

FINAL REPORT

**DISTRIBUTION AND STATUS
WHITE-SHOULDERED IBIS (*Pseudibis davisoni*)
IN EAST KALIMANTAN**



EDY SUTRISNO
IMANUDDIN



PREFACE

Indonesia has a very high biodiversity, which are many of its still lack of information. Based on that condition, Biodiversity Conservation Indonesia (BCI) take a small parts to fulfill the data of Indonesia biodiversity with finishing the one year of research of "Distribution and Status White-shouldered Ibis (*Pseudibis davisoni*) in East Kalimantan".

This final report presenting results of distribution and population surveys and some aspects of its ecology, includes of White-shouldered Ibis behavior, diets and habitat. The potential treats of this species were also presented.

We hope this research can support institutional or anybody who concern for conservation effort for water birds, especially White-shouldered Ibis and its habitat. Therefore We can planned the continuous development synergy with biodiversity conservation.

EXECUTIVE SUMMARY

White-shouldered ibis (*Pseudibis davisoni*) is a water bird species from *Threskiornithidae* family with declining population, and classified as Critical Endangered species in IUCN Red List of Threatened Species. East Kalimantan Province was chosen as survey area in this research because it was reported to have the largest population of White-shouldered Ibis in Indonesia. Aims of this research is to provide a comprehensive basic data of White-shouldered Ibis to be used for further monitoring and conservation activities by assessing its distribution, population and the quality of its habitat in East Kalimantan Province. Direct observation method combined with semi-guided interview with local inhabitant in the observation area was carried out for those aims.

During survey there were 21 sightings with total 53 individual birds were recorded. From those sightings, it was recorded minimum size of 1 individual and maximum size of 10 individuals. All sightings were made between Long Iram and Long Bagun in Mahakam Rivers. Also identified three types of foraging behavior of White-shouldered Ibis, three types of foraging sites, and identified three different types of individuals during the survey. The serious threats for White-shouldered Ibis is forest clearance and land degradation caused by logging activities and forest fire. The team conducted public awareness activity through dialogue with local conservation agencies, scientific community, and NGO's that have concern in biodiversity conservation

Continuous monitoring and further research is needed to know the size and distribution of White-shouldered Ibis accurately, public awareness campaign for local inhabitant must be conducted to create mass-participation for effective conservation, and local government support is necessary to conserve the species via local regulation, specific protection decree, or favorable spatial planning policy.

ACKNOWLEDGMENT

Biodiversity Conservation Indonesia (BCI) is very grateful to British Petroleum (BP), BirdLife International and Fauna & Flora International for providing the fund to conduct this programme through "BP Conservation Programme Award 2001". Special thanks are due to Dr. Ani Mardiasuti (head of Forest Conservation Department of Faculty of Forestry Bogor Agricultural University) Dr. Dewi M. Prawiradilaga (Balitbang Zoology-Indonesian Institute of Sciences/FFI-IP) and Resit Sozer who has given us proposition for the research and reviewed the final report.

We would also like to thanks Rustam Fahmi, our counterpart from Mulawarman University who had helped us during our journey in East Kalimantan, Dr. Chandra dewana Boer who gave us consultation and chance to share our experience in front of his students on Forestry faculty in Mulawarman University. In field we also get help from a number of people, for that we thank a lots to: Mr. Gunawan and Mr. Yani from Barito Pacific Timber who welcomed the team to use their sites on Laham sites, all staffs and managers in Laham sites, and Mr. Fiktorius Paran as chief of Laham villages who with all his hospitality giving team many valuable information. We also thanks to Kang Dedi, Abah, and Iyan who accompanied the team in day's survey.

We also thank all who we can't mention in detail for their supports.

ORGANIZATION PROFILE

Biodiversity conservation Indonesia (BCI) is a local NGO established in September 14th 1994, based in Bogor. Vision of BCI's is as prerequisite for sustainable development with missions to act as catalyst for change of development paradigm and empowering people capacity and/or natural resources managers to accelerate the achievement of biodiversity-based sustainable development.

BCI's objectives are provide inputs at the policy level to accelerate change of development direction toward sustainability, increase people knowledge, understanding, awareness and/or care and capacity in the field of biodiversity conservation through various action programs, including the empowerment of traditional wisdom, develop biodiversity conservation science and technology, and facilitate synergy of activities dedicated to biodiversity conservation between community groups, government, private organization and NGO's at local, national and global level.

