Bitterns in Rice
PROJECT

The Story So Far

2012 - 2016

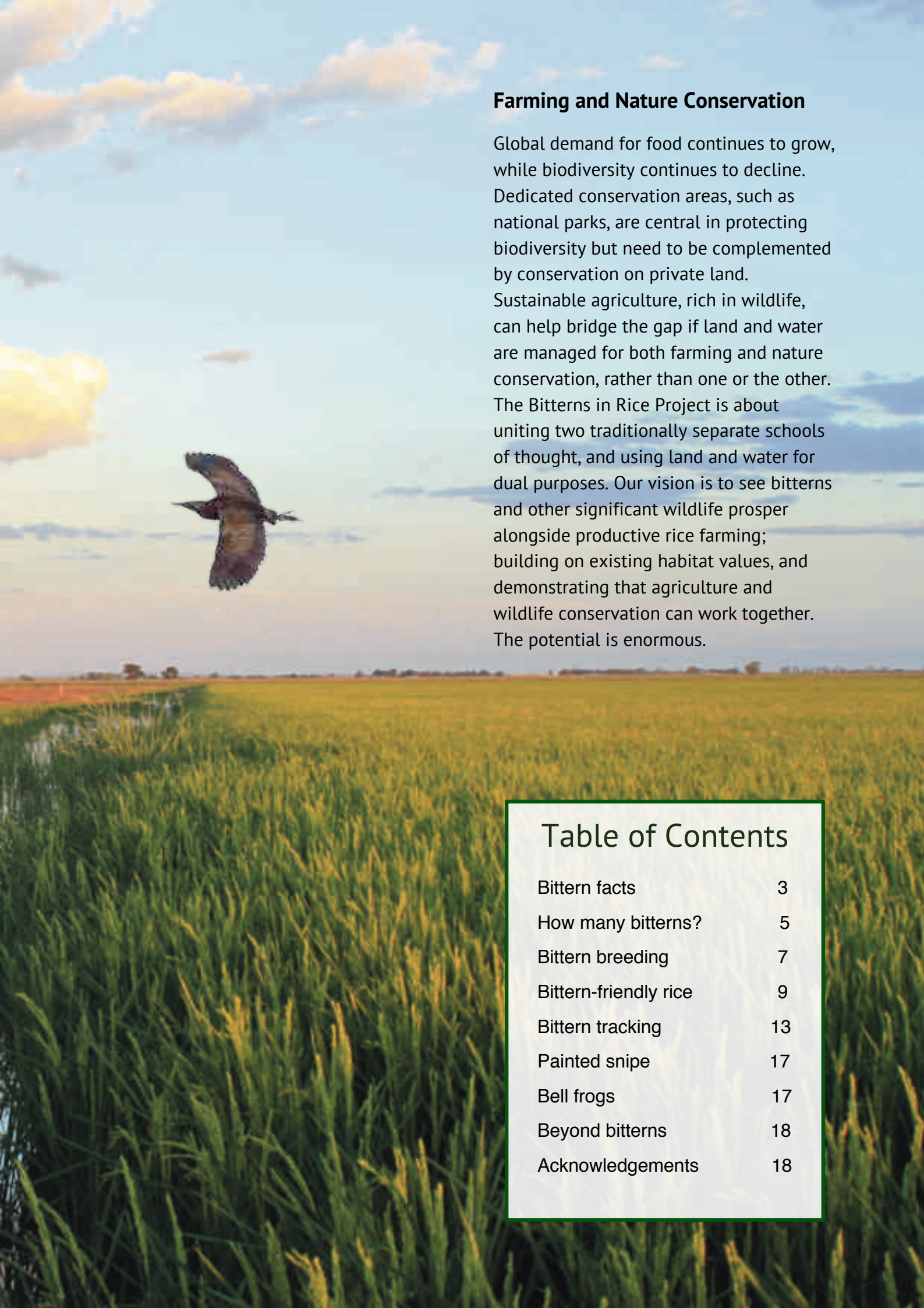
The Bitterns in Rice Project

A curious rice grower photograped some strange birds in his crop, triggering the Ricegrowers' Association of Australia, Birdlife Australia, Riverina Local Land Services and other organisations to come together to learn more about bitterns in rice and see what could be done to aid in their conservation.

