



CIWG ANNUAL REPORT 2022

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



EXECUTIVE SUMMARY

This report summarizes the results of Cambodia Ibis Working Group (CIWG) member's activities from the 1st of January to the 31st of December 2022. The Cambodia Ibis Working Group (CIWG) 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. The 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 (GDNPA) of the Ministry of Environment, the Forestry Administration of the Ministry of Agriculture, Forestry and Fisheries.

The priority sites for the conservation of the White-shouldered Ibis (WSI) and Giant Ibis (GI) in Cambodia are: at Siem Pang Wildlife Sanctuary (SPWS), Mekong Flooded Forest (MFF), Eastern Plain Landscape (EPL) (EPL refers to Srepok Wildlife Sanctuary (SWS) and Phnom Prich Wildlife Sanctuary), Kulen Brahmdeb Wildlife Sanctuary (KPWS), 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.

For the ex-situ population ACCB, in partnership with key stakeholders, rescues Giant Ibis and White-shouldered Ibis from the wild and illegal trade. These individuals have been rehabilitated at ACCB and since 2017 incorporated in the assurance population ACCB is establishing for the species with the support of the relative government authorities. As of 2022, ACCB houses three Giant Ibis (sex undetermined) and nine White-shouldered Ibis (three males, three females, three sex undetermined). During the reporting year, two White-shouldered Ibis came into the collection through rescues.

The major in-situ population monitoring for the two species includes nest monitoring and protection for both species, and a standardised coordinated population census for White-shouldered Ibis. For 2022, the national total number of Giant Ibis nests recorded was 41 nests, slightly above the 10-year mean from all sites of 40.1, with a total of 45 chicks recorded as fledging. For White-shouldered Ibis, 95 nests were recorded over the 2021-22 nesting season; the highest national count of White-shouldered Ibis nests since records began. From these, 158 chicks were recorded as fledging, also the highest-ever count recorded.

The Minimum Population Estimate for the Cambodian population of White-shouldered Ibis, derived from the standardized non-breeding season roost census count of all sites combined, in 2022 was 792. This continued an increasing trend that began in 2018 and was the fourth highest out of the 14 years of monitoring. For Giant Ibis, a population census was conducted at Lomphat Wildlife Sanctuary by NatureLife Cambodia, resulting in a minimum population estimate for the site of 30 individuals.

Three working group meetings were held for the CIWG in 2022.

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GLOSSARY & ABBREVIATIONS

ACCB	Angkor Centre for Conservation of Biodiversity
BLI	Birdlife International
CPA	Community Protected Area
CIWG	Cambodia Ibis Working Group
CWS	Chhaep Wildlife Sanctuary
DDF	Deciduous Dipterocarp Forest
EDGE	Evolutionarily Distinct and Globally Endangered
EPL	Eastern Plains Landscape (SWS and PPWS)
KBWS	Kulen Brahmdeb Wildlife Sanctuary.
LWS	Lomphat Wildlife Sanctuary.
MoE	Ministry of Environment
MFF	Mekong Flooded Forest.
NGO	Non-Governmental Organization.
PDAFF	Provincial Department of Agriculture, Forestry and Fisheries
PDOE	Provincial Department of Environment
PPWS	Phnom Prich Wildlife Sanctuary
SIBA	Sesan Important Bird Area
STRS	Stung Treng Ramsar site
SPWS	Siem Pang Wildlife Sanctuary
SWS	Srae Pok Wildlife Sanctuary
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

ACKNOWLEDGEMENTS

The Cambodia Ibis Working Group (CIWG) thanks all its members for their contributions, including the Royal Government of Cambodia's Ministry of Environment (MoE) and Ministry of Agriculture, Forestry and Fisheries (MAFF). The CIWG members would like to thank the various donors and supporters of the project activities.

This report was prepared in 2023 by Oliver Gray-Read and Ny Naiky (NatureLife Cambodia), with sections written by Christel Griffioen and Eleonore Zittoun (ACCB), with other contributions from the CIWG members from Rising Phoenix Co. Ltd, WCS Cambodia, and WWF Cambodia.

INTRODUCTION

This report summarizes the results of Cambodia Ibis Working Group (CIWG) member's activities from the 1st of January to the 31st of December 2022.

In 2021 a group of conservation NGOs and government agencies, ministries and departments agreed to form the Cambodia Ibis Working Group (CIWG) 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.

The 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 (GDNPA) of the Ministry of Environment, the Forestry Administration of the Ministry of Agriculture, Forestry and Fisheries.

The priority sites for the conservation of the White-shouldered Ibis (WSI) and Giant Ibis (GI) in Cambodia are: at Siem Pang Wildlife Sanctuary (SPWS), Mekong Flooded Forest (MFF), Eastern Plain Landscape (EPL) (EPL refers to Srepok Wildlife Sanctuary (SWS) and Phnom Prich Wildlife Sanctuary), Kulen Brahmdeb Wildlife Sanctuary (KPWS), 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.

Species Background: Giant Ibis *Thaumatibis gigantea*

The Giant Ibis *Thaumatibis gigantea* is the largest extant member of the Ibis family (Threskiornithidae), the Cambodian National Bird, and, with an EDGE score of 6.44 it ranks number #2 on the EDGE of Existence list for birds globally. The Giant Ibis is classed as Critically Endangered on the IUCN Red List.

The Giant Ibis was once found across mainland South-East Asian dry forest landscapes, however its range and population both contracted dramatically through the 20th century due to habitat destruction, disturbance, and hunting (Thewlis 1996). The contraction of the distribution of Giant Ibis resulted in the species extinction in Thailand, and the few relatively recent records from Laos and Vietnam possibly only represent spill-over from the Cambodian Giant Ibis population (Eang et al. 2021; Wright et al. 2012a; Loveridge & Ty 2015). The population contraction continued into the 21st century and is likely to be ongoing due to habitat loss due to encroachment and land conversion, and increasing human disturbance (Eang et al. 2021; Loveridge & Ty 2015; Birdlife International 2018). The near-endemic Cambodian population is largely restricted to the northern and eastern areas of the country (Ty et al. 2016) and is considered to be mostly confined to the protected areas of those regions (Eang et al. 2021).

The Giant Ibis is considered largely a specialist of Deciduous Dipterocarp Forest (DDF) (Eames et al. 2018; Ty et al. 2016), dependent on a matrix of habitats incorporating grasslands, wetlands, undisturbed forest for nesting and roosting, and also relies heavily on seasonal waterholes within the forest for feeding (Keo 2008; Eames et al. 2018; Ty et al. 2016). The Giant Ibis maintains stable home ranges and generally occurs in singles, pairs or small parties (Ty et al. 2016), which do not tend to increase or decrease in flock size depending on season (Wright et al. 2012a), although small flocks of up to 15 individuals have been recorded very occasionally (Eang et al. 2021).

No evidence of migration has been observed in Giant Ibis (Ty et al. 2016; Wright et al. 2012a), however there remains a knowledge gap in the dispersal and movement patterns of juvenile / pre-breeding-age ibis (Eang et al. 2021). Compared to the White-shouldered Ibis *Pseudibis davisoni*, which shares largely the same distribution and habitat, the Giant Ibis appears less tolerant to human activity, rarely being sighted within 4km of villages (Wright et al. 2012).

Species Background: White-shouldered Ibis *Pseudibis davisoni*

The White-shouldered Ibis *Pseudibis davisoni* is one of only two extant species of Ibis in the genus: *Pseudibis*, is classed as Critically Endangered on the IUCN Red List, and is listed on the EDGE of Existence list with a score of 5.63.

The White-shouldered Ibis was distributed across South-East Asia, but following steep declines during the 20th century is now considered extirpated from Thailand, Myanmar, Peninsular Malaysia and most of Laos and Vietnam (BirdLife International 2018; Wright et al. 2010). There was one small but extant population remaining on Kalimantan, but the current status of this population is unclear (Meijard et al. 2005). Reasons for the declines mainly include loss of habitat from the conversion of wetlands, river channels and dry forest, and persecution via hunting and nest robbery (Wright et al. 2010).

A variety of wetland habitats have been associated with the species, such as pools, marshes, and watercourses, including wide rivers with sand and gravel bars, however, in Cambodia, deciduous dipterocarp forest (DDF) also appears to be an important habitat (BirdLife International 2018). The species also appears to be in part dependent on the presence of low-intensity agriculture within the wetland/DDF mosaic (Wright et al. 2010; Sum & Bou, 2015). Foraging habitat preferences vary throughout the year with seasonal waterholes dry forest highly important during dry season (Wright et al. 2013a), with other foraging habitats such as abandoned paddyfields also used in wet season (Keo 2008; Eames et al. 2018; Wright et al. 2012a).

Compared with Giant Ibis, White-shouldered Ibis are more frequently sighted in areas closer to settlements, which may be related to the higher densities of livestock (Wright et al. 2012a). This has also in part resulted in a situation where White-shouldered Ibis populations are frequently found outside the boundaries of the Protected Area network (Wright et al. 2012b; Wright et al. 2013b).

EX-SITU MANAGEMENT

Current Ex-situ Program

ACCB, in partnership with key stakeholders, rescues Giant Ibis and White-shouldered Ibis from the wild and illegal trade. These individuals have been rehabilitated at ACCB and since 2017 incorporated in the assurance population ACCB is establishing for the species with the support of the relative government authorities. 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.



Figure 1: White-Shouldered Ibis Enclosure at ACCB. ©ACCB/Kees Groot.

At the time of writing ACCB houses three Giant Ibis (sex undetermined) and nine White-shouldered Ibis (three males, three females, three sex undetermined). During the report year, two White-shouldered Ibis came into the collection through rescues. The first individual (ACCB Local ID 0180019) was rescued by Rising Phoenix on March 29th, 2022 at Siem Pang Wildlife Sanctuary after a storm knocked down the tree with a WSI nest being monitored by Rising Phoenix. The fledgling fell with the tree and fractured the humerus of its left wing, the other fledgling in the nest presumably flew off with the parent birds. The injured ibis came under ACCBs care on March 30th, presenting an open humeral fracture with incipient necrosis/infection (Figure 3). The wing had to be amputated and the bird received intensive treatment, but unfortunately it died several days later, probably due to a systemic infection caused by the bone fracture.



Figure 2: Fractured left-wing humerus with bone necrosis and infection. ©ACCB/Maria Blümm.

The second WSI (ACCB Local ID 0180020) was rescued at the Mekong Flooded Forest landscape in collaboration with PDoE of Kratie province and WWF on 20th April and handed over into ACCBs care. This bird's right eye was filled with blood and the cornea was severely damaged, the animal also presented neurological symptoms. After four months of intensive treatment, it appears that the ibis regained vision to the injured eye and can now see with both eyes again (figure 2-4). The bird has been integrated into the ex-situ flock at ACCB.

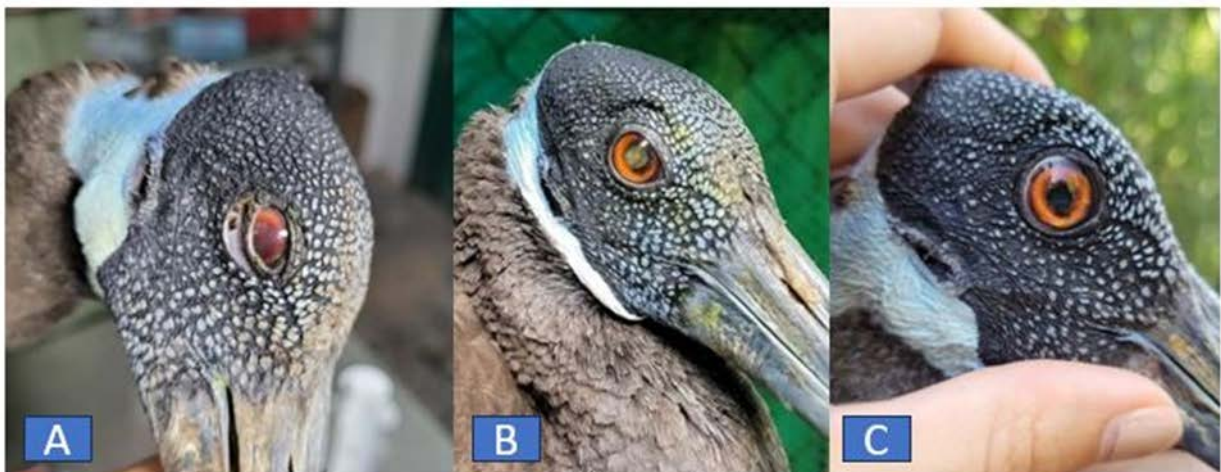


Figure 3: (a) eye at arrival, (b) eye during treatment, (c). Eye after treatment is completed, ©accb/maria blümm.

