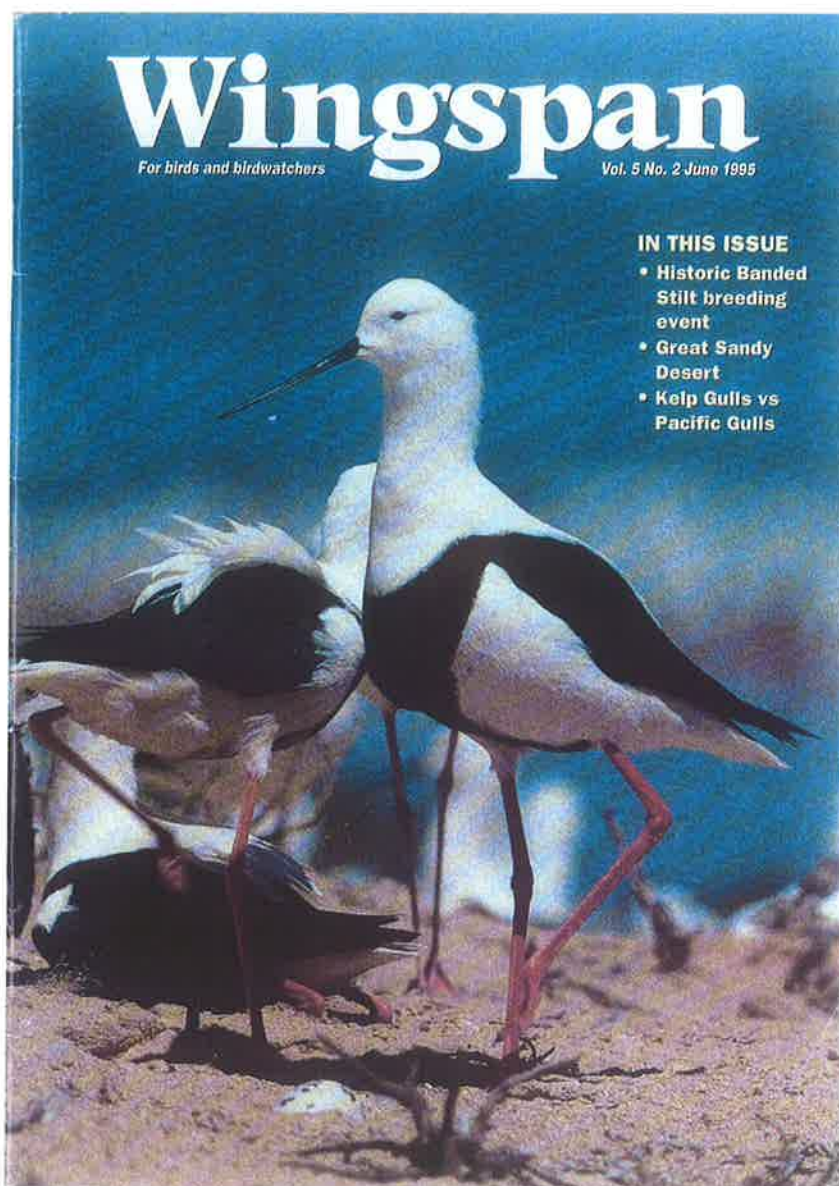


**BANDED STILT *CLADORHYNCHUS LEUCOCEPHALUS*  
RESEARCH IN WESTERN AUSTRALIA IN 1995**



**ALL PUBLICATIONS, PRESENTATIONS, MEDIA  
ARTICLES AND ASSOCIATED CORRESPONDENCE**

**RESEARCH MATERIALS CONSOLIDATION REPORT**

JAK Lane  
WA Department of Parks and Wildlife

May 2014

**Cover photo:** Cover of June 1995 (Vol.5 No.2) issue of *Wingspan*. This issue contained (pages 13-15) the article '*History in the mating*', by Clive Minton, Grant Pearson & Jim Lane, describing the early stages of breeding by Banded Stilt at Lake Ballard in 1995.

This **Research Materials Consolidation Report** is a preliminary stage in the preparation of research reports and scientific publications relating to the Banded Stilt breeding event on Lakes Ballard and Marmion in Western Australia in 1995.

The purpose of an RMCR is to consolidate and conserve all of the research materials relating to a research project. The material reproduced here is in its original form, with limited or no reformatting.

### **FUTURE WORK**

The next steps to be taken in finalising this RMCR and then preparing reports and publications making use of its contents should be to:

- Obtain and search 'The Tattler' (the pre-2006 series, not to be confused with 'Tattler' which is the January 2006 onwards series) for articles not already in this RMCR relating to Banded Stilt breeding. **In particular, obtain 'The Tattler' 19:6-7 and 20:5.**
- Read / re-read: Collard, S., Clarke, A., Armstrong, D. & Sautter, E. (2013). *Coorong to Outback: Observations of a Banded Stilt breeding colony at Lake Torrens, South Australia, May 2010*. Stilt 63-64:6-15, and similar articles before deciding most appropriate structure and content for publication of 1995 work at Lakes Ballard & Marmion.
- Check most-recent issues of 'Stilt' and 'Tattler' for most-recent 'Instructions to Authors' when contemplating where and how best to publish the 1995 Banded Stilt work.
- See yellow highlighted text in the remainder of this RMCR summary for other Future Work needed / desirable.
- Maybe search 'Stilt' for pre-1995 articles relating to Banded Stilt breeding.
- See Table 1 of Collard *et al.* (2013) for a list of 'Recorded Banded Stilt breeding events, 1904-2010' including References for each.

### **NOTES ABOUT THE CONTENTS OF THIS RMCR**

As its title indicates, this RMCR draws together all of the publications, presentations and media (print) articles that have resulted to date (03/5/2014) from the work by Clive Minton, Grant Pearson, Alan Clarke, Andrew Chapman, *et al.* on the 1995 Banded Stilt breeding event in the Eastern Goldfields of Western Australia, principally on Lakes Ballard and Marmion, and the associated correspondence.

Copies of some other, closely-related publications, e.g. concerning other Banded Stilt breeding events elsewhere in WA and Australia, are also included or at least mentioned in this RMCR.

Relevant extracts from the WA Department of Conservation & Land Management (CALM) Science Division 'Annual Research Activity Reports' are also here.

See another Banded Stilt RMCR for all materials relating to the production of the video 'Bobby and the Banded Stilt' by the ABC Natural History Unit.

## SUMMARY LISTS OF PUBLICATIONS & PRESENTATIONS

Below are summary lists, in chronological order, of all of the publications and presentations included (mainly) or mentioned in this RMCR. Refer to the '[CONTENTS OF THIS RMCR](#)' section for more information about each item, including further work to be done.

### PUBLICATIONS to date concerning the 1995 work at Lakes Ballard and Marmion.

- Hollands, D. & Minton, C. (2012). *Waders: the shorebirds of Australia*. Blooming Books, Melbourne.
- Geering, A., Agnew, L. & Harding, S. (2007). *Shorebirds of Australia*. CSIRO Publishing.
- Lane, J. (1997). *Les Lacs du desert [Western Australia's Desert Lakes]*, p.22 in 'Antipode AFA' – News Francais et Australien – No.5 – Dec 1997.
- 'Leg-Flagged Banded Stilts' article by JL apparently published in 'WA Bird Notes' in December 1996 (sent to editor on 23/10/1996).
- 'Leg Flagged Banded Stilts' published (p.18) in WA Bird Notes No.77 (March 1996). This was authored by JL, though this was not indicated.
- Minton, C., Lane, J. & Pearson, G. (1995). *Update on Banded Stilt breeding event*. 'Wingspan' 5(3):9 (Sept 1995 issue).
- Minton, C., Lane, J. & Pearson, G. (1995). *Banded Stilts complete the job*. The Tattler No.4, p.3 (July 1995 issue).
- Minton, C., Pearson, G. & Lane, J. (1995). *History in the mating*. Wingspan 5(2):13-15. (June 1995 issue).
- Lane, J. (1995) *Leg-flagged Banded Stilts*. WA Bird Notes No.74, p.19 (June 1995 issue), under the heading 'STOP PRESS'.
- Minton, C., Pearson, G. & Lane, J. (1995). *Banded Stilts quick off the mark*. The Tattler, No.3, p.3 (April 1995 issue).

### PRESENTATIONS to date concerning the 1995 work at Lakes Ballard and Marmion.

- Early 1997 presentation to Busselton Naturalists Club Inc. regarding *BaSt breeding at Lakes Ballard and Marmion in 1995*.
- Part of the Program and Abstracts of the 'Southern Hemisphere Ornithological Conference' (SHOC) in Albany, WA, 05-09/10/1996. Relevant abstract is: '*Banded Stilt breeding at Lake Ballard, Western Australia*' by J. Lane, G. Pearson, & C. Minton, presented by JL on 07/10/1996.
- Banded Stilt talk to RAOU (now Birdlife Australia) WA Group in Perth on 23<sup>rd</sup> Sept 1996.
- Fax (14/10/1996) from CDTM to JL referring to two overhead projections sent to him by JL for use in New Zealand 'later this week'.
- Seminar '*Banded Stilt breeding in the Goldfields*' to be presented by JL at the CALM 'Wildlife Research Centre' (Woodvale) on 17 May 1996.

### Some other CLOSELY-RELATED PUBLICATIONS.

Note that this list is not exhaustive. Check the other Banded Stilt RMCR's – and more-widely in the scientific literature – for other closely-related publications not listed here.

- Standen, R. (Feb 2014). *Hello from the AWSG leg flag sighting database operator*. Tattler No.31, p11. Includes a 'Call for flag sightings not yet submitted'.
- Collard, S., Clarke, A., Armstrong, D. & Sautter, E. (2013). *Coorong to Outback: Observations of a Banded Stilt breeding colony at Lake Torrens, South Australia, May 2010*. Stilt 63-64:6-15.
- Johnstone, R.E., Burbidge, A.H. & Darnell, J.C. (2013). *Birds of the Pilbara region, including seas and offshore islands, Western Australia: distribution, status and historical changes*. Records of the Western Australian Museum, Supplement 78:343-441.
- Pedler, R. (Oct 2013). *Banded Stilt banding update – Please keep an eye out*. Tattler, No.30, p.14.
- Minton, C. (July 2013). *Use of AWSG and VWSG recoveries and flag-sighting data*. Tattler No.29, p.11.
- Christie, M. (July 2013). *Banded Stilt breeding event*. Tattler No.29, p.13.
- Collard, S. & Clarke, A. (Oct 2012). *Abstracts from ASC 2012: Banded Stilts in the brine: Lake Torrens breeding event, May 2010*. Stilt 62, p.59.

- Pedler, R.D. & Bennett, A.T.D. (Oct 2012). Abstracts from ASC 2012: *Banded Stilts: Cross-continental movements by an extreme boom bust species*. Stilt 62, p.64.
- Christie, M. (Aug 2012). *Banded Stilt update, July 2012*. Tattler No.25, p.7.
- George, L. (Apr 2009). *Shorebirds and their known habitat / status in the Gascoyne Region, Western Australia*. Stilt 55, pp.40-50. Only p.42 (Lake MacLeod) printed here.
- Christie, M. (Oct 2006). *South Australian wader studies – An overview*. Stilt 50, pp.249-251.
- Paton, D.C. & Rogers, D.J. (Oct 2006). *South Australian wader studies – Chapter 3: The Coorong, Lake Alexandria and Lake Albert. Waterbird research in the Coorong Region, South Australia: Past, Present, Future*. Stilt 50, pp.254-256.
- Baxter, C. (Oct 2006). *South Australian wader studies – Chapter 9. Resident waders. Banded Stilt Cladorhynchus leucocephalus breeding at Lake Eyre North in 2000*. Stilt 50, pp.262-263.
- Edey, D. (Oct 2006). *South Australian wader studies – Chapter 15. Research resources. Wader-related references for South Australia*. Stilt 50, pp.275-276. ‘Note: This list does not include references published in ‘Stilt’ for which see Phillips (2006)’.
- Gosbell, K. & Christie, M. (Oct 2006). *The breeding of Banded Stilt and Red-necked Avocet in the Coorong, South Australia: December 2005 – February 2006*. Stilt 50, pp.277-284.
- Phillips, H. (Oct 2006). *Papers in Australian Wader Study Group journals 1980-2006*. Stilt 50, pp.304-325. Only pages 304 and 306 (Banded Stilt) printed here.
- Brearley, A. (2005). *Ernest Hodgkin’s SWANLAND: estuaries and coastal lagoons of South-western Australia*. University of Western Australia Press.
- Clarke, A., Muir, B., Elscot, S. & Lane, J. (2004). *Banded Stilt breeding attempt at Lake Disappointment*. The Stilt 46:39.
- Kraaijeveld, K., Minton, C., Collins, P. & Jessop, R. (Apr 2003). *The first catch of Banded Stilts in Victoria: Biometrics, moult and age / sex structure*. The Stilt 43, pp.14-19.
- White, M.E. (2000). *Running down: Water in a Changing Land*. Kangaroo Press, NSW. **Borrow and read / extract BaSt section.**
- Minton, Jessop & Collins (2000). *Visit to Banded Stilt breeding colony on Hughes Island, Lake Eyre North, 1st – 5th April 2000*.
- Minton, C., Jessop, R. & Collins, P. (Oct 2000). *Silver Gull predation at Banded Stilt colonies*. Abstracts of the AWSG Conference, Brisbane, 1-2 July 2000. Stilt 37, p.51.
- Phillips, H. (Oct 2000). *Bird Species Index, The Stilt: Nos.31-36*. Stilt 37, pp.54-.... Only pages 54 and 55, 56 (Banded Stilt) printed here.
- Alcorn, M. & Alcorn, R. (Apr 2000). *Seasonal migration of Banded Stilt Cladorhynchus leucocephalus to the Natimuk-Douglas salt pans in Western Victoria, Australia*. The Stilt 36, pp.7-10.
- ‘Proceedings of the Salt Lake Ecology Seminar’ held on 07/7/1999 at Perth Zoo Conference Centre.
- Coate, K. (1999). *Bird notes for the Easter campout at Goongarrie Station*. The Naturalist News, May 1999, p.4.
- Williams, W.D., De Deckker, P. & Shiel, R.J. (1998). *The limnology of Lake Torrens, an episodic salt lake of central Australia, with particular reference to unique events in 1989*. Hydrobiologia 384:101-110.
- Johnstone, R.E. & Storr, G.M. (1998). *Handbook of Western Australian Birds. Volume 1. Non-Passerines (Emu to Dollarbird)*, pp.206-207, Plate 30, Egg Plate 20 (Banded Stilt).
- Jessop, R., Collins, P. & Brown, M. (Apr 1998). *The manufacture of leg flags in the light of experience*. The Stilt 32, pp.49-51.
- Phillips, H. (Oct 1997). *Bird Species Index, The Stilt: Nos.25-30*. Stilt 31, pp.63-.... Only pages 63 and 64, 70 (Banded Stilt) printed here.
- Phillips, H. (Oct 1997). *Author Index, The Stilt: Nos.25-30*. Stilt 31, pp.72-.... Only page 74 (Minton et al. – Banded Stilt) printed here.
- Singor, M.J.C. (Apr 1997). *Waders of the Creery wetlands and adjacent mudflats, Western Australia*. The Stilt 30, pp.39-48.
- Rogers, D.I.R. & Eades D.W. (Apr 1997). *Belly-soaking and egg-cooling behaviour in a Red-capped Plover Charadrius ruficapillus*. The Stilt 30, p.53.

- Barter, M. (Apr 1995). *For the record – Large numbers of Red-necked Stint and Banded Stilt at Lake Reeve, Gippsland, Victoria*. The Stilt No.26, p.36.
  - Gibbs, H. (Aug 2011). *Concerns about leg-flagging of waders*. Tattler N0.22, pp.10-11.
  - Gosbell, K., Christie, M., Stewart, I. & Hollands, D. (July 2010). *Lake Torrens turns on an exciting breeding event*. Tattler No.18, pp.10-11.
  - Minton, C. (July 2009). *PVC sheet for flags / colour bands*. Tattler No.14, p.7.
  - Christie, M. (Apr 2008). *More on Banded Stilts*. Tattler No.9, p.5.
  - Gosbell, K. (Jan 2006). *Mysterious Banded Stilt breeding event*. Tattler No. ... p.7.
  - McKenzie, M. (1995). *Disappearing stilts*. p.4 in Sept 1995 issue of 'WA Bird Notes'.
  - 'ERRATA' section of WA Bird Notes No.71, p.3, (Sept 1994 issue) that reads 'Banded Stilt – 15000 (incorrectly 1500 in WABN 70), April 94, Cargills Salt Works, Port Hedland (Port Hedland) – AWSG'.
  - A copy of the draft paper (13pp) headed 'Banded Stilt Breeding at Lake Torrens, South Australia, in 1989'. The authorship is not indicated but seems likely (from the above) to include K. Bellchambers, G. Carpenter and possibly D. Paton. Regarding this paper, it appears from Table 1 of Collard *et al.* (2013) (a list of 'Recorded Banded Stilt breeding events, 1904-2010' including References for each) that this draft paper was not published (as at Oct 2013).
  - HANZAB, Volume 2 (1993), pp.780-790 (Banded Stilt).
  - Watkins (1993). *A National Plan for Shorebird Conservation in Australia*. ...
  - Bellchambers, K. & Carpenter, G. (1992). *Sudden life on Stilt Island*. Natural History 4:42-48.
  - Bellchambers, K. & Carpenter, G. (1990). *Birds recorded at Lake Torrens during its 1989 flooding*. South Australian Ornithologist 31:1-6.
  - Extracts concerning BaSt from: Storr, G.M. (1986). *Birds of the South-eastern Interior of Western Australia*. Records of the Western Australian Museum, Supplement No.26.
  - Burbidge, A.A. & Fuller, P.J. (1982). *Banded Stilt breeding at Lake Barlee, Western Australia*. Emu 82:212-216.
  - Young, C. (1981). *Abandoned breeding colony of Banded Stilt discovered in W.A. Goldfields*. Swans [S.W.A.N.S.] 11(2):3-5.
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## CONTENTS OF THIS RMCR

Note that from early 1995 to the early 2000s, Jim Lane (JL) was based in Busselton and technical officers Grant Pearson (GBP) and Alan Clarke were based at Woodvale (a northern suburb of Perth) – hence the many faxes and emails between JL and GBP listed below.

1. On 07/5/2014, JL spent 1-2 of hours searching online through all issues of ‘Tattler’ (not its predecessor ‘The Tattler’, which doesn’t seem to be available online) from Edition 1 (January 2006) to Edition 32 (April 2014) for all papers / articles concerning BaSt that could be useful in writing up the 1995 work at Lakes Ballard and Marmion. JL then printed them (those not already in this or other BaSt RMCR’s) and they are inserted here.
  - Standen, R. (Feb 2014). *Hello from the AWSG leg flag sighting database operator*. Tattler No.31, p11. Includes a ‘Call for flag sightings not yet submitted’.
  - Pedler, R. (Oct 2013). *Banded Stilt banding update – Please keep an eye out*. Tattler, No.30, p.14.
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  - Christie, M. (July 2013). *Banded Stilt breeding event*. Tattler No.29, p.13.
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  - Gosbell, K., Christie, M., Stewart, I. & Hollands, D. (July 2010). *Lake Torrens turns on an exciting breeding event*. Tattler No.18, pp.10-11.
  - Minton, C. (July 2009). *PVC sheet for flags / colour bands*. Tattler No.14, p.7.
  - Christie, M. (Apr 2008). *More on Banded Stilts*. Tattler No.9, p.5.
  - Gosbell, K. (Jan 2006). *Mysterious Banded Stilt breeding event*. Tattler No. ... p.7.

Obtain and search ‘The Tattler’ (the pre-2006 series) for articles not already in this RMCR relating to Banded Stilt breeding. **In particular, obtain ‘The Tattler’ 19:6-7 and 20:5.**

2. On 06/5/2014, JL spent the evening searching online through all issues of ‘Stilt’ (the AWSG journal) from No.26 (April 1995) to No.63-64 (Oct 2013) for all papers / articles concerning BaSt that could be useful in writing up the 1995 work at Lakes Ballard and Marmion. The next day JL printed them (those not already in this or other BaSt RMCR’s) and they are inserted here. Note that the No.1 edition was in ‘Spring 1981’.
  - Collard, S. & Clarke, A. (Oct 2012). *Abstracts from ASC 2012: Banded Stilts in the brine: Lake Torrens breeding event, May 2010*. Stilt 62, p.59.
  - Pedler, R.D. & Bennett, A.T.D. (Oct 2012). *Abstracts from ASC 2012: Banded Stilts: Cross-continental movements by an extreme boom bust species*. Stilt 62, p.64.
  - George, L. (Apr 2009). *Shorebirds and their known habitat / status in the Gascoyne Region, Western Australia*. Stilt 55, pp.40-50. Only p.42 (Lake MacLeod) printed here.
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  - Baxter, C. (Oct 2006). *South Australian wader studies – Chapter 9. Resident waders. Banded Stilt Cladorhynchus leucocephalus breeding at Lake Eyre North in 2000*. Stilt 50, pp.262-263.
  - Edey, D. (Oct 2006). *South Australian wader studies – Chapter 15. **Research resources. Wader-related references for South Australia.*** Stilt 50, pp.275-276. ‘Note: This list does not include references published in ‘Stilt’ for which see Phillips (2006)’.
  - Gosbell, K. & Christie, M. (Oct 2006). *The breeding of Banded Stilt and Red-necked Avocet in the Coorong, South Australia: December 2005 – February 2006*. Stilt 50, pp.277-284.
  - Phillips, H. (Oct 2006). ***Papers in Australian Wader Study Group journals 1980-2006.*** Stilt 50, pp.304-325. Only pages 304 and 306 (Banded Stilt) printed here.
  - Kraaijeveld, K., Minton, C., Collins, P. & Jessop, R. (Apr 2003). *The first catch of Banded Stilts in Victoria: Biometrics, moult and age / sex structure*. The Stilt 43, pp.14-19.

- Minton, C., Jessop, R. & Collins, P. (Oct 2000). *Silver Gull predation at Banded Stilt colonies*. Abstracts of the AWSG Conference, Brisbane, 1-2 July 2000. *Stilt* 37, p.51.
  - Phillips, H. (Oct 2000). *Bird Species Index, The Stilt: Nos.31-36*. *Stilt* 37, pp54-.... Only pages 54 and 55, 56 (Banded Stilt) printed here.
  - Alcorn, M. & Alcorn, R. (Apr 2000). *Seasonal migration of Banded Stilt *Cladorhynchus leucocephalus* to the Natimuk-Douglas salt pans in Western Victoria, Australia*. *The Stilt* 36, pp.7-10.
  - Jessop, R., Collins, P. & Brown, M. (Apr 1998). *The manufacture of leg flags in the light of experience*. *The Stilt* 32, pp.49-51.
  - Phillips, H. (Oct 1997). *Bird Species Index, The Stilt: Nos.25-30*. *Stilt* 31, pp.63-.... Only pages 63 and 64, 70 (Banded Stilt) printed here.
  - Phillips, H. (Oct 1997). *Author Index, The Stilt: Nos.25-30*. *Stilt* 31, pp.72-.... Only page 74 (Minton *et al.* – Banded Stilt) printed here.
  - Singor, M.J.C. (Apr 1997). *Waders of the Creery wetlands and adjacent mudflats, Western Australia*. *The Stilt* 30, pp.39-48.
  - Rogers, D.I.R. & Eades D.W. (Apr 1997). *Belly-soaking and egg-cooling behaviour in a Red-capped Plover *Charadrius ruficapillus**. *The Stilt* 30, p.53.
  - Barter, M. (Apr 1995). *For the record – Large numbers of Red-necked Stint and Banded Stilt at Lake Reeve, Gippsland, Victoria*. *The Stilt* No.26, p.36.
3. A copy of: Collard, S., Clarke, A., Armstrong, D. & Sautter, E. (2013). *Coorong to Outback: Observations of a Banded Stilt breeding colony at Lake Torrens, South Australia, May 2010*. *Stilt* 63-64:6-15.
  4. Johnstone, R.E., Burbidge, A.H. & Darnell, J.C. (2013). *Birds of the Pilbara region, including seas and offshore islands, Western Australia: distribution, status and historical changes*. Records of the Western Australian Museum, Supplement 78:343-441. Only pages 343, 383-384, 389 reproduced here. These are the Abstract and Introduction and the sections concerning Banded (& Black-winged) Stilt, Avocet and Silver Gull. Particularly relevant observations include numbers and movement of BaSt to and from Port Hedland Saltworks, age groups, c.60,000 BaSt in Dec 1992, Mandora Marsh and Halse *et al.* (2005).
  5. Extracts regarding BaSt from: Hollands, D. & Minton, C. (2012). *Waders: the shorebirds of Australia*. Blooming Books, Melbourne. Contains extensive descriptions and many photos of BaSt breeding events including lake Ballard in 1995.
  6. Extracts regarding BaSt from: Geering, A., Agnew, L. & Harding, S. (2007). *Shorebirds of Australia*. CSIRO Publishing. Topics covered include: breeding areas, salinity, 'Red-capped Plover are known to drape their damp bellies over their eggs (Rogers & Eades 1997)', a 'summary of the breeding ecology' of BaSt (including modal clutch size' of 3-4 eggs, 'incubation period' of '19-21, 28 days', 'age of first flight' of '50 days'), creche formation, predators, Silver Gulls, 'Nest Record Scheme' and moults.  
Note in particular the reference (a copy is below, at 1998): Williams, W.D., De Deckker, P. & Shiel, R.J. (1998). *The limnology of Lake Torrens, an episodic salt lake of central Australia, with particular reference to unique events in 1989*. *Hydrobiologia* 384:101-110.
  7. Extracts regarding BaSt (especially p.206) from 'Ernest Hodgkin's SWANLAND: estuaries and coastal lagoons of South-western Australia' by Anne Brearley (2005). The Banded Stilt stuff draws heavily on materials provided to Brearley by JL for this book.
  8. Clarke, A., Muir, B., Elscot, S. & Lane, J. (2004). *Banded Stilt breeding attempt at Lake Disappointment*. *The Stilt* 46:39. Records ACI and BM's observations on 23<sup>rd</sup> August 2004. Makes reference to dead chicks, predation, cats, dog/dingo, 'anostracan shrimps and ostracods', BaSt feeding, did not locate BaSt nesting island, BaSt at Coral Bay (CDTM), previous records of breeding at or near Lake Disappointment (Butler in 1971, Percival Lakes, 'Kolichis (1976)').

Alan Clarke's original report (06/09/2004) to JL and SE on these 23/8/2004 observations is also here and [has more detail](#).

9. '*Breeding ecology and conservation of the Banded Stilt*' (SPP 1999/0013) extract (pp.83-84) from WA Dept. of Conservation & Land Management (CALM) Science Division's 'Annual Research Activity Report: July 2003 – June 2004'.
10. '*Breeding ecology and conservation of the Banded Stilt*' (SPP 1999/0013) extract (pp.69-70) from WA Dept. of Conservation & Land Management Science Division's 'Annual Research Activity Report: June 2002 – June 2003'.
11. Printout (05/08/2003) from CALM website of 'Science Project Plan Summary: SPP 1999/0013. *Breeding ecology and conservation of the Banded Stilt*'. Note the start (15/03/1995) and finish (15/03/2005) dates of this SPP.
12. Email (24/7/2000) from Peter Copley (NPW SA) to JL making reference to HANZAB [Vol.2, pp.780-790] treatment of BaSt populations and movements. Seeks JL's comments on conservation status of BaSt and asks about Silver Gull numbers in inland WA.
13. Article (The Weekend Australian, May 20-21, 2000, p.5) regarding recent partial filling of Lake Eyre. Has a photo of 'Lake Eyre shrimp'.
14. Copy of Minton, Jessop & Collins (2000). *Visit to Banded Stilt breeding colony on Hughes Island, Lake Eyre North, 1<sup>st</sup> – 5<sup>th</sup> April 2000* and covering letters recommending that '[Silver Gull] control measures be prepared now and implemented when the next Banded Stilt breeding event occurs in South Australia'. Received by GBP and JL in electronic format (as CLIEYRE3.doc).
15. Letter (20/7/1999) from Mary E. White, D.Sc., to JL seeking BaSt photos for a book she is writing. JL recommended she contact CDTM. Also see her letter of 27/4/1999 below. Bibliographic citation is: White, M.E. (2000). *Running down: Water in a Changing Land*. Kangaroo Press, NSW. [Borrow and read / extract BaSt section](#).
16. Fax (02/8/1999) from JL to GBP replying to CDTM's 23/7/1999 fax to GP in which he wrote: 'I would like to put a brief note in Tattler re the final outcome of the [1999] Banded Stilt breeding attempt' and asked a number of questions related to BaSt breeding activity and movements in WA in 1999. [Check for / obtain copy of resultant article](#).
17. Extracts from 'Proceedings of the Salt Lake Ecology Seminar' held on 07/7/1999 at Perth Zoo Conference Centre. See JL's office computer for a digital copy of the entire Proceedings and see the '*Water Depth & water Quality Measurements, Aquatic Invertebrate Sweeps, Food Availability, Feeding & Drinking Observations at Lakes Ballard & Marmion in 1995*' RMCR for hand-written notes made by JL at this Seminar.
18. Science Project Plan (SPP) for '*Breeding ecology and conservation of the Banded Stilt*' ('Band Stilt SPP 1999.doc'), 'Request No. WD/0023'. Note the proposed start (15/03/1995) and finish (15/03/2005) dates.
19. A copy of 'Coate, K. (1999). *Bird notes for the Easter campout at Goongarrie Station*. The Naturalist News, May 1999, p.4. Includes description of active BaSt nesting colony found on Lake Goongarrie on 02/4/1999. Note that JL has B&W aerial photos of Lake Goongarrie (and Lake Marmion) and photocopies of these are to be included in another RMCR.
20. Letter (27/4/1999) from Mary E. White, D.Sc., to JL seeking BaSt photos for a book, '*Water in a Changing Land*', she is writing. See her letter of 20/7/1999 above for response. Note that this book was apparently to contain, inter alia, material (checked by Andy Chapman) about Lake Boonderoo. [Borrow a copy of this book to see content re BaSt and Lake Boonderoo](#).
21. Williams, W.D., De Deckker, P. & Shiel, R.J. (1998). *The limnology of Lake Torrens, an episodic salt lake of central Australia, with particular reference to unique events in 1989*.

- Hydrobiologia 384:101-110. Refer to when writing up water level, salinity, aquatic invertebrate 'sweep samples', BaSt gut contents (diet) and brine shrimp sections of report on Lakes Ballard and Marmion in 1995.
22. Johnstone, R.E. & Storr, G.M. (1998). *Handbook of Western Australian Birds. Volume 1. Non-Passerines (Emu to Dollarbird)*, pp.206-207, Plate 30, Egg Plate 20 (Banded Stilt). Pages re Silver Gull are also reproduced here.
  23. Article (12/3/1998, p.26 in 'Busselton-Margaret Times') headed '*Banded stilt visits tagger*'. Refers to JL sighting a leg-flagged BaSt on Vasse-Wonnerup 'last week'. '... the second such bird to visit Busselton from the 500 stilts that were tagged ... in 1995'.
  24. '*Les Lacs du desert*' [*Western Australia's Desert Lakes*] p.22 in 'Antipode AFA' – News Francais et Australien – No.5 – Dec 1997. Written by JL and focussing on BaSt breeding at Lake Ballard in 1995.
  25. Fax (30/7/1997) from CDTM to JL and JL's faxed (01/8/1997) reply. CDTM writes, inter alia, 'I'm delighted you are picking up the Banded Stilt ball and are going to lead the running on it!'
  26. Several pages by JL 'prepared 22-24/7/97' headed: 'The Following is the Makings of the "Water Depth and Quality Section" of the Final Publication on the 1995 Banded Stilt Work'.
  27. Fax (23/7/1997) from JL to CDTM saying inter alia: 'In order to make some progress with this [write-up of the 1995 BaSt work at Lakes Ballard and Marmion] I have decided to work on the data and write it up section by section ...' 'As I complete draft sections I will send them to you for comment / corrections / input etc.' 'I am currently working on the water level and water quality data from Lake Ballard'. JL then asks CDTM some questions relating to this data.
  28. Letter (undated but probably early 1997) from Sue Palmer, Secretary, Busselton Naturalists Club Inc., thanking JL for his presentation 'last month' (check diary for date) re the BaSt breeding at Lakes Ballard and Marmion in 1995.
  29. Rogers, D.I.R. & Eades, D.W (1997). *Belly-Soaking and Egg-Cooling behaviour in a Red-capped Plover Charadrius ruficapillus*. Stilt 30: 53-54. Relevant to JL *et al.* observations of nesting BaSt dunking their breast-abdomen feathers into the water on 15/3/1995 at main breeding colony on Lake Ballard.
  30. Article headed '*Stilts a stunning sight on lake*' on front page of 'Great Southern Herald (26/2/1997). Refers to 15-20,000 BaSt sighted on Lake Dumbleyung by ACI and relates to banding & flagging done at Lakes Ballard & Marmion in 1995.
  31. Various copies of text of '*Leg-Flagged Banded Stilts*' article by JL apparently published in 'WA Bird Notes' in December 1996 (sent to editor on 23/10/1996). Check other RMCR's or WA Bird Notes for the published article.
  32. Fax (23/10/1996) from JL to Verna Costello, CALM Corporate Relations, with material '... that could be used as basis for article in "Bush Telegraph". Primarily aimed at asking people to report any sightings oh leg-flagged BaSt. See leg-flag sightings RMCR.
  33. A copy of Lane, J. (1995) *Leg-flagged Banded Stilts*. WA Bird Notes No.74, p.19 (June 1995 issue), under the heading 'STOP PRESS', that JL had intended sending to Verna Costello (see 23/10/1996, above) but did not send, for the reason given in an annotation by him.
  34. Fax (14/10/1996) from CDTM to JL referring to two overhead projections sent to him by JL for use in New Zealand 'later this week'. Also refers to 'sheets of data' JL referred to during his presentation at the SHOC conference in Albany earlier in the month (see below) and slides (photos).

35. Part of the Program and Abstracts of the 'Southern Hemisphere Ornithological Conference' (SHOC) in Albany, WA, 05-09/10/1996. Relevant abstract is: '*Banded Stilt breeding at Lake Ballard, Western Australia*' by J. Lane, G. Pearson, & C. Minton, presented by JL on 07/10/1996.
36. Some additional materials gathered / prepared by JL when preparing the 'overheads' referred to below, i.e. for the '*Banded Stilt breeding at Lake Ballard, Western Australia*' presentation by J. Lane, G. Pearson, & C. Minton (presented by JL) at SHOC, Albany, on 07/10/1996.
37. Copies of the 'overheads' used by JL (in combination with list of slides below) to deliver the '*Banded Stilt breeding at Lake Ballard, Western Australia*' presentation by J. Lane, G. Pearson, & C. Minton (presented by JL) at SHOC, Albany, on 07/10/1996. The numbers in the top corners of these overheads indicate the order of presentation.
38. List of the slides (35mm colour photos) used by JL when presenting Banded Stilt talk to RAOU (now Birdlife Australia) WA Group in Perth on 23<sup>rd</sup> Sept 1996 and the '*Banded Stilt breeding at Lake Ballard, Western Australia*' presentation (see above) at Southern Hemisphere Ornithological Conference' (SHOC) in Albany, WA, on 07/10/1996. **Add the unique photo storage number (JL's) to each of the slides in this list.**
39. Fax (17/9/1996) from CDTM to JL and JL's reply fax (19/9/1996) in which CDTM enquires about progress with paper for SHOC (see above) and JL says he won't be able to do until 'week after next'. JL refers to slides (photos) sent to him by Mark Lamble for SHOC and asks if CDTM could bring some as they are 'more stunning than either mine or Mark's'. **Keep in mind that** CDTM has high quality photos that he took on Lake Ballard in 1995 and JL doesn't have (as at 27/4/2104) copies of these. See articles published in Wingspan in 1995 for a small sample of CDTM's slides.
40. Fax (05/8/1996) from JL to GBP with copy of Abstract for SHOC (see above). Inter alia JL comments that: 'I will be giving an expanded version at RAOU in Sept [1996]'.
41. Fax (05/8/1996) from JL to Promalco Conventions with copy of 'Spoken Paper Final Abstract' of '*Banded Stilt breeding at Lake Ballard, Western Australia*' presentation for SHOC (see above).
42. Fax (05/8/1996) from JL to CDTM with copy of 'draft abstract' for SHOC (see above). Inter alia JL comments asks: 'Any changes desired?'
43. Letter (13/6/1996) from Prof Brian Collins, Chair, Organising Committee, SHOC, to JL and other presenters with information regarding preparation / presentation of Abstracts and Presentations at SHOC in Oct 1996 (see above).
44. Broadcast fax (07/5/1996) advising of seminar '*Banded Stilt breeding in the Goldfields*' to be presented by JL at the CALM 'Wildlife Research Centre' (Woodvale) on 17 May 1996. A final draft by JL for this Notice is also here.
45. Article '*Leg Flagged Banded Stilts*' published (p.18) in WA Bird Notes No.77 (March 1966). This was authored by JL, though this was not indicated, probably because JL wanted all sightings to be reported to GBP, whose name and contact details are indicated.
46. Letter (08/3/1996) from Jeremy Talbot of RAOU WA Group confirming agreement to change date of presentation by JL from 22/4/1996 to 23/9/1996.
47. Fax (09/1/1996) from CDTM to JL and JL's faxed (17/1/1996) reply. JL writes, inter alia: 'Have made no further progress with the Stilt project but plan to do so for a presentation I have to give in April [probably a reference to proposed 22/4/1996 talk to RAOU WA Group, later changed to 23/9/1996, see above]'.
48. A copy of: Minton, C., Lane, J. & Pearson, G. (1995). *Update on Banded Stilt breeding event*. 'Wingspan' 5(3):9 (Sept 1995 issue) and cover of this issue. Includes great photos by CDTM of BaSt chick 'taking a first drink at the water's edge', single parent BaSt

leading brood of chicks from colony to water and ‘newly-hatched chick, still wet, ... [under] ... incubating adult’.

49. A copy of: McKenzie, M. (1995). *Disappearing stilts*. p.4 in Sept 1995 issue of ‘WA Bird Notes’. About BaSt numbers at ‘Cargill salt works, Port Hedland’.
50. Fax (23/8/1995) from JL to GBP in which he refers to data on BaSt numbers at localities in WA, as presented in: Watkins (1993). *A National Plan for Shorebird Conservation in Australia*.
51. Fax (15/8/1995) from CDTM to JL in which he writes, inter alia, that he will fit the BaSt presentation proposed by JL into the program for SHOC (see above); encloses ‘a copy of a short note I put in ‘Tattler’ – the AWSG Newsletter. It is a brief version of what is about to appear in Wingspan’ [add copy here and link to article in Wingspan], and ‘I viewed all the ABC Banded Stilt footage with Mark [Lamble] and Jeremy [Hogarth] the other night. It’s very good. They will do us a copy some time’.
52. Correspondence (03-09/8/1995) between Prof Brian Collins (Chair, Organising Cttee, SHOC), A/Prof Ron Wooller (Murdoch Uni), JL and CDTM concerning fitting the paper proposed by JL on the 1995 BaSt work at Lake Ballard into the program of the SHOC conference to be held at Albany, WA, in Oct 1996 (see above).
53. Fax (29/7/1995) from CDTM to JL in which he writes, inter alia: ‘... we have successfully provoked action on the Lake Torrens paper [presumably the paper referred to at 27/6/1995 below] & that a full draft will be available shortly. We need to get cracking ourselves. We need to discuss who does what – in about a week’s time’. Double-check whether this proposed paper was published. It doesn’t seem so (as at 03/5/2014).
54. A copy of the CALM Science Division approvals (24/7 & 05/5/1995) for JL and GBP to publish, with CDTM, ‘*History in the mating*’ in Wingspan (published in June 1995 issue, see below).
55. A copy of: Minton, C., Lane, J. & Pearson, G. (1995). *Banded Stilts complete the job*. The Tattler No.4, p.3 (July 1995 issue).
56. Faxes (18/7/1995) from JL to Phil Straw (RAOU Sydney) and Kate Gorringer-Smith (RAOU Melbourne) with a ‘typed version with amendments ... as discussed’ of ‘Follow-Up Note for Wingspan and Tattler, as written by C.M [CDTM] with a few amendments by J.L (18/7/95) - “*Banded Stilts Complete the Job*” or “*Banded Stilts Did It!!*”’.
57. Copy of note from GBP to JL with an annotation by JL that indicates that on 17/7/1995 JL told Jeremy Talbot (of RAOU WA Group) that he would be able to give a talk to the WA Group about the 1995 BaSt work on 22/4/1996. Note that this date was later changed to 23/9/1996, see above.
58. Fax (14/7/1995) from CDTM to JL in which he writes, inter alia: ‘I attach the text of a follow up note for Wingspan. Could you please arrange the necessary [CALM?] approval?’ and ‘I’ve sent her [‘Kate Gorringer-Smith, the editor, at RAOU HQ’] 12 more slides & captions & this should make it more interesting’ and ‘I’ve sent an identical text to ‘The Tattler’ ... Attached was CDTM’s hand-written draft of “*Banded Stilts Complete the Job*” or ‘*Banded Stilts Did It!!*’, authored by CDTM, JL & GBP. See above for typed version, with some amendments.
59. Faxes (13/7/1995) between JL and CDTM in which JL proposes they present a paper on the 1995 BaSt work at the Oct 1996 SHOC in Albany, WA. CDTM is enthusiastic and indicates he will endeavour to fit the proposed paper into the SHOC program.
60. Fax (07/7/1995) from JL to CDTM concerning publication of the Lake Torrens (SA) BaSt breeding data (of Keith Bellchambers & Carpenter, see 27/6/1995 below) and the BaSt data collected in 1995 by JL, CDTM *et al.* in the eastern goldfields of WA. JL agrees that ‘as discussed’ the two data sets be published separately, in ‘Emu’, that the two papers be

complimentary, and that drafts be exchanged, with JL & CDTM as senior authors of the WA drafts.

