R E P O R T

THE CONSERVATION STATUS OF OTTERS IN PREK TOAL CORE AREA, TONLE SAP LAKE, CAMBODIA

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Abstract: The conservation status of otters in South-east Asia remains poorly known, because of a paucity of records for which certain identification can be confirmed. Otter populations in South-east Asia face a multitude of threats and are in decline; the identification and then protection of sites that support sizeable populations is a priority for their conservation. A rapid camera-trap survey targeted otter populations along one stream in Prek Toal Core Area, an area of flooded forest in the Tonle Sap Great Lake Cambodia. 172 camera-trap days over May to July 2014 produced a total of 34 notionally independent photographs of otters, of which 24 could be identified as Smooth-coated Otter and 4 as Hairy-nosed Otter. Although few other otter records exist for Cambodia, these data indicate that Prek Toal is at least a regionally important site for these species and of probable global significance for Hairy-nosed Otter. Protection of fish-breeding habitat and a large waterbird colony has perhaps benefitted the otter population at Prek Toal.

Keywords: camera-trap, Prek Toal, conservation priority, wetlands, fish

INTRODUCTION

Four otter (Lutrinae) species are known to inhabit South-east Asia (Corbet and Hill, 1992; CEPF, 2012; IUCN, 2015), although the difficulties in identifying otters to species in the wild and even in many cases as specimens, mean that exact distributions for all species remain uncertain. Three species are confirmed for Cambodia: Hairy-nosed Otter *Lutra sumatrana*, Smooth-coated Otter *Lutrogale perspicillata* (Poole 2003) and Asian Small-clawed Otter *Aonyx cinereus* (Hon and Dong 2008 in Hon et al., 2010). There are no Eurasian Otter *Lutra lutra* records for the country, although this species has been reliably recorded in the surrounding countries of Thailand (Kruuk et al., 1994), and, historically, northern Lao PDR (Duckworth et al., 1999) and Vietnam (Roberton 2007).

Otter populations in Asia face a multitude of threats and are in decline (IUCN, 2015). Major threats include wildlife hunting to meet demand for the skin, traditional medicine and exotic pet trade and targeted hunting for perceived/proven damage to fish ponds/fishing gear. Other locally relevant at least potential threats include opportunistic hunting using dogs, large-scale habitat conversion for agro-industries, agricultural encroachment, overharvesting of prey animals, accidental/secondary poisoning, and hydro-dam development (in that it leads to a rise in hunting) (Timmins and Sechrest 2010; CEPF, 2012; IUCN, 2015; WWF, 2013). Hairy-nosed Otter is listed as Endangered on the *IUCN Red List of Threatened Species* (Aadrean et al.,

2015), and both Smooth-coated Otter and Asian Small-clawed Otter are listed as 'Vulnerable' (de Silva et al., 2015; Wright et al., 2015). All three species are considered high regional priorities for conservation investment and for species-focused conservation action (CEPF, 2012).

Hairy-nosed Otter was first confirmed for Cambodia in the late 1990s (Poole, 2003) and there have since been a few confirmed records, centred around the Tonle Sap Lake and the coastal wetlands in the south-west of the country. Records collated in Poole (2003) were based on live captive/market animals or museum specimens and exact provenance was difficult to determine, though at least two records were very likely to have come from flooded forest habitat in the Tonle Sap Lake (Poole, 2003). A camera-trap record from the Tonle Sap Lake is in Olsson et al., (2007) and repeated in Wright et al., (2008) but no other details are given. Another camera-trap record is in Wright et al., (2008) but no further details are given in the text other than "a tributary to the Tonle Sap River at about 300m". A captive animal was recorded at Preaek [Prek] (stream/river) Roung, near Botum-Sakor National Park, Koh Khong Province (Royan, 2010). A captive animal and two skins were recorded during wildlife surveys in the coastal lowlands of South-west Cambodia, all in Koh Khong province (Timmins and Sechrest, 2010). The first published wild records of the species with more exact locality data for Cambodia were from Peam Krasaop Wildlife Sanctuary (Hon and Dong 2008 in Dong et al., 2010) and Central Cardamom Protected Forest, Pursat province (Wright et al., 2008; provisionally identified earlier in Holden and Neang Thy, 2009).

Smooth-coated Otter is one of the more widespread otter species in Cambodia with reliable field records from the following sites: Western Siem Pang, Stung Treng Province (Birdlife International unpublished, 2013); Seima Protection Forest, Mondulkiri Province (WCS Cambodia 2010); Tatai Krom commune (Heng and Hon, 2007 in Dong et al., 2010), Botum-Sakor NP (Royan, 2009); Stoeng Koh Pao (A. Starr pers. comm. 2008 in Timmins and Sechrest, 2010) and Prek Ta Ok Valley (Timmins and Sechrest, 2010) all in Koh Khong Province; Mondulkiri Protected Forest (Gray et al., 2012) in Mondulkiri Province; and Prey Long [Prey Lang] in Kratie, Preah Vihear, Kampong Thom and Stung Treng provinces (Theilade and Schmidt, 2011). There is also a record of a captive animal in Kbal Tol village near Prek Toal Core Area, Battambang Province (Poole, 2003).