Unfortunately, in 2022 we also lost one of the resident WSI from the assurance population. This individual, a male rescued at the MFF landscape in Kratie province in 2018, sustained a humeral fracture to the right wing. The skin was punctured at the fracture, making this an open fracture

increasing the risk of infection and complications. Despite intensive treatment, which included a bandage to stabilize the fracture, painkilling, and antibiotics to prevent infection the ibis died nine days after sustaining the injury, most probably due to stress.

For the 2021-2022 breeding season, a nest material was added to encourage nest building and breeding behavior for both the Giant Ibis and White-shouldered Ibis. Some initial nest-building activity was seen for the White-shouldered Ibis flock, but this was the only breeding activity observed during the 2021-2022 breeding season. As the White-shouldered Ibis breeding season occurs from December to April, preparations have already started for the 2022-2023 breeding season during this report year. Additional nest sites have been created in the enclosure and since the beginning of November a variety of nest material has been offered to the flock every two days. Adaptations to the diet have been made to simulate the wild diet during the breeding season; the number of frogs has been increased and the number of fish in the diet has been decreased to stimulate breeding behaviors. Until now, there have not been any observations of active nest building, but certain individuals have been seen standing and calling on the nest.

Plans for the future, longer-term 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 continue to expand the assurance population of each species by adding 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, providing 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 at the assurance population at ACCB. In order to support a growing assurance population additional facility for Giant Ibis and White-shouldered Ibis will need to be constructed at ACCB. The assurance population will offer opportunities for research on the species' biology and behavior. Husbandry Guidelines for the species will be developed by ACCB.

IN-SITU MANAGEMENT

Giant Ibis Priority Sites

Giant Ibis conservation in Cambodia is implemented across five main project sites, namely: Siem Pang Wildlife Sanctuary (SPWS) supported by Rising Phoenix Company, Lomphat Wildlife Sanctuary (LWS) supported by NatureLife Cambodia, Kulen Brahmdeb Wildlife Sanctuary (KPWS) and Chhaeb Wildlife Sanctuary (CWS) supported by WCS Cambodia, the Eastern Plain Landscape, which includes Srepok Wildlife Sanctuary and Phnom Prich Wildlife Sanctuary and is supported by WWF Cambodia, and the Mekong Flooded Forest site (MFF), which includes Sambo Wildlife Sanctuary and areas within the Mekong River Dolphin Management Area and is also supported by WWF Cambodia.

White-Shouldered Priority Ibis Sites

The White-shouldered Ibis conservation in Cambodia is implemented across five main project sites, namely: Siem Pang Wildlife Sanctuary (SPWS) supported by Rising Phoenix Company, Lomphat Wildlife Sanctuary (LWS) supported by NatureLife Cambodia, Kulen Brahmdeb Wildlife Sanctuary (KPWS) and Chhaeb Wildlife Sanctuary (CWS) supported by WCS Cambodia, the Eastern Plain Landscape, which includes Srepok Wildlife Sanctuary and Phnom Prich Wildlife Sanctuary and is supported by WWF Cambodia, Mekong Flooded Forest (MFF), which includes Sambo Wildlife Sanctuary and areas within the Mekong River Dolphin Management Area and is also supported by WWF Cambodia, and an area 6km south of the Stung Treng Ramsar site and includes Koh Sralay Island, Siembok District and is supported by ACCB.

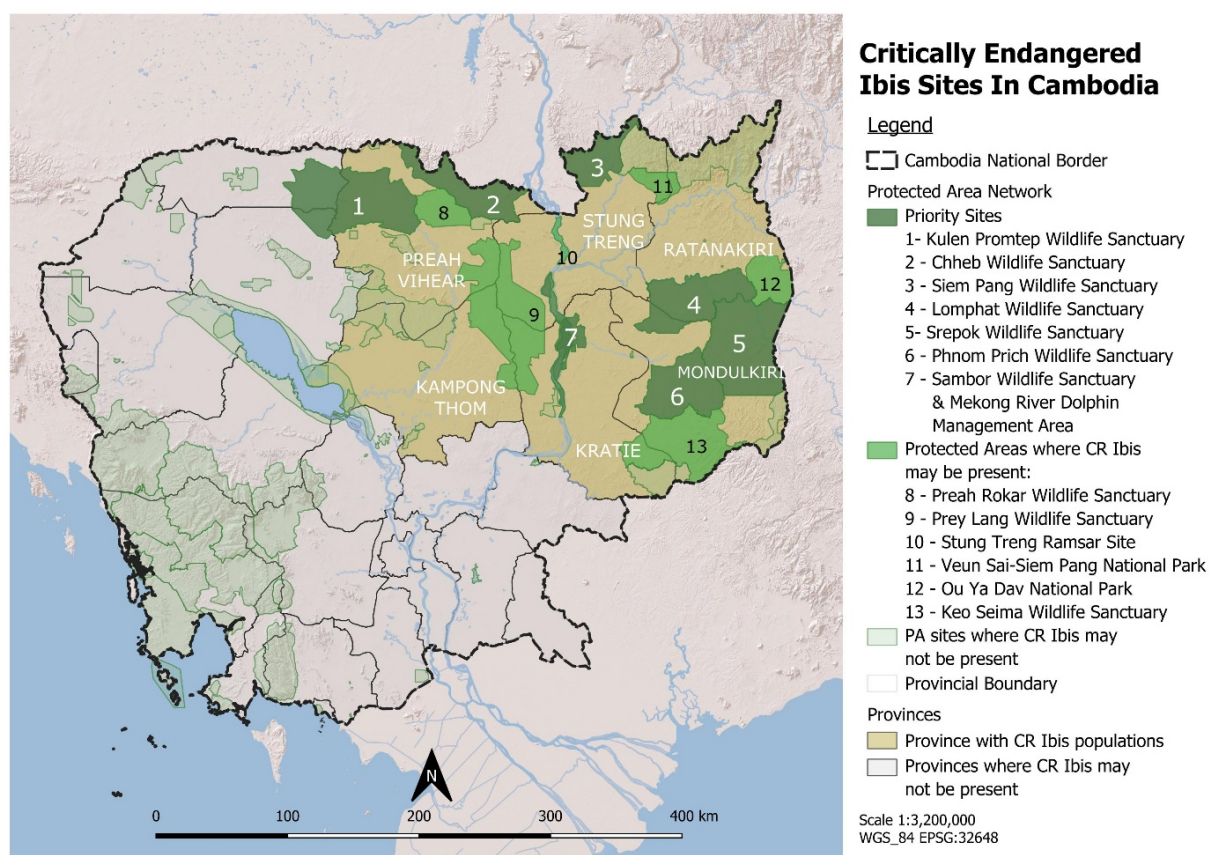


Figure 4: Map of priority Critically Endangered Ibis sites in Cambodia

SECTION 1: GIANT IBIS

GIANT IBIS NEST MONITORING 2022

Giant Ibis breed during the wet season in Cambodia (Keo 2009; Birdlife International 2018; Wright et al. 2012a), with nest-finding and breeding behaviour beginning around May and June, and nest-building generally occurring in late June until August (Pin et al. 2020). Although rare, Giant Ibis will sometimes nest outside of the usual wet season calendar, with a chick having been recorded in December, and a pair having been observed building a nest in October (Eang et al. 2021). Breeding pairs of Giant Ibis do so solitarily and are dispersed across the landscape at fairly low densities (Sum et al. 2011; Wright et al. 2012a).

It is believed that Giant Ibis pairs show some degree of fidelity to nest sites, and form relatively monogamous relationships, but the degree of either of these attributes is not known to high degree of certainty (Eang et al. 2021). It is not known whether Giant Ibis pairs breed every year, or at what age they first breed (Eang et al. 2021).

Giant Ibis show a preference for nesting in the canopies of taller Dipterocarpus trees (Keo 2008; Ty et al. 2016; Wright et al. 2012a), often with nests open to the sky (Keo, 2008), which is a nest site selection also seen in other species of ibis, thought to provide benefits in terms of access for take-off and landing (Huang et al. 2022), and due to smaller trees offering less structural support and increasing the chance of storms or windy days leading to dislodged nests (Olmos et al. 2001). Some studies suggest that Giant ibis clutch size is almost always two eggs per nest (Keo 2009).

The nest monitoring data for the species starts in 2003 from the Northern Plains Landscape (NPL), then 2013 at Siem Pang Wildlife Sanctuary (SPWS), and 2015 at Lomphat Wildlife Sanctuary (LWS). At two other sites Giant Ibis nests are not recorded regularly every year, with the earliest record at Mekong Flooded Forest (MFF) in 2017, and in 2022 for the Eastern Plains Landscape (EPL).

Giant Ibis Nest Searching Results - 2022 Season

Methods: Giant Ibis nest searching is undertaken every breeding season by CIWG partners' field staff, CPA or conservation group members, Governmental Staff and Rangers, and trained community members.

Nests may be located in a number of different ways: nest locations from previous breeding seasons are checked early in the season to establish continued nesting activity; nests may be located by targeted searching by field teams either based on experience or geo-spatial data analysis. At Siem Pang Wildlife Sanctuary both geo-spatial analysis of riverine/gallery forest habitats and results-based incentives have been used by Rising Phoenix to increase searching success. Gathering information from local community members or groups is also employed and is effective in some areas, and to this end for a number of years CIWG member organisations have offered nest reward payments; these typically are a one-off payment of around \$5-\$15 USD, to any individual that provides the location of a new nest where field teams subsequently confirm there are active Giant Ibis nests.

Result: For 2022, the national total number of Giant Ibis nests recorded was 41 nests (Table 2, above), slightly above the 10-year mean from all sites of 40.1.

At the site level, the two sites with the highest numbers of nests were Siem Pang Wildlife Sanctuary (SPWS) in Stung Treng Province, and the Northern Plains Landscape (NPL) in Preah Vihear Province. At the Northern Plains Landscape, Giant Ibis nests were recorded in two

Protected Areas: Kulen Promtep and Chhaeb Wildlife Sanctuaries. Both SPWS and NPL recorded six nests each, which together accounted for 78% of all nests found nationally. Lomphat Wildlife Sanctuary (LWS) recorded 7 nests (all in the Ratanakiri Province portion of the PA), equalling 17% of the national total, with the remaining two nests being located at Mekong Flooded Forest (MFF) in Kratie Province, and Eastern Plains Landscape (EPL). At EPL the nest was located in Phnom Prich Wildlife Sanctuary in Mondulkiri Province.

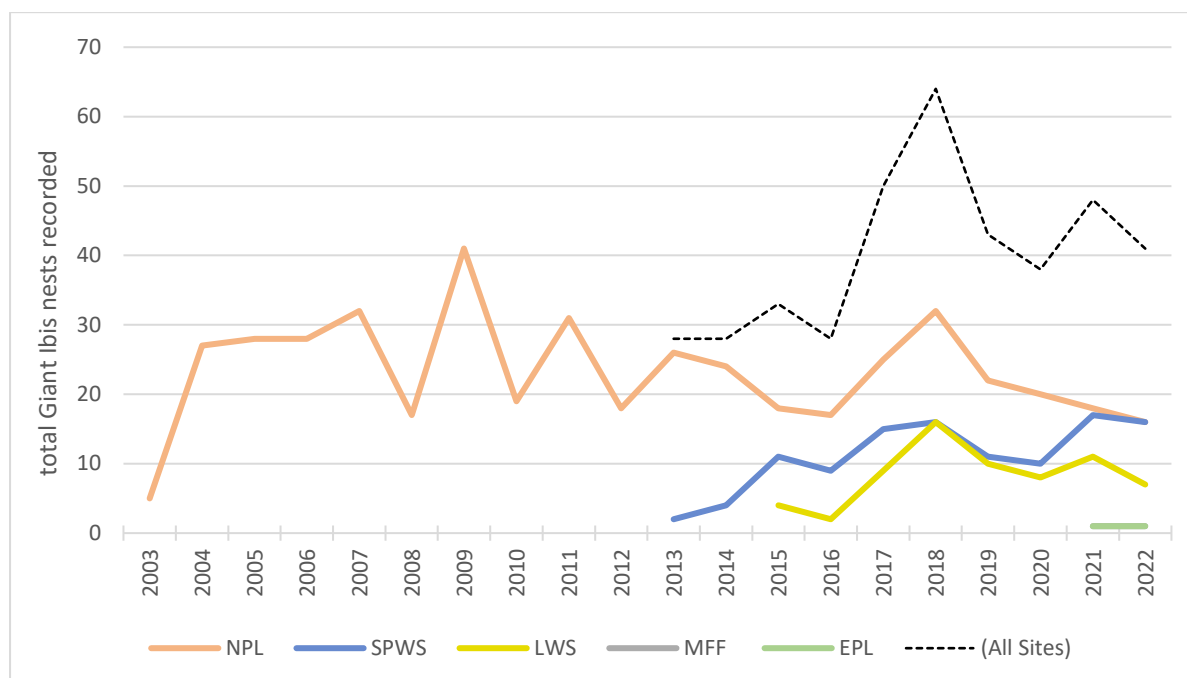


Figure 5: Number of Giant Ibis nests recorded by site from 2003 to 2021.

