Australian Government

Department of the Environment and Energy

Australian National Report to the 19th JAMBA, 13th CAMBA and 6th ROKAMBA Consultative Meetings

Okinawa, Japan
27 to 30 November 2018

Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment Nineteenth Consultative Meeting

and the

Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment Thirteenth Consultative Meeting

and the

Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds and their Environment Sixth Consultative Meeting

Front cover: Great Knot *(Calidris tenuirostris)* at Crab Creek, South Australia © Copyright Chris Purnell
Back cover: Eastern Curlew *(Numenius madagascariensis)* in Merimbula, New South Wales © Copyright Dan Weller

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Adult Roseate Tern *(Sterna dougallii)* on Lady Elliot Island in the Great Barrier Reef, Queensland ©
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Introduction

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is the Australian Government's central piece of environmental legislation. The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as matters of national environmental significance. This complements state and territory responsibilities and laws protecting native species.

Migratory species listed under the EBPC Act are also matters of national environmental significance. Migratory species are those animals that migrate to Australia and its external territories, or pass though or over Australian waters during their annual migrations. Examples of migratory species are species of birds (e.g. albatrosses and petrels), mammals (e.g. whales) or reptiles (e.g. marine turtles). Listed migratory species are those listed on the appendices of the Convention on the Conservation of Migratory Species of Wild Animals (the CMS or Bonn Convention), the Japan-Australia Migratory Bird Agreement (JAMBA), the China-Australia Migratory Bird Agreement (CAMBA) and the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Matters of national environmental significance are important to all Australians and, given the interconnectedness of the global biosphere, internationally as well. The EPBC Act aims to balance the protection of these crucial environmental and cultural values with our society's economic and social needs by creating a legal framework and decision-making process based on the guiding principles of ecologically sustainable development.

Specifically, the EPBC Act aims to:

- provide for the protection of the environment, especially matters of national environmental significance
- conserve Australia's biodiversity
- protect biodiversity internationally by controlling the international movement of wildlife
- provide a streamlined environmental assessment and approvals process where matters of national environmental significance are involved
- protect our world and national heritage
- promote ecologically sustainable development

As migratory species are matters of national environmental significance, an action will require approval if the action has, will have, or is likely to have, a significant impact on a listed migratory species. The action must be referred to the Environment Minister and undergo an environmental assessment and approval process.

For over 40 years, Australia has played an important role in international cooperation to conserve migratory birds in the East Asian - Australasian Flyway, entering into bilateral migratory bird agreements with Japan in 1974, China in 1986 and the Republic of Korea in 2006. Each of these agreements provides for the protection and conservation of migratory birds and their important habitats, protection from take or trade except under limited circumstances, the exchange of information, and building cooperative relationships. Our four countries were instrumental in the development and establishment of the East Asian – Australasian Flyway Partnership in 2006.

The Australian Government recognises that habitat loss and degradation is a significant threat to many of our migratory birds, and the conservation of important sites both within Australia and along their migration routes is essential to their survival. Many pressures are contributing to this degradation, of which population growth and associated coastal development and unsustainable hunting are of particular concern. The JAMBA, CAMBA and ROKAMBA provide an important mechanism for pursuing conservation outcomes for migratory birds in each country. However, efforts to conserve migratory birds in one country can only be effective with cooperation and complementary actions in all countries that these birds visit.

はじめに

1999** 年環境保護・生物多様性保全法* ***Environment Protection and Biodiversity Conservation Act 1999 *(**EPBC** 法)* は、オーストラリア政府の環境法の中核をなしています。**EPBC** 法は、同法によって「国の環境にとって重要な存在」と定義される国内外の重要な動植物、生体群集、自然遺産を保護および管理するための法的な枠組みを提供しています。こうした枠組みは、各州および特別地域における在来種を保護するための責務および法律を補っています。

移動性動物種 (**migratory species**) として **EPBC** 法に規定されている動物種も、国の環境にとって重要な存在です。移動性動物種とは、毎年の渡りの際にオーストラリアやオーストラリアの海外領土に移動してくる、またはオーストラリアの領海もしくはその上を通過する動物を指します。移動性動物種の例としては、鳥類 (アホウドリ、ミズナギドリなど)、哺乳類 (クジラなど)、爬虫類 (ウミガメなど) が挙げられます。上記に挙げた移動性動物種は、移動性野生動物種の保全に関する条約 (**CMS** またはボン条約)、日豪渡り鳥協定 (**JAMBA**)、中豪渡り鳥協定 (**CAMBA**) および韓豪渡り鳥協定 (**ROKAMBA**) の附属書にも記載されている動物種です。

「国の環境にとって重要な存在」である動物種はすべてのオーストラリア人にとって大切なものであり、さらに地球上の生物圏の相互関連性を考慮すると、世界中の人々にとっても重要なものであると言えます。**EPBC** 法は、生態学的に持続可能な開発の指導原則に基づいて法的な枠組みおよび意思決定プロセスを設定することにより、これらの重要な環境上および文化的な価値の保護と、社会の経済的および社会的なニーズとの調和を保つことを目的としています。

具体的に、**EPBC** 法は以下の目的を掲げています。

- 環境、特に国の環境にとって重要な存在を保護する
- オーストラリアの生物多様性を守る
- 野生動物の国境を越えた移動を管理することにより、生物多様性を国際的に保護する
- 国の環境にとって重要な存在に関して、合理化された環境評価および認定プロセスを提供する
- 世界遺産と国家遺産を保護する
- 生態学的に持続可能な開発を促進する

移動性動物種は国の環境にとって重要な存在ですので、同法に記載された移動性動物種に重要な影響を及ぼす活動、または及ぼす可能性があると思われる活動については当局の承認を得る必要があります。こうした活動は環境大臣に申請を行い、環境評価および承認手続きを経てから進める必要があります。

過去 **40** 年以上にわたり、オーストラリアは東アジア・オーストラリア地域フライウェイ (**East Asian – Australasian Flyway**) 内の渡り鳥の保護を目的とした国際協力において重要な役割を果たしてきました。オーストラリアは、**1974** 年に日本と、**1986** 年に中国と、そして **2006** 年には韓国とそれぞれ渡り鳥に関する二国間協定を締結しています。それぞれの協定では、渡り鳥とその重要な生息地の保護および保全、捕獲や売買からの保護 (一部の限定的な状況を除く)、情報交換、協力関係の構築などが規定されています。上記 **4** か国は、**2006** 年の東アジア・オーストラリア地域フライウェイ・パートナーシップの推進および締結に重要な役割を果たしています。

オーストラリア政府は、生息環境の喪失および劣化は多くの渡り鳥にとって重大な脅威であり、オーストラリア国内および渡り鳥の移動ルートにおける環境保全は、これらの生物の存続に不可欠であると認識しています。こうした生息環境の劣化はさまざまな外的要因によりもたらされていますが、その中でも人口増加とそれに伴う沿岸地域の開発、および生態的に持続不可能な狩猟が特に懸念事項となっています。**JAMBA**、**CAMBA**、**ROKAMBA** の各協定では、各国において効果的に渡り鳥の保全活動を行う重要な仕組みが規定されています。しかし、渡り鳥を保護するための努力は一国だけでなく、鳥たちが訪れるすべての国が協力し合い、補完的な活動を行うことで初めて効果を発揮します。

简介

《**1999**年环境和生物多样性保护法案》（**Environment Protection and Biodiversity Conservation Act 1999**）（简称**EPBC Act**）是澳大利亚政府环境法案的核心内容。**EPBC Act**是保护和管理国内外重要的植物区系、动物区系、生态社 区和遗产地的法律框架，**EPBC Act**规定这些领域为国家环保重点。该法案与各州和领地保护本土物种的义务和法律相辅相成。

EPBC Act列出的迁徙物种也是国家的重点环保对象。迁徙物种指的是在每年的迁徙过程中迁到澳大利亚及域外领地或穿过或飞越澳大利亚水域的动物。迁徙物种包括鸟类（如信天翁和海燕）、哺乳动物（如鲸）或爬行动物（如海龟）。法案中列出的迁徙物种就是《保护野生动物迁徙物种公约》（简称**CMS**或**Bonn**公约）、《日澳候鸟保护协定》（简称**JAMBA**）、《中澳候鸟保护协定》（**CAMBA**）以及《韩澳保护候鸟协定》（**ROKAMBA**）附录中列出的迁徙物种。

国家重点环保对象对每位澳大利亚人都息息相关，而且因为全球生物圈的相互关联性，对国际社会也很关键。**EPBC Act**旨在以生态可持续发展为指导原则，建立法律框架和决策程序，从而实现环境和文化保护的重要理念与经济和社会需求的平衡发展。

EPBC Act的具体目标包括：

- 为环境保护、尤其是国家环保重点提供法律依据
- 保护澳大利亚的生物多样性
- 控制野生动物跨国流动，保护全球生物多样性
- 针对国家环保重点，简化环境事项评估和审批流程
- 保护国内外的自然遗产
- 促进生态可持续发展

因为迁徙物种属于国家重点环保对象，因此如果某一行为对所列出的迁徙物种产生、将产生或可能产生重大影响，则需要获得批准。有关行为需上报环境部长，并接受环境评估和审批。

过去**40**年，在保护东亚—澳大利西亚迁飞（**East Asian – Australasian Flyway**）路线上的候鸟的国际合作中，澳大利亚发挥了重要作用，分别在**1974**年、**1986**年和**2006**年先后与日本、中国和韩国签订了双边候鸟保护协议。每项协议都为保护候鸟及其重要栖息地提供了法律依据，并规定仅在少数情况下可捕捉或交易候鸟，实现了各国信息互通、建立了合作关系。四国对**2006**年东亚—澳大利西亚迁飞伙伴关系的建立和发展起到了积极的作用。

澳大利亚政府认识到，栖息地的丧失和环境恶化对很多候鸟是一个重大的威胁，保护澳大利亚境内及其迁徙沿线重要栖息地对候鸟的生存至关重要。栖息地的环境恶化来自诸方面的压力，其中人口增长、由此产生的沿海地区开发以及不可持续的捕猎活动是主要因素。**JAMBA**，**CAMBA** 和**ROKAMBA**是各国候鸟保护的重要机制。但是，所有候鸟栖息国必须共同合作、采取互补行动，候鸟保护才能取得成效。

서론

1999 년 환경보호 및 생물다양성 보전 조례(**Environment Protection and Biodiversity Conservation Act 1999**, **EPBC Act**)는 호주 정부 환경법의 핵심입니다. **EPBC Act** 는 국가중대환경사안으로 **EPBC Act** 에서 정의한 국내외의 주요 식물군, 동물군, 생태학적 군집 및 자연유산 지역을 보호하고 관리하기 위한 법적 기틀을 제공합니다. 이는 주 및 테리토리 의무와 토착종을 보호하는 법률을 보완합니다.

EPBC Act 에 명시된 이동성 생물종은 국가중대환경사안이기도 합니다. 이동성 생물종이라함은 연중 이주 기간 동안 호주 및 호주령으로 이주하거나 호주 영해를 통과 및 비행하는 동물을 일컫습니다. 이동성 생물종으로는 철새(예, 알바트로스와 바다제비), 포유류(예, 고래), 파충류(예, 바다거북) 등이 있습니다. 등재된 이동성 생물종은 이동성 야생동물종 보전에 관한 협약(**Convention on the Conservation of Migratory Species of Wild Animals**, **CMS** 또는 **Bonn** 협약)과 일본-호주 철새 협정(**Japan-Australia Migratory Bird Agreement**, **JAMBA**), 중국-호주 철새 협정(**China-Australia Migratory Bird Agreement**, **CAMBA**), 한국-호주 철새 협정(**Republic of Korea-Australia Migratory Bird Agreement**, **ROKAMBA**)의 부속서류에 명시되어 있습니다.

국가중대환경사안은 글로벌 생물권의 상호연결성을 감안할 때 모든 호주인에게는 물론 국제적으로도 중요합니다. **EPBC Act** 는 생태학적으로 지속발전 가능한 개발의 지도원칙에 따라 법적 체계와 의사결정 과정을 갖추어 이러한 중대 환경 및 문화 가치의 보호와 호주 사회의 경제 사회적 요구의 균형을 맞추는 것을 목표로 합니다.

특히 **EPBC Act** 의 목표는:

- 국가중대환경사안을 비롯 환경 보호를 지원하고
- 호주 생물다양성을 보전하고
- 야생 생물의 국가간 이동을 통제하여 국제적으로 생물다양성 보호에 힘쓰고
- 국가중대환경사안과 관련하여 원활한 환경평가 및 승인 과정을 마련하고
- 세계 및 국가 유산을 보호하고
- 생태학적으로 지속가능한 개발을 촉진하는 것입니다

이동성 생물종은 국가중대환경사안이므로 등재된 이동성 생물종에 중대한 영향을 끼치거나, 끼치게 되거나, 끼칠 가능성이 있는 행위의 경우 승인을 받아야 합니다. 이러한 행위는 환경부 장관에게 의뢰되어야 하고 환경 평가 및 승인 절차를 거쳐야 합니다.

지난 **40** 년 동안 호주는 **1974** 년 일본과, **1986** 년 중국과, **2006** 년 한국과 철새보호 양자협정을 체결하면서 동아시아-대양주 철새이동경로(**East Asian - Australasian Flyway**)를 이용하는 철새의 보존을 위한 국제적 협력에 있어 중요한 역할을 해왔습니다. 각 협정은 철새 및 그 주요 서식지의 보호 및 보존과 일부 정해진 상황 이외에는 포획 및 거래 금지, 정보 교환, 협력 관계 수립을 지원합니다. 이 네 개 국가들은 **2006**년 동아시아-대양주 철새이동경로 파트너쉽 개발 및 수립에서 핵심적 역할을 했습니다.

호주 정부는 서식지 소실 및 질적 저하가 많은 호주 철새를 심각하게 위협한다는 점을 인지하며, 호주 내 및 호주 철새의 이동 경로 상의 주요 장소 보전이 철새 생존에 필수라는 점을 인정합니다. 이러한 질적 저하에 관여하는 많은 압박 요인 중 인구 증가 및 이와 관련된 해안 개발 그리고 지속가능하지 않은 포획은 특별한 우려 대상입니다. **JAMBA** 와 **CAMBA**, **ROKAMBA** 는 각국에서 철새 보존 성과를 올리기 위한 중요한 장치를 제공합니다. 그러나 철새를 보존하려는 한 국가의 노력은 이 철새들이 경유하는 모든 국가에서 협력 및 보완 조치를 취할 때에만 효과적입니다.

Kakadu National Park © Copyright Department of the Environment and Energy

Eastern Curlew *(Numenius madagascariensis)* in Merimbula, New South Wales © Copyright Dan Weller

Implementation of the Agreements by the Australian Government

Australian Government Department of the Environment and Energy

Relevant JAMBA Articles: II, III, IV, V, VI
Relevant CAMBA Articles: II, III, IV
Relevant ROKAMBA Articles: 2, 3, 4, 5

Summary

Australia provides critical habitat for millions of migratory birds each year. To ensure their conservation, the Australian Government has fostered international cooperation through a range of important agreements, including bilateral migratory bird agreements with Japan, China and the Republic of Korea, the Convention on Migratory Species (CMS), the Ramsar Convention on Wetlands, the Agreement on the Conservation of Albatrosses and Petrels (ACAP), and through the voluntary, non-binding initiative, the East Asian - Australasian Flyway Partnership (EAAFP). A range of important activities are also undertaken within Australia to conserve migratory bird populations and their habitats. These activities have largely focused on migratory waterbirds, including shorebirds and seabirds as their tendency to aggregate in flocks in coastal areas makes them particularly vulnerable to habitat loss and disturbance.

Since the last bilateral migratory bird consultative meetings in October 2016, the Australian Government has pursued a number of policy initiatives, including the implementation of the Wildlife Conservation Plan for Migratory Shorebirds. The plan outlines a national framework identifying research and management actions to protect migratory shorebirds in Australia. The plan also outlines national actions to support migratory shorebird conservation, and will be used to ensure these activities are integrated and remain focused on the long-term survival of migratory shorebird populations and their habitats. Habitat protection and restoration in Australia has been advanced under the National Landcare Programme for projects that will directly benefit migratory birds and their habitat. The Commonwealth Environmental Water Office, Parks Australia and Great Barrier Reef Marine Park Authority are also working to improve the habitats of migratory birds and reduce or eliminate known threats to these birds such as invasive weeds and feral cats.

As some migratory bird populations decrease, there is a growing need to minimise threats to the remaining habitats that are critical for their ongoing survival. This need is occurring in the face of ever-increasing human development and loss of habitat. The Australian Government recognises that efforts to conserve migratory birds in one country can only be effective with the cooperation and complementary actions in all countries that these birds visit. Without urgent action to reduce or eliminate threats, further declines leading to extinctions are to be expected.

オーストラリア政府による協定の実施

オーストラリア政府　環境・エネルギー省

JAMBA の関連条項：**II**、**III**、**IV**、**V**、**VI**

CAMBA の関連条項：**II**、**III**、**IV**

ROKAMBA の関連条項：**2**、**3**、**4**、**5**

要約

オーストラリアは毎年、何百万羽もの渡り鳥に重要な生息地を提供しています。これらの渡り鳥を保護するためオーストラリア政府は、日本、中国、韓国それぞれとの渡り鳥に関する二国間協定、移動性野生動物種の保全に関する条約（**CMS**）、湿地に関するラムサール条約、アホウドリ・ミズナギドリ類保全協定（**ACAP**）を含む重要な協定の数々、および自発的で法的拘束力のないイニシアティブである東アジア・オーストラリア地域フライウェイ・パートナーシップ（**EAAFP**）を通して国際的な協力関係を育んできました。またオーストラリア国内では、渡り鳥の個体数および生息地を保護するための重要な活動が数多く行われています。これらの活動は、主に渉禽類や海鳥を含む渡り性の水鳥を対象に行われています。こうした水鳥たちは沿岸部に群れて生息する習性を備えており、生息地の喪失や劣化の影響を特に受けやすくなっているからです。

2016 年 **10** 月に行われた前回の渡り鳥に関する二国間協議以来、オーストラリア政府は渡り性渉禽類に関する野生動物保全計画（**Wildlife Conservation Plan for Migratory Shorebirds**）の実施を含む、いくつかの新しい政策の取組を行ってきました。同計画は、オーストラリア国内に生息する渡り性渉禽類を保護するための調査および管理活動を認定する全国的な枠組みを描いています。また同計画は渡り性渉禽類の保護を支援する全国的な活動についても大要を描いており、またこれらの活動が一体となり、渡り性渉禽類とその生息地の長期的な保護に取り組むことを保証しています。オーストラリア国内における生息地の保護と回復は、国家ランドケア・プログラム（**National Landcare Programme**）の下、渡り鳥とその生息地に直接利益をもたらすような事業の数々によって推進されています。連邦政府環境水担当局（**The Commonwealth Environmental Water Office**）、パークス・オーストラリア（**Parks Australia**）、グレートバリアリーフ海洋公園局（**Great Barrier Reef Marine Park Authority**）の各団体も、渡り鳥の生息地の改善、および渡り鳥に対する侵略的な雑草や野猫など既知の脅威の軽減または排除に取り組んでいます。

特定の渡り鳥は個体数が減少しており、こうした種の存続に不可欠とされる既存の生息地に対する脅威を最小限に抑える必要性が高まっています。この問題は、人間による継続的な開発および生息地の破壊と密接な関係をもっています。オーストラリア政府は、渡り鳥の保護を目的とした努力は一国だけでなく、その鳥たちが訪れるすべての国が協力し合い補完的な活動を行うことで初めて効果を発揮するということを認識しています。これらの脅威を軽減または排除するための活動を緊急に行わない限り、渡り鳥の個体数はさらに減少を続け、絶滅への一途をたどることが予測されています。

澳大利亚政府对各协议的落实

澳大利亚政府环境与能源部

JAMBA相关条款：**II**，**III**，**IV**，**V**，**VI**

CAMBA相关条款：**II**，**III**，**IV**

ROKAMBA相关条款：**2**，**3**，**4**，**5**

总结

每年，澳大利亚是数以百万的候鸟的重要栖息地。为保护候鸟，澳大利亚政府参与了国际合作，签署了一系列重要协议，包括与日本、中国、韩国的双边候鸟协议、《候鸟公约》（**CMS**）、《**Ramsar**湿地公约》、《信天翁和海燕保护协议》（**ACAP**），还通过自愿、非约束性的倡议建立了东亚—澳大利西亚迁飞伙伴关系（**EAAFP**）。澳大利亚境内还开展了一系列重要的活动，以保护候鸟种群及栖息地。这些活动主要针对迁徙水鸟，如滨鸟和海鸟，因为这些物种喜欢在沿海地带群居，极易受到栖息地丧失和侵扰的影响。

2016年**10**月最近一次双边候鸟协商会议以来，澳大利亚政府采取了一些政策措施，包括落实《迁徙滨鸟野生动物保护计划》。该计划制定了一项全国性的研究和管理行动框架，保护澳大利亚境内的迁徙滨鸟，同时列出全国范围内的行动，支持迁徙滨鸟的保护，并确保这些行动相互融合，同时关注迁徙滨鸟种群及其栖息地的长期存活。国家土地保护计划促进了澳大利亚境内的栖息地保护和恢复，让候鸟及其栖息地直接受益。联邦环境水资源办公室、澳大利亚公园保护部门和大堡礁海洋公园管理局也在努力改善候鸟的栖息地，同时减少或消灭入侵杂草和野猫等已知威胁。

由于候鸟数量有所减少，我们愈加需要将对剩余栖息地的威胁降至最低，因为这关乎候鸟的长期生存。面对日益扩张的人类开发和不断加剧的栖息地丧失，保护工作迫在眉睫。澳大利亚政府认识到，所有候鸟迁徙途径国与栖息国必须共同合作、采取互补行动，每个国家的候鸟保护才能取得成效。如果不采取紧急措施减少或消除威胁，候鸟数量将持续减少，造成物种的灭绝。

호주 정부의 협약 이행

호주 환경·에너지부

JAMBA 관련 조항: **II**, **III**, **IV**, **V**, **VI**

CAMBA 관련 조항: **II**, **III**, **IV**

ROKAMBA 관련 조항: **2**, **3**, **4**, **5**

요약

호주는 매해 수 백만 마리 철새에 주요 서식지를 제공합니다. 보존을 보장하기 위해 호주 정부는 일본, 중국, 한국과의 철새보호 양자 협정, 철새 생물종 협약 (**CMS**), 습지**Ramsar** 협약, 알바트로스 및 바다제비 보호 협정(**ACAP**), 동아시아-대양주 철새이동경로 파트너십(**EAAFP**) 등 다양한 주요 협정을 통해 국제적 협력을 증진해 왔습니다. 광범위한 주요 활동으로 호주 내에서의 철새 개체수 및 서식지 보전 활동 등이 있습니다. 이러한 활동은 섭금류(**shorebird**) 및 해조류(**seabird**) 등 주로 이동성 수금류(**waterbird**)에 집중되어 있는데 이는 이 조류들이 해안가 지역에 군집하여 서식하는 경향이 있어 특히 서식지 소실 및 교란에 노출되어 있기 때문입니다.

지난 **2016** 년 **10** 월에 열린 철새 관련 양자협의회 이후 호주 정부는 섭금류를 위한 야생 생물 보존 계획(**Wildlife Conservation Plan for Migratory Shorebirds**) 개발 등 새로운 정책안 몇 가지를 추진하였습니다. 이 계획안은 호주 이동성 섭금류를 보호하기 위한 연구 및 관리 방안을 파악하는 국가적 체계를 약술하고 있습니다. 이 계획안은 이동성 섭금류 보존을 지원하는 국가적 방안도 기술하며, 이러한 활동이 통합적으로 이루어지며 섭금류 개체수 및 서식지의 장기적 존속에 지속적으로 집중할 것이라는 점을 보장하기 위해 사용될 것입니다. 호주 내 서식지 보호 및 복구는 철새 및 그 서식지 보호에 직접 혜택을 줄 프로젝트에 국가 토지관리 프로그램(**National Landcare Programme**) 하에 진행되었습니다. 호주 연방정부 환경용수 관리부(**Commonwealth Environmental Water Office**)와 호주 국립공원 관리공단(**Parks Australia**), 대보초해양공원 관리국(**Great Barrier Reef Marine Park Authority**)이 협력하여 철새 서식지를 증진하고 외래 잡초, 야생 고양이와 같은 알려진 위협을 감소 또는 제거하기도 합니다.

일부 철새 개체수가 감소하면서 이들의 지속적인 생존을 위해 필수적인 잔존 서식지에 대한 위협을 감소해야 한다는 필요성이 증가하고 있습니다. 부단히 증가하는 문명 개발 및 서식지 손실에 직면하여 이러한 필요성이 발생하고 있습니다. 호주 정부는 한 국가에서의 철새 보존 노력은 이러한 철새가 방문하는 모든 국가에서 협력 및 보완 조치를 취할 때에만 효과적이라는 점을 알고 있습니다. 위협을 감소하거나 제거하기 위한 긴급 조치가 없이는 차후 개체수 감소는 멸종으로 이어질 것으로 예상됩니다.

Commonwealth policy initiatives related to migratory birds and their habitat

Australian Government's Wildlife Conservation Plan for Migratory Shorebirds

The Australian Government's *Wildlife Conservation Plan for Migratory Shorebirds* covers 35 species of migratory shorebird that regularly visit Australia. The plan outlines a national framework identifying research and management actions to protect migratory shorebirds in Australia. All 35 species covered by the plan are listed migratory species under the EPBC Act as they are listed on the appendices to the CMS and Australia's migratory bird agreements with Japan, China and the Republic of Korea. The plan includes a summary of Australia's commitments under international conventions and agreements and outlines key aspects of identifying 'important habitat' as described in the *EPBC Act Policy Statement 3.21 – Industry Guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species*. The plan also outlines national actions to support migratory shorebird conservation, and will be used to ensure these activities are integrated and remain focused on the long-term survival of migratory shorebird populations and their habitat. The plan will be used to engage bilaterally with Japan, China and the Republic of Korea on how threats in the Yellow Sea region can be managed through practical action and community participation. The plan was made in consultation with all state and territory agencies, BirdLife Australia and the research community. There was widespread support for the new plan amongst key stakeholders. Actions included in the *Wildlife Conservation Plan for Migratory Shorebirds* will also benefit a number of shorebird species that were listed as threatened in 2015 and 2016. The plan will be reviewed in 2020.

Further information on the Australian Government's *Wildlife Conservation Plan for Migratory Shorebirds* can be accessed here: http://www.environment.gov.au/biodiversity/migratory-species/migratory-birds

Conservation Advices for Threatened Migratory Birds

When a native species or ecological community is listed as threatened under the Commonwealth EPBC Act, conservation advice is developed to assist its recovery.

Conservation advice provides guidance on immediate recovery and threat abatement activities that can be undertaken to ensure the conservation of a newly listed species or ecological community.

Recovery activities

Conservation advice includes practical on-ground activities that can be implemented by local communities, natural resource management groups or interested individuals, such as landholders. Examples of such on-ground activities may include:

- monitor known sites to identify key threats
- prevent damage to habitats at known sites such as on private property

Conservation advice may also include broader management actions which can be undertaken by organisations such as local councils, government agencies or non-government organisation's, to protect the species or ecological community on a regional level. Examples of such management actions may include:

- protect areas which contain populations or which could support populations in the future
- develop a management plan for the control and eradication of feral species in the local region

For some species and ecological communities, recovery plans may also be developed to assist in recovery.

Australian Government's Threatened Species Strategy

Australia is a country rich in unique plants and animals. They are core to the identity of Australians, culturally significant to Indigenous peoples, important to the health of our environment and a strong contributor to our economy. Australia's distinctive plants and animals are a gift and are important to protect. The Australian Government has established an additional national approach to threatened species. The *Threatened Species Strategy* is a plan for how we will prioritise effort and work in partnership with the community and state and territory governments. The Strategy sets out a road map and highlights how Australia's approach of science, action and partnership can be used to achieve the long-term goal of reversing species declines and supporting species recovery.

Dr Sally Box began in the role of Threatened Species Commissioner in January 2018. The Commissioner continues to act as a champion for threatened species and oversees the implementation of Australia's Threatened Species Strategy which includes the Eastern Curlew as one of 20 target bird species. An additional initiative for the Christmas Island Frigatebird (*Fregata andrewsi*) has also been included.

In 2017, three projects were funded through the Threatened Species Recovery Fund to support threatened migratory birds.

Community Conservation of Eastern Curlew project

Project activities include restoring key habitats, reducing human disturbance and promoting best practice management at priority Eastern Curlew sites from Darwin to Wollongong.

Investment: $204,590

French Island Cat Free project

Project seeks to manage the impacts of feral cats on French Island, Victoria. Part of the Western Port Ramsar site.

Investment: $160,000

Hunter Wetlands National Park project

The project aims to remove and exclude invasive mangroves from saltmarsh and shorebird habitat.

Investment: $20,000

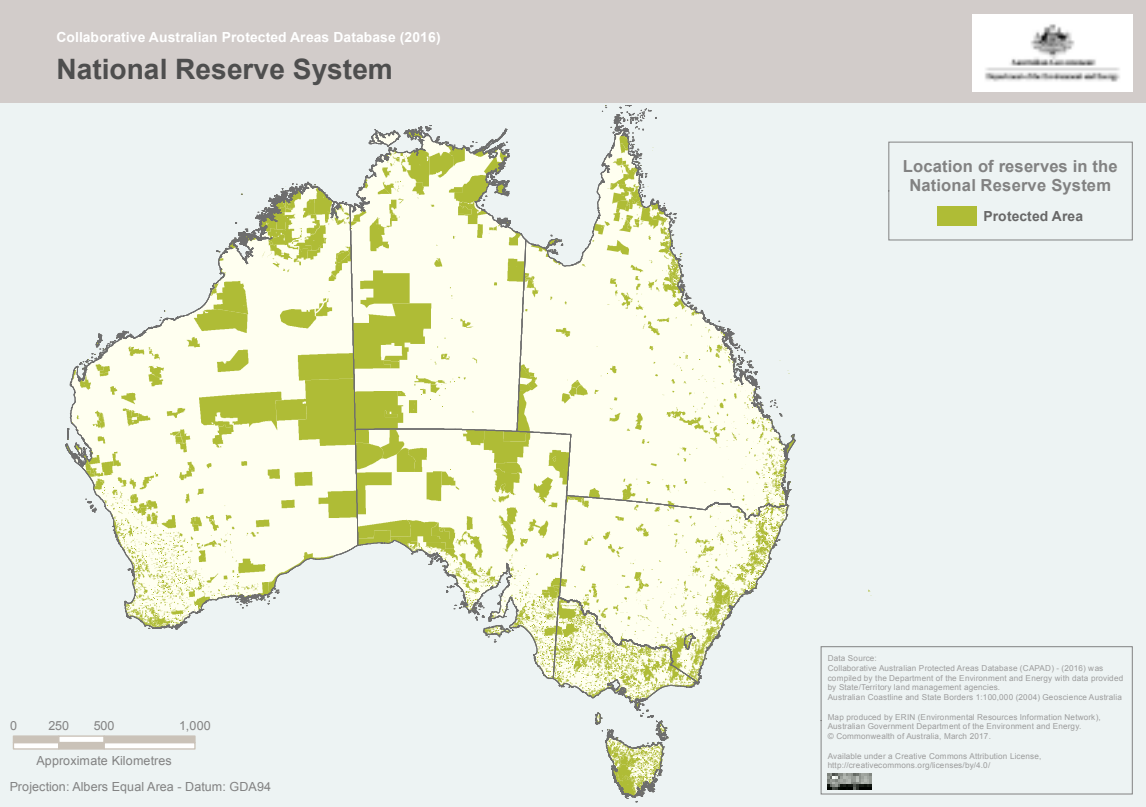
Further information on the Australian Government's *Threatened Species Strategy* can be accessed here: http://www.environment.gov.au/biodiversity/threatened/publications/strategy-home

National Reserve System

The National Reserve System is Australia's network of protected areas, conserving examples of our natural landscapes and native plants and animals for future generations. Based on a scientific framework, it is the nation's natural safety net against our biggest environmental challenges.

The reserve system includes more than 10,500 protected areas covering 19 per cent of the country - over 150 million hectares. It is made up of Commonwealth, state and territory reserves, Indigenous lands and protected areas run by non-profit conservation organisations, through to ecosystems protected by farmers on their private working properties.

There are 75 dedicated Indigenous Protected Areas (IPAs) in Australia covering more than 67 million hectares or 44.6% of the National Reserve System. Many IPAs include migratory bird habitat. At least 20 IPA Management Plans address threats to migratory birds and the protection of migratory bird habitats.



Threat Abatement Plan for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations

The *Threat Abatement Plan for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations* includes a range of actions that help to avoid or minimise the bycatch of certain shearwater species included under JAMBA, CAMBA and ROKAMBA. The threat abatement plan applies to all Commonwealth-managed longline fisheries and has reduced seabird bycatch in relevant fisheries significantly. The shearwater species that directly benefit from the implementation of the threat abatement plan include: *Ardenna pacifica* (Wedge-tailed Shearwater), *Ardenna carneipes* (Flesh-footed Shearwater), *Ardenna griseus* (Sooty Shearwater), *Ardenna tenuirostris* (Short-tailed Shearwater).

Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans

The *Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans* (2018) identifies the following species adversely impacted by marine debris that are included under JAMBA, CAMBA and ROKAMBA: *Ardenna pacifica* (Wedge-tailed Shearwater), *Ardenna tenuirostris* (Short-tailed Shearwater), *Oceanites oceanicus* (Wilson's Storm Petrel), *Ardenna carneipes* (Flesh-footed Shearwater), *Sula leucogaster* (Brown Booby). Implementation of the plan will mitigate the impacts of marine debris on these species.

National Environmental Management Light Pollution Guidelines for Marine Turtles and Migratory Birds

The Department of the Environment and Energy, in collaboration with the Western Australian Department of Biodiversity, Conservation and Attractions, is developing *National Environmental Management Light Pollution Guidelines for Marine Turtles and Migratory Birds*.

Artificial light has been recognised as a threat to marine turtles and seabirds. The project will review the mechanisms by which artificial light affects turtles and seabirds, and assess the potential impact of light on migratory shorebirds in Australia.

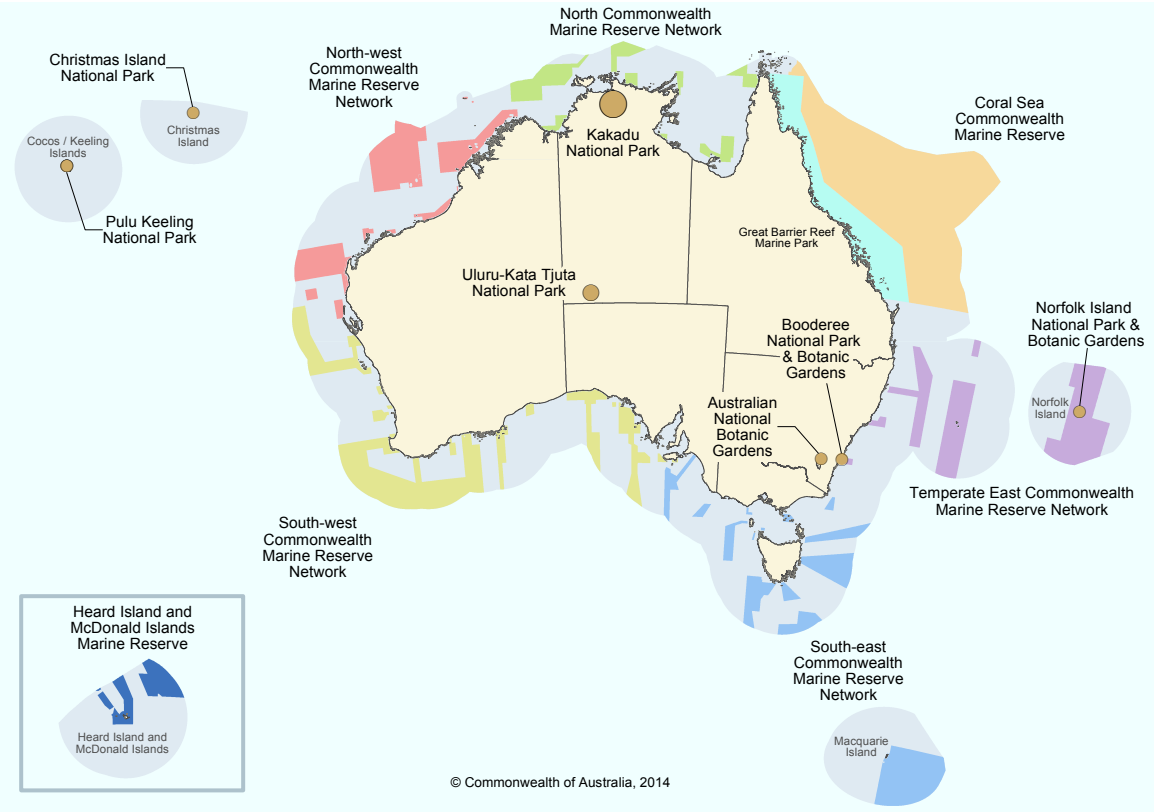
The guidelines will provide best practice light pollution mitigation strategies to ameliorate the impacts of light pollution on wildlife.

View of coastline at Delta Downs, south-east Gulf of Carpentaria, Queensland © Roger Jaensch and CLCAC

Commonwealth investment in migratory birds and their habitats

Parks Australia

Australia's six Commonwealth National Parks, the Australian National Botanic Gardens and 58 Commonwealth Marine Reserves protect some of the country's most stunning natural areas and Aboriginal heritage. They are managed by Parks Australia.



Under the EPBC Act, the Director of National Parks' responsibilities include:

- Managing Commonwealth reserves and conservation zones
- Protecting biodiversity and heritage in Commonwealth reserves and conservation zones
- Carrying out research relevant to Commonwealth reserves
- Cooperating with other countries to establish and manage national parks and nature reserves in those countries
- Making recommendations to the Australian Government Minister for the Environment and Energy

Commonwealth reserves that are wholly or partly on Indigenous people's land are managed in conjunction with a Board of Management. The Board's role is to prepare reserve management plans, make decisions to implement those plans, monitor management and provide advice to the Minister. A majority of board members must be Aboriginal people nominated by the traditional owners of that reserve. These boards play crucial roles in determining the policies and priorities for the management of each protected area.

Since October 2016, a number of projects undertaken by Parks Australia have benefited a number of migratory birds and their habitat. Examples of these projects include:

Christmas Island Cat Eradication and Rat Control Project 2015-2020

This project has removed stray and feral cats as well as introduced black rats from the Christmas Island ecosystem. This includes foreshore, grassland and forested areas utilised by migratory species.

Investment: Project funded in 2015 by $400,000 supported by the Threatened Species Commissioner and an offset contribution by Phosphate Resources Limited of $1.35 million throughout the life of the project (e.g. $250,000 p.a. for six years). Additional funding of $650,000 for 2016 provided by the Director of National Parks.

Christmas Island Frigatebird *(Fregata andrewsi)*

A National Environmental Science Programme funded workshop was held to gain a better understanding of Christmas Island Frigatebird population trends and their main drivers to increase the probability of ameliorating the threats; develop measures to mitigate or eliminate the main current and potential future threats; develop a conservation advice or recovery plan that will, in association with other conservation planning for Christmas Island, provide a guide for future policy with respect to managing the frigatebird. This brought together relevant Australian and Indonesian experts.

Investment: $10,000

Norfolk Island Rat Control Program 2015 – 2018

Expansion of the previously existing rat baiting program across Norfolk Island National Park. One thousand additional bait stations have been added to the original 800. All stations are baited on a bi-monthly basis.

Investment: This is a Threatened Species Commissioner supported project ($300,000). Additional in kind funding contribution of $133,000 provided by Parks Australia.

Feral Cat Control Program within Norfolk Island National Park

Ongoing cat trapping and removal from within Norfolk Island National Park. A total of 53 cats were trapped in 2015. A further 90 individuals were caught between January 2016 and June 2018. A draft management plan for managing feral cats on Norfolk Island has been developed.

Tarler Bird *(Porphyrio porphyrio)* Control Program

Control activities continue on Phillip Island in response to community raised concerns regarding the predation of eggs and young seabirds.

Weed Control and Habitat Restoration on both Norfolk Island and Phillip Island

Ongoing weed control activities occurring on both Norfolk Island and Phillip Island and ongoing propagation and revegetation works on Norfolk Island with current nursery stocks (June 2018) of over 1800 plants.

Terek *(Xenus cinereus)* and Curlew Sandpipers *(Calidris ferruginea)* © Copyright Department of the Environment and Energy

Seabird Research Support on Phillip Island

Parks Australia continue to support researchers investigating migration patterns and nest predation threats of seabirds on Phillip Island.

Booderee National Park

Intensive fox control benefits roosting migratory shorebirds known to visit Booderee National Park including CAMBA, JAMBA and ROKAMBA listed species. These species include Whimbrel (*Numenius phaeopus*), Bar-tailed Godwit (*Limosa lapponica*), Ruddy Turnstone (*Arenaria interpres*), Oriental Plover (*Charadrius asiaticus*) and Latham's Snipe (*Gallinago hardwickii*).

Weed control on Bowen Island benefits JAMBA, CAMBA and ROKAMBA listed species such as: Short-tailed Shearwater (*Ardenna tenuirostris*), Wedge-tailed Shearwater (*Ardenna pacificus*) and possibly the Sooty Shearwater (*Ardenna griseus*).

Coral Sea Clean-up and Biodiscovery Voyage 2016

This project reduced the threat of marine debris on nesting and migratory seabirds from the Coringa-Herald and Lihou Reefs Ramsar sites. This project removed over 2 tonnes of marine debris from 11 isolated islands and cays in 2016.

Parks Australia continues to monitor marine debris, and promote marine debris removal in the Marine Park by tourism operators.

Investment: Parks Australia and Bush Blitz funded the voyage at a cost of $330,000.

National Landcare Programme

The National Landcare Program (NLP) is a key part of the Australian Government's commitment to protect and conserve Australia's water, soil, plants, animals and ecosystems, as well as support the productive and sustainable use of these valuable resources.

NLP Phase One

From July 2014 to June 2018, the Australian Government invested $1 billion to continue its longstanding commitment to delivering on-ground biodiversity and sustainable agriculture outcomes that benefit our community and environment.

NLP Phase Two

The Australian Government is investing a further $1 billion in the second phase of the National Landcare Program. The majority of the investment will be delivered over a period of five years—from July 2018 to June 2023—while some elements of the program began during the 2017-18 financial year.

The investment will primarily be delivered by the Department of the Environment and Energy and the Department of Agriculture and Water Resources and will include a range of measures to support natural resource management and sustainable agriculture, and to protect Australia's biodiversity.

With its investment in the next phase of the National Landcare Program, the Australian Government aims to work in partnership with governments, industry, communities and individuals to protect and conserve Australia's water, soil, plants, animals and ecosystems, as well as support the productive and sustainable use of these valuable resources.

The National Landcare Program is a nationwide effort to address problems such as:

- loss of vegetation;
- soil degradation;
- the introduction of pest weeds and animals;
- changes in water quality and flows; and
- changes in fire regimes.

The next phase of the National Landcare Program includes funding for new programs as outlined below.

Smart Farms Program

The Australian Government is allocating $134 million to support the development and uptake of best practice management, tools and technologies that help farmers, fishers, foresters and regional communities improve the protection, resilience and productive capacity of our soils, water and vegetation, and in turn support successful primary industries and regional communities. The Smart Farming Partnerships and Smart Farm Small Grants programs are open to a range of Australian legal entities.

Regional Land Partnerships

From July 2018, the Regional Land Partnerships component of the program will deliver $450 million over five years Australia-wide to deliver national priorities at a regional and local level.

National Landcare Regional Investments 2015-2018

Reef Catchments Mackay Whitsunday Isaac - Protecting Species, Ecosystems, Coasts and Communities

Activities include coastal weed reduction and removal of marine debris which indirectly benefit migratory bird species including the *Numenius madagascariensis* (Eastern Curlew)

Southern Gulf NRM - Building resilience in critical habitats across the Southern Gulf – wetlands project

Seeks to improve the condition of 12,000 hectares of the Wetland through coordinated fencing, weed management, pest animal management and condition monitoring helping to reduce wet season grazing pressure and feral pig damage. The project serves to promote conservation and increase the area of threatened species habitat/significant area protected, which includes habitat for migratory bird species such as the Eastern Curlew.

Fitzroy Basin Association - Preserving the ecological character and cultural heritage of the Shoalwater and Corio Bay Ramsar site project

Seeks to address threats to the ecological character of the Shoalwater and Corio Bays Ramsar wetlands, including pest plants and animals and erosion to improve habitat for threatened species, native waterbirds, migratory shorebirds, turtles, dugong and fish, which use the area at different life history stages.

Burnett Mary Regional Group - Keeping it Great project

Seeks to address priority threats including pest plants and animals and inappropriate land use practices in the Great Sandy Strait Ramsar Site and the Fraser Island World Heritage Area. Rehabilitation activities will protect and enhance biodiversity for the primary purpose of conservation. Implementation activities will benefit threatened species including migratory birds.

Environment Small Grants

The Australian Government is providing $5 million in small grants to community, landcare, environment and other natural resource management groups to deliver natural resource management activities that improve the quality of the local environment. The small grants were allocated through a one-off grant round in the 2017-18 financial year.

Continuing to deliver the Reef 2050 Plan

An updated Reef 2050 Plan was released by the Australian and Queensland Governments in July 2018 and is the overarching framework for protecting and managing the Great Barrier Reef until 2050. The Plan sets clear actions, targets, objectives and outcomes to drive and guide the short, medium and long-term management of the Reef. The Plan firmly responds to the pressures facing the Reef and will address cumulative impacts and increase the Reef's resilience to longer term threats such as climate change.

The second phase of the National Landcare Program provides additional funding towards meeting the Government's commitment to the Reef 2050 Long-Term Sustainability Plan.

Great Frigatebird *(Fregata minor)* on North Keeling Island © Copyright Department of the Environment and Energy

Caring for our World Heritage places

World heritage sites that are nominated for World Heritage listing are inscribed on the list only after they have been carefully assessed as representing the best examples of the world's cultural and natural heritage. Australia currently has 19 properties on the World Heritage List.

The second phase of the National Landcare Program provides help with the management of Australia's treasured World Heritage sites. A particular focus will be addressing critical threats such as feral animals and weeds, and changed fire regimes.

Support for Indigenous Protected Areas

The Australian Government will provide $15 million for Indigenous Protected Areas, in addition to an investment of $93 million for the ongoing support of existing Indigenous Protected Areas. Indigenous Protected Areas perform a number of important roles which deliver benefits to our environment and our local communities, such as:

- safeguarding the biodiversity of the nation's remote areas for present and future generations;
- protecting the cultural heritage of Aboriginal and Torres Strait Islander people in their region; and
- providing employment, education and training opportunities for Aboriginal and Torres Strait Islander people in remote areas.

Centre for Invasive Species Solutions

The Australian Government is supporting the Invasive Animals Cooperative Research Centre's (IACRC) transition into the new Centre for Invasive Species Solutions. The new Centre is focusing on invasive species management and this investment supports the Centre and its efforts to carry out research, development and extension activities aimed at managing invasive animals and weeds. Following the conclusion of the CRC Program funding in June 2017, the Centre has continued the collaborative investment that Invasive Animals Cooperative Research Centre had begun in invasive species management.

Commonwealth Environmental Water Office

Murray-Darling Basin

The Murray-Darling Basin Environmental Water Knowledge and Research Project aims to improve the science available to support environmental water management. Through consultation with jurisdictions, water managers and scientific organisations priority research questions were identified that covered four themes: Vegetation; Fish; Food webs; and Waterbirds.

As part of the waterbirds theme the key knowledge gap identified was in-relation to which flow regimes best support recruitment of waterbirds and how do threats and pressures affect recruitment outcomes for waterbirds.

The research will focus on monitoring nests of three colonially-breeding waterbird species: Australian White Ibis; Straw-necked Ibis; and Royal Spoonbill at one of the priority research sites per year: (Macquarie Marshes, Barmah-Millewa or Narran Lakes).

The waterbird research component aims to produce information that will allow managers to better target water, vegetation and feral animal management actions to ensure 'event readiness' at nesting sites between flooding events and to maximise recruitment of waterbirds during flooding events.

Investment: $10 million over five years (to 2018/19) across four research themes, including waterbirds.

Great Barrier Reef Marine Park Authority

The Great Barrier Reef Marine Park Authority (GBRMPA) undertakes a number of activities that contribute to the conservation of migratory birds. Examples include:

- Development of the *Reef 2050 Long-term Sustainability Plan*, which includes actions to identify, protect and manage the habitats that support migratory birds, as well as monitor seabird populations.
- Informed by the 2012 Informing the Outlook for Great Barrier Reef Coastal Ecosystems (a technical report on the current status of the catchment and the threats it faces):
  - Development of hydrological spatial layer to identify catchment connections to support management of Great Barrier Reef coastal ecosystems (including migratory bird habitat).
  - Development of an ecological tool to establish a metric for valuing the biological, biogeochemical and physical processes occurring in the Great Barrier Reef catchment (including migratory bird habitat).
- Development and implementation of the *Seabird Monitoring Strategy for the East Coast of Queensland 2015-2020* with Queensland Parks and Wildlife Service
- Development and implementation of *The adaptive management strategy for seabirds on Raine Island National Park (Scientific)* with Queensland Parks and Wildlife Service

Commonwealth investment in science and research

National Environmental Science Programme

The National Environmental Science Programme is a long-term commitment to environment and climate research with funding of $25.5 million per year during the life of the programme.

The programme is built on its predecessors—the National Environmental Research Program and the Australian Climate Change Science Programme —to support decision-makers to understand, manage and conserve Australia's environment with the best available information, based on world-class science.

The $142.5 million National Environmental Science Programme is being delivered through six research hubs.

- the **Clean Air and Urban Landscapes Hub** supports environmental quality in urban areas with funding of $8.88 million.
- the **Earth Systems and Climate Change Hub** is furthering our understanding of the drivers of Australia's climate with funding of $23.9 million.
- the **Marine Biodiversity Hub** is researching Australian oceans and marine environments, including temperate coastal water quality and marine species, with funding of $23.88 million.
- the **Northern Australia Environmental Resources Hub** is supporting the sustainable development of our northern landscapes with funding of $23.88 million.
- the **Threatened Species Recovery Hub** is supporting the management of threats and improving recovery of threatened species with funding of $29.98 million.
- the **Tropical Water Quality Hub** is researching coastal water quality and coastal management focused on the Great Barrier Reef and other tropical waters with funding of $31.98 million.

Projects currently funded that include migratory birds include:

Research and management priorities for Christmas Island Frigatebirds

The Christmas Island Frigatebird (*Fregata andrewsi)* is listed as Endangered under the EPBC Act. It is currently one of the most threatened species on Parks Australia's estate and has been added to the list of priority bird species within the Threatened Species Strategy. Reasons for its decline and how to recover the species are poorly understood. This project aims to provide direction for the ongoing management, monitoring and research requirements necessary for the recovery of the species.

Early indications from current monitoring are suggesting the species has declined significantly since the last monitoring effort in 2003-04. At this stage the reasons for its decline, or even how to investigate them, are unresolved. While action is urgently required, a careful assessment of current evidence will allow more effective and efficient use of funds for research and management.

Investment: $35,407

Saving Threatened Species on Australian Islands (2015 – 2019)

Australia has over 9,300 islands supporting hundreds of threatened and migratory species. Although islands can be important havens for biodiversity, more species extinctions have occurred on Australia's islands than on mainland Australia and when islands are invaded by invasive species the consequences to native species and ecosystems can be catastrophic.

With so many islands, Australian policy makers and planners need evidence to determine and prioritise the most effective and efficient conservation actions. The project has developed a national database for threatened species on Australian islands and worked with partners on several priority case study islands. The project will continue to build on this strong base, by advancing the case studies, analysing the database collated to provide management and policy advice, and analysing relationships between feral species and threatened species across all Australian islands in order to prioritise optimal on ground actions.

The project is comprised of five sub projects, including:

- Threatened species and their threats on Australian islands
- Actions for saving threatened species on "priority islands"
- Post eradication monitoring and translocation on islands
- Saving threatened plants on Norfolk Island
- Understanding cane toad threats to Kimberley Islands

Investment: $1,391,773

Strategic Planning for the Far Eastern Curlew

The Far Eastern Curlew (*Numenius madagascariensis*) is one of the largest migratory shorebirds in the world. It has experienced one of the most acute declines of any Australian shorebird species: a 5.8 per cent annual rate of decline. If this trend persists, the global population will fall to 10 per cent of its 1993 abundance by 2035. It is listed as Endangered on the IUCN Red List and Critically Endangered under Australia's EPBC Act.

It is endemic to the East Asian-Australasian Flyway and is heavily impacted by mudflat loss and degradation in north-east Asia. Loss of habitat in this region can make birds more sensitive to impacts in other regions of the flyway, such as Australia.

Around three quarters of the population is estimated to spend the non-breeding season in Australia, where it is impacted by coastal development and disturbance. Very little is known about the exact habitat requirements of Far Eastern Curlew at non-breeding sites, making it extremely difficult to provide appropriate guidance on development proposals affecting Far Eastern Curlew habitat.

Coastal development can negatively affect Far Eastern Curlew populations. However, they are also known to use some artificial habitats for roosting, sometimes incorporating developed areas into local movements. This behaviour provides opportunities and obligations to consider and manage artificial sites as part of local conservation efforts. This project will analyse Far Eastern Curlew feeding and roosting habitat and the relationship between the two in order to develop evidence based strategic guidelines for Far Eastern Curlew conservation. The guidelines will give certainty to policy makers, conservation planners, developers and regulators about habitat requirements and offsets.

A large number of Far Eastern Curlew and other migratory shorebirds roost on land belonging to Darwin Port, where they feed on surrounding mudflats. The numbers of Far Eastern Curlew roosting at the port, where the birds are protected from disturbance, has increased substantially. The maximum count recorded at the port is 264 birds which is about 0.85% of the total flyway population. Darwin Port are planning to expand operations in future, and seek to understand how to achieve this without negatively impacting the quality of habitats available to migratory birds visiting the Port lands.

The project will be undertaken in close cooperation with Darwin Port who are also providing financial support for the research. The project will assess the overall availability of suitable habitats, the impacts of developments within Darwin Harbour and the port and the ways in which these impacts could be mitigated.

Investment: $372,456

Vulnerability of food supplies for migratory shorebirds to altered flow in the southern Gulf of Carpentaria

Migratory shorebirds are present in vast numbers along the Gulf of Carpentaria's south-east coastline, especially from September to April. These shallow and productive tidal environments are important resting and feeding areas, as well as staging areas for birds that fly north or south. The critically endangered Great Knot and Far Eastern Curlew are among the many migratory bird species using the Gulf coast, and food and rest are vital to their continued survival. The south-east Gulf's significance for shorebirds has been recognised through its inclusion as a site in the international East Asian-Australasian Flyway Site Network.

Rivers flowing into the Gulf deliver freshwater, sediments and nutrients to estuaries and nearby coastal areas, nourishing the mudflats where shorebirds rest and forage for shellfish, crustaceans and worms. Developments that use significant water or changes in climate that alter river flows may therefore impact the survival of the shorebirds.

This project aims to quantify and compare the shorebird food resources produced by three Gulf river systems that flow alteration may affect – the Flinders, Gilbert and Mitchell Rivers. It will identify the relative importance of the estuaries and adjacent mudflats in terms of food resources for shorebirds. This information will inform future water planning, environmental impact assessments, and migratory shorebird habitat protection and management.

This project will:

- improve our understanding of the role of freshwater, associated nutrient loads and benthic animals in providing sufficient food of the right quality and quantity to support shorebird species
- inform water resource planning especially in the Flinders, Gilbert and Mitchell Rivers, and the environmental assessment of development proposals in the region
- improve shorebird habitat protection and management, for example through contributions to priority actions in the Australian Government's *Wildlife Conservation Plan for Migratory Shorebirds*, to actions for the Far Eastern Curlew in the Threatened Species Strategy, and to the East Asian-Australasian Flyway Site Network
- help inform management of other relevant EPBC Act listed species and Ramsar wetlands

Project activities include:

- Examining previous reports on shorebird distribution, abundance and diversity in the region
- Sample the benthic organisms that provide food for shorebirds in the Flinders, Gilbert and Mitchell Rivers, in both the wet and dry seasons, to examine densities and diversity
- Assess key shorebird species' food preferences, the kinds of food available relative to their needs, and what kind of developments are most likely to impact on shorebirds

- Analyse field and experimental data to determine how different flows affect densities of benthic organisms, and the implications for different shorebird species, eg. those with longer bills or shorter bills feeding at different depths in the substrate
- Compare the results to those from other studies in comparable locations

Anticipated outputs:

- Conceptual models of flow regime, food webs and shorebird use of intertidal habitats
- Decision tree or guide outlining the implications of the findings for decision making
- Referral guidelines and conservation advice to improve species management in the Gulf of Carpentaria
- Report, scientific papers and factsheets summarising key research findings

Investment: $210,000

Contribution of rivers to the productivity of floodplains and coastal areas of the southern Gulf of Carpentaria

The Flinders, Gilbert and Mitchell Rivers flow into the southern Gulf of Carpentaria, supporting healthy ecosystems and nationally significant wetlands as well as important recreational and commercial fisheries. With increasing interest in developing water resources in northern Australia, further information is needed to understand how such developments will impact on the health and productivity of floodplains and coastal areas. Specifically, we need to know which flow characteristics of the rivers earmarked for future development are most important for the region's plants and animals so we can make informed management decisions.

This study will help us to better understand the downstream impacts of water resource development in Gulf of Carpentaria catchments. Information from the study will enable State and Federal Government decision makers to identify which flows make the biggest contributions to aquatic production, wetland and coastal ecosystems, and biodiversity within the Gulf. The research will help inform future water allocation and improve our ability to ensure that development in the region is environmentally sustainable.

Investment: $851,600

Information about current projects being undertaken by NESP research hubs.

The importance of artificial roosts for migratory shorebirds

Threatened Species Recovery Hub

National Environmental Science Programme

Shorebirds roosting at East Arm Wharf, Darwin, NT. Photo: Michael Lawrence-Taylor

Australia's migratory shorebirds

Australia has 37 species of migratory shorebirds. They breed in boreal and arctic areas of Russia, Mongolia, northern China and Alaska before migrating 12,000-14,000km to spend their non-breeding season in Australia during our summer.

Australia's shorebirds are part of a migration route called the East Asian-Australasian Flyway. Millions of shorebirds journey through this flyway annually. Many make their first southward migration to Australia when only a few months old.

A recent analysis of data spanning 1973-2014 showed population decreases in 12 migratory shorebirds species in Australia. Since 2015 eight species or subspecies have been listed or have had their conservation status uplisted under the *Environmental Protection and Biodiversity Conservation Act 1999*.

A muddy life driven by tides

Shorebirds are adapted to foraging for invertebrates below or on top of muddy substrates along the shorelines of oceans, lakes, rivers and wetlands. The daily movements of many species are largely governed by tidal cycles: at low tide foraging for invertebrates on exposed intertidal mudflats, at high tide moving to supratidal roosting areas primarily to rest and digest.

Disturbance taking a toll

Globally, migratory shorebirds are in serious decline and face multiple threats throughout their life cycle. One of the most significant threats to shorebirds in Australia, where many shorebird species spend the non-breeding season, is disturbance - especially at high tide roosts. A common cause of disturbance is people and their dogs on beaches for recreation.

Disturbance causes shorebirds to expend extra energy keeping watch and fleeing by walking or flying. The effect of disturbance is often underappreciated, but can be significant given the huge distances the birds fly during migration. A study from Lee Point near Darwin, Northern Territory concluded that the increased energy associated with 10 alarm flights per day could have negative consequences to the point of reducing survival or reproductive success.

The distance at which a shorebird initiates a flight because of the approach of a perceived predator differs between species. Some birds such as the Far Eastern Curlew, which had a mean flight initiation distance of over 125 m recorded in Victoria, are particularly intolerant. Disturbance can cause birds to abandon roosts for the tide cycle or even altogether.

Lack of roosts safe from disturbance may even constrain the number of shorebirds that can be supported in a given region.

Charles Darwin University

Research Institute for the Environment and Livelihoods RIEL

Darwin Port

A global trend

Shorebird declines are being experienced globally, nowhere more so than in the East Asian-Australasian Flyway (EAAF). Species experiencing the most rapid declines are the ones most reliant on a migration route through the Yellow and Bohai Sea region of the EAAF, which encompasses parts of the coastlines of China, The Democratic Peoples' Republic of Korea and the Republic of Korea.

A key threat to shorebirds in this region is the loss or degradation of intertidal mudflats. There has been more than a 50% decline in tidal mudflats in the Yellow Sea region, and remaining mudflats are affected by widespread pollution, algal blooms and declines of invertebrate and vertebrate fauna.

Loss of habitat in this region can make birds more sensitive to impacts in other regions.

Far Eastern Curlew

The Far Eastern Curlew *Numenius madagascariensis* has experienced one of the most acute declines of any Australian shorebird species. It has experienced a 5.8 % annual rate of decline; if this trend persists, the global population will fall to 10 % of its 1993 abundance by 2035. It is listed as Endangered on the IUCN Red List and Critically Endangered under Australia's EPBC Act.

It is endemic to the East Asian-Australasian Flyway and is heavily impacted by mudflat loss in the Yellow Sea region. Around three quarters of the population is thought to spend the non-breeding season in Australia, where it is also impacted by disturbance.

Roosting bar-tailed godwits. Photo: Micha Jackson

A study in Moreton Bay, Queensland showed that recreational use of foreshores, particularly by dogs, resulted in a consistent negative effect on the occupancy and abundance of shorebirds within a protected area. Luckily, however, it also showed that strategic zoning can be used effectively to accommodate both migratory shorebirds and recreational use.

The importance of artificial roosts

Safe roosts free from disturbance are of great importance to shorebirds. Though they should not be considered a replacement for natural habitat, a number of studies have shown that supratidal artificial habitats can provide attractive high tide roosts for migratory shorebirds, particularly when they are shielded from disturbance. They can also provide foraging opportunities for some species.

Artificial roosting habitats can include those that have been created 'accidentally' or those constructed or reconstructed deliberately to provide or maintain resources for shorebirds. In Australia they are generally associated with commercial salt works, ports, wastewater treatment and in some cases specifically constructed roosts.

Examples of artificial roosting habitat in Australia:

- Artificial ponds at a former commercial salt operation in the Gulf St. Vincent area, South Australia, consistently recorded over 15,000 shorebirds during counts over the last several decades.
- Supratidal ponds associated with the Western Treatment Plant, Victoria, consistently hold internationally significant numbers (more than 1% of the global population) of many shorebird species. The ponds are used throughout the tidal cycle for roosting and foraging by different species.
- Settling ponds at East Arm Wharf, associated with the Darwin Port, Northern Territory, support consistently large numbers of roosting Far Eastern Curlews whose abundance at the site has steadily increased in recent years despite the species-wide decline.

A common characteristic of the sites above is their relative inaccessibility to the public. Management of these habitats can provide opportunities to help shorebirds maintain a positive energy balance during the non-breeding season, particularly when putting on weight before migration.

Far Eastern Curlews are among the species that use artificial habitats, though only a few locations in Australia have recorded counts of over 100 birds.

Eastern Curlewl. Photo: Micha Jackson

Safe roosts free from disturbance are of great importance to shorebirds.

What makes good roosting habitat?

Proximity to foraging grounds and avoidance of disturbance and predation risk are some of the most important factors affecting roost choice by shorebirds. In general, shorebirds will prefer to roost close to their foraging grounds, but will invest a significant amount of energy to travel to alternate 'safer' roosts if nearby roosts are regularly disturbed or vulnerable to predation. This can also result in different roosting behaviour at night time. Other factors that can be important are microclimate and landscape features of the roost.

Variability in shorebird behaviour strongly indicates that managers wanting to improve roosting conditions for shorebirds of a given species in a given locality require a detailed local knowledge of available foraging and roosting habitat as well as the seasonal behaviour of target species for management. Similarly, design or implementation of artificial roosts requires careful consideration of regional and site-specific details and extensive consultation with relevant experts such as ecologists and engineers.

Roosting Whimbrel. Photo: Micha Jackson

Further Information

More information and references can be found in the report "Literature review: Importance of Artificial roosts for migratory shorebirds, TSR Hub, 2017"

For more information on Research Project 5.1.1: Strategic planning for the Eastern Curlew, see the TSR Hub website.

Australian Government

Threatened Species Recovery Hub

National Environmental Science Programme

This project is supported through funding from the Australian Government's National Environmental Science Programme.

Strategic planning for the Far Eastern Curlew

Project Summary
Project 5.1.1

Threatened Species Recovery Hub

National Environmental Science Programme

Far Eastern Curlew. Photo: Micha Jackson

Research in Brief

The Far Eastern Curlew has experienced one of the most acute declines of any Australian shorebird species. Currently little is known about their exact feeding and roosting habitat requirements. While coastal development can negatively impact populations, they are known to use some artificial habitat for roosting.

This project will provide the knowledge needed to develop strategic guidelines for Far Eastern Curlew conservation.

Why is the research needed?

The Far Eastern Curlew *Numenius madagascariensis* is one of the largest migratory shorebirds in the world. It has experienced one of the most acute declines of any Australian shorebird species: a 5.8% annual rate of decline; if this trend persists, the global population will fall to 10% of its 1993 abundance by 2035. It is listed as Endangered on the IUCN Red List and Critically Endangered under Australia's EPBC Act.

It is endemic to the East Asian-Australasian Flyway and is heavily impacted by mudflat loss and degradation in north-east Asia. Loss of habitat in this region can make birds more sensitive to impacts in other regions of the flyway, such as Australia.