CONTENTS

PREFACE.....	i
EXECUTIVE SUMMARY	ii
ACKNOWLEDGMENT	iii
ORGANIZATION PROFILE	iv
CONTENTS.....	v
I. INTRODUCTIONS.....	1
I.1. Background	1
I.2. East Kalimantan	2
I.3. White-shouldered Ibis (<i>Pseudibis davisoni</i>)	2
II. AIMS AND OBJECTIVES.....	3
II.1. Aims	3
II.2. Objectives	3
III. METHODOLOGY	4
III.1. Distribution of White-shouldered Ibis	4
III.2. Population.....	4
III.3. Habitat Analysis.....	4
III.4. Public Awareness.....	4
IV. RESULT AND DISCUSSION	5
IV.1. Distribution.....	5
IV.2. Population Size	5
IV.3. Behavior.....	7
IV.4. Habitat.....	7
IV.5. Diets	8
IV.6. Intraspecific Variation.....	8
IV.7. Threats	8
IV.8. Public Awareness	9
IV.9. Status and Conservation.....	9
V. CONCLUSION AND RECOMMENDATION.....	11
VI. REFERENCES	12
VII. OTHER RELATED REFFERENCES	14
APPENDIX.....	15

I. INTRODUCTIONS

I.1. Background

White-shouldered ibis (*Pseudibis davisoni*) is water bird species from *Threskiornithidae* family with declining population, and classified as Critical Endangered species in IUCN Red List of Threatened Species (Hilton-Taylor 2000). Based on recent observation in Indonesia its total population was estimated around 30 to 100 individuals in East Kalimantan Province (Sözer and Heijden 1997).

Globally, the White-shouldered Ibis is distributed in Myanmar, China, Thailand, Cambodia, Laos, Vietnam, East Malaysia and Indonesia (Collar *et al.* 1994; MacKinnon & Phillips 1993; Smythies 1981; Robson 2000; Hoyo *et al.* 1992; Hancock *et al.* 1992). In Indonesia, White-shouldered Ibis is found in Kalimantan island, especially along Mahakam river and Long Iram in East Kalimantan, and Puruktjau and Barito in South Kalimantan province (Hancock *et al.* 1992; Petersen 1991; Smythies 1981; Robson 2000; Perennou *et al.* 1984; Holmes & Burton 1987; Collar *et al.* 1994; Hoyo *et al.* 1992). Based on existing information, White-shouldered Ibis habitat is swamp, river forest, swamp forest, pools, streams and marshy areas in open lowland forest (Robson 2000; Sibuea *et al.* 1995).

East Kalimantan Province was chosen as survey area because it was reported to have the largest population of White-shouldered Ibis in Indonesia. Mahakam region is assumed to be the habitat for remaining single core population (Sözer and Heijden 1997). The facts that the region is threatened by rapid sedimentation (Syaifullah 2001) and there is no definite population size on the remaining core population make this survey important.

White-shouldered Ibis was classified in endangered category due to the rapid fragmentation and degradation of its habitat (Collar *et al.* 1994) caused by the rapid increase of human population, more intensive cultivation, wetland drainage and pesticide (Hancock *et al.* 1992). There are still limited researches of White-shouldered Ibis, especially about its ecology and distribution aspects, including in Indonesia. Little is known about its habitat preferences in Kalimantan, although most recent records reported of birds foraging on large gravel and shingle banks that emerge when the river is low (Sözer and Heijden 1997). Therefore, an intensive survey over the range of White-shouldered Ibis (Holmes and Burton 1987) and continued monitoring are needed as basic foundation for the conservation of White-shouldered Ibis in East Kalimantan.

I.2. East Kalimantan

East Kalimantan province covered 211440 km² area, and located between 113⁰44'E-119⁰00'W and 4⁰24'N-2⁰25'S. Geographically, in the north it has border with Malaysia, Makasar strait and Sulawesi Sea, in the south with South Kalimantan province and in the west with West Kalimantan province, Central Kalimantan province, and Malaysia. Generally, the climate in East Kalimantan is hot with average year temperature approximately 19.20⁰C to 35,40⁰C. It also has relatively high humidity, around 83.81 to 86.17% in average. East Kalimantan has two seasons: dry season extends from May to October and wet season from November to April (BPS Kalimantan Timur 2001).

East Kalimantan has ten recommended sites as important bird area, which are not only important for birds and other wildlife, but also give important protection service to their surrounding watersheds area for industry and agriculture activities (Holmes *et al.* 2001). From those 10 recommended locations, two sites were identified as habitat of *Pseudibis davisoni*, which are located in the wetland of middle Mahakam (00⁰14'S 116⁰19'E) and Long Bagun (00⁰40'N 115⁰35'E).

I.3. White-shouldered Ibis (*Pseudibis davisoni*)

Description : Medium size (75 cm) black ibis with bare head, white patch on shoulder, and red legs and nape patch. General plumage is dark brown with glossy black wings and tail (MacKinnon *et al.* 1993). In flight, the wing shows distinctive white patch on inner lesser upstreamwing-coverts (Robson 2000)

Voice : Harsh kyee-ahh (MacKinnon and Phillipps. 1993). Group territorial calls include long, loud, unearthly, hoarse screams "ERRRRRH" or "ERRRRROH" (repeated after longish intervals), accompanied antiphonally by monotonous, subdued, moaning, rhythmic "ERRH ERRH ERRH..." also screams mixed with honking sounds "ERRH OWK OWK OWK...." and more subdued "OHHAAA OHHAAA..." and "ERRR-AH" (Robson 2000).

