OTTER

the Journal of the International Otter Survival Fund

IOSF
INTERNATIONAL OTTER SURVIVAL FUND
www.otter.org

Volume 3 2017, May 31

ISSN 2520-6850 = OTTER (Broadford)

The International Otter Survival Fund (IOSF) was inspired by observing otters in their true natural environment in the Hebrides. Because the otter lives on land and in the water and is at the peak of the food chain it is an ambassador species to a first class environment. IOSF was set up in 1993 to protect and help the 13 species of otter worldwide, through a combination of compassion and science. It supports projects to protect otters, which will also ensure that we have a healthy environment for all species, including our own.

OTTER is the annual scientific publication of the IOSF.

The publication aims to cover a broad spectrum of papers, reports and short contributions concerning all aspects of otter biology, behaviour, ecology and conservation. It will also contain information on the work of IOSF and reports on our activities.

Submission of manuscripts
OTTER is a peer-reviewed journal and authors are asked to refer to the Guidelines for Contributors before submitting a paper. These Guidelines may be found at the back of each Journal or can be sent as a pdf upon request.
Papers should be submitted through enquiries@otter.org.

Publication
A limited number of copies of the Journal will be printed and these will be available for sale on the Ottershop (www.ottershop.co.uk). It will also be made available on the IOSF website (www.otter.org)

Back Issues
Issue 1 (Proceedings of the First Otter Toxicology Conference, Published 2002) is now out of print.

Issue 2 (Proceedings of the European Otter Conference "Return of the Otter in Europe – Where and How?", held on the Isle of Skye in 2003, Published 2007) is available on a CD at the Ottershop (www.ottershop.co.uk).

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Published by the International Otter Survival Fund
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DEVELOPING THE NEPAL OTTER NETWORK

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With financial support from Wildlife Reserve Singapore, the Nepal Otter Network hosted a meeting on 'Developing the Nepal Otter Network' in collaboration with the IUCN Otter Specialist Group (OSG), Himalayan Otter Network and Nepal Biodiversity Conservation Society Nepal. The workshop was held at Hotel Vaishali, Kathmandu, on 14 January 2017. Professor Melissa Savage from IUCN OSG, He Bing from WWF China and Li Meng Jiao, also from China, were three international participants. Ten participants from Nepal attended, from a range of organisations and backgrounds. They came from government departments and from research and academia, including from Tribhuvan University's Institute of Forestry.

The main objective of this meeting was to develop a set of priorities for actions to improve the understanding of the status of otters in the country, and to form a collaborative network to work together on issues pertaining to the protection of the three otter species present in Nepal.

The first session of the meeting began with short introductions by the participants. This was followed by a discussion of the following questions:

- Where has otter research been done?
- Where and what are the research gaps?
- What are the big issues for otter conservation in Nepal?
- What areas are the top priorities for research and conservation of otters in Nepal?
- What conservation efforts would you like to be involved with?
- What information is there about illegal trade of otters in Nepal?
- What are the laws for otter conservation in Nepal?

After discussion on these questions, the group summarised and identified ten important tasks with commitment to work on each task by the following researchers:

Task 1: Create a database and digital map of documented presence and photographs of otters in Nepal
ACTION: Purna Man Shrestha

Task 2: Identify and prioritise critical sites for otter research
ACTION: Jyoti Bhandari

Task 3: Conduct an otter training workshop for interested researchers
ACTION: Paras Acharya: Rajesh Jha, Sanjan Thapa

Task 4: Create an illegal otter trade database and illegal trade report for Nepal
ACTION: Mohan Bikram Shrestha and Sanjan Thapa

Task 5: Education and public awareness
ACTION: Gandhiv Kafle, Deepak Gautam, Rajesh Jha, Druba Bijaya and Mohan Bikram Shrestha

Task 6: Establish an umbrella organisation for the Nepal Otter Network to work under and to establish credibility and for funding purposes
ACTION: Melissa Savage

Task 7: Identify other non-profit wildlife organisations for 'piggybacking' on other wildlife research projects – camera trapping etc. Identify long-term monitoring projects where people are open to adding otters to their ongoing programme
ACTION: Jyoti Bhandari and Druba Bijaya

Task 8: Create a 'closed' Nepal Otter Network Facebook page for sharing information, otter documentation, and collaboration
ACTION: Gandhiv Kafle

Task 9: Identify sources of funding for various kinds of otter research and conservation work
ACTION: Melissa Savage

Task 10: Encourage non-members to join the Otter Specialist Group
ACTION: Melissa Savage

Attendees: Paras Acharya, Tribhuvan University, Patan multiple campas
Jyoti Bhandari, Tribhuvan University, Institute of Forestry
Dhruba Bijaya, Tribhuvan University, Institute of Forestry
He Bing, WWF China
Deepak Gautam, Tribhuvan University, Institute of Forestry
Rajesh Jha, National Trust for Nature Conservation
Li Meng Jiao
Gandhiv Kafle, Agricultural Forestry University
Laxmi Kumari Neupane, Ministry of Forest & Soil Conservation
Melissa Savage, IUCN Otter Specialists Group
Mohan Bikram Shrestha, Wildlife Conservation Nepal
Purna Man Shrestha, Tribhuvan University
Sanjan Thapa, Small Mammals Conservation & Research Foundation

Photo: Purna Man Shrestha

2016, THE YEAR OF THE OTTER

IOSF designated 2016 as the YEAR OF THE OTTER to draw attention to otters, their role in the ecosystem and the importance of their conservation.

The YEAR OF THE OTTER poster was translated into 28 languages and these were used in even more countries throughout Asia, Africa, South America, USA and Europe. But what did the Year actually achieve? It is not possible to list everything that happened in 2016 and here is a selection of events worldwide:

- In September 2016 a training workshop was held in China to train more people in research and education and also make people aware of the threat to otters through the illegal wildlife trade. This was the first such event in China. (See report on page 11)
- In Tanzania, William Mgomo is continuing his education work with schools and with local fishermen, who sometimes see otters as pests. (See report on page 5)
- The Kikongo Otter Sanctuary in the Democratic Republic of Congo continues with its community work.
- The otter rescue and rehabilitation work in the Skye otter hospital continued and help was also given to people with cubs in Germany, Finland, Greece and the Democratic Republic of Congo.
- Another new initiative was the launch of the OTTER OSCARS which will be presented annually. (See more on page 78)
- Public talks, walks and other activities were held worldwide to draw attention to otters and their conservation.
- A new otter orphanage was opened in the Netherlands.
- Various events took place to raise funds for otters including sponsored walks, teas, auctions, etc.
- A billboard was erected by the River Otter Ecology Project, Mt. View Sanitary District, California, USA.

The aim of the YEAR OF THE OTTER was to create awareness of otters and raise funds for their conservation. This was certainly achieved and the foundation laid will now be built upon.

Each year IOSF will continue to hold its World Otter Day on the last Wednesday in May – for 2017 this is 31 May. For more information contact enquiries@otter.org

REPORT ON RAISING AWARENESS OF OTTERS WITH FISHERMEN AND FISH FARMERS IN TANZANIA

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Abstract
Education and public awareness is vital in otter conservation as it is necessary to work with the people to encourage real protection. Visits were made to fishing communities on Lake Nyasa in December 2016 to discuss the importance of the otter in wetland ecology and to look at methods to keep otters away from their fish without killing them.

Keywords: *Education, public awareness, fishermen, fish farmers, traps, African clawless otter, tourism*

INTRODUCTION

This is the field report for a project to raise awareness about otters in the Nyasa and Mbinga Districts, southern Tanzania. The main purpose was to speak with fishermen and fish farmers about the role played by otters in the ecosystem, not only for awareness but also to collect some information concerning the presence of otters. Fishermen catch fish in Lake Nyasa and fish farmers have ponds in which they grow their fish.

METHODS

The fieldwork was carried out from 6–9 December 2016 using a motorcycle and boat to reach remote places. Meetings were held with fishermen to tell them about the importance of protecting otters in their natural habitat. They are good indicators of a healthy environment (wetland) and indicate that there is a good fish supply in rivers and lakes. They can also become a tourist attraction at the Lake.

Figures 1 and 2: Meeting with fishermen on Lake Nyasa

At the meetings there were discussions about the various perceptions of people. In Lake Nyasa the fishermen believe that '*otters have the root in their mouth that helps them to catch fish easily*'. So they hunt them to get the root, because they believe that they will get many fish if they tie the root into their fish net (trap). Some people in Lake Nyasa also eat otter.

A field survey revealed many signs of otter along Lake Nyasa where the shore is rocky. Footprints and spraints (droppings) were found along the rock near to where the river flows into Lake Nyasa.

Figure 3: Otter footprints

Figure 4: Otter spraint

The fishermen claimed to see African clawless otters on the rocks eating fish, but fortunately they do not appear to have much conflict with otters. Some destruction of fish nets by otters has been reported but it is not causing great conflict.

Discussions were also held with fish farmers, who keep fish in ponds, as they do have a conflict with otters who raid the ponds and so the people use traps to catch them. They were told that otters do not eat only their fish but also eat crabs, worms and crustaceans. In the field the fish farmers were shown how to identify otter spraint, and the remains of crabs were found but not fish. They were advised that the best way to prevent otters eating their fish is to put a fence surrounding the ponds and not to set traps to catch them. However, traps were also set to catch the otter for meat.

After talking to both fishermen and fish farmers they seemed to have a better understanding of the importance of otters in the ecosystem as all living organisms depend on each other in order to survive.

Figure 5: Showing a fish farmer signs of otter

Figure 6: Leghold trap set for otter

RESULTS

The results showed that many people knew nothing about the role played by otters in the ecosystem. So because of their different beliefs about otters they are not sensitive about killing them. Such education and awareness work does seem to bring a positive change in attitudes to otters. Many people understood the lesson and promised to protect the otter, and some of the fish farmers even removed their traps for otters along their ponds.

RECOMMENDATIONS

There is still much work to do on the otters of Africa, where there is little information or data and so people show less concern for them. There is also a need to do more surveys to collect information on otters and understand exactly which species are present and their distribution in Africa, especially in Tanzania.

It is recommended that this programme of raising awareness about otters should be extended to other areas on Lake Nyasa, where fishermen gather to arrange safaris and sell their fish, and also with fish farmers. This will lead to more people understanding the importance of otters in ecology and the best ways to avoid otters eating the fish in their pond without harming them.

There is potential to use otters as a tourist attraction in Lake Nyasa because there is no protected area for wildlife. Through tourism, all can benefit from the otter for the present and future generations. So everyone has a responsibility to take care of otters and to stop killing them for bush meat and other reasons as mentioned above.

CHALLENGES

There were some challenges during this programme and it was difficult to gather many people at a time because of rain. More field equipment is needed including a camera, GPS, a computer and binoculars.

CONCLUSIONS

Education and awareness are very important in order to bring positive results in otter conservation, and this can lead to a change in attitude of people when they know the role played by the otter in the ecosystem. This project has shown that people are willing to change their minds and protect the otter for future and present generations, so it is just a matter of educating them.

ACKNOWLEDGEMENTS

I would like first to thank IOSF for financial and moral support and also Jan Reed-Smith, of the African Otter Network, for her advice and support whenever I need it. Secondly, I thank the project Manager (Richard Bwire), who allowed me to conduct these activities.

AFRICAN OTTER NETWORK

Otters in Africa are largely overlooked, as the main focus for conservation is on the large mammals, and particularly the elephant. As a result little funding is available for study of these animals and there is little public awareness of their role in the ecosystem and the need for their conservation. So in July 2015, IOSF organised the first ever African otter training workshop at the College of Wildlife Management, Mweka, in Tanzania, which brought together participants from 10 sub-Saharan countries. This was done with the assistance of Jan Reed-Smith of the African Otter Outreach Project (AoTOP), which has since evolved into the African Otter Network. The aim was to train more local people to carry out research and public awareness and to encourage them to develop their own projects. Here Jan gives a report on the work of the Network.

Mission Statement and Organisational Purpose

africanotternetwork.wordpress.com

www.facebook.com/africanotternetwork

African Otter Network's mission is the combining of efforts to ensure African otters are well known and conserved in clean and thriving freshwater ecosystems. AON brings together a group of biologists and conservationists concerned by the lack of knowledge about, and awareness of, Africa's four species of otters. Its objectives are to create a network in order to gather information about the otters' current status and distribution as well as support range-country partners through fostering their research and conservation projects.

The underlying objectives of the African Otter Network are to:

- Increase and distribute knowledge of African Otters and aquatic-associated ecosystems' conservation.
- Increase expertise in research methodology and conservation of African otters.
- Inspire stakeholders to protect African otters for the future.

- Train and encourage the next generation of field biologists to further explore otter behaviour, habitat use and role in their ecosystems.
- Create education and information resources fulfilling local partner needs.

This will be accomplished by:

- Gathering existing data and identifying gaps.
- Establishing a priority action plan for African otters' conservation.
- Training of new biologists and conservationists.
- Creation of a viable and effective Pan-African network of otter biologists and other researchers working in aquatic-associated ecosystems.
- Lobbying key stakeholders to conserve ecosystems benefiting all resident species and people.
- Developing expertise of local partners interested in otter biology, conservation and human/otter conflict issues.
- Assisting with funding and technical expertise mobilisation where needed.
- Experience sharing.

The group's operating principle consists of working with a team of advisors to prioritise and develop specific projects and initiatives. Each project or initiative will have a leader among the team of advisors or a local partner and will be under the direction of the appropriate AON team member. The implementation of projects and/or initiatives will bring together stakeholders in targeted countries.

William meets with the fishing communities on Lake Nyasa

AON also has created a programme, Otters For Africa, that focuses on supporting range-country frontline partners who are working on gathering local knowledge of otters, traditional lore, and assisting communities in addressing human/otter conflict issues. At this time, we have three ongoing projects:

- Kikongo Otter Sanctuary Friends of Congolese Earth Boys Club – we have donated funds to help the club buy shovels and other supplies to replant forest in their area; an important one for the rare Congo clawless otter.

- William Mgomo otter surveys and outreach – William is supported by IOSF and AON in his work with local communities addressing otter depredation in fish ponds and his efforts to assess local knowledge and attitudes towards otters. William has identified the presence of the African clawless and spotted-necked otters in the region where he is working.

- Hetherwick Msiska surveys for otter distribution in Malawi – Hetherwick also is supported by IOSF in his effort to assess the current distribution of otters in his region of Malawi and address the hunting of otters for use in traditional medicine and for the making of hats.

REPORT ON THE ASIAN OTTERS AND WETLANDS TRAINING WORKSHOP IN CHINA

5–10 September 2016
Chimelong Penguin Hotel, Zhuhai, China

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Otters are great indicator species as they are top predators and use both the land and water – they are therefore ideal symbols for wetland conservation.

There are three species of otter in China: Eurasian otter (*Lutra lutra*), classified in the Red List as 'Near Threatened'; Smooth-coated otter (*Lutrogale perspicillata*) and Asian small-clawed otter (*Aonyx cinereus*), both classified in the Red List as 'Vulnerable'.

Populations of all three are declining, largely due to wetland degradation, depletion of food resources, and illegal hunting. The high quality of otter fur has meant that they have been an important target species for the fur trade. China is a major market, particularly in Tibet, where it forms a part of the traditional dress. Otters are now protected in China but, of course, illegal trade does still continue.

In China there has been great concern for the giant panda which has recently been downgraded from 'Endangered' to 'Vulnerable' in the IUCN Red List. Similarly, there have been conservation efforts for tigers and elephants – but there has been virtually no work done on Chinese otters, and this was the first ever workshop on otters held in China.

Thirty-three participants attended the workshop from eight different countries – Nepal, Sri Lanka, Thailand, The Netherlands, Australia, Ukraine, UK and, of course China. They came from zoos, universities and NGOs, and the workshop was officially opened by Mr Matthew Rous, HM Consul-General Guangzhou.

The first day began with a look at the otters of the world, an overview of Asian otters (their identification, ecology and threats), and Chinese otters (historical overview, status, current knowledge, legislation, threats).The afternoon continued with considering otters as wetland ambassadors, re-introducing otters, and caring for otters for release.

A major part of the workshop was education and public awareness, particularly in

schools and zoos, and this was done both in presentations and in actual practice during a session with a group of local schoolchildren (Figures 1 & 2). There was also discussion about the best way to do education work with older children (12–17 years) and adults.

Figure 1: Participants and children together have enjoyed the practical education session

Figure 2: The children went into the park to talk to visitors about otters and give them leaflets in Chinese

Field techniques (survey methods and use of camera traps) were discussed but actual fieldwork was not possible as otters cannot be found near the venue. However, participants had a chance to practice spraint (droppings) analysis and identifying footprints from casts.

Threats to otters can come from conflict with fishermen and from roads and so mitigation measures were considered. However, one of the main threats is from the illegal wildlife trade and this was looked at both on an Asian scale and from a more local scale in Nepal and China. Tibet has always been a major market for otter furs but one participant who works on the Tibetan plateau told us that the use of real furs is declining there as the people become more concerned about conservation, encouraged by the Dalai Lama. He has prepared a book on otters in Tibetan for use in his education and public awareness work.

The final afternoon was for discussion and to introduce the concept of setting up a Chinese Otter Conservation Network, a totally new initiative. The discussion was lively and there was great enthusiasm for setting up the Network. The aim is for the Chinese people themselves to work together to take otter conservation forward and they identified two priorities:

1) Baseline otter surveys to get a better understanding of current distribution and status;
2) Education and public awareness.

Already a team from WWF Hong Kong and Ocean Park Hong Kong, have volunteered to help Sharne McMillan who is doing a PhD on otters in Hong Kong and Sharne is also keen to help them with their education work – true co-operation. Participants are also enthusiastic to carry out survey work in northern China and in the Xiaokeng Forest Park in the south.

Overall the workshop was a great success. The Chinese Otter Conservation Network now plans to set up a website and use a Chinese social network site to keep in touch and to create more awareness. The sites will be run by the Chinese Network but a link to both sites will be put on the IOSF website. IOSF will keep in regular contact with the Chinese Otter Conservation Network which will also be linked to the Asian Otter Conservation Network, set up following earlier workshops.

