NOTE FROM THE EDITOR

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Dear Friends, Colleagues and Otter Enthusiasts!

It is December and Lesley has just closed issue 38/4 and we are ready to start with the first ever 5th issue in one year. So, there is still much more to come this year.

I do hope that you all are safe while we at least here in Europe experience the next steep rise of infections of the ongoing pandemic situation. Take care of yourself and your families.

While it is very nice to see so many manuscripts arriving in one year this also seriously increases the workload for Lesley. She uses a lot of time for the language editing and to double check missing references etc. Without the efforts of Lesley, the IUCN OSG Bulletin would not be what it is and I want to thank you Lesley for all your efforts on behalf of all of us!

OBITUARIES

ROBERT P. BROOKS

Rob Kayaking

Robert P. Brooks, a long-time and dedicated member of the Otter Specialist Group (OSG), died at his home in central Pennsylvania on May 17, 2021. Rob developed Creutzfeldt-Jakob disease, a rare and horrible disease that progresses rapidly and is always fatal. Many OSG members knew Rob through his participation at OSG conferences at Frostburg, South Korea, and the most recent gathering in China, and his dedication and accomplishments in preserving wetlands and the precious plants and animals dependent on these habitats. However, those most familiar with Rob were also aware of his kind, gentle, and thoughtful nature – a person always willing to lend comfort or assistance and whose presence made the world a better place.

Rob's professional accomplishments are numerous and impressive. His educational background includes a BS in Biology at Muhlenberg College, Allentown, Pennsylvania and MS and PhD degrees in Wildlife Biology at the University of Massachusetts, Amherst, both in the United States. Rob's graduate research demonstrated an early devotion to wetland wildlife, resulting in a MS thesis and PhD dissertation respectively focused on American beavers (*Castor canadensis*) and muskrats (*Ondatra zibethicus*). Soon after completing his PhD, Rob began his academic career at The Pennsylvania State University (Penn State) in 1980, where he retired to professor emeritus status in 2018 after 38 years of dedicated academic service. At Penn State, Rob contributed in various capacities, including Professor of Wildlife and Wetlands; Professor of Geography and Ecology; and the Director of "Riparia," an interdisciplinary program that he conceived, developed, and made prominent at the University. Riparia was designed to integrate biological, physical, social, and educational (particularly outreach efforts to citizen and conservation groups) elements of wetland conservation through conducting rigorous scientific assessments with the

intent of applying outcomes to enhance and preserve wetlands and associated aquatic communities. In recognition of these dedicated efforts to conserve wetlands, Rob was the 2013 recipient of the of the Environmental Law Institute's prestigious "National Wetlands Award," in the area of science research. Rob's research program has contributed over 150 publications in peer-reviewed journals and proceedings, book chapters, books, and non-refereed journal articles. Topics of these writings range from wetland hydrology, factors influencing wetland plant communities, and numerous wetland-dependent vertebrates – the North American River otter was the focus of over 15 of these writings. Rob was particularly proud of his recent book (co-edited with his former PhD student, Denice Wardrop), *Mid-Atlantic Freshwater Wetlands: Advances in Wetlands Science, Management, Policy, and Practice*, which represents a culmination of his dedication and research activities pertaining to wetlands in Mid-Atlantic region of the Eastern United States. Rob was also an active participant at numerous scientific meetings and various professional societies, including particularly close affiliations with the Society of Wetland Scientists and The Wildlife Society. Rob supported his research program (primarily comprised of graduate students) by obtaining over 110 grants totaling over $30M USD.

Among Rob's greatest personal fulfillments and for which he derived the most professional pride and pleasure was the opportunity to mentor graduate students – over 40 graduate students completed MS or PhD degrees under his guidance. I was one of Rob's early graduate students and had the good fortune of knowing him for almost 40 years. Initially Rob was my PhD advisor and mentor but over the last 25 years we were mostly friends who mixed in presentations and manuscripts to justify traveling to wildlife conferences in beautiful parts of the world. Our most recent travel and one I will most remember was to the most recent otter conference at the Wolong Nature Reserve in China, where Rob delighted in interacting with OSG members during the conference and traveling with those that participated in the post-conference nature tour. During our many personal and professional travels, we discussed many things, often graduate students. Rob's smile would always grow especially wide, and his eyes would have a special glow when talking about the graduate students that had worked with him - I'm sure they all are aware, but he was so grateful, proud, and appreciative to have been involved with such a dedicated group of individuals, for their contributions to his conservation efforts, and their ongoing contributions to conservation. Ultimately, Rob regarded mentoring students, especially graduate students, as the most rewarding aspect of his professional career and the most substantial contribution a professor makes to conservation.

