

Breeding population decline in Cattle Egrets nesting at Seaham Swamp Nature Reserve and Hunter Wetlands Centre Australia

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A long-term research study by the Hunter Wetlands Centre Australia (HWCA) Project Egret Watch investigated the number of Cattle Egret *Ardea ibis* breeding in the nesting seasons 1987/88–2010/11 at HWCA and Seaham Swamp Nature Reserve (SSNR). A general trend of major decline in numbers was identified for each colony and for the total number of nests for the two colonies combined. The combined total represents almost the entire nesting population of the species in the Hunter (the very small contribution of Toronto Wetland being excluded because of discontinuous records). No nesting was recorded at SSNR in 2008/09–2010/11. The 235 nests at HWCA in 2008/09 represented the entire population in a crash of 87% from the 1,900 pairs, which comprised the all-time peak breeding stock in 1987/88. The decline continued to 155 in 2009/10 and 158 in 2010/11. This is a recipe for total extinction of the Hunter nesting population and a warning that the point of no return may have been passed already. A progressive history of degradation in ecological characteristics since 1987/88, at both sites, as well as other habitats locally and along the migration routes, may have created cumulative conditions detrimental to Cattle Egret survival. Further studies are needed to investigate factors operating locally and along migration routes, in both the nesting and non-nesting seasons. Results of preliminary studies reveal declines in the numbers of both local Hunter populations leaving the district in winter. Similar declines are inferred in the number of migrating birds originating from colonies in northern NSW and southern Queensland passing through the Hunter to join them, both along the migration routes and at wintering locations in south-eastern New South Wales, Victoria, Tasmania and New Zealand.

INTRODUCTION

Maddock and Geering (1994: 191) summarised the historical range expansion of the Cattle Egret *Ardea ibis* after its arrival in Australia, now generally recognized as self-introduction via Asia and Papua New Guinea early in the 1900s. Since the 1940s, its population rapidly increased and its range expanded from the Northern Territory and Western Australia to South Australia, Victoria, New South Wales, Tasmania and Queensland, and subsequently New Zealand. It began to breed in NSW in the Grafton area in the 1950s and was first recorded as a visitor in the Hunter in the 1970s. It commenced nesting at Seaham in 1978 and at Shortland in 1980.

I began research into the breeding biology and winter migration patterns of the species in 1981 when the small first colony on what is now known as the Newcastle Wetlands Reserve was abandoned and a new colony established in 1981 at what is now known as the Hunter Wetlands Centre Australia (HWCA). The research was formalised as Project Egret Watch under the auspices of the

Hunter Wetlands Trust in 1984; subsequently it came under the umbrella of HWCA (after it officially came into existence in 1985) and expanded the scope of its studies to include Seaham Swamp Nature Reserve (SSNR) from 1985 onwards.

I have previously drawn attention to the ongoing decline in Cattle Egret nesting in articles published in the Wetlands Centre newsletter *The Wetlander*: ‘In 2003 I observed that although the number of Cattle Egrets nesting at Seaham was about the same as in the previous season, Shortland nest numbers for all species were down, with Cattle Egrets down by 43%’ (Maddock 2003). Later I drew attention to the fact that, by 2005–06, there were only 98 egret nests, 95% less than the peak in 1987/88 (26 Eastern Great Egret *Ardea modesta*, nine Intermediate Egret *Ardea intermedia*, two Little Egret *Egretta garzetta* and 61 Cattle Egret, the number of Cattle Egret nests being the lowest on record). I further stated that the ‘decline is likely to be a reaction to significant degradation of the habitat on which the egrets depend locally for foraging and roosting habitat along the migration

routes during the non-breeding season.' I explained this in terms of (a) wetlands being under threat from development and prolonged drought, and (b) the disappearance of pastures along the migration routes of the Cattle Egret associated with urban development. I noted that Cattle Egret nest numbers at Seaham had also decreased, from 700 nests in 1991/92 to 306 (a 44% decline) in 2005/06 (Maddock 2006).

The most recent detailed historical reports on the status of egret nesting and other colonial waterbirds at both HWCA and Seaham are provided by Maddock (2008a, 2009a, 2009b). The reports identified serious long-term decline in the nesting populations of all four egret species (Great, Intermediate, Little and Cattle Egrets).

