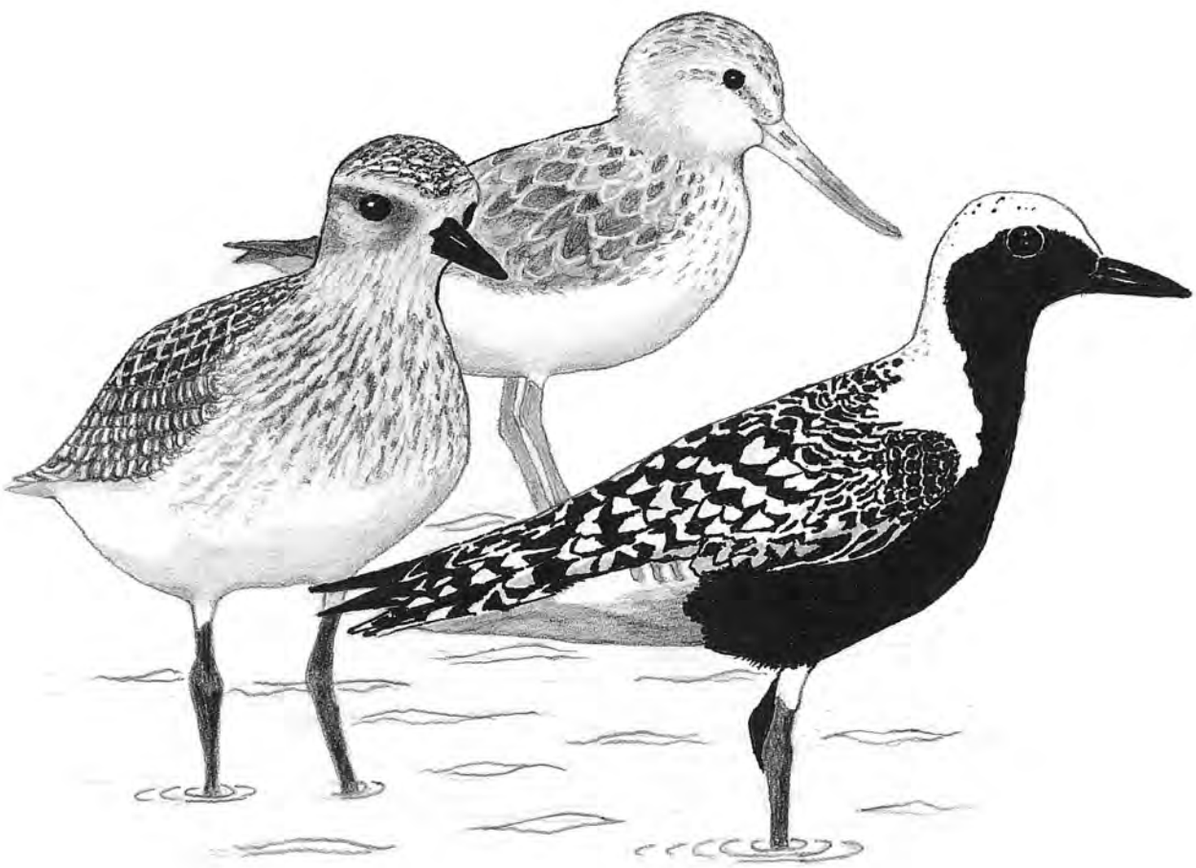
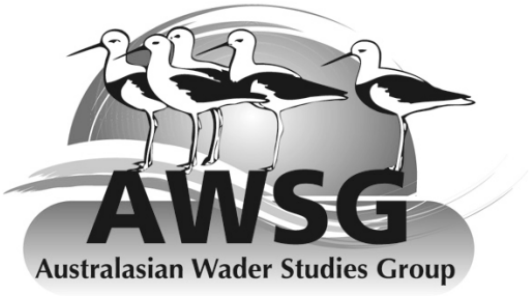
Stilt

The Journal for the East Asian-Australasian Flyway



AWSG
Australasian Wader Studies Group

Number 67 • April 2015



Stilt

ISSN 0726-1888

MISSION STATEMENT

To ensure the future of waders and their habitats in Australia through research and conservation programmes and to encourage and assist similar programmes in the rest of the East Asian–Australasian Flyway.

OBJECTIVES

- Monitor wader populations through a programme of counting and banding in order to collect data on changes on a local, national and international basis.
- Study the migrations of waders through a programme of counting, banding, colour flagging, collection of biometric data and use of appropriate scientific instruments.
- Instigate and encourage other scientific studies of waders such as feeding and breeding studies.
- Communicate the results of these studies to a wide audience through its journal *Stilt* and membership newsletter the Tattler, other journals, the internet, the media, conferences and lectures.
- Formulate and promote policies for the conservation of waders and their habitat, and to make available information to local and national governmental conservation bodies and other organisations to encourage and assist them in pursuing this objective.
- Actively participate in flyway wide and international forums to promote sound conservation policies for waders.
- Encourage and promote the involvement of a large band of amateurs, as well as professionals, to achieve these objectives.

OFFICE BEARERS

STATE CONSERVATION OFFICERS

INTERNATIONAL REPRESENTATIVES

OTHER COMMITTEE MEMBERS

MEMBERSHIP OF THE AUSTRALASIAN WADER STUDIES GROUP

Membership of the AWSG is open to anyone interested in the conservation and research of waders (shorebirds) in the East Asian–Australasian Flyway. Members receive the twice yearly bulletin *Stilt*, and the quarterly newsletter *Tattler*. Please direct all membership enquiries to the Membership Manager at BirdLife Australia, Suite 2-05, 60 Leicester St, Carlton Vic 3053, AUSTRALIA.
Ph: 1300 730 075, fax: (03) 9347 9323.
Email: membership@birdlife.org.au

Annual Subscriptions:	Australia & New Zealand	A$40.00
	Overseas	A$45.00
	Institutions	A$50.00

Published in September 2015

EDITORIAL

Welcome to another issue of *Stilt*. There has been much research and monitoring activity in the last 6-12 months, both from *Stilt* contributors and in the broader research community. Several recent publications highlight again the critical importance of the Yellow Sea as both staging and resident habitat for migrating waders and other waterbirds. Nick Murray's PhD research findings have unequivocally demonstrated that massive losses of intertidal habitat have occurred in the Yellow Sea and the impact of these losses on waders is significant (Murray *et al.* 2014, Murray & Fuller 2015, Murray *et al.* 2015). The practice of sea wall enclosing of mudflats or 'reclamation' has received pointed commentary and discussion from within Yellow Sea countries (Koh & de Jonge 2014, Hua *et al.* 2015, Ma *et al*. 2015), highlighting the extent and the drivers of the issues. And eight years of counts by the China Coastal Waterbird Census Group highlight how 75 species of waterbirds were found to meet the Ramasr 1% criterion on at least one occasion along the Chinese coast (Bai *et al*. 2015). At the same time, further evidence of population decreases has been reported from Australia (Hansen *et al.* 2015). The message to Australian, Chinese and Korean governments is clearer than ever – policy and on-ground actions to halt wader declines are critically urgent if we are to prevent population extinctions.

There has also been significant action at the flyway-scale by the East Asian-Australasian Flyway Partnership, WWF Hong Kong, AWSG and others to prioritise species (Conklin *et al*. 2014), and critical areas (Watkins 2015), for conservation and engagement activities. The Council of Arctic Flora and Fauna has made specific mention of actions around Yellow Sea habitat protection in its Arctic Migratory Bird Initiative Work Plan 2015-19 (http://www.caff.is/arctic-migratory-birds-initiative-ambi), which is an important part of invoking government responses. And the New Zealand government has been extremely proactive in working with Chinese officials to raise the profile of, and try to increase protection for Yalu Jiang National Nature Reserve. These high-level successes have been driven by the tireless efforts of the team at Pukorokoro Miranda Naturalists Trust. Although there is recognition that these actions are still not enough to halt wader declines, they are critical steps in the right direction toward the ultimate goal of trying to salvage some species and habitats in the Yellow Sea. More information can be found in the Chair's report on following pages.

In addition to the stories and evidence mounting from the Yellow Sea, there is also the evidence of what wader populations are doing elsewhere, which is important for informing local actions and priorities. To this end, there has been an excellent variety of papers received from *Stilt* contributors recently. In the previous issue, an overview of the importance of the Myanmar coast for waterbird populations (Zöckler *et al.* 2014) indicates the huge numbers of shorebirds and waterbirds, including internationally significant numbers of threatened species, in this part of the flyway. Crossland *et al.* (2014) provide a sobering account of land use change impacts on plovers in Java, Indonesia, highlighting that habitat loss issues are not just impacting waders in the Yellow Sea. There is a fascinating contribution from Herring and Silcocks (2014) about the use of rice paddies by Australian Painted Snipe. There are some changes to the published version of the latter manuscript, which are outlined below.

This issue of *Stilt* contains a very timely piece from Clive Minton about the annual value of VWSG volunteer effort, which highlights the massive in-kind contribution that volunteers make to research and monitoring of waders in this country. This is a contribution rarely acknowledged by government agencies and in some cases, appears to be just assumed, thus dooming wader groups to struggle with little funding but the expectation that they will hand over their data for free. Sadly, this is probably true, allowing authorities and other organisations to absolve themselves of their responsibilities toward wader conservation, leaving volunteers to continue paying for it themselves. It is perhaps no wonder that entreating government to take urgent conservation action has been so difficult in recent years.

In addition to this valuation of volunteer effort, several other interesting contributions appear in this issue. These include a report on wader use of rocky platforms on the New South Wales coast, a short note detailing a new redshank record from the Pilbara, and an overview into movements of Banded Stilt from colonies marked in Western Australia. These three manuscripts add to our body of knowledge about habitats and areas used by waders that are relatively under-studied compared to the estuaries and sandy coasts, where much of the wader monitoring activity in Australia is focused. There are also several reports from Indonesia, adding to another rapidly expanding body of knowledge, this time about one of the major intervening regions for waders on migration between southerly latitudes and the Arctic.

Finally, I would like to say farewell to Yaara Rotman, who has been assisting me with editing for the last two years. She has successfully completed her PhD and returned overseas. She will be missed in Australia and I will miss her good natured and patient editorial assistance. I would like to take this opportunity to thank Yaara for her contribution to Australian wader studies.

Birgita Hansen
Editor

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ERRATUM

Three errors appear in *Stilt* 66 in the article by M. Herring & A. Silcocks (pages 20-29). On page 20 in the introduction, at the end of the second paragraph, the last sentence should read 'Despite this, little is known of the use of rice fields by waterbirds in Australia, especially for cryptic and threatened species (Taylor & Schultz 2010).'

Figure 1, on page 21, failed to reproduce properly in the final printed version. A new version is provided below. A formatting error was overlooked on pages 27-28, resulting in five rather than four research priorities. The correct research priorities are provided below after the new version of Figure 1.

The Editorial team apologises to the authors for these errors.

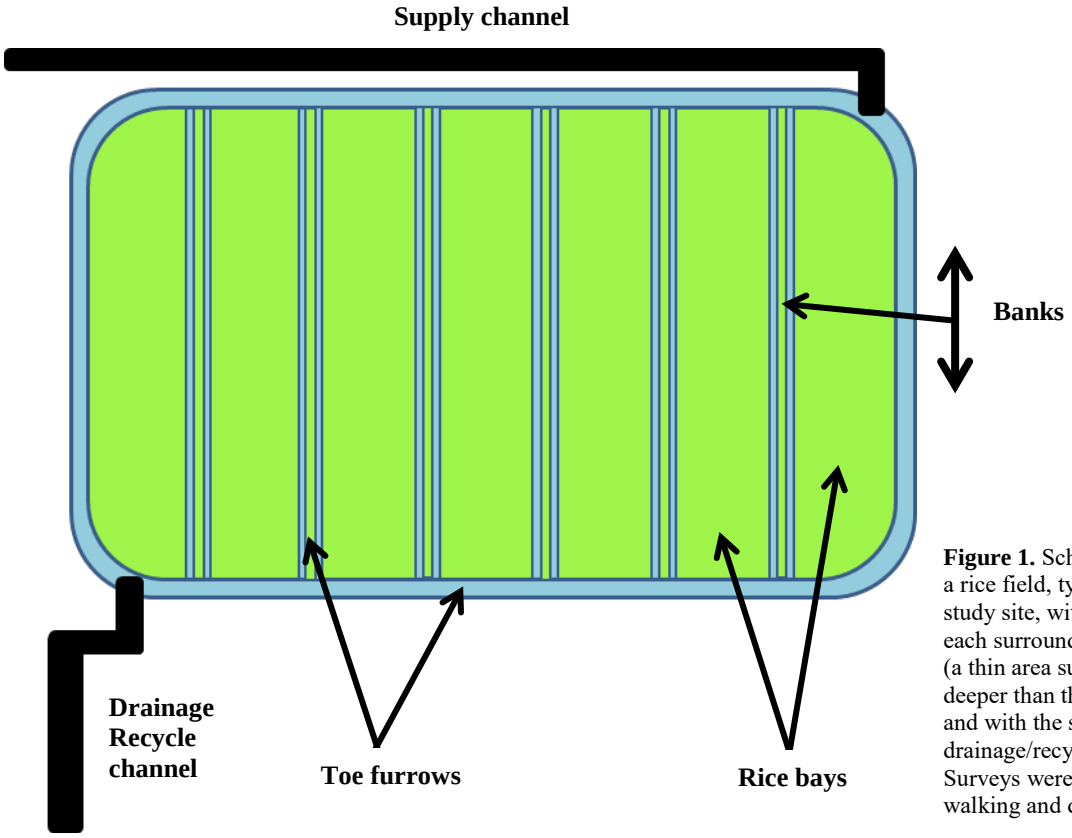

Figure 1. Schematic diagram of a rice field, typical of a single study site, with seven rice bays, each surrounded by toe furrows (a thin area surrounding the bay, deeper than the crop) and banks, and with the supply and drainage/recycle channels. Surveys were conducted by walking and driving along banks.

Future research priorities

We recommend the following interrelated priorities for future research of the use of rice fields by the APS in the Riverina region of New South Wales:

1. To determine spatial and temporal variation in abundance of the APS in rice fields throughout and between rice-growing seasons through an extensive long-term targeted monitoring program. Ideally, sites could be surveyed weekly or fortnightly and include all sites with previous APS records. Potentially, this work could be incorporated into the *Bitterns in Rice Project* (Bitterns in Rice Project 2014b), although the survey method for APS would need to be different, incorporating the association of APS with shallow edges. We recommend that a standardised 1-hour APS survey in rice fields consist of approximately 30 minutes of driving along tracks adjacent to rice fields and approximately 30 minutes of walking 1 km, both in an attempt to flush birds. Surveys could begin as early as one month after sowing, when some cover would have emerged, and be conducted throughout the day to maximise the number of sites covered each day.
2. To explore the relationship between the APS, rice fields and natural wetlands. This work could test the sub-optimal habitat hypothesis and investigate the potential association of significant numbers in rice fields with population booms following exceptionally wet periods.
3. When APS are located in rice fields, intensive systematic monitoring should aim to determine the extent to which they breed therein and the factors affecting breeding success.
4. To investigate which agronomic factors, such as water management and pesticide application, influence APS use of rice fields and any potential impacts, with particular attention being paid to prey availability and breeding. This would inform the development of APS-friendly rice-growing guidelines in conjunction with guidelines for managing habitat for the Australasian Bittern.

Raising awareness of the APS among rice farmers and encouraging them to report sightings to Birdlife Australia is a priority for education and advocacy.

NEWS FROM THE CHAIR

The AWSG Committee has been involved in a number of significant activities over the last 12 months since its meeting in September 2014 in the margins of the Australasian Shorebird Conference.

"Global Travellers in Trouble"

The major focus of the Conference was on the significant declines in migratory shorebird populations in the East Asian – Australasian Flyway with paper after paper detailing the impacts of habitat loss and other pressures on migratory shorebirds across the Flyway but most noticeably in the major staging sites located in the Yellow Sea. The Conference called on governments in the Flyway to take action to address this situation warning that the wonders of the migration that has been occurring for millions of years is at severe risk of disappearing.

In response to the numerous papers predicting dire future prospects for migratory shorebirds at the Australasian Shorebird Conference held in Darwin in September 2014, the magazine Wildlife Australia invited me to write an article about this situation. The article was published in the Wildlife Australia Winter 2015 edition and is a cooperative effort with a number of AWSG members and wonderful photographs provided by some top-class photographers. The article is designed to raise awareness about the plight affecting migratory shorebirds and will hopefully reach wide audience. It also calls on the Australian and other Flyway Governments to work cooperatively to address the problems facing migratory shorebirds.

Meeting of the Partners of the East Asian - Australasian Flyway Partnership

The 8th Meeting of the Partners (MoP) of the EAAFP was held in Kushiro 16-21 January 2015 with the specific objective of commemorating the 21 years of the EAAF. The Flyway program was established in December 1994 as an initiative fostered from the Japan-Australia Migratory Bird Agreement. The program evolved into the EAAFP in 2002 as an initiative under the World Summit on Sustainable Development and the Ramsar Convention. The EAAF Partnership now has 34 Partners. Four new Partners were welcomed at the Opening Ceremony - Myanmar, Vietnam, the Convention on Biological Diversity and the Asian Centre for Biodiversity (ACB) and Government Partners were presented with Flyway Site Certificates for 9 new sites– Mongolia (1), Japan (2), Myanmar (3), Australia (1) and Thailand (2). The major outcomes from the meeting include those listed below.

Monitoring the management and status of Flyway Network Sites

A draft template was considered and will be provided to National Government Partners following some fine-tuning. The template will enable site managers to report on the status of their sites in an easy-to-use format. This information will enable assessment on how the Partnership is progressing with its site-based objectives (management, Communication, Education, Participation and Awareness (CEPA) working group, and monitoring). It will align with the Ramsar site reporting process.

South East Asian Network

The MoP agreed to the proposal for establishing a network for Partners in the South East Asian region, noting that this region is not well understood for migratory shorebirds. Membership of the group will include Partners in South-east Asia. The ASEAN Centre for Biodiversity and possible other members such as Bangladesh.

Formation of an Eastern Curlew Task Force

Noting that the Eastern Curlew is in rapid decline with a 67% drop in population numbers over 20 years, the MoP supported the formation of an Eastern Curlew Task Force with the Chair to be Dr Mark Carey (Australian Government). A plan of action will be submitted to MoP9 for endorsement.

Proposed Situation Analysis on Hunting and Illegal Killing of Migratory Waterbirds

Recognising that the impacts of hunting and illegal killing of migratory waterbirds are not well understood, the MoP endorsed a proposal for an assessment of hunting and illegal killing of migratory waterbirds as a preparatory step to address this issue. The assessment would be brought to MoP9. The situation analysis will build on the work being done by the University of Queensland and BirdLife International with input by Wetlands International relating to work done on hunting in Indonesia.

Definition of migratory waterbirds under the EAAFP

In response to issues raised by Japan and BirdLife International (specifically Mr Simba Chan, coordinator of the Crane Working Group) the MoP agreed to formation of a Task Force to look at this issue and that membership should also include the CMS (as the body whose definition is currently used) and Australia (in view of possible implications for the legislative base underpinning Australian legislation). The Task Force will report to MoP9.