Around three quarters of the population is estimated to spend the non-breeding season in Australia, where it is impacted by coastal development and disturbance. Very little is known about the exact habitat requirements of Far Eastern Curlew at non-breeding sites, making it extremely difficult to provide appropriate guidance on development proposals affecting Far Eastern Curlew habitat.

How will the research help?

Coastal development can negatively affect Far Eastern Curlew populations. However, they are also known to use some artificial habitats for roosting, sometimes incorporating developed areas into local movements. This behaviour provides opportunities and obligations to consider and manage artificial sites as part of local conservation efforts. This project will analyse Far Eastern Curlew feeding and roosting habitat and the relationship between the two in order to develop evidence based strategic guidelines for Far Eastern Curlew conservation.

Charles Darwin University · The University of Queensland · Darwin Port · Larrakia Nation · In partnership with Northern Territory Government

The guidelines will give certainty to policy makers, conservation planners, developers and regulators about habitat requirements and offsets.

A large number of Far Eastern Curlew and other migratory shorebirds roost on land belonging to Darwin Port, where they feed on surrounding mudflats. The numbers of Far Eastern Curlew roosting at the port, where the birds are protected from disturbance, has increased substantially. The maximum count recorded at the port is 264 birds which is about 0.85% of the total flyway population. Darwin Port are planning to expand operations in future, and seek to understand how to achieve this without negatively impacting the quality of habitats available to migratory birds visiting the Port lands.

The project will be undertaken in close cooperation with Darwin Port who are also providing financial support for the research. The project will assess the overall availability of suitable habitats, the impacts of developments within Darwin Harbour and the port and the ways in which these impacts could be mitigated.

What research activities are being undertaken?

The research is being undertaken in Darwin Harbour and focuses on:

1. Roosting habitats

Far Eastern Curlew (and other migratory shorebirds) will be fitted with satellite tags at East Arm Wharf so that individual birds can be tracked to identify locations around Darwin Harbour regularly used for roosting, as well as the frequency, season and tidal conditions when they are used. The findings will support comprehensive strategic planning for shorebirds, and the development criteria for the establishment of artificial roosts where these are warranted by development.

2. Feeding habitats

Tagging will also enable identification of feeding sites, the frequency with which they are used and the season, time and tidal conditions at the time of feeding and the size of feeding territories. Remote sensing will be ground truthed with field observations that will also identify, where possible, prey types. Gender differences in bill size suggest there may also be differences in prey type and habitat use. The density of favoured prey types will be assessed using standard techniques for measuring food abundance in intertidal habitat.

3. The relationship between roosting and feeding habitats

The spatial data for Far Eastern Curlew and other migratory birds visiting Darwin Harbour will be combined to consider foraging range from roosting sites for different times of year and different tides. Daily energy budgets will be used to calculate pre-migratory fuelling rates and replenishment rates for birds that have recently arrived on the non-breeding grounds. Models will be developed for different seasons and components of the population (e.g. immature birds remain in Australia for at least one Austral summer so will have lower energetic demands).

4. Spatial modelling under different development scenarios

Using spatial data for the whole of the harbour, modelling will be undertaken for a suite of scenarios developed by industry and government and projected to 50 years in the future. Options will include not only existing roost

This is a saltpan in Darwin Harbour. Photo: Michael Lawrence-Taylor

sites but also explore the potential for creating new tailored roost sites based on what is learnt of the characteristics of roost sites in research phase 1. This will provide greater flexibility in planning and conservation investment, especially given the experience of increasing numbers using the artificial site at East Arm Wharf.

5. Development of offset, habitat management and habitat protection planning tools

The final phase will draw on all of the research to develop planning tools relevant to the assessment of development proposals. The tools will be developed in collaboration with assessment branches in Commonwealth, State and Territory agencies. An important part of this research will be the development of specific criteria for the assessment of the suitability of alternate natural and artificial roost habitats and alternate feeding habitats.

Who is involved?

The project is being led by Charles Darwin University and the University of Queensland. It is being undertaken in close collaboration with Darwin Port, who manage nationally important habitat for Far Eastern Curlew, and who are providing financial support to the project.

The project is a partnership with the Larrakia Traditional Owners of the area, and Larrakia Rangers will support the field research component of the project. The Northern Territory Government will also sit on a steering committee to ensure the results can be translated directly into planning and policy.

Helicopter habitat survey. Photo: Michael Lawrence-Taylor

Where is the research happening?

Fieldwork will be undertaken at all significant roost and feeding sites around Darwin Harbour, but will focus on land managed by Darwin Port at East Arm Wharf.

When is the research happening?

The project commenced in early 2017 and will run for three years. The fieldwork component of this project will start when Far Eastern Curlew begin arriving back in Darwin in August 2017 and birds will be captured for tracking through the non-breeding season. Observational surveys and invertebrate prey surveys will be conducted throughout the summer seasons of 2017-18 and 2018-19.


Larrakia rangers looking for Far Eastern Curlew. Photo: Michael Lawrence-Taylor

Further Information

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Australian Government

Threatened Species Recovery Hub
National Environmental Science Programme

This project is supported through funding from the Australian Government's National Environmental Science Programme.

Christmas Island frigatebird: Workshop focusing on research and management priorities

Project Summary
Project 2.3.6

Threatened Species Recovery Hub

National Environmental Science Programme

A Christmas Island frigatebird. Photo: Parks Australia

Research in Brief

The Christmas Island frigatebird is listed as Endangered under the EPBC Act, listed globally as Critically Endangered and is a specially listed priority bird species in the Threatened Species Strategy. The project consisted of a workshop held in March 2018 involving national and international experts. The workshop focused on collating the known information about threats and population trajectory of the frigate bird and proposing future research and management priorities.

The recommendations of the workshop informed a new conservation advice for the species, and have led to the development of a longer-term program of work on research and monitoring, which is being coordinated by Parks Australia.

Why is the research needed?

This workshop was timely as there was considerable uncertainty about the population trends of the species and the effect of various potential threatening processes both on Christmas Island and in the non-breeding grounds in South East Asia used by frigatebirds. At the same time, the conservation advice for the species was being drafted by the Department of Environment and Energy and accurate information was needed to inform this process.

How will the research help?

By bringing together all groups working on the species, the workshop helped to build a better understanding of the status and current population trends of the species and the level of impact of the various threatening processes the species experiences.

From this, recommendations for future research, monitoring methods and management actions were developed.

The workshop also informed the development of an updated conservation advice outlining the way forward for proposed research, management and monitoring activities and providing a springboard for ongoing collaborations.

A program of research and monitoring has been developed following the workshop, coordinated by Parks Australia. It includes plans to review methods for monitoring the species in both its breeding and non-breeding ranges, and a collaboration being developed between Fauna & Flora International–Indonesia Programme, CSIRO Oceans and Atmosphere and Parks Australia to investigate foraging success of frigatebirds in Indonesian waters.

CHARLES DARWIN UNIVERSITY

Australian Government
Parks Australia

What research activities are being undertaken?

A workshop was held in Canberra in March 2018. The workshop brought together relevant people with an interest in and knowledge of the frigatebird including colleagues from Indonesia and the Australasian Seabird Group.

The workshop focused on:

- developing better understanding of population trends
- assessment of the relative impacts and extent of threats, on Christmas Island and in non-breeding areas
- identifying management options to mitigate or eliminate the main current and potential future threats
- identifying future research needed to fill important knowledge gaps
- informing the development of a conservation advice.

Who is involved?

The workshop brought together a network of researchers and managers from government agencies and non-government conservation organisations in Australia and Indonesia, and was coordinated by Parks Australia and Stephen Garnett from Charles Darwin University.

Where is the research happening?

The workshop was held in Canberra.

The Christmas Island frigatebird breeds on Christmas Island and with some dispersal in the non-breeding season to South East Asian waters; ongoing research, monitoring and management will occur across this range depending on the project.

When is the research happening?

The workshop was held in March 2018.

Christmas Island frigatebird. Photo: Shah Jahan CC BY-SA 4.0 Wikimedia Commons

Christmas Island Coastline. Photo: Nicki Mitchell

Christmas Island frigatebird. Photo: Parks Australia

Further Information

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Australian Government

Threatened Species Recovery Hub

National Environmental Science Programme

This project is supported through funding from the Australian Government's National Environmental Science Programme.

Norman River and floodplain in the Gulf of Carpentaria, photo Michele Burford.

Northern Australia Environmental Resources Hub

National Environmental Science Programme

Links between Gulf rivers and coastal productivity

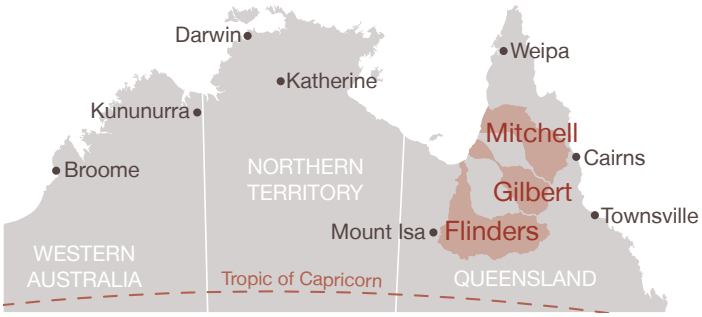
Start-up factsheet

The challenge

The Flinders, Gilbert and Mitchell Rivers in Queensland flow into the Gulf of Carpentaria, supporting healthy ecosystems and nationally significant wetlands as well as important recreational and commercial fisheries. With increasing interest in developing water resources in northern Australia, further information is needed to understand how such developments will impact on the health and productivity of floodplains and coastal areas. Specifically, we need to know which flow characteristics of the rivers earmarked for future development are most important for the region's plants and animals so we can make informed management decisions.

How will this research help?

This project will help us to better understand the downstream impacts of water resource development in Gulf of Carpentaria catchments. Information from this research will contribute to supporting sustainable development in northern Australia by helping to ensure that aquatic production in coastal and floodplain areas of the southern Gulf is maintained to support fish, fisheries, migratory birds, and other animals and ecosystems that depend on river flows. This includes planning and managing water allocations, protecting regional biodiversity and sustainably managing Gulf commercial and recreational fisheries.



The Flinders, Gilbert and Mitchell Rivers catchments in the Gulf of Carpentaria.

The researchers will use banana prawns, which have a well understood life cycle, as an indicator species, photo Matthew Whittle.

Key project activities

- Identify mangrove and floodplain productivity 'hotspots' in the southern Gulf using remote sensing and other data, and undertake field work to ground truth these.
- Determine the extent of feeding areas for migratory shorebirds and fisheries species in estuaries and coastal areas, and measure the rates of primary productivity that underpin their food supply.
- Measure the densities of juvenile banana prawns in estuaries and determine if banana prawns in Gulf fisheries can be linked to their estuary of origin using trace element 'fingerprinting'.
- Examine the flow data from key southern Gulf rivers to quantify how flows from major rivers can affect ecological assets such as banana prawns.
- Use fisheries data to assess how much of the coastal finfish catch can be explained by patterns of floodplain inundation.
- Use barramundi earbones to compare barramundi growth rates in different years and in different Gulf rivers.
- Use trace element and/or isotopic analysis to assess whether high growth rates of barramundi are associated with freshwater or marine/estuarine production.
- Undertake trade-off analysis using data from fisheries, agriculture and environmental values to determine the relative benefits of river flow.

Anticipated research outputs

1. Maps of key hotspots for primary production in floodplains and coastal waters in the southern Gulf of Carpentaria that are important for sustaining healthy populations of fish, birds, turtles, crocodiles and other aquatic plants and animals in the region.
2. Information on the relative importance of southern Gulf rivers in delivering nutrients that fuel coastal productivity, and their importance for the migratory shorebirds that rely on coastal habitats in summer months.
3. Quantitative information on the relative importance of different estuaries in the southern Gulf of Carpentaria to the banana prawn, a freshwater flow indicator species.
4. Economic trade-off analysis on the benefits of extracting water for agricultural irrigation, versus the downstream use of water to support ecosystems and fisheries in the southern Gulf of Carpentaria.

Gulf floodplain, photo Michele Burford.

Who is involved?

This project will be led by Professor Michele Burford at Griffith University, with Dr Jim Smart and Professor Stuart Bunn from Griffith University leading sub-projects.

The project leaders will be assisted by researchers from Griffith University, CSIRO, Queensland Department of Agriculture & Fisheries, Charles Darwin University and the Northern Territory Department of Primary Industry and Resources.

Contact: m.burford@griffith.edu.au

For further information and project updates, visit the project webpage at www.nespnorthern.edu.au/projects/nesp/links-gulf-rivers-coastal-productivity

This project is supported through funding from the Australian Government's National Environmental Science Programme.

Northern Australia Environmental Resources Hub

National Environmental Science Programme

nespnorthern.edu.au nesp.northern@cdu.edu.au

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July 2017

The Great Knot is critically endangered but finds refuge and food along the south-east Gulf coast, FLPA/Alamy stock photo.

Northern Australia Environmental Resources Hub

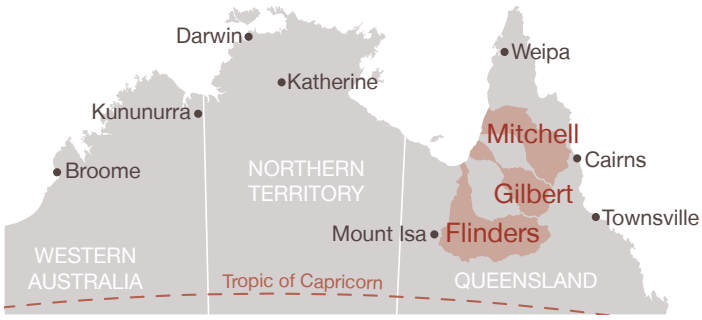
National Environmental Science Programme

Links between Gulf rivers and food for migratory shorebirds

Start-up factsheet

Gulf coasts are critical habitat for migratory shorebirds

Migratory shorebirds are present in vast numbers along the Gulf of Carpentaria's south-east coastline, especially from September to April. These shallow and productive tidal environments are important resting and feeding areas, as well as staging areas for birds that fly north or south. **The critically endangered Great Knot and Far Eastern Curlew are among the many migratory bird species using the Gulf coast, and food and rest are vital to their continued survival.** The south-east Gulf's significance for shorebirds has been recognised through its inclusion as a site in the international East Asian-Australasian Flyway Site Network.



The Flinders, Gilbert and Mitchell Rivers flow into the Gulf of Carpentaria.

Overview

This project will:

- improve our understanding of the role of freshwater, associated nutrient loads and benthic animals in providing sufficient food of the right quality and quantity to support shorebird species
- inform water resource planning especially in the Flinders, Gilbert and Mitchell Rivers, and the environmental assessment of development proposals in the region
- improve shorebird habitat protection and management, for example through contributions to priority actions in the Australian Government's Wildlife Conservation Plan for Migratory Shorebirds, to actions for the Far Eastern Curlew in the Threatened Species Strategy, and to the East Asian-Australasian Flyway Site Network
- help inform management of other relevant Environmental Protection and Biodiversity Conservation Act-listed species and Ramsar wetlands.

Understanding links between river flow and shorebird food sources will inform planning and management

Rivers flowing into the Gulf deliver freshwater, sediments and nutrients to estuaries and nearby coastal areas, nourishing the mudflats where shorebirds rest and forage for shellfish, crustaceans and worms. Developments that use significant water or changes in climate that alter river flows may therefore impact the survival of the shorebirds.

This project aims to quantify and compare the shorebird food resources produced by three Gulf river systems that flow alteration may affect – the Flinders, Gilbert and Mitchell Rivers. It will identify the relative importance of the estuaries and adjacent mudflats in terms of food resources for shorebirds. This information will inform future water planning, environmental impact assessments, and migratory shorebird habitat protection and management.

This project is investigating the ecological productivity of the Gilbert River and other Gulf rivers, photo Stephen Faggotter.

Project activities

- Examine previous reports on shorebird distribution, abundance and diversity in the region
- Sample the benthic organisms that provide food for shorebirds in the Flinders, Gilbert and Mitchell Rivers, in both the wet and dry seasons, to examine densities and diversity
- Assess key shorebird species' food preferences, the kinds of food available relative to their needs, and what kind of developments are most likely to impact on shorebirds
- Analyse field and experimental data to determine how different flows affect densities of benthic organisms, and the implications for different shorebird species, eg. those with longer bills or shorter bills feeding at different depths in the substrate
- Compare the results to those from other studies in comparable locations.

Anticipated outputs

- Conceptual models of flow regime, food webs and shorebird use of intertidal habitats
- Decision tree or guide outlining the implications of the findings for decision making
- Referral guidelines and conservation advice to improve species management in the Gulf of Carpentaria
- Report, scientific papers and factsheets summarising key research findings.

Who is involved?

This project is being led by Professor Michele Burford at Griffith University.

Professor Burford will be assisted by researchers from Griffith University and the Queensland Department of Environment and Science.

Contact: m.burford@griffith.edu.au

For further information and project updates, visit the project webpage at www.nespnorthern.edu.au/projects/nesp/gulf-shorebird-food-supply

Griffith UNIVERSITY

Queensland Government

This project is supported through funding from the Australian Government's National Environmental Science Program.

Northern Australia Environmental Resources Hub

National Environmental Science Programme

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May 2018

International engagement in relation to migratory birds and their habitats

Convention on the Conservation of Migratory Species of Wild Animals

The Convention on the Conservation of Migratory Species (CMS) is an intergovernmental treaty that is concerned with the conservation of wildlife and habitats on a global scale.

The Convention came into force generally in 1983 and Australia has been a Party to the Convention since 1991. There are currently 126 Parties to the Convention in total.

The Convention seeks to conserve avian, terrestrial and marine species that migrate across or outside national jurisdictional boundaries. Parties to the Convention must protect migratory species listed on its Appendices that live within, or pass through, their jurisdiction. The Convention includes two Appendices:

- Appendix I lists migratory species which are in danger of extinction throughout all or a significant proportion of their range. Once a species is listed on Appendix I, Parties are obliged to "endeavour to conserve and restore habitats, remove barriers to migration, control factors that are endangering the species and prohibit the taking of the species";
- Appendix II lists migratory species which are not endangered but have an "unfavourable conservation status", and which require international agreements for their management, as well as species with a conservation status that would benefit from international cooperation. Once listed on Appendix II, Parties are obliged to "endeavour to conclude agreements where these would benefit the species".

The EPBC Act imposes a domestic requirement that species listed in either Appendix must be added to the list of migratory species under the Act. The EPBC Act also makes it an offence to kill, injure, take or move listed migratory species in Commonwealth waters.

Eastern Curlew *(Numenius madagascariensis)* and Whimbrels (Numenius phaeopus) in the South-east Gulf of Carpentaria © Roger Jaensch and CLCAC

Historically, the Convention has always had a strong interest in the conservation of migratory birds. This is evidenced through the recent appointment of two individual experts to cover scientific and technical issues associated with migratory birds. The Convention has always had a number of specially appointed experts (referred to as CoP-Appointed Councillors) to address specific themes. There are currently 10 such Councillors covering a range of issues such as marine turtles, by-catch and climate change, with two experts devoted to birds.

While a great many migratory birds were included in the Appendices to the Convention at the outset, two bird species have been recently moved from Appendix II to Appendix I as a reflection of the concern surrounding their conservation status:

- Eastern Curlew, (*Numenius madagascariensis*), was included in Appendix I in 2011; and
- Great Knot, (*Calidris tenuirostris*), was included in Appendix I in 2014.

Following its inclusion on Appendix I, the Eastern Curlew was included on the list of species designated for concerted action under the Convention. Concerted actions were established under the Convention in 1991 and are designed to recommend initiatives to benefit a selected number of Appendix I species. Australia accepted the role of focal point for the Eastern Curlew and is progressing the implementation of an international Single Species Action Plan for the species through a number of forums.

At the 12th Conference of Parties, held in the Philippines from 23 – 28 October 2017, the Single Species Action Plan for the Far Eastern Curlew was adopted. The Parties also adopted two other Single Species Action Plans (Baer's Pochard and the European Roller), a Multi-Species Action Plan for African-Eurasian Vultures and an Action Plan for Migratory Landbirds in the Africa-Eurasian Region.

A number of resolutions were also adopted that are of relevance to a number of migratory bird species, including a resolution designed to tack illegal hunting, take and trade of migratory birds in the East Asian – Australasian Flyway, one calling for greater protection of critical intertidal habitats, and a standard bird taxonomy was also adopted. A full list of the resolutions adopted at the recent meeting can be accessed here:

https://www.cms.int/documents/cop-resolutions

Agreement on the Conservation of Albatrosses and Petrels

The Agreement on the Conservation of Albatrosses and Petrels (ACAP) has developed a range of best practice advice and guidance designed to mitigate the threats to seabirds on land and at sea. ACAP conservation guidelines including about biosecurity, tissue sampling following a disease outbreak, conducting a census, eradication, field collection protocols for DNA dietary analysis of seabird scats, and translocation are applicable to the shearwater species included under JAMBA, CAMBA and ROKAMBA.

ACAP best practice advice and facts sheets for fisheries help to mitigate seabird bycatch during fishing operations and are applicable to the shearwater species included under JAMBA, CAMBA and ROKAMBA.

Ramsar Convention

Australia is a signatory to the Convention on Wetlands of International Importance (see www.ramsar.org). The Ramsar Convention, as it is commonly known, is an intergovernmental treaty dedicated to the conservation and 'wise use' of wetlands.

The Ramsar Convention focuses on conservation of important habitats rather than species. Parties are committed to identifying wetlands that qualify as internationally significant against a set of criteria, nominating these wetlands to the List of Wetlands of International Importance (the Ramsar List) and ensuring the maintenance of the ecological character of each listed Ramsar site.

As at August 2018, Australia has 66 Wetlands of International Importance that cover a total of approximately 8.1 million hectares. Many of Australia's Ramsar sites were nominated and listed using waterbird-based criteria, and in some of these cases migratory shorebirds are a major component of the waterbird numbers (e.g. Roebuck Bay and Eighty-mile Beach Ramsar Sites in Western Australia).

One new Ramsar site was added to the Australian reserve system since the last report in 2016. Glenelg Estuary and Discovery Bay was approved for listing by the Australian Government as a wetland of international significance under the Ramsar Convention. The site covers more than 22,000 ha and has diverse aquatic habitats, including intertidal sandy beaches, estuarine habitat, freshwater swamps and permanent lakes. The site supports nationally threatened coastal saltmarsh, and eight nationally or internationally listed species of conservation significance, such as the Eastern Curlew and Australasian Bittern, which are both critically endangered. The site also includes part of the Discovery Bay Shorebird Site, which is an internationally important non-breeding area for Sanderling and regularly supports 1 per cent of the flyway population.

East Asian – Australasian Flyway Partnership

The Partnership for the Conservation of Migratory Waterbirds and the Sustainable Use of their Habitats in the East Asian–Australasian Flyway (East Asian— Australasian Flyway Partnership) was launched on 6 November 2006. A Ramsar regional initiative, the Partnership is an informal and voluntary collaboration of effort focusing on protecting migratory waterbirds, their habitat and the livelihoods of people dependant on them.

The EAAF is one of nine major migratory waterbird flyways around the globe. It extends from within the Arctic Circle in Russia and Alaska, southwards through East and South-east Asia, to Australia and New Zealand in the south, encompassing 22 countries. Migratory waterbirds share this flyway with 45 per cent of the world's human population. The EAAF is home to over 50 million migratory waterbirds—including shorebirds, Anatidae (ducks, geese and swans), seabirds and cranes—from 207 species, including 33 globally threatened and 13 near threatened species.

Flyway Partners include countries, intergovernmental agencies, international non-government organisations and the international business sector. The Partnership operates via working groups and task forces, many of which focus on migratory shorebirds and seabirds. A cornerstone of the Partnership is the establishment of a network of internationally important sites for migratory waterbirds throughout the EAAF.

East Asian - Australasian Flyway Site Network

The East Asian — Australasian Flyway Site Network is a voluntary, non-binding, collaborative project involving over 130 sites across 22 countries. The Flyway Site Network has been operating since 1996 under the Asia-Pacific Migratory Waterbird Conservation Strategy and is now supported by the East Asian — Australasian Flyway Partnership.

The Flyway Site Network represents a unique opportunity for national governments, non-government organisations and site managers in the Flyway to work together to achieve more effective conservation and protection of migratory waterbirds. The Network provides for internationally important sites to be included in a broad-based conservation arrangement across the Flyway. Through the Flyway Site Network, national governments, site managers and local stakeholders can work cooperatively to achieve positive conservation outcomes to protect migratory waterbirds.

The conservation of migratory waterbirds is dependent on the appropriate management of a comprehensive network of internationally important sites. Increasing the number of sites in the Network will enhance its overall effectiveness.

There are 24 East Asian — Australasian Flyway Partnership Network Sites in Australia, many of which are Ramsar sites, including Roebuck Bay in north-west Western Australia, Moreton Bay in Queensland, Logan Lagoon in Tasmania and Corner Inlet in Victoria. Flyway Network Sites may be designated regardless of tenure or protected status and several Australian sites are privately managed, e.g. by Indigenous communities. Along with migratory waterbirds, the Flyway Site Network also protects many Australian endemic, threatened and migratory species and threatened ecological communities. A full list of sites can be accessed here:

http://www.environment.gov.au/biodiversity/publications/celebrating-australias-migratory-waterbirds-and-their-habitats

South-East Gulf of Carpentaria high tide roost, Pelican Island, Queensland © Roger Jaensch and CLCAC

Red-necked Stint *(Calidris ruficollis)* at Lake Tuchewop, Victoria © Chris Purnell

Implementation of the Agreements by State and Territory Governments

Compiled by state and territory representatives of the Wetlands and Aquatic Ecosystems sub-Committee

Relevant JAMBA Articles: II, IV, V, VI

Relevant CAMBA Articles: II, III, IV

Relevant ROKAMBA Articles: 2, 3, 4, 5

Summary

Australia has a Federal Government with 8 separate State or Territory Governments. The State and Territory agencies have primary responsibility for land and wildlife management within their jurisdictions.

The Australian Government has responsibility for matters in the national interest, and for non-state/territory areas, which includes the marine environment from 3 nautical miles out to the edge of the Exclusive Economic Zone (EEZ). The State and Territory agencies have primary responsibility for the management of wildlife, including migratory species, which occur within their jurisdictional borders, including State/Territory waters.

State and territory agencies undertake a range of activities in their jurisdictions which protect migratory birds and their habitat. Since October 2016 activities have included: nomination of important migratory waterbird areas to the East Asian-Australasian Flyway Site Network; assessments and surveys of important habitat and important bird populations; completion of ecological character descriptions for Ramsar sites; habitat restoration and management programs; conservation assessments; management planning; weed and feral animal control activities; conservation status reviews; and educational activities.

オーストラリア政府による協定の実施

湿地・水界生態系小委員会の州および特別地域代表により編集

JAMBA の関連条項：**II**、**IV**、**V**、**VI**

CAMBA の関連条項：**II**、**III**、**IV**

ROKAMBA の関連条項：**2**、**3**、**4**、**5**

要約

オーストラリアには連邦政府の他に、**8** つの州および特別地域の政府があります。州および特別地域の政府は、それぞれの管轄区域における土地および野生生物の管理に対する主要な責任を担っています。

オーストラリア政府は、国益に関する問題、および州／特別地域外の区域（沿岸 **3** 海里から排他的経済水域（**EEZ**）の端までの海洋環境を含む）について責任を担っています。州および特別地域の政府機関は、それぞれの管轄区域内（水域を含む）における、移動性動物種を含む野生生物の主な管理責任を担っています。

州および特別地域の政府機関は、それぞれの管轄区域内において、渡り鳥とその生息地の保護を目的としたさまざまな活動を行います。**2016** 年 **10** 月以降に行われた活動には、以下の内容が含まれています：東アジア・オーストラリア地域フライウェイ・サイト・ネットワークへの、渡り性水鳥の重要生息地の指定；重要な生息地および重要な鳥類の個体数に関する評価および調査；ラムサール条約で取り決められている場所の生態学的特徴の記載の完了；生息地の回復および管理のプログラム；保全に関する評価；管理計画の立案；雑草および野生化した動物の管理活動；保護状況の見直し；教育活動。

澳大利亚政府对各协议的落实

湿地与水生生态系统州和领地分委员会代表汇编

JAMBA相关条款：**II**，**IV**，**V**，**VI**

CAMBA相关条款：**II**，**III**，**IV**

ROKAMBA相关条款：**2**，**3**，**4**，**5**

总结

澳大利亚由一个联邦政府和**8**个独立的州和领地政府组成。各州和领地政府部门对各自辖区内的土地和野生动物管理负有首要责任。

澳大利亚政府有义务管理事关国家利益的事务，也有义务管理非州或领地辖区，其中包括从**3**海里至专属经济区（**EEZ**）边缘范围内的海洋环境。各州和领地政府部门对各自辖区内（包括州或领地水域）的野生动物（包括迁徙物种）管理负有首要责任。

各州和领地政府在各自的辖区内开展一系列保护候鸟及其栖息地的行动。自**2016**年**10**月开展的行动包括：指定东亚—澳大利西亚迁飞路线重要的迁徙水鸟栖息地；对重要的栖息地和鸟类种群开展评估和调研；完成《**Ramsar**公约》列出的各湿地生态特征描述；恢复和管理栖息地；保护评估；管理规划；草类和野化动物管控；保护状态检查以及教育活动。

주 및 테리토리 정부의 협정 이행

편집: 주 및 테리토리의 습지 및 수생태 보전 소위원회

JAMBA 관련 조항: **II**, **IV**, **V**, **VI**

CAMBA 관련 조항: **II**, **III**, **IV**

ROKAMBA 관련 조항: **2**, **3**, **4**, **5**

요약

호주에는 **8**개의 개별 주 정부 또는 테리토리 정부와 아울러 연방 정부가 있습니다. 주 및 테리토리의 담당 기관이 관할 구역 내 토지 및 야생 생물 관리에 대한 주된 책임을 맡습니다.

호주 정부는 국가적 이익이 걸린 사안과, 주/테리토리에 속하지 않은 구역에 대해 책임을 맡으며, 여기에는 **3**해리로부터 배타적경제수역(**EEZ**) 경계선까지의 해양 환경이 포함됩니다. 주 및 테리토리의 담당 기관이 야생 생물 관리에 대해 주된 책임을 맡는데, 여기에는 주/테리토리 수역을 포함하여 관할 구역 내에서 발견되는 이동성 생물종이 포함됩니다.

주 및 테리토리 담당 기관은 관할 구역 내에서 다양한 활동을 통해 철새 및 그 서식지를 보호합니다. **2016**년 **10**월 이후 활동으로는 동아시아-대양주 철새이동경로 지역 네트워크에 주요 이동성 수금류(**waterbird**) 지역 지정, 주요 서식지와 주요 조류 개체수 평가 및 조사, **Ramsar** 지역 생태학적 특성 설명서 완성, 서식지 복구 및 관리 프로그램, 보존 평가, 관리 계획, 잡초 및 야생 동물 통제 활동, 보존 상태 평가, 교육활동이 있습니다.

Western Australia

Legislation

The *Biodiversity Conservation Act 2016* received Royal Assent on 21 September 2016. Once fully proclaimed, the Act will replace the *Wildlife Conservation Act 1950* and will provide significant changes in the legislated ability for the Western Australian Government to protect and conserve biodiversity and biodiversity components. These include a formal listing process for threatened species; recognition and listing of threatened ecological communities and identification and highest level protection of critical habitats. Full proclamation of the Act is dependent on the drafting of Biodiversity Conservation Regulations, which is currently underway. It is anticipated that the Regulations will come into effect on 1 January 2019.

Policy initiatives

The *Pilbara Conservation Strategy* was released in February 2017. The strategy outlines a landscape-scale approach to conservation across the Pilbara bioregion and identifies opportunities for partnerships to mitigate threats across tenure boundaries to protect conservation values, including threatened and other important species, communities and ecosystems, like the Fortescue Marsh.

The *Western Australian Biosecurity Strategy 2016-2035* was released in November 2016 to provide strategic direction for the management of emerging and ongoing biosecurity issues that impact WA agriculture, fisheries, forests and the environment.

The *Wetlands Conservation Policy for Western Australia* (1997) continued to be implemented, which includes an objective to maintain the abundance of waterbird populations, particularly migratory species.

The Department of Biodiversity, Conservation and Attractions (DBCA) continued to work with other states and the Australian Government in developing a national wetlands policy regarding the implementation of international agreements. Toolkits for identifying, classifying and managing high ecological value aquatic ecosystems were finalised and made publicly available.

Conservation reserve system

In January 2018, 1,001 hectares of Class A conservation reserve was created over an enclave within Yalgorup National Park, providing an improved buffer to wetlands within the Peel-Yalgorup System Ramsar site that provide important habitat for migratory shorebirds. The buffer zone adjacent to the Vasse-Wonnerup System Ramsar Site was also extended through reservation for conservation.