Habitat : Pools, streams and marshy areas in open lowland forest (Robson 2000). Swamp, forest along river flow, edge of river, and swamp forest (Sibuea *et al.* 1995).

Status : Critically Endangered (Hilton-Taylor 2000), Protected (Noerdjito and Maryanto 2001; Sibuea *et al.* 1995), Non Appendix (Sibuea *et al.* 1995).

II. AIMS AND OBJECTIVES

II.1. Aims

This project aims to provide a comprehensive basic data of White-shouldered Ibis to be used for further monitoring and conservation activities by assessing its distribution, population and the quality of its habitat in East Kalimantan Province.

II.2. Objectives

- ❖ To identify the distribution and population size of White-shouldered Ibis in East Kalimantan Province through re-observation of the previous observation.
- ❖ To assess the existing White-shouldered Ibis habitat quality/condition and its existing and potential threat
- ❖ To determine the conservation status of White-shouldered Ibis in East Kalimantan Province.
- ❖ To identify locally important sites requiring protection for White-shouldered Ibis.
- ❖ To promote the continuous monitoring activities and other conservation action plans for the conservation of White-shouldered Ibis in East Kalimantan Province through scientific publication of project's results.
- ❖ To increase the local stakeholders' awareness on White-shouldered Ibis existence and their level of knowledge by conducting this collaborative research project.
- ❖ To encourage local stakeholders in conducting further researches on White-shouldered Ibis.

III. METHODOLOGY

III.1. Distribution of White-shouldered Ibis

Local distribution of *Pseudibis davisoni* was identified through direct observation with boat survey technique (Howes & Bakewell 1989) using motorized canoes or ces/ketinting along Mahakam River and its down stream area to observe sites from previous observation conducted by Sözer, Göner, Limberg, Meijaard, Kühne; between Long Iram-Long Bagun and by Silvius and Verheught in Mahakam lakes (Sözer and Heijden 1997). Observations were conducted using Binoculars 7-15 x 35, 10 x 50 and Spotting Scope Nikon 20x. Document action was made by Nikon Fm 2 with 35 mm and 200 mm lens. This method was combined with semi-guided interview with local inhabitant in the observation area to verify its existence during the ground check.

III.2. Population

Population size was identified through sight method assuming different individual from each sighting. Semi guided interviews were conducted to identify the existence of White-shouldered Ibis on each site, local name, and local inhabitant's hunting and trading pattern related with the species. Besides collecting population size data, team also recorded foraging behavior, social behavior, resting and roosting behavior and other visible behavior of White-shouldered Ibis. Other bird species observed in the habitat were also recorded.

III.3. Habitat Analysis

Habitat analysis recorded general habitat conditions and typical habitat that have relevancy with activities of White-shouldered Ibis. Semi-guided interview will also be utilized to assess the local inhabitant level of knowledge on White-shouldered Ibis existence and their knowledge on existing and potential local threats to its habitat.

III.4. Public Awareness

Public awareness activities were conducted during and after field research. During field survey, public awareness was conducted by transferring information to local inhabitant of White-shouldered Ibis status, and also by collecting information of the local inhabitant awareness on White-shouldered Ibis extinction and other additional relevant information. Public awareness after field survey was conducted through discussion with local scientist and NGOs community in order to ensure the continuity of monitoring activities in local level after this research.

IV. RESULT AND DISCUSSION

IV.1. Distribution

In this research, besides doing observation in location between Long Iram-Long Bagun, Team also observed other possible sites, there are, Nyawatan River, Kelian river and Mahakam lakes. Those sites observed based on previous research, from those observations the team only identified the recent existing of White-shouldered Ibis only between Long Iram and Long Bagun. We were not encountered with White-shouldered Ibis in Nyawatan and Kelian River, although from interview with local people indicating that White-shouldered Ibis were also found in this river. The locations where the White-shouldered Ibis were recorded are shown in Table 1.

IV.2. Population Size

During observations, there were 21 sightings with totally 53 encountered individuals (Table 1). The size of each sighting varied, ranging from 1 individual to maximum of 10 individuals. The area surveyed and identified as White-shouldered Ibis habitat covered area between Long Iram and Long Bagun. In comparison to the previous survey which was able to identify 14 individuals in one sighting (Sözer and Heijden 1997), this sighting shows a possibility of declining population size due to rapid habitat degradation that made it difficult for White-shouldered Ibis foraging in large groups.