Establishment of an EAAFP Finance Committee

Korea, as the host of the Secretariat, raised concerns about the need to engage more Partners in providing support to the Partnership and the support for the Secretariat. In response to concerns about funding for the Partnership, the MoP endorsed establishment of a Committee that is tasked to develop a strategy to address the goal of achieving a more sustainable and equitable future for the EAAFP. It will also prepare a summary of all the contributions associated with operations under the EAAFP to indicate the level of investment Partners are contributing to the Partnership to provide a more realistic picture of overall expenditure in the Partnership. A draft

report is to be prepared by the Committee and circulated to Partners prior to MoP9.

An Independent Review of the EAAFP

This includes an update of the Implementation Strategy. The MoP endorsed an independent review to be conducted of the structure and operation of the Partnership with terms of reference to be developed by mid-March 2015 and circulated to Partners for comment. The review will also focus on the current Implementation Strategy and a new implementation strategy as well as looking at implementation mechanisms (e.g. working groups, task forces and work planning).

Adoption of a specific EAAFP work program for the Yellow Sea Ecoregion

A full draft of the consolidated EAAFP 2015 Work Plan will be made available on the EAAFP website for comments from Partners prior to finalisation.

A field trip to the Tancho Sanctuary in the Kushiro-Shitsugen to view Red-crowned Cranes and to the Akkeshi–ko Lake to see both Steller's Sea Eagle and the White Tailed Eagle was conducted on 18th January. Recovery efforts involving feeding the Cranes in Winter have been undertaken and the Red-crowned Crane population now numbers 1200.

The Grey Plover crowd sourcing funding project

The AWSG in cooperation with BirdLife Australia conducted a crowd-funding project over May-June 2015 to raise funds for satellite trackers to be placed on Grey Plovers. The project was highly successful, well exceeding its target of $17,680 with a final amount of $25,341 at closure of the project. This important project will allow four, and possibly five satellite trackers to be placed on Grey Plovers to give us a better idea of their migration pathway, stopover sites and breeding grounds. We are very grateful to all those who supported this first time funding approach particularly those who contributed funds towards it. We are hoping that other worthwhile projects could be sourced through this mechanism in the future.

2015 AWSG Committee Meeting

The AWSG Committee held its 2015 meeting in Melbourne on 25 June 2015. As a first step, the CEO of BirdLife Australia, Paul Sullivan, was invited to address the AWSG Committee about his perspectives on the relationship between AWSG and BirdLife Australia and to brief the Committee on his attendance as a Council member of BirdLife International. Paul recognised the cooperation between AWSG and BirdLife Australia and praised the work of the AWSG over the years. Paul suggested that AWSG should develop case studies and stories about its work with particular emphasis on the changes that this has produced and is producing both in Australia and In the Flyway. This will be a task that the AWSG will pick up and develop.

Reflecting that the AWSG has been in existence for 35 years it was seen to be an ideal time to focus on what has been achieved to date and the directions we want to take into the future. A broad-ranging discussion about "AWSG into the Future" focused on the following several key areas:

A reviewed committee structure

It was agreed that a new structure, centred around five sub-committees, should be put in place. They will be responsible for the AWSG Database (Chair Roger Standen); Communications (Chair Phil Straw); Science and Research (Chair Danny Rogers); Conservation (Chair Dan Weller); and Fundraising (Chair Penny Johns). This structure was seen to be a more disciplined way of addressing the primary functions that AWSG deals with. The sub-committees will aim to meet quarterly and develop a 12 months' work program. This will also provide more comprehensive reporting to the AWSG membership through both Tattler and Stilt.

AWSG and the Flyway

My report on the 8th Meeting of the Partners of the East Asian-Australasian Flyway Partnership was included in the April edition of Tattler. Recognising that the Flyway is one of AWSG's key areas of interest it was agreed that we need to better communicate with AWSG members and the broader community about what is happening in the Flyway. Doug Watkins is taking up the role of AWSG representative on the Flyway Partnership Management Committee that advises the Secretariat. This role will be focused on creating better linkages between the AWSG membership and community with key Flyway work and priorities. I will remain the AWSG representative on the Flyway Partnership Finance Committee, which has the task of developing funding mechanisms and sources for the Partnership and its work.

Better Communication

The Committee agreed that it is imperative to improve communication and awareness-raising about shorebirds and their habitat needs given the declines in shorebird populations. This was for both the AWSG membership and the broader community including government and the corporate sector. Stories that can be built around shorebirds such as the Grey Plover project will be significant ways of raising awareness. A range of communication products will be explored by the Communications Sub-committee to assist in awareness raising and promotion of conservation objectives for shorebirds.

Advocacy

The Committee reinforced the importance of its advocacy role on behalf of shorebirds and agreed that it should work closely with BirdLife Australia in relation to responding to development applications and proposals that can potentially adversely impact on shorebirds.

Development of relevant policies

It was agreed that AWSG needed to increase its work and involvement in the development of policy and influencing governments both in Australia and more broadly in the Flyway. As a starting point, an information gathering exercise will be done on three specific areas of interest to shorebirds (namely, Beach Wrack, aquaculture and saltworks) to assess what sort of policy work may need to be done on the issues.

AWSG Database

Future directions for managing and maintaining the very valuable database were considered at a meeting prior to the AWSG Committee meeting and an approach adopted for the short to medium term. This is still a work in progress and further information will be provided at a future date.

Alison Russell-French
Chair

TREASURER'S REPORT FOR 2014

In 2014, total income exceeded expenses by $10,776.97. The balance of $68,066.78 carried forward at 31 December 2014 includes commitments for future contract expenditure of $21,724.94. General accumulated funds were $46,341.84 at the end of the year.

Australasian Wader Studies Group
Income and Expenses
1 January 2014 - 31 December 2014

INCOME			**EXPENSES**		
Item	**2014**	**2013**	**Item**	**2014**	**2013**
	$	**$**		**$**	**$**
Balance brought forward	57,289.81	49,939.51	Printing	3,237.24	3,596.92
Subscriptions	9,306.17	3,359.20	Postage/courier	1,464.45	841.81
BirdLife Australia transfer		24,184.41	Surveys/reports/monitoring	30,069.48	12,452.61
Contracts - State Govts.	36,235.67		Donations	3,000.00	7,000.00
Contracts - Other	12,500.00	40,500.00	Travel/accommodation/meals	15,366.42	18,841.05
Donations	18,151.00	3,550.00	Salaries/superannuation etc		16,901.95
Conference/meetings	17,553.98		Conference/meetings	13,610.27	
Other income		116.40	Equipment/consumables	13,720.00	4,509.41
			Consultant fees	300.00	
			Other expenses	2201.99	215.96
Total income	93,746.82	71,710.01	Total expenses	82,969.85	64,143.75
Total accumulated funds	**151,036.63**	**121,649.52**		**151,036.63**	**121,649.52**
Balance carried forward	**68,066.78**	**57,505.77**			

Membership statistics:

Membership at the end of the year was:	**2014**	**2013**
Australia/New Zealand	217	230
Overseas (excl. NZ)	15	23
Institutions	12	10
Complimentary	57	55
Total	**301**	**318**

This summary of income and expenses for the past year is not an audited statement. It has been prepared for the information of AWSG members from records of transactions provided by BirdLife Australia relating to the Australasian Wader Studies Group.

The AWSG is a special interest group of BirdLife Australia and members who wish to see the audited accounts of BirdLife Australia should refer to the Concise Financial Report included in the BirdLife Australia Annual Report 2014.

AN INLAND RECORD OF REDSHANK *TRINGA* SP. IN THE PILBARA BIOREGION, WESTERN AUSTRALIA

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The Common Redshank *Tringa totanus* and Spotted Redshank *T. erythropus* are vagrants to Australia with most records from coastal Roebuck Bay-Broome area, southern Kimberley. Here we report the first inland Pilbara record of a redshank species, 352 km from the coast, near Newman town on 9 September 2011. The field observation was distant and the redshank could not be identified to species level.

INTRODUCTION

The Common Redshank *Tringa totanus* is a regular vagrant visitor to Australia in small numbers. The flyway population is estimated at 45,000 (Wetlands International 2014) to 75,000 individuals (Conklin *et al.* 2014). Only an estimated 200 birds reach Australia during the northern winter each year (Geering *et al.* 2007). This shorebird prefers coastal regions, particularly mangrove-backed mudflats, and is probably only regular about Roebuck Bay (Broome area) and Port Hedland Salt Works (Geering *et al.* 2007).

The status of the Common Redshank in Australia is best known in Roebuck Bay. During August to April (1985-2003) a total of seven individuals were caught and banded at sites about Roebuck Bay, and one wintering first-year bird was captured on 19 June 2003 (A. Boyle & C. Hassell *pers. comm.*). At least three individual birds typically over-winter at Roebuck Bay each year, but larger numbers (up to at least 16 individuals) use mangrove habitat at Crab Creek (A. Boyle *pers. comm.*). Elsewhere in Western Australia there is nearly always one bird present each year on Adele and Lacepede Islands (A. Boyle *pers. comm.*); with some records south to Coral Bay and the Peel Inlet (Johnstone and Storr 1998). A total of 49 records are listed for Western Australia on the NatureMap database (DPaW 2014) mostly at Roebuck Bay, Broome (n= 38 records); and Carnarvon, on the central coast (n= 7 records; mostly Lake George). In Darwin, Northern Territory, small numbers are recorded, but not in every year, and it should be considered as a regular vagrant (N. McCrie *pers. comm.*). Based on observations in the Broome-Roebuck Bay area, the estimate of 200 birds visiting Australia annually may be an overestimate (C. Hassell *pers. comm.*).

In the Pilbara region the Common Redshank is considered as a 'rare visitor to coastal areas' (Johnstone *et al.* 2013). At Port Hedland (north coast of Pilbara) there are regular records of ones or twos on saltwork ponds and tidal flats, but a maximum of four birds was noted on 15 December 1984. There are very few inland Australian records (Geering *et al.* 2007). One was noted in April 1996 at Boort, northern Victoria, approximately 200 km from the coast (Fowler and Fowler 1996). No records have been documented for the inland Pilbara (Johnstone *et al.* 2013). Here we document the first inland record of a Redshank species from the inland Pilbara bioregion.

METHODS

During 5-9 September 2011 surveys for birds, mammals, reptiles and amphibians were conducted at several sites by CRT and JT. These sites were mostly in arid shrublands and grasslands dominated by Mulga (*Acacia aneura*), *Cassia*, *Tephrosia* and Spinifex *Triodia* spp., located 6 km west of the town of Newman. No natural wetlands were present in the study area but on 8 and 9 September we incidentally visited an artificial acid-rock drainage (ARD) pond, which is a type of tailings pond, directly south-west of Newman (23 23 21S; 119 40 36E). ARD ponds are the result of acidic water discharges generally from metal or coal mines. The pond is 352 km from the nearest coast and south of Port Hedland Salt Works. The pond was shallow, about 1.2 km long and 200-300 m wide (Figure 1), with patches of fringing *Typha* reedbeds and silty mud, and three small *Typha* dominated islets.

RESULTS

We recorded five species of shorebird on the ARD pond: Black-winged Stilt *Himantopus himantopus*, Black-fronted Dotterel *Elseyornis melanops*, Common Sandpiper *Actitus hypoleucos*, two Common Greenshank *Tringa nebularia* and one Common Redshank *T. totanus*. On 8 September, from a distance of 80-100 m we observed three large waders, approximately 30 cm tall, which we immediately identified as Common Greenshank in non-breeding plumage – obviously tall grey-coloured shanks. We were unable to get much closer to the birds because the edge of the pond was unstable. One of the birds was different because it had reddish legs. Both CRT and JT

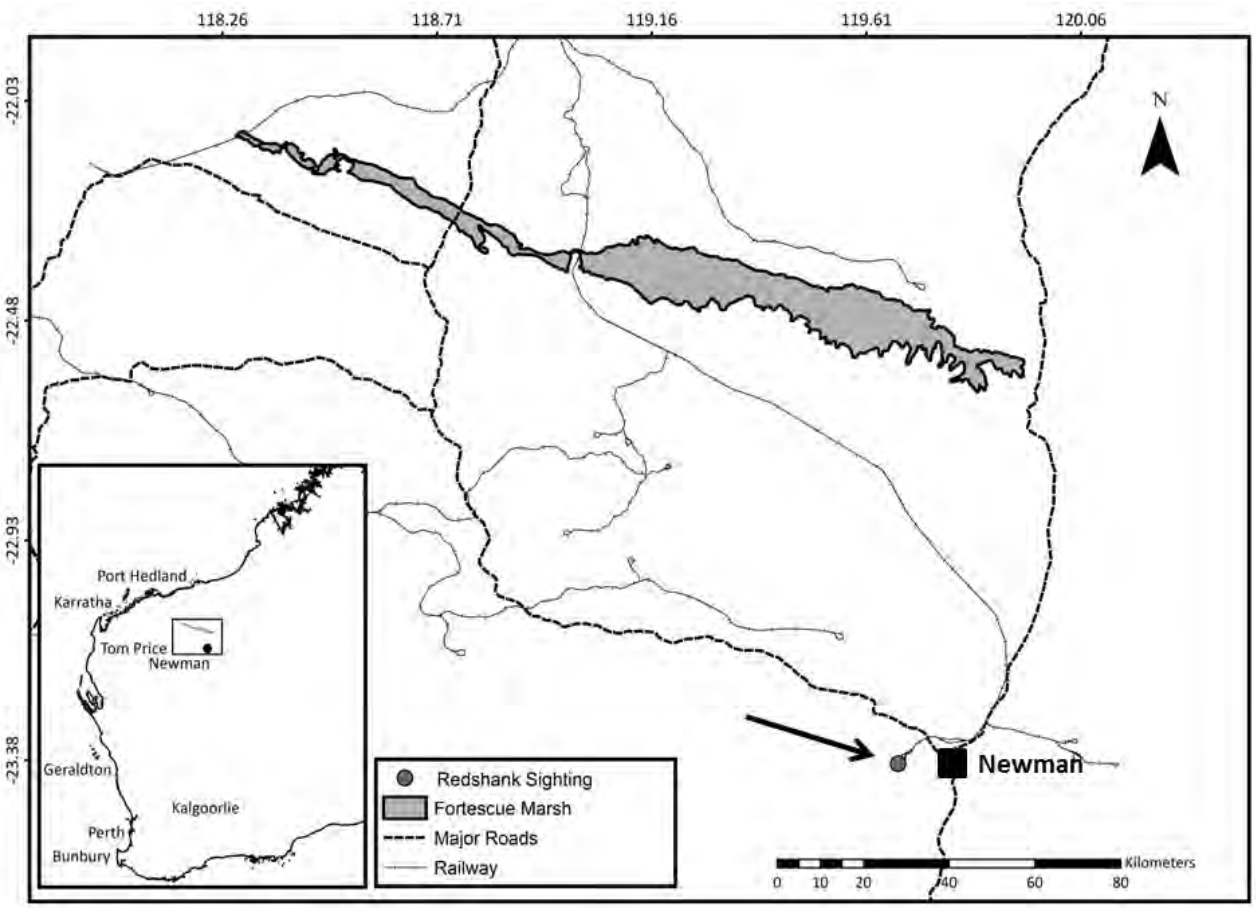

Figure 1. Map of the study area in the Pilbara, Western Australia.

were able to see clearly that the tarsus and fibula of this bird were red in clear mid-day light using 8 x 32 Nikon binoculars over a period of approximately two minutes.

By comparison the Common Greenshanks had dark or grey-greenish legs, confirmed when two birds flew closer to the shore. These two were subsequently photographed with a basic automatic digital camera with limited 'optic lens' capability from a distance of about 40-50 m, but we were unable to take photographs to verify the redshank because it remained further away. The redshank was not seen in flight or heard calling. The distinctive red legs could not have been caused by illusory lighting, or by peculiar mud or reflections on the water. The water colour was brown and highly turbid. The only bird with red legs of a similar height in this region is Black-winged Stilt, which was observed on the pond but can be excluded by the strikingly different appearance particularly leg length, neck length and head shape. We therefore concluded that the bird observed was a redshank.

DISCUSSION

Common Redshank a regular vagrant to Australia and therefore, it is more likely that our observation was of this species and not its much rarer congener, Spotted Redshank *T. erythropus*. However, because of the distance at which the bird was observed and the absence of useful supporting notes on bill shape and other distinguishing characteristics, we cannot confidently rule out Spotted Redshank. Spotted Redshank was recorded at Port Hedland Salt Works in October 1956 (Johnstone *et al.* 2013) but is generally an exceptional vagrant to Australia. There are only four Australian records of Spotted Redshank accepted by the BirdLife Australia Rarities Committee (BirdLife Australia 2015).

An inland Pilbara record of Common Redshank, or Spotted Redshank, on an artificial freshwater wetland, is not particularly significant because vagrants of such wide-ranging migrants might be recorded almost anywhere in Australia with suitable habitat. This may be the furthest inland Australian record of a redshank. In the Roebuck Bay area Common Redshank is not known to use freshwater wetlands despite their availability (Chris Hassell *pers. comm*. 2014). In East Timor (Timor-Leste), and probably much of South-East Asia, the Common Redshank is strongly associated with mudflats, fishponds and estuaries but regularly feeds in wet rice fields and has been recorded once at sewerage treatment ponds (Trainor 2005).

The Pilbara region is subject to intensive general fauna surveys because of the environmental requirements of the resources industry; however terrestrial habitats rather than wetlands are the main focus of most of this work (*c.f.* Burbidge *et al.* 2010, Johnstone *et al.* 2013). Wetland surveys are particularly limited in the Pilbara during much of the summer migrant season (e.g. November-March). There has been a lack of intensive survey effort in the Pilbara and where surveys have been done, migrant shorebirds have been recorded only in small flocks of less than 100 individuals (Johnstone *et al.* 2013, Trainor *et al.* in press). Thus, it would appear that no sites currently meet criteria for listing as nationally or internationally significant for shorebirds.

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SHOREBIRD USAGE OF THREE INTERTIDAL COASTAL ROCK PLATFORMS ON THE NEW SOUTH WALES CENTRAL COAST, AUSTRALIA

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The New South Wales (NSW) Central Coast in south-eastern Australia has valuable habitats for shorebirds but also has a large and rapidly increasing human urban population. Low tide and high tide surveys at three proximate intertidal coastal rock platforms in the Norah Head area in 2013-2014 identified nine species of migratory shorebirds and four species of Australian resident shorebirds. Red-necked Stint *Calidris ruficollis*, Ruddy Turnstone *Arenaria interpres* and Curlew Sandpiper *Calidris ferruginea* were the most common species. Records of four additional shorebird species (three migratory and one Australian resident) dating from the period 1997-2015 were obtained from secondary sources. The total recorded shorebird community of the Norah Head rock platforms comprises 17 species, of which eight are considered regular visitors and nine are vagrant or occasional visitors. Human recreational use of these rock platforms was assessed. There appeared to be a negative relationship between the average level of human activity on each rock platform and both the diversity and number of shorebirds recorded there. It is proposed that differences in local-scale physical attributes and local context of the rock platforms, such as accessibility over the tidal cycle and walking distance from public vehicle access, influence the level of human activity and, in turn, affect the level of shorebird usage. This study illustrates the noteworthy habitat value of coastal rock platforms on the NSW Central Coast and the likely influence of anthropogenic disturbance levels on shorebird use of this habitat.