Maddock (2000: 131, 134, 135) had highlighted the decline of the Great, Intermediate and Little Egrets, calling for them to be at least classified as vulnerable under threatened species legislation. Moves have been initiated, under the umbrella of the Ramsar Managers Network in NSW, to nominate them as Endangered or Critically Endangered. Because Cattle Egret numbers had been consistently higher than for the other species and the degree of decline at that time had not been considered as catastrophic, the need to also protect this species was overlooked. Results in the 2007/08 to 2010/11 seasons have raised a sharp warning concerning the future viability of the species, which now appears equally threatened.

The NSW Bird Atlasers column graph of the Cattle Egret Annual Reporting Rate 1997-2006 (R.M. Cooper & B.R. Curtis, NSW Bird Atlas, pers. comm.) shows a very similar profile of a

steep rise from 1977 to 1987 and then a steady decline to very low rates in 2006, a similar profile to **Figures 2 and 3**, suggesting that the species may be in trouble state wide.

This paper provides updates on the status of Cattle Egrets nesting at Seaham and HWCA for the 2007/08 to the 2010/11 seasons and reviews changes that have taken place up to the 2008/09 nesting season in the combined breeding population of Cattle Egrets at HWCA and Seaham after the initial period of expansion from the 1981/82 season to 1987/88. The HWCA population had increased from 108 to 1,393 in that time. No records were available for the period between first nesting at the Seaham colony in 1978 until the 1984/85 season when 150 nests were counted. The numbers continued to rise to 507 in the 1987/88 season and ultimately reached a peak of 700 in 1991/92 (Maddock 2008a: Appendix 2, Table 1). This report recognizes the need to consider that the two colonies are part of a much wider ecosystem and they should be considered as an integrated entity rather than as separate local sites existing in isolation.

The majority of Hunter Cattle Egrets migrate out of the local area after nesting and are joined by birds originating from nesting colonies in north coastal NSW and southern Queensland, which winter in south-eastern NSW, Victoria, Tasmania and New Zealand. This paper further presents a preliminary exploration of, and a case for future study into, negative ecological impacts arising from loss and degradation of night-roosting and foraging habitat along migration routes and at wintering locations.

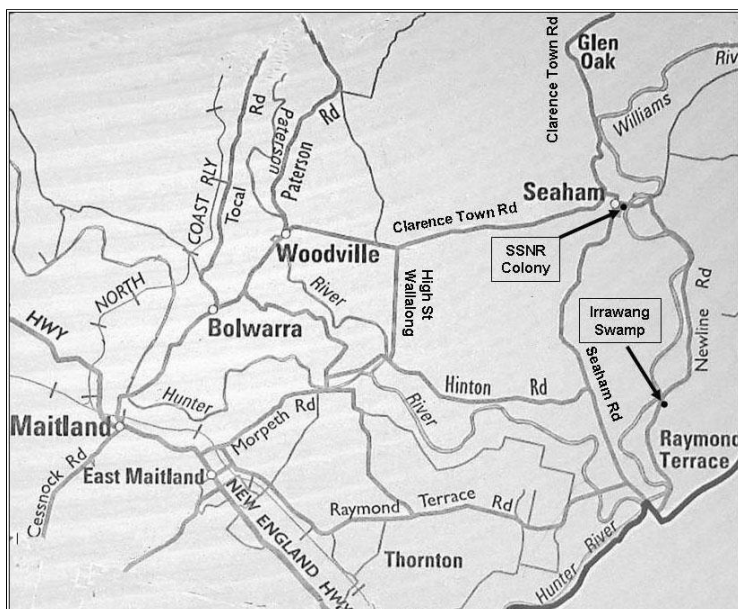


Figure 1. Map of the Maitland–Raymond Terrace–Seaham area traditionally used by Cattle Egrets for foraging and night roosting since the 1980s. The following areas have been subject to continuous study by Project Egret Watch in the period 1987 – 2009: Newline Road from Raymond Terrace to Seaham; High Street, Wallalong – Hinton Road from Morpeth Road to Seaham Road; Seaham Road from Seaham to Raymond Terrace; the SSNR colony and night roost at Seaham; and the night roost at Irrawang Swamp.