61. Letter (04/7/1995) from Jeremy Talbot (RAOU WA Group) to JL seeking a speaker to talk on the 1995 BaSt work in the eastern goldfields at a meeting of the group some time in 1996.
62. Exchange of faxes (01-04/7/1995) between JL & CDTM referring to issues concerning their recently published article '*History in the mating*' in Wingspan (June 1995 issue) on BaSt breeding on Lake Ballard in 1995.
63. Fax (27/6/1995) from CDTM to JL & GBP in which he writes, inter alia: 'I enclose ... a copy of the draft [Keith] Bellchambers / [Graham] Carpenter paper on the 1989 Lake Torrens Banded Stilt breeding, together with associated correspondence. Do you agree with what I proposed to Keith?' Actually there were several enclosures concerning this draft paper, as follows:
  - Copy of a letter of 12/6/1995 (mistakenly dated 1996) from CDTM to Keith Bellchambers thanking him for his letter and 'copy of the original draft of your Banded Stilt paper'. In this letter CDTM agrees with KB and David Paton (SA Uni) that the SA and 1995 WA data must be published and there should be 'maximum liaison and cooperation'; that ideally the works would be published simultaneously in 'Emu'; that CDTM envisages the final version of the WA paper going to 'Emu' by December; that 'drafts would be available for you to see & refer to as they emerge'; that if Graham Carpenter can't run with it then KB should; that CDTM will consult with JL & GBP 'to ensure they concur ...', and 'I will then perhaps give David Paton a call, as you suggest'.
  - Copy of a letter of [05]/6/1995 from Keith Bellchambers to CDTM with a 'copy of the draft paper of Lake Torrens Banded Stilt'. This letter indicates, inter alia, that DP thinks it would be good to coordinate the publication of the SA and WA work; that 'You mob got far more biological data than us but we had data on wildlife management issues e.g. predation'; that the draft paper is old, and that 'if you give David a call you might get access to even more data'.
  - A copy of the draft paper (13pp) headed 'Banded Stilt Breeding at Lake Torrens, South Australia, in 1989'. The authorship is not indicated but seems likely (from the above) to include K. Bellchambers, G. Carpenter and possibly D. Paton. Regarding this paper, see 29/7/1995 above. It appears from Table 1 of Collard *et al.* (2013) (a list of 'Recorded Banded Stilt breeding events, 1904-2010' including References for each) that this draft paper was not published (as at Oct 2013).
64. A copy of: Minton, C., Pearson, G. & Lane, J. (1995). *History in the mating*. Wingspan 5(2):13-15. (June 1995 issue). Note that it contains photos of BaSt on the colony, the BaSt colony from the air, BaSt attempting to copulate, brooding BaSt 'with little breeding plumage', BaSt nests with eggs, and JL, GBP & MR marking nesting quadrats with coloured tape, all taken by CDTM on 15/3/1995, that JL does not (as at 30/4/2014) have copies of.
65. A copy of Lane, J. (1995) *Leg-flagged Banded Stilts*. WA Bird Notes No.74, p.19 (June 1995 issue), under the heading 'STOP PRESS'. See below for hand-written draft, which was slightly edited by WABN before printing.
66. Fax (30/5/1995) from JL to CDTM with a hand-written copy of the article: Lane, J. (1995) *Leg-flagged Banded Stilts*, that JL faxed to John Blyth (Editor of WABN) on 16/5/1995 for printing in the June 1995 issue of WA Bird Notes (see above).
67. Fax (16/5/1995) from JL to John Blyth (Editor of WABN) with a hand-written copy of the article: Lane, J. (1995) *Leg-flagged Banded Stilts*, for printing in the June 1995 issue of WA Bird Notes (see above).

68. Copy of: Minton, C., Pearson, G. & Lane, J. (1995). *Banded Stilts quick off the mark*. The Tattler, No.3, p.3 (April 1995 issue).
69. Fax (20/3/1995) from JL to CALM Library requesting a copy of: Bellchambers, K. & Carpenter, G. (1992). *Sudden life on Stilt Island*. Natural History 4:42-48. The title of the article was not known to JL at the time of composing this fax. A copy (see below) of this 1992 article was obtained by JL on 01/5/2014.
70. Fax (20/3/1995) from JL (at CALM Busselton) to Raelene [Hick] (at CALM Woodvale) with corrections (typos) to her typescript of the 'Banded Stilt Research Programme – Lake Ballard, March/April 1995' that CDTM had hand-drafted (see 14/03/1995 below). Inter alia, CDTM refers to a number of publications including: 'There are estimated to be 250,000 Banded Stilts in Australia (Watkins 199..)' and 'Breeding has only been recorded about 20 times (Higgins 1994 [or 1993, see hand-written draft – This seems to be a reference to the relevant volume of HANZAB])'.  
Regarding publication, CDTM wrote: 'Results should be published in both the scientific literature (e.g. Emu), and in more widely circulated 'popular' journals. If the ABC [Australian Broadcasting Commission] decides to make a half hour documentary then this will provide further dissemination of the information gained of this spectacular Banded Stilt breeding phenomenon'.  
This typescript does not appear to have been developed further by JL or CDTM.
71. Extract (15/3/1995) from JL's field notebook that reads 'Lake Torrens account was in ANH [Australian Natural History?], American Natural History magazine (Natural History Bulletin) also in Birds International'. This would have been based on advice from CDTM to JL. Obtain copies of each of these.
72. Extract from a fax (14/03/1995) from CDTM to JL with his (CDTM's) draft manuscript headed 'Banded Stilt Research Programme – Lake Ballard, March/April 1995'. See 20/3/1995 above for typed copy of this manuscript.
73. A copy of an entry in the 'ERRATA' section of WA Bird Notes No.71, p.3, (Sept 1994 issue) that reads 'Banded Stilt – 15000 (incorrectly 1500 in WABN 70), April 94, Cargills Salt Works, Port Hedland (Port Hedland) – AWSG'.
74. A copy of an entry in the 'Observations' section of WA Bird Notes No.70, p.2, (June 1994 issue) that reads 'Banded Stilt – 1500, 4/94, Cargills Salt Works, Port Hedland (Port Hedland) – AWSG'. Importantly, '1500' was corrected to 15000' in the next (Sept 1994) issue of WABN (see above).
75. Marchant, S. & Higgins P.J. (1993). *Handbook of Australian, New Zealand & Antarctic Birds, Volume 2 Raptors to Lapwings*. Melbourne, Oxford University Press. (pp.780-790, Plate 59 – Banded Stilt).
76. A copy of: Bellchambers, K. & Carpenter, G. (1992). *Sudden life on Stilt Island*. Natural History 4:42-48.
77. A copy of: Bellchambers, K. & Carpenter, G. (1990). *Birds recorded at Lake Torrens during its 1989 flooding*. South Australian Ornithologist 31:1-6.
78. Extracts concerning BaSt from: Storr, G.M. (1986). *Birds of the South-eastern Interior of Western Australia*. Records of the Western Australian Museum, Supplement No.26.
79. A copy of: Burbidge, A.A. & Fuller, P.J. (1982). *Banded Stilt breeding at Lake Barlee, Western Australia*. Emu 82:212-216.
80. A copy of: Young, C. (1981). *Abandoned breeding colony of Banded Stilt discovered in W.A. Goldfields*. Swans [S.W.A.N.S.] 11(2):3-5.
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On 07/5/2014, JL spent 1-2 of hours searching online through all issues of 'Tattler' (not its predecessor 'The Tattler', which doesn't seem to be available online) from Edition 1 (January 2006) to Edition 32 (April 2014) for all papers / articles concerning BaSt that could be useful in writing up the 1995 work at Lakes Ballard and Marmion. JL then printed them (those not already in this or other BaSt RMCR's) and they are inserted here.

- Standen, R. (Feb 2014). Hello from the AWSG leg flag sighting database operator. Tattler No.31, p11. Includes a 'Call for flag sightings not yet submitted'.
- Pedler, R. (Oct 2013). *Banded Stilt banding update – Please keep an eye out.* Tattler, No.30, p.14.
- Minton, C. (July 2013). *Use of AWSG and VWSG recoveries and flag-sighting data.* Tattler No.29, p.11.
- Christie, M. (July 2013). *Banded Stilt breeding event.* Tattler No.29, p.13.
- Christie, M. (Aug 2012). *Banded Stilt update, July 2012.* Tattler No.25, p.7.
- Gibbs, H. (Aug 2011). *Concerns about leg-flagging of waders.* Tattler N0.22, pp.10-11.
- Gosbell, K., Christie, M., Stewart, I. & Hollands, D. (July 2010). *Lake Torrens turns on an exciting breeding event.* Tattler No.18, pp.10-11.
- Minton, C. (July 2009). *PVC sheet for flags / colour bands.* Tattler No.14, p.7.
- Christie, M. (Apr 2008). *More on Banded Stilts.* Tattler No.9, p.5.
- Gosbell, K. (Jan 2006). *Mysterious Banded Stilt breeding event.* Tattler No. ... p.7.

Obtain and search 'The Tattler' (the pre-2006 series) for articles not already in this RMCR relating to Banded Stilt breeding. In particular, obtain 'The Tattler' 19:6-7 and 20:5.



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### Editorial

People are connected to birds for many different reasons and in many different ways. For some it is a sublimation of the hunting instinct - to hunt and collect through binoculars, telescopes and cameras; for others it is the desire to study, understand, and perhaps control or at least arrest the ongoing population declines; to have the satisfaction of counting and searching for flags; to rejoice in the sheer beauty of the birds and their landscapes; to marvel at the feats of endurance that are undertaken annually; to wonder about the mechanics of flight .... All these aspects of human-bird interaction and influence are covered in some way in the articles in this edition of *Tattler*.

Although Australian government funding for shorebird programs has faded, BirdLife Australia will continue to support well-established projects like Shorebirds 2020 and Beach-nesting Birds. WWF-Hong Kong will continue to prepare a conservation plan for shorebirds and advocate for its implementation. Hopefully the politicians will become involved.

## 9th Australasian Shorebird Conference 20-21 September 2014

The 9th Australasian Shorebird Conference will be held in Darwin on Saturday 20th and Sunday 21st September 2014. The conference will be hosted by the Research Institute for the Environment and Livelihoods at Charles Darwin University's Casuarina campus. We encourage you to submit symposia proposals and abstracts on key issues concerning shorebirds along the East Asian-Australasian Flyway. We hope you will join us.

Conference Deadlines:

**15 March 2014 Symposia submission deadline – closing soon!**

**30 April 2014 Abstract submission deadline**

1 July 2014 Early registration deadline

Contact: [Amanda Lilleyman](mailto:Amanda.Lilleyman@cdu.edu.au)

PhD Student Charles Darwin University T. +61 8 8946 6470 | M. +61 458 226 908

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*Tattler* is the quarterly newsletter of the Australasian Wader Studies Group. Contributions are welcome and encouraged from all working with shorebirds and their habitats along the East Asian - Australasian Flyway.

Please contact the editor for more information.

Compiled and published by the Australasian Wader Studies Group

[www.aws.org.au](http://www.aws.org.au)

## **Why are migratory shorebirds declining so rapidly and what should we do?**

Sumatra and Alaska over the past four years to discuss the conservation actions required to keep one of the world's largest and most threatened migratory bird flyways functioning. The Partnership is a dynamic collaboration among 14 governments across the region, together with three intergovernmental agencies, nine international NGOs and an international corporation (Rio Tinto). Prospective PhD student Eduardo Gallo-Cajiao will soon commence an internship with the Flyway Partnership to better understand the policy environment across the routes that our migratory shorebirds take to establish how best to achieve positive change.

Ultimately, without data from you, the foot soldiers of field ornithology, we would be unable to understand what is happening to our shorebirds, and unable to present compelling data to decision makers that something needs to be done. For your hard work in counting shorebirds, keep it up, and THANK YOU!

To keep up to date with our work, or download any of our papers, visit our website at <http://www.fullerlab.org> or follow us at <http://www.facebook.com/fullerlab>

**Richard Fuller**  
University of Queensland

## **Hello from the AWSG leg flag sighting database operator**

### **Unresolved flag sighting**

Occasionally there are flag sightings that despite many email conversations across the flyway, I cannot get resolved.

One recent example of this was a Curlew Sandpiper seen at the Coorong in South Australia. The observers described the sighting as "...black over yellow (the yellow looked stained), over orange on the upper right leg (black was cut to point). Lower left leg had silver band."

I clarified whether these were all flags or some bands and the response came back that there were three flags and the metal band.

No-where that we know of has used this colour combination, but there must be someone out there who has done something like this and the reason I am chasing this one is that clipping the black flag is unusual and hope that someone can identify where this may have come from.

If you clip any flags, please use your imagination in case the black was originally blue or green or the orange /yellow was stained white or something else. I'd love to hear if we can sort this one out.

### **Call for flag sightings not yet submitted**

While on the subject of flag sightings, after a year of learning about the AWSG database and catching up on a backlog of missed sightings, I am now in a position to chase any more missed sightings. So please dig through your sightings of marked waders and send them in to me if you haven't received a notification back from the AWSG about your sightings. This particularly applies to Australian flagged birds seen overseas or overseas/interstate birds seen in Australia.

When I receive overseas sightings of overseas flagged birds, not all these sightings get a formal response from the ASWG as I often send the details direct to the bander and ask them to contact the person who has sent the sighting in (particularly when engraved flags are involved as it saves double handling the information). Other times it is easier for me to process the sighting and automatically notify the bander and sighter together.

Regular contributors of sightings will soon receive an email from me seeking any sightings that haven't been submitted.

### **Rog Standen**

Operator of the leg flag sighting database on behalf of the AWSG

Please notify AWSG of flag sightings through the AWSG website <http://www.awsg.org.au/reportform.php> if possible, or Email: [flagging@aws.org.au](mailto:flagging@aws.org.au)



Bar-tailed Godwit with notched orange flag - originally caught and banded with orange over green flags in the Hunter Estuary in November 2004 - it has since lost the green flag.

# Tattler



## Newsletter for the Asia Pacific Flyways

Editor: Liz Crawford Email: [tattler@awsg.org.au](mailto:tattler@awsg.org.au) No. 30 October 2013

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### Editorial

Southward migration is in full swing and those who monitor flagged shorebirds wait hopefully for their 'regulars' to reappear after this year's breeding event in the northern hemisphere. Articles in this Newsletter emphasise that all the links in the migration chain need protection - from the wetlands near Port Fairy, Victoria frequented by Latham's Snipe to the mudflats and salt pans of Bohai Bay, China used by thousands of knots on migration, and further north to the tundra breeding grounds where oil and gas exploration is underway. Research focuses attention on critical staging sites, such as Delaware Bay in the US, and provides sound argument for changing human behaviour to help protect shorebird species. It's a desperate situation when a species declines by 75% since the 1980s and is only now being proposed for protection! There's cause for celebration in the recent Banded Stilt breeding event - it will be interesting to see where the blue-flagged chicks turn up.



*Tattler* is the quarterly newsletter of the Australasian Wader Studies Group. Contributions are welcome and encouraged from all working with shorebirds and their habitats along the East Asian - Australasian Flyway. Please contact the editor for more information.

Banded Stilts at Lake Victoria, Point Lonsdale, Victoria taken early this year by Stewart Monckton.

Compiled and published by the Australasian Wader Studies Group  
[www.awsg.org.au](http://www.awsg.org.au)

A special interest group of BirdLife Australia



### ***Banded Stilt banding update - Please keep an eye out***

In recent weeks several thousand Banded Stilt chicks have dispersed from Lake Torrens South Australia and are turning up at a range of southern sites. Chicks from this breeding event were banded in July 2013. Thanks to the efforts of the Victorian Wader Studies Group and a team of other local volunteers, 947 of them are sporting blue leg flags on their upper left leg!

Small groups of these juvenile stilts have been seen at Port Augusta and between Snowtown and Redhill in mid north of South Australia. In each of these flocks up to 10% of the chicks have been wearing blue flags and nearly half of these are engraved with individual numbers/letters, making it well worth the effort of stopping to scan through a group of stilts with the telescope. Blue-flagged Banded Stilts have also been sighted in the Coorong, South Australia, on 6 October 2013.

I am really interested in any sightings you may have. By getting an idea of the proportion of flagged juveniles in dispersing flocks we can estimate the fledging success from this breeding event as well as document the dispersal patterns of the flocks and movements of individual stilts with unique numbered flags. Please report your sightings to [reece.pedler@deakin.edu.au](mailto:reece.pedler@deakin.edu.au)

Many thanks, **Reece Pedler**  
PhD Candidate  
Deakin University  
Centre for Integrative Ecology, School of Life and Environmental Sciences

Note: Alastair Wood, a member of one of the blue-flag banding teams, has written an interesting account of the banding effort, available on:

<http://www.theglobaldispatches.com/articles/the-banded-stilt-project>



**Figure 1.** Dispersing juvenile Banded Stilts at Price Salt Fields, South Australia 23 September 2013.



**Figure 2.** Some Banded Stilt chicks at the time of banding on Lake Torrens, during July/August 2013



**Figure 3.** Banded Stilt chick with engraved leg flag

### ***Victorian oystercatcher re-caught after 25 years***

Catching oystercatchers is never an easy task, even when they walk right into the catching area, as happened on 12 August 2013 as the Victorian Wader Studies Group attempted to catch oystercatchers on Point Smythe at the entrance to Andersons Inlet, in Cape Liptrap Coastal Park.

A flock of 23 Sooty and 2 Pied Oystercatchers arrived on the point after being twinkled off one of the sand bars in Andersons Inlet. The two Pies, who were the local resident pair, took exception to the Sooties crowding up their point

and began to harass the Sooties. This had the effect of herding most of the Sooties into the catching area.

Disappointingly, only three Sooty Oystercatchers and one Pied Oystercatcher were caught. The Pied Oystercatcher was a re-catch, having been originally caught in May 1988 at Inverloch as a 3+ adult, making it at least 28¼ years old, and one of the oldest Pied Oystercatcher on record in Australia. Its old coloured rings were replaced with a flashy new blue flag engraved A4.

**Jonathon Stevenson**



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### Editorial

At this time of year, millions of shorebirds are sitting on eggs or guarding chicks in the vast reaches of the Arctic tundra, having staged successfully on those critically important mudflats and salt pans around the Yellow Sea. As various articles in this edition emphasize, the inexorable destruction of intertidal mudflats around the Yellow Sea continues, seemingly unabated. Tentative diplomacy appears helpless in the face of continuing economic growth and development. However, there is hope. Read the story of Tina Lin (page 18), a 12-year-old schoolgirl from Fujian province in South East China. Tina has become a passionate advocate for shorebirds after attending an environmental education training workshop with her mother, a teacher. The workshop, organised by the Fujian Birdwatching Society, assisted by RSPB's International Education Manager, was aimed at birdwatchers but 35 local teachers and educators also attended. From this small beginning a strong force for conservation is emerging within China. Let's hope her voice is heard.

### Egg Thief Caught on Camera

After flying 10,000km to their northern breeding ground on the beautiful Arctic tundra of Chukotka Peninsula, northeast Siberia, a Red Knot couple suffered predation of their first clutch. The thief was captured by an automatic nest camera installed by Pavel Tomkovich in his study area.

Also present in the area is a breeding adult Red Knot with a lime flag (Chukotka) and two metal bands. This bird was banded here as a chick in July 2004 and given a lime flag and a metal band. In June 2005 the bird was caught in Corner Inlet, Victoria and given an extra metal band.



*Tattler* is the quarterly newsletter of the Australasian Wader Studies Group. Contributions are welcome and encouraged from all working with shorebirds and their habitats along the East Asian - Australasian Flyway.

Please contact the editor for more information.

Compiled and published by the Australasian Wader Studies Group

[www.aws.org.au](http://www.aws.org.au)

A special interest group of BirdLife Australia



## Sea Level Rise and Migration Bottlenecks

Migratory shorebird populations are at greater risk from rising sea levels than previously realized, according to researchers in the East Asian–Australasian Flyway (EAAF) (Iwamura *et al.* 2013). Sea-level rise (SLR) will greatly alter littoral ecosystems, causing habitat change and loss for coastal species. Although loss of habitat directly impacts on species, there is a magnifying effect when the habitat lost is critical to a large proportion of the species, as in the case of stopover sites for migratory shorebirds.

Using a mathematical technique that models the flow of water through a pipeline, scientists have developed an innovative method to measure the effect of habitat loss on shorebird populations. The study focuses on ten species that migrate annually between breeding areas in the Russian and Alaskan arctic regions and non-breeding areas in Southeast Asia and Australasia. The species include: two sub-species of Bar-tailed Godwit (*Limosa lapponica baueri* and *Limosa lapponica menzbieri*), Curlew Sandpiper (*Calidris ferruginea*), Eastern Curlew (*Numenius madagascariensis*), Great Knot (*Calidris tenuirostris*), Grey-tailed Tattler (*Tringa brevipes*), Lesser Sand Plover (*Charadrius mongolus mongolus* and *Charadrius mongolus stegmanni* combined), two sub-species of Red Knot (*Calidris canutus rogersi* and *Calidris canutus piersmai*) and Terek Sandpiper (*Xenus cinereus*).

They show that reductions in population flow far exceed the proportion of habitat lost for these 10 long-distance migrant shorebirds using the EAAF. They estimate that SLR will inundate 23–40% of intertidal habitat area along their migration routes, but cause a reduction in population flow of up to 72 per cent across the taxa. This magnifying effect was particularly strong for taxa whose migration routes contain bottlenecks—sites through which a large fraction of the population travels. They develop the *bottleneck index*, a new network metric that positively correlates with the predicted impacts of habitat loss on overall population flow.

Sites such as Bohai Bay in the Yellow Sea mark some of the biggest bottlenecks in the EAAF and need to be conserved immediately. International cooperation along the EAAF is crucial if we are to succeed in conserving shorebirds.

### Reference

Iwamura, T., Possingham, H.P., Chadès, I., Minton, C., Murray, N.J., Rogers, D.I., Treml, E.A. and Fuller, R.A. (2013). Migratory connectivity magnifies the consequences of habitat loss from sea-level rise for shorebird populations. *Proc R Soc B* **280**: 20130325.

An interesting review of this paper is at <http://news.mongabay.com/2013/0619-smith-seabirds.html#fmcyEZcBdXJEDfui.99>

## Use of AWSG and VWSG recoveries and flag-sighting data

This note was triggered by the recent publication of the paper above by the University of Queensland team who are looking at the consequences for shorebirds in our Flyway of habitat loss due to sea level rise (and also, separately, from reclamation). The principal conclusion was that the effects of habitat loss are significantly magnified for many species because they preferentially use those areas of shoreline which will be most affected by changes from these causes.

Examination of the recoveries and flag-sighting data generated by AWSG and VWSG banding provided the basis for determining the principal areas of shoreline in the Flyway used by each species. This data was examined and “brainstormed” by a knowledgeable group at a meeting at the BirdLife Australia HQ a couple of years ago. Outline maps of both northward and southward migration were constructed for each species with estimated proportions of the population using each stopover location. This was based on a rough quantitative examination of the volume of leg-flag sightings and recoveries at each place.

In all our conservation actions we need to be aware that in most species the adverse effects of habitat loss are generally magnified in relation to the actual amount of habitat loss. A simple example to illustrate this would be the Red Knot. With some 60% of the population using Bohai Bay as a stopover on northward migration more than half of the total Red Knot population in the Flyway will be affected by the changes taking place to the shoreline in that area, which in itself is only a tiny fraction of the total shoreline in the Flyway.

AWSG and VWSG members will be particularly interested to see the way in which their data has been utilised for conservation purposes – EVERY flag-sighting and recovery counted. It is the quantitative data we are obtaining for flag sightings which is now the most important element of our on-going flagging programme (which has already given us a good outline of the migration route/main stopovers of most of our regularly banded species).

**Clive Minton**

## **Banded Stilt Breeding Event**

On the 1st of June 2013, the Northern Flinders Ranges and areas between Woomera and Andamooka in northern South Australia (SA) received ~50 mm of welcome winter rain following over 12 months of extremely dry conditions. After two small follow-up rains totalling nearly 20 mm in the fortnight following, Roxby Downs resident Reece Pedler checked the online satellite image to find some small 'puddles' of water on nearby Lake Torrens. He organised a charter flight, mainly to confirm his theory that Banded Stilts needed almost double this amount of rain to give a bare minimum of water coverage in the lake for breeding. From the air a few hundred Banded Stilt were detected standing around a small island not far from where they'd bred in 2011 and hundreds more were scattered across shallow sheets of water in the massive salt lake. He thought, "surely they can't be nesting, there is hardly any water here!" None-the-less, being well aware of just how canny Banded Stilt are, Reece cancelled all his other plans and headed for Lake Torrens the next day. He arrived to discover not just a few hundred, but several thousand stilt on a neighbouring island and first eggs already laid!

And so Reece embarked on an intense period of field work – which has resulted in the colony being closely monitored not only for research, but also for control of predators (namely Silver Gulls, through the SA Environment Department's permits and protocols). The colony, estimated at ~8,000 nests is due to begin hatching in the

second week of July and so flightless chicks will be at banding age by late July.

Already Reece and his father Lynn Pedler have managed some wonderful flag sightings – perhaps the most exciting being of two individuals sporting plain orange flags – one positively identified as being a juvenile from a wonderful catch at Werribee (Victoria) in December 2000 of 151 Banded Stilt (89 juveniles), 40 Avocets (13 juveniles) and some stints! I am sure anyone involved with Banded Stilt will remember the trauma of the 2000 breeding event at Lake Eyre when predation by Silver Gulls caused the failure of two breeding attempts. After human intervention a third attempt successfully produced about 50,000 young, and a fourth attempt failed when the water ran out. And now, 13 years later, at least one of these chicks is sitting on 3 eggs at Lake Torrens, only a couple of hundred kilometres from where it hatched.

But for those of us involved with the banding at the very end of the breeding event in 2010, nothing compares to this spreadsheet entry: *1.7.2013, Lake Torrens breeding colony, left leg – plain square orange/plain square yellow, full breast band 100% – incubating 3 eggs*. We only flagged 54 chicks in 2010 and all present were concerned whether or not these 'tail-enders' would make it through to adult hood.

**Maureen Christie,  
Friends of Shorebirds, SE Australia**

## **Spoon-billed Sandpiper Habitat Protection at Key Sites**

World Wetland Day in February 2012 and again in 2013 was dedicated to the Ramsar designation of the Gulf of Mottama in **Myanmar**, demonstrating a strong Government commitment. Considerable progress has been made. The national partner of the Spoon-billed Sandpiper Task Force, BANCA (Biodiversity and Nature Conservation Association), together with BirdLife, Ramsar Network Japan/Wild Bird Society of Japan (RNJ/WBSJ) and the Royal Society for Bird Protection, have pushed for the designation and it is hoped that the coastal area around Nan Thar Island will also be included in the next batch of designated areas. The benthos-shorebird survey in the Gulf of Mottama that has been carried out jointly by BANCA and RNJ/WBSJ is expected to contribute important data on the ecosystem of the site by the time of designation.

Surveys in October illustrated the huge importance of the Rudong mudflats in **China**

for stop over and moulting and the imminent threat of habitat loss. Almost all other Spoon-billed Sandpiper sites in China, including those officially protected (e.g. Min Jiang), are also threatened. In addition trapping and poisoning were identified as widespread and common threats. BirdLife China Programme supported an awareness and education campaign working with local people and schools. It is inspiring to see the many different levels of Chinese society becoming engaged in shorebird conservation. This included national and local government as well as small businesses and the wider public with an increasing number of small campaign groups.

A BirdLife International partner, the Hong Kong Bird Watching Society (HKBWS) has conducted Spoon-billed Sandpiper surveys in southern China (Fujian, Guangdong, Guangxi and Hainan) and identified two new sites in western Guangdong

# Tattler



## Newsletter for the Asia Pacific Flyways

Editor: Liz Crawford Email: [tattler@awsg.org.au](mailto:tattler@awsg.org.au) No. 25 August 2012

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### Editorial

Included in this issue are articles about the African - Eurasian Flyway and the American Atlantic Flyway, as well as articles about northward migration on the East Asian - Australasian Flyway (EAAF). It is heartening to read about progress in conservation of critical stop-over sites such as the Wadden Sea in the African - Eurasian Flyway, but disheartening to read about on-going reclamation of tidal flats at Bohai Bay, a critical stop-over site in the Yellow Sea on the EAAF.

However, there is an international push to assist shorebird and waterbird conservation along the EAAF: this year the high profile British Birdwatching Fair is raising funds to support BirdLife International's conservation programs in the EAAF. Additional support will be provided by the Rio Tinto-BirdLife Programme. One of the awareness-raising activities will be *Welcome to the Birds*, an annual Flyway-wide festival to be held in October, timed to coincide with southward migration.

Finally, the provisional program for the AWSG Conference to whet your appetite and encourage you to register for this exciting and informative conference in Adelaide.

*Tattler* is the quarterly newsletter of the Australasian Wader Studies Group. Contributions are welcome and encouraged for all working with shorebirds and their habitats along the East Asian - Australasian Flyway.

Please contact the editor for more information.



Great Knot in flight Photo: Adrian Boyle

**Compiled and published by the Australasian Wader Studies Group**

A Special Interest Group of Birds Australia

[www.awsg.org.au](http://www.awsg.org.au)

## **Bohai Bay Update cont.**



Red Knots roosting in the salt pans at Nanpu Photo: Adrian Boyle

quickly and radically the coastline can be changed. In previous years we have recorded thousands of birds and many flags on the Zuidong mudflats, but over just a few years most of the mudflats have gone, a 6-lane highway has been built and preparation of the area for construction is well underway. Zuidong, the small fishing village, is being systematically destroyed as a series of apartment blocks take shape behind. As things stand at the moment it seems this is the

destiny of the rest of the coastline in this area. So let's hope that the super-biodiverse mudflats at Nanpu can escape that fate.

A sobering end, as ever, when discussing shorebirds and the Yellow Sea.

For more information visit  
[www.globalflywaynetwork.com.au](http://www.globalflywaynetwork.com.au)

*Chris Hassell, Matt Slaymaker, Adrian Boyle and Ginny Chan*

## **Banded Stilt Update, July 2012**

This episode of the Banded Stilt story starts in March 2012 when news of widespread, extensive rainfall in central Australia led to an expectation of a possible breeding event. Water was flowing into Lake Eyre South and Lake Torrens, and by 15 March, Reece Pedler and Ben Parkhurst had found a breeding colony on a small island in Lake Eyre South, and another at Lake Torrens. The Lake Eyre South colony was on a tiny island/mound spring. On a beautiful calm day, the site looked idyllic with Banded Stilt on nests, clear blue water, and stilts feeding in the shallows. But Silver Gulls were present, hassling nesting stilt and predating eggs. After dark eight adult Banded Stilt were captured, banded, flagged, and fitted with transmitters.

Hopes were high that the breeding on Lake Eyre South would be successful, despite Clive Minton's gloomy prediction that the presence of even a small number of Silver Gulls spelt doom for any chicks. Unfortunately Clive was right and no chicks survived from this breeding event.

Since then Banded Stilt have moved in all directions – some going ~1700 km W to the Canning Stock Route in Western Australia and 1400 km SE to Lake Corangamite near Colac in Victoria!

**Maureen Christie, Friends of Shorebirds, SE Australia**

## **New AWSG Committee 2012**

The new Australasian Wader Study Group Committee was declared following receipt of nominations in July. An election of committee members was not necessary because there were no more nominations for committee positions than those provided under AWSG Rules. The term of office is two years.

### **Committee Office Bearers**

Chair: Alison Russell-French

Vice Chair: Phil Straw

Treasurer: Arthur Keates

Secretary: John Renowden

Stilt Editor: Birgita Hansen

International Liaison: Ken Gosbell

Conservation Officer: Joan Dawes

Chair of Research Committee: Danny Rogers

### **Other Committee Members**

Heather Gibbs

Chris Hassell

Roz Jessop

Marcel Klaassen

Clive Minton

Adrian Riegen

Paul Wainwright

Doug Watkins

# Tattler



Editor: Liz Crawford  
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## Newsletter for the Asia Pacific Flyways

No 22: August 2011

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*Tattler* is the quarterly newsletter of the Australasian Wader Studies Group. Contributions are welcome and encouraged for all working with shorebirds and their habitats along the East Asian - Australasian Flyway.  
Please contact the editor for more information.

### Editorial

Since August 2007, Lisa Gale has done a wonderful job of editing the *Tattler*, gathering input from contributors and collating several issues each year. She has helped to keep us all up-to-date on a diverse range of issues affecting shorebirds. We thank her for her efforts and wish her well in juggling parenthood and a new job.

This edition of *Tattler* invites you to participate in the 2012 Wader and Tern Expedition to NW Australia – a great opportunity to mix with like-minded enthusiasts while working closely with shorebirds. Other features highlight the importance of community engagement and corporate sponsorship in implementing programs to protect shorebirds. Results of leg-flagging are discussed and the need for regular monitoring of shorebirds is emphasized – without the hard evidence provided by these programs, governments are unconvinced about the urgent need to protect and conserve shorebird habitat along the entire Flyway.

Now that southward migration has commenced, the excitement of spotting flagged shorebirds is an added bonus to our bird-watching – and every re-sighting helps to fill in the missing links in the migration maze.

### Northwest Australia Wader and Tern Expedition 2012

A series of special expeditions has taken place over the years to undertake comprehensive long-term studies of the waders and terns in NW Australia. A further major NW Australia Wader and Tern Expedition will take place from **Saturday 18th February to Saturday 10th March 2012**.

A large number of people will be needed if a satisfactory team is to be available throughout this three-week period. Anyone interested in participating in the next expedition is encouraged to participate.

#### Objectives

The fieldwork program will, as usual, principally consist of regular banding and appropriate counting of waders and terns at two locations (Broome and 80-Mile Beach).

The specific objectives of this Expedition are:

- To obtain an estimate of the relative breeding success in the 2011 Arctic breeding season of all the main species of migratory waders. This is achieved by measuring the proportion of juveniles in catches.
- To catch additional samples of species which are less frequently caught in NW Australia, e.g. Black-tailed Godwit, Whimbrel, Grey Plover, Greenshank, Oriental Plover, Eastern Curlew, Little Curlew, Oriental Pratincole.
- To continue the program of putting individually lettered/numbered Yellow leg flags on all the main medium/large migratory wader species caught at Broome. This is to facilitate the collection and calculation of survival rate data in the future. The use of engraved flags has also been extended to some "freshwater" species of waders mist-netted at Roebuck Plains.

Compiled and published by the Australasian Wader Studies Group

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[www.awsg.org.au](http://www.awsg.org.au)

## Concerns about Leg-flagging of Waders

I am the person within the Australasian Wader Studies Group (AWSG) who collates all international flag sightings of shorebirds into a database. I am responding to the concerns regarding leg-flagging of waders that have been raised on Birding Aus (repeatedly) by Ian May.

First, can I assure you that there is still much to learn about the migration of many (if not all) species of shorebirds, even though the data generated from leg-flagging to date has already increased our knowledge immensely. In the current edition of AWSG's journal, *The Stilt*, there is a paper with the latest migration maps covering all of the common wader species. This includes an explanation of what more has been learned over the last five years, since the last similar report was published. All issues of *The Stilt* are made available for free, online at the AWSG web site [www.awsg.org.au](http://www.awsg.org.au) <<http://www.awsg.org.au/>>. However, there is a slight delay between publication and uploading to the web site, so if you would like a copy of this latest article, please email me for a copy.

I do not intend to enter into a debate about the pros-and-cons of leg-flagging waders or banding more generally. Suffice to say, it is regulated by the Australian Bird and Bat Banding Scheme (ABBBS) and through research permits granted by the states. If there was any evidence of the sort of adverse impacts from leg flagging that Ian May refers to, ABBBS would most certainly, and immediately, ban leg flagging.

However, in contrast to Ian's claims, adverse impacts from flagging seem to be incredibly rare.

I will put on the record some further information which might be relevant.

1) In response to these concerns (initially raised directly by Ian May with Clive Minton, rather than via Birding Aus) AWSG did look in great detail at the survival rates of small waders, including Red-necked Stints and Curlew Sandpipers, with and without flags (i.e. those banded only with a metal band, and comparing to those with both a band and a flag). There is no detectable difference in survival. Other analyses of survival of shorebirds cannon-netted, banded and flagged in Australia are consistent with similar studies carried out in other parts of the world, in that they show shorebirds (whether marked with metal bands, individual colour-band combinations, or leg-flags) to be long-lived birds, with high rates of annual adult survival.

Not only do flagged birds survive, they migrate and they get seen on migration. The number of birds resighted on migration is limited by the number of observers in remote places in the flyway, but when careful

searches are made, they usually result in fascinating data. Over the past 21 years, there have been over 21,000 resightings of Australian-flagged shorebirds overseas. Important patterns are emerging from these resightings. A recent example is the discovery

of the importance of a small region in Bohai Bay for subspecies *piersmai* of the Red Knot *Calidris canutus* on northwards migration: in 2009 it was used by 80% of birds flagged and individually colour-banded in north-western Australia, and by 62% of those similarly marked in New Zealand [1]. This site is rapidly being lost to tidal flat reclamation projects, and current efforts to preserve it have been driven in large part by the role that flag resightings played in discovering and quantifying its importance.

In response specifically to the Great Knot and Global Flyway network project, Danny Rogers has provided me with the following information: We have done survival analyses on the Great Knots individually colour-banded by that project (with one flag and four colour-bands)... Average annual survival of those Great Knots (i.e. the probability of their surviving from one year to the next) was 93.7%. There were some annual fluctuations (especially a dip right after the closure of the Saemangeum sea-wall, which is why we are analysing that data) but on the whole, Great Knots with colour-bands are right up there with the longest-lived birds that have been studied.

Also of relevance is that some species of shorebird which have never been banded and flagged in Australia are suffering serious declines – one particularly disturbing example being the critically endangered Spoon-billed Sandpiper.

2) AWSG/VWSG always welcome volunteers to come and experience banding firsthand, and programs are published in relevant newsletters where possible e.g. Birds Australia's VicGroup newsletter.

3) All banding studies (and most studies of any kind) do have impacts on the study species, even though great efforts are made to minimise these impacts. Regardless of how carefully you try and study something without affecting it, it is impossible to do so. The individual banders, in conjunction with the banding office, determine how best to minimise the adverse impacts on birds and whether the scientific value of a study outweighs the costs. All I can really say is that the impact of banding and flagging activities is very minimal in comparison to the impacts of natural events and other human activities on these species, and can not possibly be responsible for shorebird population declines. Of course, many of the people banding waders are also those most concerned about (and active in making a difference to) their conservation status. They do this work out of a genuine passion and commitment, and often devote more hours to this work than someone working full time (but for no pay - and often at much cost). So it is easy to criticise, but much harder to go out there and actually "do something better".

On a much brighter note, some wader-flagging study projects in this flyway have been implemented in place of shorebird hunting. So, for example, every time I see a bird with black and white flags (indicating that it came from Chongming Dao, an island near Shanghai

in China) it is a tangible reminder that these birds, which would once have been sold at local markets for food, are now being released alive with colour flags instead.