INTRODUCTION

Many shorebird populations in south-eastern Australia are currently in serious decline (Nebel *et al*. 2008; Hansen 2011; Stuart 2011; Cooper *et al*. 2012; Minton *et al*. 2012). The causes of this decline are in part related to impacts elsewhere in the East Asian-Australasian Flyway, such as at breeding grounds and staging areas, and in part due to local factors within Australia, including habitat loss and human disturbance (Lane 1987; Dutson *et al*. 2009). The identification and protection of a broad range of local shorebird habitats is an important component of shorebird conservation. Areas of rocky coastline are common in south-eastern Australia, but the use of rocky shores by shorebirds in Australia has not been as frequently studied as intertidal mudflats (Gallo-Cajiao & Coughlan 2014).

People using coastal zone environments for recreational activities can adversely impact on shorebirds as they feed, roost or nest on coasts (Lord *et al*. 2001; Blumstein *et al*. 2003; Glover *et al*. 2011; Meager *et al*. 2012; Crossland *et al*. 2014; Weston *et al*. 2014). Persistent, cumulative disturbance may potentially reduce shorebird survivorship (Lafferty 2001a). The New South Wales (NSW) Central Coast has valuable habitats for shorebirds but is situated on one of the most densely human populated stretches of the Australian coastline, located between the cities of Sydney and Newcastle and with a local urban population of over 300 000 people (Australian Bureau of Statistics 2013). The area is therefore likely to experience conflict between coastal recreational activity and shorebird populations.

This study had two aims. One was to increase our knowledge of how rocky shore habitats in south-eastern Australia are utilised by shorebirds, by documenting the shorebird community of three proximate intertidal coastal rock platforms in the Norah Head area of the NSW Central Coast, and investigating if any differences in shorebird usage existed between the three rock platforms. Two, was to examine the level of human recreational activity at each site, and to then compare local-scale context and physical attributes of the sites affecting human accessibility to try and better understand the relationship between human recreational activity levels and shorebird usage.

METHODS

Site description

The Norah Head area (33°16.90’ S, 151°34.67’ E) is located 70 km north-east of Sydney on the NSW Central Coast, in Awabakal Aboriginal country. The coastline in this area comprises a Pleistocene coastal sand barrier incorporating occasional rocky headlands (former offshore islands predominantly comprised of Narrabeen Group sandstone) and is backed by a series of shallow coastal lagoons. The three rock platforms surveyed were Norah Head (8.5 ha), Soldiers Reef (3.7 ha) and Pelican Point (1.9 ha) (Figure 1), located along a 2.4 km section of coastline and separated by sandy ocean beaches. The study area is part of the 12 985 ha *Tuggerah Important Bird Area*, which is centred on the coastal lagoons as well as incorporating part of the adjacent coastline and which was identified in part because of its importance

for waterbirds and migratory shorebirds (Dutson *et al*. 2009; Birdlife International 2014). All three rock platforms have suitable shorebird habitat features including areas of low wave-washed shoreline, shallow intertidal pools and crevices and areas with boulders or cobbles, as well as proximity to sandy beaches and coastal lagoons which provide additional foraging opportunities.

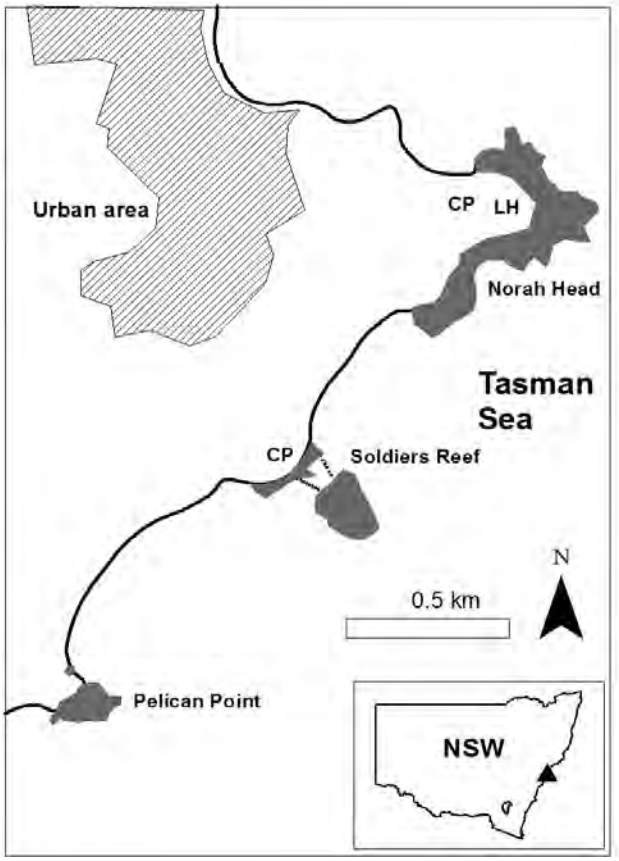

Figure 1. Coastal rock platforms in the Norah Head study area. The dotted lines at Soldiers Reef mark a tidal channel, which isolates a semi-detached reef here at high tide. The public car parks (CP) near Norah Head and Soldiers Reef and the lighthouse (LH) at Norah Head are marked. The inset map shows the location of the study area in NSW.

Data collection

Diurnal surveys of shorebirds and other waterbirds on each rock platform were done during both low and high tides between February 2013 and December 2014, comprising 16 surveys per site (Appendix 1). Each survey was between 30 and 60 minutes duration (depending on the size of the rock platform) with all shorebirds counted and additional waterbirds seen listed. Secondary data sources were also investigated for additional information on shorebirds in the study area. Sources used were Gladstone *et al*. (2007), recent volumes of the Birding NSW Central Coast Group monthly newsletter *The Twitcher*, the Atlas of NSW Wildlife public database (NSW Office of Environment and Heritage 2014) and interpretive signage located at the Norah Head lighthouse (providing details of unusual bird species recorded at Norah Head).

Information was also recorded on the numbers of people and dogs seen on the rock platforms during each field survey and the types of activities in which people were engaged. Accessibility over the tidal cycle, adjacent land use, direct distance from the nearby Norah Head urban area and walking distance from public vehicle access were local site attributes considered to potentially influence the extent and frequency of human access. These were assessed for each of the three sites through field observations and use of GIS mapping, and were used to explore any relationships with shorebird count data.

RESULTS

In total, 13 species of shorebird were recorded across the three rock platforms during the field surveys, comprising nine migratory species and four Australian resident species (Table 1). Table 1 lists the number of surveys when each species was recorded at each of the three sites (separately for October-March and April-August) as well as the maximum single count for each species at each site over the duration of the study. Migratory species dominated the community, making up over 70% of species diversity and over 90% of individuals (by maximum counts). The most abundant species overall was Red-necked Stint *Calidris ruficollis* (making up over half of the total maximum count), followed by Ruddy Turnstone *Arenaria interpres* and Curlew Sandpiper *Calidris ferruginea*. Rarely recorded species included Sanderling *Calidris alba*, Sharp-tailed Sandpiper *Calidris acuminata* and Masked Lapwing *Vanellus miles*. Based on frequency and maximum count data, eight of the recorded species are considered to be regular visitors to the study area while the remaining five are likely to be occasional visitors or vagrants (Table 1). The majority of migratory species were recorded only within the period October to April, with the exception of Ruddy Turnstone (also recorded in small numbers in August) and Double-banded Plover *Charadrius bicinctus* (a trans-Tasman migrant, recorded between March and August).

Looking at the three rock platforms separately, the greatest number of shorebird species was recorded at Pelican Point (11), followed by Soldiers Reef (nine) and Norah Head (four). Pelican Point was the only site where all eight regular shorebird visitors were recorded (being the only site where Red-capped Plover *Charadrius ruficapillus* was recorded). Nil shorebird count results were obtained in seven of the 16 surveys at Norah Head, two surveys at Pelican Point and none at Soldiers Reef. Based on the summed maximum count data (converted to birds ha^{-1} to assist comparison between the differently-sized rock platforms), Pelican Point supported up to about 72 shorebirds ha^{-1}, compared to 35 shorebirds ha^{-1} at Soldiers Reef and one shorebird ha^{-1} at Norah Head (Table 1). The greatest single survey count was at Pelican Point on 1 March 2014, with 116 shorebirds from seven species recorded in 30 minutes during a low tide count (a density of 61 shorebirds ha^{-1}).

Four of the 13 shorebird species recorded (31%) were only represented by single records (Table 1) and this, together with the shape of the cumulative species curve from the field surveys (Figure 2), suggests further survey effort may have identified additional species. Reference to secondary sources identified records of another four species (three migratory and one Australian resident) from the study area: Black-winged Stilt *Himantopus himantopus* in 1997 (NSW Office of Environment and Heritage 2014), Whimbrel *Numenius phaeopus* most recently in 2012 (Morris & Price 2012a) and Lesser Sand Plover *Charadrius mongolus* and Red Knot *Calidris canutus* most recently in 2015 (Morris & Mitchell 2015a & b). All four are considered to be only occasional visitors to the study area. These and other records from secondary sources which augment the list of shorebird species for each rock platform are listed in Table 2. They increase the Pelican Point species tally to 13, Soldiers Reef to 15 and Norah Head to nine. Published references to a record of the Beach Stone-curlew *Esacus magnirostris* at Norah Head (e.g. Morris *et al*. 1981; Pringle 1987; Pizzey & Knight 1999) are imprecise references to a 1959 record of a single bird seen on a sand dune during a 10 km beach walk from

Table 1. Frequency and maximum counts for shorebirds on three coastal rock platforms at Norah Head, NSW, 2013-2014.

	Norah Head			**Soldiers Reef**			**Pelican Point**					
	Frequency Oct-Mar (9 surveys)	**Frequency Apr-Aug (7 surveys)**	**Maximum count**	**Frequency Oct-Mar (10 surveys)**	**Frequency Apr-Aug (6 surveys)**	**Maximum count**	**Frequency Oct-Mar (10 surveys)**	**Frequency Apr-Aug (6 surveys)**	**Maximum count**	**Overall frequency (48 surveys)**	**Combined maximum count**	**% of total shorebirds (by maximum counts)**
Migratory species												
Pacific Golden Plover # *Pluvialis fulva* [1]	0	0	-	7	0	6	3	0	7	10	13	4.8
Double-banded Plover # *Charadrius bicinctus*	0	0	-	0	2	1	1	6	5	9	6	2.2
Grey-tailed Tattler # *Tringa brevipes* [1]	2	0	1	7	0	5	2	2	2	13	8	2.9
Wandering Tattler * *Tringa incana* [1]	0	0	-	4	0	1	0	0	-	4	1	0.4
Ruddy Turnstone # *Arenaria interpres* [1]	1	1	2	9	1	18	4	1	15	17	35	12.8
Sanderling * *Calidris alba* [1]	0	0	-	0	0	-	0	1	1	1	1	0.4
Red-necked Stint # *Calidris ruficollis* [1]	1	0	2	8	0	80	7	3	76	19	158	57.9
Sharp-tailed Sandpiper * *Calidris acuminata* [1]	0	0	-	1	0	1	0	0	-	1	1	0.4
Curlew Sandpiper # *Calidris ferruginea* [1]	0	0	-	5	0	14	2	0	18	7	32	11.7
Resident species												
Australian Pied Oystercatcher * *Haematopus longirostris*	0	0	-	0	0	-	0	1	1	1	1	0.4
Sooty Oystercatcher # *Haematopus fuliginosus*	4	2	2	2	5	3	1	2	3	16	8	2.9
Red-capped Plover # *Charadrius ruficapillus*	0	0	-	0	0	-	4	5	8	9	8	2.9
Masked Lapwing * *Vanellus miles*	0	0	-	0	0	-	1	0	1	1	1	0.4
Total maximum count			**7**			**129**			**137**		**273**	**100**
Total maximum count per ha			**0.8**			**34.9**			**72.1**			
Number of species		**4**			**9**			**11**		**13**		

regular visitor to study area
* vagrant/occasional visitor to study area
[1] species listed on CAMBA, JAMBA and/or ROKAMBA (see text)

The Entrance (south of the current study area) to Norah Head (Wilson 1961). The location of this record was likely to have been at or near The Entrance and it was not included in Table 2.

Another 14 waterbird species were recorded in the study area during the field survey. Table 3 lists the number of surveys when each species was recorded at each of the three sites. The most frequently recorded species were Silver Gull *Chroicocephalus novaehollandiae*, Great Cormorant *Phalacrocorax carbo* and Crested Tern *Thalasseus bergii*, with additional commonly recorded species including Pied Cormorant *Phalacrocorax varius*, Little Pied Cormorant *Microcarbo melanoleucos*, Little Black Cormorant *Phalacrocorax sulcirostris* and White-faced Heron *Egretta novaehollandiae*. Silver Gull were seen in flocks of up to about 200 birds, Crested Tern up to about 50, Great Cormorant and Pied Cormorant in numbers up to seven, and Little Pied Cormorant, Little Black Cormorant and White-faced Heron usually as single birds. Common Tern *Sterna hirundo*, Little Tern *Sternula albifrons* and Caspian Tern *Hydroprogne caspia* were seen in flocks of up to about 100, 50 and 10 respectively. The most rarely recorded species were Eastern Reef Egret *Egretta sacra* and White-bellied Sea-Eagle *Haliaeetus leucogaster*. Additional waterbird species known from the study area include Little Penguin *Eudyptula minor*, White-fronted Tern *Sterna striata* and Kelp Gull *Larus dominicanus* (Morris & Price 2012c; NSW Office of Environment and Heritage 2014; Morris & Mitchell 2015b).

Information on the average numbers of people and dogs counted during the field surveys is provided in Table 4, together with the documented site attributes relating to human accessibility. Norah Head was the most readily accessible site overall, only a 350 m walk

Table 2. Additional shorebirds from three rock platforms identified from secondary sources.

	Norah Head	Soldiers Reef	Pelican Point
Migratory species			
Pacific Golden Plover # *Pluvialis fulva* [1]	2007 (G)		
Double-banded Plover # *Charadrius bicinctus*	1994 (A)		
Lesser Sand Plover * *Charadrius mongolus* [1]		2015 (T)	2012 (T)
Whimbrel * *Numenius phaeopus* [1]	2012 (T)	2007 (G)	
Wandering Tattler * *Tringa incana* [1]			2014 (T)
Red Knot * *Calidris canutus* [1]		2015 (T)	
Sanderling * *Calidris alba* [1]		2014 (T)	
Curlew Sandpiper # *Calidris ferruginea* [1]	1994 (A)		
Resident species			
Australian Pied Oystercatcher * *Haematopus longirostris*	2013 (S)	2015 (T)	
Black-winged Stilt * *Himantopus himantopus*		1997 (A)	
Number of additional species	**5**	**6**	**2**

Note: dates given indicate the most recent record.
Sources:
G = Gladstone *et al*. (2007)
T = Birding NSW Central Coast Group monthly newsletter *The Twitcher* (Morris & Price 2012a & b; Morris & Price 2014a & b; Morris & Mitchell 2015a & b)
A = Atlas of NSW Wildlife public database (NSW Office of Environment and Heritage 2014) for the period 1990-2014
S = interpretive sign at Norah Head.
# regular visitor to study area
* vagrant/occasional visitor to study area
[1] species listed on CAMBA, JAMBA and/or ROKAMBA.

Table 3. Frequency of additional waterbirds on three coastal rock platforms at Norah Head, NSW, 2013-2014.

	Norah Head (16 surveys)	Soldiers Reef (16 surveys)	Pelican Point (16 surveys)
Australasian Gannet *Morus serrator*	3	5	3
Little Pied Cormorant *Microcarbo melanoleucos*	8	3	4
Great Cormorant *Phalacrocorax carbo*	13	10	10
Little Black Cormorant *Phalacrocorax sulcirostris*	6	5	3
Pied Cormorant *Phalacrocorax varius*	11	6	5
Australian Pelican *Pelecanus conspicillatus*	2	2	0
White-faced Heron *Egretta novaehollandiae*	10	5	3
Eastern Reef Egret (dark morph) *Egretta sacra* [1]	1	1	0
White-bellied Sea-Eagle *Haliaeetus leucogaster* [1]	1	1	1
Little Tern *Sternula albifrons* [1]	0	3	3
Caspian Tern *Hydroprogne caspia* [1]	4	3	1
Common Tern *Sterna hirundo* [1]	6	3	0
Crested Tern *Thalasseus bergii* [1]	11	13	8
Silver Gull *Chroicocephalus novaehollandiae*	16	16	14

[1] species listed on CAMBA, JAMBA and/or ROKAMBA.

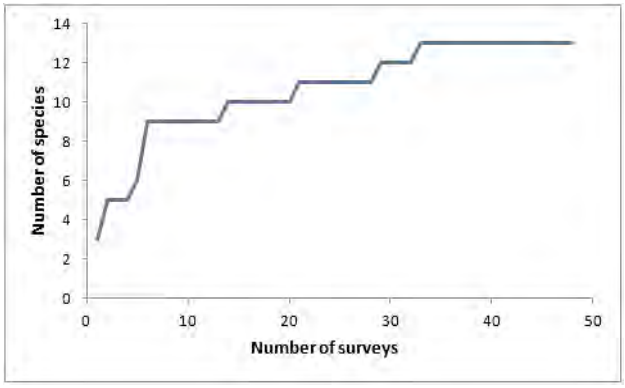

Figure 2. Cumulative species curve for shorebirds from the surveys done in the Norah Head study area 2013-2014.

Table 4. Physical and local context attributes of the three rock platforms in the Norah Head study area and human recreational activity levels recorded during the 2013-2014 field surveys.

	Norah Head	Soldiers Reef	Pelican Point
Accessible by people during high tide	Yes	No	Yes
Direct distance from urban area	650 m	700 m	1200 m
Walking distance from closest public vehicle access	350 m	250 m	1100 m
Immediate adjacent land use	Historical lighthouse tourist attraction	Car park for popular swimming beach	Wyrrabalong National Park
No. of people on platform during survey (mean ± SE)	19.9 ± 2.9	13.3 ± 3.0	1.8 ± 0.6
Average density of people on platform	2.3 people ha^{-1}	3.6 people ha^{-1}	0.9 people ha^{-1}
No. of domestic dogs on platform during survey (mean ± SE)	2.7 ± 0.4	0.7 ± 0.3	0.0 ± 0.0
Average density of dogs on platform	0.3 dogs ha-1	0.2 dogs ha-1	0.0 dogs ha-1

Note: data for human recreational activity at Soldiers Reef refers to low tide surveys only.

from vehicle access (Figure 1), close to the urban area and able to be reached by people at all tides, and had comparatively high numbers of people and dogs present. Soldiers Reef was also a short walk from public vehicle access; however, a noteworthy feature of this rock platform was a tidal channel separating a semi-detached intertidal reef from the adjacent headland (Figure 1). This channel hinders safe human access to the reef during high tides (Gladstone *et al*. 2007; Murphy *pers. obs*.). Information on the comparatively high number of people and dogs at Soldiers Reef relates only to low tide surveys. Pelican Point was the furthest site from vehicle access and was adjacent to a national park. It had the lowest average number of people and no dogs were observed there over the duration of the study. People observed on the three rock platforms were engaged in a range of recreational activities including rock-fishing and bait-collecting from the shoreward edge of platforms, purposeful walking (usually along the landward edge of platforms), rambling (slow meandering walk across all areas of platforms) and surfers crossing the platforms to access the sea. All dogs seen were accompanying people and included both leashed and unleashed animals.