The results of the number of nests found, the number of nests that monitoring confirmed successfully fledged chicks, and the total number of chicks that fledged are shown below in Table 1 and Figure 5. These results are discussed for searching, and monitoring/protection below.

Table 1: Giant Ibis nest monitoring results 2022.

2022 Giant Ibis Nest Season Results	Total Nests	Successful Nests	Chicks Fledged
Siem Pang Wildlife Sanctuary (SPWS)	16	11	18
Northern Plains Landscape (NPL)	16	11	20
Lomphat Wildlife Sanctuary (LWS)	7	4	4
Mekong Flooded Forest (MFF)	1	1	2
Eastern Plains Landscape (EPL)	1	1	1
(All Sites)	41	17	45

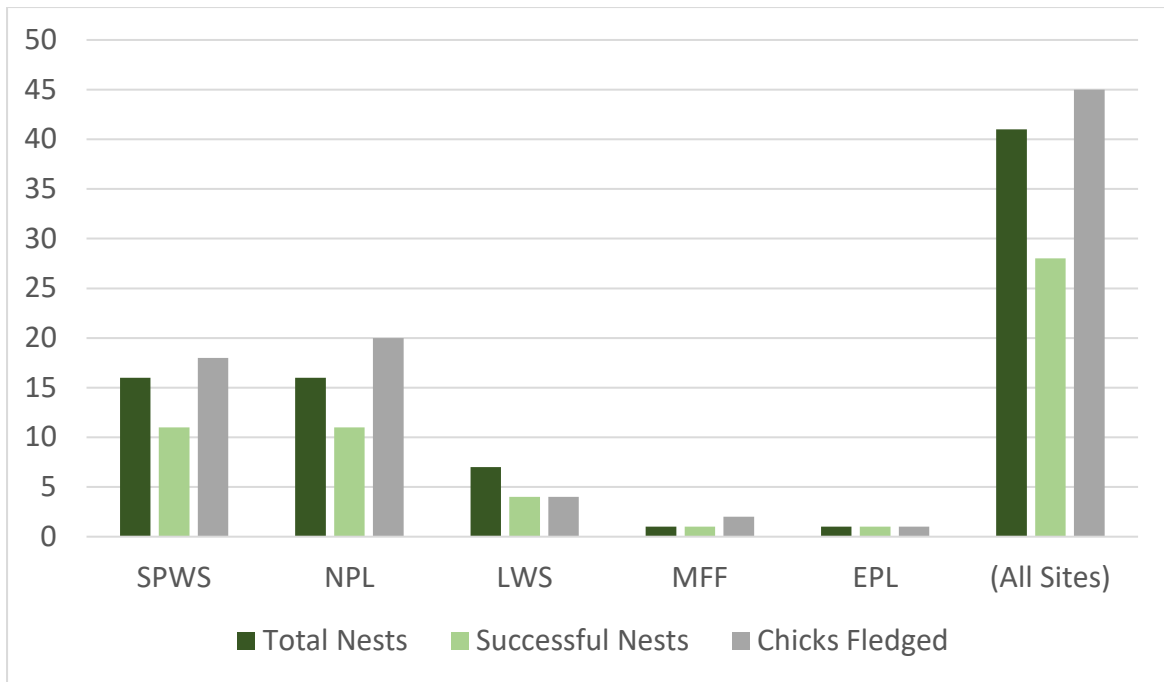


Figure 6: Giant Ibis nest monitoring results 2022

In Table 2, the historical records for numbers of nests found, the number of nests that monitoring confirmed successfully fledged chicks, and the total number of chicks for all sites is shown.

Table 2: Giant Ibis nest searching results by site from 2003-2022.

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	16	16	11	18	7	4	4	1	1	2	1	1	1	41	28	41

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

Giant Ibis Nest Monitoring & Protection Results - 2022 Season

All active nests discovered should be monitored by responsible organisations to maximum capacity available. The major goals for nest monitoring are to establish and record the number of chicks where present, and to establish and record whether the nests failed or succeeded in fledging chicks.

In all cases, CIWG member's personnel are responsible for monitoring nests, or coordinating monitoring by community members, groups, or governmental staff. All non-CIWG member monitoring staff should receive training and instructions on monitoring protocol, to avoid disturbing the nesting birds, or to avoid drawing attention (either by people or natural predators) to the nest.

Result: In the 2021-22, the total number of chicks recorded as fledging was 45.

This is below the ten-year national mean from combined sites of 50.2, however this partly reflects an unusually high record in one particular year (90 nests recorded in 2018), and if this outlying result is removed, the mean over the period is 45.7, similar to the 2022 result.

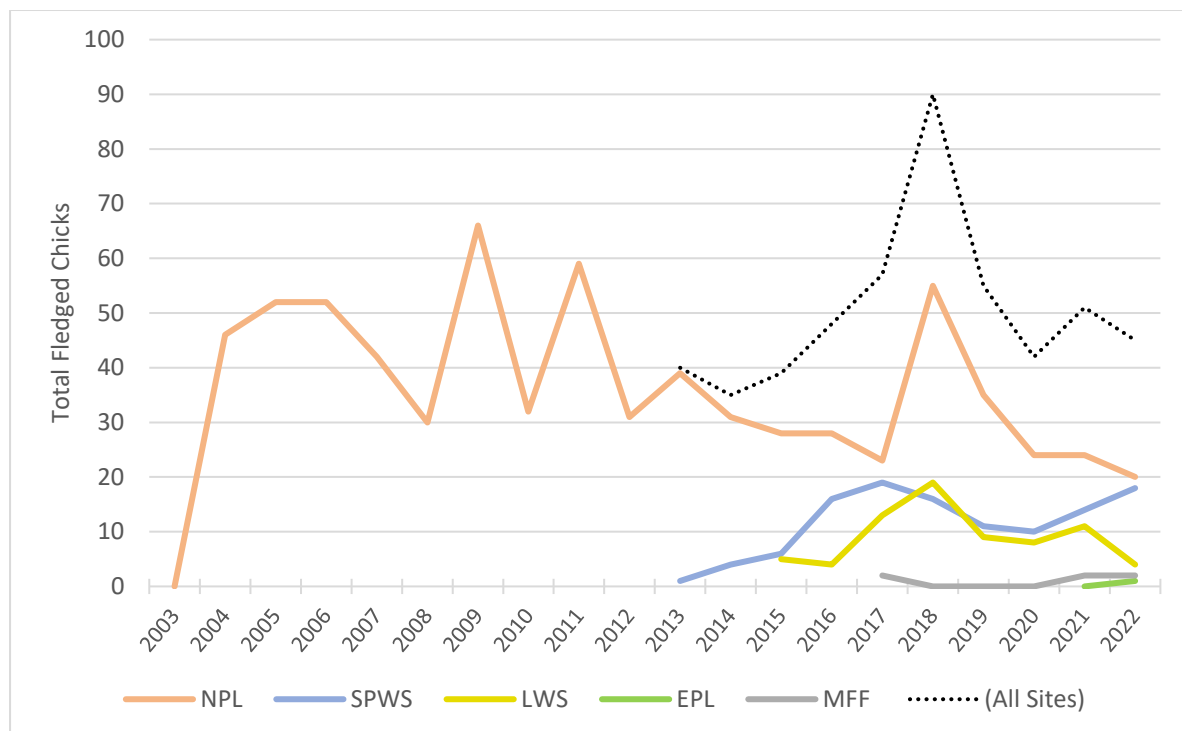


Figure 7: Number of Giant Ibis chicks fledged at each site from 2003 to 2022

Nest Fledging Success Rate

The rate of success/failure of nests can be calculated by the number of successfully nests compared to the total number of all nests, expressed as a percentage. A higher than usual rate of failure for nests could indicate a level of human-caused pressure. Given the known pressures at most nest sites, this is the most likely reason. However, other reasons are possible, such as extreme seasonal weather patterns, increases in predator populations, etc., all of which should be considered.

Table 3: The Percentage of Nest Success fledge at Each Sites 2022.

Site	NPL	SPWS	LWS	MFf	EPL	All Sites
Nest Successfully Fledged Rate	68.8%	68.8%	57.1%	100%	100%	68.3%

Overall, the nest fledging success at a national level was 68.3% of monitored nests successfully fledged chicks. This is quite low compared to the previous ten years of results from combined sites. The 10-year mean of nest fledging success is 78%. Primarily, this was caused by a drop from the previous year at both the NPL and LWS sites. The rate of successful nests was highest at the MFf and EPL sites, although this is from one nest each at both sites, so may not particularly reflective, and has little bearing on national level result. The full table of nest fledging success from each year is attached in the Appendix.

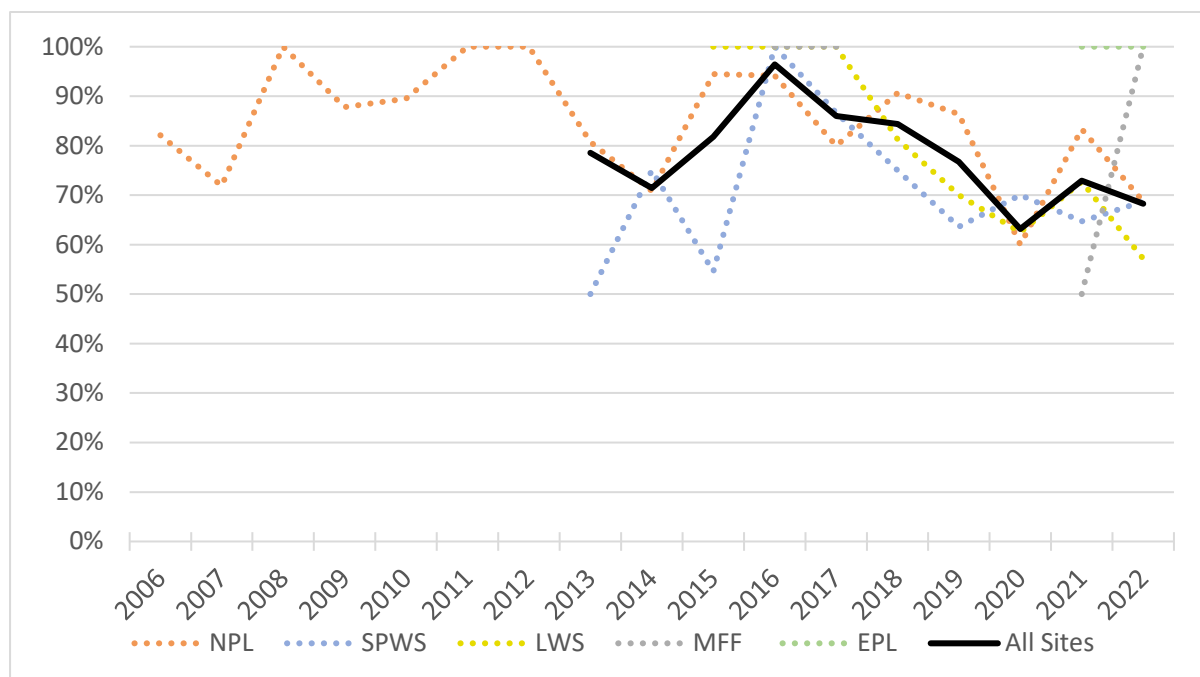


Figure 8: Percentage of Giant Ibis nests that successfully fledged chicks, 2006-2022

Nest Productivity

In this case, productivity refers to the number of chicks produced per successful nest. Only successfully fledged nests are used, otherwise this would become a proxy for the ration of successful;/unsuccessful nests. Giant Ibis usually produce two or three chicks under ideal habitat conditions, so nest productivity may provide an indication of local habitat quality, and/or quality of foraging resources. Other reasons, such as unfavourable seasonal weather patterns, could also affect the number of chicks produced.

