NOTE FROM THE EDITOR

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Dear Friends, Colleagues and Otter Enthusiasts!

Welcome to the second issue of 2014! We have just closed issue 31/1 and the first papers for the new issue will be online soon and more are in the pipeline so keep following the development on our website.

Meanwhile some of you have met at the 2014 International Otter Colloquium in Rio de Janeiro that just finished a few days ago and the reactions I heard from Rio where very positive. Those of you that could not participate will soon be able to read the contributions as we plan to have the Proceedings of the Colloquium published in a special issue 31/A. Similar to the usual issues articles will be reviewed and go online whenever they are finished. Such an approach allows the fast contributors to see their articles online and not to have to wait for delayed submissions or reviews as in a printed version.

I want to thank the reviewers since 2012, namely Janis Ozolins, Joszef Lanski, Jessica Groenendijk, Eleanor Kean, Hans-Heinrich Krueger, Nambodiri Naveen, Marcelo Rheingantz, Claudio Soto-Azat, Ferdia Marnell, Oldemar Carvalho Junior, Platt, Syed Ainul Hussain, Grace Yoxon, Fernando Rosas, Emmelianna Bujak, Daniel Gallant, Claudio Chehebar, Tom Serfass, Elisabeth Chadwick, Daniel Allen, Petra Hajkova, Nicole Duplaix, Howard Golden, Robert Brooks, Hermann Ansorge, Omar Fadhil Al-Sheikly, Dilian Georgiev, Nuno Pedroso, Hugh Jansman, Juan Pablo Gallo-Reynoso, Roland Melisch, Carolina Ribas, Andreas Kranz, Peter Urban, Silva Lopez Gilberto, Michael Belanger and Darren Norris as without their support the quality could not be guaranteed. Furthermore I want to thank Mauricio Montaño, Laurent Mercier, Claudio Chehebar, Maximiliano Sepúlveda, Rob Williams, Martin Buschiazzo, Helen Jacques and Sebastién Cambier who translated abstracts into French or Spanish.

Please feel free to send me photos of otters as we are in need of good pictures for the title pages of future issues! Your help is greatly appreciated.

You all know what comes at the end of my editorials? Lesley is really doing an incredible job with the Bulletin and the overall website and in edition does also always the last editing and critical reading finding the last small mistakes or omissions. Lesley, as in the last sentence of all my editorials - thanks for all your continuing support.

O B I T U A R Y

A Tribute to Rob Strachan (1958 – 2014)

Rob in March 2014. Photo taken by Dave Lewns

The otter world lost one of its gifted champions when Rob Strachan died on the 17th May 2014. For many years Rob's name was synonymous with national otter surveys in England, and in later years Scotland and Wales, but for many he is also intimately connected with water vole conservation and research. He was well known to many in the world of conservation, from both the research and practitioner perspectives. He was quite simply one of the most gifted and observant field naturalists I have known, a careful and enthusiastic teacher and communicator, and a very good friend, and his tragic death to pancreatic cancer after a mercifully short illness took him from us far too early in his life.

Rob was born in Billericay in Essex, and it was in this county that he had his formative years and developed his acute field skills. When he was three the family moved to Tiptree where he went to school, and he studied for his 'A' levels in Colchester. He then studied Biology at Lanchester Polytechnic in Coventry, and for his sandwich year he worked at the famous Kew Gardens, working on the classification of orchid species based on pollen morphology. Although Rob's higher education specialised in botany, he was already a well-rounded field naturalist, having been an explorer of the environment around him from an early age, frequently bringing home specimens for further observation and analysis. One of four brothers, he seems to have lived an almost Gerald Durrell-like life in his early years, fascinated by the natural world and sharing his knowledge with his younger brother Chris, who followed in Rob's footsteps and is now one of my colleagues in the Environment Agency.

When I met Rob in 1990 I had already corresponded with him over several years beforehand, because by this time he had already undertaken national otter and pine marten surveys for the Nature Conservancy Council and a national water vole survey for the Vincent Wildlife Trust (VWT). Rob had been one of the two principal surveyors for the national Otter Survey of England in 1984-86, along with Johnny Birks. When he approached me at a Mammal Society conference in London, it was to ask for my help in looking at some of the alternate 50km squares (those not part of the core survey) for the 1991-94 Third National Otter Survey of England, funded by VWT, for which he was to be the sole field surveyor.

From our first meeting we were good friends, sharing a passion for wildlife and travel which animated us every time we met. Rob was always 'there', someone to talk to about mammal conservation matters, otters, and in fact any natural history subject at all, because Rob was an extremely competent all-round naturalist with particular skills in ornithology, mammalogy and botany, and an interest in everything else!

Rob spent ten years of his life as an itinerant wildlife surveyor working on pine marten, otter, and water vole surveys, this last being an eye-opening national survey which highlighted for the first time the scale of the national decline for this mammal. I and many other friends around the country gave Rob an occasional roof and a pint and a meal at the pub during his roving surveys when he was on 'our patch'. By this time I was working for the Environment Agency (EA) in the Thames catchment, and in due course we were in discussion with Oxford University's Wildlife Conservation Research Unit (WildCRU - headed by Professor David MacDonald) about research opportunities to investigate the decline of the water vole and the role of American mink. I did not hesitate to recommend Rob as a valuable asset to David's team, and knew he was 'available' having just completed the 1991-94 national otter survey. Many happy years of collaboration ensued between the University and the EA, with some ground-breaking research undertaken by the team at WildCRU of which Rob immediately became a key component, leading to the publication of the Water Vole Conservation Handbook (now in its third edition) along with other papers and publications. In 1995 Rob's excellent book *Mammal Detective* was published by Whittet.

During his WildCRU years for a time Rob also was seconded to the Environment Agency for two days a week to provide riparian mammal advice to staff and others from around the country, and he built up particularly extensive experience of development issues as they affect water voles during this time. He always kept his hand in on otter conservation matters as well, and while still working at WildCRU was the principal surveyor for the national otter survey of Scotland in 2003/4, allowing him to visit some of the most wonderful parts of the country that he loved so much. When he finally left WildCRU in 2005 to join the EA in Wales, he could apply all his conservation skills and knowledge to the work of a statutory environmental regulator. In 2009 Rob co-ordinated and undertook part of the field survey work for the Fifth National Otter Survey of Wales.

Throughout this time Rob was an active supporter of the Mammal Society, giving talks at conferences, providing advice to local mammal groups, leading youth group expeditions and supporting numerous other events, and sharing his exceptional knowledge of mammal ecology and field signs with a broad audience. He gave an enormous amount of time to others to help them understand and care for the natural world, and all this with incredible calm and gentleness. In 2008 he quite rightly was awarded the Society's Medal.

Rob had a rich treasure trove of wildlife encounters and experiences from both home and abroad, and always seemed to be in the right place at the right time to see something special. His stories included the nurse who nearly fainted as a wriggling botfly larva was removed from his head, and the otter he rugby-tackled after seeing it hit by a car only to find it wasn't quite as injured as he thought! He enjoyed sharing these experiences, and never lost his thrill and wonder at the natural world, nor his desire to pass this wonder on to others.

Rob was still with the EA's Welsh successor, Natural Resources Wales (NRW) when he was diagnosed with pancreatic cancer in early spring 2014. He had been living with his partner Jane at Tretower for a few years by this time, and I can only think that Rob's last great endeavor was to hang on so that he could marry Jane at their home, on the day before he died.

Rob's knowledge of otter ecology and conservation was extensive, and he will always be remembered for his passion for this species, and his field survey skills, just as he also will be for his water vole expertise. But his knowledge and skills went far beyond

these two species – he was an exceptional field naturalist, and an incredibly kind and helpful human being.
His family and friends have lost someone very special, and the conservation world has lost a very humble and talented hero.

Graham Scholey,
Environment Agency (England),
Chair – UK Otter Biodiversity Action Plan Steering Group.

R E P O R T

STATUS OF OTTERS IN THE SUNDARBANS TIGER RESERVE, WEST BENGAL, INDIA

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Abstract: Sundarbans is the largest mangrove forest in the world comprising a large network of small rivers and innumerable islands. During February 2010 to May 2010 boat transects were carried out in the Sundarbans Tiger Reserve, India to estimate the sign encounter rates of tiger and its prey species. During these transect surveys otter signs and sightings were also recorded. A total of 237.8 km of transect surveys were carried out in which four sightings of smooth coated otter groups were recorded and otter signs at seven different locations (tracks at six locations and a spraint at one location) were recorded on the mud banks of the forested islands. The mean group size of the smooth coated otter groups was 2.75 (S.E. = 0.85, Range = 1-5) and the encounter rate of the otter signs was 0.03/km (S.E. = 0.01). As the speed of the mechanised boat was maintained at 4.5 km/hr it was not possible to identify the species of otter based on the pugmarks on the mud banks. In the past few decades due to the decline in the fresh water flow in the Indian Sundarbans the biodiversity in this region has been affected to a large extent. These changes may have affected the presence and distribution of otters in this region. Till date there have been no systematic surveys for otters in the Sundarbans Tiger Reserve. This study presents preliminary information on the distribution and abundance of otters in the region but extensive surveys are necessary to generate reliable abundance estimates and distribution patterns for otters in this region

Keywords: *Lutrogale perspicillata* (smooth coated otter), *Lutra lutra* (Eurasian otter), *Aonyx cinereus* (Oriental small-clawed otter), Animal sign encounter rates.

INTRODUCTION

Sundarbans is the largest mangrove forest in the world created at the confluence of the deltas of rivers Brahmaputra, Ganges and Meghna comprising a huge network of smaller rivers, creeks, channels and innumerable islands (Chakrabarti, 1992). Out of the total area of Sundarbans, 38% falls in India and the rest lies in Bangladesh (Mitra, 2000). Sundarbans is famous for tigers but its water channels and mangrove forests are also the habitat for otters. Three species of otters are found in India, namely the *Lutrogale perspicillata* (smooth coated otter), *Lutra lutra* (Eurasian otter) and *Aonyx cinereus* (Oriental small-clawed otter) (Foster-Turly and Santiapillai, 1990; Hussain, 1993; Prater, 1998; Reuther, 1999; Menon 2003). Throughout India the

existing populations of the three species of otters and their habitat have not been surveyed systematically and hence not much information is available on the status of otter populations in India (Hussain, 1999). All of these three species of otters have been reported from the Indian part of the Sundarbans (Sanyal, 1999) but recently Mallick (2011) reported the presence of only smooth coated otter and Oriental small-clawed otter from the Sundarbans Tiger Reserve.

The Sundarbans Tiger Reserve is located south of the Tropic of Cancer between 21° 32'- 22° 40' N and 88° 05'- 88° 10' E. The Sundarbans Tiger Reserve covers an area of about 2,585 km^2 (Jhala et al., 2011) and the major rivers flowing through this region are the Matla, Raimangal and Harinbhanga (Mallick, 2011). The area surrounding the Sundarbans Tiger Reserve is densely populated, with the human population density being 1,437.4 persons/km^2 which is among the highest in India (Jhala et al., 2011). A large chunk of this human population depends on the mangrove forests for their livelihood thus making biodiversity conservation a highly difficult task.

