

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



**PREDATORS (AND SCAVENGERS) OF BANDED STILT
AT LAKES BALLARD & MARMION IN 1995**

RESEARCH MATERIALS CONSOLIDATION REPORT

**JAK Lane
WA Department of Parks and Wildlife**

March 2014

Cover photo: Little Crows *Corvus bennetti* are predators of Banded Stilt chicks and either predators of scavengers (or both) of Banded Stilt eggs. In 1995, Mark Lamble of the Australian Broadcasting Commission Natural History Unit filmed a Little Crow flying into the main Banded Stilt nesting colony on Lake Ballard, landing and then flying off with a downy stilt chick in its beak. Lamble also filmed a Little Crow 'drinking' from a Banded Stilt egg at the same site. Photo copyright: Graeme Chapman.

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

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

FUTURE WORK

The next steps to be taken in finalising this RMCR and then preparing reports and publications based on its contents should be to:

- Ask Andy Chapman (ACh) for copies of his field notes from the banding and flagging trips on which he accompanied JL & ACl (Ballard, April-May 1995) and GBP & ACl (Marmion, June 1995).
- Extract references to predators / scavengers from the 1995 Field Notes of JLane, GPearson, AChapman and (AClarke).
- Check for, and extract if necessary, any significant references to predators / scavengers in the various articles that CDTM, JL & GBP published in 'Wingspan', 'Tattler', 'Stilt', 'WA Bird Notes' etc. (JL will prepare an RMCR of these articles) in 1995-96 concerning the 1995 breeding event at Lakes Ballard and Marmion.
- See yellow highlighted text in the remainder of this RMCR summary for other Future Work needed / desirable.
- An aspect that might be investigated is whether there are any accounts of Aborigines taking Banded Stilts, their eggs and or chicks for food or other purposes.

Photographs

The scanned (digital) copies of all photos taken at Lakes Ballard and Marmion in 1995 by JL, GBP & ACh – and some of those taken by CDTM – are on JL's office computer and backups. Amongst these photos are three, very poor quality photos of a raptor flying overhead at Lake Ballard, some of BaSt eggs that look as though they have been predated or scavenged, and some showing the many non-predated, non-scavenged BaSt eggs that lay about the nesting sites on Ballard and Marmion after nesting had ceased.

Note that CDTM could perhaps have taken some photos relating to predators / scavengers on Lake Ballard in 1995 that JL does not have copies of.

Field Notes

A separate RMCR of 1995 Field Notes has been prepared containing copies of all the Field Notes made by J Lane (JL), G Pearson (GBP), A Clarke (ACl) and A Chapman (ACh) in 1995 while undertaking collaborative research with C Minton (CDTM) on Banded Stilts in Western Australia. These Field Notes contain observations / remarks concerning predator / scavenger activity at Lake Ballard and Marmion in 1995 **THAT HAVE NOT BEEN REPRODUCED IN THIS (PREDATOR / SCAVENGER) RMCR AND MUST BE REFERRED TO** during preparation of any report or publication on this topic.

CONTENTS

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

This RMCR contains:

1. Fax (03/10/2002) from Stephen White (CALM) to JL – and JL's response of 04/10/2002 – seeking JL's thoughts about a proposal to place statues on Lake Ballard. The attached letter from Ross J. Green of Langford WA includes the statement that 'For many years no one knew where they nested ...'. JL commented by replacing 'no one knew' with 'only the Aborigines'. This is a pointer to the possibility that Aborigines preyed on Banded Stilt (eggs? chicks? nesting adults?) during breeding events (and flocking adults?).
2. Emails (24/7/2000) from Peter Copley (SA NPWS) to Andrew Burbidge and JL that inter alia refer to loss of Banded Stilt eggs to Silver Gulls at Lake Eyre; culling of gulls, potential for gulls to prey on BaSt chicks, and potential listing of BaSt in South Australia as 'conservation dependent' 'because of the need to protect any future breeding events from gull predation'.
3. Copy of Minton, Jessop & Collins (2000). *Visit to Banded Stilt breeding colony on Hughes Island, Lake Eyre North, 1st – 5th April 2000* and covering letters recommending that '[Silver Gull] control measures be prepared now and implemented when the next Banded Stilt breeding event occurs in South Australia'. The report inter alia describes predation of BaSt eggs and chicks (not adults) by Silver Gulls and interactions with other species including Caspian Tern and Australian Pelican.
4. Email (12/4/2000) from EOL to JL referring to item on ABC Channel 2 on previous night in which CDTM talked about gulls taking thousands of BaSt eggs on Lake Eyre.
5. One of the 'overheads' that JL projected during his presentation (on behalf of JL, CDTM *et al.*) at the 'Southern Hemisphere Ornithological Conference' (SHOC) in Albany, WA, on 07/10/1996. This overhead is of 'Current and Potential Conservation Issues'. Note that predation by gulls (or any other species) is not listed as an issue (in WA) but in a draft of this overhead JL listed 'Aboriginal lifestyle change' as a 'positive' so far as BaSt breeding was concerned. The thought here was that the change in Aboriginal lifestyles, while not necessarily to their net benefit, had probably / possibly resulted in less predation of BaSt eggs, chicks, nesting adults by Aborigines (assuming Aborigines used to 'predate' nesting BaSt. **Did they?**).
6. Hardcopy (16/05/1996) of document 'Banded Stilt *Cladorhynchus leucocephalus* Seminar' '... compiled [by JL] 14-16 May 1996 in preparation for seminar at Woodvale [CALM's Wildlife Research Centre] on Fri 17 May [1996]. Words and sentences relating to potential predators / scavengers have been highlighted (circled) in pink (by JL on 27/03/2014).
7. Copy of 'Bobby & The Banded Stilts: Narration Draft 1' with JL's edits as faxed by JL to David Luffman of ABC TV Natural History Unit on 13/5/1996. Two references to gulls / predators are highlighted.
8. JL's fax (29/4/1996) to Jeremy Hogarth with additional comments on '... the 7 one hour tapes you sent me last year and ... the 29 min 20 sec video that Mark Lamble sent me (11/4/96 version)'. Inter alia JL writes: 'Predators/scavengers at the breeding colonies were Little Crows, Brown Falcons, Wedge-tailed Eagles and Peregrine Falcons. Although they did not take large numbers of chicks ...'. JL also refers to footage (from 0.43.23 to 0.43.48 on Tape Three) of a Little Crow 'drinking from an egg?' and 'Starting at 0.48.39 there is also approx two and a half minutes of slow motion footage of a Little Crow flying

and landing and then of it flying off with a downy chick in its beak'. 'There is also footage of a Wedge-tailed Eagle in Tape Five (0.49.46 to 0.50.56)'.

9. One page of 'Notes / Ideas' and 15 pages of notes (all by JL) referring to and describing in considerable detail the content of (videos) Tape One to Tape Seven (all or nearly all of the filming) for 'Bobby and the Banded Stilt'. References to predators / scavengers include the following: 'use Little Crow footage (predator)'; 'small islands also offer best views of approaching predators'; Little Crow 'pecking at something'; 'Dragon lizard [potential predator or too small] on 1st breeding island'; 'Raptor overhead – Kestrel?'; 'Fluffy [BaSt] chick in beak [of Little Crow] while flying away. Avocet(?) chasing crow'; 'Remains of dead [BaSt] chicks'; 'Wedge-tailed Eagle [land and takes off twice] and 'Maggots eating nest debris'.
10. Several pages from faxed (25/4/1996) copy of 'Transcription of Comments while Watching Un-Cut Rushes of Banded Stilts on Lake Ballard'. Present: CDTM, Mark Lamble, David Luffman, Jeremy Hogarth. Recorded at ABC Natural History Unit, 1995. These pages make reference to aggression by adult BaSt towards BaSt chicks; BaSt life span (CDTM guesses 10-20 years); 'a cat walking down the dune [at shoreline of Lake Ballard] and ... the chicks realise and panic [and] they go straight out into deeper water'. and BaSt chicks' 'panic move' – 'they would still feed, but all march in the same direction'.
11. Letter (03/3/1996) from Jeremy Hogarth to JL seeking JL's comments on an attached 'early draft' [18/10/1995] script of 'Bobby and the Banded Stilts'. Extracted [by JL on 27/3/2014] pages of script refer to defence (by parents) – or lack of it – of BaSt chicks from predators, and aggression by adult BaSt towards BaSt chicks [note that JL has not include all mentions of this behaviour into this RMCR].
12. A four-page memorandum from Andy Chapman to JL with a detailed summary of the observations he (ACh) made during aerial surveys of 06/6/1995 [or was it 12/6/1995?], 14/7/1995 and 22/8/1995 and a brief ground visit to Lake Marmion on 10/8/1995. Inter alia makes reference to two Wedge-tailed Eagles and one Kestrel on Lake Ballard on 14/7/1995.
13. One page of notes by JL recording his phone conversation on 15/7/1995 with Andy Chapman concerning observations made by ACh during his aerial survey of Lakes Ballard and Marmion on 14/7/1995. Inter alia reads: 'He [ACh] saw a few Wedge-tailed Eagles – mainly on [Lake] Ballard'.
14. Faxed (19/06/1995) copy of 17/06/1995 report by GBP for JL, headed 'Report on Survey to Lake Ballard and Lake Marmion 8 June 1995 to 13 June 1995'. Inter alia reads [all in relation to Lake Marmion] 'Drove up [in Argo] behind creche of 30 [BaSt] chicks and ran all down placing them in a nally bin ...' [This demonstrates how Aborigines could have easily captured BaSt chicks in shallow water in the past]; 'peregrine Falcon flew low over colony putting flock of BaSt on the colony to flight'; 'Wedge-tailed Eagle ... sat and watched'; 'Chapman [ACh] reports that the [Wedge-tailed] eagle was present on the colony at 1400[hrs] when [he] flew the area ...'.
15. Fax (07/06/1995) from JL to GBP with a four-page 'Revised Program Lake Ballard June 1995' with instructions for GBP, ACh and ACI regarding survey and other work to be undertaken at Lake Ballard and Lake Marmion from Thurs 8th to Wed 14th June 1995. Inter alia the program refers to: 'Other Tasks: make notes of any predator/scavenger activity you see' and 'If too shallow for boats, note that Mark [Lamble] found [Banded] Stilt very shy of people on foot but very accepting of Argo [6 wheel amphibious vehicle]. See JL's fax of 02/06/1995 below to CDTM for the 'draft work program'.
16. Fax (05/06/1995; typed 01/06/1995) message from Mark Lamble, ABC Natural History Unit, to JL with a 'rough diary' of observations he made while at Lake Ballard from 09/05 to 17/05/1995. Observations include, inter alia, 'They [2-3000 adult BaSt] all

departed when a wedge tailed eagle flew in [to the main breeding island on Lake Ballard, on 12/5/1995] and landed on the breeding island'; 'Interspersed with the [BaSt] chicks [near the western end of Lake Ballard] were adults that acted like sentry/alarm birds, that at any sign of a threat would lead the chicks toward deeper water or away from the threat' and 'If the birds [BaSt] saw a human form on the shore or out in the lake they would run for hundreds of metres and not return until the person was long gone'. A map of where the stilt chicks were is attached (and where they camped and the vehicular route to it). JL faxed a copy of this fax to CDTM on 06/06/1995. See also JL's jottings on 05/6/1995 (and 18/5/1995) concerning ML's observations of 09-17/5/1995.

17. A page of jottings (05/6/1995) by JL recording some of the observations detailed by Mark Lamble in his faxed message of 05/06/1995 (typed 01/06/1995). Included is reference to: 'Cat coming down sand dune & birds running away'. See also jottings of 18/5/1995.
18. Fax (02/06/1995) from JL to CDTM (also sent to ACh & GBP) with: 'draft work program for Grant [GBP] and co. to work to next week. I ... would appreciate any comments'. The draft program includes: 'make notes of any predator/scavenger activity you see'. This copy of the draft program has subsequent annotations [by JL]. See JL's fax of 07/06/1995 above to GBP for 'Revised Program'.
19. Jottings by JL recording message (18/5/1995) from Jeremy Hogarth with some of the observations made by Mark Lamble near the western end of Lake Ballard earlier in the month, including: 'no predators except uid [unidentified] raptor'. See jottings of 05/6/1995 and fax of 05/6/1995 for more details.
20. Map of Lake Ballard with markings by JL showing 'Camp Island' and 'Work Area' (essentially all that part of the lake around and west of Camp Island). Also shown (by JL) is the [boat?] route taken on 01/5/1995 by ... (CHECK). and 'times [1252, 1301, 1312hrs] are those of 29/4/95' and a distance (presumably) calculation. There are also six hand-drawn circles near the north (western) shore of the lake and a straight line (indicating?).
21. Photocopy (2 A4 pages) of six small notepad pages of notes made by JL during phone conversation with Ron Johnstone (WA Museum) on 11/04/1995 in which Ron shared details of his aerial survey (with Phil Stone and Nick Kolichis) for breeding BaSt on 07/04/1995 and their subsequent ground visit to Lake Ballard, in kayaks, which JL recorded as being on 12/04/1995 but couldn't have been, given date (11/04) of phone conversation [It was on 08/04/1995 (JL 16/3/2014)]. Inter alia the notes read: 'Hoard of crows came off 2nd [BaSt breeding] island at [Lake] Ballard. Wedge-t [Wedge-tailed Eagle].
22. Handwritten notes by JL headed 'Grant's [GBP's] Tasks Sat 8 → Tues 11 April 95'. Inter alia they read: '[Item] 11: Record any predator activity'.
23. One (*Folio 54*) of fourteen small pages of notes by JL on red 'Shellabear & Son' note paper (which suggests to JL that he was in transit in Perth when he made these notes). Folio 65 has the following written on it: 'These notes made in preparation for 2nd visit ([proposed to be in] March 95), JL 14/5/96'. The pages are numbered as file *folios 65-52*. *Folio 54* has a sketch labelled '15/3/95' that appears to show the number of eggs in each of a number of nests in a hypothetical quadrat on that date. Underneath is written 'If no predators and eggs don't roll out, no problem. If predators, need to be able to identify which eggs predated versus which eggs hatched'.
24. Fax (20/3/1995) from JL (at CALM Busselton) to Raelene [Hick] (at CALM Woodvale) with corrections (typos) to her typescript of the 'Banded Stilt Research Programme – Lake Ballard, March/April 1995' that CDTM had hand-drafted (see 14/03/1995 below).
25. Fax (14/03/1995) from CDTM to JL with his (CDTM's) draft manuscript headed 'Banded Stilt Research Programme – Lake Ballard, March/April 1995'. Inter alia CDTM lists '...

specific parameters which should be studied / measured / assessed', including: '(k) Predator activity – at the colony and subsequent on chick creches'.

CDTM also writes: 'It is important also, from a conservation viewpoint, to assess the predator impact at a Western Australian [BaSt] breeding colony. Historical information suggests this has in the past been very low. However ... (CDTM goes on to describe the impact of Silver Gulls on BaSt eggs 'and some chicks too' at Lake Torrens in South Australia in 1989). See 20/3/1995 for a typed copy of this draft manuscript.

26. Two pages of notes by JL headed 'Telephone Discussion with Clive Minton (at Kalgoorlie) on Monday ... February [1995] (± 1 day)'. Is February correct? Or was it March? The notes 'all on one egg today?' and '15 days since' suggest this conversation was on the day of the first aerial survey in 1995, i.e. on Sunday 12/03/1995.

In relation to predators/scavengers, these notes read: 'get in before predation (gulls)' This appears to have been one of CDTM's thoughts in relation to work that should be done / started on the day of the first visit to the main BaSt colony on Lake Ballard, i.e. on 15/03/1995 (helicopter trip).

Fax (03/10/2002) from Stephen White (CALM) to JL – and JL's response of 04/10/2002 – seeking JL's thoughts about a proposal to place statues on Lake Ballard. The attached letter from Ross J. Green of Langford WA includes the statement that 'For many years no one knew where they nested ...'. JL commented by replacing 'no one knew' with 'only the Aborigines'.