METHODS

The status of the breeding population has been monitored by regular nest counts for each species taken in late November or early December at a time when nest owners are easily identified, because at least one parent bird is on duty. These counts have been recorded annually in 24 of the 28 years the HWCA colony has been active and in 24 of the 25 years since the study began at Seaham.

The discussion also draws on observations made during surveys conducted at Cattle Egret night roosts and locations where Cattle Egrets forage in the general vicinity of SSNR at locations shown in **Figure 1**.

RESULTS

The long-term trends in the number of Cattle Egret breeding at SSNR and HWCA presented in **Figures 2** and **3** are derived from the data in Maddock (2008a: Appendix 2, Table 1) and Maddock (2009: Appendix 1, Table). The starting point was chosen as 1984/85 to show the last stages of the original expansion in nesting population of the species.

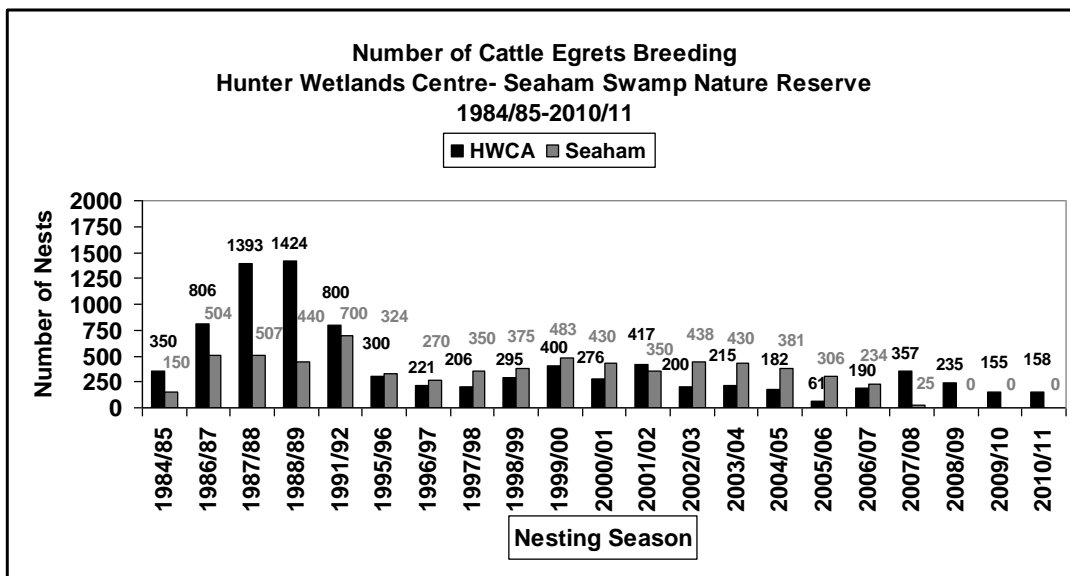


Figure 2. The history of decline in Cattle Egret nesting numbers at the HWCA and SSNR colonies 1984/85 – 2010/11 also showing the reversal of relative importance of the two colonies over time.