Field surveys were also conducted in Nyawatan River and Kedangpahu River. However we were not encountered with White-shouldered Ibis although from interview with local people indicating that White-shouldered Ibis were also found in this river. In Mahakam lakes also we did not record White-shouldered Ibis.

Table 1. Sighting of White-shouldered Ibis During Research Activities

No.	Date Sighting	Coordinate	Number of Individuals	Location on sites	Type of Site
1.	16 August 2001	00 ^o 22 ⁿ N 115 ^o 25 ^e E	2	Upstream Laham	Gravels banks, Bangris tree
2.	16 August 2001	00 ^o 20 ⁿ N 115 ^o 24 ^e E	1	Downstream laham	Tree canopy on the rivers edge
3.	18 August 2001	00 ^o 13 ⁿ N 115 ^o 31 ^e E	2	Pari river estuari	Mud banks
4.	18 August 2001	00 ^o 13 ⁿ N 115 ^o 30 ^e E	2	Pari river	Mud banks
5.	19 August 2001	00 ^o 22 ⁿ N 115 ^o 25 ^e E	2	Upstream Laham	Mud banks
6.	22 August 2001	00 ^o 13 ⁿ N 115 ^o 28 ^e E	10	Databilang	Mud banks
7.	23 August 2001	00 ^o 22 ⁿ N 115 ^o 25 ^e E	3	Merah river estuari	Gravel banks, sand banks, mud banks
8.	25 August 2001	00 ^o 17 ⁿ N 115 ^o 23 ^e E	2	Ratah river estuari	Mud banks
9.	26 August 2001	00 ^o 22 ⁿ N 115 ^o 25 ^e E	2	Merah river estuari	Gravel banks, sand banks
10.	31 August 2001	00 ^o 18 ⁿ N 115 ^o 25 ^e E	2	Upstream Ratah river	Sand banks
11.	31 August 2001	00 ^o 17 ⁿ N 115 ^o 22 ^e E	1	Ratah river	Gravel banks
12.	1 September 2001	00 ^o 13 ⁿ N 115 ^o 28 ^e E	5	Downstream Databilang	Gravel banks
13.	1 September 2001	00 ^o 15 ⁿ N 115 ^o 28 ^e E	1	Upstream Ratah river	Sand banks
14.	2 September 2001	00 ^o 22 ⁿ N 115 ^o 25 ^e E	2	Upstream laham	Gravel banks
15.	3 September 2001	00 ^o 22 ⁿ N 115 ^o 25 ^e E	2	Upstream laham	Gravel banks
16.	3 September 2001	00 ^o 27 ⁿ N 115 ^o 27 ^e E	2	Upstream Medang river	Gravel banks
17.	5 September 2001	00 ^o 27 ⁿ N 115 ^o 23 ^e E	2	Upstream Mamahak ulu	Gravel banks, sand banks
18.	6 September 2001	00 ^o 13 ⁿ N 115 ^o 28 ^e E	3	Downstream Databilang	Gravel banks
19.	6 September 2001	00 ^o 11 ⁿ N 115 ^o 30 ^e E	1	Downstream Maau	Mud banks
20.	6 September 2001	00 ^o 02 ⁿ N 115 ^o 34 ^e E	2	Upstream Ujoh Bilang	Dead tree on the river edge
21.	8 September 2001	00 ^o 11 ⁿ N 115 ^o 31 ^e E	4	Lutan-Mamahak Tebbo	Sand banks

IV.3. Behavior

Foraging Behavior

There were three types of foraging behavior of White-shouldered Ibis during the research. The First type is probing, sweeping the bill from side to side through water and silt in shallow water. This distinctive form of specialization is closely linked with the most obvious structural adaptation, the characteristic bills (Hoyo *et al.* 1992). The second type is pecking, with walking slowly picking up foods from substrate; this form is used in mud banks and sand banks. The Third type is flipping (Hoyo *et al.* 1992) where White-shouldered Ibis turns over objects like rock and gravel. This activity occurs in gravel banks. White-shouldered Ibis used head swinging method to clean up the prey from mud and to swallow easily (see Hancock 1992).

Body Maintenance Behavior

Body maintenance activities identified during research were preening and sunbath. Preening was conducted with help of bill and back part of the head. Bill is used for preening and cleaning plumage of chest side and flight plumage. It was used for cleaning back plumage, which was supported by back part of head to help preening or doing head scratching. In order to keep the plumage dry and clean plumage White-shouldered Ibis conducted sunbath. The activities were conducted in mud banks and gravel bank. By doing delta wing terms White-shouldered Ibis also use thermal from gravel to maintain its plumage. To maintain body temperature, during sunbath activities, White-shouldered Ibis usually goes down to the water to drink and then returns to former place or by opening its bill and trembling its neck.