Rob's professional achievements have undoubtedly established a meaningful and enduring conservation legacy. However, from our discussions I learned that without doubt Rob considered being part of a wonderful family to be his proudest and most satisfying accomplishment. His wife Becky, their children Ben and Emily, and their four grandchildren were a constant focus of his discussions and what put the brightest twinkle in his eyes. He so loved Becky and felt so fortunate to have her as a life partner. I can't imagine a more perfect pairing – both so kind, gentle, and considerate. Understandably, these endearing personal characteristics are also possessed by Ben and Emily. At conferences, he would "light up" when there was an opportunity to share stories to colleagues about his children and their accomplishments. More recently, the grandchildren had become the focus of his attention and stories. I can imagine no greater misfortune then those grandchildren growing up without experiencing more of Rob's love, kindness, and wisdom, but I also know that Becky and Ben and Emily and

their wonderful spouses will be imparting such characteristics to the grandchildren and will be sharing wonderful stories about their grandfather.

With deep sorrow, but also with deep gratitude and fond memories,

Tom Serfass

Rob and river otter statue

Rob's family are planning a variety of ways to highlight Rob's interest, dedication, and contributions to conserving wetlands and wetland dependent wildlife, including the creation of North American river otter and belted kingfisher statues as part of an educational display in Rob's name at the Penn State arboretum. In 2007 the IUCN Otter Specialist Group had its conference in South Korea – as you can see in this photo Rob clearly demonstrated an affinity for otter statues and I have little doubt that he would be delighted to have his name associated with an otter statue intended to inspire young people about the importance of protecting the aquatic resources he so loved and committed his life to preserving.

A lifelong fascination, interest, and appreciation of aquatic habitats permeated Rob's professional and personal activities. He particularly enjoyed his annual kayaking trips along the Maine Coast where he camped on coastal islands.

BJARNE SØGAARD 1949 - 2021

It is with great sadness that we report the death of our good friend and colleague for many years, senior biologist Bjarne Søgaard. Bjarne passed away on November, 27 2021 after a short illness with hospitalization at Aarhus University Hospital.

Bjarne was deeply involved in the work and the management that led to the success of reversing the population development for the otter in Denmark. From being isolated in northwestern Jutland with approx. 200 individuals left in the early 1980s, the otter is today found in a large part of Denmark: Jutland and the islands of Funen, Zealand and Lolland-Falster. The explanation is a formidable collaboration between the World Wide Fund for Nature - WWF and Animal Protection - Denmark, managing authorities, research institutions and volunteers. Orders for the use of stop grids in eel traps and the establishment of fauna passages at road bridges were from the beginning in 'Project Otter' seen as the most important management measures in relation to reversing the negative development. Over the years, Bjarne has participated and contributed with knowledge and experience to several conferences and meetings around the world related to otters and other mustelids. The most recent was the 33rd European Mustelid Colloquium, 8-11 October 2019 in Lisbon, Portugal.

Bjarne was, if anyone, professionally dedicated to his work. He was employed as a biologist in the Ministry of Agriculture's Game Administration (later the Forest and Nature Agency) on Kalø Estate in 1985. Bjarne was a valued and well-liked employee here, and was especially involved in the establishment of the first hunting-free core areas for birds in Denmark. It became a huge success for both the birds and the hunt.

When a position became vacant at the Danish Environmental Research Institute in 1999, Bjarne applied for this, and was employed here until 2017, when he retired. In parallel with his work with otters and reserves, Bjarne was also in his long working life responsible for the Danish species monitoring program (NOVANA) with the development of technical instructions, coordination of the monitoring and reporting. He had a very large network and countless employees in agencies, counties and municipalities. Biologists from research institutions in Denmark and Europe have benefited from Bjarne's overview, with his positive energy and ability to create collaboration and results.