Thanks to all the attendees:

1. Jyoti Bhandari, Chinese Academy of Sciences, China but originally from Nepal
2. He Bing, Nyanpo Yutse Environment Protection Society, Peking University, China
3. Yi-Lun Chiang, Kinmen Wildlife Rehabilitation and Conservation Association, Taiwan
4. Li Fei, Kadoorie Conservation China, Hong Kong
5. Yuanjun Huang, Chinese Academy of Sciences, China
6. Yang Huiqiang, Shanghai Zoo, China
7. Addy de Jongh, Stichting Otterstation Nederland, The Netherlands
8. Budsabong Kanchanasaka, Wildlife and Plant Conservation Department Bangkok, Thailand
9. Ho Siu Kit, AEC Ltd, Hong Kong
10. Nga Yee Lai, WWF Hong Kong

11. Ling-Ling Lee, National Taiwan University
12. Fung Luk, Ocean Park, Hong Kong
13. Sharne McMillan, University of Hong Kong but originally from Australia
14. Elena Nesterko, Stichting Otterstation Nederland, The Netherlands/Ukraine
15. Vasantha Nugegoda, Ocean Park, Zhuhai, China
16. Lala Peng, Ocean Park, Zhuhai, China
17. Maggy He Qijing, Wildlife Conservation Society China Program, China
18. Matthew Rous, HM Consul-General, British Consulate-General Guangzhou, China
19. Mohan Bikram Shrestha, Wildlife Conservation Nepal
20. Purna Man Shrestha, Small Mammals Conservation and Research Foundation, Nepal
21. Padma de Silva, IOSF Asian Co-ordinator, Sri Lanka
22. Wasana de Silva, Chinese Academy of Sciences, China, but originally from Sri Lanka
23. Zhang Xiaohong, Wetlands International China
24. He Yong, Green Earth Volunteers, China
25. Grace Yoxon, International Otter Survival Fund, Scotland
26. Paul Yoxon, International Otter Survival Fund, Scotland
27. Ning Zuomei, Snow Alliance, China
28. Zeng Shengwei, Dalian Student Environmental Alliance, China
29. Miro Li, Ocean Park, Zhuhai, China
30. Delu Zhang, Ocean Park, Zhuhai, China
31. Tiger Li, Ocean Park, Zhuhai, China
32. David Lai, Ocean Park, Zhuhai, China
33. Jiesui Zeng, Wildlife Conservation Society China Program, China

ACKNOWLEDGEMENTS

This workshop would not have been possible without the financial support of the following and we are very grateful for their help:

Aage V. Jensen Foundation
Anderson Rogers Foundation
Colchester Zoo Action for the Wild
The Rufford Foundation

FIRST PHOTOGRAPHIC EVIDENCE OF SMOOTH-COATED OTTER (*Lutrogale perspicillata maxwelli*) AND EURASIAN OTTER (*Lutra lutra seistanica*) IN IRAQ SINCE 1950s

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Abstract
*Two otter species occur in Iraq, the Eurasian otter (*Lutra lutra*) and the smooth-coated otter (*Lutrogale perspicillata*), which are listed respectively as "Near Threatened" and "Vulnerable" in the IUCN Red List. Iraq's endemic taxon* L. p. maxwelli *is a flagship species to the country. The first photographic record of smooth-coated otter in the wild was recently obtained from Al-Edheam Marsh at the northern edge of Hawizeh Marsh in southern Iraq. Other first photographic records for Iraq were of the Eurasian otter and were obtained in the Al-Hammar Marsh and at the Mosul Dam in southern and northern Iraq, respectively. Both Iraqi otter species are facing a major decline due to illegal hunting/trapping, habitat loss and fragmentation, thus strong conservation efforts are required to protect their populations in Iraq. In conclusion, the photographic record of the endemic smooth-coated otter will support the Mesopotamian Marshlands to persist and endure as a UNESCO's World Heritage Site.*

Keywords: Lutra lutra seistanica, Lutrogale perspicillata maxwelli, *Eurasian otter, smooth-coated otter, Hawizeh Marsh, UNESCO World Heritage Site, Mesopotamian Marshlands (Al-Ahwar), Mosul Dam*

INTRODUCTION

Iraq is situated at the northern range of the Arabian Peninsula and has a variety of wetlands which are suitable for otters and other aquatic-associated species. The confluence of the Tigris and Euphrates Rivers form the southern Iraqi marshland, a unique aquatic landscape in the Middle East **(Al-Sheikhly & Nader, 2013)**. The marshes of southern Iraq are crucial ecosystems, which are very important as breeding areas and incubators for fish and invertebrates, and play a vital habitat role for the majority of wildlife in the region **(Al-Saad et al., 2010)**. Two otter species exist in Iraq: the Eurasian otter (*Lutra lutra*) and the endemic Iraqi subspecies of the smooth-coated otter (*Lutrogale perspicillata maxwelli*). The smooth-coated otter *L. p. maxwelli* was believed to be extinct in Iraq by the 1990s, but recent surveys (2007–2015) proved the occurrence of the persistence of this species in southern Iraq **(Al-Sheikhly & Nader, 2013; Al-Sheikhly, Haba, & Barbanera, 2015)**.

The Eurasian otter *Lutra lutra seistanica* **(Birula, 1912)** occupies the preeminent lakes, streams, tributaries, and marshes of the Tigris and Euphrates Rivers **(Al-Sheikhly et al., 2015)**. **Ainsworth (1838)** reported the species from the Tigris and Euphrates Rivers and **Danford and Alston (1877)** reported that otters were "not uncommon in Asia Minor, especially in the trout streams of the Taurus". They suggested that the species ranges across all of the major waterways in Iraq from the Arabian Gulf to the northern frontiers. **Cheeseman (1920)** listed a specimen from Amara and Sanborn reported an individual from Qalat Salih near Amara **(Sanborn, 1940)** reported an individual from Qalat Salih near Amara. **Hatt (1959)** recorded two specimens: one from the Tigris, near Al Zuhour Royal Palace in Baghdad, which was offered to the collection of the Iraq Natural History Museum by King Faisal II on December 1954; another was obtained from Mosul market as a trade skin. **Hatt (1959)** stated that otters occur at the Hindiya Barrage on the Euphrates. They were apparently numerous at the time because of an abundance of prey fish and fishermen catch many as they were attracted by extensive fish netting in the river. Specimens were collected from the southern shore of Al-Hammar Marsh, west of Basra and Abusakhair, 35 miles south east of Amara, and are in the British Museum **(Hayman, 1957; Harrison, 1968; Harrison & Bates, 1991)**. The distribution of the Eurasian otter in northern Iraq was uncertain. The remains of many partially eaten crabs reported from the Tigris River tributaries in northern Iraq (Kurdistan) suggested that otters had formerly occupied this area **(Hatt, 1959)**. The species was recorded from the central marshes, vicinity of Al-Maimona, Musharah River, Tarmiya, Al-Alam, Samarra Lake, Himreen, Khan Al-Baghdadi, Haditha, Derbendikhan, Dukan, Little Zab, Barzan and TaqTaq, Mashab in eastern Al-Hammar Marsh **(Al-Sheikhly & Nader, 2013; Abass, 2013)**. Recent records come from the Mashab River in eastern Hammar Marsh and TaqTaq **(Al-Sheikhly, Haba, & Barbanera, 2014; 2015)**.

The smooth-coated otter (*L. p. maxwelli*) is confined to the dense reed beds of the southern marshes **(Hayman, 1957)**, with one record from Kurdistan **(Omer et al, 2012** but see below**)**. The sub-species holotype is based on a skin (apparently adult male) and a live cub. The skin was reported from the village of Abusakhair (Faraijat tribe,

c. 56 km SE of Amara, along the Tigris River), and is now included in the mammal collection of the Natural History Museum of London (Specimen code 1956.378). The live cub was probably found in a tumulus island village called Daub, *c.* 19 km north west of Al-Azair (west of the Tigris River: **Hayman, 1956; Maxwell, 1957, 1960**). During the period of 1991 to 2003, wide areas of reed beds and lakes of southern Iraqi marshes were ditched and drained by the previous Iraqi regime for political reasons. The destruction and drainage of these marshes affected the wildlife of southern Iraq **(Richardson & Hussain, 2006)** and it was believed that the drainage of the Lower Mesopotamia wetlands would almost certainly result in the global extinction of the *L. p. maxwelli* **(Scott & Evans, 1993)**. After 1980s, *L. p. maxwelli* was believed to be extinct, but during field surveys carried out in 2007 to 2012 its occurrence in the southern Iraqi marshes was proved by **Al-Sheikhly & Nader (2013)**. Additionally, another isolated population of *L. p. maxwelli* was found in Kurdistan, and this newly discovered area is representing a remarkable extension of the species geographical range known so far **(Omer et al., 2012; Al-Sheikhly & Nader, 2013)**. Nevertheless, the occurrence of the species in this region was not confirmed by **Moretti et al. (2017)**. Recent records were reported from Fao-Rass Al-Beisha, Abu Al-Khasib and Umm Al Rassas, Abu Ajaj-Hor Al-Hammar, Umm Al-Na'aj lake-Hawizeh, and TaqTaq **(Al-Sheikhly & Nader, 2013; Al-Sheikhly et al., 2014)** and another remarkable record of a male smooth-coated otter was obtained from Hawizeh Marsh **(Al-Sheikhly et al., 2015)**.

It was suspected that >30% of the global population of the smooth-coated otter has declined over the past 30 years due to large-scale hydroelectric projects, reclamation of wetlands for settlements and agriculture, reduction in prey biomass, poaching and contamination of waterways by pesticides **(de Silva et al., 2015)**. Moreover, there were a marked decline of the endemic *L. p. maxwelli* due to hunting, trapping and habitat destruction and this has also effected populations of the Eurasian otter **(Al-Sheikhly, 2012)**.

RECENT OBSERVATIONS

Smooth-coated otter (Lutrogale perspicillata maxwelli)

The smooth-coated otter is extremely rare, elusive, and mainly restricted to the southern marshes. Recent surveys carried out within a project granted by the National Geographic Society Conservation Trust (USA, grant #C261-13 to FB) highlighted the importance of the Hawizeh Marsh as a main geographical sanctuary for Iraq's smooth-coated otter population **(Moretti et al., 2017)**. A photograph of a dead smooth-coated otter trapped near Al-Edheam Marsh, in the northern part of Hawizeh Marsh (Maysan Governorate, southeastern Iraq ,RAMSAR site: 31°34'N, 47°40'E) on 29 April 2015 was featured in **Al-Sheikhly et al. (2015)**. This photograph represents very rare evidence of *L. p. maxwelli* in Iraq since the 1950s. However, the first photographic evidence of an adult in the wild was taken at Al-Edheam Marsh (31°42'13.00"N, 47°44'45.60"E) at the north-eastern edge of Hawizeh Marsh (south-eastern Iraq) on 27 and 30 March 2017 (Figure 1 a and b).

Figure 1: a and b: Iraq's smooth-coated otter **(Lutrogale perspicillata maxwelli)** *at Al-Edheam Marsh, the first photographic evidence in the wild. Photos: Khidher A. Al-Kanani-Iraqi Ministry of Health and Environment, 2017*

On 17 July 2016, the Mesopotamian Marshlands (Al-Ahwar) were added to the UNESCO's World Heritage list during the Fortieth Session of the World Heritage Committee, and referred to as a refuge of Biodiversity and the Relict Landscape of the Mesopotamian Cities. The registration of the Iraqi marshes was based on its biodiversity values in which Iraq's smooth-coated otter is recognised as a flagship species to Iraq. These records are the only documentation of Iraq's smooth-coated otter in the wild and highlight the significance of the Al-Edheam Marsh site. The Al-Edheam Marsh is probably serving as a hotspot for *L. p. maxwelli* in the Hawizeh Marsh and further research and monitoring is required. In addition, the current photographic record reflects the biodiversity values of Al-Ahwar and will support the Mesopotamian Marshlands to persist and endure as a UNESCO's World Heritage Site.

Eurasian otter **(Lutra lutra)**

The Eurasian otter is largely distributed in lakes, streams, tributaries, and marshes of the Tigris and Euphrates Rivers, although this species is even rarer than the smooth-coated otter. The first photographic record was obtained from a camera trap set at Hareer Area (30°35'N, 47°41'E) in eastern Al-Hammar Marsh in Basra Governorate in southern Iraq in 2014 (Figure 2). The record from Al-Hammar Marsh represented the first documentation of the Eurasian otter in the wild in southern Iraq.

Most recently, a significant sighting of the Eurasian otter was obtained from Mosul Dam (Nineveh Governorate) in northern Iraq where an adult otter was observed and

Figure 2: Eurasian otter (**Lutra lutra*****) in eastern Al-Hammar Marsh, the first photographic evidence in southern Iraq. Photo: National Geographic Society Conservation Trust 2014***

photographed by Bruce McLennan and Bob Zook on 28 January 2017. The otter was sighted at one of the rocky edges on the downstream side of the dam (Figure 3). This sighting at the Mosul Dam is considered to be the first photographic evidence of the Eurasian otter in the wild in northern Iraq.

Figure 3: Eurasian otter (Lutra lutra***) at Mosul Dam (Nineveh Governorate) in northern Iraq. Photo: Bruce McLennan and Bob Zook 2017***

One of the major threats to otters in Iraq is hunting and trapping. Otters are targeted by local hunters and fishermen all over the country wherever and whenever possible. Both species are trapped by submerged cages, traps and nets mainly for their fur. The marsh inhabitants (Marsh Arabs) are still hunting otters heavily for their fur and trapping their cubs to be raised as pets. Each year, fishermen collect otter cubs during early March and mid April in order to be raised as pets and/or to be trained to chase and catch large fish. Fishermen in central and northern Iraq are also killing otters for their fur, or to defend their aquaculture. 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 **(Al-Sheikhly et al., 2014)**. More work is needed to ensure the protection of otters and their habitat for the future.

ACKNOWLEDGEMENTS

We would like to thank the Iraqi Green Climate Organization (IGCO) for providing identification guidelines for otters in Iraq; the Iraqi Ministry of Health and Environment for permitting the use of Iraq's smooth-coated otter photographs and that National Geographic Society for permission to use the photo of the Eurasian otter. Thanks to Dr Jassim Al-Falahi, the Technical Deputy Minister for the Environmental Affairs (Iraqi Ministry of Health and Environment) and Shatha K. Khalaf, Head of the Technical Directory (Iraqi Ministry of Health and Environment) for their continuous help and support.

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A REVIEW OF CHINA'S OTTERS AND THEIR CONSERVATION FROM THE NATIONAL WETLAND INVENTORY

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The State Forestry Administration of China launched the Second National Wetlands Inventory in 2009, with an aim to obtain a better understanding of the wetlands dynamic changes resulting from the rapid social and economic development in that decade and contributing to the making of policies and development of ecological restoration programmes. The survey was completed in 2013 (excluding Taiwan, Hong Kong and Macao) and the final result was released to the public in 2014.

The data derived from the Second Inventory were more accurate as a result of using standardised guidelines for this inventory. The First Inventory was completed in 2003 and the significant difference between the two inventories was in the size of the units which changed from 100 ha to 8 ha for each unit. The survey covered the adjacent sea, coastal wetland, lakes, marshes, river wetlands with a width of 10m and length of 5km, reservoirs and ponds. A total of 276,200 wetland areas were surveyed for animals and plants within these limits. Compared with the First Inventory, the data showed:

a) The natural wetland had been reduced by 3,376,200 ha.

b) The protected wetlands had increased up to 5,259,400 ha including 25 Ramsar sites, 279 wetlands nature reserves and 468 wetland parks.

c) There are increasing pressures exerted on wetlands, such as pollution, over-harvesting, reclamation, alien species invasion, and infrastructure due to a rapid urbanisation process.

The otter (*Lutra lutra*), as a semi-aquatic animal, acts as an indicator of a healthy wetland ecosystem. The mammal survey in the National Wetland Inventory focused on otters and was accompanied by interviews and literature reviews of the currently published papers. The data did not indicate clearly which species were listed in this survey as China supports three species of otters (*Lutra lutra, Lutra perspicillata, Aonyx cinereus*) as recorded in history.

The data from the Second Inventory also revealed that otters are found in 24 provinces and autonomous regions. However, some provinces did not report mainly because when the otters disappeared in those areas it was not possible to do so.
It is noted that the Second Inventory elaborated that otters cover more provinces

and autonomous regions compared with the First Inventory, as some wetlands were saved and protected with rules, laws and strict enforcement hunting, or reclamation or restoration projects had been launched. Furthermore the Chinese government has carried out a lot of campaigns to raise public awareness of wetlands and wildlife conservation. In addition, the data also explained that those provinces or autonomous regions supporting large areas of river wetlands have potentially provided better habitats for otters e.g. Qinghai, Tibet, Heilongjiang, Sichuan, Inner Mongolia and Shannxi. These areas are water sources for the national or internationally important ecoregion and biodiversity hotspots.

Some local nature reserves have set up infrared cameras to detect wildlife and otters were recorded by cameras in Sichuan and Heilongjiang provinces. Some otters were also trapped by local people and released into the wild in Shannxi. Photos of otters were also taken by people in provinces in Qinghai and they have occasionally been observed in the wild in some provinces.

Although historically otters were widely distributed across China where the National Wetlands and Wildlife Inventories were conducted, otter populations and their exact habitats in the wild remain unclear even though hunting them for the fur trade has been prohibited for years. Therefore it is necessary to conduct a thematic survey of otters to get accurate information about this species across China.

It is fully recognised at all levels of government that wetlands conservation will be shifted from saving remaining natural wetlands to full protection in the 13th National Five-Year Development Plan. It is believed that the otter population will increase and their habitats will greatly improve under the laws and strict enforcement.

ACKNOWLEDGEMENTS

Special thanks to the State Forestry Administration for offering the data of the Second National Wetlands Inventory and their staff involved in the field survey.