IV.4. Habitat

All White-shouldered Ibis identified during the research were recorded along Mahakam River and its branches. During the survey, it was identified that in the river branches White-shouldered Ibis were mostly seen around estuary, approximately maximum 1 km from estuary. This phenomenon presumably was driven by effectiveness in foraging activities. In dry season where the river level was low, it's easier to forage in and around estuary or in the main river. They feed on the estuaries probably because the abundance of worms.

The survey identified three types of foraging sites: that is mud banks, gravel banks and sand banks that emerge when water surface was low. Although White-shouldered Ibis is wild, their feeding areas sometime located near village, and they seem familiar with human activities. White-shouldered Ibis also used those types of sites for sunbath activities site. For resting sites, White-shouldered Ibis used banks shaded by vegetation. In the nearby estuary, gravel, shingle and mud bank were also used as resting sites. For roosting sites, White-shouldered Ibis used

large tree growing along the river, such as *bangris* (*Coompassia* sp.) or in dead tree in the edge of rivers.



Photo 1. One of White-shouldered Ibis Habitat Types

IV.5. Diets

The observations identified that Ibis mostly eat worms in mud banks, and small fish in gravels, although once the birds were seen catching flies with their bill. It was identified that larvae, pupae and small crustacean were alternative for their diets based on their foraging activities on the gravels. The team also identified juvenile whose trying to eat fruit that drop in the mud banks. According to Hancock (1992) *Pseudibis papillosa* is omnivore.

IV.6. Intraspecific variation

There were three different types of individuals identified during the survey:

- The first type have black glossy color of wing feathers, the color of its plumages are dull brown, there were white patch on inner lesser upstream wing-coverts, white blue pale collar, reddish of iris, pinkish of leg color.
- The second type generally has similar identification as the first one but on white collar around its nape there were black spot assumed as down feather. The size was relatively smaller than the first type, the color of wing feathers and body are all light brown. This second type assumed as juvenile because in one sighting there were preening activity of first type individual to second type of individual.
- The third type has its all body plumages and wing feather coloring brown and circle on bare head coloring white and pale blue. This third type assumed as sub-adult of White-shouldered Ibis.

IV.7. Threats

The serious threats for White-shouldered Ibis is forest clearance and land degradation caused by logging activities and forest fire. Fire locations that

identified during research were spread on whole research area. Mostly on small area because land clearing by local inhabitant. Hunting occurs on limited scale and was not considered as serious threat since it does not focus on single species and only for consumption needs. Local inhabitant said that meat of White-shouldered Ibis is not delicious. Undirected threats for White-shouldered Ibis affected by human activities are destructive fishing through poisoning and electrical use. Riverboats and motorized canoes may disturb foraging birds.

IV.8. Public Awareness

During research, the team also gave information to local inhabitant about the status of White shouldered ibis. According to information collected from local inhabitant, many of them know about the existence of White-shouldered Ibis, but only several people realize that after 1997 forest fire the species became rarely seen. The team also conducted public awareness activity to promote continuous conservation through dialogue with local conservation agencies, scientific community, and NGO's that have concern in biodiversity conservation such as Bumi, Marilas and Lories. The team also had opportunities to speak in front of students of Forestry Faculty in University of Mulawarman. The Team shared the information about the research, the existence of White-shouldered Ibis in East Kalimantan, and recent data collected during the research.



Photo 2. Forest clearance is serious threat of White-shouldered Ibis

IV. 9. Status and Conservation

White-shouldered Ibis is classified as critical Endangered species (Hilton-Taylor 2000). Government of Indonesia has protected it since 1978 with Minister of Agriculture decree No. 742/Kpts/Um/12/1978 and reinforces it with government regulation No. 7 year 1999 (Noerdjito and Maryanto 2001). This regulation is ineffective because seldom being implemented in field and socialized to local

inhabitant. White-shouldered Ibis is common for local inhabitant but they didn't know the conservation status of White-shouldered Ibis.

The serious threats of White-shouldered Ibis are forest clearance and land degradation caused by logging and forest fire. Forest fire happening in 1997 had significant impact to the population size of White-shouldered Ibis. Nowadays those conditions become worsen with the local government of West Kutai policy to give concessionary right for small area (100 ha).