This is a pointer to the possibility that Aborigines preyed on Banded Stilt (eggs? chicks? nesting adults?) during breeding events (and flocking adults?).

fax

Environmental Protection Section

Phone: (08) 9334 0365

Fax: (08) 9367 9913

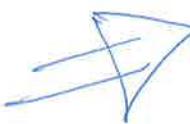
To: Jim LaneDate: 8/10/02From: STEPHEN WHITEFax: 9752 1432No. Pages: 2Subject: LAKE BACARDI

Jim What are your thoughts about the attached, not the letter its self but the proposal to put the statues on the lake. Do you have comments the impacts on birds etc. The attached is all I know.

Stephen White.



TO STEPHEN WHITE + REVER HANSON



Some J. things

Jim
4/10

Carrie has an interest in knowing what is proposed, where and when - in some detail. Given that the lake is 60 km x 15 km there might be room for both! R. 4/10/02

Community News.

Dear Editor,

This morning, 3/10/02, Inside Cover under the heading, "Spotted" it carries a story of how the Perth International Arts Festival has kicked in \$200,000 and hopes to raise another \$500,000 to place 50 figurines on Lake Ballard near Menzies. They hope to raise enough money to place a 100 there. (\$1.5 M?) They also hope to get people to go out there to see them.

You've gotta be joking. Ever been out there in the middle of summer? NO THANKS!

Lake Ballard is ~~the (I believe the only known)~~ ^{ONE OF SEVERAL} breeding colony of our little black and white coastal bird with the turned-up beak. The one we often see along the water's edge of our rivers or shores. STRAIGHT REPLY

~~ONLY THE ADULTS~~ ^{WHERE} For many years no-one knew where they nested, but there were many stories from people seeing the chicks running through the bush, miles and miles from nowhere after a cyclone and no one seemed to know from where they came. Herds of them, they just appeared. Well, they are bred at Lake Ballard.

It appears that after a cyclone, the parents fly from our coastal regions to this lake, which is hundreds of kilometers inland, and on two (2) of the sand islands that are formed in the lake by the waters of a cyclone, they make their own, well protected, exclusive breeding colony.

After the chicks are born they immediately head for the water and in a crèche type situation, supervised by elder siblings, they enter the only feeding ground available to them.

EGGS

Lake Ballard has a shrimp like creature that lies dormant encased in salt between cyclones and is brought to life by the fresh water. This may only happen, well I don't think anyone knows for sure, but only when everything comes together for them.

But these birds by some quirk know when all these conditions are right and come from both the north and south coastal region. (And they don't even have a cell phone.)

I was first interested in these lakes because I believed that in bringing the water from the north via a river system it would be, or was more environmental friendly, profitable and not as sterile as a pipe line system would be.

If the lakes system from our north could be joined, it would allow the water to flow between the most suitable lowest points

The exclusive breeding ground of these black and white ~~handed~~ ^{handed} ~~stilts~~ [✓] and the possible environmental damage that would possibly be done to them, changed my mind on this theory.

Now we have someone going to put some stainless steel stick figurines, costing hundreds of thousands dollars, possible on an island used only after a cyclone, in a most probable

cyclone season, where one of our Australian coastal birds fly thousands of kilometers to breed.

You've gotta be joking!

Yours sincerely,

R.H.Green.

P.S.

After reading this morning's article I contacted CALM, Channel 2, Channel 7, Inside Cover and PIAF and you.

PIAF have environmental permission from somewhere (Eastern States) to put these figurines on the Lake.

I do think that the possible \$1.4m could be spent somewhere else ei., at the Cancer Foundation, or Telethon, or Appealathon instead of way out in the middle of a salt lake that has the only food available and is the only known breeding ground of a little tiny coastal bird.

ONE OR SEVERAL

My information for this came from a program on channel 2 that I saw very early one morning about a year ago. I think it was put out by CALM and if I remember right in with Murdoch Uni.

I look at it this way; with all the environmental goings on and the Native rights etc. just how much background work was done before someone decided to spend huge amounts of donated money on damaging a possible environmental wonderland.
And for what???????

I think they are called, Black and white banded stilts, anyhow if you could put these thoughts together, maybe someone will get interested enough to stop what I believe is just a huge waste of donated money to satisfy someone's ego on something they don't or might not know about.

And I do hope that my memory's got it all right.

Thanks,
Ross.

9334
0278.
ATTN
LETTER

Emails (24/7/2000) from Peter Copley (SA NPWS) to Andrew Burbidge and JL that inter alia refer to loss of Banded Stilt eggs to Silver Gulls at Lake Eyre; culling of gulls, potential for gulls to prey on BaSt chicks, and potential listing of BaSt in South Australia as 'conservation dependent' 'because of the need to protect any future breeding events from gull predation'.

To: Jim Lane@buss.sid@CALM
From: "Copley, Peter (DEH)" <pcopley@deh.sa.gov.au>
Cc:
Subject: Banded Stilts
Attachment:
Date: 24/Jul/2000 4:16 PM

22.

Hi Jim

I gather Andrew Burbidge has forwarded an e-mail request to you from me earlier today concerning the current whereabouts of Banded Stilts other than at Lake Eyre. I'd be very interested to know what the "WA population" is doing at present and how many birds are at what general localities to compare with current SA data. The treatment about Banded Stilts in HANZAB seems rather equivocal about how large the population(s) is (are), and which birds move from where to breeding colonies on inland salt lakes during such events.

At my 'kite-flying' suggestion to Andrew B that perhaps these Stilts are a species that may warrant listing as 'conservation dependant' because of the need to protect any future breeding events from gull predation, Andrew pointed out that "most breeding has been on remote WA salt lakes and there have been plenty of successful breeding events without any management". What is your impression on this point? What is happening with Silver Gull numbers in the inland areas of WA following lake flooding events?



Hope you can assist.

Regards

Peter Copley
Senior Ecologist, Species Conservation
Biodiversity Conservation Programs
National Parks & Wildlife SA
Department for Environment, Heritage and Aboriginal Affairs

Email: pcopley@dehaa.sa.gov.au
Phone: +61 8 8204 8781
Fax: +61 8 8204 8889

The information in this e-mail may be confidential and/or legally privileged. Use or disclosure of the information by anyone other than the intended recipient is prohibited and may be unlawful. If you have received this e-mail please advise by return e-mail or by telephoning +61 8 8204 8786.

To: iSMTP@CALM.COMO.1@Servers [<pcopley@deh.sa.gov.au>]

From: Andrew Burbidge@WOOD.SID@CALM

Cc: Jim Lane@BUSS.SID@CALM

Subject: re: Translocation Proposals

Attachment:

Date: 24/Jul/2000 9:22 AM

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Peter

I think refereeing TPs helps a lot! So I hope you win out against the Philistines.

The best person to contact re banded stilts in WA is Jim Lane.
jiml@calm.wa.gov.au.

I'll copy this reply to him.

Cheers,

Andrew

Dr Andrew A Burbidge
Director, WA Threatened Species & Communities Unit
Dept Conservation & Land Management
PO Box 51, Wanneroo, WA 6065
Phone +61 8 9405 5128, fax +61 8 9306 1066
andrewb@calm.wa.gov.au
----- Original Text -----

From: "Copley, Peter (DEH)" <pcopley@deh.sa.gov.au>, on 24-Jul-2000 9:17 AM:

Dear Andrew

Thank you for such a prompt refereed reply to our recent translocation proposals. I really appreciate the effort that Tony and Jeff put in to get them returned so soon. I also appreciate the comments and queries received from them. They are being addressed this week. The WA TP assessment process is a good one. If only I could convince my "powers that be" that refereeing value-adds to the process. I have some opposition to it here on the basis that "it's not necessary" or that if issues arise where it becomes necessary, then we can seek some refereeing input. Your refereed examples should help my case.

On another matter, we lost all Banded Stilt eggs at Lake Eyre to Silver Gulls when I wrote to you last. But the Stilts re-nested on another island, we culled about 2,500 - 3,000 gulls early on and had little further gull interference (though there are thousands and thousands of gulls nesting on other islands) and have had >10,000 chicks hatch by late last week with hatching still occurring from the estimated 20,000 nests. We're now monitoring what is happening to the dispersing creches of chicks as they swim/drift past the gull islands!

We have some reasonable estimates / guesstimates for numbers of stilts at Lake Eyre. Who should I contact to find out about numbers currently in WA?

Hope you can help.

Regards



Copley

Senior Ecologist, Species Conservation
Biodiversity Conservation Programs
National Parks & Wildlife SA
Department for Environment, Heritage and Aboriginal Affairs

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Email: pcopley@dehaa.sa.gov.au

Phone: +61 8 8204 8781

Fax: +61 8 8204 8889

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Copy of Minton, Jessop & Collins (2000). *Visit to Banded Stilt breeding colony on Hughes Island, Lake Eyre North, 1st – 5th April 2000* and covering letters recommending that ‘[Silver Gull] control measures be prepared now and implemented when the next Banded Stilt breeding event occurs in South Australia’.

The report inter alia describes predation of BaSt eggs and chicks (not adults) by Silver Gulls and interactions with other species including Caspian Tern and Australian Pelican.

To: ALAN CLARKE@WOOD.SID@CALM, Jim Lane@BUSS.SID@CALM
From: Grant Pearson@WOOD.SID@CALM
Originated by: "Rosalind Jessop" <rosj@penguins.org.au>
Cc:
Subject: fwd: Lake Eyre Report
Attachment: CLIEYRE3.doc
Date: 19/Apr/2000 2:33 PM

14

Jim
Attached copy of Minton report as discussed.

Grant Pearson
Department of Conservation and Land Management
WA Wildlife Research Centre
Wildlife Place
Woodvale WA 6026
Tel:(8) 9405 5163, Fax: (8) 9306 1641
Email: grantp@calm.wa.gov.au

----- Original Text -----

From: "Rosalind Jessop" <rosj@penguins.org.au>, on 19/04/2000 5:59 AM:
To: iSMTP@CALM.COMO.1@Servers["Sandra Harding"
<joyceh@dragon.com.au>],iSMTP@CALM.COMO.1@Servers["Phil Straw"
<pstraw@mpx.com.au>],iSMTP@CALM.COMO.1@Servers[<john.read@wmc.com.au>],iSMTP@CA
LM.COMO.1@Servers[<donald.coventry@birdsaustralia.com.au>],Grant
Pearson@WOOD.SID@CALM

To: Jim Lane@BUSS.SID@CALM
From: Grant Pearson@WOOD.SID@CALM
Cc:
Subject: re: fwd: Lake Eyre Report
Attachment:
Date: 19/Apr/2000 2:47 PM

13.

I think i have word 7 and it extracts without any problem. Do you get a prompt asking how to extract it? If so tell it to extract in whatever is later than 6 if you can. I'll fax a copy anyway.

gp

Grant Pearson
Department of Conservation and Land Management
WA Wildlife Research Centre
Wildlife Place
Woodvale WA 6026

Tel:(8) 9405 5163, Fax: (8) 9306 1641

Email: grantp@calm.wa.gov.au

----- Original Text -----

From: Jim Lane@BUSS.SID@CALM, on 19/04/2000 2:44 PM:

Which format is the attachment in? It looks weird. Did you have to convert it?

I am using "Word for Windows Version 6" at the moment, but will be updating to Office 2000 in a week or so.

From: Grant Pearson@WOOD.SID@CALM, on 19/Apr/2000 2:33 PM:

Jim
Attached copy of Minton report as discussed.

Grant Pearson
Department of Conservation and Land Management
WA Wildlife Research Centre
Wildlife Place
Woodvale WA 6026

Tel:(8) 9405 5163, Fax: (8) 9306 1641

Email: grantp@calm.wa.gov.au

----- Original Text -----

From: "Rosalind Jessop" <rosj@penguins.org.au>, on 19/04/2000 5:59 AM:

To: iSMTP@CALM.COMO.1@Servers["Sandra Harding"
<joyceh@dragon.com.au>],iSMTP@CALM.COMO.1@Servers["Phil Straw"
<pstraw@mpx.com.au>],iSMTP@CALM.COMO.1@Servers[<john.read@wmc.com.au>],iSMTP@CA

LM.COMO.1@Servers[<donald.coventry@birdsaustralia.com.au>],Grant
Pearson@WOOD.SID@CALM

Lake Eyre Visit

Clive Minton, Rosalind Jessop, Peter Collins

We thought that you would like a copy of this report which we have prepared following our recent visit to Lake Eyre.

This report was primarily written for the South Australian National Parks and Wildlife Service and for those who financially supported us but it contains detail which we hope you will find of interest.

We were particularly pleased with the reception which our verbal report to the District Manager and Head Ranger at Port Augusta received. They indicated enthusiasm for the immediate preparation of an action plan for control of Silver Gulls at future Banded Stilt breeding events in South Australia.

A copy of the letter sent to SANPWS is attached

Address for correspondence 165 Dalgetty Road, Beaumaris. Vic. 3193.
(email: mintons@ozemail.com.au).

Visit to Banded Stilt breeding colony on Hughes Island, Lake Eyre North

1st - 5th April 2000.

Dr. Clive Minton¹, Dr. Rosalind Jessop² and Peter Collins²

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²RMB 4009, Cowes. Vic. 3922.

Executive Summary

Heavy rains in central Australia in the middle of February facilitated major breeding activity by Banded Stilt, Australian Pelican, Silver Gull and Caspian Tern on Hughes Island in the centre of Lake Eyre North.

A five day visit to the island in early April 2000 found that large scale predation of Banded Stilt eggs and young was being carried out by Silver Gulls. The net result was that the estimated 18,000 pairs of Banded Stilt, the majority of the South Australia/Victoria population, produced very few young. If such low breeding success continues in future there will be a major reduction in the population.

It is strongly recommended that control measures be prepared now and implemented when the next Banded Stilt breeding event occurs in South Australia.

Introduction

The Banded Stilt is an endemic species of Australian wader which requires ephemeral salt lakes in inland South Australia and Western Australia for breeding. Breeding opportunities therefore only occur at irregular intervals following major rain events.

The Banded Stilt populations of South Australia/Victoria and Western Australia are thought to be largely separate, with a total estimated population of at least 100,000 individuals.

During the last 20 years Banded Stilts are only known to have nested in South Australia four times - in 1984 (probably at Lake Eyre), 1989 (Lake Torrens), 1997 (Lake Eyre North) and now in 2000 (again at Lake Eyre North).

Maintenance of population numbers in a bird which can breed only irregularly is dependant on a high adult survival rate and good breeding success. However detailed studies at Lake Torrens in 1989 by SANPWS staff indicated exceptionally high nest failure due to predation by Silver Gulls. By contrast similar studies at Lake Ballard in Western Australia in 1995 showed no gull predation and reproductive success was extremely high. Photographs taken at Lake Callabonna in South Australia in 1930 clearly show that Silver Gull predation was not a problem then.

The principle purpose of this visit was to obtain up to date information on Silver Gull predation at South Australian Banded Stilt breeding events since this potentially affects the long term viability of this part of the Australian Banded Stilt population.

Field Work

Major rains fell in the northern parts of South Australia in February. On the 12/13th February some 150+ mm fell in the area of Lake Eyre and to the north and west of there, causing severe local flooding. A week later a further 50 mm of rain fell over a wider area.

Experience at Lake Ballard in 1995 showed that Banded Stilts were capable of laying eggs within 1 to 2 weeks of a major rain event. CDTM travelled to William Creek at the beginning of March and made fixed wing aerial surveys over Lake Eyre on 2nd and 3rd March. A nesting colony of 2-3,000 Banded Stilts was located on Hughes Island in the middle of Lake Eyre North. 1,200 Pelican nests and 1,000 Silver Gull nests were also present on the same island.

CDTM, REJ and PCC returned to William Creek on 30th March and carried out a fixed wing aerial survey on 31st March. They were then deposited on Hughes Island by hired Jet Ranger helicopter from April 1st to 5th. A further fixed wing aerial search for Banded Stilt chicks was carried out over the lake on 6th April.