No field records of Asian Small-clawed Otter were traced by Poole (2003) but the species has since been confirmed at Chhlong, Kratie Province (Gray et al., 2012); Seima Protected Forest, Mondulkiri Province (WCS Cambodia unpublished, 2015), and along the Prek Kasap in Stung Treng and Ratanakiri provinces (Hon et al., 2010).

In Cambodia, it is thought that otters are primarily hunted for the skin and traditional medicine trade (e.g. Wright et al., 2008, Dong et al., 2010, WCS Cambodia, 2010). Some of this trade is assumed to be international (e.g. Wright et al., 2008), for which China (especially Tibet) is a major demand country (Yoxon and Yoxon, 2007, 2014). However, as with other countries in the region there exists, relative to South Asia, very little documented international trade in otter skins or their parts in Cambodia (DW pers. obs.). There is some evidence of the use of otter parts in local traditional medicine in Cambodia; skins steeped in alcohol are given to women during pregnancy/childbirth (Poole, 2003), and dried penes are perceived to be aphrodisiacs (Dong et al., 2010). Wright et al. (2008) mention "massive hunting" of otters around the Tonle Sap Lake based on incidental observations of skins and traps in villages at this site and some anecdotal reports of trade to China, however it is largely unknown how significant a threat the international wildlife trade is to Cambodia's otter populations. Despite these uncertainties on the dynamics of current

trade, otters are thought to have undergone significant hunting-driven declines in Cambodia (Poole, 2003).

Prek Toal was one of the first sites in the region that had some proof of the probable co-existence of Hairy-nosed Otter and Smooth-coated Otter (Poole, 2003). However, despite years of large waterbird conservation there since then (Sun Visal and Mahood, 2015), there has been little otter-focused conservation activity at the site and the status of these two globally threatened species at Prek Toal is now uncertain. Following a relatively recent spate of unconfirmed field sightings of both Hairy-nosed Otter and Smooth-coated Otter, and a captive record of the former in 2011 (Sun Visal and Mahood, 2011), a rapid survey was undertaken to clarify the likely conservation status of both species at Prek Toal. The results of this survey are presented here, as well as recommended follow up.

STUDY SITE

The Prek Toal Core Area [Prek Toal] (13°07'N, 103°39'E) lies on the north-western edge of the Tonle Sap Lake (map 1). It is one of three core areas in the Tonle Sap Biosphere Reserve. It has the largest waterbird colony remaining in South-east Asia and is a site of global importance for biodiversity conservation (CEPF, 2012). The waterbird colony includes breeding populations of several of the region's most threatened bird species including Greater Adjutant *Leptoptilos dubius*, Spot-billed Pelican *Pelecanus philippensis* and Milky Stork *Mycteria cinerea* (Sun Visal and Mahood, 2011).

Prek Toal (21,342 hectares) is one of the closest to intact areas of seasonally inundated forest around the Tonle Sap Lake (Seng Kim Hout et al., 2003), and probably the region; similar habitats have now been mostly converted into agriculture e.g. the Mekong Delta. The site contains a mixture of scrub and gallery forest dominated by *Barringtonia acutangula* and *Diospyros cambodiana* (Seng Kim Hout et al., 2003). During the peak of the wet season (July – October) the entire site is flooded, with only the tops of the larger (7 – 15 m high) trees remaining visible. In the dry season, the water levels drop dramatically, with only three permanent streams and a few small pools retaining water, little of which is more than 1 m in depth.

Prek Toal and its biodiversity, together with the rest of the Tonle Sap Great lake and its inundation zone, face a multitude of threats including unsustainable fishing practices, wildlife hunting, agricultural development, clearance of the flooded forest, and changes to hydrological flows caused by the development of hydro-electric power dams along the Mekong River and its tributaries (CEPF, 2012; Arias et al., 2012; WWF, 2013).

METHODS

Four LED-flash camera-traps (Bushnell Trophy Cam) were used for the survey. Locations for the camera-traps were selected based on the presence of otter signs (latrines and/or tracks). Otter signs were found following rapid searches of exposed banks of soft mud. It became apparent during the survey that gently sloping banks with little Water Hyacinth *Eichhornia crassipes* obstructing access to/from the water were ideal locations; this microhabitat would often produce multiple sets of *Lutra*/*Lutrogale* tracks and well-used latrines.

Camera-trap survey effort focused on the Prek [stream] Da (Map 1), where a relatively large number of unconfirmed Smooth-coated Otter and Hairy-nosed Otter sightings had been reported by permanently-based conservation patrol staff during 2011 – 2014, and where otter signs were found to be relatively abundant. A patrol station is located at the mouth of the Prek Da stream to prevent illegal activity during

the dry season in the Prek Toal Core Area; it was thought this would also have the benefit of reducing the risk of theft of the camera-traps.

