

Black-necked Stork breeding events at Hexham Swamp and the installation of a nest base platform

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The Black-necked Stork *Ephippiorhynchus asiaticus australis* is uncommon in the south of its range, with the southernmost confirmed breeding activity recorded at Hexham Swamp, near Newcastle, New South Wales. In recent years, storks breeding in Hexham Swamp have faced challenges that have hampered their breeding efforts. A lack of trees stable enough to support their large, heavy nest has caused eggs and chicks to be lost during inclement weather. A platform was installed in Hexham Swamp in August 2024 in an effort to provide a stable breeding structure. Branches and soft vegetation in the form of a nest were placed on the platform. The use of unmanned aerial vehicles and a motion activated camera enabled close views of activities in this structure as well as the natural nests on the site. Although they often visited the platform during 2025 and 2026 the breeding pair chose not to use this structure, instead choosing the nest tree used from 2022 to 2025. The installation of the platform is documented and successive breeding events by the species between 2020 and 2026 are summarised.

INTRODUCTION

The nominate subspecies of the Black-necked Stork has a distribution extending from India to South East Asia. The subspecies *australis* is present in southern New Guinea and Australia where it is more common across northern Australia. In New South Wales (NSW) it is found mostly in the north of the state. In 2006 the NSW population was estimated at 200-220 birds including 75 breeding pairs (Clancy & Andren 2010). On the east coast its range extends as far south as Newcastle (Cooper *et al.* 2014) and the Central Coast (Clancy & Kingsford 2015). There are early records from as far south as the Illawarra (Cooper *et al.* 2014). Black-necked Storks are known to breed as solitary pairs in often difficult-to-access places, making detailed breeding studies a challenge. Some nests are about 2-3 km apart but most are at least 6 km apart (Clancy & Kingsford 2015) and territories in the lower Clarence River averaged 6300 ha (Clancy & Andren 2010). The species is classified as Endangered in NSW under the *Biodiversity Conservation Act 2016*.

In the Newcastle Region, there are recent breeding records from Hexham Swamp (**Figure 1**). The swamp covers almost 2500 ha and supports a range of wetland types including mangroves and saltmarsh. The dominant vegetation is Common Reed *Phragmites australis*. Other vegetation includes Cumbungi *Typha latifolia* and various Casuarina and Melaleuca species. A project to

restore habitat diversity was initiated by the Hunter Catchment Management Authority, now known as Hunter Local Land Services, in the 1990s (Winning & Saintilan 2009). Floodgates which had prevented tidal inundation were opened in 2013. As a result species richness doubled in both estuarine-marine dwelling species and freshwater-estuarine species including an increase in the abundance of eel species (Boys 2015). Eels are an important food item for Black-necked Stork (Clancy 2011).

The first sighting of a Black-necked Stork in Hexham Swamp was in 1999 (<https://birddata.birdlife.org.au/>). There were few further reports in the following 10 years. However, since 2010 this species has been observed there every year and there are confirmed breeding records or breeding attempts every year from 2020 to 2026 (**Figure 1**, **Figure 2**). It is likely that Black-necked Stork bred successfully before 2020 as there are earlier reports of immature birds either alone or accompanied by an adult (Stuart 2018).

Black-necked Storks build a large nest approximately two metres across and one metre deep. Large branches form the base which is then lined with softer vegetation. Hexham Swamp has few trees capable of supporting such a heavy structure as has been borne out by the failures of the three trees chosen by the breeding pair: 2020 Narrow-leaved Paperbark *Melaleuca linariifolia*, 2021 another Narrow-leaved Paperbark, and 2022 - 2026 Swamp She-oak *Casuarina glauca* (**Figure 2**).

Between 2020 and the end of 2025 eight chicks hatched, three of which are known to have perished before fledging (Lindsey 2020; Lindsey & Kyte 2023). An unknown number of eggs were also lost

due to the instability of the trees supporting the nests which tilted and/or fell to the ground.



Figure 1. Hexham Swamp showing locations of three nest sites used by Black-necked Stork 2020-2026. Image Google Earth.



Figure 2. View of Hexham Swamp, looking towards the northeast from Kau Ma Park, Fletcher, showing the three trees used as nest sites by Black-necked Stork and the site of the platform: Swamp She-oak nest site 2022-2026 (Red); Narrow-leaved Paperbark 2021 (Yellow) and Narrow-leaved Paperbark 2020 (Blue). The latter is also the site of the platform. Photo: Ann Lindsey.