Since 2012, the Bitterns in Rice Project has been uncovering the well-guarded secrets of Australia's Bunyip Bird – the globally endangered Australasian Bittern – and raising awareness of its plight. Bitterns arrive in rice crops about two months after sowing and begin nesting once there is sufficient cover. We now know that rice growers in the New South Wales Riverina are custodians of the world's largest known breeding population.

"If we can help bitterns by providing them with a habitat to live in and breed in then it's a win-win situation for everyone."

Coleambally Rice Farmer, Ian Payne



Farming and Nature Conservation

Global demand for food continues to grow, while biodiversity continues to decline. Dedicated conservation areas, such as national parks, are central in protecting biodiversity but need to be complemented by conservation on private land. Sustainable agriculture, rich in wildlife, can help bridge the gap if land and water are managed for both farming and nature conservation, rather than one or the other. The Bitterns in Rice Project is about uniting two traditionally separate schools of thought, and using land and water for dual purposes. Our vision is to see bitterns and other significant wildlife prosper alongside productive rice farming; building on existing habitat values, and demonstrating that agriculture and wildlife conservation can work together. The potential is enormous.

Table of Contents

Bittern facts

Scientific name: *Botaurus poiciloptilus*

Size: with necked stretched up, can stand about a metre tall. Males are larger than females (875-2085 gms versus 571-1135 gms). Wingpsan: 1050-1180 cms.

Habitat: shallow wetlands with vegetation like reeds, rushes, sedges, canegrass, rice.

Diet: fish, frogs, yabbies, small mammals, insects, lizards.

Breeding: poorly known. Usually four or five eggs in well-hidden platform nest about 10-30 cm above water level. Incubation approx. 23 days; chicks leave nest after about two weeks, then take a further five weeks until fledging. Appears that only female incubates & raises young.

Movements: poorly known. Responds to flooding of ephemeral inland wetlands, probably sometimes from coastal refuges.

Relatives: three other species in *Botaurus* group not found in Australasia: the American Bittern, Pinnated Bittern and Eurasian/Great Bittern. Two other bitterns found in Australia (*Ixobrychus* group): Black Bittern and Australian Little Bittern.

Juvenile Nankeen Night-Heron

Mice are among the prey bitterns pursue.

Bittern eggs are similar in size to small chicken and bantam eggs.

Identification: commonly confused with the smaller, tree-roosting Nankeen Night-Heron that often occurs in flocks and is seen feeding around rice fields at night. Australasian Bitterns are not known to roost in trees and only rarely occur in loose flocks of five or more.

Juvenile and immature Nankeen Night-Herons lack the orange-brown plumage of adults and can have a similar mottled brown plumage to bitterns. Otherwise, bitterns are the only large, brownish heron-like waterbirds found in the rice fields of the NSW Riverina.

The Bunyip Bird & Booming Males

The deep, booming calls given by males during the breeding season helped give rise to legends of Australia's mythical Bunyip. Various Indigenous groups, and later, European colonists, told tales of a fearsome, elusive creature living in the swamps.

The call can be heard for about two kilometres. The best time to listen for it is at dawn or dusk, but they can boom throughout the day and night. Because bitterns are so sneaky and hide in wetland vegetation, the booming of males is a useful way of learning they're present.

Globally Endangered Species

It is estimated that only 1500-4000 Australasian Bitterns remain in the world, with the International Union for Conservation of Nature (IUCN) classifying them as *Endangered*. The Australian Government also considers the species *Endangered*. The largest remaining populations occur in south-eastern Australia and New Zealand, with smaller populations persisting in Tasmania, south-west WA and possibly still New Caledonia.

Masters of sneakiness and stealth: this Australasian Bittern eyes off potential prey on the edge of a rice crop near Jerilderie.

Peter Merritt

How many bitterns use rice crops?