DISCUSSION

This study demonstrates that the coastal rock platforms in the Norah Head area have noteworthy value as habitat for shorebirds, supporting an identified shorebird community comprising eight regular visitors and nine occasional visitors. Wandering Tattler *Tringa incana* (Figure 3), described as an occasional visitor in the present study (based on single birds recorded on four occasions), has also been recorded in the study area by several other observers (e.g. Morris & Price 2012a & b, 2014a; Morris & Mitchell 2015a) and may be a regular but scarce visitor to the Norah Head area. Many of the shorebirds recorded in this study are of conservation concern. Grey-tailed Tattler *Tringa brevipes* (Figure 3) is listed as *near threatened* on the *Red List of Threatened Species* (IUCN 2014). Eleven species (Tables 1 and 2) are listed under one or more of the bilateral migratory bird agreements between China-Australia (CAMBA), Japan-Australia (JAMBA) and Republic of Korea-Australia (ROKAMBA). Four species are currently listed under the NSW *Threatened Species Conservation Act 1995* (*TSC Act*): Curlew Sandpiper and Australian Pied Oystercatcher *Haematopus longirostris* as *endangered* (defined as a very high risk of extinction in NSW in the near future) and Sanderling and Sooty Oystercatcher *Haematopus fuliginosus* (Figure 4) as *vulnerable* (high risk of extinction in NSW in the medium-term future). Sooty Oystercatcher and Red-capped Plover are Australian endemics. The range of additional waterbirds recorded in the study area, including six species listed under CAMBA, JAMBA and/or ROKAMBA (Table 3), one species listed as endangered under the *TSC Act* (Little Tern) and one species which is rare in the NSW Central Coast/Sydney area (Eastern Reef Egret) (Gladstone *et al*. 2007; NSW Office of Environment and Heritage

Figure 3. Grey-tailed Tattler (left) and Wandering Tattler (right) at Soldiers Reef, Jan. 2014 (J.K. Murphy).

Figure 4. Sooty Oystercatcher at Pelican Point, Jan. 2014 (M.J. Murphy).

2014; Murphy *pers. obs*), further demonstrates the habitat values of these rock platforms.

Some of the shorebirds identified as regular visitors (or possible scarce regular visitors) in the present study, including Sooty Oystercatcher, Ruddy Turnstone and Wandering Tattler, are known to favour rocky shore habitats in coastal southern Australia. In contrast, the coastal habitat preferences of others such as Double-banded Plover, Red-capped Plover, Red-necked Stint and Curlew Sandpiper are soft-sediment environments such as intertidal mudflats and sandy beaches (Lane 1987; Geering *et al*. 2008; Hollands & Minton 2012). Further research at additional coastal rock platforms would be useful in determining the extent to which the latter species also use rocky coastal habitats in southern Australia.

In October 2007, Gladstone *et al*. (2007) did a brief survey of 15 coastal rocky shore sites across the NSW Central Coast (including Norah Head and Soldiers Reef but not Pelican Point), with a survey effort of two to three 20 minute surveys for birds per site. They identified a total of eight shorebird species of which four (Pacific Golden Plover *Pluvialis fulva*, Ruddy Turnstone, Red-necked Stint and Sooty Oystercatcher) occurred at three or more sites. All four species were identified as regular visitors in the present study. Gallo-Cajiao and Coughlan (2014) studied the shorebird community of a coastal rock platform at Long Reef, 55 km south-west of Norah Head, over the period 2008-2013, identifying six regular visitors and 11 vagrants. The regular visitors identified at Long Reef correspond closely with those identified in the present study, with the six species listed at Long Reef (Pacific Golden Plover, Double-banded Plover, Grey-tailed Tattler, Ruddy Turnstone, Red-necked Stint and Sooty Oystercatcher) included in the suite of eight species identified at the Norah Head rock platforms. The remaining two regular visitors to the Norah Head rock platforms, Curlew Sandpiper and Red-capped Plover, were recorded at Long Reef as vagrants (E. Gallo-Cajiao *pers. comm*.).

The majority of shorebirds identified in the present study as only occasional visitors to the Norah Head rock platforms are generally considered to prefer intertidal mudflats, sandy beaches or wetlands in coastal southern Australia (Lane 1987; Geering *et al*. 2008; Hollands & Minton 2012). Some of these occasional visitors are common in other habitats in the local area. Sharp-tailed Sandpiper, Red Knot, Black-winged Stilt and Masked Lapwing, for example, are common on the nearby coastal lagoons, including Tuggerah Lake less than 3 km west of the study area (Murphy *pers. obs*.; NSW Office of Environment and Heritage 2014). Masked Lapwing is also common in the adjacent Norah Head urban area (Murphy *pers. obs*.). Others like Sanderling are scarce on the NSW Central Coast (NSW Office of Environment and Heritage 2014).

Gladstone *et al*. (2007) identified the Norah Head and Soldiers Reef rock platforms as relatively high value shorebird sites on the NSW Central Coast; the former as low tide foraging habitat for shorebirds (with five species and a combined maximum count of 33 birds recorded) and the latter as a neap high tide shorebird roost (four species and 66 birds). The present study did not find Norah Head to be a notable site for shorebirds, with comparatively low numbers of four species recorded over the 16 surveys. Gulls and terns, however, were regularly seen roosting in numbers at Norah Head during the present study (in mixed flocks of over 300 birds), as described by Gladstone *et al*. (2007). The present study supports the assessment by Gladstone *et al*. (2007) of Soldiers Reef as a valuable high tide roost for shorebirds, identifying nine species at the site over the 16 surveys and a total of 15 species with the inclusion of secondarily sourced records. During the present study shorebirds were regularly seen roosting or loafing on boulders on the south-eastern margin of Soldiers Reef at high tide, and were observed moving out to forage over the platform as the tide receded (Murphy *pers. obs*.). They were also observed being displaced from the open rock platform area when people (sometimes with dogs) crossed the intervening channel on the falling tide, retreating to the boulder area or simply flying away (Murphy *pers. obs*.). Sooty Oystercatcher were also occasionally observed relocating to Soldiers Reef at high tide after being disturbed into flight by people on adjacent rock platforms (Murphy *pers. obs*.).

The present study also found Pelican Point to be a noteworthy site for shorebirds, with 11 species recorded (13 including secondary sources) and a comparatively high density of shorebirds. During the present study shorebirds were seen foraging in the wash zone around the margins of this rock platform and using a flat open expanse in the middle of the platform for loafing (Murphy *pers. obs*.). Two species recorded here, Sanderling and Red-capped Plover, are locally rare on the NSW Central Coast (NSW Office of Environment and Heritage 2014). The occurrence of these disturbance-sensitive sandy shore species at Pelican Point is probably associated with its proximity to a long and relatively undisturbed sandy beach to the immediate south.

Numerous studies have shown that repeated disturbance by people engaged in recreational activities can have detrimental impacts on shorebirds including reduced foraging opportunities, disruption of roosts, and abandonment or destruction of eggs or young (e.g. Fitzpatrick & Bouchez 1998; Paton *et al*. 2000; Lafferty 2001a & b; Weston & Elgar 2007; Glover *et al*. 2011; Milton & Harding 2011; Burger & Niles 2013; Weston *et al*. 2014). From a behavioural ecology perspective, non-lethal anthropogenic disturbance stimuli can be considered analogous to predation risk, with evolved anti-predator responses in wildlife inadvertently triggered by human recreational activity, diverting time and energy away from other necessary activities such as feeding or parental care (Frid & Dill 2002). Domestic dogs are considered to have an even greater disturbance effect on shorebirds than do people, being more likely to trigger an anti-predator response and at a greater distance (Paton *et al*. 2000; Lafferty 2001a & b; Lord *et*

al. 2001; Burger *et al*. 2007; Glover *et al*. 2011). Comparison of the levels of shorebird usage and human recreational activity on the three rock platforms documented in this study identified some notable patterns. Norah Head, the most readily accessible site overall had a relatively high level of human recreational activity and the lowest overall shorebird usage. Pelican Point, the furthest site from public access, had the lowest level of human recreational activity (including nil dog activity) and the highest overall shorebird usage. Soldiers Reef is a more complex shorebird site, as it is close to vehicle access like Norah Head, but a large part of the site (a semi-detached reef) can only be reached by people at low to mid tides, at which times it had relatively high human recreational activity and low to moderate shorebird usage. During high tides, however, this reef was an undisturbed refuge with no human recreational activity and high shorebird usage. These patterns were not statistically tested or causal links experimentally investigated in the present study: nevertheless, a precautionary approach is appropriate with respect to the likely important role of coastal recreational activity in affecting the distribution and abundance of shorebirds in the Norah Head study area.

Conclusion

This study has documented the shorebird community of coastal rock platforms in the Norah Head area of the NSW Central Coast, contributing to our knowledge of how rocky shore habitats in south-eastern Australia are used by shorebirds. The study illustrates that coastal rock platforms in an urban area can retain value as shorebird habitat. However, local-scale site attributes, such as accessibility over the tidal cycle and walking distance from public vehicle access, may play a role in determining the level of human disturbance and thereby a site's actual level of use by shorebirds. Glover *et al*. (2011) reported an encouragingly high level of support amongst Australian coastal zone users for protection of shorebirds, although also noting that this did not always translate to agreement with necessary actions. As coastal urban populations in Australia continue to grow and conflict between recreational use and shorebird habitat protection increases, it is essential to engage with local communities to devise effective and workable solutions (Glover *et al*. 2011; Burger & Niles 2013).

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Appendix 1. Norah Head rock platforms field survey dates.

Norah Head	Soldiers Reef	Pelican Point
Sat 29-Jun-2013	Wed 20-Feb-2013	Fri 17-Jan-2014
Sat 18-Jan-2014 x2	Thu 21-Feb-2013	Sat 18-Jan-2014
Sat 1-Mar-2014	Sat 29-Jun-2013	Sun 19-Jan-2014
Fri 18-Apr-2014	Fri 17-Jan-2014	Sat 1-Mar-2014
Sat 19-Apr-2014 x2	Sun 19-Jan-2014	Fri 18-Apr-2014
Sun 20-Apr-2014	Sat 1-Mar-2014	Sat 19-Apr-2014
Sat 2-Aug-2014	Fri 18-Apr-2014 x2	Sun 20-Apr-2014
Mon 4-Aug-2014	Sat 19-Apr-2014	Sat 2-Aug-2014
Thu 23-Oct-2014 x2	Sat 2-Aug-2014	Sun 3-Aug-2014
Fri 24-Oct-2014 x2	Sun 3-Aug-2014	Mon 4-Aug-2014
Sat 25-Oct-2014	Thu 23-Oct-2014	Thu 23-Oct-2014
Sun 30-Nov-2014	Fri 24-Oct-2014 x2	Fri 24-Oct-2014 x2
	Sat 25-Oct-2014	Sat 25-Oct-2014
	Mon 1-Dec-2014	Sun 30-Nov-2014
		Mon 1-Dec-2014
16 surveys	16 surveys	16 surveys

THE VALUE OF ANNUAL VOLUNTEER INPUT TO THE OPERATIONS OF THE VICTORIAN WADER STUDY GROUP

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The Victorian Wader Study Group, as with many other ornithological fieldwork bodies, is entirely managed and operated by volunteer effort. An attempt has been made to quantify the main components of this in order to demonstrate the monetary value of such in-kind volunteer input, the level of which is not widely appreciated. It is estimated that the annual volunteer effort is at least 14,048 person hours. If this is costed at the standard Victorian Government Coastcare recommended level of $30 per hour, this equates to an annual value of $421,440. Vehicle transport costs incurred by volunteers taking part in fieldwork activities (costed at $1 per vehicle kilometre) add a further $121,800. Airfares for the two visits to King Island each year are $7,520. Additional costs associated with equipment (consumables, maintenance, and depreciation) are $26,000 per annum. The net value of the volunteer contribution needed to undertake VWSG activities annually is therefore estimated at $576,760. As volunteering represents a major contribution to research and monitoring, these in-kind inputs need to be recognised, inter alia, when requests for funding support from external bodies are made.

INTRODUCTION

"Amateurs" have traditionally played a major role in ornithological research. This was especially so in the early years and until the middle of the 20th century, when I observed very few professionals (other than collectors and taxidermists) in the ornithological field. In recent years there has been a huge increase in ornithological research and teaching, particularly in universities, and there are many more people now earning their principal income from ornithology-related activities. Nevertheless, in many countries of the world, the counting and banding of birds is still extensively undertaken by volunteers ("Citizen Science" – see Furness and Greenwood, 1993). Also, most large-scale population surveys are still dependent on volunteer effort, often led by a professional co-ordinator.

The Victorian Wader Study Group was formed in 1978 and incorporated in 1987. It has approximately 200 members. Its principal activity is the catching, banding and flagging of waders along the Victorian coast and in other parts of south-east Australia. It is also involved in the national wader population monitoring programs, organised through the Australasian Wader Studies Group/Birdlife Australia. All participants in VWSG activities are volunteers, even though some are professionally qualified and employed in the ornithological/wildlife field.

The annual out-of-pocket operating costs of the group are low (around $10,000 in 2013/2014), and these are financed by members' contributions and small donations and grants from individuals and other philanthropic organisations. Some limited financial support is also received from government bodies such as Coastcare. External funding is occasionally sought for one-off major costs, eg. geolocators.

When applying for such external funding, information is often requested concerning the value of VWSG self-help in-kind funding. Costing of just a small number of the group's activities in the past has clearly shown that the major proportion of annual costs is being carried by VWSG members and other fieldwork participants. For this purpose, I carry out a more comprehensive costing assessment that might be of wider interest.

METHODS

In consultation with the more experienced members of the group, and also those undertaking special tasks for the group (e.g. processing flag sightings) on a relatively routine basis, estimates were made of the number of person hours required each year for the various different major components of VWSG activities. Using the $30 per hour cost prescribed by Coastcare for valuing volunteer effort, the total estimated cost of effort input by volunteers to VWSG activities each year was calculated.

Estimates were also made of more tangible costs, such as consumable items of equipment (gunpowder, electric fuses, electrical items, engraved flags, etc). The considerable maintenance effort required on nets and cannon-netting electrical equipment and hardware was also costed. Annual capital costs of equipment were not included, because expenditure is quite variable from year to year, so a depreciation charge was included, assuming an average 5-year life for equipment.

Transportation costs to and from fieldwork were also estimated and costed at a conservative $1 per vehicle kilometre. The travel and accommodation costs of the twice-yearly visits to King Island (Tasmania) and the south-east of South Australia were calculated separately.

RESULTS

Table 1 shows the total costs per annum estimated for the principal VWSG fieldwork and other activities.

Table 1. The value of annual VWSG in-kind volunteer effort. Values are in Australian dollars.

Volunteer activity / expense	Details	Person hours	Value ($)
Banding			
Permits / Animal Ethics Committee approvals	10 days × 1 person × 5 hours / day	50	
Organising fieldwork teams	50 days × 2 persons × 3 hours / day	300	
Preparation of equipment before / after fieldwork	50 days × 2 persons × 4 hours / day	400	
Travel to-from fieldwork	80 days × 15 persons × 2 hours / day	2,400	
Transport costs	80 days × 8 vehicles × 150 km / day × $1 / km / vehicle		96,000
Fieldwork – catching	80 days × 15 persons × 8 hours / day	9,600	
Curation of data, data entry	50 days × 2 persons × 5 hours / day	500	
Processing flag sightings	100 days × 1 person × 3 hours / day	300	
Equipment costs			
- Consumables	Powder, fuses, electrical items (not including depreciation)		6,000
- Maintenance	10 days × 22 persons × 3 hours / day	60	
- Depreciation	Nets, hardware, radios etc., depreciated over 5 years		8,000
Geolocator costs	60 units × $200 per unit		12,000
- Preparation / mounting of units	3 persons × 6 hours / day	18	
- Downloading and interpreting	30 days × 1 person × 6 hours / day	180	
Distant fieldwork			
King Island			
- Airfares	2 visits × 10 persons / visit × $376		7,520
- Accommodation	2 visits × 9 nights / visit × $200		3,600
- Car hire	2 visits × 9 days / visit + fuel		1,700
South Australia			
- Car travel costs	2 visits × 5 vehicles / visit × 1600 km / vehicle × $1 per km		16,000
Counting for fieldwork			
Personnel	2 days × 15 persons × 6 hours / day	180	
Travel	2 days × 15 persons × 2 hours / day	60	
Transport costs	2 days × 15 vehicles × 150 km / vehicle / day (return) × $1 / km		4,500
Totals			
Time input	14,048 person hours × $30 / hour	14,048	421,440
Other costs	Transport and equipment		155,320
Total annual value			**$576,760**

The largest number of person hours was the time spent by banding teams (assumed to average 15 persons) in carrying out fieldwork (9,600 person hours) and travelling to and from such activities (2,400 person hours). Overall, it is estimated that 14,048 person hours are required each year to carry out the main components of the VWSG banding and counting programmes. Costed at $30 per hour, this is equivalent to $421,440. Note that such costs still exclude some significant activities such as the analysis of data, the preparation of scientific papers for publication, presentations to scientific conferences and other ornithological organisations, etc.

The estimated overall cash expenditure on transport costs was $96,000 for banding fieldwork and $4,500 for counting activities. Additional transport and accommodation costs in relation to our fieldwork at more distant locations (King Island and the southeast of South Australia) are $21,300, plus $7520 in airfares (King Island). Expenditure on consumables and equipment was also costed ($6000), together with the value of geolocators deployed each year (an average of $12,000 for each of the last 5 years). The personal equipment costs of volunteers, such as binoculars, telescope, camera, and special outdoor clothing were not included.

The overall estimated annual expenditure on VWSG activities is around $547,940. This cost is largely borne by VWSG members and the volunteers who participate in fieldwork during the year.

CONCLUSION

Volunteers participate in activities such as those of the VWSG mainly because they enjoy them. An additional motivation may be the concern for conservation, and the wish to input in a tangible way. Few volunteers probably realise the real economic value of their annual input to citizen science. Governments and grant-giving organisations need to be aware of the very considerable

financial contribution being made by so many people through their volunteer activities. If a relatively modest grant or financial contribution can assist, stimulate, or maintain such a level of volunteer commitment, then the value of that external financial support is enhanced still further.