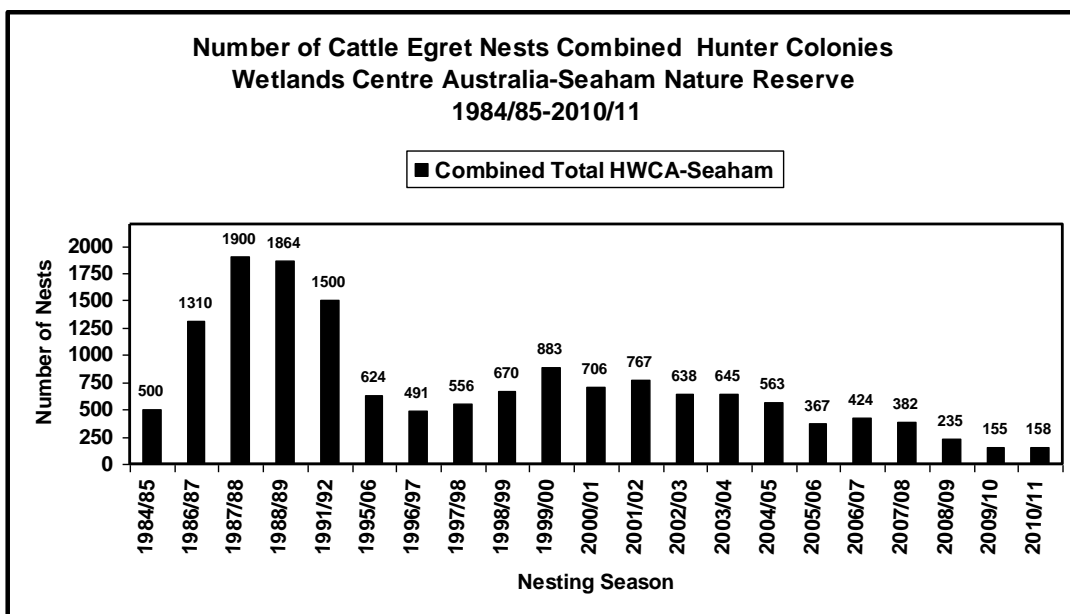


Figure 3. Decline in the combined population of nesting Cattle Egrets breeding at HWCA and SSNR colonies 1984/85 – 2010/11.

Seaham Swamp Nature Reserve: 2006/07–2008/09 Seasons

In 2006/07, only 284 nests were located at Seaham, the lowest number since 1986/87 and the Warren Street trees, which had been the mainstay of nesting pairs since 1985, remained empty for the whole season (Maddock 2007: 3). During the following nesting season 2007/2008, on 12 November 2007 only 46 Cattle Egret nests had been established but by 10 December only 25 had survived. By the end of January 2008 all nest activity had ceased – the earliest termination in the history of the colony (Maddock 2008a: Appendix 1, p. 3).

Maddock (2009b: 3–4) reported the following events for the 2008/09 nesting season:

- From the beginning of September 2008 until mid January 2009 no Cattle Egret nests were found at Seaham. Three Cattle Egret individuals were recorded loafing on the south-eastern shore on 11 November and 39 were in a dead tree at 1640hr on 8 January. Some of the birds were in dull breeding colour.
 - When it became evident that nesting would be unlikely, searches were carried out for Cattle Egrets foraging in the areas in the surrounding Nelsons Plains, Hinton, Wallalong, Seaham, Glen Oak and Newline Road, historically used by large flocks feeding with grazing stock during the nesting seasons, as well as in non-breeding seasons. Most of the searches found no Cattle Egrets. Of the 30 positive records, 11 were of single birds, 11 were flocks of 2–5, 5 flocks were 6–10 and 3 flocks were greater than 10.
 - 67 Cattle Egrets loafing in trees at the south-eastern corner of Seaham Swamp were recorded on 12 January 2009 at 0950hr. Some wore bright-coloured breeding plumes, suggesting the potential for nesting.
 - Later in the day at 1220hr, most of the loafing birds had vacated the trees, but some were still loafing on the southern shore. A flock of 20 was located south on Newline Road at Eagleton and further south at Irrawang Swamp, 10 were feeding with cattle. Neither had been present at the sites earlier in the morning.
- was assumed that they were from the group that had been recorded loafing at Seaham Swamp earlier in the morning.
- Two days later, between 1750 and 1800hr on 14 January, no Cattle Egrets were located along Newline Road, none were present at the Seaham colony site and no nests were located.
 - During evening counts between 1700 and 1900hr at the ibis night roost at Irrawang Swamp, on Newline Road south of the SSNR colony, on 21 November, 3 and 12 December 2008, and 8 January 2009, flocks of Cattle Egrets were noted flying down the Williams River Valley, originating from unknown locations well north of Irrawang Swamp, and heading south to beyond Raymond Terrace. In past nesting seasons, all evening Cattle Egret movements along Newline Road had been south to north as parent birds returned to the SSNR colony from foraging grounds south of the colony.
 - In past years, nesting had usually commenced in October, although a small number of tagged first-year birds were occasionally recorded arriving back and commencing nesting as late as early December. Nesting usually ceased and the colony was vacated by late February–early March. Subsequent to the end of the season, the swamp was regularly used as a night roost by Seaham fledglings and adults that had not yet departed on the annual migration. Birds migrating southwards from breeding colonies in Queensland and northern NSW arrived and largely replaced local birds as they too departed on their migration.
 - Subsequent continuous regular monitoring confirmed the initial statement (Maddock 2009a) that no nesting had taken place at Seaham for 2008/09. The first resumption of night roosting was identified by the presence of 68 Cattle Egrets in the traditional roost trees on the night of 23 April 2009 (Maddock 2009b).
 - After April, regular monitoring of the night-roosting population at Seaham was maintained without finding any evidence of late nesting, confirming that nesting had failed.