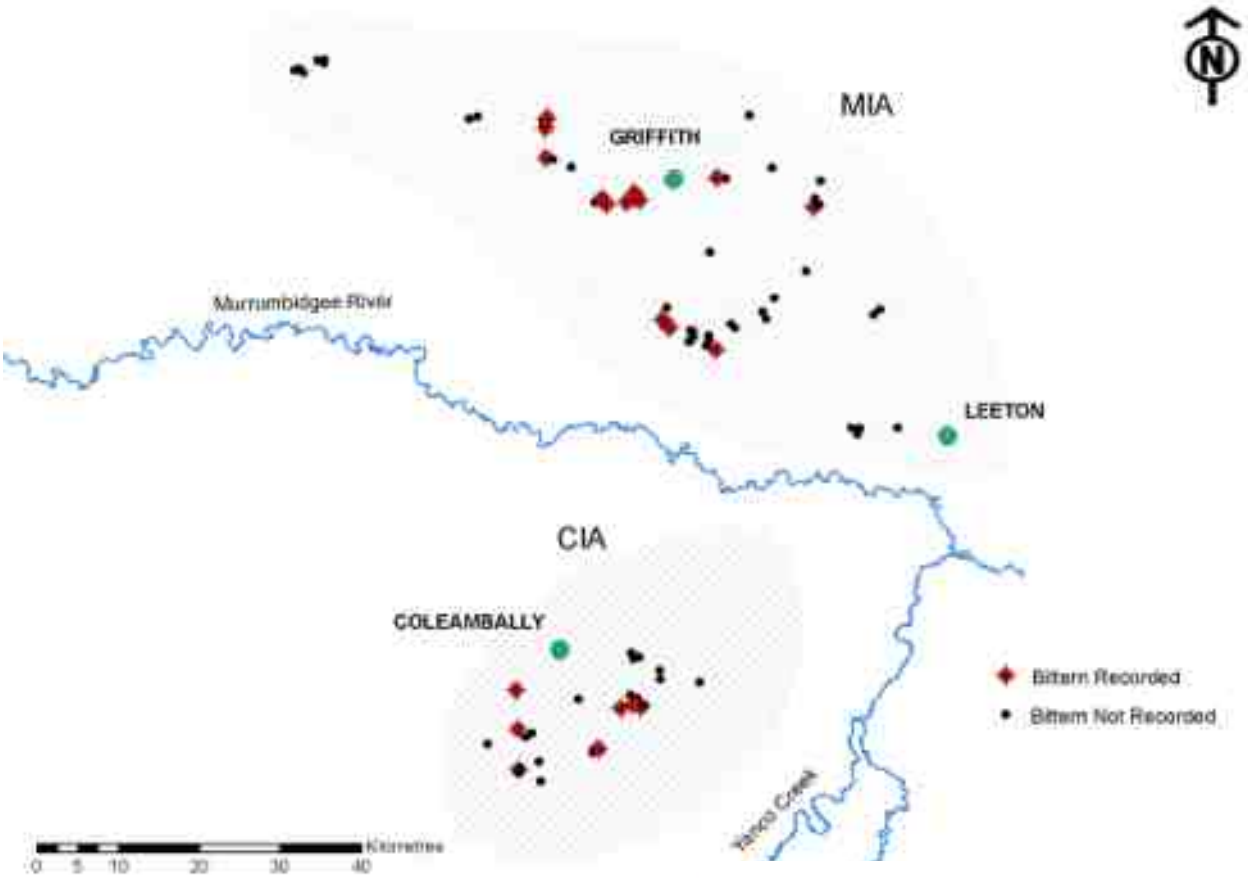
Since 2012, a key aspect of our work has been determining the size of the bittern population using rice crops each season. Our method is standardised 1-hour surveys around dawn and dusk on randomly selected rice farms with aerially-sown rice.

The random approach means our results are representative, giving us confidence in extrapolating them. A key survey window exists in summer when males are booming, but before the rice is too tall, making observation difficult.

We have more data analysis to do and are yet to apply the random approach to surveys in the Murray Valley. Bittern numbers also vary between years, largely as a result of the amount of rice grown.

Nonetheless, it is already clear that in most years the rice attracts approximately 750 bitterns (500-1000). This is remarkable as it equates to around 40% of the global population. Riverina rice crops support the largest known Australasian Bittern breeding population in the world.

Four bitterns in one bay, early in the breeding season, a rare sight.