A detailed census of all the birds encountered on Hughes Island was undertaken. Also prolonged observations were made of Silver Gull predation at the Banded Stilt colony over the 5 day period.

Results

a) Banded Stilts

On the 1st April it was estimated that there were 9,000 occupied Banded Stilt nests at the colony located about half way along the western side of the island (which was about 2 km long by 250 metres wide, with the long axis running in a north/south direction).

The original colony located on 2/3 March, which had apparently subsequently doubled in size (per local air tour operators), had already been vacated. Furthermore a segment of the new colony had also already been recently vacated.

Measurements of the total areas covered by the colonies, nest densities (up to 10 per square metre) and the area of the colony occupied by nests gave an estimate of 4,500 nests for the original colony and 13,500 nests for the 'new colony' giving a total estimated breeding population of 18,000 pairs.

A brief incursion into one end of the colony indicated that the majority of nests contained 3 eggs, with some with 2 or 4 eggs. The average clutch size will be calculated once the photographs taken at the time have been developed. But it is clearly similar to the average clutch size of 3 eggs recorded in the Lake Ballard colony.

b) Australian Pelican

The island contained 4,714 Pelican nests located in 12 separate colonies/subcolonies. The majority were on the southern half of the island. Most colonies favoured areas with small (half metre high) bushes around the perimeter of the island but some colonies were on bare ground in the centre of the island.

Full details of the nest contents are given in Table 1. Two eggs was clearly the dominant clutch size (92.6%) with 3.2% having laid 3 eggs and 4.2% laying 1 egg.

Hatching in some southern parts of the colony appeared to have commenced a few days prior to the census and on the 2nd April 625 of the nests (13%) contained at least one hatched young.

Table 1. Contents of the 4714 Australian Pelican nests on Hughes Island on 2 April 2000.

1 egg	2 eggs	3 eggs	4 eggs	(abandoned eggs) (53)
164	3793	131	1	
1 young	2 young	3 young		
33	348	9		
1 egg/1 young	1 egg 2 young	2 eggs/1 young		
222	8	5		

Total breeding pairs = 4714

c) *Silver Gulls*

Silver Gulls nests were spread over approximately 400 metres at the northern end of the island. On 2nd April 2,152 nests were counted. Nest contents are detailed in Table 2. The most common clutch size was 3 eggs (62%), followed by 2 eggs (28%). Some of the anomalous nest contents were due to roaming chicks temporarily crouching in other nests because of our presence.

Hatching was in progress with some chicks up to 10 days old. On 2nd April 37% of the nests had hatched at least one chick.

Table 2. Contents of the 2152 Silver Gull nests on Hughes Island on 2 April 2000.

1 egg	2 eggs	3 eggs	4 eggs	5 eggs	6 eggs
116	360	785	7	3	1
1 young	2 young	3 young	4 young	5 young	
111	176	100	9	1	
1 egg/1 young	1 egg/2 young	1 egg/3 young	1 egg/7 young		
104	79	18	1		
2 eggs/1 young	2 eggs/2 young	2 eggs/3 young			
159	18	5			
3 eggs/1 young	3 eggs/2 young	3 eggs/4 young			
23	7	1			
abandoned eggs	predated eggs	dead chicks	empty nests	*runners	
6	16	24	68	95	

* (young not attached to nests).

Total estimated breeding pairs = 2152.

d) *Caspian Tern*

Only two Caspian Terns were seen on 2/3 March but by 1st April a large colony had formed on a sand bank close to the gull colony on the north end of the island. A census on 3rd April showed 114 nests and 36 scrapes indicating a breeding population of 150 pairs (Table 3). Two nests contained newly hatched chicks.

Two eggs was the most common clutch size (51%) followed by 3 eggs (37%).

Because the Silver Gulls were occupying the higher ground on the northern end of the island, which was used by the Caspian Terns in 1997 (CDTM per. obs.), the terns appeared to have been forced to nest on this lower bank which had been submerged immediately after the mid-February rains. They could thus be vulnerable to flooding when the next pulse of water reaches Lake Eyre in late April from the Georgina/Diamantina/Warburton River system.

Table 3. Contents of the 150 Caspian Tern nests on Hughes Island on 3 April 2000.

1 egg	2 eggs	3 eggs	1 egg/1 young	2 eggs/1 young	empty nests	Total
-------	--------	--------	---------------	----------------	-------------	-------

12	56	44	1	1	(new) 36	150
----	----	----	---	---	-------------	-----

e) Other Species.

At least 12 pairs of Red-capped Plover were nesting on the island.

A single Gull-billed Tern was regularly seen and on two occasions behaved as if nesting. However no nest was found.

Five pairs of Orange Chat were present and breeding. Budgerigars, Zebra Finches and Little Button Quail were also seen but not thought to be breeding.

At least 200 Sharp-tailed Sandpipers were seen feeding on the salt flats around Hughes Island on most days. Their 'fat profile' suggest that they had already accumulated large fat reserves and were ready for departure. About 100 Red-necked Stints (some in breeding plumage) and a single Curlew Sandpiper (non-breeding) were also seen.

No raptors were seen. However a Wedge-tailed Eagle had been reported visiting the island a few days before our arrival. Wedge-tailed Eagles had apparently bred on the island, on the ground, in 1997. Remains of their prey, including several Bearded Dragons, were seen at several locations.

An old dingo scat was also found.

There was evidence of two active rabbit burrows on the island but no rabbits were seen.

Silver Gull Predation

a) Banded Stilt

Thirteen hours of systematic observations of Silver Gull predation at the Banded Stilt colony were made between 1st and 5th April. Observations were made from a distance of 80 metres by two observers with the aid of binoculars and a telescope.

Marauding Silver Gulls were present throughout the Banded Stilt colony at all times - day and night. Counts made at 15 minute intervals showed that numbers varied between 25 and 162 with typically 80 to 100 present at one time (Figure 1). Five and fifteen minute counts of gulls newly arriving at the Banded Stilt colony from the Silver Gull colony to the north ranged between 3 and 12 per minute with an average of 6.5 per minute. This suggests that during daylight hours, on average 390 visits were made by Silver Gulls each hour to the Banded Stilt colony. This equates to around 4,875 visits each day. If Silver Gulls visited the colony at the same rate during the night as observed close to dawn/dusk then an additional 4,100 visits would have been made making a total of around 9,000 visits each 24 hours.

Silver Gulls patrolled on foot within the colony seeking every opportunity to seize an unguarded egg or chick. Sometimes several gulls appeared to be working together in concert and on occasions gulls were even seen to pull at adult Banded Stilts in order to try and drag them off their nests. Other gulls would hover over nests and drop into the colony causing a disturbance which created opportunities for predation of eggs and /

6.
or young by a number of gulls. On one occasion a low flying Pelican caused disturbance leading to the contents of 40 or so nests being lost.

Whenever it was possible to identify that an egg or a chick had been taken by a Silver Gull this was recorded. In many cases predation was followed by a melee of up to ten gulls fighting for the egg or chick. Eggs were often eaten on the ground close to the nest. However chicks were often carried away to be eaten, resulting a chase by up to 10 other gulls in aerial pursuit. Sometimes the chick was dropped and then retrieved by a different bird.

Inevitably the number of eggs/chicks predated was under recorded as it was often difficult to tell if all the contents of a clutch were taken. Also when the egg/chick was consumed rapidly and no melee or chase resulted the predation event may have been missed.

Predation was already at a high level at first light (about 0600) and continued at the same level until mid-morning (Figure 2). There was some reduction in the rate of predation in the middle of the day, especially on hot days, when the gulls appeared to seek shade or stand in the water. However heavy predation resumed again from mid-afternoon and was still continuing when it became too dark to see (around 1830). Predation appeared to continue during darkness judging by the sounds emanating from the colony and gulls appeared to be arriving and departing from the colony all night. Night time predation was also recorded at the Lake Torrens Banded Stilt colony in 1989.

The number of chicks recorded as being predated averaged 1.85 per minute during daylight hours. 51% of the predation events involved chicks and 49% eggs (28% one egg and the remainder clutches of eggs). It was not possible to quantify night predation rates but judging by the noticeable reduction in the size of the colony between dusk and dawn the following day it must have been very significant.

The recorded daytime predation rate equates to a loss of 1,350 eggs/chicks per day. However during the five day period the colony was under observation it decreased from an estimated 9,000 to 3,000 nests. This is equivalent to around 18,000 eggs/chicks. However over the same period only 322 chicks were seen to successfully depart from the colony (escorted by protective adults) for the relative safety of the open lake.

It therefore appears that most of these 6,000 nests failed due to predation. The combination of unmeasured night-time predation and the under recording of day-time predation meant that the actual predation losses were more than twice the recorded level i.e. around 3,000 eggs/chicks per day.

It was also notable that the extent and effectiveness of gull predation increased as the Banded Stilt colony decreased. This was particularly because massive gull predation became more possible as open areas appeared in the colony allowing greater gull access. Similar observations were made at Lake Torrens in 1989 when the final 3,000 nests were totally destroyed by Silver Gull predation. At Hughes Island there was a further reduction in the colony size to only 1,500 nests by the morning of the 6th April (fixed wing aerial survey) - equivalent to the loss of 4,500 eggs/chicks in only about 20 hours). It is estimated that the colony will have been empty by 8th April.

b) Australian Pelican

The Silver Gulls were not attempting to predate either Pelican eggs or newly hatched chicks. However they were increasingly depriving the young Pelican chicks of food by stealing the partially digested fish regurgitated by the adult Pelican prior to feeding the small chicks.

While large chicks can take food from within the Pelican's beak/crop, small chicks have to be fed by the adult with small pieces of fish held in the bill. To achieve this the adult Pelican regurgitates a large portion of its crop contents onto the ground and it is then that the adult gulls working in concerted packs of 8 to 10 birds were observed stealing up to 90 % of the regurgitant. With the imminent termination of the Banded Stilt colony as a source of food for Silver Gull adults and chicks, it is likely their attention will turn even more onto the predation of Pelicans in the future. This presumably could have a detrimental effect on the survival of young Pelican chicks.

c) Caspian Terns

There was no evidence of current predation by Silver Gulls at the tern colony even though their colonies were adjacent. However previous experience elsewhere has shown that Silver Gulls can be a major predator of Caspian Tern eggs and chicks. Gull predation may therefore increase in the future.

d) Red-capped Plover

Two young chicks were seen to be taken by Silver Gulls.

Other Activities

Banding

No banding was undertaken because so few young birds were successfully leaving the colony and because of the risk of associated further gull predation opportunities.

An exciting discovery however was the presence of a yellow leg flagged breeding adult bird in the colony. This bird had been banded as a chick at the Lake Ballard, Western Australia, colony in 1995. This is the first evidence of any interchange between the South Australian and Western Australian Banded Stilt populations.

b) Blood Sampling.

Blood samples from 14 dead Banded Stilt chicks were collected for DNA analysis. These were chicks accidentally dropped by gulls during aerial chases or collected from beside nests in the Silver Gull colony (one Silver Gull nest had 10 dried chicks in it).

These blood samples will be sent to Professor Allan Baker at the University of Toronto for use in his wader classification studies. (he is the world expert in wader classification using DNA techniques). They will also be used to see if any DNA characteristics have yet developed to separate the Banded Stilt populations of South Australia and Western Australia (from where blood samples already exist).

c) Photography

A detailed photographic record was obtained of all aspects of the breeding waterbirds on Hughes Island. The gull predation in the Banded Stilt colony was also photographed extensively.

Conclusions and Recommendations

The exceptional mid- February rains in central Australia put sufficient water in Lake Eyre North to trigger a major breeding event for Banded Stilts, Australian Pelicans, Silver Gulls and Caspian Terns. However the breeding success of the Banded Stilts has been limited by massive predation of eggs and chicks at the colony by Silver Gulls. In due course the breeding success of Pelicans and Caspian Terns is also likely to be adversely affected by Silver Gull predation.

It is too late for any remedial action to be taken to improve the breeding success of this particular Banded Stilt breeding event. However it is strongly recommended that SANPWS prepare a plan for the intensive control of Silver Gull numbers at and immediately adjacent to, any future Banded Stilt colony in South Australia. Unless such remedial action is taken to greatly reduce the massive predation by Silver Gulls in the future it is likely that there will be a major reduction in the Banded Stilt population.

Proven methods exist for gull control, including the use of bread soaked in alpha-chloralose. This has proved effective in extensive gull control programs carried out in Western Europe and North America over the last 30 years.

The appropriate approvals need to be obtained well in advance and control methods and the necessary products decided upon and purchased. An appropriate budget allocation needs to be made also. This is because it will be necessary to act very quickly after a future rain event not only to locate the Banded Stilt colony but also to implement control measures within 10 to 14 days of the rain event occurring. These measures will need to be sustained for a period of 4 to 6 weeks to ensure that the expected continual inflow of gulls is controlled and that all the Banded Stilts get an opportunity to hatch young successfully and get them to the relative safety of open water.

It is also recommended that SANPWS endeavour to carry out an extensive aerial survey of Lake Eyre North during the next two weeks (before April 20th) to determine just how many young are successfully produced to fledging by the 18,000 pairs of Banded Stilt that nested on Hughes Island and to try and ascertain the breeding success of Pelicans and Caspian Terns.

The expected further inflow of water from Queensland should sustain the water levels long enough for these to successfully complete breeding. It is even possible it may stimulate renewed breeding activities by the Banded Stilts, especially in view of their poor breeding productivity at the first attempt. This would enable an immediate testing of the effectiveness of gull control measures in limiting predation activities.

Acknowledgments.

The visit to Hughes Island would not have been possible without the generous support of an anonymous donor (\$8,000), the BBC Natural History Unit (\$5,000) and the Norman Wettenhall Trust (\$4,000) who provided the most of the funds for the helicopter transportation to the island (\$20,000).

We are also extremely grateful to the proprietors of the William Creek Hotel for accommodation at reduced rates and for flying CDTM up to William Creek from Melbourne on March 2nd.

Wrightsair based at William Creek were also most generous in taking us on 3 aerial surveys over Lake Eyre at reduced rates, as well as providing regular information on bird numbers at Hughes Island obtained during their scenic flights.

SANPWS staff at Port Augusta are thanked for their assistance in many ways, including permission to visit the National Park, permission to land a helicopter on Hughes Island, and the provision of a portable radio.

We also thank Keith Bellchambers and Nicky du Prue and Wally and Betty Klau for accommodation during our journey to and from William Creek.

Figure 1. The average number of Silver Gulls present in the Banded Stilt colony during daylight hours, Hughes Island, Lake Eyre, 1st to 5th April 2000.

