed large numbers of Banded Stilts, generally in spring and summer. The more substantial counts made were:

2200	Mitre Lake	10 Jul. 82
9100	White Lake	30 Sep 82
24150	Lake Wyn Wyn	11 Dec 83
6887	Lake Wyn Wyn	14 Jan 84
1789	Lake Wyn Wyn	14 Feb 84
5655	Lake Wyn Wyn	10 Nov 84
50000	Mitre Lake	29 Sep 85
6000	Heard Lake	6 Oct 85

In most seasons these wetlands fill from local runoff in winter and spring, and then most dry out over the warm Wimmera summer. Figure 1 depicts the numbers of wet and dry sites for each count.

In this survey we attempted to count the numbers of fully banded, partially banded and unbanded Banded Stilts (banded birds are adults, and unbanded birds are presumably juveniles), but this was not possible if the birds were swimming or distant. This information is depicted in Figure 2 for all sites combined.

There are three points of interest in Figure 2:

1. Banded Stilts disappeared from the region between 18 February and 13 March 1989, probably because the habitat was becoming unsuitable, since most sites were dry or very shallow and salt saturated at this time.

2. Banded Stilts were absent from 13 March to 21 September, even though most wetlands were replenished by rain in May. Under these conditions Banded Stilts would normally be expected in substantial numbers throughout the period from July to December.

3. A small number of Banded Stilts reappeared between 21 September and 14 October, and of these the large majority were unbanded. Numbers increased in November, and then dropped to zero as the wetlands dried out.

The disappearance of Banded Stilts from south-eastern Australia following heavy rains in the Lake Eyre basin has previously been reported (Hewish, 1989). Our observations appear to be another example of this movement.

We were fortunate to be able to visit Lake Eyre South on 30 September 1989 when the lake was full and seemed to offer ample suitable habitat for Banded Stilts. Along approximately 500m of shoreline we counted 150 Banded Stilts, and of 104 observed closely one was banded, one partially banded and 102 unbanded. By the immense size of Lake Eyre South we assumed we would not be seeing Banded Stilts in Victoria for some time, so it was with some surprise that we observed them on the Wimmera wetlands two weeks later on 14 October. Why would Banded Stilts leave the Lake Eyre basin while there was still ample habitat available to arrive back on the small Wimmera wetlands which were rapidly drying?

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17 Lawrence Street
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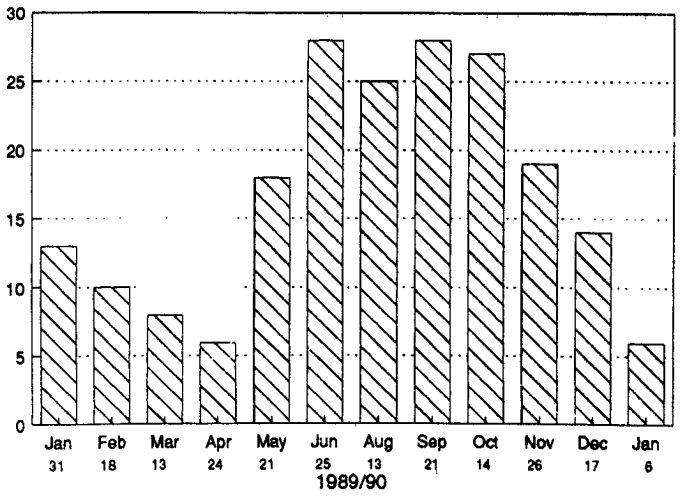

Fig 1: Number Of Wet Sites

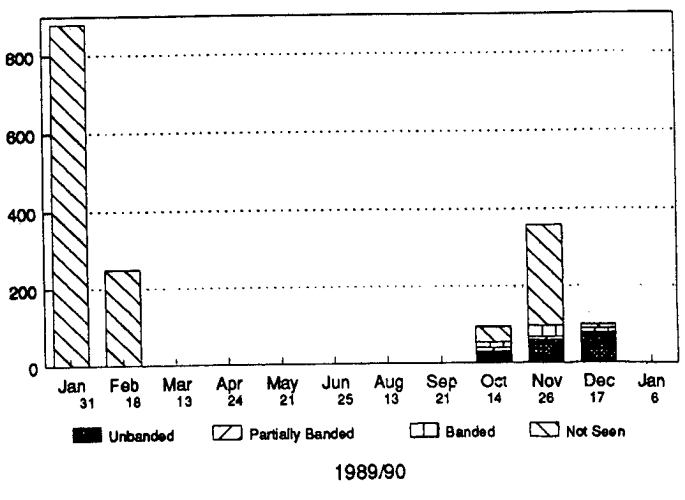

Fig 2: Banded Stilt Numbers

WADERS OF THE PARRY LAGOONS, KIMBERLEY REGION, W.A.