METHODS

In February 2010 the tiger population monitoring exercise was started in the Sundarbans Tiger Reserve, India. During this exercise, boat transects were conducted to estimate the animal sign encounter rates along the banks of the forested islands from the start of February 2010 to mid-May 2010. The boat transects were carried out during early morning hours and late afternoon and evening hours and also according to the low-tide time frame as the mud bank of the islands are exposed only during this time frame. During the survey the speed of the mechanized boat was maintained at around 4.5 km/hr and there were always two observers looking out for signs and animal sightings on the banks of the islands. 8X42 Bushnell binoculars were used during the survey. The focus of these surveys was on tiger signs and the signs of the prey animals but otter sightings and signs were also recorded during these surveys. The Sundarbans Tiger Reserve is divided into 4 ranges, namely the Sajnekhali range, Bashirhat range, National park west range and National park east range. The Sajnekhali and Bashirhat ranges together form the buffer zone whereas the National park west and east ranges form the core zone of the tiger reserve. The boat transects were conducted only in the Sajnekhali and the National park west range (western portion of Sundarbans Tiger Reserve) due to logistic constraints.

RESULTS AND DISCUSSION

In all a total of 237.8 km of boat transect surveys were carried out of which 117.3 km were conducted in the Sajnekhali range and 120.5 km were covered in the National Park west range. During the entire survey a total of four sightings of smooth coated otter groups were recorded totaling 11 individuals and also otter signs at seven different locations were recorded (tracks at six locations and a spraint at one location). Of the four sightings of smooth coated otter groups three were sighted in Sajnekhali range and one was sighted in National Park west range. The mean group size was 2.75 (S.E. = 0.85, Range = 1-5) and in one of these smooth coated otter groups sighted in Sajnekhali range an otter cub was also seen (The smooth coated otters have a smooth, sleek and almost velvety coat which helps in identifying this species). Among the otter signs recorded, four were found in Sajnekhali range and three in National park west range. Since the speed of the boat was maintained at 4.5km/hr it was not possible to ascertain the species of otter based on the pugmark imprints. The encounter rate for otter signs during this study was 0.03/km (S.E. = 0.01). Mallick (2011) reported an

encounter rate of 0.009/km for otters in Sundarbans Tiger Reserve. As mentioned earlier, this survey was mainly designed for recording tiger signs and the signs of its prey animals so it is possible that some otter signs were missed and not recorded during the survey. Hence the encounter rate for otter signs mentioned here may be negatively biased. Also in Sundarbans the tides rise and fall after six hour intervals thus submerging and exposing the banks of the islands periodically. The fluctuation in water level due to tides obliterates the signs deposited on the shoreline of the islands which in turn affect the detection probability of the signs

CONCLUSION

In the past few decades the freshwater inflow in the Indian part of Sundarbans has largely declined due to the silting up of most of the rivers coming into this part of the delta and thus the increasing salinity in this region has affected the biodiversity of this region (Gopal and Chauhan, 2006). Otters are among the top predators in a wetland ecosystem and hence are good indicators of the health and changes in a wetland ecosystem (Erlinge, 1972). It is likely that changes in the biodiversity of this region over the past few decades may have affected the presence and distribution of the three species of otters in this region. Till date there have been no systematic surveys for otters in the Sundarbans Tiger Reserve. This study presents preliminary information on the distribution and abundance of otters in the region but extensive surveys are necessary in the Sundarbans Tiger Reserve so as to generate reliable abundance estimates and distribution patterns for otters in this region which in future may serve as indicators to the changes taking place in this unique wetland ecosystem.

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RÉSUMÉ : ETAT DES LIEU CONCERNANT LES LOUTRES DANS LES SUNDARBANS DE LA RÉSERVE DU TIGRE, OUEST DU BENGAL, INDE

Le Sundarbans constitue la plus grande mangrove du monde comprenant un large réseau de petites rivières ainsi que d'innombrables iles. De Février à Mai 2010, des transects réalisés en bateau ont été fait dans ces Sundarbans dans la réserve du Tigre en Inde pour estimer le taux de rencontre entre les tigres et leurs proies. Durant ces études de transects, des traces et des observations de Loutres ont été relevées. Un total de 237,8 km de transects a été réalisé au sein desquels 4 observations directes de Loutre d'Asie ont été enregistrés avec également des traces de Loutre qui furent repérées en 7 lieux différents (des pistes en 6 endroits et des excréments à un endroit) sur des bancs de vase d'iles boisées. La taille moyenne des groupes de Loutres d'Asie était de 2,75 (SD = 0,85 ; répartition = 1-5) et le taux de découverte d'autre traces de Loutres était de 0,03/km (SD = 0,01). Comme la vitesse du bateau à moteur était fixée à 4,5km/h, il était impossible d'identifier les espèces de Loutres à partir de leurs empreintes sur ces bancs de vase. Durant les dernières décennies, une diminution de l'apport en eau douce dans les Sundarbans indiennes, ce qui a affecté la biodiversité de cette région de façon très importante. Ces changements ont pu influencer la présence et la distribution des Loutres dans cette région. Jusqu'à présent, aucune enquête concernant les Loutres n'ont été réalisées dans les Sundarbans de la réserve du Tigre. Cette étude reporte donc des informations préliminaires quant à la distribution et à l'abondance des Loutres dans cette région. Cependant, des études plus approfondies seront nécessaires pour estimer l'abondance et acquérir des profils de distribution valides pour les Loutres de cette zone géographique.

RESUMEN : STATUS DE LAS NUTRIAS EN LA RESERVA DE TIGRES SUNDARBANS, BENGALA OCCIDENTAL, INDIA

El Sundarbans es el mayor bosque de manglar del mundo, y consiste en una gran red de pequeños ríos e innumerables islas. Desde Febrero de 2010 a Mayo de 2010, llevamos a cabo transectas en bote en la Reserva de Tigres Sundarbans, India, para estimar las tasas de encuentro de signos de tigre y sus especies presa. Durante estas transectas también fueron registrados los signos y avistajes de nutria. Realizamos un total de 237.8 km de prospecciones de transecta, en los cuales registramos cuatro avistajes de grupos de nutria lisa, y signos de nutria en siete localizaciones distintas (huellas en seis localidades y una feca en una), en las barrancas barrosas de las islas forestadas. El tamaño medio de grupo de nutria lisa fue 2.75 (S.E. = 0.85, Rango = 1-5) y la tasa de encuentro de signos de nutria fue 0.03/km (S.E. = 0.01). Como la velocidad del bote motorizado se mantuvo a 4.5 km/hr no fue posible identificar la especie de nutria en base a las huellas en las riberas barrosas. En las últimas décadas, debido a la declinación en el flujo de agua en los Sundarbans de la India, la biodiversidad en esta región ha sido muy afectada. Estos cambios pueden haber afectado la presencia y distribución de nutrias en esta región. Hasta la fecha, no ha habido prospecciones sistemáticas en busca de nutrias en la Reserva de Tigres Sundarbans. Este estudio presenta información preliminar sobre la distribución y abundancia de nutrias en la región, pero se necesitan prospecciones extensas para generar estimaciones de abundancia y patrones de distribución confiables en esta región.

R E P O R T

A DISTRIBUTION SURVEY FOR OTTERS ALONG A RIVER IN CENTRAL BHUTAN

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Abstract: We report the findings of a survey for otters along a major river in central Bhutan. The river bears various names in different stretches along its run, including Mochhu, Phochhu, Punatsangchhu and Sunkosh. We report: 1) the distribution and density of otter sign, including tracks, scats, latrines and dens, 2) the correlation between sign abundance and vegetation and substrate characteristics, and 3) the correlation of otter sign with human disturbance. Five of the six 5.5 km transects sampled were positive for otter sign. The one transect with no otter sign was the site of a recent severe flood event. Linear sign density was 9.4 sign km^{-1} along one bank of the river, with a mean of 45% of two sample rounds positive for presence of otter sign in sample plots. The Kamichhu site possessed the highest percentage of positive plots at 95%, and the Sunkosh site the lowest at 35%. The number of otter sign was positively correlated with bankside vegetation and with sandy beaches with large boulders. Human disturbance also influenced the density of otter sign, with proximity of settlements, represented by the presence of footpaths, grazing and trash, apparently deterring otter presence. Three species of otters likely occupy the rivers of Bhutan (*Lutrogale perspillata*, *Lutra lutra*, and *Aonyx cinerea*) (Wangchuk et al., 2004), but since altitudinal niche partitioning by these species is not understood in the study area, we make no attempt to predict distribution by species. Only one otter species, a smooth-coated otter (*L. perspicillata)* was directly sighted.

Key words: *Lutrogale perspillata*, Bhutan, habitat, human disturbance

INTRODUCTION

Otters have been reported to inhabit the rivers of Bhutan (Wangchuk et al., 2004; Ruiz-Olmo et al., 2008) but to date no systematic survey has been conducted. Three species of otters are reported in the country, the Eurasian otter (*L. lutra*), smooth-coated otter (*L. perspillata*) and Asian small-clawed otter (*A. cinerea*) (Wangchuk et al., 2004). Wangchuk et al. (2004) report that Eurasian and smooth-coated otters are present within an elevation range of 1000-3600 meters above sea level (masl), and small-clawed otters in foothills habitats from 160-1000 masl. de

Silva (2011) notes the dearth of information on otters from Bhutan, including the lack of an account of habitat preferences and threats. Basic information on the distribution and abundance of otters is needed to formulate local and national conservation plans (MacDonald and Mason, 1994).

Bhutan is an exceptionally rugged and mountainous country. The country's position on the southern slopes of the Himalaya range results in a huge drop in elevation on a north-south axis of ~ 145 km, from the highest point, at 7, 570 masl in the peaks along the border with China to the north, to 98 masl, in the lowlands at the border with India to the south. Some of the highest mountains in the world dominate the north of the country, where climate is severe year-round. Below the Himalayas lie temperate highlands which experience a strong monsoon season in mid-summer. At low elevations in the south, lie subtropical savannas and grasslands, which have been largely converted to agricultural production.

The snows and glaciers of the high Himalaya provide a series of generous parallel rivers with steep descent over this landscape. This gives the country a wide variety of natural habitats and climatic conditions, and high levels of biodiversity. Over 40% of the area of the country has been designated as natural protected area, and further areas are under consideration for designation as wildlife corridors between reserves. Hunting of any kind is prohibited, and a serious effort is made to patrol these large protected areas. While many reserves are inhabited by people, settlements are small and scattered. Arable land constitutes only 2.5% of the country (World Bank 2014). The Bhutanese government has consistently shown a commitment to wildlife protection and is concerned about the pressure on wildlife in the surrounding region (Rinzin et al. 2009).

Otter populations are declining throughout Asia and the Himalayan region (e.g., de Silva, 2007; Kafle, 2009), subject to intensifying pressures of expanding human populations, fragmentation of habitat, declining water quality, loss of an adequate prey base, and intensifying pressure from the pelt trade (Foster-Turley et al., 1990; Yoxon, 2007). The rivers of Bhutan offer abundant clean river habitat for otters. Although no studies have been conducted on the issue, the greatest threat in Bhutan at this time may be the current and planned construction of multiple hydroelectric power facilities. Ninety-one potential hydropower sites for run-of-the-river generation facilities have been identified in the country (Uddin et al., 2007). A drop of nearly 8,000 m in fewer than 200 km generates huge hydraulic force in numerous rivers, providing a clean energy source and a significant asset that the government has recently begun to tap for domestic supply and for export to India. The construction of these facilities, with high head dams and reservoirs, has the potential for negative impact on the habitat continuity and foraging base of otters, although Pedroso et al. (2007) suggest that otters can successfully use reservoirs for foraging. Two of the largest hydropower projects in the country, the Punatsangchhu Hydro Power Authority I and II, are now under construction on the river surveyed in this study (Rahaman and Varis, 2009).

This study presents data on the distribution of otter activity sign along the Phochuu/Punakha/Sunkosh River, the second longest river system in the country, flowing from the north to the south through central Bhutan to its confluence with Brahmaputra River in India (Choden, 2009). We had three objectives: 1) to document the distribution and density of otter sign - tracks, scats, latrines, and dens, 2) to correlate vegetation and bankside strata with otter sign, and 3) to correlate human disturbances with otter sign.