4) AWSG focuses its conservation efforts on known threats to waders, in particular stopping the destruction of their migratory stop-over sites. This is an uphill battle, but having solid science behind the need to protect these areas is critically important. As over half of the world's population lives in 'our' flyway, development pressures are intense - especially so in China and Korea.

There is an excellent article in a recent 'Wingspan' (Birds Australia's magazine) which highlights the

urgency of these threats, and the possibility that existing bilateral conservation agreements (between Australia and China, and Australia and Korea) could help stop or slow this destruction. In their words "With a sustainable future for our shorebirds so imperilled, it is vital that we take action and demand that our governments honour the commitments they have signed up to at the international level". Read the whole article at:

[www.awsg.org.au/pdfs/minutes-to-midnight.pdf](http://www.awsg.org.au/pdfs/minutes-to-midnight.pdf)

Heather Gibbs  
Australasian Wader Studies Group

### ***New Study Reports Worrying Declines in Moreton Bay Shorebirds and the Value of Monthly Monitoring***

Long-term monitoring of shorebirds has provided valuable data for the analysis of changes in shorebird populations. A new scientific paper, due to appear in the journal *Conservation Biology*, by Wilson *et al.* 'Analyzing Variability and the Rate of Decline of Migratory Shorebirds in Moreton Bay, Australia' uses long-term data and new sophisticated modelling techniques to detect trends in shorebird populations.

The study looked at 15 years of shorebird population monitoring data collected by Queensland Wader Study Group (QWSG) volunteers at shorebird roosts throughout Moreton Bay. It highlighted the usefulness of monthly counts and compares simple versus more rigorous analysis techniques. The monthly surveys provided data that allows trends to be identified for more species with more confidence than would have been possible with biannual counts (one in summer and one in winter). The paper uncovered strong evidence of long-term declines in Moreton Bay populations of White-winged Black Tern, Red Knot, Bar-tailed Godwit, Ruddy Turnstone, Common Greenshank, Great Knot and Whimbrel, with evidence of an increase in Red-necked Stint (probably owing to the Port of Brisbane reclamation). There was some evidence of declines in another 4 species, and some evidence of increases in another 3. Interestingly, this paper showed that if counts had only been done twice a year in Moreton Bay, declines would have been detected in only four species; the Bar-tailed Godwit, Common Greenshank, Whimbrel and Eastern Curlew. These results highlight the question: how much evidence do we need to decide when species are in decline?

Many factors can affect survey counts at both local and regional scales. Disturbances and weather conditions can affect counts, while higher breeding success in one year may increase the numbers of juveniles that migrate. All these sources of variation obscure underlying patterns in bird abundances. Using a simple model, such as linear regression, will assume that all the variation comes from one source (usually the variation in our ability to count the birds accurately). However, this study compared these simple methods

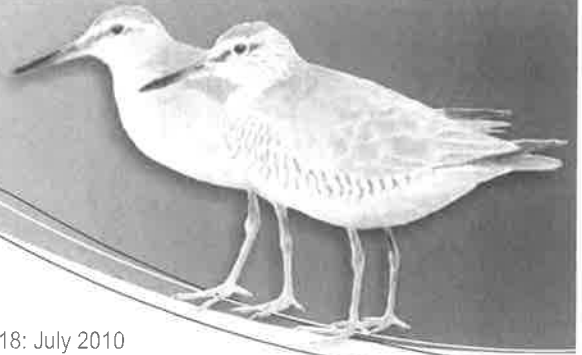
with recently developed stochastic state-space models to account for many more sources of variation in bird counts, producing a much more realistic model. Simple population analyses techniques were more likely to identify population declines when there was in fact no decline happening. The more complex stochastic state-space models are less powerful at detecting change but give rise to fewer "false alarms". However, is it better to be more certain about the declines we do report, or should we identify all species that are possibly declining even if this gives rise to some false alarms? In this paper, the authors were able to identify both. They were able to distinguish between those species for which there was evidence of strong decline and those where there was some evidence of decline. The paper also demonstrated the value of monthly counts in providing greater scientific certainty regarding the changes in species populations.

This study highlights the value of the shorebird data collected by volunteers over the last 25 years. It is exciting to know that a team of researchers at the University of Queensland led by Richard Fuller, Howard Wilson and Hugh Possingham will be extending the work discussed here. Supported by QWSG, the Queensland Department of Environment and Resource Management, the Port of Brisbane, the Federal Environment Department, and the Australian Research Council, the team will determine if the results observed in Moreton Bay reflect what is happening throughout the East-Asian Australasian Flyway. More importantly, the team will also try to uncover what is driving these declines. The long-term monitoring carried out by volunteers will continue to provide valuable data for this research.

For more information or to download a pdf copy of this paper, visit [www.fullerlab.org](http://www.fullerlab.org)

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# Tattler



Editor: Lisa Gale  
Email: [tattler@awsg.org.au](mailto:tattler@awsg.org.au)

Newsletter for the Asia Pacific Flyways

No 18: July 2010

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*Tattler* is the quarterly newsletter of the Australasian Wader Studies Group. Contributions are welcome and encouraged for all working with shorebirds and their habitats along the East Asian– Australasian Flyway. Please contact the editor for more information.

with the introduction of geolocators. Amazing information is being garnered from species around the world adding important knowledge to the species and habitat requirements. And not too soon! With the loss of habitat occurring on flyways at an increasing rate, knowing the importance of staging sites and the non-stop efforts taken by some species to get there will only add weight to the argument for habitat protection and species conservation throughout the flyway.

## Editorial

Migratory bird studies are moving forward quickly

## Geolocators update

Our geocator projects have finished up for the year with the deployment of the final units for this year in March/April. Details are given in the table on the following page.

Our greatest emphasis is on Ruddy Turnstone, with a total of 75 now carrying geolocators. These have been done at four sites, three of them long-term catching sites for our Ruddy Turnstone studies. One of the reasons for using a range of locations is that the timing and rate weight gain prior to northward migration in April is markedly different for Victoria/South Australia/Tasmania. There may, or may not, be associated differences in their migration strategy.

BAS geolocators come from British Antarctic Survey in the U.K. Some of these are the same as those used last year at Flinders (Mark 10, weighing 1.0g) and some are an even newer model (Mark 12, weighing 0.8g). The Swiss-made geolocators were provided by Professor Marcel Klaassen of Deakin University (Geelong) who has now joined the VWSG and AWSG in the Ruddy Turnstone project in Victoria and the Greater Sand Plover project in north-west Australia. In addition he has his own project on Sharp-tailed Sandpipers at Werribee Sewage Farm (where most birds had already migrated northwards before it was possible to start

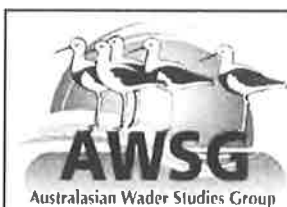
deploying geolocators this year).

Greater Sand Plovers were selected as the first species on which to try geolocators in north-west Australia because they have a reasonably high recapture rate and because they are of increasing conservation concern with plummeting numbers in the last five years. At present we have no recoveries or flag sightings on or near the possible breeding grounds and no clear indication of any migratory stopover hotspots.

Two of the Ruddy Turnstone to which geolocators were applied at Flinders on 17th April were birds which had carried geolocators the previous year. One was the famous 9Y, which made the 27,000km round trip with a return migration through the Central Pacific. It will be fascinating to see if this bird adopts the same migration route in 2010. It was also photographed at its first stopover in Taiwan in May 2009, so let us hope this happens again this year. Its engraved flag was worn and has now been replaced by CMY.

Next October/November is going to be an exciting time as we try to recapture birds with geolocators and find out where they have been.

Clive Minton  
Victorian Wader Studies Group



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scheme has been received.

Our ongoing environmental awareness education project for local children at their school and in the field continued between December 2009 and January 2010, and included introductions to animals and their habitat, birdwatching, and educational games. Parents are invited to join, and environmental issues are discussed with village leaders. Since 2007, the number of mangrove and pine trees has visibly increased due to enhanced local awareness, mangrove re-planting and locally imposed restrictions on cutting down the mangroves to make fishtraps (until recently up to 300 trees were used for one fishtrap).

Using data collected since 2007 and the raised awareness at local government and community levels on the importance of this wintering site for

migratory shorebirds (including the endangered Nordmann's Greenshank), WCS aims to secure a national protected status for Cemara beach.

**Acknowledgements**

This work was made possible thanks to generous financial support from Cargill Inc. We would like to thank our supervisor Joost Philippa, D.V.M, Ph.D, the Forest Protection and Nature Conservation department (PHKA), the Natural Resources Conservation Agency (BKSDA) Jambi, local NGO Gita Buana, and our field team: Drh. Lia Nugraha, R. Agus Hadi, Drh. Yulissa Fitriani, Herman (local guide), Asrin Hotlan, Risky Darmawan, Nur Aini, Dwijo Leksono, Lutfian Nazar, Muhammad Amri, Muhammad Arifin.

*Fransisca Noni and Iwan Londo*

**Lake Torrens turns on an exciting breeding event**

The normally dry, salt encrusted bed of Lake Torrens was transformed into a lake following significant local rain which occurred in April this year. Members of Friends of Shorebirds SE have been monitoring the large flock (150 – 200,000) of Banded Stilt that has been utilising the hypersaline conditions of the lower Coorong for the last 8 years. Iain Stewart, who had been tracking water flows throughout the arid interior since the floods in northern Australia, reinforced by David Dadd's report of the absence of birds in the Coorong, immediately realised the significance of the water in Lake Torrens. A call went out to members and the Department for Environment and Heritage (DEH) Coorong staff for news of the Coorong flock. The last documented sighting of a significant number was on 5<sup>th</sup> April.



Photo: Ken Gosbell

The DEH, South Australia, was contacted stressing the urgency of the situation – high in everyone's thoughts was the massive predation that had occurred at Lake Eyre in 2000, and the need to locate and protect a breeding colony as soon as possible. They firstly flew over the Coorong and confirmed the missing birds and then subsequently made a search of a number of inland lakes from Lake Eyre to the south. In early May they located a

large colony of around 140,000 Banded Stilt which appeared to be nesting on an island in Lake Torrens. This was a very special event as this species had not had an extensive breeding event since the one at Lake Eyre South in 2000 although a small attempt was recorded in the Coorong in 2006.

This species requires small isolated islands in large ephemeral inland salt lakes where the influx of fresh water stimulates the dormant brine shrimp and other small crustaceans to hatch and reproduce. Such conditions are erratic given the nature of inland Australia and Banded Stilts are known to have bred in SA only seven times in the last 70 years.

In response to the discovery of this breeding colony, DEH sent in an expedition of ecologists and rangers in early May, led by Alex Clarke of the Port Augusta office of DEH. Their objective was to observe and check for any excessive predator activity. They were able to confirm the colony had 140,000 - 150,000 birds and that they were witnessing probably the largest breeding event on record with up to 200,000 chicks produced. Even better news was the fact that predation activity by Silver Gulls was minimal and within natural bounds. It was also observed that following the first hatching, the colony split with half moving to a northern island and the remainder laying a second clutch of eggs in the original colony.

The AWSG, VWSG and Friends of Shorebirds SE, were invited to participate in a second expedition timed to coincide with the second hatching to record observations and to attempt to place bands and coloured leg flags on some of the chicks. The latter was aimed at finding more about the movements of these birds including any possible movement between the WA and south-eastern Australian populations. Accordingly four of us (Maureen Christie, Iain Stewart, David Hollands and Ken Gosbell) accompanied a team of rangers and ecologists from the Coorong office of DEH (Simon

Oster, Clare Manning and Chris Thompson). We set out from Port Augusta and camped on the shores of Lake Torrens from 14 – 18 June when we returned to Port Augusta. To view this body of water almost 200km long and up to 30km wide, surrounded by gibber and desert, listening to a colony of Banded Stilts almost 3km away was an amazing experience.

The colony occupied about half of a small island some 320m by 200m which was located 2.7km from the shoreline campsite. Hence a walk through water 20 – 30cm in depth for this distance to get to the colony each day was more than sufficient exercise. The colony was much reduced by the time we arrived with less than 10,000 birds in it. It was located on sandy patches interspersed with low salt bush (*Atropex sp*), Nitre-bush (*Notraria sp*), Samphire (*Sarcoconia sp*), *Rhagonia* and other plants. Birds were nesting in scrapes which were at a density of 10 – 15 per square metre and were sitting on 2 to 4 eggs. Some 30% of the colony had been abandoned probably due to disturbance by a fox and/or dingo which had killed quite a few adult birds. We assessed that chicks from the second clutch had been hatching for the last week and this continued at a reasonably constant rate for the days we were there. When the chicks are 1 or 2 days old the adults take them across the stony beach and introduce them to the water. The rate of chicks being taken to the water varied from 50 to 350 chicks per hour and we saw very few actually taken by gulls. However, as the colony thinned out, more gulls were entering the colony.



One of the inspiring sights was to see the adults shepherd their family of 2 – 4 fluffy white/grey down covered chicks to the water, negotiate past the line of gulls and reach the open water where they amalgamated with other family groups to form crèches. The largest crèche we observed was 40 chicks but as they were moving some distance (several kilometres) to feed we suspect that even larger crèches were being formed which is their normal behaviour.

Several attempts were made to band chicks while they were in their family groups in the water. This was a tedious process due to adults appearing to abandon the chicks when captured. This meant



great care was needed to reunite chicks with adults who were caring for crèches. Because of these constraints we were only able to band and leg flag 54 chicks. So, if you see a Stilt with orange/yellow on the Left tibia it is a very special bird and we need to hear about it. We are also interested in observations of juvenile stilts – recognizable by their grey legs. The first clutch is thought to have started hatching on the 10th May. Allowing 50 days to fledge, they could be arriving at a wetland near you any day! Indeed news of the arrival of adults is also of interest as it will help us understand how they disperse after such a large breeding event. One of the highlights of our visit to the colony was when Clare spotted a bird with flags on its right leg which was the result of the banding undertaken by Maureen and her team in the Coorong in 2006.

Overall this was an exciting event which at this stage appears to have been extremely successful for this enigmatic species. To have observed and photographed this unique event combined with the experience of witnessing the way in which outback Australia comes alive with water was very special. We would like to thank the staff of DEH SA for their consideration, co operation and assistance on site; it was a great team effort. We also thank our flag making teams for making a large number of flags at short notice.

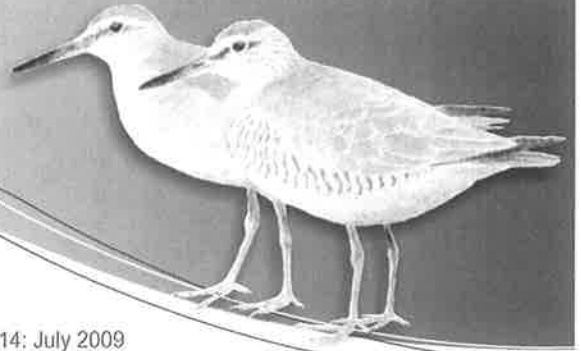
It should also be noted that a small breeding event also took place on Lake Eyre where some 5,000 birds nested. This was reported in the media earlier this month.

Although we have increased our knowledge of one of the most interesting of our resident species through the observations of this event, there is still much to learn. Just how did those birds who were happily feeding in the Coorong know that suitable breeding conditions had been created 1000kms away? Maybe in time we will learn.

*Ken Gosbell, Maureen Christie, Iain Stewart and David Hollands*

4 July 2010





Editor: Lisa Collins  
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Newsletter for the Asia Pacific Flyways

No 14: July 2009

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*Tattler* is the quarterly newsletter of the Australasian Wader Studies Group. Contributions are welcome and encouraged for all working with shorebirds and their habitats along the East Asian– Australasian Flyway. Please contact the editor for more information.

## Editorial

This time of year is about growing excitement and anticipation of what the coming season will bring in terms of flag sightings and interesting records. OK most of the waders are still in the northern hemisphere, but this is the time when northern observers send in reports of interesting flag sightings and counts from northward migration that gets me excited about the impending southward migration soon to commence and bringing with it interesting flag sightings and records of its own. And more so, because I don't have to leave the country to be a part of it! The birds will come to me! (well closer anyway)

As a warm up for the coming season I took a recent trip to the Cairns esplanade. This was just as much about catching up with other shorebird regulars as catching up with the birds. For something that is about personal achievement e.g. *my* bird list, which birds did I see etc, bird watching is quite a social activity.

Bird watching always throws up something interesting or unusual. This time it was a pair of Beach Stone-curlew, next time I will be looking for coloured flags from far-off places!

## Coorong wetlands can still be saved

Scientists have come up with some solutions on how to save the struggling Coorong wetlands after a three year study just wound up. The region has been struggling for a while with very high salt levels, which actually got worse during the study.

This means there's less fish and waterbird populations and plant species have declined. In fact, in some parts it's just as salty or if not more so than sea water.

Scientists from the CSIRO, Adelaide University, Flinders University, SARDI and the SA government have been working together on the research. They looked at different climate forecasts and worked out how they're going to affect wetlands. Then they came up with different solutions to save them such as flooding seawater into the Coorong or diverting

water from drains scheme in the South East.

Research leader Justin Brookes says while the best thing would be a freshwater flood, but this is unlikely. They're recommending similar work get underway in the Lower Lakes.

Amy Spear

Wednesday, 22/07/2009

<http://www.abc.net.au/rural/sa/content/2009/07/s2633420.htm>

Ed—The CSIRO report outlining different management options for the Coorong can be downloaded from <http://www.clw.csiro.au/publications/waterforahealthycountry/cllamm/CLLAMM-Final-Report-Ecosystem-Assessment.pdf>



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## **BirdLife grant helps Endangered shorebird**

A grant from the BirdLife International Community Conservation Fund is helping establish a new population of Endangered Shore Plover *Thinornis novaeseelandiae* on Mana Island, off the west coast of Wellington, New Zealand.

The project is showing early signs of success. A pair from among 41 juveniles introduced to the island in 2007 hatched and fledged a chick during 2008, and five more young Shore Plovers have fledged in 2009.

The first chick was born to one-year-old parents. Shore Plovers normally breed from two years.

The sole natural breeding population of Shore Plover is on Rangatira (South East) Island in the Chatham Islands. The species was once widespread around the coast of New Zealand's South Island, but had been extirpated by the 1870s. Their global population is estimated to be less than 250 birds, with a total range of just 4 km<sup>2</sup>.

The Mana Island translocation is the latest in a series of releases of Shore Plover. Ten pairs are held in captivity, mainly at the Pukaha Mount Bruce National Wildlife Centre in northern Wairarapa. Young birds produced by the captive flock are released on to predator-free islands as soon as they are old enough to fly.

A local community NGO, the Friends of Mana Island (FOMI), is funding and providing volunteers for the five-year translocation project, which includes intensive monitoring of the newly introduced birds. The BLICCF grant, together with local support and the proceeds of an art auction held in London last year by the New Zealand Society and New Zealand's Department of Conservation, has provided FOMI with sufficient funding to complete the project.

"It's great for visitors to see one of the world's rarest shorebirds as soon as they get off the boat," said Colin Ryder - FOMI President and Forest & Bird (BirdLife in New Zealand) regional committee member. "It's hard to believe that they are only 30 to 40 minutes from downtown Wellington."

FOMI was set up to assist the Department of Conservation in implementing the restoration plan for Mana Island. Mice have been eradicated from the island, which is now predator-free, over half a million native trees have been planted, a wetland restored, and threatened reptiles and invertebrates reintroduced. Forest & Bird has also been heavily involved in the island's restoration, most importantly having initiated and resourced the mouse eradication project.

The island is a scientific reserve, and Shore Plover joins other successful introductions of New Zealand's endemic bird species that are rare on the mainland, including two more Endangered species - Takahe *Porphyrio hochstetteri* and Brown Teal *Anas chlorotis*.

"The BirdLife grants are supporting the recovery of a number of Globally Threatened bird species in New Zealand and elsewhere in the South Pacific", said Mr Ryder. "FOMI is extremely grateful that our project on Mana Island was selected for funding and I can assure the donors that their contribution has made a real difference."

*Birdlife International News*  
16-06-2009

[http://www.birdlife.org/news/news/2009/06/shore\\_plover.html](http://www.birdlife.org/news/news/2009/06/shore_plover.html)

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## **PVC Sheet for Flags/Colour Bands**

As you may already aware, Darvic sheet, used for flags/colour bands for many years, ceased to be manufactured a couple of years ago. Since then I've been working with others around the world to investigate suitable alternative materials. It seems that we have now got to the situation where a potentially suitable replacement material is available.

For the last year or so another company in the UK has been making PVC sheet which is claimed to be virtually identical to Darvic. Various people, including myself, have trialled this material and so far it has performed satisfactorily. The manufacturer has come to arrangements with the BTO and with Porzana Ltd for the supply of this material for bird ringing/banding/flagging operations.

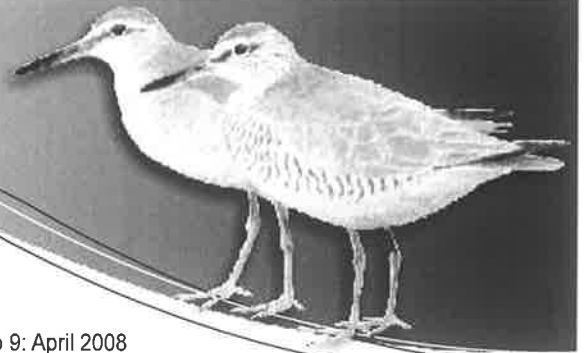
Single colour 0.5mm thick PVC sheet, called Salbex,

is now stocked by the British Trust for Ornithology Ringing Office in the UK. Virtually the full range of colours previously available in Darvic is covered. It is also available as bi-coloured sheet - Salgrave. Unfortunately it is only available at present at 1.5mm thick. Initial contact on supplies should be made with Jez Blackburn: [jez.blackburn@bto.org](mailto:jez.blackburn@bto.org).

A range of sheets in different colours are now stocked by Porzana Ltd [porzana@cfs-broadband.co.uk](mailto:porzana@cfs-broadband.co.uk). They are also prepared to make engraved blanks in this material if required, leaving the bander to form them into bands or flags. This material may be more of interest to those marking wildfowl and large gulls than to shorebird banders. The new PVC sheet can be satisfactorily 'glued' with the usual PVC solvent cement.

*Clive Minton*

# Tattler



Editor: Lisa Collins  
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**Newsletter** for the Asia Pacific Flyways

No 9: April 2008

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*Tattler* is the quarterly newsletter of the Australasian Wader Studies Group. Contributions are welcome and encouraged for all working with shorebirds and their habitats along the East Asian– Australasian Flyway. Please contact the editor for more information.

## Editorial

Every call for the latest happenings on the Flyway for inclusion in *Tattler* seems to result in a bombardment of fascinating sightings and recoveries from exotic locations furthering, and sometimes confusing, our knowledge of shorebirds and their migration.

As we marvel at the huge numbers and rare sightings, we have to wonder if these observations are caused by a degrading environment with some species being 'winners', e.g. the stilts (pg 3), and others forced to travel long distances from usual migration or dispersal routes in order to survive.

This highlights the importance and significance that counts and field observations of bands/flags can make to our understanding of shorebird ecology and it is great to see these opportunities are available in many flyway countries. More importantly, this data can be used to inform environmental decision making, providing evidence supporting claims.

So get out there and get spotting as your observations and participation are critical to unlocking more of the secrets of migration and for promoting environmental conservation worldwide.

## New AWSG Committee

The new AWSG Committee has been elected for the period 1 July 2008 to 30 June 2010. Representatives are:

<b>Chair:</b>	Ken Gosbell
<b>Vice – Chair:</b>	Phil Straw
<b>Secretary:</b>	Penny Johns
<b>Treasurer:</b>	Brian Speechley
<b>Chair, Scientific Committee:</b>	Danny Rogers
<b>Editor, Stilt:</b>	Roz Jessop
<b>Conservation Officer:</b>	Ann Lindsey
<b>Committee Members:</b>	Maureen Christie
	Peter Collins
	David Milton
	Chris Hassell
	Clive Minton

Adrian Riegen      Jennifer Spencer  
Doug Watkins      Paul Wainwright

We sincerely thank all those leaving the Committee in June for their contribution over a number of years. We hope that you will remain actively involved with the AWSG. To the newly elected members, Paul and Jennifer, we say a warm welcome and look forward to your contribution over the next 2 years.

The next two years pose a number of challenges to the Group and I look forward to the new Committee working together to achieve the objectives we have set ourselves.

*Ken Gosbell*

*AWSG Chair*



Compiled and published by the Australasian Wader Studies Group

A Special interest Group of Birds Australia

## Interim results of % juvenile monitoring in SE Australia

We now have satisfactory samples of Red-necked Stint, Curlew Sandpiper and Sharp-tailed Sandpiper to have good confidence in the level of juvenile birds in the population this summer.

The most pleasing result is the very high breeding success (32.2% juveniles; average 9.8%) of Curlew Sandpipers. This is the highest proportion of juveniles since the 1991/92 season and the second highest ever in the 29 years for which we have data on this species. It also tallies well with the high figure found in north-west Australia during the November 2007 AWSG Expedition. It is particularly pleasing that they have had such good breeding success given that they have experienced such a prolonged and extensive downturn in their population in Australia over the last 20 or more years.

Red-necked Stints (10.7% juveniles; average 13.8%) have again had a year of below average breeding success. This is now the fourth consecutive similar year for this species. It is noticeable that everywhere Red-necked Stint populations have declined to more normal long-term levels, after the huge peaks in the late 1990s and early 2000s when a run of ultra-good breeding seasons occurred.

Sharp-tailed Sandpipers also had above average

breeding success (19.9% juveniles; average 11.1%). This is the fifth year out of the last six that they have done so. Their numbers are now well and truly established at much higher levels than were present in the decade up to the 2002/03 season.

The VWSG have also caught a reasonable sample of Bar-tailed Godwits and these are showing an exceptionally high proportion of juveniles (56.5% juveniles; average 15.4%). Whilst a part of this may be caused by sampling effects the result is certainly an indication that 2007 was a very good year for the *baueri* subspecies which breeds in Alaska and spends the non-breeding season in eastern Australia and New Zealand.

Unfortunately we've not yet managed to get anywhere near catching a useable sample of Red Knot and there is a danger we will miss out on data for this species this year.

Overall so far it seems that 2007 was a good, or above average, breeding year for most wader species that spend the non-breeding season in south-eastern Australia with only Red-necked Stint faring poorly.

Clive Minton

VWSG

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## More on Banded Stilts

It was always thought that the eastern and western Australian Banded Stilt populations were discrete. But a growing number of sightings of western birds in eastern Australia, and now vice versa, are being reported.

With 250,000 Banded Stilt in the Coorong, and reports of flocks up to 10,000 elsewhere, the chances of seeing any of the 333 Banded Stilt chicks flagged with South Australian (SA) colours (orange/yellow) in the Coorong in January 2006 would seem remote....but not so. On the 18<sup>th</sup> February, Danny Rogers saw one of 'our' chicks in 85% breeding plumage at the Avalon Saltworks in Victoria. It was in a flock of 2000. This follows on from a series of sightings (Jan, March & Dec 2007) at Cheetham Saltworks, Laverton.

And then recently, news of a sighting that I had hardly dared hope for – on 8<sup>th</sup> February a SA Banded Stilt was sighted at Yalgorup National Park, WA (about ½ way between Mandurah and Bunbury, on the coast). This is the first recorded movement of Banded Stilt from eastern Australia to western Australia.

Other sightings of interest have been of a Victorian flagged (151 were banded at Werribee in 2000) Banded Stilt seen in the Coorong in August 2007 and two seen in February 2005. We have had WA birds visiting us - several yellow flags were seen at



Image: Danny Rogers

Lake Eyre in 2000, with one sighted at Lake George in April 2001. These were flagged at Lake Ballard after Cyclone Bobby in April 1995.

We are slowly building up a picture of Banded Stilt movements throughout Australia and it is exciting to be so closely involved with extending our knowledge of this beautiful but enigmatic species.

We are asking everyone who sees any Banded Stilt to not only make an estimate of how many there are, but to also check their legs! Check for flags but also note that the colour of their legs is important – pink means an adult, grey means a juvenile.

Maureen Christie

Friends of Shorebirds, SE: [twinpeppers@icisp.net.au](mailto:twinpeppers@icisp.net.au)

# Tattler

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## Newsletter for the Asia Pacific Flyways

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### A Note from the Editors

In a previous edition of *The Tattler* (July 2005) a proposal to form an Asia Pacific Shorebird Group was suggested by Phil Straw; (Editor, *The Tattler*), Lew Young; Hong Kong, Weiting Liu; Taiwan, Doug Watkins; Wetlands International – Oceania, and Yuri Gerasimov; Russia. Since then the proposal has been put to three shorebird meetings/workshops - in Tainan (Taiwan), Nelson (New Zealand) and Krabi (Thailand) - as well as being discussed between individuals via the Internet. So far more than one hundred people have put their names down to be part of the new group/network. Taking into the consideration that many of these people represent potential partner groups, the number of people who will be involved will be much greater. The main interest has come from researchers, wetland managers and conservationists who can see the advantage of a network of shorebird/waterbird specialists across the Asia Pacific.

The precise structure of the group will be worked out over the coming months. However in the meantime everyone agrees there is a need for effective communication across the region in the form of a newsletter (printed and electronic versions) easily accessible to all. Rather than creating an entirely new newsletter it was suggested that *The Tattler* should be extended to cover the region. This is a logical move, however it is appropriate to give a new look to the newsletter as it will be fulfilling a new function. We

hope you like the new look - a new layout and slight name change. The new name, *Tattler: Newsletter for the Asia Pacific Flyways*, reflects the new role of the newsletter in covering the three flyways -; Central Asian and Indian, East Asian-Australasian and Western Pacific Flyways. From this edition (January 2006) *Tattler* will be available in Chinese as well as English. We hope that other language versions will be available soon (any volunteers to translate?).

We hope you find this edition of *Tattler* interesting. As you will see from the contents, it includes the results of some interesting studies and findings in the Asia Pacific region.

We have avoided any lengthy discussions about the H5N1 strain of Avian Flu as this could take up a newsletter in itself, anyway we are sure you have read enough about the subject even if you are in the remotest part of the world. On page 11 you will see, what we hope will be the first in a series about important shorebird sites in the Asia Pacific region, on Chongming Island, Shanghai. The Island will also be the site of one of China's largest and most ambitious development projects, including an 'eco' city. This will be a big challenge to demonstrate whether development can go hand in hand with environmental enhancement. Another site of international importance that is not faring well as a result of development is Saemangeum in South Korea. Only lengthy fights in the highest courts in the land is likely to decide the fate of thousands of shorebirds. A team of scientists and volunteers will at least monitor the results of this massive development project with the help of South Korean and overseas researchers.

A lot of time and effort has been put into catching, banding and colour marking shorebirds with leg flags and a variety of coloured bands. This potentially provides invaluable information about the major migration routes and staging areas of shorebirds. However this only happens if we have a network of observers throughout the region to report colour band or flag sightings. It doesn't matter how many times you see the same colour flags, all sightings are important. If you do not have a local coordinator to report sightings to email them to [mintons@ozemail.com.au](mailto:mintons@ozemail.com.au) (or send details to the editors of *Tattler*), and you will receive full details about who banded the bird and where it was banded/flagged.

The editors welcome articles of interest about shorebirds in the Asia Pacific region; they should be sent in either English or Chinese (preferable simplified characters) to [tattler@avifaunaresearch.com](mailto:tattler@avifaunaresearch.com)

Phil Straw, Editor; Chih Ying Lee, Assistant Editor

## Coorong Wader Survey 2006

The AWSG is planning to again undertake a survey of waders in the Coorong over the period 3 to 7 February 2006. This will be carried out with the support of the South East Region of the South Australia Department of Environment and Heritage. The survey will cover the total area of the Coorong, a complex waterway which stretches for over 100kms and includes the mouth of the Murray River. We will again be assisted by local fishers who contribute their local knowledge and boat transport. This complex has suffered considerable stress resulting from the drought and reduced natural flows from the Murray River which is having an impact on the biodiversity of the area. One of the objectives of our team is to determine the habitat usage and distribution of migratory and resident waders along the length of the complex. This is the seventh consecutive year we have undertaken this survey and it is essential that regular counts such as these be maintained to provide land managers with appropriate planning information.

*The Coorong is in a highly degraded state as a result of allocation of more than three quarters of the river flows to irrigators by various government departments over past years. Most of this extraction takes place before the river reaches the state of South Australia. In an effort to restore environmental qualities, a target of 500 gigalitres was set by the Murray Darling Ministerial Council under the Living Murray initiative. The water was to come from improving water efficiency measures, saving an estimated 240 gigalitres. The remaining 260 gigalitres would have to come from buying water from irrigators and farmers who are willing to sell their water entitlements. Conservationists were disappointed that the MDMC deferred, yet again, any decision until April 2006. Conservationists are also concerned that the setting of water efficiency practices will take a long time, meaning considerable delays before any improvement can occur in the river. The severely stressed ecosystems of the Coorong may not have that time to spare.*

*Buying water remains the most cost effective and efficient way to return real water to the Murray and the Coorong, according to Don Henry, Executive Director of the Australian Conservation Foundation. This is backed up by many government ministers and expert scientists.*

*To understand how desperate the need is, it's worth having a closer look at the Coorong wetlands which rely on the Murray River flows. Studies have revealed that pelicans have not bred in the Coorong for four years yet the Coorong was once Australia's largest permanent breeding colony for pelicans. The water of this internationally recognised wetland is now three times saltier than sea water. Twelve species of native fish are locally extinct and the count of migratory waders has dropped to 50,000 from 150,000 in the 1980s. Numbers of Curlew Sandpiper have plummeted from 40,000 to just 2000 birds.*

*For any further information on the February count please contact Ken Gosbell (ken@gosbell.id.au).*

## Mysterious Banded Stilt Breeding Event

The Banded Stilt is one of the world's most mysterious shorebirds; it seems to breed in significant numbers only after cyclonic rains in the vicinity of large salt lakes on inland Australia. Once the right conditions occur, thousands of Banded Stilts arrive at a recently flooded lake within 10 to 12 days of a rain event, travelling a thousand kilometres or more, apparently knowing exactly where to go. It appears that such an event may have happened recently at the Coorong, in South Australia.

It is broadly acknowledged that the health of the Coorong has been deteriorating in recent years due to lack of fresh water flows and constriction of the Murray Mouth. One of the impacts of this has been the substantial increase in salinity of the water in the southern lagoon. In July 2005 approximately 100,000 Banded Stilt were recorded by Maureen Christie and members of Birds SE saw a similar number in October. These stilts were assumed to be feeding on the massively increased population of brine shrimp that was developing in the hypersaline lagoon. Late in 2005 there were indications that a breeding event might occur and in mid-January 2006 this was confirmed with the observation by Pam Gillan, David Dadd and Chris Thompson, Department of Environment and Heritage (DEH) of approximately 240 chicks in several crèches on the water. At the time of writing the nesting colony had not been located. This is thought to be a unique event in the Coorong; there are no previous known records of Banded Stilt breeding in coastal locations in the southeast of South Australia. Field surveys of the movements of adults and chicks are continuing in order to document more fully this unusual event.

*Ken Gosbell*

## Shorebirds in Vanuatu: observations wanted

Vanuatu is in the Western Pacific Flyway and, as with much of this Flyway, very little is known about shorebirds in this island nation because very few birdwatchers visit Vanuatu and even fewer take an interest in waders. Basic information about shorebirds, such as major sites, species present, numbers, seasonality and migration, is poorly known but progress is being made in filling these gaps through the development of a new website and a bird atlas project.

**Vanuatu Birds Online** <http://www.positiveearth.org/vanbirds/> aims to record the distribution of Vanuatu's birds and to promote their conservation. After only two years of data collection there has already been progress in the area of shorebirds. We have count data from several locations including some new sites. We have enough recent records of Greater Sand Plover *Charadrius leschenaultii* (previously unreported) to indicate it is a regular non-breeding visitor.

*/continued on page 8*

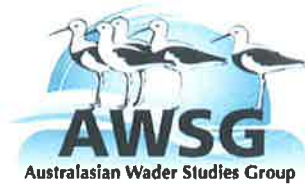
On 06/5/2014, JL spent the evening searching online through all issues of 'Stilt' (the AWSG journal) from No.26 (April 1995) to No.63-64 (Oct 2013) for all papers / articles concerning BaSt that could be useful in writing up the 1995 work at Lakes Ballard and Marmion. The next day JL printed them (those not already in this or other BaSt RMCR's) and they are inserted here. Note that the No.1 edition was in 'Spring 1981'.

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- Christie, M. (Oct 2006). *South Australian wader studies – An overview*. Stilt 50, pp.249-251.
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- Baxter, C. (Oct 2006). *South Australian wader studies – Chapter 9. Resident waders. Banded Stilt Cladorhynchus leucocephalus breeding at Lake Eyre North in 2000*. Stilt 50, pp.262-263.
- Edey, D. (Oct 2006). *South Australian wader studies – Chapter 15. Research resources. Wader-related references for South Australia*. Stilt 50, pp.275-276. 'Note: This list does not include references published in 'Stilt' for which see Phillips (2006)'.  
*Research resources. Wader-related references for South Australia*
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- Phillips, H. (Oct 2006). *Papers in Australian Wader Study Group journals 1980-2006*. Stilt 50, pp.304-325. Only pages 304 and 306 (Banded Stilt) printed here.
- Kraaijeveld, K., Minton, C., Collins, P. & Jessop, R. (Apr 2003). *The first catch of Banded Stilts in Victoria: Biometrics, moult and age / sex structure*. The Stilt 43, pp.14-19.

Continued →

**'Stilt' No.26 (April 1995) to No.63-64 (Oct 2013) CONTINUED**

- Minton, C., Jessop, R. & Collins, P. (Oct 2000). *Silver Gull predation at Banded Stilt colonies*. Abstracts of the AWSG Conference, Brisbane, 1-2 July 2000. Stilt 37, p.51.
  - Phillips, H. (Oct 2000). *Bird Species Index, The Stilt: Nos.31-36*. Stilt 37, pp54-.... Only pages 54 and 55, 56 (Banded Stilt) printed here.
  - Alcorn, M. & Alcorn, R. (Apr 2000). *Seasonal migration of Banded Stilt Cladorhynchus leucocephalus to the Natimuk-Douglas salt pans in Western Victoria, Australia*. The Stilt 36, pp.7-10.
  - Jessop, R., Collins, P. & Brown, M. (Apr 1998). *The manufacture of leg flags in the light of experience*. The Stilt 32, pp.49-51.
  - Phillips, H. (Oct 1997). *Bird Species Index, The Stilt: Nos.25-30*. Stilt 31, pp.63-.... Only pages 63 and 64, 70 (Banded Stilt) printed here.
  - Phillips, H. (Oct 1997). *Author Index, The Stilt: Nos.25-30*. Stilt 31, pp.72-.... Only page 74 (Minton *et al.* – Banded Stilt) printed here.
  - Singor, M.J.C. (Apr 1997). *Waders of the Creery wetlands and adjacent mudflats, Western Australia*. The Stilt 30, pp.39-48.
  - Rogers, D.I.R. & Eades D.W. (Apr 1997). *Belly-soaking and egg-cooling behaviour in a Red-capped Plover Charadrius ruficapillus*. The Stilt 30, p.53.
  - Barter, M. (Apr 1995). *For the record – Large numbers of Red-necked Stint and Banded Stilt at Lake Reeve, Gippsland, Victoria*. The Stilt No.26, p.36.
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59 ↙  
64 ↙

Saltworks; my study aims are to discover the parameters influencing shorebird distribution at these sites, how they do so and if any of these can be utilized to predict shorebird distribution in other areas and habitats. I will do so by examining and sampling abiotic (water, substrate, salinity, wind) and biotic (invertebrate and shorebird numbers and behaviours) factors across a range of habitats found at these three sites; eventually inputting these in species distribution models and testing these in other shorebird habitats and areas.

### PROGRESS TOWARD UNCOVERING EVIDENCE OF DECLINES IN MIGRATORY SHOREBIRDS IN AUSTRALIA AND THE HABITATS THEY RELY ON IN SE ASIA

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Shorebird monitoring by volunteers since 1980 has resulted in an exceptionally rich data set on an important component of Australian biodiversity. Here, we review the spatial and temporal coverage of the Australian shorebird monitoring count data. We report on some of the techniques used to identify changes in abundance in wildlife, and highlight some of the growing number of results indicating long-term declines in some migratory shorebird species at selected individual sites in Australia. We then report on progress in quantifying the loss of staging habitat which is thought to be one of the most likely causes for some shorebird declines. Developing a novel remote sensing approach which uses Landsat data selected with the help of a regional tide model, we have mapped the extent of intertidal wetlands in the Yellow Sea in 1980's and 2000's. Here we describe the status and distribution of intertidal mudflats across the Yellow Sea region. We have discovered that a large proportion of intertidal habitat has been lost primarily to coastal reclamation. Together habitat loss estimates and available count data will form the foundation of a project seeking to quantify the scale of declines in migratory shorebirds while identifying the causes of those declines.