During a brief trip to the Kimberley region of Western Australia with Niven McCrie in July 1989 some time was spent over two days at the Parry Lagoons (15° 35' 128° 18') near Wyndham. This site has previously been shown to qualify as a Wetland of International Importance under the criteria set by the Ramsar Convention (Jaesch 1989, Talbot 1988).

As the site is not often visited and literature on the waders which use the area is scarce a list of the waders seen, with approximate numbers of each species, is given below (Table 1).

Comb-crested Jacana	nc
Masked Lapwing	450
Red-capped Plover	300
Black-fronted Plover	50
Black-winged Stilt	1000
Greenshank	50
Marsh Sandpiper	50
Black-tailed Godwit	50
Sharp-tailed Sandpiper	200
Red-necked Stint	300
Long-toed Stint	1
Curlew Sandpiper	200
Australian Pratincole	400

Table 1. Approximate numbers of waders. Parry Lagoons, 14-15 July 1989.
nc - not counted.

References

Jaensch, R.P., 1989. *Birds of wetlands and grasslands in the Kimberley Division, Western Australia: some records of interest, 1981-88.* RAOU Report No. 61.

Talbot, J., 1988. Remote Wetlands Expedition - May 1988. *W.A. Bird Notes* 47: 4-6.

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ASIAN WETLAND BUREAU

AWB NEWS

News for shorebirds on the East Asian/Australasian flyway could hardly be grimmer at the start of the 1990's. Despite warnings of declining inshore fisheries, rising sea levels, and decimated ecosystems, large-scale coastal reclamation projects are rearing ugly heads along much of the flyway. Asia's latest development craze threatens coastal wetlands along the entire west coast of North and South Korea, and Peninsular Malaysia, as well as much of the central China coastline, including the unexplored but potentially vital Yellow River Delta. The implementation of all the proposed reclamation projects would have a devastating effect on flyway populations of shorebirds and other waterbirds, so it is hoped that, at the very least, some mitigative environmental safeguards will be incorporated into these projects.

Raising awareness of the importance of wetlands for shorebirds is one of the aims of the Shorebird Studies Manual, which now awaits publication. The Manual is a compendium of shorebird research techniques developed by AWB over six years in Asia. It is aimed primarily at the novice shorebird researcher, but will also provide experts with ideas for broadening the scope of their studies.

Training courses at Yencheng in China, in October, and Rajkot in North-Western India, in December, applied many of the techniques covered in the Manual. Trainees came from a variety of backgrounds, but most are currently involved in some form of conservation-oriented wetland management. Although other waterbirds, such as ducks and cranes, made up the bulk of wetland avifauna at the training sites, a few thousand shorebirds were observed in both instances, including Asian Dowitcher *Limnodromus semipalmatus* and Spoon-billed Sandpiper *Eurynorhynchus pygmeus* in China, and Crab Plover *Dromus ardeola* in India.

The latter species was the star bird of recent shorebird counts in Malaysia, undertaken as part of the IWRB/AWB mid-winter Asian Waterfowl Census. A juvenile Crab Plover, among thirteen thousand shorebirds on the remote west coast island, Pulau Tengah, was the first Malaysian record since 1912! Other shorebirds of note seen during counts at Pulau Tengah and Tanjung Karang were three Nordmann's Greenshanks *Tringa guttifer* and three Malaysian Plovers *Charadrius peronii*.

David Bakewell
Publications & Information Officer

THE DYNAMICS OF BODY COMPOSITION OF OVERWINTERING DUNLIN
Calidris alpina sakhalina

Shi Ming & Lu Jianjian.
(Dept. of Environmental Science, East China Normal University, Shanghai 200062, China.)

Samples of Dunlin collected monthly in mist-nets on the coast of Shanghai in winter (Sep 1986 - Apr 1987) were analysed for body composition. Measurements included total weight, water content, lean weight, fat content and mineral content. Changes in these values reflect changes in the energetic metabolism of this species while overwintering (Blem, 1976). These data are also fundamental to further research into the energy utilization and storage strategy of what is the numerically dominant shorebird overwintering at Shanghai. Results indicate that:

A. There were two peaks in the values of both weight and fat content during the overwintering period (Fig.1). Energy consumption during reproduction and migration showed in the low values of both total weight and fat content at the beginning of the period (Sep - Oct).

The values of these two indices then increased until mid-November. Maxima of total weight and fat content, relative to the earliest (September) values, were 1.66 and 2.35 respectively for females, 1.20 and 3.00 for males.