STATUS OF SMOOTH-COATED OTTERS *Lutrogale perspicillata* (GEOFFROY, 1826) IN THE KHAURAHA RIVER OF BARDIA NATIONAL PARK, NEPAL

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Abstract
Otters are indicators of healthy wetlands which help to maintain the biotic integrity of the river basin. A survey of Lutrogale perspicillata *was conducted in Khauraha River between December 2014 and May 2015 to determine the status and distribution pattern. Data on habitat structure, and otter signs were collected in each 1km section of river. The study revealed a large number of otter signs and sightings in Khauraha River. Most signs were found on sandy shorelines of channels characterised by low current and depth and densely covered by* Saccharum spontaneum *and riverine forest. The diversion of water from Geruwa into Khauraha for irrigation has created suitable or preferred habitats for otters due to an increase in volume of water. The bank of the river is covered by dense* Saccharum sp. *grasslands, shrubs, riverine forest with sand banks and gravel/small stones. The water flow is low to moderate and there are shallow meandering channels. So the area provides suitable or preferred habitats for sprainting, foraging, grooming and resting sites. The Khauraha River outside the Park is severely threatened by over-fishing, extraction of sand and stones, livestock grazing, removal of shoreline vegetation, construction of bridges, etc., but inside the Park there is far less human disturbance in comparison to rivers of the Karnali river system, such as Karnali and Geruwa rivers. However there are some occasional fishing activities in the area. The Park management should adopt active conservation measures for otters such as environmental impact studies of activities such as the creation of impoundments/rocky dams and drainage of water for irrigation. They should also create programmes of restoration of degraded habitats and regular monitoring/strict patrolling during grass harvesting season. There is also an urgent need for a study of habitat selection and feeding ecology of smooth–coated otters to maintain the long-term conservation of this species in the Karnali River system. This study has identified critical otter habitats in Khauraha River that needs concerted efforts to conserve the declining otter populations.*

Keywords**:** *Khauraha River,* Lutrogale perspicillata*, smooth-coated otter, spraints, tracks*

INTRODUCTION

Four species of otter occur in Asia **(Foster-Turley, 1992**; **Sivasothi and Nor, 1994)** of which two have been known to occur in Nepal **(Acharya, 2016)**, namely the Eurasian otter (*Lutra lutra*) and the smooth-coated otter (*Lutrogale perspicillata*). They are considered to be top predators in their habitat, and as such they are indicators

of a flourishing aquatic ecosystem as they rely on high water quality, healthy and unpolluted prey as well as undisturbed, clean wetland habitat **(Sivasothi & Nor, 1994; Kruuk, 2006; Ruiz-Olmo,*et al.* 1998; Melquist and Hornocker, 1983; Macdonald and Mason, 1986).**

The smooth-coated otter has been reported in the river basins of Koshi, Narayani, Karnali and Mahakali (**Shrestha, 2003; Acharya, 2016**). In the last few decades, its population has probably declined as a consequence of overall loss of natural riparian habitats and hunting, lack of fish, and human disturbance **(Acharya & Gurung, 1994; Acharya, 1997, 2006a and b)**. Nonetheless, research on otters is inadequate in Nepal and the distribution of this species is still poorly known. The smooth-coated otter is known to live in large rivers, estuaries, and coastal mangrove swamps, lakes and rice fields and to require undisturbed riparian forests or scrub (**IUCN, 1992**). Generally this species occurs in the lower slow-flowing parts of the river, and in artificial lakes **(Kruuk, Kanchanasaka, O'Sullivan & Wanghongsa, 1994; Kruuk, 2006)**. On the River Narayani, the status of smooth-coated otters was investigated by **Evans, Heardman, Houghton and Tiler, (1985)** in relation to fish distribution and otter predation upon them. These authors estimated that 8 to10 family groups were present. More recently, otter signs have also been recorded on the River Rapti near its confluence with the River Narayani (**Acharya, 1998**). A survey of otters in the Narayani River found otter signs along braided channels characterised by densely covered *Saccharum sp*. with sandy islands between shallow, low-water channels **(Acharya, Lamsal, Rajbhandari, Shrestha, Neupane, Pathak, Lama, & Lama, or et al? 2010; Acharya & Lamsal, 2010; Acharya & Rajbhandari, 2012a)**. A survey in the Karnali River indicated the presence of smooth-coated otters (**Thapa, 2002; Bhandari, 2007, 2011; Joshi, 2009). Acharya and Rajbhandari (2012b)** recorded the presence of smooth-coated otters from the Babai River of Bardia National Park. More recently, otter signs and sightings have been recorded on the Karnali River system **(Acharya, 2016)**.

Although a top predator and the fact that the otter is considered to be an indicator of the health of aquatic habitats **(Foster-Turley, MacDonald & Mason, 1990; Yoxon, 2007)**, until now its conservation has not been considered a priority in Nepal. Increased hunting for fur and habitat fragmentation are now threatening its survival in many areas, especially in several Asian countries **(Yonzon, 2006; Yoxon, 2007)**. Knowledge about habitat preference and ecological requirements is of utmost importance for developing effective conservation and management strategies. The success of conserving threatened species depends on knowing their basic biology, including distribution, abundance, life history strategies, genetic diversity, and sources and status of factors affecting their survival **(Kruuk, 2006; Lee & Hung, 2007; Acharya & Rimal, 2007)**. Knowledge and data on species are critical for policy actions for conservation. However, the successful application of scientific knowledge is affected by decision-makers' choices to seek short-term specific, economic and political interest over the longer-term and overall interests and welfare of society **(Gutleb, 2007)**. This study looks in more detail at the status of the smooth-coated otter population in the

Khauraha River in Bardia National Park, which was assessed through surveys between December 2014 and May 2015.

STUDY AREA

Bardia National Park is located in south-western Nepal, covering 968km^2 in the sub-tropical lowlands of the mid-far Western Terai (81^0 20' E and 28^0 35' N) (Figure 1).The Park is the largest and most undisturbed wilderness area in the Terai. It was established in 1976 as a legally protected nature area under the National Parks and Conservation Act and declared as a National Park in 1988. The Park has a great diversity of species (e.g. >30 mammal species, >200 bird species, many amphibian and reptile species, and

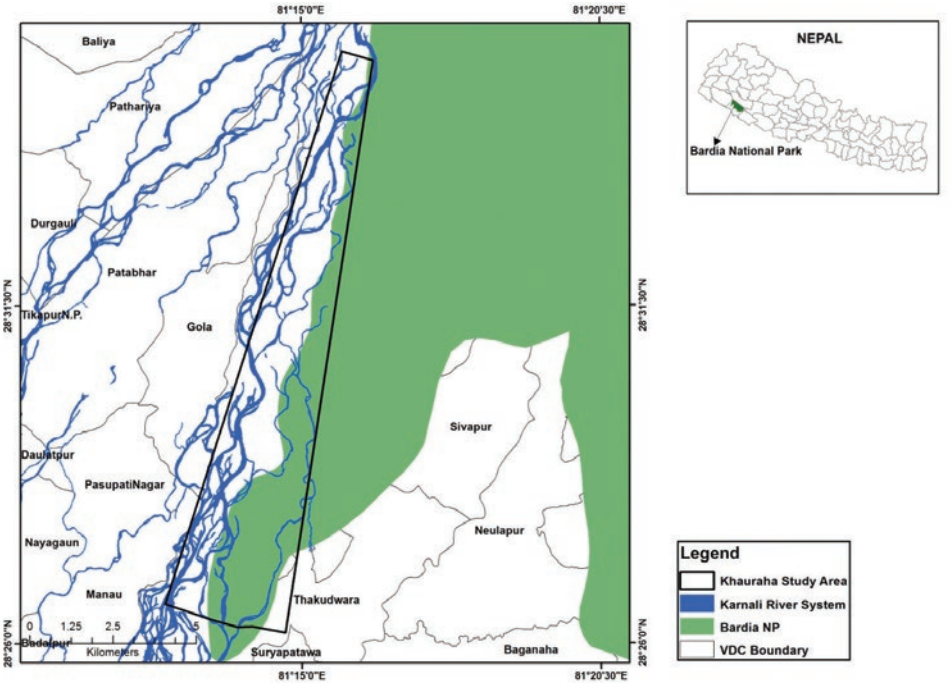

Figure 1: Bardia National Park showing the Khauraha River

>75 fish species). It has a subtropical monsoonal climate with heavy rains from June to September/October (summer), a cool period from October to mid February (winter) and a hot season until the monsoon (spring). The vegetation of the Park has been thoroughly described by **Dinerstein (1979)** and recently by **Sharma (1999)**. About 70% of the Park is covered with dominantly Sal forest with a balanced mixture of grassland, savanna and riverine forest. The Park is drained by Babai, Karnali, Geruwa and Khauraha Rivers. The focus of this study was the main stream of the Khauraha River from the north-eastern part of the Park (Tented Camp) to Patharboonji at the south-eastern part outside the Park, covering a total length of 25 km. The Khauraha River is a diversion channel of the Geruwa River of the Karnali River system lying inside the Bardia National Park. The greater part of this shallow meandering branch flows within the Park area and ultimately joins with the Geruwa branch near Patharboonji outside the Park. The area is characterised by the typical vegetation of Sal forest, riverine forest, grasslands and shoreline with sand banks, small/large stones and gravel.

METHODS

Surveys were conducted during winter (November to January) 2014 and summer (May) 2015 using a rubber boat and walking along both banks. The survey started at 10.00 and ended at 16.00. In the winter, 12 days were spent surveying for otters by walking along the banks of the river but in summer we used rubber boats and spent four days surveying for otters from Lalmati to Patharbandh and Hattisar to Patharboonji. During periods of foggy weather, surveys were carried out only when visibility was clear and good light available. In the May survey it was more difficult to observe otter signs because of the submersion of sand banks due to increased water volume and dense coverage by grass species, so fewer signs were found. Otter distribution was assessed by the standard method, i.e. by searching for otter signs (spraints, footprints, dens, resting and grooming sites) along both banks of 600m-long stretches of river.

Four experienced observers recorded the position (GPS) and habitat parameters for each otter sighting and all otter signs. All possible measurements of footprints were taken (maximum length and width), as well as the composition of spraints, to help with identification of the otter species **(Kruuk et al. 1994; Aadrean et al, 2010)**. Signs such as tracks and spraints are often used in field surveys to provide information on the distribution and abundance of otters, but the accuracy of these methods may be compromised with several related species occurring sympatrically **(Koepfli & Wayne, 1998)**. Distance from the water's edge and the type of substrate was recorded for the location of each otter sign and also water depth and width of the nearest water course. ARC GIS was used to map all otter signs.

Variables measured were water depth, slope of the bank, mean river width, escape cover distance (distance from the edge of water to the point where the undergrowth starts), number of basking and grooming sites, number of possible spraint marking sites, number of dead logs along the bank, approximate percentage of the total area covered by rocks, grass and soil, type of vegetation along the bank, dominant plant species and undergrowth. Holts were identified by following the otters and the following data was recorded: distance from water, distance from maximum water level, substrate type, vegetation type, mean water depth, river width, shade and slope. Similarly for grooming sites: distance from water, distance from escape cover, percentage of grass cover, percentage of sand and mud in rolling places, slope of the bank, water depth in foraging areas, underwater substratum and number of streams joining the river.

RESULTS AND DISCUSSION

In **December 2014** otter signs were recorded in Laguna Machan, Bagh Tappu, Mahagaunda, Tinkune, Barasinghe Machan, Ajingar Ghol, Sano Bandh, Baghaura Phanta, Baghaura, Khauraha Cross, Patharbandh, Gulgulwa Belghat, Chingari, Kingfisher Tal, Chapri Bagar, Kalo Ban, Kachuwa Tal and Hatti Machan areas (Figure 2).

Otter footprints occurred mostly on sandy shorelines of channels which are 0.6-2.0m deep (1.268 ± 0.486, N = 18) and 30–110m (54.21 ± 20.78, N = 18) wide (Table 1). All fresh tracks were located between 0.05-4 m (1.482± 1.875, N = 18) from the edge

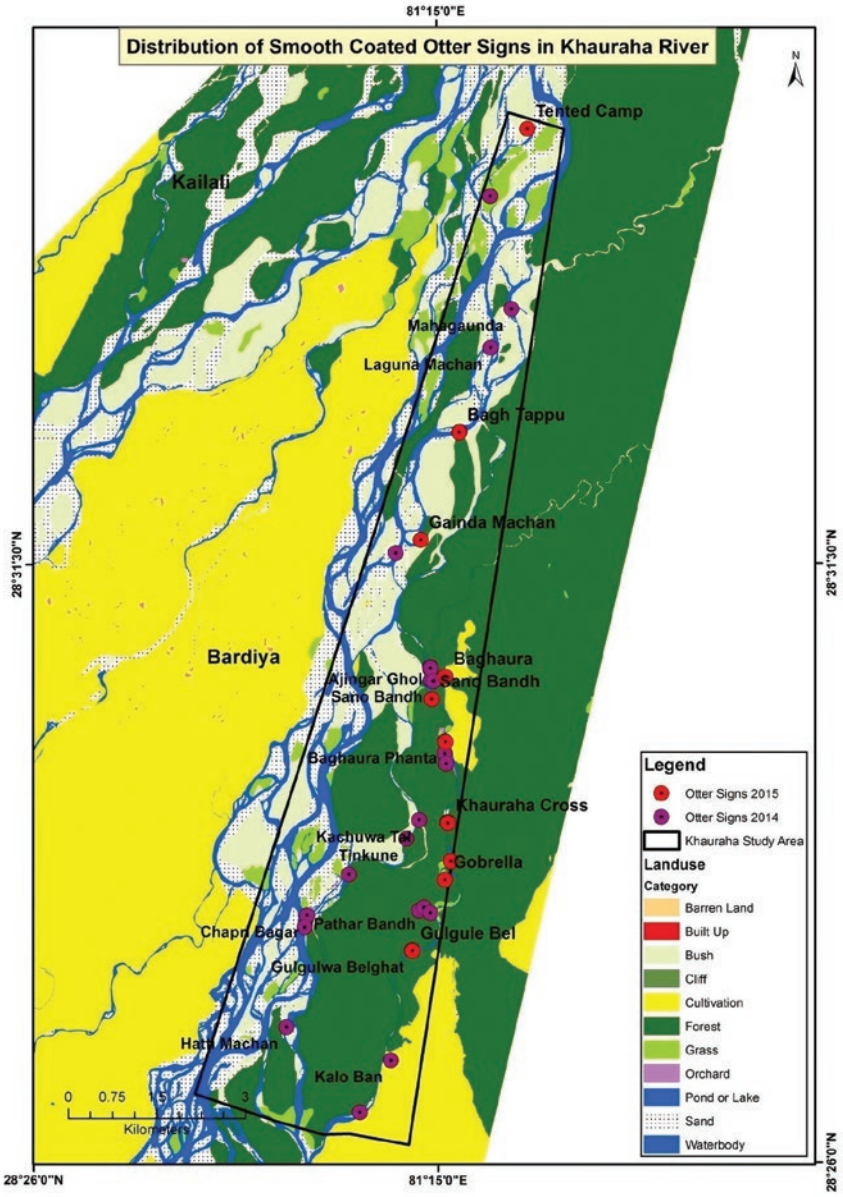

Figure 2: Distribution of otter signs in Khauraha River

of the water. At 19 sites the tracks were located between 0.05-1.5m (0.134 ± 0.252, N = 18) above the water level (Table1).

Spraints were cylindrical and, when fresh, were black in colour and had a pleasant, sweet-musky smell. Old spraints were grey to white. Spraints were mainly found on the sandy banks of the channels covered by the *S. spontaneum* and sand banks along the riparian forest. Certain sites such as Sano Bandh, Ajingar Ghol, Barasinghe Machan, Khauraha Cross, Patharbandh and Terrible Island are frequently used by otters for sprainting because of the sloping ground, sand banks with dense *S. spontaneum* grasses, riparian forest and a refuge from disturbance. Spraint and den sites are used with regularity and fidelity **(Kruuk, 1995; Anoop & Hussain, 2004;**

Table 1: Locations of tracks with river depth, river width, current, substrate, distance from bank and height above water level in Khauraha River, December 2014

Location	Latitude	Longitude	River depth m	River width m	Current	Substrate	DFEW* m	HFWL** m
Laguna Machan	28.55813	81.25751	1.87	110	Slow	Sand	0.60	0
Bagh Tappu	28.54532	81.25215	0.8	105	Slow	Sand	0.50	0
Mahagaunda	28.56405	81.26113	0.65	66	Fast	Sand	8.0	1.0
Tinkune	28.48309	81.24277	1.5	30	Slow	Sand	0.40	0
Barasinghe Machan	28.50932	81.24699	1.1	54	Slow	Sand	1.5	0.40
Ajinghar Ghol	2830549	0811481	2.0	54	Slow	Sand	0.5	0
Baghaura Phanta	28.49796	81.24952	0.85	50	Medium	Sand	0.50	0.15
Baghaura Phanta	28.49953	81.2507	0.85	50	Slow	Sand	0.45	0.30
Khauraha Cross	28.4855	81.2499	0.75, 1.5	40	Slow	Sand	2.25	0
Khauraha Cross	28.48505	8114979	0.60	45	Slow	Sand	2.0	0.15
Khauraha Cross	2828974	81.24965	0.60	45	Slow	Sand	0	0
Patthar Bandh	2828609	81.14956	1.25	41	Slow	Sand	0.50	0
Pathar Bandh	2828659	81.15038	1.45	35	Slow	Sand	0.5	0
Pathar Bandh	28.47173	81.24691	2.0	48	Slow	Sand	1.5	0
Gulgulwa Belghat	28.46601	81.24375	1.0	46	Slow	Sand	2	0
Chingari	28.44125	81.23466	1.20	43	Slow	Sand	0.50	0
Kingfisher Tal	28.47763	81.23281	1.3	67	Slow	Sand	2.9	0.50
Chapri Bagar	28.4714	81.2256	2.0	36	Fast	Sand	0.05	0.05
Chapri Bagar	28.46974	81.22519	1.95	65	Slow	Sand	3.5	0
±			1.268± 0.486	54.21± 20.78				0.134 ±0.252

DFEW* = Distance from edge of water; HFWL** = Height from water level

Shenoy, Varma & Devi Prasad, 2006) and tend to have preferred characteristics like elevated ground, presence of grooming substrate (e.g. sand), surrounding vegetation and a refuge from disturbance **(Kruuk, 2006)**. **Nawab and Hussain (2012)** carried out a study of smooth-coated otters in river systems of the Upper Gangetic Plains which indicated that the otters preferred sandy stretches with moderately steep bank-slopes, tall grasses, slow water current and a large number of fallen dead trees. **Shenoy et al. (2006)** found that spraint sites in the Cauvery Wildlife Sanctuary, although sandy, almost always included some rocks. The bank side vegetation and prey availability in this study showed strong associations with otter presence, indicating the importance of these factors **(Hussain, 2002)**.