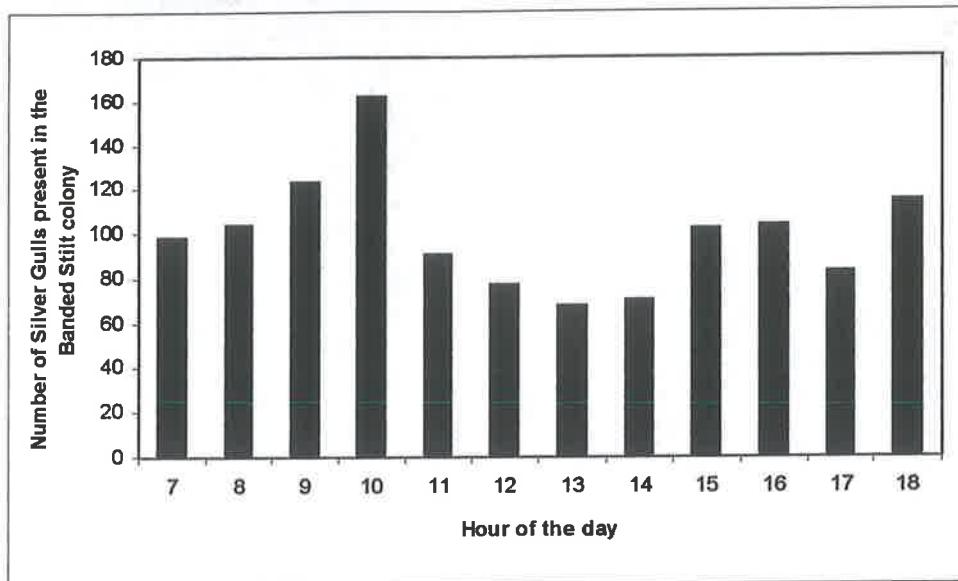
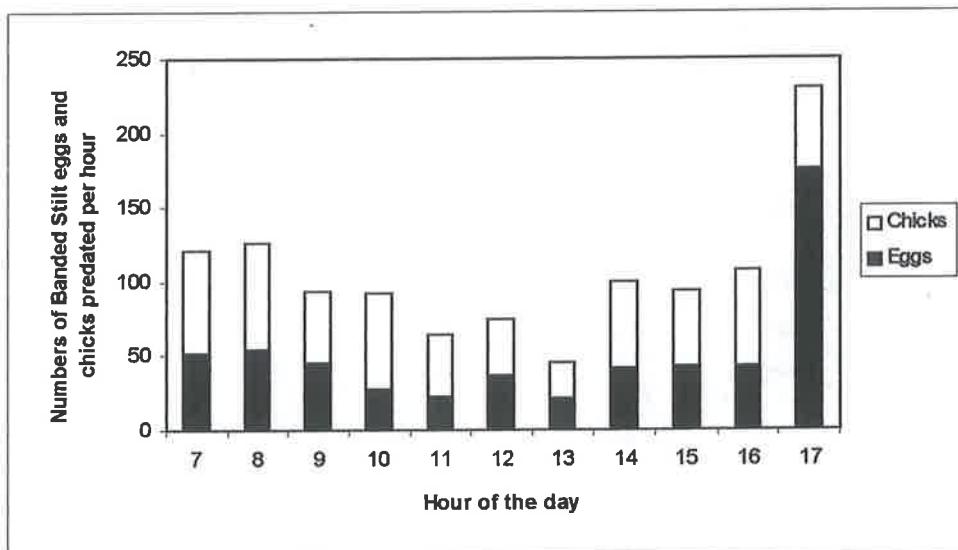


Figure 2. The average number of Banded Stilt eggs and chicks predated by Silver Gulls, Hughes Island, Lake Eyre, 1st to 5th April 2000 (note the large number of eggs taken at 17.00 hours was due to an overflight by an Australian Pelican which disturbed the Banded Stilts allowing the Silver Gulls to predate the eggs and chicks).



Australasian Wader Studies Group

Lindsay Best
Acting Director SANPWS
GPO Box 1047
Adelaide
SA 5001



Recommendations for Silver Gull Control at Banded Stilt Colonies.

Dear Mr. Best,

We attach a copy of a report we have prepared after our recent visit to Hughes Island in Lake Eyre North where we observed massive predation at the Banded Stilt colony by Silver Gulls. The data collected supports earlier information collected by the South Australian National Parks and Wildlife Service during the Banded Stilt breeding event at Lake Torrens in 1989.

We consider that there will be a major reduction in the Banded Stilt population in South Australia and Victoria if drastic measures are not taken to restore a reasonable level of breeding success at Banded Stilt breeding events in South Australia in the future.

We recommend that SANPWS immediately make appropriate preparations to implement a Silver Gull control programme at, and near, future Banded Stilt colonies in South Australia, whenever and wherever these infrequent breeding opportunities occur.

We have already verbally presented our findings and recommendations to John Watkins and Pearce Doherty at Port Augusta and were most pleased at their generally supportive reactions.

We would be most grateful if you would please accept this report and consider initiating action on the recommendations as a matter of urgency.

Yours Sincerely
Dr. Clive Minton
Dr. Rosalind Jessop
Peter Collins

Address for correspondence 165 Dalgety Road, Beaumaris. Vic. 3193.

(email: mintons@ozemail.com.au).

Email (12/4/2000) from EOL to JL referring to item on ABC Channel 2 on previous night in which CDTM talked about gulls taking thousands of BaSt eggs on Lake Eyre.

To: Jim Lane@buss.sid@CALM
From: "Eileen Lane" <eol@wantree.com.au>
Cc:
Subject: Lake Eyre and Banded Stilts eggs
Attachment:
Date: 12/Apr/2000 7:32 AM

Hi, James,

Did you see the 7.30 report on Channel 2 last night?

Clive
An ornithologist, Minton was talking about the flooding of Lake Eyre and said that although there were advantages, one problem was that some gulls had appeared (I forgot the species) and taken thousands of eggs of BANDED STILTS.

Only 354 chicks "came off" the colony. (Clive's words)

The problem when I see anything like that (it was only a short excerpt) is that by the time I try to alert you by phone, most or all of it is over by the time you get to the phone and back.

See you tomorrow.

Moi

Eileen Lane

One of the ‘overheads’ that JL projected during his presentation (on behalf of JL, CDTM *et al.*) at the ‘Southern Hemisphere Ornithological Conference’ (SHOC) in Albany, WA, on 07/10/1996. This overhead is of ‘Current and Potential Conservation Issues’.

Note that predation by gulls (or any other species) is not listed as an issue (in WA) but in a draft of this overhead JL listed ‘Aboriginal lifestyle change’ as a ‘positive’ so far as BaSt breeding was concerned.

The thought here was that the change in Aboriginal lifestyles, while not necessarily to their net benefit, had probably / possibly resulted in less predation of BaSt eggs, chicks, nesting adults by Aborigines (assuming Aborigines used to ‘predate’ nesting BaSt. Did they?).

CURRENT AND POTENTIAL CONSERVATION ISSUES

NON-BREEDING HABITATS

SALT FIELD CONSTRUCTION	+ VE
LANDSCAPE SALINISATION	+ VE
SALINE WATER DRAINAGE	- VE
URBAN GROWTH	- VE
RECREATION	- VE

BREEDING HABITATS

INCREASED RUNOFF	+ VE
SILTATION (?)	- VE
MINING OF LAKE BEDS	- VE
WATER USE (MINING)	- VE
HYPERSALINE DISPOSAL	- VE
RECREATION	- VE



CONSERVATION ISSUES

<u>NON-BREEDING HABITATS</u>	
SALTFLATTS	+ ve
SALTWATER INTRUSION	+ ve
DRAINAGE	- ve
URBANISATION / INDUSTRIALISATION	- ve
<u>BREEDING HABITATS</u>	
<u>ABORIGINAL LIFESTYLE CHANGE</u>	+ ve
<u>INCREASED RUNOFF</u>	+ ve
SITATION ?	- ve
<u>MINERAL EXTRATION</u>	- ve
MINING OF LAKESIDES	- ve
WATER EXTRACTION	- ve
HYPERSALINE WASTE DISPOSAL	- ve

Leleking 1930 not Glouet ?
+ Ibis ?

Battled dimensions

distance from wet

Island dimensions

clutch size ?

Hardcopy (16/05/1996) of document ‘Banded Stilt *Cladorhynchus leucocephalus* Seminar’ ‘... compiled [by JL] 14-16 May 1996 in preparation for seminar at Woodvale [CALM’s Wildlife Research Centre] on Fri 17 May [1996]. Words and sentences relating to potential predators / scavengers have been highlighted (circled) in pink (by JL on 27/03/2014).

This printout appears to be of "STILTSEM"
("Date Modified 16/05/1996 5:12 PM") 10/01/2014

BANDED STILT CLADORHYNCHUS LEUCOCEPHALUS SEMINAR

This material compiled 14-16 May 1996 in preparation for seminar at Woodvale on Fri 17 May.

- Info in this document has been drawn from my BaSt files (Vol 1 gone thru carefully, Vol 2 less so, stopping just before reaching transcript of Clive comments while viewing uncut stilt footage from Ballard), also from the 2 Wingspan articles (Vol 5 Nos. 2&3), *also my work diary*.
- Still need to: redo Vol 2, go thru my notebooks, get data that Grant, Alan and Andy have yet to give me, get water analysis results, do sweep and gut contents, do photos of nest quadrats, data from logger (I think Grant has sent it to me). *OK for twig on thin branch*

The Banded Stilt is: *Cladorhynchus leucocephalus* Slide of stilt
description? *OK for white head*
only found in Australia, monospecific genus, member of .. family
distribution, numbers

wt 220-260
in (Hogarth)

first discovered in 18.. by .. at ..

breeding a mystery until 1930 when recorded at.. by .. colony size ..

since then, breeding recorded at .. (sites, distribution) Only about 20 nesting events ever recorded (3 in SA and rest in WA). Most nesting attempts only found when chicks mobile or breeding over (deserted colonies).

breeding actually witnessed on few occasions, due to difficulty of finding and gaining access to colonies
Chicks on road at Menzies. (1400 walked thru town?, 500 killed on road?)

Grant and I have taken an interest in locating breeding sites since 19.. when he and Phil Fuller found .. at Lake Barlee.

Since then we have:

Barlee in 19.. with Roger Jaensch and found ..

Primary interest is in identifying significant breeding sites and any threats, conservation needs

In Feb 95, Tropical Cyclone Bobby dumped 385 mm of rain to north of Kalgoorlie in 4 days (25-28th) of continuous rain.

Stilts left coastal sites e.g. Creery lagoon.

We planned an air survey of .. for

Clive Minton contacted us. He was passing thru Kalgoorlie on .. and interested in flying with us sharing costs.

Jeremy Hogarth of ABCTV Natural history (who Grant had met on Broome wader expedition) also contacted us to see what we were doing 'cause they wanted to film Banded Stilts nesting (waiting for .. years since meeting Clive?).

Grant flew to Kal on .. to join Clive for flight.

Sun 12 March Air survey

Grant & Clive flew Barlee, Ballard and Marmion Lakes (previous nesting locations) 150-250 km N of Kal on Sunday 12 March, 16 days after 4 days rain started. 4.5 hrs searching.
Marmion: no birds.

1004 stayed around
0950 hr arrived
1014 .. Marmion
1018 .. left Marmion
arrived Ballard (E end)

1102 hr leave Ballard.
1123 .. arrive Barlee

Barlee: 20 000, all seemingly paired but no sign of colony. Had the least water of the three lakes.
Ballard: All birds on water were paired. 10 000 birds, half (5000) at colony (1st) of around 2000 nests. At core of colony incubation appeared to have begun.

Not equipped to gain access to colony.

Luck. Found a Jet Ranger helicopter in Kalgoorlie with a spare day. Agreed to share heli cost with Clive 50:50. (Pilot + 3 or 4 + hide; \$695/hr; 1hr each way). Clive rang me to convince of value. On Tues 14th he faxed me a draft research program.

Wed 15 March 1995, Clive Minton, Marj Reni, Grant, me. Helicopter to Lake Ballard

"Photo 6 at the mouth end of Marmion" *between 1004 hr + 1014 hr*
Photo 8 flooded station *between 1014 + 1018 hr*
Photo 9 East end of Ballard *between 1018 + (say) 1025*

I flew to Kalgoorlie from Perth 0615 hrs on Wed 15 March for helicopter trip (returned to Perth same evening, (with Grant?)).

Grant, Clive, Marj Reni (VWSG) (staying at Prospector Caravan Park) and I flew to Ballard colony on Wed 15 March 1995.

Perfect island for helicopter adjacent, even shade. We landed 600m away from nesting area without disturbing the birds.

Circled island first for photographs of extent of nest area (see folios 14-16 for map (from my air photos) of nesting area on this day).

Landed, walked, waded to nest island. Found we could sit 10-20m from nesting birds.

Observed plumages, nesting behaviour, eggs, staked out and phot'd (to see how many nests, eggs and eggs/nest) some quadrats to, marked eggs in c250 nests for determination of clutch size, nesting desity, hatching success etc .. (We marked every egg in every nest in an area (still laying) outside the quadrats with the number of eggs in that nest), photographed birds.

Colony now 4500 nests (from 2000 in 3 days).

Copulation attempted everywhere, 45 seconds each, up to 20 visible at one time.

Nests contained 1-5 (mostly ..) eggs, colony still growing. Assuming laying rate of 1 per day, the first eggs (i.e. of the nests containing 5 eggs, and also assuming they were all layed by one bird) were layed around 8 March, 12 days after 4 days rain started and only 8 days after it finished! *3 eggs in 5 nests → 10/3 = 14 days*

Frenzied activity - pairing, fighting, copulating.

One third of birds did not have complete plumage. 10% had no band at all. Yet doing everything including copulating (both males and females) and incubating.

Back plumes.

Predators?

Incubating adults dunking belly feathers in water and having drink before returning to nest (hot day).

Spent 8 or 9 hrs (check notebooks) at island then flew back to Kal.

I flew back to Perth at 1940 hrs (with Grant?).

This was the earliest stage at which a nesting colony had been visited by anyone (not true for early scrapes).

Planning

Discussion with Clive and Jeremy. Opportunity for the first time to follow breeding event from go to whoa.

Information on how soon after lake fills does nesting start, clutch size and laying rate, incubation period, how long for chicks to fledge, diet, salinity, role sharing, nesting behaviour, hatching success, fledging success, predators, dispersal. Also band and leg flag for first time - dispersal, movements, survival. I had particular interest in seeing what threats might be, any conservation needs.

ABCTV would join us. We would make logically possible (Argo, boats, radios, camp, etc) and ABC would pay for air surveys including first and helicopter flight.

Did literature searches with Romeny Lynch's help re colonial nesting studies, DNA, Banded Stilt.

Planned to return on ground on .. (me booked to fly to Kal on evening of 22 March and do air survey 23/3) but delayed 1 week (?) due to ill camera man (bitten in Qld, hospitalised) and need to find replacement.

Wk 29/3
Sun 26 March - Fri 7 April. Me, Grant (most of time), ABC TV, on Lake Ballard, at Camp Island
Grant and I drove to Kalgoorlie with trailer, 2 punts (10', 12'), outboards, Argo, Argo trailer, etc (SLIDE) on Sun 26 March, meeting ABCTV Nat Hist crew (Mark Lamble and Campbell ..) at Kal airport around 7.15 pm).

Next day, Grant and Mark (?) did air survey of Ballard and Barlee. Found fewer birds and no nesting on Barlee, but now 3-4 (how many seen on flight, only 3 and not including colony 3.5 km west of Camp Island?) nesting colonies on Ballard.

After lunch, Grant, I (our vehicle) and ABC team (with hired Toyota personnel carrier) drove to Jeedamya Station (leaseholder/manager is John Finlayson) and then to Crossover Lake. Ferried some gear across Crossover Lake by punt, then camped on N side for the night. Next morning (29/3), ferried rest of gear across lake, then to shore of Ballard (by Argo + Argo trailer) then ferried gear by punts (1 8hp outboard, 1 electric) out to Camp Island. Established camp there (water, fuel, generator, tents, tarps, fridge, 25 watt portable HF radio with sellcall, hand radios. Water .. deep. Camped there for .. days.

Is the following air survey data or ground data?

Now 1st colony grown to 20 000 nests (10 per sq metre).

Second colony of 15 000 found 3.5 km west.

Also two other, smaller colonies (seen by Mark and Grant further west during air survey) on Ballard.

Observed ... numbers in and out of colony, colony size, new quadrats to determine laying rate - photographed these daily. Photographed quadrats established on previous visit daily - most interested in when hatching would occur (incubation period) (from incomplete catches of 15/3 plus knowledge of final clutch size and laying rate and date hatched).. Stopped photographing these when first chicks appeared because of concern about mortality (Mark Lamble had observed aggressive behaviour of adults to chicks on nest. Established 4? new quadrats in area where laying still occurring (nests contained 1 preferably or two eggs) using 20mm PVC pipe and elbows, and phot'd each day to determine laying rate.

Established automatic water level recorder, took water samples for salinity and nutrient (P & N?) analysis, sweep samples (50um or 110um nets?) near camp island for invertebrates. Water and air temps taken. ult feeding areas to collect adults and sweeps for diet analysis.

Hatching began on 3 April (peeping on 2/4?), .. approx .. days after....