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MOVEMENTS OF BANDED STILTS MARKED AT THE LAKE BALLARD AND LAKE MARMION COLONIES IN WESTERN AUSTRALIA IN 1995

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The breeding behaviour and movements of Banded Stilt (*Cladorhynchus leucocephalus*), have long been an enigma, ever since the first conclusively identified breeding colonies were located in 1930. The few colonies reported over the ensuing 65 years (to 1995) had mainly been found after young had hatched and become mobile, or even after colonies had been abandoned (normally following breeding failure). Few birds were banded and, at the time of the breeding events in the Western Australian goldfields area in 1995, only one banded bird showing movement had ever been recovered. In April – June 1995, at Lakes Ballard and Marmion, more than 800 chicks were marked, with at least 480 being flagged and 325 with metal band only. Twenty-four sightings of these birds (one involving three flagged birds) have subsequently been reported, in the period up to December 2014. Initially most of these were within Western Australia with birds moving as far north as Port Hedland (approximately 1050 km), and to various places along the lower west coast of the state from Busselton (700 km) to Rottnest Island, and up as far as Yarra Yarra Lakes (550 km). More surprisingly, at least three individuals were seen in the breeding Banded Stilt colonies at Lake Eyre in 2000 (around 1550 km east). The largest movement, also to the east, was a bird seen at Lake George in South Australia, over 1900 km. More recently there have been six further sightings in South Australia (five possibly being of the same bird) with the latest being 19 ½ years since the chicks were flagged. It appears that Western Australian Banded Stilts will move around between breeding events to any suitable habitat in the state, south of the Kimberley. They are also not totally isolated from the Banded Stilt which occur in south-eastern Australia and which breed in south-eastern parts of Central Australia. This movement data is a foundation for the much larger volume of Banded Stilt movement information now being generated from further extensive flagging and from satellite transmitter studies.

INTRODUCTION

Banded Stilts (*Cladorhynchus leucocephalus*) have always held a fascination for wader ornithologists. This is partly because the first breeding activities of this endemic Australian shorebird, without a close counterpart on any other continent, were not reliably observed until as late as 1930 (Glauert & Jenkins 1931) and nesting colonies are still only observed intermittently. It also relates to their largely unknown movements, with birds appearing at, and then disappearing from locations in an apparently random manner. Perhaps most fascinating of all is how Banded Stilts seem to so rapidly recognise conditions which could lead to a breeding opportunity in a region well away from where they are currently situated.

Banded Stilts nest mainly on small islands, but occasionally on peninsulas, in large ephemeral, mainly inland, salt lakes (Glauert & Jenkins 1931, Howe & Ross 1931, McGilp & Morgan 1931, Carnaby 1933, 1946; Kolichis 1976, Burbidge & Fuller 1982, Phillipps 1990). Banded Stilt chicks leave the nest within a day or two of hatching (Robinson & Minton 1989, Gosbell *et al.* 2010) and are escorted to the water by one or both parents (Collard *et al.* 2013). Families soon leave the natal island, joining together into larger groups and creches as they swim away to other parts of the lake (Kolichis 1976, Bougher 1988, Gosbell *et al.* 2010, Bellchambers & Carpenter 1992, Collard *et al.* 2013). This dispersal behaviour presents occasional opportunities for the banding and flagging of large numbers of chicks, provided access is possible, the timing is right, and experienced personnel and equipment are available at sometimes very short notice!

In the early 1990s the three principal authors decided they would watch closely for the occurrence of weather conditions that might lead to a Banded Stilt breeding event, and then be prepared to act quickly to extract the maximum possible scientific information from such an occurrence. Thus, in early March 1995, shortly after ex-Tropical Cyclone Bobby traversed inland Western Australia from the north-west to the south-east producing four days of heavy rain (300mm at nearby Menzies), the team swung into action. The story of how a nesting colony on Lake Ballard was located 15 days after this rain event commenced, and that a visit three days later showed that some birds had already started incubating 4-egg clutches, will be told elsewhere. But later the opportunity was taken to band and colour leg flag chicks at the end of this breeding event, and at a subsequent breeding event at nearby Lake Marmion.

This paper gives details of the information on movement, lifespan and breeding plumage changes, which resulted from this first significant banding and flagging of Banded Stilt chicks. It forms a foundation for more extensive recent studies (e.g. Pedler *et al.* 2014) on the movements of Banded Stilts within Australia.

METHODS

Site descriptions

Lake Ballard is a large (~60,000 ha), flat-bottomed, shallow (≤ 0.5 m), episodically-filled, fresh-saline lake with many small islands, 33 km north-west of Menzies in the Eastern Goldfields of Western Australia. Average annual rainfall and evaporation are *c.* 230 mm and *c.* 3200 mm respectively. Lake Marmion is similar but smaller (~35,300 ha) and 15 km south-east of Lake Ballard. These lakes are infrequently inundated, usually by single, summer-autumn, high rainfall events resulting from weakened tropical cyclones (Lane *et al.* 1996).

Bird capture

Capture of chicks was undertaken between 10th April and 3rd May on Lake Ballard and 11th – 12th June 1995, on Lake Marmion. They were initially caught on Lake Ballard by following them in a small boat and catching them in a hand-net. Care had to be taken when doing this as there was a tendency for the accompanying adult bird(s) to depart and not return, even when the banded and flagged chicks were subsequently released. This behaviour was unexpected considering that many waders are extremely defensive of their offspring, often employing predation distraction techniques like the "broken wing" display. The problem was ameliorated by only catching a part of each (assumed) brood or kin group, and then maintaining visual contact with the remainder of the group during processing, so that the chicks could be released back into the same group again afterwards.

At the later colony on Lake Marmion the water was too shallow for a motor boat. An amphibious vehicle (an "Argo") was used to approach chicks, which were then caught by banders running after them and catching them by hand. They were again released as a group as close as possible to another creche of chicks attended by adults.

Most chicks were fitted with a standard Australian Bird and Bat Banding Scheme (ABBBS) metal band, with the exception of the last 17 at Ballard and 98+ at Marmion captured after supplies of metal bands had run out. Most bands were placed on the upper right leg, but many were on the left. A single plain yellow leg flag was added to most of the banded birds and to many that were not banded. Flags were always positioned on opposite upper legs to bands and thus most flags were on the left. Most of the banded and / or flagged chicks were estimated to have been at least one week old and some were almost fully fledged.

Subsequent sightings of marked birds were mostly made by other birdwatchers, alerted to look out for such birds by individual direct communications, verbal presentations to interested groups and through regional media, *WA Bird Notes, The Tattler* and *Wingspan*. Observers were also asked to record the plumage of sighted marked Banded Stilts. Author ACl also conducted several searches in the south-western coastal and inland agricultural regions of Western Australia for marked birds.

Distances travelled by most sighted individuals have been calculated from both Lake Ballard and Lake Marmion as, in the case of all flagged birds, either origin was possible. Only the distance from Lake Ballard has been calculated for the single 'band only' sighting, as only at Ballard were chicks leg-banded but not flagged.

RESULTS

At Lake Ballard, 507 chicks were banded and / or flagged (Table 1). Most banding and / or flagging was done from 29th April to 3rd May. One chick was banded and flagged on 10th April and 10 on 13th April. At Lake Marmion at least 298 chicks were banded and / or flagged, all on the 11th and 12th June. An additional 20 or so may have been 'flagged only' at Lake Marmion. The exact number is uncertain.

The sightings of marked birds subsequently reported (Table 2) therefore derive from a total of 690 birds metal banded (of which, 365 were also flagged) with a total of at least 480 birds, from the two lakes combined, carrying leg flags.

The effort made to publicise the need for people to look out for bands or flags on Banded Stilts was well rewarded with keen observers taking the opportunity to scan flocks systematically when birds were sighted at a range of locations in Western Australia. Some sightings were made by or reported direct to WA authors; others have been gleaned from subsequent publications (Table 2).

Within Western Australia, most marked Banded Stilts were seen at lakes along the lower west coast from Busselton (Vasse estuary and Port Geographe; a movement of around 700 km SW) to Yarra Yarra Lakes (approximately 550 km W) (Table 2 and Fig 1).

Table 1. Banded Stilt chicks flagged and/or banded at Lakes Ballard and Marmion in 1995.

Site	Period	Flagged & Banded	Flagged Only	Banded Only	Total Flagged	Total Banded	Total Flagged and/or Banded
Lake Ballard	April-May	165	17	325	182	490	507
Lake Marmion	June	200	98+	0	298+	200	298+
Total	April-June	365	115+	325	480+	690	805+

Table 2. Sightings of Banded Stilt banded and/or flagged as chicks at Lakes Ballard and Marmion in 1995. 'Map Ref' refers to circled numbers (locations) in Figure 1. 'F' = flag sighting; 'B' = band sighting. Text in quotation marks is exactly as reported by observer. No. refers to the number of marked (banded, flagged or both) bird re-sighted. Distance refers to distance moved from Lakes Ballard and Marmion. Time refers to time elapsed between first capture and subsequent re-sighting. Description refers to breast band colour, leg colour or breeding status. Ref. refers to published and ABBBS references to re-sightings.

Map Ref.	Date	Location (State)	No.	Distance (km)	Time	Description	Ref.
1	1995, Oct 24	Lake Arrow (WA)	1 F	B 122 M 88	0y6m14d 0y4m12d	No information	Anon (1996); Lane (1996).
2	1996, Jan 20 & 21	Rottnest I. (WA)	1 F	B 596 M 622	0y9m10d 0y7m8d	'No chest band'	Anon (1996); Lane (1996).
3	1996, Feb 28	Cargill Salt, Port Hedland, (WA)	1 B (and definitely no Flag)	B 1,039	0y9m30d 0y9m25d	'60% breast band'	Lane (1996)
4	1996, Feb 28	Cargill Salt, Port Hedland, (WA)	3 F	B 1,039 M 1,078	0y10m18d 0y8m16d	'1 pronounced band, 2 less so' or '60% breast band'	Lane (1996)
5	1996, Mar 7	Dampier Salt (WA)	1 F	B 1,064 M 1,109	0y10m26d 0y8m24d	No information	Lane (1996)
6	1996, Sep 29	Yarra Yarra Lakes (WA)	1 F	B 510 M 554	1y5m19d 1y3m17d	No information	Lane (1996)
7	1997, Jan 6	Lake Cooloongup (WA)	1 F	B 590 M 613	1y8m27d 1y6m25d	'90% banding'	None.
8	1997, Jan 9	Lake Cooloongup (WA)	1 F	B 590 M 613	1y8m30d 1y6m28d	'90%' or '100%' breast band	None.
9	1997, Feb 24	Thomsons Lake (WA)	1 F (and definitely no Band)	B 579 M 603	1y9m21d 1y8m12d	Breast band 'mottled /faded' 'Legs pink'	None.
10	1997, Mar 17	Vasse estuary (WA)	1 F	B 709 M 724	1y11m7d 1y9m5d	'Well-developed band'	None.
11	1997, Mar 19	Vasse estuary (WA)	1 F	B 709 M 724	1y11m9d 1y9m7d	'Fully-developed, rich dark brown - chestnut breast band'	None.
12	1998, Mar 10th	Port Geographe (WA)	1 F (and definitely no Band)	B 706 M 721	2y10m7d 2y8m26d	'Full dark chestnut band. Dark wings'	None.
13	1998, Apr 6th	Martin's Tank, Yalgorup NP (WA)	1 F	B 633 M 651	2y11m27d 2y9m25d	Breast band complete, not 'blotchy'	None.
14	1998, Oct 30	Lake Ninan (WA)	1 F	B 452 M 483	3y6m20d 3y4m18d	No information	None.
15	2000, Apr 3	Hughes I., Lake Eyre North (SA)	1 F	B 1,565 M 1,522	4y11m24d 4y9m22d	'A breeding adult'.	'ABBBS (2000)'; Minton *et al.* (2000); Baxter (2003).
16	2000, Jul 19	Ibis I., Lake Eyre North (SA)	1 F	B 1,601 M 1,557	5y3m9d 5y1m7d	Adult departing colony with chicks.	Baxter (2003), p.47.
17	2000, Jul 27	Ibis I., Lake Eyre North (SA)	1 F	B 1,601 M 1,557	5y3m17d 5y1m15d	Adult departing colony with chicks.	Baxter (2003), p.47.
18	2001, Apr 28	Lake George (SA)	1 F	B 1,964 M 1,912	6y0m18d 5y10m16d	No information	Gosbell & Christie (2006).
19	2012, Nov 9	St Kilda Beach (SA)	1F	B 1,749 M 1,696	17y6m30d 17y4m28d	'Full breast band, 100%, no mottling'.	None.
20	2012, Dec 13	Bird Lake, Port Augusta (SA)	1F	B 1,634 M 1,584	17y8m3d 17y6m1d	'Full breast band, 100%, no mottling'.	None.
21	2012, Dec 22	St Kilda Beach (SA)	1F	B 1,749 M 1,696	17y8m12d 17y6m10d	'Full breast band, 100%, no mottling'.	None.
22	2013, Jan 22	Bird Lake, Port Augusta (SA)	1F	B 1,634 M 1,584	17y9m12d 17y7m10d	'Full breast band, 100%, no mottling'.	None.
23	2013, Oct 3	Cantara, Coorong (SA)	1F	B 1,904 M 1,852	18y5m23d 18y3m21d	No information	None.
24	2014, Dec 10	St Kilda Beach (SA)	1F (and definitely no Band)	B 1,749 M 1,696	19y7m7d 19y5m28d	'Near full breast band, 99%, tiny mottling …'	None.

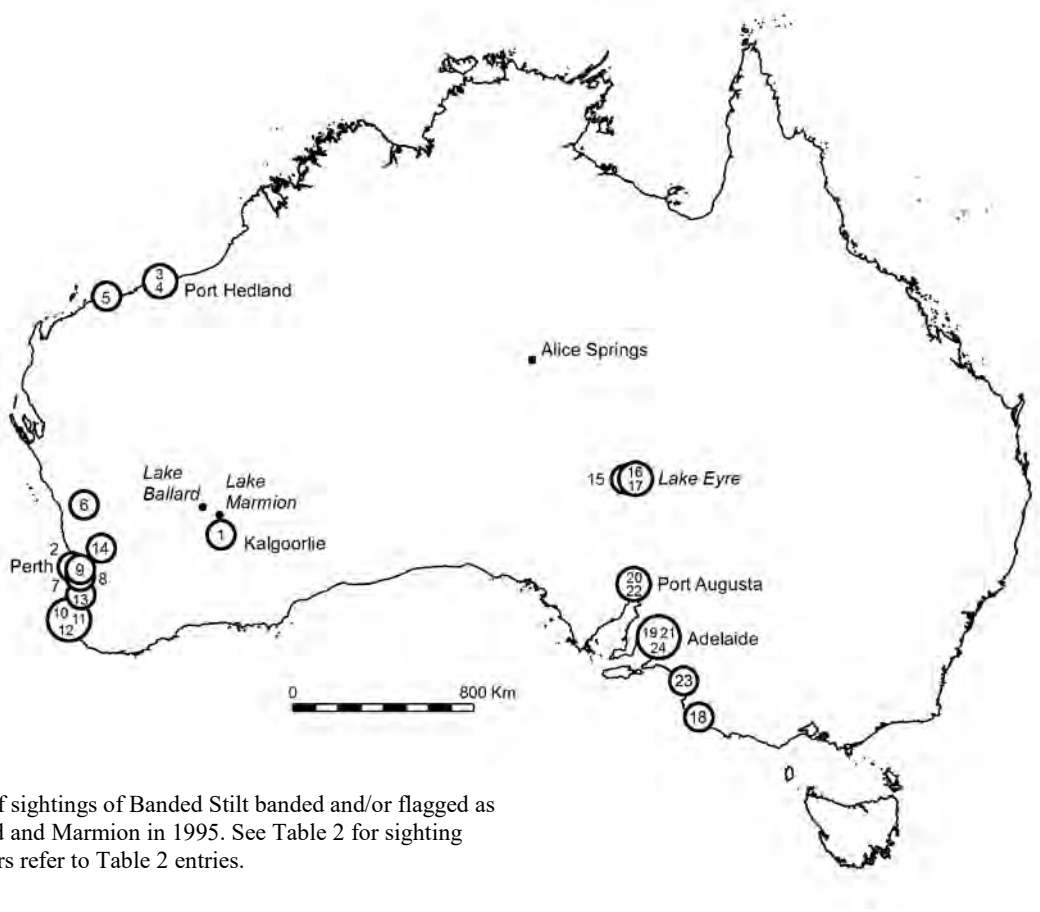

Figure 1. Locations of sightings of Banded Stilt banded and/or flagged as chicks at Lakes Ballard and Marmion in 1995. See Table 2 for sighting details. Circled numbers refer to Table 2 entries.

However, five birds travelled north (between 1050 and 1100 km) to saltworks at Port Hedland (four birds in February 1996) and Dampier (one bird on March 7th 1996). All sightings in Western Australia were made between October 1995 and October 1998.

The searches conducted in the south-western coastal and inland agricultural regions of Western Australia by author ACl produced two sightings, both in January 1997 at Lake Cooloongup on the lower west coast.

In 2000-2001 there were four sightings in South Australia, three being at Banded Stilt breeding colonies at Lake Eyre North. One author (CM) was part of the team that recorded the first yellow-flagged Banded Stilt at a breeding colony on Hughes Island, in the middle of Lake Eyre North in April 2000. The two other yellow-flagged Banded Stilts, considered different birds from each other because of the timing, were subsequently seen escorting chicks to the water at a later breeding event on Ibis Island, Lake Eyre, in July 2000. The further sighting in South Australia was made in April 2001 at Lake George, a location where large non-breeding concentrations of Banded Stilts frequently occur. Lake Eyre is around 1600 km East of Lakes Ballard and Marmion. The movement to Lake George constituted a journey of over 1900 km.

More recently (2012-2014) there have been a further six sightings of yellow flagged Banded Stilt in South Australia. R.D. Pedler observed a single bird with a yellow flag on the right leg on three occasions at St Kilda Beach, near Adelaide, and twice at Port Augusta. Recent unpublished studies have shown that Banded Stilts frequently move back and forth between these two locations (R.D. Pedler, *pers. comm.*). It is possible therefore that only one individual was involved. On the most recent occasion (St Kilda Beach, 10 December, 2014) the bird was photographed. It did not have a metal band on either leg and the flag was of small diameter, sitting partway up the tibia (L.D. & R.D. Pedler, *pers. comm.*). On these bases there can be a very high degree of confidence that this bird was flagged at Ballard or Marmion in 1995 and was not part of a group of birds flagged on the Coorong in 2006 with 'orange above yellow' (Friends of Shorebirds South East (FoSSE) *unpubl. data*) that had lost its orange flag. This bird was therefore 19 ½ years old. In October 2013, a bird with a yellow flag on its *left* leg was observed in the Coorong. Without further information regarding the diameter and positioning of this flag and the presence or absence of a metal band, we cannot be certain that this bird was flagged in 1995. There is a possibility that it was flagged 'orange above yellow' at Lake Torrens in 2010 or 2011 and subsequently lost its orange flag.

Where records of plumage were made by observers, some of the birds (reported between 9 and 12 months after banding) were recorded as having 60% of their chestnut / black breast band already developed (Table 2). By the second year, most were showing 90% or more breast band. Birds in later years were usually reported as being in full adult breeding plumage. There were no recoveries of dead birds and no retraps.

DISCUSSION

This banding and flagging fieldwork in 1995, and the subsequent reports of marked birds, has shown that young Banded Stilt disperse at least 1100 km from their natal site and that movements occur from western to eastern parts of the continent. The long lifespan of at least some individuals of the species is also confirmed.

At the time of the breeding events in the Western Australian goldfields area in 1995, only one previous movement record had been obtained from a marked bird, a juvenile banded at Hannans Lake, WA, and recovered 364 km west-north-west 3½ years later (ABBBS, D. Drynan *pers. comm.*).