Photo 3. Activities of White-shouldered Ibis (A. Perching, B. Resting, C. Foraging, D. Flying)

V. CONCLUSION AND RECOMMENDATION

Conclusions :

1. During survey there were 21 sightings with total 53 individual birds were recorded. From those sightings, it was recorded minimum size of 1 individual and maximum size of 10 individuals. All sightings were made between Long Iram and Long Bagun in Mahakam Rivers.
2. Serious threats for White-shouldered Ibis are forest clearance and land degradation caused by logging activities and forest fire. Fire locations identified during research activities were widely spread on whole research area, mostly in small areas because land clearing by local inhabitant. Hunting occurs on limited scale and is not considered as serious threat since it does not focus on single species and only for consumption needs.
3. There three different types of individuals during survey that can be differentiated from its body size, color of plumage and white blue collar.
4. All Ibis identified during the research were located along Mahakam river and its branches. Mud banks, gravel banks and sand banks that emerge when the water surface was low are the favorite types of sites that used by White-shouldered Ibis. For roosting sites, White-shouldered Ibis use large tree along the river, such as *bangris* (*Coompassia sp.*) or in dead tree in the edge of rivers.
5. Worm, small fish, flies, larvae, pupae and small crustacean were White-shouldered Ibis diets based on their foraging activities. Fruit may also be part of their diet since the team identified juvenile whose trying to eat fruit that falling in the mud banks.

Recommendation :

1. Continuous monitoring and further research, especially on minimum habitat requirement, breeding activity, and its bioecology, are needed
2. Further monitoring of distribution of White-shouldered Ibis population in the entire Kalimantan Island is immediately needed to know the size and distribution of White-shouldered Ibis accurately.
3. Public awareness campaign for local inhabitant must be conducted to create mass-participation for effective conservation.
4. Local government support is necessary to conserve the species via local regulation, specific protection decree, or favorable spatial planning policy.

VI. REFERENCES

- BPS Kalimantan Timur. (2001). *Propinsi Kalimantan Timur dalam Angka 2000*. BPS Kalimantan Timur, Samarinda.
- Collar, N. J., Crosby, M. J. and Stattersfield, A. J. (1994). *Birds to Watch II: The World List of Threatened Birds*. BirdLife Conservation Series No. 4. BirdLife International, Cambridge.
- Hancock, J. A., Kushlan, J. A. and Kahl, M. P. (1992). *Storks, Ibises and Spoonbills of the World*. Academic Press, London.
- Hilton-Taylor, C. (compiler) 2000. *2000 IUCN Red List of Threatened Species*. IUCN, Gland, Switzerland and Cambridge, UK. xviii + 61pp.
- Howes, J. and Bakewell, D. (1989). *Shorebird Studies Manual*. AWB Publication No. 55. Kuala Lumpur.
- Hoyo, del J., Elliott, A., and Sargatal, J. eds. (1992). *Handbook of the Birds of the World*. Volume 1. Ostrich to ducks. Lynx Editions, Barcelona.
- MacKinnon, J. and Phillipps, K. (1993). *A Field Guide to the Birds of Borneo, Sumatra, Java & Bali the Greater Sunda Island*. Oxford University Press, Oxford.
- Noerdjito, M., Ibnu Maryanto. eds. (2001). *Jenis-jenis Hayati yang dilindungi Perundang-undangan Indonesia*. Balitbang Zoologi (Museum Zoologicum Bogoriense) Puslitbang Biologi-LIPI & The Nature Conservancy, Cibinong.
- Perennou, C., Mundkur, T., Scott, D. A., Follested, A. and Kvenild, L. (1994). *The Asian Waterfowl Census 1987-91: Distribution and Status of Asian Waterfowl*. AWB Publication No. 86. IWRB Publication No. 24. AWB, Kuala Lumpur, Malaysia and IWRB, Slimbridge, U.K.
- Peterson, S. (1991). *A Record of White-shouldered Ibis in East Kalimantan*. Kukila 5(2):144-145.
- Robson, C. (2000). *A Field Guide to the Birds of South-East Asia, Thailand, Peninsular Malaysia, Singapore, Myanmar, Laos, Vietnam, Cambodia*. New Holland Publishers (uk) Ltd, London Capetown Sydney Auckland.

Sibuea, T., Rusila Noor, Y., Silvius, M. J., and Susmianto, A. (1995). *Burung Bangau, Pelatuk besi dan Paruh sendok di Indonesia*. Panduan untuk Jaringan Kerja. PHPA/Wetlands International-Indonesia Programme, Bogor.

Smythies, B. E. (1981). *The Birds of Borneo*. Third Edition Revised by Earl of Cran Brook. The Sabah society with The Malayan Nature Society.

Sözer, R. and Heijden, A. J. W. J V. D., (1997). *An Overview of the Distribution, Status and Behavioral Ecology of White-shouldered Ibis in East Kalimantan, Indonesia*. Kukila 9: 126-140.

Syaifullah, M. (2001). *Sungai Mahakam yang terus mendangkal*. Kompas Newspapers. Monday, 5 Februari 2001: 25.

VII. OTHER RELATED REFERENCES

Alikodra, H.S. (1990). *Pengelolaan Satwaliar*. Jilid I. Departemen Pendidikan dan Kebudayaan Direktorat Jenderal Pendidikan Tinggi Riset Antar Universitas Ilmu Hayat Institut Pertanian Bogor. Bogor.

