

# **GREY-HEADED FISHING EAGLE PROJECT: 2006 STUDY REPORT.**



*Malcolm A.C. Nicoll and Ruth E. Tingay*



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**Citation:** Nicoll, M.A.C. and Tingay, R.E. (2007). *Grey-headed Fishing Eagle Project: 2006 Study Report*. Unpublished report, CAER, Reading and Natural Research, Banchory.

## INTRODUCTION

The genus of Asiatic-Oriental fishing eagles, *Ichthyophaga*, contains only two species: the grey-headed fishing eagle *Ichthyophaga ichthyaetus* (hereafter referred to as GHE) and the lesser fishing eagle *Ichthyophaga humilis* (Brown and Amadon, 1968; Brown, 1976; Collar *et al.*, 1994; del Hoyo *et al.*, 1994). Whilst both species are broadly sympatric, ranging from northeast India, down the Thai-Malay Peninsula to Indonesia, virtually nothing is known of their specific ecological requirements in any part of their range (Ferguson-Lees and Christie, 2001). The GHE is currently classified as *globally near-threatened* (Birdlife International, 2001), exhibiting range contraction and apparent population decline, for unknown reasons (Ferguson-Lees and Christie, 2001; Birdlife International, 2004), although potential threats are thought to include deforestation, pesticides and anthropogenic disturbance (Birdlife International, 2001; Baral and Inskipp, 2004). The remaining stronghold of the GHE has been reported as northeast India and Nepal (Ferguson-Lees and Christie, 2001).

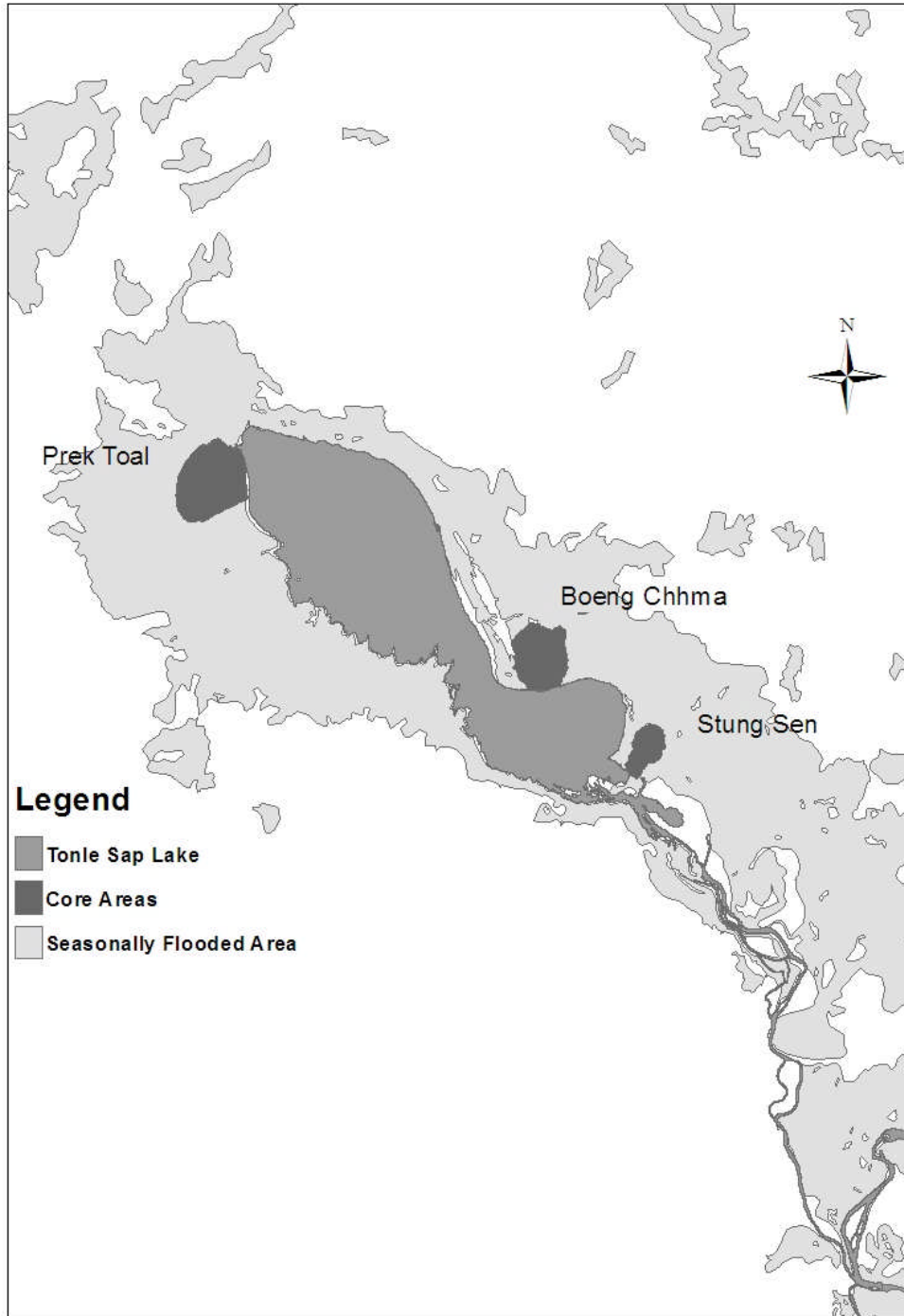
Unpublished information indicated the potential of Cambodia as a suitable study area for the species, particularly the flooded forest surrounding Southeast Asia's largest