METHODS

Six study stretches of 5.5 km each, were located from north to south within a 105 km study area, the Mochhu, Phochhu, Punatsangchhu, Kamichhu, Burichhu, and Sunkosh stretches (starting point of each study stretch was: Mochhu: 27°38'02.1"N, 089°51'50.8"E [1268 masl]; Phochuu: 27°42'39.5"N, 089°45'56.3"E [1497 masl]; Punatsangchhu: 27°34'30.7"N, 089°52'20.3"E [1380 masl]; Kamichhu: 27°15'58.77"N, 90° 2'18.84"E [626 masl]; Burichhu: 27°03'57.0"N, 090°04'10.0"E [475 masl]; Sunkosh: 26°59'18.2"N, 090°04'09.9"E [341 masl]) (Figure 1). The Kamichhu stretch was located between two hydroelectric facilities under construction, 22 km downstream from Punatsangchuu I and 5.5 km upstream from Punatsangchuu II (Figure 1).

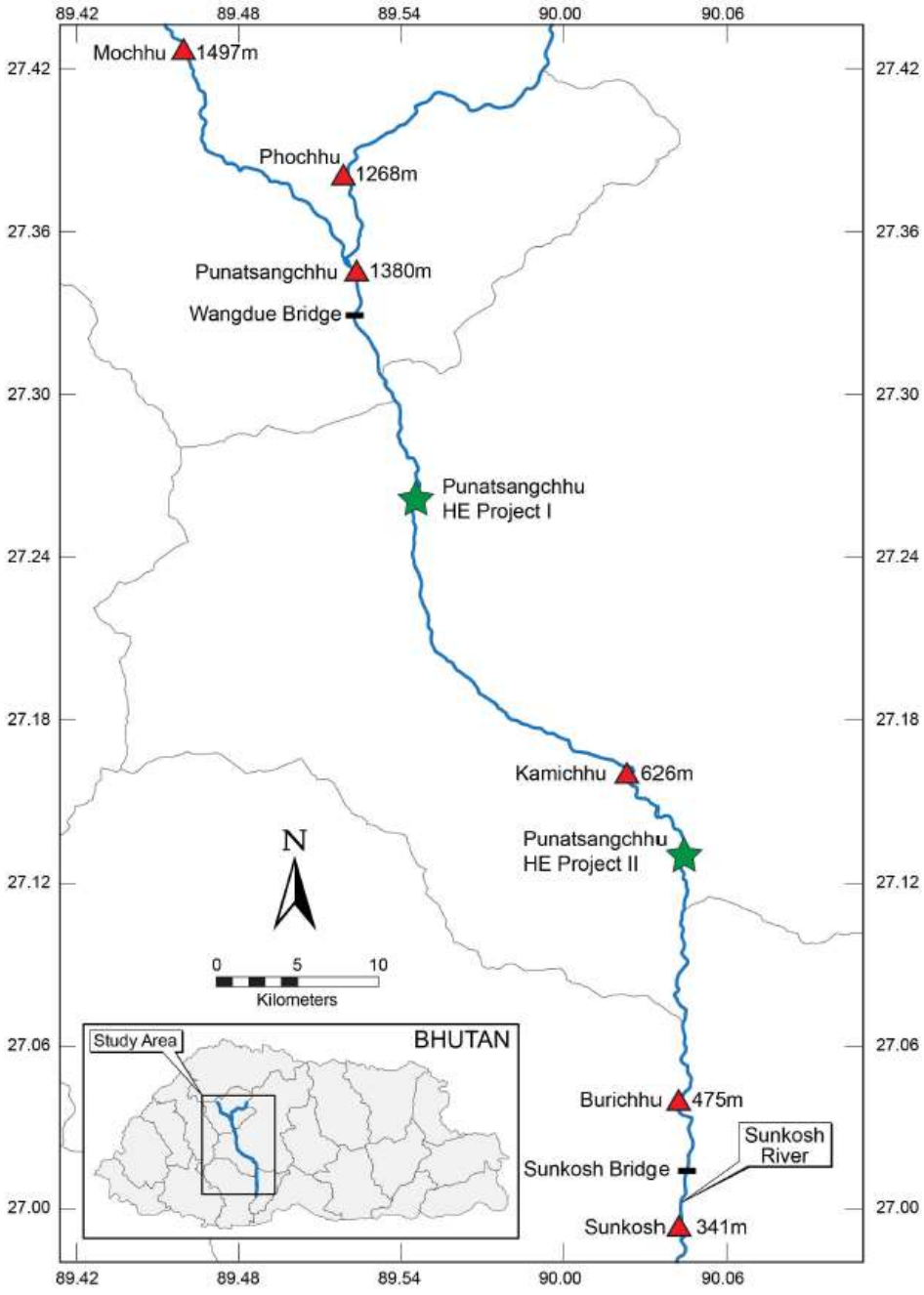

Figure 1. Map of the study area along the Phochuu/Punakha/Sunkosh River. Six study stretches (elevation masl) are marked with red triangles. Hydroelectric generation plants under construction marked with green stars. Coordinates are N (vertical) and E (horizontal).

Forest cover was dominated by temperate broadleaf forest along the upper portion of the study area, dry Chir pine (*Pinus roxburghii*) forests along the middle portion, and subtropical broadleaf vegetation in the lowest portion (Figure 2,3). Annual precipitation varies from 400 to 600 mm in the upstream section, 700 to 900 mm for the midstream region and more than 2000 mm in the southernmost region (Choden, 2009). No transects were located close to the two hydroelectric facilities and dam under construction, where the river is currently diverted from its channel.

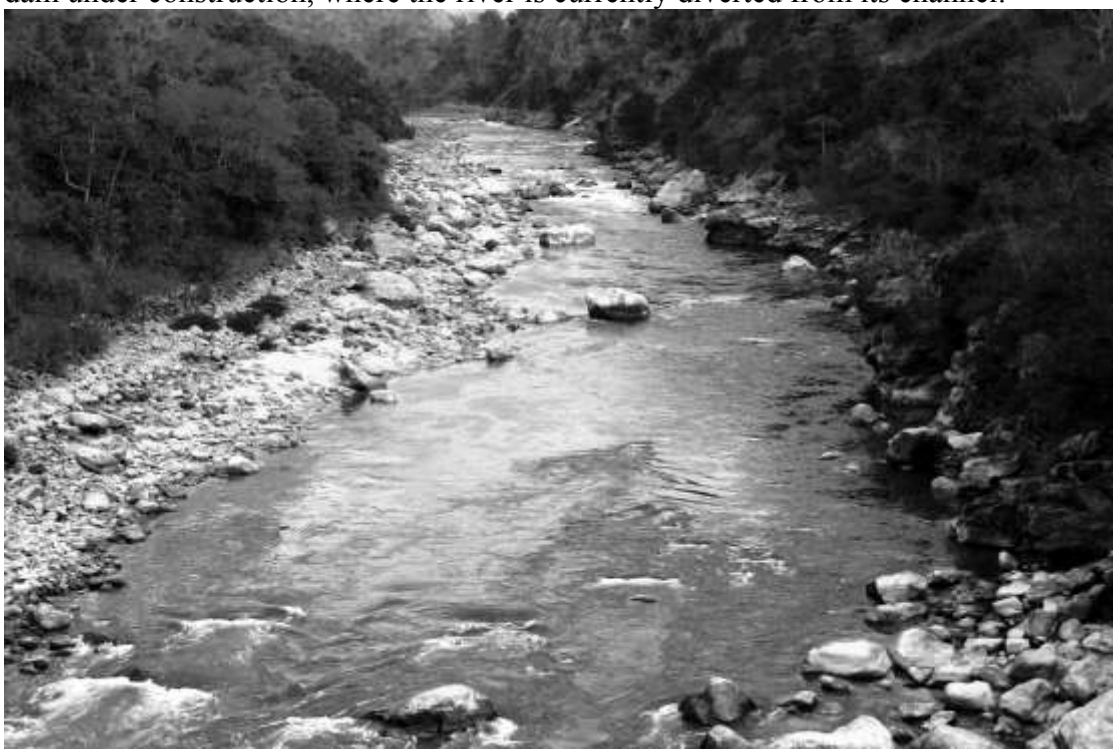

Figure 2. The high-energy Punatsangchhu/Sunkosh River drains a large portion of the high Himalaya, and flows on a steep north-south gradient through narrow valleys.

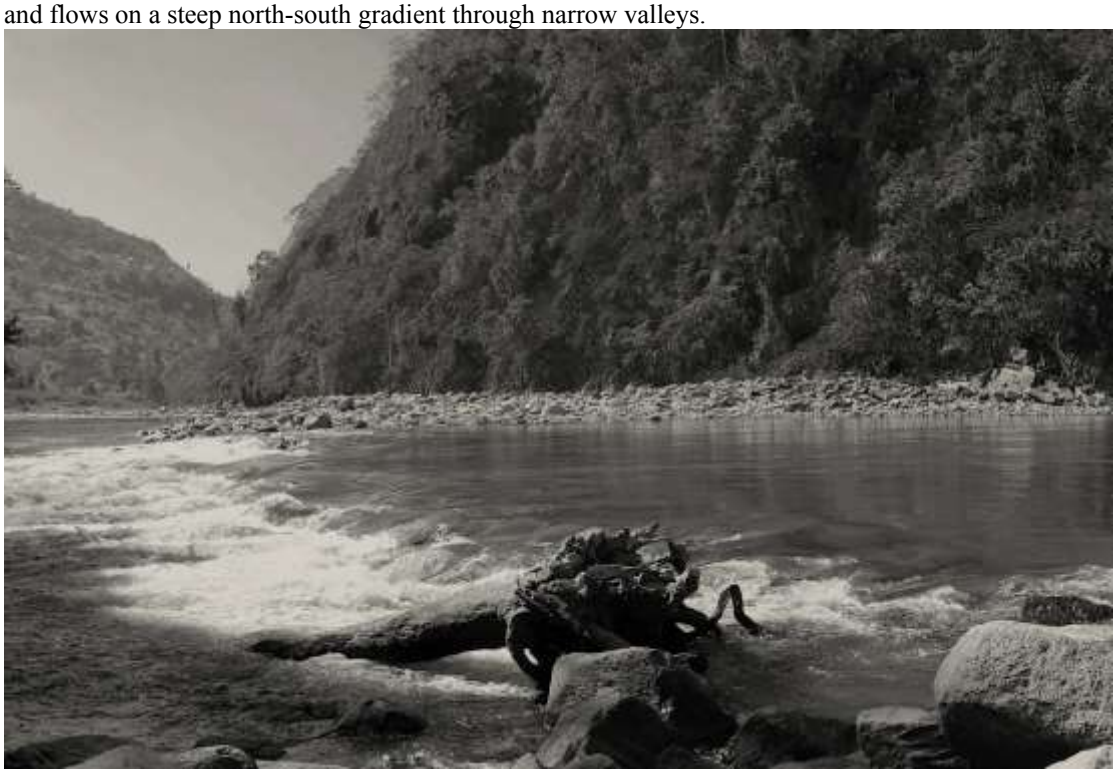

Figure 3. Lower gradients in the southern reaches of the Punatsangchhu/Sunkosh River slow and broaden the flow, providing more sandy beaches.