Bjarne was an institution on Kalø Estate, where he was a committed, funny and very helpful colleague. He had a great interest in Kalø's history and was involved in the staff and art association and did his part to make Kalø a good working place.

We will miss him and our thoughts go to his family.

Aksel Bo Madsen and Morten Elmeros

V I E W P O I N T

MISLEADING USE OF IUCN RED LIST TERMINOLOGY TO DEFINE NEOTROPICAL OTTER LOCAL CONSERVATION STATUS
in response to Carvalho-Jr *et al*. (2021)

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Abstract: The IUCN Red List Guidelines are an important resource to guide the definition of the global, national and even regional conservation status of our biodiversity. However, as with all models, if the assumptions underlying the criteria are not valid, or the guidelines for applying the criteria are not followed correctly, then misleading results will be generated. Carvalho-Jr et al. (2021) mis-used the IUCN Red List Guidelines to define the local status of Neotropical Otter *Lontra longicaudis* in Santa Catarina Island, Santa Catarina province, Brazil. The category generated, Critically Endangered, is groundless, for multiple reasons.

Citation: Rheingantz, M.L. and Duckworth, J.W. (2021). Misleading Use of IUCN Red List Terminology to Define Neotropical Otter Local Conservation Status. *IUCN Otter Spec. Group Bull.* **38** (5): 254 - 257
Keywords: *Lontra longicaudis,* Red List assessment, Santa Catarina island, conservation status

The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (the IUCN Red List) is the most comprehensive source to evaluate the risk of extinction of animals, fungi and plants across the world. This list highlights the species with higher and lower risk of extinction through a series of Categories, and it is much used in combination with other information to define the species that require more conservation efforts. However, the definition of status (assignment of Category) must follow standardized Criteria, that are available in Guidelines for Using the IUCN Red List Categories and Criteria (IUCN, 2019). Each species can be assessed not only globally, but also 'sub-globally', where only a part of its range is considered, *e.g.* national, regional and local scales. These are particularly useful when setting conservation priorities in smaller scales.

Carvalho-Jr. et al. (2021, this journal) made provocative conclusions about the status of Neotropical Otter *Lontra longicaudis* (Olfers, 1818) in Santa Catarina Island, assigning this population the category of Critically Endangered (CR). This assessment is flawed in multiple ways and would lead to erroneous perceptions about the conservation situation of the species in the island and possibly more broadly in its distribution range.

The CR assessment did not mention information source used (a,b,c,d or e; IUCN, 2019) to fit the species as Critically Endangered (CR) under A2 in Santa Catarina

island. To be CR in A2, the otter population in the island should have reduced by 80% or more in the last 10 years or three generations (whichever is the longer). It seems most likely they used 'b', 'an index of abundance appropriate to the taxon' as they focus on spraint numbers. The extent to which spraint counts can be used as an index of population is controversial (e.g. Mason and Macdonald, 1987; Kruuk et al., 1989) but here we focus on the lack of any compelling evidence that a decline in spraint numbers actually occurred, let alone one of sufficient magnitude to suggest a CR category. The first major point is that the purported decline was based on an unreasonable extrapolation. The authors wrote that otter spraints are decreasing, but an inspection of the graphics, in particular Figure 2, the low number of faeces occurred only in the year of 2017. In all the other surveyed years (2004-2009; there was no survey in 2010-2016) the number of spraints show no clear directional trend across years. So, the 'evidence' of decline in spraint numbers rests entirely on one, disjunct, year. Accepting that spraint numbers were lower in 2017 than in 2004-2009 (but see below), it is impossible to tell if 2017 was simply a chance 'bad year' (from which recovery would occur), or a reflection of genuine population decrease. Use of Criterion A requires that the population is in a genuine directional decline: it is not to be used simply for fluctuations. For the island's otter population, this would require more years to show a directional trend with reduction in otter spraints, or in theory a long-enough period after a sudden population collapse to show no recovery was made.

