

CIWG ANNUAL REPORT

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Report of activities by the members of the Cambodia Ibis Working Group



មូលនិយមសង្ខេប៖

របាយការណ៍សង្ខេបលទ្ធផលការងារអភិរក្សសត្វត្រយងនៅកម្ពុជា ចាប់ពីថ្ងៃទី១ ខែមករា ដល់ថ្ងៃទី៣១ ខែធ្នូ ឆ្នាំ ២០២៣ របស់ក្រុមការងារអភិរក្សសត្វត្រយងនៅកម្ពុជា។ ក្រុមការងារអភិរក្សសត្វត្រយងនៅកម្ពុជា បានបង្កើត ឡើងដើម្បីសម្របសម្រួលសម្មភាពការងារអភិរក្សថ្នាក់ជាតិ សម្រាប់សត្វត្រយងទាំងពីរប្រភេទគឺសត្វត្រយងយក្ស (*Pseudibis gigantea*) និងសត្វត្រយងយក្សចង្កកស (*Pseudibis davisoni*), ក្នុងបញ្ជីក្រហមនៃសហភាពអន្តរ ជាតិសម្រាប់ការអភិរក្សធម្មជាតិ (the IUCN Red List of Threatened Species) បានចាត់ទុកប្រភេទសត្វត្រយង ទាំងពីរនេះថាជាប្រភេទជិតផុតពូជបំផុត។ អង្គការក្រៅរដ្ឋាភិបាលដែលជាសមាជិកស្នូលនៃក្រុមការងារអភិរក្សសត្វ ត្រយងនៅកម្ពុជារួមមាន៖ អង្គការមជ្ឈមណ្ឌលអង្គរសម្រាប់អភិរក្សជីវៈចម្រុះ (ACCB), អង្គការជីវិតធម្មជាតិកម្ពុជា (NLC), ក្រុមហ៊ុនវាយហ្ស៊ីងហ្ស៊ីនិក (Rising Phoenix Co. Ltd), អង្គការមូលនិធិសកលសម្រាប់អភិរក្សធនធាន ធម្មជាតិ (WWF), អង្គការសមាគមអភិរក្សសត្វព្រៃ (WCS) ។ សមាជិករដ្ឋាភិបាលរួមមាន៖ អគ្គនាយកដ្ឋាន តំបន់ការពារធម្មជាតិនៃក្រសួងបរិស្ថាន (MoE), រដ្ឋបាលព្រៃឈើ (FA) នៃក្រសួងកសិកម្ម រុក្ខាប្រមាញ់ និង នេសាទ (MAFF)។

ទីតាំងអាទិភាពសម្រាប់ការអភិរក្សសត្វត្រយងយក្ស និងសត្វត្រយងចង្កកសក្នុងប្រទេសកម្ពុជាមាន៖ ដែនជម្រក សត្វព្រៃសៀមប៉ាង (SPWS), ព្រៃលិចទឹកទន្លេមេគង្គ (MFF) ដែលក្នុងនោះមាន ដែនជម្រកសត្វព្រៃសំបូរ (SBWS) និងតំបន់អភិរក្សសត្វផ្សោត, ទេសភាពវាលទំនាបខាងកើត (EPL) ដែលរួមមាន ដែនជម្រកសត្វព្រៃ ស្រែពក (SWS) និងដែនជម្រកសត្វព្រៃភ្នំព្រិច, តំបន់ទេសភាពវាលទំនាបខាងជើង (NPL) រួមមានដែនជម្រក សត្វព្រៃគូលែនព្រហ្មទេព(KPWS) និងដែនជម្រកសត្វព្រៃឆែប-ព្រះរកា (CPRWS) និងដែនជម្រកសត្វព្រៃលំ ផាត់(LWS), និងទីតាំងចំនួនផ្សេងទៀតដែលនៅមានរបាយសត្វត្រយងមួយចំនួនបានរស់នៅបែកខ្ញែកនៅខាង ក្រៅតំបន់ដែលមានរៀបរាប់ខាងលើ មាននៅភាគខាងជើង និងភាគខាងកើតនៃប្រទេសកម្ពុជា។

មជ្ឈមណ្ឌលACCB ក្នុងភាពជាដៃគូជាមួយនិងភាគីពាក់ព័ន្ធសំខាន់ៗ ដូចជាអាជ្ញាធរ រដ្ឋាភិបាលពាក់ព័ន្ធ អង្គការអភិ រក្សក្រៅរដ្ឋាភិបាល និងសហគមន៍ បានធ្វើការសហការក្នុងការជួយសង្គ្រោះសត្វត្រយងចង្កកស និងសត្វត្រយងយ ក្ស ពីការជួញដូរសត្វព្រៃខុសច្បាប់។ ប្រភេទសត្វទាំងនោះត្រូវបានជួយសង្គ្រោះ និងស្តារឡើងវិញនៅមជ្ឈមណ្ឌលអង្គរ សម្រាប់ការអភិរក្សជីវៈចម្រុះ (ACCB) ហើយចាប់តាំងពីឆ្នាំ២០១៧ ប្រភេទទាំងពីរនេះត្រូវបានដាក់បញ្ចូលទៅក្នុង ចំនួនប្រជាសាស្ត្រធានាមិនឲ្យមានការផុតពូជ ដែលមជ្ឈមណ្ឌលអង្គរសម្រាប់ការអភិរក្សជីវៈចម្រុះ (ACCB) កំពុង បង្កើតឡើងសម្រាប់ប្រភេទសត្វទាំងនេះ។

គិតត្រឹមឆ្នាំ២០២៣ មជ្ឈមណ្ឌលអង្គរសម្រាប់អភិរក្សជីវៈចម្រុះ (ACCB) បានជួយសង្គ្រោះសត្វត្រយងយក្សចំនួន ៣ក្បាល (មិនស្គាល់ភេទ) និងសត្វត្រយងចង្កកសចំនួន៩ក្បាល (៤.២.៣)។ នៅខែមីនា ឆ្នាំ២០២៣ សត្វត្រយង ចង្កកសមួយក្បាលត្រូវបានជួយសង្គ្រោះដោយជោគជ័យ ហើយបន្ទាប់មកបានជួយសង្គ្រោះសត្វត្រយងយក្សមិន

ទាន់ពេញវ័យមួយក្បាលទៀតដោយជោគជ័យនៅខែសីហា ឆ្នាំ២០២៣។ ការបន្តជួយសង្គ្រោះទៅលើសត្វត្រយង ចង្កឹកសមួយក្បាល និងសត្វត្រយងយក្សមួយក្បាល ជាអកុសលសត្វទាំងពីរបានងាប់ មុនពេលក្រុមជួយសង្គ្រោះ បានទៅដល់ទីតាំង។ ជាងនេះទៅទៀត មជ្ឈមណ្ឌលអង្គរសម្រាប់ការអភិរក្សជីវចម្រុះ (ACCB) បានទទួលភាព ជោគជ័យមុនគេលើពិភពលោកដោយបានធ្វើការបង្កាត់ពូជ និងភ្លាស់ស៊ុតសត្វត្រយងចង្កឹកសចំនួនពីរ និងចិញ្ចឹម បានដោយជោគជ័យនៅក្នុងទីកន្លែងថែទាំសត្វ។ ការត្រួតពិនិត្យ និងតាមដានចំនួនសត្វត្រយងទាំងពីរប្រទេកនៅ ក្នុងដែនអភិរក្សធម្មជាតិ ដោយមានការត្រួតពិនិត្យតាមដាន ការការពារសំបុក និងការចូលរួមធ្វើជំរឿនថ្នាក់ជាតិ ដែលមានស្តង់ដារសម្រាប់តាមដានចំនួនប្រជាសាស្ត្រសត្វត្រយងចង្កឹកស។

នៅឆ្នាំ២០២៣ ចំនួនសំបុកសរុបនៃសត្វត្រយងយក្សទូទាំងប្រទេសមានចំនួន៤១សំបុក ចំនួននេះដូចគ្នាទៅនឹងឆ្នាំ ២០២២។ ក្នុងចំនោម៤១សំបុក មាន៣០សំបុក (៧៣.២%) បានទទួលជោគជ័យ និងមានការកើនឡើង៥.២% ធៀបជាមួយឆ្នាំ២០២២ មានន័យថា សំបុកទទួលបានជោគជ័យមានចំនួន៦៨%ក្នុងឆ្នាំ២០២៣។ ក្នុងចំនោម សំបុកជោគជ័យទាំង៣០សំបុក មានកូនញាស់សរុបចំនួន៤៦ក្បាល គឺស្មើនឹងកូនសត្វញាស់ជាមធ្យមចំនួន១.៥៣ ក្បាល ក្នុងមួយសំបុក ចំនួននេះហៅថា ផលិតភាពសំបុក វាមានការថយចុះបន្តិចកាលពីឆ្នាំ២០២២ ដែលមានផល ិតភាពសំបុក ១.៦១ កូនក្នុងមួយសំបុកក្នុងឆ្នាំ២០២៣។

នៅក្នុងរដូវកាលបង្កាត់ពូជត្រយងចង្កឹកសឆ្នាំ២០២២-២០២៣ មានសំបុកសរុបចំនួន ១២១សំបុក ត្រូវបានរក ឃើញ និងមានការកើនឡើងគួរអោយគត់សម្គាល់ គឺកើនចំនួន២០សំបុក ធៀបជាមួយឆ្នាំ២០២១-២០២២ ដែល បានរកឃើញចំនួន១០១សំបុក។ ក្នុងចំនោម១២១សំបុក មាន៩៥សំបុកទទួលបានជោគជ័យ គឺមានអត្រា ជោគជ័យចំនួន៨៤.៤% ចំនួននេះមានការកើនឡើងធៀបទៅនឹងរដូវកាលមុន ដែលមានអត្រាជោគជ័យចំនួន ៨០.២%។ ចំនួនសំបុកជោគជ័យទាំង៩៥សំបុក ទទួលបានកូនចំនួន១៧៥ក្បាល មានផលិតភាពសំបុក១.៨៤ ក្នុងមួយសំបុក វាមានការថយចុះបន្តិចធៀបទៅនឹងរដូវកាល ២០២១-២០២២ ដែលមានផលិតភាពសំបុក១.៩៦ ក្នុងមួយសំបុក។

ជំរឿនសត្វត្រយងចង្កឹកសក្នុងឆ្នាំ២០២៣ យើងធ្វើការរកតម្រូវបានចំនួន ៧៨៤ក្បាល។ ចំនួននេះត្រូវបានយកចេញ ពីចំនួនខ្ពស់បំផុតក្នុងកំឡុងពេលធ្វើជំរឿនក្នុងខែកញ្ញា។

ក្រុមការងារអភិរក្សសត្វត្រយងកម្ពុជាបានរៀបចំកិច្ចប្រជុំចំនួន៣ដងក្នុងឆ្នាំ២០២៣ សម្រាប់ព័ត៌មានលម្អិតសូម ស្វែងរកផ្នែកខាងចុងនៃរបាយការណ៍។

EXECUTIVE SUMMARY

This report summarises the results of the Cambodia Ibis Working Group member's activities from the 1st of January to the 31st of December 2023. The Cambodia Ibis Working Group was formed to coordinate conservation activities at the national level for two native species of Ibis, the Giant Ibis (*Thaumatibis gigantea*), and the White-shouldered Ibis (*Pseudibis davisoni*), both of which are classified as Critically Endangered by the IUCN Red List of Threatened Species. The non-governmental organisation (NGO) core members of CIWG consist of the Angkor Centre for Conservation of Biodiversity (ACCB), NatureLife Cambodia, Rising Phoenix Co. Ltd, the World-Wide Fund for Nature Cambodia (WWF), and the Wildlife Conservation Society Cambodia Program (WCS). The Government members consist of the General Directorate for Nature Protected Area of the Ministry of Environment (MoE), the Forestry Administration of the Ministry of Agriculture, Forestry and Fisheries.

The priority sites for the conservation of the Giant Ibis and White-shouldered Ibis in Cambodia are: Siem Pang Wildlife Sanctuary (SPWS), Mekong Flooded Forest (MFF) which comprises the Sambor Wildlife Sanctuary (SBWS) and the River Dolphin Management Area, the Eastern Plain Landscape (EPL) which comprises Srepok Wildlife Sanctuary (SWS) and Phnom Prich Wildlife Sanctuary, the Northern Plains Landscape (NPL) which comprises Kulen Promtep Wildlife Sanctuary (KPWS) and Chhaeb-Preah Roka Wildlife Sanctuary (CPRWS) and Lomphat Wildlife Sanctuary (LWS), plus there are a few smaller and more fragmented populations outside of these areas across the northern and eastern parts of the country.

ACCB, in partnership with key stakeholders such as relevant government authorities, conservation NGOs, and communities, rescues White-shouldered Ibis and Giant Ibis from the wild and illegal trade. These individuals have been rehabilitated at ACCB, and since 2017 incorporated into the assurance population ACCB is establishing for the species. As of 2023, ACCB houses three Giant Ibis (sex undetermined) and nine White-shouldered Ibis (4.2.3). In March 2023, a juvenile, White-shouldered Ibis was successfully rescued, followed by the rescue of one juvenile Giant Ibis, in August 2023. Further rescues of one White-shouldered Ibis and one Giant Ibis also occurred, unfortunately, both had passed away before rescue teams could reach the location of the birds. Furthermore, ACCB experienced a worldwide breakthrough this year, with two White-shouldered Ibis eggs being laid and then successfully incubated, hatched, and raised in captivity.

The in-situ population monitoring for the two Ibis species includes nest monitoring and protection, and a standardised coordinated national population census for White-shouldered Ibis. For 2023, the national total number of Giant Ibis nests discovered was 41 nests, the same as the 2022 season. Of these 41 nests, 30 (73.2%) were successful, an increase of 5.2% from the 2022 season, which saw 68% of nests successful. Of the 30 successful nests a total of 46 chicks fledged, resulting in an average of 1.53 fledged chicks per nest. This average, referred to as nest productivity, is a slight decrease from the 2022 season, which saw nest productivity of 1.61 chicks per nest.

For the White-shouldered Ibis 2022-23 breeding season, a total of 121 nests were discovered, a significant increase of 20 from the 2021-22 season which saw 101 nests discovered. Of these 121 nests, 95 were successful, resulting in a success rate of 84.4%, another increase from the previous season, which resulted in an 80.2% success rate. From these 95 successful nests, 175 chicks successfully fledged, providing a nest productivity of 1.84, a decrease from 2021-22 seasons of 1.96 nest productivity. Furthermore, the national White-shouldered Ibis census for 2023 identified a total of 784 individuals, this number was taken from the highest count during the census month of September.

The CIWG held a total of three meetings throughout 2023, the information of which can be found at the end of this report.

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GLOSSARY & ABBREVIATIONS

ACCB	Angkor Centre for Conservation of Biodiversity
BFCA	Bengal Florican Conservation Area
CBC	Centre for Biodiversity Conservation
CIWG	Cambodia Ibis Working Group
CPA	Community Protected Area
CPRWS	Chhaeb-Preah Roka Wildlife Sanctuary
DDF	Deciduous Dipterocarp Forest
EDGE	Evolutionarily Distinct and Globally Endangered
EPL	Eastern Plains Landscape (SWS and PPWS)
IUCN	International Union for the Conservation of Nature
KPWS	Kulen Promtep Wildlife Sanctuary
LWS	Lomphat Wildlife Sanctuary
MFF	Mekong Flooded Forest
MoE	Ministry of Environment
NGO	Non-Governmental Organization
NPL	Northern Plains Landscape
PDOE	Provincial Department of Environment
PPWS	Phnom Prich Wildlife Sanctuary
SBWS	Sambor Wildlife Sanctuary
STRL	Stung Treng Ramsar Landscape
SPWS	Siem Pang Wildlife Sanctuary
SWS	Srepok Wildlife Sanctuary
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

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This report was written in 2024 by Jack Willis (ACCB) and Ny Naiky (NatureLife Cambodia) on behalf of the Cambodia Ibis Working Group (CIWG), with sections written by Christel Griffioen (ACCB), and other contributions from the CIWG members from NatureLife Cambodia, Rising Phoenix Co. Ltd, WCS Cambodia, and WWF Cambodia.

INTRODUCTION

This report intends to present an overview of the conservation activities undertaken by members of the Cambodia Ibis Working Group throughout the year 2023.

In 2021, a collaborative effort was initiated by conservation NGOs and various government entities, including ministries and departments. This initiative led to the establishment of the Cambodia Ibis Working Group, aiming to streamline national-level conservation endeavours for two native Ibis species. The two Ibis species include Cambodia's national bird, the Giant Ibis (*Thaumatibis gigantea*) and the White-shouldered Ibis (*Pseudibis davisoni*). Both species are currently classified as critically endangered by the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The aim of the working group was to regularly provide updates on conservation and monitor efforts contributed by each member organisation, in addition to providing a platform for collaborations and the exchange of information and data.

Key NGO contributors to CIWG include the Angkor Centre for Conservation of Biodiversity (ACCB), NatureLife Cambodia (NLC), Rising Phoenix Co. Ltd (RP), the World Wide Fund for Nature Cambodia (WWF), and the Wildlife Conservation Society Cambodia Program (WCS). Government representation includes the General Directorate for Nature Protected Area of the Ministry of Environment, and the Forestry Administration of the Ministry of Agriculture, Forestry and Fisheries.