freshwater lake - Tonle Sap Lake (12°25' to 13°25'N; 103°25' to 104°40'E), where anecdotal reports suggested the presence of GHE. The Tonle Sap Lake was designated a UNESCO World Biosphere Reserve in 1997 (Poole, 2005), with three designated core areas: Prek Toal (21,342ha), Boeng Chhma (14,560ha) and Stung Sen (6,355ha) (see Fig. 1). The Prek Toal Core Area (13°07'N 103°39'E) is situated at the north-west end of the Tonle Sap and is considered one of the most intact areas of freshwater swamp forest around the lake (Chan *et al.*, 2004). It consists of gallery forests and short-tree scrublands with scattered trees and small ponds. The site has been designated as an internationally Important Bird Area (Chan *et al.*, 2004) as it supports the most significant large waterbird colonies of Southeast Asia, including breeding populations of the globally threatened spot-billed pelican *Pelecanus philippensis*, milky stork *Mycteria cinera*, lesser adjutant *Leptoptilos javaicus* and greater adjutant *Leptoptilos dubius* (Goes, 2005). In view of the quality of the habitat at Prek Toal, anecdotal reports of fishing eagles, available infrastructure and logistical support, this area was identified as the study area.

In December 2005 the first systematic survey of the GHE in Prek Toal core area was conducted in collaboration with the Ministry of Environment (MoE) Government of Cambodia and Wildlife Conservation Society (WCS) (Tingay *et al.* 2006). A total of 34 GHE pairs were recorded during the transect surveys. Of these 34 pairs, 28 were categorised as breeding pairs (at varying stages of the breeding cycle) and six as potentially breeding pairs. Seven old/unused nests were also located and a further six active nests were located to the south of the area surveyed, between October 2005 and January 2006. Data were also collected on the breeding biology, feeding ecology and behaviour of the species at Prek Toal.

In November/December 2006 we returned to Prek Toal to continue the study on the status, distribution and ecology of the GHE.

Figure 1. A map of Tonle Sap Lake showing the location of the three protected core areas: Prek Toal, Boeng Chhma & Stung Sen.