The artificial nest

Although there are no records of artificial nests being used for Black-necked Stork in Australia or south-east Asia, they are widely used as a conservation tool for Oriental White Stork *Ciconia boyciana* (Xu *et al.* 2021), Black Stork *Ciconia nigra* (Foundation pro Biodiversity <https://www.stiftung-pro-artenvielfalt.org/en/content/projekte/projekt-wildtierschutz-schwarzstorch-schutz.php>) and White Stork *Ciconia ciconia* (Bialas *et al.* 2020) <https://pmc.ncbi.nlm.nih.gov/articles/PMC7024061/>. In view of the lack of substantial and stable trees in Hexham Swamp we requested of the stakeholders (Hunter Local Land Services and NSW National Parks & Wildlife Service) that an artificial nest be installed to see if Black-necked Storks would use such a structure. The proposal was supported, with Hunter Local Land Services agreeing to provide the funding for the project.

A local industrial design company, Dog Rough Design, was commissioned to build a platform, which was helicoptered in on 27 August 2024 and embedded into the 2020 nest tree, a Narrow-leaved Paperbark (**Figure 3**). We considered it would have been preferable to embed the artificial nest in the Swamp She-oak but, from at least 9 August 2024, the adults had been regularly attending that nest and were assumed to be in the process of breeding again.

The platform was made from aluminium tubing which had been painted brown. When in position, it was approximately 4.2 m high and 2 m wide. Branches and soft vegetation were placed in the basket by the ground team, to create the artificial nest. On 22 February 2026 the ground team refurbished the vegetation on the platform.



Figure 3. Artificial Nest Platform embedded in Narrow-leaved Melaleuca 27 August 2024 in Hexham Swamp. Ground team from left to right: L. Williams, C. Tourenq, T. Ireland, R. Kyte, G. Little. Photo: Louise Williams.

METHODS

A combination of methods was used to observe breeding events 2020-2026 at Hexham Swamp.

- Two unmanned aerial vehicles (UAV) owned by Hunter Bird Observers Club Inc. were used to observe more closely activities in the nests. They were DJI Mavic 3 Multicopter and Autel Evo 11 Multicopter with a thermal camera. Registered pilots with animal care and ethics approval flew the drones opportunistically and the results were logged onto a spreadsheet.
- A motion activated camera, a Reconyx 4G Hyperfire 2 with solar panel, was attached to the artificial nest structure in February 2026.
- Observations were made using a telescope from a fixed position at Kau Ma Park, Fletcher, which overlooks Hexham Swamp.
- On occasions, A Class banders walked out to nest sites in order to band or rescue chicks, stabilise trees or, in the case of the artificial nest, add more vegetation to the denuded platform.

RESULTS

The 2020-2023 breeding events and their outcomes have been reported previously (Lindsey 2020; Lindsey & Kyte 2023). For completeness they are re-presented below together with the events and outcomes from 2024-2026.

2020

Successful breeding in Hexham Swamp was confirmed in 2020 when the resident pair was observed attending a nest with two chicks at the southern end of the swamp. The nest was in an unstable Narrow-leaved Paperbark (Lindsey 2020) on land managed by Hunter Local Land Services. These chicks were banded on 15 October 2020 and had fledged by 1 November 2020 (Lindsey 2020). They were never sighted again.

2021

As the 2020 nest subsequently disintegrated the pair chose a different tree in 2021 building again in a Narrow-leaved Paperbark. Two chicks were banded on 19 November but storms caused the nest to fall onto the ground and one chick was lost (Lindsey & Kyte 2023). The other chick survived and was returned to the stabilised nest. After fledging it was not seen again (Lindsey & Kyte 2023).

2022

In 2022 the pair built a new nest in a Swamp She-oak and in December two juveniles flew from the nest before they could be banded (Lindsey & Kyte 2023).

2023

In 2023 the pair used the same Swamp She-oak and two chicks were in the nest on 11 August (Lindsey & Kyte 2023). Following a week of stormy weather the two young were seen on the ground under the nest which was tilted to one side. On 6 October the young were rescued, banded and returned to the now-stabilised nest. However by 13 October one juvenile (banded Pink Black), was again on the ground. It was found dead on 29 October. The other juvenile (banded Pink Yellow), survived and fledged probably on 1 November. Pink Yellow was last observed on Hexham Swamp on 28 June 2024.