2014-2015 rice season study sites

During the last two seasons (2014-16), we expanded our random sampling approach from the Coleambally Irrigation Area (CIA) to include the Murrumbidgee Irrigation Area (MIA). The 2014-15 season, with 67 000 hectares of rice, produced some particularly insightful results. We had 80 sites, 23-30 hectares each, on 41 randomly selected farms with aerially-sown rice (see map above). After just two surveys at each site, bitterns were recorded on 37% of farms and 26% of sites. When bitterns were recorded, it usually involved one or two individuals, but additional surveys often revealed the presence of more. For example, one farm was found to support eight bitterns and at least three nests. The 2015-16 season saw just 22 000 hectares, with stiff competition among bitterns. Unusually, some rice fields had more than one booming male. During harvest time, bitterns concentrate in the remaining crops. In 2015, we found two farms, one near Leeton and one near Coleambally, that together had at least 26 bitterns; about 1% of the global population.

"I'm pleased that by growing rice we can support such large numbers of the endangered bittern."

Griffith Rice Farmer, Gary Andreazza

Widespread and successful breeding

It's now clear there is widespread breeding of bitterns in rice crops and that they can breed successfully, producing fully fledged young before harvest. The random sampling approach, together with surveys near the end of the season, have been central in revealing this.

It's remarkable that these constructed, agricultural wetlands can yield ten or so tonnes of rice per hectare, as well as future generations of one of the world's rarest, most threatened waterbird species; the Australasian Bittern.

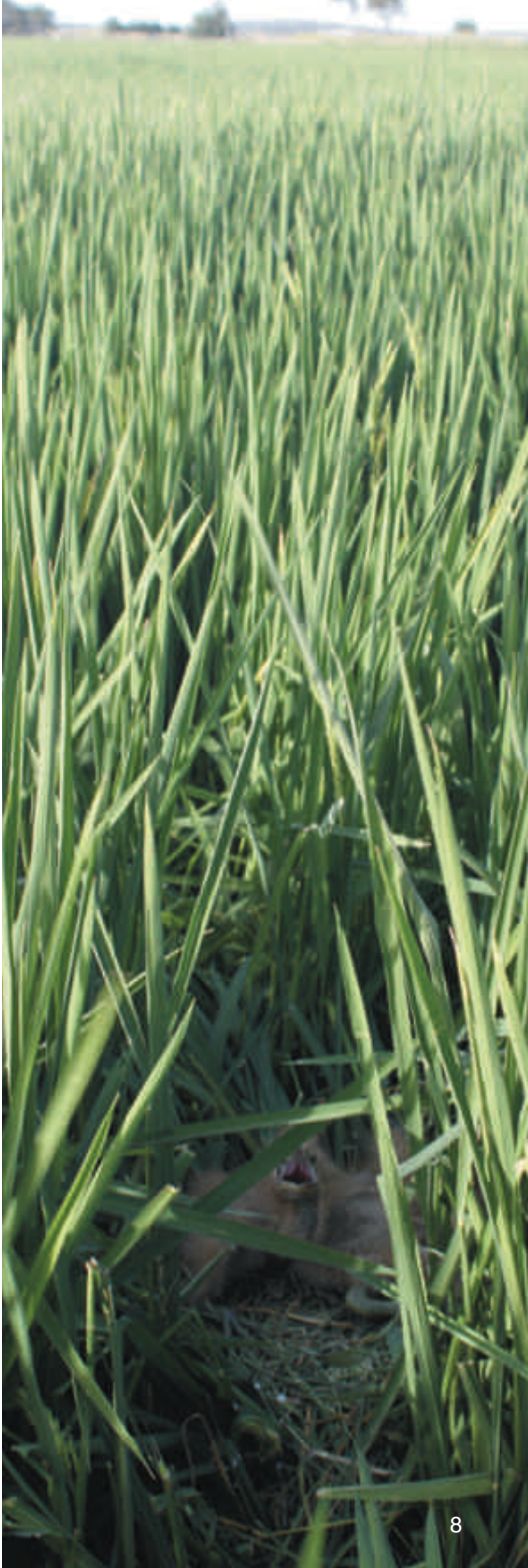
But three of the 16 nests found in rice crops may have not had sufficient time for the chicks to fledge before harvest. This highlights opportunities to increase breeding success by encouraging early breeding and providing habitat adjacent to rice crops for the chicks to roam to.