As there were few suitable trees along the banks of the streams, the camera-traps were attached to wooden poles that were staked into the ground. To avoid 'trap shyness' freshly cut branches were used to mask the shape of the camera-traps. To maximise the possibilities of photographing the entire animal, and to ensure that cameras were low enough to photograph the distinguishing neck, chin and cheek pelage patterns of otter species, cameras were positioned 20 – 30 cm from the ground. During the first survey period there was little risk of a sudden rise in water levels, however, during the survey effort that ran from June to July, the cameras were checked every few days and moved if necessary. The sensitivity of the infra-red trigger beam on all camera-traps was set to 'high', and the delay between photographs was set to one second. All cameras were pointed on an approximate North/South bearing to avoid overexposure of the photograph (which can reduce the ability to identify a photographed animal). No baits or lures were used at any of the camera-trap locations. All notionally independent encounters with otters, defined when successive photographs of the same species at the same camera-trap station were separated by at least 30 minutes, were extracted from the camera-trap data and recorded.

RESULTS

Camera trapping ran over two survey periods: 25 May to 17 June 2014 and 19 June to 9 July 2014. Four camera-traps were used at nine separate stations and this resulted in a total of 172 effective camera-trap nights (Table 1). A total of 34 notionally independent photographs of otters were produced, of which 24 were Smooth-coated Otter and 4 Hairy-nosed Otter. The remaining six could not be identified to a species. Both species were recorded at two camera-trap locations (camera-trap stations 2 and 3; Table 1). Other photographed small carnivore species were Leopard Cat *Prionailurus bengalensis*, Small Asian Mongoose *Herpestes javanicus* and Common Palm Civet *Paradoxurus hermaphroditus*.

Smooth-coated Otter

Five of the nine camera-trap stations recorded Smooth-coated Otter (Figure 1 and Table 1). The largest minimum group size photographed was five individuals (Figure 2), which was recorded on two separate dates: 7 June 2014 and 2 July 2014. The majority of photographs (70%) were taken during the day (05h30 – 18h00), with half of these in the early hours of the morning (05h30 – 7h30).

Hairy-nosed Otter

Two of the nine camera-trap stations recorded Hairy-nosed Otter (Figure 3, 4, Table 1). The species was recorded too infrequently to look into activity patterns in any meaningful detail but Hairy-nosed Otter was recorded at 07h35, 09h46, 12h06 and 17h46. This would suggest a diurnal activity pattern however this species has been recorded at night elsewhere (U Minh Ha NP, Vietnam in 2008; Save Vietnam's Wildlife unpublished data).

Figure 1. Smooth-coated Otter *Lutrogale perspicillata*, Prek Toal, May 2014.

Figure 2. Group of five Smooth-coated Otters *Lutrogale perspicillata*, Prek Toal, July 2014.

Figure 3. Hairy-nosed Otter *Lutra sumatrana*, Prek Toal, May 2014.

Figure 4. Hairy-nosed Otter *Lutra sumatrana*, Prek Toal, May 2014.

Map 1. Prek Toal Core Area in the Tonle Sap Biosphere Reserve, with otter sighting records and camera-trap locations