In the Kimberley region, the Yawuru Nagulagun / Roebuck Bay marine park was created and its management plan was finalised. The terrestrial coastal strip of Eighty Mile Beach and Walyarta Conservation Park were created and jointly vested between the relevant Aboriginal Corporations and the Conservation and Parks Commission.

Work is underway to add Morley Beach on the Wilson Inlet to the conservation reserve system, involving a change of tenure from unallocated Crown Land to Conservation Park. This will provide improved protection for this important migratory shorebird site on Western Australia's south coast.

Management

DBCA provides advice to regulatory authorities for development proposals that have the potential to impact on conservation significant species, including migratory shorebirds and threatened species. Management plans for conservation reserves, including marine and national parks, also assist in managing threats to migratory shorebird habitat in reserves. DBCA also assists the Australian Government with the identification of environmental values and potential impacts from proposed developments within and adjacent to Ramsar sites that include migratory shorebird habitat.

DBCA has provided financial assistance and advice to the Department of the Environment and Energy to develop *National Environmental Management Light Pollution Guidelines for Marine Turtles and Migratory Birds* to provide guidance to proponents, local governments and government assessors of development proposals.

The Western Australian Oiled Wildlife Response Plan provides guidance to an oiled wildlife response and a series of regional plans are in development. DBCA has also provided oiled wildlife response training to its staff, community members and industry. The plans and training include considerations for the mitigation of, and response to, impacts of an oil spill on migratory birds. In 2017, DBCA also acquired an oiled wildlife response container to better equip the State to respond to an oil spill.

The *Western Shield* wildlife recovery program continued to implement broadscale fox and feral cat control for native animal conservation across a network of sites in WA. Feral herbivore control was also undertaken, including in areas adjacent to Fortescue Marsh.

Healthy Wetland Habitats, a voluntary off- reserve conservation program that provides technical and financial assistance to private land managers for the management of wetlands of high conservation value, supported the installation of 1,343m of fencing on two properties abutting the Vasse Wonnerup System Ramsar site to provide protection from grazing and delineate between areas managed for agriculture and conservation.

Preliminary assessments to determine the status of the ecological character of two Ramsar sites of importance for migratory and threatened species (Muir-Byenup System and Lake Gore) have been completed and a third assessment (Vasse-Wonnerup System) is underway. An Operational Plan is being developed to guide future management of the Vasse-Wonnerup System Ramsar Site.

Monitoring and research

Key sites have been identified on remote islands in the Pilbara region, including four new sites for the Critically Endangered Eastern Curlew (*Numenius madagascariensis*). About 63,000 shorebirds and seabirds were counted between 2014 and 2018 with results indicating migratory shorebirds are present year-round. Recreational usage of these sites has been recorded using a combination of aerial surveys, social surveys, vessel patrols and visitor boxes, which has been used to determine the profile of the average island visitor to inform targeted education and interpretation strategies.

DBCA undertook shorebird surveys of the Montebello Islands and Bedout Island off the Pilbara coast in 2017 and 2018. Information collected from these surveys will be used to identify areas of importance to shorebirds and potential threats, and inform management actions (e.g. signage and interpretation, and designation of no camping zones).

In February and March 2017, aerial waterbird surveys were undertaken by DBCA staff, traditional owners from the Indigenous Desert Alliance and Bennelongia Environmental Consultants over the ephemeral lakes of the Western Desert (including Lake Disappointment and Lake Mackay), Roebuck Plains, Walyarta Conservation Park and Lake Gregory following a significant rainfall event. Migratory shorebirds were recorded during the surveys, as were several significant Banded Stilt (*Cladorhynchus leucocephalus*) breeding colonies.

Sharp-tailed Sandpiper *(Calidris acuminata)* at Lake Tuchewop, Victoria © Chris Purnell

In May 2018 a survey of waterbirds using the Parry Lagoons area of the Ord River Floodplain Ramsar site was undertaken by DBCA staff.

DBCA staff participated in, and provided logistical support for, Shorebirds 2020 surveys at various sites across WA, including Roebuck Bay and Eighty Mile Beach (through the Monitoring Yellow Sea Migrants in Australia project), Barrow Island, Exmouth Gulf and islands and the Ningaloo coast, and the Peel-Yalgorup System and Vasse-Wonnerup System Ramsar sites and sites on the south coast.

Migratory bird presence data was included in a re-evaluation of wetlands within the Perth and Peel area in collaboration with the Department of Water and Environmental Regulation. Migratory bird survey data has been included in a review of the condition of the Forrestdale and Thomsons Lakes, Peel-Yalgorup, Vasse-Wonnerup and the Muir-Byenup systems Ramsar sites as part of a mid-term review of the *Forest Management Plan 2014-2023*.

DBCA collaborated with State agencies and the Commonwealth to conduct a trial of a national methodology for assessing condition of wetlands: the *Integrated Ecological Condition Assessment*, which is intended to become a fifth module of the national Aquatic Ecosystems Toolkit. A case study was prepared for the Peel-Yalgorup System Ramsar site using the methodology to present to other states for future take up in assessing condition changes in nationally and internationally important wetlands.

DBCA continued to work in partnership with other State agencies, the City of Busselton, Water Corporation, GeoCatch and the South West Catchments Council to manage and monitor the Vasse-Wonnerup System Ramsar site. Two years of monthly waterbird monitoring was completed and several PhD studies were supported. Possible impacts of recent water level management on waterbird numbers at this site are to be assessed.

Surface water depth and quality monitoring was undertaken monthly for the Lake Warden system including monthly lake depth measurements, increased to fortnightly and then weekly when trigger levels for operating the Lake Wheatfield pipeline were approached.

DBCA continued to monitor water levels, salinity and pH of 105 wetlands across south-western Australia (Geraldton to Esperance), including numerous sites of international, national and regional importance to resident and migratory shorebirds. The *South West Wetlands Monitoring Program*, which ran from 1977 to 2018, provided

context for management and revealed and tracked impacts of threatening processes, in particular long-term water level declines and salinity increases associated with regional rainfall decline.

Education and engagement

A Regional Communication Strategy and an Interpretive and Information Action Plan has been developed to raise awareness of threatened and migratory species and safeguard important habitat in response to a potential increase in recreational disturbance on the Pilbara coast and islands. The strategy identifies key user groups, and achievements include:

Development of a Shorebirds and seabirds of the Pilbara coast and islands identification guide to be distributed through the local and broader community.

A *Threatened and protected species education manual* for years 4-6 is has been developed and will be made available to all schools in WA in 2018.

Engagement and education activities have occurred through school-based activities with Bush Ranger Cadet Units in Exmouth and Onslow, school holiday program activities within Exmouth District and in collaboration with Shire of Exmouth, Shire of Ashburton and the Wheatstone Indigenous Sea Ranger Program, and broader community engagement through local festivals and community events in Exmouth, Karratha and Onslow. In 2017 over 3,000 people took part in activities in the Pilbara region.

A shorebird identification workshop was held in Exmouth in January 2018 for the local community. The workshop was facilitated by DBCA and presented by BirdLife Australia with funding from the National Government's Landcare Program Threatened Species Recovery Fund. The workshop provided an opportunity for tourism operators, pastoralists, other government agencies and the local community to develop a greater understanding of shorebirds, important habitat and potential threats in the region.

DBCA promotes shorebird conservation through its websites (Parks and Wildlife Service and Explore Parks) and shorebird articles are occasionally posted via the Department's social media platforms (Twitter, Facebook and Instagram). Shorebird conservation is also promoted through occasional media and newsletter articles. Stakeholders are involved in the preparation and implementation of management plans for conservation reserves, which include management strategies and actions for protecting shorebird habitat. DBCA scientists publish articles relating to shorebird conservation, including recent publications concerning trends in numbers of the Eastern Curlew in south-western Australia.

Queensland

Protected Areas

The Queensland Government has worked with key non-government partners to successfully nominate and support management of East Asian-Australasian Flyway Partnership sites in the Gulf (Delta Downs and Tarrant) and raise community awareness of their importance as habitat for shorebird species. For example, the Department of Environment and Science worked with Indigenous rangers from the Carpentaria Land Council Aboriginal Corporation (CLCAC), researchers from the University of Queensland (UQ), and the Queensland Wader Study Group (QWSG) to promote migratory shorebird conservation work within the Gulf of Carpentaria at the World Science Festival Brisbane on the 24 March 2018. The Gulf is one of the most important sites in Australia for shorebird conservation, providing habitat for roughly 50% of migratory shorebirds passing through Australia.

Progression of updates to the Ramsar documentation for Queensland's five Ramsar sites Moreton Bay, Shoalwater and Corio Bays Area, Currawinya Lakes, Great Sandy Strait and Bowling Green Bay, is currently underway. Documentation includes Ecological Character Description (ECD), Ramsar Information Sheets (RIS) and Ramsar Management Summaries (RMS). To date RISs for Shoalwater and Corio Bays Area and Currawinya Lakes Ramsar sites have been finalised, with Moreton Bay and Bowling Green Bay in advanced stages of development. Great Sandy Strait will be completed in the near future. Flyway Site Information Sheets as part of the East Asian-Australasian Flyway Partnership, are also being updated for each site.

Queensland is developing an Intertidal and subtidal Classification Scheme to standardise classification using biophysical characteristics of the water column and sea floor. The scheme directly relates to shorebird management through facilitating a more comprehensive understanding of ecological values and representativeness of particular ecosystems with which to inform management and development decisions. More information on the Scheme is available at https://wetlandinfo.ehp.qld.gov.au/wetlands/what-are-wetlands/definitions-classification/classification-systems-background/intertidal-subtidal/

A new management framework, the *Values Based Management Framework* (VBMF), for high priority National Parks within Queensland is being finalised and management plans for Currawinya and Bowling Green Bay, important areas for migratory shorebirds, have been drafted. These plans consider biodiversity values, which includes shorebird conservation and management.

Non-government organisations play a key role in conserving migratory shorebirds and Conservation Volunteers Australia (CVA) is leading a project, *Community Conservation of Eastern Curlew*. The project includes five locations in Australia, one of which covers Moreton Bay and the Broadwater area in south east Queensland and involves on-ground works (i.e. weed control), a community awareness and shorebird monitoring.

The Fuller Lab (UQ) is leading the *Recovering Australia's Migratory Shorebirds Project* funded through the Australian Research Linkage Projects Scheme. The project aims to investigate the drivers of decline in Australia's shorebird populations to determine the most effective management activities to safeguard the future of Australia's shorebirds. The Fuller Lab are currently analysing migratory shorebird population statuses and trends in Great Sandy Strait. This includes examining distribution of shorebirds in relation to disturbance sources and intertidal foraging habitat, and whether these local factors can explain variation in trends across roost sites. Results of these analyses will help to prioritize management actions within the Great Sandy Strait. More information on the project can be found at https://wetlandinfo.ehp.qld.gov.au/resources/static/pdf/resources/fact-sheets/fs-arc-sb-project.pdf

Climate change and migratory shorebirds

As part of the *Queensland Climate Adaptation Strategy*, Queensland is developing biodiversity and ecosystem sector adaptation plans, in which wetlands and waterbirds will be considered. Further information is available at https://www.qld.gov.au/environment/assets/documents/climate/qld-climate-adaptation-strategy.pdf

Currawinya Lakes and Great Sandy Strait have been nominated for assessment as part of the Australian Government's Climate Change Vulnerability Assessment. Both sites support important shorebird habitat, with Great Sandy Strait the focus of QWSG biannual shorebird surveys.

Shorebird populations in Australia

As part of the ARC Linkage Project (see above), the Fuller Lab (UQ) are evaluating harvest of migratory shorebirds in the East Asian-Australasian Flyway (EAAF); this includes collating historical hunting records from the flyway, estimating historical and recent levels of harvest, and evaluating potential population-level impacts of hunting on migratory shorebirds.

The Fuller lab are also updating the national migratory shorebird population trends (previous trends from Clemens et al. 2016 were current to 2014). A component of this analysis will examine whether population trends differ between natural and artificial roost sites from across Australia.

Wetland rehabilitation and management

Queensland has developed and maintains a wide range of wetland rehabilitation and management tools and guidelines on its webpage *WetlandInfo* (see https://wetlandinfo.ehp.qld.gov.au/wetlands/ management/wetland-management/).

This includes information specific to management of shorebirds and other waterbirds (see https://wetlandinfo.ehp.qld.gov.au/wetlands/management/bird-management/)

Research and monitoring

Shorebird related research priorities and activities have been identified through a number of processes including DES published science priorities.

As part of the ARC Linkage Project, the Fuller Lab (UQ) in collaboration with QWSG, have equipped four Far Eastern Curlews with GPS/Argos tracking devices between November 2017 and March 2018. This component of the project will provide detailed information on non-breeding movements and habitat use, migratory routes, and stopover biology for this critically endangered species.

Carpentaria Land Council Aboriginal Corporation (CLCAC) and research institutes currently undertake shorebird surveys within the Gulf of Carpentaria. A Gulf stakeholder workshop explored ways to better integrate monitoring between all parties.

Griffith University is currently undertaking a research project in partnership with Queensland Government and Northern Australia Environmental Resource Hub on the effects of flow alteration on estuaries in the Gulf of Carpentaria. The project aims to identify the food resources present in important estuarine habitats that support shorebirds and how these food sources may be affected by water extraction in Catchment Rivers.

Education and engagement

WetlandInfo continues to be the storehouse for public material related to wetland management in Queensland. The website has pages dedicated to promoting internationally significant events such as World Wetlands Day as well as state based pages on shorebird management and conservation, including linkages to other key partners in Queensland. It also contains information on: legislation, policies and programs administered to manage wetlands; on state, national and international conventions, partnerships, agreements, legislation and strategies that protect waterbirds and their habitats; and information on shorebird locations in Queensland.

For further information: https://wetlandinfo.ehp.qld.gov.au/wetlands/

The Fuller Lab (UQ) are evaluating governance of migratory shorebird conservation in the EAAF; includes identifying institutional arrangements across nations, identifying actors involved in such arrangements, and evaluating effectiveness of those arrangements.

New South Wales

Saving our Species program

The Saving our Species (SoS) program is the NSW Government's threatened species conservation program. Actions under the program include developing conservation strategies, on-ground projects, monitoring, community awareness raising and education.

The SoS program is currently developing conservation strategies and on-ground projects for threatened migratory species including shorebirds, seabirds, marine mammals, and turtles.

Under the program, 11 priority Little Tern (*Sterna albifrons*) sites along the NSW coast have received funding. Actions implemented include: fox control, community liaison and compliance, managing risk of inundation and avian predation and monitoring of breeding.

SoS is currently developing a strategic approach to managing migratory species through the 'partnership species' management stream of the program. The stream prioritises the management of migratory species that have sites or populations of high conservation value in the state. This includes developing strategies for species such as the Black-tailed Godwit (*Limosa limosa*), Curlew Sandpiper (*Calidris ferruginea*), Terek Sandpiper (*Xenus cinereus*), Greater Sand Plover (*Charadrius leschenaultii*), Lesser Sand Plover (*Charadrius mongolus*), Great Knot (*Calidris tenuirostris*), Loggerhead turtle (*Caretta caretta*), Green turtle (*Chelonia mydas*), and Southern-right whale (*Eubalaena australis*).

Little Terns *(Sterna albifrons)*

Since 2001 NSW has monitored fledging rates of little terns and other threatened beach-nesting shorebirds at over 25 major nesting sites along the NSW coast.

Where feasible, primary threats to fledgling have been managed at these sites, including introduced Red Foxes (*Vulpes vulpes*), human disturbance, domestic dogs, inundation and native avian predators (corvids and gulls).

Observed fledging rates have been variable irrespective of management, but estimated rates at sites with management such as fox control are 50 per cent higher than unmanaged sites. Despite management efforts, the number of breeding pairs across all sites has been declining at about 3 per cent per year since 2001.

Hunter Estuary Wetlands Ramsar Site

The wetlands restoration at Tomago within the Hunter Estuary Wetlands Ramsar site, is now a key site in the East Asian-Australasian Flyway, with over 5,000 Sharp-tailed Sandpipers (*Calidris acuminata*) recorded during the 2014/15 summer (which was almost 2 per cent of the world population), and the shorebird diversity has increased threefold since 2009, as a result of the habitat restoration efforts.

Significant sections of key migratory shorebird roosting habitat on the Kooragang Dykes have been repaired and raised, and significant amount of estuarine habitat within Hexham Swamp has been restored.

Mangrove seedlings are being removed from 500 ha (Ash Island, Tomago, Stockton Sandspit, Kooragang Dykes, Smiths and Sandy Island) from within Hunter Wetlands National Park) to improve wader habitat and 18 ha of saltmarsh has been restored as migratory shorebird habitat through mature mangrove removal.

NSW has removed 95 per cent and treated approximately 500 ha of Spiny Rush (*Juncus acutus)* at Tomago, Ash Island and Hexham Swamp, and has restored 50 ha of mudflat and 10 ha of saltmarsh at Tomago.

Towra Point Ramsar Site

Following indications of changed ecological character at the site, in 2014 a Ramsar preliminary assessment noted a reduction of shorebird diversity and numbers. In 2017, NSW collaborated with the Australian Government to undertake a formal assessment of the Ramsar site, to determine whether there had been a change in ecological character. The assessment indicated that there has been a change in the diversity of bird species at the site and for Little Tern breeding success. These changes were linked largely to reduced habitat availability and increased threats from pests, human disturbance and vegetation encroachment. NSW is currently working with the Australian Government to develop a Response Strategy to assist in developing key management actions to help provide greater protection of the site.

Programs to support waterbirds

Environmental watering of key waterbird habitat in NSW is carried out annually to maintain and enhance migratory shorebird habitat in iconic wetlands across five key catchments. These habitats support many migratory bird species including Latham's Snipe and Sharp-tailed Sandpiper.

Long-term watering plans are being prepared for NSW Murray-Darling Catchments, which will set targets for maintaining habitats for waterbirds within key wetland systems such as the Macquarie Marshes, Gwydir Wetlands, Lowbidgee wetlands and the Murray River.

Maintenance of migratory bird habitat is supported through statutory water sharing plans which aim to maintain system health. This provides important water flow protection for numerous inland habitats. These include Narran Lakes and Menindee Lakes which provide critical habitat for very high numbers of migratory birds.

Red-footed Booby *(Sula sula)* over North Keeling Island © Copyright Department of the Environment and Energy

Environmental Water

By the end of 2016-17, OEH delivered almost 1,400,000 megalitres of water (from state, Commonwealth and The Living Murray accounts) within the Murrumbidgee, Murray, Lachlan, Macquarie and Gwydir systems. This supported migratory bird species, including; Sharp-tailed Sandpiper, Latham's Snipe, Common Greenshank and Marsh Sandpiper.

Waterbird monitoring

The Aerial Waterbird Surveys of Eastern Australia (AWSEA) contributes to 33 years of data collected across six survey bands in Eastern Australia including major wetland sites in the Murray-Darling Basin. This program is coordinated by the University of New South Wales with contributions made by the NSW Government for the NSW portion.

The NSW Government undertakes counts of waterbirds in the Macquarie Marshes, Gwydir Wetlands, Lower- and Mid-Murrumbidgee Wetlands, Central Murray Forests and Narran Lakes, to complement data collected through the AWSEA, and to support the adaptive management of environmental water by the NSW and Commonwealth Governments. Many of these areas support Ramsar wetlands that contain significant habitat for migratory species listed under JAMBA, CAMBA and/or ROKAMBA.

Annual survey reports can be found here: https://www.ecosystem.unsw.edu.au/content/rivers-and-wetlands/waterbirds/eastern-australian-waterbird-survey

Victoria

Glenelg Estuary and Discovery Bay Ramsar Site

Glenelg Estuary and Discovery Bay was approved for listing by the Australian Government as a wetland of international significance under the Ramsar Convention. The site covers more than 22,000 ha and has diverse aquatic habitats, including intertidal sandy beaches, estuarine habitat, freshwater swamps and permanent lakes. The site supports nationally threatened coastal saltmarsh, and eight nationally or internationally listed species of conservation significance, such as the Eastern Curlew and Australasian Bittern, which are both critically endangered. The site also includes part of the Discovery Bay Shorebird Site, which is an internationally important non-breeding area for Sanderling and regularly supports 1% of the flyway population.

Victorian Ramsar Estate

Ramsar site Ecological Character Descriptions (ECD) and corresponding Ramsar Information Sheets (RIS) are currently being updated. ECD addendum have been published for the Corner Inlet, Edithvale Seaford Wetlands, Kerang Wetlands and Western Port Ramsar sites. The ECD addenda include improvements to limits of acceptable change and incorporate a range of recent data and information relating to waterbirds.

Victoria is improving the way in which Ramsar sites are managed in response to recommendations of an audit by the Victorian Auditor General's Office (VAGO) - *Meeting obligations to protect Ramsar wetlands*. This work will have positive effects for the conservation of migratory birds through improvements to management and monitoring of Ramsar values at Victorian Ramsar sites. VAGO audit response actions include:

- Agreed roles, responsibilities, and accountabilities of each agency responsible for the management of the states Ramsar sites.
- Establishment of a Ramsar Site Coordinating Committee for each site. These committees are responsible for the implementation of Ramsar Site management plans.
- Improved tracking of ecological character status and management plan implementation through the development of an online monitoring tool and annual action planning and reporting via the site coordinating committees.
- Development of a state-wide monitoring, evaluation, reporting and improvement framework.

Five Victorian Ramsar sites have standalone Ramsar Site Management plans which are all now current. These are Glenelg Estuary and Discovery Bay, Kerang Lakes, Western Port, Edithvale Seaford Wetlands, and Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar sites. The seven sites that have a Ramsar Site Management Plan embedded within their Regional Waterway Strategies (developed by catchment management authorities) will be strengthened to ensure that activities are focused on high priority threats that impact critical components, processes and services (which include migratory birds).

South Australia

The Coorong, Lake Alexandrina and Albert

In January 2018, annual monitoring of waterbirds by University of Adelaide researchers counted approximately 187,500 waterbirds from 60 species in the Coorong. Approximately 100,000 of the waterbirds present were in the Coorong's Southern Lagoon. These abundances were considerably greater than in January 2017, but similar to abundances recorded in 2016, when approximately 185,000 waterbirds from 57 species were recorded in the Coorong.

As outlined in the 2018 condition monitoring report (Paton *et al*, unpublished) abundances for many piscivorous (fish-eating) species and shorebirds increased in the Coorong in 2018. The report however indicates that although "there were also more shorebirds present in the Coorong in January 2018 than January 2017, their abundances (in the Coorong) generally remained below their long-term median abundances" (Paton *et al,* unpublished).

In January 2018, 12 migratory waterbird species were recorded across the Coorong with five of these species observed in the Southern Lagoon. Three species exceeded 10,000 individuals across the whole Coorong, including the migratory Red-necked Stint (*Calidris ruficollis*). Although this species was one of the most abundant during the 2018 survey, with an increase in numbers compared to 2017, there is still concern that there has been an overall decline in abundance of this species and the Curlew Sandpiper (*C. ferruginea*) at the site. There were a further six species that were recorded in numbers greater than 5,000 across the Coorong, including the Sharp-tailed Sandpiper (*C. acuminata*), with 906 individuals recorded in the Southern Lagoon.

The 2018 monitoring report by Professor Paton states that "a number of shorebird species continued to spend more than 70 per cent of their time foraging" and that the "high rates of foraging are indicative of low resource levels". Resource levels are based on chironomid larvae and *Ruppia tuberosa* seeds and turions (a small shoot that stores starch and functions as a propagule for the adult plant) which monitoring indicates were in relatively small numbers throughout the Southern Lagoon, linked to the continued degraded condition of the Coorong. The South Australian Government continues to work with the Australian Government on the delivery of environmental water to the Coorong for environmental benefit, which has resulted in substantive improvement across much of the site.

Of concern is the continued presence of filamentous green algae throughout the southern Coorong. The algae is an issue due to its deleterious effects on the ecology, including smothering shorelines, suppressing the emergence of chironomids and limiting access to mudflat foraging habitat for shorebirds. A report titled *Optimising Ruppia habitat* is due to be published shortly summarising the investigations undertaken into *R. tuberosa* requirements, filamentous algae and their interaction.

The South Australian Government has assembled an independent scientific expert panel to provide scientific advice on the status of the Coorong, immediate threats and key knowledge gaps in supporting maintenance of the site's ecological character, including the protection and enhancement of waterbird populations, their habitat and key food resources. Additionally, a community summit on the Coorong was held on 5 June 2018, attended by 80 key stakeholders, including community members and scientists to explore future management of the Coorong.

The South Australian Government is presently preparing a plan of action with a number of potential on-ground interventions and investigations aimed at improving the ecological function of the Coorong Southern Lagoon as a migratory shorebird habitat to compliment the continued provision of environmental water from the Murray-Darling system.

Milang Foreshore Habitat Restoration Project

The Milang Foreshore Habitat Restoration Project has recently been completed in the Coorong and Lakes Alexandrina and Albert Ramsar site. The project co-developed with the local community, seeks to maintain and continue the recovery of native habitat and feeding grounds for threatened migratory waterbird species at Milang, specifically the Latham's Snipe *(Gallinago hardwickii)*. The habitat restoration project has focused on infrastructure and ecological works in and around the wetland to improve the snipe habitat, together with awareness raising of the environmental significance of this Ramsar wetland and its relationship to social and cultural values of the area.

South East Flows Restoration Project

A large construction project is currently underway to restore inflows from the south east of South Australia to the Coorong South Lagoon aimed at assisting to maintain salinity in the Southern Lagoon within target levels and prevent ecological degradation during periods of low flows from the Murray-Darling Basin.

Flows to maintain salinity levels in the Coorong from the south east are complementary to River Murray Flows over the barrages. Flow will be adjusted annually to account for the Coorong requirements and delivery of flows to en route wetlands for increased environmental outcomes. These flows will support the important waterbird habitat of the Coorong.

Historically, quantities of freshwater flowed into the Southern Lagoon from the South East and this source of freshwater has been reduced by drainage works in the region over the past 150 years. The South East Flows Restoration Project involves constructing a new flow path to connect existing elements of the South East Drainage Network, to deliver additional water directly into the Southern Lagoon.

Construction works commenced in March 2017 and are scheduled for completion in 2018 whereupon additional flows of between 5.0 - 45.3 GL (1GL = 1 billion litres) annually are estimated to reach the Coorong.

Adelaide International Bird Sanctuary

On Ground Activities in the Adelaide International Bird Sanctuary

A Risk Analysis was undertaken in 2016 to determine the highest threats to shorebirds and their habitat. Disturbance impacts from Off Road Vehicles (ORV) including motor bikes, four wheel drives, and dogs off leads, were identified as the most significant threat to shorebirds in the short to medium term.

A multi-pronged approach to the management of shorebird disturbance activities is being undertaken in the Adelaide International Bird Sanctuary, including development and placement of community signage, strategic and targeted revegetation projects, community stewardship of key areas, development of visitor facilities to help promote passive recreational activities and change the type of person that visits and uses these coastal areas.

In addition, in 2017 the Department for Environment and Water developed a compliance plan for the Adelaide International Bird Sanctuary. Since the implementation and commencement of the Compliance program in April 2017 (which has a significant educational focus), over 400 people have been spoken to about their behaviours and activities and some reduction in beach disturbance has been observed.

Mutual Agreement between Department of Defence and Department of Environment and Water

A Mutual Agreement between Department of Defence and Department for Environment and Water (Northern and Yorke Region and Adelaide Mount Lofty Ranges Regions) was signed in late 2017 for the delivery of on ground actions in the Upper St Vincent Gulf. The Department of Defence Proof Experimental Establishment, Port Wakefield incorporates a large proportion of the shorebird habitat in Upper St. Vincent Gulf.

The Department of Defence has recognised the role of community (individuals and groups) in the delivery of on-ground actions, including wader surveys and will foster community participation in protecting and managing their landscapes and seascapes. In relation to this, Birds SA are now able to access the Department of Defence land at Port Wakefield to undertake shorebird surveys enhancing monitoring of shorebirds in the vicinity of the Adelaide International Bird Sanctuary.

Formation of the South Australian Shorebird Alliance

The South Australian Shorebird Alliance (SASA) is a collaboration involving multiple government and not-for-profit organisations to support community efforts in South Australia aimed at protecting resident and migratory shorebirds, including beach-nesting birds. Shorebird Alliance partners include representatives from across South Australia, BirdLife Australia, Birds SA, Friends of Shorebirds South East, Local Government Association (Councils), and the Department for Environment and Water. Alliance affiliates and other supporters include organisations and groups such as Adelaide University, Australian Wildlife Conservancy, the Adelaide International Bird Sanctuary Collective and Friends groups.

SASA formally commenced the partnership in November 2017, with the formation of a Working Group to assist with the implementation of Birdlife Australia's Shorebird Conservation Action Plan across priority areas of the state. National priorities involved include: threatened Far Eastern Curlew, Curlew Sandpiper, Hooded Plover, Wetlands of International Importance (Ramsar) and the Australian Government's Wildlife Conservation Plan for Migratory Shorebirds. The Alliance aims to work with communities through collaborative awareness raising, information exchange, on ground works and engagement activities to minimise disturbance and breeding impacts to shorebirds in South Australia. The SASA and Birdlife Australia will co-host a Migratory Shorebird Conservation Action Planning process in September 2018.

Australian Capital Territory

Migratory Species Action Plan

The *Nature Conservation Act 2014* (ACT) requires the development of an Action Plan for Migratory Species to cover those listed species likely to occur in the ACT, as regular or opportunistic migrants. Listed migratory species are those species listed under the *Environment Protection and Biodiversity Conservation Act 1999* that are subject to international agreements.

The Action Plan will help inform environmental impact assessment processes, but also identify strategies to improve management of the habitat of migratory species. An Action Plan for migratory species maps their known critical and potential habitats and proposes management strategies to ensure their persistence.

The Migratory Species Action Plan is at http://www.environment.act.gov.au/__data/assets/pdf_file/0009/1168704/Migratory-Species-Action-Plan_ACCESS.pdf.

Funding has been provided to the Wetlands and Woodlands Trust and the ACT Parks and Conservation Service who manage the key site at Jerrabomberra Wetlands Nature Reserve to commence implementation of the plan.

Latham's Snipe monitoring project

The 201 hectare Jerrabomberra Wetlands Nature Reserve is a unique wetlands complex in the heart of Canberra, popular for bird watching, education and walking. Some areas have restricted access to protect important habitat for birds such as the Latham's Snipe.

Funding has been provided to the Woodlands and Wetlands Trust (the Trust) to monitor Latham's Snipe at Jerrabomberra and other ACT wetlands. Latham's Snipe is one of many bird species that regularly migrate to the ACT each year that are listed in international conservation agreements and conventions. The funding is part of a larger Japanese–Australian Latham's Snipe Project.

Mixed shorebird flock in Spencer Gulf, South Australia © Chris Purnell

Update on species or subspecies of birds in danger of extinction

Australian Government Department of the Environment and Energy

Relevant JAMBA Articles: III, IV, V, VI

Relevant CAMBA Articles: III

Relevant ROKAMBA Articles: 3

Summary

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is the national environmental law for Australia. The EPBC Act promotes the conservation of biodiversity by, amongst other things, providing strong protection for nationally threatened species and sub-species. These can be listed as Extinct in the Wild, Critically Endangered, Endangered, Vulnerable or Conservation Dependant. State and Territory governments also have similar legislation which provide for listing of species and subspecies considered threatened within their jurisdictions.

Any person may nominate a native species for listing under any of the threatened species categories of the EPBC Act. Nominations are forwarded to the Threatened Species Scientific Committee, which is a committee established to advise the Minister for the Environment and Energy. Once the Threatened Species Scientific Committee has conducted an assessment of the conservation status of nominated species, its advice and subsequent recommendations are forwarded to the Minister who makes the final decision. After a species or subspecies is listed under the EPBC Act their recovery is promoted using Conservation Advice, Recovery or Threat Abatement Plans.

Since October 2016, no new bird species have been listed under the threatened species provisions of the EPBC Act, and seven other bird species were transferred between categories (see Table 1).