Ideal datasets rarely exist, and IUCN Red List assessors and reviewers take this into account when assessing species status, so spatially erratic ones such as shown in the manuscript are allowable. But the validity of their use in determining population change must be justified, not only presumed, as stated in IUCN Red List Categories and Criteria (IUCN, 2019). Because of the broad stability in the 2004-2009 period the need for such justification in this case is even higher.

The second major issue is that insufficient methodological information is given to know whether spraint numbers available to be counted in 2017 were lower than in 2004-2009, or whether the lower counts reflect differences in survey characters. It is not mentioned if the methods used in all areas and years were standardized. Even if they were, such a bold claim of massive decline by the authors should have been accompanied by a profound discussion of possible confounding factors that could have produced the result, with explanation as to why all could be considered far less plausible than a major decline in the local otter population. Several factors could, if not constant across years, have major effects on 'number of spraints' counted. They include the amount of survey effort, the spatial distribution of survey effort and the seasonal distribution of survey effort; and change in who undertakes the survey. These, and other factors, could have major effects on the number of spraints found which could dwarf any actual change in the number of spraints present to be found, and thereby if not taken in account provide a misleading result and conclusions. Without information on these and other factors, it is not possible to tell whether otter spraints were genuinely lower in number in 2017 than in 2004-2009, or not.

A claim of population change extrapolated to a larger area, as here, requires that the surveyed parts of the island are representative of the island as a whole. This is not discussed, even though they surveyed only a small part of the island. As Neotropical otters can have a 15-30 km linear home range (personal observation; Trinca et al., 2013), the otters in the whole island could be considered to be part of one single population, and one single otter can swim from mainland to island and vice-versa. The otters in that island have behaviour to forage in salt water, and in other areas of Santa Catarina province there are occurrences in rocky shores and other farther islands

(Carvalho-Jr et al., 2012, 2013). In these circumstances, of assessing a non-closed population, application of the IUCN Red List criteria requires consideration of the 'rescue effect': that the extinction risk of the sub-global population under consideration is reduced because of exchange with adjacent populations. IUCN (2012) stated that "Normally, such a downlisting will involve a one-step change in category, such as changing the category from Endangered (EN) to Vulnerable (VU)... if the region is very small and not isolated by barriers from surrounding regions, downlisting by two steps may be necessary... If it is unknown whether or not extra-regional populations influence the extinction risk of the regional population, the category [provisionally assigned before consideration of rescue effect] should be kept unaltered". Carvalho-Jr et al. (2021) did not discuss or even, it seems, consider, this aspect of applying IUCN Red List Criteria, and, even if there were credible evidence of a decline of the claimed magnitude (which there is not; see above), the appropriate IUCN Red List category could be any of Vulnerable, Endangered, or CR.

We recognize the effort of Carvalho-Jr et al. (2021) in providing the use of this important tool, the IUCN Red List criteria, to define the population status of Neotropical Otter in Santa Catarina Island, Southern Brazil. However, the flaws above mean that no credence should be attached to the claim that the island population warrants a categorisation as CR. Based on the information available to the public, the appropriate category cannot be suggested.

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RÉSUMÉ

UTILISATION ERRONEE DE LA TERMINOLOGIE DE LA LISTE ROUGE DE L'UICN POUR DÉFINIR LE STATUT LOCAL DE CONSERVATION DE LA LOUTRE A LONGUE QUEUE - en réponse à Carvalho-Jr et al. (2021)

Les Lignes directrices de la Liste rouge de l'UICN sont une ressource importante pour nous aider à définir le statut de conservation mondial, national et même régional de notre biodiversité. Cependant, comme pour tous les modèles, si les hypothèses sous-jacentes aux critères ne sont pas valides ou si les directives d'application des critères ne sont pas suivies correctement, des résultats erronés seront engendrés. Carvalho-Jr et al.

(2021) ont utilisé à mauvais escient les lignes directrices de la Liste rouge de l'UICN pour définir le statut local de la loutre à longue queue, Lontra longicaudis, sur l'île de Santa Catarina, située en province de Santa Catarina, au Brésil. La catégorie générée, «en danger critique», est sans fondement, pour de multiples raisons.