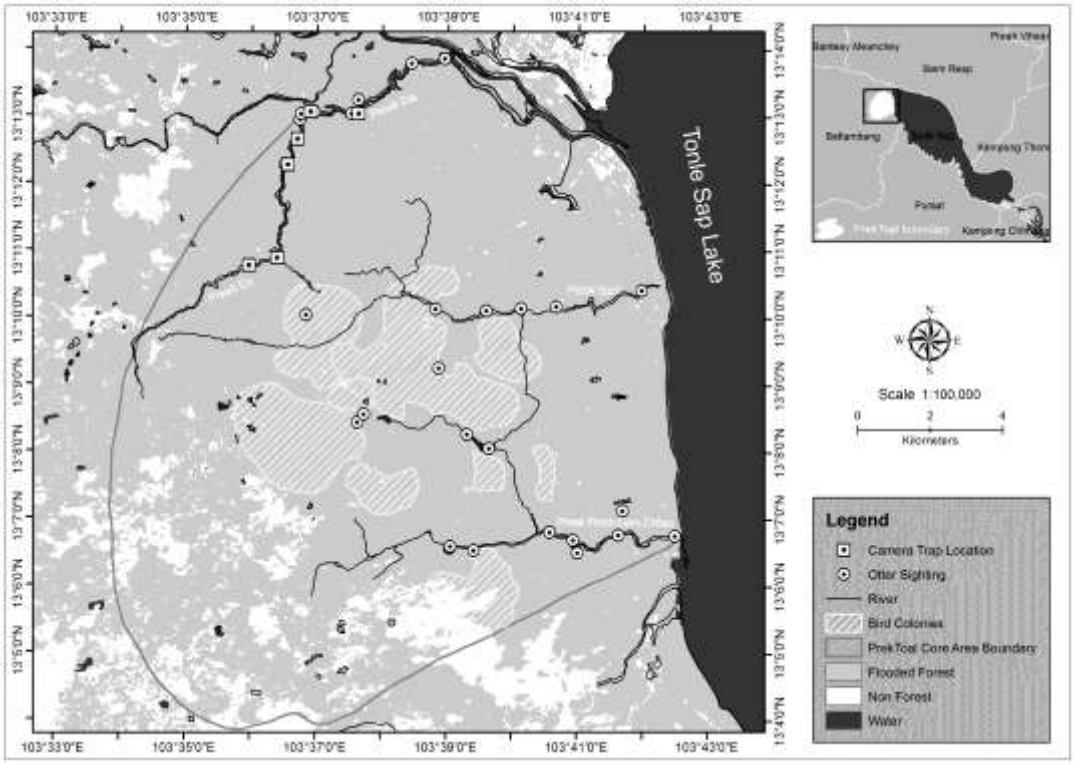

Table 1. Camera trap station details, survey effort and otter species recorded

Camera-trap station No.	Latitude (DD MM SS.SS)	Longitude (DD MM SS.SS)	Microhabitat	Otter signs recorded	Date set	Date of last photo	No. trap nights[1]	SCO[2]	HNO[2]	Otter sp.[2]	Other small carnivore species
1	13° 10’ 42.13”	103° 35’ 58.68"	Gentle slope with exposed dry soil and 20cm high grasses, beyond that it was dense scrub	Otter latrine; dried out spraint found on the ground.	25-May	15-Jun	22	3(2)	0	4(1)	Leopard Cat *Prionailurus bengalensis*
2	13° 10’ 49.01”	103° 36’ 24.68”	Flat exposed bank, bordered by dense scrub	Otter latrine; dried out spraint found on the ground. Fresh *Lutra*/*Lutrogale* tracks in soft mud	25-May	17-Jun	24	47(7)	1(1)	0	Small Asian Mongoose *Herpestes javanicus*, Common Palm Civet *Paradoxurus hermaphroditus*
3	13° 12’ 12.31”	103° 36’ 33.81”	Relatively steep slope from the water's edge leading to an enclave in some dense scrub	Otter latrine; reported by rangers to be Hairy-nosed Otter. Relatively fresh spraint found on a low-lying horizontal branch of a tree.	25-May	15-Jun	22	14(2)	6(3)	6(5)	Small Asian Mongoose
4	13° 12’ 35.36”	103° 36’ 42.65”	Flat exposed bank, bordered by dense scrub	Set of relatively old *Lutra*/*Lutrogale* tracks	25-May	17-Jun	24	0	0	0	Small Asian Mongoose, Leopard Cat
5	13° 10’ 49.11”	103° 36’ 54.81”	Flat exposed bank	Otter latrine; dried out spraint found on the ground.	20-Jun	09-Jul	20	39(10)	0	0	Small Asian Mongoose

6	13° 12’ 36.45”	103° 36’ 51.72”	Small open area on the bank in dense scrub. Dense matts of water hyacinth later blocked the entrance to this site	Otter latrine; dried out spraint found on the ground.	20-Jun	09-Jul	20	0	0	0	
7	13° 12’ 59.81”	103° 36’ 54.64”	Small open area on the bank in dense scrub	Otter latrine; dried out spraint found on the ground.	20-Jun	09-Jul	20	16(3)	0	0	Leopard Cat
8	13° 10’ 49.01”	103° 36’ 24.68”	Same location as 'No.2': Flat exposed bank, bordered by dense scrub	Otter latrine; dried out spraint found on the ground. Fresh *Lutra*/*Lutrogale* tracks in soft mud	19-Jun	23-Jun	4	0	0	0	
9	13° 12’ 58.28”	103° 37’ 38.62”	Small open area on the bank in dense scrub	Otter latrine; dried out spraint found on the ground.	23-Jul	08-Jul	16	0	0	0	Small Asian Mongoose, Common Palm Civet
							172	**119(24)**	**7(4)**	**10(6)**	

All dates given are from 2014

1 Number of effective trap nights is the number of 24 hour periods that the camera was in operation for, calculated by the difference between the date set and the last photograph taken.