Observations of tracks, scats, latrines, and dens were recorded in each of the six study stretches in plots along a transect on the riverbank parallel to the river. Ten plots measuring 100 m x 10 m, were located 500 m apart along each 5.5 km transect, for a total of 60 plots. Thus, a one linear kilometer transect was sampled within each of the six study stretches, with varying distances between transects (Figure 1). The sampling design modifies the methodology of Macdonald and Mason (1983) who investigated the distribution of scats as a measure of Eurasian otter activity on a river in Wales, and Nawab and Hussain (2012), who surveyed smooth-coated otters on a river in the upper Gangetic plain. Otter sign was identified by reference to Wangchuk et al. (2004), and by the presence in the fish bones and crab fragments in scat. No attempt to distinguish the species of otters present by differences in sign. Study stretches were selected during a reconnaissance trip to locate otter sign, and based on reports of otter presence by local residents.

The seasonal flow of the river is highly variable, with the highest flow during the summer monsoon months. The survey was conducted during the relatively low-water season of winter; plots were sampled in January and February, and resampled in April, 2013. A heavy 2-day rainfall between sampling efforts enabled the sampling of freshly deposited scats.

Presence of tracks, scats, latrines, or dens defined a plot and a transect as 'positive' for otter presence. Scats were registered separately when more than 5 m apart (Melquist and Hornocker, 1983; Newman and Griffin, 1994). Dens were recorded only when fresh scats were also present to corroborate otter use. Geographic co-ordinates and elevation were recorded from the center of each plot. Sampling was conducted along one bank of the river.

Habitat variables were also recorded in each plot. Habitat was characterized as 1) percent vegetation cover, and 2) bankside substrata. Vegetation was measured by percent cover class: 1) 0-5%, 2) 5-25%, 3) 25-50%, 4) 50-75% and 5) 75-100%. The midpoint of each category was averaged, giving a value for vegetation cover in each plot. Substrate attributes were binned by diameter category as follows: 1) sand (< 5 mm), 2) pebbles (5 mm-5 cm), 3) small stones (5-50 cm), 4) large stones (50-100 cm), and 5) boulders (>100 cm). Evidence of human disturbance, scored on a scale from 1 to 5, included: 1) human footpaths, 2) evidence of grazing, 3) garbage deposition sites, 4) loose trash, 5) sand and boulder excavation, 6) bankside construction, 7) evidence of fishing, 8) recreational sites, 9) evidence of the use of explosives, and 10) construction debris.

Density of each type of otter sign is reported for each study stretch and for each sampling round by density per plot and density per kilometer in Table 1. Otter sign per kilometer of river (sign km^{-1}) was calculated for each study stretch separately, for each of the two sampling rounds, and for the two sampling rounds combined. Total otter sign recorded in each study stretch was correlated against 1) vegetative cover, 2) substrate parameters, and 3) human disturbance, using Pearson's correlation test. Evidence of sand and boulder extraction, construction activities, recreation, use of explosives, and construction debris were excluded from the analysis as none were recorded. We focused on sign distribution and density because, although important for wildlife conservation, estimating abundance of cryptic carnivores is difficult, and otter sign counts do not translate well into an estimate of otter abundance (Melquist and Hornocker, 1983; Mason and Macdonald, 1987; Gallant et al., 2007; Long et al., 2008).

RESULTS AND DISCUSSION

Otter signs were documented in five of the six study stretches, the Phochhu, Punatsangchhu, Kamichhu, Burichhu and the Sunkosh stretches. Thirty-one out of 60 plots in round one of sampling, or 52%, were positive for otter sign, and 23 out of 60 plots in round two of sampling, or 38%, were positive for otter sign. Percentage of plots positive for otter sign for both rounds combined was 45%. If the flood-affected Mochhu section, where no sign was found and otters were apparently absent, is omitted from analysis, the proportion of positive plots rises to 54% for combined sampling rounds. The documentation of more numerous positive plots in round 1 than in round 2 was likely due to the longer period of time of accumulation of sign. Mean percent positive plots for combined rounds was none in the Mochhu stretch, 55% in the Phochuu stretch, 35% in the Punatsangchhu stretch, 95% in the Kamichhu stretch, 50% in the Burichhu stretch and 35% in the Sunkosh stretch (Table 1). Individual scats were the most common form of otter sign, with tracks the second most common, with rare dens (Table 1).

Table 1. Number of otter sign by type (round 1 [R1] and round 2 [R2] sampling combined) per sampled river stretch, mean density of otter sign km^{-1}, and percent plots positive for otter sign (n = 60; sampled length of transect per site = 1 km).

Study stretches	Scats		Tracks		Dens		Mean		% positive
	R1	R2	R1	R2	R1	R2	R1	R2	density plots
					km^{-1}				
Mochuu	0	0	0	0	0	0	0	0	0
Phochhu	3	2	10	5	1	0	2	1	12	55
Punatsangchhu	1	1	6	3	0	0	0	0	5.5	35
Kamichhu	3	2	14	8	11	12	0	0	25	95
Burichhu	1	1	7	0	9	1	0	0	9.5	50
Sunkosh	1	1	2	3	2	0	0	0	4.5	35
Total	9	7	39	19	23	13	2	1	9.4	45

By comparison, in studies of smooth-coated otter distribution in India, Hussain and Choudhury (1997) reported 36% of sampled sites as positive in 425 km, and Nawab and Hussain (2012) reported 15.5% of sampled sites as positive in 190 km. Both studies, however, documented sign on both banks of the river.

The mean of otter sign km^{-1} of river along the length of all transects for combined rounds of sampling was 9.4 sign km^{-1}, with a mean of 12.2 sign km^{-1} for round one and 6.7 sign km^{-1} for round two (Table 1). Mean of otter sign for both sampling rounds combined ranged on the transects from none for Mochhu, 12 sign km^{-1} for Phochhu, 5.5 sign km^{-1} for Punatsangchhu, 25 sign km^{-1} for Kamichhu, 9.5 sign km^{-1} for Burichhu, and 4.5 sign km^{-1} for Sunkosh (Table 1). It is difficult to correlate the presence of otter sign with the intensity of use of an area by otters, and further research will be needed to document the species and abundance of otters in this river.

No otter sign was documented in the Mochhu stretch, although there appears to be abundant suitable otter habitat there, and National Park staff has reported otter sightings in past years. In summer of 2012, however, a severe flood caused by a stalled intense rainstorm, may have reduced prey availability and temporarily caused otters to move downstream for better hunting. The higher percentage of tracks than scats in the Kamichhu stretch suggests that bankside substrate may strongly influence how well tracks are recorded, and that scats counts may yield more reliable results than track counts (Mason and Macdonald, 1987).

The positive correlation of otter sign with vegetation parameters recorded in the

survey (r=0.52, P<0.05) indicates that good bankside vegetation cover within 10 m of the river is advantageous for otters (Table 2). Bankside vegetation is an important characteristic of otter habitat, for lying up, escape and breeding purposes (Mason and Macdonald, 1987; Kruuk, 1995; Melisch and Foster-Turley, 1996; Hussain and Choudhury, 1997; Anoop and Hussain, 2004).

Otter sign was positively correlated with sandy substrate (r=0.63, n=57, P<0.05) and boulders (r=0.94, P<0.05) (Table 2). Pebbles and large stones, on the other hand, were negatively correlated with otter sign (r=-0.53, n=33, P<0.05) and (r=-0.63, n=113, P<0.05) respectively (Table 2). Anoop and Hussain (2004) note that sand is used by otters for grooming and basking, and that scats and dens are most common in sites with sandy substrate and boulders.

Table 2. Correlations between otter sign and percent substrate and vegetation cover (P<0.05 [one-tailed])

Habitat Parameters	# sign	Pearson's r	Sig.
Sand	57	0.63	0.00
Pebbles	33	-0.53	0.00
Small stones	72	-0.19	0.06
Large stones	113	-0.63	0.00
Boulders	64	0.94	0.00
Vegetation	85	0.52	0.00

Certain human disturbances appeared to influence otter presence. There is a negative correlation between otter sign and human footpaths (r=-0.63, n=31, P <0.05) and grazing (r=-0.71, n=26, P<0.05), suggesting that the proximity of human settlements deters otters (Table 3), as reported by Newman and Griffin (1994) and Nawab and Hussain (2012). Harassment by feral dogs from settlements may be one reason for this.

Table 3. Correlations between otter sign and human disturbance parameters (P=0.05 [one-tailed])

Human Disturbance Parameters	# sign	Pearson's r	Sig.
Footpath	31	-0.63	0.00
Grazing	26	-0.71	0.00
Garbage deposition	10	0.02	0.47
Loose trash	13	-0.03	0.46
Fishing	23	-0.45	0.02

Evidence of illegal fishing was also negatively correlated with otter sign (Table 3), but the reasons for this are probably complicated. Signs of illegal fishing were concentrated in the lower portions of the river, along the Sunkosh stretch. Despite a negative correlation between signs of fishing and otter sign (r=-0.45, n=23, P <0.05), in some plots fresh tracks were observed close to fish traps in the Sunkosh and Burichhu stretches, as well as fresh evidence of dragging of fish traps and fish kills. Otters are at risk of being trapped in such snares during foraging. Of the ten defined human disturbance parameters, five were not documented in plots: extraction of river materials, construction activities, recreation, use of explosives, and construction dumps.

Our assessment of the human disturbance parameters is limited to the study plots. A major human disturbance parameter, however, was not studied--the construction of hydroelectric power plants. The potential for disruption to otter habitat of a large number of hydroelectric power facilities, both the construction

phase, as well as the built facility--generating plant, dams, roads, reservoirs, and service facilities--may have a significant impact on otters in Bhutan, as they have elsewhere in Asia (Foster-Turley et al., 1990). Plots in the Kamichhu stretch were located between two dam construction sites. Nevertheless, the highest density of otter sign was documented in the Kamichhu stretch, perhaps because part of this stretch is protected from illegal fishing and may have high fish densities. The golden mahaseer (*Tor putitora*), which inhabits the river here, is endangered throughout the Himalayan region due to habitat loss and degradation and overfishing (Nautiyal, 1994). Mining of sand along the Mochhu and Punatsangchhu stretches, although not documented in sampled plots, may also influence otter habitation.

CONCLUSION

Our observations constitute the first distribution survey of otters along the rivers of Bhutan. Otter signs were found in all study stretches except one. Tracks, scats, latrines and dens were recorded in about half of sample plots. Otter signs were more common in sites with more vegetation cover, and along sandy riverbanks with large boulders. Fewer otter signs were observed along sandy banks if those areas were subjected to frequent human activities and/or lacked vegetation cover. In contrast, abundant sign was documented in sandy areas with large boulders and vegetation, away from human footpaths. Differential size of tracks may reflect presence of both adults and cubs, or the sympatric presence of both Eurasian and smooth-coated otters.

This study documents otter presence over a short period of time in the dry winter season in Bhutan, and surveys are needed along other rivers and in other seasons. Behavioral traits and prey base were not studied, nor was otter abundance, essential to give managers the tools to conserve and protect otter species in the country. Otters throughout Asia face serious threats, and pressure from the pelt trade in the Himalayan region is intense (Yoxon, 2007). In addition, the impact on otter populations of the construction of multiple hydro-generation facilities needs investigation. Although the Bhutanese Forest and Nature Conservation Rules clearly outline the legal protected status of otters, a knowledge base of the distribution, abundance and ecology of the three species of otters inhabiting the country is urgently needed. We recommend that the Department of Forests and Park Service formulate river bankside regulation to protect riparian habitats. Bhutan, with its many rivers of high water quality and quantity, low hunting pressure, low human population pressure, and high level of governmental commitment to wildlife protection, presents a conservation opportunity for otters, if a comprehensive, scientifically-based conservation program is implemented.