Bibby, C., Jones, M. and Marsden, S. (1998). *Expedition Field Techniques: Bird Surveys*. Royal Geographical Society, London.

Gönner, C. 2000. *Birds Lof Lake Jempang and The Middle Mahakam Wetlands, East Kalimantan*. Kukila 11:13-36.

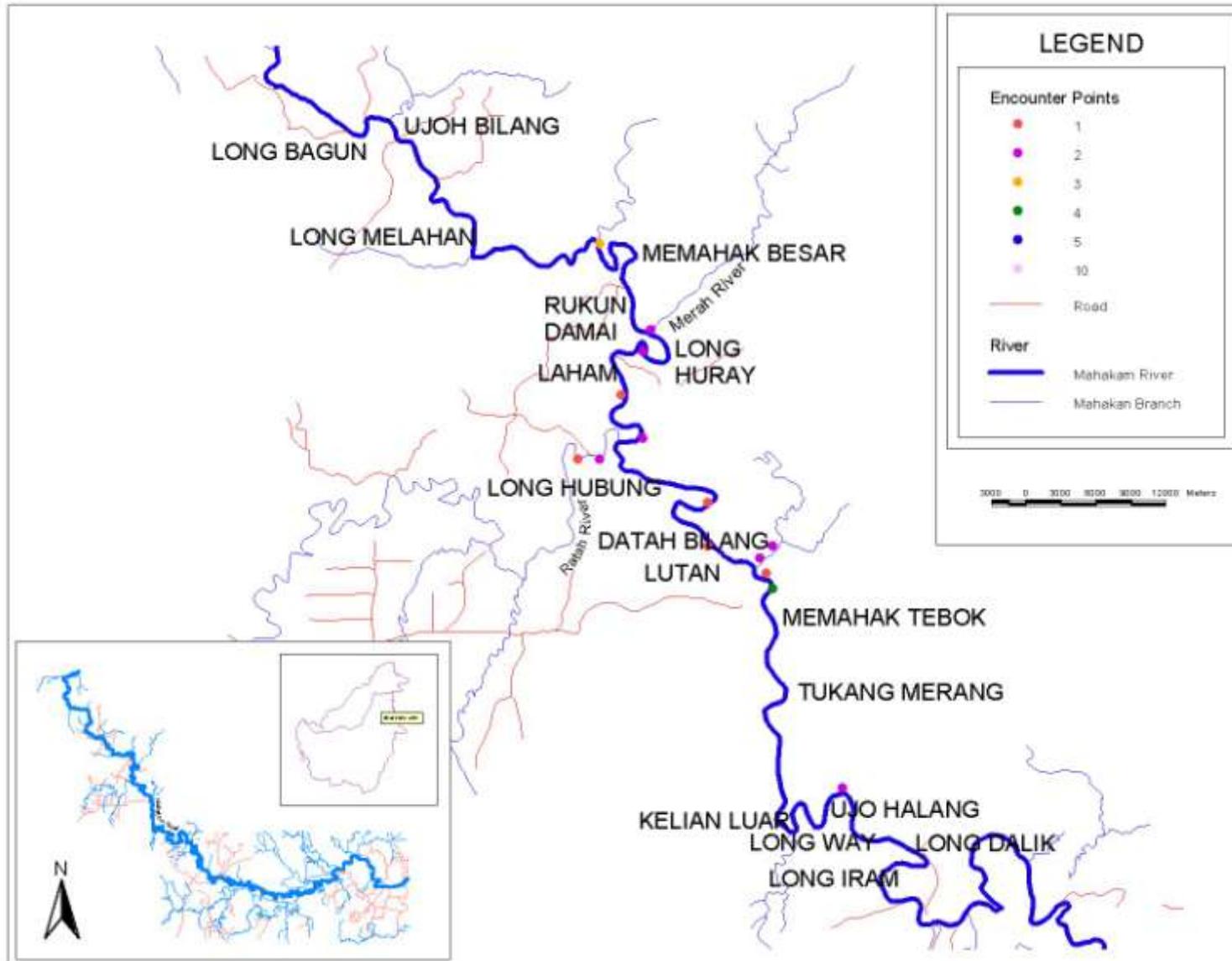
Holmes, D. A., and Burton, K. (1987). *Recent Notes on the Avifauna of Kalimantan*. Kukila 3(1-2):5.

Mackinnon, K., Hatta, G., Halim, H. and Mangalik, A. (1996). *The Ecology of Kalimantan. Indonesian Borneo*. The Ecology of Indonesia Series. Volume III. Periplus Editions (HK) Ltd. Singapore.

Shannaz, J., P. Jepson dan Rudyanto (Edit.) (1995). *Burung-Burung Terancam Punah di Indonesia*. PHPA/MoF-BirdLife International-Indonesia Programme, Bogor.