Mark and Campbell .. boated off to west and found a second colony of .. pairs, .. km distant. Filmed frenetic behaviour. Reported new nests being formed and eggs laid, so next day I went there and established ten .. quadrats to determine laying rate and subsequently size of colony hatching success and hopefully incubation period

Predators observed were ..

Banding, colour marking and flagging approved by ANCA on 23/3).

Had bands (initially 490 (issued 23/3), size 8, incoloy) on this trip? by Clive?

I tried catching adults on nest to individually colour mark (20 bands of each colour). Too disturbing. Then tried individual recognition by plumage. Too time consuming.

I collected 30? eggs of .. clutches (SLIDES or prints?) for DNA testing to see if all laid by same female. Show also SLIDES of clutches in nest?

Recorded waterfowl breeding at Crossover Lake for comparison.

Ron Johnstone, Phil Stone, Nick Kolichis's air survey on Fri 7 April (and 1 day ground visit on Sat 8th).

They flew (air survey) Barlee (central arm & northern portion), Goongarrie, Marmion, Ballard and Raeside (central) on 7 April (flew over me at 1st colony) and found:

- Marmion: 500-1000 stilt (no colony seen),
- Ballard: 1st colony 3-5000 pairs, 2nd colony 2-3000 pairs, at 29 23'S 120 51'E colony of 500-1000 pairs, western end possibly 500-1000 pair colony
- Barlee: 1000 pair colony (my Guitar I.)

On 8/4 they paddled kayaks out to both colonies (met our team). Phil Stone took "viewCAM". Took photos. Rain, cold squalls. On 2nd colony they did/saw:

- collected 10-12 incubating adults ranging from 0-100% chest band.
- collected 4 chicks
- took stomach samples
- collected small series of eggs
- Saw creches of 50-100 birds
- hoard of crows came off the island

• Wedge-t Eagle

Ron J. also said "John Darnell, Port Hedland 50-60 000 birds, 80% inactive"

Grant returned to Perth on .. for a few days (left vehicle in Kal?) to do Peel-Harvey on 5/4 and for private reasons, but did his back in (so Alan Clarke and Raelene did P-H on 6/4 instead). I left Ballard on Fri 7 April, Cam gave me a lift in ABC vehicle back to Kal for the night. Grant returned (flew) to Kal on Fri 7 April and had late dinner (valium) with me and Cam in Kal. Next morning I flew to Perth and Grant and Cam returned to Ballard, meeting Clive at Jeedamya (he had driven down from Broome) and taking him out too.

I took stilt eggs to John Weatherall at Murdoch Uni on Sat 8 for DNA analysis (what requested?)

Sat 8 April Clive joins, Grant rejoins, ABC TV team on Lake Ballard at Camp Island (I left previous day). Grant and ABC leave .. April, Clive leaves 15 April

Grant had returned to Perth on .. for a few days. He returned (flew) to Kal on Fri 7 April and met (late dinner) me and Cam in Kal. Next morning Grant and Cam returned to Ballard (I flew to Perth), meeting Clive at Jeedamya and taking him out too.

Clive and Grant did the following.

- collected with Grant 3 males and 1 female with chicks

Much rain. Clive's vehicle bogged at Crossover Lake.

Grant and ABC left on .. Gear left in ABC tent and under green tarp on Camp I.

Clive stayed on his own for three days until Sat 15/4, when he left.

Clive did the following.

1st colony

- photo'd the 15 quadrats (on 15/4?)
- counted addled eggs, dead chick, active nests
- guessed 20 000 nests

2nd colony

- measured approx as $80 \times (20-5 = av15) = 1200 \text{ sq m} = 12-15000 \text{ nests}$

General

- 9-10 AM (12/4), incubation changeovers observed. .. PM (9/4) birds left nest, drank etc, returned to unoccupied (except eggs) nests to resume incubation. Unclear how frequently changeover occurs and in what proportion of nests.
- 1 parent with chicks when leave island
- rain added 13cm to Ballard. Water depth 51cm at 4pm on 14/4, four days after rain (at stake on N side of Camp I.)
- didn't band in colony.
- caught broods going to water for measurement purposes. Footprints trap chicks, fill them in.
- by boat & plankton net, Clive (alone) banded, flagged, weighed, measured 10 chicks (4 families) in 2hrs, don't catch all at once.
- expects high survival
- on some mornings Clive saw up to 2000 chicks leaving 1st breeding island in just a couple of hours.
- recorded brood sizes
- families were closely associated on water, but no true creching at this stage at least.
- lack of predation. Compare with Lake Torrens in 1989 where Silver Gulls totally destroyed last part of colony and took many eggs and some chicks throughout the breeding event. No gulls yet (I saw 1 later, not at colony).
- Little Crows mainly took dead chicks, often failed to take live chicks, only succeeded twice.
- Wt Eagle snatched chick from group of adults and chicks crossing island.
- 70mm of rain fell on 10 April, topping up the lake almost back to its maximum level..
- parents don't do distraction displays, unlike other waders.

Incubation period:

- hatching commenced 3 April, 22 days after first air survey of 12 March, therefore incubation at least 23 days (counting 12/3 and 3/4). Note that I said hatching started 3/4, but I actually heard cheeping in 2/4 (check), which gives incubation period of **at least 22 days**.
- 2nd method of calculation [from general area where we marked (on 15/3) eggs of incomplete (1-2 egg) clutches, and Mark Lamble's advice that most here hatched 6, 7, 8th April, i.e. 23 days after 15/3, assuming they became 3-4 egg clutches] gives 21-23 days (counting 12/3 and 7/4) (23-2+1= incubation period of **22+-1 day**)
- 3rd method [Clive's visit on 9/4 to area of eggs marked on 15/3 and observation of a nest with 4 eggs, one of which was marked "1" (i.e. only one egg in this nest on 15/3), with 3 of these chipping on 9/4] (25-3+1=23 days) (includes day of hatching). Also 2 nests with marked eggs, some chipping and 1 or 2 chicks in nest. One is consistent with 23 day max incubation period, the other calculates to 23 day period.
- Most other eggs in marked eggs area visited on 9/4 had hatched (some addled) therefore the above three calculations probably at upper end of range of incubation period, **therefore average incubation period probably 21-23 days**.
- Note that all three methods assume incubation commences after laying of last egg of clutch. It probably commences after 2nd last egg so add 1 day to each of above, gives incubation period of **22-24 days**.

Hatching success

Clive photo'd and counted eggs etc in the 15 quadrats on 14 April at completion of nesting.

Weights

Egg weights: within week of hatching (2 chipping): 28-45gm (average c 37.5gm). Note that Clive wrote in Wingspan that "clutch of eggs weighs almost as much as female itself". CHECK CLUTCH SIZES AND WEIGHTS.

Chicks caught as leaving colony (before reaching water) on 12 April: 22-31gm (average 27.6gm, n=11)

Chicks banded & flagged c1km west of colony: 23-31gm (average 27.4gm; n=10)

Chicks (1-2 days after leaving nest) collected 1-2km W of colony on 11/4: 23-28.5gm (average 25.8gm; n=14; c1/8 of adults).

Adults collected with 1-2 day old broods: 4 male 203, 209, 210, 241gm; 1 fem 197gm. (average 212gm)
All had active large double brood patches.

Brood sizes	as leaving the colony			on water 1-3km from colony (1-2 days after leaving)	
	9/4	12/4	14/4		11/4
Average	2.9	2.7	2.6		2.4
Mode	3	3	3		2
broods (n)	60	131	153	81	>425

Crossover lake records.

Grant went to PNG from Sun 23 April to .. so unavailable for next Ballard trip.

26 April - 4 May ?, Alan Clarke, Rob Thomas (1 night) and me, joined by Andy Chapman, Lake Ballard, at Camp Island.

Alan and I drove up from Perth in 4Runner with punt and outboard (SLIDE) on Wed 26 April. Now have 2 petrol outboards(.. and 8hp) plus electric.

I did air survey of Barlee and Ballard on Th 27 April AM.

- Barlee: Found breeding island (empty), 1 creche of 50 large chicks + 10 adults. W-t Eagle swooping. Also c3000 adults".
- Ballard: Found no stilt on 1st island, but still stilt sitting on 2nd. No other breeding sites found. Many creches (to 50) to west and north of 2nd island. Chicks in 1000s, not 10 000s (underestimate?).

Mon 21 May 1995
22/12/13 6.

27 April PM, Alan, Rob and I drove (2 vehicles to Jeedamya and then out to Camp Island in the dark on compass bearing).

Next day (Fri 28/4), 1st breeding island already deserted (SLIDES). Counted chicks coming off 2nd island. Rain.

Rob left for Kal that afternoon (Fri), wet track out. Pissed down overnight?

Andy Chapman joined us for 3 days (picked him up at Crossover Lake) on PM of ... (Sun or Mon).

Andy, Alan and I took water samples, measurements, Collected parents and chicks for diet, sexing. Caught (SLIDES), banded .. and leg flagged (SLIDES and EXHIBIT) on tibia (above "knee"). 500 flags made by VWSG (Mike Barter, need to thank) Why yellow?

Flagged 170 chicks. .. by boat (SLIDES), ranging .. km west of 2nd nesting island. We shot, collected, swept.

Brine shrimp abundant.

Water depth, quality:

28/4: water 0.54m deep at stake next to Camp island (0.89m from top of stake down to water surface), pH 7.9, Temp 19.0 (8.30hrs. am?). (V1, folio 106)

2/5: depths at sites of collection of adults and chicks, 0.47, 0.48, 0.49, 0.33, 0.31m. (V1, folios 108-9).

4/5: 0.44m deep at stake (0.97 down from top of stake), pH 7.8, temp 12.6 (time?)

Measured 1st nesting area on 4 May (when 2nd?) and used triangular tessellation method to compare later.

Alan and I left on 4 May, driving 4Runner back to Perth (Northam).

Crossover Lake records (see Vol 1, folios 107, 109).

8hp outboard taken to Kal for servicing, electric outboard left at the Lake.

9 - 17 May, ABC TV team at Ballard on own, Camp Island then drove to West end of Ballard air survey?

Detailed report at V1 folios 129-33.

Did air survey with Andy Chapman.

All birds had left 2nd island. All creching at W end of Lake.

Mark and Cam left Kal Tues night (9/5) and drove to Crossover Lake. 1-3mm rain o' night.

Wed 10/5 to Camp I. then Mark boated c 15 km W till too shallow. V. strong NW wind flattened tent on Camp I. Rained o' night <5mm.

11/5 looked for tracks to W on mainland.

12/5 filmed Camp I. and 1st deserted colony. 2-3000 adult stilt landed in water near 1st island, then moved up close to it. Attempted copulation on water. Very vocal. Very flighty. They filmed it. The birds left when Wt eagle landed on breeding island.. "over 2.5-3hrs (meaning?).

13-14/5 filmed Camp I. and 2nd deserted colony.

15/5 moved from Camp I. to New Camp.

16/5 filmed chicks on lake.

17/5 filmed chicks, returned to Crossover lake camp.

18/5 returned to Kalgoorlie.

They then drove to west end of lake along N side trks/fencelines. Camped there. (2 days?). Big sand dune, visibility for c2km. Takes 2hrs towing trailer to drive from Crossover Lake to new camp when have done it once. 60km/hr in good stretch. 3 fences to cross, then camp 500m from lake (good map at V1, folio 129).

Many adults flying back and forth past Camp I while camped there.

Found "hundreds and perhaps thousands of chicks" 30? (not 70) km W of Camp Island. Compare this with statement in Wingspan that Mark reported tens of thousands of well-grown chicks on the western end of Ballard. CHECK.

Fledging on 17 May Mark and Cam saw chicks flying 30-50 cm above water for 10-15 meters. These were the oldest chicks seen. Saw chicks flying only 3 times near New Camp. So if these were the first chicks to hatch, i.e. hatched at 1st island on 3rd April, they fledged at 44 days (6 weeks 2days).

No strict creches, loose groups of 3-20, all different ages, adults interspersed and came and went. Adults acted as sentry/alarm birds and lead chicks away from threat. Didn't appear attached to particular chicks. Birds very very flighty to people (1 km or more away). Used Argo as film platform. Half a km from new camp he (Mark) had birds walking past very close.

One person can round them (chicks) up on hard ground.

Conditions changed day to day (wind).

The birds marched E during day and W at night. Chicks are wading, not swimming.

Very few "artemia" in water near new camp, but v. thick around breeding island (estimated 4x as many as previous visit).

Wingspan article says chicks feeding in very shallow water on minute items too small to be brine shrimp, and adults periodically left chicks to fly to deeper water, presumably to feed on brine shrimps.

Bogged the Argo many times in soft spots in mud. It did not fare well..

No predators except uid raptor.

Mark caught one banded chick on 10/5 at 2pm, 3km NW of Camp I. (among 7 chicks and 3 adults). Didn't get number.

Filmed chicks from Argo. Birds came to accept it and was a great filming platform (said it would also be good catching platform).. Cat came down sand dune and birds ran away.

7-14? June 1995. Grant, Alan and Andy Chapman at Ballard, then Marmion Lake

Air survey by Andy Chapman and Ian Kealley in Cessna 210 on Tuesday 6 June of Ballard and Marmion with objectives of .. (V1, folio 123). Not paid for by ABC (agreed). Strong NW wind. (full report at V1 folios 139-40). (Also see V2, folio yy for another full report COMPARE!!)

- Ballard 22 000 stilt. No flightless chicks left. Not one! Therefore all fledged Check against date at which last chicks came off 2nd island. No new nesting activity. GyTl in thousands, Shel in hundreds.
- Marmion: c1500 adults and c600 chicks (about same age as Ballard at beginning of May, i.e. some not long out of nest) in lee of one island. Also another c700 adults Water too shallow for outboard. Didn't find nest site but thought could find on ground. GyTl & Shel.. Note that Wingspan article says colony on Marmion was "5000 pairs, with at least 2000 chicks seen in June" and "nesting success probably lower than Ballard due to regular presence of Wt Eagle and a Peregrine Falcon..

at Camp Island

My Diary says "advise Grant of Marmion location" (ticked).

Grant and Alan then drove to Kalgoorlie (see full report of this trip at V1 folios 150-154).

Initially they went to Ballard?

Water depth and quality: depth 775 mm (??), pH 8.7. Samples taken, sweeps done. Nesting area of 1st island precisely measured. Depth datalogger downloaded, logger left in place.

All gear withdrawn from Camp Island and Crossover lake campsite.

Crossover Lake records:

Grant, Alan and Andy moved from Ballard (Camp Island) to Lake Marmion on Sat 10 June access via V. Tonkin's station. Have "magic" campsite.

Marmion

Installed staff gauge. Measured water quality., samples, pH 7.4.

Found 10-15 000 adults and 1000 chicks.

On 11/6, banded 200 chicks (all that were issued) on left tibia. Flagged 195 chicks on right tibia. Worked from Argo, towing 3m punt. (Note that extra 20 were flagged but flags removed because thought on wrong leg).

Collected 1 family. Chicks weighed 32, 33, 34, 39, 42 gm. All had large yolk sacs. Adult was male, 221 gm.

Salinity 46 ppt on 11/6 (Andy Chapman), pH was 7.9..

Ostracods and Parartemia.

Depth mainly 10-20cm, too shallow for boat, used Argo.

Capture chicks by driving to creches, chase 20-30, catch, take back to boat, release, adults come back.

Oldest chicks have well developed flight and body feathers, will fly within week. Also chicks 2-4 days old..

Andy left at 0700hrs on 12/6 and flew air "survey" of Marmion (and..?) on Mon 12 June to find nesting site and direct Grant that way (also to Grant via radio in PM).

Banded and flagged chicks. Total flagged = 195+260+20=475.

Collected more families. Detailed measurements taken.

On 13/6 Grant and Alan visited Marmion nest site (SLIDES??).

Water depth up to 52 cm.

Detailed observations made at colony.

Measurements. Size of colony. Peregrine Falcon and Wt Eagle. Photos & veg samples taken.

Totals of chicks banded and flagged.

Argo and trailer left at Marmion.