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RÉSUMÉ

ÉTUDE DE LA RÉPARTITION DES LOUTRES LE LONG DE LA RIVIÈRE AU CENTRE DU BHOUTAN

Nous rapportons ici les résultats de l'enquête sur les Loutres le long de la principale rivière du centre du Bhoutan. Tout le long de son cours, cette rivière possède une grande variété de noms incluant Mochhu, Phochhu, Punatsangchhu et Sunkosh. Nous reportons ici (1) la distribution et la densité des traces de Loutres pouvant être des empreintes, des excréments, des latrines et des tanières, (2) la corrélation entre l'abondance de ces traces et les caractéristiques de la végétation et du substrat

environnant, et (3) la corrélation de ces traces avec les perturbations engendrées par les hommes. Cinq des six transects de 5,5 km échantillonnés ont présenté des signes révélant la présence de Loutres. Le seul transect n'en présentant aucune a, récemment, subit une sévère inondation. La densité linéaire des diverses traces laissées par les Loutres était de 9,4 traces km^{-1} le long du cours de la rivière. 45% des emplacements étudiés se sont révélés positifs quant à la présence de traces laissées par les Loutres à la suite des deux campagnes d'échantillonnage. Le site de Kamicchu possédait le plus grand pourcentage d'emplacements positifs avec 95 %, et le site de Sunkosh le plus faible avec 35 %. Le nombre de traces de la présence de Loutres était positivement corrélé avec la végétation des rives et les plages de sable présentant de gros rochers. Les perturbations humaines (sentiers, pâturage et déchets) influencent aussi la densité des traces de Loutres en les dissuadant. Trois espèces de Loutre (*Lutrogale perspillata*, *Lutra lutra*, and *Aonyx cinerea*) sont supposées occuper les rivières du Bhoutan (Wangchuk et al., 2004), cependant la répartition altitudinal des niches de ces espèces n'est toujours pas connue pour la zone étudiée, et nous n'avons aucunement essayé d'en prédire leur distribution. Seulement une espèce de Loutre, la Loutre à pelage lisse (*L. perspicillata*), a pu être directement identifiée.

RESUMEN

PROSPECCIÓN DE LA DISTRIBUCIÓN DE NUTRIAS A LO LARGO DE UN RÍO EN BHUTAN CENTRAL

Informamos aquí los hallazgos de una prospección de nutrias a lo largo de un gran río en Bhutan central. El río tiene varios nombres en distintos tramos, incluyendo Mochhu, Phochhu, Punatsangchhu y Sunkosh. Informamos: 1) la distribución y densidad de signos de nutria, incluyendo huellas, fecas, letrinas y cuevas, 2) la correlación entre la abundancia de signos y las características de la vegetación y el sustrato, y 3) la correlación de los signos de nutria con el disturbio humano. Cinco de un total de seis transectas de 5.5 km muestreadas, fueron positivas para signos de nutria. La transecta sin signos era el sitio de un reciente evento de inundación severa. La densidad lineal fue de 9.4 signos km^{-1} a lo largo de la barranca del río, con una media de 45 % de dos rondas de muestreo, positivas para presencia de signos de nutria en las parcelas de muestreo. El sitio Kamichhu poseyó el mayor porcentaje de parcelas positivas, con 95 %, y el sitio Sunkosh el más bajo, 35 %. El número de signos de nutria se correlacionó positivamente con la vegetación ribereña y con las playas arenosas con grandes rocas. El disturbio humano también influenció la densidad de signos de nutria, con la proximidad de asentamientos, representada por la presencia de senderos, pastoreo y basura, aparentemente repeliendo la presencia de nutrias. Los ríos de Bhutan son ocupados aparentemente por tres especies de nutrias ((*Lutrogale perspillata* , *Lutra lutra*, and *Aonyx cinerea*) (Wangchuk et al., 2004), pero como aún no se comprende el particionamiento de nicho altitudinal por parte de estas especies en el área de estudio, no hacemos ningún intento de predecir la distribución por especie. Solamente una especie, la nutria lisa (*L. perspicillata)* fue avistada directamente.

R E P O R T

PHOTOGRAPHIC RECORD OF SMOOTH-COATED OTTER (*Lutrogale perspicillata* GEOFFROY 1826) IN NYAMJANG CHU VALLEY, ARUNACHAL PRADESH, INDIA

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Abstract: A pair of Smooth-coated otters was sighted in remote temperate parts of the Nyamjang Chu valley (Chu = River) in westernmost part of Tawang district, Arunachal Pradesh on 1st April 2014. The otters were photographed basking on a riverside rock and identified based on their morphological features. There were no previously published records of Smooth-coated Otters; normally a species found more in plains, from western Arunachal Pradesh and the state as a whole has very scanty information regarding presence and distribution of otters. The sighting signifies the rich biodiversity of Nyamjang Chu, in Pangchen valley and implies initiation of strong conservation measures to safeguard the future of the otters.

Keywords: Otters, Nyamjang Chu, Pangchen valley, mountain river, Arunachal Pradesh

INTRODUCTION

Smooth-coated otters, classified as Vulnerable by IUCN (Hussain et al., 2008), is one of the least studied Asian otter species (Hussain and Choudhury, 1997). It is widely distributed in south and south-east Asia, including Pakistan, India, Nepal, Bhutan, Bangladesh, South West China, Myanmar, Thailand, Vietnam, Malaysia, Sumatra, Java and Borneo (Masan and Macdonald, 1986, Corbet and Hill, 1992). In India, it is essentially a plains otter which uses large rivers and lakes, peat swamp forests, mangroves and estuaries (Hussain et al., 2008).

Information regarding its presence and distribution in north-east of India is very scanty, including in Arunachal Pradesh. Although otter species have been reported from various parts of Arunachal Pradesh like Dibang Wildlife Sanctuary in the east (Chetry and Medhi, 2006), Ziro valley (Selvan et al., 2013), in Namdapha Tiger Reserve (Naniwadekar et al., 2013) the identity of the species remains unconfirmed in many occasions and there are no photographic records of Smooth-coated otters from most areas in Arunachal Pradesh. The only published information from Nyamjang Chu valley, the present sighting location, is by Mishra et al. (2006), where they report the presence of otters in upper Nyamjang Chu Valley through secondary information.

The present sighting was obtained on 1st April, 2014 in upper Nyamjang Chu and provides the first confirmed record of the species from the region.

DETAILS OF SIGHTING

Arunachal Pradesh, by virtue of its geographical position, climatic conditions and altitudinal variations, is a biodiversity rich region in north-east India, with large tracts of tropical wet evergreen, subtropical, temperate and alpine forests (Paul et al., 2005). The state is a part of the Eastern Himalaya Global Biodiversity Hotspot (Myers et al., 2000) and recognized as one of 200 globally important eco-regions (Olson and Dinerstein 1998). Nyamjang-Chu is one of the two major rivers in the Tawang district in the western most corner of Arunachal Pradesh. Tawang district, with a geographical area of 2085 km^2, is entirely mountainous with precipitous terrain and has a population density of 15 per km^2 (Tawang district website: http://tawang.nic.in/). The present sighting occurred in the upper Nyamjang Chu valley, between the major settlement of Zemithang (located around 90 km from the town of Tawang, the district headquarters of Tawang district) and Bap Teng Kang (Fig. 1), near the Tawang-Zemithang road.

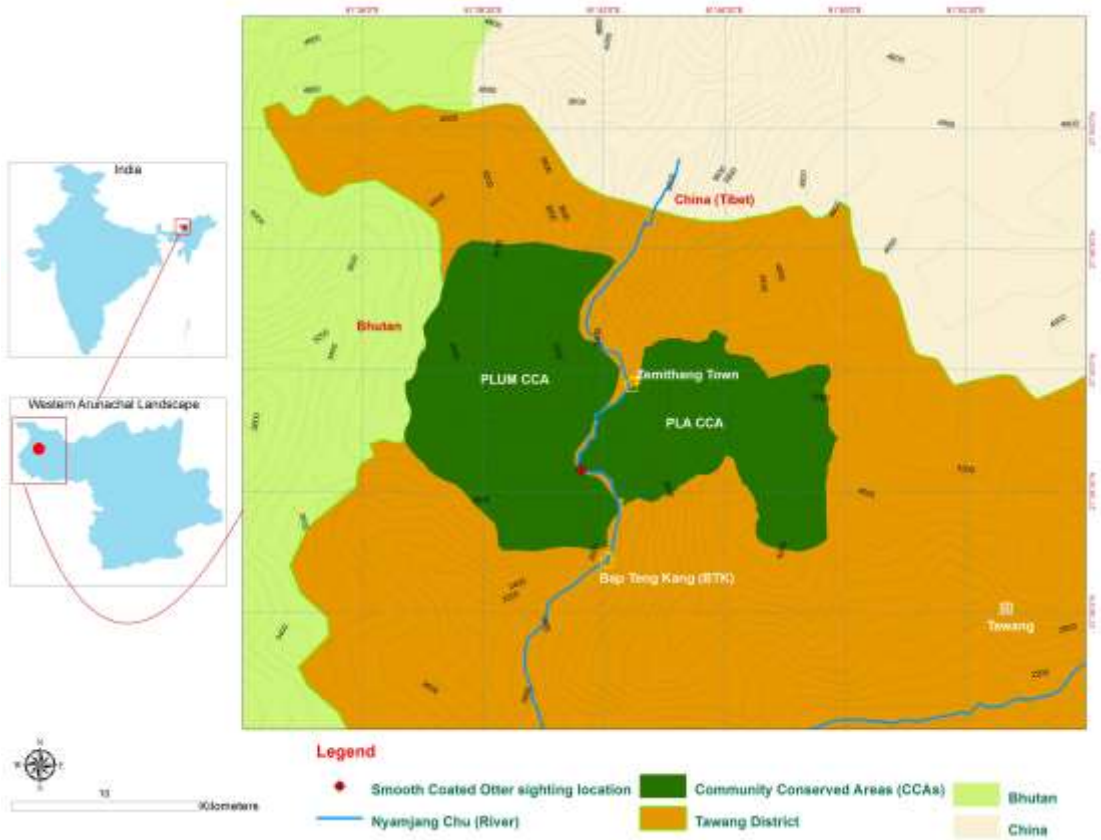

Figure 1. The sighting location in Tawang district with the two CCAs also marked. Map: Kamal Medhi/ WWF-India

On 1st April 2014, at around 9:45 am, a pair of otters was sighted on the riverside by the Tawang- Zemithang road, around 15 km away from Zemithang town, between boundaries of two adjoining Community Conserved Areas (CCAs). Pangchen Lumpo Muchat Community Conserved Area (PLUMCCA) and Pangchen Lakhar Community Conserved Area (PLACCA), in two sides of the valley, have been demarcated by the community members with support and guidance from WWF-India. The otters were seen basking on a flat rock near the water's edge, approx 10 meters from the road,

(Fig. 2), at around 2100 m above sea level (asl), the general habitat being lower temperate mixed forests with *Pinus* sp., *Alnus* sp., etc. The pair was photographed using multiple hand-held cameras (Sony HX 300) and later on identified by their large heavily webbed front paws, flattened tail, smooth coat, non-spotted muzzle and hairless rhinarium (Pocock, 1941; Prater, 1971; Hussain, 1999). After sometime, one of the animals went down into the water and swam to a nearby patch with large boulders, followed by its companion shortly afterwards. There were earlier infrequent reports of otter sightings by the locals residing in Zemithang and adjoining villages, but the present sighting provides the confirmation regarding the identity.