## PROJECT AIMS

- (i) To expand the area of Prek Toal core area systematically surveyed for GHE, to include: the area to the west of Prek Da; the north-western boundary of Prek Toal and a one kilometre buffer area adjacent to this boundary.
- (ii) To collect data on the occupancy and breeding status at nest sites located in 2005.
- (iii) To collect data on nest site selection.
- (iv) To conduct a feasibility study into assessing the status and distribution of water snakes within the different habitats at Prek Toal.
- (v) To provide further training to WCS staff and MoE rangers at Prek Toal.
- (vi) To visit the Boeng Chhma protected area and conduct a preliminary survey of GHE.

## PROJECT MANAGEMENT

### **Principal Investigators:**

Dr Ruth Tingay (Natural Research Ltd).

Dr Malcolm Nicoll (University of Reading).

### **Collaborators**

Mr Sun Visal (Prek Toal Conservation Officer, WCS, Cambodia).

Mr Tom Clements (Technical Advisor, WCS, Cambodia).

Mr Joe Walston (Country Director, WCS, Cambodia).

## METHODS

**Survey:** We repeated the survey techniques in 2005 (see Tingay *et al.* 2006 for details) to cover the north-western area of Prek Toal and a buffer zone of one kilometre outside of the boundary. The survey was carried out on the 1<sup>st</sup> December 2006 and where nest sites/pairs were located, positions were recorded and breeding status was determined.

**Nest site monitoring:** Where possible all known nest sites were visited and the occupancy by GHE pairs and the stage of their breeding cycle determined. Criteria for assessing the status of nest site occupancy and breeding pairs were the same as in 2005

(Tingay & Nicoll 2006). Nest sites were visited from 30<sup>th</sup> November - 7<sup>th</sup> December 2006.

**Nest site selection:** All known nest sites (and any new ones located) were visited and information on the nest tree and the next nearest tree was recorded. The information collected and methods employed are described in Table 1. Nest sites were visited from the 30<sup>th</sup> November – 5<sup>th</sup> December 2006

Table 1. Data collected on trees with and without grey-headed fish eagle nests.

<b>Data</b>	<b>Information on collection methodology</b>
Nest site code	The code for each nest, e.g. GHFN30. For the next nearest tree to the nest tree code it .....RT, e.g. GHFN30RT (RT = Random Tree)
Tree species	Common and where possible scientific name
Distance to human activities	Precise distance of human activity, fishing, snake harvesting etc. within 500m of the nest tree. If no activity in the vicinity record as none.
Nest aspect	Using points of the compass (e.g. NW) record the side of the tree that the nest is located on. If it is exposed with no particular aspect then record it as exposed.
Position of nest in tree	This is the location of the nest within the tree: in the crown, on the edge of the canopy or on the top of the canopy.
Tree depth below water	Water depth at (or as near as possible to) the base of the tree. Measured using a telescopic pole.
Crown density	This is recorded as the amount of light that is blocked by branches, leaves, foliage etc. Typically this is estimated by eye for the defined canopy boundary. This should be estimated from the side of the tree that the nest is on from at least more than half a tree length away. It is recorded as a categorical variable: 0-25%, 26-50%, 51-75% & 76-100%.
Eye-level to water level	This is the height of the clinometer above the water when the tree height etc. is measured.
Eye-level to canopy base	This is the height of the tree canopy base above (or below) the clinometer.
Eye-level to nest base	This is the height of the base of the nest above the clinometer.
Eye-level to tree top	This is the height of the tree top above the clinometer.
Observer distance from tree	The distance of the observer when recording tree height etc. from the tree. It should be either 10, 15, 20 or 25m (distance confirmed with a rangefinder) then the inbuilt scales on the clinometer can be used to provide height estimates directly.

**Water snake distribution and abundance feasibility study:** Following approval from the Ministry of Fisheries and the appropriate fishing lot manager, we set up traditional water snake gill nets in two different habitats: (i) alongside a main waterway (the western side of the Prek Da, (ii) in an area of flooded forest one kilometre to the west of Prek Da. At each site 3x70m nets (1.5m in depth) were set in an unbroken line (210m) on a north-south axis. Nets were set on the afternoon of the 2<sup>nd</sup> December and checked daily first thing in the morning for the next four days. All snakes were removed from the nets and

taken back to the field centre for identification and data collection. The information recorded for each snake is shown in Table 2.