Both weight and fat content then dropped over the next two or three months, with the minima in January, because severe weather conditions and the availability of food affected activity and foraging success.

The second peak in the values of the two indices appeared at the end of March, when increasing temperatures and more clement weather allowed an increase in foraging intensity and a consequent build-up of fat reserves, or hyperlipogenesis (King, 1965), as preparation for migration and reproduction (Morton *et al*, 1973).

From the regression analysis, the regression equations of total body weight (TBW), and fat as a percentage of total body weight (Fat%), were:

Fat% (male) d= 0.437 TBW - 12.9 r=0.78;
Fat% (Female) = 1.238 TBW - 50.54 r=0.869.

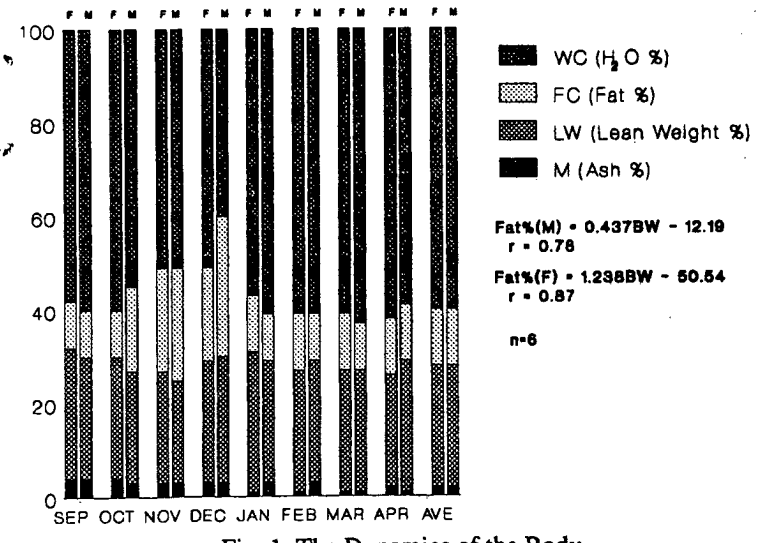

Fig. 1 The Dynamics of the Body

The same trend of changing weights and fat content were evident in both sexes, although the females had a relatively higher lipid content, after the initial post-migratory low, throughout the period.

B. Average values of body composition of both male and female Dunlin were similar during the period. However, the rate of change in the values differed between the sexes (Fig.2). The most significant factor, apart from total body weight, was lipid percentage, with the coefficients of variance (CV) : 34.0% (female), and 48.6% (male). Water percentage (CV): 6.4% (female), 11.0% (male). Other factors were not significantly correlated.

This indicates that:

a) The change of fat content is related mainly to total weight and to water content.

b) The energy reserve corresponds directly with fat (triglyceride) levels, as no significance was found in the change in lean dry weight (P>0.05), (Connell *et al*, 1960).

This study was supported by the National Scientific Foundation (China): 3860890.

References:

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Connell, C.E.; E.P. Odum; & C. Carey, 1960. Fat-free weights of birds. *Auk* 77: 1-9.

King, J.R., *et al.* 1965. The lipid reserves of White-crowned Sparrows on the breeding ground in central Alaska. *Auk* 82: 236-52.

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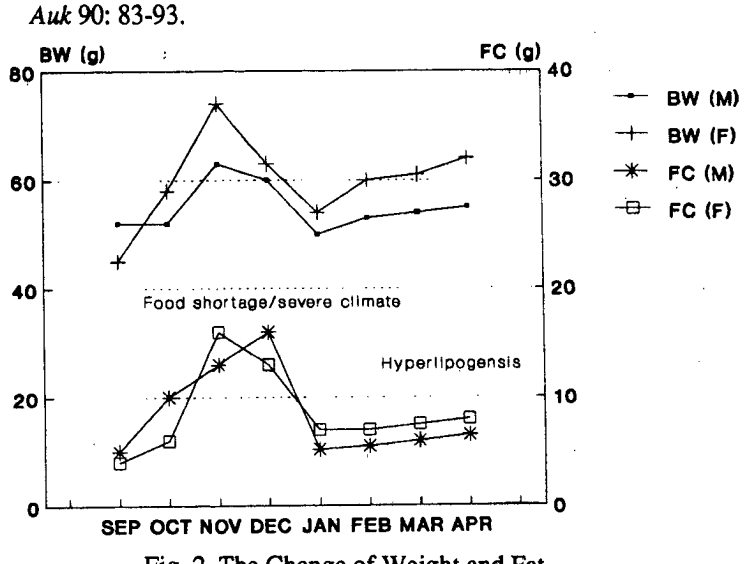


Fig. 2 The Change of Weight and Fat

A PRELIMINARY STUDY OF THE OVERWINTERING WADER (Charadriiformes) COMMUNITY ON THE NORTH COAST OF THE EAST CHINA SEA.