Prior to 1995, a total of 633 Banded Stilt had been banded in Australia with the first 13 birds being banded in 1959. During the four decades preceding 1995 (i.e. 1985-94, 1975-84, etc.) subtotals of 262, 161, 112 and 98 birds were banded (ABBBS, D. Drynan *pers. comm.*). It is therefore conceivable that the bird sighted wearing a band but definitely no flag at Port Hedland in February 1996 was banded not in 1995, but during one of these pre-1995 periods.

The first sighting of a bird flagged during the April-June 1995 event, reported here, at Lakes Ballard and Marmion, did not occur until 4-6 months after these birds had been marked. Eighteen more sightings were made between then and 2001, in both Western and South Australia. Surprisingly, for such a potentially long-lived species, there were no more sightings until the six records in South Australia between 2012-2014. This 're-commencement' of sightings was perhaps at least partially due to the considerable increase in fieldwork activities and observations on this species in South Australia in recent years.

There appears to be no distinctive pattern in the initial movements of Banded Stilts away from the breeding colonies within Western Australia, based on information generated from the chicks marked at and Lake Marmion in 1995, other than towards more-permanent water (wetlands) closer to the coast. A range of suitable habitats near or on the lower west coast of Western Australia (450-700 km W to SW from the breeding sites) and on the north coast (1000-1100 km NNW) were occupied when birds were not breeding, with locations in these parts being visited in the first year after fledging.

It appears that birds start to develop a fair amount of the adult breeding plumage before the end of their first year, and have almost 100% by the end of the second year. More data are needed to see how variable this may be and whether breeding plumage, once attained, is then retained throughout each subsequent year.

Any idea that the Western Australia Banded Stilt population may be largely separate from the South Australia – southern Victorian – eastern Central Australia population (i.e. as expressed by Mathews 1927, 1931; Jones 1945 and Minton *et al.* 2000) has been well refuted by these results. At least two Lake Ballard / Lake Marmion birds were recorded breeding at Lake Eyre, a single bird was seen even further east at Lake George, and more recently, six further sightings (five of which may be of the same bird) were made in the Port Augusta, Adelaide, and Coorong areas. However, more data will be needed before the extent of the mixing of Banded Stilt populations can be judged. To place this in a broader context, the tendency to travel widely to wherever there is (or may be) suitable habitat is a characteristic of many species of birds occupying inland areas of the Australian continent.

Figure 2. At Lake Ballard, Banded Stilt chicks were captured by plankton net from a motorised punt. Photo: A. Chapman, 02 May 1995.

Figure 3. Several hundred Banded Stilt chicks were both leg-banded *and* flagged in 1995. Hundreds more were banded *or* flagged. Photo: J. Lane, 30 April 1995, Lake Ballard.

Figure 4. One adult Banded Stilt with yellow flag on upper left leg was photographed at St. Kilda Beach, South Australia, on 10 December 2014. This bird was flagged as a chick at Lake Ballard or Marmion in April-June 1995. Photo: R. Pedler.

It is noteworthy that only one sighting was made of a bird bearing only a metal band, compared with 25 sightings of flagged birds, despite the fact that the numbers of 'banded only' birds (325) and 'flagged' birds (480+) were of similar magnitude. This highlights the advantages of flagging for gathering information on movements and lifespan of this species, and waders more generally.

The 1995 fieldwork at Ballard and Marmion, and the subsequent reports of marked birds, provide an initial foundation for the much more extensive studies of Banded Stilt movements and ecology which have taken place in recent years, particularly since a prolonged drought broke in South Eastern and Central Australia in 2009. However, it should be noted that the distributional patterns of the species revealed by these (and other) movement sightings are almost certainly influenced by observer bias, since most of the information was derived from birdwatchers observing marked birds at reasonably frequently-visited locations. The use of satellite telemetry for Banded Stilt movement studies in more recent years (Pedler *et al.* 2014) will have removed this potential human bias from results, and will therefore lead to a much more accurate indication of the balance of movements of birds to different locations. Such knowledge will assist in identifying the range of sites needed to maintain the varying abundance of the species and in ensuring that the most important breeding and feeding sites are not harmed by inappropriate or poorly managed activities.

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NOCTURNAL FORAGING BY GREY-TAILED TATTLERS *TRINGA BREVIPES*

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Many shorebird species are known to feed at low tide during the night. However, Grey-tailed Tattlers *Tringa brevipes* are described in several sources as diurnal foragers, and nocturnal foraging by them has never been documented. Recent studies of Grey-tailed Tattlers at Port Stephens in Australia and Hakata Bay in Japan have confirmed that this species regularly forages at night at low tide. Details are provided of nocturnal foraging observations including some previously unreported records by other observers. At night, foraging birds call more frequently than in the daytime. At Najima in Hakata Bay, Grey-tailed Tattlers utilised a different substrate when foraging at night.

INTRODUCTION

Most shorebird species feed at low tides regardless of whether it is day or night (Dann 1987, Finn 2007), and in some cases, nocturnal foraging plays an important role in maintaining the daily energy balance of migratory shorebirds (Lourenço *et al.* 2008, Santiago-Quesada *et al.* 2014). However, several sources state that the Grey-tailed Tattler *Tringa brevipes* is a diurnal bird which roosts at night (Higgins & Davies 1996, Department of the Environment 2015, ARKive 2015, BirdLife Australia 2015). The daytime foraging behaviour of Grey-tailed Tattlers is well documented (for example, Keast 1949, Andrew 1962, Domm & Recher 1973) but there appear to be no published reports about them foraging at night. Notably though, three species closely related to Grey-tailed Tattlers, Common Greenshank *T. nebularia*, Spotted Redshank *T. erythropus* and Common Redshank *T. totanus*, are known to feed at night (Thomas *et al.* 2006).

The uncertainty about whether or not Grey-tailed Tattlers forage at night may be due to the fact that they are a much under-studied species (Lappo *et al.* 2012). As part of a study of Grey-tailed Tattler behaviour (Wooding & Stuart 2013, Stuart & Wooding 2014) we decided to investigate their nocturnal habits. One of our aims was to find birds at night at low tide and establish what they were doing. If Grey-tailed Tattlers were confirmed to be solely diurnally foraging birds, our secondary aim was to determine if they would fly from feeding grounds to their normal high tide roost as dusk approached, or if they would roost elsewhere. Tattlers mainly pass through Japan and Taiwan when they migrate between Australia and their breeding grounds (Branson *et al.* 2010). Therefore, our study focussed on the behaviour of birds in Japan during the northward and southward migrations and in Australia during the austral summer.

METHODS

Nocturnal surveys were carried out at three locations around Hakata Bay on the outskirts of Fukuoka, Japan, and at two sites around Port Stephens in New South Wales, Australia. These locations were selected from a larger set of known Grey-tailed Tattlers feeding sites on the basis of their reliability in daytime of having Grey-tailed Tattlers feeding within 50-100 m of their high tide roost. At many other locations, birds foraging diurnally at low tide were observed to range over a much greater distance from their roost site and thus, locating them at night would be more problematic.

In Japan, the three Hakata Bay locations were Najima (33°38’52” N, 130°25’18” E), Kashi (33°39’36” N, 130°25’42” E) and on the Tatara River (33°37’45” N, 130°27’07” E). They all have artificial lighting of sufficient intensity to observe Grey-tailed Tattlers without using any additional light. The two Port Stephens locations were Salamander Bay (32°43’40” S, 152°05’24” E) and Lemon Tree Passage (32°43’53” S, 152°02’24” E). Both Port Stephens sites have only low levels of artificial lighting; observations from these sites were made at dawn or dusk, with inferred night-time behaviour. Grey-tailed Tattlers were observed from ~2 hours after high tide to ~2 hours before the next high tide, i.e. on both falling and rising tides.

Standard binoculars (not night-vision) and telescopes were used for the surveys. Some low quality digital images were collected in May 2015; they are available for viewing at http://www.thinkingaboutbirds.com/grey-tailed-tattlers.php. Attempts to use torches (white or red light) to locate and monitor Grey-tailed Tattlers at night were unproductive – the birds sometimes reacted strongly to such lighting, becoming agitated and flying away. In contrast, they seemed unaffected by camera flash lights.

RESULTS

On 17 May 2014 at Najima we were observing a flock of 12 Grey-tailed Tattlers foraging around the rocks at low tide in late afternoon. As dusk approached they continued to forage and made no attempt to go to a roost. The lighting was poor on this occasion and very soon birds could no longer be seen. However, we could hear dispersed birds calling from the mudflats for the following 30 minutes that we were present. We could not find any roosting birds either at their normal high

tide roost site or elsewhere – it seemed that all 12 birds had continued to forage.

In the following two weeks we made four visits to Najima at night, finding foraging Grey-tailed Tattlers on every occasion (Table 1). We also confirmed nocturnal foraging during the southward migration, with several tattlers observed foraging at night at Najima on 3 August 2014. In 2015 during the northward migration, we made further observations on foraging Grey-tailed Tattlers at Najima and also confirmed nocturnal foraging at two other locations in Hakata Bay.

At Salamander Bay and Lemon Tree Passage in Port Stephens, it was not possible to confirm that Grey-tailed Tattlers were foraging at night. The records from these sites (Table 1) are based on the following strong circumstantial evidence: Grey-tailed Tattlers could be heard calling on the mudflats in the dark; foraging shorebirds of about the correct size could be seen by using a red torch, but not positively identified; Grey-tailed Tattlers were able to be positively identified on the mudflats at dawn or dusk, when it was possible to see them in natural light and confirm the foraging behaviour.

Table 1. Instances of nocturnal foraging by Grey-tailed Tattlers.

Site	Date	Time of Observation
Najima	23 May 2014	1:00-2:00
	24 May 2014	23:00-24:00
	27 May 2014	1:00-1:45
	29 May 2014	0:20-1:30
	3 August 2014	22:00-22:40
	15 May 2015	23:00-23:30
	18 May 2015	0:10-1:50
	19 May 2015	1:10-2:15
	20 May 2015	3:00-4:25
Kashi	15 May 2015	23:40-23:55
Tatara River	18 May 2015	2:00-2:30
Salamander Bay	29 September 2014	17:00-18:35 (dusk at 17:55)
	24 October 2014	4:45-6:15 (dawn at 5:35)
Lemon Tree Passage	10 February 2015	5:35-6:35 (dawn at 6:25)
Penrhyn Estuary[1]	5 March 2013	20:00-22:00
Roebuck Bay[2]	1997-2003	Several instances noted

[1]P. Straw *pers. comm.* [2]D. Rogers *pers. comm.*

DISCUSSION

Frequency of Nocturnal Foraging

Although some sources describe the Grey-tailed Tattler as diurnal foragers, nocturnal foraging by them during migration seems unsurprising. Nocturnal foraging maximises the opportunity to replace post-migratory condition loss and increase the energy reserves needed to complete the migratory journey and breed successfully (Lourenço *et al.* 2008, Santiago-Quesada *et al.* 2014). However, several of the nocturnal records lie outside the migration period. It is generally considered that Grey-tailed Tattlers begin to depart Australia from mid-April, returning from late September onwards (Higgins & Davies 1996). Observations of nocturnal foraging in February-March lie well outside of the migration period, and at the time of our late October observation, birds had been back in Australia for several weeks. These observations suggest that nocturnal foraging by Grey-tailed Tattlers is by no means uncommon at any time. Given the relative ease by which we obtained records of foraging at night, it is unclear how the Grey-tailed Tattler ever came to be described as a diurnal bird. However, a shorebird's nocturnal foraging frequency is affected by the availability of diurnal prey (Dodd & Colwell 1996) and there may be periods when tattlers do not need to feed at night.

After some preliminary findings were presented at a conference (Stuart and Wooding 2014), additional instances of Grey-tailed Tattler nocturnal foraging were brought to our attention. Those instances involved birds foraging in the Penrhyn Estuary, Sydney Australia (33°57'43" S, 151°12'24") (P. Straw *pers. comm.*) and at Roebuck Bay (centred around 17°58' S, 122°18' E) near Broome Australia (D. Rogers *pers. comm.*). The details for those records are included in Table 1.

Behaviour during Nocturnal Foraging

By day, Grey-tailed Tattlers generally are silent when foraging, usually only calling as they take to wing when a disturbance occurs. However, when foraging at night, they call more frequently. There has been no obvious disturbance happening on most of the occasions when birds have been heard calling at night. Possibly their vocalisations at night enable them to maintain contact with other birds from the group. In contrast, Dunlins *Calidris alpina* have been found to call less frequently at night in order to avoid predation by owls (Mouritsen 1992).

At Najima, where most of the observations were made, a change in foraging behaviour occurred. By day, whenever intertidal areas had begun to become exposed, Grey-tailed Tattlers flew from their roost site to a small cove where they foraged along the shoreline seeking prey on the mudflat and in the shallow water alongside it. As the tide dropped further, many small rocks within the bay became exposed and the tattlers foraged in the crevices of them and amidst the seaweed and mud around their base. Birds were observed eating large numbers of small crabs. In contrast, at night as the water levels dropped they did not return to the cove but instead, flew to some rock platforms and foraged upon these. They were only rarely been observed to go near the edge of the rock platforms, and they spent most of their time walking slowly over the main body of the rock platform.

Grey-tailed Tattlers have never been observed to feed on the rock platforms at Najima in the daytime. Their change in behaviour for nocturnal foraging may relate to prey availability. We noticed that the crabs which they mainly take in the daytime from mudflats seemed not to be active in the cove at night.

Foraging Grey-tailed Tattlers at Roebuck Bay had no difference in pace length by day and night (D. Rogers *pers. comm.*), suggesting that their hunting style does

not change substantially at night. That fits with our observations at Najima, where the birds appeared to walk purposefully and watchfully at night, much like in the daytime, although albeit hunting on a different substrate.

CONCLUSION

Studies of Grey-tailed Tattlers at Port Stephens in Australia and Hakata Bay in Japan have confirmed that they forage at night at low tide. This is a previously unreported behaviour by Grey-tailed Tattlers. Nocturnal foraging occurs regularly during the migration period and birds also have been shown to feed at night during the austral summer. At night, foraging birds call more frequently than in the daytime. At Najima in Japan, Grey-tailed Tattlers utilised a different substrate when foraging at night.

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FIRST RECORD OF GREY-TAILED TATTLER *TRINGA (HETEROSCELUS) BREVIPES* IN MAINLAND SUMATRA, INDONESIA

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The Grey-tailed Tattler was first recorded in Sumatra during 1999–2000 when a single bird was observed on two occasions on Siberut Island, West Sumatra (Grantham & Kemp 2000, Kemp 2000). There have been no further records of the species until recently, with a record from Belitung Island of East Sumatra on 21 February 2014 (Iqbal *et al.* 2014). All previous records of Grey-tailed Tattler from the Sumatran region were from offshore islands (Grantham & Kemp 2000, Kemp 2000, Iqbal *et al.* 2014); to date there have been none for the Sumatra mainland.

On 9 October 2014, RR observed one Grey-tailed Tattler on a mud-sandy beach at Jenggalu river (3°50'16.23"S, 102°17'35.20"E). Jenggalu River is part of Pantai Panjang beach which is administratively in Gading Cempaka, Bengkulu city, Bengkulu province (Figure 1). The bird was identified as a Grey-tailed Tattler by plain grey upperparts, a light grey wash on the upper breast, the white supercilium, a rather stout straight bill and shortish yellow legs (Figure 2). These characters fit well with the non-breeding description of Grey-tailed Tattler in various field guides (Hayman *et al.* 1986, MacKinnon *et al.* 1993, Sonobe & Usui 1993, Gills & Wiersma 1996, Chandler 2009, Robson 2011). This brings the total number of records of Grey-tailed Tattler on mainland Sumatra to two, this one from Pantai Panjang beach (Bengkulu Province) and the other from the same location on 6 November 2014. In view of the numbers of Grey-tailed Tattlers that use the East Asian-Australasian Flyway, it is really quite strange that the species should be so scarce on Sumatra. However, it is generally uncommon between Japan and Australia, which suggests that most birds undertake nonstop flights across this region, although some stop in the Philippines (Bamford *et al.* 2008). Similarly, Higgins and Davies (1996) point out that the species is a rare passage migrant in much of south-east Asia during southward migration. During northward migration, the species is a common in northern Australia and it has been estimated that some birds are capable of flying nonstop from north-west Australia to the Philippines or southern China (Bamford *et al.* 2008).

Figure 1. Map of Sumatra showing the location where Grey-tailed Tattler observed in Bengkulu during the study (black square). Previous (offshore) records are indicated with a black triangle and black circle.

Figure 2. Grey-tailed Tattler on 9 October 2014 at Pantai Panjang beach, Bengkulu (©Riki Rahmansyah).