Grant and Alan returned to Perth on ..

12/6 + 475

Air survey by Andy Chapman on Fri 14 July.

(See V2, folio yy for full report)

Ballard: 4 passes over lake. 6-7000 Stilt all flying, no further nesting

Marmion: 20-25 000, include. 10% chicks not flying but "coloured up". He reported gear (trailer + Argo) was OK at Marmion.

Other bird observations made (see V2 folio xx)

Flight was 3hrs, Piper Warrior, \$630 in toto.

Air survey of Ballard and Marmion Andy Chapman and .. on Tues 22 August 1995

Piper Warrior. (See V2, folio yy for full report)

Ballard: 4 traverses of lake. Western end dry. c11 500 stilt "all adults wading and flying" ..

Marmion: 7500 stilt, c20 incapable of flight.

10 August 1995 Andy and .. collected Argo and trailer from Marmion

Depth 5cm at sample point near camp. Salinity 63 ppt. Of c200 stilt observed from shore only 5-6% had bands on chests.

.....Sep? , Grant diverted from SW lakes survey (9-17/9) to Ballard to collect water level recorder.

Drove up from Esperance.

Retrieved Water level recorder from Ballard. Observations?

Brought gear back from Marmion (observations?) and Kal?

Tag publicity and sightings

Publicity for tags - Wingspan? WA Bird Notes (see my Vol 1, folio 113), Direct approaches, Mike Bamford. "Tattler"? Clive will do SA and Vic.

Subsequent sightings, by, on, where, implications,

Mike Bamford reported 10 000 Banded Stilt at Port Hedland prior to Cyclone Bobby and none one week later.

Andy reported that on 24 October 1995, 1 stilt in flock of 300 in 2cm water at Lake Arrow 24km of Kalgoorlie was leg flagged (yellow). He is going to S coast over Xmas - observations??

Letter of late Nov 1995 from Mike Bamford.

Terri Lloyd at Dumbleyung.

1 yellow flagged Stilt observed at Rotto on 21 Jan 1996.

Cargill Salt, Port Hedland, stilts began arriving 13 Feb 1996.

One yellow flagged stilt at Dampier Salt on 7 March 1996. Steve vL said BaSt have only begun arriving in past 2 weeks.

Grant saw 3 leg flagged and one banded Banded Stilt at Port Hedland Saltworks on 28 (check) Feb 1996.

A question?

ABC film

half our program "Bobby and the Banded Stilt"

Film in final stages. 1st draft of narration. ... of film. Jeremy Hogarth to TVNZ.

Working on data with Clive as time permits for publication in Emu. Popular articles in Wingspan.
No plans for further work at this stage, snowed under.

Andy Chapman

Found nesting on Marmion (why looked? for renesting?).

Finished

Travel claims, diaries (checked mine 15/5/96), vehicle logs,

Granr, Alan and Andy slides?

No renesting as at Lake Torrens (Wingspan)

Copy of 'Bobby & The Banded Stilts: Narration Draft 1' with JL's edits as faxed by JL to David Luffman of ABC TV Natural History Unit on 13/5/1996.

Two references to gulls / predators are highlighted.

DEPARTMENT OF ~~Conservation~~
BUSSELTON DISTRICT
FAX NO: (097) 521 432

FAXED
TO: DAVID LUFFMAN URGENT: YES / NO

AT: A3C TV NAT. HEST.

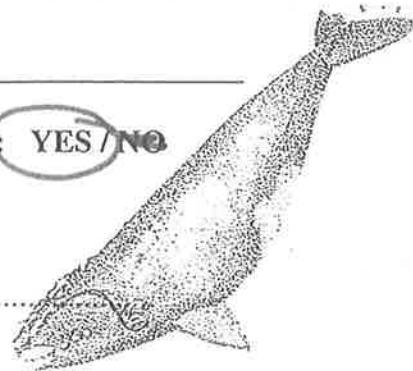
..... Fax No.

FROM: JEM LANE

DATE: 13/5/96

Your Ref:

Local Ref:



Comments on Banded Stilt video

No. of pages inc. this page: 9

Please call us on (097) 521 677 if this message was incomplete or illegible

nest, or breed.

01.31 Only in the 1930's was it realised that the answer to the mystery lay here, in the vast salt lakes far inland.

01.42 More especially, it lay buried in the salt itself:

01.50 in billions of tiny eggs - not dead, but dormant, waiting year after year, sometimes for a decade, for rain.

1.59 On February the 24th, 1995, it came

CYCLONE BOBBY - NEWSCAST

03.17  Far away from human settlements, across the normally arid inland, cyclone Bobby dumps four hundred ~~of~~ millimetres of rain in a mere four days.

03.34 Enormous quantities of water flow across the flat red earth towards the lowest point in the region - three great salt lakes five hundred kilometres from the nearest sea shore - Lakes Barlee, Ballard and Marmion.

TX	G3	097 572930	MARGARET RIVER	03/04 10:00	00'43	1	OK
TX	G3	097 572930		03/04 17:08			

BOBBY & THE BANDED STILTS: NARRATION DRAFT 1 J.H.

196.

00.09 In the arid heart of Australia, a great salt lake shimmers in the heat. Few places on the surface of the earth appear so stark and lifeless.

00.23 There's barely a hint of moisture - only the harsh, dry desert winds. Yet here in a few days time, billions of tiny shrimp will swim, and ~~all hundred~~ thousand water birds will come to breed - and all because of a storm called Bobby.

Seventy /

TITLE: BOBBY AND THE BANDED STILTS

00.57 The Banded Stilt is one of Australia's commonest wading birds - and one of its most mysterious.

01.05 Unlike many waders that frequent these coasts, the stilts are not migrants, but permanent residents .

01.16 Yet for over a century after they were named for Western science, no ornithologist had ever seen them mate, or nest, or breed.

01.31 Only in the 1930's was it realised that the answer to the mystery lay here, in the vast salt lakes far inland.

01.42 More especially, it lay buried in the salt itself:

01.50 in billions of tiny eggs - not dead, but dormant, waiting year after year, sometimes for a decade, for rain.

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BOBBY & THE BANDED STILTS: NARRATION DRAFT 1 J.H.

03.52 Many Australian salt lakes, when they fill, are soon inhabited by millions of fish, washed in by seasonal rivers. Here there are no rivers, and no fish. (04.03) But there will soon be life in abundance.

04.10 Within days billions of tiny crustacea are struggling free from the long-dormant eggs in the salt crust..

04.20 In the sunlit water, algae and bacteria are already multiplying to feed the brine shrimps. Soon the lakes will be a living soup.

04.34 It's a minor miracle of nature. But hundreds of kilometres ~~to the west~~, ^{Australia's} *distant*, a still more extraordinary event is taking place

04.53 All up and down ~~the~~ western coast, the Banded Stilts are leaving. In flocks of thousands they head ~~to the east~~ ^{inland}.

05.21 The coast this far south wasn't in Cyclone Bobby's path. Here, it has hardly rained for ~~weeks~~ ^{months}.

05.30 So how have the birds learned that far inland, the salt lakes are filling, the brine shrimp are hatching? Nobody knows. Yet there's no hesitation. Only two or three times in their lives will the Banded Stilts get a chance to breed.

06.14 Of the three enormous island-studded lakes which have suddenly appeared in the south-western outback, the ~~majority~~ ^{main} majority of Banded Stilts choose only one - Lake Ballard.

06.29 Less than a week after the rains ceased, the birds have begun to arrive.

06.38 And they keep on coming. Some ^{may} have flown from as far away as Port Headland, a thousand kilometres to the north ~~near~~.

07.02 Why do they prefer this lake to the others?

07.06 Why, of all the islands in Lake Ballard, do they choose to crowd together on just four? There are a host of questions without answers - because this is the first time ever that a Banded Stilt breeding event has been studied, and filmed, from start to finish.

1940
BOBBY & THE BANDED STILTS: NARRATION DRAFT 1 J.H.

07.29 From the moment they arrive, there's an air of frantic urgency. All over the tiny island, birds are pairing off and trying to mate.

07.43 It may be only ~~a matter of weeks~~ ^{two or three months} before the Lake dries out - and there's a lot to do.

07.50 Everywhere, there are squabbles and fights over nest sites.

07.56 Why the birds feel the need to crowd so closely together is not entirely clear. There's no shortage of islands - and few predators to force them to seek safety in numbers.

08.08 And yet day after day, more Banded Stilts arrive, and the pressure for space increases.

08.37 To a human observer, there's no visible difference at all between the sexes. But despite the apparent chaos, the Stilts have already formed breeding pairs - a male and a female take joint responsibility for scraping out the nest hollow and defending it from encroaching neighbours.

09.18 Males without mates resort to desperate measures. This one is trying to force his attentions on a female who's already ~~laying~~ incubating. Approaching the task from this end, he's no chance of success -

09.34 but he keeps on trying.

10.09 There are spats about everything - even a single leaf which could be packed around the nest hollow to make it cosier, is the object of vigorous fencing.

10.36 This looks like another unwelcome attempt at mating. The female keeps her head disdainfully erect - a sure sign that she's not interested in her suitor

11.00 Eventually, she seems to get tired of the business, and chuck's him off

11.14 This is the way it should be done. The female's bill is outstretched, parallel with the ground, in a gesture of compliance ^{nor perhaps of pleasure}  wagging side to side

11.32 After forty five seconds or so, the male hops off, and both birds perform a curious little dance of triumph.

BOBBY & THE BANDED STILTS: NARRATION DRAFT 1 J.H.

11.47 The island is full of drama - pursuit and rejection, ~~hostile~~ tiffs and reconciliations.

12.10 So urgent has been the response of the Stilts to Cyclone Bobby, that many of them are still growing their breeding plumage - the rich chestnut coloured band across the breast for which they're named, ~~shading to~~ a glossy black patch ^{merging with} on the belly.

12.26 Yet the birds with mottled breasts seem to fare just as well in the breeding stakes as those in full regalia.

12.33 This Stilt, with only the barest hint of a Band, has already laid her eggs. So why bother to grow breeding plumage at all? It's another mystery. ^{to a thousand}

12.44 A mere fortnight since Cyclone Bobby passed by, the early arrivals have flown ~~at least~~ five hundred kilometres, mated, and laid ^{as} a clutch of up to five enormous eggs. It's ~~one of the most astonishing feats~~ in the avian world. ^{to a thousand}
~~One of the most impressive feats~~

13.04 And still, through the days and nights of March, the breeding colony grows.

13.37 By early April, there are four separate colonies on Lake Ballard - around 70,000 thousand adult birds in all, or perhaps a quarter of the entire Banded Stilt population of Australia.

13.51 And yet the lake can feed them easily. It's now ~~seething~~ ^{teeming} with brine shrimp. With no fish to check the increase, their population is growing at a phenomenal rate.

14.07 Within days of hatching, the shrimp are ready to mate.

14.22 Each female produces up to a hundred eggs, which will hatch in just three weeks.

14.29 And almost the only living creatures feeding on this wealth of protein are the Banded Stilts. ^{in such numbers}

14.40 No other waders arrive to breed at Lake Ballard. Only the Stilts are adapted to feeding in waters of such high salinity. And ~~its~~ ^{its} remoteness means that ~~very~~ few predators find their way here. ^{have found} and breeding on shallow ^{and} a few Avocet

BOBBY & THE BANDED STILTS: NARRATION DRAFT 1 J.H.

14.56 Less than five weeks after the end of the rains, the first chicks are hatching.

15.32 An hour or two in the sun will turn its down from soggy grey to fluffy white.

15.50 In other salt lakes, in other years, young chicks like these have been snapped up in their thousands by predatory Silver ~~black~~ gulls. But the gulls never found the colony at Lake Ballard. 

16.03 Yet there are dangers all around for the chicks - from their own kind. The nests are packed so tightly now that each adult bird's territory ends only centimetres from the nest. The chicks must stay close beneath the protection of their parents wings and bill.

16.30 A few false steps, and a chick has strayed out of the safety zone - immediately the other adults attack it.

16.55 With two other chicks to protect, the parent can't come to the rescue.

17.13 As the relentless harassment continues, the chick becomes disoriented - and staggers further into hostile territory.

17.31 The nesting birds are hypersensitive about the area immediately surrounding their nests - and the chick is tossed from one danger zone to the next.

18.03 ²⁴ Within hours of hatching, the chicks must get to the water to feed - the only way get there in relative safety is to be escorted by a parent through the gauntlet of nesting stilts.

18.16 The stray chick has to be abandoned, to make its own way if it can.

18.21 Even the parent ~~is vulnerable to attack -~~ ^{receives unwanted attention} in this case ~~what looks like attempted rape -~~ from yet another amorous mate.

18.37 Desperately the third chick tries to catch up with its parent and siblings.

18.51 Usually, once they're clear of the nesting area and reach the open beach, the chicks are safe.

19.12 But in the first few days, the chicks were often attacked by other adults right on the water's edge.

BOBBY & THE BANDED STILTS: NARRATION DRAFT 1 J.H.

19.20 The parent rushes to their defence - but the attacks continue, ~~ruthlessly~~, ~~relentlessly~~.

19.47 There's no obvious explanation for this continued bullying, for the beach is normally a place of free passage. After the first few days of hatching, this apparently ~~aggressive~~ spiteful behaviour was ~~never~~ seen again.

20.02 The third chick, abandoned again to its fate, is reaching the end of its strength.

20.13 But it makes a last effort.

20.24 And at last it reaches the safety of the water. Though only a few hours old, it's able to feed itself immediately.

20.34 More and more families are escorted by a parent - usually the father - down to the water's edge.

20.47 And here, a remarkable transformation happens. ~~Pure spite~~ hostility for no apparent reason is very rare in nature. And so is altruism - expending effort to help another creature who doesn't directly share your genes. ~~Now~~ Now, quite suddenly, ~~the~~ adult stilts turn from bullies, to babysitters.

21.12 At first, parents and chicks ~~float~~ ^{head} out onto the lake in little family groups.

21.20 But gradually, the families coalesce, and ~~most~~ ^{many} of the adults leave.

21.30 Eventually only a few are left to shepherd the growing flocks. Each creche usually numbers forty or fifty chicks, minded by half a dozen adults. For days, they'll ~~waddle~~ ^{swim with the wind behind them} across the vast expanses of the lake, feeding on the brine shrimp as they go.

21.55 By the end of April, the chicks have ended up at the western end of the lake, fifty kilometres from the island.

22.03 Though more widely dispersed, they're still in their creches, still minded by their adult baby-sitters. But many are ~~halfway to adulthood themselves~~ ^{main resting} ~~half adult size~~.

BOBBY & THE BANDED STILTS: NARRATION DRAFT 1 J.H.

flight and body

22.16 Their down is being replaced by ~~old~~ feathers. But it will be some weeks yet before they're able to make the long ~~journey~~ ^{flight} to the coast, and it's vital that the water - and the shrimp - remain in the lake until then.

22.34 Sometimes in the past, the lakes where the Banded Stilts have bred have dried up prematurely - and thousands upon thousands of chicks have ~~had to~~ ^{been} left to die.

22.56 But this time, ~~a~~ further fall of rain has ^{refreshed} the lake.

23.05 It's slowly emptying, and the chicks have to make short dashes across the muddy island foreshores from one patch of water to the next. But there'll be time for the chicks to ~~grow to maturity~~ ^{been} fledge.

22.19 Leaving the chicks and their minders behind, thousands of stilts are already leaving.

23.34 Two months after they arrived in the wake of Cyclone Bobby, ~~they~~ head westward again towards the sea.

23.50 ^{many} The colony is deserted. Thousands upon thousands of nest scrapes, dead chicks and rotting eggs are all that is left.

24.20 It looks like a disaster zone. But in fact it's been one of the most successful breeding events in years. Less than twenty percent of the eggs failed to hatch, and were abandoned to the maggots.

24.38 The vast majority of the hatchlings, this year, will survive. ^{few} There have been ~~no serious~~ predators; the lake water and the brine shrimp have lasted well;

24.49 As the water levels fall, the salinity of the lake is rising. It's a signal for the brine shrimp to perform their last rite: to ensure the survival of their species - and of the Banded Stilts as well.