The priority sites for White-shouldered Ibis and Giant Ibis conservation in Cambodia encompass the Siem Pang Wildlife Sanctuary (SPWS), the Mekong Flooded Forest (MFF), the Eastern Plain Landscape (EPL) comprising Srepok Wildlife Sanctuary (SWS) and Phnom Prich Wildlife Sanctuary (PPWS), Kulen Promtep Wildlife Sanctuary (KPWS), Chhaeb-Preah Roka Wildlife Sanctuary (CPRWS), the Stung Treng Ramsar Landscape (STRL), and Lomphat Wildlife Sanctuary (LWS). Additionally, smaller, and more fragmented populations exist beyond these regions across the northern and eastern parts of the country.

Species Background: Giant Ibis (*Thaumatibis gigantea*)

Within the Ibis family, Threskiornithidae, the Giant Ibis claims the title of the largest member among the 36 species and the only member of its genus *Thaumatibis*. This magnificent bird, distinguished by its commanding stature and unique plumage, has become a central focus for conservation initiatives led by the Cambodia Ibis Working Group. Recognising its ecological significance, Cambodia designated the Giant Ibis as the country's national bird in 2005 through a royal decree. This national status further emphasises the species importance in helping to maintain the country's diminishing wildlife and to promote ongoing conservation endeavours. Currently with a population estimate of less than 200 mature individuals, the Giant Ibis is listed as critically endangered on the IUCN Red List of Threatened Species (IUCN). In addition to this, the Giant Ibis also has an EDGE (Evolutionarily Distinct and Globally Endangered) score of 6.44,

ranking it as number #2 on the EDGE of Existence list for birds globally (BirdLife International, 2018; Edge of Existence, 2023a).

As a flagship species, the Giant Ibis plays a pivotal role in indicating the health and vitality of its ecosystems. Once spanning across Thailand, Cambodia, Lao PDR, and Vietnam, the species has dwindled significantly throughout the 20th century due to lowland habitat loss, habitat conversion for infrastructure development, and poaching (Thewlis & Timmins, 1996; Eang, *et al.*, 2021). Primarily confined now to the eastern and northern plains of Cambodia, with potential but unconfirmed sightings in Vietnam and Laos and confirmed extinction in Thailand (Loveridge & Srun 2015; Keo *et al.*, 2009).

Although scientific understanding of their ecological requirements is still understudied, the Giant Ibis is predominantly a specialist species, strongly associated with dry deciduous dipterocarp forests (DDF) (Wright, *et al.*, 2012). These forests are a unique and threatened ecosystem characterised by deciduous trees belonging to the Dipterocarpaceae family. Dipterocarp forests provide essential breeding and foraging grounds for the Giant Ibis. The availability of suitable trees is a critical factor influencing the reproductive success of the Giant Ibis, which are particularly dependent on large, mature trees for nesting, preferring the canopy of dipterocarps (Keo, 2008; Wright, *et al.*, 2012). The habitat of the Giant Ibis plays a crucial role in its survival, as this critically endangered species is highly sensitive to environmental changes and human disturbance (Eang, *et al.*, 2021). During the dry season, from November to May, the Giant Ibis is known to forage at seasonal wetlands, locally known as trapaengs. These wetlands serve as crucial feeding grounds where the birds find prey such as aquatic invertebrates, amphibians, and small fish (Wright, *et al.*, 2012). The Giant Ibis' reliance on trapaengs for foraging highlights the significance of these wetland habitats in supporting the species, particularly during the dry months when other water sources may be scarce. Although the Giant Ibis and the White-shouldered Ibis have overlapping ranges, the Giant Ibis appears to be less tolerant of anthropogenic activity, making studying their movement patterns more difficult (Wright, *et al.*, 2012).

Species Background: White-shouldered Ibis (*Pseudibis davisoni*)

The White-shouldered Ibis (*Pseudibis davisoni*) is distinguishable from other members of the Threskiornithidae family by its striking white nape and shoulder patches. The White-Shouldered Ibis is currently ranked as critically endangered on the IUCN Red List of Threatened Species; it also has an EDGE score of 5.63 (Edge of Extinction, 2023b). Originally distributed across Southeast Asia, the White-shouldered Ibis has undergone substantial declines during the 20th century, leading to extirpation from Thailand, Myanmar, Peninsular Malaysia, Vietnam and most recently Lao PDR (BirdLife International 2018; Wright, *et al.*, 2013). Described as one of the most threatened large water birds in Southeast Asia, the White-Shouldered Ibis population is mostly confined to Cambodia, with a small population in Kalimantan, Indonesia (Tordoff, *et al.*, 2005; Meijard *et al.*, 2005; Wright, *et al.*, 2013). The Cambodian

population is assumed to make up about 87-95% of the global population of White-Shouldered Ibis and can be mostly found within the northeast of the country (BirdLife International, 2018).

As both Ibis species occur sympatrically in much of their current ranges, the White-Shouldered Ibis faces many of the same threats as the Giant Ibis. Primary factors contributing to the decline in this species encompass habitat loss due to the conversion of wetlands, river channels, and dry forests, alongside anthropogenic pressures involving hunting and nest robbery (Wright *et al.*, 2010).

The species exhibits associations with diverse wetland habitats, encompassing pools, marshes, watercourses, and expansive rivers featuring sand and gravel bars. Notably, the deciduous dipterocarp forests in Cambodia emerge as a vital habitat for the White-shouldered Ibis (Wright, *et al.*, 2010). Dependency is also noted in the coexistence of low-intensity agriculture within the wetland and DDF mosaic (Wright *et al.*, 2010; Sum & Bou, 2015). Foraging habitat preferences exhibit seasonal variations, with a pronounced reliance on seasonal waterholes and dry forests during the dry season (Wright *et al.*, 2013a). Alternately, abandoned paddy fields become relevant during the wet season (Keo 2008; Eames *et al.*, 2018; Wright *et al.*, 2012a).

In contrast to the Giant Ibis, the White-shouldered Ibis displays higher sighting frequencies in proximity to human settlements, potentially linked to elevated livestock densities (Wright *et al.*, 2012a). Consequently, this often makes them more susceptible to land conversion and poaching activities.

Ex-Situ Conservation

Current Ex-situ Program

ACCB, in partnership with key stakeholders such as relevant government authorities, conservation NGOs, and communities, rescues White-shouldered Ibis and Giant Ibis from the wild and illegal trade. These individuals have been rehabilitated at ACCB, and since 2017 incorporated into the assurance population ACCB is establishing for the species. By uniting expert knowledge and perspectives from all stakeholders we can bridge the gap between wild and captive populations management and improve conservation efforts for the species as part of the One Plan Approach to species conservation.

In March 2023, a juvenile, White-shouldered Ibis was successfully rescued, followed by the rescue of one juvenile Giant Ibis, in August 2023. Not long after the arrival of the Giant Ibis at ACCB, concerning signs of illness were observed by staff. Subsequent examination revealed that the juvenile was afflicted with Avian Malaria, as evidenced by the presence of parasites in its bloodstream. Moreover, one of its toes exhibited signs of necrosis. The team at ACCB diligently addressed the malaria infection and conducted a successful surgical procedure to amputate the affected toe. We are pleased to report that the Ibis has since been cleared of the disease, has fully recuperated, and has seamlessly adjusted to its new aviary environment.

The ACCB was also contacted for two further rescues: one Giant Ibis and one White-shouldered Ibis. For the Giant Ibis case in March, the team arrived at the location only to find that the bird had already passed away. There were no physical injuries found, the rapid Avian Influenza test performed on location was negative, and the carcass was taken by WCS to NAPHRI for a necropsy. For the White-Shouldered Ibis, staff were contacted on the 14th of December that an injured adult had been found in Stung Treng Province. A team set out for collection, but on the way to the site were informed that the individual had succumbed to their injuries, which included a wing injury caused by a gunshot. Biometrics were taken post-mortem, and the carcass was then sent to WCS, for necropsy at NAPHRI.

Currently the ACCB houses three Giant Ibis, all of which remain unsexed, and nine White-Shouldered Ibis (4.2.3).

The ACCB experienced a worldwide breakthrough this year, with two eggs laid and then successfully incubated, hatched, and raised by the parents in captivity. The first observations of nest building, and incubation were seen in February 2023. In 2022, individuals were paired up and placed in smaller sub-enclosures, which did not lead to successful reproduction, therefore in 2023, the birds were given free mate choice. This proved to be a successful change, as two nests were built, one in a smaller breeding aviary (Figure 1), and one in the main aviary. At least one egg was laid in both nests. Due to the inaccessibility of the nests, and the nervous nature of the birds, there was not a confirmed sighting until the 27th of March despite a chick being first heard on the 18th of March. Limiting human presence and interference was of key importance when managing the breeding season.

However, on April 25th, it was observed that one of the chicks displayed a wing deformity. The chick's primary feathers on both wings were rotated outward, suggesting a bilateral valgus deformity commonly known as "angel wings" (Figure 3). At this point, the chick was nearing the fledging age of 40 days post-hatching, prompting the decision to remove the chick from the nest. It was then transported to the on-site veterinary clinic for a thorough health assessment and treatment by ACCB's resident veterinarian. Following the chick's separation from its parents for treatment, super worms (*Zophobas morio*) were eliminated from all White-shouldered Ibis diets for the remainder of the breeding season due to their high protein content, which was suspected to contribute to the deformity. At the clinic, the chick received treatment that involved applying a figure-of-eight bandage to each wing to maintain their physiological position. Additionally, Selenium-Vitamin E was administered to prevent neuromuscular diseases like capture myopathy.

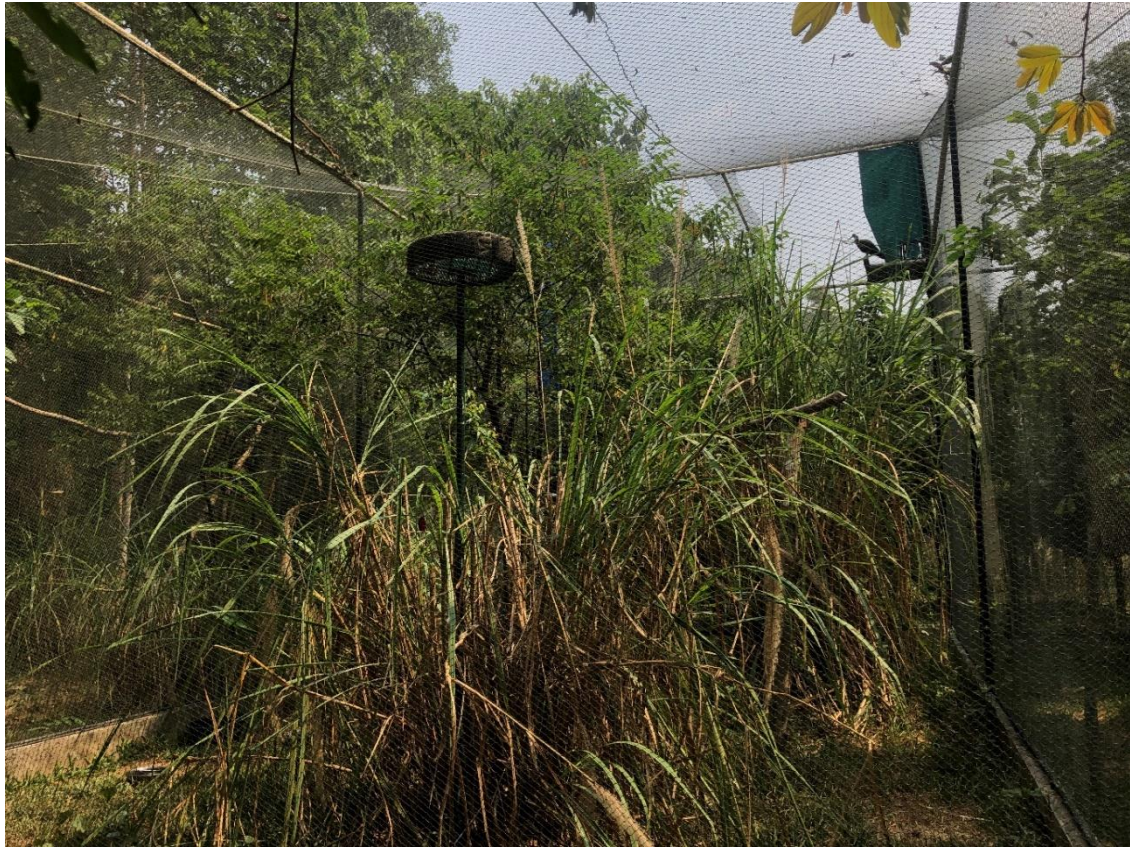


Figure 1. One of the smaller breeding aviaries at ACCB. The nest platform is situated in the top right corner of the aviary.
Photo: ACCB/Kees Groot



Figure 2. White-shouldered Ibis with a chick in the nest. Photo: ACCB/Kees Groot



Figure 3. Valgus deformity on White-shouldered Ibis chick, noticeable on both the right and left wing where the primary feathers are sticking outwards from the body, before treatment. Photo: ACCB/M. Blümm.

Unfortunately, allowing free mate choice did not come without its risks. There was increased aggression between male conspecifics and two males were found dead with hematomas and stab wounds, likely the result of intense aggression and fighting. White-shouldered Ibis are territorial and solitary nesters, therefore once a nest was active, the presence of another individual was likely seen as a threat. After these incidents, it was decided to separate all individuals, aside from the breeding pairs, during the remainder of the breeding season, while still maintaining visual contact. Moving forward, heightening monitoring and identification of bonded individuals before the breeding season, as well as separating pairs once they have bonded, will be crucial. Additionally, the construction of additional aviaries within the complex to house bonded pairs separately will be necessary. ACCB is currently working on creating a manuscript that discusses the lessons learned from the first successful ex-situ conservation breeding of the Critically Endangered, White-shouldered Ibis. This manuscript is expected to be submitted for peer-reviewed publication in 2024.

The netting of the White-shouldered Ibis breeding facility at ACCB was last replaced in 2011. The locally sourced netting utilised for the aviary has deteriorated over time due to UV exposure and the humid climate of Cambodia. By September 2023, the net had developed a significant number of holes that could no longer be patched up, creating a potential risk for birds to escape. Consequently, all birds had to be temporarily relocated from the aviary until the netting could be replaced. To ensure the safety of the White-shouldered Ibis and maintain our ex-situ management program, it is imperative to replace the aviary netting with more durable and higher-quality materials. Through secured funding from a co-investor supporting Bengal Florican and White-shouldered Ibis ex-situ conservation efforts, we have procured UV-resistant netting from China, which is pending transportation to Cambodia. In anticipation of the 2023/24 breeding season,

we obtained local netting to repair the three breeding/separation enclosures and provide housing for two pairs of White-shouldered Ibis during the breeding season.

In preparation for the 2023-2024 breeding season, previously successful bonded pairs from the 2022-2023 season were individually housed in sub-enclosures within the breeding facility. Both pairs commenced nest-building activities in December 2023, although the presence of eggs could not be confirmed due to limited access to the nests and the non-invasive approach adopted to minimize disruptions.

For the 2023 Giant Ibis breeding season, a single individual was removed from an enclosure of three after aggression was observed and apparent bonding between the two other Ibises. The individual adapted well to the enclosure move, however after a few months died suddenly and unexpectedly. The necropsy yielded no results on the cause of death, however, did confirm the individual as being female. For the rest of the season, the other two Ibis did not engage in breeding behaviours such as nest building, and based purely on beak size it is suspected that they are both male.

Future captive breeding plans.

The ex-situ conservation efforts for both Ibis species will significantly contribute to the implementation of the One-Plan Approach (OPA) to Giant- and White-shouldered Ibis conservation. Acting as an example of how ex-situ conservation can be an appropriate conservation tool for threatened species conservation. ACCB will add further birds obtained through wildlife rescue and rehabilitation efforts to the assurance population to ensure a viable and genetically diverse population. Globally there are many examples of successful captive breeding programs of other Ibis' species and with that considerable captive husbandry experience. Therefore, there is considerable evidence that the assurance colonies for both species could become reproductively successful in the near future, as long as sexually mature representatives of both sexes are present. As the assurance population grows, the founder generation (and its F1 offspring) will be kept as the assurance population at ACCB. To support a growing assurance population, an additional facility for Giant Ibis and expansion of the White-shouldered Ibis enclosure will need to be constructed at ACCB. The assurance population will offer opportunities for research on the species' biology and behaviour. Husbandry Guidelines for the species are already in the process of being developed by ACCB and will continue to be adapted as further information is garnered on the Ibis species requirements.

In-Situ Conservation

Giant Ibis Priority Sites

Conservation efforts for the Giant Ibis in Cambodia extend across multiple key project locations as shown in Figure 4. These sites include Siem Pang Wildlife Sanctuary with support from Rising Phoenix Ltd, Lomphat Wildlife Sanctuary supported by NatureLife Cambodia, Kulen Promtep Wildlife Sanctuary and Chhaeb-Preah Roka Wildlife Sanctuary supported by WCS Cambodia. Additionally, the initiative spans the Eastern Plain Landscape, comprising Srepok Wildlife Sanctuary and Phnom Prich Wildlife Sanctuary, supported by WWF Cambodia. The Mekong Flooded Forest site, inclusive of the Sambor Wildlife Sanctuary and areas within the Mekong River Dolphin Management Area, is supported by WWF Cambodia. The strategic distribution of these conservation projects underscores a collective commitment to safeguarding the Giant Ibis and its habitat in diverse ecosystems across the region.