RESUMEN

USO ERRÓNEO DE LA TERMINOLOGÍA DE LA LISTA ROJA DE LA UICN PARA DEFINIR EL STATUS LOCAL DE CONSERVACIÓN DE LA NUTRIA NEOTROPICAL – en respuesta a Carvalho-Jr *et al.* (2021)

Las Directrices de Uso de las Categorías y Criterios de la Lista Roja de la UICN son un importante recurso para guiar la deinición del status de conservación global, nacional e incluso regional de nuestra biodiversidad. Sin embargo, como con todos los modelos, si los supuestos subyacentes a los criterios no son válidos, o las directrices para aplicar los criterios no son seguidas correctamente, entonces se van a generar resultados erróneos ó engañosos. Carvalho-Jr et al. (2021) utilizaron incorrectamente las Directrices de la Lista Roja de la UICN para definir el status local de la Nutria Neotropical *Lontra longicaudis* en la Isla de Santa Catarina, provincia de Santa Catarina, Brasil. La categoría generada, En Peligro Crítico, no tiene fundamentos, por múltiples razones.

R E P O R T

THE FIRST PHOTOGRAPHIC RECORDS OF THE EURASIAN OTTER *Lutra lutra* IN SYRIA: ITS MYSTERIOUS OCCURRENCE IS REVEALED

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Abstract: The Eurasian Otter (*Lutra lutra*) has been recorded only rarely in Syria. Known only from few scattered localities in the eastern part of the country, but its current status is extremely unclear. Previous field observations and local communities' information lack photographic documentation. In June 2019 and December 2020, two Eurasian otters were killed in the Lower Syrian Euphrates valley; single Eurasian Otter was killed in Deir ez-Zor and another in Ar Raqqah provinces in eastern and northern Syria, respectively. Moreover, in January 2020, two dead Eurasian otters were found in the mountainous costal region in Latakia Province in extreme northwestern Syria. These current records represent the first photographic documentation for the persistence of the Eurasian Otter in eastern Syria, and remarkable extensions of known range in the northern and northwestern regions. Furthermore, the species distribution range in the neighboring countries was also reviewed.
Citation: Aidek, A., Baddour, F.S. , Ibrahim, N.N. and Al-Sheikhly, O.F. (2021). The First Photographic Records of the Eurasian Otter *Lutra lutra* in Syria: Its Mysterious Occurrence is Revealed. *IUCN Otter Spec. Group Bull.* **38** (5): 258 - 266
Keywords: Eastern Syrian plateau; Euphrates River; Eurasian Otter; Hunting and trapping; Mediterranean coast.

THE STATUS OF EURASIAN OTTER IN SYRIA

Syria (32° to 37° N and 35° to 42°E) lies at the eastern side of the Mediterranean Sea with a coastline of a183km. It has two mountain chains parallel to the coastline; a rift between the chains is an extension of the Red Sea. Besides elevated grounds, dry steppes, arid lands and semi-deserts are the main habitats of the Syrian plateau which occupies the majority (*ca*. 55%) of the country's area with elevation of about 500m a.

s. l.. The Euphrates, Tigris, and Orontes are the major rivers crossing Syria (Barkoudah et al. 2002; Aidek 2010) (Fig. 1).