To date, there are 155 birds listed on the EPBC Act threatened species list. Of those, 22 are listed extinct, 17 critically endangered, 54 endangered and 62 vulnerable. The list of threatened species listed under the EPBC Act is maintained on the internet at:

http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl

絶滅の危機に瀕した鳥類の種および亜種に関する改訂

オーストラリア政府　環境・エネルギー省

JAMBA の関連条項：**III**、**IV**、**V**、**VI**

CAMBA の関連条項：**III**

ROKAMBA の関連条項：**3**

要約

1999 年環境保護および生物多様性保全法（**EPBC** 法）は、オーストラリア連邦の環境法です。**EPBC** 法は、特に全国的に絶滅の危機に瀕した生物の種および亜種の保護を強化し、生物多様性の保全を促進しています。これらの種および亜種は「野生絶滅」、「絶滅寸前」、「絶滅危惧」、「危急」、「保全対策依存」の各カテゴリーに分類することができます。州および特別地域の政府も同様な法を制定し、それぞれの管轄区域内において危機に瀕していると考えられる種および亜種を列挙しています。

EPBC 法が定めるこれら危惧種のカテゴリーすべてにおいて、誰でも特定の在来種をリストに加えるよう推薦することができます。推薦が行われた場合、その届出は環境・エネルギー相の諮問機関として設立された絶滅危惧種科学委員会（**Threatened Species Scientific Committee**）に送られます。絶滅危惧種科学委員会は推薦された種の保全状況の評価を行い、環境・エネルギー相が同委員会による助言および提案を基に最終決定を下します。種または亜種が **EPBC** 法のリストに加えられた場合は、保全のための助言（**Conservation Advice**）、回復計画（**Recovery Plan**）または脅威軽減計画（**Threat Abatement Plan**）のいずれかを用いてその種または亜種の回復を促進します。

2016 年 **10** 月以来、**EPBC** 法の絶滅危惧種の規定の下で新たな鳥類種はリストに加えられていません。また、既に同リストに加えられていた鳥類種のうち **7** 種が異なったカテゴリーに移動されています（表 **1** 参照）。

今日まで、**EPBC** 法の絶滅危惧種リストには **155** 種の鳥類が記載されています。そのうち **22** 種は絶滅、**17** 種は絶滅寸前、**54** 種は絶滅危惧、**62** 種は危急に分類されています。**EPBC** 法の絶滅危惧種リストは、下記のアドレスでインターネット上に公開されています。

http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl

濒危鸟类物种或亚种最新信息

澳大利亚政府环境与能源部

JAMBA相关条款：**III**，**IV**，**V**，**VI**

CAMBA相关条款：**III**

ROKAMBA相关条款：**3**

总结

《**1999**年环境和生物多样性保护法案》（简称**EPBC Act**）是澳大利亚环境保护的国家法律。该法案为在全国范围内受威胁的物种和亚物种提供强有力的保护，从而推动生物多样性的保护。这些物种分为野生灭绝、极度濒危、濒危、脆弱或依赖保护几种。州和领地政府还有相似的法律，列出各自管辖范围内被视为濒危的物种和亚物种。

任何人都能提名一种本土物种列入**EPBC Act**濒危物种的范畴内，提名物种将发往濒危物种科学委员会（**Threatened Species Scientific Committee**），该委员会旨在为环境和能源部长提供建议。濒危物种科学委员会对提名物种的保护状态评估之后，将会把意见和得出的建议发给部长做最后决定。濒危物种或亚物种列入**EPBC Act**之后，会根据《保护建议》、《恢复或威胁消除计划》开展恢复行动。

自**2016**年**10**月起，**EPBC Act**濒危物种规定中没有新增鸟类，有七种鸟类的保护级别发生了变化（见表**1**）。

到目前为止，**EPBC Act**濒危物种名单中已列出了**155**种鸟类，其中**22**种已经灭绝，**17**种极度濒危，**54**种濒危，**62**种处于脆弱状态。**EPBC Act**中列出的濒危物种名单可在下面的网址上查阅：

http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl

멸종 위기에 처한 조류 및 그 아종에 관한 추가 내용

호주 환경·에너지부

JAMBA 관련 조항: **III**, **IV**, **V**, **VI**

CAMBA 관련 조항: **III**

ROKAMBA 관련 조항: **3**

요약

1999 년 환경보호 및 생물다양성 보전 조례(**Environment Protection and Biodiversity Conservation Act 1999**, **EPBC Act**)는 호주 국가 환경보호법입니다. **EPBC Act** 는 국가적으로 멸종 우려종 및 그 아종을 강력하게 보호하는 등 생물다양성 보전을 증진합니다. 이러한 종은 야생 멸종, 극도 위협, 위협, 취약 또는 보전활동 의존적 범주로 지정할 수 있습니다. 주 및 테리토리 정부에는 관할 지역 내에서 멸종 우려에 있다고 파악되는 종 및 아종의 목록을 제공하는 유사 법률이 마련되어 있기도 합니다.

누구든 **EPBC Act** 의 모든 멸종 우려종 범주에 자생종을 지명할 수 있습니다. 지명을 하면 멸종우려종 과학위원회(**Threatened Species Scientific Committee**)로 정보가 전달되는데, 이 위원회는 호주 환경·에너지부 장관에게 자문하기 위해 설립된 기관입니다. 멸종우려종 과학위원회(**Threatened Species Scientific Committee**)는 지명한 종의 보존 상태를 평가한 후 자문 및 후속 권고 사항을 최종 의사결정자인 장관에게 전달합니다. 종이나 아종이 **EPBC Act** 하에 등재된 후 이들의 복구는 보전 자문(**Conservation Advice**)이나 복구(**Recovery**), 위협 감소(**Threat Abatement**) 계획을 통해 진행됩니다.

2016 년 **10** 월 이후 어떠한 신규 조류 생물종도 **EPBC Act** 의 멸종 우려종 조항 하에 등재되지 않았으며, 다른 **7** 종은 분류 항목이 변경되었습니다(표 **1** 참조).

현재까지 **EPBC Act** 하에 멸종 우려종으로 등재된 조류는 **155** 종입니다. 이 중 **22** 종은 '멸종' 항목에, **17** 종은 '극도 위협' 항목에, **54** 종은 '위협' 항목에, **62** 종은 '취약' 항목에 등재되었습니다. **EPBC Act** 의 멸종 위기종 목록은 다음 웹 사이트에서 관리합니다.

http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl

General background information about listing threatened species

The Australian Government helps protect species at risk of extinction by listing them as threatened under Part 13 of the EPBC Act. Once listed under the EPBC Act, the species becomes a Matter of National Environmental Significance (MNES) and must be protected from significant impacts through the assessment and approval provisions of the EPBC Act. More information about threatened species is available on the Department's website at: http://www.environment.gov.au/biodiversity/threatened/index.html.

Public nominations to list threatened species under the EPBC Act are received annually by the Department. In order to determine if a species is eligible for listing as threatened under the EPBC Act, the Threatened Species Scientific Committee (the Committee) undertakes a rigorous scientific assessment of its status to determine if the species is eligible for listing against a set of criteria. These criteria are available on the Department's website at: http://www.environment.gov.au/biodiversity/threatened/pubs/guidelines-species.pdf.

As part of the assessment process, the Committee consults with the public and stakeholders to obtain specific details about the species, as well as advice on what conservation actions might be appropriate. Information provided through the consultation process is considered by the Committee in its assessment. The Committee provides its advice on the assessment (together with comments received) to the Minister regarding the eligibility of the species for listing under a particular category and what conservation actions might be appropriate. The Minister decides to add, or not to add, the species to the list of threatened species under the EPBC Act. More detailed information about the listing process is at: http://www.environment.gov.au/biodiversity/threatened/nominations.html.

To promote the recovery of listed threatened species and ecological communities, conservation advices and where required, recovery plans, are made or adopted in accordance with Part 13 of the EPBC Act. Conservation advices provide guidance at the time of listing on known threats and priority recovery actions that can be undertaken at a local and regional level. Recovery plans describe key threats and identify specific recovery actions that can be undertaken to enable recovery activities to occur within a planned and logical national framework. Information about recovery plans is available on the Department's website at: http://www.environment.gov.au/biodiversity/threatened/recovery.html.

Table 1: Birds listed under the threatened species provisions of the *Environment Protection and Biodiversity Conservation Act 1999* since the October 2016 JAMBA, CAMBA and ROKAMBA meeting.

Genus, species, subspecies	Common Name	Conservation Status	Effective from
Fregata andrewsi	Christmas Island Frigatebird	from Vulnerable to Endangered	7-Dec-16
Hypotaenidia sylvestris	Lord Howe Woodhen	from Vulnerable to Endangered	15-Aug-17
Atrichornis clamosus	Noisy Scrub-bird, Tjimiluk	from Vulnerable to Endangered	15-Feb-18
Calyptorhynchus baudinii	Baudin's Cockatoo, Long-billed Black-Cockatoo	from Vulnerable to Endangered	15-Feb-18
Dasyornis longirostris	Western Bristlebird	from Vulnerable to Endangered	15-Feb-18
Neochmia phaeton evangelinae	Crimson Finch (white-bellied)	from Vulnerable to Endangered	15-Feb-18
Melanodryas cucullata melvillensis	Tiwi Islands Hooded Robin	from Endangered to Critically Endangered	11-May-18

Flock of Black-tailed Godwits *(Limosa limosa)* © Roger Jaensch and CLCAC

Take of migratory birds or their eggs in accordance with Article II

Department of Primary Industries, Parks, Water and Environment, Tasmanian Government

Relevant JAMBA Articles: II

Relevant CAMBA Articles: II

Relevant ROKAMBA Articles: 2

Summary

Migratory birds, including all species listed on the annexes of JAMBA, CAMBA and ROKAMBA, are protected as a matter of national environmental significance under Australia's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). They are further protected under State and Territory (provincial) environmental laws. There are permits issued to capture birds for the purposes of scientific research, but also for traditional hunting which is consistent with the Articles of the migratory bird agreements. The only migratory bird species harvested in significant numbers in Australia is the Short-tailed Shearwater *(Ardenna tenuirostris)* in Tasmania.

第II条に基づいた渡り鳥の捕獲またはその卵の採集

タスマニア政府　一次産業・公園・水・環境省

JAMBA の関連条項：**II**

CAMBA の関連条項：**II**

ROKAMBA の関連条項：**2**

要約

JAMBA、**CAMBA**、**ROKAMBA** の附属書に記載されたすべての種を含む渡り鳥は、オーストラリアの **1999** 年環境保護・生物多様性保全法（**EPBC** 法）の下、「国の環境にとって重要な存在」として保護されています。これらの渡り鳥には、州および特別地域（地方）の環境法により、さらなる保護が適用されます。ただし、科学的な調査を目的とした捕獲には許可証が発行される場合があります。また、渡り鳥に関する協定の条項に則った伝統的な狩猟も許可される場合があります。オーストラリアでは、渡り鳥の種の中でハシボソミズナギドリ（**Short-tailed Shearwater**：**Ardenna tenuirostris**）のみがタスマニアにおいて相当数捕獲されています。

濒危鸟类物种或亚种最新信息

塔斯马尼亚政府第一产业、公园、水资源和环境部

JAMBA相关条款：**II**

CAMBA相关条款：**II**

ROKAMBA相关条款：**2**

总结

根据澳大利亚《**1999**年环境和生物多样性保护法案》（**EPBC Act**），在**JAMBA**、**CAMBA** 和**ROKAMBA**附录中列出的所有候鸟物种都是国家重点环保对象。这些物种得到了州和领地（省级）环境法的进一步保护。根据候鸟协议的条款规定，不论是科学研究还是传统狩猎，捕捉候鸟都需要获得许可证。在澳大利亚境内唯一大量捕捉的候鸟是塔斯马尼亚的短尾海鸥（**Ardenna tenuirostris**）。

협정 제 2 조에 의거한 철새 포획 및 그 알의 채취

타스매니아 정부, 일차산업 공원 수자원 및 환경부

JAMBA 관련 조항: **II**

CAMBA 관련 조항: **II**

ROKAMBA 관련 조항: **2**

요약

JAMBA 와 **CAMBA**, **ROKAMBA** 의 첨부 자료에 등재된 모든 종을 포함하여 철새는 **1999** 년 환경보호 및 생물다양성 보전 조례(**Environment Protection and Biodiversity Conservation Act 1999**, **EPBC Act**) 하의 국가중대환경사안으로 보호를 받습니다. 더 나아가 이러한 철새는 주 및 테리토리(지방) 환경법 하에 보호를 받습니다. 과학 연구 목적의 조류 포획과 철새 협정 조항과 일치하는 범위에서의 전통적 포획에 발급하는 허가증이 있습니다. 호주 내에서 대량

포획하는 유일한 철새는 타스매니아 주의 쇠부리슴새(**Short-tailed Shearwater**, 학명**Ardenna tenuirostris**)입니다.

Tasmania's Department of Primary Industries, Parks, Water and Environment (DPIPWE) maintains a long term cultural harvest of Short-tailed Shearwaters, known as Muttonbirding, on Commonwealth land at South Arm in southern Tasmania. Seventy-two permits were issued to recognised indigenous individuals for the 2016/17 breeding season. Each permit allowed a maximum take of 25 birds. Forty-four permit holders harvested under their permits taking a total of 1,008 birds. During the 2017/18 breeding season 67 cultural muttonbirding permits were issued and 37 utilised with a total harvest of 878 birds. During this period a further two permits were issued each year allowing recognised indigenous groups to take no more than 10 Short-tailed Shearwaters. At this stage, no returns have been received for these permits.

DPIPWE permits an indigenous commercial harvest, with birds predominately taken from three islands; Big Dog, Trefoil and Babel Islands. These islands contain some of the largest Short-tailed Shearwater colonies in Tasmania. Commercial take has been reported as 93,500, 81,000 and 63,500 in 2015, 2016 and 2017 respectively. DPIPWE's Wildlife Management Branch has not yet received reported take for 2018.

DPIPWE also manage a recreational harvest of Short-tailed Shearwaters. Members of the public can purchase a permit to harvest from 38 sites around Tasmania's Bass Strait Islands and two sites on Tasmania's west coast. These permits allow take of up to 25 birds per day (15 on the West Coast sites) for a period of 15 days.

As previously reported 834 Recreational Game Licences were issued to take Short-tailed Shearwater in 2016, returns received indicate a maximum total take of 53, 677. During the 2016/17 breeding season 845 Recreational Game Licences were issued allowing the take of Short-tailed Shearwaters. Thus far, returns have been received and processed from 460 licence holders, indicating a take of 28,168 birds. Extrapolation on this initial return data suggests a total of around 52,000 Short-tailed Shearwaters were harvested.

During the 2017/18 breeding season, 865 Recreational Game Licences allowing take Short-tailed shearwaters were issued. At this stage, the recreational harvest returns for the 2017/2018 breeding season have not been processed.

Coral Sea Parks Australia officer undertaking management work on Cato Island within the Coral Sea Commonwealth Marine Reserve © Copyright Department of the Environment and Energy

Coordination of Bird and Bat Banding in Australia

Australian Government Department of the Environment and Energy

Relevant JAMBA Articles: I, IV, IV, VII

Relevant CAMBA Articles: I, III, III

Relevant ROKAMBA Articles: 3

Summary

Through the Australian Bird and Bat Banding Scheme (ABBBS), the Australian Government Department of the Environment and Energy coordinates training and accreditation of researchers doing banding studies in Australia. There are 939 accredited banders and banding groups currently operating in Australia. Bands, literature, equipment and data storage have also been provided to scientists in the South East Asian/Pacific region who are conducting research in countries that do not have a banding scheme, with the agreement of the countries involved. Four projects in Papua New Guinea, and one project in French Polynesia are currently, or have been, supported during the reporting period.

Around 3.32 million banding and 634,000 recovery records generated since 1953 are now stored electronically, enabling sophisticated analysis and efficient responses to requests for data. A major project to convert the remaining paper-based records into electronic format has seen over one million banding and recovery records added since 2005. These data, accumulated over more than 65 years, are available to government and the research community.

オーストラリアにおける鳥類およびコウモリ類の標識調査の調整

オーストラリア政府 環境・エネルギー省

JAMBA の関連条項：**I**、**IV**、**IV**、**VII**

CAMBA の関連条項：**I**、**III**、**III**

ROKAMBA の関連条項：**3**

要約

オーストラリア政府環境・エネルギー省は、オーストラリア鳥類およびコウモリ類標識計画（**ABBBS**）を通じて、オーストラリアで標識調査を行う研究者に対するトレーニングおよび認定の制度を整備しています。オーストラリアでは現在、**939** に上る個人および団体が標識調査の認定を得て活動を行っています。同調査に必要な足環や文献、機材、データ記憶装置などは、標識計画がない国々で同様な研究を行っている東南アジアおよび太平洋地域の科学者たちにも、そうした国々の合意の下に提供されています。同計画は、パプアニューギニアにおける **4** 件のプロジェクトおよび仏領ポリネシアにおける **1** 件のプロジェクトに対して、その調査報告期間中に支援を提供してきました。そのうちいくつかのプロジェクトには、現在も支援を行っています。

1953 年より集められた記録のうち、標識調査の記録はこれまでに約 **332** 万件、回復に関する記録は約 **63** 万 **4000** 件に上ります。現在これらの記録は電子的に保管および管理され、高度な分析に加え、データのリクエストに対する効率的な対応が可能となっています。紙媒体だったこれらの記録を電子化するため大がかりなプロジェクトが実施され、さらに **2005** 年以降は **100** 万件を超える標識調査および回復に関する記録が加えられています。**65** 年を超えて蓄積されたこれらのデータは、現在では政府および研究者のコミュニティーによって利用可能となっています。

澳大利亚鸟类和蝙蝠环志行动

澳大利亚政府环境与能源部

JAMBA相关条款：**I**，**IV**，**IV**，**VII**

CAMBA相关条款：**I**，**III**，**III**

ROKAMBA相关条款：**3**

总结

根据澳大利亚鸟类和蝙蝠环志方案（**ABBBS**），澳大利亚政府环境与能源部对在澳大利亚境内开展环志研究的人员组织培训和认证。目前澳大利亚有**939**名认证环志人员和环志组织。签订协议之后，澳大利亚还为东南亚及太平洋地区没有环志方案的国家正在开展环志研究的科学家提供环志、文献、设备和数据存储。在报告期内，巴布亚新几内亚的**4**个项目以及法属波利尼西亚的一个项目已经或正在获得支持。

自**1953**年以来产生的**332**万环志和**63. 4**万条恢复记录现在已实现了电子储存，可对数据进行精密分析，并在收到数据需求时做出高效回复。自**2005**年起，通过一项重点数据转化项目，又有一百多万条纸质环志和恢复记录转为电子格式。这些积累超过**65**年的数据可以为政府和研究组织提供参考。

호주 조류 및 박쥐류 가락지 부착 방안 마련

호주 환경·에너지부

JAMBA 관련 조항: **I**, **IV**, **IV**, **VII**

CAMBA 관련 조항: **I**, **III**, **III**

ROKAMBA 관련 조항: **3**

요약

호주 조류 및 박쥐류 가락지 부착 프로그램(**ABBBS**)을 통해 호주 환경·에너지부는 호주 내에서 가락지 부착 연구를 하는 연구원의 훈련 및 인증을 담당합니다. 현재 호주에서 활동 중인 공인 가락지 부착조사인 및 부착 단체는 **939** 곳이 있습니다. 가락지 부착 프로그램이 없는 국가 중 협정을 맺은 곳에서 연구 활동 중인 동남아·태평양 지역의 과학자들에게 가락지, 문서 자료, 장비, 데이터 저장장치를 제공하기도 했습니다. 파푸아 뉴기니의 **4** 개 프로젝트 그리고 프렌치 폴리네시아의 **1**개 프로젝트는 보고 기간 동안 지원을 받았거나 현재 받고 있습니다.

1953 년 이후 기록된 가락지 부착 약 **3** 백 **32** 만 건과 재포획 **63**만 **4**천 복구 기록이 현재 전자 매체에 저장되어 정교한 분석과 데이터 요청에 다른 효과적인 응답이 가능합니다. 나머지 문서로 작성된 정보의 디지털화하는 대형 프로젝트를 통해 **2005** 년 이후 **1** 백만 건 이상의 가락지 부착 및 복구 기록이 저장되었습니다. 정부 및 연구 공동체는 **65**년 이상 축적된 이 정보를 이용할 수 있습니다.

Noteworthy Recoveries

Some interesting recoveries of species listed on JAMBA, CAMBA and/or ROKAMBA reported in 2016-2018 are outlined below.

Longevity

Caspian Tern, *Hydroprogne caspia*, 091-06283, banded at Mann's Beach, Corner Inlet, Victoria on 11.02.1989. Trapped in fishing gear and released alive at Wellington Point, Queensland on 23.02.2018, 29 years 0 months and 12 days after banding. Distance moved is 1383km. This is the longest time elapsed between banding and recovery recorded for this species.

Bridled Tern, *Onychoprion anaethetus*, 061-77336, banded at Penguin Island, Western Australia on 26.03.1988. Retrapped and released alive at the banding site on 10.12.2017, 29 years 8 months and 14 days after banding. Distance moved is 0km. This is the longest time elapsed between banding and recovery recorded for this species.

Crested Tern, *Thalasseus bergii*, 071-83405, banded at Mann's Beach, Corner Inlet, Victoria on 10.01.1988. Re-sighted in the field on 11 occasions between July 2016 and June 2018 at Flat Rock, Ballina, New South Wales. The most recent sighting was made on 02.06.2018, 30 years 4 months and 23 days after banding. Distance moved is 1260km.

Bar-tailed Godwit, *Limosa lapponica*, 072-32851, banded at Roebuck Bay, Broome, Western Australia on 06.09.1993. Retrapped and released alive at the banding site on 01.03.2018, 24 years 5 months and 23 days after banding. Distance moved is 0km. This is the second longest time elapsed between banding and recovery recorded for this species.

Wedge-tailed Shearwater, *Ardenna pacifica*, 161-70890, banded at Muttonbird Island, Coffs Harbour, New South Wales on 22.03.1986. Retrapped and released alive at the banding site on 06.09.2016, 30 years 5 months and 15 days after banding. Distance moved is 0km.

Long distance movements

Roseate Tern, *Sterna dougallii*, 052-20713 and 052-46482, banded at Gannet Cay, Great Barrier Reef, Queensland on 10.01.2002 and 13.01.2008. Both birds retrapped and released alive at Keise Island, Okinawa, Japan on 15.07.2017, 15 years 6 months and 5 days (052-20713) and 9 years 6 months and 2 days (052-46482) after banding. Distance moved for both birds is 5998km.

Curlew Sandpiper, *Calidris ferruginea*, 042-63460 (Leg Flag Yellow 'JPH'), banded at Roebuck Bay, Broome, Western Australia on 25.07.2010. Re-sighted at Ying Kou City, Liaoning, China on 10.05.2017, 6 years 9 months and 15 days after banding. Distance moved is 6455km.

Bar-tailed Godwit, *Limosa lapponica*, 073-70281 (Leg Flag Orange 'CRW'), banded at Barry Beach, Corner Inlet, Victoria on 17.06.2015. Re-sighted at St Paul Island, Alaska, USA on 21.05.2017, 1 year 11 months and 4 days after banding. Distance moved is 11403km.

Far Eastern Curlew, *Numenius madagascariensis*, 091-45128 (Leg Flag Yellow 'Z9'), banded at Roebuck Bay, Broome, Western Australia on 22.02.2016. Re-sighted at Namyang Bay (Unpyong-Ri), Republic of Korea on 15.07.2017, 1 year 4 months and 23 days after banding. Distance moved is 6139km. This is the third record of an individually identifiable Far Eastern Curlew banded in Australia and re-sighted in the Republic of Korea.

Little Tern, *Sternula albifrons*, 3E05279*, banded at Tamashima Harbour Island, Kurashiki, Japan on 21.06.2006. Re-sighted at Patches Beach, Ballina, New South Wales on 04.03.2016, 9 years, 8 months and 12 days after banding. Re-sighted again at Flat Rock, Ballina, New South Wales on 26.02.2017, 10 years 8 months and 5 days after banding. Distance moved is 7305km.

* Bird Migration Research Centre, Yamashina Institute for Ornithology

Little Tern, *Sternula albifrons*, C285387*, banded at Huanghua Port, Cangzhou City, China on 11.08.2013. Re-sighted at Flat Rock, Ballina, New South Wales on 22.02.2017, 3 years, 6 months and 11 days after banding. Distance moved is 8338km. This is the first record of a Little Tern banded in China and re-sighted in Australia.

* National Bird Banding Centre of China

Summary of banding and recoveries

The following tables provide information about banding for the period 1 July 1953 to 30 June 2018.

Table 1 provides an aggregated list of bird band recoveries for JAMBA, CAMBA and ROKAMBA species, between Australia and Japan, Australia and the People's Republic of China and Australia and the Republic of Korea. It provides figures for the total number of recoveries in the period 1953 – 2018.

Table 2 provides a list of banding projects operating during 2016-2018 on species listed under JAMBA, CAMBA and/or ROKAMBA.

Birdwatching is a popular activity at the Adelaide International Bird Sanctuary, South Australia © Narelle Montgomery

Table 1: Summary of bird band recoveries for JAMBA, CAMBA and ROKAMBA species between Australia and Japan/People's Republic of China/Republic of Korea.

SPECIES	Species listed under: JAMBA J CAMBA – C ROKAMBA - R			Number of birds banded 1 July 2016 – 30 June 2018	Number of birds banded 1953-2018	Total recoveries 1953-2018					
						Australia to Japan	Japan to Australia	Australia to China	China to Australia	Australia to Republic of Korea	Republic of Korea to Australia
Garganey	J	C	R	-	-	-	-	-	-	-	-
Streaked Shearwater	J	C	R	-	-	-	2	-	-	-	-
Wedge-tailed Shearwater	J			570	92079	-	-	1	-	-	-
Flesh-footed Shearwater	J		R	332	16430	21	-	1	-	45	-
Sooty Shearwater	J			1	263	1	-	-	-	-	-
Short-tailed Shearwater	J	C	R	809	123182	29	-	-	-	1	-
Bulwer's Petrel	J			-	1	-	-	-	-	-	-
Swinhoe's Storm-Petrel	J	C		-	-	-	-	-	-	-	-
Matsudaira's Storm-Petrel	J			-	-	-	-	-	-	-	-
Wilson's Storm-Petrel	J			-	40	-	-	-	-	-	-
Red-tailed Tropicbird	J	C		51	3778	-	-	-	-	-	-
White-tailed Tropicbird	J	C		1	99	-	-	-	-	-	-
Masked Booby	J		R	-	18334	-	-	-	-	-	-
Red-footed Booby	J	C		-	1353	-	-	-	-	-	-
Brown Booby	J	C	R	-	8524	-	-	-	-	-	-
Great Frigatebird	J	C		-	479	-	-	-	-	-	-
Lesser Frigatebird	J	C	R	-	1828	-	-	-	-	-	-
Christmas Island Frigatebird		C		-	46	-	-	-	-	-	-
Latham's Snipe	J		R	154	1212	1	6	-	-	-	-
Pin-tailed Snipe	J	C	R	-	31	-	-	-	-	-	-
Swinhoe's Snipe	J	C	R	-	87	-	-	-	-	-	-
Black-tailed Godwit	J	C	R	8	1408	-	-	9	9	9	-
Bar-tailed Godwit	J	C	R	665	25693	77	2	311	69	198	2
Little Curlew	J	C	R	-	1549	-	-	-	-	-	-
Whimbrel	J	C	R	162	1110	2	-	2	2	-	-
Far Eastern Curlew	J	C	R	9	1559	27	-	10	-	15	-
Common Redshank	J	C	R	-	20	-	-	-	-	-	-
Marsh Sandpiper	J	C	R	-	647	-	-	1	-	-	-
Common Greenshank	J	C	R	15	1396	-	1	-	3	-	-
Wood Sandpiper	J	C	R	-	192	-	-	-	-	-	-
Terek Sandpiper	J	C	R	151	8990	2	3	29	4	8	2
Common Sandpiper	J	C	R	-	259	-	-	-	-	-	-
Grey-tailed Tattler	J	C	R	347	10589	62	19	32	9	3	-
Wandering Tattler	J			-	2	-	-	-	-	-	-
Ruddy Turnstone	J	C	R	524	8959	19	4	211	3	4	-
Asian Dowitcher	J	C	R	3	150	-	-	1	-	-	-
Great Knot	J	C	R	1283	36936	23	-	869	120	138	10
Red Knot	J	C	R	217	16161	1	5	891	19	3	1

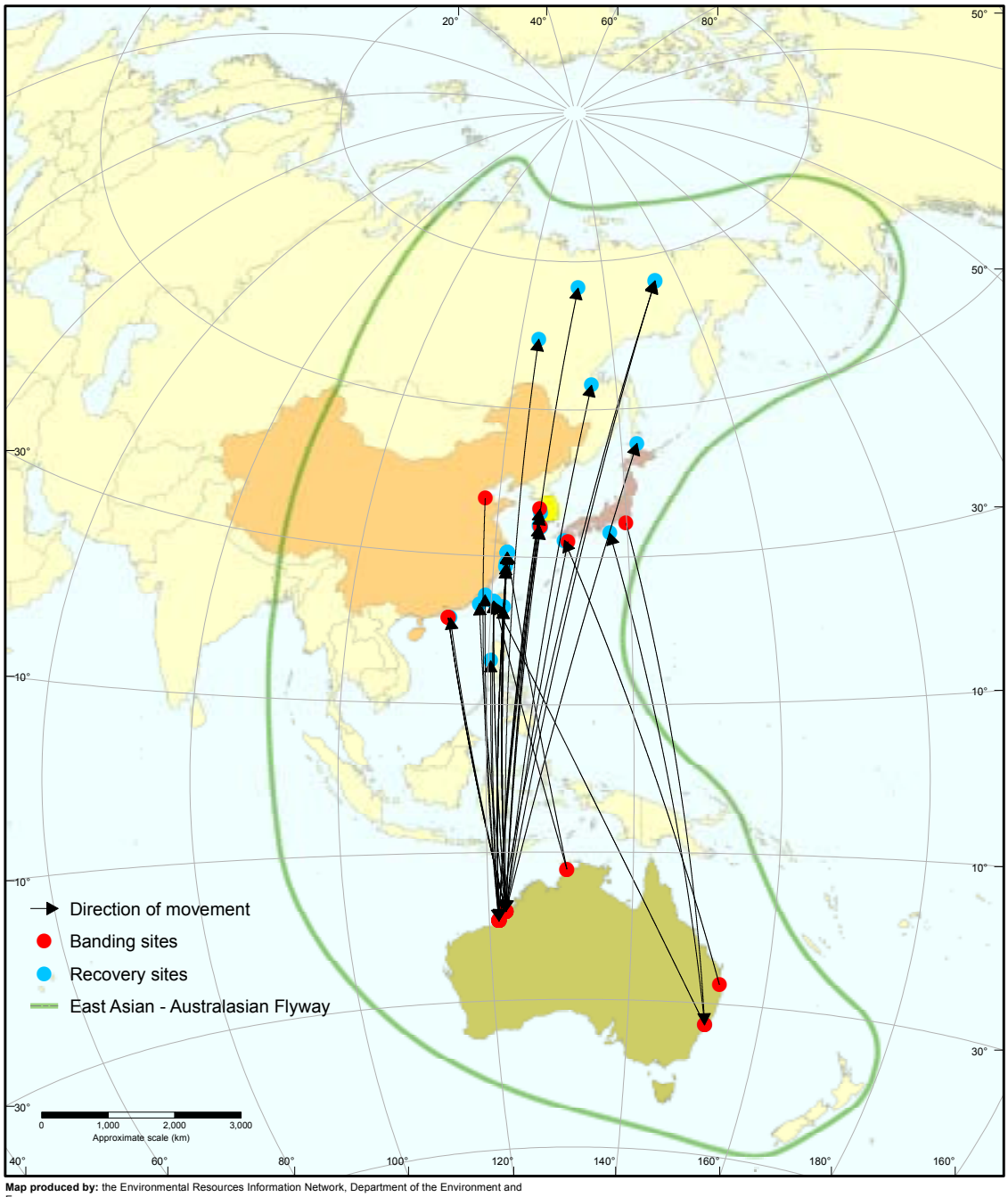
SPECIES	Species listed under: JAMBA J CAMBA – C ROKAMBA - R			Number of birds banded 1 July 2016 – 30 June 2018	Number of birds banded 1953-2018	Total recoveries 1953-2018					
						Australia to Japan	Japan to Australia	Australia to China	China to Australia	Australia to Republic of Korea	Republic of Korea to Australia
Sanderling	J	C	R	146	6836	57	1	36	1	4	-
Red-necked Stint	J	C	R	3581	167288	26	12	109	12	3	-
Long-toed Stint	J	C	R	-	165	-	-	-	-	-	-
Pectoral Sandpiper	J		R	-	30	-	-	-	-	-	-
Sharp-tailed Sandpiper	J	C	R	301	18070	-	-	19	1	3	-
Curlew Sandpiper	J	C	R	1163	48363	1	-	229	20	-	-
Broad-billed Sandpiper	J	C	R	19	1765	-	1	8	2	1	-
Ruff	J	C	R	-	8	-	-	-	-	-	-
Red-necked Phalarope	J	C	R	1	24	-	-	-	-	-	-
Pacific Golden Plover	J	C	R	16	916	-	-	1	1	-	-
Grey Plover	J	C	R	10	662	10	-	1	12	2	-
Little Ringed Plover	J	C	R	-	21	-	-	-	-	-	-
Lesser Sand Plover	J	C	R	89	1514	2	-	4	2	-	-
Greater Sand Plover	J	C	R	850	17708	-	-	42	29	-	-
Oriental Plover	J	C	R	5	799	-	-	-	-	-	-
Oriental Pratincole	J	C	R	-	1359	-	-	5	-	-	-
South Polar Skua	J			-	426	-	-	-	-	-	-
Pomarine Jaeger	J	C		-	4	-	-	-	-	-	-
Arctic Jaeger	J	C	R	-	3	-	-	-	-	-	-
Long-tailed Jaeger	J	C		-	1	-	-	-	-	-	-
Caspian Tern	J			144	4735	-	-	-	-	-	-
Roseate Tern	J	C		-	10473	46	89	17	20	-	-
Black-naped Tern	J	C		-	1281	-	-	-	-	-	-
Common Tern	J	C	R	-	3268	1	-	-	-	-	-
Little Tern	J	C	R	25	7310	12	11	1	2	3	1
Gull-billed Tern		C		4	1589	-	-	5	-	-	-
Crested Tern	J			4778	239637	-	-	-	-	-	-
Bridled Tern	J	C		246	11361	-	-	-	-	-	-
White-winged Black Tern	J	C	R	168	580	-	-	-	-	-	-
Common Noddy	J	C		258	7888	-	-	-	-	-	-
Oriental Cuckoo	J	C	R	-	28	-	-	-	-	-	-
White-throated Needletail	J	C	R	1	31	-	-	-	-	-	-
Fork-tailed Swift	J	C	R	-	4	-	-	-	-	-	-
Yellow Wagtail	J	C	R	-	10	-	-	-	-	-	-
Grey Wagtail	J	C	R	-	-	-	-	-	-	-	-
Barn Swallow	J	C	R	-	4	-	-	-	-	-	-
Red-rumped Swallow	J	C	R	-	-	-	-	-	-	-	-
Oriental Reed-Warbler	J	C		-	7	-	-	-	-	-	-
	Totals			17,107	937,554						