White-shouldered Ibis Priority Sites

The conservation initiatives to safeguard the White-shouldered Ibis in Cambodia are strategically orchestrated across a network of five principal project sites. These include Siem Pang Wildlife Sanctuary, where support is provided by the Rising Phoenix Company; Lomphat Wildlife Sanctuary, supported by NatureLife Cambodia; Kulen Promtep Wildlife Sanctuary and Chhaeb-Preah Roka Wildlife Sanctuary, both supported by WCS Cambodia. The Eastern Plains Landscape encompasses the Srepok Wildlife Sanctuary and Phnom Prich Wildlife Sanctuary and is supported by WWF Cambodia. Furthermore, the Mekong Flooded Forest, which includes the Sambor Wildlife Sanctuary and areas within the Mekong River

Dolphin Management Area, is also supported by WWF Cambodia. Additionally, the Stung Treng Ramsar Landscape, comprising Koh Sralay Island, and the island islands of Koh Hib and Koh Snaeng, located north of Stung Treng City, are all supported by ACCB (Fig. 4). This strategic allocation of resources and expertise underscores a comprehensive and collaborative approach to White-shouldered Ibis conservation in Cambodia.

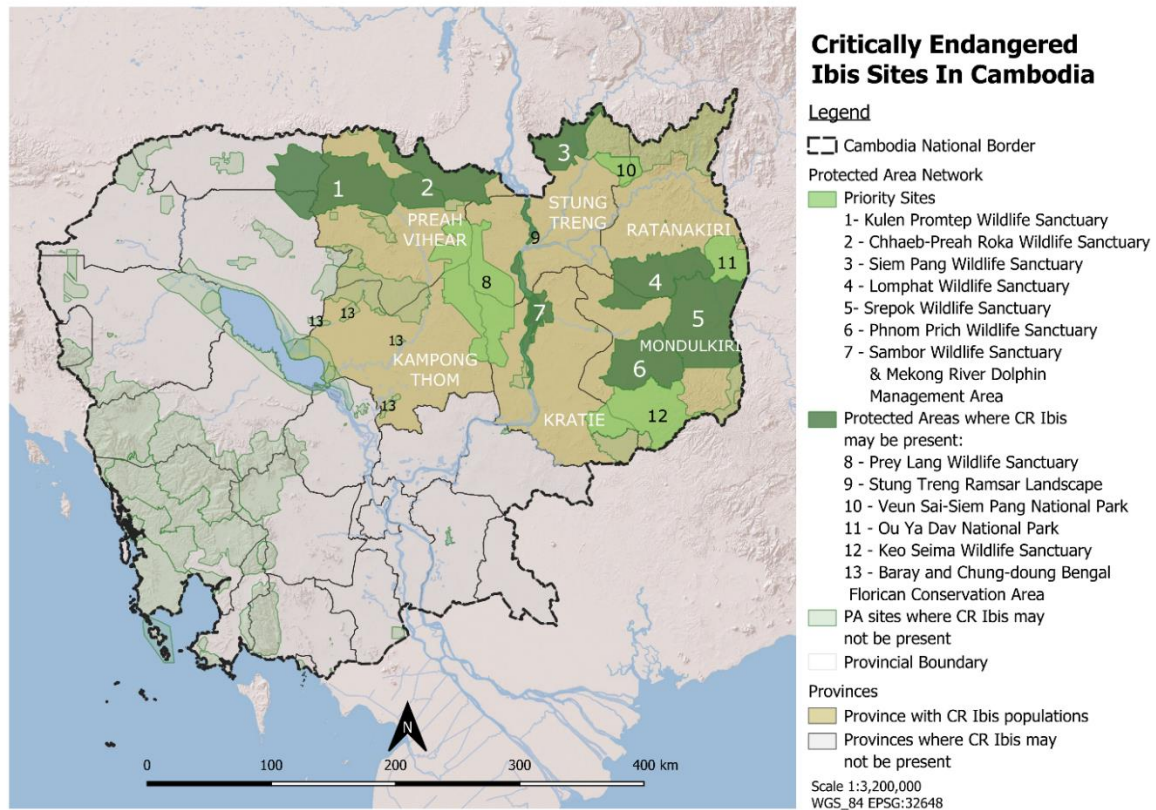


Figure 4. Priority sites for the critically endangered, White-shouldered Ibis and Giant Ibis in Cambodia

RESULTS

SECTION 1: GIANT IBIS

Giant Ibis Nesting Behaviour

The Giant Ibis breeding activities occur primarily during Cambodia's wet season, typically with breeding behaviours commencing in late May, or early June. The construction of nests is usually observed taking place between late June and August, although notably, instances of nesting outside the conventional wet season calendar have been documented, with a recorded chick in December and a pair observed building a nest in October (Keo, *et al.*, 2009; Eang *et al.*, 2021). Although the Giant Ibis and the White-shouldered Ibis occur sympatrically in most of their range and exhibit very similar behaviours, their breeding times are significantly different (Wright, *et al.*, 2012). The Giant Ibis build their nest atop the canopies of tall Dipterocarpus trees, which is believed to be advantageous by improving access for take-off and landing (Huang *et al.*, 2022). Additionally, the choice of taller trees may serve to mitigate risks associated with smaller trees, which offer less structural support, increasing the vulnerability of nests to storms or windy

conditions (Olmos *et al.*, 2001). Research shows the main cause of mortality in Giant Ibis chicks is predation from mammalian predators, particularly mustelids and snakes, which may further explain the adaptation to nesting high in the canopy (Keo, *et al.*, 2009). However, nests so open atop the canopy may also result in higher predation from avian predators. It should be noted that during the working group meetings, some organisations have reported an increased number of crows around some of the Ibis nests, however further information on this would need to be collected to decide how much of a concern this may become.

It is believed that breeding pairs of the Giant Ibis exhibit a solitary disposition, distributed across the landscape at relatively low densities (Sum *et al.*, 2011; Wright *et al.*, 2012). While there is a belief that these pairs display some level of fidelity to nest sites and engage in relatively monogamous relationships, confirmation of these behaviours is not yet confirmed (Eang *et al.*, 2021). The Giant Ibis clutch size typically consists of two eggs per nest. Eggs will hatch after approximately 32 ± 1.16 days and fledging will commence after 70 ± 4.64 days (Keo *et al.*, 2009).

Nest monitoring data for the Giant Ibis has been collected since 2003 in the Northern Plains Landscape, since 2013 at Siem Pang Wildlife Sanctuary, and since 2015 at Lomphat Wildlife Sanctuary. However, regular records of Giant Ibis nests are not consistently maintained across all sites, with the earliest recorded data at Mekong Flooded Forest in 2017 and then not monitored again until 2021. Furthermore, the Eastern Plains Landscape only started collecting data in 2022.

Nest Searching Methodology

The Giant Ibis nest searching is undertaken every breeding season by member organisations of the CIWG and their qualified field staff. Government Staff, rangers from external organisations and trained community members may also be involved in various ways to aid in conducting nest-searching opportunities.

Nest identification will involve various methodologies, initially, teams will check nest sites used in previous breeding seasons for any nesting activity, as Giant Ibis will often reuse old nests. Organisations may also employ targeted searches of sites, relying on both experiential knowledge and geospatial data analysis. The acquisition of information from local community members is a common and effective method for obtaining data on new nest sites, this is particularly beneficial in areas that are difficult for trained field staff to frequent. To support this effort, CIWG member organizations have been offering nest reward payments for several years, typically a one-time payment ranging from \$5 to \$15 for individuals who provide the location of a new nest, subsequently confirmed by field teams. Some members may also employ the use of nest guardians, these are local community members who are given conditional payment to protect nests, in addition to a monetary reward if chicks in that nest successfully fledge (Loveridge & Srun, 2015).

Giant Ibis Results 2023

Table 1. The Giant Ibis nest monitoring results from 2023. The table shows the total number of nests found, the number of nests successful, and the number of chicks that fledged.

2022-23 Giant Ibis Nest Season Results	Total Nests	Successful Nests	Chicks Fledged
Northern Plains Landscape (NPL)	18	15	23
Siem Pang Wildlife Sanctuary (SPWS)	17	10	16
Lomphat Wildlife Sanctuary (LWS)	5	4	5
Mekong Flooded Forest (MFF)	1	1	2
Eastern Plains Landscape (EPL)	0	0	0
All Sites	41	30	46

Table 1 shows that for the 2023 season, a total of 41 nests were discovered, the same as the 2022 season. Of these 41 nests, 30 (73.2%) were successful, an increase of 5.2% from the 2022 season, which saw 68% of nests successful. Of the 30 successful nests a total of 46 chicks fledged, resulting in an average of 1.53 fledged chicks per nest. This average, referred to as nest productivity, is a slight decrease from the 2022 season, which saw nest productivity of 1.61 chicks per nest.

The site with the highest total of Giant Ibis nests was the NPL, with a total of 18 nests discovered, two nests higher than the previous season (Figure 5). The second-highest nest count was from SPWS, with a total of 17 nests discovered, one nest more than in 2022. The site with the third-highest nest counts comes from LWS with a total of five nests, two fewer than the 2022 season. The MFF was the fourth-highest count with a total of one nest, the same as the previous season. Lastly, the EPL found no nests during the 2023 season, one less than in 2022.

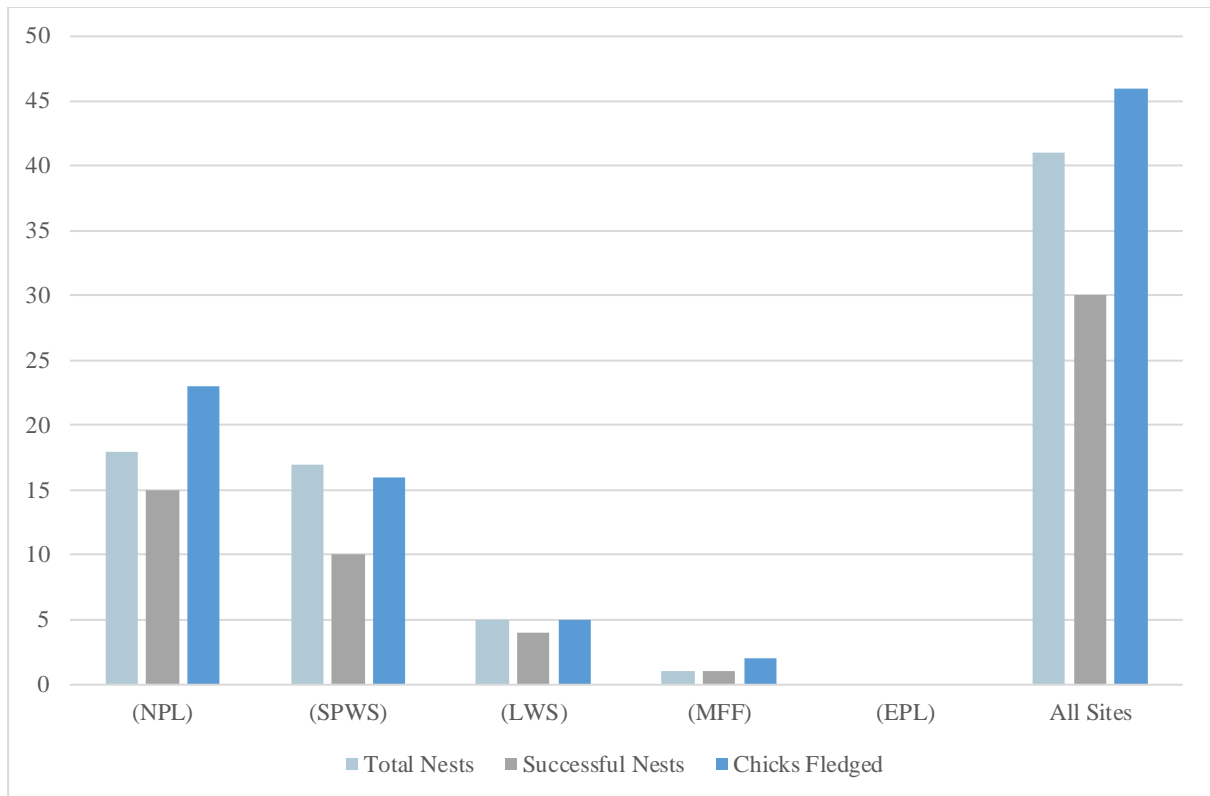


Figure 5. A bar chart displaying all the Giant Ibis nest monitoring results for the 2023 season.

Giant Ibis Nest Searching Results

The historical trend of Giant Ibis nest discoveries in the Northern Plains Landscape has shown fluctuations over the years (Figure 6). Initially, there was an increasing trend from 2003 to 2008, with a peak of 32 nests in 2007. However, the number of nests almost halved in the following year, dropping to 17 in 2008. Subsequently, the nest count varied, reaching a high of 41 in 2009 and a low of 17 again in 2016. Despite these fluctuations, the NPL has consistently maintained a substantial number of Giant Ibis nests, recording an average of 22.9 nests per season, making it a crucial site for the conservation of the Giant Ibis in Cambodia.

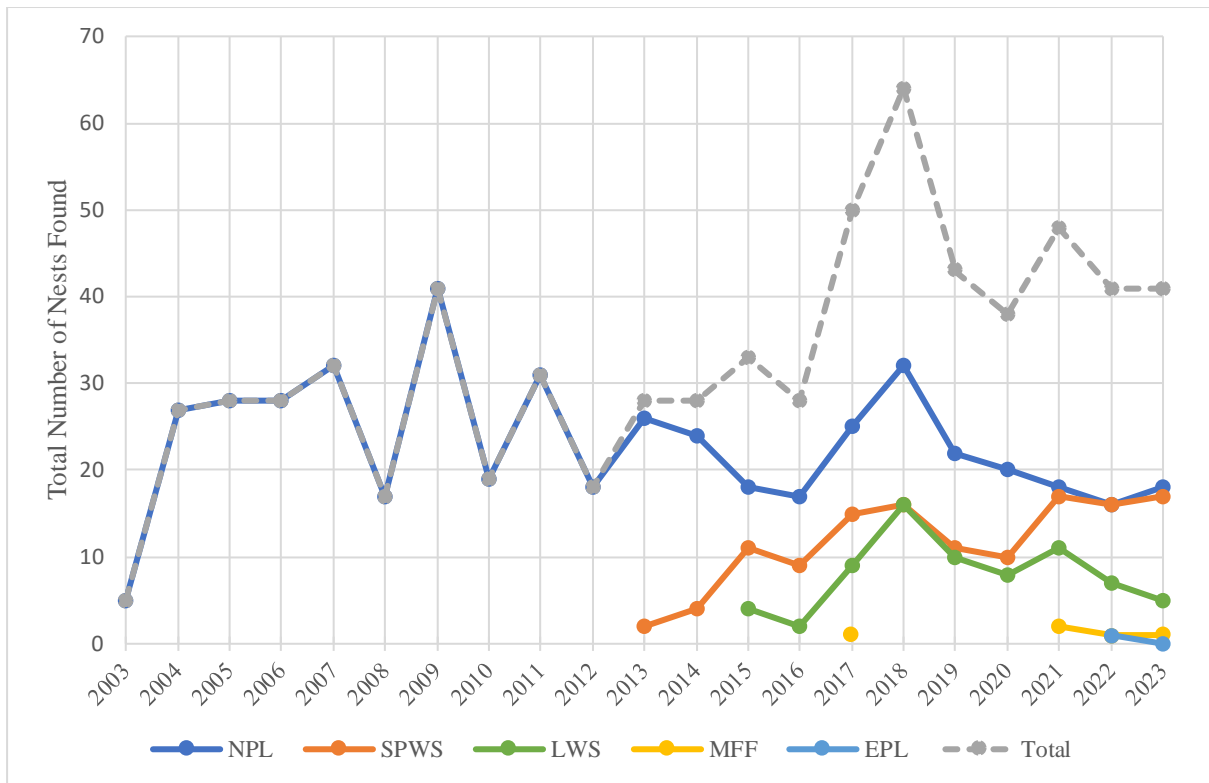


Figure 6. The Total number of Giant Ibis nests recorded according to site from 2003 to 2023.

In contrast, figure 6 shows the trend in nest discoveries at the Siem Pang Wildlife Sanctuary has had a more consistent increase since data collection began in 2013. The early years saw lower nest counts, with two nests in 2013 and four nests in 2014, which is typical for newly established monitoring programs. However, as field teams grew and the experience of field staff improved, the number of detected nests steadily increased. The highest counts were recorded in 2021 and 2023, with 17 nests found in each season. This upward trend in nest discoveries at Siem Pang Wildlife Sanctuary underscores the site's importance for the conservation of the Giant Ibis.