In 2021-22, average number of Giant Ibis chicks per successful nest at a national level was 1.61, close to, but slightly below the 10-year mean from all sites of 1.63.

At the site level, the MFf and EPL sites both recorded one total nest only, so the results are not comparable to the other three sites. Siem Pang Wildlife Sanctuary was slightly above the 10-year

mean with 1.64 chicks, but at Lomphat Wildlife Sanctuary, all four successful nests produced only one fledged chick each. The full table from each year is attached in the Appendix.

Table 4: The Average number Giant Ibis chicks per success nest 2022.

Site	NPL	SPWS	LWS	MFF	EPL	All Sites
Chicks per successful nest	1.82	1.64	1.00	2.00	1.00	1.61

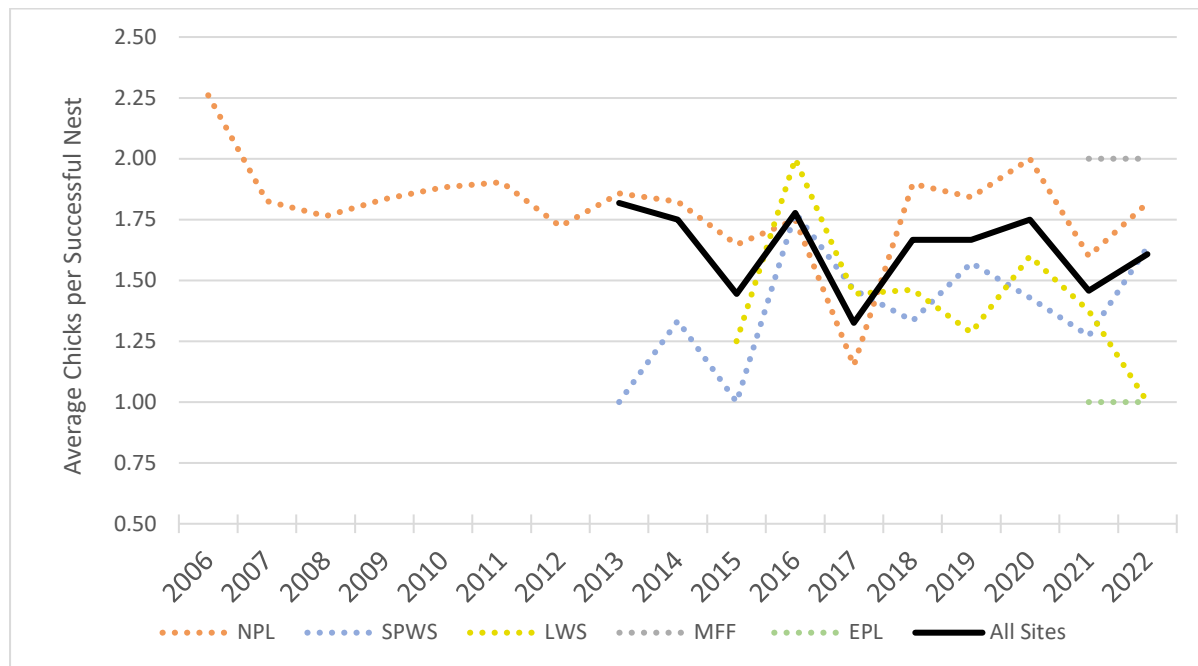


Figure 9: The average number of chicks fledged per successful nest by site from 2006-2022.

GIANT IBIS POPULATION ESTIMATES

The existing global population estimate of 194 mature individuals (equivalent to approximately 290 individuals) given on the IUCN Red List entry for the species was made in 2014 based on monitoring data and expert opinion collected for the production of the ‘Ten-year species action plan for the Giant Ibis (*Thaumatibis gigantea*) in Cambodia 2015-2025’ (Loveridge and Ty 2015).

To date, a standardised population methodology is not applied at all sites. A standardised methodology does exist, but to date has been applied only at Siem Pang Wildlife Sanctuary in 2016 and 2020, and at Lomphat Wildlife Sanctuary in 2019 and again this year in 2022. The results of the LWS 2022 census are described in detail below, but a summary of other estimates of populations for the other sites are given here. A combined total population estimate will not be estimated here, due to the reason described above, and consequently, no inferences of population trend will be made at the national level.

- **Siem Pang Wildlife Sanctuary:** The result of the 2020 population census at the site provided an estimate a minimum of 53 mature birds (26 pairs) (Eang et al. 2021).
- **Lomphat Wildlife Sanctuary:** The result of the 2022 population census at the site provided an estimate a minimum of 30 mature birds (census information detailed below).

- **Northern Plains Landscape:** Based on the 2022 nest monitoring results, the resident population of mature Giant Ibis must be 32 or higher (16 nests).
- **Mekong Flooded Forest:** Based on the 2022 nest monitoring results, the resident population of mature Giant Ibis must be 2 or higher (1 nest). Incidental sightings are recorded at the site, but these do not increase this estimate.
- **Eastern Plains Landscape:** Based on the 2022 nest monitoring results, the resident population of mature Giant Ibis must be 2 or higher (1 nest). Incidental sightings are recorded at the site, and three individuals were recorded in Phnom Prich Wildlife Sanctuary in 2022.

Lomphat Wildlife Sanctuary Giant Ibis Non-Breeding Census 2022

The Lomphat Wildlife Sanctuary Giant Ibis non-breeding census survey is conducted within the Protected Area and adjoining nearby habitats. Conducted over 18 days in January, February, and March 2022, a total of 13 monitoring personnel carried out six survey days in each month falling between the 22nd and 27th of the month. The team consisted of NatureLife Cambodia staff assisted by nine trained local community members. The census methodology followed the methods from previous published studies regarding Giant Ibis monitoring both at Siem Pang Wildlife Sanctuary in 2016 and 2020 (Ty et al. 2016; Eang et al. 2021), and at Lomphat Wildlife Sanctuary in 2019 (Pin et al. 2020). One aspect of this survey method is to divide the survey area into zones from which there is believed to be no or minimal movement of Giant Ibis between zones, and by checking and cleaning data on return from the field, this enables reduces the possibility of double-counting individual birds. Following field surveys data is screened to remove possible double counts.

The results of the surveys in each of the six groups, and for the total aggregated area, is displayed below in Table 5, and the locations of survey sites displayed below in Figure 10.

Table 5: The Result of Giant Ibis Population Estimate in Lomphat WS in 2022.

Trapeang Group	January 2022				February 2022				March 2022		
	No. of detections			Estim. Birds	No. of detections			Estim. Birds	No. of detections		
	Visual	Calls	Total		Visual	Calls	Total		Visual	Calls	Total
1	0	12	12 (23)	12	6	6	12 (28)	12	7	5	12 (28)
2	2	4	6 (15)	6	2	0	2 (2)	2	0	0	0 (0)
3	0	4	4 (4)	4	0	2	2 (2)	2	2	2	4 (4)
4	0	1	1 (1)	1	4	0	4 (4)	4	4	0	4 (4)
5	0	2	2 (2)	2	2	0	2 (4)	2	0	0	0 (0)
6	1	4	5 (5)	5	2	0	2 (2)	2	2	0	2 (2)
Total	3	27	30 (50)	30	16	8	24 (42)	24	15	7	22 (38)

The ratio of visual to auditory detections increased month-on-month. In January approximately 90% of detections were auditory; this decreased to a 50/50% ratio in February, and in March only 47% of detections were auditory as opposed to visual. In general, total and screened detections fell each month. This census was the second attempt to estimate the population size of Giant Ibises in the Lomphat Wildlife Sanctuary. The first attempt was undertaken in 2019 (Pin et al., 2020), and provided a minimum population estimate of 36 adults (the highest monthly count during the study).

The 2022 survey built on this by using the same methodology, combining sightings and call detections. The selection of trapeangs for survey was based on the need to maximise time and resource capabilities, so may not be compared to surveys conducted in other areas using different sampling methodologies.

The results suggest a minimum population of at least 30 mature Giant Ibises occurred in LWS. Based on the experience of our field monitoring teams and the careful screening of data to remove double-counts, we believe this to be an accurate minimum population estimate. Comparing to the 2019, the minimum population estimate has declined by 6 individuals, or a drop of 16%, despite increased survey effort in 2022 compared with 2019. Surveyed waterholes increased from 49 in 2019 to 59 in this second study and our study area was also expanded to include two previously un-surveyed areas. Although the minimum population estimate decreased, previous studies (Pin et al., 2020, Eang et al., 2021, and Ty et al., 2016) agree that without surveying all trapeangs in a set area, surveys will usually underestimate the true total population. The number of surveyed trapeangs in 2022 was still low compared to a total number of waterholes in the whole sanctuary (59 of ~200 or 29.5%). This is supported by the high number of incidental sightings of Giant Ibis in LWS in a variety of areas across the PA; over 218 independent sightings between 2020 to early 2022 (NatureLife Cambodia, unpublished data).

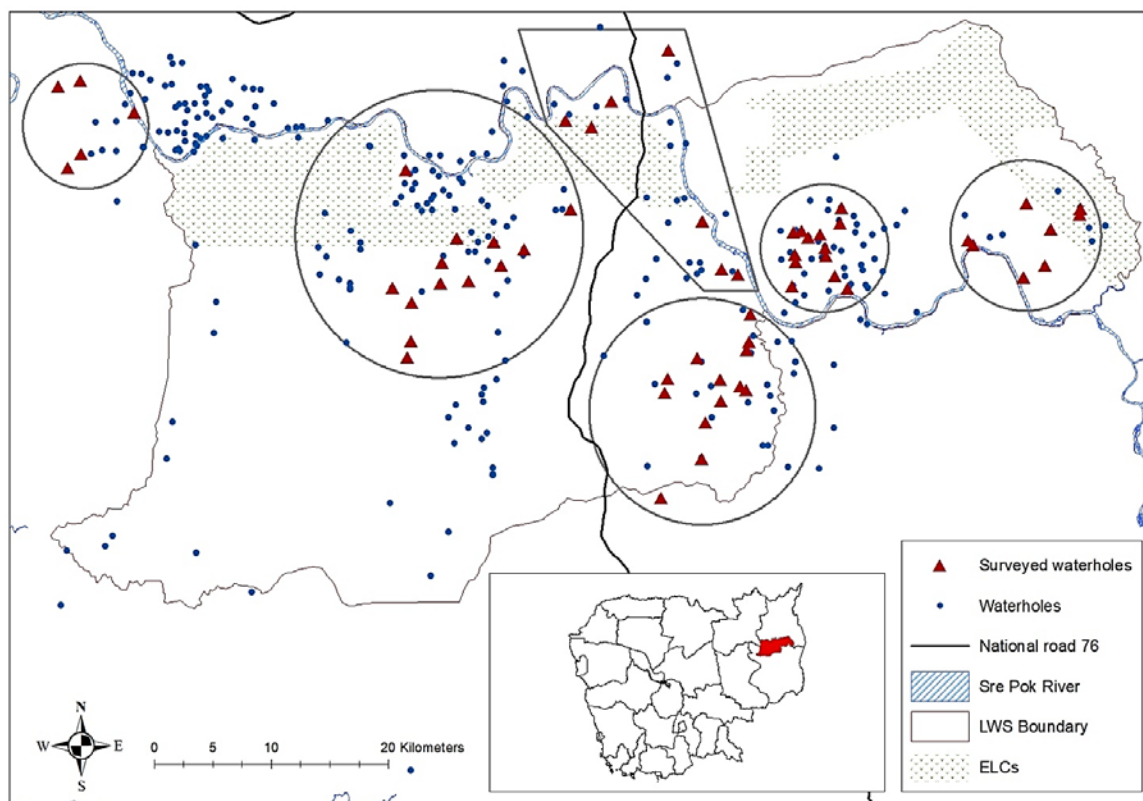


Figure 10: Map of the Giant Ibis Census results from LWS 2022.