### BANDED STILTS IN THE BRINE: LAKE TORRENS BREEDING EVENT, MAY 2010

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In early 2010, heavy rain fell across outback South Australia, providing ideal conditions for one of the largest Banded Stilt breeding events ever recorded in Australia. Aerial surveys of the inland salt lakes led to the discovery of the breeding colony at Lake Torrens National Park. A field surveillance team from the Department of Environment and Natural Resources was deployed to observe the breeding birds and if needed, protect them from predatory Silver Gulls. In this paper, we describe the climatic conditions leading up to the mass breeding event and the techniques used to locate the colony. We present results from field-based behavioural observations, including the impact of Silver Gulls and the overall success of the breeding event. We also provide information from follow-up observations, including the discovery of a second, smaller breeding colony at Lake Torrens in the same year. Stilt behaviour was similar to that observed in previous studies, although the impact of gulls was lower than anticipated. Findings are discussed in the context of Banded Stilt conservation and the long-term implications of the breeding event on population viability in southern Australia.

### CONSERVING MIGRATORY SHOREBIRDS UNDER DYNAMIC THREATS

K.L. DHANJAL-ADAMS\*<sup>1</sup>, H.B. WILSON<sup>1</sup>, B.E. KENDALL<sup>2</sup>, C.E. STUDDS<sup>1</sup>, H.P. POSSINGHAM<sup>1</sup>, R.A. FULLER<sup>1,3</sup>

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In Moreton Bay over the last 15 years, at least seven shorebird species have declined by up to 79%. Population trends in Moreton Bay are therefore likely indices of declines occurring elsewhere along the flyway and are most likely being amplified by migratory connectivity. Yet our understanding of how to conserve migratory birds is remarkably poor, with few tools available for diagnosing the reasons for population change in migratory species, and even fewer available for prioritising conservation actions for migrants that are sufficiently responsive in time and space. Our work addresses these fundamental gaps in our knowledge by 1) discovering how to manage the threat of disturbance to migratory species whose populations are dynamic in time and space, 2) developing and testing a method to distinguish local from remote causes of population

upstream diversion of River Murray water resulted in a cascade of adverse ecological changes in the CLLMM. Water levels in the Lower Lakes fell below sea level, exposing harmful acid-sulphate soils, and salinity in the Coorong South Lagoon increased to >200ppt (modelled natural is 80ppt). These unprecedented conditions had a negative impact on the abundance and distribution of waterbirds as well as the fish, macro invertebrate and plant species that make up much of their diet. In order to better understand the impact of the site's hydrology on the availability of waterbird habitat, we developed Bayesian models that enable managers to predict the consequences of ecological change for waterbirds. These species-specific models characterise cause and effect relationships between habitat components and a particular measure of waterbird habitat. We demonstrate the use of these habitat models as tools for the effective management and conservation of waterbirds.

### BANDED STILTS: CROSS-CONTINENTAL MOVEMENTS BY AN EXTREME BOOM-BUST SPECIES

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Banded Stilts are iconic among Australian birds for their classic boom and bust life ecology strategy, which involves them travelling hundreds of kilometres to inland salt lakes following major rainfall events and breeding *en masse* in colonies totalling tens or hundreds of thousands to exploit rich but highly ephemeral food resources. Despite Australian ornithology's fascination with boom and bust and this species in particular, there is very little known about the strategies and cues important to this complex and risky ecological strategy, particularly in view of the threats facing the species from climate change, regulation of inland waterways, toxic waste-water storages and predation at breeding events. Early results from satellite tracking using 5 gram solar-powered tags attached to Banded Stilt at a recent breeding event demonstrate that a large number of inland ephemeral lakes, coastal wetlands and artificial salt fields play an important role as post-breeding stop-over sites for this species. Cross-continental scale movements demonstrate that the degree of interconnectedness between eastern and western Australia is likely to be much greater than previously thought and suggest that regular movements of hundreds of kilometres are commonplace for this species.

### A PINCH OF SALT: THE VALUE OF THE COMMERCIAL SALTFIELDS AS SUPRATIDAL HABITATS FOR SHOREBIRDS IN GULF ST VINCENT

CHRIS M. PURNELL

*BirdLife Australia, Adelaide Mt Lofty Ranges NRM, SA, Australia*

Gulf St Vincent has long been recognised as an internationally significant area for shorebirds, however coastal eutrophication, increased disturbance, mangrove incursion, extreme weather events and sea-level rise threaten to decrease the value of intertidal habitat. Given these threats, population monitoring and mapping of the gulf's supratidal shorebird habitats has become a conservation priority for land managers. In Gulf St Vincent, the most significant supratidal habitat is provided by a series of commercial salt evaporation ponds (salinas) found within Cheetham Salt's Dry Creek operation. Since 1976, 52 species of shorebirds have been recorded in the salt fields, nine of them in international significant numbers (>1% EAA Flyway pop). The predictable manipulation of water depth and salinity used for salt production, create variations in fluvial dynamics and benthic substrates resulting in distinct invertebrate communities that represent reliable yet diverse shorebird habitats. Consequently, the salinas provide both preferential high-tide and supplemental low-tide feeding habitats for a variety of shorebirds species, increasing the number of birds that the region can sustain and reducing the detrimental impacts of the loss of intertidal habitats elsewhere in the gulf.

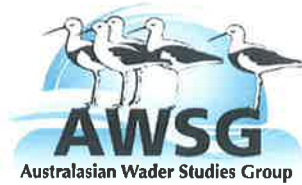
### WATER BIRD MONITORING PROGRAM ALONG CHINA'S COAST IN 2005-2012

BAI QINGQUAN, ZHANG MING, CHEN JIANZHONG, WANG FENGQIN, SHAN KAI, MENG DERONG, HAN YONGXIANG, LI JING\*, TONG MENXIU, ZHANG LIN, BO SHUNQI, YANG ZHIDONG, NI GUANGHUI, TANG QINYUAN, YANG JIN, CHEN ZHIHONG, XU ZHIWEI, ZENG XIANGWU, TIAN SUIXING, CHEUNG H.F., FION CHEUNG KA WING, WING KAN VIVIAN FU, YU YAT TUNG

*The China Coastal Water-bird Census Team*

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*China Coastal Waterbird Census* is a program conducted by volunteers with the aim of monitoring the distribution, migration and seasonal changes of waterbirds through monthly surveys along the eastern coast of China mainland. The program covers 15 sites from 11 provinces and Special Administrative Regions (Liaoning, Hebei, Tianjin, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Hong Kong S.A.R. and Hainan) and was started in September 2005. Regular monthly surveys were carried out in 11 sites and all these 11 sites are Important Bird Areas. Survey results provide more information about the migratory birds along the East Asian-Australasian Flyway. Seventy-three species of waterbird reach 1% of East Asian-



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Party

**Lake MacLeod**

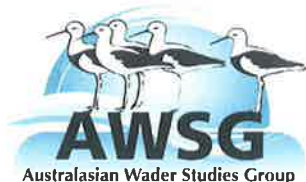
This lake is situated 10 km inland from the coast and approximately 130 km long and 40 km across at its widest point (Figure 2). The lake surface is usually dry but after sufficient rainfall water can flow into it from the Minilya and Lyndon Rivers from the north or from the south through Cardabia and Boolathana Creeks. Two permanent water bodies occur in the north, Cygnet & Ibis Pond, collectively termed “the northern ponds”. These ponds were unique in that they were fed water from the sea through subterranean flaws, up-welling through ‘vents’ in the lake floor and one of few places in the world with inland mangroves *Avicennia marina*. Many of these mangroves drowned during a flood event in 2000. The ‘flood sheet’ formed after rainfall can have a dramatic affect at opposing ends of the lake, a dry bed can be found to be under several centimetres as the wind shifts the water around the lake. This phenomenon is also common around the ponds with shifting water levels, there is no known evidence that sea tides have any influence on water levels but it may have. Lower than normal levels may be caused by brine extraction from the south of the lake for solar salt production. The surface of lake here is also

changeable with much of it unstable soft sediment, some with a harder overlay that can be treacherous and making surveys difficult. Most surveys were conducted at various points around Cygnet Pond; access has been by motorised aluminium or inflatable dingies and thereafter by foot where possible. Some areas accessed one year were found inaccessible the next. Ibis Pond is too shallow for watercraft and due to soft sediments is mostly inaccessible.

A draft plan was drawn up to nominate this area for Ramsar listing but was curtailed after strong opposition from pastoralists. Jaensch & Vervest (1990) reported 41,606 birds at Lake MacLeod during their September 1987 visit and established the lake as an important staging area for Curlew Sandpiper on their southern migration. Bird surveys were conducted in November 1999, September 2000, October 2001, January & September 2002, March & October 2003, March & November 2004, September 2005 and October 2006 (Davis 2003; Hassell 2005) (Table 1). Colin Davis led surveys till November 2004, those after by Chris Hassell. Waterfowl and shorebird number fluctuate markedly in some years, mostly due to climatic conditions or the result of climatic conditions such as the flood event of 2000.

**Table 1.** Lake MacLeod count records 1999 to 2006

Scientific name	Common name	Nov-99	Sep-00	Oct-01	Jan-02	Sep-02	Mar-03	Oct-03	Mar-04	Nov-04	Sep-05	Oct-06
<i>Limosa limosa</i>	Black-tailed Godwit	14	0	12	0	0	0	0	66	1	0	0
<i>Limosa lapponica</i>	Bar-tailed Godwit	386	18	60	54	160	3	26	65	50	1	26
<i>Numenius madagascariensis</i>	Eastern Curlew	0	1	0	0	0	0	0	0	0	0	0
<i>Tringa stagnatilis</i>	Marsh Sandpiper	3	0	43	0	10	2	1	0	3	0	0
<i>Tringa nebularia</i>	Common Greenshank	235	300	120	30	40	72	70	62	270	112	132
<i>Tringa glareola</i>	Wood Sandpiper	3	0	0	0	0	0	0	0	2	5	0
<i>Xenus cinereus</i>	Terek Sandpiper	0	0	2	0	0	0	0	0	4	0	0
<i>Actitis hypoleucos</i>	Common Sandpiper	6	2	5	2	2	7	20	2	11	11	16
<i>Heteroscelus brevipes</i>	Grey-tailed Tattler	2	0	1	0	0	0	0	0	13	0	0
<i>Arenaria interpres</i>	Ruddy Turnstone	37	10	50	2	25	2	3	6	38	14	26
<i>Calidris tenuirostris</i>	Great Knot	21	39	38	0	75	10	60	83	260	1	0
<i>Calidris canutus</i>	Red Knot	137	8	660	0	515	187	668	150	250	2	278
<i>Calidris alba</i>	Sanderling	1	1	0	0	0	0	0	0	5	3	0
<i>Calidris minuta</i>	Little Stint	2	0	0	0	0	0	1	1	1	0	0
<i>Calidris ruficollis</i>	Red-necked Stint	2350	6000	4	250	3340	6206	6440	6000	7750	4	25000
<i>Calidris subminuta</i>	Long-toed Stint	0	0	0	0	0	0	0	1	1	1	0
<i>Calidris melanotos</i>	Pectoral Sandpiper	0	0	0	0	0	0	0	1	0	0	0
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	214	100	21	3	50	23	205	8	850	295	129
<i>Calidris ferruginea</i>	Curlew Sandpiper	18392	40000	2000	70	8000	16690	26283	485	45000	1066	55000
<i>Limicola falcinellus</i>	Broad-billed Sandpiper	1	0	0	0	3	0	0	30	0	0	0
<i>Phalaropus lobatus</i>	Red-necked Phalarope	0	0	0	0	0	0	0	0	0	0	17
<i>Haematopus longirostris</i>	Australian Pied Oystercatcher	6	2	2	1	6	6	6	6	8	2	24
<i>Himantopus himantopus</i>	Black-winged Stilt	5	500	284	530	1000	79	885	230	850	3008	60
<i>Cladorhynchus leucocephalus</i>	Banded Stilt	2042	8000	0	600	6000	15645	16204	1	100000	25700	9000
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet	0	70	0	402	346	778	214	28	2315	1240	600
<i>Pluvialis fulva</i>	Pacific Golden Plover	3	0	5	0	1	0	0	0	4	0	0
<i>Pluvialis squatarola</i>	Grey Plover	31	0	40	0	14	18	5	60	21	10	7
<i>Charadrius ruficapillus</i>	Red-capped Plover	114	500	24	70	300	454	442	400	3125	402	2027
<i>Charadrius mongolus</i>	Lesser Sandplover	3	0	0	0	17	0	4	0	0	1	0
<i>Charadrius leschenaultii</i>	Greater Sandplover	12	0	3	0	35	3	6	0	515	18	68
<i>Charadrius veredus</i>	Oriental Plover	33	0	12	0	0	0	0	0	3	0	9
<i>Charadrius australis</i>	Inland Dotterel	0	0	0	0	0	0	0	6	0	0	0
<i>Erythronyx cinctus</i>	Red-kneed Dotterel	0	0	0	0	14	2	5	0	0	1	0
<i>Vanellus tricolor</i>	Banded Lapwing	0	4	0	0	3	0	0	0	0	0	0
<i>Turnix velox</i>	Little Button-Quail	0	0	0	0	0	0	0	0	0	0	0



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## SOUTH AUSTRALIAN WADER STUDIES – AN OVERVIEW

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This overview of wader studies in South Australia comprises contributions from people working in the field who have some connection with the Australasian Wader Studies Group (AWSG). It is biased not only towards the interests of those contributors but to the issues of the day, with the strong slant towards the Coorong reflecting the level of community concern for the health of the Murray/Darling system. It must be remembered that this is only part of the picture of the accumulation of wader data in South Australia. Locations referred to throughout the review are shown in Figure 1.

The AWSG Hooded Plover monitoring program is not included in this review, despite SA being actively involved from its commencement in 1980. The AWSG Population Monitoring Program (PMP) is outlined as part of this review. Of the 33 sites of importance identified by Watkins (1993) only 11 are still being regularly monitored. Others may be being monitored irregularly or informally. One of our challenges is to encourage wader enthusiasts to check their notebooks and share the data they have.

South Australia has five Ramsar sites: Banrock Station Wetland Complex (1,375 ha), Bool and Hacks Lagoon (3,200 ha), Coongie Lakes (1,980,000 ha), Riverland (30,600 ha) and The Coorong, Lake Alexandrina and Lake Albert (140,500 ha). This report only covers two of these, and only one of those in any depth. The important sites of the upper Spencer Gulf are only mentioned briefly, as part of contributions on banding and counting. This is not to imply that there is no research available on the areas of the state not reviewed.

It is hoped that this review will initiate a system that will see the pooling of wader research across the state, regardless of the source of the data. University research, wetlands operated by private enterprise, the SA Department of Environment and Natural Resources, volunteer effort and groups such as the South Australian Ornithological Association, the AWSG and the Victorian Wader Study Group can all contribute to the overall accumulation of accessible data that will provide a solid basis from which informed decisions affecting flyway management can be made.

The overview consists of 15 papers and short notes, referred to as chapters for ease of reference, which conveniently considered in six groups. A brief summary of the chapters is given below.

### Eyre Peninsula

1. Jane Cooper describes the counting project she started in 1979. Initially covering a 200 km section of the isolated west coast of the Eyre Peninsula, it has been extended to cover all of the important wader sites of the peninsula. Targeted monitoring of resident species is also undertaken.

### Gulf St Vincent

2. David Close makes an assessment of the wader sites within the Gulf. He notes the use of stormwater to create wetlands north of Adelaide. He points to the need for further counting to determine whether an observed decline in the number of palaeartic waders is significant.

### The Coorong, Lake Alexandrina and Lake Albert

3. Waterbird research in the Coorong region, South Australia: past, present, future: David C. Paton & Daniel J. Rogers. The University of Adelaide is involved in research into many aspects of the Coorong environment.
4. Waterbird Monitoring – The Coorong and Lakes Alexandrina and Albert Ramsar Site, 2001–2004: Russell Seaman. A project commenced in 2001, and ongoing, surveying almost 60 sites along the shorelines of the Coorong, and Lakes Alexandrina and Albert, to determine the species richness and abundance of all waterbird species.
5. The Birdaking Project: Rob Tanner. Shorebird counts in a difficult to access stretch of the Coorong. This project is an example of how an enthusiastic volunteer can contribute to the understanding of an area.
6. Lake Alexandrina and Lake Albert: John Eckert. In contrast to the problems of increasing salinity facing the Coorong, the lakes are facing problems caused by the freshening of the system.

### The Lower South East

7. Bool Lagoon. A personal look at The Bool, with the sad message that this important wetland has only received water from the Mosquito Creek Catchment once in the last 10 years.
8. Wader Sites of the Lower South East: Maureen Christie. A review of coastal and near coastal sites from the Victorian border through to The Coorong.

### Resident Waders

9. Banded Stilt *Cladorhynchus leucocephalus* Breeding at Lake Eyre North in Year 2000: Chris Baxter. A review of the series of breeding attempts at Lake Eyre North in 2000. This breeding event produced about 50,000 young. This is the author's précis of a longer paper of the same name which appeared in the *South Australian Ornithologist*. A small breeding event of 2005–06 in The Coorong is the subject of a separate article in this issue of Stilt (Gosbell & Christie 2006).
10. Declining Hooded Plover population on Kangaroo Island, South Australia: Terry Dennis. Chronicling the

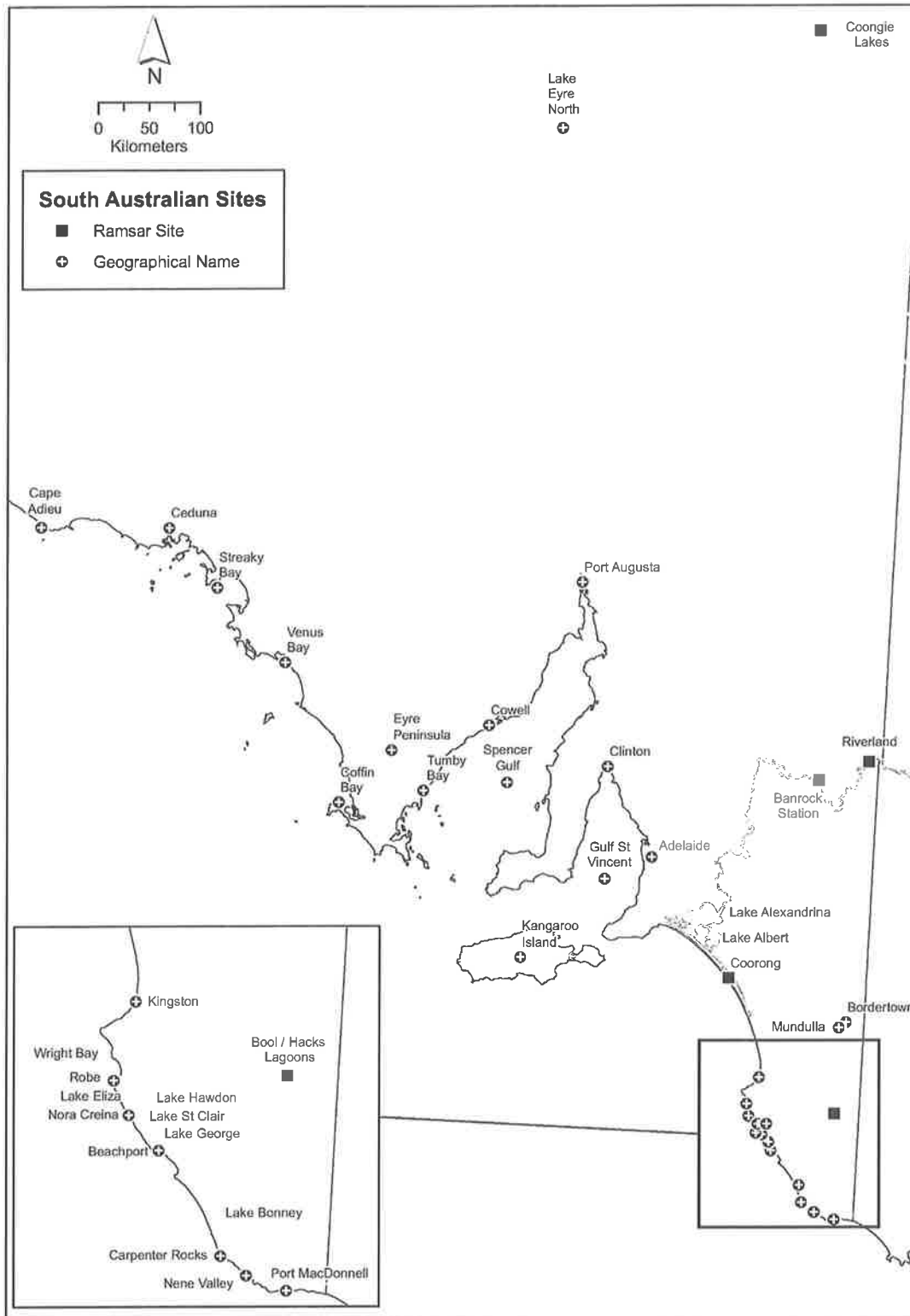


Figure 1. South Australian water sites.

pressures that beach nesting species are facing along an increasingly urbanised coast. This is the author's précis of Dennis & Masters (2006).

11. Conservation of the Bush Stone-curlew *Burhinus grallarius* in the South East of South Australia: Dan

Harley. Incredibly the stronghold of this species in the South East is within the town boundaries of Mundalla and Bordertown.

**Research Resources**

12. Waders in the collection of the South Australian Museum: Philippa Horton. Museum collections become increasingly important as researchers use modern tools such as DNA analysis.
13. Banding and flagging waders in South Australia: Maureen Christie. A summary of banding activities in South Australia since the commencement of banding here in 1957.
14. The AWSG monitoring program in South Australia: Ken Gosbell.
15. Wader-related references for South Australia: David Edey.

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**CHAPTER 1. EYRE PENINSULA****A CHRONOLOGY OF SHOREBIRD SURVEYS ON THE EYRE PENINSULA**

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**EARLY YEARS**

I first started monitoring shorebirds on the Eyre Peninsula and surrounding areas in 1979 when I moved to Streaky Bay, and was asked by David Close to survey likely shorebird sites in the area for the Australasian Wader Studies Group (AWSG) National Wader Count. I monitored these sites, using AWSG National Wader Count Protocols, a minimum of three times a year over the following 27 years. Results from these counts were used in preparation of Lane (1987) and Watkins (1993). Streaky Bay, Baird Bay, Sceale Bay, Tourville Bay, Murat Bay, Coffin Bay wetlands, Gunyah Beach and Sleaford Bay were identified as areas containing internationally significant populations of at least one species of migratory shorebird (Watkins 1993). Within the Spencer Gulf ten species of international significance and 12 species of national significance were identified by Watkins (1993), making it the highest-ranked site in South Australia for the number of species of international significance.

**INCREASING COVERAGE, AWARENESS AND SUPPORT**

In 1993 Tod River Estuary, Louth Bay to Tumby Bay and Tumby Bay to Pt Neill were added to the sites visited (Table 1). These sites have a large proportion of resident shorebirds, notably Hooded Plover, and few migratory shorebirds. Two inland sites, Pillana Lagoon and Lake Malata, known to be used by shorebirds, were also added at this time.

In 2000 I was invited to join Jim Wilson's team on Eyre Peninsula (EP) as part of a state-wide count of shorebirds in South Australia (Wilson 2000). As a consequence, I worked at raising the profile and importance of shorebird monitoring on Eyre Peninsula, writing articles, creating interpretive displays and posters for Field Days and forums, and talking to community groups.

In 2002–2003 a further comprehensive count of the Eyre Peninsula was organised by a small group of amateur bird watchers who had submitted data for the AWSG counts in the 1980s; Jane Cooper, Peter Needle, Trevor Cox and Colin Gill. The Ark on Eyre Small Grants Fund (DEH SA) covered our fuel expenses and the purchase of a telescope. That year we counted from Cape Adieu in the Far West, to Franklin Harbour on Eastern Eyre Peninsula. Although one of the aims of the trip was to spend more time counting the Ceduna Bays, many of the sites there are difficult to reach by land and require boat access.

Since 2004 there has been increased support from government agencies, NGOs and local rangers. The 2004–2006 *Resident Sea/Shorebird Nesting Count Venus Bay & Baird Bay* program by the Friends of Streaky Bay District Parks was initiated by the Senior Ranger, South Australian National Parks and Wildlife Service (NPWSA), at Venus Bay Conservation Park, in collaboration with the Friends of Streaky Bay District Parks, and funded by the Wildlife Conservation Fund (DEH SA). The aim is to provide accurate baseline data on the number and location of nesting seabirds and shorebirds, most significantly Pacific Gulls,

from the metropolitan area of stormwater and treated sewage, a flow which has killed extensive areas of seagrass, and possibly caused the release of silt. Further comprehensive counts of the Gulf are needed to determine whether the decline observed at the three main sites is significant. The counts should be done in the period of peak numbers, January to mid-February.

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## CHAPTER 3. THE COORONG, LAKE ALEXANDRIA AND LAKE ALBERT WATERBIRD RESEARCH IN THE COORONG REGION, SOUTH AUSTRALIA: PAST, PRESENT, FUTURE

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The Coorong and Lower Lakes lie near the mouth of the Murray River, and provide a diverse range of wetland habitats that are used by waders and other waterbirds. The Coorong wetlands consist of a large lagoonal body of water that stretches from the Murray Mouth some 110 km to the southeast along the coast. The lagoon is relatively shallow, rarely deeper than 3 m, can be up to 5 km wide, and is protected from the Southern Ocean by the Sir Richard and Younghusband Peninsulas. Salinities in the Coorong gradually increase from estuarine near the Murray Mouth to hypermarine (saltier than sea water) in the south. As such, the Coorong is an excellent example of a reverse estuary. On the other hand, Lakes Alexandrina and Albert are now permanently fresh and have been since the 1940s, following the construction of the Barrages in the late 1930s. The Barrages prevent freshwater leaving the Lakes and entering the northern Coorong except when the Barrage gates are open. Water levels in the lakes are now maintained at a relatively constant level of around 0.7 m AHD. The Barrages also prevent marine waters moving upstream into the southern sections of the two Lakes, so with the construction of the Barrages the estuarine regions of the River Murray were greatly reduced.

The combination of fresh, estuarine and marine wetlands supports a diversity of waterbird communities and this diversity of habitats and birdlife was the main reason the Coorong and Lower Lakes were listed as a Wetland of International Significance under the Ramsar Convention in November 1985. In the 1980s the Coorong supported large numbers of migratory and endemic waders, various piscivorous birds, including pelicans, terns, grebes and cormorants, as well as waterfowl, particularly teal, shelduck and swans. For example, more than 60,000 Red-necked Stints, 50,000 Sharp-tailed Sandpipers, 40,000 Curlew Sandpipers and 5,000 Red-capped Plovers regularly used the

Coorong during summer. In addition, over 70,000 Banded Stilts, 60,000 Hoary-headed Grebes, 50,000 Grey Teal and 7,000 Australian Pelicans used the Coorong in some years, the latter breeding on islands in the southern lagoon. Other significant species included Whiskered, Fairy, Caspian and Crested Terns – the last three species also breeding in the southern Coorong.

Counts of shorebirds using the Coorong commenced in the 1980s. Many of these were summer counts conducted by the AWSG (summarised in Watkins 1993, Jaensch & Barter 1988). The University of Adelaide also counted waders and other waterfowl using the southern lagoon of the Coorong in different seasons during 1984–85. These surveys are especially useful for making comparisons with more recent censuses, and give us the best picture regarding declines in the use of the Coorong by many waterbird species (see below).

In addition to these waterbird counts, a number of researchers have also been interested in other biotic components of the system, many of which have a direct bearing on the quality of the Coorong as waterbird habitat. This research included studies into the physical nature of the Coorong (e.g. Noye 1973), as well as the distribution of submerged aquatic plants, macro-invertebrates and fish fauna along the Coorong (e.g. Geddes & Butler 1984, Geddes 1987). The latter work showed that, as salinities became increasingly hypermarine along the Coorong, the estuarine flora and fauna were replaced by species better suited to the saltier conditions. Other research investigated the performances of key species of fish like the Small-mouthed Hardyhead *Atherinosoma microstoma* to changes in salinity (Molsher *et al.* 1994). Paton (1982, 1986) documented some of the food chains of the water birds in the Coorong, and Paton *et al.* (2001) also investigated relationships between migratory waders, mudflats and

aquatic food resources in the estuarine regions of the Coorong.

Other research investigated the potential for human recreational activities (various types of boating, as well as walking along the shore) to disturb waterbirds, including shorebirds in the Coorong (Paton *et al.* 2000). Buick & Paton (1989) deployed artificial nests and estimated that off-road vehicles driving along the ocean beach of Youngusband Peninsula had the potential to destroy at least 80% of Hooded Plover nests on the beach. This led to a seasonal closure of an extensive section of the ocean beach during the plover's breeding season.

In the mid- to late 1990s, monitoring programs were established for key assets – including birds – that might be affected by the influx of freshwater into the hypermarine southern Coorong from the Upper South East Drainage scheme. The scheme had Federal Government approval to release a ten-year rolling average of up to 40 gigalitres of freshwater annually into the southern Coorong. There were concerns that doing this could ultimately lead to freshening the southern Coorong to such an extent that much of the hypermarine systems of the Coorong could be lost (e.g. Paton 2000, 2002a). There were also concerns that the water coming off agricultural land could bring significant nutrients and also small levels of pollutants (e.g. heavy metals) that might accumulate in the Coorong. Some of the aquatic invertebrates inhabiting the southern Coorong are sensitive to small amounts of these pollutants (Brooks *et al.* 1995). The extent to which this could happen depends on the volumes that were released. To date the volumes are typically around 10 GL and, although dampening the salinities in the immediate vicinity of the Salt Creek outlet, there are no other measurable impacts.

Counts of waterbirds and waders over the last five years (e.g. Wilson 2001; Gosbell and Christie 2004, 2006a; Paton 2005; Gosbell & Grear 2005) have demonstrated significant reductions in the numbers of shorebirds and other water birds in the Coorong. For example, Gosbell & Grear (2005) report an 80% decrease in the numbers of migratory shorebirds between the early 1980s and 2001 (based on AWSG surveys), particularly for those species for which the Coorong is internationally significant (e.g. Red-necked Stint, Sharp-tailed Sandpiper and Curlew Sandpiper). Other species have also shown significant declines, including Red-capped Plover from 5,700 to fewer than 1,000, and Fairy Tern from 1,500 to 300 (Paton 2005). Even Australian Pelicans have declined dramatically, and in recent years few if any have bred, yet in the 1980s to 1990s several thousand bred annually in the Coorong. These declines in numbers of birds are not unexpected given reductions in key components of the birds' food chains. For example, in the southern Coorong the key aquatic plant *Ruppia tuberosa*, and the key species of fish, the Small-mouth Hardyhead *Atherinosoma microstoma* have almost disappeared (Paton 2005).

The more recent waterbird surveys have also confirmed the global importance of the Coorong to a range of waterbird species. Based on complete annual counts between 2000 and 2006, Paton *et al.* (in prep.) found that 12 waterbird taxa (species or subspecies) use the Coorong at levels of abundance that meet Criterion 6 of the Ramsar Convention

(i.e. >1% of the global population is regularly found on the site), and that, for many of these taxa, abundance levels well exceed this criterion. For example, up to 36% of the estimated global population of Banded Stilts were found on the Coorong lagoons in January 2006; while, among migratory shorebirds, up to 21% of the global population of Sharp-tailed Sandpipers have been recorded (based on global population estimates provided by Wetlands International [2002]). The value of the Coorong to shorebirds has also been confirmed by the AWSG censuses (Gosbell and Grear 2005), but the significance of the Coorong is not limited to shorebirds; Grey Teal, and the nationally threatened Fairy Tern, also continue to use the Coorong in significant numbers (Paton 2005).

Much of the recent ecological research in the Coorong has focussed on the links between waterbird habitat and the hydrology of the Coorong and Lower Lakes. Reductions in flow from the Murray-Darling Basin to the Coorong have drastically altered the physical and biotic nature of the wetlands, such that their value as habitat to different waterbird species has changed. The region is listed as one of six Significant Ecological Assets along the River Murray by the Living Murray scheme of the Murray-Darling Basin Commission (Murray-Darling Basin Commission 2005). Reduced flows have a number of impacts, including increasing the probability of the Murray Mouth closing, resulting in the loss of a tidal prism at the northern end of the Coorong, which has serious implications for available foraging habitat for shorebirds (Paton 2002b). Reduced flows also result in higher salinities and alter the seasonality of water depths in the southern Coorong. Higher salinities and the maintenance of inadequate water depths in recent years have altered the food-webs for the Coorong, particularly those of the southern Coorong with the near-extirpation of two key food resources: the aquatic macrophyte *Ruppia tuberosa*, and the only fish species that can inhabit the hypermarine southern lagoon, the Small-mouthed Hardyhead.

For some waterbirds, the loss of these key species has obvious implications for the piscivores that nest in the south lagoon; there are few if any obvious alternative food sources to Hardyheads, while the loss of *R. tuberosa* eliminates the primary food source for waterfowl. However, concurrent booms in populations of Australian brine-shrimp *Parartemia zietziana* and the chironomid *Tanytarsus barbitarsus* make the link between salinity, water depth and food availability more complex than the simple loss of key food species might suggest. Some species of birds have benefited from these changes. For example, Banded Stilts and Red-necked Avocets have not only increased in abundance, they have also bred in the southern Coorong for the first time (Gosbell & Christie 2006b; Paton *et al.* unpubl.).

While the links between Murray-Darling flows and the ecological status of the Coorong are now established, further ecological research is required to predict the response of the Coorong to alternative water management scenarios. As a result, an ambitious multidisciplinary research program (CLLAMMEcology) has been recently established under CSIRO's *Water for a Healthy Country* flagship program. CLLAMMEcology is a collaborative research program

between the University of Adelaide, Flinders University, SARDI Aquatic Sciences and CSIRO. Fish and macro-invertebrate biologists, botanists, experts in trophodynamics, ornithologists and modellers are all involved. The ornithologists will be collecting data to predict the responses of key bird species to changing conditions in the Coorong. The aim of the work is to be able to predict the benefits that will accrue if and when water for environmental purposes is returned to the River.

In addition to documenting changes in distributions and abundances of waders and other waterfowl along the Coorong (as has been measured in the past), the foraging performances of the birds will also be documented and used to assess the quality of habitats from a bird's perspective. These changes in behaviour will be linked to measured changes in their food supplies. Such fine-scale measures will become particularly important in determining the response of migratory shorebirds, whose abundance might change as a result of modifications to habitats away from the Coorong (both breeding and staging areas, and alternative overwintering areas).

While the situation for shorebirds in the Coorong continues to look grim, the increased knowledge that will be provided by the CLLAMMEcology project will mean that we at least have the right tools for the community (through its politicians) to make informed decisions on the Coorong's management. Hopefully these decisions will result in the Coorong's restoration as a truly significant, and remarkable, wetland system.

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### The Future

A regional shorebird conservation group called Friends of the Shorebirds South East was formed in 2005. This group aims to:

- Continue the current banding, flagging and counting programs;
- Improve public awareness of shorebirds, and issues affecting them;
- Respond to any localised threats, especially those affecting nesting shorebirds;
- Expand the number of sites being counted regularly;
- Seek to have a protocol developed that recognises the importance of over-wintering areas to migratory shorebirds; as some of these birds move to New Zealand in the second year of life the argument could be made that they are staging sites;
- Contribute to local government, NRM Boards and DEH programs by providing information on shorebirds and their needs.

The coastal area in the South East of South Australia is coming under increasing pressure, with land formerly used for farming being subdivided for residential and rural living. With increasing population in coastal areas and increasing tourism, increased pressure on our beaches is putting nesting waders at risk. In addition, urbanisation of the coast makes it more difficult to implement effective fox and feral cat control due to restrictions on bait placement.

One of the consequences of sustained, localized disturbance is that waders may shift to alternative feeding sites. A wader must feed to meet its immediate energy requirements and, if disturbance reduces food intake rate below a critical level, the birds must emigrate or starve (Cayford 1993). The significance of disturbance to roosting and foraging waders in the South East has not been quantified and a project to assess disturbance is being undertaken this summer by Friends of Shorebirds SE, at the

initiative of WWF and with the support of the Department of Environment. Two sites have been selected for monitoring – Danger Point and Pethers Rocks, Canunda. Disturbance to nesting shorebirds will also be investigated. It is interesting that, at the artificially created site at the Port MacDonnell breakwater, which is in the centre of town, human disturbance, including dog walking, came first. But, despite these disturbances, waders feed on reefs exposed at low tide, and roost in piles of wrack along the foreshore.

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## CHAPTER 9. RESIDENT WADERS

### BANDED STILT *CLADORHYNCHUS LEUCOCEPHALUS* BREEDING AT LAKE EYRE NORTH IN 2000

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### INTRODUCTION

The Banded Stilt *Cladorhynchus leucocephalus* is an endemic Australian wader that specializes in breeding on small isolated islands in vast ephemeral inland salt lakes. Its non-breeding distribution is mainly coastal and inland South Australia, Western Australia and Victoria (Marchant and Higgins 1993). Total population estimates range from 133,000 (Robinson and Minton 1989) to *c.* 200,000 birds (Marchant & Higgins 1993).

Banded Stilts feed almost exclusively on brine-shrimps *Paratemia* sp., and breed irregularly and intermittently when water conditions are suitable, generally immediately after heavy rains. They typically nest in close-packed colonies numbering thousands on small islands in large inland salt lakes in South Australia (Lakes Eyre, Torrens and Callabonna) and Western Australia (Lakes Grace, Marmion, Ballard, Barlee and others). Generally the clutch is three or four (occasionally two or five) eggs in a sand scrape. One or

two days after hatching, the precocious young are escorted to water by adults to begin feeding. They generally form large juvenile crèches with few adults present (Marchant & Higgins 1993).

### THE LAKE EYRE BREEDING EVENT IN 2000

From early March to late August 2000, 34 field trips were undertaken to Lake Eyre North (LEN) to monitor and manage the Banded Stilt breeding population for National Parks and Wildlife South Australia (NPWSA). Field work consisted of two main activities: (1) Aerial and ground monitoring of all Banded Stilt movements – particularly those associated with breeding; and (2) Monitoring and managing Silver Gull numbers and gull predation at or near Banded Stilt breeding colonies. Aerial surveys and transportation of field crews to remote LEN islands were carried out using NPWSA Cessna aircraft and a chartered Bell Jet Ranger helicopter.

Banded Stilts started nesting on Hughes Island, LEN, in late February 2000. By the start of April it was determined that Hughes Island was host to c. 18,000 pairs of breeding Banded Stilts. Unfortunately, this breeding event failed due to severe predation of stilt eggs and young by 2,000+ pairs of Silver Gulls breeding nearby. Only 322 stilt chicks were observed to reach the water and they were considered to be at high risk of gull predation.

Banded Stilts were observed nesting a second time on Hughes Island on 25 May 2000. About 4,000 stilt nests containing freshly laid eggs were being incubated by adults. Unfortunately, once again hungry gulls were harassing sitting adults and the stilt nests were under constant threat. Large numbers of gulls were ever intent on scavenging stilt eggs to feed themselves and their hungry chicks and runners at the northern end of the islet. The stilt colony was destroyed by gull predation and deserted by 31 May 2000 (pers. obs.). Sadly, this was the second failed Banded Stilt breeding event in year 2000.

NPWSA personnel arrived on Hughes Island one day too late to intervene and protect the breeding stilts. A trial baiting of Silver Gulls was then carried out using alpha-chloralose bread baits distributed within the gull breeding rookery. The purpose of the trial baiting was to gauge the effectiveness of this anaesthetizing narcotic drug in order to be ready to act if a third stilt nesting attempt were to occur. The trial was successful and 270 Silver Gulls were killed; they were buried on the islet.

On 4 July 2000, an estimated 18,000 pairs of Banded Stilts started nesting on Ibis Island, LEN, c. 30 km east of Hughes Island. NPWSA acted promptly as it was critical that the stilt nesting succeeded this time. Water levels in LEN were drying up and hence the time left for this opportunist breeder to successfully recruit large numbers of young into its population was running out. During 6–8 July a NPWSA team, assisted by volunteers, prepared and distributed 6,000 alpha-chloralose bread baits into the breeding Silver Gull colony on North Ibis Island. This baiting was enormously successful with most of the gulls present being killed.