Shi Ming & Lu Jianjian
(Dept. of Environmental Science, East China Normal University, Shanghai 200062, China.)

Characteristics of the wader community at 11 different sampling areas (plots), on the north coast of the East China Sea (27deg.57min.N., 120 deg.50min.E.; and 31 deg.51min.N., 121deg.09min.E.), were studied from September 1986 to January 1987. This is one of the main overwintering areas in China. Results include the following findings:

1. Species and population density, (Tables 1 & 2).

   a) The composition of the wader community during the overwintering period was a homogeneous and stable one.

   b) All plots contained suitable overwintering habitat for some waders.

   c) *Calidris alpina* and *Charadrius alexandrinus* were the numerically dominant species of the community.

2. Diversity and homogeneity indices: there were no significant changes in plots over time. Plot No. 4 contained the lowest numbers because of the activities of fishermen. Plots Nos. 10 and 11 had the highest numbers because the abundant sedges, *Scirpus mariqueter* and *Scirpus tabernaemontani*, meant high production of intertidal benthic fauna. The type of coast, richness of vegetation and other environmental factors were reflected in differences in these indices.

3. With PCA (Principal Component Analysis), ordination analyses of the community characters of density and frequency show that:

   a) With density classification, the first and second ordination axes expressed 77.1% and 19.5% (total 96.6%) of all variation, (Fig.1). Plots could be assigned to three community types: A, B and C. Type A was characterized by low density, loose structure and less competition. Type C had higher densities, more defined structure and increased competition. Type B was intermediate between A and C.

   b) With frequency classification, the ordination axes expressed 24.2% and 20.2% (44.4% total) of variation, (Fig. 2). Plots could be assigned to two community types, A and B, according to the presence of common species in each type. Of these species, *Charadrius alexandrinus, Calidris alpina, Tringa nebularia* and *Numenius arquata*, the presence of two or three were typical of Type A, all four of Type B.

Table 1: Frequency and percentage of perceived over-wintering Charadriiformes

Species	1	2	3	4	5	6	7	8	9	10	11
Himantopus himantopus	-	-	-	-	-	-	-	-	-	-	0.7
Vanellus vanellus	-	-	-	-	0.8	-	-	-	-	-	45.8
Tringa erythropus	0.1	-	3.1	-	1.5	-	0.3	0.4	-	1.9	0.4
Calidris alpina	56.0	22.2	54.6	90.9	55.7	72.2	38.2	75.5	40.6	28.2	15.5
Charadrius alexandrinus	8.3	4.9	26.6	7.6	32.8	5.6	56.1	14.4	50.3	49.1	31.6
Recurvirostra avosetta	18.5	61.5	-	-	-	-	-	-	-	-	3.5
Tringa ocrophus	0.5	0.9	4.7	1.1	-	2.8	0.6	0.7	1.5	1.9	-
Numenius arquata	13.3	8.4	-	-	-	11.1	0.8	1.4	0.4	1.9	-
Pluvialis squatarola	0.7	-	-	-	0.8	-	3.0	2.5	4.8	11.3	-
Gallinago gallinago	0.4	-	1.6	-	-	-	-	-	1.0	-	-
Actitis hypoleucos	-	0.4	-	-	-	-	0.3	1.1	-	-	-
Pluvialis fulva	-	0.4	-	-	-	-	-	1.8	-	-	-
Xenus cinereus	-	-	-	0.4	0.8	-	-	-	-	-	-
Tringa glareola	-	-	1.6	-	-	-	-	-	-	-	-
Tringa totanus	0.2	-	-	-	1.07	-	-	-	-	-	-
TOTAL	10	8	7	4	8	5	8	9	7	7	7

Table 2: Species and densities of over-wintering *Charadriiformes* in each sampling area (head/ha)