Marking sites were 0.5-9.5m (2.09 ± 2.33), N = 17) from deep stretches of the river, 0.27-2.85 (1.453 ± 0.65, N = 17) in depth (Table 2). The smooth-coated otter has been

reported to mark well above the water-line **(Kruuk, 2006)**; accordingly the height above water level of sprainting sites was 0.1-3.5m (0.667±.0.822, N = 17) (Table 2).

Table 2: Locations of spraints with river depth, river width, current, bank angle, distance from edge of water and height above water level in Khauraha River, December, 2014

Location	Latitude	Longitude	River depth m	River width m	Current	Bank angle	DFEW*	HFWL**
Laguna Machan	28.55813	81.25751	1.87	110	Slow	9	1.0	0.70
Mahagaunda	28.56405	81.26113		66	Fast	25	8.0	1.0
Kalo Ban	28.449197	81.24002	0.27	37	Slow	0	9.5	0
Kachuwa Tal	28.48593	81.24501	1.45	34	Slow	7	1.5	0.60
Tinkune	2828991	08114567	2.0	40	Slow	15	0	0
Tinkune	28.48309	81.24277	1.5	30	Slow	15	2.5	0.65
Ajingar Ghol	28.50932	81.24699	1.1	54	Slow	9	1.6	0.40
Ajingar Ghol	28.50914	81.24702	2.0	54	Slow	7	1.3	0.30
Sano Bandh	28.50733	81.24706	1.57	42	Slow	12	0.50	0.10
Sano Bandh	28. 50715	81.24749	2.85	42	Slow	25	0.50	1.0
Sano Bandh	28.50727	81.24708	1.7	42	Slow	15	0.60	0.25
Baghaura Phanta	28. 49796	81.2495	1.75	34	Slow	15	3.5	0.50
Baghaura Phanta	28.49796	81.24952	1.75	34	Slow	15	3.5	0.80
Khauraha Cross	28.4855	81.2499	0.80	58	Slow	45	4.50	3.50
Khauraha Cross	28.48566	81.24991	0.80	58	Slow	0	0	0
Gulgulwa Bel Ghat	28.46601	81.24375	1.0	46	Slow	15	4.0	1.5
Hatti Machan	28.45431	81.222	0.30	21	Slow	25	1.0	1.03
Ajinger Ghol	28.50914	81.24702	2.0	54	Slow	10	1.3	0.30
Mean ±			1.453 0.65				0	0.667 0.822

DFEW* = Distance from edge of water; HFWL** = Height from water level

Otters groom by vigorously rubbing their fur on the ground surface **(Melquist & Hornocker, 2003; Anoop & Hussain, 2004)**. Three grooming sites were recorded on sandy islands and banks and these were found between 0.6 and 3.0m from water.

Two scratch sites were recorded on sandy banks. These were located between 0.5 and 4.0m from water, where the depth of the water ranged between 1.9 and2.0m.

Dens were recorded from Sanobandh and Khauraha Cross on the Khauraha River.

In **June 2015** otter signs were recorded at Bagh Tappu, Gainda Machan, Sano Bandh, Baghaura, Gobrella, Khauraha Cross, Tented Camp, and Gulgule Bel Ghat (Figure 2).

The lower number of otter signs found compared to December may have resulted from the higher river discharge and consequent submersion of riparian areas **(Acharya & Lamsal, 2010; Acharya, 2016). Anoop & Hussain (2004)** noted that some grooming and sprainting sites visited by otters become submerged during periods of heavy rains, once the water level was lowered otter signs appeared again. In a study of otters in June 2014 in the Karnali River system, **Paneru (2014)** observed six smooth-coated otters in the Bagh Tappu area and recorded otter signs in Balconi, Laguna Machan, Bagh Tappu, Gainda Machan, Ajingar Ghol, Khauraha Cross, Helipad, Patharbandh and Dalla Community Forest, Bagh Tappu, Laguna Machan, Khauraha Cross and Helipad areas but they did not record any signs in Geruwa and the main Karnali River. Based on the survey carried out in Karnali River system in December 2014 and May 2015 otter signs were recorded from Geruwa, Karnali, and Khauraha Rivers. This study observed otters in Bagh Tappu, Bagh Machan, and Khauraha Cross and recorded a large number of signs at the Khauraha River as compared to Geruwa and Karnali **(Acharya, 2016)**.

Otters' footprints occurred mostly on sandy shorelines of channels which are 0.8-1.5m deep (1.133 ± 0.247, N = 6) and 32–86m (45.5 ± 18.491, N = 6) wide (Table 3). All fresh tracks were located between 0.2 and 5.0m (1.745 ± 1.634, N = 6) from the edge of water. At five sites the tracks were located between 0.2 and 0.7m (0.556±2.756, N=6) above the water level (Table 3).

Table 3: Locations of tracks with river depth, river width, substrate, distance from bank and height above water level in Khauraha River, May 2015

Location	Latitude	Longitude	River depth m	River width m	Sub-strate	DFEW* m	HFWL** m
Bagh Tappu	28.54518715	81.25204956	0.96	86	Sand	5.0	1.0
Gainda Machan	28.52875133	81.24537715	0.8	32	Sand	2.32	0.7
Sano Bandh	28.50440760	81.24719879	1.28	42	Sand	5.0	0.7
Baghaura	28.50788	81.24958	1.51	34	Sand	1.8	0.47
Gainda Machan	28.49787776	81.24957598	1.3	37	Sand	0.262	0.268
Gobrella	28.47678378	81.2494457	0.95	42	Sand	0.6	0.2

DFEW* = Distance from edge of water; HFWL** = Height from water level

Marking sites were 1.6–6.7m (4.483±1.528, N = 6) from deep stretches of the river, 0.6–1.2m in depth (1.0045±0.283, N = 6) and the height above the water level was 0.6–3.5m (1542±0.922, N =6) (Table 4).

Table 4: Locations of spraints with river depth, river width, current, bank angle, distance from edge of water and height above water level in Khaurahai River, May, 2015

Location	Latitude	Longitude	River depth m	River width m	Current	Bank angle	DFEW* m	HFWL** m
Tented Camp	28.59159457	81.26396251		40	Fast	12	4.0	1.2
Bagh Tappu	28.54518715	81.25204956	0.96	86	Slow	9	5.0	1.0
Baghaura	28.50788	81.24958	1.28	34	Slow	6	4.6	0.65
Khauraha Cross	28.48545302	81.24993824	0.7	66	Slow	35	5.0	3.5
Gobrella Chowk	28.47960781	81.25045239	1.12	35	Slow	12	1.6	1.3
Gulgule Bel	28.46593022	81.24378492	0.6	36	Slow	12	6.7	1.6
Mean			1.0045 ±0.283				4.483 ±1.528	1.542 ±0.922

DFEW* = Distance from edge of water; HFWL** = Height from water level

In Khauraha, active conservation measures in the form of stringent protection of riverine habitats, restoration of degraded habitats and regular monitoring of habitat/ populations are needed to maintain the long-term otter population. Strict monitoring of riverine grasslands is needed during the grass cutting season as two sub-adults were killed by the local people in January 2015. The Bardia National Park permits thatch grass to be harvested in the grassland of the Gainda Machan area near the Khauraha River but this area is well used for natal dens and resting sites (Figure 3).

Figure 3: Sub-adults of smooth-coated otter killed in Bardia National Park by grass cutters in 2015

This river is a stronghold for smooth-coated otters, as is evident by the occurrence of a large number of otter signs in most of the riverine stretch within the Park. The diversion of water from the Geruwa branch into the Khauraha during November, construction of impoundments for irrigation by the Thakurdwara and Suryapatuwa

Village Development Committee, shallow meandering channels, low-medium water flow, dense coverage of grasslands, riverine forest, and availability of prey, shoreline comprising sands, small stones, large stones and gravel with low human disturbance has created optimum habitats for smooth-coated otters **(Acharya, 2016). Raha and Hussain (2016)** noted that the Eurasian and smooth-coated otters require middle and low elevation, wider, slow-flowing rivers with tall trees and dense canopy that are managed to maintain productive prey base and few human activities. **Khan et al. (2014)** in a study of smooth-coated otters in the upper Ganges basin found that the presence of otters was associated with shallow and calmer regions (with low water velocity), as these conditions increase the rate of prey capture per effort. Ease in capturing prey was interpreted to be the most important factor in selecting the habitat by the species, as also suggested by other studies **(Kruuk, 1995; Anoop, 2001; Nawab, 2007; Acharya & Lamsal, 2010)**. The riverine branch lying outside the Park from Hattisar to Patharboonji faced formidable pressure from livestock grazing, sand and stone mining, overfishing, and overexploitation of natural resources so there were no records of any otter signs.

Compared with the important sprainting sites recorded in December 2014, e.g. Ajingar Ghol, Sanobandh, Khauraha Cross, Barasinghe Machan, Baghaura Phanta and Terrible Island area, in the June 2015 survey fewer otter signs were recorded because of the submersion of riparian areas and dense coverage of *S. spontaneum, Imperata cylindrica* in pre-monsoon season **(Acharya, 2016).** Otter distribution conformed with the reported otter preference for lowland marshes, swamps and bogs interconnected by meandering streams **(Melquist & Hornocker, 1983)**.

In December 2014, diversion of water from Geruwa into Khauraha and construction of small impoundments/rocky dams at Bagh Tappu and drainage downstream to Gainda Machan increased the flow of water in the Khauraha River. Before the construction of drainage and small reservoirs, most of the Khauraha River appeared stagnant with little flow. The increase in water level in the Khauraha led to suitable habitat conditions for otters. This river supported the largest population of smooth-coated otters due to habitat suitability and less human disturbance. The Park management should initiate environmental impact assessments of the impacts of construction of diversion channel, irrigation intakes, drainage and small impoundment to otter population. Outside the protected areas the Khauraha from Hattimachan to Patharboonji is threatened by high human disturbance such as overfishing, livestock grazing, firewood collection, and sand and stone mining.

Our results correlated with the findings of **Acharya and Lamsal (2010)** studies of smooth-coated otters on the River Narayani which revealed a large number of otter signs in zones 2 and 3 (Gidha-Bhosarghat) along the western branch of the River Narayani. According to their study, most signs were found along braided channels characterised by low water current and depth, and separated from the main course by high sandy banks. Both banks and sandy islands were densely covered by *Saccharum sp*.

Monitoring of otter populations and habitats in 2012 in Narayani has not recorded any sightings and signs due to the high level of human disturbance such as overfishing, livestock grazing, sand and stone extraction. Thus it would seem that the otters have disappeared from the Narayani River. This matches the findings of **Houghton (1987)** which showed that human disturbance decreases the availability of suitable habitats and overfishing decreases the available food supply for the otters. A high level of sprainting and holt sites were only found on the undisturbed banks of the Park side.

The Khauraha River receives far less human disturbance than the Geruwa and Karnali and as a result otters were sighted during the daytime. In the Karnali and Geruwa branches increasing human disturbance – through various forms of fishing followed by sand and stone extraction, traffic noise of tractors loading stones, removal of shoreline vegetation, firewood and grass cutting, gold mining, livestock grazing, construction of irrigation intakes, bridges, sedimentation from the creation of Chisapani irrigation intake, ferry crossing, movement of people in the Ghats – is likely to be the main threat to otter conservation **(Acharya, 2016; Paudel et al., 2014)**. The otters therefore become active only at night in the absence of human activities.

If we assume that the distribution of otter signs is an indicator of habitat use **(Clavero, Prenda & Delibes, 2006)**, it can be said that the preference of otters for densely covered, sandy islands between shallow, low water channels probably reflects the availability of fish and resting sites during monsoon with respect to the main course of the river **(Acharya & Lamsal, 2010)**. This branch receives low human disturbances within the Park area, but high human disturbances outside the Park. Management should be directed to the stringent protection of riverine habitats, monitoring of habitats and population, strict monitoring during grass cutting season, and ecological research to long-term survival of otters **(Acharya & Lamsal, 2010).**

CONCLUSION

Conservation and appropriate management of riverine habitats is urgently required to ensure habitat improvement and conservation for otters as they are one of the environmental indicator species of the river basin. The importance of otters has been overshadowed by conservation measures for other aquatic and terrestrial flagship species such as the gharial crocodile, tiger and rhinoceros. There are inadequate conservation measures and monitoring of the restoration of degraded habitats of the otter and other aquatic life. Therefore, the Park management should prepare a monitoring plan and evaluate the effects of irrigation intakes, impoundment, human disturbance during the thatch grass harvesting period, and their effects on otters.

ACKNOWLEDGEMENTS

Hariyo Ban Programme/WWF Nepal funded the project. I thank the Department of National Parks and Wildlife Conservation for permitting us to work in Bardia National Park. Bardia National Park Office and NTNC are acknowledged for facilities support.

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THE OTTER AS AN UMBRELLA SPECIES IN CHINA

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Abstract
Various systems for evaluating the conservation of biological species stated that otter species in China are at a risk of disappearing. In order to rescue otter populations across China, it is high time to carry out remedial measures in terms of immense field surveys and ex-situ conservation programmes. Therefore this paper provides a brief overview of the current status of otter species in China.

Keywords: *Anthropogenic threats, China, conservation, otter species, vulnerable*

INTRODUCTION

Otters are one of the most amazing mammal species in the animal kingdom. They appear playful and slide along river banks, bounce items such as stones, spin around themselves, and chase their tails. Because of the adorable appearance of this animal it is also known as a symbol of 'loyalty and honesty' by some Native American tribes.

Their long slim bodies, flattened heads, short limbs with webbed feet, muscular tails, thick silky fur, and small eyes are all adaptations to semi-aquatic and aquatic life styles. Fish is the staple food of most otters but they will also take crayfish, birds, ducks, frogs, shellfish, clams and sea urchins etc. and even reptiles and small mammals **(Wikipedia, n.d.; Zhang et al., 2014).**

Otters can be used as a key indicator of healthy environments and water quality determines where otters inhabit. **Foster-Turley (1990)** stated that otters can be found in aquatic ecosystems of unpolluted, undisturbed bank sides with a good food supply. Moreover, previous studies have shown a positive correlation between otter signs and the percentage of vegetation cover **(Khan et al., 2014)**. Droppings (spraints) and footprints are common signs of the presence of otters in a particular habitat **(Link, 2005; Zhang et al., 2014; de Silva, 1991)**

Otters are found in every continent except Australia and Antarctica **(Foster-Turley, 1990)** and there are five species of otter in Asia. Of the five species, three species can be found in China, i.e. Eurasian otter (*Lutra lutra*), smooth-coated otter (*Lutra perspicillata*) and Asian small-clawed otter (*Aonyx cinereus*) **(de Silva, 2011; Zhang et al., 2014; Foster-Turley & Santiapillai, 1990).** Recent investigations have unearthed fossils of a giant otter skull found in Yunnan province, China **(Cleveland Museum of Natural History, 2017)** which imply that otters existed abundantly in China around six million years ago. It is recorded that 1,360,000 otters lived in the Changbaishan mountain nature reserve in north-east China in 1975 but the population began to

decline in 1990 **(Zhang et al., 2014)**. Nevertheless, China still considers them as a class II state key protected species since 1987 **(Foster-Turley & Santiapillai, 1990).**

THE OTTER POPULATION POST 1987

Zhang et al. (2014) mention that the otter population in the Changbaishan area declined by 99% from 1975 to 2005, implying that otters are in a very vulnerable state in China and there has been a dramatic decline. Out of 22 provinces and 5 autonomous regions, otters were recorded in 12 provinces and 3 autonomous regions, although recent data shows that they are now recorded in 24 provinces and autonomous regions (**Zhang & Daming, 2017**)

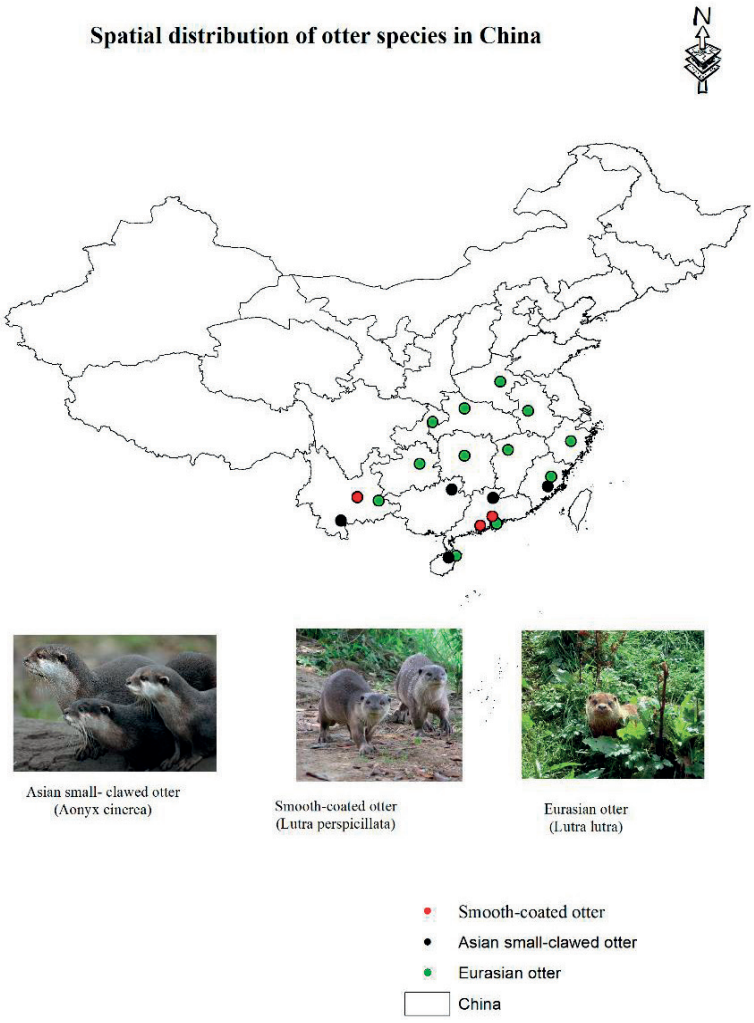

Figure 1: Spatial distribution of otter species in China

The map in Figure 1 depicts the spatial distribution of otter species in China based on previous studies **(Zhang et al., 2014; Foster-Turley & Santiapillai, 1990; Hussain, Gupta & de Silva, 2011)**, but this does not take into account the data from the Second

National Wetland Inventory as quoted by **Zhang and Daming (2017)**. However, review of previous studies showed that otters had completely disappeared from some of their habitats, particularly in Xinjiang, Uygur region, and Lhalu wetland range **(Zhang et al., 2014; de Silva, 2011)**. In Hong Kong the Asian small-clawed otter is believed to be extinct although there are populations of Eurasian otter still present.