[2] Species recorded: SCO is Smooth-coated Otter *Lutrogale perspicillata*, HNO is Hairy-nosed Otter *Lutra sumatrana*. If the identity of the otter could not be confirmed it was recorded as ‘Otter sp.’ Numbers recorded in each column include the total number of photographs followed by the number of notionally independent photographs in parentheses ( )

DISCUSSION

These are the first confirmed wild records for Hairy-nosed Otter and Smooth-coated Otter for Prek Toal. Site records for both species had previously been limited to unconfirmed field observations (Sun Visal and Mahood, 2011) and captive animals seen in Prek Toal and Kbal Tol villages (Poole, 2003; Sun Visal and Mahood, 2011). Hairy-nosed Otter has not been reliably recorded in the wild in Cambodia since Holden and Neang Thy (2009). The most recent confirmed Smooth-coated Otter record for Cambodia is a camera-trap photograph from Western Siem Pang, Stung Treng province in 2013 (BirdLife International, unpublished data).

Camera-trapping at otter latrines proved to be a relatively successful method for producing verifiable otter records in Prek Toal. This method generated a total of 34 notionally independent records, 82% of which could be identified to a species level. There were a total of 172 effective camera-trap nights during this rapid targeted survey, which is a relatively low survey effort; typically most surveys that use this method generate approximately 1,000 effective camera-trap nights (e.g. Willcox et al., 2014), or even greater (e.g. Gray et al., 2014, Coudrat et al., 2014), though none of these surveys were targeting otter species. Camera-traps were concentrated in a relatively small area of the site. The low survey effort produced a relatively large number of verifiable otter records, indicating the suitability of this survey method when the objective is to confirm presence/non-detection of otter species in seasonally flooded forest during the dry-season.

The confirmation of Hairy-nosed Otter, considered to be one of the rarest and most threatened otter species in the world, arguably places Prek Toal as one of the most important sites for otter conservation globally. The site is also likely to be regionally significant for Smooth-coated Otter; the species is probably extinct in Vietnam (DW pers. obs.) and is in decline in other range countries, including Cambodia.

Prek Toal is widely considered to be one of the conservation success stories in Asia, where active management and an approach that has effectively mixed community outreach, community-based eco-tourism, enforcement and direct species-based interventions, has led population increases in multiple threatened and near-threatened waterbird species (Sun Visal and Mahood, 2011; 2015). Several of these long-term site-based activities are likely to be benefitting the site's otter species. These include enforcement activities aimed at minimising wildlife hunting, and monitored bans on dry-season fishing along the main streams that lead into Prek Toal Core Area. The latter activity is enforced through a strict no-use/no-entrance policy and there is anecdotal evidence that this has helped to limit the impacts of wildlife hunting on mammal species; Indochinese Silvered Leaf Monkey *Trachypithecus germaini* and Long-tailed Macaque *Macaca fasciculata* are both recorded along these streams and are thought to be recovering from severe hunting-induced declines. It therefore seems likely that these activities are also benefiting otter species, both by limiting hunting during the dry season when most wildlife is vulnerable to this threat, and by aiding the population recovery of prey animals. This is however speculative and further research on the impacts these activities are having on the site's otter species is warranted; similar actions could then be justified at other sites in Cambodia and in the region.

CONCLUSIONS

Otters across South-east Asia are in decline and no populations should be considered secure. Whilst there might seem to have been a relatively large number of recent records (i.e. within the last 10 years) for all three of Cambodia's known otter

species, populations at most of these sites are probably low, and are facing an array of direct and indirect threats. Moreover, given the amount of general survey effort in potentially suitable otter habitat by people likely to notice and report otters, the overall number of records is extremely low, relative to areas such as southern India; the average motivated general bird and mammal surveyor is lucky to have seen otters at all in Cambodia since the resurgence of survey activity around 1999, whereas in similar habitat in southern India (and at Kaziranga in north-east India), sightings are so frequent as to be daily in some areas (Will Duckworth *pers. comm.* 2015). Without targeted interventions, most or all of the Cambodian otter populations are likely to go extinct in the near future.

Prek Toal has a relatively large amount of natural habitat remaining, a seasonally flooded-forest ecosystem that by regional standards is close to intact, and there are several long-term site-based activities already underway that are likely to be benefiting otter populations there. Prek Toal represents one of the best opportunities to conserve Hairy-nosed Otter and should be considered a priority site for otter conservation in Asia.