25.07 As they sink to the bottom in their death throes, the females carry inside their bodies a different kind of egg, one with a hard outer casing which will be able to survive years of drought.

25.20 Like a shroud, the salt crust will crystallise around them.

25.39 The eggs, dormant but not dead, begin their long wait.

BOBBY & THE BANDED STILTS: NARRATION DRAFT 1 J.H.

(25.46 A few months after the passing of Cyclone Bobby, Lake Ballard will once more be a sheet of salt, lifeless and forbidding.)

25.55 And so it may stay for three years, or five, or a decade, until the next great storm brings it back to life, and the Banded Stilts return to breed again.

JL's fax (29/4/1996) to Jeremy Hogarth with additional comments on '... the 7 one hour tapes you sent me last year and ... the 29 min 20 sec video that Mark Lamble sent me (11/4/96 version)'.

Inter alia JL writes: 'Predators/scavengers at the breeding colonies were Little Crows, Brown Falcons, Wedge-tailed Eagles and Peregrine Falcons. Although they did not take large numbers of chicks ...'.

JL also refers to footage (from 0.43.23 to 0.43.48 on Tape Three) of a Little Crow 'drinking from an egg?' and 'Starting at 0.48.39 there is also approx two and a half minutes of slow motion footage of a Little Crow flying and landing and then of it flying off with a downy chick in its beak'. 'There is also footage of a Wedge-tailed Eagle in Tape Five (0.49.46 to 0.50.56)'.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
BUSSELTON DISTRICT
FAX NO: (097) 521 432

187.

FAXED

TO: JEREMY HOGARTH URGENT: YES NO

AT: TV NZ

FROM: JEN LANE

Fax No. 0011 64 3 4799917

DATE: 29/4/96

Your Ref:

Local Ref:

No. of pages inc. this page: 3

~~Lagurs and regurgitating falcons. Although they did not take large numbers of chicks they were a significant feature of the breeding event (particularly from their point of view) and it would be good to include some footage in the video.~~

The Tape Three footage (from 0.43.23 to 0.43.48 - drinking from an egg?) of a Little Crow, although not great, looks usable. Starting at 0.48.39 there is also approx two and a half minutes of slow motion footage of a Little Crow flying and landing and then of it flying off with a downy chick in its beak. This also looks usable (though it's difficult for me to tell the quality from the tapes).

There is also footage of a Wedge-tailed Eagle in Tape Five (0.49.46 - 0.50.56). Presumably this was not good enough quality to use.

Tape Four

Between 0.09.08 and 0.15.39 of this tape there is footage of the very earliest stages of hatching. As mentioned in one of my previous faxes, I think it would be a great pity not to include some of this in the video. After re-examining all the tapes I also believe that the footage in the 11/4/96 video looks a little artificial and would be concerned that others viewing the final product may also form this opinion.

At 0.39.05 there is an attractive, approx 10 sec, sequence of three downy 1-2 day old chicks walking near the water's edge. This sequence shows better than any other how large their legs are in comparison with their bodies. If included in the video, there could be an accompanying

TO: JEREMY HOGARTH
SUBJECT: "STILTS" VIDEO

Since my last fax I have been right through the 7 one hour tapes you sent me last year and had another couple of looks at the 29 min 20 sec video that Mark Lamble sent me (11/4/96 version).

Additional comments I have are as follows.

Tape Two

Feather maintenance through washing and preening is an important part of the daily routine for nesting stilts and can be related to the need to maintain their flight feathers for the return flight to the coast. However, there is only very limited footage (one second - from 0.16.15 to 0.16.16) of washing in the video and a fairly short sequence (from 0.12.01 - 0.12.05) of preening.

There are some lengthy sequences of washing at 0.18.06 in Tape Two that would appear suitable for inclusion and if this could be done it would add significantly to the video.

There is also additional preening footage in Tape Two and at the end of Tapes One and Seven which could perhaps be included, though this is less important.

Tape Three

Predators/scavengers at the breeding colonies were Little Crows, Brown Falcons, Wedge-tailed Eagles and Peregrine Falcons. Although they did not take large numbers of chicks they were a significant feature of the breeding event (particularly from their point of view) and it would be good to include some footage in the video.

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At 0.39.05 there is an attractive, approx 10 sec, sequence of three downy 1-2 day old chicks walking near the water's edge. This sequence shows better than any other how large their legs are in comparison with their bodies. If included in the video, there could be an accompanying

comment relating the size of the legs to the chicks' rapid dispersal from the colony (which is not simply "wind driven") and their need to catch prey soon after hatching.

At 0.40.40 there are a couple of seconds of footage showing the very large webbed feet of these chicks. Perhaps this sequence could also be included? in slow motion?

Tape Six

There is virtually no footage of fledged or almost fledged, chicks in the 11/4/96 video. It seems to me this is a significant omission.

There is good footage, some closeup, of fledged or almost fledged chicks feeding in shallows from 0.43.50 onwards in Tape Six (particularly at 0.47.30 and 0.54.10). Look for the large chicks with no down on their wing feathers. There is also footage of near-fledged chicks at the beginning of Tape Seven

Also, the footage of a muddy-bellied chick feeding in the tracks of the Argo (6 wheel vehicle) should be replaced. Both the habitat (mounded muddy terrain) and chick's plumage condition (muddy) are artificial, particularly the habitat.

Tape Seven

I think the best footage obtained of families leaving the colony is in the first fifteen minutes (and some later sequences) of this tape. I say this because the camera angle is wide enough to see all the action and there are long, uninterrupted sequences following family parties from the edge of the colony all the way to the shoreline and then out onto the lake. These sequences also show how well most parents deal with interference by other stilts. They also show (though not closeup) adult stilts drinking when they reach the water's edge (there is no footage of drinking in the video, see 0.22.00 below).

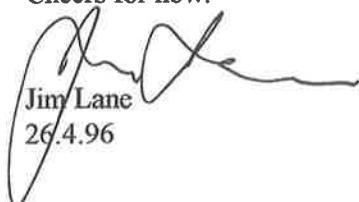
At 0.12.22 - 13.01 there is good footage showing two families joining together when they reach the shallows and then heading out onto the lake. Although such behaviour is implied in the video it is not clearly shown. Given the significance of creche formation it would be good to show this first merging of families. It also makes an interesting contrast with the aggressive/defensive interactions on the island and at the water's edge immediately beforehand.

22.00 - 0.22.15 shows an adult stilt (with chicks) drinking when it reaches the water's edge. If used, the accompanying commentary could refer to the salinity of water (which we can determine fairly precisely if given the date on which this footage was taken) and the ability of stilts to cope with high salinities.

That's it.

I am on long service leave until next Monday but can be contacted at home until then if need be.

Cheers for now.



Jim Lane
26.4.96

One page of 'Notes / Ideas' and 15 pages of notes (all by JL) referring to and describing in considerable detail the content of (videos) Tape One to Tape Seven (all or nearly all of the filming) for 'Bobby and the Banded Stilt'.

References to predators / scavengers include the following: 'use Little Crow footage (predator)'; 'small islands also offer best views of approaching predators'; Little Crow 'pecking at something'; 'Dragon lizard [potential predator or too small] on 1st breeding island'; 'Raptor overhead – Kestrel?'; 'Fluffy [BaSt] chick in beak [of Little Crow] while flying away. Avocet(?) chasing crow'; 'Remains of dead [BaSt] chicks'; 'Wedge-tailed Eagle [land and takes off twice] and 'Maggots eating nest debris'.

NOTES / IDEAS

170.

- advantageous to disperse rapidly + widely from nesting island (food ^{supplies}) linked to aggression?
- yes, ~~nest~~ eyes often do appear small.
- is the head profile unusual? salt glands?
- importance of washing / preening to maintain plumage
- all ♂ were in good condition when shot with chicks? synapomorphy?
e.g. for feeding during incubation period?
- saying bellies (feathers only?) in some adults with chicks - not evident in others or some broods - which?
- slow motion to show swallowing action? prey?
- a lot of unassisted feeding (+ washing) film # (check first video).
- RCP footage not used - not good enough?
- comment on long back plumes?
- comment on difference in size of chicks in some broods.
- use dibble cone footage (predator)
 - could make the point that ^{extra} rain kept water levels up
 - they breed on the smallest of the many islands - show island eyes
 - small islands also offer best view of approaching predators.
- purpose of aggression may be to disperse chicks as quickly as possible so food source not depleted. No - no aggression between families.
- have average of 2 chicks cause can only protect 2....
- webbed feet - dispersal? any other spp with
- two flocks of large chicks used?
- mud on chick unusual + due to Argo triterps.
- comment on wind + high hatching?

TAPE ONE

00.00 aural of 1st colony (Bellard)
min. sec microcass

16. — street persons at lower & lower levels, resting birds rising

~~00.10~~ serials of another island⁽⁵⁾ and mainland

20.48 ground shots of breeding Stilt on 1st island; incubating birds attempted copulations, plunges, walking, preening, chequing positions on eggs, long legs, pecking, unattended eggs in open, many birds standing/walking in colony,

25.21 "this roll is 13" (words spoken)

25.23 continuation, resting birds fending off potential predators, fencing (bills), sleeping on nest,

30.27 perfectly webbed feet

30.30 continuation

31.19 "abandoned" eggs

31.25 continuation, chasing thru' colony,

37.35 resting bird "playing" with piece of shell. (used in video)

39.30 open bill

39.40 continuation

40.14 successful copulation.

42.45' MC Roll 5 slate 2 in picture - (but voice said "roll 2A")

43. — continuation of incubating stilt on 1st island.

44. — masses of birds flying up from nests, disturbed by me (?), returning to nests,

48. - 30 MC a Great moving thru colony with PVC quadrant, photographing nests. (49.35' finished)

49.40 continuation of birds on nests

51. — copulation (successful?)

51.50 sky, clouds, rain in distance beyond colony.

52.20 continuation of birds on nests (1st colony). [53.04^{voice}, "This is 28"]

53. — preening birds closeup.

56.05 2 birds swimming together, taking off.

(2)

TAPE ONE Contd

56.30 Still sitting on eggs, closeups., birds walking about, closeups
~~the~~ bills slightly upturned, pairs of 2sot flying in,
 groups flying in, plunges, on nest, pecking at and moving
 debris, scratching head with foot (leg over wing)

1.01.58 Still panting. (not good enough to use)

1.02.— construction

1.02.50 End of Tape one.

TAPE TWO

00.10 "wants" continue 2B
 continuation of incubating birds on 1st island colony, preening,
 birds on water, preening, pecking at each other, birds in shallows.
 plunges, stretching, walking, calling (searching?),
washing, preening, water's edge, chasing,
 Black faced Plover?

03.20 continuation, washing, sitting, pecking at ground, etc.
 walking third colony, dropping in, sunbathe profiles of birds,

04.19 new day, continuation of following in last resting colony, sitting
 birds, 2 Humpbacked gulls (long),

11.30 ~~the~~ voice saying "reel 3, washing, washing, feeding", birds along
 that, flying, swimming)

13.25 ~~the~~ approaching island in shallows., washing, preening, feeding,
 flying, landing, males in flight (presumably one disturbing them)
 feeding (pecking) in shallows, washing (18.06) (long),

20.40 ML Roll 9 (Slide 2?) in view. Sitting on eggs, feeding in
 shallows, continuation in resting colony, flying etc., washing,
 preening, feeding,

31.10 ML Roll 10 (Slide 1?) in view
 continuation of washing, feeding etc. in shallows,

TAPE TWO contd

32.50. forward level shot of 2nd breeding Island (first film of this). forward shot of nesting colony, birds in shallows, flying, cloud, rain in distance, cliff at one end (E) of island, disturbed birds flying, settling, 39.29 voice saying "roll 3". 41.55 RML Roll 11 slate 1 sign, held by Cam. . . . continuation of film of disturbed birds on 2nd breeding island, flight (pairs),

46.05 voice saying "continuing Roll 3". Silhouettes of sitting Shilt, looks like back on 1st breeding island (at sunset).

49.19 wide angle film of 1st (E) breeding island. Then of sitting Shilt. ~~around~~ television date in afternoon.

51.03 flying Shilt, flocks & pairs,

51.50 Closups of Red-capped Plover. (don't use - eggs to be ready to come)

52.30 continuation of flying Shilt.

53.20 Adult of Rato and Plover

53.40 continuation of flying.

54.00 RML Roll 12 slate 1 last voice says "roll 4"?

54- Closups of eggs in nest with sitting bird behind, bird returning to sit on eggs, changing positions on eggs,

57.34 One bird with well developed chest bend tries to get onto ^{not good} _{empty} nest. Eggs of 2nd bird with similar chest bend when it changes its position on eggs. Unsuccessful - driven off.

58.10 2 birds settling on eggs, closups - used in order. more shots of birds settling on eggs - closups. Masses of disturbed birds. 1.02.03 me in deepest background. Birds back on nests.

1.02.42 end of Tape Two.

TAPE THREE

00.00 voice saying "this is Roll 4 contd". Incubating Shilt on 1st breeding island. ^{Disturbed} Birds returning to sit on eggs in foreground.

TAPE THREE Contd

02.06 ~~nest~~ ^{nest} First film of chick (fluffy) in ~~nest~~ (with egg).
Closeup of debris around nest & bird settling in (near end, legs),
settling on egg, 05.20 webbed feet - not great shot. - long
sequences.

07.30 Adults pecking at sitting chick, then adult settling over,
more pecking of chick, more adult settling over,

09.03 2 chicks walking with adults to the shore. One is
bigger & more steady on feet, adult attempting to
copulate with chick. *Dipperini* adult has full chest band & slightly
lowered belly feathers. (very persistent bird attempting to mount
chick has imperfect band. 2 others also downed off. Reach water
edge.

12. — another chick being protected by 1 adult (sitting) from attacks by
neighbors. Flying still, walking, feeding (upending),

14.54 Re. Avocet (2) in mid distance, stills sitting nearby.

15.30 Obs Beaks among sitting birds.

16.25 Voice says "still the last Roll of four".

17. — sitting chicks being attacked by adults, — not close. Sheltering
under wings of adult.

19.35 Attempted copulation on shoreline, Adult sheltering chicks
under wings at water edge. full chest band. lowered belly
feathers. Chicks walking about on their own. 1 larger ^{flap}
attacked by birds with incomplete plumages. Smaller chicks ~~were~~
wings (stamps) a lot whereas larger chick in brood does not.
Attempted copulation with bird sheltering 2 chicks - did not copulate.
Kicked on Dredging on chicks (attempted copulation). Another attempt
to copulate with adult sheltering chicks. 3 wings attacking chicks
in water.

31:50 Voice says "Roll 5". Chicks in water still being "attacked"

33.30 Chick being attacked on land.

TAPE THREE ~~Contd~~
~~black.~~

34.07 Good shot shows a bird opposed the nest, then lower its belly feathers as it settles onto eggs. Similar shot of bird in distance.

Birds settling. 2 chicks on the move with 5! adults, but only 1 with lowered belly feathers. Settling birds.

38.25 4 chicks on water with 1 adult (swimming). (Initially 3 adults with 5 chicks - split up occurred)

38.51 Roll 17 slate 1 - Voice says "Roll 5".

39.45 1 Chick + 1 egg + 1 standing adult, which settles on them (in nest) Dark chest band. lowered belly feathers. Fighting with neighbors.

but not lowered belly feathers 3 Chicks heading for shore. The one protective adult has full chest band, the 2 following "aggressor" bands are not fully developed. Prowed by up to 5 "adult" in shallows. Present belly feathers not lowered when moving into deeper water either. *Temp* ~~success~~ reaches water OK

43.23-48 *43.23-48* ^(26 secs) Delim of little Cownp. doobs OK to me. Picking at something.