Hunter Wetlands Centre Australia Colony at Shortland Reserve: 2006/07–2008/09 Seasons

In 2006/07, 190 pairs of Cattle Egret nested at HWCA, an increase of 129 on the previous season, compared with the decrease at Seaham referred to above (Maddock 2007). Inspection of **Figure 2** shows that this was the first season that Shortland had more nests than Seaham since 1991/92. In 2008/09 255 Cattle Egrets nests were recorded at HWCA, a decrease of 122 from the previous season (Maddock 2009b: 4).

DISCUSSION

Both the HWCA and SSNR colonies have supported significant populations of nesting Cattle Egrets since the colony at HWCA became established in 1981. However, in addition to their separate contributions, it is important to consider their combined contributions to a total Lower Hunter population, as the combined total represents almost the entire breeding population in the Hunter. The contributions of the small Toronto Wetland colony have not been included in this paper as the records are not continuous and represent only a very small proportion of the total population (Maddock 2008a: Appendix 2, Table 2, p. 5). However, it should be noted that a similar pattern of decline is evident. The 5 records available for the period 1987/88–2000/01 ranged from 14–40 nests, the 40 being recorded for 2000/01. In the 5 records 2002/03–2007/08, the range was 3–10, the 10 recorded in both 2005/06 and 2007/08.

In 1987/88, the peak year with a total of 1,900 Cattle Egret nests, HWCA contributed 1,393 and Seaham 507 nests. In 1988/89 HWCA increased again to 1,424 nests but Seaham fell to 440 resulting in a small drop in the combined total to 1,864. However Seaham recovered with 542 in 1989/90 and 700 in 1991/92, but HWCA had already started what became a downward trend, falling to 800 nests in 1991/92 and then 300 in 1995/96. After achieving its all-time peak of 700 nests in 1991/92, SSNR also embarked on a similar scale of decline, with numbers falling to 322 in 1994/95 (Maddock 2008a).

Despite fluctuations, a declining trend has prevailed for both colonies, with HWCA providing significantly smaller numbers of nesting pairs than SSNR until 2007/08 (**Figure 2**). The trend is mirrored in the combined colony number of nests

(**Figure 3**) with the lowest nest count on record for the 2008/09 season involving a fall of 1,665 nests, which is 87% lower than the peak in 1987/88. After a very minor peak of 357 nests in 2007/08 HWCA resumed the slide to 155 in 2009/10 and recorded only 158 in 2010/11, while SSNR failed to make any contribution with zero nesting for the three seasons 2009/10–2010/11.

In the early stages of the historical expansion of the range and nesting populations of the Cattle Egret, the HWCA colony held precedence over SSNR in numbers of nests. It is interesting to note that SSNR became dominant in 1995/96 (**Figure 2**) and remained that way until the situation reversed again in 2007/08, with HWCA regaining ascendancy for the first season since 1991/92.

Ecological processes are highly complex and interactive, making it difficult to pin down underlying causes. The progressive decline in nesting at both colonies has been taking place at the same time as negative changes to ecological characteristics of the sites, with both colonies suffering similar degrees of habitat degradation. Habitat has deteriorated or been destroyed in the surrounding region and along migration routes. It is likely that both sets of degradation processes have produced interactive cumulative negative impacts contributing to the decline in the nesting population. Follow-up studies are needed to try to identify links between these ecological factors. Preliminary results from the beginnings of such a study ring warning bells.

At the breeding colonies there has been damage to nest trees, major detrimental changes in hydrology and nutrient levels, toxic algal blooms and loss of important native surface vegetation and invasion of noxious aquatic weeds (*Water Hyacinth* *Eichhornia crassipes* at SSNR and Alligator Weed *Alternanthera philoxeroides* at HWCA) requiring spraying with consequent negative impacts on other aquatic life. These impacts have been dealt with in some detail, accompanied by photographic records, in Maddock (2008a, 2008b).