Species	1	2	3	4	5	6	7	8	9	10	11
Himantopus himantopus	-	-	-	-	-	-	-	-	-	-	0.0023
Vanellus vanellus	-	-	-	-	0.0015	-	-	-	-	-	0.1522
Tringa erythropus	0.0002	-	0.0202	-	0.0021	-	0.0016	0.0024	-	0.0194	0.0012
Tringa nebularia	0.0058	0.0052	0.0505	-	0.0156	0.0101	0.0098	0.0146	0.0295	0.0582	0.0082
Calidris alpina	0.1661	0.0868	0.3535	0.7143	0.1141	0.0875	0.5374	0.5108	0.8861	0.0194	0.0515
Charadrius alexandrinus	0.0246	0.0191	0.1717	0.0600	0.0672	0.0067	0.7864	0.0973	1.0970	0.5039	0.1053
Recurvirostra avosetta	0.0550	0.2413	-	-	-	-	-	-	-	-	0.0117
Tringa ocrophus	0.0014	0.0035	0.0303	0.0086	-	0.0034	0.0082	0.0049	0.0338	0.0169	-
Numenius arquata	0.0393	0.0330	-	-	-	0.0135	0.0115	0.0097	0.0084	0.0195	-
Pluvialis squatarola	0.0019	-	-	-	0.0016	-	0.0426	0.0170	0.0211	0.1163	-
Gallinago gallinago	0.0012	-	0.0101	-	-	-	-	-	0.0198	-	-
Actitis hypoleucos	-	0.0017	-	-	-	-	0.0016	0.0073	-	-	-
Pluvialis fulva	-	0.0017	-	-	-	-	-	0.0122	-	-	-
Xenus cinereus	-	-	-	0.0029	0.0016	-	-	-	-	-	-
Tringa glareola	-	-	0.0101	-	-	-	-	-	-	-	-
Tringa totanus	0.0005	-	-	-	-	-	-	-	-	-	-
TOTAL	0.2960	0.3923	0.6464	0.7858	0.2037	0.1212	1.3991	0.6762	2.0957	0.7536	0.3224

Table 3: Diversity (H & Hmax) and homogeneity (J) indexes of each sampling area

Indexes	1	2	3	4	5	6	7	8	9	10	11
H	1.28	0.98	1.27	0.35	1.07	0.95	0.94	0.91	1.01	1.34	1.28
Hmax	2.30	2.08	1.95	1.39	1.95	1.61	2.08	2.20	1.95	1.95	1.95
J	0.56	0.47	0.65	0.25	0.55	0.59	0.45	0.41	0.52	0.69	0.66