Both the Northern Plains Landscape and Siem Pang Wildlife Sanctuary have consistently reported the highest Giant Ibis nest counts since 2013 when both sites recorded data. In 2023 both sites contributed 85.4% of total nests found across all sites, and historically have contributed at least 73% every year. These trends highlight the critical role of both sites in the conservation efforts for the Giant Ibis population in Cambodia.

The Lomphat Wildlife Sanctuary is the third-highest site in terms of Giant Ibis nest discoveries and the only other site with more than five years of consecutive data collection. Monitoring at Lomphat Wildlife Sanctuary began in 2015, and its total nests discovered have remained relatively stable. Lomphat Wildlife Sanctuary has consistently contributed between 7% and 25% of the total nests discovered, with this percentage increasing significantly from 2018 – 2021, although, there has been a recent decline in nest numbers throughout the last two seasons. Since the Mekong Flooded Forest and Eastern Plains Landscape

have only recently begun data collection, it is not accurate to make observations on the historical trend of their total nests discovered at this stage.

Giant Ibis Nest Monitoring & Protection Results

Each organization bears the responsibility of maximizing the success rate of Giant Ibis nests by monitoring and protecting as many nest sites as feasible within their operational capacities. Protection strategies vary among organisations, influenced by factors such as financial resources, survey landscape size, and available field staff. Many organizations enlist the help of local community members for more frequent and rigorous nest monitoring. Some organisations have implemented compensation schemes to incentivise local community members to protect and monitor nests. Staff and community members receive training and instructions by the CIWG members developed monitoring protocols from qualified members of working group organizations, this ensures minimal disturbance to nests and birds, preserving natural behaviours such as incubation and ultimately impacting nest success and fledgling numbers. While monitoring every nest in each landscape is not feasible, recording the success and failure of found nests allows the CIWG to estimate the overall nest success rate within the larger population, and to collect data on the number of chicks that successfully fledge each year.

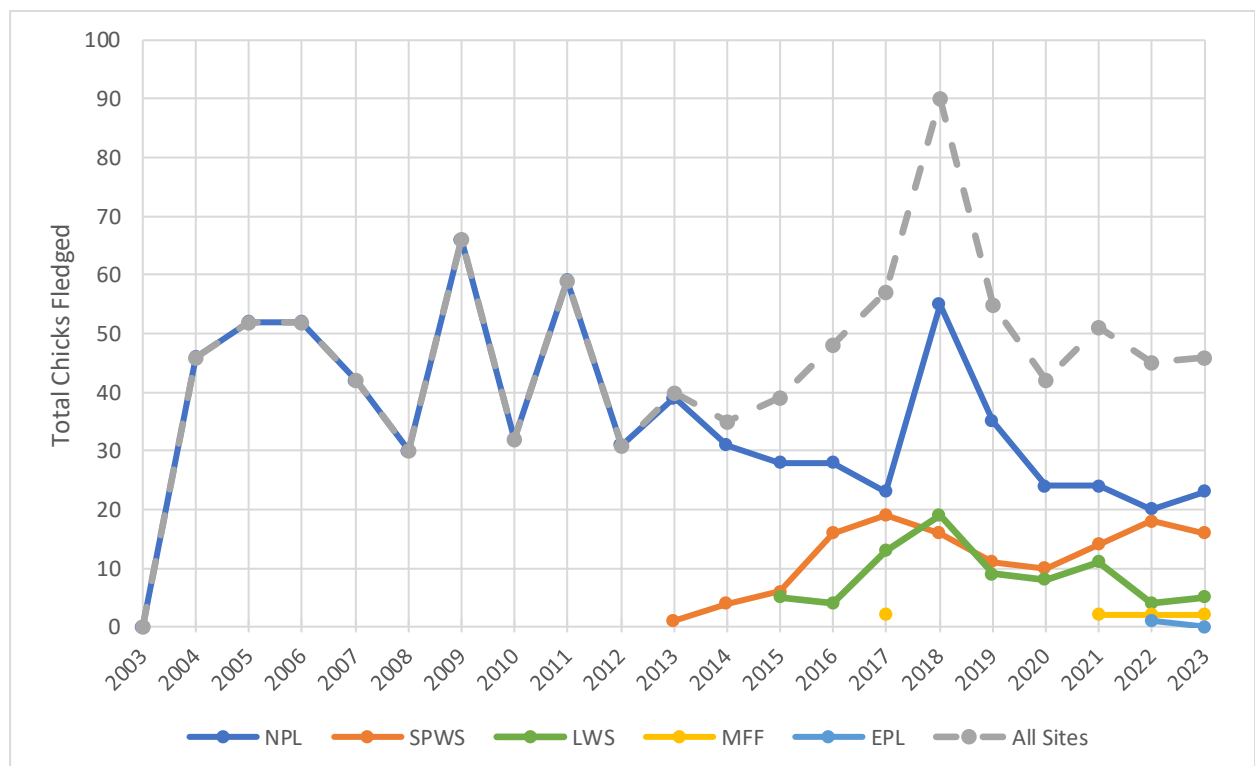


Figure 7. The total number of recorded Giant Ibis Chicks that fledged from each site from 2003 to 2023.

The 2023 season yielded a total of 46 successfully fledged chicks (Figure 7), one more than recorded in the previous year. Since 2003, the number of successfully fledged chicks has exhibited fluctuations, with certain years experiencing notable increases, such as 90 chicks in 2018 and 66 chicks in 2009. However, as data collection for many of the sites has only begun in recent years, it is not an accurate estimation of population changes nationally for the Giant Ibis. As the CIWG continues to collect data and increased effort is placed at newer sites, the historical data available will provide a more accurate estimate of the national population trends. However, from the data the CIWG has gathered so far, we can see that the NPL has seen a recent decline in recorded fledged chicks, while still maintaining the highest number of fledged chicks, whereas sites such as SPWS have seen a slight increase in recent years.

Nest Success Rate

The determination of nest success rates involved a comparative analysis between the total number of nests discovered and the number of successful nests, expressed as a percentage. This dataset provides insights into trends in annual nest success rates, facilitating comparisons across seasons and sites. For example, a sustained decline in nest success rate at a specific site over several seasons may signal adverse influences compared to previous years, prompting further investigation and potential mitigation measures tailored to address site-specific declines. Typically, such declines are associated with anthropogenic pressures, such as land conversion or increased nest destruction.

Furthermore, if a significant decrease occurs across multiple sites within a single season, it may be attributed to abiotic factors like extreme weather patterns or broader-scale influences affecting the species at a regional or global level. Isolated instances of decreases in nest success rates within a single season and at an individual site can also occur. These are often attributed to factors such as increased predation success, often representing short-term fluctuations in predator abundance.

The continued monitoring of sites and analysis of the nest success rate will also facilitate a timely understanding of these changes and allow the CIWG to forecast future trends in nest success rates, fledgling success, and overall Giant Ibis population dynamics, assuming no significant landscape alterations occur.

Table 2. *The Giant Ibis Nest Success Rate for the 2023 Season.*

Site	NPL	SPWS	LWS	MFJ	EPL	All Sites
Nest Success Rate	83.3%	58.8%	80%	100%	N/A	73.2%

The 2023 season resulted in 73.2% of Total Nests found being successfully fledging chicks (Table 2). This was a 4.9% increase from the 2022 season which resulted in a total of 68.3% of nests being successful (Figure 8). The site with the most nests in 2023 was the NPL, which found 18 nests and had 15 successful nests, resulting in an 83.3% success rate. The site with the second-highest nest count was SPWS with 17 total nests and 10 successful nests in 2023, resulting in a 59% success rate. It should be noted that the number of nests per site varies drastically, and many sites may only find a few nests, making success rates differ greatly from those who have a much higher nest count. For example, sites such as the EPL had one nest last season, giving it a 100% success rate, whereas the EPL had no nests to monitor this year, but one last year. The MFF also only had one nest this year, providing a 100% success rate.

Historically the NPL has maintained a stable and high success rate throughout its 18 years of monitoring Giant Ibis nests (Figure 8). The site saw a slight drop in 2020, with a 60% success rate, other than that the site has rarely dropped below 70% and maintained an average annual success rate of 84.7% since 2006. The results from SPWS have fluctuated a lot over their 11 years of monitoring Giant Ibis nests. The 2023 results saw a decline of 10% from 2022 and the second-lowest success rate, showing a downward trend appearing. However, over the 11 years, they have managed to maintain an average of 69.7% success rate. Lomphat Wildlife Sanctuary has also maintained a high success rate throughout its nine years of monitoring Giant Ibis nests. However, as the number of total nests discovered increased, the success rate started to decrease (Figure 8). Furthermore, 2023 saw the LWS having their lowest total nest count (five nests) since 2016 (two nests), and this, in turn, increased the success rate, seeing a 22.9% increase in 2023 (80%) compared to 2022 (57.1%). The correlation between lower nests counts and higher success rate could be due to the number of field staff available to monitor all nests, fewer nests require less staff, and allow more time and effort spent on protecting those fewer nests. Overall, despite the few outliers due to low nest numbers, the average success rate across all sites from 2006-2023 has been 82.5% annually.

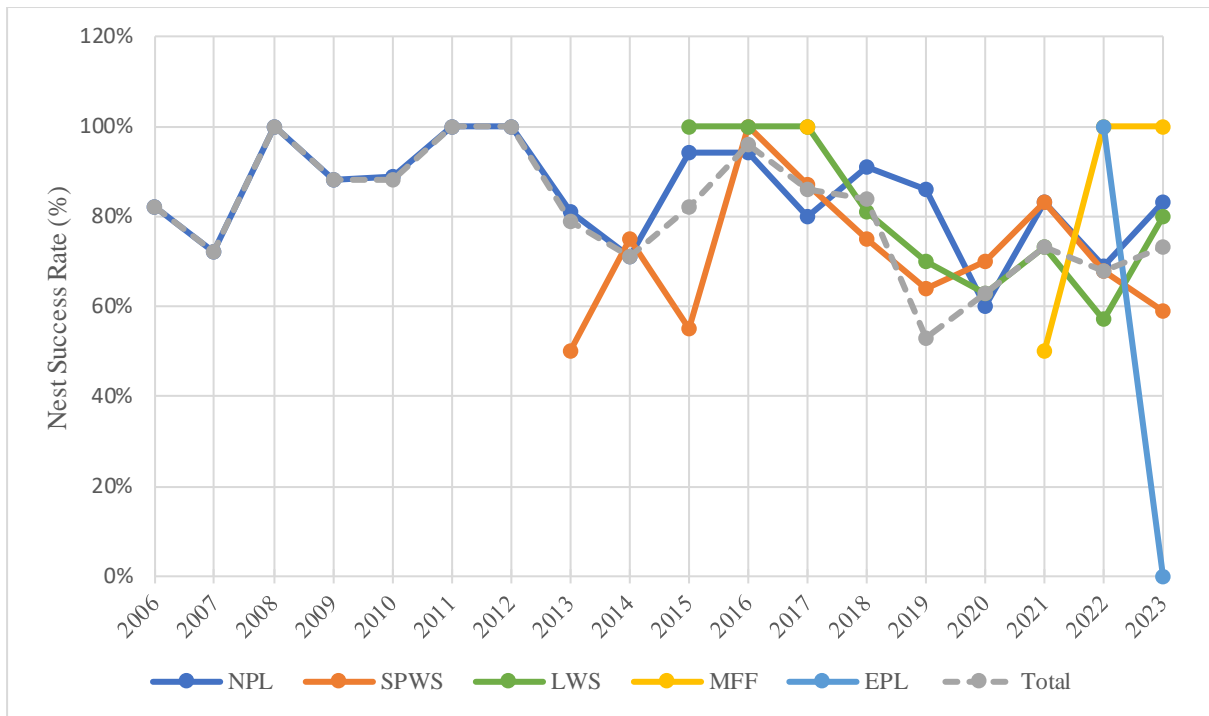


Figure 8. Giant Ibis nesting success rate from 2006 - 2023.

Nest Productivity

Nest productivity, which refers to the number of chicks fledged per successful nest, offers crucial insights into the quality and suitability of habitats for breeding Giant Ibis. This metric serves as an indicator of habitat quality, reflecting factors such as food availability and sufficient shelter from predators. In ideal conditions, Giant Ibis typically produce two chicks per successful nest, making nest productivity a key indicator of the habitat's ability to support healthy populations of Giant Ibis. Additionally, nest productivity can shed light on predation pressures, with lower productivity potentially indicating increased predation rates. Understanding nest productivity is vital for effective habitat management and conservation efforts, as it provides valuable information on the reproductive success of Giant Ibis populations and the overall health of their habitats.

Table 3. The Nest Productivity for the Giant Ibis sites for the 2023 breeding season.

Site	NPL	SPWS	LWS	MFF	EPL	All Sites
Total no. of successful nests	15	10	4	1	0	30
Chicks per successful nest	1.53	1.6	1.25	2.00	N/A	1.53

The 2023 results (Table 3) indicate that the nest productivity across all combined sites was 1.53, showing a slight decrease from the 2022 average of 1.61. The (MFF) site, while exhibiting the highest nest productivity, had only one nest that successfully fledged two chicks. This means the numbers can appear

skewed, making comparisons with the other sites hosting a larger number of nests not an accurate reflection of the overall health of the habitat. The MFF has consistently shown a 2.00 average over the last three seasons, demonstrating its reliability in successfully producing chicks, albeit in limited quantities. In contrast, the EPL reported no nests in the 2023 season, indicating a decline of one nest and one chick compared to the previous season.

The three most comparable sites are the NPL, SPWS and LWS. The NPL which hosts the most successful nests had an average nest productivity of 1.53 chicks per nest, a 0.29 decline from the 2022 results (Figure 9). The 2023 results for the NPL are the lowest seen at the site since 2017 (1.15), however, the historical nest productivity of the NPL is 1.78 average chicks per nest for all seasons, a very good average considering the number of years the site has been monitored. The SPWS produced an average of 1.6 chicks per successful nest, a very insignificant decrease of 0.04 from the 2022 season. The 2023 results for SPSW are the second-highest the site has recorded since 2016, which is encouraging news going forward, and may reflect the improvements in habitat management which contribute to the habitat quality. The last site is LWS which achieved a nest productivity rate of 1.25, a 0.25 increase from the 2022 season. Historically LWS' average nest productivity has fluctuated since it started recording in 2015, sitting around the average of 1.4 chicks per nest for all seasons.

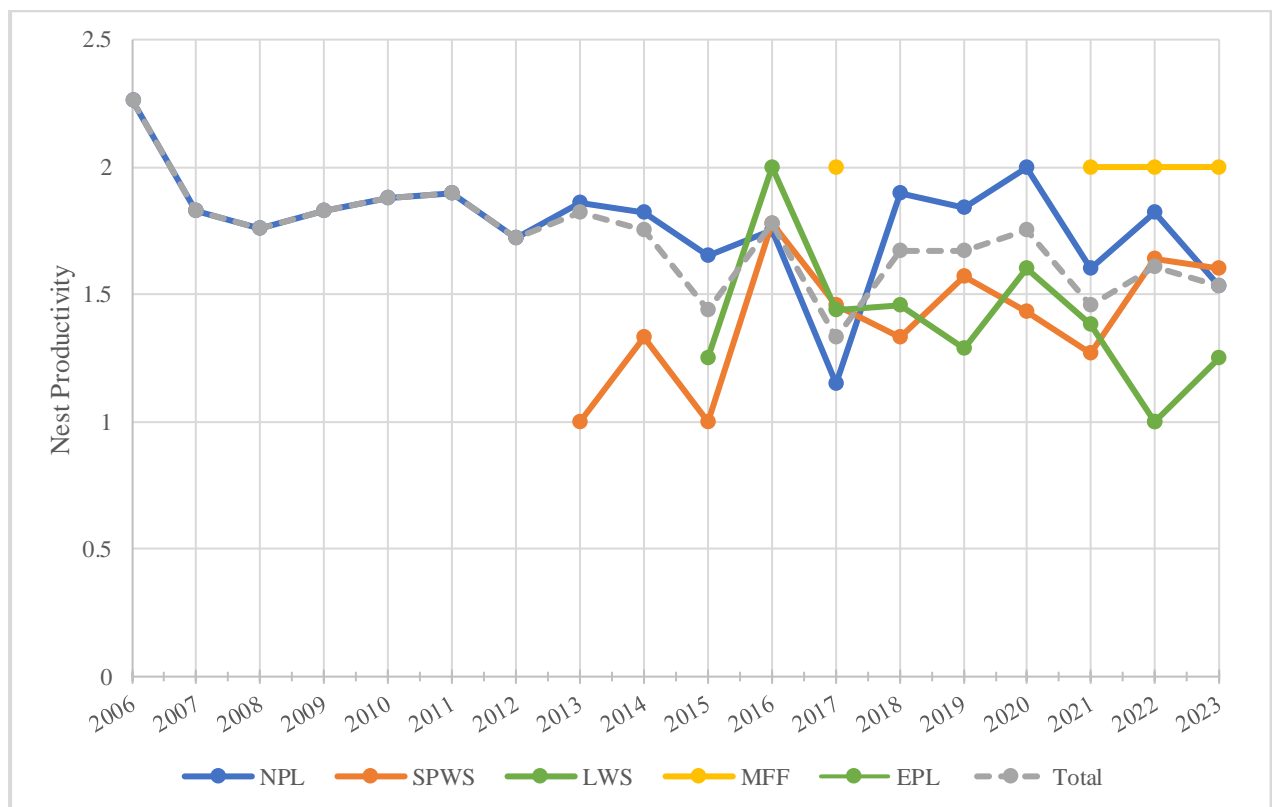


Figure 9. The Nest Productivity from all sites from 2006-2023.