Zhang et al. (2016) mention that there were a substantial number of Eurasian otters in north-east China, particularly in the basins of Songhua River and Ussuli River. They further mentioned that by 2004, the number of otters had been significantly reduced by 92%. **Shek et al. (2007)** also indicated that the Eurasian otter should be a protected species in Hong Kong as they were on the brink of extinction in China. Otter populations are even more vulnerable due to the continuing influence of anthropogenic threats. Habitat destruction as a result of urbanisation and infrastructural developments and the pelt trade are primary threats to otters **(Khan et al., 2014; de Silva, 2011; Lau et al., 2010; Hussain et al., 2011).**

The IUCN Red List (2015) classified 12 of the 13 otter species under categories of 'Vulnerable', 'Near Threatened' and 'Endangered'. Only the North American river otter (*Lontra canadensis*) is classified as 'Least Concern'. Moreover, the China Red Data Book listed otters as 'Vulnerable Species' while in the Wild Animals Protection Ordinance (Cap. 170) they are listed as being under statutory protection in Hong Kong. Furthermore, trade in otter is controlled under the animals and plants ordinance (Cap. 187) in Hong Kong **(Foster-Turley & Santiapillai, 1990)**. Further, Taiwan listed the otter as an endangered species in 1990 **(Zhang et al., 2014)**. Despite the fact that the otter is an umbrella species, it appears to be extremely vulnerable in China. Therefore, it is very important to identify the significant factors which contribute to the present spatial distribution of otters across China and carry out remedial measures to conserve the species. In this respect, otter species identification, surveys, and programmes on education and awareness of otters throughout the country have become very important aspects in otter conservation.

The International Otter Survival Fund (IOSF), Scotland, conducted a training workshop on Asian otters in China in 2016 with a view to forming a Chinese otter conservation network in order to gather data from various areas of China. Also, education and public awareness were given high priority during the workshop. This initiative provided a great opportunity to bring together the diverse institutions and organisations that work towards otter conservation in China. Furthermore, knowledge and strength acquired during the workshop encouraged otter specialists in China to become engaged in otter surveys in various regions. Most importantly, gathering information on otters' current status, identifying knowledge gaps of otter populations and hence future conservation of otters at regional and national levels would be the key roles of this otter network in China. Since otters are charismatic animals and also an umbrella species of healthy ecosystems, protecting and preserving them would simply lead to more protection and preservation of the aquatic ecosystems of China.

CONCLUSIONS

The three otter species are at risk of disappearing from the Chinese territory due to continuing influence of anthropogenic threats. So it is necessary to implement appropriate conservative strategies to protect the remaining otter population in China.

ACKNOWLEDGEMENTS

I would like to express my sincere thanks to Ms Grace Yoxon, Director, IOSF, Scotland, and Prof. P.K. de Silva, Asian coordinator, IOSF, for giving me the opportunity to participate in the programme on the 'Asian Otters and Wetland Training Workshop' in China. For me, this workshop experience was transformative.

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AN OTTER SURVEY OF THE RIVER DEE, ABERDEENSHIRE, SCOTLAND, 2016

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Abstract
The aim of this survey was to assess the current presence of otter along the River Dee, in Aberdeenshire, Scotland, through a series of spot-checks for field signs indicating otter activity along the riverbanks carried out from its upper reaches at the White Bridge in the Forest of Mar down to the coast at Greg Ness (approximately 125km). Spraint sites were the most abundant field signs observed along the course of the River Dee, with a total of 208 spraint sites found, the majority of which consisted of fresh or recent spraints (n = 162; 77.9%). The fresh or recently deposited spraints were found throughout upper, mid and lower regions of the River Dee surveyed. Both in situ and laboratory-based spraint analysis was performed to give an index of the diet of otters utilising the River Dee. The Salmonids (Salmon and Trout species) were the dominant prey item observed in the spraints along the River Dee but mammal remains were the dominant prey item found in spraints on the tributaries of the River Dee. Eel (Anguilla anguilla) *remains were more prevalent than salmonids from spraints on the tributaries. Mammal remains were the most frequent non-fish items found in all spraints observed in this survey. Other non-fish items included bird, amphibian and crab remains.*

Keywords: *Aberdeenshire, eel, otter, River Dee, salmonids, spraint, spraint analysis.*

INTRODUCTION

The Eurasian otter *(Lutra lutra)* is one of the designated species for the River Dee Special Area of Conservation (SAC). SAC sites are areas designated under the European Union's Habitats Directive (92/43/EEC). These sites are internationally important and are there to protect threatened habitats and species listed in the directive.

The overall findings of the most recent National Otter Survey of Scotland, which was completed in 2012, indicated an apparent decline in recorded otter presence at several of the SAC sites **(Findlay, Alexander & MacLeod, 2015)**, when compared to the previous National Otter Survey, completed in 2004 **(Strachan, 2007)**.

Furthermore, comparing results for otter occurrence on the River Dee SAC from these two National Surveys had shown a decrease of positive survey sites, from 98.1% in 2004 **(Strachan, 2007)** to 75% in 2012 **(Findlay et al., 2015)**.

The aim of this survey was simply to assess the current presence of otter along the River Dee, by means of spot-checks for spraint sites (deposits of otter faeces), from its upper reaches down to the coast.

STUDY AREA

The River Dee is the main river system in the county of Aberdeenshire. It is approximately 140km in length, flowing eastwards from its source in the Cairngorms to the North Sea at Aberdeen (Figure 1).

It is a fast flowing oligotrophic river (high oxygen content but low in plant nutrients), and supports larger fish species such as salmon *(Salmo salar)* and trout *(Salmo trutta)*. These fish species are an important food resource for otters, and a catalogue of studies have been conducted within the Dee catchment, which are brought together and presented in notable publications such as **Chanin (1985; 1993); Kruuk (1995; 2006); Mason and Macdonald (1986)**.

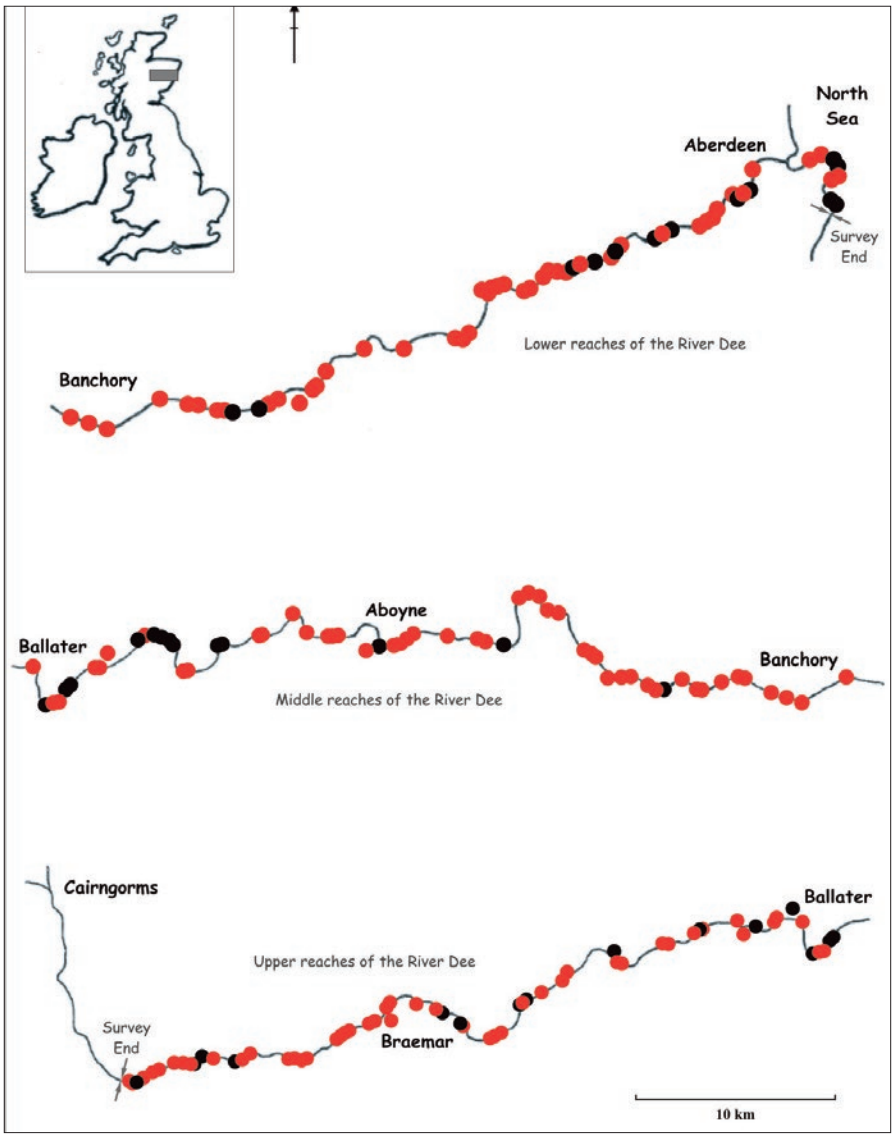

Figure 1. Survey location and spraint sites found on the lower, middle and upper reaches of the River Dee, Aberdeenshire, during spot checks conducted in 2016. Spraint sites shown with either recent spraint deposits (●) or remains of old spraints (●)

METHODS

A series of survey sites were chosen at roughly every 2 to 3km, on either side of the riverbanks (based on ease of accessibility to the river), with additional focus points to include all accessible bridge crossings along the river's course.

At each survey site, any field signs found indicating otter activity was recorded. In summary this included SPRAINTS (otter faeces); SPRAINT SITES (spraints are principally deposited at regularly visited areas within the otter's home range, and are usually located on prominent features such as grass tufts, rocks, and areas where there is cover, for example under bridges) **(Chanin, 1985; Mason & Macdonald, 1986)**; FOOTPRINTS (otters have five toes and webbed feet, however often the smallest toe does not make a mark, resulting in a typical "four-toed" print. Such prints tend to be lopsided and can be distinguished from the more symmetrical dog or fox prints); REST-SITES (areas utilised by otters for sleeping or resting).

The structure of a rest-site can vary depending on the geographical resources present, (as does the terminology used to describe such areas), whether it is an underground den or a temporary resting place above ground. They can range from substantial piles of branches/logs, dug burrows, in dense scrub or amongst rocks and boulders. The lair of an otter is commonly referred to as a holt and these are considered as the main resting sites within an otter's territory.

Otters may also use temporary and much smaller resting places, often referred to as a "lie up" "hover" or "couch". Such rest-sites can also be found in a variety of places, for example under dense scrub, small rocky outcrops and simply amongst grass or sedge tussocks.

For the purpose of this survey, a holt was defined as a substantial burrow system, or any natural crevices and boulder matrix, with lots of signs indicative of regular use by otters. All other small shelters above ground deemed to be utilised by otters were categorised as rest-sites.

If a survey site was perceived as negative, then up to 15 minutes was spent traversing the riverbanks to establish if there were any field signs evident beyond the initial focus point. Consequently it was acknowledged that the distance travelled within the 15 minutes of search time would vary depending on the limitations of the terrain and operative fatigue. Any incidental field sign of otter activity found during travel to the next survey site was also recorded.

A select few of the River Dee tributaries were also surveyed, in order to ascertain any immediate otter activity away from the main river. The method of site choice for the tributaries was also based on opportune access whilst travelling to the next survey site along the River Dee. As a result, the survey of the tributaries was largely based on a quick spot-check around their associated bridges.

The main part of this survey was to examine the River Dee. However, a second part to the whole survey aim was to cover a small section of coastline, following on from the

mouth of the river. Whilst the survey methods for the River Dee were based on widely spread spot-checks, the coastal section was examined in a continuous fashion from the Harbour to Greg Ness, and up to 100m inland from the high water level.

An assessment of spraint contents was made in the field with a x10 magnification hand lens, both on the River Dee and on the coastal section surveyed. Where spraint analysis could not be readily established in the field, samples were taken for subsequent examination in a more controlled environment. In the laboratory, each spraint collected was put separately into a jam jar with hot water and a denture-cleansing tablet. The samples were soaked in solution for 24 hours and then rinsed through a 0.5mm sieve. The spraint contents were allowed to dry at room temperature on filter paper.

The dry spraint contents were then examined under a binocular microscope and identified using a personal reference collection and published keys from **Webb (1977), Watson (1978) and Conroy et al., (1993)**.

RESULTS

This survey was conducted during favourable weather conditions in May (for six days) and November (for eight days) 2016.

The lower reaches of the Dee from Aberdeen to Banchory together with the upper reaches from Ballater to Braemar were visited in May. The mid reaches from Banchory to Ballater and the remaining upper reaches from Braemar to the Forest of Mar were visited in November.

There were only two stretches of the River Dee over the 3km survey threshold that were not assessed during this survey: Inver to Crathie around Balmoral – 3.5km un-surveyed; Desswood to Northbrae (west of Kincardine O' Neil) – 3.1km un-surveyed.

Time constraints and the commencement of unsuitable weather conditions during the winter months restricted the survey of the upper reaches of the River Dee at the foothills of the Cairngorms in the Forest of Mar. Therefore the total area of the River Dee covered in this survey was approximately 125km, from the White Bridge (Forest of Mar; grid ref: NO 018884) to Victoria Bridge (Aberdeen Harbour; grid ref: NJ 946054).

The River Dee is regularly subjected to spate conditions, particularly in the winter months. There were many areas observed during this survey, where vast sections of riverbank were severely eroded (see Figure 2) and many bankside trees had been washed away from the mid to lower reaches of the Dee, especially at Ballater. In the winter of 2015/16 this area was on the receiving end of quite a dramatic heavy spate. It was also during this winter flood that the Abergeldie Castle Suspension Bridge had collapsed and a couple of the other suspension bridges on the Dee had suffered structural damage (Figure 3).

Figure 2. Collapsed bank along the middle reaches of the River Dee

Figure 3. Collapsed Abergeldie Castle Suspension Bridge from the River Dee winter spate of 2015-16

Table 1. Tributaries of the River Dee surveyed and occurrence of field signs of otter activity (from bridge spot-checks only)

Tributary Name	Dee Region	Date	Occurrence
Burn of Ardoe	Lower	23-May-16	Positive
Burn of Leggart	Lower	23-May-16	Positive
Culter Burn	Lower	23-May-16	Positive
Unnamed Banchory-Devenick burn	Lower	23-May-16	Positive
Burn of Sheeoch	Lower	25-May-16	Positive
Crynoch Burn	Lower	25-May-16	Positive
Tilbouries Burn	Lower	25-May-16	Positive
Water of Feugh	Mid	25-May-16	Positive
Burn of Canny	Mid	26-May-16	Negative
Brackley Burn	Mid	27-May-16	Positive
Tullich Burn	Mid	27-May-16	Positive
Dinnet Burn	Mid	28-May-16	Negative
Pollagach Burn	Mid	28-May-16	Positive
Burn of Cattie	Mid	13-Nov-16	Positive
Drumwheels Burn	Mid	13-Nov-16	Positive
Dess Burn	Mid	14-Nov-16	Positive
Allt Dinnie	Mid	15-Nov-16	Positive
Water of Tanar	Mid	15-Nov-16	Positive
Clunie Water	Upper	26-May-16	Positive
Feardar Burn	Upper	26-May-16	Positive
Coilacriech Burn	Upper	27-May-16	Negative
Distillery Burn	Upper	27-May-16	Positive
Easter Micras Burn	Upper	27-May-16	Positive
Girnock Burn	Upper	27-May-16	Positive
River Gairn	Upper	27-May-16	Positive
River Muick	Upper	27-May-16	Positive
Torgalter Burn	Upper	27-May-16	Positive
Allt a' Chlair	Upper	18-Nov-16	Negative
Ey Burn	Upper	18-Nov-16	Negative
Linn of Corriemulzie Waterfall (Corriemulzie Burn)	Upper	18-Nov-16	Negative
Allt Ton na Gaoithe	Upper	19-Nov-16	Positive
Lui Water	Upper	19-Nov-16	Negative

Despite the devastation of the previous winter spate, all 25 of the bridges crossing the Dee were safely visited and spraint sites were found under 17 of them (68% positive for otter presence). Furthermore, many spraint sites were found along both sides of the riverbanks of the River Dee and its tributaries, and the results are summarised in Figure 1 and Table 1.

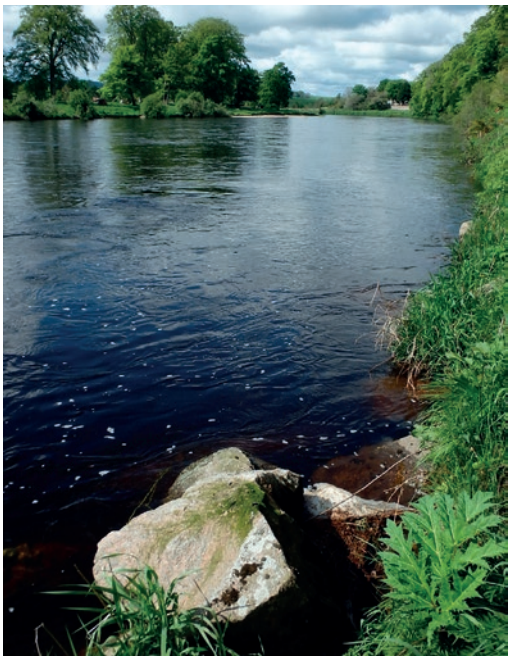

Figure 4. Spraint site on rock at bankside on the lower reaches of the River Dee

A total of 4.5km of coastline was also examined, from Torry Quay to Greg Ness, which includes Nigg Bay and Girdle Ness. This coastal section was visited in May 2016.

River Dee

Spraint sites were the most abundant field signs observed along the course of the River Dee during this survey (Figures 4 and 5). A total of 208 spraint sites were found, the majority of which consisted of fresh or recent spraints (n = 162; 77.9%), whereas 46 spraint sites (22.1%) comprised entirely of old spraints or remains of old spraint fragments.