SECTION 2: WHITE-SHOULDERED IBIS

WHITE-SHOULDERED IBIS NEST MONITORING 2022

White-shouldered Ibis breeding season generally begins in November and lasts until May when all chicks have fledged, although exceptional cases may occur outside this period. The first monitoring of nests of the species began around 2003 in the Northern Plains Landscape (NPL) by WCS, and for the 2021-22 breeding season all nests were located in Kulen Promtep Wildlife Sanctuary. Nest monitoring of White-shouldered Ibis commenced at the Mekong Flooded Forest (MFF) area in 2009-10, Lomphat Wildlife Sanctuary (LWS) in 2010-11, in 2012-13 at Siem Pang Wildlife Sanctuary (SPWS), and in 2013-14 in the Eastern Plains Landscape (EPL) which comprises Srepok Wildlife Sanctuary and Phnom Prich Wildlife Sanctuary. White-shouldered Ibis nests were also recorded at Koh Sralay Island by ACCB in 2019-22, an area just south of Stung Treng Ramsar site (STRS). The results of the number of nests found, the number of nests that monitoring confirmed successfully fledged chicks, and the total number of chicks that fledged are shown below in Table 6 and Figure 11. In Table 7, the historical records for numbers of nests found, the number of nests that monitoring confirmed successfully fledged chicks, and the total number of chicks for all sites is shown.

Table 6: The White-shouldered Ibis Nest Searching Result at Each Site 2021-2022

2021-22 WSI Nest Season Results	Total Nests	Successful Nests	Chicks Fledged
Mekong Flooded Forest (MFF)	38	35	65
Siem Pang Wildlife Sanctuary (SPWS)	36	28	62
Lomphat Wildlife Sanctuary (LWS)	9	7	11
Northern Plains Landscape (NPL)	9	7	13
Stung Treng Ramsar site (STRS)	5	4	8
(All Sites)	92	70	158

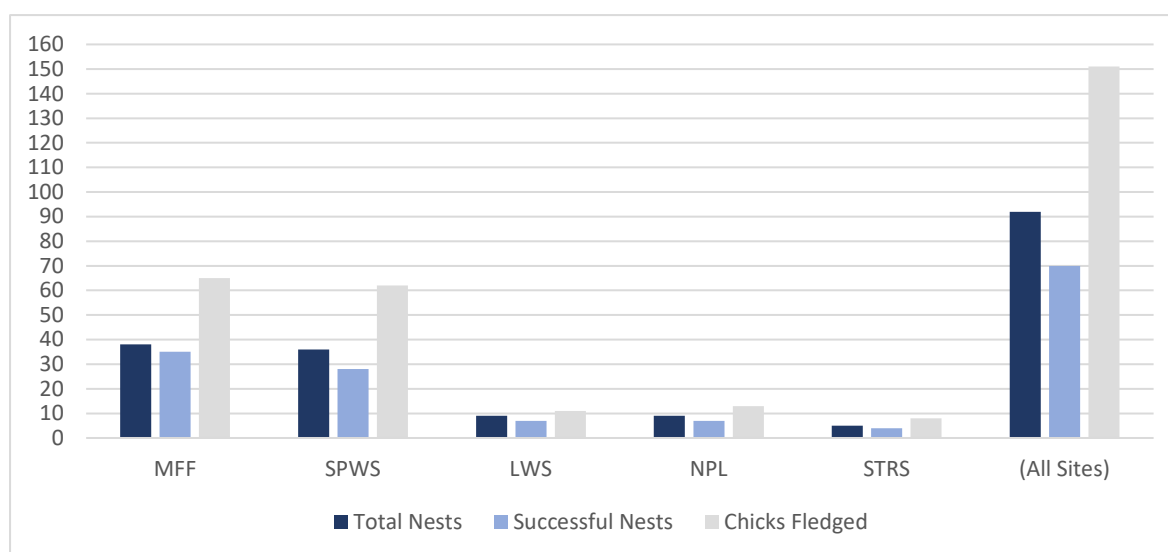


Figure 11: WSI Nest Searching Result at Each Site 2021-2022.

Table 7: The historical records for numbers of WSI nests found, number of nests and number of fledged chicks.

YEAR	NPL			SPWS			LWS			MFF			EPL		ACCB			All Sites			
	N	S	C	N	S	C	N	S	C	N	S	C	N	S	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						69	58	110	
2020-2021	8	7	12	31	26	53	10	6	9	29	28	57						78	67	131	
2021-2022	9	7	13	36	28	62	9	7	11	38	35	65			4	4	7	96	81	158	

White-shouldered Ibis Nest Searching Results: 2021-22 Season

Methods: White-shouldered Ibis nest searching is undertaken every breeding season by CIWG partners' field staff, CPA or conservation group members, Governmental Staff and Rangers, and trained community members. Nests may be located a number of different ways: nest locations from previous breeding seasons are checked early in the season to establish continued nesting activity; nests may be located by targeted searching by field teams either based on experience or geo-spatial data analysis, or by gathering information from local community members or groups. For White-shouldered Ibis, in some areas gathering information from local communities is highly effective, and to this end for a number of years CIWG member organisations have offered nest reward payments; these typically are a one-off payment of around \$5-\$15 USD, to any individual that provides the location of a new nest where field teams subsequently confirm there are active White-shouldered Ibis nests.

Results: The 2021-22 season provided the highest national count of White-shouldered Ibis nests since records began (Table 7, above, and Figure 12, below), of 96 nests.

Two sites provided the majority of the White-shouldered Ibis nests recorded in the 2021-22 season; Mekong Flooded Forest in Kratie Province and Siem Pang Wildlife Sanctuary in Stung Province, accounting for 38 and 36 nests respectively, which was 77% of the nationwide total. The results were the highest totals for both sites, and represent steadily increasing counts for both sites over the last ten years.

The three other sites that recorded nests in the 2021-22 breeding season were the Northern Plains Landscape and Lomphat Wildlife Sanctuary, both of which recorded 9 nests each, and Koh Sralay Island near Stung Treng Ramsar site. For the Northern Plains Landscape, all nests were recorded in Kulen Promtep Wildlife Sanctuary in Preah Vihear Province, whereas at Lomphat Wildlife Sanctuary, nests were recorded in both Ratanakiri and Mondulkiri Provinces.

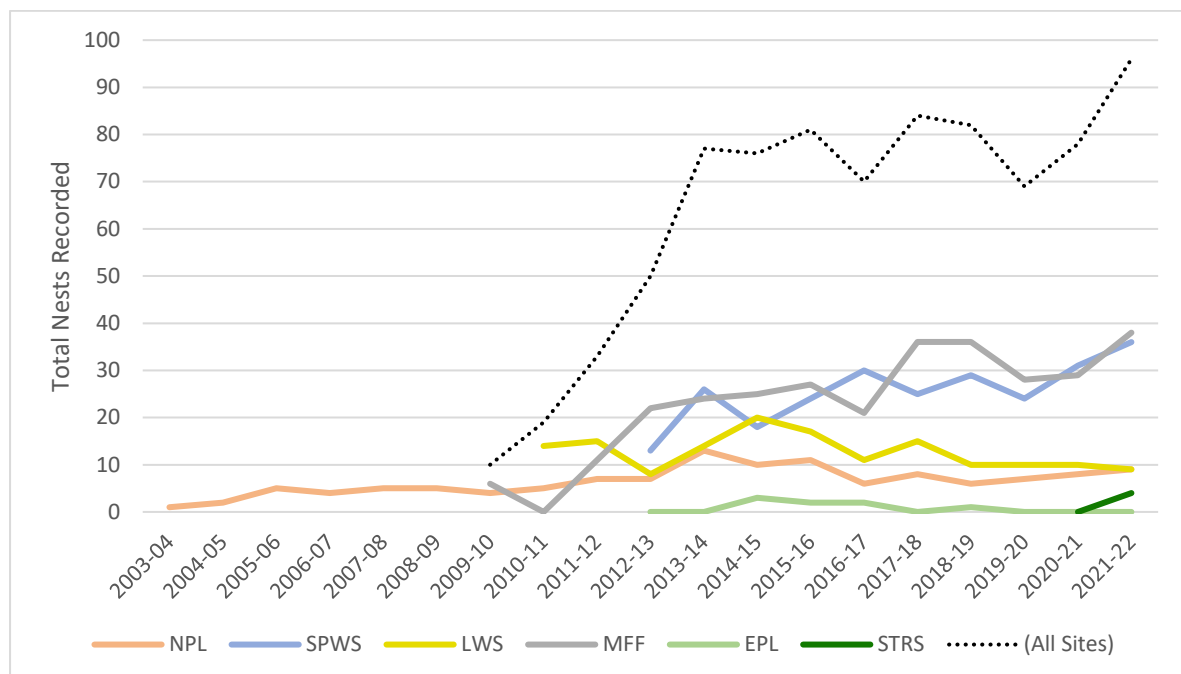


Figure 12: The highest annual count of White-shouldered Ibis nests 2003-2022

White-shouldered Ibis Nest Monitoring & Protection Results - 2021-22 Season

All active nests discovered should be monitored by responsible organisations to maximum capacity available. The major goals for nest monitoring are to establish and record the number of chicks where present, and to establish and record whether the nests failed or succeeded in fledging a chick or chicks.

In all cases, CIWG member's personnel are responsible for monitoring nests, or coordinating monitoring by community members, groups or governmental staff. All non-CIWG member monitoring staff should receive training and instructions on monitoring protocol, to avoid disturbing the nesting birds, or to avoid drawing attention (either by people or natural predators) to the nest.

Result: In the 2021-22, 158 chicks were recorded as the having successfully fledged, the highest ever national record of White-shouldered Ibis chicks since records began (Table 8, above, and Figure 13, below).

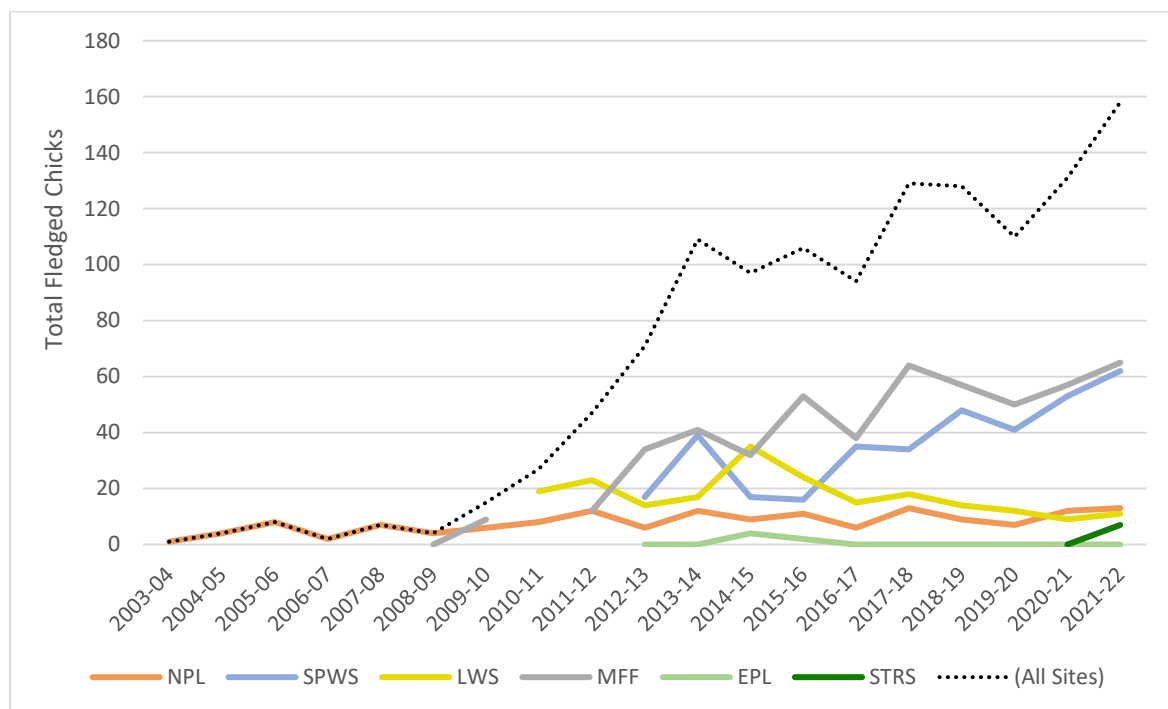


Figure 13: The highest national record of White-shouldered Ibis chicks fledged 2003-2022.