GIANT IBIS POPULATION ESTIMATES

Currently, the IUCN Red List of Threatened Species estimates the population of Giant Ibis as 194 mature individuals (Equivalent to approximately 290 individuals), this population estimate was conducted in 2014, almost 10 years ago (Loveridge and Ty, 2015). Currently, no national census is undertaken for the Giant Ibis in Cambodia. However, a standardised methodology has been applied at Siem Pang Wildlife Sanctuary in 2016 and 2020, and at Lomphat Wildlife Sanctuary in 2019 and again in 2022.

Current data on Giant Ibis populations in Cambodia can only be taken from breeding individuals from the Giant Ibis Nest Monitoring Surveys conducted by members of the CIWG, which by themselves are not reliable estimates. However, this data would provide a total count of 82 mature, breeding individuals in 2023 (41 total nests) and 45 successfully fledged chicks, resulting in a total of 126 individuals. Taking into account the age of sexual maturity (4-5 years) you would also include the fledging for the previous years (138 from 2020, 2021 & 2022), providing a maximum of 264 individuals. However, this data is unreliable as it cannot consider the many other variables involved, such as species survivorship at different life stages, in addition to relying on the theory that all mature individuals are successfully breeding. For this reason, a standardised methodology must be put in place for a national census count, similar to the White-shouldered Ibis census, that can more reliably provide an updated population estimate for the Giant Ibis in Cambodia. A breakdown of the maximum observed population for 2023 (an assumption that all fledglings survived) is detailed below:

- **Northern Plains Landscape** – The population based on the total number of nests discovered places the minimum number of mature breeding individuals at NPL at 36 and the fledglings at 23 providing a total of 59 Giant Ibis.
- **Siem Pang Wildlife Sanctuary** – The total number of nests discovered places the minimum number of mature breeding individuals at SPSW at 34 individuals and fledglings at 16. Resulting in 50 Giant Ibis.
- **Lomphat Wildlife Sanctuary** – The total number of nests discovered places the minimum number of mature breeding individuals at LWS as 10 and fledglings at 5, providing a total of 15 individuals.
- **Mekong Flooded Forest** – The MFF had 1 breeding pair, so 2 individuals and 2 successfully fledged chicks, resulting in 4 individuals.
- **Eastern Plains Landscape** – The EPL had no successful breeding pairs of Giant Ibis during the 2023 season.

SECTION 2: WHITE-SHOULDERED IBIS

White-shouldered Ibis Nesting Behaviour

The breeding season dynamics of the White-shouldered Ibis exhibit a marked departure from those of the Giant Ibis. While the Giant Ibis synchronizes its breeding season closely with the onset of the wet season, the White-shouldered Ibis manifests its breeding activities predominantly during the dry season, typically commencing as early as November and concluding in late May upon the fledging of all offspring. This behavioural disparity in the timing of breeding likely stems from the distinctive feeding ecology of the White-shouldered Ibis. While many large waterbirds primarily forage in water bodies during this period, the White-shouldered Ibis exhibits a unique foraging behaviour, often observed scavenging within the exposed substrate of receding trapaengs during the dry season. This foraging strategy enables them to effectively provision their young amidst water scarcity. Notably, their diet comprises predominantly amphibians, which are concentrated in higher densities within the arid substrate and makeup over 80% of their dietary intake (Wright *et al.*, 2013).

Additionally, White-shouldered Ibis display nesting preferences distinct from their counterparts. They exhibit a tendency to select taller trees for nesting sites, yet unlike the Giant Ibis, they do not prefer the canopy and instead opt for elevations ranging from 10 to 25 meters above ground level (Wright *et al.*, 2013c). Nests are constructed using a combination of sticks and fresh leaves, or alternatively, they may occupy abandoned raptor nests, often reusing the same nests in successive breeding seasons (Wright *et al.*, 2013c).

The monitoring of White-shouldered Ibis nests commenced in 2003 within the Northern Plains Landscape (NPL) by the Wildlife Conservation Society (WCS). Subsequently, for the 2021-22 breeding season, all nests were situated within the Kulen Promtep Wildlife Sanctuary (KPWS). Nest monitoring expanded to include the Mekong Flooded Forest (MFF) area in 2009-10, the Lomphat Wildlife Sanctuary (LWS) in 2010-11, the Siem Pang Wildlife Sanctuary (SPWS) in 2012-13, and the Eastern Plains Landscape (EPL) encompassing Srepok Wildlife Sanctuary (SWS) and Phnom Prich Wildlife Sanctuary (PPWS) in 2013-14. Additionally, White-shouldered Ibis' nests were documented at Koh Sralay Island by the Angkor Centre for Conservation of Biodiversity (ACCB) from 2019-22, an area located just south of the Stung Treng Ramsar Landscape (STRL). Further nesting sites were discovered by ACCB in 2023 at Koh Hib, an island north of Stung Treng city, still within the Stung Treng Ramsar Landscape.

Nest Searching Methodology

White-shouldered Ibis nest searching is undertaken every breeding season by members of the CIWG, field staff, community protected area (CPA) members or conservation group members, Governmental staff and rangers, and trained community members.

Nest identification can involve various methods, initially, teams will check nest sites used in previous breeding seasons to assess any nesting activity, as White-shouldered Ibis will often reuse nests. Organisations may also employ targeted searches of sites, relying on both experiential knowledge and geospatial data analysis. The acquisition of information from local community members is also a proven and effective method for obtaining data on nest sites. To support this effort, CIWG member organizations have been offering nest reward payments for several years, typically a one-time payment ranging from \$5 to \$15 to individuals who provide the location of a new nest, subsequently confirmed by field teams to host active, White-shouldered Ibis nests. Some members may also employ the use of nest guardians, local community members who are given conditional payment to protect nests and rewarded if chicks in that nest successfully fledge. These guardians are employed to protect the nest from being damaged, eggs being stolen or predated on.

White-shouldered Ibis Results 2023

The table below (Table 4) shows the results of the 2022 – 2023 breeding season. This table includes the total number of nests found by each organisation, the number of these nests that had been confirmed to successfully fledge chicks, and the total number of chicks that fledged from the successful nests.

Table 4. The White-shouldered Ibis nest searching result at Each of the six sites and the total from all sites from 2022-2023.

2022-23 White-shouldered Ibis Nest Season Results	Total Nests	Successful Nests	Chicks Fledged
Northern Plains Landscape (NPL)	16	9	16
Siem Pang Wildlife Sanctuary (SPWS)	32	27	51
Lomphat Wildlife Sanctuary (LWS)	13	8	13
Mekong Flooded Forest (MFF)	52	48	90
Eastern Plains Landscape (EPL)	N/A	N/A	N/A
Stung Treng Ramsar Landscape (STRL)	8	3	5
Total from all sites	121	95	175

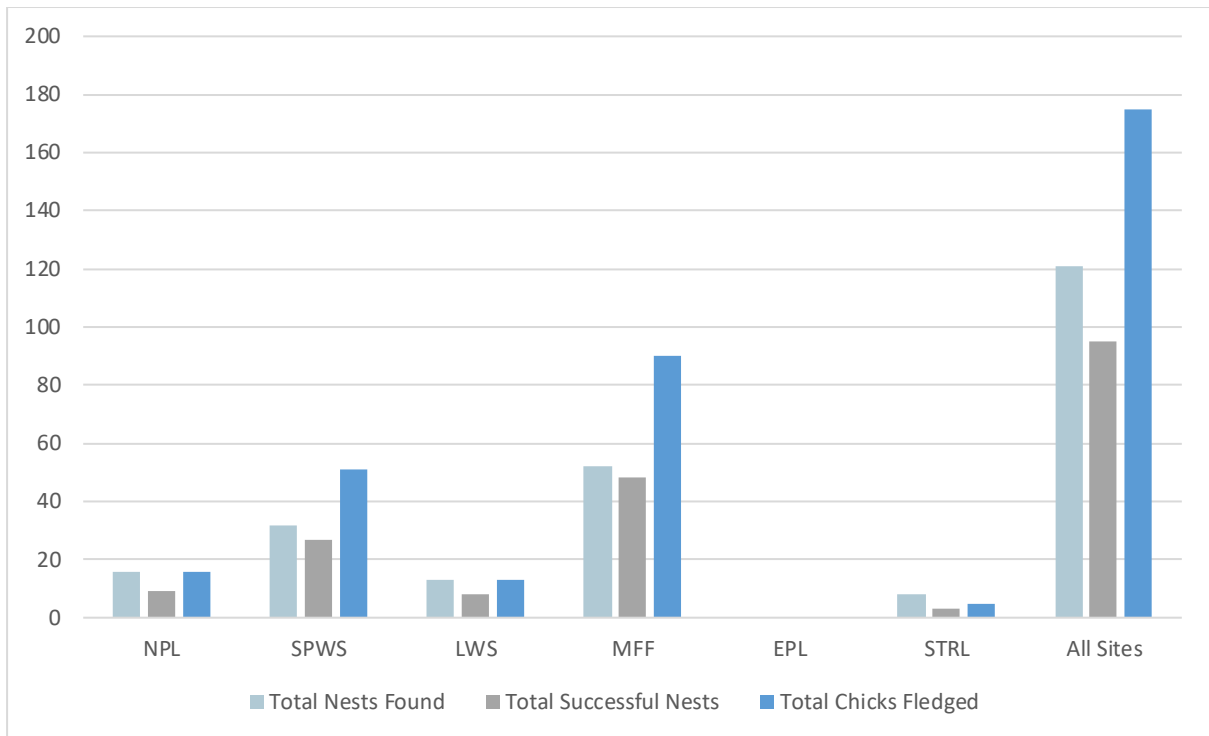


Figure 10. White-shouldered Ibis nest searching results at each site during the 2022-2023 breeding season.

White-shouldered Ibis Nest Searching Results

The 2022-23 season yielded the highest number of nest sites on record since recordings began in the 2003-04 season (Figure 11). A total of 121 nests were discovered by all organizations during this season's searches, marking a notable increase of 20 nests compared to the previous season's 101 nests, which was the highest number at that time. The overall trend of total nests discovered shows a steady increase and represents the benefits of the continued efforts of the members of the CIWG.

The MFF, monitored by WWF, boasted the highest number of nests found, totalling 52 (Figure 10). This marked an increase of 14 nests from the previous season. Siem Pang Wildlife Sanctuary, monitored by RP, followed with the second highest, with a total of 32 nests. While still a substantial number, this represented a decrease of six nests from the previous season. Together, these two sites accounted for 68.9% of all nationwide nests discovered during the 2022-23 season. These two sites have consistently shown the highest numbers of nests discovered for most of the years recorded.

Historical results from LWS indicated a slight decrease since 2015, but nest counts have remained relatively steady for the past eight seasons. The 2022-23 season saw 2 more nests than in the 2022-23 season. The NPL has also maintained relatively stable nest numbers throughout previous seasons, with a notable increase in the most recent 2022-23 season, where 16 nests were found, an increase of 7 from the last season and the largest count since nest counting began in 2003-04.

Conversely, the EPL has shown a decline in nest findings in recent years, with no nests discovered since the 2018-19 season. The STRL, monitored by ACCB, is the newest addition to nest searching, beginning in the 2019-2020 season. Results thus far indicate a slight increase in nests found, with the current season boasting their second-highest all-time count of eight nests found.

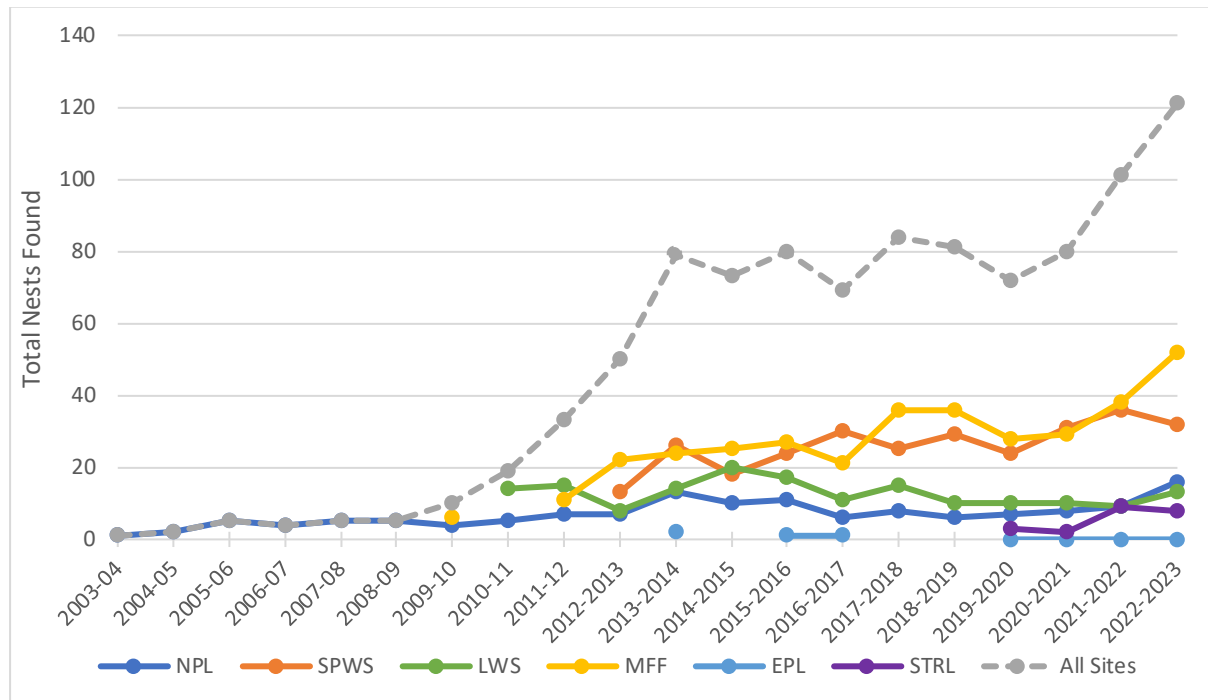


Figure 11. The annual count of White-shouldered Ibis nests for each site from 2004 - 2023

White-shouldered Ibis Nest Monitoring & Protection Results

To ensure the maximum success rate of White-shouldered Ibis nests, it is the responsibility of each organisation to monitor and protect as many nest sites as possible within the limits of their capabilities. The protection methods may vary depending on the organisation as each will be variably limited due to financial resources, the size of the surveyed landscape and the number of field staff available. Organisations will also employ the use of local community members to help monitor nests on a more regular basis. Compensation schemes have also been set up by some organisations to encourage nest protection and monitoring by local community members. All staff and community members would have received the appropriate training and instructions on monitoring protocol by qualified members of the working group organisations. This training ensures that neither the nests nor the birds are disturbed, which could influence their natural behaviours, such as incubation and ultimately impact the success of the nest and the number of fledglings.

The overall aim of nest monitoring and protection is to record the number of nests that succeed and those that fail. Although finding and monitoring every single nest in each landscape is not plausible, recording

the success and failure of those that are found will allow the CIWG to collate that information and understand how big of a difference nest monitoring and protection have on the population.

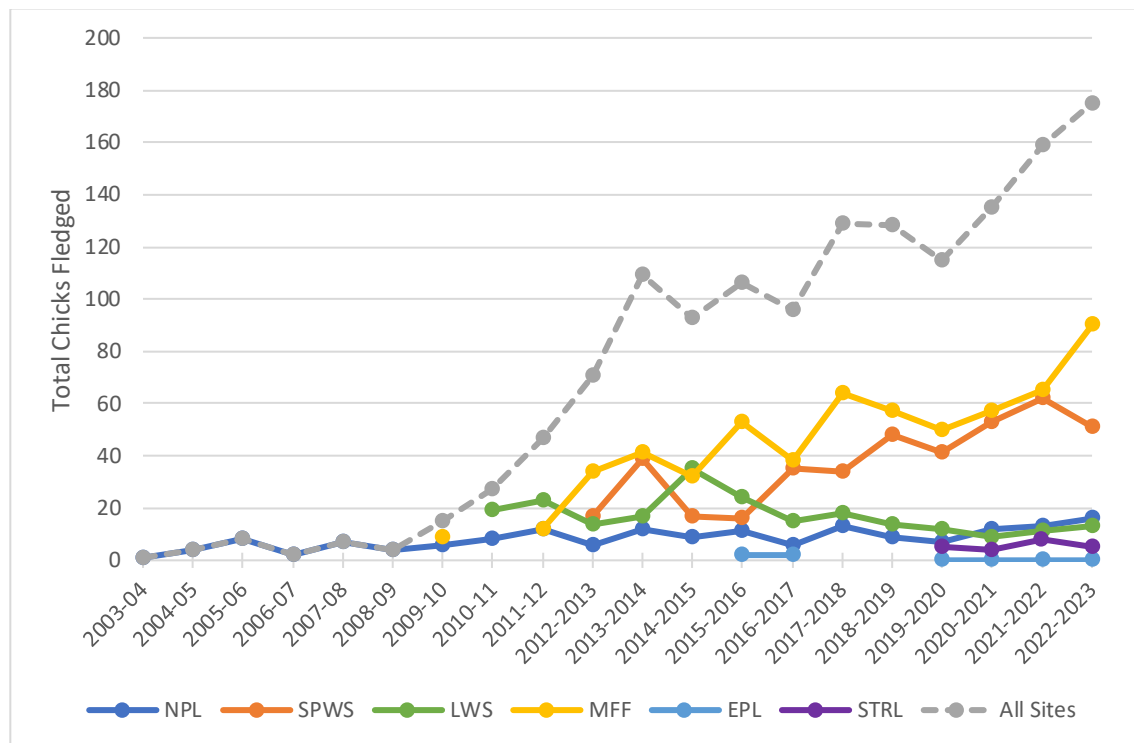


Figure 12. The total number of recorded White-shouldered Ibis chicks fledged from all sites between the years 2003 and 2023.