Tanner, J. T. (1978). *Guide to the Study of Animal Population*. The University of Tennessee Press. Knoxville.

Appendix. 1. Map of White-shouldered Ibis Encountered



Appendix 2. List of Others Species of Birds that Identified on Area Surveyed

Family	English Name	Scientific Name
Phalacrocoracidae	Oriental Darter	<i>Anhinga melanogaster</i>
Ardeidae	Black-crowned Night-heron	<i>Nycticorax nycticorax</i>
	Striated Heron	<i>Butorides striatus</i>
	Cinnamon Bittern	<i>Ixobrychus cinnamomeus</i>
	Intermediate Egret	<i>Egretta intermedia</i>
	Great Egret	<i>Egretta alba (Casmoredius albus)</i>
	Cattle Egret	<i>Bubulcus ibis</i>
	Chinese Egret	<i>Egretta eulophotes</i>
	Javan Pond-heron	<i>Ardeola speciosa</i>
	Little Egret	<i>Egretta garzetta</i>
Ciconiidae	Lesser Adjutant	<i>Leptoptilos javanicus</i>
Accipitridae	Brahminy Kite	<i>Haliastur Indus</i>
	Black Eagle	<i>Ichthinaetus malayensis</i>
	White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>
Rallidae	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>
	Purple Swampphen	<i>Porphyrio porphyrio</i>
	Common Moorhen	<i>Gallinula chloropus</i>
Scolopacidae	Common Sandpiper	<i>Tringa hypoleucos</i>
Laridae	Gull-billed Tern	<i>Sterna (Gelochiledon) nilotica</i>
	Little Tern	<i>Sterna albifrons</i>
	Black-naped Tern	<i>Sterna sumatrana</i>
	Whiskered Tern	<i>Chlidonias hybridicus</i>
Columbidae	Green Imperial Pigeon	<i>Ducula aenea</i>
	Spotted Dove	<i>Streptopelia chinensis</i>
Cuculidae	Plaintive Cuckoo	<i>Cuculus (Cacomantis) merulinus</i>
Strigidae	Collared Scopsowl	<i>Otus lempiji</i>
Apodidae	Asian Palm-swift	<i>Cypsiurus balasiensis</i>
	Fork-tailed Swift	<i>Apus pacificus</i>

Family	English Name	Scientific Name
Alcedinidae	Stork-billed Kingfisher	<i>Pelargopsis capensis</i>
	Blue-eared Kingfisher	<i>Alcedo meninting</i>
Bucerotidae	Rhinoceros Hornbill	<i>Buceros rhinoceros</i>
	Asian Pied Hornbill	<i>Anthracoceros albirostris</i>
Capitonidae	Black Hornbill	<i>Antracoceros malayanus</i>
Eurylaimidae	Yellow-crowned Barbet	<i>Megalaima henricii</i>
Hirundinidae	Black-and-yellow Broadbill	<i>Cymbirhynchus macrorhynchus</i>
	Barn Swallow	<i>Hirundo rustica</i>
	Pacific Swallow	<i>Hirundo tahitica</i>
Pycnonotidae	Asian Martin	<i>Delichon dasypus</i>
Turdidae	Yellow-vented Bulbul	<i>Pycnonotus goiavier</i>
	Oriental Magpie-robin	<i>Copsycus saularis</i>
Sylviidae	Siberian Blue Robin	<i>Erithacus cyane</i>
	Ashy Tailorbird	<i>Orthotomus ruficeps</i>
	Dark-necked Tailorbird	<i>Orthotomus atrogularis</i>
	Rufous-tailed Tailorbird	<i>Orthotomus sericeus</i>
Monarchidae	Pied Fantail	<i>Rhipidura javanica</i>
Dicaeidae	Orange-bellied Flowerpecker	<i>Dicaeum trigonostigma</i>
Nectariniidae	Brown-throated Sunbird	<i>Anthreptes malacensis</i>
	Crymson Sunbird	<i>Aetopyga siparaja</i>
Estrildidae	Tree Sparrow	<i>Passer montanus</i>
	Dusky Munia	<i>Lonchura fuscans</i>
	Chestnut munia	<i>Lonchura malacca</i>
Corvidae	Slender-billed Crow	<i>Corvus enca</i>

Appendix 3. List of Others Species that Identified on Area Surveyed

English Name	Scientific Name
Western Tarsier	<i>Tarsius bancanus</i>
Silvered Langur	<i>Presbytis cristata</i>
Proboscis Monkey	<i>Nasalis larvatus</i>
Long-tailed Macaqua	<i>Macaca fascicularis</i>
Bornean Gibbon	<i>Hylobates muelleri</i>
Oriental Small-clawed Otter	<i>Aonyx (Amblonyx) cinerea</i>