Figure 5. Spraint sites under bridge in the upper reaches of the River Dee

A noticeable concentration of old spraints was located on a patch of the River Dee at Cambus o' May. Here, six spraint sites, all on the north bank (true left-hand bank), were distributed over an area of the river for approximately 980m. However, within this length, some relatively recent otter prints (Figure 6) were found on the silty margins of the riverbanks. The nearest site with recent spraints to this patch of old spraints was 820m upstream, also on the north bank.

Figure 6. Recent otter prints at the bankside along the middle reaches of the River Dee

Figure 7. Sign-heap in sand substrate under the Bridge of Potarch. Note spraint on top of sand pile

It was interesting to note that approximately 2km downstream from the Cambus o' May Suspension Bridge was a site with the highest concentration of fresh spraints found during this survey (four spraints sites; six fresh spraints, two recent spraints within 15m of riverbank). This site was on the south bank (true right-hand bank) and associated with a tributary confluence.

During the spot-checks carried out in November 2016, 15 spraint sites found on the Dee (one in the upper reaches, 12 in the mid reaches and two in the lower reaches), which would have been awash from recent spate conditions a few days beforehand.

Moreover, three spraint sites at Bridge of Potarch would have been underwater the day before. It was only due to the failing light and spate conditions at the end of the previous day's survey that a revisit was programmed in. From the first inspection there was only one spraint site under the bridge. The following day there was a newly constructed sign-heap (Figure 7) under the bridge, together with fresh spraint deposits

along the riverbanks. A sign-heap is a structure formed by otters, by scraping substrate or vegetation into a small mound, often used to place a spraint on top.

There are many suitable areas along the riverbanks of the Dee, which presented rest-site opportunities for an otter. These mainly included eroded bank overhangs, exposed tree roots and outcrop/boulder crevices.

Ten active rest-sites were found; one in the lower reaches of the River Dee (Aberdeen to Banchory), four in the mid reaches (Banchory to Ballater) and five in the upper reaches (Ballater to Linn of Dee). Nine of the rest-sites exhibited fresh or recent spraints deposited within them. One rest-site in the upper reaches of the Dee had only old spraints associated with it.

An unusual rest-site was observed associated using a tree, felled by winter spates, which had a large clump of soil still intact on the root plate. A burrow had been made at the base of the tree into the root plate (Figure 8a and 8b). No other entrance/exit

Figure 8a. Rest-site in uprooted tree root plate

Figure 8b. Rest-site in uprooted tree root plate

was detected and just a small cavity was created within the earth mound of the root plate itself. All the other rest-sites found were either among eroded bank overhangs, exposed tree roots or rock crevices (Figure 9).

One of the ten rest-sites found could be considered a holt, with several spraints at the entrance and several small spraint heaps inside an outcrop crevice complex, located in the upper reaches of the Dee.

Amongst the other field signs found along the River Dee during this survey

Figure 9. Rest-site under rock outcrop (with several spraints within the crevice)

were the aforementioned sign-heap, 12 occurrences of otter footprints and two rolling sites (area of flattened grass where rolling and grooming has taken place, often accompanied by a spraint deposit). (see Figure 10).

Figure 10. Rolling site (grooming area) on flattened grass along the middle reaches of the River Dee

Tributaries of the River Dee

A spot-check of 32 tributaries of the River Dee was conducted. This included several of its major tributaries, together with a select few minor streams and rivulets (Table 1).

Evidence of otter activity was observed on 25 of the tributaries (78.1%); with spraint sites found on 24 of them, whilst only otter footprints were found on the Girnock Burn. Otter prints also occurred at three other tributaries; the Burn of Ardoe, (the size of which indicated a cub), the Burn of Cattie and the Crynoch Burn.

From the 31 spraint sites found associated with the tributaries, fresh or recent spraint deposits occurred on 27 of them (87.1%), and four spraint sites consisted wholly of old spraints (12.9%).

Three rest-sites were found along the tributaries surveyed. Two were located under outcrop crevices, with recent spraint deposits inside. One rest-site was under a footbridge, where a small pile of recent spraint deposits was tucked up against the retaining bridge wall.

One dead otter cub was found on the B9077 road near to the Crynoch Burn (approximately 250m from the River Dee). It was emaciated and flattened and more

than likely was a road kill. This was the only otter observed throughout the entire survey.

Aberdeen coastal section

Beyond the confines of the harbour the coastline from Torry Quay to Greg Ness is a mix of sheltered and exposed rocky coast with large shingle, edging reclaimed sand dunes. The sheltered bay consisted of shingle and sand. Very few freshwater pools were evident within the coastline surveyed (Figure 11), and the nearest source of freshwater would be the River Dee itself.

Figure 11. Rocky coastline profile with brackish pool in strata at Greg Ness

Only nine spraint sites, together with three active rest-sites were found over a distance of 4.5km of coastline. All of the rest-sites were located under old and eroded sea defence structures, and had recent spraint deposits within them.

The majority of spraint sites found on the coastal section surveyed comprised of old spraints (n = 5; 55.6%). Two of these spraint sites were located by freshwater pools. The remaining four spraint sites which had recent spraint deposits (44.4%), were all associated with the rest-sites under the sea defences. Two fresh spraints were also located on the foreshore below the high tide level.

Spraint Analysis

Most of the spraints examined during this survey were examined in situ on the River Dee and its tributaries (261 and 68 samples respectively). A further 26 samples were

taken from the field for further analysis. The most abundant prey items found in all the spraints combined was not surprisingly, fish. Other dietary components comprised mammal, bird, frog and crab (Figure 12).

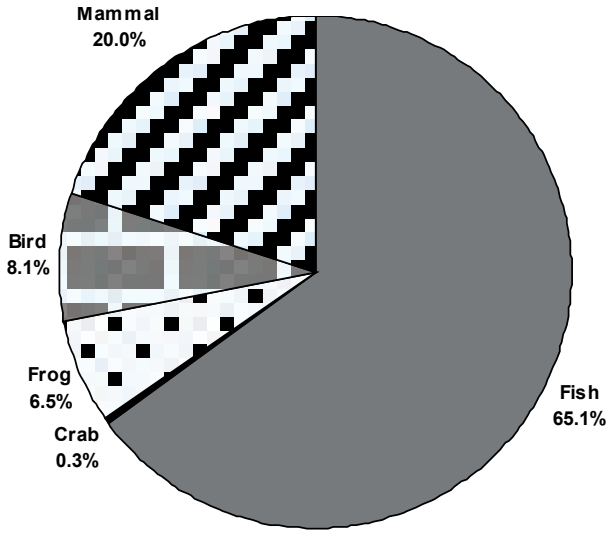

Figure 12. Combined percentage occurrence of prey items in 355 spraints from in situ samples (n = 329) and laboratory analysis (n = 26), from the River Dee and its tributaries.

Further analysis of the 261 spraints examined in situ on the River Dee alone showed that 63.6% of the spraints found comprised fish species, predominately represented by the Salmonids (salmon and trout species), followed closely by eel *(Anguilla anguilla)* (Figure 13). The Lotidae (rocklings) also featured among the fish species found in spraints along the lower reaches of the Dee at Aberdeen City and in one spraint found

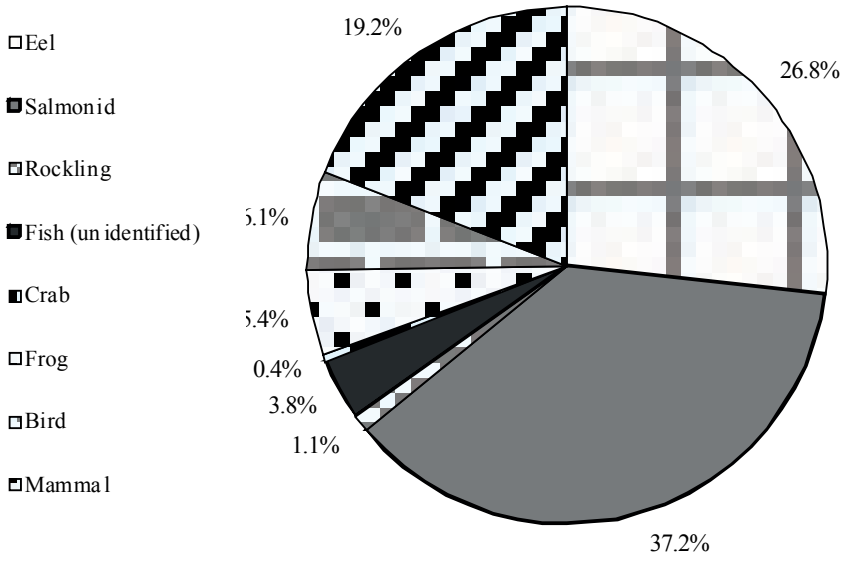

Figure 13. Percentage occurrence of prey items in 261 spraints from in situ samples from the River Dee.

in the mid reaches at Blackhall Forest, Banchory.
Of the non-fish material found in the spraints, mammal was the second most abundant prey item followed by bird and frog. Feathers were observed in spraints mostly found in the lower and mid reaches of the Dee. Whereas frog bones occurred both in the lower and upper reaches of the Dee crab remains only appeared in one spraint along the lower reaches of the Dee at Aberdeen City.

Fish species occurred in 40% of the spraints examined in situ on the tributaries of the Dee, and eel was the most abundant. However, mammal remains occurred most, together with a relatively high proportion of bird, and these made up the majority of the prey items in the spraints of the Dee tributaries (Figure 14).

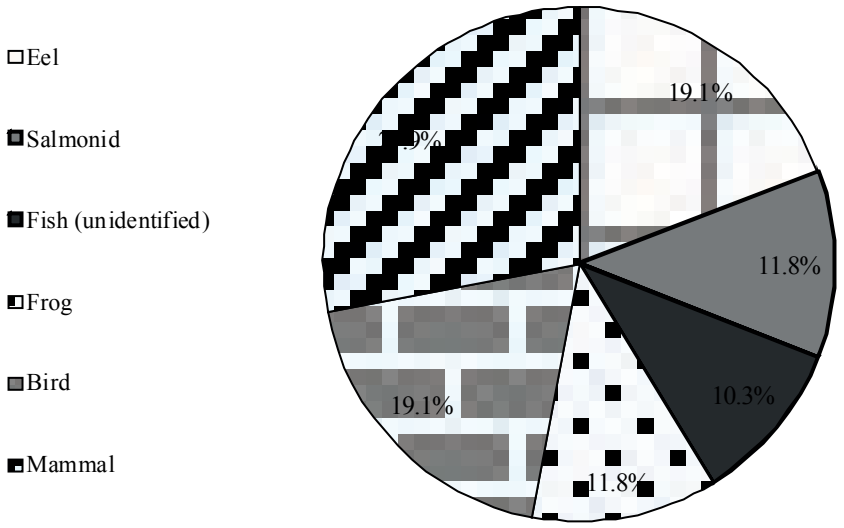

Figure 14. Percentage occurrence of prey items in 68 spraints from in situ samples from the tributaries of the River Dee.

A more detailed analysis was performed on 26 spraints collected from spraint sites on the River Dee. Nine spraint samples were collected from the lower reaches of the Dee, eight from the mid reaches and nine from the upper reaches. A high percentage of the contents were fish species (80.6%). Mammal remains were the highest of the non-fish element of the spraint contents and frog occurred more than bird (Figure 15).

Salmonid bones were the most abundant of the fish remains present in the collected spraint samples. These were found predominately in the mid and upper reaches of the Dee. Eel was also plentiful and mainly found in spraints collected on the lower reaches of the Dee.

Other fish species that occurred in the collected samples were viviparous blenny or eelpout *(Zoarces viviparous)*, Lotidae (rocklings), Gadidae (cod family, e.g. saithe *Pollachius virens*) all from the lower reaches of the Dee. These are all marine fish and so it would appear that the otters are spending at least some time hunting on the coast. Percidae (perch species) were also found in the upper reaches of the river.

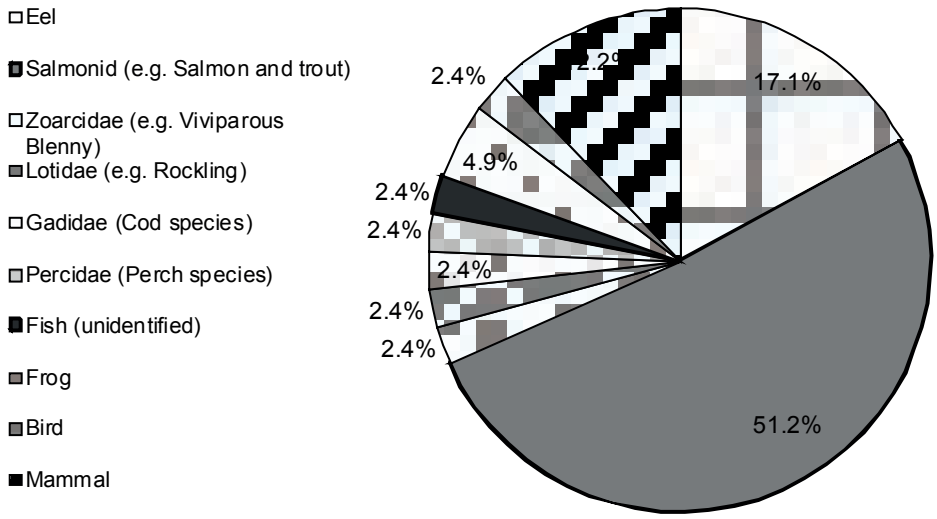

Figure 15. Percentage occurrence of prey items in 26 spraints from samples collected from the River Dee.

A total of 32 spraints were found along the coastal section. They largely comprised fish species (Figure 16) and were mostly associated with one of the rest-sites. Only one of the spraints had mammal bones, which was also found at a rest-site. The fish remains in the other 22 spraints from the harbour area included Lotidae, salmonid, viviparous blenny, and Gadidae. The five spraints found around Girdle Ness comprised of Lotidae, viviparous blenny and eel, whereas the three spraints at Greg Ness contained eel and Gadidae.

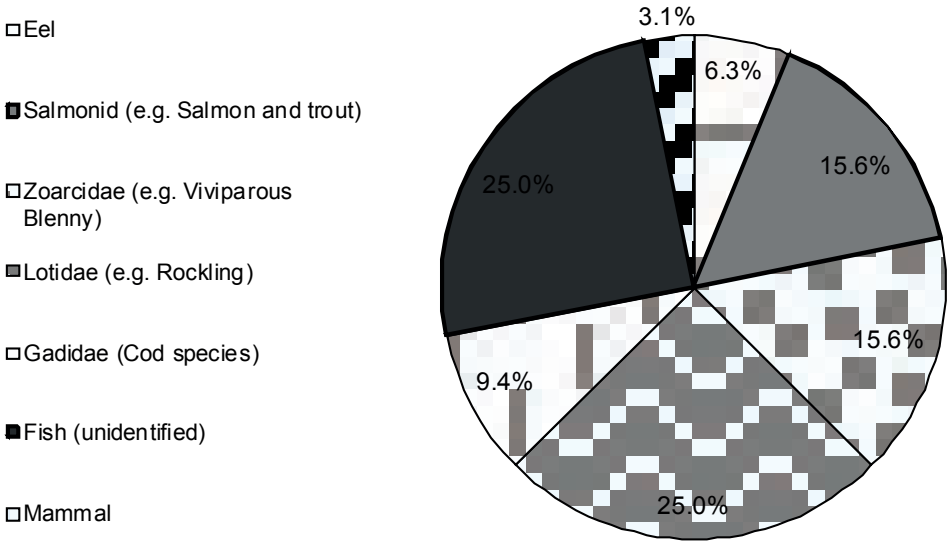

Figure 16. Percentage occurrence of prey items in 32 spraints from in-situ and collected samples (28 and 4 respectively) from the coastal area associated with the River Dee.

Figure 17. Fresh mink prints at the Bridge of Potarch, middle reaches of the River Dee

Figure 18. Otter spraint (left-hand) and mink scat (right-hand) on rock in the upper reaches of the River Dee

Other mammal observations

An adult male mink *(Neovison vison)* was seen scouting along the riverbanks heading upstream, at Bridge of Potarch, Kincardine O'Neil, in the mid region of the Dee and footprints were found (Figure 17). Mink scats were found with otter spraint along the banks of the upper Dee at Ballochbuie Forest (Figure 18), and mink footprints were also found in the upper Dee on the Girnock Burn, west of Ballater.

A Pine Marten *(Martes martes)* scat was found along the Lion's Face trail, Braemar.

Badger *(Meles meles)* footprints were found along a footpath adjacent to the River Dee at Peterculter, and under a bridge on the Girnock Burn. A badger latrine was found along a run following up from the riverbank at Kingcausie in the lower Dee.

DISCUSSION

Whilst this survey does not follow the exact survey procedures as outlined in the National Otter Surveys, this survey was conducted on approximately 89% of the river's total linear length. As in the National Surveys, survey sites were only visited once (with the exception in this survey for the Bridge of Potarch; see River Dee results). Thus in both cases the data merely provides an incidental account of field signs found and by extension confirmation of otter presence on the River Dee. Nevertheless it does show

that during early summer and early winter 2016, recent otter activity (measurable from field signs) had occurred on the upper, middle and lower reaches of the River Dee, together with a small section of coast from Aberdeen Harbour to Greg Ness (Figure 1).

Spraints were the most abundant field signs observed during this survey, and the majority of all the spraints found were recent or fresh, both during May and November, in all three regions of the Dee. This was also reflected in the higher percentages of spraint sites with recent spraint deposits, on the River Dee and its tributaries. Conversely however, the coastal section had more spraint sites with old spraint remains. Speculatively this may imply that the river was being utilised by otters in all regions of the Dee throughout the summer/winter period, and otter activity on the coast associated with the river mouth was much less frequent? This is a very biased assumption, however, due to the fact that only a very small percentage of coast (4.5km) was examined compared to 125km of river.

The distribution of otters is affected by the availability of resources such as food, shelter, and particularly along sea coasts the presence of freshwater **(Kruuk & Hewson, 1978; Kruuk & Moorhouse, 1991; Kruuk, Conroy & Moorhouse, 1991; Kruuk et al., 1998; Yoxon, 1999). Yoxon (1999)** found that there was a relationship between the geology and the number of freshwater pools present in an area, and the presence of freshwater pools is an important factor for finding otters along the coastline.