The total number of recorded chicks fledged for all sites has shown to be sharply increasing in recent years, particularly since the 2008-09 season (Figure 12). However, the data can also be representative of several other factors influencing more than just the population of White-shouldered Ibis fledgling success. For example, there is a large increase as more organisations start recording and more sites are covered. There has also been an increase in the resources put in place to monitor the number of nest sites thus increasing the number of fledglings recorded. There have also been improvements in the ability of field staff to search and find nests. These results, while at a local level are still extremely useful, they also provide vital data on the current population estimates of White-shouldered Ibis at a national level, enabling us to compare population estimates against fledgling success.

The two sites with the highest number of fledglings during the 2022-23 season came from the MFF and SPWS, the two sites that have historically recorded the highest number of White-shouldered Ibis. The MFF had a total of 90 successfully fledged chicks during the 2022-23 season, an increase of 25 chicks from the previous season. Siem Pang Wildlife Sanctuary had a total of 51 successfully fledged chicks, a decrease of 11 from the previous season.

The third-highest site was the NPL, with a total of 16 successfully fledged chicks, three higher than recorded in the 2021-22 season. This season was also the highest number of successfully fledged chicks

that the Northern Plains Landscape has observed since they started recording in 2003. Lomphat Wildlife Sanctuary recorded a total of 13 successfully fledged chicks, two more than last season. Finally, the STRL observed a total of five successfully fledged chicks, three less than the previous season.

Nest Success Rate

The nest success rate was determined by comparing the total number of nests discovered to the number of successful nests, expressed as a percentage. This dataset enables the identification of trends in annual nest success rates, facilitating comparisons across seasons and sites. For instance, a sustained decline in nest success rate at a single site over multiple seasons may indicate adverse influences compared to previous years, warranting further investigation and potential mitigation measures to address this decline at the specific site. Such declines are typically associated with anthropogenic pressures, such as land conversion.

Conversely, if a notable decrease occurs across multiple sites in a single season, it may be attributed to abiotic factors such as extreme weather patterns, or factors impacting the species on a national or even global scale. Additionally, drops in nest success rates within a single season at an individual site can also occur, these isolated instances are often caused by factors such as increased predation success and can be a case of short fulgurations in predator abundance.

Monitoring and analysing these datasets allow for a timely understanding of these changes and enable the CIWG to predict future trends in nest success rates, fledgling success and overall White-shouldered Ibis population trends under the assumption there are no significant landscape changes.

Table 5. The percentage of Successful Nests from the Total Nests at each site during the 2022-2023 season.

Site	NPL	SPWS	LWS	MFF	EPL	STRL	All Sites
Nest Successfully Fledged Rate	56.3%	84.4%	61.5%	92.3%	N/A	37.5%	84.4%

The 2022-23 season witnessed the third-highest count of successful, White-shouldered Ibis nests since the beginning of recorded data (Figure 13). However, it is important to note that this data may be skewed due to the removal and addition of certain monitoring sites. For instance, the EPL has not collected nest data since the 2015-16 season, while the STRL only began collecting data in the 2019-20 season. However, it is no surprise this season saw the highest number of successful nests, as it also saw the highest number of total nests found.

The percentage of successful nests indicates that for the previous four seasons (2019 to 2023), where data was collected at most of the sites, the success rate of recorded, White-shouldered Ibis nests remained very high, ranging between 78.5% to 86.2%. The 2022-23 season saw a rate of 84.4%, which is notably high when compared to research on many other Ibis species (Herzog *et al.*, 2020; Keo *et al.*, 2009). This success

could be a result of the collaborative efforts of the CIWG contributing to the protection of White-shouldered Ibis in Cambodia.

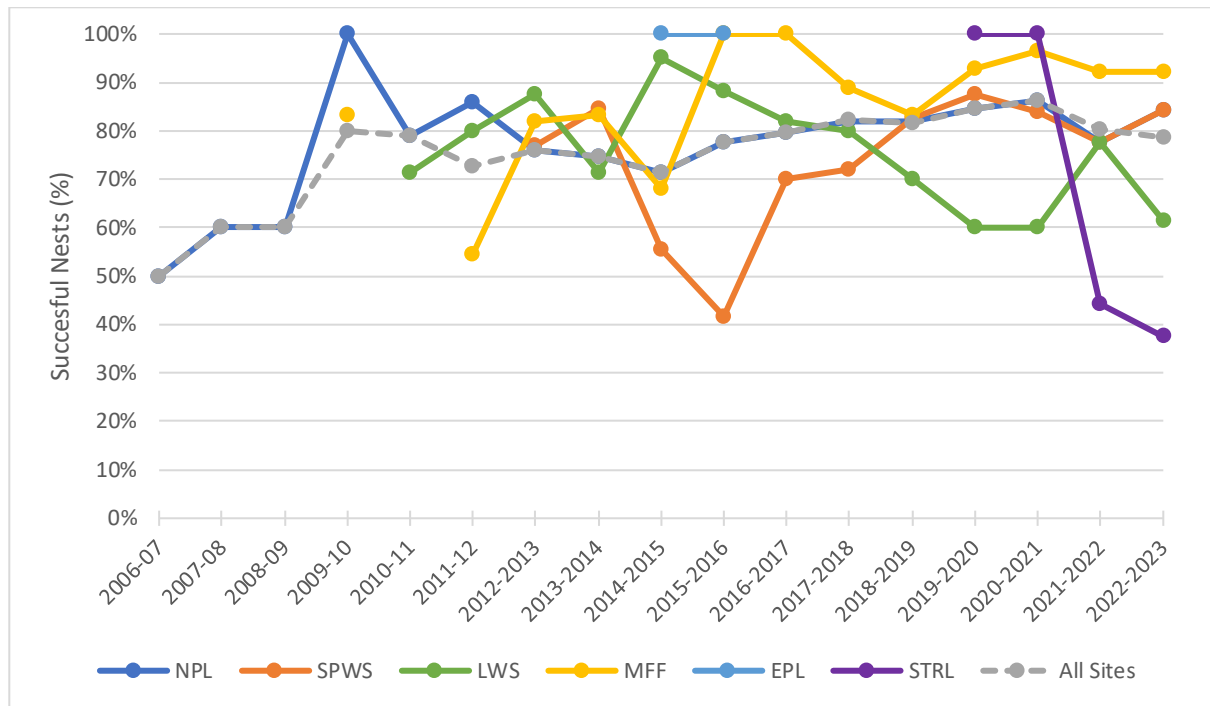


Figure 13. The percentage of successfully recorded nests for the White-shouldered Ibis at all sites from 2006-2023.

During the 2022-23 season, the MFF emerged as the site with the highest percentage of successful, White-shouldered Ibis nests, boasting an impressive 92.3% success rate (48 out of 52 nests) (Figure 13). This site has consistently maintained the highest success rate, rarely dropping below 80% and is one of two locations with the largest number of total nests found. The exceptional success rate at the MFF reflects both the quality of the habitat and the well-organized protection provided to the White-shouldered Ibis population in this area.

The SPWS was the next highest, with a success rate of 84.3% (27 out of 32 nests). Similar to the MFF, SPWS has consistently reported high numbers of total nests found. These two sites serve as strongholds for the Cambodian White-shouldered Ibis population, playing a crucial role in maintaining stable White-shouldered Ibis numbers and ensuring a high nest success rate.

In contrast, LSW reported a total nest success rate of 61.5% (8 out of 13 nests), while the NPL recorded a success rate of 56.3% (9 out of 16 nests). Although both sites have historically maintained high nest success rates, they have experienced a slight decline in the 2022-23 season.

The increase in the total number of nests discovered at both LWS and the NPL in the 2022-23 season compared to previous seasons may explain the lower overall success rates. This increase in total nests discovered resulted in higher numbers of successful nests but also contributed to lower success rates.

Furthermore, the STRL reported a notably lower success rate of 37.5% (3 out of 8 nests). The site, which previously consisted of Koh Sralay, expanded to include Koh Hib and Koh Snaeng in the 2022-23 season, where another population of White-shouldered Ibis was discovered. This addition of Koh Hib and Koh Snaeng, coupled with the relatively low number of nests being monitored, can significantly impact the data. For instance, in the 2020-21 season, only two nests were discovered on Koh Sralay, both of which survived, resulting in a 100% success rate. However, the following season saw nine nests discovered on Koh Sralay, with twice as many nests surviving compared to the previous year (four), yet the success rate dropped to 57.1%.

Nest Productivity

Nest productivity, which refers to the number of chicks fledged per successful nest, offers crucial insights into the quality and suitability of habitats for breeding White-shouldered Ibis. This metric serves as an indicator of habitat quality, reflecting factors such as food abundance and availability of sufficient shelter from predators. In ideal conditions, White-shouldered Ibis typically produce two or three chicks per successful nest (Matheu *et al.*, 2020), making nest productivity a key indicator of the habitat's ability to support healthy populations of White-shouldered Ibis. Additionally, nest productivity can shed light on predation pressure, with lower productivity potentially indicating increased predation rates. Understanding nest productivity is vital for effective habitat management and conservation efforts, as it provides valuable information on the reproductive success of W populations and the overall health of their habitats.

In the 2022-23 breeding season, the average number of chicks successfully fledged per nest was 1.84, representing a slight decrease from the previous season's average of 1.96 chicks per nest (Figure 14). It is worth noting that the 2021-22 season also recorded a decrease in the number of located nests by 20 and successful nests by 14 compared to the 2022-23 season. Despite being one of the seasons with historically lower nest productivity, it is essential to interpret this data cautiously due to the inclusion of new sites and an increasing number of total nests being discovered.

Table 6. *The Average number of White-shouldered Ibis chicks' success per nest 2022-2023.*

Site	NPL	SPWS	LWS	MFF	STRL	All Sites
Chicks per successful nest	1.78	1.89	1.63	1.88	1.67	1.84

In comparison to the preceding season, the 2022-23 season witnessed a decline in the average number of successfully fledged chicks at three out of the five sites (Table 6). Most Notably SPSW, which experienced

a decrease from 2.21 chicks per nest in 2021-22 to 1.89 in 2022-23, marking the lowest average success rate per nest at SPWS since the 2016-17 season. Similarly, NPL observed a decline from 1.86 chicks per nest in 2021-22 to 1.78 in 2022-23. Another site exhibiting a reduced average success rate of fledged chicks was the STRL, which decreased from 2.0 in 2021-22 to 1.66 in 2022-23.

Conversely, the MFF and LWS sites demonstrated an increase in their average success rates. The MFF recorded a marginal increase from 1.86 in 2021-22 to 1.88 in 2022-23, whereas LWS showed a rise in nest productivity from 1.57 in 2021-22 to 1.63 in 2022-23, representing an increase of 0.06 chicks per nest.

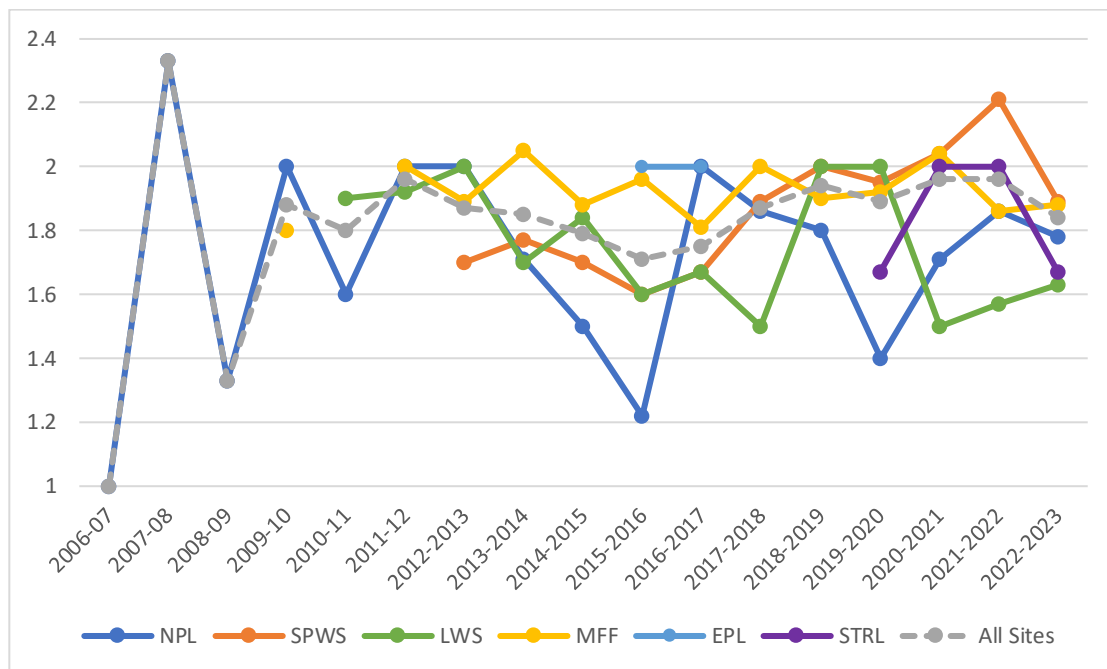


Figure 14. The Nest Productivity of recorded White-shouldered Ibis nests at Each Site from 2006-2023.

The historical records of each site offer valuable insights into the trends and fluctuations in nest productivity over the years. Analysing the data provides a comprehensive view of how each site has performed, highlighting both the stability and variability in nest productivity, in addition to providing further potential data on habitat quality and changes in a site's landscape.

The NPL site has shown frequent drops in productivity, but always witness a return to its previous high productivity (Figure 14). For example, the site saw a peak of 2.00 in 2016-17, followed by a drop to 1.4 two seasons later in the 2019-20 season, but most recently saw the following three seasons remain above 1.7. As mentioned previously, declines in a single season could be a result of short seasonal changes in a specific habitat such as increased predation rates or high nest disturbance.

Nest productivity at the SPWS site has seen a slow increase over the years since data was collected. The site saw a peak of 2.21 chicks per nest most recently in the 2021-2022 season, with a slight decline to 1.89

in 2022-23. This site has maintained a high nest productivity and continues to show potential as an increasingly important site in the far Northeast of Cambodia.

The LWS site has shown a significant increase in productivity in 2022-23, after seeing a decline in the previous two seasons. Similar to the NPL, the LWS experiences short declines in nest productivity but inevitably bounces back to higher numbers.

The MFF site has exhibited relatively stable nest productivity over the years since data was collected in the 2009-10 season. The site recorded a marginal increase from 1.86 chicks per nest in 2021-22 to 1.88 in 2022-23, maintaining a consistent level of productivity. The importance of the MFF cannot be underestimated, as the nest productivity at the site has never dropped below 1.8, a very high nest productivity maintained.

The EPL site has not recorded any White-shouldered Ibis nests since the 2015-16 and 2016-17 seasons, where they had a nest productivity of 2.00, although both as a result of one successful nest with two chicks. Nest productivity at the STRL site has seen highs of 2.00 and lows of 1.67 throughout four seasons. The STRL is the newest site to start collecting nest data on White-shouldered Ibis and will require further data to fully see a trend appear.

WHITE-SHOULDERED IBIS POPULATION CENSUS 2023

It is estimated that Cambodia is home to approximately 87-95% of the global population of White-shouldered Ibis with the non-Cambodian population found along the Mahakam River in East Kalimantan, Indonesia (BirdLife, 2018). In 2009, a collaborative initiative was launched by the Ministry of Environment (MoE), Forestry Administration, and several conservation organizations to conduct a national census to monitor the White-shouldered Ibis population in Cambodia. This monitoring program aims to estimate both the population size and trends of the species by counting the birds in their wet season roosts.

The White-shouldered Ibis census is conducted four times a year during the wet season months of July, August, September, and October. These months coincide with the species' communal roosting behaviour, ensuring the accuracy of the counts. Field teams visit roost sites on specified dates each month, this approach minimises errors and prevents double-counting due to potential movements between sites. The teams conduct an evening count of Ibises arriving at the roost, followed by a morning count of birds leaving the roost the next day. The evening and morning counts are scheduled for the 15th and 16th of each census month.

Before the census date, field monitoring staff conduct surveys to identify the optimal locations and roosts for the census. Evening counts typically take place between 17:30 to 18:30 or until it is too dark to continue counting. The morning counts on the following day typically start before sunrise, between 05:30 to 06:30 and last until all birds have seemingly left the roosts the following day. Each team records their counts, and the highest count from each roost is selected and aggregated across all sites to provide a national Minimum Population Estimate (MPE).