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RED-NECKED PHALAROPE *PHALAROPUS LOBATUS* IN WEST PAPUAN WATERS, INDONESIA

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Red-necked Phalarope *Phalaropus lobatus* is an uncommon to common migrant in many parts of Indonesia, where it is recorded as not uncommon to the waters of Greater Sundas (MacKinnon & Phillipps 1993) and common in the Wallacean region (Sulawesi, Lesser Sundas and Moluccas) (Coates & Bishop 2000). In Papua, the bird is a regular visitor, but found only in localised areas (Bishop 2006). Pratt & Beehler (2015) reported the bird as common to abundant on seas of New Guinea, but rarely found on freshwater, with some birds on passage over land to and from Australian waters. A record of 4,500 birds from Lake Dakatua (West New Britain), Papua New Guinea on 1 October 1979 suggests this as an internationally important area for the species (Bishop 2006, Bamford *et al.* 2008). The species is also recorded from the south coast off Round Hill, Central Province of Papua New Guinea, with a count of approximately 50 birds (Bishop 2006). In contrast, in the western part of the Papua Island (Indonesian region), Bishop (2006) only recorded the species from a few locations, i.e. Kurik, near Merauke and two highland locations (up to 4,000 m) at Jaya Wijaya (Cartenz) Mountains. However, Coates (1985) provided records that covered extensive areas in the west, south-west and north of Papua: from Waipeu and Misool Island; Aru islands, off the coast of Irian Jaya (between Sorong and Pulau Adi); and off the north coast from the Vogelkop and Geelvink Bay east to Karkar Island. The only recent records of the species along the western part of Papua are based on trip reports to Raja

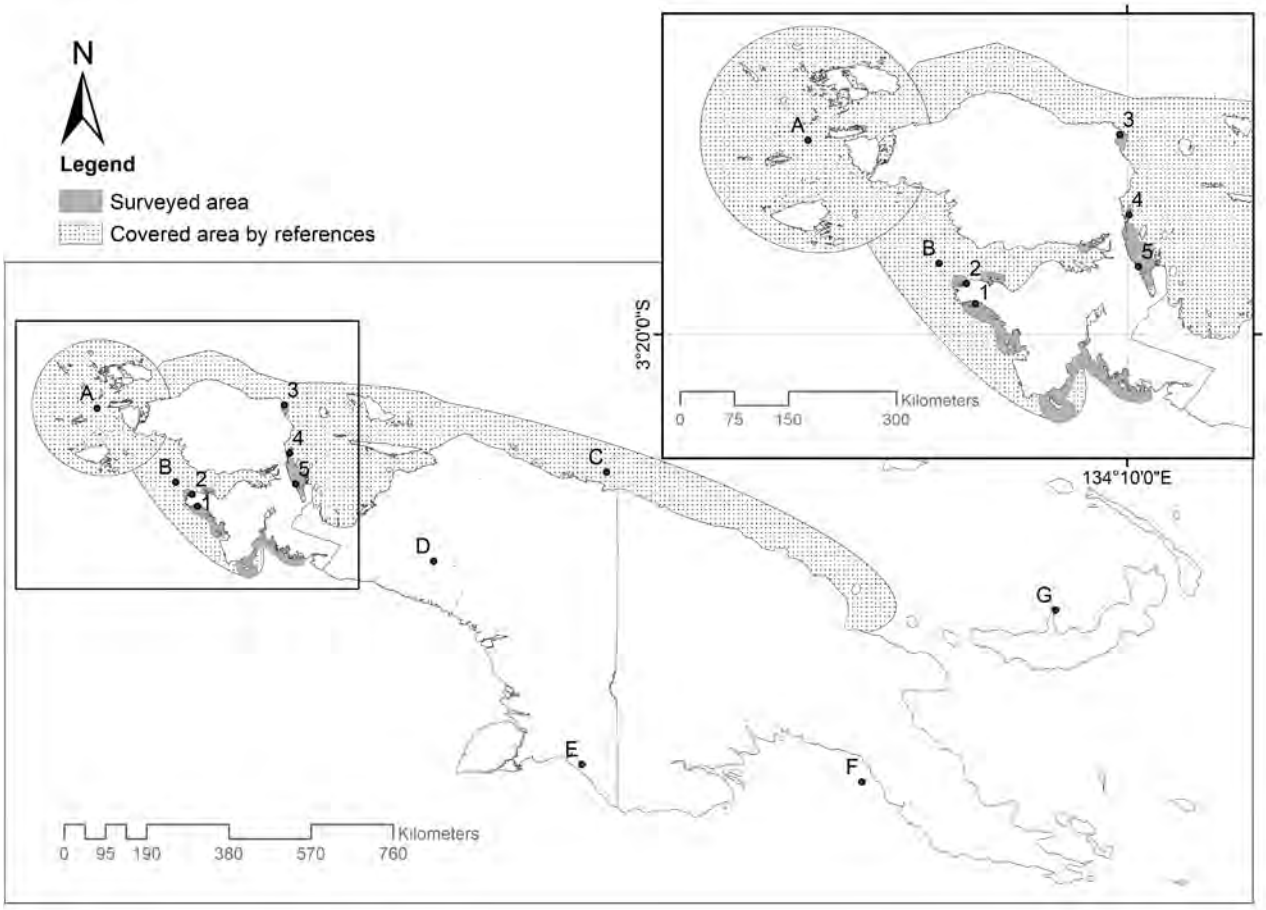

Figure 1. Maps of Papua Island with records of the Red-necked Phalarope *Phalaropus lobatus*. Previously published records as follows: (A) Raja Ampat area: Waipeu and Misool Island (Coates 1985); between Batanta Island and Salawati Island (Mitzen 2012); between Sorong and Waigeo Island (Dreyer 2012); (B) South-west area: from Sorong to Pulau Adi (Coates 1985); (C) north to east Papua: from the Vogelkop and Geelvink Bay east to Karkar Island (Coates 1985); (D) Jaya Wijaya (Cartenz) Mountains (Bishop 2006); (E) rice fields at Kurik, near Merauke (Bishop 2006); (F) south coast off Round Hill (Bishop 2006); (G) Lake Dakatua (Bishop 2006). Records during this survey (grey area) as follows: (1) waters between Panjang Island and Fakfak capital city; (2) Patipi Bay; (3) Doreri Bay; (4) around Rumberpon Island; (5) around Sombokoro Island.

Ampat Islands where some small groups were observed between Batanta Island and Salawati Island on 9-10 October 2012 (Mitzen 2012), and another 47 birds were recorded between Sorong and Waigeo Island on 24 October 2012 (Dreyer 2012).

During 26 February to 10 March 2014, I visited the small islands in the waters of five districts in West Papua: Kaimana; Fakfak; Manokwari; Teluk Bintuni; and Teluk Wondama (Figure 1). Over this period, a total of 46 birds were observed in three districts: Fakfak, Manokwari and Teluk Wondama (Table 1).

The first two sightings were made in the waters of Fakfak District on 2 March. Fifteen birds were foraging on the waters between Panjang Island and Fakfak capital city. The birds foraging in one spot appeared to be taking small fishes that had risen up to the water surface (Figure 2). While foraging, the birds seemed to be unaware of my presence, and allowed me to approach very closely. On 4 March, two birds were foraging in Patipi Bay on the north side of the district (Figure 3).

The next encounters occurred in the eastern part of West Papuan waters. On 5 March, I observed three birds swimming in Doreri Bay close to the Manokwari's harbour. On 8 March, I observed eight birds near Sombokoro Island in Teluk Wondama District, and on 9 March, I encountered another 18 birds around Rumberpon Island. There is a possibility these birds may have been double-counted later in the area of Teluk Cendrawasih National Park. However, with the large areas of open water available in the park, small flocks might spread following the presence of the food resource and therefore, it is equally as likely they are all different birds.

These records fill a knowledge gap about the bird's distribution during its migration through West Papuan waters. It is interesting that there are very few similar published accounts available from the area demonstrating the species' preference for pelagic waters. During a seabird survey along Indonesian waters in July to August 1984, Cadée (1985) found birds in the Bay of Ambon, but did not record any along the south-west Papuan waters. An intensive survey along the Bintuni Bay, where most of the area is covered by mangroves, failed to record the species (Erftemeijer *et al.* 1991). The lack of records from these areas may be due to the difficulties in accessing the area. Raja Ampat appears to be an exception because of its popularity for bird watchers. There is potential for the species to occur in the vast open waters of other parts of the West Papuan waters, such as south Kaimana, South Sorong and Sorong district, and also north of Manokwari.

The 46 birds recorded during the survey represent only a small number of the total population that have been recorded in Papua. However, this provides information on the species occurrence during its northern migration and indicates the reliability of the food resources in the area. Records of up to 26 birds along the waters of Teluk Cendrawasih National Park reflecting a healthy condition of the park's waters, where about 200 species of coral reefs and 355 fish recorded (Anonymous 2005). Overall, with the fact that the species' has no conservation status nor any national protection, and given its strong preference for pelagic waters, the conservation of the species in Indonesia may be challenging.

Table 1. Records of Red-necked Phalarope during 26 February to 10 March 2014 in West Papuan waters.

Date	Location	District	No. of birds
2 March	Waters between Panjang Island and Fakfak capital city	Fakfak	15
4 March	Patipi Bay	Fakfak	2
5 March	Doreri Bay	Manokwari	3
8 March	Around Sombokoro Island, Teluk Cendrawasih National Park	Teluk Wondama	8
9 March	Around Rumberpon Island, Teluk Cendrawasih National Park	Teluk Wondama	18

Figure 2. A flock of Red-necked Phalarope *Phalaropus lobatus* foraging on the waters between Panjang Island and Fakfak city on 2 March 2014. Photographed by Imam Taufiqurrahman.

Figure 3. One of three Red-necked Phalarope *Phalaropus lobatus* observed on Patipi Bay, Fakfak, on 4 March 2014. Photographed by Imam Taufiqurrahman.

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NORTH-WEST AUSTRALIA WADER & TERN EXPEDITION 2015 REPORT

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INTRODUCTION

The 2015 North-west Australia Wader and Tern Expedition was conducted between February 6 and 28. It had similar objectives to previous annual expeditions and followed the now well-established fieldwork practices (eg. pre-erection of keeping cages and shadecloth before every beach catch). The only additional aim was a requirement to deploy five further satellite transmitters on Little Curlew and a hundred geolocators on Red Knot. The fieldwork schedule was also similar to 2014, with the first half of the period being spent at Roebuck Bay, Broome (based at Broome Bird Observatory), and the second half at 80 Mile Beach (based at Anna Plains Station).

Most of the main objectives were satisfactorily achieved, except that a total of only 21 geolocators could be deployed on Red Knot. Satisfactory catch samples were obtained of all nine species, which are monitored annually for breeding success via the percentage of juveniles in catches. In the "special" species category, the main achievement was a total of 104 Oriental Plovers – our best-ever yearly total for this species. The five satellite transmitters were successfully deployed on Little Curlew, with two birds being caught close to water bores on Anna Plains Station and the other three on 80 Mile Beach.

We were again extremely lucky, for the second consecutive year, in having no rain interfere with our catching programme. This is in spite of February being in the middle of the "wet season" in North-west Australia. The rain which instead fell extensively further east, right across the Northern Territory and Northern Queensland, may well have contributed to the huge numbers of Oriental Pratincoles which were present this year in NWA. An estimated 30,000-50,000 were seen on several occasions on Roebuck Plains behind the bird observatory, and this is probably a record total for this location. A survey of 20 km of 80 Mile Beach in the hottest part of the day on 19th February produced an amazing total of around 500,000 Oriental Pratincoles resting on the beaches. By the next day most of these had gone, presumably moving further west in search of food as Anna Plains this year did not have any significant numbers of locusts or grasshoppers for them to feast on.

More detail is given below of the most important results of the Expedition.

MAIN ACHIEVEMENTS

Catching

Six cannon-net catches were made in seven catching attempts at Roebuck Bay, Broome, with a total of 901 waders and 10 terns being caught (Table 1). Ten cannon-net catches were made on 80 Mile Beach and a further two on Anna Plains Station. Mist-netting was also carried out on one evening on Anna Plains Station. A total of 1,180 waders and 18 terns was caught there (Tables 1 and 2).

The overall catch for the expedition of 2081 waders (and 28 terns) was the smallest for several years (around 3000 is the usual total; Table 2). This was partly because on two occasions one of the cannons failed to fire, resulting in a couple of hundred birds being missed on each. Additionally, a combination of a fresh onshore wind and sub-optimal powder charges also caused significantly reduced catches on two occasions. These experiences (plus numerous pictures of nets firing) have provoked us into considering whether there would be advantages in increasing the powder charges in the central cannons. On another occasion extremely hot weather caused us to deliberately control the catch size to less than 100 birds. The result of all this was that the very first catch (274 birds on the 7 February at Nick's Beach at Broome) turned out to be the largest catch for the Expedition, when we normally try and commence an Expedition with a relatively smaller catch, in order for new members of the team to gain experience. The average shore cannon-net catch of waders was 129.

Species mix in catches was similar to other recent years with 9-11 species occurring in most catches. On 17 February we had the amazing variety of 19 species – 15 species of waders and 4 species of terns in a catch of 145 birds.

Great Knot (629) and Greater Sand Plover (381) dominated the totals, in spite of attempts to reduce the proportion of these in our catches (Table 3). Next was Red-necked Stint with 203 birds. We had to work hard for our 199 Bar-tailed Godwits, and in the end most of these were caught in the later catches at 80 Mile Beach.

Terek Sandpipers were again scarce in Roebuck Bay, and this deficit was not easily made up at 80 Mile Beach. We finished with a total of 81 Terek Sandpipers but did rather better with Grey-tailed Tattlers (153). Curlew Sandpipers were also less numerous (92 caught) after the huge bonanza the previous year following the extraordinarily good breeding success of this species in the Arctic summer of 2013.

Red Knot again proved difficult with only small numbers scattered throughout the flocks at most locations. We were hoping to rectify this on our last catch at 80 Mile Beach where there was a fairly concentrated flock of 1,000-2,000 three kilometres north of the Anna Plains entrance. We fired on 120 Red Knot, all within range of the net, but unfortunately it was one of the occasions when we had a misfire with one of the

Table 1. NWA 2015 Expedition catch totals.

Catches	Location	Sub-site	New	Retrap	Total	Comments
07/02/2015	Broome	Nicks Beach	190	84	274	1 Great Knot from China, 1 Greater Sand Plover from Hong Kong, 1 geolocator retrieved from Red Knot, 9 geolocators deployed on Red Knot
08/02/2015	Broome	Two Dog Hermit Beach	136	84	220	3 geolocators deployed on Red Knot, plus 1 Little Tern
09/02/2015	Broome	Minton Straight				[No catch]
10/02/2015	Broome	Minton Straight	7	1	8	
11/02/2015	Broome	Eagles Roost	169	89	258	1 Great Knot from China, plus 9 Little Tern
12/02/2015	Broome	Sandy Blowout	17	4	21	2 geolocators deployed on Red Knot
13/02/2015	Broome	Sandy Blowout	95	25	120	7 geolocators deployed on Red Knot
Sub-total			***614***	***287***	***901***	
Terns			***9***	***1***	***10***	
Total Broome			***623***	***288***	***911***	
16/02/2015	Anna Plains	Third Turkey Bore	10	0	10	1 satellite transmitter deployed on Little Curlew
17/02/2015	80 Mile Beach	7km south of AP	134	1	135	Curlew Sandpiper from Victoria, plus 10 terns of 4 species
18/02/2015	80 Mile Beach	20km south of AP	32	6	38	
18/02/2015	Anna Plains	Second Turkey Bore	3	0	3	1 satellite transmitter deployed on Little Curlew
19/02/2015	80 Mile Beach	23km south of AP	18	0	18	3 satellite transmitter deployed on Little Curlew
20/02/2015	80 Mile Beach	27km south of AP	50	1	51	
20/02/2015	Anna Plains †	Third Turkey Bore	8	0	8	
21/02/2015	80 Mile Beach	41km south of AP	83	0	83	plus 8 White-winged Black Tern
22/02/2015	80 Mile Beach	41km south of AP	211	9	220	1 Great Knot from China
23/02/2015	80 Mile Beach	41km south of AP	238	11	249	1 Great Knot from China, 1 Greater Sand Plover from south China
24/02/2015	80 Mile Beach	41km south of AP	153	9	162	
24/02/2015	80 Mile Beach	11km south of AP	156	7	163	2 Great Knot from China
25/02/2015	80 Mile Beach	3km north of AP	38	2	40	
Sub-total			***1134***	***46***	***1180***	
Terns			***18***	***0***	***18***	
Total Anna Plains			***1152***	***46***	***1198***	
Total waders			**1748**	**353**	**2081**	
Total terns			**27**	**1**	**28**	
Total waders and terns			**1775**	**334**	**2109**	

† All captures were made cannon nets except this one, which was made with mist nets.

cannons, and only 38 were caught. We finished up therefore with only 75 Red Knot in total, and with only enough at Broome to deploy 19 geolocators on adult birds there.

As usual, although there were many thousands of Oriental Pratincoles on the parts of 80 Mile Beach where we tried to catch in our first few days there, these dissipated as twinkling occurred. In the end our catch total was only 17, and half of these were caught around the Turkey Bores on Anna Plains Station during the course of catching Little Curlew. However we were much more fortunate with the Oriental Plovers which this year accumulated on the beach in larger numbers than usual, probably because the shorter vegetation on Anna Plains (due to the relatively low rainfall in the first half of the wet season) provided more feeding areas than usual for them. A bonus was that most of the Oriental Plover had already assumed a considerable amount of their extremely beautiful breeding plumage. A total of 104 was caught, without the species being particularly targeted, with 60 in one catch – the third highest catch total for this species. Finally, six Asian Dowitchers caught at Roebuck Bay was a greater total than usual for this species.

A single cannon-net was set on two occasions in the late afternoon by one of the Turkey Bores about 30 km south of Anna Plains Station. The objective was to try and catch Little Curlew that were collecting in the late afternoon (prior to overnight roosting) around these bores, together with Oriental Plovers and Oriental Pratincoles. On both occasions we were able to get a Little Curlew into the catching area quite quickly and make a small catch (to enable us to put on the first two satellite transmitters). On the first occasion banding and processing was temporarily disrupted when a brown snake decided to investigate. Eight mist-nets were also erected just before dusk by one of these bores on another occasion and this again produced a small and varied catch, including another Little Curlew and Pacific Golden Plover.

Table 2. Comparison of Catches during the 2006-2015 Expeditions (including terns).

Catches	Year	New	Retrap	Total
BROOME	2006	857	174	1031
(1st period)	2007	985	223	1208
	2008	807	184	991
	2009	1374	208	1582
	2011	6	3	9
	2012	48	27	75
	2013	168	80	248
	2014	1229	565	1794
	2015	***623***	***288***	***911***
80 MILE	2006	1619	55	1674
BEACH	2007	1690	95	1785
	2008	1215	62	1277
	2009	604	28	632
	2011	1878	47	1925
	2012	1749	84	1833
	2013	1701	72	1773
	2014	1928	108	2036
	2015	***1152***	***46***	***1198***
BROOME	2006	1120	176	1296
(2nd period)	2007	861	192	1053
	2008	567	88	655
	2009	1172	296	2068
	2011	1072	484	1556
	2012	1093	383	1476
	2013	741	398	1139
	2014	No 2nd period		
	2015	No 2nd period		
TOTAL	2006	3596	405	4001
	2007	3536	510	4046
	2008	2589	334	2923
	2009	3150	532	4282
	2011	2956	534	3490
	2012	2890	494	3384
	2013	2610	550	3160
	2014	3157	675	3830
	2015	**1775**	**334**	**2109**

Table 3. NWA 2015 Expedition - Wader and Tern Catch Details.

Species	New	Retrap	Total
Asian Dowitcher	6	0	6
Bar-tailed Godwit	179	20	199
Black-tailed Godwit	4	0	4
Black-wing Stilt	21	4	25
Broad-billed Sandpiper	1	0	1
Common Greenshank	7	0	7
Curlew Sandpiper	83	9	92
Eastern Curlew	7	1	8
Great Knot	514	115	629
Greater Sand Plover	302	79	381
Grey Plover	5	0	5
Grey-tailed Tattler	144	9	153
Lesser Sand Plover	4	0	4
Little Curlew	6	0	6
Oriental Plover	104	0	104
Oriental Pratincole	17	0	17
Pacific Golden Plover	3	0	3
Pied Oystercatcher	3	0	3
Red Knot	65	10	75
Red-capped Plover	13	0	13
Red-necked stint	129	74	203
Ruddy Turnstone	31	9	40
Sanderling	16	0	16
Terek Sandpiper	79	2	81
Whimbrel	5	1	6
Sub-total	**1748**	**333**	**2081**
Gull-billed Tern	4	0	4
Little Tern	11	1	12
Whiskered Tern	3	0	3
White-winged Black Tern	9	0	9
Sub-total	**27**	**1**	**28**
TOTAL	**1775**	**334**	**2109**

Recaptures and controls

As usual, there was a good percentage of previously banded birds in the waders caught at Roebuck Bay, Broome, with 288 (32 %) of the 911 birds caught there being re-captures. The majority had been banded in Roebuck Bay but there were also six Great Knot originally banded in China, two Greater Sand Plovers (one from Hong Kong and one from Southern China) and a Curlew Sandpiper previously banded in Victoria. Some of these were caught at 80 Mile Beach (Table 4).

At 80 Mile Beach the retrap rate was lower, with only 46 (4%) of the waders having been previously banded. This lower retrap rate is because of the much greater wader populations at 80 Mile Beach, the much greater overall area of roosting beaches, and the lower level of banding activity (only one period each year).