Table 2. Data collected on water snakes.

<b>Data</b>	<b>Methodology</b>
Date	
Site	Net 1 (Prek Da) or Net 2 (flooded forest)
Identity	A unique numerical identifier for each snake
Species	Species name
Body length	Snout to tail measurement (mm)
Head length	Snout to neck measurement (mm)
Jaw width	Widest point of jaw (mm)
Vent to tail	Measurement from the vent to the tip of the tail (mm)
Sex	Determined by dissection

**Boeng chhma survey:** A three day scoping visit (4<sup>th</sup>-7<sup>th</sup> December 2006) by RT and MN to this protected area was planned. Unfortunately, en-route on the 4<sup>th</sup> December the boat engine broke down and RT and MN returned to Prek Toal on the 5<sup>th</sup>.

## RESULTS

**Survey:** A further seven GHE nests were located during the survey: six of which were occupied by breeding pairs and one which was unused.

**Nest site monitoring:** Of the 34 documented active nest sites in 2005, 23 were in use in 2006 and five were of unknown status as we were unable to reach them due to their location within the water bird colonies.

A further 19 nests were found in and around Prek Toal either during the survey, while re-visiting known nests or by VS and the team of rangers in October 2006. Of these 19 nests, 16 were occupied by breeding pairs. A further 10 nests were found located along Kampong Prahok, Stoeng Chas and Prek Angkrong on the 7<sup>th</sup> December 2006. Of these ten nests, four were occupied by breeding pairs, three showed signs of recent abandonment and three were unused, old nests. A summary of the occupancy at nest sites

and the status of breeding pairs are provided in Table 3. A map of the locations of nest sites visited in 2006 is shown in Fig. 2.

Table 3. A summary of occupancy and breeding status of pairs at known nest sites in 2005 and 2006.