The majority of chicks came at the two sites with the highest number of nests, Mekong Flooded Forest and Siem Pang Wildlife Sanctuary. Both counts represent a steady increase over the last ten years, and the highest result for Siem Pang Wildlife Sanctuary.

Nest Fledging Success Rate

The rate of success/failure of nests can be calculated by the number of successful nests compared to the total number of all nests, expressed as a percentage. A higher than usual rate of failure for nests could indicate a level of human-caused pressure. Given the known pressures at most nest sites, this is the most likely reason, but other reasons are possible, extreme seasonal weather patterns, increases in predator populations or other reasons should be considered.

In 2021-22, the nest success rate was highest at the Mekong Flooded Forest site, with 92.1% of monitored nests successfully fledging chicks, and at Koh Sralay near the Stung Treng Ramsar site, with 100%. At the other three sites that recorded nests, the nest success rate was the same at 77.8%. This exact same number may seem unlikely, but two sites (NPL and LWS) had the same numbers of nests and successful nests (9 and 7 respectively), and SPWS just happens to calculate to the same number (36 and 28). It is notable that the highest success rates at the MFF and STRS sites both taken mainly on the large islands in the Mekong River, a habitat not found at the other three sites. For 2019-2021, data collected by ACCB from STRS was included in the MFF site due to the proximity of the locations, but has been disaggregated from 2021-22.

Table 8: The Percentage of Nest Fledging Success at Each Site 2021-2022.

Site	NPL	SPWS	LWS	MFF	STRS	All Sites
Nest Successfully Fledged Rate	77.8%	77.8%	77.8%	92.1%	100%	84.4%

Compared with previous years, the result in 2021-22 is the second highest after the year before, and nest success of monitored rates from a national perspective have been generally slightly increasing since around 2015 (see Figure 14, below). The full table of data is available in the Appendix.

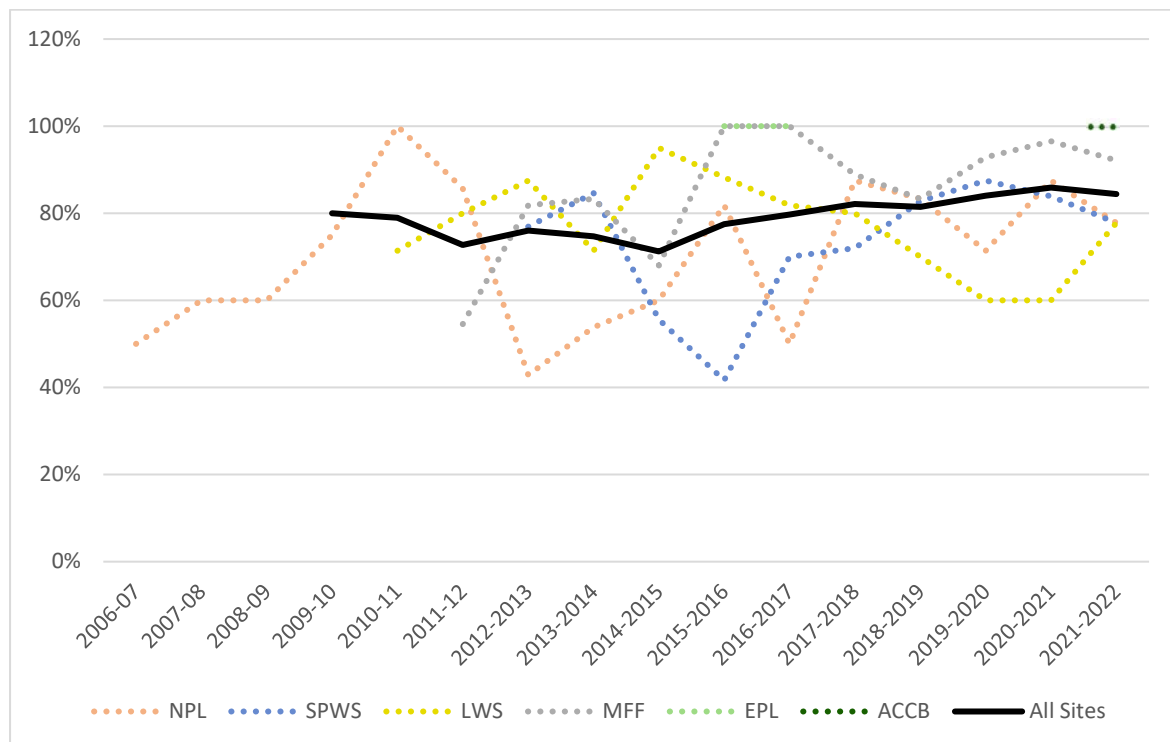


Figure 14: The percentage of White-shouldered Ibis nests that successfully fledged by site, 2006-2022.

Nest Productivity

In this case, productivity refers to the number of chicks produced per successful nest. Only successfully fledged nests are used as if all nests are used, otherwise the indicator is more of a proxy for the rate of nest success. White-shouldered Ibis usually produce two or three chicks under ideal habitat conditions, so nest productivity may provide an indication of local habitat

quality, and/or quality of foraging resources. Other reasons could also affect the number of chicks produced.

In 2021-22, average number of chicks per successful nest at a national level was 1.96. At the site level, the highest number of chicks per successful nest was at Siem Pang Wildlife Sanctuary with 2.21 chicks fledging per successful nest on average. The averages were close to identical at the Northern Plains Landscape and the Mekong Flooded Forest sites with 1.86 chicks each, and lowest at Lomphat Wildlife Sanctuary with 1.57 chicks per nest.

Table 9: The Average White-shouldered Ibis chicks' success per-nest 2021-2022.

Site	NPL	SPWS	LWS	MFF	STRS	All Sites
Chicks per successful nest	1.86	2.21	1.57	1.86	1.75	1.95

In the context of historical results, 1.96 is the third highest ever result, only very slightly below 2020-21, and 2011-12 (both 1.96 chicks per successful nest). The number of chicks successfully fledged per nest has remained quite stable at the national level, generally staying between 1.8 to 2.0, dipping below that between 2014-15 and 2016-17. The full table of data is available in the Appendix.

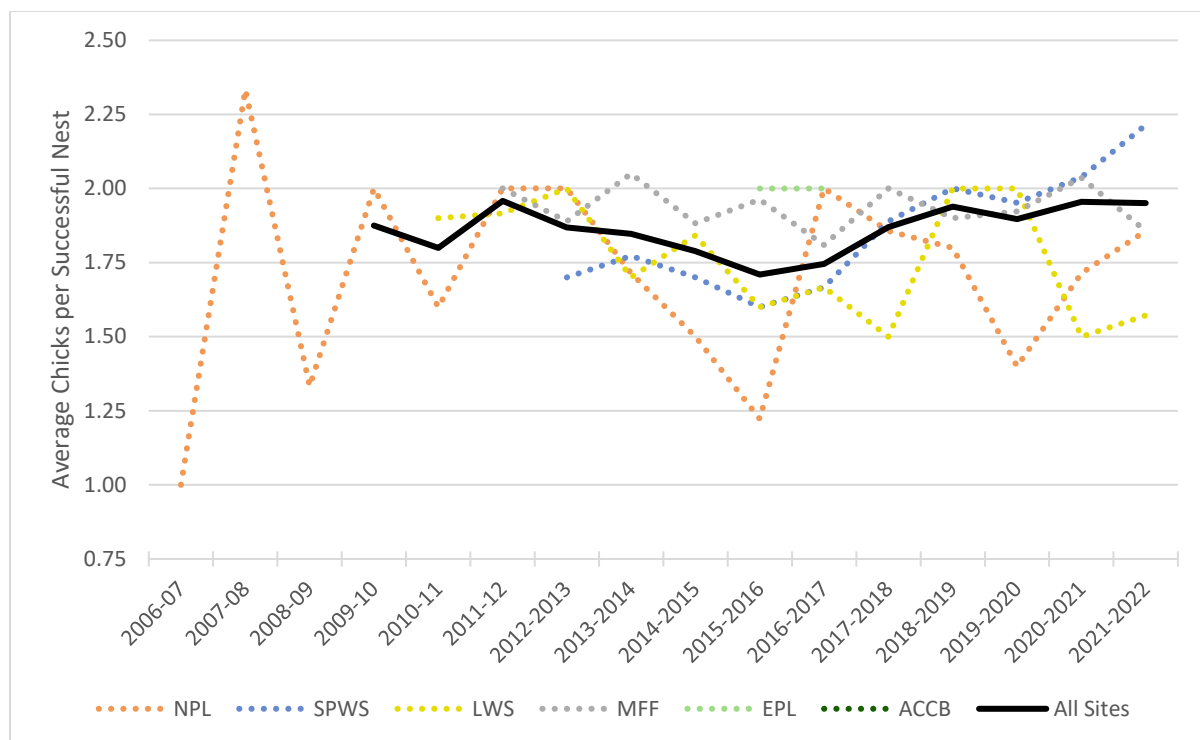


Figure 15: The average White-shouldered Ibis Chicks per successful nest at each site from 2006-2022.

WHITE-SHOULDERED IBIS POPULATION CENSUS 2022

In 2009, the Ministry of Environment (MoE), Forestry Administration and conservation organizations started to jointly monitor the Cambodian White-shouldered Ibis population by counting the birds in their wet season roosts. This makes estimating both the population size and the trend possible.

White-shouldered Ibis census events are conducted four times per year during the four consecutive wet season months (July, August, September, and October) when the species engages in communal roosting behavior. On a synchronized date during each month, teams will arrive at roost sites and take an evening count of White-shouldered Ibis arriving at the roost, and then another count the next morning of the birds leaving the roost. This method of an evening count followed and morning counting helps to increase the accuracy of the count and prevents double-counting due to potential movement between sites. The evening then morning dates are set for the 15th and 16th of each census month, barring exceptional circumstances.

Before the census date, field monitoring staff conduct surveys and gather information to identify the best locations and roosts for survey during the census. The evening counts are generally made between 17:30 to 18:30 in the evening, and 05:30 to 06:30 the following morning. Counts are recorded by all teams and then the highest count from each roost is selected and aggregated across all sites to provide a national minimum population estimate (MPE).

Various organisations, groups and personnel are employed in conducting the roost counts. These can include CIWG member organisations biodiversity monitoring teams, MoE and MAFF Rangers or personnel, local community conservation group members, or local community members. All census team members are fully trained, and the data collection and management is overseen by CIWG member organisations.

In 2022, roost census counts were conducted by six CIWG member organisations across six sites.

1. **Siem Pang Wildlife Sanctuary** in Stung Treng Province. Counts were organised by Rising Phoenix Co. Ltd. *The total number of roost sites surveyed during one monthly count was 17.*
2. **Sambo Wildlife Sanctuary** and **Mekong River Dolphin Management Area** in Kratie Province. Counts were organised by WWF- Cambodia Mekong Flooded Forest Programme. *The total number of roost sites surveyed was 17.*
3. **Lomphat Wildlife Sanctuary** in Ratanakiri and Mondulakiri Provinces. Counts were organised by NatureLife Cambodia. *The total number of roost sites surveyed was 17, of which six roost sites had ibis recorded at them during the census.*
4. **Kulen Promtep Wildlife Sanctuary** in Preah Vihear Province. Counts were organised by WCS Cambodia Programme. *The total number of roost sites surveyed was ten, of which seven roost sites had ibis recorded at them during the census.*
5. **Koh Sralay Island / Mekong River Dolphin Management Area** in Stung Treng Province. Counts were organised by ACCB. *The total number of roost sites surveyed was ten, of which seven roost sites had ibis recorded at them during the census.*
6. **Eastern Plains Landscape** including Phnom Prich and Srepok Wildlife Sanctuaries in Mondulakiri Province. Counts were organised by WWF Eastern Plains Landscape Programme. *The total number of roost sites surveyed was 12.*