Old birds

It was particularly pleasing that one of the Little Terns captured at Roebuck Bay carried a band put on at Bush Point on the NWA Wader and Tern Expedition 17 years ago (Table 5). Its plumage / moult indicated that it was a visitor from the Northern Hemisphere, probably breeding in Japan, China, or Taiwan.

There were eight other birds re-captured during the Expedition, which had achieved notable minimum ages. The oldest of these was a 24 year old Bar-tailed Godwit. The oldest Great Knot was 22 years old. Unusually one of the very old Godwits (21 years) was retrapped at 80 Mile Beach. Recapture rates are much lower there than at Broome and therefore re-catching a very old bird occurs quite rarely.

Clare Morton has been handling the NWA Banding and Flag Resighting Database for many years now. Just before she withdrew from this role in December 2014 she prepared the attached list (Table 6) of old birds, which she had 'processed' in the last couple of years. It contains four Bar-tailed Godwit, three Great Knot and a Red Knot, which had all survived to a minimum age of 21. Two Bar-tailed Godwits in their 26th year (minimum) are the oldest birds in the list. The oldest Great Knot was just short of a minimum of 24 years old when it was last sighted. This bird has been seen 58 different times in the Broome area!

Table 4. NWA 2015 Controls (recaptures of birds banded elsewhere).

Species	Country of origin	Band number	Condition of band	Age at Capture	Recapture Date	Recapture location	Flags	Australian Band
Greater Sand Plover	Hong Kong	NW26021	good	2+	7/02/15	Broome (Nicks Beach)	WY both engraved K6	
Greater Sand Plover	China	E142868	good	1	23/02/15	80 Mile Beach (41km S of Anna Plains entrance)	WY yellow engraved 82	
Great Knot	China	F127041	good	2+	7/02/15	Broome (Nicks Beach)	BkW	
Great Knot	China	F047458	worn and corroded	2+	11/02/15	Broome (Eagles Roost)	BkW	063-23164 replacement
Great Knot	China	F127111	good	2+	22/02/15	80 Mile Beach (41km S of Anna Plains entrance)	BkW	
Great Knot	China	F126104	good	2+	23/02/15	80 Mile Beach (41km S of Anna Plains entrance)	BkW	
Great Knot	China	F126199	good	2+	25/02/15	80 Mile Beach (11km S of Anna Plains entrance)	BkW	
Great Knot	China	F066766	worn and corroded	2+	25/02/15	80 Mile Beach (11km S of Anna Plains entrance)	BkW	063-23832 replacement
Curlew Sandpiper †	Victoria, Australia	042-57131	good	2+	17/02/15	80 Mile Beach (7km S of Anna Plains entrance)	O (orange)	

† Banding details: 3+ 22/08/2009 Stockyard Point, Western Port, Victoria

Table 5. Oldest Recaptures during NWA 2015.

Species	Band	Date banded	Banding location	Age at banding	Retrap date	Retrap location	Minimum age at retrap
Bar-tailed Godwit	072-09384	12/10/1992	Broome	2	11/02/2015	Broome (Eagle's Roost)	24
Bar-tailed Godwit	072-55721	4/03/1996	Broome	1	13/02/2015	Broome (Sandy Blowout)	20
Bar-tailed Godwit	072-56810	4/04/1996	80 Mile Beach	2	24/02/2015	80 Mile Beach	21
Great Knot	062-57441	16/05/2000	Broome	1	7/02/2015	Broome (Nick's Beach)	15
Great Knot	062-57375	4/03/2000	Broome	1	11/02/2015	Broome (Eagle's Roost)	15
Great Knot	062-15441	25/04/1996	Broome	1+	11/02/2015	Broome (Eagle's Roost)	20+
Great Knot	062-13736	4/03/1996	Broome	1	11/02/2015	Broome (Eagle's Roost)	20
Great Knot	062-09221	16/04/1994	Broome	1	22/02/2015	80 Mile Beach	22
Little Tern	042-12498	8/10/1998	Bush Point	3+	11/02/2015	Broome (Eagle's Roost)	19+

Proportion of juveniles

The 2014 wader breeding season in Siberia appears to have been rather poor with only one species (Ruddy Turnstone) having a percentage of juvenile birds in our catch samples above the long-term average (Table 7). It is interesting that the high proportion (27.5%) of juvenile Ruddy Turnstone this year followed the exceptional breeding performance of this species, which occurred the previous year (32.7%). Bar-tailed Godwit (5.5% juveniles), Great Knot (6.5%), and Red-necked Stint (10.3%) were the worst performing breeding species in 2014. The Great Knot is of particular concern as the percentage of juveniles in the 2013 / 2014 non-breeding season was also low (5.0%). This is a species heavily dependent on the mudflats of the Yellow Sea for its main refuelling during both northward and southward migration to the breeding grounds in Northern Siberia. It is these mudflats that have been disappearing so rapidly in recent years due to reclamation.

Geolocators and satellite transmitters

It had been intended to deploy 100 geolocators on Red Knot – all at Roebuck Bay, where the chances of recapturing birds to retrieve the geolocators and download the stored information is greatest. Previous attempts to obtain much needed information on the migration of Red Knot, particularly between North-west Australia and China, by the use of satellite transmitters had failed because of the difficulties of attaching these transmitters to a bird that changes shape so much during fattening for migration, making the standard harness attachment unsuitable. It is possible that a further attempt to deploy the remaining 79 geolocators on Red Knot in Broome will be made in April, where, fortunately, this is one of the last species to depart on northward migration. Red Knot will be in more concentrated roosting flocks on the beaches in the second half of April when many other species have departed.

Table 6. Other old waders re-sighted in NW Australia in the last three years. Information extracted from NWA Flag Sightings Database by Clare Morton.

Species	Band	Date banded	Banding location	Age at banding	Most recent sighting	Location	Minimum age	Comments
Red Knot	051-56125	12/10/1992	Broome	3+	15/01/2012	Broome	21 ½	ELF IM Seen 6 other times at Broome
Bar-tailed Godwit	072-09313	01/10/1992	Broome	3+	12/02/2014	Broome	23 ½	ELF ERK Seen10 other times at Broome and once in Korea (08/08/2013)
Great Knot	061-90330	13/10/1992	Broome	2	17/12/13	Broome	22 ½	ELF XXL Seen 5 other times at Broome
Bar-tailed Godwit	071-86463	02/04/1990	80 Mile Beach	1	16/10/13	Broome	24 ¼	ELF BB Seen 12 other times at Broome
Bar-tailed Godwit	071-85969	23/03/1990	Broome	2+	11/03/14	Broome	25 ¾	ELF HW Seen 30 other times at Broome
Great Knot	061-90557	12/10/1992	Broome	2	24/02/14	Broome	22 ¾	ELF ZXP Seen 1 other time at Broome
Bar-tailed Godwit	071-86928	09/04/1990	Broome	2+	27/09/13	Broome	25 ¼	ELF EAY Seen 17 other times at Broome
Great Knot	061-72422	02/09/1992	Broome	3+	21/04/2014	Broome	23 ¾	ELF AHA Seen 58 other times at Broome

Table 7. Percentage juveniles in cannon net catches during NWA 2015 Expedition. Mean % Juv = mean percentage juveniles 1998/99 to 2013/14.

Species	Total catch	No. Juveniles	% Juveniles	Mean % Juveniles	2014 breeding success
Monitored each year					
Great Knot	629	41	6.5%	11.9%	poor
Greater Sand Plover	381	76	19.9%	23.4%	average
Red-necked stint	203	21	10.3%	20.6%	poor
Bar-tailed Godwit	199	11	5.5%	10.9%	poor
Grey-tailed Tattler	153	29	19.0%	20.6%	average
Curlew Sandpiper	92	17	18.5%	17.5%	average
Terek Sandpiper	81	10	12.3%	13.7%	below average
Red Knot	75	10	13.3%	17.2%	below average
Ruddy Turnstone	40	11	27.5%	N/A	good
"Specials"					
Oriental Plover	104	15	14.4%	N/A	average?
Oriental Pratincole	17	?0	?	?	?

A geolocator put on a Great Knot two years ago was retrieved. As the battery had ceased to record new data, it was necessary to send the unit back to the UK for downloading. We now have the downloaded information. On the northward track the main stopovers were in the Phillipines and the northern Yellow Sea. It was returning by a similar route when the geolocator failed over Indonesia in mid-September. Its breeding in 2014 appears to have been unsuccessful in spite of two breeding attempts. We're hoping it contains one (or more) round-trip migrations.

The five satellite transmitters (5 g) were deployed on Little Curlew between 16 and 19 February. All birds flew off strongly with their attachment. Satellite downloads over subsequent days showed that each was moving around quite widely over Anna Plains Station. Most birds shifted a little southwards, with one reaching the border of Mandora and Anna Plains Station, about 100 km south, opposite Sandfire roadhouse. We now have a month of data on each bird. There has been a gradual return northwards recently, still within the confines of Anna Plains, with one bird now being situated close to the station and another on the plains just to the north, where we successfully mist-netted Little Curlew in 2014. It will be interesting to see if these birds move up to Roebuck Plains before leaving Australia on northward migration some time in April / early May.

One of the five Little Curlew originally fitted with satellite transmitters on Roebuck Plains in early November 2013 is still working. This bird visited Anna Plains in early February after spending nearly three months near Kununurra. However, by the time we arrived at Anna Plains it had already moved back to Roebuck Plains. More recently it has again moved down to Anna Plains – perhaps an indication that the feeding

for Little Curlew there is better at the present time. We are hoping its solar-powered battery continues to operate long enough to give us at least another set of northward migration tracks this year.

Flag sightings

Some scanning was carried out, mainly at 80 Mile Beach, looking for colour bands and engraved flags on feeding and roosting waders, especially Red Knot. A number of Chinese-flagged birds were seen as well as locally marked birds. One Great Knot carrying a recently deployed satellite transmitter, put on at Roebuck Bay, was seen down on 80 Mile Beach, nicely confirming the information being relayed back by the Argos satellite tracking system.

Passerine banding

This was disappointing this year. There was no opportunity to deploy mist-nets at Broome Bird Observatory. The only attempt at Anna Plains produced just two Singing Honeyeaters and a Bar-shouldered Dove. The area around the Bore was drier than usual, and with the lack of recent rain there was little insect life or tree flowering taking place in the bush vegetation.

Other birds

A probable Yellow Bittern was flushed from the old coast road at Anna Plains one morning – after there had been an overnight thunderstorm. There have only been a handful of previous records of this species in Australia.

OTHER MATTERS

Participants

For most of the Expedition, the team this year was only 20 people (22 individuals) – about 5-8 fewer than on most recent Expeditions. Participants again came from a range of different locations with the usual 50 % being from outside Australia. Their origins are given below.

11 Australia (4 Vic, 4 WA, 4 Qld, 1 NT, 1 NSW)
4 UK
2 China (mainland)
2 Taiwan
1 China (Hong Kong)
1 USA
1 Canada

In addition, the Wardens and Assistant Wardens at Broome Bird Observatory took part in most of the catches at Broome, and the Wardens also joined us for a couple of days at 80 Mile Beach.

Itinerary

Seven catching days were spent at Broome, and ten at 80 Mile Beach. The arrangement whereby a day off was spent at Broome, and another at 80 Mile Beach, with a travel day between the two, seemed to work satisfactorily. However, part of the team did spend the afternoon of the "day off" at 80 Mile Beach cannon-netting a small sample of waders (including a Little Curlew) on Anna Plains Station!

Talks

A total of 12 talks was given by members of the Expedition during the three week period we were together. There was again a wide range of topics ranging from Yellow Chat studies in Kakadu, through Wildlife on Skomer Island (West Wales), to birds in the remaining parts of the British Empire (19 British Overseas Territories), and a couple of superb videos of the Mai Po Marshes WWF Reserve in Hong Kong.

Finances

The total contribution by participants to the cost of the Expedition was $35,116. Quite a number of items of expenditure are still to be finalised (replacement black powder, electric fuses, engraved leg flags, a present for the BBO, contribution to satellite transmitter costs, etc.), but it looks as if there will be, as usual, a small surplus. The average cost of food worked out, as expected, at close to $20 per person per day. The final accounts for NWA 2014 and other activities in North-west Australia over the past year was a surplus of $2,616. This will be used for future Expeditions and related costs in NWA.

NEXT EXPEDITION

The Expedition leaders have considered the optimum dates for the **NWA 2016** Expedition. It seems that **Saturday 6 February to Sunday 28 February** are the best. A slightly later date is not possible because there are too many days with unsuitable tide heights in early March. The same type of schedule will be maintained, but in 2016 we will visit Anna Plains / 80 Mile Beach for the first half of the Expedition, and then have the second half at Broome Bird Observatory / Roebuck Bay. This is because during the two spring tide series during the Expedition, the highest tides occur in the first half. The highest tides can still be utilised at 80 Mile Beach, whereas at Broome many of the waders become unavailable for catching during these periods because they prefer to roost in the lagoons on Roebuck Plains behind the mangroves rather than on the narrow beaches close to the cliffs on Roebuck Bay.

We want to start recruiting the team for NWA 2016 as soon as possible to maximise the chances of being able to reach the target of 25 people taking part throughout the Expedition. So would NWA 2015 participants please put their hand up as soon as possible for 2016? If this is not possible could you please try and encourage other suitable people whom you know to come instead?

ACKNOWLEDGEMENTS

Everyone who took part at any time in NWA 2015 Expedition activities is greatly thanked for their huge input. It was a really happy team who worked extremely hard and really enjoyed their deserved achievements and success.

The Western Australia Department of Parks and Wildlife again most generously supported the participation of two people from China – Feng Xuesong,

from the Education Department of the Wader Study Station at Chong Ming Dao, near Shanghai, and Xin Jin, one of Professor Zhijun Ma's students from Fudan University. Parks and Wildlife were also extremely kind in loaning two 4WD vehicles and two excellent trailers. They also kindly provided some financial support for other logistics.

Anna Plains Station (John, David, and Helen Stoate) were, as usual, extremely generous in allowing us to base ourselves around their homestead for 12 days. We thank them enormously for providing accommodation, access to their cool room, swimming facilities, and for giving us permission to roam at will looking at and catching birds around their million acre cattle station.

Graeme MacArthur is greatly thanked for providing his plane and piloting skills for a two hour aerial survey of Roebuck Plains.

The AWSG and Global Flyaway Network would like to acknowledge the Yawuru, Karajarri and Nyangumarta traditional owners for permission to conduct research on their lands.

The WA Parks and Wildlife Department and the Australian Bird and Bat Banding Scheme are thanked for providing research and banding permits.

List of Participants

Australia
VIC: Clive Minton, Roz Jessop, Mike Dawkins, Prue Wright
WA: Chris Hassell, Maurice O'Connor, Grace Maglio, Frank O'Connor
QLD: Robert Bush
NT: Micha Jackson
NSW: Demetrios Bertzeletos
UK: Ed Stubbing, Bee Buche, Mike Pienkowski, Anne Pienkowski
China (mainland): Feng Xuesong, Xin Jin
Taiwan: Jun Liao, Jeremy Lin
Hong Kong: Katherine Leung
USA: Mark Dodds
Canada: Mark Field

BBO staff: Nigel Jackett, Jaimie Jackett, Ric Else, Jane Taylor.

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Research papers should document the outcome of original research from wader scientific studies and monitoring of waders. Please note at present, *Stilt* does not publish keywords. Research papers should contain the following sections:

TITLE - in bold, capitalised type.

AUTHORS NAME AND ADDRESS - JOHN SMITH[1], STEPHEN BROWN[2] AND MAX WELL[3]

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INTRODUCTION - This should be a short section of about half a journal page to "set the scene" and explain to the reader why the study was important. It should end with a clear definition of the aims of the study.

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RESULTS - The key findings of the study are provided here. Where feasible, data should be presented in figures and/or tables.

DISCUSSION - This section explains the significance of the major results obtained, their relevance to other work, and implications for future research.

ACKNOWLEDGEMENTS - In this section the author(s) should thank others who have contributed to the work. If applicable, ethics committee approvals and funding sources should be detailed.

REFERENCES - This section gives details of all the literature cited in the paper. References should be in alphabetic and chronological order with multi-authored references after single author citations by the same author. Examples of the required format follow:

Single author papers: **Smith, F.T.H.** 1964. Wader observations in southern Victoria, 1962-1963. *Australian Bird Watcher* 2: 70-84.

Multi-authored papers: **Dann, P., R.H. Loyn & P. Bingham**. 1994. Ten years of water bird counts in Westernport Victoria 1973-83. II. Waders, gulls and terns. *Australian Bird Watcher* 15:351-67.

Books: **Kershaw, K.A.** 1964. Quantitative and dynamic ecology. Edward Arnold, London.

Reports: **Noor, Y.R**. 1994. A status overview of shore birds in Indonesia. Pp. 178-88. *In:* Wells, D.R. & T. Mundur. (Eds.) Conservation of migratory water birds and their wetland habitats in the East Asian-Australia Flyway. Asian Wetland Bureau, Malaysia.

Online material: **Dutson G., Garnett S. & Gole C.** 2009. Australia's Important Bird Areas: Key sites for bird conservation. Birds Australia (RAOU) Conservation Statement Number 15. Available at http://www.birdlife.org.au/document/OTHPUB-IBA-supp.pdf (accessed 10 August 2012).

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FIGURES - Figures should be placed after Tables. All maps should have a border, distance scale, reference latitude and longitude and/or inset map to enable readers unfamiliar with the area to locate the site in an atlas. Google Maps and Google Earth images will be accepted but are discouraged as they reproduce poorly in print. Line figures are preferred. At their minimum, Google Earth images should retain the Google trademark device and year of image publication.

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OTHER MATTERS

In general, nomenclature of Australian birds should follow **Christidis, L. & W. Boles.** 2008. Systematics and Taxonomy of Australian Birds. CSIRO Publishing, Australia. The first reference to a species in the text should have the scientific name in *italics* after the common name. Where alternative nomenclature is used, the appropriate reference(s) should be clearly cited.

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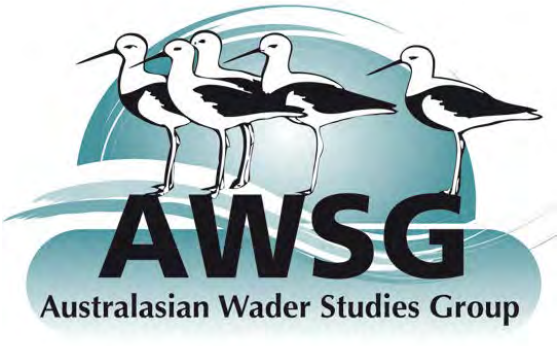
All back issues are available in PDF format from the AWSG website <www.awsg.org/stilt.php>. Most volumes are also available in print as back issues. Please contact the Secretary (stilt@birdlife.org.au) for details of costs and availability.

Deadlines:

The closing dates for submission of material are **1 February and 1 August** for the April and October editions respectively.

Extensions to these dates must be discussed with the Editor. Contributors of research papers and notes are encouraged to submit well in advance of these dates to allow time for refereeing. Other contributors are reminded that they will probably have some comments to consider, and possibly incorporate, at some time after submission. It would be appreciated if this could be done promptly



Stilt 67 – April 2015

Table of Contents