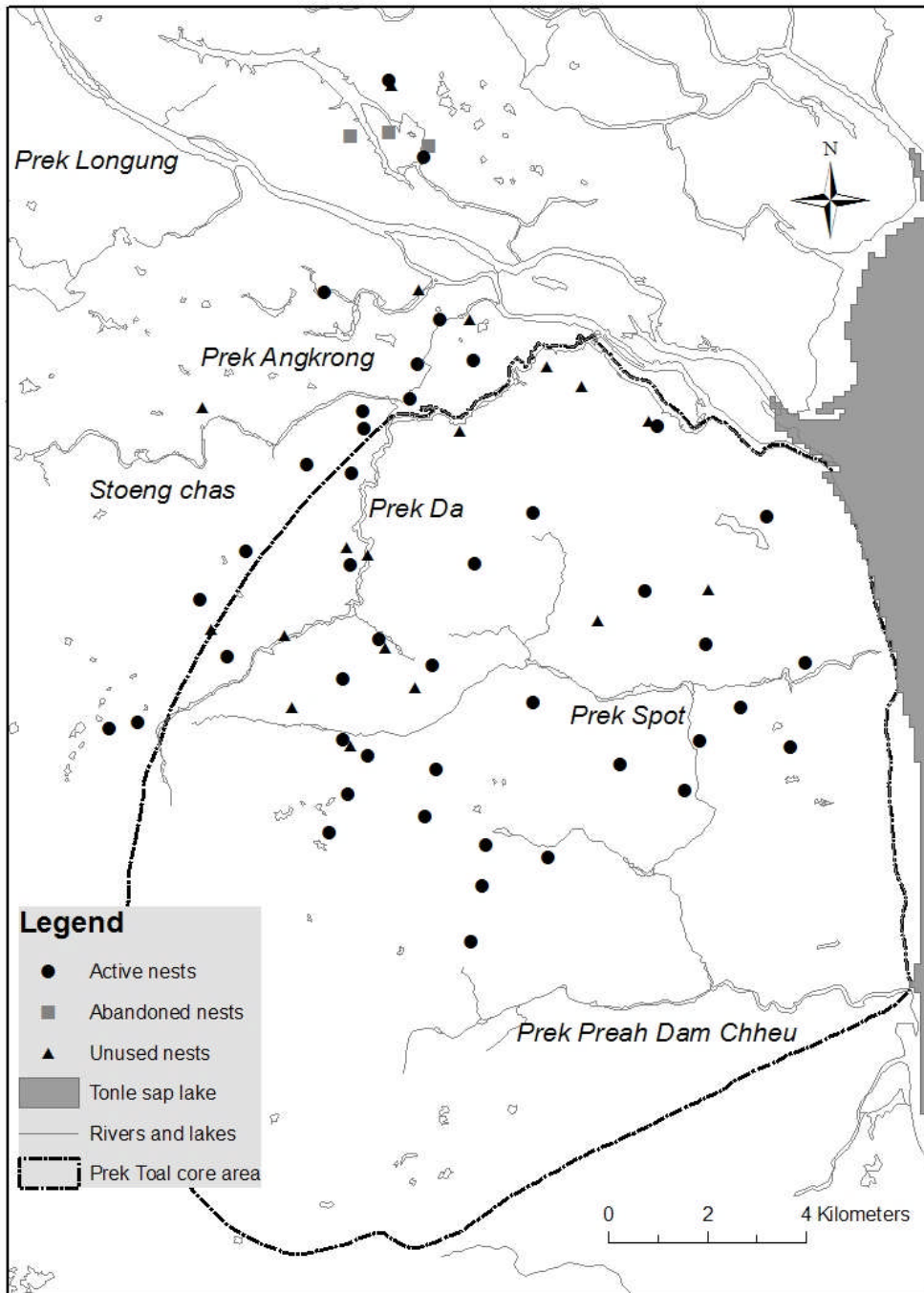
<b>Nest site</b>	<b>2005</b>	<b>2006</b>	<b>Location</b>
GHFN01	Breeding pair	Breeding pair	Prek Toal
GHFN02	Breeding pair	Unused	Prek Toal
GHFN03	Breeding pair	Breeding pair	Prek Toal
GHFN04	Unused	Unused	Prek Toal
GHFN05	Breeding pair	Breeding pair	Prek Toal
GHFN06	Breeding pair	Unused	Prek Toal
GHFN07	Breeding pair	Breeding pair	Prek Toal
GHFN08	Breeding pair	Breeding pair	Prek Toal
GHFN09	Breeding pair	Breeding pair	Prek Toal
GHFN10	Breeding pair	Unused	Prek Toal
GHFN11	Breeding pair	Unused	Prek Toal
GHFN12	Unused	Unused	Prek Toal
GHFN13	Breeding pair	Breeding pair	Prek Toal
GHFN14	Breeding pair	Breeding pair	Prek Toal
GHFN15	Breeding pair	Breeding pair	Prek Toal
GHFN16	Breeding pair	Breeding pair	Prek Toal
GHFN17	Unused	n/a	Prek Toal
GHFN18	Unused	Unused	Prek Toal
GHFN19	Unused	Unused	Prek Toal
GHFN20	Breeding pair	Unused	Prek Toal
GHFN21	Breeding pair	Breeding pair	Prek Toal
GHFN22	Breeding pair	Breeding pair	Prek Toal
GHFN23	Unused	Unused	Prek Toal
GHFN24	Breeding pair	Breeding pair	Prek Toal
GHFN25	Breeding pair	Unused	Prek Toal
GHFN26	Breeding pair	Breeding pair	Prek Toal
GHFN27	Breeding pair	Breeding pair	Prek Toal
GHFN28	Breeding pair	Breeding pair	Prek Toal
GHFN29	Breeding pair	Breeding pair	Prek Toal
GHFN30	Breeding pair	Breeding pair	Prek Toal
GHFN31	Breeding pair	Breeding pair	Prek Toal
GHFN32	Breeding pair	Unused	Prek Toal
GHFN33	Breeding pair	Breeding pair	Prek Toal
GHFN34	Unused	Breeding pair	Prek Toal
GHFN35	Breeding pair	Unused	Prek Toal
GHFN36	Breeding pair	Breeding pair	Prek Toal
GHFN37	Breeding pair	Breeding pair	Prek Toal
GHFN39	Breeding pair	n/a	Prek Toal
GHFN40	Breeding pair	n/a	Prek Toal
GHFN41	Breeding pair	n/a	Prek Toal
GHFN43	Breeding pair	n/a	Prek Toal