Evidence of changes with consequent negative impacts on the habitat along the migration routes has been emerging since at least 1995 and work is currently in progress on a study of the situation along the traditional migration routes. This is still incomplete and is too large a topic to deal with here. However, a few examples illustrate the kinds of impacts found to date and foreshadow the need for more extensive investigations.

Geering and Maddock (1995: 9) reported that fewer Cattle Egrets had passed through the Shoalhaven area that year (an important staging area not only for SSNR and HWCA adults and offspring but also for egrets from Queensland and northern NSW) and that a grazing land feeding area had been “greatly modified”. Maddock (1998: 4) reported that Cattle Egret habitat at Werribee, an important wintering site used in Victoria at that time by Hunter, north coastal NSW and south-eastern Queensland birds, was rapidly disappearing: “no birds, not even starlings have returned”. The area was also being badly affected by El Nino drought.

Current work in progress on the issue of problems along migration routes is already producing evidence of decline in numbers of Cattle Egrets and negative changes to habitat. Night-roosting sites for wintering birds in the Hunter have also suffered ecological degradation and have been abandoned or are being used by fewer Cattle Egrets than in the past. Historically favoured foraging areas at High Street, Wallalong to Hinton Road, and Clarence Town Road to Newline Road (**Figure 1**) where long-term data is available, have progressively been used by fewer birds since the 1980s (Maddock unpublished data).

In the 1990s, Jesmond and Wallsend Parks and grassy areas on road margins and in small pockets from the Blue Gum Road–Newcastle Road junction at Jesmond to the Thomas Street Link Road roundabout was favoured regular winter foraging habitat for flocks of 30 or more Cattle Egrets, which also used the Newcastle Wetlands Reserve for night roosting. Birds tagged by Project Egret Watch at Shortland and at the Clarence Valley colonies were regularly identified in the flocks (Project Egret Watch records). Road works and vastly increased traffic have since destroyed the suitability of the habitat, the night roost has become severely degraded, and the area has been abandoned by the birds.

There have been major changes to habitat and decline in Cattle Egret usage in the Wyong area, once a favoured wintering location for winter migrants originating from SSNR, HWCA and the north coast colonies in the Clarence area (D. Rogers pers. comm.). Information to hand from parts of NSW and from Tasmania and New Zealand, at the limits of the migration routes, also provides examples of declining bird numbers and

habitat changes resulting in negative impacts.

The Maddock and Geering (1994: 194) study involving marked birds found that 64% of the birds originating from the Hunter nesting colonies (including both adults and offspring) undertake southerly migration. In 1988/89 this would have involved well over 2000 individual adults, as well as about the same number of fledglings migrating southwards. The numbers would have declined progressively since. Assuming that the same percentage still holds true today, the migrating number for the 2008/09 season would have been only 500–600 adults and fledglings. Project Egret Watch recoveries show that many birds die during migration, hence fewer birds would return to nest than had originally embarked. It is feasible that substantial cumulative negative changes to roosting and foraging habitat on the migration routes over time could increase the numbers lost. Follow-up investigation of the long-term data along the lines of the McKilligan (2001) 20-year study of the Cattle Egret population dynamics in south-east Queensland is needed to determine whether density-dependent and density-independent factors could have been at work to regulate or control the Hunter nesting population.

CONCLUSIONS

The continuous trend of decline in the numbers of Cattle Egrets nesting at HWCA and SSNR, discussed previously in a number of reports and articles, plummeted critically to a lowest level on record in the period 2007/08–2010/11. For the first time in the recorded history of the colonies, no Cattle Egret nesting occurred at SSNR in the 2008/09–2010/11 seasons and only very small numbers and low frequency of occurrence of foraging egrets had been recorded in the historically high-density daylight foraging catchment areas surrounding the nesting colony. Evening movements of a few foraging birds in the area, traditionally directed towards the SSNR breeding colony, were in the opposite direction travelling south towards Raymond Terrace. The long history of steady degradation of the ecological characteristics of the two colony sites and the other Hunter Region wetlands, combined with loss and degradation of foraging and night-roosting habitat locally and along the migration routes, are the most likely factors contributing to the decimation of breeding population. Further research into the issues involved is needed to clarify this conclusion.

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