Left: Neil Bull with a 13-day-old chick near Griffith. It was from one of three nests found in adjacent rice bays, each with an attending female, all within the territory of a single booming male. This confirmed polygamy, and although simple pairs are common, it explained why there are often three or four adult bitterns found in a single rice field during the breeding season.

Left: An 18-day old chick near Coleambally, already 50 metres from its nest, hiding in Barnyard Grass on a bank.

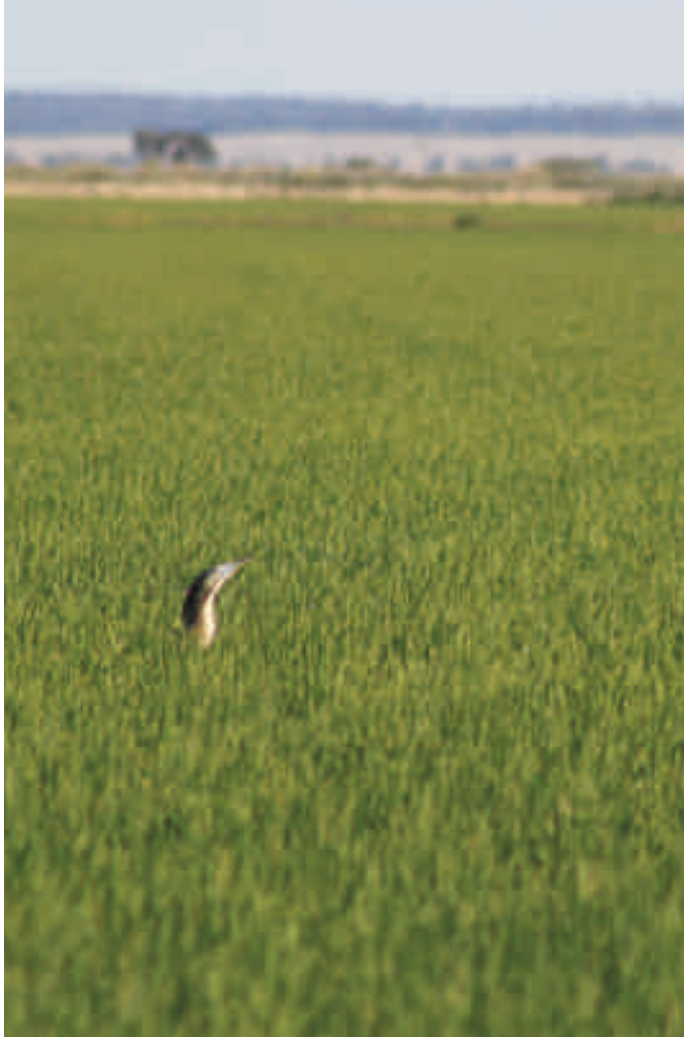
Below: Chicks like this one that have hatched before the end of January have sufficient time to fledge prior to harvest, which usually peaks in April. When a female bittern lays her eggs, it's about three weeks before they hatch and then another seven or eight weeks before the young are able to fly.

Below, left: A recently fledged bittern in an advanced rice crop before harvest.



Bittern friendly rice growing

In May 2014, we launched the first edition of our *Bittern Friendly Rice Growing Tips*. This work in progress is a crucial part of the Bitterns in Rice Project, enabling rice growers to take the lead on bittern conservation. They are for rice growers in the New South Wales Riverina that are keen and able to help conserve this special bird. We are now able to incorporate our collective knowledge up to July 2016 and refine them to three key tips: 1) early permanent water; 2) reduce predator impact; and 3) create additional habitat.



1. Early Permanent Water

Bitterns usually don't arrive in rice crops until about two months after sowing, once sufficient prey and cover have established. The timing of the rice season means bittern breeding tends to be delayed and bitterns show a strong preference for aerially sown crops with permanent water applied around October. Direct-drill crops, on the other hand, typically don't receive their permanent water until December. Driven by water savings, these crops are increasingly common. Mid-season drainage and shorter season varieties are also likely to reduce opportunities for successul bittern breeding.

Above: Abundant tadpoles from an aerially sown crop, including endangered Southern Bell Frogs (inset), Spotted Marsh Frogs and Barking Marsh Frogs.

Above, left: Mark Robb radio tracking bittern chicks in a crop that received permanent water in October.

Left: Prey sampling during the 2015-16 rice season.