Table 2: Banding projects operating during 2016-2018, relevant to JAMBA/CAMBA/ROKAMBA

SPECIES GROUP	RESEARCHER	PROJECT
COMMUNITY	A/P A LILL	Seasonal physiological adjustments in birds
LARIDAE	DR CA SURMAN	Population Biology of Seabirds on Pelsaert Island, Houtman Abrolhos, WA
	DR JN DUNLOP	Caspian Terns as indicators of Coastal Seagrass and Estuarine Food Chains
PHAETHONTIDAE	MR C J HASSELL	Effect of artificial nest shelters on Red-tailed Tropicbirds at Bedwell Island, Rowley Shoals, WA
	THE ANPWS-DOE CORAL SEA PROJECT	Red-tailed Tropicbird (Phaethon rubricauda) - aspects of breeding biology
	THE CHRISTMAS ISLAND NATIONAL PARK	Cat control and its ecological consequences for Christmas Island indicator species
PROCELLARIIDAE	DR DA STEWART	The effects of vegetation on the breeding success of Wedge-tailed Shearwaters on Mudjimba Island, SEQ
	DR CA SURMAN	Monitoring of fledgling Wedge-tailed Shearwater activity at Varanus Island, NW Shelf, WA
	DR J L LAVERS	Status and trends of Flesh-footed Shearwater populations across Australia
	DR JPY ARNOULD	At sea movements of Short-tailed and Wedge-tailed Shearwaters
	DR JN DUNLOP	Survivorship in two petrels with sympatric breeding populations on islands off the south coast of WA
	DR MA HINDELL	Investigating the relationship between marine resources and foraging and reproductive success in two sympatrically breeding seabird species in S. Tasmania
	F.I.R.M. - FRENCH IS MUTTONBIRD RESEARCH	Population Dynamics and Telemetry Studies on Shearwaters of French Island, Vic
	MR MC HOLDSWORTH	Fisher Island Short-tailed Shearwater colony
	MR RG CAMERON	Phillip Island Nature Park Shearwater Banding Project
	MS NM SWANSON	Wedge-tailed Shearwaters - Mutton Bird & Solitary Islands, Coffs Harbour
	SOSSA - SOUTHERN OCEAN SEABIRD STUDY	SOSSA NSW Seabird Study (Petrels and Shearwaters)
	DR BC CONGDON	Global climate change: identifying impacts at upper trophic levels in tropical marine ecosystems
	DR CA SURMAN	An ecological study of the seabird communities of the Lowendal Islands, WA

SPECIES GROUP	RESEARCHER	PROJECT
SEABIRDS	DR BC CONGDON	Global climate change: identifying impacts at upper trophic levels in tropical marine ecosystems
	DR CA SURMAN	An ecological study of the seabird communities of the Lowendal Islands, WA
	DR CA SURMAN	Investigating the breeding and foraging behaviour of seabirds on the Lacepede Islands to determine their vulnerability to impacts associated with potential oil spills and their ability to recover
	DR DA STEWART	Does variation in the diet of seabirds breeding in the Great Barrier Reef reveal drivers of population declines?
	DR JN DUNLOP	The population dynamics of tropical seabirds in the eastern Indian Ocean
	DR L J MCLEAY	Assessing population status and ecology of marine threatened, endangered and protected species: mitigation and management of threats and interactions with marine resource users
	DR R H CLARKE	Marine Resource Use by Tropical Seabirds
	THE CHRISTMAS ISLAND NATIONAL PARK	Seabirds of Christmas Island
	THE NSW NPWS SEABIRD PROJECT	Demography and resource use of seabirds
SHOREBIRDS	DR GP CLANCY	North Coast Wader and Tern Banding Survey
	DR J T COLEMAN	Long Term Monitoring of Body Condition and Habitat Utilisation by Wading Birds in Queensland
	MISS A LILLEYMAN	Ecology of the Far Eastern Curlew and associated shorebird species on non-breeding grounds
	THE AUSTRALASIAN WADER STUDY GROUP	Studies of Waders & Terns throughout Australia & Asia
	THE NSW WADER STUDY GROUP	Charadriiformes
	THE VICTORIAN WADER STUDY GROUP	A Comprehensive Long Term Study of Waders & Terns in South-East Australia
	THE WA WADER STUDY GROUP	Waders in the South-West of Western Australia - Movements & Population Dynamics
SULIDAE	MRS MJ MCCOY	Movements of Boobies and Gannets through the Pacific region
	THE ANPWS-DOE CORAL SEA PROJECT	Population monitoring of Masked Booby on NE Herald Cay, Coral Sea
	DR JL LAVERS	Population status of Masked Booby on Bedout Island, Pilbara

Terek Sandpiper (*Xenus cinereus*)
Band Recoveries and Engraved Leg Flag Sightings for movements >1000km.



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Caveat: This map illustrates migratory bird movements into and out of Australia. It does not reflect the views the Australian Government or the Department on disputed international boundaries. The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything containing herein.

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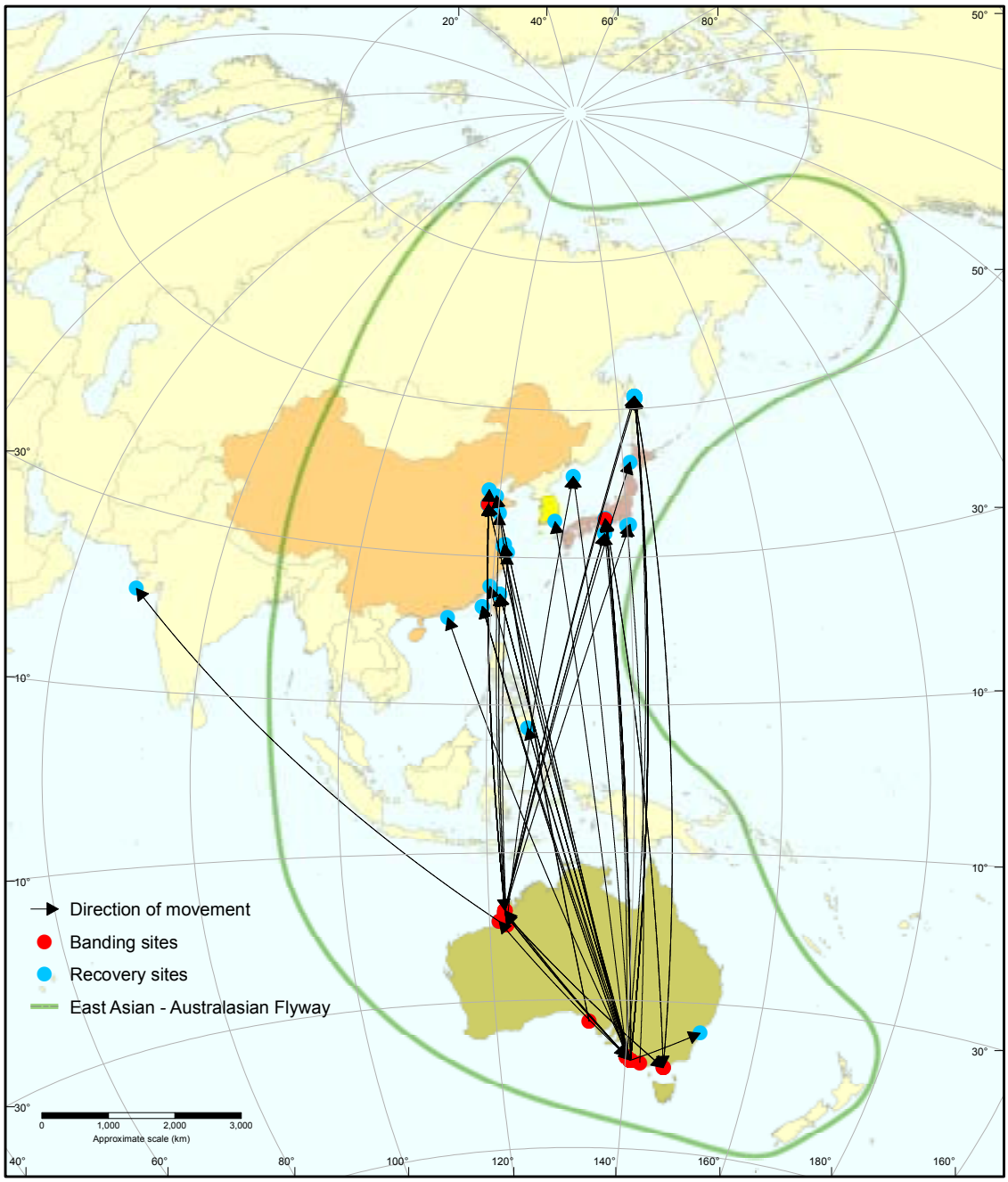
Sanderling (*Calidris alba*)
Band Recoveries and Engraved Leg Flag Sightings for movements >1000km.



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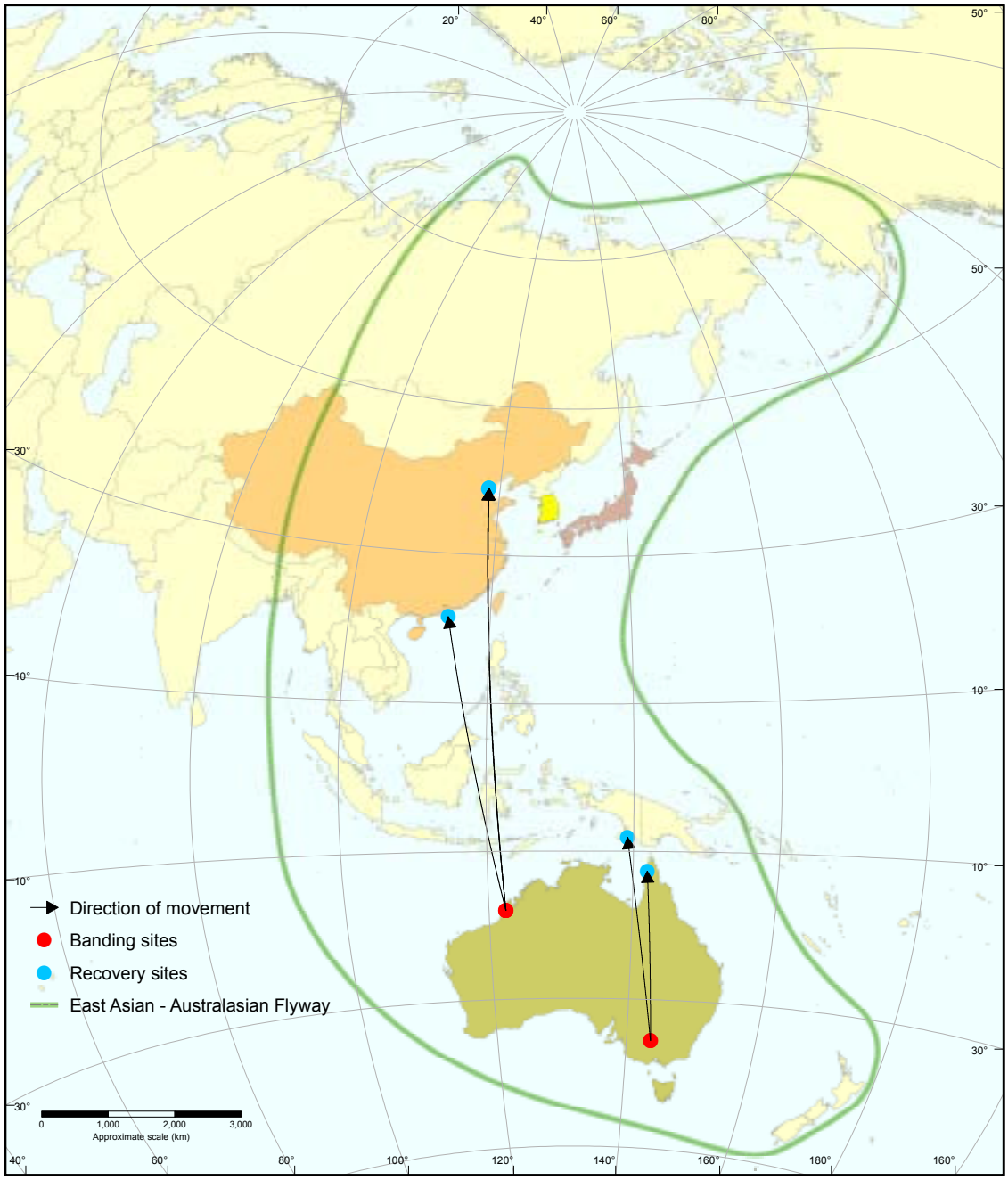
Gull-billed Tern (*Gelochelidon nilotica*)
Band Recoveries and Engraved Leg Flag Sightings for movements >1000km.



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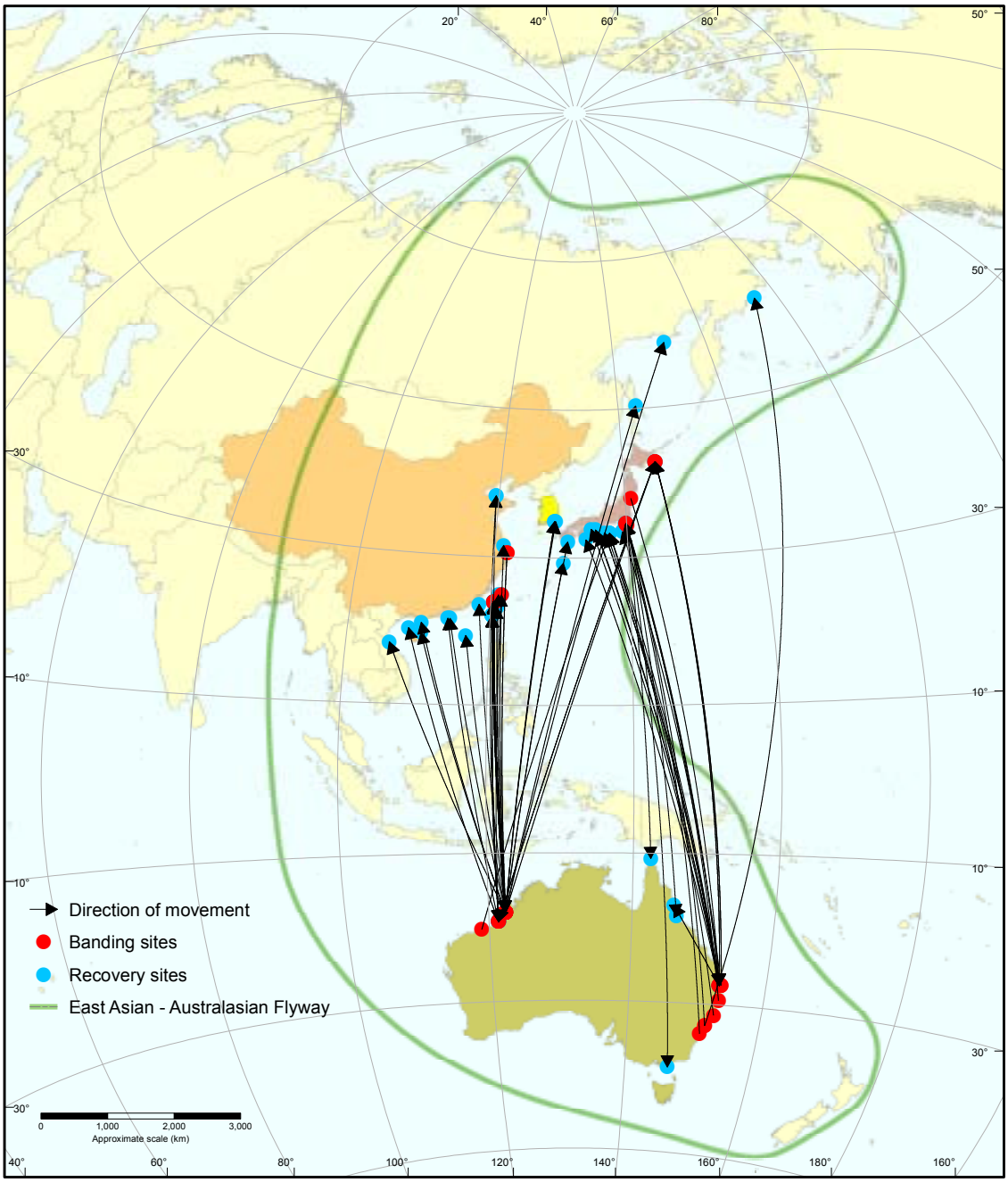
Grey-tailed Tattler (*Tringa brevipes*)
Band Recoveries and Engraved Leg Flag Sightings for movements >1000km.



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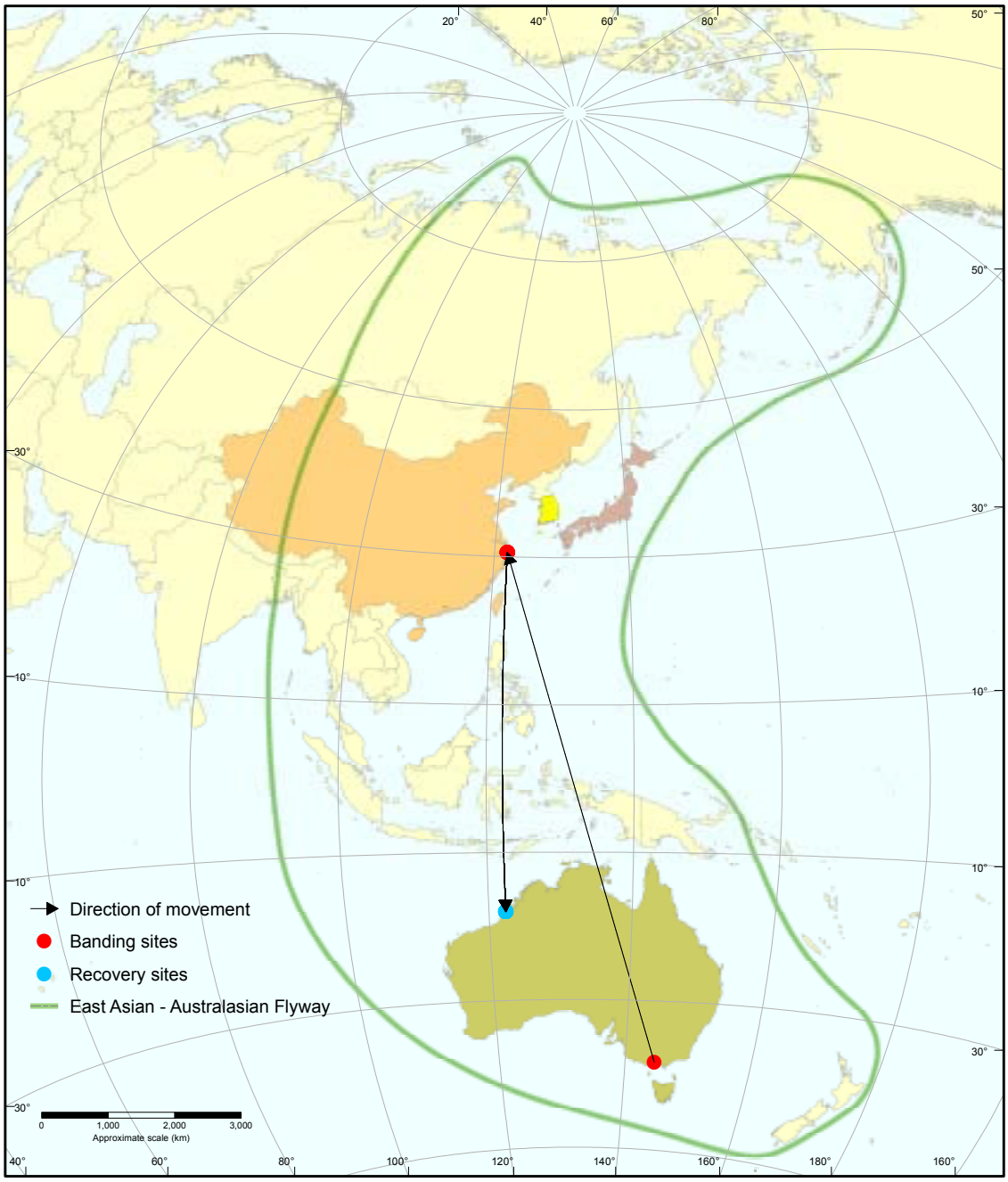
Grey Plover (*Pluvialis squatarola*)
Band Recoveries and Engraved Leg Flag Sightings for movements >1000km.



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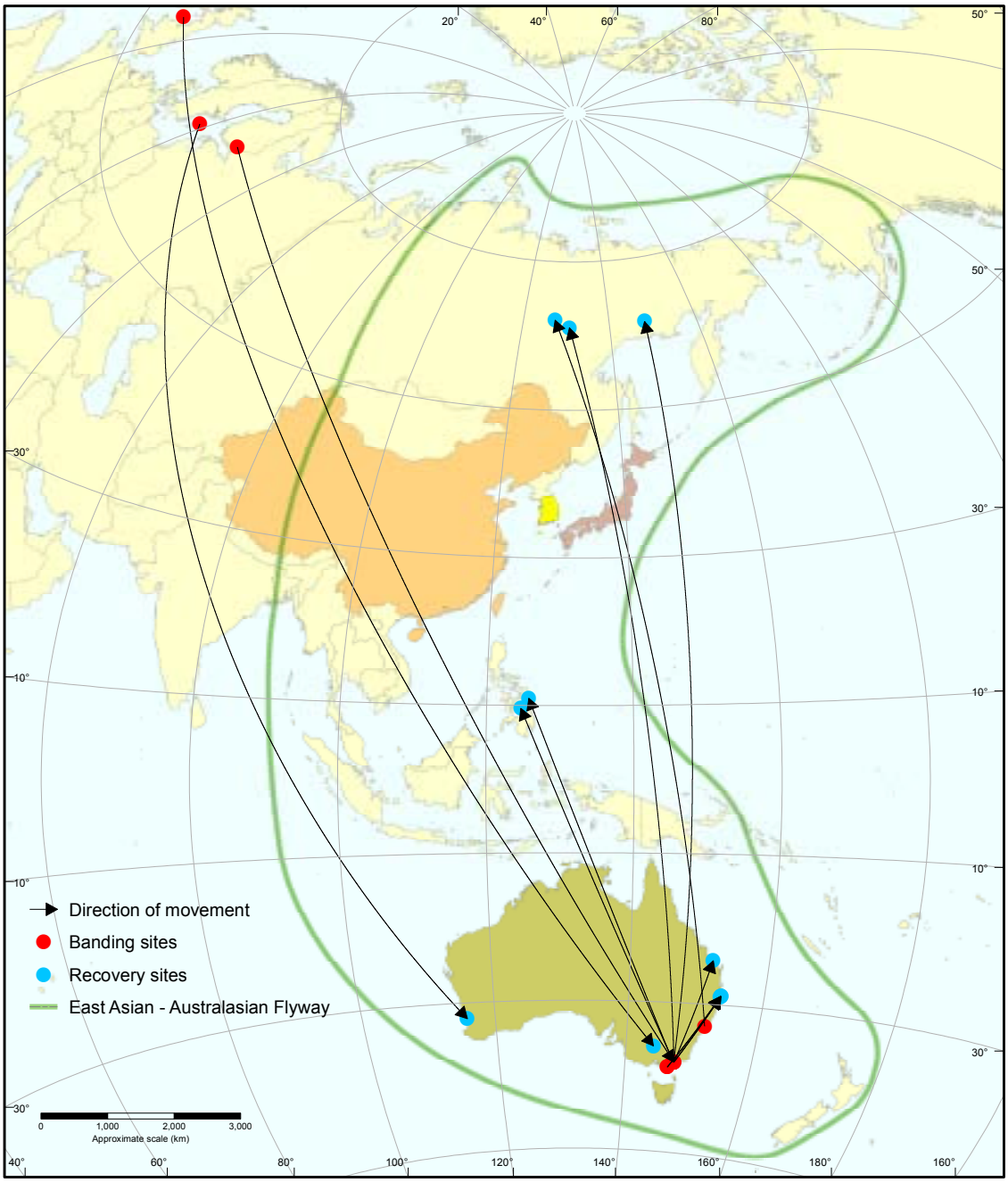
Common Tern (*Sterna hirundo*)
Band Recoveries and Engraved Leg Flag Sightings for movements >1000km.



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Water lilies on Yellow Water Lagoon in Kakadu National Park © Copyright Department of the Environment and Energy

Breeding colony of Crested Terns *(Thalasseus bergii)* on Lady Elliot Island in the Great Barrier Reef © Copyright Department of the Environment and Energy

BirdLife Australia's activities 2016 - 2018

BirdLife Australia

Relevant JAMBA Articles: I, IV, VI

Relevant CAMBA Articles: I, III, IV

Relevant ROKAMBA Articles: 1, 3

Summary

BirdLife Australia is Australia's largest bird conservation organisation. As an independent, not-for-profit organisation, their aim is clear: to create a bright future for Australia's birds.

BirdLife Australia has been a voice for Australia's birdlife for well over a century, protecting birds and their habitats through its robust programs and informed advocacy. It is the passion of members and supporters which keeps the organisation moving forward. With active branches and groups across the country, BirdLife Australia is able to tap into local issues as well as understanding the bigger picture.

Over the years BirdLife Australia's conservation work has achieved beneficial results for a wide range of different species. BirdLife's experience and specialised knowledge, combined with their ability to unite and inspire the bird-loving community, means that it can act quickly and decisively at local, state and national levels.

2016年から2018年にかけてのバードライフ・オーストラリア (BirdLife Australia) の活動

バードライフ・オーストラリア

JAMBA の関連条項：**I**、**IV**、**VI**

CAMBA の関連条項：**I**、**III**、**IV**

ROKAMBA の関連条項：**1**，**3**

要約

バードライフ・オーストラリアは、オーストラリア最大の鳥類保護団体です。独立した非営利組織である同団体は、「オーストラリアの鳥たちに明るい未来を創造する」という明確な目標を定めています。

バードライフ・オーストラリアは、過去 **100** 年以上にわたり活発なプログラムおよび正確な情報に基づいた運動を通じて、オーストラリアの野鳥およびその生息地の保護を訴えてきました。同団体は、会員と支援者一人ひとりの熱意によって前進を続けています。オーストラリア全土に活発な支部およびグループをもつバードライフ・オーストラリアは、局地的な問題に対応できる一方で、より大局的な問題についても理解しています。

長年にわたり、バードライフ・オーストラリアの保護活動は幅広い種の鳥類にとって有益な結果をもたらしてきました。豊かな経験と専門知識を備え、また多くの愛鳥家たちに結束およびインスピレーションをもたらすことができるバードライフ・オーストラリアは、地方・州・全国すべてのレベルで迅速かつ決然たる行動を起こすことが可能となっています。

2016–2018年澳大利亚鸟类保护组织(BirdLife)行动

澳大利亚 BirdLife

JAMBA相关条款：**I**，**IV**，**VI**

CAMBA相关条款：**I**，**III**，**IV**

ROKAMBA相关条款：**1**，**3**

总结

澳大利亚**BirdLife**是澳大利亚最大的鸟类保护组织。**BirdLife**是一个独立、非赢利的组织，其目标很明确，即为澳大利亚的鸟类创造一个美好未来。

澳大利亚**BirdLife**一百多年来都是澳大利亚保护鸟类的倡议机构，通过稳健的方案和知情倡导对鸟类及其栖息地进行保护。支撑该组织向前发展的是会员及其支持者的热情。澳大利亚**BirdLife**在全国各地都有活跃的分支组织，不仅能够解决当地的问题，还能着眼全局。

澳大利亚**BirdLife**多年来的保护工作让多种物种受益。**BirdLife**有着丰富的经验和专业的知识，再加上能够团结和鼓励爱鸟群众，这个组织能够在本地、州和国家范围内采取快速和果断的行动。

2016 – 2018년 호주국제조류보호협회 (BirdLife Australia)의 활동

BirdLife Australia

JAMBA 관련 조항: **I**, **IV**, **VI**

CAMBA 관련 조항: **I**, **III**, **IV**

ROKAMBA 관련 조항: **1**, **3**

요약

BirdLife Australia는 호주 최대의 조류 보전 기구입니다. 이 기구는 독립적인 비영리 기구로서, 호주 조류를 위한 밝은 미래 창출이라는 명확한 목표를 갖고 있습니다.

BirdLife Australia는 **1**세기 넘게 호주의 조류 생물을 위해 목소리를 내왔으며, 견실한 프로그램 및 정보에 기초한 옹호활동을 통해 조류와 그 서식지를 보호합니다. 이 기구의 발전을 유지하는 원동력은 회원 및 지지자들의 열정입니다. 호주 전역의 활동적인 지방 조직 및 그룹 덕분에, **BirdLife Australia**는 거시적인 상황을 이해하면서 지역적 이슈에 다가설 수 있습니다.

수년에 걸쳐 **BirdLife Australia**의 보전 작업은 광범위하고 다양한 생물종을 위해 유익한 결과를 달성해왔습니다. **BirdLife Australia**는 자체의 경험 및 전문화된 지식에 더하여 조류 사랑 커뮤니티를 통합하고 고취할 수 있는 능력을 겸비하고 있기 때문에, 지역과 주 및 국가적 수준에서 신속하고 결정적인 조치를 취할 수 있습니다.

Shorebirds 2020 Update

Shorebirds 2020 (S2020) was the name given to BirdLife Australia's migratory shorebird project, which commenced in 2007 on the foundations of work undertaken by the Australasian Wader Study Group (AWSG). It has been maintained and continues under the same name, although Shorebirds 2020 now refers to the monitoring program component within BirdLife Australia's new Migratory Shorebird Program – which itself is underpinned by the Migratory Shorebird Conservation Action Plan.

Brief summary of program statistics:

- 496 mapped shorebird areas nationwide; 2,790 count areas nationwide;
- 1,454 registered online database users, 302 active users in last 18 months
- 54,000 shorebirds ID booklets printed; 38,600 distributed thus far
- 2,300 shorebird posters distributed thus far
- 26,000 shorebirds "wing thing" kids activity education booklets in circulation

Survey Coverage and Site Network

With the inclusion of five indigenous ranger groups around the Gulf of Carpentaria, Queensland (Mapoon, Napranum, Pormpuraaw, Borroloola, Millingimbi), as well as numerous other additions to the S2020 site network, such as the Exmouth Gulf, BirdLife Australia are slowly working at filling in the gaps around coastal areas. Inland wetland systems remain generally poorly covered and continue to be a major gap in S2020 coverage, especially for Curlew Sandpiper and Sharp-tailed Sandpiper in wet years (eg 09/10, 10/11).

A number of additional interested Indigenous groups have been identified through BirdLife Australia's Indigenous Grant Program. Some of these are in strategic locations where we do not have survey coverage at the moment (Maningrida, Milingimbi, Injinoo, Nhulunbuy, Normanton/Karumba).

Through the delivery of the update of Flyway Population Estimates project, several survey coverage gaps have become more apparent than ever (eg. Northern Territory, Kimberley Coast, Gulf of Carpentaria, Inland Australia). The data collation process that was instigated by this project has also highlighted a number of important sites around the country which now have patchy survey coverage, or ceased survey coverage. A key focus of the program will be addressing these gaps in the upcoming months.

Given S2020 and NAILSMA involvement thus far in initiating training for four ranger groups around the Gulf of Carpentaria, it is paramount that support for these groups continues to be available through further training and on-ground involvement.

It is important that we maintain communication and involvement with these groups to foster relationships. Other groups have expressed interest in the Shorebirds 2020 program around the Gulf of Carpentaria. An additional five groups have expressed interest in receiving shorebird monitoring training.

The ranger groups are uniquely placed to assist with bridging the coverage gaps across northern Australia given their location, resources, interest and knowledge on country.