Table 3. continued

<b>Nest site</b>	<b>2005</b>	<b>2006</b>	<b>Location</b>
GHFN44	Breeding pair	n/a	Prek Toal
GHFN45	*	Breeding pair	Prek Toal
GHFN46	*	Breeding pair	Prek Toal
GHFN47	*	Breeding pair	Prek Toal
GHFN48	*	Breeding pair	Prek Toal
GHFN49	*	Breeding pair	Prek Toal
GHFN50	*	Unused	Prek Toal
GHFN51	*	Breeding pair	Prek Toal
GHFN52	*	Breeding pair	Prek Toal
GHFN53	*	Breeding pair	Prek Toal
GHFN54	*	Breeding pair	Prek Toal
GHFN55	*	Breeding pair	Prek Toal
GHFN56	*	Unused	Prek Toal
GHFN57	*	Breeding pair	Prek Toal
GHFN58	*	Breeding pair	Prek Toal
GHFN59	*	Breeding pair	Prek Toal
GHFN61	*	Unused	Prek Toal
GHFN62	*	Breeding pair	Prek Toal
GHFN63	*	Breeding pair	Prek Toal
GHFN64	*	Breeding pair	Prek Toal
GHFN65	*	Breeding pair	Stoeng chas
GHFN66	*	Unused	Stoeng chas
GHFN67	*	Breeding pair	Kampong Prahok
GHFN68	*	Abandoned	Kampong Prahok
GHFN69	*	Abandoned	Kampong Prahok
GHFN70	*	Abandoned	Kampong Prahok
GHFN71	*	Unused	Kampong Prahok
GHFN72	*	Breeding pair	Kampong Prahok
GHFN73	*	Unused	Prek Angkrong
GHFN74	*	Breeding pair	Prek Angkrong

Notes: \* Nest site not known in that year; n/a, nest site not visited in 2006 and status therefore remains unknown.

Figure 2. The status of Grey-headed fish eagle nest sites located and visited in 2006 inside and outside of the Prek Toal Core Area, Tonle Sap Lake.



Notes: The following six known nest sites were not visited this year due to access issues related to water levels and water bird colonies: GHFN 17, 39, 40, 41, 43 & 44. These sites are not shown on the map.

**Nest site selection:** In total we collected data on 34 pairs of trees (a GHE nest tree and the next nearest tree). Data will duly be analysed to explore the factors determining the location of nest trees and the presence or absence of a GHE nest.

**Water snake distribution and abundance feasibility study:** Over the four days that the nets were set, a total of 109 water snakes of five species were caught (81 in net one and 28 in net two). A summary of the proportions of each species caught at each netting site is shown in Table 4.

Table 4. A summary of the proportions of the different species of water snakes caught at the two sampling sites: Net 1 – Prek Da; Net 2 – flooded forest.

Species	Proportion in net 1	Proportion in net 2	Proportion of total
Puff-faced water snake	0.037	0.035	0.036
Rainbow water snake	0.59	0.43	0.55
Tentacled water snake	0.025	0.035	0.028
Tonle Sap water snake	0.33	0.5	0.38
Bocourts water snake	0.012	0	0.001

The data presented here are a summary of what was achieved while at Prek Toal in 2006 and as yet no analysis has been conducted so no meaningful conclusions can be drawn. Analysis of the morphometric data, abundance and sex ratios is planned.