Far left: A direct-drill crop, with permanent water delayed until December.

During the 2015-16 rice season, we looked in detail at bittern prey, comparing different sowing methods and water management. Carp, Mosquitofish, dragonfly larvae, water beetles and a range of other animals were found, but by far the most important prey were tadpoles. During the early-mid part of the rice season, when male bitterns were establishing territories and breeding was commencing, aerial sown crops with early permanent water supported an average of 12.3 times as many tadpoles as direct-drill crops with delayed permanent water. During the mid-season, when there were hungry chicks to feed, the different crops were more similar but those with early permanent water still had 6.4 times as many tadpoles. Pesticide regimes and the quality of adjacent habitat like supply channels, as well as other factors, may also impact the abundance of bittern prey.

Bittern friendly rice growing

"I've trialled bittern friendly rice cropping and I reckon there are many benefits for the rice industry. Even if it means sacrificing a small area of crop to ensure the long term viability and environmental sustainability of our area, then I'm still all for it."

Coleambally Rice Farmer, Bernie Star

2. Reduce Predator Impact

Foxes and cats are abundant around rice fields, and although our evidence is limited, they are likely to impact heavily on bittern breeding success. Rice growers could improve the chances of chicks surviving by providing more cover for the roaming chicks to hide in. We have seen chicks hiding in tall, thick Barnyard Grass on banks between bays and suspect cover like this would reduce the risk of predation by foxes, cats and other predators. Grassy banks may also restrict predator access to the rice field. Foxes in particular avoid moving through dense vegetation. Direct control through shooting and baiting, coupled with the maintainence of cover, should boost the yield of young bitterns.

Above: This storage dam has excellent waterbird habitat, with shallows and waterplants. It could be used to support bitterns early in the season and when the rice has been drained and harvested.

Left (two photos): A bare bank and a grassy bank, the latter supporting cover for bittern chicks.

Below left: Foxes are likely to heavily impact bittern breeding success.

Far left: Threatened Species Commissioner, Gregory Andrews, with a bittern chick. He visited rice growers in 2016 and was enthusiastic about the idea of promoting bittern friendly rice growing.

Below: bittern in flight at harvest time.

Below right: After the 2014-15 rice harvest, this Cumbungi-filled channel supported four bitterns for several weeks.

3. Create Additional Habitat

The management and creation of additional bittern habitat adjacent to or as part of a rice field is one of the best things that growers can do to benefit these birds and other wildlife. From natural wetlands to drainage channels and farm dams, there are numerous opportunities. We're keen to trial dedicated habitat zones that can be managed independently of the rice crop and maintained between rice seasons.

These constructed wetlands would effectively extend the season by providing habitat early on in spring and through autumn and winter when there is no rice. They would complement the existing habitat values of rice fields and give unfledged young somewhere to go at harvest time.

Management could target bittern habitat but also cater for other threatened species like the Australian Painted Snipe and Southern Bell Frog. Additional habitats provide alternative feeding and breeding sites, and the simple decision not to spray a channel, for example, could be the difference between a chick fledging or not, or an adult deciding to stay for winter or not.

Andrew Silcocks

Where do the bitterns go after harvest?

The network of wetlands that the bitterns rely on from about May to November, when there is no rice, is slowly being revealed. Thanks to a successful crowdfunding effort, with the generous support of more than 300 people and 20 community groups, we'll eventually be able to satellite track ten bitterns between rice seasons, following them wherever they go. The first five have already produced some captivating results.

Targeted surveys of suspected non-breeding wetlands, together with observations from rice farmers and the tracking results to date, highlight the value of a wide range of Riverina wetlands, including large swamps like Fivebough at Leeton (see background image), creeklines, channels, dams and irrigated wheat crops. Four of the first five tracked bitterns eventually departed the Riverina at the end of the rice season, with three settling in Victoria.

Left: COG, a young male from near Leeton, stayed local after the 2015-16 rice season ended.

Right: Vin, an adult breeding male from Coleambally, dispersed 191 km towards Sydney, as the 2015-16 season ended.

Far right, top: This four-hectare, well-vegetated dam near Leeton supported at least eight bitterns during the 2014 non-breeding season.

Far right, below: Matt Herring, Andrew Silcocks & Inka Veltheim, thrilled after catching Vin, bittern number 2.