Banded Stilt nesting was estimated to have started on Ibis Islet about 27 June and a 19–21 day incubation period meant that first young would appear about 15–17 July. Stilt nesting

proceeded without mishap and first chicks were indeed noted in nests on 17 July. The first chicks left their nests for the brine-shrimp-rich waters of LEN on 19 July. This nesting event was monitored very closely by NPWSA and an estimated 50,000 advanced young were dispersed throughout the shallows of Southern LEN (mostly Belt Bay and ABC Bay) by 28 August 2000 (pers. obs.). Dispersal of most adults and young from LEN to permanent wetlands further south started in early September as LEN continued to dry up.

On 27 July 2000, just when the first nesting event on Ibis Island was ending, a second wave of nesting commenced, representing the fourth breeding attempt by Banded Stilts for the year. By 1 August the colony had increased to c. 5,000 pairs, but alas the lake dried back very quickly and the breeding stilts abandoned their nests about 11 August 2000.

### CONCLUSIONS AND RECOMMENDATIONS

It is generally accepted that maintaining a healthy population of Banded Stilts, which breeds only irregularly on vast ephemeral inland salt lakes, is dependent on achieving outstanding breeding success when the opportunity arises, i.e. during the boom or bust cycle (Minton 1989). The losses inflicted by Silver Gulls on Banded Stilt eggs and recently hatched young at LEN in the year 2000 indicate their predatory capabilities. These events clearly illustrate the magnitude of the problem that conservation managers face in protecting future Banded Stilt breeding colonies from Silver Gull predation.

A Banded Stilt Management Plan and an Action Plan for Banded Stilt Breeding Success, would provide wildlife managers with clear guidelines on how to best manage this species. To achieve this there needs to be immediate and ongoing funding and support for scientific research into this poorly understood species. It may be wise to list this species as nationally vulnerable until further scientific research reveals its exact conservation status.

The reduction and ongoing control of Silver Gull populations at state and national levels would be a major boost to the breeding success of Banded Stilts. Primarily, a Silver Gull Management/Action Plan needs to be developed and implemented to facilitate the successful reduction of Silver Gull numbers artificially inflated by scavenging from rubbish tips, aquaculture, parks and gardens etc.

It is strongly recommended that the conservation initiatives mentioned here are formulated and implemented in the near future. There is a definite need to be proactive in protecting Banded Stilt populations, particularly during sensitive and all important breeding events, to ensure the long-term conservation of this magnificent Australian endemic species.

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## THE BREEDING OF BANDED STILT AND RED-NECKED AVOCET IN THE COORONG, SOUTH AUSTRALIA: DECEMBER 2005 – FEBRUARY 2006.

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In July 2005, a large roost of 100,000 Banded Stilt *Cladorhynchus leucocephalus* was observed in the South Lagoon of The Coorong. In January 2006 there was evidence of some breeding having taken place with the observation of several young chicks in the care of adult birds. During the annual AWSG wader survey undertaken on 4 and 5 February 2006 a count of 1,006 juvenile Banded Stilt was made. In January Red-necked Avocet *Recurvirostra novaehollandiae* were also observed breeding along the margins of the South Lagoon. This is the first time that either of these species has bred in the Coorong. The conditions in the Coorong have progressively deteriorated over the last eight years due to the lack of freshwater inflows from the Murray River leading to extreme hypersalinity in the South Lagoon with resultant change in environmental conditions. This caused a large hatch of brine shrimp and an abundance of other food sources such as chironomid larvae. Several attempts were made to find the breeding colony of the Banded Stilt and to assess the degree of success of this event. In addition, teams from Victoria and South Australia banded and flagged a total of 334 chicks. While these events are interesting, they result from a severe worsening of water quality conditions in the Coorong exacerbated in recent years by the lack of river flows over the barrages. While this problem persists, it is essential that monitoring the water quality and biodiversity throughout the Coorong is undertaken to provide information for land and water managers to improve this critical situation and to ensure the restoration of the values which made it a Ramsar site.

### INTRODUCTION

The Coorong is a body of water, some 140 kilometres long, confined by the coastal dunes of the Younghusband and Sir Richard Peninsulas. The Coorong is the natural drainage point for the extensive Murray-Darling Basin. The Ramsar Convention accorded the Coorong and Lakes Alexandrina and Albert Wetlands the status of Wetland of International Importance in 1985. The national and international significance of the site has recently been further acknowledged by it being nominated as one of six Significant Ecological Assets within the river Murray catchments as part of the 'Living Murray Initiative' (DWLBC 2005). The area is the traditional home of the Ngarrindjeri people for whom the land and waters of the site are a living body (Ngarrindjeri Ramsar Working Group 1999). See Figure 1 for map.

The Coorong is separated into the North and South Lagoons by rocky shallows and a narrow connection at the Needles and Parnka Point. The lagoons are relatively shallow ranging from mudflats to water 2 to 3 metres deep and vary in extent both with the season and the tide. Although it is a coastal lagoon with an estuarine influence, it is not a typical estuary. Fresh water from the River Murray occurs near the barrages and Mouth while salinities generally increase with distance from this area, particularly in the South Lagoon. For this reason it can be considered a 'reverse estuary' (Geddes 2003). The ecology of the Coorong is essentially influenced by the flow of water from the barrages at the Murray Mouth, the tidal signature at the Mouth, and any inflows from Salt Creek to the South Lagoon. In February 2006 the salinity levels of the South Lagoon were at historically high levels and had a significant impact on the aquatic biota and dependant birdlife.

The first evidence of a possible breeding event was when mating was observed early in December. In early January, Banded Stilt chicks were sighted by a local resident following which extensive searches for breeding colonies were undertaken. These were continued as part of the scheduled population survey of shorebirds (waders) in the Coorong that the Australasian Wader Studies Group (AWSG) undertook in February 2006. A report of this survey was published in May 2006 (Gosbell & Christie 2006). Two of the key observations of the surveys were first, the large number of Banded Stilt *Cladorhynchus leucocephalus* present in the South Lagoon and secondly, the breeding activity of both Banded Stilt and Red-necked Avocet *Recurvirostra novaehollandiae*. The initial objective of the surveys was to ensure the safety of the breeding colony and to arrange any predator control that was considered necessary. Also, as this is thought to be the first record of such breeding events in the Coorong, there was the added objective of establishing the nesting behaviour, distribution and breeding success of these species. The opportunity was also taken to band and leg flag Banded Stilt to assist the study of future movements. The banding was carried out by the Victorian Wader Study Group (VWSG) and Friends of Shorebirds SE.

### Banded Stilt

The Banded Stilt is an endemic Australian wader that is mainly found in Western Australia (WA), South Australia (SA), Victoria, and, to a lesser extent, New South Wales in both coastal and inland locations (Marchant & Higgins 1993). The eastern population is thought to be separate from the Western Australian population (Minton *et al.* 2000). The total population estimate is 206,000 (Watkins 1993) with the sites of significance being The Coorong, SA, 77,000; Lake

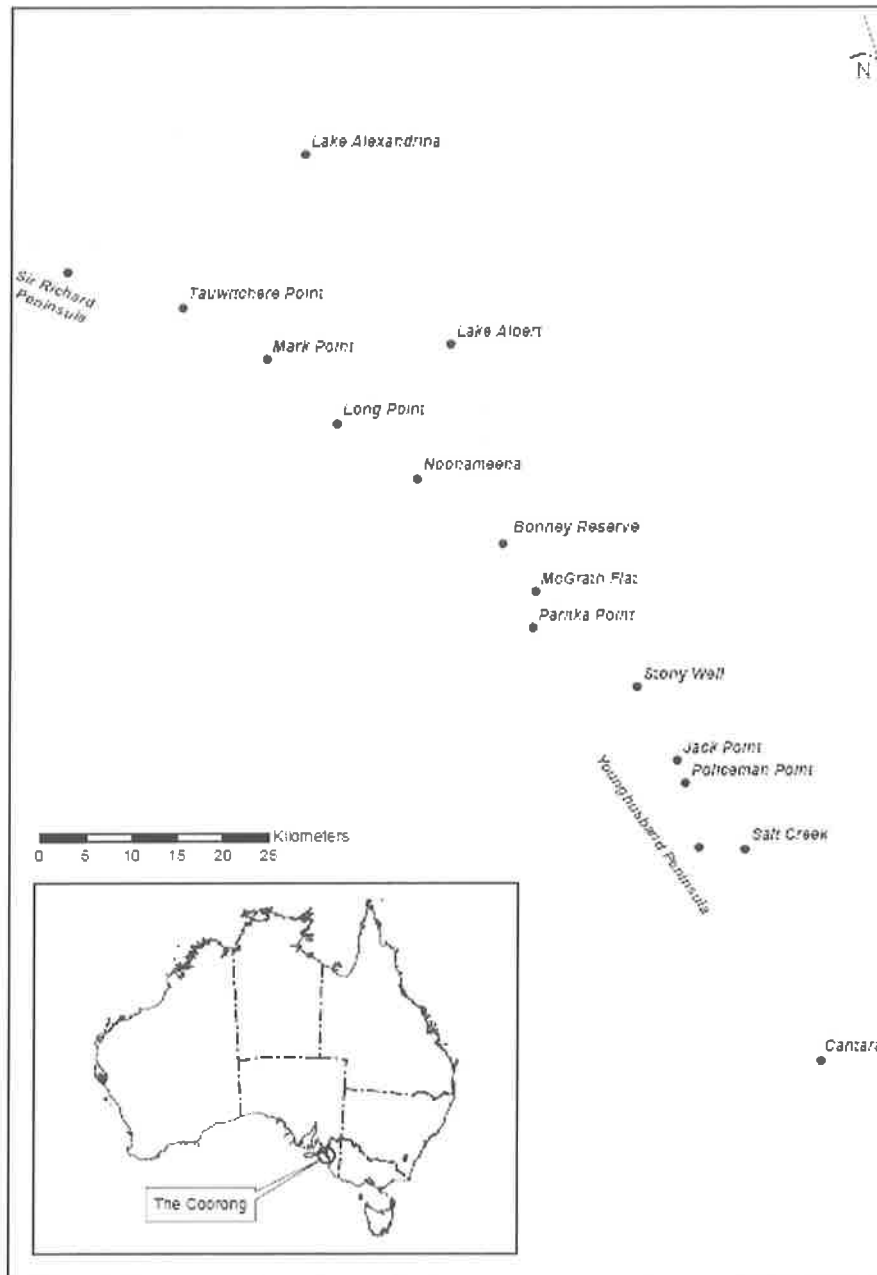


Figure 1. Map of Coorong.

Eyre, SA 30,000 and up to 45,000 birds in over 23 sites in WA (Marchant & Higgins 1993). When not breeding, large compact flocks in the tens of thousands are found in coastal or near coastal shallow lakes, saltfields and tidal mudflats or saltmarsh. They are nomadic and dispersive, their movements influenced by the effect of weather on water levels, salinity and food availability which includes crustaceans, insects and vegetation. Movements are often dictated by the presence of their major food which is brine-shrimp, *Parartemia* sp. (Marchant & Higgins 1993, Hayman *et al.* 1998, Baxter, 2003). They are sporadic, opportunistic breeders usually travelling to large inland salt lakes such as Lake Eyre, Lake Torrens or Lake Callabonna in SA

following heavy rains where they form huge colonies on low islands (Minton *et al.* 2000, Minton 1989, Bellchambers & Carpenter 1992). A number of inland lakes in WA have been recorded as supporting breeding colonies of up to 179,000 nests. They breed on small islands in lakes, sometimes on sandspits or on stony soil. The clutch size is generally one to five, usually 3–4 eggs in a scrape in sand (Robinson & Minton 1989; Marchant & Higgins 1993). Chicks remain at the nest until all eggs have hatched, then leave to form large crèches, usually within one to two days of hatching. The white downy chicks are precocial and are fully feathered at six weeks.

Banded Stilt are recorded as having bred in SA in only six of the past 70 years and these events have been restricted to Lake Callabonna, Lake Eyre and Lake Torrens (Baxter 2003). There are no confirmed records of breeding at coastal locations such as the Coorong. There is, however, a reported sighting by a fisherman (Glen Hill pers. comm.) of a small breeding event (c. 50 chicks) in April 2005 in an area similar to that observed in this report.

### Red-necked Avocet

The Red-necked Avocet is an elegant endemic wader with an unmistakable long, slender strongly-upcurved black bill, diagnostic chestnut head, white body and black and white wings (Hayman *et al.* 1986). They are gregarious and are typically encountered in large flocks in freshwater, brackish or hypersaline waters including saltfields (Marchant & Higgins 1993). They are often found in company with Banded Stilt. They occur largely in the southern coastal areas between Melbourne and Perth.

Like the Banded Stilt they are opportunistic breeders and are dispersive in response to rainfall and changing water levels. They breed in a variety of habitats ranging from flooded paddocks to inland salt lakes on low islands; nests are also variable but typically on bare ground or low vegetation scantily lined with vegetative or shell material. They breed in anything from single pairs to colonies of up to 150 pairs (Marchant & Higgins 1993). The total estimated population is 107,000 (Watkins 1993) with the highest recorded counts being Lake Eyre, SA, 95,000; far northwest lakes of NSW, 6,850; and the Coorong, SA, 5,400 (Lane 1987). The clutch size is usually four eggs and the chicks are precocial and leave the nest at hatching, following the parents who feed them. Red-necked Avocet are recorded as having bred at similar inland lake sites to those detailed for Banded Stilt. There are no known records of them breeding in the Coorong proper, but breeding has been recorded in a samphire swamp near Dog Lake, which is part of the Coorong & Lakes Ramsar site (Anon 2000).

There are three historical records of breeding activity in the Coorong area. Arnold (1927) reports breeding activity on Hindmarsh Island in 1926 but found no nests before leaving the island. His host's record of the birds of the island (Newell 1927) does not mention avocet breeding so maybe the attempt was unsuccessful. The other record is a clutch of four eggs in the S.A. White collection (Philippa Horton pers. comm.), probably taken by White himself, from between Meningie and Cooke Plains in September 1924. In wet years Avocet are known to have bred in saline areas of the Lower South East around Naracoorte (J. Bourne pers. comm.).

### Conditions in the Coorong 2005/2006

The major factor impacting on the aquatic environment is salinity which varies from fresh to brackish in the Lakes to hypersaline conditions in the South Lagoon where the influences of tides and freshwater inflows are negligible under current conditions (see Figures 2 and 3). Relative salinities between North and South Lagoons fluctuate seasonally between winter and summer (see Figure 2). While there has been a general decline in the health of the Coorong

since 1981, this has been more rapid since 2001 with salinities in the southern lagoon now exceeding four times that of sea water (36 mg/l) (Figure 3). This has been exacerbated by the extended drought in south-eastern Australia since 2000. The lack of freshwater inflows and lack of tidal influence south of Pelican Point has progressively led to the Coorong lagoons acting as a sink for sea water. This has caused a severe decline in the abundance and distribution of key estuarine flora and fauna species particularly in the southern lagoon (Phillips *et al.* 2005). These hypersaline lagoons with salinities exceeding 100 parts per thousand total dissolved solids (ppt TDS) have been found to be almost devoid of macrofauna (Dittmann *et al.* 2006). The macrobenthic survey carried out in 2004 found two well defined benthic communities, one in the region of the Murray Mouth characterized by polychaetes while in the south lagoon it is characterized by insects (Chironomidae) (Dittmann *et al.* 2006).

In January 2004 and 2005, Paton (2005) recorded salinities of 100 ppt TDS (cf. sea water of 36 ppt TDS). Paton states that "Aquatic food sources have declined throughout the Coorong. In the South Lagoon the abundance of *Ruppia tuberosa* and turions and hardyhead fish have declined considerably, particularly for the two southernmost sections. The abundances of chironomid larvae did not follow this trend and were higher in January 2005 than in some previous years in several sections. The higher abundances of chironomid larvae recorded in 2005 might be a consequence of low numbers of hardyhead fish, which would typically feed on chironomid larvae." This regime is favourable to species such as Banded Stilt and Red-necked Avocet resulting in the presence of large numbers of the former and the breeding activity for both species which is reported here.

### Background to the current study

Each year, usually in early February, the AWSG conducts a wader survey in the Coorong (Gosbell and Christie 2006). Banded Stilt and Red-necked Avocet are almost always found in the Coorong and the South East coastal lakes, in particular Lake George. Both species have been recorded using these areas, particularly in the summer, by a number of sources (Marchant and Higgins 1993). However, on 21 July 2005, three large flocks and smaller scattered groups totalling about 100,000 Banded Stilt were observed (MC pers. obs.) off Fat Cattle Point and the bay to the north (see Fig. 4). Over the period 30 September to 3 October 2005 a Birds SE campout was held at Cantara (Fig. 4). During this event it was estimated that between 113,000 and 150,000 Banded Stilt were in huge roosting flocks in the lagoon between Parnka Point turnoff and Hack Point (Anon 2005). Following this, large numbers of Banded Stilt were regularly seen between Policeman Point and in Thompson Bog (Josie Lord pers. comm.). On the basis of their calls, large numbers were often believed to be behind Rabbit Island (Chris Thompson pers. comm.). When fewer birds were seen at these locations it is likely that they were dispersed throughout the South Lagoon or in flocks on the Younghusband Peninsula shore. It was noticed at Woods

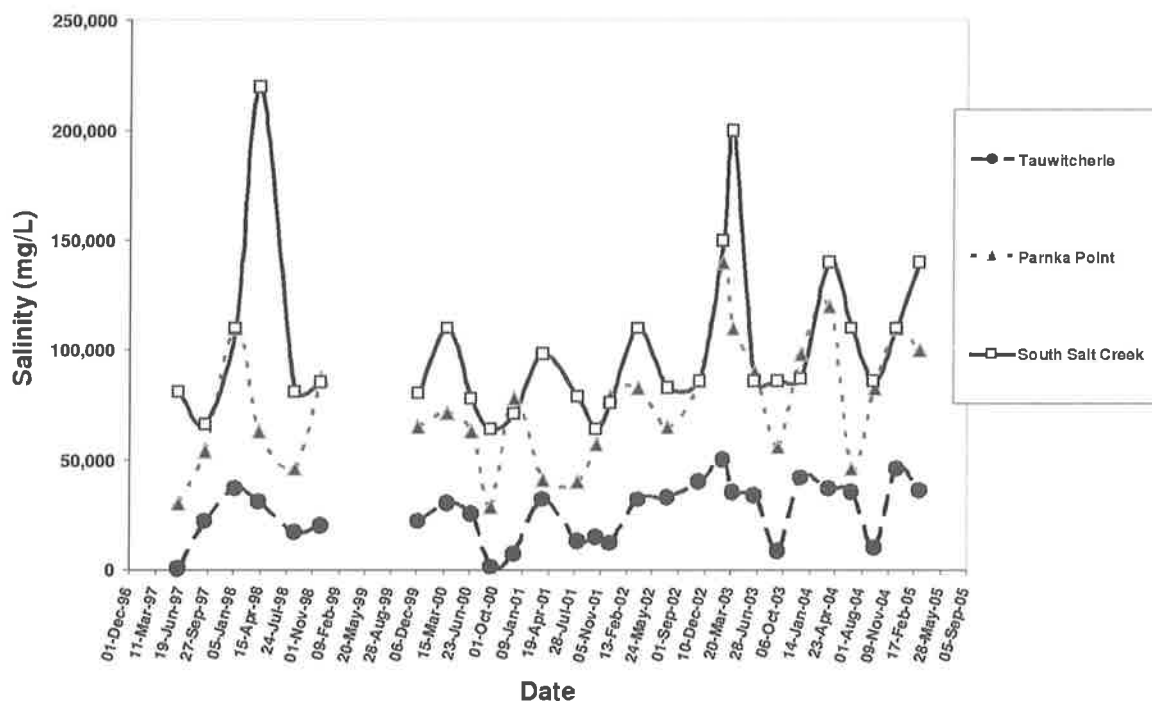


Figure 2. Salinity fluctuations in the Coorong with time (Data and chart from Department of Environment and Heritage (SA).

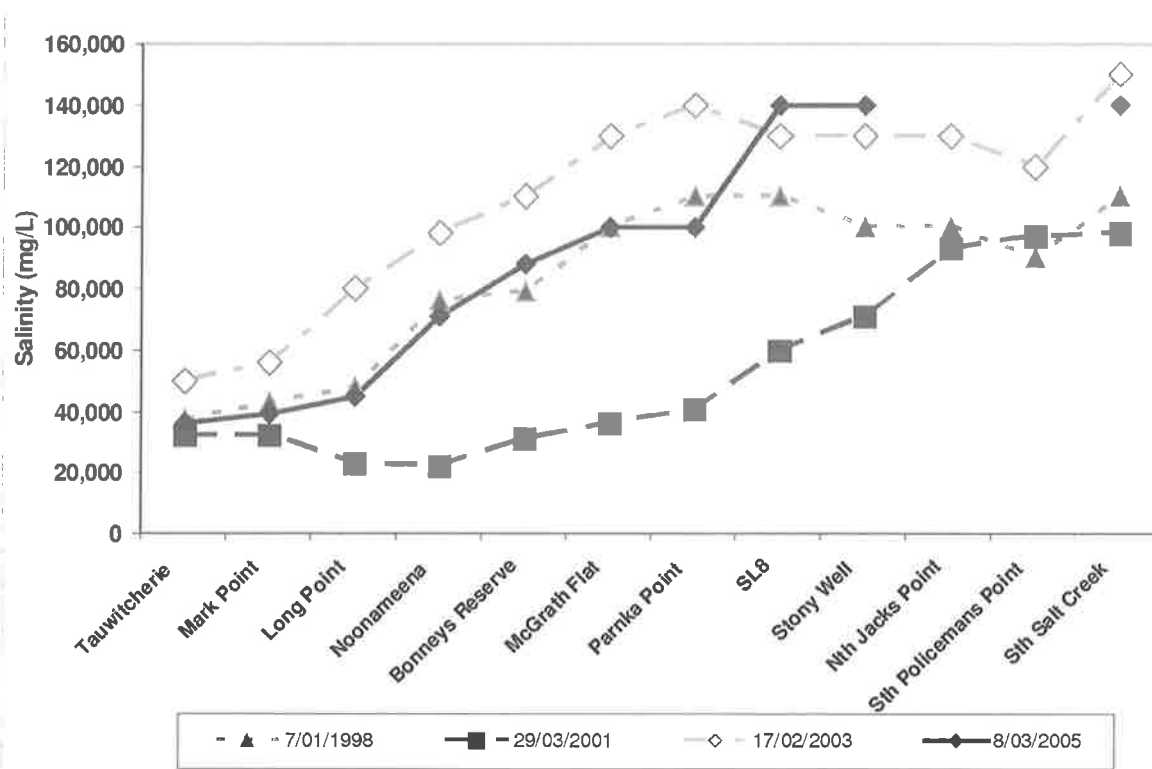
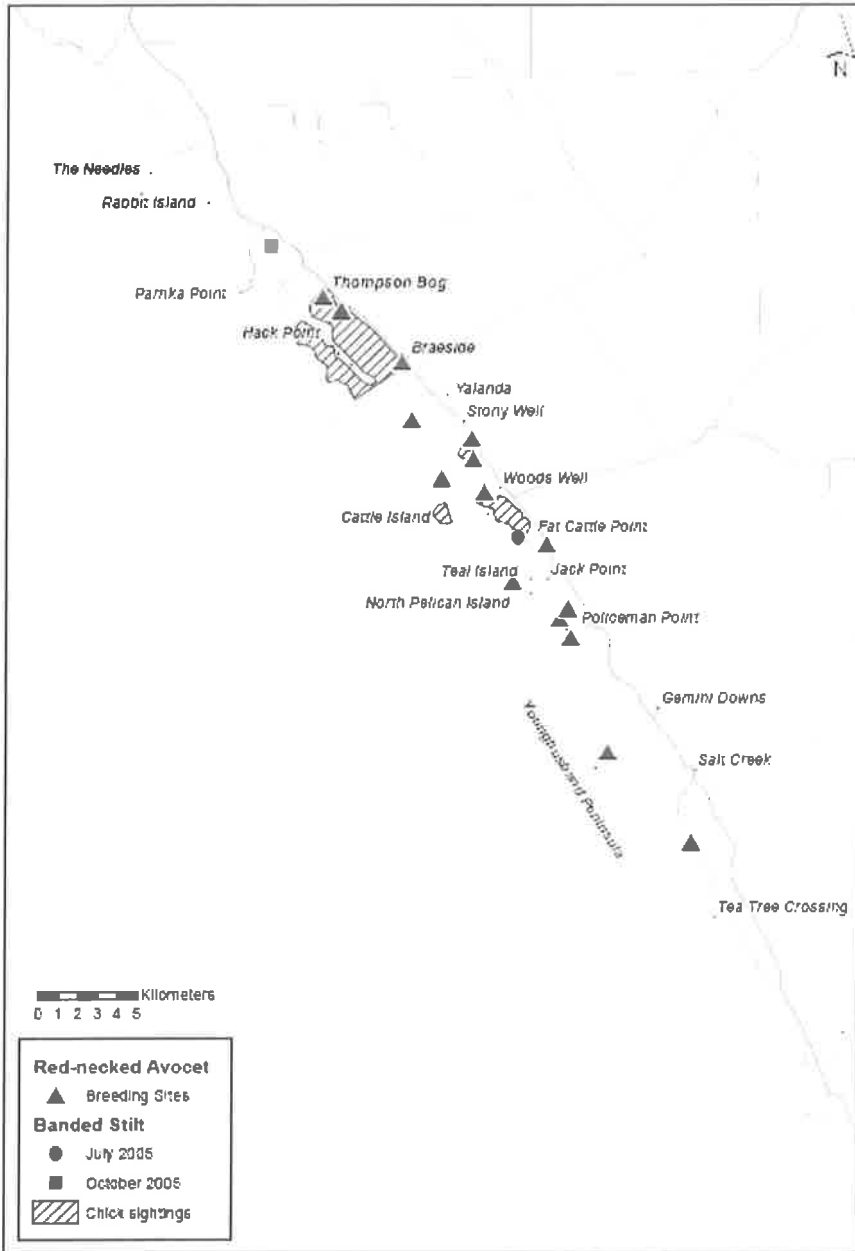


Figure 3. Longitudinal salinity gradients in Coorong for years 1998 to 2005 (Data from Department of Environment and Heritage (SA).



**Figure 4.** Map of the Coorong showing location of Banded Stilt and Red-necked Avocet chicks, Jan – Feb 2006

Well that stilts, which had roosted there overnight, left in the morning flying to the west, and returned from that direction in the evening (Pam Gillen pers. comm.). Essentially the same areas were being used in February when the AWSG survey was undertaken. Details are in Gosbell and Christie (2006). Figure 5 shows the recorded populations of Banded Stilt in AWSG surveys of the Coorong from 1982 to 2006.

**Fieldwork January – March 2006**

*Search for the Banded Stilt Colony*

The initial phase of the fieldwork was searching for the Banded Stilt colony. This started on 12 January at the area where the first chicks were found. During the following

week, the search area was extended, so that soon the eastern shore of the South Lagoon had been searched by car and on foot. The Younghusband Peninsula shore and the shores of the many small islands from Salt Creek to Stony Well had been scanned, and Cattle Island had been searched on foot. On the 20 January an aerial search was conducted southwards from midway along the North Lagoon, along the full length of the South Lagoon, and as far south as Cantara. The swampy land to the east of the highway was dry and considered unsuitable for nesting. From the air, we were able to identify several potential nesting sites, one of which we were able to access on foot the following morning. Old nests were found on a small reef in the northern end of Thompson

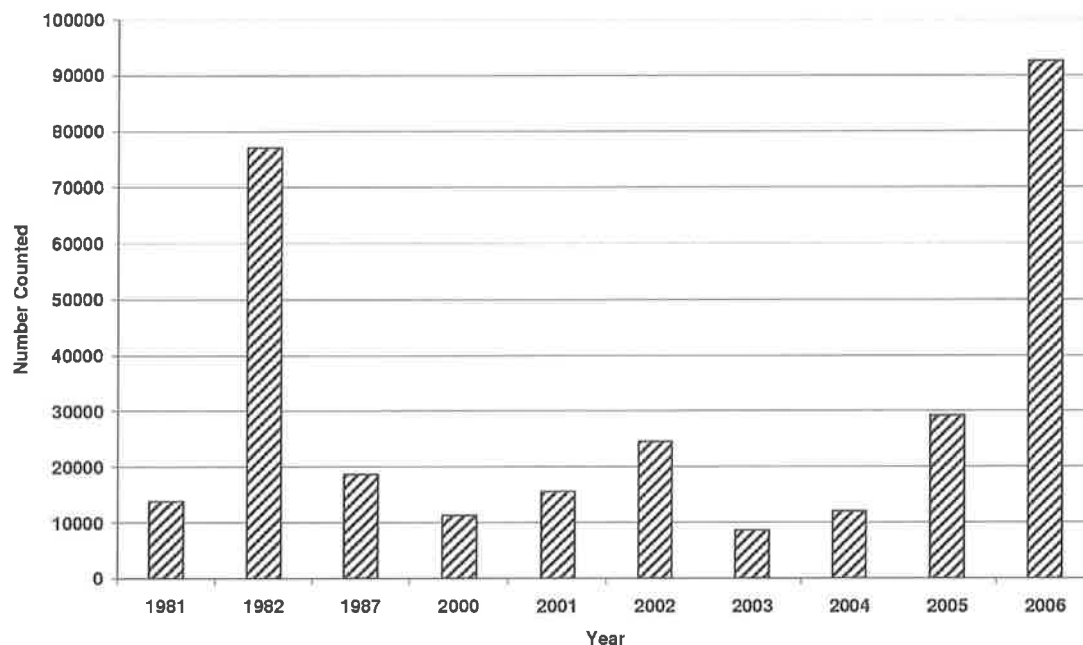


Figure 5. Chart showing population of Banded Stilt in the Coorong during AWSG counts 1981 – 2006.

Bog. Photographs of these nests were recognised by a local resident, who was able to direct us to a nesting site near Stony Well that had been abandoned by 16 December 2005. Both sites were readily accessible to foxes.

On 24 January, on the point at the southern boundary of Thompson Bog, the remains of several old scrapes were noticed. They were found in an area that had been visited by the survey group regularly over the preceding week. That they were not noticed earlier illustrates how difficult it is to find nests once the incubation period is finished. Without sitting birds to draw an area to attention, it would only be possible to find scrapes with surveys on foot and, even then, it would be easy to overlook a small site. With chicks first seen in the Woods Well area, it is also likely that there was a breeding site in that vicinity.

The searches also challenged our view of where Banded Stilt will nest. It had been assumed that they would be nesting on islands, or the Younghusband Peninsula shore. In the event, all the scrapes that were found were on or near the eastern shore of the Coorong.

#### *Banding and Flagging of Banded Stilt Chicks.*

Chicks were banded with numbered metal bands and two coloured leg flags, the South Australian flyway code of orange over yellow, both flags on the tibia. The first flags were placed on four downy chicks found feeding on the water's edge at Thompson Bog on 20 January. They were caught by scooping them up in hand nets whilst they were swimming in shallow water. They were released in a group, swimming off together to be joined quickly by an adult. Both flags were visible on the swimming chicks, but they did not affect the chicks swimming technique. The majority of chicks were caught using this method, except for the final session on 11 February when they were captured from a boat. These chicks were fully feathered and most

approaching fledging but several chicks flew to evade capture. In all, 334 chicks were banded of which all but one were leg flagged.

#### **Breeding of Red-necked Avocet**

Coincidental to the search for Banded Stilt nests, Red-necked Avocet were also found nesting. Initially the importance of this was not realised, and the search for avocet nests was conducted as secondary to the Banded Stilt survey. This is, however, the first confirmed breeding of this species in the Coorong. All nests were found in small depressions amongst sharp broken limestone outcrops. In most instances, nests were lined with small shells. All stages of nests were found with up to four eggs, chicks plus egg, or empty. Breeding was spread throughout the South Lagoon and occurred over several months.

## **DISCUSSION**

#### *Conditions of the Coorong*

The presence of Banded Stilt in the Coorong in record numbers indicates that the Coorong, particularly the South Lagoon, has undergone major change. That this species and Red-necked Avocet underwent the first recorded breeding event in history is further evidence of the magnitude of the change in environmental conditions. The hypersalinity of these waters has seriously impacted on the biodiversity of plant and animal life found in this area. The paucity of aquatic flora and macrobenthic fauna has led to a dominance of brine shrimp and chironomid larvae in several areas of the South Lagoon.

#### *Distribution*

Gosbell & Christie (2006) show that the use of the southern areas of the Coorong by shorebirds has been progressively

reducing since the 1980s. In 2006, 75% of migratory waders were utilizing the area north of The Needles compared to proportions ranging from 45% to 65% over the eight previous years of records. On the other hand record numbers of Banded Stilt were found in the South Lagoon in February 2006 following previous observations in excess of 100,000 birds in July and October 2005. At the same time there were either few or no Banded Stilt found in the traditional sites of western Victoria, Lake George or Port Augusta (P. Collins, pers. comm., KG and MC pers. obs.) leading to the view that almost the whole of the south-eastern Australian population of Banded Stilt was attracted to the Coorong from July 2005 to March 2006.

#### *Breeding success*

The number of Banded Stilt observed in the AWSG Wader Survey in February 2006 was 92,500 (Gosbell & Christie 2006). However, as the number of juveniles counted on the survey was 1,006, this indicated a relatively small breeding event when compared to events such as Lake Eyre in 2000 where approximately 18,000 pairs nested and recruited around 50,000 young (Baxter 2003). The reasons for this low recruitment rate are not fully understood but are possibly a combination of uncertain food resources, lack of suitable nesting sites and predator activity. In a year when traditional breeding sites are unsuitable, even this small number of chicks is a bonus for the species. Of course, if this were to become an annual event it would be a substantial benefit to the population; it may even be possible to facilitate such an event by ensuring suitable and safe nesting sites.

Nesting sites were very difficult to find for several reasons. Firstly, hatching had finished and secondly, nesting had occurred in sites usually considered atypical of the species. Two major sites were found, one on the eastern shore of the Coorong, the other on the sandy eastern shores of small offshore rocky reefs in shallow bays. Based on the density of the scrapes located, the first site had the potential of producing 1,800–2,400 chicks and was deserted by 16 December 2005. On two occasions during January, two chicks of an age consistent with this site were observed. The fate of any others is unknown. The adults may have abandoned the nests without completing laying or they may have been subject to predation from foxes or Silver Gulls. The latter would have been feeding young at the time. Alternatively, the advanced young may have come from another, unknown site.

On the same basis the second site had the potential of 500 – 700 chicks, and yet 1,006 chicks were observed. With several nearby areas not searched, it seems likely that there were several locations each with a relatively small number of scrapes. Without knowing the full extent of the colony, it is not possible to judge whether they had been subjected to any significant predation. The scrapes found, although on an offshore reef, were not beyond the reach of foxes. No predation by Silver Gulls was witnessed, but the stilt chicks were possibly already old enough to escape predation by the time they were under observation. At that time Silver Gull breeding was well advanced, with the majority of parents no longer feeding young. A fresh water release from Morella Basin was also providing a prime gull feeding site at that time.

Unlike the Banded Stilt, the Red-necked Avocet appeared to experience a relatively successful breeding event although it was difficult to judge how much predation this species experienced. Breeding was spread throughout the South Lagoon and occurred over several months. A breeding colony of Silver Gulls were observed with nesting avocets in mid January (in the vicinity of Policeman Point) and a small number of predated eggs were found in early February (in the vicinity of Stony Well). The control and protection afforded to the chicks by the parents probably minimised predation following hatching. The survey in February counted 2,400 birds. A complete count of nests and juveniles was not undertaken during this count although there were many observations of parent birds shepherding groups of two to four young. Over the term of the complete survey, 140 nests were counted. As large areas of suitable habitat were either not counted, or only superficially counted, this can be considered a significant breeding event.

#### *Movements*

Little is known of the movements of Banded Stilt, and of interactions between the populations of Western Australia and south eastern Australia. In 1995, 800 chicks were banded and flagged with a yellow flag on the tibia at Lake Ballard, WA (Clive Minton pers. comm.) At least two yellow flagged birds were sighted in the Lake Eyre breeding population in 2000 (Baxter 2003). Another was sighted at Fosters Point, Lake George on 28 April 2001 (Iain Stewart pers. comm.). It is hoped that the banding and flagging of the chicks in the Coorong will add to this knowledge.

#### *What of the future?*

The abnormal conditions of the Coorong, particularly in the South Lagoon, attracted the large numbers of Banded Stilt and contributed to the unique breeding events of this species and the Red-necked Avocet. It is not possible to predict future conditions in the Coorong or its usage by these species. A requirement of being a Ramsar site is for management to maintain the 'ecological character' of the Coorong and Lakes Alexandrina and Albert wetlands (Phillips *et al.* 2005). Management strategies that lead to the water quality in the southern lagoon being restored to conditions previously applying would eventually encourage the return of a more diverse flora and fauna. However, if immediate actions are not taken and conditions in the southern lagoon remain the same it is possible that another influx of Banded Stilt and Red-necked Avocet may occur to utilise the plentiful food resources that are likely to be found in the hypersaline conditions. If, however the salinity levels became higher the brine shrimp would be killed off together with any chance of further breeding (Savage 1964). The impact of anthropogenically caused salinisation has become increasingly important not only in south-eastern Australia but its effect on wildlife is a conservation issue of global concern (Hannam *et al.* 2003).

The observations of these breeding events provides several guidelines for the future. The most important is to initiate a continuous monitoring program following the first indications of any 'breeding frenzy' of Banded Stilt. This will hopefully provide for the early location of colonies

which will enable any predator threats to be monitored and appropriate actions to be taken.

#### ACKNOWLEDGEMENTS

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Many people also contributed from their store of Coorong knowledge. David Paton made available data from his surveys and knowledge gleaned from many years of Coorong work. Former Rangers from the early 60's through to the present shared their insights. Russell Seaman from the Ramsar team provided data. Doris Graham and Rob Clemens researched Birds Australia breeding records, and Philippa Horton researched SA records. Darren Herpich, DEH Mt Gambier, is gratefully acknowledged for producing the maps.

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## PAPERS IN AUSTRALIAN WADER STUDY GROUP JOURNALS 1980–2006

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This is principally a list of papers, articles and notes which have been published in *Stilt*, the bulletin of the Australasian Wader Studies Group. However, selected articles from the *Victorian Wader Study Group Bulletin* (VWSG Bulletin) and from *An Occasional Stint* (AOS), the now defunct bulletin of the Tasmanian Wader Study Group, are also included. Articles are covered under seven headings:

- Species accounts
- Research and conservation
- Reports/workshops
- Overseas counts
- Australian counts
- Banding and flagging reports
- Recoveries, sightings and movements

It is intended that this list be regularly updated and accessible on the AWSG website in future.

## SPECIES ACCOUNTS

With one exception (Australian Painted Snipe), species sequence and nomenclature follow Dickinson, E.C. (Editor) 2003. *The Howard & Moore Complete Checklist of the Birds of the World. 3<sup>rd</sup> Edition. Christopher Helm, London.*

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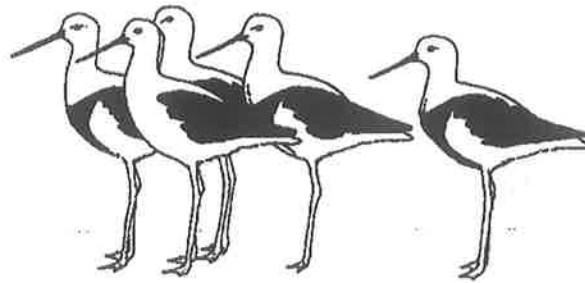
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## THE FIRST CATCH OF BANDED STILTS IN VICTORIA: BIOMETRICS, MOULT AND AGE/SEX STRUCTURE

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### ABSTRACT

This study describes the results from a single catch of 151 Banded Stilts, *Cladorhynchus leucocephalus*, at the Western Treatment Plant, near Werribee, in Victoria on 28 December 2000. More than half of the birds were juveniles, confirming that the breeding event at Lake Eyre during the winter of 2000 was successful. Adults and juveniles had similar bill lengths and total head lengths, but juveniles had shorter wings and were lighter. Our results further indicate that the breast band can be completely absent in adults, and that adults moulted their primary feathers soon after the breeding event. Whereas, juveniles started their primary moult about four months after fledging. Field observations of flagged birds over the following year and a half (to mid 2002) confirmed that adult birds did not necessarily have complete breast bands.