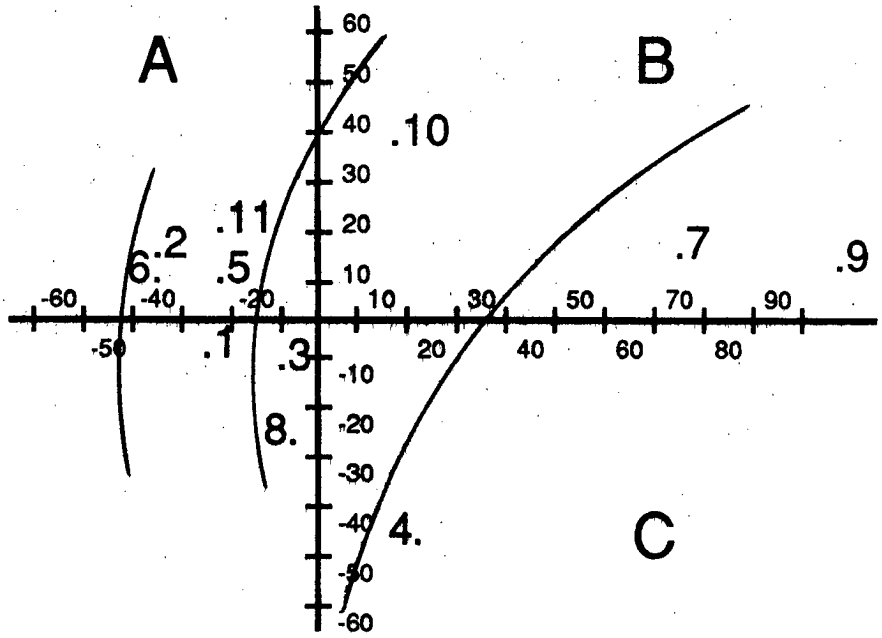


Fig. 1: PCA Ordination Chart of Density Classification

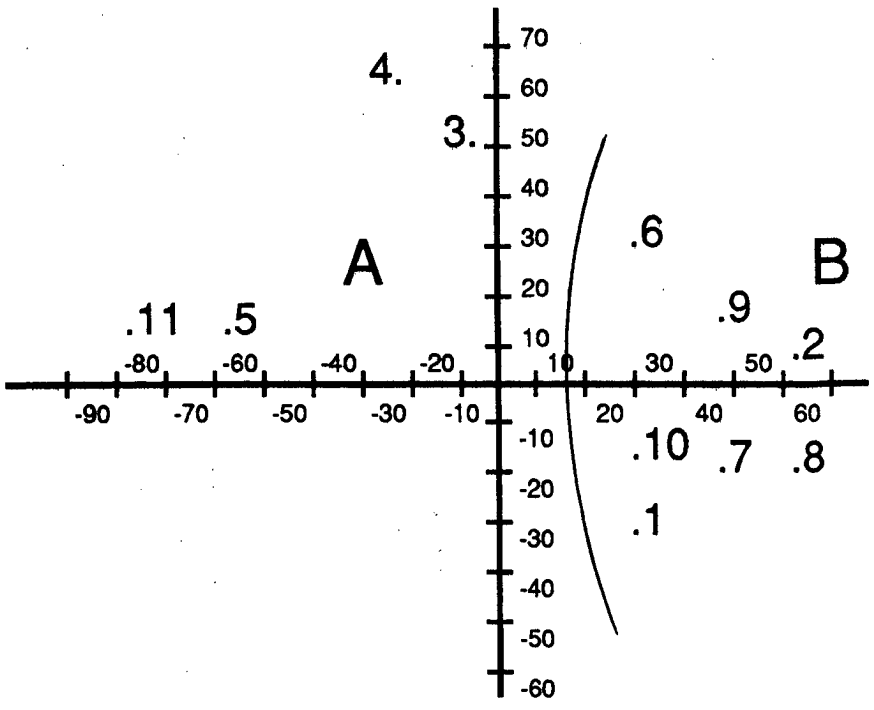


Fig. 2 PCA Ordination Chart of Frequency Classification

BANDING ROUND-UP

Compiled by Kim Lowe, Australian Bird and Bat Banding Schemes, Australian National Parks & Wildlife Service, GPO Box 8, Canberra ACT 2601

The following lists are from data supplied to the Australian Bird and Bat Banding Scheme between September 1989 and February 1990. Permission must be sought from the banders and clearance given by the ABBBS before using these data in publications.

LAYOUT OF DATA:
Line 1 - band number; banding place; co-ordinates; date of banding; age; sex; bander
Line 2 - recovery method; recovery status; recovery place; co-ordinates; recovery date; age; sex; finder
Line 3 - distance and direction between banding and recovery places; time elapsed between banding and recovery

SYMBOLS USED:

Age code:
U = unknown;
P = nestling;
J = juvenile;
1 = within the first year of life;
+1 = within the first year or older;
2 = within the second year;
+2 = within the second year or older; etc

Sex:
U = unknown;
M = male;
F = female.

Method of encounter:
01 = probably trapped;
02 = trapped but device is unknown to the banding office;
03 = trapped in a mist net;
04 = trapped with a cage trap;
05 = trapped with a cannon net;
25 = bird sick or injured;
31 = collided with a moving road vehicle;
40 = band found on a bird, no further data on how encountered;
41 = band returned, not reported if on a bird;
46 = colour marking sighted in field, bird one of a cohort marked in this manner;
48 = colour marking sighted in field;
54 = beachwashed;
61 = shot - reason unknown;
63 = taken for scientific study;
67 = taken for food or feathers;
68 = shot for food or sport;
99 = found dead, cause unknown.

Status after encounter:
00 = status of bird and band is unknown;
01 = status of bird unknown,band left on bird;
02 = status of bird is unknown and the band was left on the bird;
03 = bird is dead, status of band is unknown;
04 = bird is dead, band left on bird;
05 = bird is dead, band removed from bird;
09 = rehabilitation attempted but bird died, band status unknown;
13 = bird released alive with band;
14 = bird released alive, band removed;
26 = bird was alive in the wild with the band;
29 = bird partially decomposed, band removed.

153 BAR-TAILED GODWIT LIMOSA LAPPONICA

082-43465	ROEBUCK BAY		WA	18d 4mS	122d19mE	02/09/81	+1 U	VICTORIAN WADER STUDY GROUP
61 03	UST YANSKIY YAKUT ASSR USSR			69d13mN	139d54mE	04/06/83	U U	SOVIET BANDING SCHEME
Distance:	9781 km	Direction:	6 degs.		Time elapsed:	1 yrs 9 mths 2 days		
082-44002	BOTANY BAY		NSW	33d57mS	151d11mE	20/03/81	J M	LANE
61 03	VERHNEKOLYMSK REGION YAKUT ASSR USSR			65d46mN	150d56mE	00/00/83	U U	SOVIET BANDING SCHEME
Distance:	11055 km	Direction:	359 degs.		Time elapsed:	0 yrs 0 mths 0 days		

Two records from a 'swag' obtained by the ABBBS from the Moscow banding centre via a Danish contact! The record for 082-44002 is the third longest movement in the ABBBS records for this species. All controls have been to the USSR, China and South Korea.