Prioritising workshop program to main Shorebird Areas

S2020 workshops are held in the vicinity of those shorebird areas with long time-series data to make sure these areas continue to be counted on a consistent biannual basis.

The majority of shorebird areas with long time-series count data are those areas in proximity to population centres such as Westernport, Swan River Estuary, and Cairns Foreshore. As such, there are proportionally much larger numbers of potential counters in these areas compared to other shorebird areas which may only have a handful of counters. Workshops are strategically delivered to areas that currently have a counter shortage, and where local coordinators are asking for additional resources.

BirdLife Data Portal - Birdata

BirdLife Australia's new Birdata web portal is ready. The new Birdata portal incorporates the existing Shorebirds 2020 database and from 7 September 2018, all Shorebirds 2020 count data will need to be entered into the new Birdata portal, rather than the current Shorebirds 2020 database portal, which will be decommissioned in the not-too-distant future. The web address for the new data portal is http://birdata.birdlife.org.au

The new Birdata includes a dedicated app for your handheld Apple or Android device, which allows for data entry in the field for a number of key BirdLife Australia monitoring programs.

National Migratory Shorebirds Conservation Action Plan Update

Over a series of two workshops (April and December 2016), stakeholders from government, research institutions, NGOs and the international community met to develop detailed strategies to implement the high and very high priority actions from the Australian Government's Wildlife Conservation Plan for Migratory Shorebirds using the conservation action planning (CAP) approach.

The Migratory Shorebird CAP Steering Committee oversees the implementation of the CAP and is supported by ad hoc working groups where appropriate. Membership on the Steering Committee is made up of BirdLife Australia representatives, government and research institutions. The Committee has been designed to leverage cooperation from stakeholders across government, research institutions and NGOs to capitalise on funding opportunities, ensure relevant expertise and coordinate actions.

BirdLife Australia has undertaken the following actions to support the implementation of the Migratory Shorebird CAP.

International engagement

BirdlLife Australia attended the 12th Conference of the Parties of the Convention of Migratory Species (CMS COP12) in Manila as part of the Australian Delegation.

As part of BirdLife Australia's role as the Coordinator on the EAAFP Far Eastern Curlew Task Force, BirdLife Australia co-hosted a side event at CMS COP12 showcasing Single Species Action Plans in the EAAF, with a particular focus on the two being considered for adoption at COP12 - Far Eastern Curlew and Baer's Pochard. The Australian Government (Chair, Far Eastern Curlew Task Force), presented on the Single Species Action Plan for Far Eastern Curlew, which was successfully adopted at COP12.

COP12 also adopted a number of resolutions that will be beneficial for migratory shorebird conservation in the EAAF, including a resolution on *Promoting the Conservation of Critical Intertidal Habitats for Migratory Species*, proposed by the Government of the Philippines.

BirdLife International and partners are currently developing a strategy to have a similar resolution adopted under other international agreements, including the Convention on Biological Diversity and the Ramsar Convention.

Attendance at this international meeting also presented an opportunity for discussions with BirdLife International about how BirdLife Australia can best contribute to protecting important habitat in the EAAF outside Australia.

As of January 2018, BirdLife International Asia have been working on coastal bird conservation in the EAAF. BirdLife International Asia is currently looking for ways to strengthen collaboration between the actions of domestic BirdLife partners in the flyway.

BirdLife International organised "A Summit for the Flyways" in Abu Dhabi in April 2018. BirdLife Australia was invited to speak about migratory shorebird conservation in Australia. A key focus of the summit was to discuss strategies for conserving coastal wetlands for migratory shorebirds.

Habitat management in Australia

BirdLife Australia is currently completing a Directory of Important Habitat for Migratory Shorebirds for the Australian Government, using national and international significance criteria. This project is due to be completed in 2018 and will include both species accounts, identifying all sites around Australia that are nationally or internationally significant for a species, and site accounts, which will list all species for which the site is significant. This project is funded by the Australian Government and will be developed in consultation with state governments and local S2020 count coordinators.

BirdLife Australia has been working with the eight Natural Resource Management (NRM) regions in South Australia, along with other key stakeholders such as local councils and Birds South Australia to establish a South Australian Shorebird Alliance to coordinate conservation and management actions for both migratory and resident shorebirds. This alliance facilitated a coordinated approach across South Australia in terms of shorebird related projects that were included in National Landcare Program bids. A Terms of Reference is currently being developed for the Alliance that will be presented to SA NRM boards for approval. The work program for the Alliance is being directly guided by the CAP and represents the first application of the CAP priority actions at a regional/local scale.

BirdLife Australia has received funding from the Helen Macpherson Smith Trust to develop site action plans for migratory shorebirds at 10 priority sites in Victoria, selected from the Directory. This project will include consultation with site managers and local communities, the creation of a shorebird specific site managers network and a state-wide symposium for site managers in Victoria.

BirdLife Australia has consulted with multiple NRMs around Australia as part of National Landcare Program bids to include funding for revising/creating management plans for migratory shorebirds at key sites, from Tasmania to the Torres Strait.

Following the completion of the Directory, BirdLife Australia will develop a workshop schedule for priority sites to identify relevant site managers, explore options for revising/creating management plans and implementation of site specific on-ground management actions.

BirdLife Australia has received funding ($200,000) under the Port Phillip Bay Fund for ecological and hydrological assessments and on-ground remediation works at Avalon Coastal Park (including Snake Island) in partnership with Parks Victoria. The site includes Snake Island which benefited from the Australian Government's Threatened Species Commissioner's funding in 2015. Actions that will be implemented under the funding include:

- Engage surveyors to determine land tenure boundary (currently unknown)
- Undertake baseline ecological assessment to determine values and threats
- Install fencing/repair existing boundary fencing where appropriate (based on outcomes of land survey) to exclude stock from neighbouring properties
- Undertake hydrological study of entire site
- Undertake repair works to existing hydrological management infrastructure based on outcomes of hydrological study

- Repair existing bridge (Snake Island) and outfall gate to allow for water level management (based on outcomes of hydrological survey)
- Undertake pest control to enhance and protect values of the site (plant & animal) and monitor results
- Litter, hard rubbish and asbestos removal across entire site
- Deliver community awareness and volunteer upskilling workshops, facilitate creation of a 'Friends of Avalon Coastal Reserve' community group
- Installation and repairing of visitor access infrastructure, such as gates, access tracks and signage
- Investigate opportunities for roost site augmentation for migratory shorebirds and potential roost/nesting site creation/improvement for Little and Fairy Tern
- Develop strategic Plan for long-term management priorities and strategies for Avalon Coastal Reserve

Addressing threats to migratory birds

BirdLife Australia has consulted multiple NRMs around the country to facilitate the development of educational materials or workshops to raise awareness about the impacts of recreational disturbance. Birdlife Australia will be working closely with the Beach-nesting Bird Team in the second half of 2018 to refine the work plan for this strategy.

Restoration and remediation works at Avalon Coastal Park (including Snake Island) in partnership with Parks Victoria will provide a case study for wetland habitat rehabilitation guidelines, specifically the restoration of artificial wetlands such as decommissioned salt production facilities.

BirdLife Australia has advocated for protection of important shorebird habitat in Australia under threat from inappropriate development, including a proposed development at a number of important sites.

Knowledge exchange to inform decision makers, land managers and the public

BirdLife Australia attended a workshop in Sydney lead by NSW OEH to discuss securing strategically important populations of 'partnership species' in NSW. Partnership species primarily occur outside NSW, with less than 10% of their distribution in the state. There are 8 species listed under NSW legislation, six of those have been determined as priority species which have led to the identification of priority sites (as a result of a BLA led project delivered last year).

Focus species are, Curlew Sandpiper, Black-tailed Godwit, Greater Sand-plover, Lesser Sand-plover, Great Knot, and Terek Sandpiper. Two other species, Sanderling and Broad-billed Sandpiper do not have important populations in NSW so have not been considered priority species. Eastern Curlew, Red Knot and Bar-tailed Godwit have not been considered as they are not listed under state legislation.

BirdLife Australia attended a workshop in Brisbane lead by Queensland to discuss opportunities for improved coverage in the Gulf of Carpentaria including the capacity development of local indigenous communities to undertaken ongoing monitoring and on-ground site management in future.

BirdLife Australia is currently conducting a network audit to identify survey coverage and capacity gaps in Shorebirds 2020 Monitoring network. This will inform BLA's workshop schedule for the coming year and will be completed before 2018/19 Summer Count. BirdLife Australia has a $25,000 budget for workshops in 2018. There is potential for more workshops where external funding is available (e.g. South Coast NRM funded workshops and school visits in Esperance, DBCA funded workshop in Exmouth).

The second half of 2018 will involve updating all Migratory Shorebird Program educational materials including program brochures, ID booklets, school education toolkits/manuals, revising the primary school student/

kids Wing Thing, creation of a Birdlife branch specific shorebird program manual and migratory shorebird conservation statement (last updated 2009).

Directory of Important Habitat for Migratory Shorebirds

Thirty-seven species of migratory shorebird regularly and predictably visit Australia during their non-breeding season, from the Austral spring to autumn. In late 2016, a revision of the flyway population estimates of the 37 migratory shorebirds species routinely visiting Australia was completed by a team of migratory shorebird experts (Hansen et al. 2016).

As the population estimates form the basis for threshold-based conservation designations, their accuracy will better improve conservation decisions (e.g. to guide identification of important habitat under the Australian Wildlife Conservation Plan for Migratory Shorebirds).

The previous assessments of sites of importance focused on international significance criteria only (Watkins 1993, Bamford et al. 2008), and the most recent identified 118 areas of international importance within the country (Bamford et al. 2008). With a significant increase in the number of monitoring sites included in the Shorebirds 2020 program, and subsequent increase in amount of contemporary population monitoring data, there are likely to be many additional sites meeting the importance criteria.

The criteria used to identify an internationally important area, is that the site regularly supports:

- 1%of the individuals in a population of one species or subspecies of waterbird; or,
- a total abundance of at least 20 000 shorebirds.

Nationally important habitat for migratory shorebirds is defined if it regularly supports:

- 0.1 per cent of the flyway population of a single species of migratory shorebird; or,
- 2000 migratory shorebirds; or,
- 15 migratory shorebird species.

The S2020 database will be updated prior to a complete database extraction. Similar to the Flyway Population Estimates revision (Hansen et al. 2016), this will include targeted engagement with regional counters to:

- instigate surveys in areas which had not been covered in recent years;
- obtain and enter current data from areas which had been surveyed in recent years but not yet been submitted; and
- seek current data for areas that are housed in alternative or other regional and state databases.

Colour Flagging Migration Research

The Australasian Wader Studies Group (AWSG) is a special interest group of BirdLife Australia formed to coordinate and focus studies on shorebirds in Australia and along their migration routes. The AWSG aims to ensure the future of shorebirds and their habitats in Australia through research and conservation programs and to encourage and assist similar programs in the rest of the East Asian-Australasian Flyway.

Migration and habitat research using leg flags are key ongoing activities of the AWSG. Plastic (Darvic or similar) leg flags are attached to the birds. Re-sightings of flagged birds along the flyway are recorded in a central database and analysed to determine migration routes, destinations and stopover locations.

This report includes data on flag sightings in Australia of shorebirds banded in Japan, China and Republic of Korea, and the numbers of flag sightings in these three countries of shorebirds banded in Australia based on data collected to December 2017.

About the Project

Marking of shorebirds with PVC plastic leg flags is an important part of research into shorebird migration. The AWSG is involved in this activity in Australia, both in application of flags to birds and in recording and analysis of sightings of flagged birds. As of August 2018, the leg-flagging database contained a total of 183,340 records (further records pending as several Australian databases are in the process of amalgamation). Of these, 158,015 were from birds originally flagged in Australia (103,689 resighted within Australia and 54,326 resighted overseas). It also contained 25,325 reports of birds flagged overseas (13,684 resighted within Australia and 11,641 resighted overseas).

Lists of flag sightings relating to Australian flagged shorebirds are provided in Tables 1 and 2 below.

The AWSG and the Australian Government appreciate the cooperation from researchers and banding schemes in Japan, China and Republic of Korea in providing sighting records.

Greater Crested Tern *(Thalasseus bergii)*, Rottnest Island, Western Australia © Georgina Steytler

Table 1. Flag sightings in Australia of shorebirds flagged in Japan, Republic of Korea and China (to December 2017).

Year	Japan	Republic of Korea	China	mainland	Hong Kong	Chinese Taipei
1995	7					
1996	14					
1997	8					
1998	14					
1999	15					
2000	11	4				
2001	28	5				
2002	34	11	12	8	2	2
2003	16	15	15	9	0	6
2004	14	14	47	38	4	5
2005	12	7	249	232	1	16
2006	26	4	457	445	1	11
2007	49	2	676	661	1	14
2008	43	0	555	541	1	13
2009	51	2	702	686	1	15
2010	39	14	1033	1003	2	28
2011	38	6	919	899	6	14
2012	45	5	860	811	27	22
2013	43	9	1265	1185	30	50
2014	80	7	1318	1226	34	58
2015	84	5	1197	1120	9	68
2016	98	1	1060	1017	2	41
2017	94	0	831	815	13	3

Table 2. Australian flagged shorebirds sighted in Japan, Republic of Korea and China.

Year	Japan	Republic of Korea	China	mainland	Hong Kong	Chinese Taipei
2012	39	187	4141	3840	91	210
2013	55	193	2859	2611	113	135
2014	50	253	3820	3589	94	137
2015	47	316	3271	3136	49	86
2016	74	396	3268	3112	68	88
2017	59	234	595	488*	1	106

*exceedingly low shorebird numbers present during annual Bohai Bay counts

Masked Booby *(Sula dactylatra)* on Lord Howe Island © Copyright Department of the Environment and Energy

Key results of migratory bird research at the University of Queensland 2016 - 2018

Professor Richard Fuller, University of Queensland

Relevant JAMBA Articles: IV

Relevant CAMBA Articles: III

Relevant ROKAMBA Articles: 3

Summary

Each bilateral migratory bird agreement encourages the exchange of data and publications regarding research on migratory birds and birds in danger of extinction. Parties are also encouraged to develop joint research programs that would benefit the conservation and management of migratory birds and their habitats.

Research efforts from the University of Queensland continue to focus on migratory shorebirds and their habitats. Please contact Professor Richard Fuller (r.fuller@uq.edu.au) with any enquiries about these projects, or suggestions for further work or collaborations

2016年から2018年にかけて行われた、クイーンズランド大学による渡り鳥調査の主な結果

クイーンズランド大学　リチャード・フラー教授

JAMBA の関連条項：**IV**

CAMBA の関連条項：**III**

ROKAMBA の関連条項：**3**

要約

渡り鳥に関する二国間協定はすべて、渡り鳥や絶滅の危機に瀕した鳥類に関するデータおよび出版物の交換を奨励しています。また研究者やその団体は、渡り鳥とその生息地の保護および管理に利益をもたらすと思われる共同研究プログラムの開発を奨励されています。

クイーンズランド大学は、今後も渡り性渉禽類とその生息地に焦点を当てた研究活動を継続します。これらのプロジェクトに関してご質問をお持ちの方、または将来の研究もしくは共同研究に関して提案をご希望の方は、リチャード・フラー教授（**Professor Richard Fuller**，**E-Mail**：r.fuller@uq.edu.au）までご連絡ください。

昆士兰大学 2016-2018 年候鸟研究主要结果

昆士兰大学Richard Fuller教授

JAMBA相关条款：**IV**

CAMBA相关条款：**III**

ROKAMBA相关条款：**3**

总结

双边候鸟协议鼓励有关候鸟以及濒危鸟类的数据和出版文献交流。协定还鼓励签约各方开展联合研究，有助于候鸟及其栖息地的保护和管理。

昆士兰大学的研究将继续关注迁徙滨鸟及其栖息地。有关这些项目的任何疑问或进一步工作和合作可以联系**Richard Fuller**教授（r. fuller@uq. edu. au）。

철새 연구의 주요 결과

퀸즈랜드 대학, 리처드 풀러(**Richard Fuller**) 교수

JAMBA 관련 조항: **IV**

CAMBA 관련 조항: **III**

ROKAMBA 관련 조항: **3**

요약

각각의 양자간 철새 협정은 철새 및 멸종 위기 조류 연구와 관련한 데이터 및 간행물 교환을 장려합니다. 또한 협정 당사국들이 철새 및 그 서식지의 보전과 관리에 유익한 공동 연구 프로그램을 개발하도록 장려합니다.

퀸즈랜드 대학의 연구 노력은 이동성 섭금류(**shorebirds**) 및 그 서식지에 초점을 맞추어 진행되고 있습니다. 이 프로젝트에 관한 문의사항이나, 심화 연구 또는 협력을 위한 제안사항이 있는 경우 **Richard Fuller** (r.fuller@uq.edu.au) 교수에게 연락하기 바랍니다.

Telling the story of shorebird monitoring in Australia: A successful long-term collaboration among citizen scientists, governments and researchers

From its beginnings in the 1960s, shorebird monitoring in Australia has grown into a national effort generating high quality information about a large group of migratory and non-migratory waterbirds. Robust information on trends, combined with detailed demographic monitoring and studies of bird movements, has revealed drastic declines, particularly among the migratory species. From the start, monitoring focused on a broad range of species meaning that the reasons for these declines could be understood through comparative analyses in partnership with researchers. Threats to migratory and non-migratory species, and the actions necessary for their recovery, are increasingly well resolved. Shorebird monitoring in Australia has been a largely decentralised, volunteer-driven effort, funded from both public and private sources. It exemplifies how the public and private sectors can work together to achieve long term monitoring. We tell the story of the history and development of shorebird monitoring in Australia, together with reflections on lessons learnt in this book chapter.

Reference: Hansen BD, Clemens RS, Gallo-Cajiao E, Jackson MV, Maguire GS, Maurer G, Milton D, Rogers DI, Weller DR, Weston MA, Woehler EJ & Fuller RA (2018) Shorebird monitoring in Australia: a successful long-term collaboration between citizen scientists, governments and researchers. *In* Legge S, Robinson N, Scheele B, Lindenmayer D, Southwell D & Wintle B (eds) *Monitoring Threatened Species and Ecological Communities*. CSIRO, Canberra.

Discovering why migratory shorebirds are declining in the East Asian-Australasian Flyway

Migratory shorebirds are threatened by human-induced global change, and many species are in rapid decline in the East Asian-Australasian Flyway. Although it has long been suspected that habitat loss in stopover areas has been causing these declines, it has been difficult to demonstrate this scientifically. Using 20 years of continent-wide citizen science data, we assessed population trends of ten shorebird species that refuel on Yellow Sea tidal mudflats, a threatened ecosystem that has shrunk by >65% in recent decades (discussed below in 'Seawalls and biodiversity'). Seven of the taxa significantly declined (*menzbieri* Bar-tailed Godwit, Far Eastern Curlew, Curlew Sandpiper, Great Knot, Red Knot, Lesser Sand Plover, *baueri* Bar-tailed Godwit). Taxa with the greatest reliance on the Yellow Sea as a stopover site showed the greatest declines, whereas those that stop primarily in other regions had slowly declining or stable populations. Decline rate was unaffected by shared evolutionary history among taxa and was not predicted by migration distance, breeding range size, non-breeding location, generation time or body size. These results suggest that threats operating in the Yellow Sea are driving declines in migratory shorebird populations in the East Asian-Australasian Flyway, and points to the central importance of efforts to stop threats from worsening in this region.

Reference: Studds CE, Kendall BE, Murray NJ, Wilson HB, Rogers DI, Clemens RS, Gosbell K, Hassell CJ, Jessop R, Melville DS, Milton DA, Minton CDT, Possingham HP, Riegen AC, Straw P, Woehler EJ & Fuller RA (2017) Rapid population decline in migratory shorebirds relying on Yellow Sea tidal mudflats as stopover sites. Nature Communications, 8, 14895.

Case study: causes of decline in Bar-tailed Godwits in the East Asian-Australasian Flyway

The two sub-species of Bar-tailed Godwit both travel tens of thousands of kilometres each year, but spend different parts of their annual cycle in geographically distinct locations. The geographic separation but shared evolutionary history, migration distance, and morphology of the two sub-species provides an opportunity to

isolate the factors driving variability in abundance in the Bar-tailed Godwit *Limosa lapponica*. We compiled a spatially and temporally explicit dataset of three remotely-sensed environmental variables to identify conditions at each stage of the annual cycle (breeding, non-breeding and staging) for the two sub-species and related this information to 18 years of monthly count data from 21 sites across Australia and New Zealand. We found that the abundance of subspecies *menzbieri* in the nonbreeding range was related to climate conditions in breeding grounds, and detected sustained population declines between 1995 and 2012 in both subspecies (*menzbieri* -6.7%, *baueri* -2.1% per year). To investigate the possible causes of the declines, we quantified changes in habitat extent at 22 migratory staging sites in the Yellow Sea, East Asia, over a 25-year period and found -1.7% and -1.2% per year loss of habitat at staging sites used by *menzbieri* and *baueri*, respectively. This highlights the need to identify environmental and anthropogenic drivers of population change across all stages of migration to allow the formulation of effective conservation strategies.

Reference: Murray NJ, Studds CE, Fuller RA, Clemens RS, Dhanjal-Adams KL, Gosbell KB, Hassell CJ, Iwamura T, Minton CDT, Riegan AC, Rogers DI, Woehler EJ & Marra PP (2018) The large-scale drivers of population declines in a long-distance migratory shorebird. *Ecography*, 41, 867-876.

Seawalls and biodiversity

Coastal armouring and the reclamation of intertidal areas through the use of seawalls and other artificial structures has been practiced for thousands of years, but its recent expansion in China and elsewhere in Asia has been unprecedented in its rate and intensity. One result has been the loss of nearly two-thirds of tidal flats in the Yellow Sea, a globally unique ecosystem of high ecological value. The severe effects on biodiversity of large-scale coastal land claim activities in China are well documented, yet some recent studies have emphasized the ecological opportunities provided by such artificial coastal infrastructure in China, in some cases suggesting that the ecological impacts of coastal infrastructure should be reconsidered due to benefits to some rocky shore species in a changing climate. This is cause for concern because, while studying the "new ecology" arising from coastal modification is useful, broad conclusions around the ecological role or conservation gains from seawall construction without adequate contextualization underplays the ecological consequences of large-scale coastal land claim, and could potentially undermine efforts to achieve conservation of biodiversity, including migratory shorebirds and other waterbirds. In a recent study, we clarified the characteristics of seawall construction in China and summarized the environmental damage and some broad-scale impacts caused by this type of infrastructure expansion on the endangered Yellow Sea tidal flats ecosystem. Through this and other ongoing work, we continue to highlight the urgent need for all coastal development plans to consider how coastal wetlands and ecosystem functionality can be maximally retained within the development precinct.

Reference: Choi C-Y, Jackson MV, Gallo-Cajiao E, Murray NJ, Clemens RS, Gan X & Fuller RA (2018) Biodiversity and China's new Great Wall. *Diversity and Distributions*, 24, 137-143.

Measuring the global distribution and status of tidal flats

As evidenced in the previous sections, tidal flats are a critical habitat for migratory birds and also a key ecosystem underpinning the functioning of coastal ecosystems and the protective capacity for the human population that they provide. Yet they have never been mapped on a large scale. A UQ team, led by Dr Nicholas Murray and funded by Google, have mapped tidal flats globally at a 30-metre resolution, using Landsat data. The project has analysed 700,000 Landsat satellite images, to map the global extent and change of the tidal flats over 33 years, 1984–2016. The final intertidal dataset, which is publicly available, consists of 11 global maps of tidal flats at 30-m pixel resolution for set time-periods (1984–1986; 1987–1989; 1990–1992; 1993–1995; 1996–1998; 1999–2001; 2002–2004; 2005–2007; 2008–2010; 2011–2013; 2014–2016). A set of quality assurance layers

indicating the depth of the image stacks used to classify each pixel of the intertidal layer are also provided ("qa"), and the team is expecting to update the mapping every three years. Soon to be published, the data will be made available open access so that analyses of tidal flat change can be performed for any area around the world. The data could, for example, be used to monitor natural changes in tidal flat distributions across seasons or between years, or to investigate how tidal flats respond to anthropogenic impacts such as mangrove removal, coastal development or reclamation. They could also be used to monitor the effectiveness of coastal protected areas in maintaining tidal flats, and to investigate where large expanses of unprotected tidal flats might occur. Countries can use the data to assess performance against Sustainable Development Goals and Convention of Biological Diversity targets for intertidal ecosystems, something that has not previously been possible.

Reference: Study submitted to a journal, but not yet published (July 2018).

Protecting intertidal habitats in Australia

As a precursor to measuring the intertidal environment globally, we utilised freely available satellite imagery to produce the first map and quantify protection status of intertidal habitats across Australia. We estimated a minimum intertidal area of 9,856 km2, with Queensland and Western Australia supporting the largest areas. Thirty-nine percent of intertidal habitats were protected in Australia, with some primarily within marine protected areas (e.g. Queensland) and others within terrestrial protected areas (e.g. Victoria). Three percent of all intertidal habitats were protected by both marine and terrestrial protected areas. To achieve conservation targets, protected area boundaries must align more accurately with intertidal habitats. Shorebirds use intertidal areas to forage and supratidal areas to roost, so a coordinated management approach is required to account for movement of birds between terrestrial and marine habitats. Ultimately, shorebird declines are occurring despite high levels of habitat protection in Australia. There is a need for a concerted effort both nationally and internationally to map and understand how intertidal habitats are changing, and how habitat conservation can be implemented more effectively.

Reference: Dhanjal-Adams KL, Hanson JO, Murray NJ, Phinn SR, Wingate VR, Mustin K, Lee JR, Allan JR, Cappadonna JL, Studds CE, Clemens RS, Roelfsema CM & Fuller RA (2016) The distribution and protection of intertidal habitats in Australia. *Emu*, 116, 208-214.

Managing disturbance to migratory shorebirds

Protected areas often need to provide recreational opportunities whilst conserving biodiversity. Recreation brings important benefits to human well-being, and allowing people to experience nature in protected areas can also provide revenue and support for conservation objectives. However, not all recreational activities are compatible with environmental management goals. We conducted a research project to determine how a coastal protected area can be zoned to satisfy both recreational and conservation objectives. We collected empirical data on the effect of recreational disturbance to foraging shorebirds in Moreton Bay Marine Park, Queensland, Australia, and calculated the benefit of alternative protected area zone types on shorebird representation using a zero-inflated negative binomial model. The predictions from this model were used to optimize a zoning plan in a linear programming framework that balances recreational use with shorebird conservation. Costs reflect foregone recreational opportunity, thereby facilitating solutions that minimize restrictions on recreational use of the coastline.

We discovered a consistent negative effect of recreational use of the foreshore on shorebird occupancy and abundance and show that, despite this, zoning can be used to achieve shorebird representation targets with only a small cost to recreational opportunity. When dog recreation is permitted at all sites, a 91% shorebird representation target can be met, indicating that de facto patterns of recreation were rather well segregated from areas used by shorebirds. By restricting dog recreation to five sites and allowing people to access all other foreshore sites, shorebird representation increased to 97%.

Our approach of calculating the contribution of each zone type towards conservation objectives results in zoning plans with robust estimates of conservation benefit that can be readily implemented by managers. Specifically, we estimated the effects of removing people and domestic dog recreation within each intertidal site on shorebird abundance to inform coastal zoning plans. Incorporating cost as foregone recreational opportunity results in zoning plans that minimize the number of people required to make a behavioural change. Compliance to zone types is often ultimately voluntary so integrating the current intensity of recreational use is more likely to generate workable zoning plans.

In a second study we showed that where enforcement activity (e.g. ranger patrols) is needed to ensure compliance with conservation zoning, visiting a range of enforcement sites at varying rates yields a greater return on investment than visiting only a fixed number of sites. Assuming an exponential reduction in disturbance from enforcement, the greatest benefit can be achieved by patrolling many sites a small number of times. Assuming a linear reduction in disturbance from enforcement, repeatedly patrolling a small number of sites where return on investment is high is best. If we only prioritize sites where wildlife is disturbed most often, or where abundance is greatest, we will not achieve an optimal solution. The choice of patrol location and frequency is not a trivial problem, and prudent investment can substantially improve conservation outcomes.

References: Stigner MG, Beyer HL, Klein CJ, & Fuller RA (2016) Reconciling recreational use and conservation values in a coastal protected area. *Journal of Applied Ecology*, 53, 1206-1214; Dhanjal-Adams KL, Mustin K, Possingham HP & Fuller RA (2016) Optimizing disturbance management for wildlife protection: The enforcement allocation problem. *Journal of Applied Ecology*, 53, 1215-1224.

Climate change is reducing the amount of breeding habitat for EAAF shorebirds

Although habitat loss in the Yellow Sea has been and continues to be a primary driver of shorebird declines in the EAAF, rapid climate change in the Arctic could emerge as an increasingly important threat by influencing where species are able to breed and disrupting migratory connections globally. We modelled the climatically suitable breeding conditions of 24 Arctic specialist shorebirds and projected them to 2070 and to the mid-Holocene climatic optimum, the world's last major warming event ~6000 years ago. We show that climatically suitable breeding conditions could shift, contract and decline over the next 70 years, with 66–83% of species losing the majority of currently suitable area. This exceeds, in rate and magnitude, the impact of the mid-Holocene climatic optimum. Suitable climatic conditions are predicted to decline acutely in the most species rich region, Beringia (western Alaska and eastern Russia), and become concentrated in the Eurasian and Canadian Arctic islands. These predicted spatial shifts of breeding grounds could affect the species composition of the world's major flyways. Encouragingly, protected area coverage of current and future climatically suitable breeding conditions generally meets target levels; however, there is a lack of protected areas within the Canadian Arctic where resource exploitation is a growing threat. Our results emphasize the urgency of mitigating climate change and protecting Arctic biodiversity.

Reference: Wauchope HS, Shaw JD, Varpe Ø, Lappo EG, Boertmann D, Lanctot RB & Fuller RA (2017) Rapid climate-driven loss of breeding habitat for Arctic migratory birds. *Global Change Biology*, 23, 1085-1094.

Which sites need to be protected to maintain migratory shorebird populations?

With the rapid growth in our understanding of threats that have driven population declines in the EAAF it is increasingly essential that this information be applied to develop conservation strategies to reverse declines and stabilize future populations. Conserving migratory shorebirds requires protecting connected habitat along the pathways they travel. Despite recent improvements in tracking shorebird movements through on-board devices, migratory connectivity remains poorly resolved at a population level for the vast majority of species, making it difficult to identify a critical network of sites for shorebird conservation. To address this data limitation, we developed a novel approach to spatial prioritization based on a model of potential connectivity derived from empirical data on species abundance and distance travelled between sites during migration. Conservation strategies that prioritized sites based on connectivity and abundance metrics together maintained larger populations of birds than strategies that prioritized sites based only on abundance metrics. The conservation value of a site therefore depended on both its capacity to support migratory animals and its position within the migratory pathway; the loss of crucial sites led to partial or total population collapse. We suggest that conservation approaches that prioritize sites supporting large populations of migrants should, where possible, also include data on the spatial arrangement of sites.

Reference: Dhanjal-Adams KL, Klaassen M, Nicol S, Possingham HP, Chadès I & Fuller RA (2017) Setting conservation priorities for migratory networks under uncertainty. *Conservation Biology*, 31, 646-656.

Eastern Curlew *(Numenius madagascariensis)* in Merimbula, New South Wales © Copyright Dan Weller

National Avian Influenza Wild Bird Surveillance Program

National Avian Influenza Wild Bird Steering Group

Compiled by:

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on behalf of Australia's National Avian Influenza Wild Bird Steering Group

Relevant JAMBA Articles: III, IV, VI

Relevant CAMBA Articles: III, IV, V

Relevant ROKAMBA Articles: 3, 5, 7

Summary

Activities under the National Avian Influenza Wild Bird (NAIWB) Surveillance Program are conducted Australia-wide. The Program has two main components: Targeted surveillance: pathogen-specific, risk-based surveillance via convenience sampling of apparently healthy, live and hunter-killed wild birds, and General (passive) surveillance: investigation of significant, unexplained morbidity / mortality events in wild birds, including captive and wild birds within zoo grounds. During 2017, targeted surveillance activities included testing of samples for avian paramyxoviruses (APMVs), predominantly targeting APMV-1.

Targeted surveillance focuses on sampling predominantly from Anseriformes (waterfowl) and a small number of Charadriiformes (shorebirds), specifically from locations where there is known mixing of Charadriiformes and Anseriformes and in locations in close proximity to poultry and humans. Where possible, surveillance will continue in locations previously sampled to obtain longitudinal data. Samples are collected through State and Territory government agency programs, the Northern Australia Quarantine Strategy (NAQS) Program and university research projects. There continues to be an emphasis on virus isolation and genotyping of avian influenza viruses (AIVs) in order to inform risk and allow ongoing assay development for influenza testing. Surveillance activities will continue through to the end of 2018.