### INTRODUCTION

One of the ornithological highlights during the winter of 2000 was the breeding of large numbers of Banded Stilts, *Cladorhynchus leucocephalus*, at Lake Eyre. After two earlier attempts, in late February/May, which largely failed due to heavy predation by Silver Gulls, *Larus novaehollandiae*, the birds finally bred successfully during June–July 2000 (Anon. 2000). The success of the third breeding attempt was due to management measures taken to reduce the numbers of Silver Gulls at the breeding site (Anon. 2000). The previous known successful breeding attempt by Banded Stilts also occurred at Lake Eyre during February–November 1997 (Minton 1997). A breeding attempt at Lake Goongarrie in Western Australia in 1999 failed (Minton & Pearson 1999, Anon. 1999). The previous successful breeding in Western Australia was at Lake Ballard in 1995 (Minton & Pearson 1999).

Very little is known about the biology of this intriguing species. Banded Stilts breed on inland salt lakes, which only fill after heavy rains (Jones 1945). As such rains are unpredictable and infrequent, breeding events are scarce. Furthermore, documentation on these breeding events is limited, due to the remoteness of most salt lakes (Jones 1945) and their inaccessibility after heavy rains. When the inland lakes dry out, birds move to coastal areas (Marchant & Higgins 1993). Two populations are thought to exist: one in Western

Australia and one in South Australia and Victoria (Jones 1945). However, western and eastern birds appear to be similar in size (Marchant & Higgins 1993). The observation at the Lake Eyre breeding colony of an individual previously flagged in Western Australia (Minton, Collins & Jessop, pers. obs.) further suggests that Banded Stilts from WA are not isolated from eastern birds. Whether the Banded Stilt is separated into two distinct populations therefore remains to be established.

The irregular, highly synchronised breeding events must lead to a very unusual age structure of the population of Banded Stilts. The entire population should consist of discrete, unevenly spaced, age-cohorts. It was previously thought that Banded Stilts could be aged on the presence or absence of a breast band (Alcorn & Alcorn 1990). However, examination of museum skins has shown that adults in non-breeding plumage can also lack the breast band (Marchant & Higgins 1993). Such birds were identified as adults by the lack of white-tipped juvenile coverts or primaries, or (in case of females) by their convoluted oviducts, which indicate that they had previously bred (D. Rogers, pers. comm.). Juveniles can be recognised by their brown wing coverts, which have white tips when fresh, and their grey legs (Marchant & Higgins 1993), but can probably only be identified with certainty in the hand.

The unpredictability of breeding events probably also means that the birds have no way of timing their moult optimally in relation to breeding. For example, 25% of adults breeding in the early stages of the breeding event at Lake Ballard in March 1995 had nil or only partial breeding plumage, although these birds were actively engaging in breeding activities (Minton, pers. obs.). After 3–4 weeks all birds at the Lake Ballard and Lake Eyre breeding events had acquired full breeding plumage (Minton, pers. obs.). Full breeding plumage has been recorded in all months, while primary moult occurs mainly in winter or spring (Marchant & Higgins 1993).

This paper presents information obtained from the first catch of Banded Stilts in Victoria made by the Victorian Wader Study Group (VWSG). This was the first significant catch of adult Banded Stilts ever made and therefore provided a unique opportunity for gathering data for comparison with museum specimens. Our aims were to describe biometrics, primary moult and plumage patterns. Banded Stilts show slight sexual dimorphism in measurements (Marchant & Higgins 1993), which we used to assess whether the sex ratio of the sample was biased.

## METHODS

The sample of Banded Stilts analysed in this study were caught by the VWSG in a single cannon-net catch at the Murtcaim Wildlife Area at the Western Treatment Plant of Melbourne Water, near Werribee, at 11 a.m on 28 December 2000. For each individual, we recorded bill length, head-bill length (both to the nearest 0.1 mm, using callipers), wing length (maximum chord, to the nearest mm, using a butt-ended ruler) and body mass (to the nearest g, using an electronic balance). We further recorded primary moult and the extent of the dark breast band and belly-patch (scored as 0, 25, 50, 75 or 100% - individuals with grey smudges on an otherwise white breast were scored as 'trace'). Putative age was assessed from (1) presence or absence of a dark breast band and belly-patch (their presence was taken as evidence for adult age), (2) leg colour (juveniles have grey legs, Marchant & Higgins 1993), and (3) state of the primaries and wing coverts (brown feathers were taken as evidence for juvenile). The birds were banded with a metal band of the Australian Bird and Bat banding Scheme on the left tibia and an orange leg flag on the right tibia and released.

All bill, head-bill and wing measurements were made by three of us (CM, KK and PC). Bill measurements (but not head-bill and wing) differed significantly between the three measurers (ANOVA  $F_{2,148} = 7.16$ ,  $P < 0.001$ ). This difference was not due to differences among observers in the percentage of juveniles measured ( $\chi^2_2 = 2.68$ ,  $P = 0.26$ ). Each observer measured a similar number of birds ( $n = 46, 55$  and  $50$ ), and visual inspection of the data suggested that the differences were not due to outlying data points. Bill measurements were therefore standardised by adding/subtracting the difference between mean measurement of each observer and the overall mean ( $-1.81$  mm,  $+0.50$  mm and  $+1.11$  mm, all  $<3\%$  of the overall mean). The mean bill length for each sex and the sex ratio of the sample were calculated from the observed frequency distribution, using the method of Rogers (1995). Other statistical tests were performed in SYSTAT 7 (Systat 1997). Means are presented  $\pm$  standard deviation.

## RESULTS

### Age structure and biometrics

A total of 151 Banded Stilts were caught and measured. We classed 62 (41.1%) birds as adult and 89 (58.9%) as juvenile. The biometrics of these groups are summarized in Table 1. Juveniles had significantly shorter wings and lighter weight than adults. There were no differences in bill and head-bill length between juveniles and adults. In adults, moulting birds were significantly lighter than birds without moult ( $237.0 \pm 18.0$ ,  $n = 10$  and  $251.9 \pm 18.1$ ,  $n = 50$ , respectively,  $t_{58} = -2.37$ ,  $P = 0.02$ ). This was not the case for juveniles ( $235.0 \pm 15.9$ ,  $n = 59$  and  $231.9 \pm 15.0$ ,  $n = 30$ ,  $t_{87} = -0.87$ ,  $P = 0.39$ ).

### Sex determination and sex ratio of sample

Bill length is the most sexually dimorphic measurement in Banded Stilts (Marchant & Higgins 1993). The histogram for bill length (Fig. 1) was bimodal and we calculated the mean and standard deviation for each mode using the method of Rogers (1995). Mean bill length for males was  $72.02 \pm 2.97$  ( $n = 62$ ) and for females  $66.41 \pm 2.74$  ( $n = 89$ ). For comparison, Figure 1 also shows the expected distributions of bill lengths for males and females based on the mean and standard deviations of museum specimens reported in Marchant & Higgins (1993).

**Table 1.** Means and variation in biometric measurements (mm) and body mass (g) of adults and juveniles. Bill length was adjusted for differences between measurers. Difference tested with *t*-tests using a sequential Bonferroni analysis (Rice 1989) (*n* = sample size, SD = standard deviation and CI = confidence interval).

Measurement	Adults					Juveniles					Difference	
	<i>n</i>	Mean	95% CI	SD	Range	<i>n</i>	Mean	95% CI	SD	Range	<i>t</i>	<i>P</i>
Bill	62	68.4	67.4-69.4	3.9	61.5-76.6	89	68.1	67.2-68.9	4.0	59.7-79.0	0.48	0.63
Head-bill	62	104.4	103.3-105.6	4.6	95.6-114.3	89	104.2	103.2-105.2	4.8	92.5-116.4	0.34	0.74
Wing	58	200.6	199.3-201.9	5.0	189-212	76	196.5	195.1-197.8	6.0	184-217	4.26	0.0001 <sup>b</sup>
Mass	60	249.4	244.5-254.2	18.8	199-293	89	233.9	230.7-237.2	15.6	203-274	5.45	0.0001 <sup>b</sup>

The estimated sex ratio of 58.9% females was significantly different from the expected 50% ( $\chi^2_1 = 4.8$ ,  $P = 0.03$ ). However, when an outlying data point of 79.5mm was removed from the data set, the estimated sex ratio was 56.7% female (65 males and 85 females), which did not differ significantly from parity ( $\chi^2_1 = 2.7$ ,  $P = 0.10$ ).

#### Moult patterns

A partial or complete breast band was present in all but four adults (Fig. 2). Seven juveniles showed grey smudges on the breast, but the remaining 82 juveniles had white breasts.

Juveniles were significantly more often in active primary moult than adults (juveniles: 66.3%, adults: 16.1%,  $\chi^2_1 = 37.1$ ,  $P = 0.0001$ ). Of the 30 juveniles that were not in active primary moult, 28 had not yet started primary moult, while two had recently completed their moult (Fig. 3). In contrast, all 52 adults that were not in primary moult had fresh primaries (Fig. 3). Three adults showed an unusual pattern of primary moult in which one primary was growing (P3, P8 and P9), while all others appeared fresh.

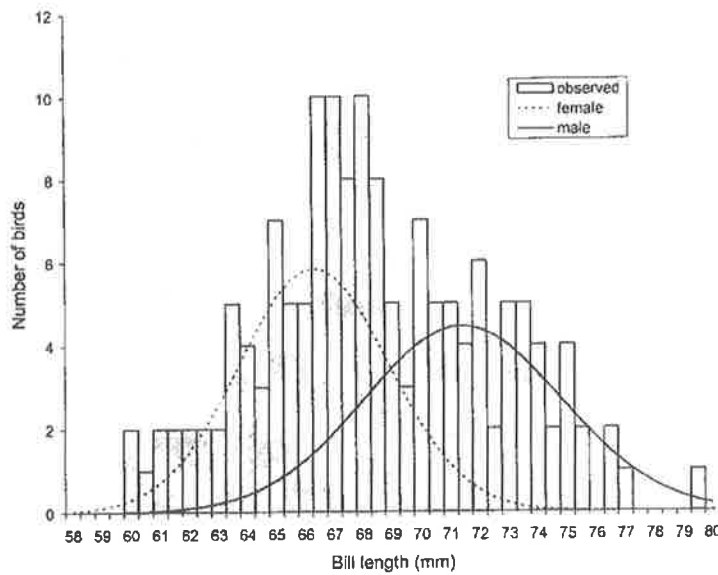
Most of the adults that were in active primary moult had no, or only a partial breast band (Fig. 4). One out of 24 birds with a full breast band was in primary moult, while nine of 38 adults with no, or a partial breast band were in primary moult ( $\chi^2_1 = 4.1$ ,  $P = 0.04$ ).

#### Resightings of leg flags

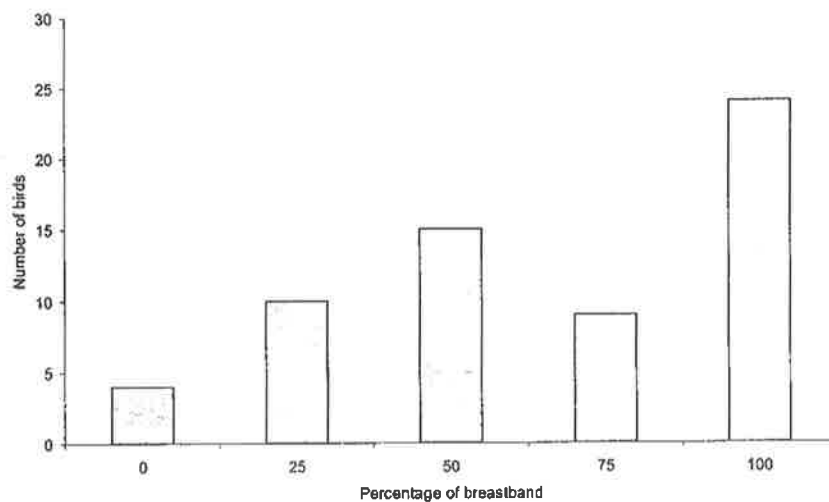
Banded Stilts with orange leg flags have been regularly observed at the Western Treatment Plant, at Laverton Saltworks, and at other locations on the Bellarine Peninsula since the 28 December 2000 catch. Throughout this period (up to July 2002) flagged birds seen have been in a range of plumages. Even during 2002, when juvenile birds marked in December 2000 would have been 1.5 to 2 years old, flagged birds could be seen with negligible breast bands and belly patches.

#### DISCUSSION

The third breeding attempt at Lake Eyre in 2000 resulted in successful hatching of chicks (Anon. 2000). Although Banded Stilts are known to abandon their chicks when the breeding sites dry out (Burbidge & Fuller 1982), ornithologists were confident that Lake Eyre had stayed in a suitable condition long enough to allow chicks to fledge.



**Figure 1.** Frequency distribution of bill length among the complete sample of Banded Stilt. Bill length was adjusted for differences between observers. The expected distributions for males and females are based on the means and standard deviations of sexed museum specimens reported in Marchant & Higgins (1993).



**Figure 2.** Frequency distribution of the presence of a breast band in adult Banded Stilt.

The results of this study confirm that a high proportion of chicks must have fledged successfully as more than half of our sample consisted of juveniles. As the Lake Eyre breeding event was the only one recorded during the previous year, it is reasonable to assume that the juveniles we caught came from there. However, it is not known whether the juveniles were evenly spread among the Banded Stilts population in December 2000. Therefore, we do not know whether the proportion of young birds in our sample was representative of the entire eastern Australian population.

The estimated mean bill lengths for males and females corresponded closely to those of museum specimens (Marchant & Higgins 1993). The mean wing length in our sample was slightly longer than that reported for specimens (Marchant & Higgins 1993). This is probably due to shrinkage of the specimens compared with live birds. It has been suggested that the populations of Banded Stilts in South Australia/Victoria is largely separated from the population in Western Australia (Jones 1945). The mean bill length and head-bill length of a

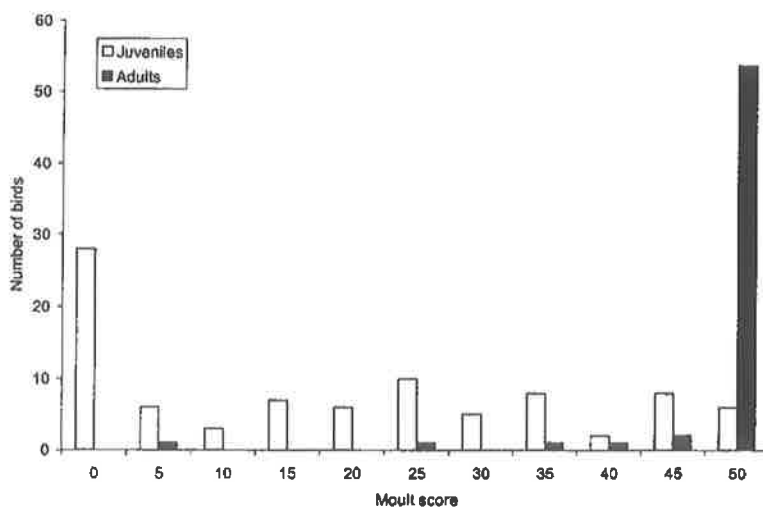


Figure 3. Frequency distribution of moult scores for adults and juvenile Banded Stilt.

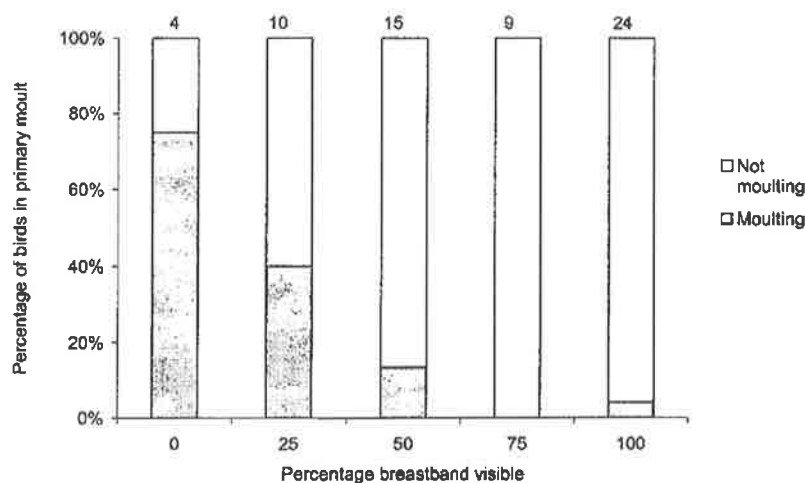


Figure 4. Percentage of birds with different amounts of breeding plumage that were in active wing moult. Sample sizes are indicated above the bars.

sample of adults caught at Port Hedland (68.1,  $n = 71$  and 103.8,  $n = 46$ ; Marchant & Higgins 1993) are both within the 95% confidence intervals of the means for our sample from Victoria. The mean wing length of the Port Hedland sample (198.8,  $n = 20$ ) was slightly shorter than that of the adults in our sample, but longer than that of juveniles, which could be due to differences in measuring technique and feather wear. Therefore, there is no compelling evidence that the two populations differ in measurements.

Based on data from museum specimens and birds caught in Western Australia, Marchant & Higgins

(1993) suggested that moulting birds are lighter than those without moult. This was confirmed for adults in our sample, but not for juveniles. The mean weight of adults without moult reported in Marchant & Higgins (1993) is 263 g (males,  $n = 9$ ) and 261 g (females,  $n = 5$ ), both heavier than in our sample (252 g). Most of the adults we caught may thus still have been accumulating weight.

About one-third of the Banded Stilt eggs at Lake Eyre had hatched by 16 July 2000 (Anon. 2000) and most chicks would have fledged in August (chicks fledge after c. 50 days, Marchant & Higgins 1993). More than half of the juveniles in our sample, taken

about four months later, were in active primary moult. Two juveniles had even completed their primary moult, but these could have been from the relatively small numbers of chicks that hatched from the first nesting attempt in late March/early April and survived the Silver Gull predation. In contrast, most adults had already finished primary moult, indicating that they had started moulting soon after the breeding event was completed. Their duration of primary moult may therefore only be c.100 days, which is shorter than the 120 days typically required by migrant waders from the Northern Hemisphere. The outer (non-moulted) primaries of three moulting adults were in very good condition, perhaps indicating that they had previously been moulted just prior to breeding. If so, these birds were then replacing these relatively new primaries again after breeding. Breeding events might thus re-synchronise moulting among adults.

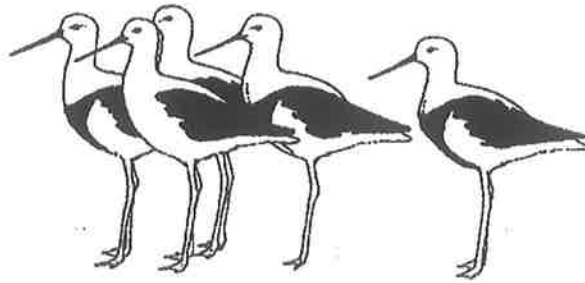
It is clear that adult Banded Stilts have a non-breeding plumage, where the breast bands and belly patch are only partial or are completely lacking. Therefore, it is inaccurate to categorise all birds seen in the field without these plumage features as juvenile/first year birds. However, it is uncertain how frequently adult birds change their body feathers and flight feathers between breeding periods and whether this always involves a stage when the dark breast band and belly plumage are lost. Marchant & Higgins (1993) state that primary moult and body moult are initiated at about the same time, but that primary moult is completed before body moult. If this is true, then the adults in our sample were moulting into 'breeding' plumage and must have been acquiring a breast band. This seems odd, considering that they had just bred, but may be in preparation for the next, unpredictable, breeding opportunity.

#### ACKNOWLEDGEMENTS

We would like to thank the management of the Western Treatment Plant for allowing us to conduct this research at the Murtcaim Wildlife Area and for their continued commitment to the conservation of birds. We offer many thanks to all the volunteers from the VWSG who were involved with the catch. We would also like to thank the South Australian Parks and Wildlife Service for their efforts in reducing numbers of Silver Gulls at the Lake Eyre breeding sites, which finally resulted in successful breeding by the Banded Stilts. We also thank the Australian Bird Banding Office for the provision of bands and both they and the Department of Natural Resources in Victoria for permission to band. Danny and Ken Rogers provided valuable comments on earlier drafts of this paper.

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ABSTRACTS

**AUSTRALASIAN WADER STUDIES GROUP CONFERENCE,  
GRIFFITH UNIVERSITY, BRISBANE, AUSTRALIA 1-2 JULY 2000**

Compiled by

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Following the success and interest shown in the two previous AWSG conferences held in 1996 and 1999, the committee decided to organise a third wader conference in conjunction with the Southern Hemisphere Ornithological Congress (SHOC) at Griffith University, Brisbane. The timing and location were chosen to take advantage of the presence of the larger audience at SHOC and presence of potential speakers from other continents. The theme of the conference was 'Long distance migrations in the Flyway'.

**THE MIGRATION STRATEGIES OF THE  
GREAT KNOT *CALIDRIS TENUIROSTRIS***

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The Great Knot is an excellent example of a long-distance migrant which uses a limited number of staging sites on its annual round trip between breeding grounds in the mountain tundra of the Russian Far East and non-breeding areas in northern Australia. The paper describes, and speculate on, the migration strategy of the species by drawing on recent information gained about preparation for, and timing of, departures from north-western Australia, staging patterns through the Yellow Sea region (on northward migration) and the Sea of Othotsk (on southward migration), and breeding behaviour.

**THE YELLOW SEA – WHAT FUTURE FOR  
MIGRATORY SHOREBIRDS?**

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Surveys conducted during the last decade have shown that the vast intertidal flats of the Yellow Sea play host to millions of migratory shorebirds, many of which spend the non-breeding season in Australasia. However, the Yellow Sea ecosystem is under serious environmental threat. The presence of 10% of the world's human population in the basins that drain into the Sea is leading to significant habitat loss and degradation, serious pollution problems and unsustainable use of natural resources. The

presentation will summarise the importance of the Yellow Sea for migratory shorebirds and discuss initiatives being planned to ensure that shorebirds will be able to migrate successfully through one of the most densely populated regions of the world.

**A PRELIMINARY REPORT ON THE WADERS OF  
THE TOP END OF THE NORTHERN TERRITORY**

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The coast and coastal wetlands of the Top End of the Northern Territory are very remote and difficult to access, and little has been documented of much of this area's fauna. Over the past ten years, I have conducted extensive aerial and ground surveys of this area, concentrating mainly on waterbirds, seabirds, shorebirds, coastal raptors and marine turtles. This presentation deals with some very preliminary analysis of the shorebird data (over 13000 species or species group records) from these surveys, and aims to provide an introduction into the distribution and status of these birds around the NT coast and coastal wetlands.

**DISTRIBUTION AND SITE SELECTION IN  
EASTERN CURLEW AT FEEDING GROUNDS IN  
MORETON BAY**

P.G. Finn<sup>1</sup>, P.V. Driscoll<sup>2</sup> & C. P. Catterall<sup>1</sup>

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<sup>2</sup>Queensland Wader Study Group, Fahey Road, Mount Glorious 4520 Qld AUSTRALIA

Low tide surveys of Eastern Curlew were conducted to assess habitat use on feeding grounds, where 51 skilled

strongly recommended that all waders captured in the flyway continue to be flagged.

#### VISIBLE DEPARTURES OF WADERS ON NORTHWARD MIGRATION FROM NW AUSTRALIA

Clive Minton<sup>1</sup>, Rosalind Jessop<sup>2</sup>, Peter Collins<sup>2</sup>, Jon Fallaw<sup>3</sup>, Becky Hayward<sup>3</sup>, Janet Sparrow<sup>3</sup> and Chris Hassell<sup>3</sup>

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Daily observations of departures of waders on northward migration have been carried out in March/April at Roebuck Bay, Broome, since 1990. This analysis describes the departure process, with most birds leaving between 1600 and 1800, just prior to darkness. Flight direction was generally north-north-west. Most birds migrated in single species flocks with an average flock size of under 100, though flocks of up to 2,000 were occasionally seen. The period of departure of each species was similar each year, with some species leaving over a narrow time-span and others over a more prolonged period. Eastern Curlew, Greater Sand Plover and Great Knot were the first species to leave, commencing in the first week of March and mostly departing before the end of the month. There was a marked correlation between local weather conditions and the intensity of migratory departures. Birds preferred to leave when tail winds occurred in the 600 – 2,500 m levels: there was almost always an adverse sea breeze at ground level. Unsettled weather conditions could halt migration for several days. Tidal conditions appeared to have only a minor influence on departures.

#### SILVER GULL PREDATION AT BANDED STILT COLONIES

Clive Minton<sup>1</sup>, Ros Jessop<sup>2</sup> and Peter Collins<sup>2</sup>

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Observations of the Banded Stilt colony at Lake Eyre North in April 2000 have confirmed that massive predation of eggs and chicks by Silver Gulls, first noted at the Lake Torrens colony in 1989, is still

occurring. In contrast, such predation has not been recorded at Banded Stilt breeding colonies in Western Australia. It is recommended that gull control be introduced at future Banded Stilt breeding colonies in South Australia in order to prevent a major decline in the population.

#### MIGRATION ROUTES AND MIGRATION STRATEGY OF BAR-TAILED GODWITS *LIMOSA LAPPONICA* AND RED KNOTS *CALIDRIS CANUTUS* WHICH SPEND THE NON-BREEDING SEASON IN NEW ZEALAND

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About 40 species of Arctic breeding waders have occurred in New Zealand. Of those some 19 species can be considered regular visitors, but mostly in small numbers. Only two species, Bar-tailed Godwit (102,000) and Red Knot (59,000) occur in globally significant numbers. Between 1979 and 1999 the New Zealand Wader Study Group banded 1599 Bar-tailed Godwits and 5793 Red Knots. In addition, since 1992 593 Bar-tailed Godwits and 1193 Red Knots had a single white leg-flag fitted to the tibia. Recoveries and flag sightings show that the two species have different breeding areas and different migration strategies. Both are long hop migrants, covering many thousands of kilometres in one flight. On northward migration, Bar-tailed Godwits follow an easterly route through Korea and Japan to breeding grounds in Alaska. Red Knots stage in regions around the Gulf of Carpentaria and migrate slightly more westerly. Recent evidence suggests that their breeding grounds are in eastern Siberia. Less is known about the southward migration. Bar-tailed Godwits may fly direct from Alaska to New Zealand. Counts and banding data and flag sightings show that Red Knots stage in eastern Australia.

#### AGE-RELATED VARIATION IN FORAGING ECOLOGY OF GREAT KNOTS AND RED KNOTS IN ROEBUCK BAY, NORTH-WESTERN AUSTRALIA

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Age-related variation in foraging success was investigated in Red Knots and Great Knots in Roebuck Bay, tropical north-western Australia. Both are long-distance migrants specialised to eat bivalves. In both species, foraging of young birds differed from that of adults. Recently arrived juveniles (about four months old) fed in different places to adults, and took different prey. When a few months older,

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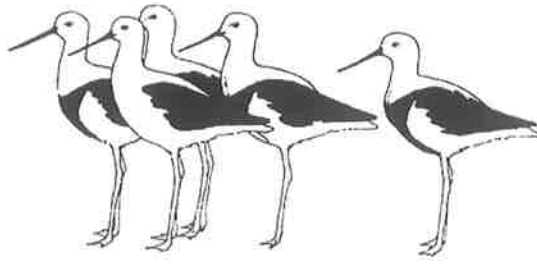
Compiled by Hugo Phillipps

The use of this index for finding references to particular birds in *The Stilt* should be fairly straightforward. Issue numbers are in bold with the relevant page numbers following. References are only to species, not to higher taxa or subspecies. Species are listed alphabetically under both the scientific name and the common substantive name. A page reference means that the bird is mentioned on that page, possibly more than once. Names of Australian birds generally follow the conventions of RAOU Monograph 2 (*The Taxonomy and Species of Birds of Australia and its Territories*, by Christidis & Boles, 1994). The scientific and vernacular names of other (non-Australian) shorebird species largely follow *Shorebirds: an identification guide to the waders of the world* (Hayman, Marchant & Prater, 1986). It is a comprehensive index; all obvious and identifiable mentions of species are listed, including trivial ones, but excluding those in earlier indexes. Comments, corrections and constructive criticism should be directed to the Compiler at the Birds Australia National Office: 415 Riversdale Road, Hawthorn East, VIC 3123, Australia. Tel: (03) 9882 2622. Fax: (03) 9882 2677. Email: h.phillipps@birdsaustralia.com.au

- Actitis hypoleucos* (Common Sandpiper) - **31**: 34, 57, 58, 59, 60, 61, 62; **33**: 10, 16, 19, 20, 29, 30, 49; **34**: 5, 6, 32, 39, 51, 52, 53, 54; **35**: 3, 4, 5, 7, 11, 12; **36**: 5, 23, 45, 46.
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- Anas gracilis* (Grey Teal) - **32**: 42, 43; **33**: 29, 30.
- Anas penelope* (Eurasian Wigeon) - **33**: 32.
- Anas platyrhynchos* (Mallard) - **33**: 32.
- Anas poecilorhyncha* (Spot-billed Duck) - **33**: 32.
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- Anser fabalis* (Bean Goose) - **36**: 24.
- Anseranas semipalmata* (Magpie Goose) - **33**: 28, 29, 30.
- Apus pacificus* (Fork-tailed Swift) - **36**: 15.
- Aquila audax* (Wedge-tailed Eagle) - **36**: 15.
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- Ardea ibis* (Cattle Egret) - **33**: 29, 30.
- Ardea intermedia* (Intermediate Egret) - **32**: 42, 43; **33**: 29, 30.
- Ardea picata* (Pied Heron) - **32**: 43; **33**: 29, 30.
- Ardea sumatrana* (Great-billed Heron) - **33**: 29, 30.
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- Arenaria melanocephala* (Black Turnstone) - **32**: 56.
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- Avocet, Pied (*Recurvirostra avosetta*) - **32**: 59; **33**: 16, 19, 20; **34**: 39; **35**: 3, 4, 5, 8.
- Avocet, Red-necked (*Recurvirostra novaehollandiae*) - **31**: 57, 58, 59, 60, 61, 62; **33**: 10, 11, 12, 13, 14, 48; **34**: 8, 51, 52, 53, 54; **35**: 64; **36**: 45, 46.
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- Branta bernicla* (Brent Goose) - **31**: 16.
- Brolga (*Grus rubicunda*) - **33**: 28, 29, 30.
- Burhinus grallarius* (Bush Stone-curlew) - **31**: 57, 58, 59, 60, 61, 62; **32**: 54; **33**: 39, 40; **34**: 51, 52, 53, 54; **35**: 59; **36**: 45, 46.
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- Butorides striatus* (Striated Heron) - **33**: 29, 30.
- Calidris acuminata* (Sharp-tailed Sandpiper) - **31**: 19, 21, 33, 34, 35, 47, 57, 58, 59, 60, 61, 62, 64; **32**: 41, 42, 43; **33**: 10, 11, 12, 13, 14, 16, 19, 20, 29, 30, 31, 34, 47, 49; **34**: 5, 22, 24, 25, 26, 27, 28, 29, 33, 39, 40, 44, 51, 52, 53, 54; **35**: 3, 4, 5, 7, 11, 12, 49, 56, 57; **36**: 44, 45, 46.
- Calidris alba* (Sanderling) - **31**: 49, 57, 58, 59, 60, 61, 62, 64; **32**: 55; **33**: 37, 45, 49; **34**: 5, 8, 10, 22, 24, 25, 26, 27, 28, 29, 33, 35, 39, 44, 51, 52, 53, 54; **35**: 3, 4, 5, 7, 33, 46, 47, 55, 56; **36**: 23, 45, 46.
- Calidris alpina* (Dunlin) - **31**: 14, 19, 20, 21, 33, 42, 63, 64; **32**: 15, 21, 30, 39, 57; **33**: 16, 18, 19, 20, 24, 34, 42; **34**: 21, 22, 24, 25, 26, 27, 28, 29, 33, 39, 40; **35**: 2, 3, 4, 5, 7, 8, 9, 31, 33, 63; **36**: 20, 21, 23, 24, 25.
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- Calidris canutus* (Red Knot) - **31**: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 16, 19, 25, 30, 31, 34, 46, 47, 51, 57, 58, 59, 60, 61, 62, 64; **32**: 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27; **33**: 7, 10,

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- Calidris maritima* (Purple Sandpiper) - **32**: 55.
- Calidris mauri* (Western Sandpiper) - **32**: 58; **35**: 8.
- Calidris melanotos* (Pectoral Sandpiper) - **31**: 57, 58, 59, 60, 61, 62, 64; **34**: 33, 51, 52, 53, 54; **35**: 3, 4, 5, 8; **36**: 45, 46.
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- Calidris paramelanotos* (Cox's Sandpiper) - **31**: 63.
- Calidris ptilocnemis* (Rock Sandpiper) - **34**: 33.
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- Calidris tenuirostris* (Great Knot) - **31**: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15, 19, 20, 21, 25, 31, 34, 47, 51, 52, 57, 58, 59, 60, 61, 62; **32**: 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27; **33**: 7, 9, 10, 11, 12, 13, 16, 18, 19, 20, 21, 24, 34, 35, 36, 42, 44, 49; **34**: 5, 6, 7, 8, 10, 21, 22, 24, 25, 26, 27, 28, 29, 33, 37, 39, 40, 43, 51, 52, 53, 54; **35**: 3, 4, 5, 7, 11, 12, 25, 26, 27, 28, 29, 30, 31, 44, 54, 55, 60, 61, 70; **36**: 6, 12, 13, 14, 16, 20, 21, 22, 23, 24, 35, 36, 37, 40, 41, 44, 45, 46.
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- Catoptrophorus semipalmatus* (Willet) - **32**: 58.
- Charadrius alexandrinus* (Kentish Plover) - **31**: 14, 20, 21, 34, 64; **32**: 54, 55; **33**: 16, 18, 19, 20, 21, 25, 42; **34**: 22, 24, 25, 26, 27, 28, 29, 34, 39, 40; **35**: 2, 3, 4, 5, 7.
- Charadrius asiaticus* (Caspian Plover) - **34**: 39.
- Charadrius bicinctus* (Double-banded Plover) - **31**: 57, 58, 59, 60, 61, 62; **34**: 51, 52, 53, 54; **35**: 11, 41, 51; **36**: 45, 46.
- Charadrius dubius* (Little Ringed Plover) - **31**: 34, 64; **34**: 39; **35**: 3, 4, 5, 7; **36**: 4, 5, 6.
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- Charadrius leschenaultii* (Greater Sand Plover) - **31**: 25, 34, 45, 50, 57, 58, 59, 60, 61, 62; **32**: 6, 7, 8, 9, 10, 11, 12, 13; **33**: 7, 9, 16, 19, 20, 29, 30, 34, 42, 48, 49; **34**: 5, 9, 10, 35, 39, 40, 45, 51, 52, 53, 54; **35**: 3, 4, 5, 7, 10, 11, 12, 25, 26, 27, 28, 29, 30, 31, 32, 51, 58; **36**: 5, 6, 12, 13, 44, 45, 46.
- Charadrius marginatus* (White-fronted Plover) - **32**: 55, 59.
- Charadrius melodus* (Piping Plover) - **32**: 55, 57, 60.
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- Charadrius obscurus* (New Zealand Dotterel) - **31**: 64; **32**: 55, 57.
- Charadrius peronii* (Malaysian Plover) - **36**: 5, 6.
- Charadrius placidus* (Long-billed Plover) - **35**: 3, 4, 5, 8.
- Charadrius ruficapillus* (Red-capped Plover) - **31**: 57, 58, 59, 60, 61, 62; **32**: 42, 43; **33**: 10, 11, 12, 13, 14, 49; **34**: 5, 8, 9, 10, 30, 48, 51, 52, 53, 54; **35**: 11; **36**: 44, 45, 46.
- Charadrius veredus* (Oriental Plover) - **31**: 2, 57, 58, 59, 60, 61, 62, 63, 64; **33**: 16, 19, 20; **34**: 51, 52, 53, 54; **35**: 3, 4, 5, 8; **36**: 15, 43, 44, 45, 46.
- Charadrius vociferus* (Killdeer) - **32**: 57.
- Charadrius wilsonia* (Wilson's Plover) - **32**: 59.
- Chlidonias hybridus* (Whiskered Tern) - **33**: 29; **36**: 13.
- Chlidonias leucopterus* (White-winged Black Tern) - **31**: 40; **32**: 43; **33**: 29; **36**: 13.
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- Sandpiper, Western (*Calidris mauri*) - **32**: 58; **35**: 8.
- Sandpiper, White-rumped (*Calidris fuscicollis*) - **31**: 63, 64.
- Sandpiper, Wood (*Tringa glareola*) - **31**: 19, 33, 34, 57, 58, 59, 60, 61, 62, 64; **33**: 16, 19, 20, 29, 42; **34**: 32, 39, 51, 52, 53, 54; **35**: 3, 4, 5, 7, 11, 12; **36**: 20, 22, 23, 45, 46.
- Scolopax minor* (American Woodcock) - **32**: 55, 60.
- Scolopax rusticola* (Eurasian Woodcock) - **32**: 56, 57; **34**: 37, 39, 40.
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- Shearwater, Hutton's (*Puffinus huttoni*) - **36**: 15.
- Shearwater, Streaked (*Calonectris leucomelas*) - **36**: 15.
- Shearwater, Wedge-tailed (*Puffinus pacificus*) - **36**: 15.
- Shelduck, Radjah (*Tadorna radjah*) - **33**: 29, 30.
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- Sterna bergii* (Crested Tern) - **36**: 13.
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**SEASONAL MIGRATION OF BANDED STILT *CLADORHYNCHUS LEUCOCEPHALUS* TO THE NATIMUK-DOUGLAS SALT PANS IN WESTERN VICTORIA, AUSTRALIA**

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**ABSTRACT**

The Natimuk-Douglas salt pans are an important seasonal habitat for the eastern Australian population of the endemic Banded Stilt. A large proportion of the population visited these lakes in 8 of the 10 survey years (1989-1998). The two years in which Banded Stilts failed to appear corresponded to exceptional rainfall elsewhere within the range of the Banded Stilt in south-eastern Australia. The Natimuk-Douglas salt pans are particularly important to Banded Stilts in dry years, providing reliable habitat when it is scarce elsewhere.

**INTRODUCTION**

Banded Stilts *Cladorhynchus leucocephalus* inhabit mainly saline and hypersaline waters of inland and coastal southern Australia, with seasonal patterns of abundance in some parts of the range with seasonal rainfall (Marchant and Higgins 1993). The Southern Wimmera district lies in a region of reliable winter and spring rainfall, and has an annual average rainfall of 410mm.

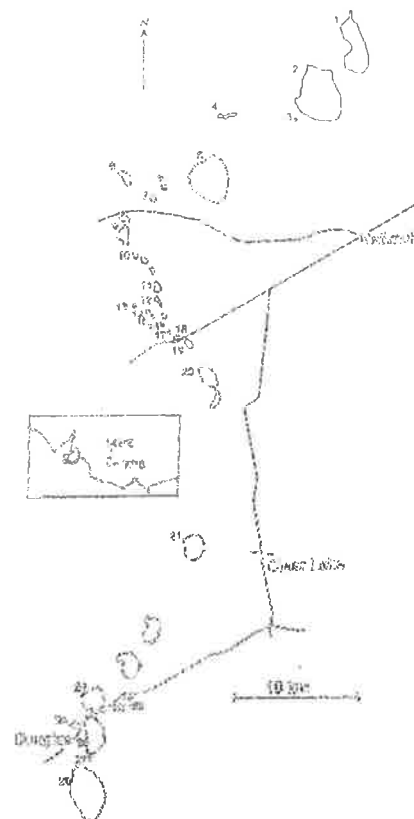
Past records (Alcorn 1985, Lane 1987) had shown that large numbers of Banded Stilts sometimes visited these wetlands. In order to determine the numbers involved, and whether the occurrence of Banded Stilts was seasonal or sporadic, we conducted monthly surveys for ten years from 1989 to 1998. This report documents the survey results, and relates Banded Stilt numbers to rainfall in the Southern Wimmera and other districts within the range of the Banded Stilt in Australia.

**METHODS**

Between the townships of Natimuk and Douglas in the Southern Wimmera district of western Victoria lies a chain of salt pans, ranging in size from 2 to 778 hectares (Figure 1, Table 1). Flat and shallow, they fill annually from winter and spring rains, then dry again in summer.