155 GREY-TAILED TATTLER TRINGA BREVIPES

051-24764	80 MILE BEACH 7 KM SOUTH ANNA PLAINS		WA	19d15mS	121d25mE	05/11/83	+3 U	WA WADER STUDY GROUP
67 03	KANG XI HA QINZHOU CITY CHINA			21d57mN	108d36mE	13/05/84	U U	NATIONAL BIRD BANDING CENTER
Distance:	4766 km	Direction:	342 degs.		Time elapsed:	0 yrs 6 mths 8 days		
061-70054	SHORES OF THE 80 MILE BEACH		WA	19d15mS	121d20mE	29/03/88	+2 U	AUSTRALASIAN WADER STUDY GROUP
03 13	MAI PO MARSHES HONG KONG			22d29mN	114d 2mE	02/09/89	U U	MELVILLE
Distance:	4684 km	Direction:	349 degs.		Time elapsed:	1 yrs 5 mths 4 days		

The sixth and seventh international control for the ABBBS for this species and the first to Hong Kong.

161 CURLEW SANDPIPER CALIDRIS FERRUGINEA

040-97272	WERRIBEE SEWERAGE FARM (SPIT, PT WILSON)		VIC	38d 3mS	144d32mE	26/01/80	+1 U	VICTORIAN WADER STUDY GROUP
40 03	YAKUT O VERKHOYANSKIY USSR			67d41mN	135d 0mE	00/00/00	U U	SOVIET BANDING SCHEME
Distance:	11751 km	Direction:	356 degs.		Time elapsed:	0 yrs 0 mths 0 days		
041-10300	YALLOCK CREEK NEAR KOOWEERUP		VIC	38d13mS	145d28mE	26/12/84	+2 U	VICTORIAN WADER STUDY GROUP
67 03	TANGGU NEAR TIANJIN CHINA			38d54mN	117d37mE	15/06/86	U U	NATIONAL BIRD BANDING CENTER
Distance:	9002 km	Direction:	338 degs.		Time elapsed:	1 yrs 5 mths 20 days		
041-13702	80 MILE BEACH 7 KM SOUTH ANNA PLAINS		WA	19d15mS	121d25mE	31/10/83	+3 U	WA WADER STUDY GROUP
67 03	SANDONG SHOUGGUONG CO.	CHINA		36d48mN	118d42mE	12/05/87	U U	NATIONAL BIRD BANDING CENTER
Distance:	6210 km	Direction:	357 degs.		Time elapsed:	3 yrs 6 mths 12 days		
041-17650	WERRIBEE SEWERAGE FARM (SPIT, PT WILSON)		VIC	38d 3mS	144d32mE	23/03/86	+2 U	VICTORIAN WADER STUDY GROUP
67 03	YANGTZE RIVER CHINA			30d48mN	121d27mE	17/05/89	U U	EAST CHINA WATERBIRD GROUP
Distance:	7991 km	Direction:	339 degs.		Time elapsed:	3 yrs 1 mths 25 days		
041-43622	WERRIBEE SEWERAGE FARM (SPIT, PT WILSON)		VIC	38d 3mS	144d32mE	27/02/88	+2 U	VICTORIAN WADER STUDY GROUP
67 03	JIMO XIAN SHANDONG CHINA			36d18mN	120d24mE	23/08/88	U U	NATIONAL BIRD BANDING CENTER
Distance:	8599 km	Direction:	340 degs.		Time elapsed:	0 yrs 5 mths 25 days		

These records bring the ABBBS total to 25 international controls. 040-97272 is the longest movement for this species under the ABBBS.

162 RED-NECKED STINT CALIDRIS RUFICOLLIS

032-40741 YALLOCK CREEK NEAR KOOWEERUP VIC 38d13mS 145d28mE 29/01/84 +2 U VICTORIAN WADER STUDY GROUP
67 03 YANGTZE RIVER CHINA 30d48mN 121d27mE 17/05/89 U U EAST CHINA WATERBIRD GROUP
Distance: 8037 km Direction: 338 degs. Time elapsed: 5 yrs 3 mths 19 days

032-74765 SWAN ISLAND QUEENSCLIFF VIC 38d15mS 144d40mE 29/03/86 1 U VICTORIAN WADER STUDY GROUP
61 03 KOBYAYSKY YAKUT ASSR USSR 63d24mN 125d27mE 14/06/87 U U SOVIET BANDING SCHEME
Distance: 11397 km Direction: 351 degs. Time elapsed: 1 yrs 2 mths 16 days

Two excellent international controls bringing the ABBBS total to 34.