Figure 2. The Smooth-Coated Otter pair sighted in Nyamjang Chu in Pangchen valley on 1st April 2014. Pic: Rajarshi Chakraborty/ WWF-India

DISCUSSION

As mentioned previously, extensive and authentic information on presence and distribution of smooth coated otters in Arunachal Pradesh, the largest of the North-Eastern states of India is lacking. The present record, in the western-most parts of the state, indicates presence of populations with possible trans-boundary distributions with both Bhutan and China. Elevationwise also, the present sighting provides one of the highest records of smooth-coated otters in India (2100 m). In Nepal, smooth-coated otters have been reported at 1500 meters above mean sea level (Shrestha, 1997), lower than the present sighting location. Otters serve as effective symbol of environmental quality and are endorsed as wetland ambassadors to promote the conservation of freshwater biomes (Foster-Turley, 1992; Sivasothi, 1995). In India, they face major threats from habitat destruction due to construction of large-scale hydroelectric projects, reclamation of wetlands for settlement & agriculture, reduction in prey biomass, poaching and contamination of waterways (Hussain et al., 2008). Nyamjang Chu valley, in one of the remotest corners of Arunachal Pradesh, holds a treasure trove of biodiversity including the Red panda (*Ailurus fulgens* Cuvier), the wintering Black-necked crane (*Grus nigricollis* Przevalski), Common leopard

(*Panthera pardus* Linneaus) and many rare species of medicinal and aromatic plants (WWF-India unpublished report). The CCAs in Pangchen valley were demarcated with the principal aim to conserve this rich biodiversity. So far, the remoteness of the area has prevented any large scale destructive development but the same can't be said with the certainty for the future. There are plans for multiple hydro-electric projects across Tawang district and therefore all precautions should be taken to ensure long-term survival of otters in the landscape. Many important habitats of Smooth-coated Otters in India have been lost to developmental activities (Hussain et al, 2008), therefore all efforts should be taken to prevent Nyamjang Chu and habitat around it from having the similar developmental activities (Figure 3). An immediate assessment survey in the sighting location and adjoining stretches of the river is hereby recommended to gather robust information on the distribution of Smooth-coated Otters in the valley and to subsequently formulate conservation strategies.

Figure 3. The otter habitat in Nyimjang Chu valley. Picture: Jaya Upadhyay/ WWF-India

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RÉSUMÉ : PREUVE PHOTOGRAPHIQUE DE LA PRESENCE DE LOUTRES À PELAGE LISSE (*Lutrogale perspicillata* GEOFFROY 1826) DANS LA VALLEE DU NYAMJANG CHU, ARUNACHAL PRADESH, INDE

Le 1ier Avril 2014, une paire de Loutre à pelage lisse a été aperçue dans les régions retirées et tempérées de la vallée du Nyamjang Chu (Chu = Rivière) dans la partie la plus à l'Ouest de la région de Tawang, Arunachal Pradesh. Les Loutres ont été photographiées lézardant sur un rocher au bord de la rivière, et leur identification fut basée sur leurs caractéristiques morphologiques. Aucun rapport mentionnant la présence Loutres à pelage lisse n'a encore été publié: normalement cette espèce est principalement trouvée dans les plaines de l'Ouest de Arunachal Pradesh et dans l'ensemble de l'état où les informations relatant leur présence et répartition sont sporadiques. Cette observation révèle la richesse de la biodiversité du Nyamjang Chu dans la vallée de Pangchen et implique l'initiation de fortes mesures de préservation afin de protéger l'avenir de ces Loutres.

RESUMEN: REGISTRO FOTOGRÁFICO DE LA NUTRIA LISA (*Lutrogale perspicillata* GEOFFROY 1826) EN EL VALLE DEL RÍO NYAMJANG, ARUNACHAL PRADESH, INDIA

Avistamos una pareja de lutrias lisas en un área remota de clima templado, del valle del río Nyamjang en la parte más occidental del distrito de Tawang, Arunachal Pradesh, el 1° de Abril de 2014. Las nutrias fueron fotografiadas asoleándose en una roca de la orilla del río, y fueron identificadas en base a sus rasgos morfológicos. No había hasta ahora registros publicados de la nutria lisa en Arunachal Pradesh occidental; ésta es normalmente una especie encontrada más en llanuras, y hay muy poca información sobre la presencia y distribución de nutrias en todo el estado. Este avistaje valoriza la rica biodiversidad del río Nyamjang y el Valle Pangchen, e implica el inicio de fuertes medidas de conservación para salvaguardar el futuro de las nutrias.

R E P O R T

OTTER HUNTING AND TRAPPING, A TRADITIONAL PRACTICE OF MARSH ARABS OF IRAQ

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Abstract: Two species of otter inhabit the marshes of southern Iraq: the European otter (*Lutra lutra*) and the smooth-coated otter (endemic subspecies: *Lutrogale perspicillata maxwelli*). Marsh Arabs have targeted otters since at least the 1950s. Nowadays, local marsh inhabitants are still heavily hunting otters for their fur or trapping their cubs to be raised as pets. These practices, together with habitat destruction (i.e., marshland drainage), represent primary threats to the otters' survival in Iraq, and have caused a dramatic decline in otter populations. We report on traditional hunting and trapping methods in Iraq on European and smooth-coated otter, and on the consequences on the conservation of these endangered species.

Key Words: Carnivores, Endemic, European otter, *Lutra lutra*, *Lutrogale perspicillata maxwelli*, Mammals, Marshes, Otter, Smooth-coated otter.

OTTER TRAPPING AND HUNTING IN IRAQ: AN OVERVIEW WITH SOME HISTORICAL RECORDS

Mesopotamian marshlands are included in a huge wetland ecosystem covering an area of 20,000 km^2 (7,700 mi^2), whose major part lies in southern Iraq while a minor one lies in southwestern Iran (Hussain, 2014). The marshes of southern Iraq comprise three major wetlands: the Central Marshes (31°0'N; 47°2'E), between the Tigris and Euphrates Rivers; the Hammar Marshes (30°50'N; 46°49'E), south of the Euphrates River; the Hawizeh Marsh (31°36'N; 47°36'E), east of the Tigris River. The marshes represent an important ecoregion of Iraq and provide an essential habitat for the unique flora and fauna of the country (Al-Saad et al., 2010).

The Marsh Arabs ("M'adan") are the primary inhabitants of the Mesopotamian marshes. They usually live in secluded villages of decorative reed houses ("Seraeif")

that can often be reached only by boat (Thesiger, 1964). Marsh Arabs provisions mainly rely on fishing, waterfowl hunting, reed harvesting, and water buffalo (*Bubalus bubalis*) raising. Two otter species can be found in the Iraqi marshlands: the European otter (*Lutra lutra*) and the endemic subspecies of the smooth-coated otter (*Lutrogale perspicillata maxwelli*) (Al-Sheikhly and Nader 2013). Since the 1950s locals have been persecuting both otter species for their skins (Thesiger, 1954). Hence, it does not come as a surprise that the discovery of the smooth-coated otter in Iraq in 1956 relied on a trapped otter cub and on a skin recovered from a dead individual (Hayman, 1956; Al-Sheikhly and Nader, 2013). For instance, the most "famous" cub was a six week old male otter named "Mjbil", which was brought to G. Young by Marsh Arabs (i.e., G. Maxwell personal communication) in February 1956. Mjbil eventually was identified as a smooth-coated otter because of both its fur and tail, which were darker and flatter than in the European otter (Hayman, 1956; Young, 1977). In addition, Maxwell's first female otter (named "Chahala") was trapped in the eastern marshes. Marsh Arabs brought Chahala to W. Thesiger and Maxwell bought her for five Iraqi dinars. Therefore, both live otters reported by Maxwell were cubs provided to him by Marsh Arabs (Maxwell, 1960; Young, 1977).

Examples mentioned above clearly suggest that otter cub trapping and sale was a common practice in Iraq during the1950s. Nevertheless, raising of otter cubs was not the only goal pursued by marshmen. Maxwell (1956) also reported that locals often killed otters to sell their skins. In this regard, Marsh Arabs recognize four local types of fur color: the so-called "black otter" (i.e., *Lutrogale perspicillata maxwelli*), the "common otter" (i.e., *Lutra lutra*), the "red" and "white" otter, the last two likely being variants of the "common otter". Maxwell saw personally only a small piece of skin of the so-called "white otter" (also named "Al-Ashab"). Nevertheless, he wished to buy a young live otter. On 29th February 1956, four otter skins were offered for sale to Maxwell in Abusakhair. Two belonged to the smooth-coated otter ("black otter"), while the others were likely European otters. Maxwell bought one of each type and deposited both of them in the British Museum in London (Hayman, 1956).

Otters' trapping and hunting are not merely historical activities in Iraq. Indeed, we observed both of these practices during recent field surveys in April 2014 carried out in southern marshes during a National Geographic Society project on the smooth-coated otter (see Acknowledgments). Unfortunately, the conflict between otters and anglers is ongoing, and it is still producing marked effects on the populations of both European and smooth-coated otter (Al-Sheikhly and Nader 2013). We interviewed many experienced local anglers and hunters who were fully aware of otter habitat and behavior. It became clear that Marsh Arabs were still identifying otters according to their fur color, namely as "black" or "white" individual. Few marshmen confirmed the presence of "red" otters mentioned by Maxwell, and there was no further information available regarding this variant. European and smooth-coated otter are regularly hunted for their fur or trapped to raise cubs as pets. The fur is sold to smugglers along the borders of Iraq with prices ranging between US$100 and US$300 per item. Otter skins are often used as waterproof sacks, filled with contraband and placed inside the gasoline tanks of a smuggler's car. The fur sacks prevent the contraband from getting wet or damaged (Al-Sheikhly, 2012).

OTTER TRAPPING AND HUNTING TECHNIQUES

In the past, otters (especially adults) were killed by a spear-like stick (called "Fala"), a long reed stick tipped with branched spears (4-5) used by Marsh Arabs to collect fish (Fig. 1). The Fala was used by Sumerians and Babylonians to catch

barbell fish in the marshlands of southern Mesopotamia (Saggs, 1987), and similar spears are now in use by Marsh Arabs (Hadid and Al-Mahdawi, 1977). Otters get speared when they accidentally enter an area occupied by anglers who are practicing the so-called "Barbara" or "Tawareef" fishing. The latter was a fishing technique commonly used in the marshes of Iraq in the 1950s, mainly between February and April when fishermen and otters were both attracted by the occurrence of a large amount of fishes. However, such a method passed into disuse in the 1990s (Al-Hassnawi, 2004). During Tawareef, 10 to 20 anglers, using many boats ("Ma'shoof" or "Tarada") practice spear and net fishing all together. On each boat, while one fisherman paddles, the others (usually two persons) stand at the edge of the boat equipped with their sharp Fala to spear fishes. Alternatively, anglers knock on tin to produce a noise to push fishes toward the nets. All boats start sailing and fishing together systematically. This method is particularly convenient when performed in long and wide waterways in order to cover large areas in the marshes. It was mainly practiced in Hammar and Hawizeh marshes, where large freshwater lakes and wide waterways ("Sibil") occurred. Tawareef was likely derived by Marsh Arabs from the fishing strategy of the great white pelican (*Pelecanus onocrotalus*), when large flocks of this species were still abundant in the marshes. Nowadays, otters are still incidentally speared by Fala. Such an occurrence is not rare especially at night, when otters are most active and anglers practice "Serag" (fishing with lamp) using oil lamp (or torchlight) to attract large fishes (Fig. 1). The Fala strikes cause damage to the otters' fur (holes, scars). Marsh Arabs report that in many cases otters are able to avoid Fala strikes due to their swift and agile maneuvers under the water. When hit by the Fala, otters usually snarl, whirl and bite the stick before attempting to escape. Through decades, otters suffered from massive injuries and bleedings caused by the strikes of Marsh Arabs' traditional fishing spear.