All salt pans were surveyed once per month from 1989-1998, excluding a few salt pans where access was more difficult. Most surveys were conducted in the middle fortnight of each month. Surveys were conducted at various times of the day. On no occasion did we observe Banded Stilts leaving or arriving at a salt pan, so it is unlikely that birds were double-counted or missed during a survey.

On each visit, each salt pan was surveyed completely from one or more vantage points using 9 x 25 binoculars or a 22x telescope. Birds were counted individually where numbers were small. Large flocks were counted in blocks of ten or one hundred birds.



**Figure 1.** Location of the Natimuk-Douglas salt pans. Surveyed salt pans are numbered (see Table 1).

Each salt pan was also scored as wet or dry. A salt pan was scored as wet if more than half of the surface of the salt pan was covered with water. This definition was chosen to exclude salt pans where thin films of water might develop following summer showers, or where small patches of water might spread from a spring.

**Table 1.** Surveyed salt pans of the Natimuk-Douglas saline wetland system. Numbers refer to Figure 1.

Salt pan	Name	Max Number Observed 1989-1998
1	Olivers Lake	11700
2	Lake Wyn Wyn	9600
3	Un-named salt pan	-
4	Grass Flat Swamp	-
5	Mitre Lake	27257
6	Un-named salt pan	-
7	Un-named salt pan	150
8	Greenhill Lake	4000
9	Hatelys Lake	2580
10	Un-named salt pan	-
11	Un-named salt pan	11
12	Un-named salt pan	-
13	Un-named salt pan	4
14	Un-named salt pan	-
15	Un-named salt pan	-
16	Un-named salt pan	755
17	Un-named salt pan	80
18	Un-named salt pan	100
19	Jaka Lake	800
20	Heard Lake	17000
21	Bow Lake	6700
22	Brooksby Lake	-
23	Duck Lake	-
24	North Lake	1800
25	Centre Lake	11000
26	Tea Tree Swamp	-
27	Un-named salt pan	3
28	White Lake	57560

## RESULTS AND DISCUSSION

Banded Stilts were recorded on 18 of the 28 surveyed salt pans (Table 1), indicating that it is the Natimuk-Douglas wetland system as a whole that is important to Banded Stilts, rather than just a few salt pans. The salt pans utilised by Banded Stilts varied from year to year, and often from month to month.

Table 2 lists the maximum monthly count of Banded Stilts over all surveyed wetlands for each of the ten survey years. In eight of the ten years, between 14,515 and 60,389 Banded Stilts were recorded, representing between 7% and 29% of the estimated 206,000 birds in the Australian population (Watkins 1993). In the remaining two years, only a handful of Banded Stilts appeared.

The total number of Banded Stilts recorded month by month is shown in Figure 2. This figure also shows the proportion of salt pans scored as wet at the time of the

**Table 2.** Maximum total number of Banded Stilts recorded on the Natimuk-Douglas salt pans in each survey year, and the month in which this number occurred.

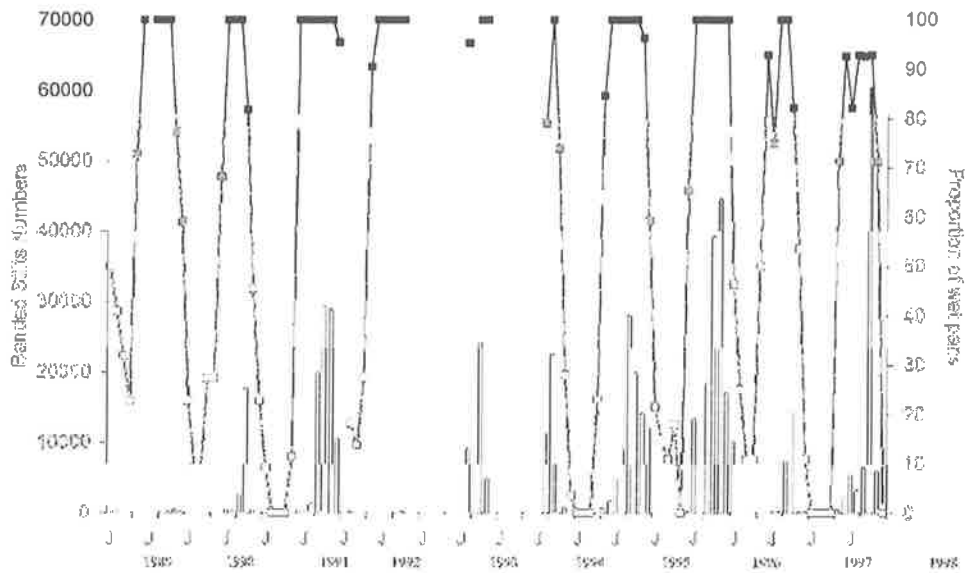
Year	Month	Maximum Number
1989	January	386
1990	October	17666
1991	October	29140
1992	October	130
1993	October	24200
1994	September	22433
1995	September	28031
1996	November	44553
1997	October	14515
1998	October	60389

survey. Months in which surveys were not conducted are indicated by the absence of a wetness symbol.

All lakes were wet by June or July each year and remained that way throughout winter and early spring. Although small numbers of Banded Stilts often appeared in the winter months, peak numbers were always recorded between September and November, except in years when few Banded Stilts arrived at all. As the lakes dried in late spring or early summer, the Banded Stilts departed.

Figure 2 shows that, although all salt pans in the Natimuk-Douglas chain filled in each of the ten years from 1989-1998, the maximum number of Banded Stilts visiting the Natimuk-Douglas wetlands varied considerably from year to year. Figure 3 shows the correlation of peak annual Banded Stilt numbers on the Natimuk-Douglas salt pans with annual rainfall across rainfall districts in southern Western Australia, South Australia, south-western New South Wales and western Victoria. This area covers the main range of the Banded Stilt in Australia.

The pattern of negative correlations of maximum Banded Stilt numbers with annual rainfall in the eastern states of South Australia, New South Wales and Victoria means that there was a tendency for larger numbers of Banded Stilts to arrive on the Natimuk-Douglas salt pans in dry years in south-eastern Australia, and fewer in wet years. In wet years more habitat in the form of wet salt pans will be available, particularly in the drier northern districts, so Banded Stilts will be more widely dispersed and less likely to be found in any one district. Conversely in dry years less habitat will be available, and unless there has been a significant rainfall event elsewhere, Banded Stilts will congregate in the wetter, more southerly regions. The Natimuk-Douglas salt pans lie in the near-coastal zone of the southern part of this region, and clearly provide one of the principal habitats

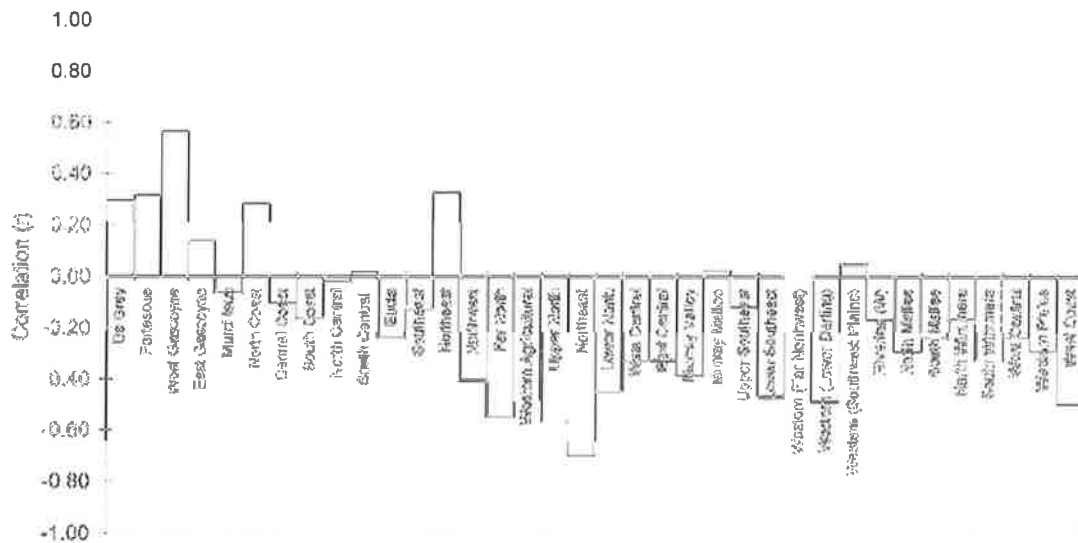


**Figure 2.** The total number of Banded Stilts recorded on each monthly survey. The solid line depicts the proportion of surveyed salt pans scored as wet.

of Banded Stilts in south-eastern Australia in the spring period of dry years.

Two years, 1989 and 1992, were unusual in that virtually

breeding on Lake Torrens (Minton 1989). Although most birds had left Lake Torrens by August, they did not return to the southern Wimmera that year. Nineteen-ninety two was the wettest year during the survey period



**Figure 3.** Correlation of peak numbers of Banded Stilts recorded each year on the Natimuk-Douglas salt pans with annual rainfall for all rainfall districts within their main range. Only the value for the Northeast district of South Australia is statistically significant ( $p < 0.05$ ).

no Banded Stilts appeared on the Natimuk-Douglas salt pans for the entire year. Exceptionally heavy rain fell over a large area of northern South Australia in March 1989. By April, up to 100,000 Banded Stilts, perhaps the entire eastern Australian population, had commenced

across many districts in western Victoria and eastern South Australia, and in some districts the wettest year on record. Undoubtedly extensive habitat was available throughout this region for much of the year. Whether or

not Banded Stilts bred in eastern Australia in 1992 is unknown.

Banded Stilts also bred at Lake Eyre in 1997 (Minton 1997), the only other documented breeding event in eastern Australia during the survey period. In February 1997, substantial rains fell across northern South Australia, a month earlier than in 1989. Large numbers of Banded Stilt chicks were observed on Lake Eyre in May. Banded Stilts did not arrive back in the southern Wimmera until November of that year, and then in smaller numbers than usual.

If rainfall in Western Australia had enticed Banded Stilts away from the southern Wimmera, we would expect to find a pattern of negative correlations for these districts in Figure 3. However Banded Stilts numbers in the southern Wimmera were positively correlated with rainfall in Western Australia during the survey period. This suggests that the eastern Australian population of Banded Stilts does not respond to rainfall events in Western Australia.

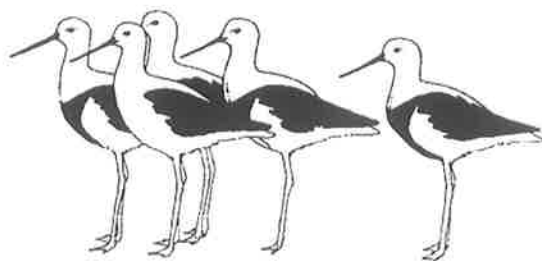
#### ACKNOWLEDGEMENTS

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## THE MANUFACTURE OF LEG FLAGS IN THE LIGHT OF EXPERIENCE.

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The following article is an update of the article - Leg-flagging in Australia - Why and How? by Mark Barter and Megan Rush that appeared in Stilt 20. Diagrams are modifications of those appearing in that article. Since publication of the Barter and Rush article in 1992, the techniques employed by the Victorian Wader Study Group have been modified to cope with the demand for large numbers of high quality leg flags, needed by the VWSG and the Australasian Wader Studies Group.

### Material

The material used for leg-flag manufacture is 0.5 mm thick unplasticized PVC sheet made by Imperial Chemical Industries in the UK under the trade name of "Darvic". Darvic has been used before for the manufacture of both colour bands and flags. The dyes are colour-fast and serious fading does not occur.

Darvic can be purchased from:  
AC Hughes  
1 High Street  
Hampton Hill  
Middlesex. TW12 1NA  
UK

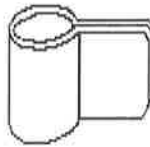
Tel: (0181) 979 1366  
Fax: (0181) 979 5872

The plastic is manufactured by ICI in 6ft x 4ft (1.83m x 1.22m) sheets and AC Hughes will cut sheets up into 24 x 1ft x 1ft (30cm x 30cm) squares

upon request. The smaller size is more easily transportable and very convenient to handle. The need to purchase Darvic should be planned for well in advance as it can take over 8 weeks to obtain it from AC Hughes.

### Manufacture of Leg-flags

Flags are made slightly larger in diameter (D) and the same height (h) as the equivalent Australian metal band (Table 1). This is to take account of the slightly larger size of the tibia in most shorebird species. In some species, which are size dimorphic, the larger sex may require a larger size leg-flag than the band. For example, some female Bar-tail Godwits require a size 8 flag. This may also be true for different sub-species so try the flag on before you "glue" it and keep a list of appropriate sizes for each species with the flags.



The basic design, illustrated left, shows that the flag portion has sides which can be glued to ensure that the leg-flag remains secure on the bird's leg.

The first stage in the manufacturing process is to cut the plastic squares into strips with a width which is equal to the height of the flag to be made (Table 1). This can be easily done on a sharp, office paper, guillotine. The wide strip which is inevitably left over at the end (unless you want to slice the tips of your fingers off) can be utilised by slicing off the

**Table 1.** Measurements for leg-flags currently used on Australian shorebirds.

Band size	Internal diameter of flag (D) - mm	Width of plastic strip (h) - mm	Length of flag blank - mm
03	3.0	5.0	27
04	3.5	5.0	30
05	4.5	7.0	32
06	5.0	7.0	35
07	6.5	8.0	43
08	7.5	8.0	43
09	9.0	10.0	45
10	9.0	10.0	45

appropriate widths at right angles to the original cutting direction. The yield will be virtually 100% if the width of the remaining strip is equal to the flag blank length required. Pre planning will achieve this.

Flag blanks are made from the strips by cutting to the desired length. The required blank length can be calculated by allowing for the circular part of the flag and for a flag length of approximately twice the flag diameter or use Table 1. Following trimming, the resulting flag length will be about 1.5 times the internal diameter of the band.

To make the flags you will need a metal rod such as a knitting needle or drill bit (a plastic rod can be used if metal is unavailable), of the relevant size (D) (Table 1), a shallow dish in which to heat water, several pairs of thick-nosed pliers and some dishes of cold water. It is important that the pan be clean and free from oil and grease that could coat the internal surfaces of the flag and interfere with the "gluing" action. The pan should be thoroughly cleaned with hot water and detergent (more than once if necessary).



Flags are formed by bending the blank around the rod using the thumb and index finger as shown here in the top diagram. The pliers are used to grip the plastic against the rod to form a circle taking care not to squeeze the plastic against the rod as this will tear the plastic, see diagram 2.

The rod and blank are then held in the hot water for 10 seconds. The flag and pliers are then plunged into a bowl of cold water to set the flag into the new shape. The flag is gently slid off the end of the rod and left for a few minutes in the container of water. The cold water should be renewed at regular intervals as it heats up due to the pliers being plunged into it. The flags will not set properly if they are plunged into warm water!

It is very important to get the correct squeezing action so both the surfaces of the flag sides are firmly in contact with each other in the finished flag. If the sides are separated to any extent, the "springiness" of the flag tends to work against the "glue" when the flag is being attached to the bird's leg and satisfactory "gluing" takes longer. The possibility of subsequent separation of the flag sides, and consequent flag loss is also greater. It is

also important to make sure that the ends of the flags are square or the resultant flag will be twisted and therefore unusable.

Badly formed leg flags can be re-used by putting them in the hot water which will cause them to return to the unformed flat state.

Slightly mis-formed flags can be renovated by replacing them on the metal rod, gripping to the correct shape with the pliers and re-immersing for a short time in hot water. The flag can then be removed as before, and dropped into cold water.



The formed flags are trimmed with a sharp pair of nail clippers or scissors to make both sides of the flag of equal length and to remove any sharp corners - see diagram opposite.

Old 35 mm plastic film containers hold a convenient quantity of flags - don't forget to label both the lid and the base with the flag size.

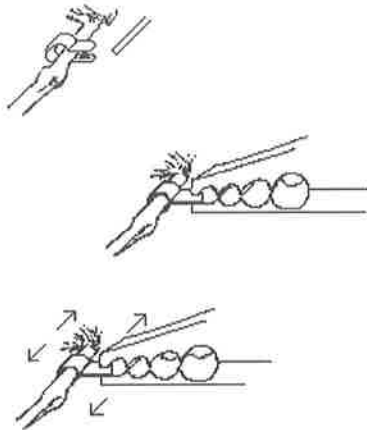
The trimmed flags are then air-dried, and thoroughly cleaned by agitating in a suitable solvent. Priming fluid for PVC pipes and fittings used by plumbers is suitable (Methyl ethyl Ketone, 53%, (V/V)). Flags should be cleaned for 20 seconds, air-dried again, clipped (see below) and kept in labelled containers. It is best to wash the bands outside away from any sources of ignition as Methyl ethyl Ketone is highly flammable. Do not leave the flags in the solvent too long or the legs will stick together making the flag useless.

Only clear Methyl ethyl Ketone should be used as the dye in the type used by some plumbers will colour the flags. This is especially important when flags are washed in red dyed fluid as the colours of the flags will change beyond recognition.

#### Leg-Flag Attachment

The most suitable method for "gluing" the flags has been found to be the solvent cement used by plumbers to glue PVC pipes and fittings (UPVC Solvent Cement, produced by Marley Extrusions Ltd, Lenham, Maidstone, Kent, UK, phone Maidstone 0622 858888 or fax 0622 858725). The solvent cement contains Methyl ethyl Ketone as a solvent and partially dissolves the plastic and upon setting, forms an adherent bond. Super Glue is

unsuitable as it does not work by solvent action and is not an effective adhesive for the hard, shiny Darvic surface especially in the marine environment. Additionally, Super Glue is more hazardous to use because of its propensity to glue "anything" to "anything", including fingers to flags and birds and bird's legs to flags.



The most successful technique for attaching the flag is to, firstly, open the flag portion just sufficiently to push over the bird's leg and then to place a drop of solvent between the flag sides using a screwdriver, whilst they are still separated by the leg (see top figure above). The flag is then pushed completely on to the leg and it should snap shut due to the inherent spring in the plastic. The flag sides are then clamped lightly with a pair of pliers for at least 20 seconds until the solvent has had time to dissolve some of the plastic and then evaporated sufficiently to hold the two sides together (see middle figure above). The exact drying time will depend on the air temperature. It is important to only use just enough solvent to cover the joint surface when the sides are clamped by the pliers. Excess solvent will be squeezed out and may cause the flag to adhere to the feathers on the bird's leg. It is good practice to continuously move the flag relative to the leg whilst the flag is clamped by the pliers (see lower figure above). The solvent evaporates rapidly and a flag that is moving freely on the leg after 20 seconds will remain free thereafter. Slide the pliers gently from the flag, as opening them may cause the flag to spring open if they are contaminated with solvent.

Birds can then be released after checking that flags are properly glued and moving freely on the leg (see lower figure above).

It is very important not to open the flag sides too much during application to the bird's leg or the flag will become permanently distorted and it will be difficult to get a satisfactory bond between the two sides of the flag.

#### Removal of Leg-flags

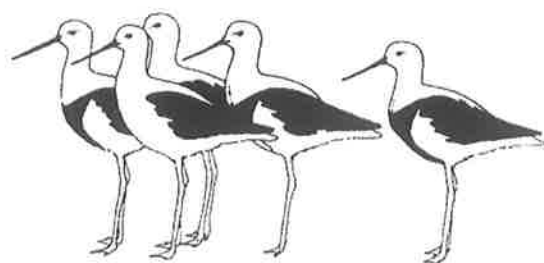
Sometimes retrapped birds have been found that have worn or faded flags. Flags are easily replaced by gently cutting the "legs" of the flag near the birds leg and this will enable the flag to be removed.

#### ACKNOWLEDGMENTS.

Special thanks go to Doris Graham of the Victorian Wader Study Group for organising leg-flag making "parties" where members of the VWSG spend many hours over hot pans in sometimes trying circumstance to produce the many thousands of flags used in Victoria and the north-west of Australia.

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## BIRD SPECIES INDEX

The Stilt: Nos.25-30

Compiled by Hugo Phillipp

**PLEASE NOTE:** The use of this index for finding references to particular birds in *The Stilt* should be straightforward. Issue numbers are in bold with the relevant page numbers following. References are only to species, not to higher taxa or subspecies. Species are listed alphabetically under both the scientific binomial and the common substantive name. A page reference means that the bird is mentioned on that page, possibly more than once. Names of all Australian birds follow the conventions of RAOU Monograph 2, *The Taxonomy and Species of Birds of Australia and its Territories*, (Christidis & Boles, 1994). The scientific and vernacular names of other (non-Australian) species largely follow *Shorebirds: an identification guide to the waders of the world* (Hayman, Marchant & Prater, 1986). It is a comprehensive index; all obvious and identifiable mentions of species are listed, including trivial ones, but excluding mentions in the previous index. All comments and corrections should be directed to the Compiler.

*Actitis hypoleucos* (Common Sandpiper)

**25:** 9, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 46, 60;  
**27:** 28, 29; **28:** 23, 24; **29:** 44, 45, 46, 47; **30:** 8, 9,  
10, 32, 34, 40, 45, 50, 51, 68.

*Anarhynchus frontalis* (Wrybill)

**27:** 46; **28:** 18, 20.

*Anas gracilis* (Grey Teal)

**25:** 11.

*Anous stolidus* (Common Noddy)

**30:** 28.

*Anser albifrons* (White-fronted Goose)

**28:** 11.

*Anser fabalis* (Bean Goose)

**25:** 41.

*Anseranas semipalmata* (Magpie Goose)

**27:** 12.

*Aphriza virgata* (Surfbird)

**25:** 8.

*Aquila audax* (Wedge-tailed Eagle)

**27:** 19, 45.

*Ardea alba* (Great Egret)

**29:** 36.

*Ardea intermedia* (Intermediate Egret)

**29:** 36.

*Arenaria interpres* (Ruddy Turnstone)

**25:** 6, 9, 10, 13, 14, 15, 16, 17, 18, 19, 41; **26:** 5, 22,  
37, 39, 40, 46, 48; **27:** 27, 28, 29, 31; **28:** 19, 24, 25,  
27, 29, 34, 40, 41, 50; **29:** 13, 15, 17, 20, 39, 40, 44,  
45, 46, 47, 48, 50; **30:** 8, 9, 11, 12, 18, 32, 34, 40, 42,  
44, 55, 56, 57, 61, 68.

Avocet, American (*Recurvirostra americana*)

**28:** 18.

Avocet, Pied (*Recurvirostra avosetta*)

**30:** 8, 10.

Avocet, Red-necked (*Recurvirostra novaehollandiae*)

**25:** 9, 10, 13, 14, 15, 16, 17, 18, 19, 33; **26:** 5, 22,  
48; **27:** 28, 29; **29:** 36, 44, 45, 46, 47, 50; **30:** 40, 44,  
68.

*Aythya australis* (Hardhead)

**25:** 11.

*Bartramia longicauda* (Upland Sandpiper)

**26:** 5; **28:** 16.

*Brania bernicla* (Brent Goose)

**28:** 40.

Bunting, Reed (*Emberiza schoeniclus*)

**25:** 41.

Bunting, Snow (*Plectrophenax nivalis*)

**25:** 41.

*Burhinus grallarius* (Bush Stone-curlew)

**25:** 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 47; **27:** 28,  
29; **29:** 44, 45, 46, 47; **30:** 68.

Buzzard, Black-breasted (*Hamirostra melanosternon*)

**30:** 31.

*Calidris acuminata* (Sharp-tailed Sandpiper)

**25:** 7, 9, 10, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 47,  
48; **27:** 21, 22, 23, 24, 25, 28, 29, 32; **28:** 24, 27, 29,  
61; **29:** 1, 40, 44, 45, 46, 47, 50; **30:** 8, 9, 11, 16, 18,  
21, 32, 33, 34, 40, 42, 46, 50, 52, 57, 68.

*Calidris alba* (Sanderling)

**25:** 9, 10, 13, 14, 15, 16, 17, 18, 19, 41; **26:** 5, 22,  
48, 64; **27:** 28, 29, 31, 50; **28:** 16, 17, 20, 24, 25, 26,  
27, 28, 29, 41, 65; **29:** 17, 18, 39, 44, 45, 46, 47, 48,  
50; **30:** 8, 16, 18, 19, 21, 32, 34, 57, 63, 68.

*Calidris alpina* (Dunlin)

**25:** 8, 41; **26:** 5; **28:** 9, 16, 18, 19, 21, 24, 27, 28, 29,  
30, 65; **29:** 18, 20, 42; **30:** 7, 8, 9, 10, 11, 12.

*Calidris bairdii* (Baird's Sandpiper)

**26:** 5.

*Calidris canutus* (Red Knot)

**25:** 1, 2, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 33,  
41; **26:** 5, 6, 19, 22, 37, 40, 41, 46, 64; **27:** 12, 13,  
14, 15, 16, 27, 28, 29, 31, 34, 35, 50; **28:** 2, 19, 20,  
24, 27, 29, 41, 61; **29:** 8, 17, 20, 44, 45, 46, 47, 48,  
50, 54, 55; **30:** 8, 9, 10, 11, 12, 13, 18, 32, 33, 34, 40,  
42, 46, 57, 59, 60, 61, 62, 63, 68.

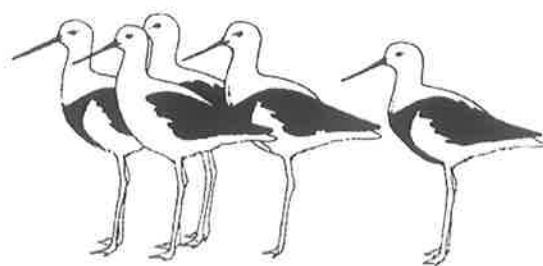
*Calidris ferruginea* (Curlew Sandpiper)

**25:** 7, 9, 10, 13, 14, 15, 16, 17, 18, 19, 41, 49; **26:** 5,  
22, 38, 40, 47, 63; **27:** 1, 28, 29, 31, 32, 33, 34, 50;  
**28:** 24, 25, 27, 28, 29, 30, 55, 56, 57; **29:** 17, 18, 20,  
35, 39, 44, 45, 46, 47, 49, 50, 52, 54; **30:** 8, 9, 10, 11,  
18, 19, 21, 32, 33, 34, 40, 42, 47, 57, 58, 61, 68.

- Calidris fuscicollis* (White-rumped Sandpiper)  
**26:** 5; **27:** 13, 14.
- Calidris maritima* (Purple Sandpiper)  
**25:** 41; **28:** 20.
- Calidris mauri* (Western Sandpiper)  
**26:** 6, 60; **28:** 21; **29:** 19, 21.
- Calidris melanotos* (Pectoral Sandpiper)  
**25:** 7, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 48; **27:** 28, 29; **29:** 44, 45, 46, 47; **30:** 40, 68.
- Calidris minuta* (Little Stint)  
**25:** 15; **26:** 5; **29:** 18, 27, 50; **30:** 40.
- Calidris paramelanotos* (Cox's Sandpiper)  
**25:** 8; **26:** 6; **29:** 50.
- Calidris pusilla* (Semipalmated Sandpiper)  
**28:** 17, 18, 20; **29:** 27.
- Calidris ruficollis* (Red-necked Stint)  
**25:** 6, 7, 9, 10, 13, 14, 15, 16, 17, 18, 19, 49; **26:** 5, 22, 36, 38, 39, 46, 48, 60, 63; **27:** 1, 16, 28, 29, 31, 33, 50; **28:** 18, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 46, 47, 57, 58, 59, 60, 61; **29:** 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 39, 44, 45, 46, 47, 49, 50, 52, 56; **30:** 2, 8, 9, 10, 11, 12, 16, 17, 18, 19, 20, 21, 32, 33, 34, 40, 42, 46, 50, 52, 56, 57, 58, 60, 61, 67, 68.
- Calidris subminuta* (Long-toed Stint)  
**25:** 10, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 48; **27:** 28, 29; **28:** 23, 24, 27; **29:** 44, 45, 46, 47; **30:** 40, 68.
- Calidris temminckii* (Temminck's Stint)  
**26:** 6, 60; **28:** 16, 23, 24; **30:** 8.
- Calidris tenuirostris* (Great Knot)  
**25:** 2, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 33, 48, 49; **26:** 1, 2, 5, 22, 38, 39, 40, 41, 58, 59, 60, 64; **27:** 12, 27, 28, 29, 34, 35, 49; **28:** 2, 3, 24, 25, 27, 29, 32, 33, 34, 35, 36, 38, 39, 40, 43, 44, 45, 62, 63, 64; **29:** 8, 41, 42, 43, 44, 45, 46, 47, 50, 51, 54; **30:** 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 18, 32, 33, 34, 40, 42, 46, 52, 57, 58, 61, 63, 68.
- Cereopsis novaehollandiae* (Cape Barren Goose)  
**27:** 20.
- Charadrius alexandrinus* (Kentish Plover)  
**26:** 5; **27:** 16; **28:** 9, 18, 20, 23, 24, 25, 26, 27, 28, 29, 30; **29:** 42; **30:** 7, 8, 9, 10, 11, 12.
- Charadrius asiaticus* (Caspian Plover)  
**26:** 5.
- Charadrius australis* (Inland Dotterel)  
**26:** 5; **30:** 50.
- Charadrius bicinctus* (Double-banded Plover)  
**25:** 6, 13, 14, 15, 16, 17, 18, 19, 48; **26:** 5, 22, 48; **27:** 28, 29, 45, 51; **28:** 16, 52, 53; **29:** 35, 39, 44, 45, 46, 47, 50; **30:** 16, 18, 19, 21, 68.
- Charadrius dubius* (Little Ringed Plover)  
**26:** 5; **28:** 23, 24; **30:** 8, 9, 10, 11, 40.
- Charadrius hiaticula* (Ringed Plover)  
**26:** 5, 60; **28:** 47; **30:** 8, 10, 22, 49.
- Charadrius leschenaultii* (Greater Sand Plover)  
**25:** 7, 9, 10, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 37, 40, 48; **27:** 12, 27, 28, 29, 32, 33; **28:** 22, 23, 24, 25, 26, 27, 28, 29, 30, 53; **29:** 44, 45, 46, 47, 48, 50, 51; **30:** 6, 8, 9, 10, 11, 12, 18, 19, 21, 32, 33, 34, 40, 42, 43, 57, 58, 60, 61, 68.
- Charadrius melodus* (Piping Plover)  
**28:** 17, 18, 19, 20, 21; **29:** 37.
- Charadrius mongolus* (Lesser Sand Plover)  
**25:** 9, 10, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 40, 48; **27:** 28, 29, 32; **28:** 22, 23, 24, 25, 26, 27, 28, 29, 30, 47; **29:** 44, 45, 46, 47, 50; **30:** 8, 9, 11, 16, 17, 18, 19, 20, 21, 22, 32, 33, 34, 40, 61, 68.
- Charadrius obscurus* (New Zealand Dotterel)  
**27:** 16.
- Charadrius peronii* (Malaysian Plover)  
**28:** 1.
- Charadrius ruficapillus* (Red-capped Plover)  
**25:** 6, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20; **26:** 5, 22, 47, 51; **27:** 27, 28, 29, 36, 39; **29:** 43, 44, 45, 46, 47, 50; **30:** 16, 17, 18, 19, 20, 21, 22, 32, 33, 40, 42, 43, 53, 68.
- Charadrius veredus* (Oriental Plover)  
**25:** 9, 10, 11, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22; **27:** 4, 28, 29; **29:** 44, 45, 46, 47; **30:** 8, 18, 32, 34, 56, 57, 68.
- Charadrius vociferus* (Killdeer)  
**28:** 16, 17.
- Charadrius wilsonia* (Wilson's Plover)  
**28:** 16.
- Chionis minor* (Black-faced Sheathbill)  
**26:** 5.
- Chlidonias hybridus* (Whiskered Tern)  
**25:** 9, 11; **30:** 27, 28, 63.
- Chlidonias leucopterus* (White-winged Black Tern)  
**25:** 9, 11; **30:** 18, 27, 28, 63.
- Circus approximans* (Swamp Harrier)  
**27:** 19; **28:** 5.
- Cladorhynchus leucocephalus* (Banded Stilt)  
**25:** 9, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 36, 48; **27:** 28, 29, 44, 45; **28:** 2, 19; **29:** 44, 45, 46, 47; **30:** 40, 41, 42, 44, 50, 59, 68.
- Coenocorypha aucklandica* (New Zealand Snipe)  
**28:** 19.
- Coot, Eurasian (*Fulica atra*)  
**26:** 19.
- Cormorant, Great (*Phalacrocorax carbo*)  
**28:** 11.
- Corvus bennetti* (Little Crow)  
**27:** 45.
- Corvus corone* (Carrion Crow)  
**30:** 15.
- Corvus coronoides* (Australian Raven)  
**25:** 29.
- Corvus tasmanicus* (Forest Raven)  
**25:** 20.
- Crake, Baillon's (*Porzana pusilla*)  
**25:** 11.
- Crow, Carrion (*Corvus corone*)  
**30:** 15.
- Crow, Little (*Corvus bennetti*)  
**27:** 45.

- Sheathbill, Black-faced (*Chionis minor*)  
**26:** 5.
- Snipe, Common (*Gallinago gallinago*)  
**25:** 37, 38; **28:** 24, 25, 27, 29; **29:** 20; **30:** 8.
- Snipe, Latham's (*Gallinago hardwickii*)  
**25:** 1, 13, 14, 15, 16, 17, 18, 19, 37, 38, 39; **26:** 5, 22, 48; **27:** 28, 29, 30; **28:** 6, 47, 48; **29:** 44, 45, 46, 47, 50; **30:** 50, 54, 55, 68.
- Snipe, New Zealand (*Coenocorypha aucklandica*)  
**28:** 19.
- Snipe, Painted (*Rostratula benghalensis*)  
**25:** 7, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 48; **27:** 28, 29; **29:** 44, 45; **30:** 50.
- Snipe, Pin-tailed (*Gallinago stenura*)  
**25:** 10; **26:** 5; **30:** 40.
- Snipe, Solitary (*Gallinago solitaria*)  
**26:** 60.
- Snipe, Swinhoe's (*Gallinago megala*)  
**25:** 37, 38; **26:** 5; **30:** 33, 34.
- Steamerduck, Flightless (*Tachyeres ptereres*)  
**27:** 15.
- Steganopus tricolor* (Wilson's Phalarope)  
**26:** 5; **28:** 18.
- Sterna albifrons* (Little Tern)  
**25:** 6, 9, 11; **26:** 4; **27:** 36, 39; **28:** 17, 18, 20; **29:** 53; **30:** 16, 18, 20, 21, 22, 26, 27, 28, 29, 30, 31, 62, 63.
- Sterna aleutica* (Aleutian Tern)  
**30:** 14.
- Sterna anaethetus* (Bridled Tern)  
**30:** 28.
- Sterna bengalensis* (Lesser Crested Tern)  
**25:** 9; **30:** 18, 27, 28, 63.
- Sterna bergii* (Crested Tern)  
**25:** 9, 11; **30:** 18, 20, 21, 27, 28, 63.
- Sterna caspia* (Caspian Tern)  
**25:** 9; **29:** 36; **30:** 18, 20, 27, 28, 63.
- Sterna dougallii* (Roseate Tern)  
**25:** 9, 11; **30:** 27, 28, 63.
- Sterna fuscata* (Sooty Tern)  
**30:** 28.
- Sterna hirundo* (Common Tern)  
**25:** 9, 11; **30:** 14, 18, 20, 27, 28, 62, 63.
- Sterna nereis* (Fairy Tern)  
**27:** 36, 39; **30:** 28, 31.
- Sterna nilotica* (Gull-billed Tern)  
**25:** 9, 11; **29:** 36; **30:** 18, 20, 21, 27, 28, 62, 63.
- Sterna sumatrana* (Black-naped Tern)  
**30:** 28.
- Stilt, Banded (*Cladorhynchus leucocephalus*)  
**25:** 9, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 36, 48; **27:** 28, 29, 44, 45; **28:** 2, 19; **29:** 44, 45, 46, 47; **30:** 40, 41, 42, 44, 50, 59, 68.
- Stilt, Black (*Himantopus novaezealandiae*)  
**25:** 2; **28:** 16, 18, 19, 20.
- Stilt, Black-winged (*Himantopus himantopus*)  
**25:** 2, 7, 9, 10, 13, 14, 15, 16, 17, 18, 19; **26:** 4, 5, 22, 37, 47; **27:** 28, 29; **28:** 16, 18, 19, 20, 23, 24; **29:** 44, 45, 46, 47; **30:** 8, 9, 10, 18, 33, 40, 42, 43, 50, 68.
- Stiltia isabella* (Australian Pratincole)  
**25:** 10, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22; **30:** 50.
- Stint, Little (*Calidris minuta*)  
**25:** 15; **26:** 5; **29:** 18, 27, 50; **30:** 40.
- Stint, Long-toed (*Calidris subminuta*)  
**25:** 10, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 48; **27:** 28, 29; **28:** 23, 24, 27; **29:** 44, 45, 46, 47; **30:** 40, 68.
- Stint, Red-necked (*Calidris ruficollis*)  
**25:** 6, 7, 9, 10, 13, 14, 15, 16, 17, 18, 19, 49; **26:** 5, 22, 36, 38, 39, 46, 48, 60, 63; **27:** 1, 16, 28, 29, 31, 33, 50; **28:** 18, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 46, 47, 57, 58, 59, 60, 61; **29:** 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 39, 44, 45, 46, 47, 49, 50, 52, 56; **30:** 2, 8, 9, 10, 11, 12, 16, 17, 18, 19, 20, 21, 32, 33, 34, 40, 42, 46, 50, 52, 56, 57, 58, 60, 61, 67, 68.
- Stint, Temminck's (*Calidris temminckii*)  
**26:** 6, 60; **28:** 16, 23, 24; **30:** 8.
- Stone-curlew, Beach (*Esacus neglectus*)  
**25:** 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22; **27:** 12; **27:** 19, 28, 29; **29:** 36, 37, 44, 45, 46, 47; **30:** 16, 18, 20, 21, 22, 32, 51, 68.
- Stone-curlew, Bush (*Burhinus grallarius*)  
**25:** 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 47; **27:** 28, 29; **29:** 44, 45, 46, 47; **30:** 68.
- Surfbird (*Aphriza virgata*)  
**25:** 8.
- Swallow, Barn (*Hirundo rustica*)  
**25:** 41.
- Tachybaptus novaehollandiae* (Australasian Grebe)  
**25:** 2.
- Tachyeres ptereres* (Flightless Steamerduck)  
**27:** 15.
- Tattler, Grey-tailed (*Heteroscelus brevipes*)  
**25:** 9, 10, 11, 13, 14, 15, 16, 17, 18, 19; **26:** 5, 22, 35, 37, 40, 46, 62; **27:** 12, 28, 29, 33; **28:** 23, 24, 25, 26, 27, 28, 30, 47, 54, 55; **29:** 44, 45, 46, 47, 51, 55; **30:** 8, 9, 18, 19, 21, 32, 34, 40, 42, 45, 50, 53, 57, 58, 68.
- Tattler, Wandering (*Heteroscelus incanus*)  
**25:** 2, 13, 14, 15, 16, 17, 18, 19, 35; **26:** 5, 22; **27:** 28, 29; **29:** 44, 45, 46, 47; **30:** 18, 19, 68.
- Teal, Grey (*Anas gracilis*)  
**25:** 11.
- Tern, Aleutian (*Sterna aleutica*)  
**30:** 14.
- Tern, Black-naped (*Sterna sumatrana*)  
**30:** 28.
- Tern, Bridled (*Sterna anaethetus*)  
**30:** 28.
- Tern, Caspian (*Sterna caspia*)  
**25:** 9; **29:** 36; **30:** 18, 20, 27, 28, 63.
- Tern, Common (*Sterna hirundo*)  
**25:** 9, 11; **30:** 14, 18, 20, 27, 28, 62, 63.
- Tern, Crested (*Sterna bergii*)  
**25:** 9, 11; **30:** 18, 20, 21, 27, 28, 63.
- Tern, Fairy (*Sterna nereis*)  
**27:** 36, 39; **30:** 28, 31.

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**WADERS OF THE CREERY WETLANDS AND ADJACENT MUDFLATS, WESTERN AUSTRALIA.**

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**ABSTRACT**

Results presented in this article were obtained from wader counts made in the Creery wetlands area 1994-96, in addition historical records are considered. Twenty-seven wader species are discussed in detail, and information on habitat, local distribution, numbers, seasonality and behaviour are presented. A higher number of overwintering Bar-tailed Godwits than expected and the presence of an Eastern Curlew during the winter months were discovered. Potential threats to the wetlands are discussed.