A freshwater source is very important for an otter living on the coast. Seawater will accumulate and reduce the thermo-insulating properties of fur **(Kruuk & Balharry, 1990)** and so otters will need to regularly wash and groom out the seawater.

Only a small number of freshwater pools were observed on the coastal section surveyed, which might explain why very few recent spraints were found in this area.

Theoretically the heavy winter spate of 2015/16 must have washed away most if not all the spraint sites on the riverbanks. Therefore results from this survey would most likely have shown all 'recent' activity from late winter/early spring onwards.

There were 17 survey sites in common in the Dee catchment from this survey compared to all previous National Otter Surveys. Only one site was negative during this survey (Corriemulzie Burn at the Linn of Corriemulzie Waterfall). This site is a tributary in the far upper reaches of the River Dee. During the four historic surveys from the late 1970s up to 2004 **(Green & Green, 1980; 1987; 1997; Strachan, 2007)**, these 17 common sites were all positive for otter activity. In 2012 **(Findlay et al, 2015)** only 11 of these sites were positive.

All of the survey sites on the River Dee were positive for field signs of otter; however, seven of its tributaries provided the negative results from this survey. It must be remembered that this survey on the tributaries was only conducted through spot-checks around bridges and not searching further up- or downstream. Therefore it does not mean that otters were not utilising the seven tributaries concerned; but merely that spraint was not deposited, or not found, during the time of the survey. It may have

been the case that otters were only hunting along the main river in these areas and not venturing up these particular tributaries. If there are no spraints in an area this does not mean that otters do not visit **(Kruuk, 1995)**. This was a case in point observed on the main river during this survey, within the Cambus o' May stretch of the River Dee which had a noticeable area of spraint sites with just old spraint remains. However, within this location, recent otter prints were found. This suggests that whilst the animal was passing through, it did not spraint at the already existing spraint sites. Instead it may have sprainted elsewhere within its territory, outside of the survey search zone, or indeed in the river itself.

False negatives always need to be taken into account with such survey work, especially on rivers subjected to regular and often heavy spates such as the River Dee. Several of the spraint sites found during this survey would have been on riverbanks underwater for subsequent days, if not just the night before (an example from this survey being the aforementioned new spraint sites found at Bridge of Potarch). Furthermore, the two fresh spraints found below the high water level at Aberdeen Harbour would be washed away at the following high tide, and therefore may not have been recorded if the survey had happened a day later.

Despite the varying techniques and their associated arguments **(see Carss & Parkinson, 1996)**, data generated from spraint analysis merely provides an index of what otters are eating **(Conroy et al., 1993)**, although research has shown a strong relationship between food availability and distribution of the species **(Kruuk & Moorhouse, 1987; Kruuk, 1995)**. The dominant fish species in the spraints observed from the River Dee during this survey were the salmonids, whereas on its tributaries eel was the most dominant of the fish species found in spraints.

From historical studies conducted on the River Dee, otters took the fish prey most available to them **(Jenkins & Burrows, 1980)** and moreover took eels and salmonids in proportion to their abundance **(Carss, Elston & Morley, 1998)**. Salmonids were also found to dominate the diet of the otters in a study on the rivers Dee and Don **(Kruuk et al., 1993)**. **Jenkins and Harper (1980)** observed that eel was the most common prey item in spraints collected on the Dee and salmonids were the main prey items in spraint from three tributaries of the River Dee in mid-Deeside. In a more recent comparative study, **Beaton (2013)** showed that eel was significantly less frequent in spraints collected from the River Dee catchment in 2012 (n = 329; 86.4% occurrence), compared to the historical study (n = 3836; 122.5% occurrence) of the same areas during 1975 to 1978 **(Jenkins & Harper, 1980)**. With one of the main prey items of otter, i.e. eel, becoming less available, alternatives were being sought. Salmonids had significantly increased in spraint samples (from 75.7% to 109.9% occurrence), together with significant increases observed with perch, amphibians and birds **(Beaton, 2013)**.

It is recognised that the Eel is undergoing a decline **(e.g. Bark, Williams & Knights, 2007; Henderson et al., 2012)** and this species has been categorised by the International Union for Conservation of Nature (IUCN) as Critically Endangered.

Spraints therefore could be a very useful and relatively easy, inexpensive resource to continually monitor the presence of eel and other prey species within a river system that occur in an otter's diet.

Mammal remains occurred most in spraints found on the tributaries, together with a relatively high proportion of bird and frog, with fish only making up 40% of the contents. Otters will take more sub-optimal prey to make up for any energy shortfalls **(Kruuk, 2006)** and spraint analysis from this survey would suggest that such prey is more readily available along the tributaries. However, the prey items found in spraint are not necessarily a product of their direct location. One such example observed during this survey was the occurrence of fish bones from the Lotidae (rocklings) found in one spraint located along the mid reaches of River Dee, approximately 35km upstream from the coast. Rocklings are a marine fish species and often found in tidal pools living amongst rocks, where they feed on other intertidal demersal fish, molluscs and crabs.

Otters can have quite an extensive territorial range on a river system. Studies on the Dee have shown linear ranges of river used by otters to be from 16km for a female to 39km for a male **(Green, Green & Jefferies, 1984)**, 12–78km for males and 19–21km for females **(Kruuk et al., 1993)** and up to 84km for a male otter **(Durbin, 1998)**.

It is conceivable therefore that the rockling bones found in the spraint on the mid reaches of the Dee was more than likely to be deposited by a male otter travelling up the Dee from the coast in a relatively short space of time. A study of captive tame otters has shown that the gut transition time of prey items was much less when the otters were active than during inactive trials **(Carss et al., 1998)**.

Further evidence of the fact that otters were hunting on the coast and utilising the River Dee was from the marine species of fish found in spraints on the lower reaches of the Dee. There is, however, a tidal influence on a small section of the River at Aberdeen City. The tidal limit is about 550m upstream from the Bridge of Dee, at Garthdee (approximately 6km from the coast). It is possible that some of the marine fish are found beyond the confines of the harbour.

Many assumptions can be made from the results presented in this paper but the only valid conclusion is that otters are utilising the River Dee from its upper reaches all the way downstream to the coast, and that the activity was recent with many fresh spraint deposits being found during early summer and early winter 2016. The significant reduction of field signs observed from the last National Otter Survey conducted on the River Dee **(Findlay et al., 2015)** was not reflected in the results of this paper. Salmonids were the most frequent fish species found in the spraints observed, with mammal being the most abundant of all non-fish prey items found in spraints. There was evidence of breeding, with the road casualty cub and cub prints found on the lower reaches of the River Dee.

POST SCRIPT

It is a personal aim to 'complete' the survey by exploring more of the upper reaches of the River Dee at the foothills of the Cairngorms during 2017. This is to find out how far upstream otter spraint sites can be found and whether there is evidence that otters visit the source.

After this current River Dee survey was completed, an opportune moment was taken to look at seven bridge crossings along the mid reaches of the River Don during November 2016. All had either fresh or recent spraint deposits under them, and all contained Salmonid bones. It is also hoped that during 2017 a more detailed investigation of the River Don can also be carried out, following the same spot-check methods as outlined in this report.

Loch Kinord and Loch Davan were also briefly checked and were both positive for otter activity in November 2016. There were a few fresh or recent spraint deposits at the survey site of either Loch. Most of the spraints were old and contained feathers, frog, Cyprinidae (e.g. carp species) and Percidae (perch species).

ACKNOWLEDGEMENTS

I am very grateful to Grace and Paul Yoxon of the International Otter Survival Fund for support, encouragement and much patience for this report to be produced. I would also like to thank the landowners and ghillies alike in allowing access to the river.

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ILLEGAL TRADE IN OTTERS IN ASIA

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Abstract

Throughout the world the illegal wildlife trade is having massive implications for fauna and flora. Where efforts to deal with the problem are focused largely on larger species such as tigers and elephants, it is smaller animals, such as otters, that are being captured and traded on an equally high level. For every one tiger skin that is seized ten otters are discovered. Figures show the alarming rates at which otters are being traded, but these are only the numbers that are being caught; significant numbers are passing under the radar and having devastating effects on otter populations worldwide. More governance is vital in order to start to bring an end to the illegal trade of otters, before we lose these species forever.

Keywords: *Otters, illegal trade, furs, pets*

INTRODUCTION

The aim of this paper is to look at the illegal trade in otters and the impact this is having on populations in Asia. It will also look at possible solutions to the problem.

There is no doubt that the illegal wildlife trade is having a serious impact on the fauna and flora of our planet and is driving some species towards extinction. In June 2014, a study by the United Nations Environment Programme (UNEP) and INTERPOL estimated that the worldwide value of this trade is over US$200 billion. Not only is this disastrous for worldwide biodiversity, but this global crime has a negative impact on the economy and social structure of the countries involved, and particularly on poorer communities. In addition, there is often a link between the illegal wildlife trade and terrorism and this connection is becoming a real concern to world leaders. An 18-month investigation found an indisputable financial link between trade in ivory and rhino horns and the Shabab, the group responsible for the Westgate Mall attack in Nairobi, Kenya **(Neme et al., 2013; Christy, 2015)**. With the global wildlife trade believed to be worth billions of dollars and increasing **(Lawson et al., 2014)**, it is vital we start to reverse this trend. In many countries wildlife crime is not seen as a matter of high priority and so there is only minimal effort in terms of money and enforcement effort. Some people even believe that it is just a local issue and is almost inevitable where there is poverty.

Where tigers, leopards, elephants and rhinos and other large fauna have become the dominant species in terms of efforts to eradicate illegal trade in wildlife, the otter trade

is generally overlooked even though it is equally alarming. The otter trade is very much part of the larger operation and, nearly every time a seizure is made for tiger and leopard furs, otter furs are found. For every one tiger skin that is seized, ten otter skins are also found **(Hussain, pers. comm., October 2007).**

There are various issues which drive the trade in otters.

Firstly, and easily the most financially rewarding for poachers, is the pelt, which is often regarded as the 'diamond' of the fur industry. Otters spend a lot of time hunting in water and, unlike whales and seals, do not have a large fat or blubber layer to keep them warm, so they rely solely on the fur. This has two different layers which keeps them warm, even in the coldest of waters. The outer fur is waterproof and keeps the inner fur dry; the inner fur is incredibly dense, with up to 70,000 hairs/cm^2 for Eurasian otters (*Lutra lutra*) and up to 130,000 hairs/cm^2 for sea otters (*Enhydra lutris*) **(Kuhn, 2009)**. Unfortunately for otters, this quality of fur, which is a necessity for their survival, is the reason that they are so sought-after in the fur trade.

The second aspect is the pet trade, as young otters are very endearing and therefore seen as a perfect pet. In Jakarta alone it is believed that there are around 800 otter pet owners. Otters, in Indonesia, have been consistently used in circuses (Figure 1), which increases their popularity and further drives the pet trade. Otters are adorable, highly intelligent and playful within the circus environment and so when people see these unnatural, performing otters, they will often want them as pets.

Figure 1: Otter in WSI Travelling Circus, Indonesia (Photo: Dave Neale, Animals Asia)

The third issue is trade in otters for medicinal purposes. Body parts have been used in traditional medicines, particularly in China and this also happens in parts of Africa, and in some areas these practices continue **(IOSF, 2014, Reed-Smith et al., 2010)**. This may be at a lower level of risk, but there is very little information on how and where they are being used.

DISTRIBUTION AND STATUS

Asia has five of the 13 species of otter found worldwide: Eurasian otter; smooth-coated otter (*Lutrogale perspicillata*); hairy-nosed otter (*Lutra sumatrana*); Asian small-clawed otter (*Aonyx cinereus*) and the sea otter (*Enhydra lutris*). Three of these species share similar habitats: the Eurasian, smooth-coated and Asian small-clawed otters are all capable of adapting to a variety of environments in order to survive, from rivers and lakes to swamps, coasts and estuaries, so these three species can be found in areas where there is sufficient water and prey. The other two species are more specific in terms of habitat. The hairy-nosed otter spends most of its time in peat swamp forests, particularly *Melaleuca* forests, although it has also been recorded in a high in the Cardamom Mountains of southwest Cambodia and also in oil and rubber plantations in Sumatra (**Wright, Olsson & Kanchanasaka, 2008).** As its name suggests, the sea otter spends the majority of its life in the sea and only comes on to land for short periods.

Each of the species indigenous to Asia is showing a decrease in population, and they are all included in the IUCN Red List of Threatened Species: the sea otter and hairy-nosed otter are "Endangered", the Asian small-clawed otter and smooth-coated otter are "Vulnerable" and the Eurasian otter is "Near Threatened".

In most of Asia, otters are legally protected. Exceptions are Asian small-clawed and smooth-coated otter in Cambodia and Indonesia, hairy-nosed otter in Myanmar (Burma) and Asian small-clawed otter in Nepal **(Gomez et al., 2016)**

BACKGROUND

The fur trade is the most alarming threat, and is having the most detrimental effect on otters within Asia. India is responsible for a large proportion of the otters being traded illegally with an estimate of around 50% of otters traded coming from India alone. Unlike larger fauna, there seems to be relatively little concern about the conservation of otters. As a result there is little funding put into this work and otters have become almost extinct in many areas such as Kashmir, Uttaranchal and the Palni Hills. In the latter, otters have been taken for several reasons: for meat, using the skin for drums and the oil to make a medicine for joint pains and pneumonia **(Meena, 2002).** In the Eastern Ghats region Asian small-clawed otters were found, but local tribes catch them for fur, meat and pets and so their numbers have declined particularly over the last decade. Although the otter is a protected species in India, this seems to be legislation with very little backbone. The law only seems to be a rule with no monitoring or governance. With little or no policing, there is no reason for poachers to stop.

In Pakistan, otters face difficulties for similar reasons i.e. for their fur and body parts for use in traditional medicines (**Khan et al., 2010**). The smooth-coated otter was doing well in three provinces of Pakistan – Sindh, Punjab and Khyber Pakhtunkhwa. However, due to mass poaching, again for the fur trade, otter populations started to decline dramatically in these provinces. They became extinct in Punjab and Khyber Pakhtunkhwa, and in 2009 the estimated 178 still believed to be in Sindh province were declining and faced a similar risk of extinction (**Khan et al., 2009**). However, since then, otters have once again started to show a steady increase in Sindh province. Surprisingly, due to flash floods in 2010 and 2011 otter habitats have started to improve. This, together with the fact that there is less demand on the market, is helping otter populations in Pakistan.

As we head east in Asia the situation does not show any signs of improvement. Although it is illegal to do so, smugglers trade furs between Nepal, India, Myanmar (Burma) and China. Apart from in more arid provinces, China's otter population used to be widespread. However, now they are rare, sightings are almost non-existent and secondary signs are seldom found **(Zhang, Yoxon & Yoxon, 2014)**.

South-east Asia faces all the same problems that the rest of Asia seems to be enduring. Otters are incredibly sought after for the two main reasons, i.e. for fur and as pets, with the latter more of a problem in this part of Asia. In Cambodia, Thailand, Myanmar, Vietnam and Laos otter populations continue to diminish, and in certain areas they

Figure 2: A Thai official holds a baby otter retrieved from a suitcase. (Photo: Panjit Tansom/TRAFFIC)

are now extinct. In 2007 a fisherman in the Tonle Sap, Cambodia claimed that in four years he alone had caught 49 otters **(IOSF, 2014)**. If we multiply that by the number of poachers on that one lake, then again by the number of areas in which otters and poachers coexist it is easy to see how monumental this problem has become.

In Indonesia, the illegal otter trade is not based on the animal's fur; instead the otter is an incredibly popular animal to have as a pet and, as mentioned, in Jakarta alone there are 800 people with pet otters **(IOSF, 2014)**. In 2013, 11 baby otters were seized at Bangkok's Suvarnabhumi International Airport, an airport that is no stranger to dealing with the illegal wildlife trade (**Nuwer, 2013; Shepherd & Tanson, 2013)**. These otters were found crammed in a suitcase ready to be sold to people who just fancied having an exciting wild animal as a pet.

As shown, the illegal otter trade is widespread throughout the whole of Asia and the continent has a massive problem controlling and policing this problem. Without pressure from authorities on people involved in the trade we have no chance of stopping it.

WHO BUYS THEM?

Rarely in any market is there a supply without demand. In order for all the poachers and smugglers to operate there is someone at the head of it all, the buyer. Without a buyer, all these efforts to catch, kill and distribute the otters, dead or alive, are pointless. When it comes to the fur trade the main market comes from China, more specifically Tibet. Otter fur is used in the Tibetan traditional dress called the chupa, mostly as a trim, and only chieftains of the tribe are allowed to wear the full skin. In 2006, the Dalai Lama called for an end to the use of real animal skins, including otters, in Tibetan traditional dress. This has been successful in some areas and there have been mass burnings of wild animal furs **(Big News Network.com)**. However, the Chinese government saw this as interference by the Dalai Lama. In order to reinstate their authority they made it obligatory to wear real furs during festivals and formal events and government officials can receive a dismissal if they fail to wear it. From upscale shops to street markets, otter fur again became in high demand all over this region of China (**Ghosh, 2005**). But recent evidence suggests that some Tibetans are continuing to reject the use of otter and other animal furs **(Bing, pers. comm., September 2016)**.

With the fur of a single otter going for up to US$200 in 2008 **(IOSF, 2014)**, it is easy to see why individuals in a less fortunate position may be tempted to opt for this method in order to make money to support their family. In some markets they are able to sell a wide variety of animal by-products. Although it is illegal to sell in plain sight, stall operators will just remove these animal products when police do their checks, before putting them back on view as soon as police decide that everything is acceptable (**Hofford, 2015**). However, the market in Mong La, Myanmar, is different as it is out of direct governmental control.

As mentioned, the other demand for otters is for pets, particularly in the case of the Asian small-clawed otter. To feed this market, young cubs are taken from the wild and the mother is usually killed as she tries to protect them. When they are young, otters are very endearing animals, with many attributes that could lead you to believe that they would be the perfect pet. However, it is not easy to rear a young otter and they often die and the owner simply goes out and buys another one. If they do survive, the owner finds that they soon grow up and all the factors that you associated with the otters as a young animal are soon forgotten as they start to bite, smell and become destructive. Then they may be dumped. Young otters are available for sale on the internet, sometimes even on sites such as Facebook (**Aadrean, 2013)**.