The census involves organisations from the CIWG, MoE and MAFF rangers or personnel, local community conservation group members, or local community members employed on behalf of members of the CIWG. All census team members, including local community members, will undergo comprehensive training provided by the CIWG members, this will ensure that data collection and management are as accurate as possible.

In 2023, roost census counts were conducted by six member organisations of the Cambodian Ibis Working Group. The census was conducted across seven different sites, consisting of:

1. **Northern Plains Landscape (NPL)** - Covering Kulen Promtep Wildlife Sanctuary in Preah Vihear Province. Counts were organised by the WCS Cambodia Programme
2. **Siem Pang Wildlife Sanctuary (SPWS)** - in Stung Treng Province. Counts were organised by Rising Phoenix Co. Ltd.
3. **Lomphat Wildlife Sanctuary (LWS)** - in Ratanakiri and Mondulakiri Provinces. Counts were organised by NatureLife Cambodia.
4. **Mekong Flooded Forest (MFF)** – Consisting of Sambor Wildlife Sanctuary and the Mekong River Dolphin Management Area in Kratie Province. Counts were organised by WWF- Cambodia Mekong Flooded Forest Programme.
5. **Eastern Plains Landscape (EPL)** - including Phnom Prich and Srepok Wildlife Sanctuaries in Mondulakiri Province. Counts were organised by the WWF Eastern Plains Landscape Programme.
6. **Stung Treng Ramsar Landscape (STRL)** - in Stung Treng Province. Counts were organised by ACCB.
7. **Baray and Chung-doung Bengal Florican Conservation Area (BFCA)** - counts were organised and performed by the WCS Cambodia Programme.

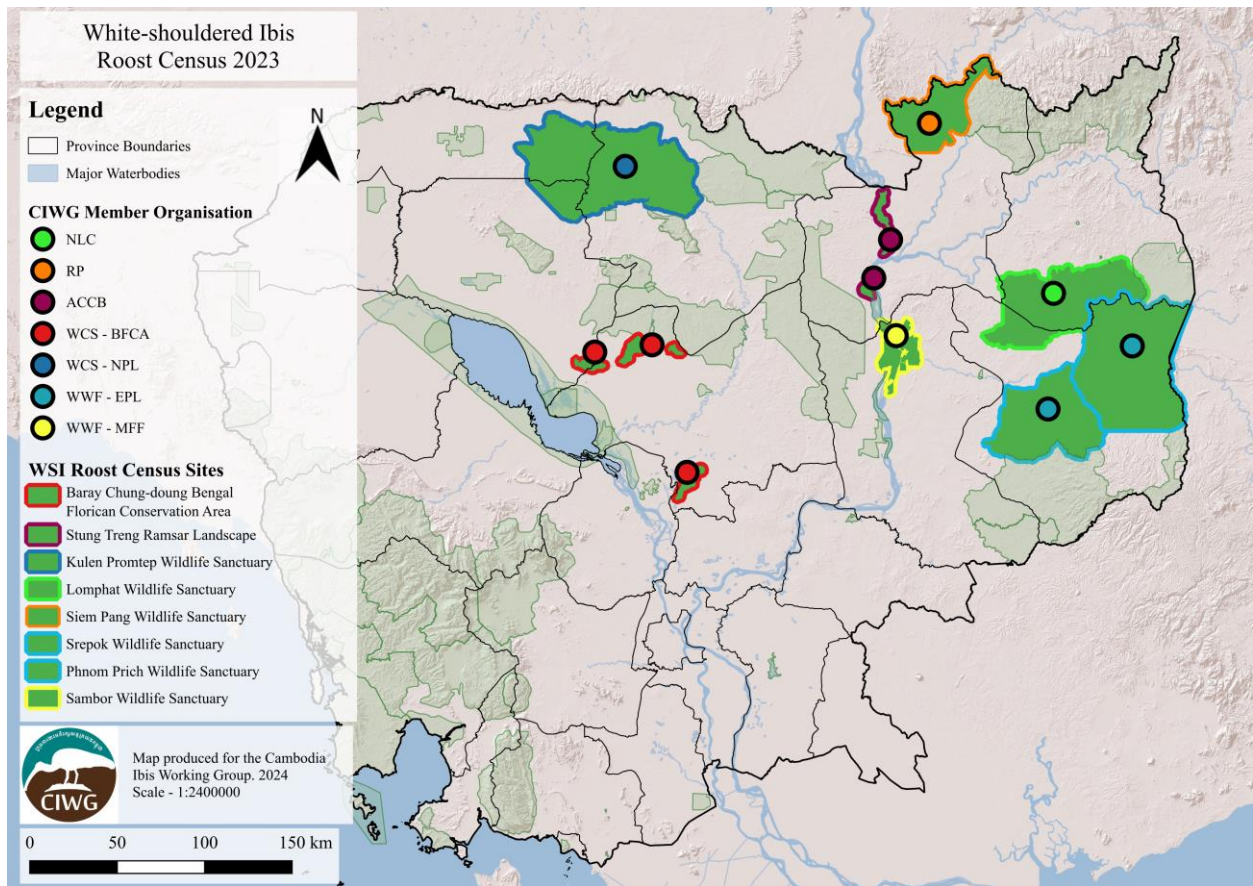


Figure 15. Map of White-shouldered Ibis census locations and the CIWG member organisations that conduct them.

The MPE for the White-shouldered Ibis in Cambodia was 784 mature individuals (Table 7), this was across all sites involved in the 2023 annual census. This was a small decrease from the previous season which had a MPE of 792.

The MPE for 2023 was chosen from September as this had the highest count for any of the four census months. The largest site count during this month came from SPWS with a high count of 370. The second highest was the MFF site with 302 White-shouldered Ibis. The NPL had 59, the STRL had 49, the LWS had 22, and the EPL saw just 11. This year's census also saw the introduction of a new site, the Baray and Chung-dong Bengal Florican Conservation Areas (BFCA), this site managed to observe just six individuals during three of the four census months.

Table 7. The White-shouldered Ibis census results from six site locations in 2023.

Site	July	August	September	October	Highest Count: by Site
NPL	59	68	59	51	68
SPWS	292	321	370	184	370
LWS	9	18	22	22	22

MFF	216	236	302	265	302
EPL	20	5	7	11	20
STRL	40	23	18	49	49
BFCA	6	6	6	0	6
Highest monthly count: All Sites	642	677	784	582	

Data produced by Wright *et al.* (2012b) suggested that Cambodia likely supports a significant portion of the total global population of White-shouldered Ibis, approximately 87-95%. Beyond Cambodia, the only other known population exists along the Mahakam River in East Kalimantan, Indonesia, this population was last estimated to have around 30-100 individuals back in 2005 but has seen a decline since then, the current population is unknown and should be investigated further (Sozer & Nijman, 2005).

The methodology for estimating populations has evolved over the years, with the number and locations of conducted census counts increasing. From 2009 to 2011, counts were conducted at four sites (SPWS, LWS, MFF, and NPL). This expanded to five sites from 2012 to 2018, including the EPL. In 2019, ACCB started monitoring Koh Sralay, which was previously part of WWF’s monitoring. In 2023, Koh Hib and Koh Snaeng were added to ACCB’s census counts, and the three islands were counted under the name STRL. Most recently in 2023, the addition of the BFCA has been included (Table 7).

Furthermore, the level of effort within each site, defined as the number of roost sites covered during each census, may vary between months or annually. These variations highlight the dynamic nature of population estimation and the importance of considering both spatial and temporal factors in census efforts. The creation of the CIWG has helped to standardise the census counts across all sites and introduced increased effort into identifying new roost sites. As the CIWG efforts to maximise the efficiency of the census counts improve, so will our population estimates. For these reasons, it is best to keep in mind that the current data displayed in Table 11 reflects increased efforts from coordinated conservation organisations rather than accurate population trends of Cambodian White-shouldered Ibis at a national level, however, it does provide an estimate for population trends, especially within individual sites.

Table 8. *The White-shouldered Ibis Census Result from 2009 - 2023.*

Year	NPL	SPWS	LWS	MFF	EPL	STRL	BFCA	Annual High Count
2009	27	147	76	55				310
2010	34	226	185	124				521
2011	39	262	242	121				644
2012	47	346	278	103	36			754

2013	58	451	298	152	77			973
2014	55	404	318	170	26			892
2015	48	491	218	168	63			938
2016	38	272	144	183	38			590
2017	35	404	53	178	34			646
2018	31	320	27	156	49			531
2019	46	344	25	172	19	38		596
2020	42	385	12	251	8	34		690
2021	40	373	5	252	14	83		755
2022	54	377	14	330	16	43		792
2023	68	370	22	302	20	49	6	784

Population counts at NPL have shown a steady increase throughout the census count years and the population will often bounce back if a drop is seen in a previous year (Figure 16). The 2022-23 census also saw the largest count yet for the NPL, with 68 individuals being recorded, a much larger increase compared to other years, showing much promise for the conservation efforts in the region.

The historical data shows a general increasing trend in the White-shouldered Ibis population at SPWS from 2009 to 2013, with some fluctuations in later years. The population more than doubled from 2009 to 2013, indicating a period of growth or potentially an increase in the number of observers. However, there was a slight decrease in 2014 followed by a gradual increase again and several large fluctuations over the following years. Overall, SPWS has maintained an extremely high population count compared to other locations, showcasing why it is a key habitat for White-shouldered Ibis conservation in Cambodia.

LWS showed a steep increase in White-shouldered Ibis numbers from 2008-2014, seeing highs of around 300 individuals. Following 2014 the site saw a significant decline, which is concerning. The population seem to be dropping by around 100 individuals annually, dropping into double figures in 2017. Most recent population counts have seen highs of 22 individuals, a very small increase of eight since 2022.

While there are minor fluctuations in the White-shouldered Ibis populations in the MFF, there is an overall increasing trend that has been happening since the 2009 census was conducted. Again, this trend may also be a result of increased census participants, but the data clearly shows a large increase in the past 14 years, going from 55 individuals to a record high of 330 individuals in 2022. In 2023 the results displayed a small decline of 28 individuals, but there's no doubt that the MFF is an extremely important site for the future of the White-shouldered Ibis population in Cambodia and globally.

The EPL exhibits considerable fluctuations from year to year ranging from 8 to 77 individuals. The census results show the population here does not appear to be stable with the overall trend appearing to decrease,

however, the 2022-23 census did see an increase to 20 individuals from the 16 individuals in 2021-22, showing perhaps some signs of promise.

The STRL shows a relatively stable trend in population counts, ranging from 34 to 83 individuals, data collection from the site by ACCB only started in 2019, with WWF previously monitoring Koh Sralay. While there are minor fluctuations, the population at STRL has remained relatively consistent, however, it should be noted that STRL consists of three islands, Koh Sralay, Koh Hib and Koh Snaeng, with Koh Hib and Koh Snaeng only being included in the census since 2023.

The BFCA conducted its first White-shouldered Ibis census this year and observed six individuals during three of the four counts and zero for the final count. The knowledge that White-shouldered Ibis are present in this area is promising and continued efforts to record the population accurately should continue.

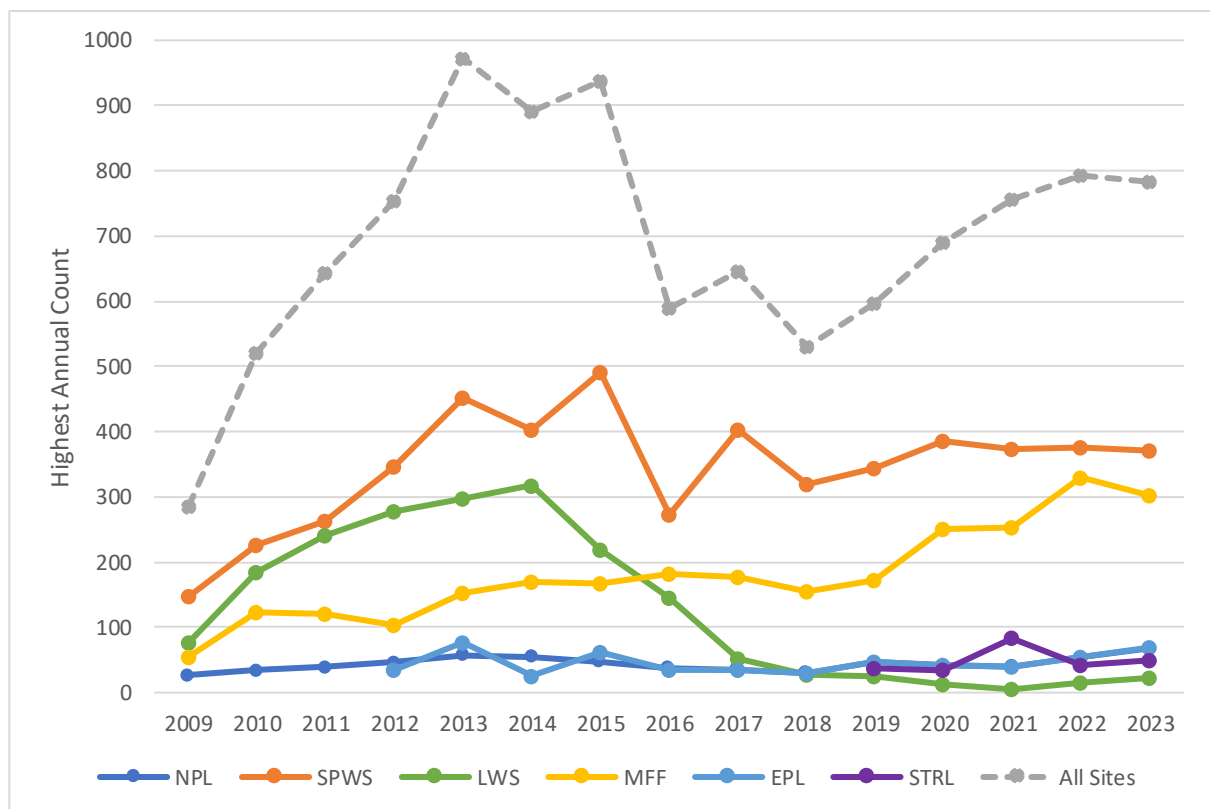


Figure 16. The White-shouldered Ibis Population Trend for all sites from 2009-2023.

The overall trend for the highest population counts annually since 2009 shows that Cambodia still hosts many White-shouldered Ibis, with the latest results showing 784 individuals in 2023 (Fig.17). There was a significant increase in 2013, with the census recording 754 individuals in 2012 to 973 individuals in 2013. This may have been the result of the inclusions of the EPL which started recording in 2012 and recording a significantly higher number (77) in the following year.

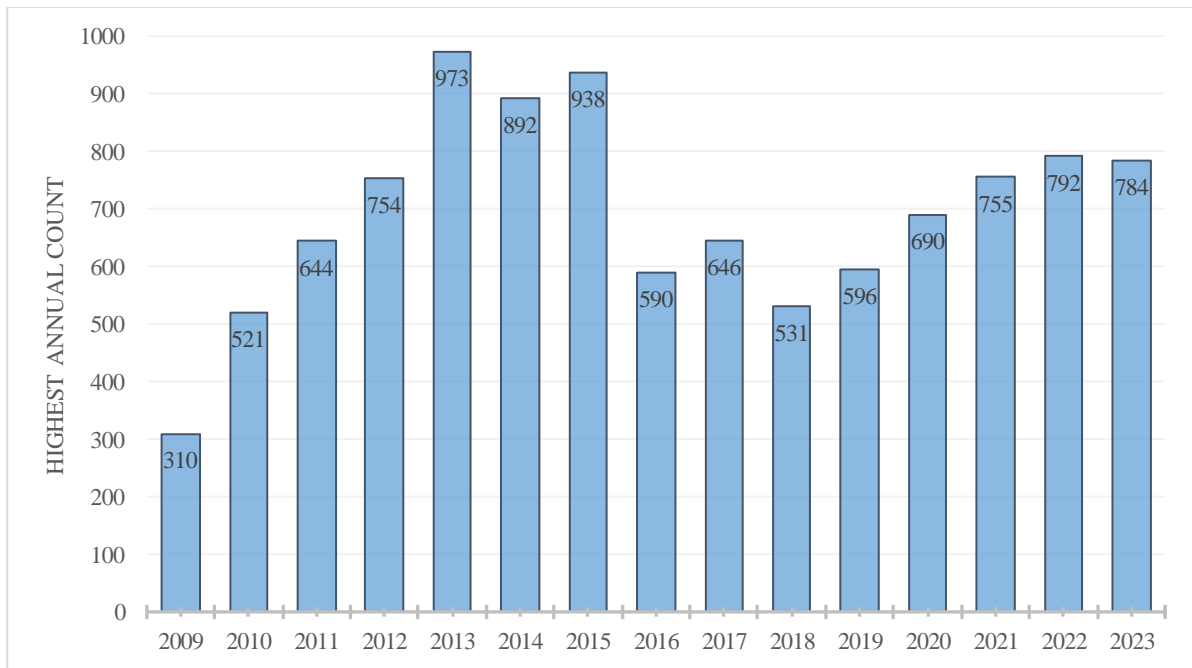


Figure 17. *The White-shouldered Ibis Census Results based on the highest annual count for all sites, from 2009-2023.*

WORKING GROUP MEETINGS

Cambodian Ibis Working Group Meetings - 2023

The Cambodian Ibis Working Group convenes every 3-4 months in the Cambodian capital of Phnom Penh, bringing together conservation NGOs and government members. This collaborative effort was established to protect the White-shouldered Ibis and Giant Ibis from extinction. These meetings serve as a platform to share information on population changes and landscape impacts affecting both Ibis species. Additionally, the CIWG facilitates the sharing and collation of national census and nest data, which is crucial for producing the annual report and providing the sole national population count for these endangered species.