**INTRODUCTION**

The Creery wetlands form an integral part of the tidal marshes and mudflats that span right across the northern part of the Peel Inlet. These important wetlands are located near the resort town of Mandurah (population 41400) which is about one hours drive south of Perth, Western Australia.

The Peel Inlet and Harvey Estuary combine to make up a large tidal estuary system that, including waterways, covers 155 square kilometres. Fresh water is discharged into the system through the Serpentine, Murray and Harvey Rivers. Salt water enters through the Mandurah estuary which is the natural outlet to the Indian Ocean and also through the Dawesville Cut, an artificial outlet located at the northern end of the Harvey Estuary. The Dawesville Cut was made to improve the water quality of the estuary and flush out the high nutrient load that

originated from the agricultural catchment areas. The Creery wetlands are one of at least three significant sites around the Peel/Harvey Estuary that are capable of holding in excess of 20000 waders (see Table 1). For an area so rich in waders it is surprising how little has been published about these premier wader sites of southwestern Australia.

**Study site**

The Creery wetlands are sometimes referred to as "The Creery Marshes", "Creery Lagoon", "Creery Island" etc but these names basically identify different localities within the wetlands. The Creery wetlands described here are located between the "new" Mandurah estuary bridge and the end of Wanjeep Street at Coodanup. An overview of the whole wetland area can be had from the top of the bridge. The area is shown in Figure 1.

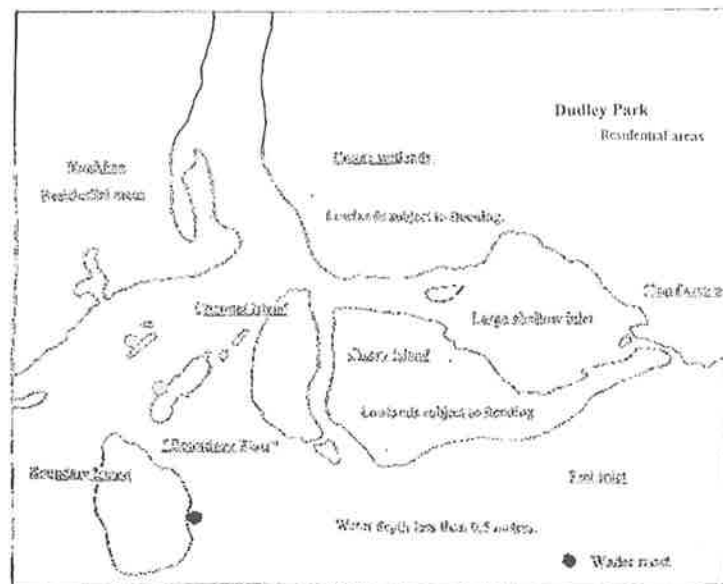


Figure 1. A map of the study site showing wader roost sites

**Table 1: Highest counts for the northern peel inlet.**

Location	A	B	C	D	E	F
	Creery wetl.	Coodanup	Serp. River	Creery wetl.	Austin Bay	L. McLarty
Year	1996	1984	1985	1992	1985	1996
Pied Oystercatcher	6		2	60		
Grey Plover	134	7	7	600	16	
Pacific Golden Plover	13			85		4
Red-Kneed Dotterel						90
Black-Fronted Plover			4		5	26
Hooded Plover					1	
Little Ringed Plover						1
Lesser Sand Plover		3				
Large Sand Plover	21			15	6	
Red-Capped Plover	33	11	32		1158	690
Black-Winged Stilt	>300	362	148		2703	1580
Banded Stilt	>2000	5	10	9000	6394	1000
Red-Necked Avocet	5	124	37		606	5000
Ruddy Turnstone	3				9	1
Eastern Curlew	11			11	2	
Whimbrel	15			7	2	
Wood Sandpiper						112
Grey-Tailed Tattler	5				5	
Common Sandpiper	1		2		2	1
Greenshank	122	7	10	200	213	103
Marsh Sandpiper				284	1	142
Terek Sandpiper	4			7		
Pin-Tailed Snipe						1
Asian Dowitcher						1
Black-Tailed Godwit	14	2	13			65
Bar-Tailed Godwit	145	7		500	537	
Red Knot	>100	6		100	542	1
Great Knot	>100			850	98	
Sharp-Tailed Sandpiper	>350	463	5	2381	2119	3000
Pectoral Sandpiper		1			3	12
Little Stint						1
Red-Necked Stint	>4000	780	1520	3246	8063	8000
Long-Toed Stint					8	96
Curlew Sandpiper	>3000	366	44	2000	2804	3000
Broad-Billed Sandpiper						2
Ruff					1	5
Oriental Pratincole						10
Unidentified Waders		100				
<b>Total</b>	<b>10382</b>	<b>2244</b>	<b>1834</b>	<b>19346</b>	<b>25298</b>	<b>22944</b>

Footnote:

Column A. Current survey's highest wader counts conducted from April 1994 to October 1996 at the Creery wetlands.

Column B. Wader counts made from July 1983 to June 1984 (Baker, 1988). Covered two and a half kilometres of the Northern Peel Inlet between Coodanup and the Serpentine river estuary. Highest figures listed.

Column C. Northwards migration count conducted from February to April 1985 (Baker 1988). Covered half a kilometre of Northern Peel Inlet near Serpentine estuary. Highest figures listed.

Column D. Waterbirds of South-Western Australia: highest numbers counted between 1981 and 1992 (Jaensch *et al.* 1993). Article contained some information relating to the Creery wetlands which was extracted.

Column E. The nature reserve Austin Bay is located on the eastern side of the Peel Inlet. Details contained in Jaensch *et al.* (1988). Highest numbers counted are listed. Area interacts with northern Peel Inlet.

Column F. Highest counts made at Lake McLarty (Burbidge & Craig 1996). Information was collated from various databases up to 1996. See references in Burbidge & Craig (1996). Area interacts with rest of Peel Inlet.

The Creery wetlands contain the largest marsh area in the study site. The wetlands are an extension of the mainland, bordered by Sheoaks and Tuart forest on the north and north-eastern side. The wetlands consist of large samphire flats that are subject to inundation at different times of the year. The Creery wetlands hold some permanent pools of water however, generally

speaking, the marshes are flooded during autumn and winter and dry out during spring to be largely dry in summer.

Opposite the wetlands lies the samphire covered Creery Island which has some small shallow lakes of it's own and a southern fringe of Sheoaks. Between the Creery

wetlands and Creery Island is a large shallow inlet/lagoon that at times contained very large numbers of waterbirds and waders. When the Banded Stilt *Cladorhynchus leucocephalus* appeared they could be found here in numbers. The lagoon offered a protected and sheltered environment.

Channel Island is to the west of Creery Island and separated by a narrow waterway. Boundary Island can be found further out into Peel Inlet and was the most isolated of the three islands. The water depth surrounding the whole complex of islands and wetlands was less than half a meter and during spring and summer, when the water levels dropped and the tide was out, extensive mudflats were exposed. Some mudflats extended for a considerable distance out into the Peel Inlet.

Boundary Flats is found between Boundary Island and Channel Island and was the richest wader site both in terms of numbers and diversity from September through to December. High water levels in winter meant that some wader habitats remained inaccessible for surveying, in particular Boundary Island.

#### Regional interactions

The wetlands of the northern Peel Inlet area cannot be viewed in isolation when considering wader numbers and wader movement. The wetlands are inextricably linked with other important sites around the Peel and Harvey Estuary system. The variables to be considered in the context of this article and which should be included in any future research are:

1. Wader movement patterns between different sites within the northern wetlands. Considerable exchange was observed between the waders from the Creery wetlands, the adjacent Coodanup beach area, the Serpentine river estuary and the other wetlands along the Mandurah estuary and Sticks Channel. A passing bird of prey was sufficient to set the rotation of waders in motion.
2. Wader movement patterns within the Peel- and Harvey Estuary system. The Austin Bay nature reserve and other nature reserves around the Peel Inlet form a chain of important and interlinking sites. The potential exchange of waders between these sites still remains to be investigated.
3. Wader movement patterns between the Peel- and Harvey Estuary system and the nearby ephemeral lakes and coastal areas e.g. banks of the Serpentine river and Lake Mclarty.
4. The interaction with the larger lake systems to the north and south of the Peel Inlet. During summer alternative feeding sites become progressively available as lakes dry out. To the north are Lake

Cooloongup, Lake Walyungup and lakes that form part of the lower reaches of the Serpentine river. To the south is Lake Clifton, Lake Preston etc.

5. Recreational pressures and variable water levels would make some sites less desirable at certain times of the year and probably result in localised wader movement.

Large fluctuations in some of the count data could be explained by some of the above mentioned factors.

#### METHODS

Data were collected during 29 visits made to the Creery wetlands, Boundary Flats and nearby Creery, Channel and Boundary Islands. Visits covered all months of the year and were made between April 1994 and October 1996. The number of visits made were 1994 (5), 1995 (12) and 1996 (12). Most visits fell in the period between September and December. The location was surveyed in the morning by walking and wading a predetermined circuit, mainly at low tides. Observations were made with Zeiss 15x60 binoculars. Efforts were mainly concentrated on Boundary Flats and the Creery Wetlands and to a much lesser extent on the wetlands along the Mandurah Estuary and the Coodanup to Nairns foreshore.

The Coodanup to Nairns beach front must rate as one of the most accessible locations to conduct wader counts anywhere. Just back from the beach and mudflats are grassed areas and a parallel road making it ideal for surveys. Figures 2 and 3 show the locations where different wader species were observed on a consistent basis at low tides. These details may prove of assistance for future reference and for comparisons.

A number of wader roosts were identified. One was at the mouth of the Serpentine River which fell outside the area surveyed. The roost at the Serpentine River is within a wildlife sanctuary and consisted of samphire, sandbanks and mudflats. Another roost was on the south-eastern side of Boundary Island and it can be reached by boat. The small unnamed islets between Boundary Island and Channel Island, and those in the Sticks Channel also had roosts on their lee sides. The foreshore at Mandurah Quay offers accessibility and elevation, both facilitate wader counts. The wader roosts on the off-shore islets can be readily surveyed by telescope from Mandurah Quay. The waders did not frequent the roosts on a consistent basis and factors such as recreational pressures, water levels and wind direction may have influenced the occupation of roost sites. During high tides and inclement weather waders occasionally dispersed to the samphire marshes.

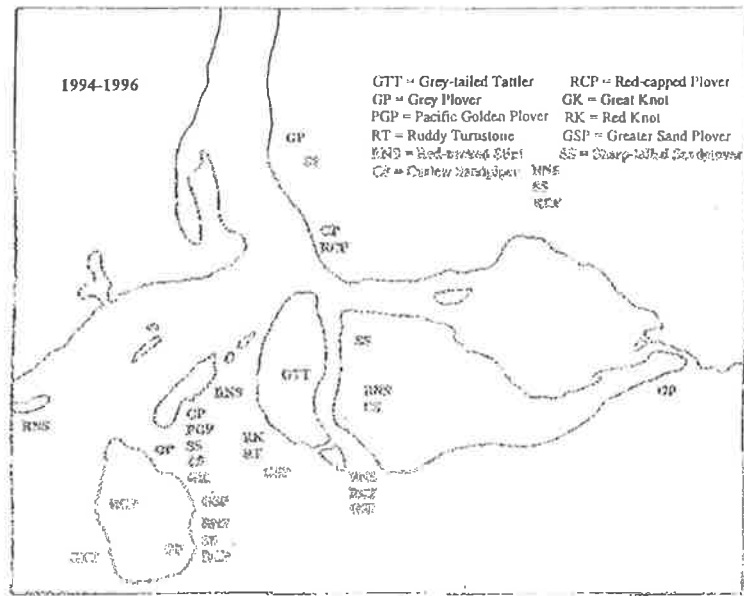


Figure 2. Distribution of small and medium sized wader species.

**RESULTS**

**Species accounts**

The following comments should be read in the context of the 1994-1996 observations. In the species account the "maximum number" and the "months present" refers only to the area surveyed as displayed on Figure 1. Reference has been made to past observations from the Creery

wetlands to supplement current observations. These records were obtained from Western Australian Bird Notes and Storr & Johnstone (1988). Arrival dates were determined by the first sightings of a wader species in the wetlands or in the case of overwintering species the date of arrival of waders showing traces of breeding plumage.

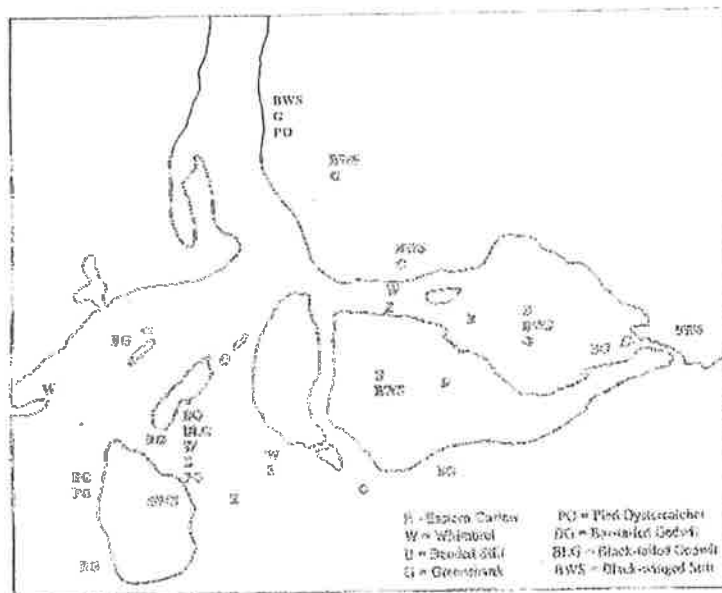


Figure 3. Distribution of large wader species.

The fact that some endemic/transequatorial waders were not listed for a specific month does not always mean they were not present, it merely means they were not observed. A summary of bird species distributions is given in Figures 2 and 3 and a summary of maximum counts is given in Table 1.

#### **Pied Oystercatcher, *Haematopus longirostris*.**

A couple of Pied Oystercatchers were regularly present on the sandy foreshore east of the new Mandurah estuary bridge. Pied Oystercatchers could be found foraging on Boundary Flats and on the sandy beaches of Creery, Boundary, and Channel Islands. Usually observed in pairs. Breeding on Boundary Island suspected. Observations also come from Nairns beach and the grassed grounds in nearby residential estates.

Maximum number: 6

Months present: July, August, October, November, December, January, February, April.

#### **Grey Plover, *Pluvialis squatarola*.**

One of the more common waders. A small number of Grey Plovers overwintered. The first groups (120) arrived in mid-September with many still showing extensive black breeding plumage. Initially groups remained together but as the season progressed they gradually dispersed throughout the region. A moderate sized flock of 60-80 Grey Plovers stayed at Boundary flats from September through to January.

On 12 May 1996 a Grey Plover was sighted near Boundary Island in partial breeding plumage which was unusual considering the time of the year. Could this have been a late departing bird? Movement to coastal beaches was suspected in winter.

Maximum number: 134

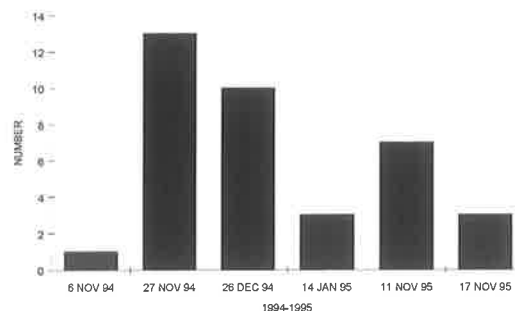
Months present: September, October, November, December, January, February, March, April, May, June

#### **Pacific Golden Plover, *Pluvialis fulva*.**

Earliest observations were made in the first week of October. November however was the month in which the majority of observations were made. The Pacific Golden Plover was seen on Boundary Flats and near Creery Island often in the company of Grey Plovers. The Pacific Golden Plover's stay was brief and its numbers were few. An observation of 14 Pacific Golden Plovers was made at Creery Island on 6 January 1994 (Anon 1994).

Maximum number: 13

Months present: October, November, December, January.



**Figure 4.** Variation in the number of Pacific Golden Plover in the summer of 1994/95.

#### **Hooded Plover, *Thinornis rubricollis*.**

Absent during this survey however previously one Hooded Plover was sighted during a RAOU excursion on 14 November 1992 (Taylor 1993).

Maximum number: 1

Months present: November.

#### **Large Sand Plover, *Charadrius leschenaultii*.**

Appeared first in mid September and was present throughout the area surveyed. Most observations were of one to three plovers, occasionally more were counted. The Large Sand Plover was observed less frequently after December. Two Large Sand Plovers were sighted at the east breakwater, Mandurah, on 4 May 1991 (Vervest 1991).

Maximum number: 21

Months present: September, October, November, December, January, February.

#### **Red-capped Plover, *Charadrius ruficapillus*.**

A common resident scattered widely throughout the wetlands in small groups. The Red-capped Plover breeds on Boundary Island. On 16 December 1995 an adult displayed the broken wing behaviour and one young runner was observed. At the Serpentine River reserve the Red-capped plover was regularly present.

Maximum number: 33

Months present: July, August, September, October, November, December, January, February, March, May

#### **Black-winged Stilt, *Himantopus himantopus*.**

Commonly found throughout the area. The sapphire marshlands were the Black-winged Stilt's main stronghold. Present around Boundary, Creery and Channel Islands. Numbers gradually decreased in the wetlands during the early winter months. Totally absent in late winter (August) and early spring (September) when the Black-winged Stilt had presumably returned to the ephemeral lakes that were being replenished by the winter rains.

Maximum number: > 300

Months present: July, October, November, February, March, April, May, June.

**Banded Stilt, *Cladorhynchus leucocephalus*.**

The Banded Stilt inhabited the saltlakes on Creery Island and the large shallow inlet between Creery Island and the Creery wetlands. Their presence at the wetlands of the northern Peel Inlet was often unpredictable. Thousands of Banded Stilts were present before the cyclonic rains of February/March 1994 fell in the interior regions of Western Australia. After these rains the Banded Stilt moved inland to breed at Lake Ballard. Ever since their departure in February 1994 only one observation has been made of two Banded Stilts on 11 November 1995. Small groups of several hundred Banded Stilts did however show up on Lake Cooloongup in January 1996.

They had still not returned at the time of writing this article (October 1996). An observation made on 28 December 1993 reported 9350 Banded Stilts at Creery Island and this gives an indication of their abundance when present (Anon 1994a). The sheer number of Banded Stilts that intermittently inhabit the wetlands are indicative of the wetlands importance as a sanctuary and it is suspected that the Creery wetlands function as a final refuge when access to other sites is restricted.

Maximum number: >2000

Months present: November, December, January, February, April.

**Red-necked Avocet, *Recurvirostra novaehollandiae*.**

A favourite roosting site was on the sandbanks north of the Serpentine River Estuary where 20-40 often occurred. Further observations came from the shallow inlet between Creery Island and the mainland.

Maximum number: 5

Months present at Serpentine River Estuary: July, August, September, November, February, March, April, May, June.

**Ruddy Turnstone, *Arenaria interpres*.**

There are a few sightings from Boundary Flats and near Channel Island. It was likely that these Ruddy Turnstones originated from the Mandurah coastal areas. A few scattered observations exist from other sites around the Peel Inlet such as Austin Bay and Lake McLarty.

Maximum number: 3

Months present: September, November, January

**Eastern Curlew, *Numenius madagascariensis*.**

The Eastern Curlew was present in the northern Peel Inlet throughout most of the year. There were a number of solitary sightings during the winter months which indicated that at least one bird overwintered. In winter

the Eastern Curlew was observed roosting on the island opposite Mandurah Quay. Eastern Curlews arrived in late September and could be found feeding in the deeper waters around Creery Island and at the edge of Boundary Flats.

They were usually solitary and occasionally in small groups up to 11 birds. Largest numbers present from October through to January. For seasonal changes in numbers see Figure 5. Observations also recorded from Mandurah boat harbour, between the Mandurah traffic bridges and in the samphire marshes. At Coodanup 16 Eastern Curlews were seen on 10 October 1992 (Anon 1992). This species was quite vocal when disturbed. Moulting primaries (numbers one to four missing) observed in mid September.

Maximum number: 11

Months present: July, August, September, October, November, December, January, February, March, May, June

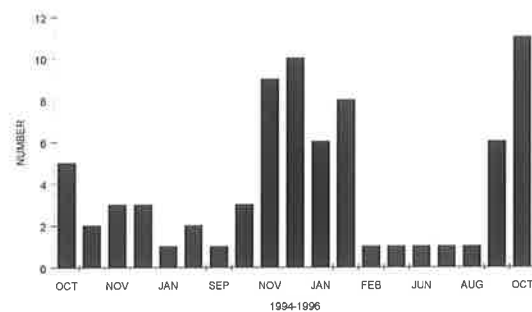


Figure 5. Seasonal trends in numbers of Eastern Curlew.

**Whimbrel, *Numenius phaeopus*.**

Details of the Whimbrel closely matched those of the Eastern Curlew. For seasonal trends in numbers see Figure 6. The habitat was very similar to that of the Eastern Curlew although Whimbrel stayed out of the deeper water. The Whimbrel was more numerous with up to 15 sighted and was often found in areas fronting onto Sticks Channel. A previous sighting of 17 Whimbrels was made at Creery Island on 10 October 1993 (Anon 1993).

Maximum number: 15

Months present: September, October, November, December, January, March, May.

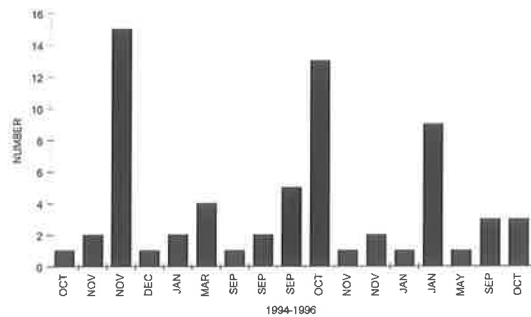


Figure 6. Seasonal trends in numbers of Whimbrel.

**Grey-tailed Tattler, *Heteroscelus brevipes*.**

The perimeter of Boundary Island consists of wide banks covered with sedges and samphire. At high tide these would flood and when the tide receded small pools were left behind among the sedges. This habitat was favoured by the Grey-tailed Tattler. Further sightings were made on the exposed mudbanks of Creery and Channel Islands. Solitary birds were usually seen although there are a number of sightings of more than ten Grey-tailed Tattlers in a group. Other locations that have produced sightings are the Mandurah estuary and Sticks Channel. Grey-tailed Tattlers are known to overwinter at Cockburn Sound 50 kilometres to the north of the Peel Inlet. There was a sighting of 14 Grey-tailed Tattlers at Sticks Channel on 6 January 1994 (Anon 1994).

Maximum number: 5  
 Months present: October, November, December, January, February.

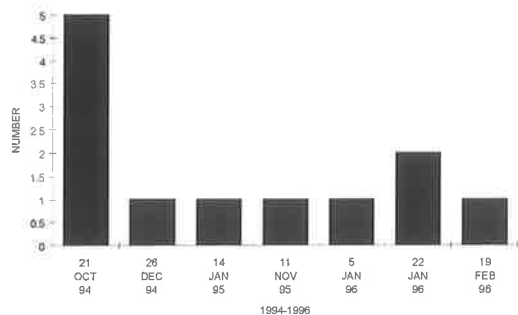


Figure 7. Number of Grey-tailed Tattler recorded in summer.

**Common Sandpiper, *Actitis hypoleucos*.**

Seen mainly on the sandy beaches along the Mandurah estuary, near the new traffic bridge and on the beaches and mudbanks of Channel Island. Further sightings come from the beach frontage near the Serpentine Estuary. Sightings were of solitary birds.

Maximum number: 1

Months present: September, November, January, February, March

**Common Greenshank, *Tringa nebularia*.**

The Greenshank was common throughout Peel Inlet and was found in a wide variety of wader habitats in the Creery wetlands. It was found feeding around the permanent pools in the samphire foreshore, along the mudbanks, on the sandy beaches and wading in shallow waters of the inlets.

When the Greenshanks first arrived in September they tended to remain in tight groups. Easily disturbed at this stage they would swarm to great heights, barely visible through binoculars, and then return to their original departure point. As the season progressed they dispersed widely throughout the Creery Wetlands and adjacent wetlands. Groups of 30-40 individual were common.

Greenshanks were occasionally noted forming groups and flying in formation before departing on their northward migration. An observation of 175 Greenshanks was made at Creery Island on 5 October 1993 (Anon 1994).

Maximum number: 122  
 Months present: September, October, November, December, January, February, March, April

**Common Redshank, *Tringa totanus*.**

One observed near Creery Island, Peel Inlet on 12 July 1985 by Jaensch and Blyth (Storr & Johnstone 1988).

**Marsh Sandpiper, *Tringa stagnatilis*.**

Absent during this survey. Only available details contained in Table 1.

**Terek Sandpiper, *Xenus cinereus*.**

Two sightings were made on the mudbanks of the channel between Creery and Channel Islands and another sighting comes from the lagoon on the north-east edge of the Peel inlet. An observation of 12 Terek Sandpipers was made on 6 April 1991 (Vervest 1991).

Maximum number: 4  
 Months present: October, April

**Black-tailed Godwit, *Limosa limosa*.**

In contrast with the Bar-tailed Godwit, the Black-tailed Godwit was not often seen. The fresh water lakes seemed it's preferred habitat. Only three observations were made during my visits. After their arrival at the wetlands the Black-tailed Godwit displayed some erratic flying behaviour such as a "zig zag" flight and a "spiralling down to the ground" flight. This behaviour was observed early in the season and similar aerobatics were also performed by the Pacific Golden Plover.

A sighting of 49 Black-tailed Godwits was made at the Creery Marshes on 28 December 1993 (Anon 1994a).

Maximum number: 14

Months present: September, October, November, December, January

**Bar-tailed Godwit, *Limosa Lapponica*.**

A common wader throughout the wetlands and found in all wader habitats. The Bar-tailed Godwit was often found feeding in the company of Greenshanks. The Bar-tailed Godwits arrived in September and some were still showing partial breeding plumage. Groups over a hundred were regularly found feeding on Boundary Flats.

A few Bar-tailed Godwits were in near full breeding plumage from mid February till early March. Could this be the contingent of Bar-tailed Godwits that were returning to their breeding grounds while those remaining kept their non-breeding plumage?

A moderate number of Bar-tailed Godwits overwintered in the northern Peel Inlet. For example groups of 15 to 45 were sighted during June and July 1996. They liked to roost on the small islands in Sticks Channel. Small numbers of Bar-tailed Godwit were seen during the winter months at the Serpentine River Estuary.

Maximum number: 145

Months present: July, August, September, October, November, December, January, February, March, April, May, June.

**Red Knot, *Calidris canutus*.**

Arrived at the Creery mudflats from mid September onwards in small groups of 20-50 individuals. Numbers peaked in November when slightly more than one hundred Red Knots were counted. After November numbers dropped off markedly and there were few observations after Christmas. Historical data seems to indicate that the Red Knot was more common in the past.

Maximum number: >100

Months present: September, October, November, December, January, March

**Great Knot, *Calidris tenuirostris*.**

The Great Knot arrived towards the end of September, usually as solitary birds. Numbers increased during October and peaked in November, after which time numbers decreased considerably. Great Knots appeared in small groups (30-50) again from mid-March to early May.

A small group of Great Knots (53) some in partial breeding plumage were seen at the Serpentine River Estuary on 12 May 1996. It was interesting to note that

at Woodman Point, which is located on the coast and ten kilometres south of Fremantle, a corresponding increase in Great Knot numbers was detected during late April and early May.

Maximum number: >100

Months present: September, October, November, December, January, March, April, May

**Sharp-tailed Sandpiper, *Calidris acuminata*.**

First arrived at the Creery Wetlands in September in small groups. Congregations of less than one hundred were noted in September but the numbers increased to several hundred by November. Initially the Sharp-tailed Sandpiper kept to the exposed mudflats and island perimeters but dispersed to the samphire marshes later in the season when they became inundated.

Maximum number: >350

Months present: September, October, November, December, January, February, March

**Red-necked Stint, *Calidris ruficollis*.**

The advance parties of a couple hundred Red-necked Stints arrived in mid September. This soon turned into a "flood" and by the end of September there were thousands (3000) on the mudflats. These numbers remained till early December after which numbers drastically declined. It is known that the Red-necked Stints disperse to the ephemeral lakes on the Swan coastal plain at this time. The lakes produce large mudflats as they progressively dry out during summer. A number of these ephemeral lakes surround the Peel /Harvey Inlet. Lake Cooloongup to the north was showing extensive mudflats as it's lake bed dried out in early February 1996 and one count estimated the number of Red-necked Stints present in excess of 10000.

Large shallow lakes formed in the Creery wetlands towards the end of summer. The inundations were caused by a combination of high tides and strong winds. The shallow lakes were located where the Sheoak treeline adjoins the wetlands. Red-necked Stints and Sharp-tailed Sandpipers were commonly found around these lakes at the end of summer and early autumn.

The Red-necked Stint overwintered in small numbers in the northern Peel Inlet. In early June 48 Red-necked Stints were present at the Serpentine River Reserve. A sighting of 6 Red-necked Stints was made at Mandurah boat harbour in July 1991.

Maximum number: >4000

Months present: September, October, November, December, January, February, March, May.

**Curlew Sandpiper, *Calidris ferruginea*.**

The Curlew Sandpiper arrived in September in groups of several hundred. Some of the first arrivals still showed

remnants of their breeding plumage. Numbers peaked in November after which time numbers reduced considerably. Small groups of 60-100 remained till mid March when they departed.

Maximum number: > 1000

Months present: September, October, November, December, January, February, March.

#### **Broad-billed Sandpiper, *Limicola falcinellus*.**

Storr and Johnstone (1988) mention that the Broad-billed Sandpiper were found on the Creery Island mudflats in March. No observations made during survey.

Months present: March

#### **Ruff, *Philmachus pugnax*.**

Not observed during survey however one sighting at Coodanup in mid-January 1992 and again that same year in October, at the same location (Anon 1992, Davies 1992, Vervest & Burbidge 1992).

Maximum number: 1

Months present: October, January

#### **Threats**

There are many factors currently impacting on the Creery wetlands and these are likely to increase in the future. These threats include:

##### **1. Residential development.**

The City of Mandurah is experiencing rapid population growth. Over the 10 years 1981-91 it had the highest percentage of population growth of all municipalities throughout Western Australia. Resident population projections at 2026 are estimated to be 150000 (Ministry for Planning 1996) a three fold increase on present numbers. The main dangers associated with human population increase are the residential developments that are continually encroaching on the Creery Wetlands e.g. at Mandaruh Quay, Dudley Park and Coodanup. These have the potential to gradually erode the importance of the wetlands. Once that has occurred their conservation value will be much harder to defend. At present the Creery wetlands act as a buffer to the more important conservation areas around Creery Island. They also inhibit ready access the these sites.

Indeed the Creery wetlands have recently escaped from being turned into a canal development. Residential development at Mandurah Quay has had an impact on the wader roosts that lie just off shore from the resorts new marina, through increased traffic of pleasure craft and Jet skies. The draft Peel regional plan further shows that all the land around the Creery wetlands has been earmarked for future urban development (Anon 1996).

##### **2. Perth's expansion.**

The Peel Inlet abuts the South-West Corridor which is a major growth corridor for the Perth Metropolitan region, the capital city of Western Australia. Recreational pressures are quite intense as the Peel Inlet provides a major holiday and recreation destination for both Perth and adjacent towns.

##### **3. Recreational activities**

The City of Mandurah has put up signs restricting access to the Creery wetlands but this has not stopped trail bikes and four-wheel drive vehicles from entering and damaging the wetlands.

The shallow tidal waters around the edges of the Peel Inlet are the breeding grounds for the Blue Manna crab *Portunus pelagicus* which shares the same habitat as the waders. The Peel Inlet is a favourite fishing spot and during the summer holidays people crowd onto the mudflats and into the shallows in their search for crabs and prawns *Metapenaeus dalli* for private consumption.

##### **4. Other factors**

Aerial spraying takes place in summer in order to reduce the number of mosquitoes. The mosquitoes are carriers for the Ross River Virus and the wetlands are their main breeding grounds. "Abate" (active ingredient temephos) is used in both liquid and granular form when sprayed over the wetlands.

A future industrial park has been planned along the Serpentine River which empties into the northern Peel Inlet. Point Grey located near the Austin Bay reserve is earmarked for future tourist resorts. Important conservation areas around the Peel-Harvey estuary are in the hands of speculators and private developers.

#### **Conclusion**

The Creery wetlands and adjacent mudflats are a site of international significance. The area is one of the most important wader sites in south-western Australia by virtue of the diversity in wader species and the sheer numbers held. Although the wetlands remain vulnerable to future development, the existence of a strong community desire to protect and preserve the Creery Wetlands continues to be an important factor in it's favour. In addition, the original developer, Ceder Woods Properties Limited and the City of Mandurah are working together to rehabilitate degraded wetland areas.

This article aims to provide a basis for further research and to complement existing data. Continued conservation can be assisted through the provision and availability of evidence endorsing the wetlands environmental value.

#### **ACKNOWLEDGMENTS**

I acknowledge the observers who published their wader sightings in the Western Australian Bird Notes (WABN) some of which have been used as reference material e.g.

David Andrew, Michael Craig, Colin Davis, Austin Fincham, Sandra Fincham, Jack Hunt, Tony Kirkby, Glen Moore, Rodney Vervest and Doug Watkins. Thanks also to the reviewers.

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— SA, 20/2/1985/50.11

- The Editor does not know of any records from this region, or indeed from the Flyway, of fish feeding of Marsh Sandpipers (except for the paper by Harrison given above). In this sense, it still appears to be a "new" prey item for the species in the region, and worthy of mention and publication.
- Weineke and Cross note that their account of the status of Marsh Sandpipers is qualified by the word "usually" and is based on a wide coverage in the area. Harrison makes the interesting point that many of the sites with higher numbers are difficult to access. Indeed, limited access to certain sites might distort our idea of population dynamics and even population estimates and it is worth bearing in mind!
- Nevertheless, the authors idea of the status of Marsh Sandpipers in the Townsville area is not mutually exclusive. Notwithstanding the inevitable problems with the definition of certain words (such as "flock") what is really needed is the generation of a frequency distribution of different sized social units, at all sites and habitats, at different times of the year. This is a massive task, and beyond the scope of the papers presented.

The Editor would like to thank the three authors involved for their contributions, and the constructive and positive attitude they have demonstrated here.

Michael Weston, *Editor*.

#### **BELLY-SOAKING AND EGG-COOLING BEHAVIOUR IN A RED-CAPPED PLOVER *Charadrius ruficapillus*.**

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The Gurdies, Westernport Bay, Victoria (Australia), was a blazingly hot place at 1300 hrs on the 19 January 1997. We had gone there to watch waders, but having misjudged the tide, found ourselves on a sandy beach separated from the sea by about 1 km of mudflats. We had just agreed that the temperature was over 40° C, that there was no shade and that in the absence of any breeze or interesting waders, we would do well to go elsewhere. At about this time we noticed an adult female Red-capped Plover *Charadrius ruficapillus* moving over the beach and adjacent sandy mudflats, running in short bursts and often pausing to look at us. From its agitated movements we guessed we were near to a nest, and kept an eye on the bird. After a minute or so of observation it crouched or sat briefly behind a clump of earth on the seaward edge of the beach. We investigated the site but it was not a nest; in retrospect the bird may have been "false-brooding" in order to lure us away from the real nest site, as has been reported for Hooded Plovers *Thinornis rubricollis* (Marchant & Higgins 1993).

Cunning, but this bird was no match for us; we backed off for about 10 metres and resumed observations.

After a bit more aimless running about, the Red-capped Plover moved onto the sandy mudflats next to the beach. After one of its brief sprints, it slowed down in a shallow puddle (perhaps 2–3 cm deep) of seawater and after a look around, walked briskly in a crouched posture so that about a cm of its belly was immersed; it also crouched momentarily on the rear edge of its tarsi. It splayed its flanks and belly feathers as it did so, thus soaking a large proportion of its underparts. As soon as it had done this it ran onto the beach, moving directly to a small hollow in the dry sand where it crouched or sat for about half a minute; a small dune in front of the bird prevented us from seeing its exact posture. It then moved off, apparently still disturbed by our presence 15 metres away. Examining the point where it had been, we found a nest: two eggs set in a small cup in hot dry sand. We moved off and within a minute the bird had moved back to the nest; again, the hummocky sand prevented us from telling whether the bird was crouching over or sitting on the eggs.

One possible interpretation of this behaviour was that the bird was simply cooling itself down, and that it was coincidence that took it to its nest immediately afterwards. This seems inconsistent though, with DR's experience of cooling behaviour of waders in Roebuck Bay, north-west Australia; larger waders there, including Whimbrel *Numenius phaeopus*, Eastern Curlew *N. madagascariensis*, Grey-tailed Tattlers *Heteroscelus brevipes* and Grey Plovers *Pluvialis squatarola*, often crouch in hot weather with the rear edge of their tarsi immersed in small rock pools, but they have not been noticed splaying and soaking their flank and belly feathers. It seems more logical to conclude that the Red-capped Plover at the Gurdies was soaking its belly feathers in order to cool down its eggs. Belly-soaking behaviour has been reported in several other species of plover and lapwing nesting in tropical and subtropical environments (Reynolds 1985). Marchant & Higgins (1993) mentioned two reports of similar behaviour in two species of wader nesting in Australia: (1) A Hooded Plover has been seen dipping its belly in water and then standing over its eggs to shade them on a hot day (Bransbury 1991); (2) A Black-fronted Dotterel *Euseyornis melanops* has been seen placing small drops of water on its eggs in hot weather (Thomson 1917). We have been unable to find any published records of this behaviour in Red-capped Plovers but given that they often nest on surfaces that must become extremely hot when exposed to direct sunlight, it may be an important ploy to prevent their eggs from cooking. Certainly the bird we saw at the Gurdies seemed very anxious to return to its nest on a day when the eggs were surely not in urgent need of incubation.

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Vignettes by Stephen Davidson

## UNUSUAL FEEDING MODE FOR EASTERN CURLEW

Clive Minton, 165 Dalgetty Road, Beaumaris, Vic. 3193

At 0630 on 8 December 1994 I was surprised to see a flock of 70 Eastern Curlew *Numenius madagascariensis* feeding in a recently mown hayfield beside the South Gippsland Highway about one kilometre from the eastern shore of Westport Bay, near Lang Lang in Victoria.

Feeding at inland sites, particularly pastureland, is a common occurrence in Western Europe for the Eurasian Curlew *N. arquata*.

Recently harvested hayfields are particularly popular there, especially near the breeding areas in northern Scotland, but I have never previously seen such habitats used for feeding in Australia.

Presumably pastureland is generally too hard for Eastern Curlews to probe in Australia. However in harvested hayfields feeding is probably more related to worms, slugs and other invertebrates exposed (and possibly damaged) by the cutting operation. This feeding mode is thus more akin to that of the Straw-necked Ibis *Threskiornis spinicollis* than normal wader probe-feeding.

It was high tide at the time of my observation and this had probably helped provoke this unusual feeding activity. Early morning is also the most likely time for such habitat to contain exposed and accessible prey. When I passed the area again one hour later (when the tide would still have been covering the intertidal feeding grounds) the birds were no longer present.

## FOR THE RECORD - Large Numbers of Red-necked Stint and Banded Stilt at Lake Reeve, Gippsland, Victoria.

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

On 1 January, 1995 I found a large flock of waders at Lake Reeve, immediately east of the Seacombe Trig Point, (38°07'S, 147°30'E) which included 8,000 Red-necked Stints and 1,800 Banded Stilts. The number of stint considerably exceeded the previous highest published total of 5,397. I have not been able to find a published record of any Banded Stilt seen on Lake Reeve. Is this the largest, most easterly occurring flock of Banded Stilts ever recorded in Victoria? Perhaps there are records of higher numbers for both species hidden away in notebooks. If so, I'd be interested to hear of them.

Lake Reeve is a very shallow wetland, some 60km long and varying up to 1.5km in width. During summer, large areas can be dry and winds may move the water around. The location of flocks is difficult to predict. When I returned to Lake Reeve in mid-March, there were no waders at all at the Seacombe Trig point, the area being almost dry with the little water present being hypersaline. However, there were around 2,000 Red-necked Stint at the westernmost part of the Lake, but no Banded Stilts. A cursory glance at the most eastern end, often favoured by waders, did not turn up any birds there.

I record this note as encouragement to others to place on record their more interesting observations, especially where the numbers exceed previously published data, so that they can be included in the planned update of the National Plan for Shorebird Conservation in Australia.