## DISCUSSION

Through further surveys, the ad-hoc location of nests (by WCS staff and the MoE rangers) and the revisiting of known nest sites, we have continued to expand our knowledge on the status and distribution of the GHE in and around Prek Toal core area. While the principle concentration of GHE pairs and active nests appears to be in Prek Toal, GHEs are distributed along the principal waterways to the north and west of Prek Toal and in the flooded forest adjacent to the western boundary. We have now thoroughly surveyed the easily accessible area of Prek Toal to the north of the main waterbird colonies and believe that it is now feasible to annually monitor the known nest

sites and the progress of breeding pairs in this area. In 2007 it is proposed that staff from WCS and rangers from MoE will monitor the status of known nest sites within Prek Toal and we await the findings. Through this monitoring we also expect to improve our knowledge on the breeding biology of the species in Prek Toal, particularly on reproductive success and the timing of breeding in relation to environmental conditions.

Unfortunately, our planned trip to conduct a preliminary survey of the protected area at Boeng Chhma for GHEs had to be cancelled due to transport issues. However, anecdotal evidence suggests that a visit to this area is necessary to confirm the presence of GHE and the status of the population, i.e. breeding or non-breeding. This is something that can hopefully be incorporated into the next field trip to the Tonle Sap Lake.

During our time at Prek Toal in 2006 we collected extensive data on the location and characteristics of nest trees. Using additional satellite imagery of areas of permanent water within Prek Toal, we plan to explore the environmental factors that determine the eagles' choice and location of nest trees. This will, hopefully, help us understand the spatial distribution of GHE pairs across Prek Toal and, perhaps in conjunction with additional ecological information, allow us to remotely identify further areas of potentially suitable eagle habitat around the Tonle Sap Lake.

## RESEARCH OUTPUT

**Training:** We have continued to provide hands-on training to WCS Project Officer Sun Visal in raptor survey techniques and behavioural ecology sampling techniques. Visal also completed a fully-funded Conservation Science Internship at Hawk Mountain Acopian Center for Conservation Science (USA) in March-July 2007, to help develop his research skills. We have provided WCS with field methods, data sheets and GPS coordinates of all known nest sites, to facilitate the monitoring of GHE nests at Prek Toal in the 2007/08 breeding season.

**Publicity:** A web page has been developed on the Natural Research website ([www.natural-research.org](http://www.natural-research.org)) to highlight the Asian Fishing Eagle Project. Information has

also been provided to the Global Raptor Information Network database ([www.globalraptors.org](http://www.globalraptors.org)).

**Publications:** In 2006 the following peer-reviewed paper was published in the Journal of Raptor Research:

Tingay, R.E., Nicoll, M.A.C., and Sun, V. (2006). Status and distribution of the grey-headed fishing eagle *Ichthyophaga ichthyaetus* in the Prek Toal Core Area of Tonle Sap Lake, Cambodia. *Journal of Raptor Research* 40 (4): 277-283.

#### ACKNOWLEDGEMENTS

We are grateful to Neou Bonheur and Long Kheng of the Ministry of Environment (MoE) Phnom Penh, for permission to undertake this research. Special thanks to the staff of the Wildlife Conservation Society (WCS) in Cambodia for their interest and invaluable logistical support, especially Sun Visal, Tom Clements and Joe Walston. We were helped in the field by ex-snake catcher and now WCS ranger Carek Ly, MoE Biodiversity Officer Kuoch Kunthea Voreak, boat driver Mr Po, and volunteer field assistants Gareth Bennett (Edinburgh Zoo) and David Walker (Natural Research). This study was funded by Natural Research Ltd, National Birds of Prey Trust, International Osprey Foundation and Hawk Mountain Sanctuary.

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