Figure 18. Members of the Cambodian Ibis Working Group at the August 2023 meeting.

CIWG Quarterly Meeting – 19th April 2023

The first CIWG meeting of 2023 was conducted on the 19th of April, at the Phnom Penh Era Hotel: #44, St. 163, Village 3, Sangkat Olympic, Khan Chamkarmon, Phnom Penh, Kingdom of Cambodia. This meeting saw 15 participants attending overall, including members from NGO's WCS, WWF, NLC and ACCB, Government members also attended, including those from the MoE and the FA. The main discussion points of the meetings were as follows:

1. To present updates on the recent conservation developments from each site related to the status of, and threats to Critically Endangered Ibis populations.

2. To review the progress of the development of the first CIWG Annual Report (2022).
3. To propose and outline a cloud-based system (Google Drive) for storing and sharing CIWG reports, data, and resources.
4. To review and finalise a protocol for conducting the White-shouldered Ibis Roost Count Census.

CIWG Quarterly Meeting – 29th August 2023

The second CWIG meeting was held on the 29th of August at the Phnom Penh Era Hotel: #44, St. 163, Village 3, Sangkat Olympic, Khan Chamkarmon, Phnom Penh, Kingdom of Cambodia. The meeting was attended by 16 participants and consisted of government members from the MoE and the FA, in addition to members from five NGOs: NLC, RP, WCS, WWF and ACCB. The main topics covered during the meeting were:

1. To officially activate the management structure of CIWG and present updates on the recent conservation developments from each site related to the status of, and threats to Critically Endangered Ibis populations.
2. To present the first draft of the CIWG 2022 annual report and get input from members.
3. To update the structure of a cloud-based system (Google Drive) for storing and sharing CIWG reports, data, and resources.
4. To review and finalize the Kobo-collect form for collecting White-shouldered Ibis roost census count data.
5. To review the status of Ibis Action Plan(s) discuss and develop Ibis' 10-year action plan.

CIWG Quarterly Meeting – 11th December 2023

The Third and final working group meeting of 2023 was held on the 11th of December at the Phnom Penh Era Hotel: #44, St. 163, Village 3, Sangkat Olympic, Khan Chamkarmon, Phnom Penh, Kingdom of Cambodia. The meeting saw 13 participants attending, including four members from the MoE and a member from the FA. From NGOs, three members from NLC attended, three members from ACCB, one from RP and one member from the Centre for Biodiversity Conservation (CBC). The objectives of the final 2023 meeting were as follows:

1. To update Ibis Conservation work from all sites from January to December 2023.
2. To finalize the CIWG 2022 annual report
3. To discuss and update the current White-shouldered Ibis
4. conservation status to develop a new White-shouldered Ibis 10-year action plan.



Figure 19. Photo from the August 2023 Cambodian Ibis Working Group Meeting at the Phnom Penh Era Hotel

DISCUSSION

White-shouldered Ibis Population Trend Overview

The 2023 census results revealed a slight decrease in the White-shouldered Ibis count compared to the previous year, with a total of 784 individuals recorded (Figure 17). This count marks a change from the trend of the previous five years, which had consistently shown increasing numbers. Despite this, the decline in the 2023 count was only a matter of eight individuals, a number that can be easily overlooked, especially if the 2024 season shows a higher count. Small fluctuations are not uncommon, particularly in stable or growing population. When such a small difference is observed, it must be noted that not all roost sites are accounted for, simply due to the sheer size of the landscapes and the amount of field staff needed to consistently cover such vast areas. However, prior to the 2022 report, information on effort and the number of roost sites surveyed was not included, only the results minimum population estimates. Furthermore, various environmental factors, such as weather conditions, food availability, and habitat disturbances, can influence yearly population counts. Annual variations in the visibility and accessibility of roosting and

feeding sites can also impact census accuracy. Overall, the small fluctuation in the population between 2022 and 2023 should not be an immediate cause for concern.

In 2023, four out of the six sites that provided census data in 2022 reported higher counts (Figure 16). These four sites, although hosting smaller White-shouldered Ibis populations compared to the NPL and SPWS, have shown significant progress in recent years. These sites have seen steady population growth after experiencing significant declines several years prior. The NPL and SPWS, while experiencing slight decreases in White-shouldered Ibis counts, still maintain the largest populations of White-shouldered Ibis in Cambodia.

Overall, the findings underscore the importance of continued collaborative efforts between conservation organisations, local communities, and government agencies to protect and conserve the White-shouldered Ibis population in Cambodia. Long-term monitoring and adaptive management strategies are crucial to ensure the sustainability of these conservation efforts and the survival of this critically endangered species.

Giant Ibis Population Trend

The most recent estimate by the IUCN Red List places the global population of the Giant Ibis at 194 mature individuals, equivalent to approximately 290 individuals. However, this estimate dates back to 2014, and no official global population estimates have been conducted since then. In Cambodia, only two locations, SPWS and LWS, have made any recent attempts at population counts for the Giant Ibis. These local efforts, while valuable, may be insufficient to provide a comprehensive update to the global or even national population estimates. However, the previous 2014 population estimate was also made with only a few local estimates. Now with the addition of new sites and increased personnel within the working group, more accurate data should be possible to attain. Therefore, it is crucial to undertake further efforts to conduct an up-to-date population estimate to inform conservation actions. Unlike the White-shouldered Ibis census, this does not necessarily need to be an annual event, but perhaps a single event to provide an update to the IUCN Red List population, or at least the national population.

The nest monitoring data presented in this report suggest a positive trend in Giant Ibis populations at selected priority sites in Cambodia over the previous ten-year period, despite some extreme fluctuations in individual years. The NPL and SPWS continue to play vital roles in the conservation of the species, consistently hosting the largest populations. Additionally, there are promising signs of success in conservation efforts at some of the sites which see fewer Giant Ibis, sites such as the MFF, where the last three years have seen two chicks successfully fledged from nests. Although the EPL did not record any nests or chicks in the current year, it is important to note that data recording at this site only began in 2022. Therefore, it is hopeful that future monitoring efforts will provide a more comprehensive understanding of the Giant Ibis population dynamics in this area.

Overall, the collaborative efforts of the conservation organizations in the CIWG, local communities, and government agencies have been instrumental in protecting and conserving the Giant Ibis. While there are positive indications of population growth and conservation success in particular areas, ongoing monitoring and conservation efforts are crucial to ensure the continued survival and recovery of the Giant Ibis population in Cambodia.

Nest Monitoring and Protection

Current nest monitoring and protection strategies seem to be an effective method of improving or maintaining the successful rate of nests and fledglings. For the White-shouldered Ibis, the CIWG has seen a significant increase in the total number of successful nests across all sites. The total number of successfully fledged chicks has also seen significant increases, with numbers continuing an upward trend. The data provides vital information on the difference that deploying field teams and working closely with local communities can have on the success of this species. The incentives that are given to locals have also proven to be an effective method for nest finding and for providing regular updates on chick status, particularly in areas where field teams may struggle to visit on a regular basis.

The nest monitoring and protection for the Giant Ibis has allowed the number of nests and chicks fledging to remain relatively stable, with a few major increases seen in some years. The trend for Giant Ibis is not improving at the same rate as the White-shouldered Ibis, and the number of successful nests has seen fluctuations in recent years. It is important for the survival of the Giant Ibis that we use this data to try to understand why there is a lack of improvement in population numbers. The fact that the population has remained stable for the number of fledglings and fluctuated for successful nests, means that it may be an issue related to the quality of the habitat rather than smaller issues such as nest predation.

Ex-situ conservation

With some major upgrades being applied to the current White-shouldered Ibis enclosure, there are big plans for the ex-situ work that ACCB is currently undertaking. These upgrades include the addition of another Giant Ibis facility, although this won't be built till after 2024. In addition to this, ACCB is also expanding the current White-shouldered Ibis Enclosure. As more Ibis are rescued and rehabilitated, ACCB will be able to house and care for an increasing number of sick or injured birds and incorporate them into the assurance population in an effort to ensure a viable and genetically diverse population will be maintained at the centre for future release programs. Currently, ACCB's breeding of White-shouldered Ibis has been a huge success in recent years, and it looks to continue growth going forward, providing even more hope for the future of this species. Furthermore, ACCB has started to take on more students to conduct their master's research projects. Some of these projects will include research on the Ibis species housed at the centre. The research of both understudied Ibis species will allow for further observations on their behaviours that may contribute to future in-situ conservation efforts and improve our understanding of their ex-situ conservation requirements. Overall, the ex-situ work that is being conducted by ACCB is critical to ensuring that every

Ibis in Cambodia stands a chance of contributing to the survival of their species and further educating people on the importance of the work that the CIWG conducts.

RECOMMENDATION

Improvements in Population Monitoring

The current work being done to conduct an annual population census for the White-shouldered Ibis has provided valuable information on the national population trend of White-shouldered Ibis in Cambodia. Some sites such as the STRL have observed a notably large population on the island of Koh Sralay that has not been accurately counted due to the lack of field staff and the terrain of the island. It is understood that future census counts will employ more local community members to cover more roost sites on the island and improve the accuracy of the counts. These improvements for the STRL will be implemented for the 2024 census counts.

However, for the Giant Ibis, there is no census currently being undertaken. It is recommended that a methodology to update the 10-year-old population estimate is agreed upon so that it can be included in the subsequent Giant Ibis 10-year Action Plan, as well as published on the IUCN Red List. There will be a number of sites without the resources or local knowledge to follow the census methodology employed at SPWS and LWS, but in that case, a standardised approach to forming localised site estimates should be devised and agreed upon by the working group members.

Improvements in Public Outreach and Education

Education and outreach play a crucial role in the conservation of Ibis species in Cambodia. These efforts raise awareness among local communities, fostering a deeper understanding of the ecological importance of the White-shouldered Ibis and Giant Ibis and the threats they face. By educating the public, the Working Group organisations can cultivate a sense of stewardship and encourage community participation in protecting these birds and their habitats. Outreach initiatives also promote sustainable practices that reduce human impact on Ibis populations, such as minimizing habitat destruction and preventing disturbances during breeding seasons. Furthermore, involving local communities in conservation activities, such as nest monitoring and protection, not only enhances the effectiveness of these efforts but also provides economic benefits, creating a positive feedback loop that supports both biodiversity and local livelihoods. This is something that many organisations have already been implementing for a long time and have shown very successful in maintaining healthy relationships with local villages.

Many of the Working Group organisations have their own particular strategies and policies regarding general outreach, and conservation messaging and communications, and this can potentially frustrate efforts to collaborate on specific outreach materials. Instead, the Working Group is well-placed to identify

the key consistent themes and messages that to all sites, and to provide recommendations, as well as synchronising agreed messaging about Ibis at the national level.

Current work by many organisations includes visits to schools, to educate the children on the wildlife in their area and why it's important to protect them. On Koh Sralay for example, ACCB implemented large signs, to educate the local communities and tell them the risks if someone is caught endangering the birds, their nests, or their habitat. However, it should be noted that these particular signs have been damaged, as they have been in place since 2019, and are currently in the process of being replaced with updated signage. Overall, education and outreach are vital for building a collaborative, informed, and proactive approach to conserving Ibis species in Cambodia and although much work is already being conducted, improvements can be made.

Research on Ibis Range and Movements

This is a recommendation that was provided in the 2022 Annual Report but has yet to provide any further discussion. The behaviours of Giant Ibis and White-shouldered Ibis are still largely understudied, particularly when it comes to movements between sites. Recommendations were made regarding the use of GPS/GSM trackers to be used, this would provide valuable data, and enable collaborative efforts between organisations. The benefit of a GPS/GSM system is that data can be uploaded to databases such as MoveBank, where all members of the working group can access the data when needed. With help from NL and RP, ACCB attached a GPS unit to a Giant Ibis in 2021 that was housed at ACCB. This was to observe how the bird would respond to the GPS unit, with the testing period lasting a total of 3-months. The results showed that the GPS unit had minimal impact on the behaviours of the Ibis, and it was concluded that further GPS studies would be possible.

Another option is to implement a national ringing system, this would enable recordings of individuals during the national roost census and nest monitoring periods. This would require a much more sophisticated system to ensure longevity in the ring combinations and ensure that all organisations collect data the same way and share it accordingly. This would also need permission from the correct authorities. However, ringing does have some complications, including gaining access to nests for ringing juveniles. Ibis nests are situated high within the canopy, making it almost impossible to reach, particularly as some of these nests can reach 25m in height. This disturbance would also run the risk of chicks falling from the nests sites or causing high amounts of stress. The benefits of ringing, however, would mean that a system could be put in place to identify individuals and offspring of individuals based on a unique colour-ringing system. The option for ringing would require further discussion and advice from external experts within the field of bird ringing, particularly for Ibis.

Overall, increased efforts should be placed into further understanding the movements of individuals during seasonal changes, as well as the dispersal of fledglings. Pros and Cons should be identified for the different option for monitoring such movements, for example would a GPS system be less intrusive than a ringing system, particularly as we could acquire more data from GPS without the need of disturbing a much larger number of Ibis in regard to using a ringing system. However, the costs of a high-end GPS system might require the acquisition of external funding if costs are too high. Further discussion on movement monitoring should be a priority for understanding more about the behaviour both these Ibis species in Cambodia.

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APPENDICES

Appendix I: Giant Ibis nest searching results by site from 2003-2023, the table shows the number of Total nests found (N), the number of nests that successfully fledged chicks (S) and the number of chicks that successfully fledged (C).

YEAR	NPL			SPWS			LWS			MFF			EPL			All Sites		
	N	S	C	N	S	C	N	S	C	N	S	C	N	S	C	N	S	C
2003	5		0															
2004	27		46															
2005	28		52															
2006	28	23	52															
2007	32	23	42															
2008	17	17	30															
2009	41	36	66															
2010	19	17	32															
2011	31	31	59															
2012	18	18	31															
2013	26	21	39	2	1	1										28	22	40
2014	24	17	31	4	3	4										28	20	35
2015	18	17	28	11	6	6	4	4	5							33	27	39
2016	17	16	28	9	9	16	2	2	4							28	27	48
2017	25	20	23	15	13	19	9	9	13	1	1	2				50	43	57
2018	32	29	55	16	12	16	16	13	19							64	54	90
2019	22	19	35	11	7	11	10	7	9							43	33	55
2020	20	12	24	10	7	10	8	5	8							38	24	42
2021	18	15	24	17	11	14	11	8	11	2	1	2				48	35	51
2022	16	11	20	16	11	18	7	4	4	1	1	2	1	1	1	41	28	45
2023	18	15	23	17	10	16	5	4	5	1	1	2	0	0	0	41	30	46

*Key: N = Total nests recorded / S = Number of nests that successfully fledged / C = Number of chicks fledged

Appendix II: The historical records for the number of nests found (N) the number of successful nests (S) and the number of fledged chicks (C) from 2003-2023.

YEAR	NPL			SPWS			LWS			MFF			EPL			ACCB			All Sites			
	N	S	C	N	S	C	N	S	C	N	S	C	N	S	C	N	S	C	N	S	C	
2003-04	1		1																			
2004-05	2		4																			
2005-06	5		8																			
2006-07	4	2	2																			
2007-08	5	3	7																			
2008-09	5	3	4																			
2009-10	4	3	6							6	5	9							10	8	15	
2010-11	5	5	8				14	10	19										19	15	27	
2011-12	7	6	12				15	12	23	11	6	12							33	24	47	
2012-2013	7	3	6	13	10	17	8	7	14	22	18	34							50	38	71	
2013-2014	13	7	12	26	22	39	14	10	17	24	20	41	2						79	59	109	
2014-2015	10	6	9	18	10	17	20	19	35	25	17	32							73	52	93	
2015-2016	11	9	11	24	10	16	17	15	24	27	27	53	1	1	2				80	62	106	
2016-2017	6	3	6	30	21	35	11	9	15	21	21	38	1	1	2				69	55	96	
2017-2018	8	7	13	25	18	34	15	12	18	36	32	64							84	69	129	
2018-2019	6	5	9	29	24	48	10	7	14	36	30	57							81	66	128	
2019-2020	7	5	7	24	21	41	10	6	12	28	26	50	0	0	0	3	3	5	72	61	115	
2020-2021	8	7	12	31	26	53	10	6	9	29	28	57	0	0	0	2	2	4	80	69	135	
2021-2022	9	7	13	36	28	62	9	7	11	38	35	65	0	0	0	9	4	8	101	81	159	
2022-2023	16	9	16	32	27	51	13	8	13	52	48	90	0	0	0	8	3	5	121	95	175	