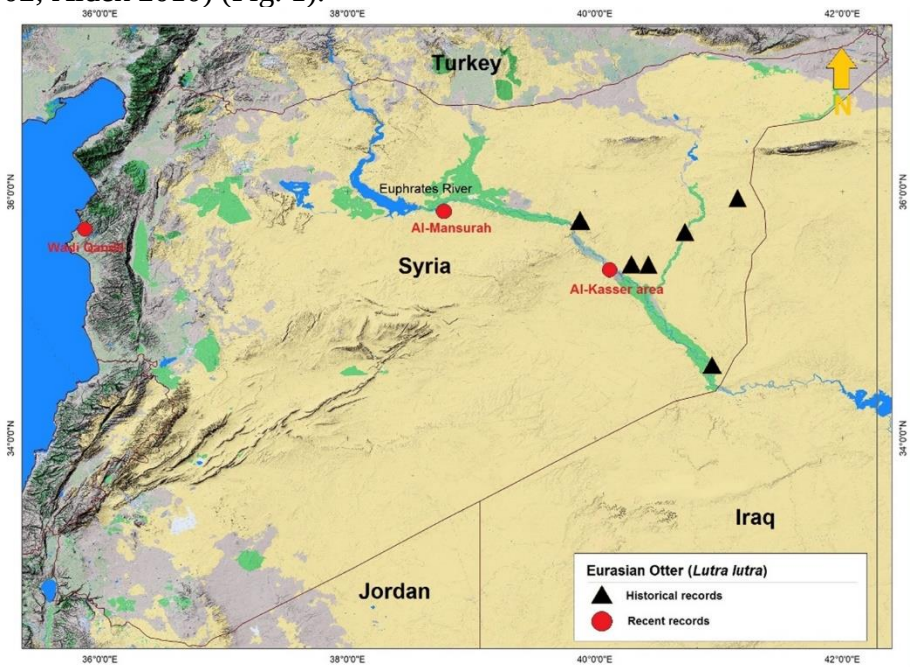

Figure 1. The known geographical distribution range of the Eurasian Otter (*Lutra lutra*) in Syria with historical and recent records.

The Eurasian otter (*Lutra lutra*) is one of the most widespread otter species, inhabiting a variety of habitats in Western Europe, across most of the Palearctic, down to India, Southeast Asia, North Africa, and the Middle East (Roos et al., 2015; Duplaix and Savage, 2018; Yoxon and Yoxon, 2019; Al-Sheikhly et al., 2020).

The current status of the Eurasian Otter in Syria is not well known, but it seems to be extremely rare. Naderi et al. (2017) indicated that the species is endangered across the Middle East and Turkey; rare and isolated in Syria and Jordan and becoming rare in Iraq. Most literature records are of sporadic field observations and anecdotal interviews with local communities. Foster-Turley and Santiapilliai (1990) and Conroy et al. (1998) indicated that the Eurasian otter occurs in rivers of the neighboring countries and is therefore probably present in Syria; but no recent information was available to them. Data collected between 1989 and 1998 appear to indicate that a considerable population of Eurasian otters is still present in the Lower Syrian Euphrates valley in northeastern and eastern Syria, an area comprising the Euphrates River, its tributary the Khabur River and the border with Iraq (Masseti, 2009; Al-Sheikhly et al., 2020). Records from Doura Europos and Deir ez (el)-Zor in eastern Syria were presented by Jacques (1998) who indicated that the species's population has declined over the last 40 years mainly due to hydrological schemes at Deir-ez-Zor during and following the construction of the Tabaqa Dam (Lake Assad). Later on, the occurrence of the Eurasian Otter was reported from an island in the Euphrates at Doura Europos, Halabiyyeh, and from Tell Sheikh Hamad, along the Khabur River, all sites in the district of Deir-ez-Zor (Kock et al., 1994; Uhrin et al., 2000). Shihab (2002) referred to the possible occurrence of the Eurasian otter in the Al-Yarmouk valley, Al-Asi River, Euphrates River, and around major lakes and dams of Tigris River in northeastern Syria. Two stuffed specimens (one adult and one sub-adult) had been captured at Basamfasal, a suburb of Deir ez-Zor along the Euphrates River up to the north of Abu Kamal (at the Iraqi border; see Masseti 2001, 2004). However, the easternmost claimed records seem

doubtful as the habitat of that region is primarily semi-deserts. The species is reported from Al Mayaddin and Doura Europos, but it was absent in the northwestern area of Raqqa "Ar Raqqah" (Masseti, 2009). Furthermore, Murdoch and Aidek (2012) mentioned that few Eurasian otters are still present along the Lower Syrian Euphrates, but presented no physical evidence confirming their occurrence. Moreover, Daoud and Khalil (2018) indicated that the Eurasian Otter seems to be confined along the Euphrates River in eastern Syria to only few localities: no records were generated during recent surveys (Fig. 1).