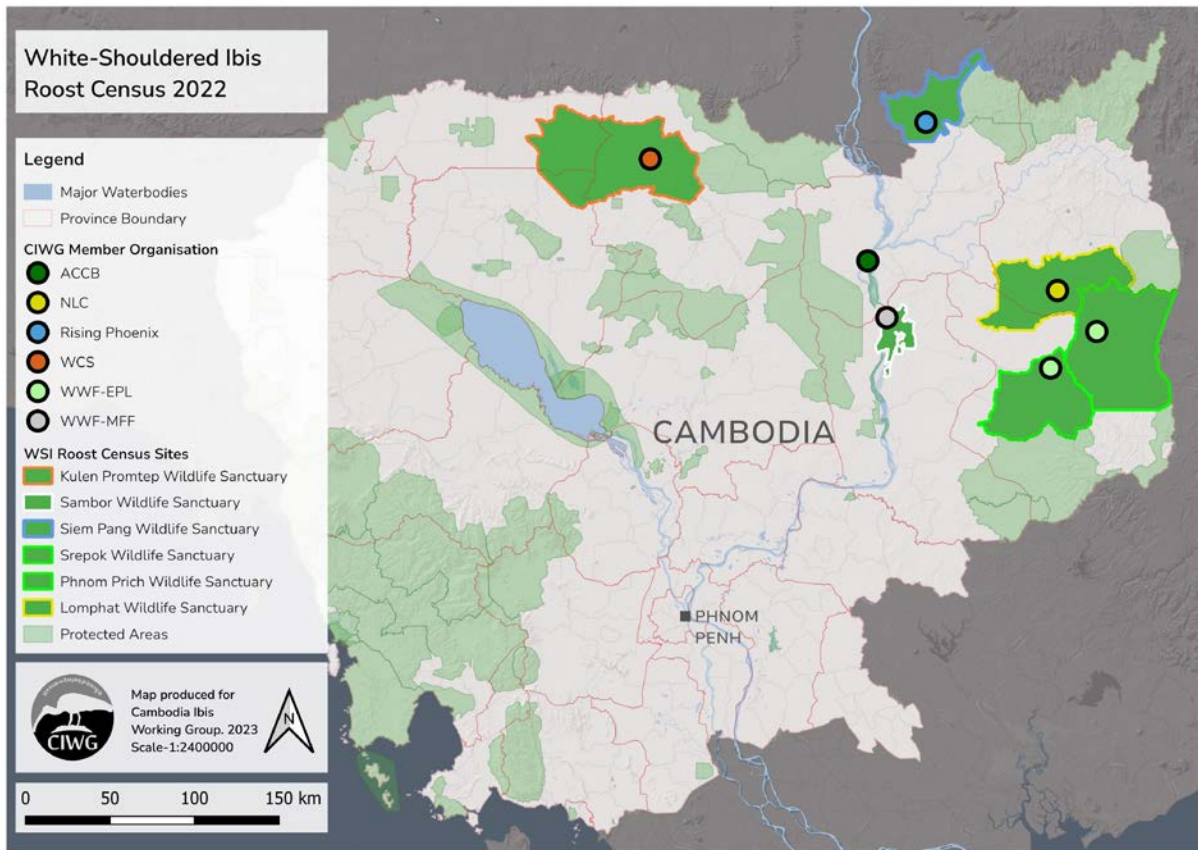


Figure 16: Map of White-shouldered Ibis areas where roost counts are conducted.

The **Minimum Population Estimate** for the Cambodian population of White-shouldered Ibis, derived from the highest monthly census count of all sites combined, **in 2022** was **792**.

This count was obtained from the September census, during which the largest site total came from Siem Pang Wildlife Sanctuary (377), followed by Mekong Flooded Forest site (326), Northern Plains Landscape (49), Koh Sralay Island (21), Lomphat Wildlife Sanctuary (12), and Eastern Plains Landscape (7).

Table 10: The White-shouldered Ibis census result from six site location in 2022.

Site	July	August	September	October	Highest Count: by Site
SPWS	266	285	377	368	377
LWS	1	8	12	14	14
MFF	234	330	326	298	330
NPL	42	54	49	32	54
EPL	5	7	7	16	16
ACCB	43	13	21	13	43
<i>Highest monthly count: All Sites</i>	591	697	792*	741	

Cambodia likely supports approximately 87-95% of the total global population of White-shouldered Ibis (BirdLife 2023). Outside Cambodia, the only other known population is a small population along the Mahakam River in East Kalimantan, Indonesia. Over the 14 years of population estimates derived from coordinated census counts, the number and locations of conducted census counts have varied to some degree. From 2009 to 2011, the census events were conducted within four sites (SPWS, LWS, MFF and KPWS), from 2012 to 2018 across five sites (SPWS, LWS, MFF, KPWS and EPL), and after 2018 also expanded to include an area on the Mekong River in Siembok District, Stung Treng. As well as the change in the number of sites conducting roost census counts, the amount of effort (meaning the number of roost sites covered during each census) within sites may also vary between months or annually.

Table 11: The White-shouldered Ibis Census Result from 2009 to 2022.

Year	SPWS	LWS	MFF	NPL	EPL	ACCB	Annual High Count
2009	147	76	55	27			310
2010	226	185	124	34			521
2011	262	242	121	39			644
2012	346	278	103	47	36		754
2013	451	298	152	58	77		973
2014	404	318	170	55	26		892
2015	491	218	168	48	63		938
2016	271	144	183	38	36		590
2017	404	53	178	35	34		646
2018	320	27	156	31	49		531
2019	344	25	172	46	19	38	596
2020	385	12	251	42	8	34	690
2021	373	5	252	40	14	83	755
2022	377	14	330	49	16	43	792

From 2009 to 2013 the steadily increasing MPE can be attributed to increasing efficiency or scope of the roost count surveys, rather than an actual population increase. From 2013 the annual count then began to fall, reducing to a count of 590 in 2016. This decrease is mainly attributable to a large decrease in birds counted at Lomphat Wildlife Sanctuary, which decreased by around 90% over this period.

Since 2018 however, the trend has once again been consistently increasing by an average of 11.92 % year-on-year up to 2022. The 2022 MPE of 792 was the fourth highest out of the 14 years of monitoring, and above the mean of the preceding twelve years of 682 birds.

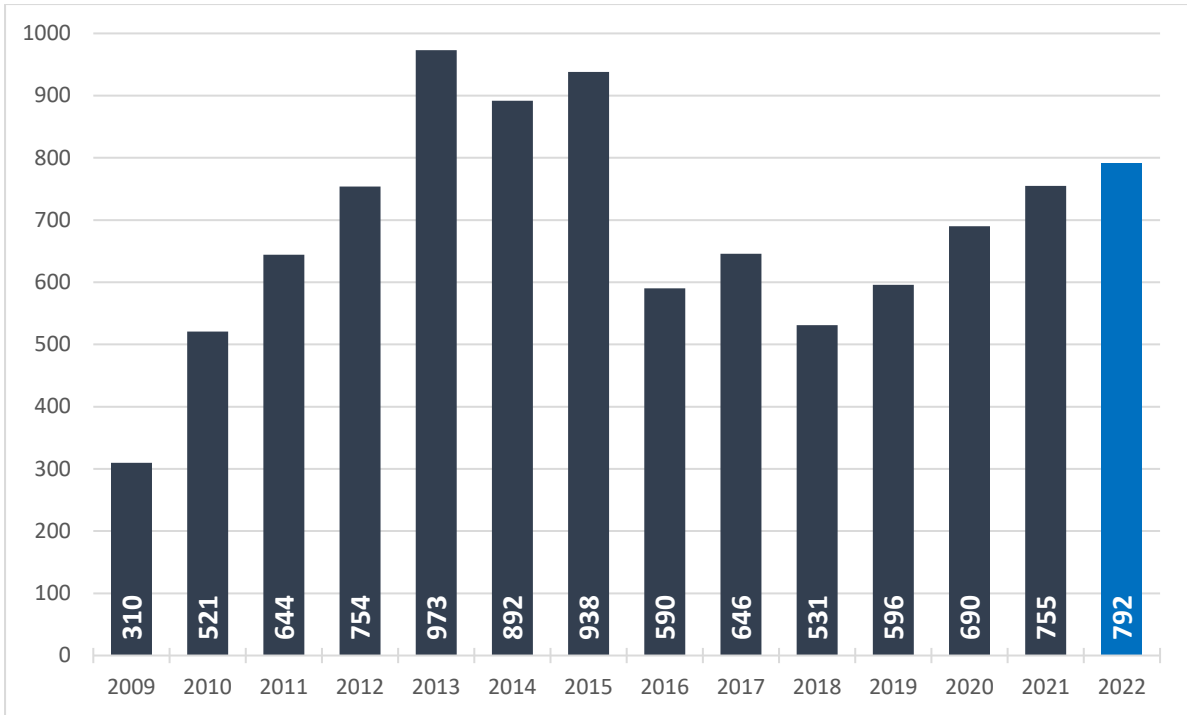


Figure 17: The White-shouldered Ibis Census annual results 2009-2022.

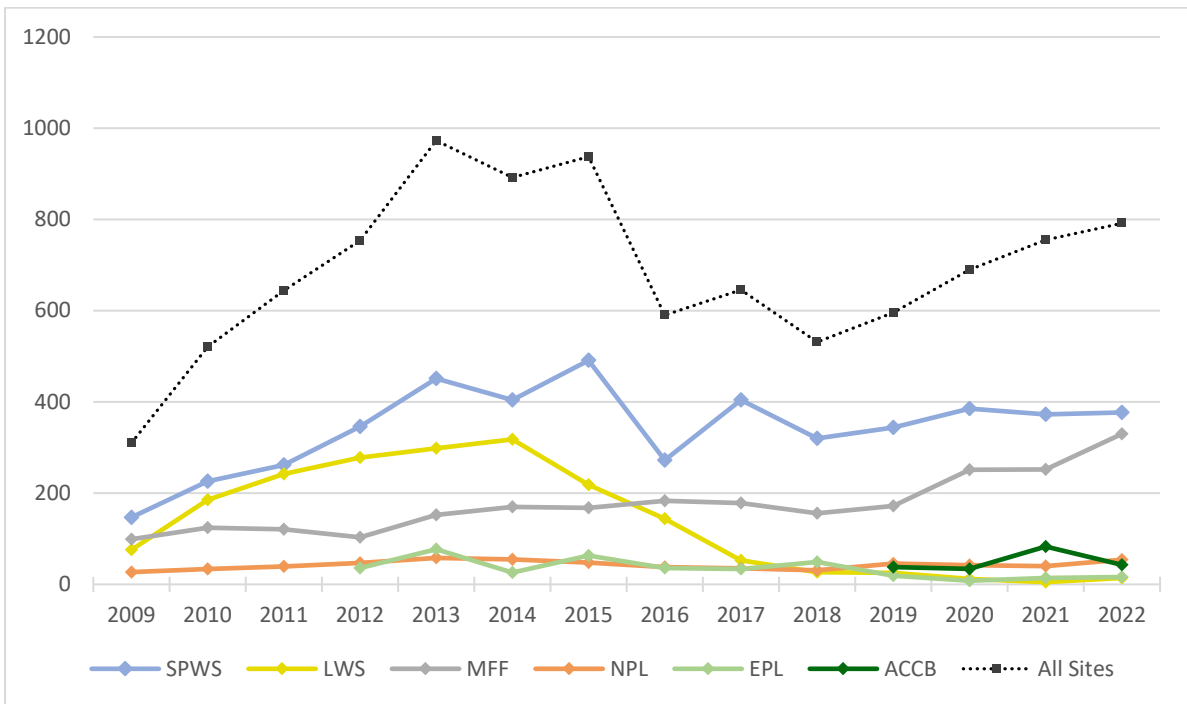


Figure 18: The White-shouldered Ibis population trend from census counts by site, 2009-2022.

WORKING GROUP MEETINGS

CIWG Quarterly Meeting - 07th April 2022

The first CIWG Meeting for 2022 was conducted on the 7th April 2022 at the Tonle Bassac II #534, on Street Brasmony Vong (93) in Phnom Penh. There were 15 participants that joined from WCS, NLC, WWF, Rising Phoenix and ACCB. The objectives of the meeting were: i) To update the Ibis Conservation status in Cambodia; ii) To form the Cambodia Ibis Working Group; iii) To develop the Vision, Mission, and Objective of Cambodia Ibis Working Group; iv) To draft the role and responsibility of core members of Cambodia Ibis Working Group.



Figure 19: The April 2022 CIWG meeting.

CIWG Quarterly Meeting 18th of August 2022

The first CIWG Working Group Meeting for 2022 was conducted on the 7th April 2022 at the Tonle Bassac II #534, on Street Brasmony Vong (93) in Phnom Penh. There were 16 participants that joined from WCS, NLC, WWF, Rising Phoenix and ACCB. The objectives of the meeting were: i) To review and update the status of Giant and White-shouldered Ibis at priority conservation sites in Cambodia; ii) To discuss and make progress regarding the Cambodia Ibis Working Group membership and roles; iii) Assess options for improving coordination and scope of White-shouldered Ibis roost census and Giant Ibis nest surveys; iv) To discuss and decide options for drafting of a logo for the CIWG.