General surveillance focuses on exclusion of AI and virulent APMV-1 from mass mortality and morbidity events in wild birds around Australia and the Australian Antarctic Territory. The wild bird program is part of a larger national program involving domestic bird surveillance, research and international responsibilities, and ongoing communication to industry.

全国鳥インフルエンザ野鳥サーベイランス・プログラム

全国鳥インフルエンザ野鳥ステアリング・グループ（National Avian Influenza Wild Bird Steering Group）

JAMBA の関連条項：**III**，**IV**，**VI**

CAMBA の関連条項：**III**，**IV**，**V**

ROKAMBA の関連条項：**3**，**5**，**7**

要約

全国鳥インフルエンザ野鳥サーベイランス・プログラム（**National Avian Influenza Wild Bird**［**NAIWB**］**Surveillance Program**）の活動はオーストラリア全土で実施されています。同プログラムは、以下二通りの主要監視活動で構成されています。一つめの「ターゲット・サーベイランス」は、一見したところ健康で、狩猟により死亡した野鳥から恣意的に採取した検体による、病原菌を対象とした、リスクに基づく監視です。二つめの「包括的（受動的）サーベイランス」は、野鳥（捕獲されたものや動物園内で飼育されているものを含む）に生じた相当数の説明できない疾病または致死に至った出来事の調査を指します。**2017** 年のターゲット・サーベイランスの活動には、鳥パラミクソウイルス（**APMV**）、特に **APMV-1** を標的とした標本の検査が含まれていました。

ターゲット・サーベイランスは、主にカモ目（水鳥）、および少数のチドリ目（渉禽類）からの採取に焦点を当てて行われます。これらの標本は、特にチドリ目とカモ目の共生が知られている場所、および家禽や人間に近接する場所で採取されます。長期的に追ったデータを得るために、可能であれば過去に標本を採取した場所でサーベイランスを継続します。標本は、州および特別地域の政府機関によるプログラムや、北部オーストラリア検疫戦略（**NAQS**）プログラム、または大学の研究プロジェクトなどを通じて採取されます。リスクの発信およびインフルエンザ検査に関する分析表の開発を継続するため、今後も引き続き鳥インフルエンザウイルス（**AIV**）の分離および遺伝子型の判定に重点が置かれます。サーベイランス活動は、引き続き **2018** 年末まで行われる予定となっています。

包括的サーベイランスでは、オーストラリアおよびオーストラリア南極領土周辺の野鳥に発生した大量死および疾病の出来事から鳥インフルエンザ（**AI**）および悪性の **APMV-1** を排除することに焦点が当てられています。野鳥プログラムはより大規模な全国プログラムの一部であり、同プログラムは国内の鳥の監視、研究および国際的な責務、そして産業界との継続的なコミュニケーションに関わっています。

国家禽流感野生鸟类监测计划

国家禽流感野生鸟类指导小组（National Avian Influenza Wild Bird Steering Group）

由

澳大利亚野生动物健康组织**Tiggy Grillo** 和 **Silvia Ban**代表澳大利亚国家禽流感野生鸟类指导小组编制

JAMBA相关条款：**III**，**IV**，**VI**

CAMBA相关条款：**III**，**IV**，**V**

ROKAMBA相关条款：**3**，**5**，**7**

总结

全国禽流感野生鸟类（**NAIWB**）监测计划（National Avian Influenza Wild Bird（NAIWB）Surveillance Program）开展的行动遍布全澳。该计划由两个部分组成：目标性监测：对明显健康、存活的以及被捕杀的野鸟任意抽样，并进行病原体特异性及基于风险的监测；普通（被动）监测：调查重大的、原因未明的野鸟发病或死亡事件，包括动物园内笼养及野生的鸟类。在**2017**年，目标性监测对副粘病毒（**APMVs**）取样测试，其中以**APMV-1**为目标重点。

目标性监测主要关注**Anseriformes**（水鸟）和一小部分**Charadriiformes**（滨鸟）的样本，尤其是已知**Charadriiformes** 和 **Anseriformes**混合的区域以及靠近家禽和人类的区域。在可能的情况下，将继续对之前已经取过样本的区域进行检测，获取纵向数据。样本是通过州和领地政府部门项目、澳大利亚北部检疫策略（**NAQS**）项目和大学研究项目共同获取。为了获悉风险并促进流感化验，禽流感病毒（**AIVs**）的病毒分离和基因分型将持续得到关注，监测行动将持续到**2018**年年底。

普通监测主要是为了观察造成澳大利亚以及澳大利亚南极洲领地范围内野鸟大规模发病和死亡的非**AI**及病毒性**APMV-1**的原因。国家项目包括国内鸟类监测、研究和国际责任，以及与该行业持续的交流，野鸟项目是其中的一个部分。

국립 야생 조류의 조류 독감 감시 프로그램(National Avian Influenza Wild Bird Surveillance Program)

야생 조류 독감 국립 운영위원회(National Avian Influenza Wild Bird Steering Group)

편집:

Tiggy Grillo 및 **Silvia Ban**, 호주 야생 조류 독감 국립 운영위원회를 대표하는 야생 건강
오스트레일리아

JAMBA 관련 조항: **III**, **IV**, **VI**

CAMBA 관련 조항: **III**, **IV**, **V**

ROKAMBA 관련 조항: **3**, **5**, **7**

요약

National Avian Influenza Wild Bird (NAIWB) Surveillance Program (국립 야생 조류의 조류 독감 (NAIWB) 예찰 프로그램)에 따른 활동이 호주 전역에서 수행됩니다. 이 프로그램에는 두 가지 주요 구성요소가 있습니다. 목표별 예찰은 외관상 건강하고 살아있는 수렵한 야생 조류의 편의 표본 추출을 통한 병원균-특정 리스크-기반 예찰이며, 일반 (수동) 예찰은 동물원에 갇혀 있는 야생 조류를 포함하여 야생 조류의 중요하고 설명되지 않은 이환 / 사망 사건을 조사하는 것입니다. **2017**년의 목표별 예찰 활동에는 **APMV-1**를 주된 목표로 하는 조류 파라믹소바이러스 (**APMV**)에 대한 표본 테스트가 포함되었습니다.

목표별 예찰은, 특히 **Anseriformes** (물새)와 **Charadriiformes** (섭금류)가 섞여 있는 것으로 알려진 장소 및 가금류와 인간에게 근접한 장소로부터, 주로 **Anseriformes** 및 소수의 **Charadriiformes** 표본을 추출하는 것에 집중합니다. 가능한 경우, 장기간에 걸친 데이터를 얻기 위해 이전의 표본 추출 장소에서 예찰을 계속할 것입니다. 표본은 주 및 테리토리 정부 담당 기관 프로그램, 노던 오스트레일리아 검역 전략 (**NAQS**) 프로그램 및 대학의 연구 프로젝트를 통해 수집됩니다. 위험을 알리고 독감 테스트를 위한 지속적 시금 개발을 위해 바이러스 분리 및 조류 독감 바이러스 (**AIV**)의 유전자형 분석에 계속 중점을 둡니다. 예찰 활동은 **2018**년 말까지 계속됩니다.

일반 예찰은 호주 및 호주남극속령 주변 야생 조류의 대량 폐사 및 이환 사건으로부터 **AI** 및 치명적 **APMV-1**를 차단하는 것에 중점을 둡니다. 이 야생 조류 프로그램은 국내 조류 예찰, 연구 및 국제적 책임, 산업계와의 지속적인 의사소통을 수반하는 보다 광범위한 국가적 프로그램의 일환입니다.

The NAIWB Surveillance Program continues to provide Australia with important outcomes. These include to:

1. Detect avian influenza^ in wild birds,
2. Contribute to a better understanding of AI^ phylogeny and gene flow of subtypes, ecology and epidemiology to support industry and human and wildlife health strategic risk assessment and management,
3. Maintain national avian influenza laboratory diagnostic capacity and capability,
4. Sharing and communication of data nationally and globally,
5. Contribute to One Health through regular communication of AIV data to the Department of Health with specific analysis of wild bird AIVs for likelihood of infection and transmission in humans, and
6. Exclude AIV and APMV-1, specifically H5 and H7, in mass mortality events in wild birds.
   Footnote: ^and APMV-1 during 2017.

Since 2005, over 104,000 wild birds have been sampled as part of active wild bird surveillance at sites in New South Wales, Queensland, Victoria, Tasmania, South Australia, Northern Territory and Western Australia, with 9,997 wild birds sampled between July 2016 and June 2018, of which 5,062 samples were also tested for APMV-1. In addition, over 3,200 wild bird mortality / morbidity events have been investigated and reported since 2005, with over 600 events investigated and reported between July 2016 and June 2018.

No highly pathogenic AIVs nor virulent strains of APMV-1 have been identified. Almost all AIV subtypes have been detected, including LPAI H5 and H7 subtypes in wild birds in Australia.

Recent avian influenza and other avian virus publications from Australia include:

- Scott AB et al (2018). Low-and high-pathogenic avian influenza H5 and H7 spread risk assessment within and between Australian commercial chicken farms. *Frontiers in Veterinary Science*, *5*, 63. https://www.frontiersin.org/articles/10.3389/fvets.2018.00063/full
- Singh M et al (2018). Assessing the probability of introduction and spread of avian influenza (AI) virus in commercial Australian poultry operations using an expert opinion elicitation. *PloS one*, *13*(3), e0193730. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0193730
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Every three months general wildlife disease surveillance information submitted to the national electronic Wildlife Health Information System (eWHIS) is collated and submitted by Wildlife Health Australia to a quarterly publication called Animal Health Surveillance Quarterly (AHSQ), which is produced by Animal Health Australia as part of Australia's national animal health information system or NAHIS. Each quarter, AHSQ contains a section on the main wildlife disease incidents that have occurred around Australia and includes a specific section on Wild bird mortality event summary — APMV-1 and AI exclusions. During the October to December 2017 quarter, a special report was included in AHSQ on seabird and shorebird mortalities. The full article is available here: http://www.sciquest.org.nz/elibrary/download/143098/Wildlife_Health_Australia.pdf (also attached)

See WHA website: https://www.wildlifehealthaustralia.com.au/ProgramsProjects/WildBirdSurveillance.aspx for a list of references and a link to AHSQ reports here: https://www.wildlifehealthaustralia.com.au/DiseaseIncidents/HistoricIncidents.aspx

Given Australia's geographic and ecological isolation, it is recognised that assumptions about AIV and APMV-1 epidemiology in Australia should not be based entirely on studies from overseas. The NAIWB Surveillance Program continues to provide valuable ecological and epidemiological background information to assist strategic risk management to minimise the economic, environmental and social impacts of AI (or HPAI) and virulent APMV-1 on human health, poultry industry and wildlife in Australia.

In particular, it is extremely important to maintain and update the capacity to rapidly and reliably test for AIV and APMV-1 in Australian poultry and wild birds as these viruses undergo constant evolution. Samples from the NAIWB Surveillance Program provide a principle source of AIV (and APMV-1 in 2017) sequence data necessary to monitor the ongoing evolution of Australian-specific lineages. These detections also allow regular evaluation of primer target sequence variability.

This provides continued confidence that the tests being used in Australia will detect any strains of highly pathogenic avian influenza H5 or H7 or virulent APMV-1.

The multi-agency and cross-jurisdictional approach of this project provides a forum for collaboration on technical aspects of influenza in humans, animals and wildlife.

Background:

The National Avian Influenza Wild Bird Steering Group (the NAIWB Steering Group) was established in January 2006 to facilitate collaboration between State and Territory programs and non-government organisations undertaking surveillance for avian influenza. Primary Industry agencies agreed to strengthen national surveillance for avian influenza in both poultry and wild birds.

The NAIWB Steering Group comprises representation from:

- Australian Department of Agriculture and Water Resources (DAWR)
- Australian Department of the Environment and Energy
- Australian Department of Health
- CSIRO Australian Animal Health Laboratory
- DAWR's Northern Australia Quarantine Strategy (NAQS) Program
- State and Territory government animal health departments in NSW, Qld, SA, Tas, Vic and WA
- World Health Organisation Collaborative Centre for Influenza in Melbourne
- Birdlife Australia
- Rural Industries Research and Development Corporation (RIRDC) / Poultry Industry representation
- Deakin University, University of Newcastle, James Cook University

The NAIWB Steering Group is responsible for development and implementation of a yearly operating plan and coordination of surveillance activities for AI and in 2017, APMV-1, in wild birds in Australian states and territories.

Nationally coordinated activities have been conducted since 2006, with funding provided by the Australian Government Department of Agriculture and Water Resources and significant in-kind support provided by the jurisdictional agencies, researchers and representative's institutions.

A combination of healthy, live and hunter-killed wild birds (targeted surveillance) and sick or dead wild birds (general surveillance) are sampled for surveillance. Sources for targeted wild bird surveillance data include state and territory government laboratories, universities and samples collected under Australia's Northern Australia Quarantine Strategy (NAQS) Program. Samples from sick birds include submissions from members of the public, private practitioners, universities, zoos and sanctuaries. Wildlife Health Australia manages the Program.

Results from the NAIWB Surveillance Program are used to inform policy development and planning by Australian government and state/territory government agencies and contribute to Australia's National Animal Health Information System (NAHIS). The data also informs Australia's international reporting; and summary data are provided to industry at regular intervals through each sampling year.

Common Noddy *(Anous stolidus)* on North Keeling Island © Copyright Department of the Environment and Energy

Wildlife Health Australia

Keren Cox-Witton, Silvia Ban and Tiggy Grillo, Wildlife Health Australia; and **Iain East,** Australian Government Department of Agriculture and Water Resources

Wildlife Health Australia (WHA)[17] is the peak body for wildlife health in Australia. WHA was established as the Australian Wildlife Health Network in 2002 as an Australian Government initiative to coordinate wildlife health surveillance information across Australia, to support Australia's animal health industries, human health, biodiversity, trade and tourism. WHA collates information from multiple sources into a national database — the Wildlife Health Information System (eWHIS)[18] — including submissions by WHA subscribers, state and territory WHA coordinators, researchers, and university, zoo and sentinel clinic veterinarians.

During the quarter, 190 wildlife disease investigation events were reported in eWHIS (Table 1), and samples were collected from 1226 wild birds for avian influenza and avian paramyxovirus-1 surveillance.

This report details some of the disease and mortality events in free-living wildlife recorded in eWHIS this quarter. WHA thanks all those who submitted information for this report.

Wild bird mortality event summary — Newcastle disease and avian influenza exclusion

WHA received 59 reports of wild bird mortality or morbidity investigations from around Australia during the quarter; investigations may involve a single animal or multiple animals (e.g. mass mortality event). A breakdown of the bird orders represented is presented in Table 2. Reports and samples from sick and dead birds are received from members of the public, private practitioners, universities, zoo wildlife clinics and wildlife sanctuaries. Avian influenza (AI) was excluded by polymerase chain reaction (PCR) testing for influenza A in 14 of the events as part of Australia's general (sick and dead bird) AI surveillance program. AI exclusion testing was not warranted in the remaining 45 events, based on clinical signs, history, prevailing environmental conditions or other diagnoses. Also, avian paramyxovirus was excluded in 13 events by PCR testing specifically for Newcastle disease (ND) virus and/or pigeon paramyxovirus type 1 (PPMV-1).

Detection of pigeon paramyxovirus type 1 in feral pigeons

In October and November, four feral pigeons (*Columba livia*) were found in Sydney with neurological signs, including stumbling and rolling, inability to fly and inability to prehend food.

The birds were euthanased and necropsy was performed at Taronga Zoo Wildlife Hospital. Based on the history and clinical signs, cloacal and tracheal swabs were submitted to NSW DPI Elizabeth Macarthur Agricultural Institute, Menangle, for notifiable disease testing. Pooled cloacal swabs from three of the birds tested positive on PCR assay for PPMV-1.[19] AI was excluded by PCR testing.

Another two feral pigeons were found dead and emaciated at the same location in a similar period. These pigeons were presumptively diagnosed with avian trichomoniasis (*Trichomonas gallinae*)[20] based on typical yellow caseous lesions in the oral cavity observed at necropsy.

Seabird and shorebird mortalities — avian influenza and avian paramyxovirus excluded

From October to December, migratory shorebirds and seabirds arrive from their Northern Hemisphere breeding grounds to form aggregations along Australian coastlines and at inland wetlands.[21,22] Targeted wild bird AI surveillance and risk analysis has demonstrated a low likelihood of migratory birds introducing highly pathogenic AI viruses into

17 www.wildlifehealthaustralia.com.au/Home.aspx

18 www.wildlifehealthaustralia.com.au/ProgramsProjects/eWHISWildlifeHealthInformationSystem.aspx

19 WHA 2016, *Avian Paramyxoviruses and Australian Wild Birds*, Fact sheet, November 2016, Wildlife Health Australia. www.wildlifehealthaustralia.com.au/FactSheets.aspx

20 WHA 2014, *Trichomoniasis in Australian Wild Birds*, Fact sheet, June 2014, Wildlife Health Australia. www.wildlifehealthaustralia.com.au/FactSheets.aspx

21 McCallum H, Roshier D, Tracey J, Joseph L, Heinsohn R (2004) Will the Wallace Line save Australia from avian influenza? *Ecology and Society* 13 (2).

22 Tracey JP, Woods R, Roshier D, West P, Saunders GR. (2004) The role of wild birds in the transmission of avian influenza for Australia: an ecological perspective. *Emu* 104 (2): 109-124.

Table 1 Number of disease investigations reported into eWHIS, October to December 2017[a]

Bats[b]	Birds[c,d]	Marsupials	Feral mammals	Marine turtles	Marine mammals	Monotremes	Amphibians
89	59	34	2	2	2	2	1

a Disease investigations may involve a single animal or multiple animals (e.g. mass mortality event).
b The majority of bat disease investigations are single bats submitted for Australian bat lyssavirus testing.
c Additional sampling for targeted avian influenza surveillance is presented separately.
d Includes free-ranging birds (native or feral species) and a small number of events involving birds from zoological collections.

Table 2 Wild bird disease investigations reported into eWHIS, October to December 2017

Bird order	Common name for bird order[a]	Events reported[b]
Anseriformes	Magpie goose, ducks, geese and swans	3
Charadriiformes	Shorebirds	3
Columbiformes	Doves and pigeons	2
Coraciiformes	Bee-eaters and kingfishers	1
Falconiformes	Falcons	3
Galliformes	Brush turkeys, scrubowls and quails	1
Passeriformes	Passerines or perching birds	20
Pelecaniformes	Ibis, herons and pelicans	5
Psittaciformes	Parrots and cockatoos	20
Sphenisciformes	Penguins	1

a Common names adapted from: del Hoyo & Collar 2014. *HBW and BirdLife International Illustrated Checklist of the Birds of the World. Volume 1 — Non-passerines.* Lynx Editions, Barcelona. (Courtesy of the Australian Government Department of the Environment and Energy.)
b Disease investigations may involve a single or multiple bird orders (e.g. mass mortality event). This quarter three wild bird events involved multiple bird orders. One involved the bird orders Psittaciformes and Columbiformes, the second involved Procellariiformes and Sphenisciformes, and the third event involved Passeriformes, Galliformes, and Pelecaniformes.

Australia[23,24,25,26]. Excluding AI as a cause of wild bird mortality and morbidity is an important activity at this time of the year, especially in locations where long-distance migrants arrive in Australia.

Migratory seabirds and shorebirds face many threats along their flyways, including habitat loss and degradation, predation, human disturbance, over-fishing, pollution (including microplastics) and climate change. A number of activities are undertaken within Australia to conserve migratory bird populations and their habitats.[27,28] Wildlife disease surveillance, through diagnostic investigation of seabird and shorebird mortality events, may contribute to a better understanding of disease due to natural or anthropogenic origins.[29,30]

During the quarter, a number of unrelated shorebird (Charadriiformes) and seabird mortality events were investigated from multiple jurisdictions.

Tailem Bend, South Australia

In Tailem Bend region, South Australia, approximately 60 sick and dead crested terns (*Thalasseus bergii*) and one dead Caspian tern (*Hydroprogne caspia*) were reported in October. Birds were described huddled and fluffed up, occasionally rolling their heads and reportedly dying in 4 to 6 hours.

Five deceased crested terns and the Caspian tern were submitted for diagnostic investigation to Gribbles Veterinary Pathology. Necropsy found consistent evidence of degeneration and erosion of the koilin layer of the gizzard with mucosal bleeding and accumulation of digested blood in the intestinal tract (melaena). Possible causes

23 East IJ, Hamilton S, Garner G. (2008) Identifying areas of Australia at risk of H5N1 avian influenza infection from exposure to migratory birds: a spatial analysis. *Geospat Health* 2: 203–213.

24 Curran J (2012) The surveillance and risk assessment of wild birds in northern Australia for highly pathogenic avian influenza H5N1 virus [PhD thesis]. Murdoch University, Australia, 2012.

25 Hansbro PM, Hansbro PM, Warner S, Tracey JP, Arzey KE, Selleck P, O'Riley K, Beckett EL, Bunn C, Kirkland PD, Vijaykrishna D, Olsen B (2010) Surveillance and analysis of avian influenza viruses, Australia. *Emerg Infect Dis* 16: 1896.

26 Grillo V, Arzey KE, Hansbro PM, Hurt AC, Warner S, Bergfeld J, Burgess GW, Cookson B, Dickason CJ, Ferenczi M, Hollingsworth T, Hoque M Jackson RB, Klaassen M, Kirkland PD, Kung NY, Lisovski S, O'Dea MA, O'Riley K, Roshier D, Skerratt LK, Tracey JP, Wang X, Woods R, Post L (2015) Avian influenza in Australia: a summary of 5 years of wild bird surveillance. *Australian Veterinary Journal* 93 (11): 387–393.

27 www.environment.gov.au/biodiversity/migratory-species/migratory-birds

28 www.birdlife.org.au/locations/australasian-wader-studies-group/about-flyways

29 Simpson VR & Fisher DN (2017) A description of the gross pathology of drowning and other causes of mortality in seabirds. *BMC Veterinary Research* 13(1): 302.

30 Newman SH, Chmura A, Converse K, Kilpatrick AM, Patel N, Lammers E, Daszak P (2007) Aquatic bird disease and mortality as an indicator of changing ecosystem health. *Marine Ecology Progress Series* 352: 299–309

include mycotoxins, heavy metals and nutritional, viral and fungal disease, including infection with avian gastric yeast. AI and avian paramyxovirus (APMV) were both excluded via PCR assay.

No fungi (including avian gastric yeast) were detected by fungal culture and microscopic examination. All heavy metals tested for in pooled frozen liver samples, by Symbio Laboratories, were within normal ranges found for seabirds. There was evidence of superficial bacterial colonisation within the affected gastrointestinal lesions of some of the birds. However, these findings were considered most likely to reflect a secondary infection. There was evidence of tapeworm burden, which may have contributed to the general debility of these birds, but most likely an incidental finding as gastrointestinal parasites are not uncommon in wild birds.

Despite no specific cause identified, the secondary effects of gastrointestinal tract haemorrhage and subsequent melaena were considered to be responsible for the weakness and deaths of these birds.

Apollo Bay, Victoria

In September, 68 crested terns were found dead in Apollo Bay over a 2-day period.

Two birds were taken to the local veterinarian for X-ray, on suspicion they had been shot. The birds were frozen and submitted to the University of Melbourne. Necropsy revealed subcutaneous haemorrhage associated with skin puncture and haemorrhage in the thorax and liver, suggestive of possible predation secondary to another illness. There was no evidence the birds had been shot.

Histology undertaken at AgriBio, Bundoora, found no further significant findings. Based on frozen liver samples submitted to Symbio Laboratories, all pesticide residues tested were less than the level of reporting. AI viruses and APMV were excluded via PCR assay at AgriBio, Bundoora.

Agencies investigating the events in Victoria and South Australia were in contact to compare findings. In both events, no further deaths were reported. The two birds submitted in Victoria had autolytic and artefactual changes which may have masked pathological lesions. Without additional birds submitted for necropsy, limited comparisons could be made between the events in Tailem Bend and Apollo Bay.

Albany, Western Australia

In October, 77 flesh-footed shearwaters (*Ardenna carneipes*) were found dead in a state of mild decomposition in Albany, Western Australia. Eight partially frozen birds, examined at the Department of Primary Industries and Regional Development (DPIRD), were described as being in poor body condition.

Although examined tissues were autolysed and findings should be interpreted with caution, four birds presented congestion of the meninges and lungs, which is a common finding in drowned seabirds.[31] No significant toxins were detected in the stomach (n = 2) or the liver (n = 2) of the birds submitted. Brain acetylcholinesterase levels did not support organophosphate or carbamate toxicity. Birds submitted were also negative for AI and APMV via PCR assay.

Broome, Western Australia

In November, a broad-billed sandpiper (*Calidris falcinellus*) was found moribund in Broome. The bird was euthanased, and necropsy findings included an empty gastrointestinal tract, emaciation and moderate, chronic, multifocal lymphoplasmacytic enteritis with cestodes (tapeworms) in the small intestine.

It is not unusual to find parasites in wild birds, and cestodes, in particular, are typically not associated with clinical disease. However, in this case, the infestation was considered significant and the likely cause of death, on the basis of large numbers of cestodes found in each of the small sections of small intestine examined histologically. AI and APMV were excluded via PCR assay.

Roebuck Bay, Western Australia

Also in November, three sick great knots (*Calidris tenuirostris*) were found at Roebuck Bay, near Broome. Two of the birds were colour banded and had been sighted in recent weeks in the area, and therefore were not thought to be suffering from exhaustion after migration from eastern Siberia.[32]

One bird died and a second bird was euthanased and both submitted frozen to DPIRD for investigation. Trauma was diagnosed based on gross and microscopic lesions. Toxicity due to organophosphates and botulinum were excluded. AI and APMV were excluded via PCR assay.

Importance of reporting seabird and shorebird mortalities

Many of the species involved in these events are listed as migratory species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).[33] However, some species (e.g. terns) are predominantly short-distant migrants and, by and large, remain on the Australian continent in resident populations. The main

31 Simpson VR& Fisher DN (2017). A description of the gross pathology of drowning and other causes of mortality in seabirds. *BMC Veterinary Research*, 13(1), 302.

32 Department of the Environment 2018. *Calidris tenuirostris* in Species Profile and Threats Database, Department of the Environment, Canberra. www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=862

33 Department of the Environment 2018. *SPRAT EPBC Migratory Lists in Species Profile and Threats Database*, Department of the Environment, Canberra. www.environment.gov.au/cgi-bin/sprat/public/publicshowmigratory.pl

long-distance migrants noted here are the broad-billed sandpiper and the great knot. The great knot is listed as critically endangered under the EPBC Act.

Although, in many instances, the seabird and shorebird mortalities reported here do not have a conclusive diagnosis, these events highlight the importance of reporting unusual signs of disease or deaths in these species. Reporting provides not only the opportunity to exclude notifiable diseases of concern (e.g. AI and APMV) but also an opportunity to investigate other threats facing these species.

Avian influenza and avian paramyxovirus type 1 surveillance

Australia's National Avian Influenza Wild Bird (NAIWB) and Avian Paramyxovirus-1 Surveillance Program comprises two sampling components: pathogen-specific risk-based surveillance by sampling of apparently healthy, live and hunter-killed wild birds; and general surveillance by investigating significant unexplained morbidity and mortality events in wild birds, including captive and wild birds within zoo grounds (with a focus on exclusion testing for AI virus subtypes H5 and H7).

Samples from sick or dead birds were discussed earlier. Sources for targeted wild bird surveillance data include state and territory government laboratories, universities and samples collected through the Northern Australia Quarantine Strategy (NAQS). Surveillance activities were expanded in 2017 to include testing for avian paramyxoviruses (APMVs), predominantly targeting the APMV-1.

During the quarter, pathogen-specific risk-based surveillance occurred at sites in New South Wales, Queensland, South Australia and Western Australia. Faecal environmental swabs were collected from 1226 waterbirds, with 1226 tested for AI and 870 for APVM-1. Results are pending.

White-nose syndrome excluded in microbats

White-nose syndrome (WNS) was excluded in October in a mass mortality of more than 200 eastern bent-wing bats (*Miniopterus schreibersii oceanensis*) in a cave in Bungonia National Park in New South Wales. The eastern bent-wing bat is listed as vulnerable under the *Biodiversity Conservation Act 2016* (NSW).

WNS is caused by the fungus *Pseudogymnoascus destructans*, which has not been identified in Australia (AHSQ Vol. 22 Issue 2). Australian bat species hibernating in caves with a climate suitable for *P. destructans* growth are considered potentially susceptible to the disease.[34] Testing for WNS is considered when cave-dwelling bats display signs of:

- white or grey powdery fungus on the face, fur, skin or wings
- non-traumatic wing damage
- mass mortality events
- abnormal behaviour, such as flying during the day.[35]

34 Holz P, Hufschmid J, Boardman W, Cassey P, Firestone S, Lumsden L, Prowse T, Reardon T, Stevenson M (2016). Qualitative risk assessment: White-nose syndrome in bats in Australia. www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx - WNS

35 WHA 2016, How to report a suspect case of white-nose syndrome, June 2016, Wildlife Health Australia. www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx - WNS

Eastern bent-wing bats have been identified as one of the species of cave-dwelling bats from southern Australia most likely to be affected by WNS if it were to be introduced into Australia.[33]

After cavers reported more than 200 dead eastern bent-wing bats to the NSW Office of Environment and Heritage, five deceased bats covered in varying amounts of white fungus were collected by NSW National Parks and Wildlife staff. The degree of desiccation indicated that the mortality had occurred at least 4 to 6 weeks previously. Post-mortem fungal invasion was considered the most likely explanation for the white fungus observed on the bats.

To rule out WNS as a possible cause of the mass mortality event, samples were sent to the CSIRO Australian Animal Health Laboratory. They tested negative for *P. destructans* by PCR assay. The cause of the mortality is not known due to the desiccation of the carcases.

WNS was also excluded in an eastern forest bat (*Vespadelus pumilus*) from Queensland. The bat had died in 2014 and had been held frozen until October 2017, when it was examined at the Queensland Biosecurity Sciences Laboratory as part of a research project. The researcher noted white flocculent material on the nasal planum and a focus of depigmentation on the wing. Although this bat species has not been identified as a high risk for WNS were it to be introduced to Australia,[33] samples were submitted for WNS exclusion due to the appearance of the lesions. WNS was excluded by PCR testing for *P. destructans* at CSIRO Australian Animal Health Laboratory. The appearance of the skin was considered a possible artefact of freezing.

For more information on WNS and Australia's preparedness activities for this exotic disease, read the Wildlife Health Australia fact sheet,[36] the Australian Government Department of Agriculture and Water Resources website[37] and 'White-nose syndrome and the risk to Australian bats' (AHSQ Vol. 22 Issue 2).

Australian bat lyssavirus

Reports to WHA for the quarter included 122 bats tested for Australian bat lyssavirus (ABLV) from the Australian Capital Territory, New South Wales, Northern Territory, Queensland, South Australia, Victoria and Western Australia.

Bat submissions were made for a variety of reasons:

- 49 cases involved contact with the potential for ABLV transmission to humans; of these
  - 12 were also associated with trauma (e.g. netting or barbed wire fence entanglement, motor vehicle trauma)
  - 8 involved contact with a pet dog or cat
  - 7 displayed other (non-neurological) signs
  - 1 displayed neurological signs (seizure)
  - the remainder had no further history reported
- 36 cases involved contact with a pet dog (33) or cat (3)
- 14 bats were associated with a mass mortality event
- 12 bats displayed neurological signs (e.g. aggression, erratic flight, inability to swallow, weakness, paralysis, staring, tremors, seizures)
- 8 cases were associated with trauma (e.g. fracture, wing membrane injury)
- 3 bats displayed other (non-neurological) signs (e.g. dehydration).

During the quarter, 15 flying-foxes were confirmed positive for ABLV by fluorescent antibody test and/or PCR testing for pteropid ABLV ribonucleic acid (RNA). Eleven of these were from two events in Queensland where young spectacled flying-foxes (*Pteropus conspicillatus*) found together in a group were taken into care and later diagnosed with ABLV infection (see Queensland state report in this issue). In the other four cases:

- A female black flying-fox (*P. alecto*) from south-east Queensland was found hanging low in a tree in the middle of the day. It had watery eyes, and mild trauma to the wing membranes. The bat was euthanased and submitted for ABLV testing.
- A female black flying-fox in north Queensland was submitted due to contact with a pet dog.
- Two black flying-foxes from central Queensland were submitted for ABLV testing due to potentially infectious human contact. Abnormal behaviour was reported in one case. In both cases, an experienced public health official provided appropriate counselling and information.

More information on ABLV testing of bats in Australia is available in ABLV Bat Stats.[38] ABLV is a nationally notifiable disease in Australia. Cases of suspect ABLV infection or exposure should be reported to the Emergency Animal Disease Watch Hotline on 1800 675 888.

36 WHA 2017, EXOTIC - White-nose syndrome, Fact sheet, April 2017, Wildlife Health Australia. www.wildlifehealthaustralia.com.au/FactSheets.aspx

37 www.agriculture.gov.au/pests-diseases-weeds/animal/white-nose-syndrome

38 www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx

environment.gov.au

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