164 RED KNOT CALIDRIS CANUTUS

051-11419 WARD SPIT 10KM WNW PT GERMEIN SA 33d 1mS 137d55mE 27/12/81 P U WATERMAN
99 03 UST ALDANSKI YAKUT ASSR USSR 62d38mN 131d58mE 15/07/82 U U SOVIET BANDING SCHEME
Distance: 10616 km Direction: 357 degs. Time elapsed: 0 yrs 6 mths 19 days

051-11482 WARD SPIT 10KM WNW PT GERMEIN SA 33d 1mS 137d55mE 27/12/81 P U WATERMAN
25 09 CHITA O MOGOCHINSKY USSR 53d47mN 119d48mE 23/08/88 U U SOVIET BANDING SCHEME
Distance: 9774 km Direction: 349 degs. Time elapsed: 6 yrs 7 mths 27 days

The second and third control to the USSR, all others were to China and New Zealand.

165 GREAT KNOT CALIDRIS TENUIROSTRIS

061-38177 10 KM SOUTH OF ANNA PLAINS WA 19d15mS 121d20mE 24/08/82 2 U WA WADER STUDY GROUP
02 03 CHONGMING IS SHANGHAI CHINA 31d38mN 121d27mE 00/05/87 1 U NATIONAL BIRD BANDING CENTER
Distance: 5631 km Direction: 0 degs. Time elapsed: 0 yrs 0 mths 0 days

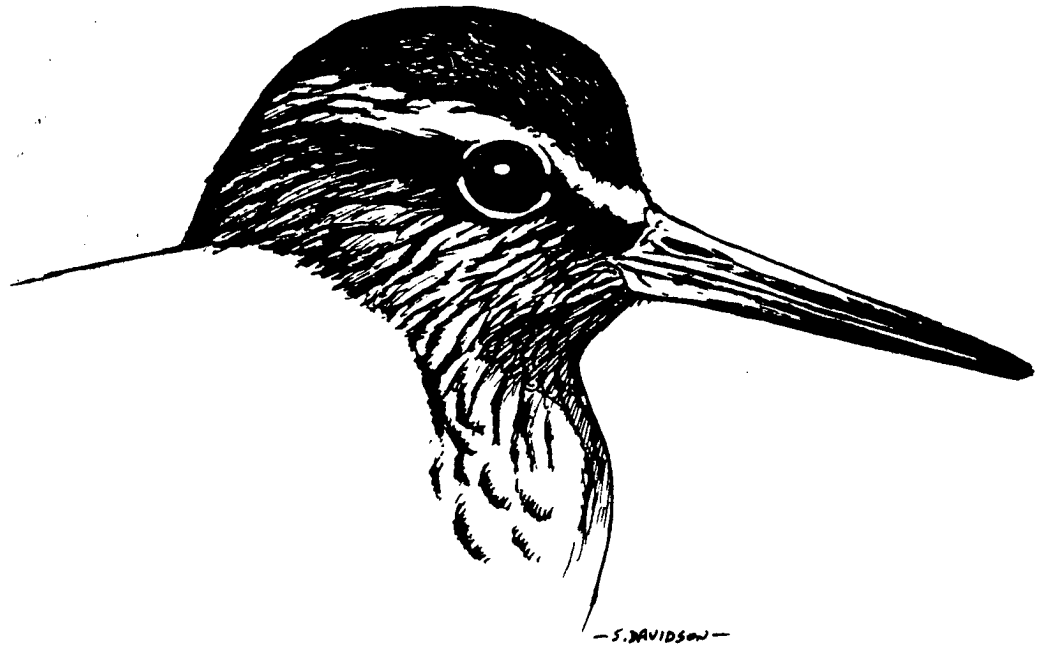
061-44558 SHORES OF THE 80 MILE BEACH WA 19d15mS 121d20mE 13/04/85 1 U AUSTRALASIAN WADER STUDY GROUP
61 03 KHABAROUSK NIKOLAYEUSKY USSR 53d12mN 140d45mE 04/07/88 U U SOVIET BANDING SCHEME
Distance: 8242 km Direction: 11 degs. Time elapsed: 3 yrs 2 mths 21 days

The third control to the USSR, all controls to China or the USSR.

168 LATHAM'S SNIPE GALLINAGO HARDWICKII

J6089313 WATENBATSU HOKKAIDO JAPAN 42d57mN 144d 5mE 07/06/85 +1 U YAMASHINA INST FOR ORNITHOLOGY
54 05 KING ISLAND YELLOW ROCK BEACH TAS 39d41mS 143d55mE 04/01/88 U U ARCHER
Distance: 9152 km Direction: 180 degs. Time elapsed: 2 yrs 6 mths 27 days

The longest movement recorded in the ABBBS records. The fifth Japan to Australia movement for this species and only one record in the reverse direction. This control the result of recent efforts by the Yamashina Institute for Ornithology in support of the Japan-Australia Migratory Birds Agreement.


-S. DAVIDSON-

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