Conservation Recommendations

The diurnal Giant Otter *Pteronura brasiliensis* can be individually identified by photographing their throat patterns when they "periscope" out of the water, allowing for some assessment of population numbers (e.g. see Groenendijk et al., 2014). Although Hairy-nosed Otter also has individual throat and neck markings, it is unlikely that this technique would work for this species; there is no evidence that the species "periscopes" and it is at least partly nocturnal. High-resolution camera-traps placed low enough on the ground at known/suspected Hairy-nosed Otter latrines may allow for individuals to be identified, but the chances of photographing enough of the throat pattern to be allow confident identification of individuals are slight. In Asia therefore, camera-trapping is only likely to produce relatively limited, though important, information on otter presence/non-detection at a site, and allow some broad inferences as to likely conservation status. To better assess the conservation status of otters at this globally important site and to measure the impacts of site-based activities, efforts should be made to produce a rigorous population estimate for both species, with Hairy-nosed Otter the priority. This should involve the collection of otter spraints and the DNA analysed for species and individual identification; visual identification to species should be considered unreliable (even if using experienced surveyors) unless suitable blind-testing with genetic confirmation is used to validate it. Specifically, on this survey, it was not possible to distinguish two sorts of spraint that would correspond to the two sorts of otters in the area. This indicates either that spraints are difficult for people of the surveyors' experience to identify to species, or that one species was sprainting in spots that meant the surveyors were not detecting it. Scat detection dogs could be used to help find otter spraints, but given the prohibitively high-costs involved with this technique this should be considered carefully, as it may not be very economically effective compared to using well-trained human observers. There was some evidence from this survey to suggest that the distribution of otter latrines in this habitat were fairly predictable suggesting that the latter, less-expensive option, could be more cost-effective.

Although the evidence of their effects on mammal populations are common-sense observations and therefore unconfirmed, the enforcement activities aimed at minimising the impacts of wildlife hunting and unsustainable fishing at Prek Toal should continue to be supported and strengthened. Similar actions could be piloted at other sites likely to be important for otter conservation in Cambodia and in the region.

There is little reliable information on the scale of trade in otter skins or parts in Cambodia, and certainly no evidence that it approaches the levels seen in South Asia (e.g. Yoxon and Yoxon, 2014). To better understand the motivating factors behind otter killing in Cambodia, a wildlife trade survey focusing on key sites across the country (with Prek Toal a priority) needs to be conducted.

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REFERENCES

Arias, M.E., Cochrane, T.A., Kummu, M., Killeen, T.J., Piman, T. and Caruso,B.S.(2012). Quantifying changes in flooding and habitats in the Tonle Sap Lake (Cambodia) caused by water infrastructure development and climate change in the Mekong Basin. *Journal of Environmental Management***, 112**: 53-66

Aadrean, A., Kanchanasaka, B., Heng, S., Reza Lubis, I., de Silva, P., Olsson, A. (2015). *Lutra sumatrana*. The IUCN Red List of Threatened Species. Version 2015.2. <www.iucnredlist.org>. Downloaded on 26 June 2015.

CEPF. (2012). Ecosystem Profile: Indo-Burma Biodiversity Hotspot, 2011 Update.

Corbet, G.B., Hill, J.E. (1992). The mammals of the Indomalayan region: a systematic review. Oxford University Press, Oxford, U.K.

Coudrat, C.N.Z, Nanthavong C., Sayavong S., Johnson A., Johnston J.B., Robichaud W.G. (2014). Non-*Panthera* cats in Nakai-Nam Theun National Protected Area, Lao PDR. Cat News, Special Issue **8:** 45–52.

de Silva, P., Khan, W.A., Kanchanasaka, B., Reza Lubis, I., Feeroz, M.M., Al-Sheikhly, O.F. (2015). *Lutrogale perspicillata*. The IUCN Red List of Threatened Species. Version 2015.2. <www.iucnredlist.org>. Downloaded on 26 June 2015.

Dong, T., Tep, M., Lim, S., Soun, S., Chrin, T. (2010). Distribution of otters in the Tropeang Roung, Koh Kong province, Cambodia. *IUCN Otter Spec. Group Bull*. **27 (2)**: 63–77.

Duckworth, J. W., Salter, R. E., Khounboline, K. (compilers). (1999). Wildlife in Lao PDR: 1999 Status Report. Vientiane: IUCN–The World Conservation Union/Wildlife Conservation Society/Centre for Protected Areas and Watershed Management.

Gray, T. N. E., Phan, C., Pin, C., Prum, S. (2014). The status of jungle cat and sympatric small cats in Cambodia's Eastern Plains. *Cat News*. Special Issue **8:** 19–23.

Groenendijk, J., Hajek, F., Johnson, P.J., Macdonald, D.W., Calvimontes, J., Staib, E.(2014) Demography of the Giant Otter (*Pteronura brasiliensis*) in Manu National Park, South-Eastern Peru: Implications for Conservation. *PLoS ONE* **9(8)**: e106202. doi:10.1371/journal.pone.0106202

Heng S., Hon N. (2007). Survey in Tatai Krom Commune, Koh Kong Province. Unpublished Report for Conservation International-Cambodia

Holden, J., Neang Thy (2009). Small carnivore records from the Cardamom Mountains, southwestern Cambodia. *Small Carnivore Conservation*. **40:** 16–21.

Hon, N., Dong, T. (2008). Otter Research at Peam Krosoap Wildlife Sanctuary, Kok Kong Province. Unpublished Report for Conservation International.

Hon, N., Neak P., Khov, P., Cheat, V. (2010). Food and habitat of Asian Small-Clawed Otters in northeastern Cambodia. *IUCN Otter Spec. Group Bull.* **27 (1)**: 12–23.