Andrew Silcocks

Robbie the bittern, tracked for 323 days, provided unprecedented insight into the movements of Australasian Bitterns.

Robbie, a legendary bittern

On April 21st, 2015, the first ever Australasian Bittern to be satellite tracked was away. Robbie, a 3-4 month old rice-bred male from Coleambally, was named by the district's irrigation cooperative after Mark Robb, for his bitterns in rice work.

Initially, he stayed local, moving up to a kilometre, but then on the afternoon of April 30th he began heading south-west, first appearing near Deniliquin. We thought he was chasing unharvested rice but he just kept going, eventually arriving at the recently restored Pick Swamp, with the unfamiliar sounds of nearby waves on the South Australian coast. He then headed along the coast back into Victoria, settling at another recently restored wetland, Long Swamp, after his 600 km dispersal. He stayed for four months before returning to the Riverina in spring. He was too early for the next rice season though and made his way back to Pick Swamp and Long Swamp where he spent the 2015-16 summer. His journey was followed by thousands of people, as he connected seemingly disparate regions.

Neil: 450 km -> Moodie Swamp

Cameron Brown

Neil and Coly-Lion take centre stage

Shortly after losing contact with Robbie, we witnessed the impressive May 2016 dispersal of Neil, a young male from near Leeton. He flew 450 km via the Wakool River to Moodie Swamp, a superb canegrass wetland near Benalla. Coly-Lion, an adult breeding male from Coleambally, was spotted by eagle-eyed birdwatchers at Tootgarook Swamp near Melbourne after his transmitter failed. The light blue leg band (see left) confirmed his identity.