Figure 1. Local angler with the "Fala" and practicing night fishing with his lamp ("Serag") (eastern Hammar Marsh. Photo: Omar F. Al-Sheikhly).

In many localities of the southern marshes otters were also incidentally trapped by means of traditional fish net ("Al-Dast"). For instance, Hatt (1959) reported that otters were captured in high numbers at the Hindiya Barrage, where, at that time, prey fish was very abundant. Nevertheless, otters are also attracted by the extensive fish netting placed in the river. This net is prepared *ad hoc* to trap large migrant fishes in running water streams and rivers such as the bunnei (*Barbus sharpeyi*), gattan (*B. xanthopterus*), and shabot (*B. grypus*) barb. The net consists of two dikes made of reed (*Phragmites* sp. or *Typha* sp.) sticks set together in an obtuse angle facing the water current, and leading to a narrow passage between them which ends in a small net attached to a bell, that rings when fish enter the net. Otters are attracted by large fishes struggling between the dikes, and they get stranded while they attempt to enter through the narrow passage to reach the net. As soon as the presence of an otter is noticed by the fisherman, the latter hits the stranded otter on its head with a short and heavy woody stick ("Muflaga"), thus causing immediate death to the animal. More frequently, otters are suffocated to death once they are stranded in the fish net. However, according to local fishermen, while adult otters (especially *Lutra lutra*) successfully escape as they aggressively bite and rip out the net using their sharp teeth, young otters die much more frequently once stranded in the net.

Another type of surface gill net ("Al-Turra") is alternatively used by local fishermen in the Iraqi marshes (Jawad, 2006). It is a large and long net dropped at night into big lakes and rivers and collected by early morning. When otters fail to set themselves free from the net, they drown and suffocated to death. Interviewed marshmen reported that otters are frequently found dead and attached to Al-Turra, although in many cases the net is found ripped out and damaged by otters that were able to escape. While fish spearing and netting are probably the most effective methods that have led a marked number of otter to death during 1950s-1970s, more recently otters are frequently killed in aquaculture systems. Marsh Arabs began to practice the aquaculture in the main channel of the Euphrates and Tigris Rivers. Fishermen reported that otters perform raids on fish cages during night and cause damage to both cages and fish stocks. Therefore, locals attempt to kill otters to protect their investment.

Another lethal method used to hunt otters in the Iraqi marshes during 1950s was the so-called "Al-Ja'za" (or "Bori") which is a long and narrow pipe shotgun manually loaded with gunpowder and shotgun pellets (Fig.2). Al-Ja'za was largely used by waterfowl hunters, which is also used to chase otters. For instance, Thesiger (1964) reported that 40 otters were killed in this way by a single man during only two months. Due to the availability of modern and more effective automatic shotguns, at the present time this technique is seen only rarely in the Iraqi marshes.

When otters were abundant in the Iraqi marshes in the 1950s, many marshmen were practicing otter cub trapping. Trappers were basically waterfowl hunters or fishermen, who were able to find dens on the marsh banks or among reed beds, and collect young otters to raise them as pets. This happened to the two otter cubs collected by G. Maxwell and is documented by the photographic evidence provided in Al-Sheikhly and Nader (2013). Nowadays, experienced trappers still spend several days in the marshes looking for otter signs. This usually occurs in February and March when otter cubs are more vulnerable. Most of otter cubs are collected when they are still under parents' care in dens. Alternatively, otter cubs are trapped when they swim after parents in lakes and rivers. Marsh Arabs usually rise and train them in for assistance while fishing for big catches during winter, a practice similar to that

still occurring for the smooth-coated otter in East Asia (India, Bangladesh: Mason and Macdonald, 1986; Kruuk, 1995). It is worth mentioning that many otter cubs usually die when managed by humans in captivity because of many factors. Even G. Maxwell lost his female otter cub "Chahala" due to an unknown fever. Unfortunately, after 2003, very little information is available about how frequently otter trapping is practiced (especially for cubs).

Figure 2. "Bori" or "Al-Ja'za" shotgun was used by waterfowl hunters to hunt adult otters in the Iraqi marshes during 1950s (Photo: Omar F. Al-Sheikhly).

Otter populations were dramatically decreased due to hunting and to habitat destruction during the Iraq-Iran war and following the drainage of marshlands in the 1990s (Al-Sheikhly and Nader 2013). During our 2014 field surveys in the southern marshes, local Arabs reported that otters became very rare and adult trapping was almost an impossible task to be accomplished. Even rarer were sightings of otters with their cubs. However, we were informed of three *Lutra lutra* cubs trapped by a local fisherman in the eastern part of the Hammar Marsh (Fig.3). In addition, we knew that two adult otters with three young had been observed in the same area, suggesting a presumed otter population recovery in eastern Hammar Marsh. In conclusion, it is worth mentioning that at present time most of the Marsh Arabs who practiced otter trapping during 1970s have left marshland areas because of war and drought, thus abandoning their practice of hunting otters.

Reports of trapped/killed otters in the Iraqi marshes are now very scarce. Nevertheless, until 2003, most of the reports made clear that otters were incidentally killed during fishing or waterfowl hunting. Since then, fishing by electrocution (or electro-fishing) became the most important cause of death for otters in the southern marshes. This fishing technique was first time noted in 2005 in a few places of both

Hammar and Central marshes. Nowadays, electrocution is widely practiced across all of Iraq (Fig. 4).

Figure 3. Three *Lutra lutra* cubs collected by a local marshman to raise them as pets (eastern Hammar Marsh, Basra province. Photos: Mr. Kamel Al-Batat 2014).

Figure 4. Otters are frequently killed by electro-fishing in southern Iraqi marshes (Photo: Mukhtar. K. Haba 2014).

According to local anglers, electro-fishing is faster and easier than other traditional methods. Fishermen use small generators to produce an electric shock. In particular, they use a long reed stick attached to a charged ring (with a net attached) to paralyze and collect fishes. Electro-fishing is practiced near rivers and waterways banks, marshland edges and among reed beds. Unfortunately, all these are habitats suitable to otters. Electric shocks are strong enough to lead to death to most of the aquatic biota found in the electrocuted zone. Al-Sheikhly and Nader (2013) reported that most of the otter specimens recently recorded in Iraq were individuals accidently electrocuted by local fishermen. Electrocution causes damage to otters' nervous system. As soon as otters come in contact with the charged ring, they get momentarily paralyzed, and then they either float or drown. Stunned individuals are immediately killed by fishermen, who use their boat paddles to club the otters' head. If necessary, fishermen electrocute further with high voltage waves at the spot where the otter was stunned the first time in order to ensure its death (Al-Sheiklhy and Nader, 2013) (Fig. 5).

Figure 5. A young smooth-coated otter *Lutrogale perspicillata* was killed by electrocution and its fur showed at the local hunter mud house (Hawizeh Marsh. Photo: Omar F. Al-Sheikhly 2014).

CONCLUSIONS

While otter cub trapping was practiced by local marshmen at least until a few years ago, otter hunting is still widely practiced by Marsh Arabs to obtain skins. Discovery of endemic-to-Iraq smooth-coated otter is anecdotal at this time, as it is based on a skin from hunted individual and on a trapped cub. In the past, traditional fishing and waterfowl hunting methods were used to provide most of the otter skins, while otters' cub trapping was practiced only by experienced marshmen. Recently, more advanced and lethal hunting techniques are used to target otters, especially shotguns and electro-fishing.

Otters became very rare after the Iraqi marshlands inundation in 2003. Both European and smooth-coated otter populations' size are dramatically decreasing due to hunting, trapping, and habitat destruction. Iraqi legislation regulates hunting with laws numbered 57 and 48. Hunting law n. 57 was issued on 3rd of May 1938 and published later on (14th of May 1938), while law n. 48 was issued and published on 3rd of May 1976. Both laws are effective and ban illegal hunting practices in Iraq, yet none specifically refers to either European or smooth-coated otter. Iraqi authorities should be promptly advised to enforce present legislation by listing otters among the species that cannot be hunted. Indeed, the protection of endangered taxa is an environmental responsibility that needs to be achieved at a national level by Iraq. Recently, the government has made an important first step for the achievement of this goal by signing (2013) the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). Hence, restrictions against the illegal commerce of live otters as well as of their parts (e.g., skins) are in force, as the European and smooth-coated otter are listed in Appendix I and II, respectively.

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RÉSUMÉ

CHASSE ET CAPTURE DES LOUTRES, UNE PRATIQUE TRADITIONNELLE DANS LES MARAIS ARABES D'IRAK

Deux espèces de Loutre habitent dans les marais du sud de l'Irak: la Loutre européenne (*Lutra lutra*) et la Loutre à pelage lisse (la sous espèce endémique: *Lutrogale perspicillata maxwelli*). La chasse de ces Loutres par les Arabes des marais remonte au moins aux années 1950. De nos jours les habitants des marais chassent toujours activement les Loutres pour leur fourrure ou bien capturent leurs petits pour les élevés comme animaux de compagnie. Ces pratiques combinées à la destruction des leur habitat (drainage des marais) représentent les principales menaces à la survie des Loutres en Irak et ont causé un déclin dramatique de leur population. Ce rapport traite donc méthodes traditionnelles de chasse et de capture en Irak sur les Loutres européennes et les Loutres à pelage lisse et de leurs conséquences sur la préservation de ces deux espèces menacées.

RESUMEN

LA CAZA Y EL TRAMPEO DE NUTRIAS, UNA PRáCTICA TRADICIONAL DE LOS ÁRABES DE LOS PANTANOS DE IRAQ

Dos especies de nutrias habitan los pantanos del sur de Iraq: la nutria Europea (*Lutra lutra*) y la nutria lisa (subespecie endémica: *Lutrogale perspicillata maxwelli*). Los Árabes de los Pantanos han cazado nutrias por lo menos desde los 1950s. Actualmente, los habitantes de los pantanos aún cazan intensamente nutrias por su piel, o trampean las crías para criarlas como mascotas. Estas prácticas, junto con la destrucción del hábitat (p.ej. drenaje de los pantanos), representan amenazas primarias para la supervivencia de las nutrias en Iraq, y han causado una dramática declinación de las poblaciones. Informamos sobre los métodos tradicionales de caza y trampeo de nutrias Europea y lisa en Iraq, y sobre las consecuencias en la conservación de estas especies amenazadas.

الخلاصة

صيد وأسر القضاعات (كلاب الماء), من الممارسات التقليدية لعرب الأهوار في جنوب العراق

يتواجد نوعين من القضاعات (كلاب الماء) في أهوار جنوب العراق, وهما القضاعة الأوربية (*Lutra lutra*) والقضاعة العراقية ملساء الفراء, ضرب مأكسويل المستوطن (*Lutrogale perspicillata maxwelli*). تصاد القضاعات وتأسر من قبل عرب الأهوار بكثرة على الأقل خلال خمسينيات القرن المنصرم من أجل فرائها أوجرائها لتربي كحيوانات مستأنسة. يعتبر الصيد الجائر والأسر من البرية وتدمير الموائل الطبيعية أهم المهددات التي ادت الى انحدار مأساوي في المجاميع السكانية للقضاعات في العراق. فيما يلي وصفٌ لوسائل وممارسات الصيد والأسر التقليدية الخاصة بصيد القضاعات, والعواقب التي تساهم في صون كلا النوعين المهددين بخطر الأنقراض في العراق.

OSG MEMBER NEWS

Changes to OSG Organization
From 1st October 2014, Nisarg Prakash has been appointed Species Coordinator for the Asian Small-Clawed Otter.

Nathan Roberts is now the OSG Webmaster. We look forward to a long and happy association!

New Members of OSG

Since the last issue, we have welcomed 6 new members to the OSG: you can read more about them on the Members-Only pages.