THE SCALE OF THE TRADE

The illegal animal trade is not a small operation, consisting of a handful of individuals looking to make a decent amount of money as easily as they possibly can; this is a well-organised network. These people not only have the intelligence and understanding of how to slip under the radar, they also have connections at international borders, who, with a little financial persuasion, can turn a blind eye to what is being taken across. The smugglers have an extensive knowledge of the land and use the old roads for salt, spice and wool to get their merchandise across borders. Each and every attempt to smuggle animal parts is meticulously and professionally planned. As the demand for otters grows, the network increases in size, making it more difficult to observe and prevent.

Collecting hard data is not easy as otters are often overlooked in efforts to prevent the illegal wildlife trade, and are not itemised or represented in reports of seizures. If the report does specify "otter" in a seizure then it almost certainly will not include the species. In 2008 IOSF produced a report on the illegal trade in otter furs **(IOSF, 2008)**, which was revised in 2014 **(IOSF, 2014)**, to include trade for pets. **Gomez et al. (2016)** carried out further analysis of seizures for a TRAFFIC report and an overview on trade in Tibet was given at the Asian Otters and Wetlands Training Workshop (**Shrestha, 2016)**.

Considering all of these factors it is impossible to track every shipment, and so the actual number of otter products being traded is difficult to ascertain. Thus the data included in this paper only represents a minimum of the number of otters that are being traded.

Nevertheless, Table 1 in Appendix 1 gives an indication of the scale of the trade in otters that have been seized throughout the world, mainly from 2000 onwards. Although the figures show the clear problems that are being faced, this is only the tip of the iceberg in terms of number of otters that are being illegally traded. Unfortunately, the illegal animal trade is a very lucrative business and this is what drives individuals to persist in pursuing this as a trade. The seizure in Sangsang, Tibet (08/10/2003) alone was worth a staggering US$787,000 (which in 2017 is worth over US$1m), and consisted of 31 tigers, 581 leopards, 2 lynx and 778 otters (**Ellis, 2005**).

THE SOLUTION

So how do we stop the demand? Within any walk of life, or any trade, if people want something, there will be someone, somewhere who wants to make money supplying that demand. The animal trade is no different, and if someone is willing to pay for otter furs, there will be someone willing to supply them. So it is vital to stop the actual demand in order to stop the trade. The only way to start putting an end to this is by completely illegalising any use of otters in any capacity, be it in traditional dress in places like Tibet, China, as pets and in circuses, or for medicine. The sooner we manage to remove the demand, the sooner we can stop the illegal trade and therefore benefit otter populations as a whole.

We then need to identify the people that actively transfer otters around countries, or across borders, but as we have already said they are very hard to find. They are generally not the head of operations, in terms of the whole trade of animals, but are the people with the intelligence about land and border crossings and who are adept at being able to smuggle animals or animal parts across borders without ever being found. They will know every method of smuggling, every route across borders and the corrupt contacts who can be bribed.

Then you come to the base of the problem, the poachers. These are the people who are doing the actual tracking and catching of otters. Highly skilled in their own right, albeit illegal, these people show incredible intelligence and understanding of the otter, its behaviour, and the habitats in which it lives. They clearly have a great understanding of wildlife and so they could possibly be an important player in terms of protection and expansion of the otter population across Asia. As we have seen, it is largely poverty that drives the trade in otters and if we can help people to make a living without killing then we are making further steps forward.

The main problem that is blatantly obvious when it comes to the battle with the illegal wildlife trade is policing. From the ground up, there is clearly not enough being done to stop people killing, transporting and selling otters within Asia. Where there are laws to prevent such trade these are often poorly enforced and it seems that this legislation exists largely on paper only. Why would the traders stop if there are no consequences to their actions and they are making a good amount of money? Unfortunately, every effort can be made by 99% of police and border officials to prevent the problem, but until corruption within the bodies responsible for maintaining the law is completely eliminated there is still an opportunity for the illegal traders in wildlife.

A solution to this problem needs to be found soon before the damage done to otter populations is irreversible. There are numerous agencies working towards a solution, such as Asia for Animals Coalition and the Coalition Against Wildlife Trafficking (CAWT). The International Consortium on Combating Wildlife Crime (ICCWC), which includes CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora), have teamed up with other worldwide reputable crime

agencies such as INTERPOL, as there are links between the illegal wildlife trade and drugs and terrorism. Therefore, if you start to reduce the wildlife trade it should coincide with a reduction in drug-related and terrorist activities due to the loss of financial backing.

At the end of August 2014, a second meeting of the South Asia Wildlife Enforcement Network (SAWEN) was held in Kathmandu, Nepal. Here representatives from eight countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka) finalised and endorsed the SAWEN statute and began the process of developing an action plan for the next six years. Inter-governmental organisations, international and regional organisations involved in the illegal wildlife trade issue, joined with international donors and organisations such as INTERPOL, CITES, UNODC, World Bank, TRAFFIC and WWF.

With the increase in technology, people involved in the trade find it a lot easier to correspond with others and sell to anyone worldwide. Websites have been set up that give individuals the opportunities to buy and sell otters as easily as they can books on the internet. The International Fund for Animal Welfare (IFAW) have been documenting trade through the internet since 2004 **(IFAW, 2014)** and have found cases of otters being advertised worldwide. However, where the internet might be aiding the crime, it is also helping to try to catch the criminals and prevent the trade. Two applications have been set up to help people and organisations locate illegal wildlife activity – Wildlife Witness and WildLeaks. Wildlife Witness, as well as teaching people about wildlife crime, allows individuals, in particular tourists, to take photos of wildlife crime when they are travelling and send them direct to TRAFFIC with information on date and location. This enables TRAFFIC to investigate further and hopefully catch the culprits. Wildleaks is the first, secure, online whistleblower platform dedicated to Wildlife and Forest Crime. Unlike other organisations, WildLeaks is focused on getting information regarding key elements (individuals or organisations) behind wildlife crimes, and regarding the networks and the modus operandi. The objective is to prevent those crimes (when possible), get a better understanding of certain phenomenon, disrupt any related activity and facilitate the identification, arrest and prosecution of the people involved. To do this they use a very secure online platform so that people can submit information safe in the knowledge that they will remain anonymous. It is managed by a small group of very experienced individuals, which includes the directors of environmental investigation NGOs, environmental lawyers, accredited journalists, security professionals and ex-law enforcement officers. Highly experienced and responsible teams of professionals evaluate documents and tips provided to WildLeaks and then advise on the most appropriate action. This may be to begin or continue an investigation with their own teams and/or in collaboration with trusted partners, and/or share the information with trusted contacts within selected law enforcement agencies and/or share the information with media partners. Whatever the course of action their aim is to facilitate the identification, arrest and prosecution of criminals, traffickers, businessmen and corrupt governmental officials behind the

poaching of endangered species and the trafficking of wildlife and forest products. WildLeaks is developing collaborations with other NGOs, who can spread the word through their own programmes, literature and websites to encourage people with information to speak out. Such collaboration is essential.

These actions help the police in Asia and around the world identify illegal wildlife activity and act to prevent it. By having a specific location and pictures governing bodies will be able to enforce the law and help to eradicate or at least considerably reduce the problem.

Research alone is not conservation and, apart from finding out information on populations and threats, unless there is practical action as well there can be little positive benefit. Where there are a lot of researchers, there are often not enough conservationists helping otters. The International Otter Survival Fund (IOSF) has held training workshops across Asia in Cambodia, Bangladesh, Indonesia and China which are aimed to train the next generation of otter conservationists and enable them to work within their own communities. By training local people they will know the best methods to encourage meaningful protection and conservation of otters. This will help not only otters but other wildlife as these conservation techniques can benefit all biodiversity and protect wetland habitats. These workshops train students and park rangers from the region in otter field techniques, public awareness programmes, law enforcement and general conservation issues. Local government personnel are also invited to attend to encourage better law enforcement and otter protection.

These workshops can change individual attitudes towards otters. Following a workshop in Cambodia in 2009, a local fisherman found a hairy-nosed otter in fishing hooks and contacted one of the community workers, instead of selling the pelt for up to US$200 – this clearly demonstrates the start of a change in attitude. Co-operation between local communities and project workers is essential but there have to be trained workers on the ground to facilitate this. The more individuals that can be trained and competent within otter conservation and the law will clearly benefit the otter.

By involving government officials in the workshops their attention is drawn to the role of otters as ambassadors of a healthy environment, problems in otter conservation and the illegal trade. They are therefore encouraged to implement better enforcement of existing legal protection and hopefully develop further protective measures, which will also reduce trade in other endangered species.

CONCLUSION

It is clear that the illegal trade in otters is having a catastrophic effect on the population of otters in Asia. This business does not only have a massive implication on the lives of otters, but it also destroys ecosystems and finances other criminal activities. It is imperative that we stop any illegal trade of otters in order to stop the declining populations reaching their ultimate climax, extinction.

Slowly but surely the importance of otters to the ecosystem as well as the severity of their part in the illegal trade is becoming more public knowledge. But still otters are often overlooked and not recorded when seizures are made. As more and more worldwide agencies and governments come on board and act on the ongoing illegal otter trade we should start to see the otter population begin to recover. However, otters do still face a lot of other problems – such as loss of habitat and prey, and pollution – which need to be addressed.

Let us just hope that these efforts continue and in twenty years' time we are not left sitting, having lost the wonderful species of otter, wondering, "what if?"

ACKNOWLEDGEMENTS

IOSF is grateful to many contacts from throughout Asia for background information and data including Prof Padma de Silva (Sri Lanka), Prof Syed Hussain (Wildlife Institute of India), Dr Reza Lubis (Wetlands International Indonesia), Annette Olsson (Conservation International), Chris Shepherd (TRAFFIC), Dr Vladimir Sevostianov (President Commander Island Association). In addition the following organisations have provided information and given their kind permission to reproduce photographs: Conservation International, Environmental Investigation Agency (EIA), TRAFFIC, Wildlife Conservation Nepal, and Wildlife Protection Society of India (WPSI).

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Appendix 1

Table 1: A summary of the KNOWN trade, which has come to light during the investigations by IOSF

Date (d/m/y)	Place found	No	Species	Live/ Parts	Other Species	Arrest/ Sentence
1974	India	85	?	Skins	1 tiger, 3 leopard	1
1989	Darchula en route to India	85	?	Skins		
1991-2003	Various	223	Eurasian	Skins		
August 1994	Dhulabari, Nepal en route to India	9	?	Skins	89 leopard, 1 tiger	
February 1996	Pashupati Nagar, Nepal	95	?	Skins		
1996	Tamku, Makalu Barun National Park, Nepal	6	?	Skins		
2000	Khaga, India	221	?	Skins	4 tiger, 70 leopard	
08/08/2001	Xiaguan, China	134	?	Skins	23 tiger, 33 leopard	
11/02/2003	Siliguri, India	19	?	Skins	20 leopard	
04/04/2003	Kathmandu, Nepal	14	?	Skins	109 leopard	
22/05/2003	Samalkha, India	18	?	Skins	7 leopard	
08/10/2003	Sangsang, Tibet	778	?	Skins	31 tiger, 581 leopard, 2 lynx	
18/03/2004	Daklang,Sindhupalchok, Nepal	6	?	Skins	7 leopard, 2 tiger skulls, bones, 175 strips of rhino skin	
04/04/2004	Kathmandu, Nepal	14	?	Skins		
20/04/2004	Kathmandu, Nepal	?	?	Skins	leopard	
11/07/2004	Kathmandu, Nepal	11	?	Skins	3 tiger, 5 sacks tiger bones	
31/01/2005	Delhi, India	42	?	Skins	2 tiger, 38 leopard, 1 snow leopard	
08/03/2005	Delhi, India	4	?	Skins	3 leopard	
06/04/2005	Delhi, India	14	?	Skins	45 leopard	3
17/04/2005	Baudha, Kathmandu, Nepal	38	?	Skins		
02/09/2005	Syafru Besi, Rasuwa, Nepal	238	?	Skins	38 leopard, 5 tiger + 113 kgs of tiger bones	1
Summer 2005	Moscow, Russia	300	Sea	Skins		
11/09/2005	Zhangmu, Tibet/Nepal border	20	?	Skins	12 tiger, 60 leopard	
2005	Linxia, Gansu Province, China	1,833	Included Eurasian & smooth-coated	Skins		

2005	India	3,275-3,825	?	Skins		
Winter 2005-06	Petro, Petropavlovsk-Kamthatskiy, Russia	300	Sea	Skins		
10/01/2006	Faitelpur, India	1	?	Skin	14 leopard	
03/02/2006	Delhi, India	4	?	Skins	34 leopard	
??/10/2006	Myanmar	4	?	Skins	1 Bengal tiger	2
02/09/2014	Langtang National Park, Nepal	216	?	Skins		
??/08/2007	Yunnan Province, China	4	?	Skins		2
13/12/2007	Northern Karnataka, India	43	?	Skins	1 tiger, 21 leopard	1
22/03/2008	Chatuchak (JJ Market), Bangkok, Thailand	1	?	Live	14 Slow Loris, 96 birds (including 24 owls), several tortoises, marine products (including 480 hard corals, 187 soft corals, 22 sea fans & 22 Giant Clams)	
05/11/2009	Majnu Ka Tila, , Delhi, India	7	?	Skins		2
14/01/2011	Ho Chi Minh City, Vietnam	6	Asian small- clawed	Live	King cobra, loris, water monitor, cobra & Asiatic soft-shell turtle	1
2012	Indo-Nepal border	?	?	Skins	Tiger, leopard, rhino horn, red sanders, live elephants & ivory, bear bile, live birds	
2012	Russian side of Russia/China border	?	?	Skins		
18/04/2013	Bagdol, Lalitpur, Nepal	1	?	Skin		
19/04/2013	Parramatta, Sydney, Australia	?	?	Parts	Included 11 orangutan skulls, 25 other skulls of monkeys, lynx, bears, & tiger. Teeth & skins from protected species such as orangutans, lynx. Feather headdress from bird of paradise.	1
30/03/2014	Gaidakot, Nawalparasi, Nepal	1	?	Skin		
05/04/2014	Baikunthapur, North Bengal, India	1	?	Skin	Skin & bones of leopard	3
02/09/2014	Langtang National Park, Nepal	216	?	Skins	?	
07/10/2014	Phnom Penh, Cambodia	10	?	Skins	19 clouded leopard, 4 eagle claws, 6 Asian golden cat paws, 6 tortoises.	2 fined S$25,000 & released
17/07/2015	Pursat city, Cambodia	2	Smooth-coat	Skin2	2 banteng skulls with horns, 4 sambar antlers, 1 eld's deer antlers, 2 python skins	

LAOS OTTER TRAINING WORKSHOP

IOSF has been holding a series of training workshops to encourage more people to work in otter conservation through research and education/public awareness. Full reports can be found at www.otter.org/Public/IOSFInternationalWorkshops.aspx. Apart from the African workshop in Tanzania, these have all been held in Asia as otter populations are being decimated by illegal hunting for furs.

In September a workshop was held in China which was very positive, and people there are now starting to look at otters and wetland conservation. It has been decided that the next workshop will be held in Laos in December 2017, and it will bring people together from Laos, Myanmar and China, as this is a major hub of the illegal wildlife trade.

The event is still in the planning process and we are working with the National University of Laos, WWF Laos and Anoulak, a conservation organisation in Laos, who have done some work on otters using camera traps.

For more information on the workshop contact enquiries@otter.org

OTTER OSCARS

As part of the Year of the Otter, IOSF launched the OTTER OSCARS, which will be presented annually to people who have done something outstanding to help otters or create more awareness. There were several categories and the first winners were announced in December 2016.

Children: Abigail Rickels, England – a poster and money box to collect money for otters.

Young People: Caitlin Beth Gillespie, Scotland – Member of St Modan's Eco Club. Researched the otter and its ecology to create an information poster.

Community Achievement: William Mgomo, Tanzania – visiting primary and secondary schools near Liparamba Reserve.

Group or Organisation: University of Wyoming Student Chapter of the Wildlife Society, USA – Since 2001 over 250 students have taken part in 31 surveys carried out twice a year on a river in Rocky Mountain National Park.

Research: Dr. Pablo César Hernández-Romero, Mexico – research into the ecology and conservation of the neotropical otter in six protected areas.

Photography: David Jeffrey Chard, Wales – his photo was taken on the River Usk in Wales

Special Award: Budsabong Kanchanasaka, Thailand – has spent a lifetime working on otters, particularly in her home country of Thailand and has been an essential part of the IOSF team working on training workshops in Asia.

Photo of Budsabong (right) with Padma de Silva, Chair of the Asian Otter Conservation Network, taken at the Chinese workshop

The opening date for nominations for the 2017 award will be on World Otter Day, 31 May 2017.

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INSTRUCTIONS FOR CONTRIBUTORS

Before submitting an article for peer review for OTTER please read carefully and follow these Instructions for Contributors. The journal has a particular interest in material with the potential to improve otter conservation.

By submitting a paper, the author(s) confirm that it has not been published or submitted for publication elsewhere.

Papers should be 2,000 to 7,000 words. Note that word counts are all inclusive except for Tables and Figure and Plate captions. Short reports and communications may also be submitted. Suitable topics include research, education case studies, literature reviews, reports on illegal trade, etc.

Preparation of manuscripts. Contributions should be in English, with British English spelling and terminology, double-spaced, without footnotes, and with line numbers. Submissions, which can be a single file with all Tables, Figures, Plates and Appendices at the end or with text and other elements in separate files, must be in DOC format (not PDF). Cover page should contain title, word count (all inclusive except for Tables and Figure and Plate captions), and full mailing address, email, affiliation and address at the time the research was carried out.

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Harrison D.L. (1968). Mammals of Arabia. Vol. 2. Carnivora. Artiodactyla. Hyracoidea. Ernest Benn, Ltd. London. 195–381.

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References in Text:	Bold
Quotations in Text:	Use single quotation marks (double within); display quotes over 40 words

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Front cover images:
Top - Smooth-coated otter *(Lutrogale perspicillata)*, Photo: Dr. Bivash Pandav
Centre - Eurasian otter *(Lutra lutra)*, Photo: Alan Horner
Bottom - Asian small-clawed otter *(Aonyx cinereus)*, Photo: Lee Matthews

Printed by Strath Print, Isle of Skye tel: 01471 822 555 www.strathprint.co.uk