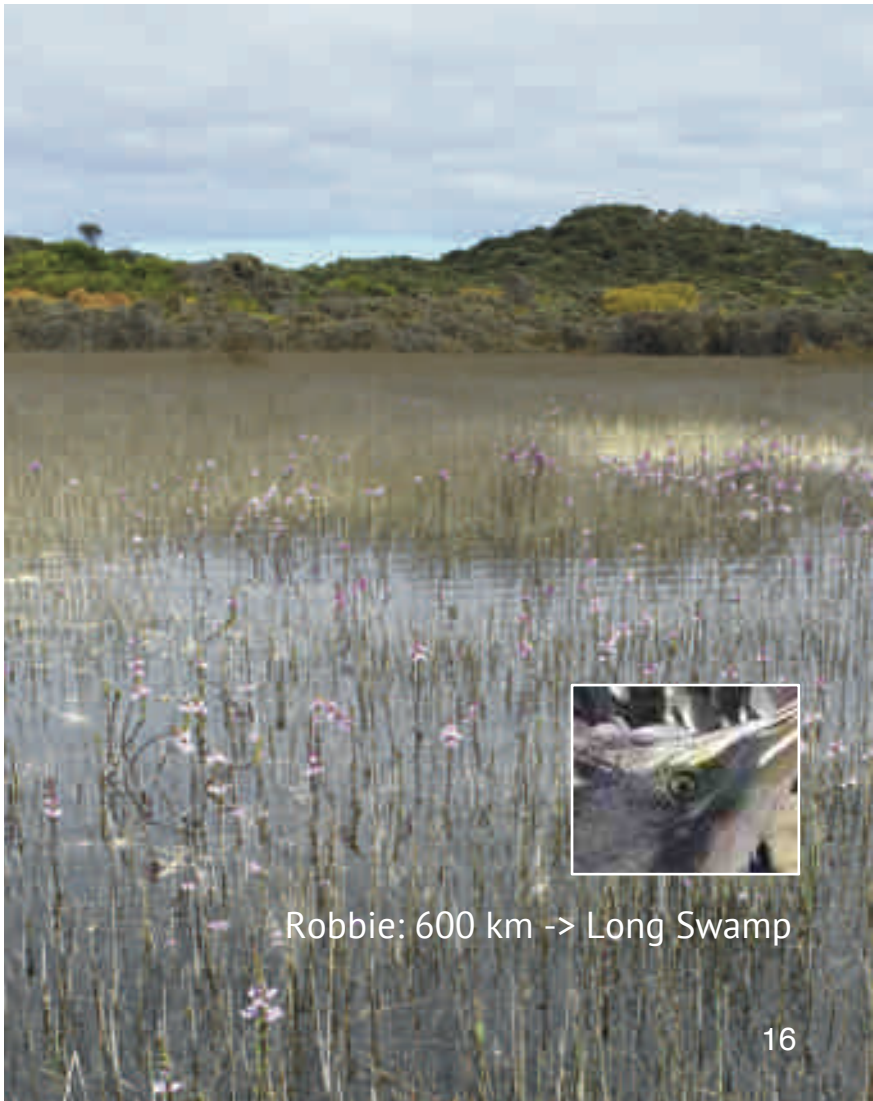
Coly-Lion: 395 km -> Tootgarook Swamp

Large, shallow, vegetated wetlands

The tracked bitterns have used many different wetland types while moving through the landscape. However, it's only the large, shallow, vegetated but treeless, freshwater swamps that support them for long periods. A sufficient network of wetlands like these, which provide bittern habitat between rice seasons, is crucial. In the Riverina and northern Victoria, there are opportunities to strategically use environmental water at key bittern sites.

Robbie, Neil, Vin and Coly-lion: Four of the first five tracked bitterns departed the Riverina at the end of the rice season; three heading south to Victoria.


Pick Swamp


Robbie: 600 km -> Long Swamp

The Australian Painted Snipe

Like our bittern, this bird is nationally and globally endangered. Remarkably, during the 2012-2013 season, we learnt they can also use rice fields in their hundreds, favouring the edges where there is mud and low cover.

Peter Merritt

The Southern Bell Frog

An Australasian Bittern seizes a Southern Bell (Growling Grass) Frog, itself a nationally threatened species.

The rice crops and irrigation infrastructure around the Coleambally and western Murray Valley regions are important for these frogs. They are the only large frogs commonly found in rice. The tadpoles, which can reach ten centimetres in length, are most likely the preferred tadpole prey for bitterns when available.

Peter Menkhorst

"One of the great benefits of being a rice grower is witnessing how many different species of wildlife can benefit from the rice crop."

Mayrung Rice Farmer,
Shelley Scoullar

Beyond bitterns

Over the last four years, we have learnt much about the other waterbirds and wildlife using rice fields, and we're keen on seeing them prosper alongside bitterns. We have recorded 53 waterbird and seven frog species in rice, with at least 18 breeding. We've found 11 species listed as threatened in New South Wales, like the Brolga and Eastern Grass Owl.The populations of several waterbirds, such as Baillon's Crake, Whiskered Tern and Glossy Ibis, are significant, probably numbering into the tens of thousands in some years. Migratory shorebirds that breed in Russia can be found. Populations of Spotted Marsh Frog may exceed a billion in some years. There is much more to this story than bitterns.

Acknowledgements

The Bitterns in Rice Project is funded primarily by Riverina Local Land Services through the Australian Government's National Landcare Programme. The working group comprises Neil Bull, Matt Herring, Andrew Silcocks, Mark Robb, Anna Wilson, Inka Veltheim, Keith Hutton, Max O'Sullivan, Daryl Gibbs, Wayne Robinson, Kimberley Beattie, Elisa Tack, Rick Webster and David Parker. We gratefully acknowledge rice farmers, and previous funding and support from Coleambally Irrigation, Rural Industries Research & Development Corporation, Norman Wettenhall Foundation, Murray Local Land Services, NSW OEH, Murrumbidgee Field Naturalists, Murrumbidgee Landcare, Murray Irrigation and Murrumbidgee Irrigation. This booklet was written and compiled by Matt Herring (MH), July 2016. Photographs by MH unless indicated otherwise.

For the latest news on the Bitterns in Rice Project, including tracking updates:

www.bitternsinrice.com.au

Bitterns in Rice PROJECT

Ricegrowers' Association of Australia INC

birdlife AUSTRALIA

NSW GOVERNMENT Local Land Services Riverina

Australian Government

National Landcare Programme

Bitterns in Rice PROJECT

Ricegrowers' Association of Australia INC

birdlife AUSTRALIA

NSW GOVERNMENT | Local Land Services Riverina

Australian Government | National Landcare Programme

This project is supported by Riverina Local Land Services through funding from the Australian Government's National Landcare Programme.