The status of the Eurasian Otter in the neighboring countries is also not fully unknown. In Turkey, the Eurasian Otter population has been notably reduced over the past 50 years (see Eroglu, 1994); however, it has been recorded throughout west and east of the country, and around the Black Sea (MacDonald and Mason, 1994; Toyran and Albayrak, 2019). A recent increase in the northeastern population was attributed to the development of aquaculture (Conroy et al., 1998). In Iraq, the species occurs in almost all suitable aquatic habitats along the Tigris and Euphrates Rivers, mainly in the southern parts of the country (Mesopotamian marshes), although few records are known from central and the north (Kurdistan) (Harrison and Bates, 1991; Al-Sheikhly and Nader, 2013). Recently, a remarkable range extension was noted in extreme northwestern Iraq close to the eastern Syrian border (Al-Sheikhly et al., 2020). In Jordan, the species is restricted to the River Yarmouk and River Zarka and is still thriving in the River Jordan, yet its population size is not well known (MacDonald and Mason, 1994; Reuther et al., 2001; Yoxon and Yoxon, 2019). In Lebanon, the Eurasian Otter was recorded at Ammik Swamp, suspected in the western Bekaa valley and in the River Litani, and recorded from Hima Anjar (Hima Kfar Zabad, Anjar, Beqaa Valley) (Lewis et al., 1968; Harrison and Bates, 1991; Masseti, 2009; Loy et al., 2016; Ramadan-Jaradi et al., 2019). The Eurasian Otter was recorded from the shores of Lake Tiberias, Lake Huleh, the Sea of Galilee, the Lower reaches of the Jordan River, Dan, the Beteha Valley, Tirat Zevi, Bet She'an Valley, near Akko on the northern coastal plain and in the borders with Lebanon (MacDonald et al., 1986; Yom-Tov, 1986; Harrison and Bates, 1991; Dolev et al., 2006). However, the Eurasian otter population has dramatically declined since 1960s, and fewer than 100 individuals might remain (see Yom-Tov, 1986; Shalmon, 1994; Reuther and Dolev, 2000; Dolev and Perevolotsky, 2004). The species has disappeared from the southern coastal plain and it is now restricted to En Nimfit Nature Reserve in the northern coastal plain, with a resident population in the Golan Heights (Illani, 1987; 1988). A single record from the Zvulun Valley and Carmel coastal area suggests the existence of a remnant population along the coast, which might be now extinct (Dolev et al., 2006; Guter et al., 2006).

RECENT RECORDS IN SYRIA

The persistence of the Eurasian Otter at two localities in the Lower Syrian Euphrates valley of the eastern desert plateau in Deir ez-Zor Province with additional new localities in the northern and northwestern Syria in Ar Raqqah and Latakia provinces is reported here. These records are based on photographs of dead specimens supplied by fishermen and supported by information from local communities in Deir ez-Zor and Ar Raqqah provinces, and by recent field surveys conducted in the coastal region in Latakia Province (Fig. 1).

An adult Eurasian Otter (sex unknown) was photographed by a local fisherman along the western bank of the Euphrates River in the Al-Kasser area (35°21'N 40°07'E), facing a river island called Hawaeijt Kate'e, to the north of the main city of Deir ez-Zor Province in June 2019 (Fig. 2A). As has happened in the Upper Euphrates River Basin

inside Iraq (see Al-Sheikhly et al., 2020), that Eurasian otters had reportedly drowned in a drift net set by local fishermen, here in the main watercourse of the Euphrates River. An adult Eurasian Otter (sex unknown) was deliberately killed by local fisherman using a hunting rifle (12mm calibre) on the western bank of the Euphrates River in Al-Mansurah (35°51'N 38°44'E), *ca*. 16 km south of Tabaqa Dam (*ca*. 140 km to the northwest of the Al-Kasser area) in Ar Raqqah Province in December 2020 (Fig. 2B).