43.52 Adult brooding 2 chicks in water + 1 nest to it.

44.10 Chicks on ground - bird on.

44.35 Voice says "Roll 5". Shnts flying - slow motion.

49.30 Roll 18 slate 1 in view. More shnts flying, landing.

56.06 Shnts feeding in shallows in mid distance. Upending shnts.

57.10 Shnts flying, slow motion.

57.35 Juven nesting colony shots.

58.35 Large scale disturbance. Return to nests. Insert behind colony (wide angle)

1:00:09 Shnts flying, slow motion.

1:01:35 MC Roll 16 slate 1 visible.

1:01:59 End of Tape Three.



TAPE FOUR

00.03 "ML Roll 20 still in view - Voice says "This is Roll 6".

00.51 ♂ ~~Boobie~~ (♂) - yolk opened on ground. Still with damaged right leg?

00.58 - 01.24 ~~Dragon lizard~~ on flat breeding island.

01.25 Hatching chick pulling free from shell pieces, adult settling on it, chick pulls its head up for first time,

04.04 Adult with chick standing under each wing, ♂ has full chest band, preening at same time,

04.22 Back to newly hatched chick - adult steps on head.

04.34 3 adults on nests attacking a chick in space between them.

04.50 Adult settles on newly hatched chick (covers it). Adult off nest + can see chick. Adult on ground, can just see chick's bill out of adult feathers. Now 2 newly hatched chicks in nest + adult settles on them. Adult changing position on chicks. Imperfect chest band.

09.08 Adult settling on eggs, one of which has small pug with chick bill tip ^{visible}.

09.35. ~~to 09.42~~ Pug hole, chick bill visible, egg covering open, adult settles over ^{in egg} hole now larger, can see that chick is breathing (bill movements)

15.39 Hole larger still, 12:14 half of shell removed - ~~imperfect~~, more of adult settling over hatching chicks, ^{adult} stretching and backwards with legs (out of nest scope). More of $\frac{1}{2}$ open egg + adult settling,

15.42 Fluffy (just) chick settling next to egg, adult settles on it, Head shape of adult,

18.00. Back to a hatching chick, feet come free, adult settling, wings of chick,

18.00. Fluffy chick + 1 or 2 eggs in nest. Adult settles on them, (seems a good shot).

18.25 Back to newly hatching chick, adult settling,

18.48 One chick hatching, fluffy chick behind, plus a 3rd yolk? ~~adult pug~~ Parent gets at hatching egg. Adult belly feathers lowered as it settles on egg/yolk. 3 fluffy chicks together being pecked by adult. Parent attempting to protect (cover)

TAPE FOUR CONTD

00.22. - more of fluffy chicks at rest, one with egg alongside
fluffy chick (parent) in nest in shadow of parent. Chicks being attacked,

Bill of chick held by attacking adult,

00.25.30 - Fluffy chick in open, near rest of others, some attacks,
 Note that sitting adults don't leave

00.26.50 - Lone chick (attacked) ~~dry or gone~~ walking very weak,
 but gets up and walks.

00.27.35 - More of chicks being attacked in colonies by sitting adults.

00.28.18 - 28.33 Razor overhead - Kestrel??

28-45 - Chicks being led to shoreline.

29.05 - More of attacks in colony. Parent goes

30.32 - Parent provides shelter, 1 then 2 chicks reach it, & third breaks
 free from sitting bird attacking it and ^{also} joins the parent, they walk off
 for shore. Actually has 4 chicks!.

31.37 - 1 adult with 2 chicks

31.50 - 2 Chicks + 1 adult feeding in shallows at edge

37.26 - 1 adult + 3 chicks walking with cross wind (used in notes).

covered (partially) belly feathers. Offers shelter at water edge

33.50 - 2 adults ⁶ chicks in shallows. 1 adult + 4 chicks in shallows.

37.22.00 - 1d more of similar, attacks on chicks at water edge,
 more sheltering of chicks, chick feeding in shallows, covered
 belly feathers, pushing other chicks away (is not its own).

37.30 - Red eared Plover on shoreline with stills.

37.49 - 1 adult leading 3 chicks to shoreline, more of chicks + adult
 in shallows. etc.

39.05 - large size of chick legs very evident (3 chicks)

39.20 - More of adults + chicks in shallows. More pushes being led
 down from nest area,

40.40 - large feet (webbed) of chicks. Chick feeding (pecking)
 intensity. More of ~~the~~ chicks / adults in shallows.

word

TAPE FOUR cont'd

41.40. - chicks + adult at water edge.

42.00. wide angle of 1st nesting colony - elevated shots from crane? Camera going up & down several times for elevated views.

45.10. Slow motion of flying Stilt. Landing on land + water. Wing markings. Singles + pairs. Wing shape is that of? Flapping except when ^{slow motion} flying.

48.39 Little coot flying just off ~~water~~ & landing. More of it flying. Shilt in background. Fluffy chick in herb is white flying away. Adult? chasing coot \rightarrow 51.30

51.30 Slow motion of Stilt flying & landing in colony. More flying. Haven't seen any sign of wing molt in any birds. Landing on water.

54.35 "Mc Roll 23 State 1" in view. Party of 10 chicks + 20 chicks on water. More of parties on water. Moving away. Chicks still small + fluffy. Note that wind has been evident in all water shots. More of family parties swimming. Sometimes in opposite direction to waves. Some of these adult feeding also. Adult: chick = approx 1:2.5 ratio.

1.00.53. Vegetation around crossover like? Drizzle $\frac{1}{2}$, Rain on vegetation & in shallows. & on water a large rain droplet.

1.03.09 End of tape.

TAPE FIVE

0.00.00. Heret views of Lake Tellerd. Water fairly calm. ~~islands~~ Pinnacle of rock in water. Close views of large vegetated islands.

0.16.05. Found levels of waves in shallows in last light. ~~the~~ Sunset shots over island + water.

0.17.02. Panning across 1st breeding island after it has been totally deserted. Empty nests, scattered eggs, debris -

repeat bridge

TAPE FIVE Contd

0.18. — more sunset shot over islands & later.

0.19.23 — sun setting over veg.

0.20. — empty colony again. added eggs in nest (closeups) and scattered ~~over~~ over colony. slow vegetation growing on island. Yellow flower⁽¹⁾ on nesting island. Closeups of flower. What is it. (at approx 0.24.45) More of egg remains. Eggshell & membrane blowing in wind. Remains of dead chicks.

Voice says "This is Roll 8" ~~as~~ by the way and the one with the sunset was also Roll 8".

Closeups of eggshell being sandblasted by wind. More of empty nest & egg remains.

0.30.16 Voice says this is "Roll 8". Waves in shallows at sunset. Islands & shallows late at sunset.

0.31.13. Panning across^{1st} nesting colony. (abandoned). Looks identical to earlier vision. Mob of waves & shoreline at sunset. late at sunset. Sun going down. Late at sunset. ~~late~~ Sun going down over vegetation. This is a ~~newer~~ ~~version~~ of footage earlier in this reel (Type 5). etc etc. More of abandoned nest area.

0.35.58 - MC Roll 28 slate in view. Voice says "more shot from Roll 8" Dead trees of Camp Island. Other vegetation of this island (& perhaps other islands) — at ground level. Edge of lake.

0.38.05. Hundreds of Shells (adults & chicks) feeding at edge of lake (water and $\frac{1}{3}$). Flying about. All in mid distance. Close to lake edge. Swimming. Mob of 100s flying. Mob of many hundreds in water in distance. ~~More~~

0.42.26. ^{MC} Roll 30 slate 1 in view and voice says "Roll 9".

Continuation of the shells (adults & chicks?) in large flocks feeding in water and still flying — all in mid distance.

TAPE FIVE CONT'D

Continue ~~scenes~~ of previous page. Nothing else.

0.49-46 Raptor lands. Takes off & lands. Wedge tailed Eagle's
takes off again. This way. Starts out of night. \rightarrow 50.58.

0.50.58 : Glassy lake surface.

0.51.22 ~~0.52.58~~ Voice says "Roll 9 again" (?) ^{? after}

0.51.25 : Continue travelling at ground level (?) (in Argo) showing
glassy water and passing low island.

52.29. "Maggots" eating nest debris.

53.45. Sunset scenes ~~for~~ over lake.

54.01 Abandoned colony scenes again (1st nesting where again).

55.11 Bird flying low over lake. What is it? Avocet??.

55.34 2 avocet in distance

55.45 edge of abandoned colony. More nest debris and old eggs.

59.07 Spider in web. (Orb spider).

59.30 Voice says "still Roll 9".

~~0.59.58~~ more of spider.

1.00.15 Agaveum - foliage of *Parthenia* swimming about. Also
other, much smaller, invertebrates?

1.02.20 MLC Roll 30 slate .. in view

1.02.36 u u 31 " in view

1.02.37 End of Tapes.

TAPE SIX

0.00.00 *Parthenia* in agaveum (and other small invertebrates) - "Dynamis" ?
Mating? Shredding eggs?

0.05.00 "Maggots" dead on surface. Continue with *Parthenia*.

0.07.25 "Dynamis". Continue with *Parthenia*. What is blue color?

0.09.30 Many more females than males - synapause?

TAPE SIX Contd

0.10.08 Voice says "Dive, Roll 10".

0.11.50 ♀ with empty egg sac. Pare luncio swimming continues.

0.12.48 Voice ~~the~~ says "This is 10 again". A abandoned
Shilt nest and eggs on ~~rocks~~ first nesting island.

0.14.24 Sunset scenes over ^{1st} nesting island (abandoned).

0.16.21 Abandoned nests & eggs again.

0.17.48 Sunset scenes over 1st breeding island (abandoned).

0.18.04 Abandoned nests & eggs again.

0.19.55 Shilt needs MC Roll? Shilt - in view. Abandoned
nests & eggs continues. Some of 2nd nesting island?

0.24.40 Large Shilt chicks feeding along shoreline (in shallow)
in scattered flock. A few adults among them.

0.25.20 Other individuals on shoreline - ~~spurts~~.

0.25.25 Shilt large chicks & adults feeding in shallow. Mid distance.
Some scenes of pecking at surface, others of head under water.

0.28.00 Feeding birds close to camera now. Many scattered in
distance also. Feeding of each individual is quite independent.

0.30.00 Solitary chicks feeding close to camera. Fast rate of feeding.

0.31.40 Adults feeding. Then continue with large chicks.

0.33.00 General shot (wide angle) of feeding chicks & adults. Note
that most of the feeding shot are belly (top of leg) deep (\rightarrow wading).

0.36.30 Red sand & green vegetation on sand dunes in background of
feeding chicks & adults.

0.38.50 Preening chicks (2). Feeding chicks (swimming & ducking head
deep under)

0.40.08 Thousands of adults & chicks feeding in distance, & flying -
panning shot.

0.41.04 Adults feeding close to camera. See Wading, head under water when
catching prey.

0.42.00 Adults & large chicks at edge of marshflat and in very shallow
water

nest
of
Laysan
Island.

②

TAPE SIX Contd

Continuation of adults + large chicks feeding in very shallow water.

0. 44.06 Chick with well developed wings. Continuation.

45.12 Chicks + adults running away from camera. Thousands in shallow water.

46.20 Chicks (some very large) feeding on ~~deep mud~~ mud.

47.30 Very large chick feeding close. Can probably fly. Younger ones with it.

48.56 Thousands of chicks - adults scattered over deep mud + very shallow water - feeding.

0.50. -- A few pools of water on mud. Very muddy dry. Still adults + chicks in distance. Running across mud. Pecking at mud.

0.53.16 Large chicks feeding in shallow water close to camera.

0.55.25 Chicks getting muddy (in tracks of Ago?).

0.56.00 Adult on one leg ~~pecking~~.

0.56.34 Chick feeding in wheel tracks of Ago again. Very close.

0.58.20 Slow motion of muddy chick feeding + swallowing.

0.59.37 Voice says "This is Roll 11 --- (inexplicable)." Ago says "This is Roll 11 --- (inexplicable)."

1.00.16 Back to normal speed (still in Ago tracks).

1.00.28 Chicks feeding in shallow water in mud distance.

1.00.28 Adult flying + landing near feeding chicks in shallow. Continuation.

1.02.02 Chicks feeding next to Ago tracks.

1.02.20 1.02.42. End of tape.

TAPE SEVEN Wetlands

0.00.01 Chicks feeding in Ago tracks - wet/muddy further. Large chicks. Adult. feeding in v. shallow water.

0.02.55 Slow motion feeding (chicks + adult)

0.03.43 Chicks of Red-necked Avocet feeding + walking. One, then 2.

0.04.48 1 adult feeding 2 chicks down from colony. 2 ³ chicks with it. more in. Defense. Attacked by another with chick.

TAPE SEVEN contd

continuation

0.07.54 adult diving

continuation of 1 adult leaving 2 chicks down from colony, into water. This is the longest unbroken footage of the process and the most interesting (scientifically). Not too close so can see what's going on around. Ends at 0.10.28.

0.10.29 More chicks leaving colony.

0.11.01 15 ~~best~~ best footage of adult attempting to couple with chick.0.11.20 continuation (1 adult + 2 chicks + 1-2 curious adult)0.12.20 1 adult diving ^(3 chicks)0.12.22 continuation. Joining another family in water + driving together
→ 0.13.01.0.13.24 Another 1 adult with 2 ~~other~~ chicks leaving colony. 1-4 curious
adults down off. → 15.12.0.05.14 more of chicks nearby water, and swimming in distance.

0.16.12 Met Lembe behind colony

0.16.14 continuation. 2 chicks among adults at water edge. ^{parent} ~~adults~~
driving off other adult0.18.16 Another family (1 adult + 1 chick) leaving colony. 3 chicks
at water edge.0.20.32 Red-capped Plover → 21.50

21.50 more chicks leaving colony.

22.00 → 22.15 1 adult (with chick) diving when reaches water
(best hunting shot yet)22.20 Another ^{for} parent + 2 chicks leaving. 1 adult + 1 chick.
chick seems to drink (24.00).

24.13 Smaller parent with 3 chicks. Parent shields chicks

25.07 adults feeding in distance among vegn.

25.28 1 adult on nest; settling on off, plunge, settling, scavenging
debris to nest; eggs lying about, general of colony (1st)
at water edge,

TAPE SEVEN cont'd

continuation, sparrowing between birds on nest, plummage, settling on eggs

0. 29.10 Mark durable

29.12 continuation

29.22 settling on eggs after major disturbance, lowest belly feathers, plummage,

30.18 eggshell in ~~water~~ waves at shoreline

30.30 general of nesting colony (occupied), adult in water, resting colony, bills, flying in (poor), etc., pecking at exposed egg (33.03) settling on eggs, mass disturbance (flight), some slow motion landing, Voice says "Shells are 12, Camerón's frogs, also ~~the~~ roll and the nest shell". (?)

34.32

39.45 continuation, massed landing of disturbed birds on water, on land, flying

35.56 general of occupied nesting area, adults in shallow nearby (breeding), flying, washing, preening, etc,

38.50 chick at edge of colony being attacked.

39.20 me disturbing the nesting adults from the last breeding colony,

40.14 my horn toppers - Testing egg worth - ♂ birds disturbed + resettling ch

41.15 me photographing in nest area, horn toppers, disturbed birds, chicks

42.40 me wading with horn toppers

Shells used ~~as~~ ^{as} CM Roll 2 Voice says "This is still Shells as CM Roll 12"

Roll 12, Camerón stuff, probably shot at night.

43.05 Burst shots over last breeding colonies + late.

44.83 water edges

44.56 Closups of red flowers + other plants, yellow flower + native (?) bee feeding (good quality), ladybird, succulents plant,

TAPE SEVEN CONTD

continuation., red leaved plant, etc, maize flowers, trees of surrounding country, bushes, other flower,

0.55.55 voice "Running at the moment is 13 and its Campbell's staff" says

~~260~~
0.56.00 continuation - pan across surrounding country from a hilltop, Loba in distance

57.10 red sand of dunes near Loba (vegetated), yellow flowering vgn. other lebaside vgn., ^{red} sand blowing in strong wind,

1.01.55 plant double prolong ago from sheltered water, Loba and birds (still) in distance & nearby,

1.02.33 end of tape.