During this meeting the results of the consultation from the previous meeting to draft the ToR (Mission, Objectives, Roles) of the working group were presented for final comment. These were subsequently finalised and submitted as part of the application for official endorsement, and are attached here as Appendix V.



Figure 20: The August 2022 CIWG meeting.

CIWG Quarterly Meeting Minutes - 15th of December 2022

The meeting was held at the Sunway Hotel Phnom Penh, Sangkat Wat Phnom, Phnom Penh on the 15th of December 2022 between 13:30 till 17:00. The meeting was open to all members of the Cambodia Ibis Working Group, and was attended by 14 participants, together representing all government and NGO members. The objectives of the meeting were: i) To update the conservation status of Ibis populations and threats at all sites and national trend based on non-breeding census results; ii) To discuss about the possible to develop the 2022 Annual Cambodia Ibis Working Group Report; iii) To update the progress of CIWG ministerial decree and vote to the logo of the CIWG; iv) To explore possible options for group collaborative actions to improve Ibis conservation nationally.

DISCUSSION

White-shouldered Ibis Population Trend

In 2022, for the fourth year in a row, the census counts show higher numbers. Given that the only other population of White-shouldered Ibis outside Cambodia is highly unlikely to number more than around 100 birds, the 2022 census count of 792 birds in Cambodia almost certainly represents upwards of 80% of the world population. There are two sites which made up most of the census count figures in 2022: Siem Pang Wildlife Sanctuary (377) and the Mekong Flooded Forest (330). Smaller counts were made at Koh Sralay Island near the Stung Treng Ramsar site, Kulen Promtep, Lomphat, Srepok and Phnom Prich Wildlife Sanctuaries. This result is very encouraging and conservation measures have certainly been essential for ensuring that the species is still healthy in numerous different locations in Cambodia. Better counting/survey effort, or movement of ibis from areas of high to low detectability (or vice versa) should also be considered in assessing the long-term trend.

Giant Ibis Trend

The existing global population estimate of 194 mature individuals (equivalent to approximately 290 individuals) given on the IUCN Red List entry for the species was made in 2014 based on monitoring data and expert opinion collected for the production of the 'Ten-year species action plan for the Giant Ibis (*Thaumatibis gigantea*) in Cambodia 2015-2025'. This estimate is now probably overdue for revision, however to date only two sites employ a standardised methodology for producing an estimate. Deriving an interpretation of the trend from nest data is potentially possible, however the data presented in Figure 6, highlights that this may not be a reliable approach; for example, it can be seen that for 2017, counts at several sites increased significantly, before falling back down to levels similar to before 2017, and it is not likely this represented a sudden actual increase and then decrease in the breeding population from one year to the next.

Nest Monitoring and Protection

The results of long-term nest monitoring and protection fit with overall longer-term trends for both species, although these trends are different for each species. White-shouldered Ibis nest data is the more positive of the two, with increasing numbers of nests recorded, and stable trend of nest success rates. Whether this is indicative of a rebounding population, or increased efforts of nest monitoring at certain sites is debatable, but in either case, the results are encouraging. For Giant Ibis the total numbers of nests recorded has fluctuated since nest results have been aggregated for all sites, but the proportion of successful nests has fallen at most sites since 2016.

Ex-situ efforts

By 2022, efforts to establish founder populations for founding captive ex-situ populations of both species have been successful, with three Giant Ibis and nine White-shouldered Ibis residing in captivity at ACCB in Siem Reap Province. The program and ACCB team have been able to gather useful knowledge and experience in the husbandry requirements of the species, and with the two populations well established, it can be hoped that captive breeding can be achieved in the near future. This not only provides opportunities to undertake studies of the birds in a controlled captive environment, but also provides a touchpoint for relevant stakeholders, as well as providing the potential means to undertake re-introduction or re-stocking to wild populations if needed in the future. The husbandry experience gained should also build the capacity of the team to successfully treat or rehabilitate rescued birds for release back to the wild.

RECOMMENDATIONS

Formally establish the working group

To properly consolidate the working group into the government structure, the CIWG should push for formal establishment in the form of an official Decree. This would not only benefit the status and functioning of the working group but also foster stronger collaboration with government departments, stakeholders and decision-makers, facilitating stronger links at the site and national level.

Address the lack of national species action plan for White-Shouldered Ibis, and track implementation progress for the Giant Ibis Action Plan 2015-2025.

There is currently no species action plan for White-shouldered Ibis, and participants agreed that given the level of conservation effort the species receives this is a gap that should be addressed. Likewise, although the Giant Ibis Action Plan commenced in 2015, the lack of working group hindered the ability to track progress towards objectives at a national level, and so not only could this be achieved through the group, planning for the end of the current plan and a possible renewal could be tackled.

Improve or consolidate the population monitoring for both species

The existing 'Non-breeding Census Protocol for White-shouldered Ibis (roost counts)' is now relatively old, having being produced almost 10 years ago. Furthermore, it was recognised that at some sites where individual roost sites attract large numbers of WSI, monitoring staff may have changed since the protocol, so it is potentially a good time to update the protocol and to ensure standardised implementation at all sites. For Giant Ibis, it is recognised that no standardised protocol had yet been adopted at all sites, meaning that estimates based on a combination of census data from sites that conduct censuses, and expert opinion from sites that don't, would be the only option. This should be planned to be conducted before the end of the current action plan, although it should be noted that estimates based on expert opinion may be a less precise way to estimate trends.

Enhance Public Outreach and Education

Expanding outreach and education initiatives to raise awareness about the importance of ibis conservation among the general public and key stakeholders should be encouraged to raise the profile of the conservation organisations engaged in conservation and facilitate fund-raising. Also, by engaging a broader audience in conservation efforts, the working group can cultivate a culture of stewardship and garner support for long-term conservation goals.

Facilitate more in-depth study of ibis range and movements

Tracking studies using GPS/GSM devices have been employed successfully for other bird species, and if this were to be able to be accomplished for either species in Cambodia, it would surely bring valuable new insights. For White-shouldered Ibis, there are still some gaps in the knowledge for the species regarding their movements from dry season nest areas to wet season communal roosting areas, as well possibly giving a better understanding of why the species continues to spend considerable time outside Protected Areas. For Giant Ibis, tracking might provide better information about foraging areas and habitat use, as well as illuminating the rates of recruitment and survival of young birds into the breeding population.

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APPENDICES

APPENDIX I: Percentage of total Giant Ibis nests that successfully fledged chicks

	<i>NPL</i>	<i>SPWS</i>	<i>LWS</i>	<i>MFF</i>	<i>EPL</i>	<i>All Sites</i>
2006	82%					
2007	72%					
2008	100%					
2009	88%					
2010	89%					
2011	100%					
2012	100%					
2013	81%	50%				78.6%
2014	71%	75%				71.4%
2015	94%	55%	100%			81.8%
2016	94%	100%	100%	100.00%		96.4%
2017	80%	87%	100%	100%		86.0%
2018	91%	75%	81%			84.4%
2019	86%	64%	70%			76.7%
2020	60%	70%	63%			63.2%
2021	83%	65%	73%	50%	100%	72.9%
2022	68.8%	68.8%	57.1%	100.0%	100.0%	68.3%

APPENDIX II: Average number of chicks per successful Giant Ibis nest

	<i>NPL</i>	<i>SPWS</i>	<i>LWS</i>	<i>MFF</i>	<i>EPL</i>	<i>All Sites</i>
2006	2.26					
2007	1.83					
2008	1.76					
2009	1.83					
2010	1.88					
2011	1.90					
2012	1.72					
2013	1.86	1.00				1.82
2014	1.82	1.33				1.75
2015	1.65	1.00	1.25			1.44
2016	1.75	1.78	2.00			1.78
2017	1.15	1.46	1.44	2.00		1.33
2018	1.90	1.33	1.46			1.67
2019	1.84	1.57	1.29			1.67
2020	2.00	1.43	1.60			1.75
2021	1.60	1.27	1.38	2.00	1	1.46
2022	1.82	1.64	1.00	2.00	1.00	1.61

APPENDIX III: Percentage of total White-shouldered Ibis nests that successfully fledged chicks **numbers from STRS are included under MFF for 2019/20 and 2020/21*

	NPL	SPWS	LWS	MFF	EPL	STRS	ALL SITES
2006-07	50%						
2007-08	60%						
2008-09	60%						
2009-10	75%			83%			80%
2010-11	100%		71%				79%
2011-12	86%		80%	55%			73%
2012-2013	43%	77%	88%	82%			76%
2013-2014	54%	85%	71%	83%			75%
2014-2015	60%	56%	95%	68%			71%
2015-2016	82%	42%	88%	100%	100%		78%
2016-2017	50%	70%	82%	100%	100%		80%
2017-2018	88%	72%	80%	89%			82%
2018-2019	83%	83%	70%	83%			81%
2019-2020	71%	88%	60%	93%			84%
2020-2021	88%	84%	60%	97%			86%
2021-2022	78%	78%	78%	92%		80%	84%

APPENDIX IV: Average number of chicks per successful White-shouldered Ibis nest

	NPL	SPWS	LWS	MFF	EPL	(ALL SITES)
2006-07	1.00					
2007-08	2.33					
2008-09	1.33					
2009-10	2.00			1.80		1.88
2010-11	1.60		1.90			1.80

2011-12	2.00		1.92	2.00		1.96
2012-13	2.00	1.70	2.00	1.89		1.87
2013-14	1.71	1.77	1.70	2.05		1.85
2014-15	1.50	1.70	1.84	1.88		1.87
2015-16	1.22	1.60	1.60	1.96	2.00	1.71
2016-17	2.00	1.67	1.67	1.81	2.00	1.71
2017-18	1.86	1.89	1.50	2.00		1.87
2018-19	1.80	2.00	2.00	1.90		1.94
2019-20	1.40	1.95	2.00	1.92		1.90
2020-21	1.71	2.04	1.50	2.04		1.96
2021-22	1.86	2.21	1.57	1.86		1.96

APPENDIX V: Cambodia Ibis Working Group Structure (CIWG)

Mission, Objective, and the ToR of the CIWG

I Mission

Working together for the long-term survival population of two critically endangered Cambodian Ibis species.

II Objectives:

1. Provide a channel and platform for needed collaboration between focal Government ministries, conservation NGOs, and other stakeholders, to conserve the two critically-endangered ibis species in Cambodia.
2. Strengthen collaboration in-situ ibis conservation activities across Cambodia via collaborative delivery of actions within the framework of ten-year Cambodia Ibis Action Plans and develop the conservation status reports.
3. Establish/support ex-situ for the maintenance of work towards a stable or increasing population of ibises within a network of well-protected sites, and improve the survival of ibis during breeding stages to allow for population growth.
4. Facilitate in identifying, implementing, and evaluating new strategies for strengthening institutional capacities at multiple levels for delivering ibis species conservation work in Cambodia.
5. Using the network provided by the working group, build and strengthen the knowledge base concerning ibis biology and behavior, and better track and understand the key factors behind the ibis population declines, by instigating, facilitating, and promoting high-quality academic research.
6. Support members in leveraging funds and resources to maintain programs for reducing the main threats and increasing the populations of both focus Ibis species in Cambodia.

III. The Role of government Core-Member of CIWG

1. To facilitate and provide advice regarding legal compliance and any further legal requirements.
2. To coordinate and communicate with and within inter-government agencies on ibis conservation matters.

3. To coordinate and ensure smooth support from all levels of authorities at the sub-national levels.
4. To give endorsement and support on ibis conservation policy matters.
5. To represent and chair ibis working group workshops and conferences.

IV. The Role of NGO Core-Member of CIWG

1. To maintain communication and collaboration with all members.
2. To undertake ibis conservation fundraising for their sites and ibis conservation programs, and when suitable jointly participate in CIWG-funded actions at the national level.
3. Join in implementing the activities outlined in the action plan to conserve ibis in Cambodia.
4. Collaborate with the working group in the sharing of data necessary to develop the ibis annual report.
5. Maintain ibis conservation programs at the priority sites under each partner's remit, and build ibis conservation capacities in the local communities at ibis conservation sites.
6. To undertake/assist in awareness-raising and promoting Ibis conservation in and around ibis conservation sites and nationwide.