M Gopakumar, India: The work of The Nityata Foundation, which I run, is along the Cauvery River in Karnataka, which has both the Small Clawed Otter (in the headwaters area of Kodagu district) and the Smooth Coated Otter (downstream). Our work is focused on building conservation measures for both species and involving the fishermen at selected points along the river in otter protection.

Mário Madureira, Portugal: I'm a veterinarian at Zoo Santo Inácio, and I have particular interest in nutrition and nutrition related pathology. I am currently working on nutrition and reproduction in *Aonyx cinereus*.

Manoel Muanis, Brazil: I joined the Ecolontras Project in 2002, and since then have worked on both the Neotropical Otter (*Lontra longicaudis*) and the Giant Otter (*Pteronura brasiliensis*). I have presented work at the colloquia in Frostburg and Korea, I am currently an appointed member of thye Strategic Advisory Group of the National Action Plan for Giant Otter Conservation (ICMBio/MMA) that covers both species of otters.

Alexey Oleynikov, Russia: I have worked on otters since my undergraduate degree in 2002. I am particularly interested in biocenotic communications between native species (otters) and introduced species such as American mink, European beaver, Canadian beaver and muskrat. I am currently participating in the project to reintroduce otters in Siretoko National Park, Hokkaido Island, Japan.

Luciana Pacca, Brazil: I am studying *Pteronura brasiliensis* potential distribution, considering the threats for its conservation in South America. I have been collecting occurrence records in Roraima, north Amazon, Brazil, where there is not much information about it and selecting environmental variables that may influence on its distribution, in order to achieve better potential distributions models.

Nathan Roberts, United Kingdom: I have worked with carnivores including Asian small-clawed otters in a UK zoo, studied the ecology of the Neotropical otter in Costa Rica and am conducting a methodological investigation at present using camera traps. I am committed to conservation across the spectrum of research, education and engagement.

Ilka Tramm, Germany: I did my MSc on communication in Asian Small-Clawed Otters, and recently surveyed Giant Otters in Peru for "Chances for Nature" e.V. I have also worked on social behaviour in breeding dingoes, and surveyed game species in South Africa.

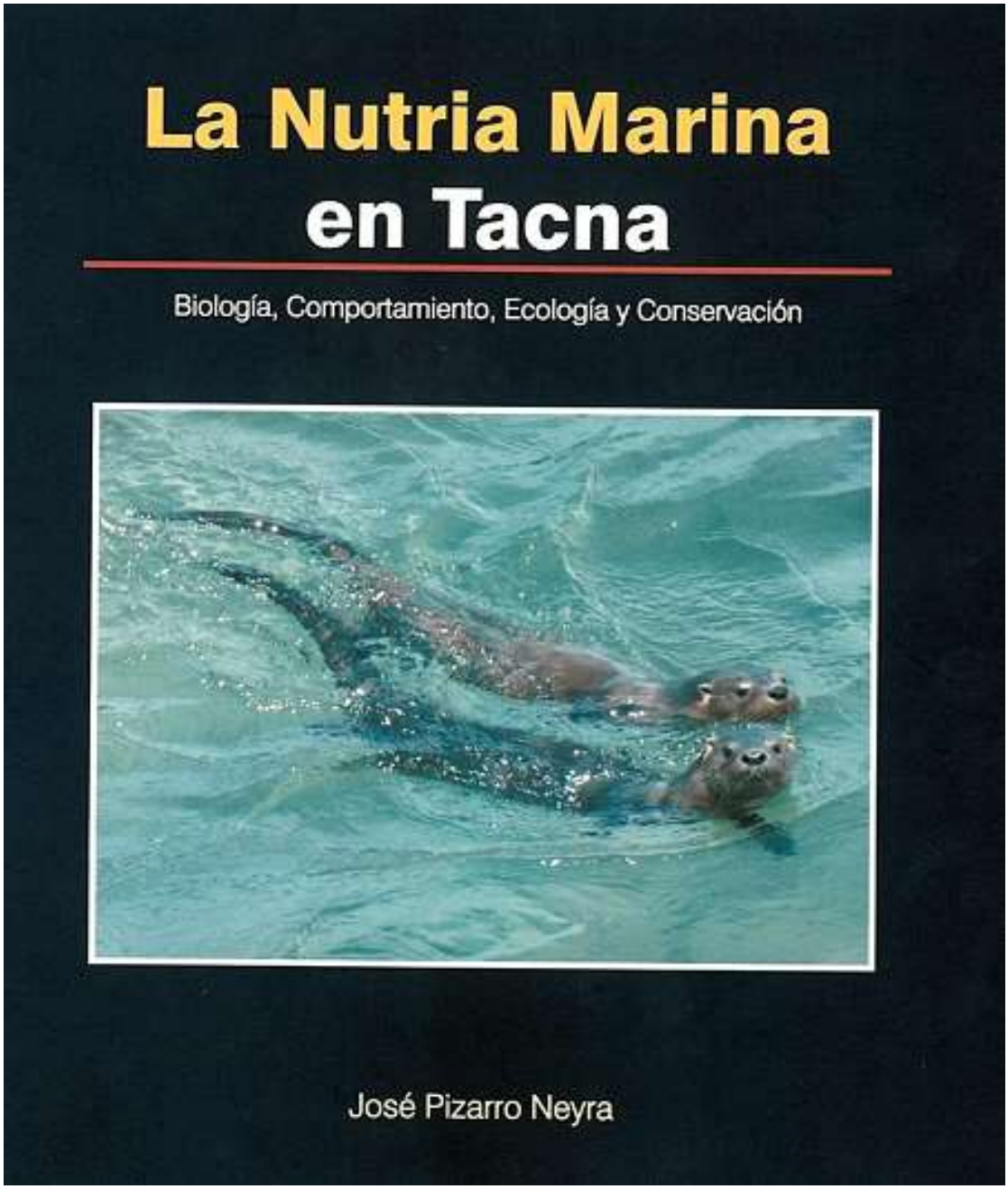
Jessica Groenendijk's Website

Dear family, friends, colleagues, and fellow nature/travel lovers,
I hope this finds you all fighting fit and contented with life.
I'm sorry to write to you en masse and I think some of you may have seen this new development on my Facebook page but I would like take this opportunity to shamelessly plug my new website – www.jsgroenendijk.com – which is dedicated to sharing my writing efforts and publications. Writing is something I've dabbled in since I was a teenager and I find myself wanting to take it more seriously at this stage in life. I am extremely fortunate to have had an unusual and adventurous childhood and working career, both of which have led me to unique places and memorable experiences – excellent fodder for my tales!
I hope you will enjoy browsing the website and reading some of the stories; I would love to hear any comments, suggestions, even criticisms ;-)
If you would like me to e-mail you when I post a new publication, please let me know!
Many thanks and best wishes,
Jess

BOOKS

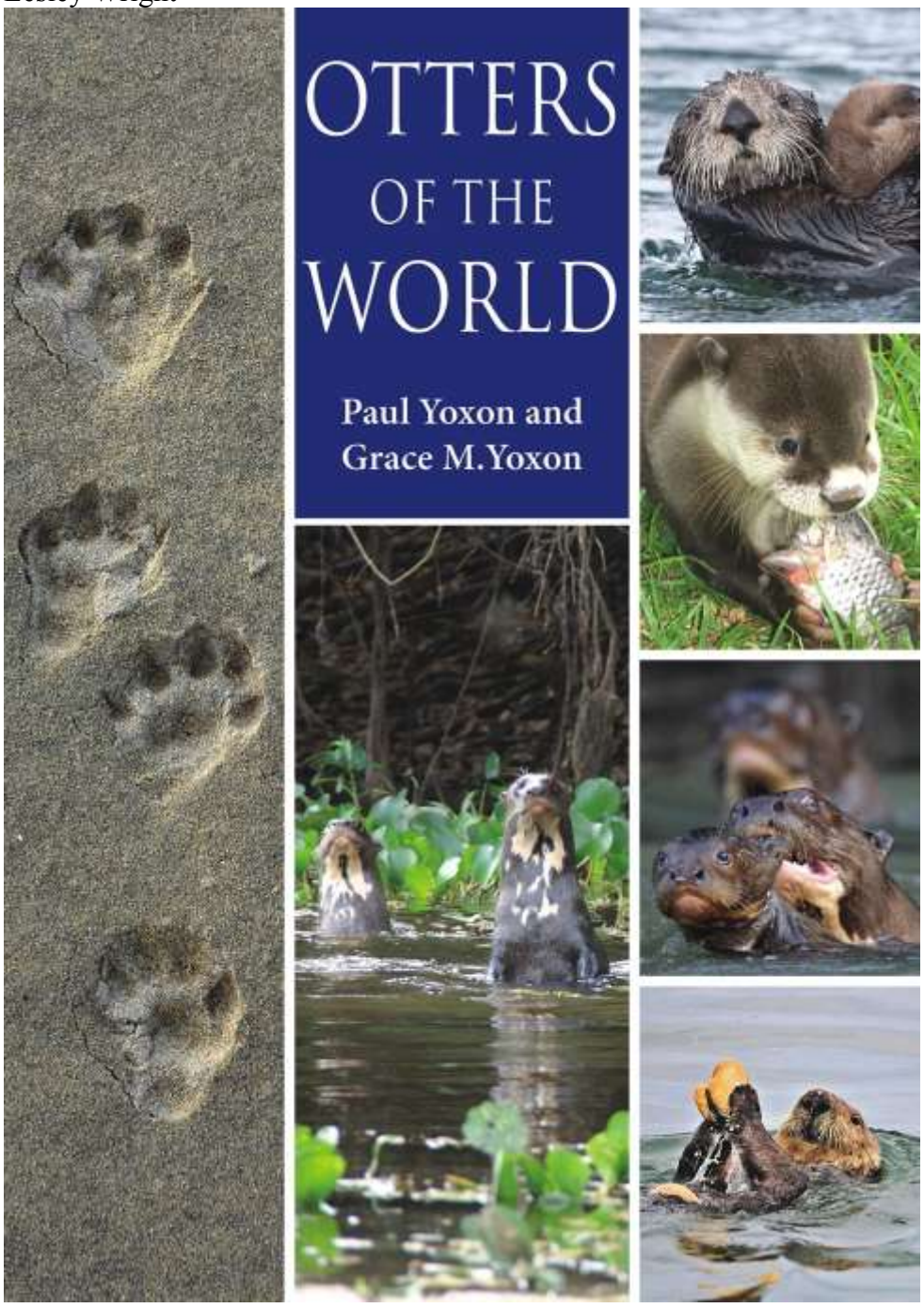
LA NUTRIA MARINE EN TACNA
José Pizarro Neyra
ISBN: 978-612-00-1691-6

This book gives an excellent overview on *Lontra felina*. For those that are able to read Spanish a wealth of information on characteristics of the species, ecology and conservation aspects in Southern Peru is presented. The book has been published private by the author. For further information please contact José Pizarro directly (josepizarroneyra@gmail.com).



OTTERS OF THE WORLD
Paul and Grace Yoxon
ISBN: 978-1849951296

This is a good general book about otters. The authors are well-known in international otter conservation and rehabilitation, and many of the details in the book are from personal experience of the many rehabilitators around the world who have worked with IOSF to raise and rehabilitate orphans and injured otters. This is the information that rarely gets into the scientific literature, and makes this book invaluable for otter people, especially those working in the field with individual animals rather than at a more abstract level. The photography is superb!
Lesley Wright



VIRTUAL OTTER

https://www.otter.de/

SCREEN SHOT OF THE MONTH

https://www.hessen.de/presse/pressemitteilung/fischotter-kehrt-zurueck-nach-hessen-0