IUCN. (2015). The IUCN Red List of Threatened Species. <www.iucnredlist.org>. Downloaded on 16 August 2015.

Kruuk, H., Kanchanasaka, B., O'Sullivan, S., Wanghongsa, S. (1994). Niche separation in three sympatric otters *Lutrogale perspicillata*, *Lutra lutra* and *Aonyx cinerea* in Huai Kha Khaeng, Thailand. *Biological Conservation*. **69:** 115–120.

Olsson, A., Heng, S., Hon, N., Peove, S., Nop, N. (2007). Cambodia Otter Research and Conservation Project. Presentation at Xth International Otter Colloquium, Oct 10-16th 2007, Hwacheon, South Korea.

Poole, C.M. (2003). The first records of Hairy-nosed Otter *Lutra sumatrana* from Cambodia with notes on the national status of three other otter species. *Nat. Hist. Bull. Siam Soc*. **51**: 273–280.

Roberton, S.I. (2007). The status and conservation of small carnivores in Vietnam. PhD Thesis. University of East Anglia [UEA], U.K.

Royan, A. (2010). Significant mammal records from Botum-Sakor National Park, Southwest Cambodia. *Cambodian Journal of Natural History* [CJNH]. **1:** 22–26.

Seng Kim Hout, Pech Bunnat, Poole, C. M., Tordoff, A. W., Davidson,P. and Delattre, E. (2003). Directory of Important Bird Areas in Cambodia: key sites for conservation. Phnom Penh: Department of Forestry and Wildlife, Department of Nature Conservation and Protection, BirdLife International in Indochina and the Wildlife Conservation Society Cambodia

Sun, Visal, Mahood, S. (2011). Monitoring of large waterbirds at Prek Toal, Tonle Sap Great Lake, 2011. Wildlife Conservation Society, Cambodia Program, Phnom Penh.

Sun Visal, Mahood, S. P. (2015). Wildlife monitoring in the Prek Toal Ramsar Site, Tonle Sap Great Lake, 2013 and 2014. Wildlife Conservation Society, Cambodia Program, Phnom Penh.

Theilade, I., Schmidt, L. (2011). Redd+ and Conservation of Prey Long Forest, Cambodia. Summary of Scientific Findings 2007-2010. Forest & Landscape Working Papers No. 66 [camera-trap photographs of Smooth-coated Otter presented in paper and confirmed by DW].

Timmins, R.J., Sechrest, W. (2010). A rapid biological survey to assess the conservation significance of the coastal lowlands of southwest Cambodia. Global Wildlife Conservation, San Francisco, CA, U.S.A. [2010 draft].

WCS [Wildlife Conservation Society] Cambodia. (2010). Otters in the Seima Protection Forest, Mondulkiri province, Cambodia. Unpublished report.

Wright, L., Olsson, A., Kanchanasaka, B. (2008). A working review of the Hairy-nosed Otter (*Lutra sumatrana*). *IUCN Otter Spec. Group Bull*. **25 (1)**: 38 - 59

Wright, L., de Silva, P., Chan, B., Reza Lubis, I. **(2015).** *Aonyx cinereus*. The IUCN Red List of Threatened Species. Version 2015.2. <www.iucnredlist.org>. Downloaded on 26 June 2015.

WWF. (2013). Ecosystems in the Greater Mekong: Past trends, current status, possible futures. WWF Greater Mekong Programme

Willcox D., Tran Quang Phuong, Hoang Minh Duc, Nguyen The Truong An. (2014). The decline of non-*Panthera* cat species in Vietnam. *Cat News*. Special issue **8**: 53–61.

Yoxon, P., Yoxon, G. (2007). Otters – the Forgotten Victims of Wildlife Crime. IOSF [International Otter Survival Fund] Press Release.

Yoxon, P., Yoxon, G. (2014). The shocking facts of the illegal trade in otters. IOSF Report. Broadford, Isle of Skye, Scotland.

RÉSUMÉ

LE STATUT DE CONSERVATION DES LOUTRES DANS LA ZONE CENTRALE DE PREK TOAL, LAC DE TONLE SAP, CAMBODGE

Le statut de conservation des loutres en Asie du sud-est reste peu documenté, essentiellement à cause du manque de données fiables et validées. Les populations de loutre d'Asie du sud-est subissent une multitude de menaces et sont en déclin. L'identification et la protection de sites accueillant des populations de loutres de taille suffisante est donc une priorité pour leur conservation. Un monitoring rapide à l'aide de pièges photos a été effectué sur les populations de loutre le long d'un cours d'eau situé dans la zone de Prek Toal, une région de forêt alluviale autour du grand lac de Tonle Sap au Cambodge. L'utilisation de pièges photos durant 172 jours a permis de récolter 34 photos différentes de loutres entre mai et juillet 2014. Parmi celles-ci, 24 concernent la loutre de Sumatra et 4 la loutre cendrée. Bien qu'il existe peu d'enregistrements de ce type au Cambodge, ces données indiquent que la région de Prek Toal est en tous cas un site d'intérêt régional pour ces deux espèces et d'une importance globale significative pour la loutre de Sumatra. La protection des frayères à poissons et d'une importante colonie d'oiseaux aquatiques a sans doute été bénéfique à la population de loutres de Prek Toal.