2024

There were three breeding attempts in 2024 again using the same Swamp She-oak. Due to the unstable nature of the tree, the nest tilted during storms and four eggs were lost in July. We assumed that the adults laid a second clutch, as from mid-August they were attending the nest again and sitting for long periods, but on 29 September the nest was empty.

On 29 November three chicks were in the nest after a third clutch of eggs were observed on 20 November. Between 26 December 2024 and 20 January 2025 one chick had fallen out of the nest and was on the ground. It was found dead on 30 January. The remaining two juveniles, which were not able to be banded, fledged between 16 February and 2 March. Juveniles which we assume were the 2024 chicks, were often observed in the company of 1-2 adults until 14 December 2025.

2025

There was no confirmation of successful breeding in 2025. Although adults attended the Swamp She-oak nest from 10 August, the nest was empty on 28 September 2025. On 8 November a wildfire burnt 168 ha of the swamp including the area around the artificial nest site (ABC News 2025). Fortunately, the platform was not damaged by the fire.

2026

On 13 November 2025 the adult pair were seen and photographed from Kau Ma Park on the artificial nest for the first time (A. Stuart pers. comm.) The installation of the camera on the platform nest enabled constant viewing. The male and female birds visited the platform nest almost every day from mid-June through to early July. However, between 10 July and 17 July the adults were observed attending the Swamp She-oak nest every day and were photographed mating there on 17 July (C. Mudge pers. comm.).

A UAV was flown over the Swamp She-oak nest on 20 July and two eggs were present, and again on 24 July, when four eggs were visible in the nest. On 24 August three small, white downy chicks were present and close viewing of a video taken at the time revealed a chick beginning to break out of the fourth egg. The DJI Mavic UAV was again flown to the nest on 4 September. The adult birds were on the nest. The male was brooding three chicks while the female sat next to him. It appears that the fourth chick did not survive. The young were active, moving around under the male's wings and crawling out where they could be clearly seen. The female regurgitated material onto the nest which the young pecked at. Sometime later the female stood and disgorged a large eel which she immediately picked up and swallowed.

DISCUSSION

The use of UAVs may be helpful in monitoring clutch size, hatching success or hatchling survival in White Stork nests (Tobolka *et. al* 2023). We could not find information relating to Black-necked Stork nesting and effects of UAV activity on the nesting birds. It has been found that an escape response in other species was more likely if the UAV take-off distance was shorter e.g. less than 120 metres (Weston *et.al* 2020). At Hexham Swamp UAV take-offs were several hundred metres from the nests and elicited no response from storks on the nest. The UAVs were flown 30 metres above the ground and a distance of 50 metres from the nests was maintained. The UAVs were not flown directly above the nests. We found that at these distances there was no escape response and that it was possible to detect the presence of eggs, chicks and food items in the nests.

The installation of the camera at the platform allowed close inspection of activities within the nest. The adults visited the platform constantly between mid-June and early July 2026 and appeared to be constructing a nest. It seemed likely that they were going to use the artificial structure for breeding purposes. However, they returned to the Swamp She-oak and rebuilt a nest on a limb on the outer edge of the tree. Ultimately, they preferred the Swamp She-oak used from 2022 to 2026 to the artificial nest which had been placed in the 2020 Narrow-leaved Paperbark. Closer inspection of the photographs of the platform revealed that since the refurbishment in February 2026 less vegetation was present. Although vegetation could have simply blown out of the nest, we wondered whether the platform nest provided a convenient source of

vegetation for the nest constructed in the Swamp She-oak. However, this is speculation as the birds were not observed or recorded removing vegetation.

CONCLUSIONS

The Black-necked Stork pair bred or attempted to breed every year from 2020 when breeding was first confirmed at Hexham Swamp. Not all eggs or chicks survived due to the failure of nest trees during storms or in strong winds. A platform was installed to provide a stable base for future breeding events. Although the adult pair did not use the platform nest for breeding in 2026, they were not deterred by the presence of the platform as, either together or alone, they visited it on many occasions and were seen to add vegetation. They may choose the platform nest in the future as they become more accustomed to its presence or if the Swamp She-oak tree fails to support the nest. The use of UAVs enabled close viewing of activities in the nest and did not disturb the breeding pair.

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