RESUMEN

ESTADO DE CONSERVACIÓN DE LAS NUTRIAS EN EL ÁREA NÚCLEO PREK TOAL, LAGO TONLE SAP, CAMBOYA

El estado de conservación de las nutrias en el Sudeste de Asia sigue siendo poco conocido, a causa de una escasa cantidad de registros con confirmación cierta de identificación. Las poblaciones de nutrias en el Sudeste de Asia enfrentan una multiplicidad de amenazas, y están en declinación; la identificación y consecuente protección de los sitios que albergan poblaciones significativas, es una prioridad para su

conservación. Realizamos una prospección rápida de nutrias con cámaras-trampa, a lo largo de un arroyo en el Área Núcleo Prek Toal, un área con bosque inundado en el Gran Lago Tonle Sap, Camboya. 172 días-cámara-trampa de Mayo a Julio de 2014, produjeron un total de 34 fotografías nocionalmente independientes de nutrias, de las cuales 24 pudieron ser identificadas como Nutria Lisa, y 4 como Nutria de Sumatra. Aunque hay pocos registros de nutrias para Camboya, estos datos indican que Prek Toal es un sitio regionalmente importante para estas especies, y de probable significación global para la Nutria de Sumatra. La protección de hábitat para reproducción de peces, y de una gran colonia de aves acuáticas, posiblemente haya beneficiado a las poblaciones de nutrias en Prek Toal.

KHMER ABSTRACT

ពត៌មានស្តីអំពីស្ថានភាពអភិរក្សសត្វអេទៅតំបន់អាស៊ីអាគ្នេយ៍ ត្រូវបានគេដឹងតិចតួចនៅឡើយ ដោយសារ
មានការកត់ត្រាតិចតួចប៉ុណ្ណោះតាមរយៈការធ្វើអត្តសញ្ញាណកម្មដើម្បីបញ្ជាក់អំពីប្រភេទ។
ចំនួនសត្វអេទៅក្នុងតំបន់អាស៊ីអាគ្នេយ៍ កំពុងប្រឈមមុខនឹងការគំរាមកំហែងដោយសកម្មភាពមនុស្ស និងកំពុង
មានការថយចុះ ហើយការកំណត់តំបន់រស់នៅរបស់សត្វអេ ជាកត្តាអទិភាពបំផុតសម្រាប់ការអភិរក្សពួកវាទាំងនោះ។ យើងនឹងផ្តល់ពត៌មានស្តីអំពីការសិ
ក្សាស្រាវជ្រាវចំនួនសត្វអេដោយម៉ាស៊ីនថតស្វ័យប្រវត្តិនៅតាមព្រៃកមួយ នៃតំបន់ស្នូលព្រៃកទាល់ដែលជាតំបន់ព្រៃលិចទឹកបឹងទន្លេសាបនៃប្រទេស
កម្ពុជា។ ម៉ាស៊ីនថតស្វ័យប្រវត្តិត្រូវបានដាក់ចំនួន ១៧២ថ្ងៃ ពីខែមេសា ដល់ ខែឧសភា ឆ្នាំ២០១៤ ដែលថតបាន
រូបភាពសត្វអេផ្សេងៗគ្នាសរុបចំនួន ៣៤រូប ដែលក្នុងនោះមាន២៤រូប ជាប្រភេទ អេខ្លួនរលោង និង ៤រូប ផ្សេងទៀតជាប្រភេទ អេរោមច្រមុះ។
ទោះជាមានការកត់ត្រាអេមួយចំនួនផ្សេងទៀតនៅប្រទេសកម្ពុជាក៏ដោយ ក៏ទិន្នន័យនេះបានបង្ហាញថា តំបន់ស្នូលព្រៃកទាល់
ហ៊ាងហោចណាស់ ជាទឹកន្លែងដែលមានសារៈសំខាន់
ក្នុងតំបន់សម្រាប់ប្រភេទទាំងនេះ ហើយប្រហែលអាចជាតំបន់ដែលមានសារៈសំខាន់ជាសាកល សម្រាប់ប្រភេទអេរោមច្រមុះផងដែរ។ វាត្រូវបានគេសន្និ
ដ្ឋានថា ការការពារជម្រកត្រីមេពូជ និងបន្ទាយពងកូនសត្វស្លាប
ទឹកនៅតំបន់ស្នូលព្រៃកទាល់ បានជួយការពារដល់ចំនួនសត្វអេនៅក្នុងតំបន់នេះផងដែរ។