Both sites are situated within the Middle East Steppe Ecoregion (see Olson et al., 2001) and the general habitats are mixture of cultivated annual crops and vegetable farms irrigated by well-vegetated canals and water management schemes flanking the steep muddy banks of the Euphrates River. One of the most important habitats of the Lower Syrian Euphrates valley is provided by the many islands fringed by Common Reed *Phragmites australis* and Common Bulrush *Typha latifolia* that have formed as a result of the Euphrates River's declining flow; these islands are known locally as "hawaeij". The vegetation is comprised mainly of riparian species mainly Tamarisk *Tamarix* shrubs, Euphrates Poplar *Populus euphratica*, Willow *Salix* trees, and scattered Date palm *Phoenix* sp. orchards (Fig. 2C & D).

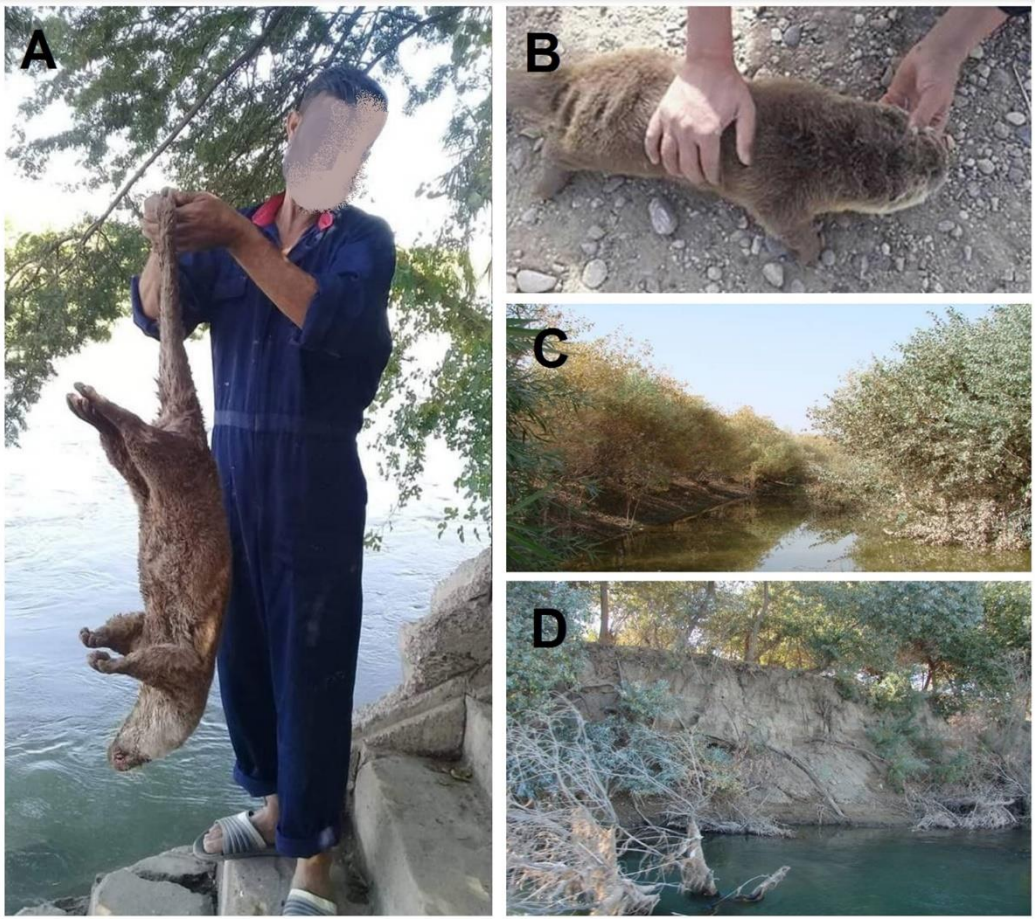

Figure 2. A: A local fisherman holding a dead adult Eurasian otter (*Lutra lutra*) in the Al-Kasser area, Deir ez-Zor Province; B: a killed Eurasian otter in Al-Mansurah, Ar Raqqah Province; C–D: the general landscape of the Euphrates River banks. Photos © Ahmad Aidek

Recent field surveys in the coastal region of the Mediterranean Sea in northwestern Syria recorded two Eurasian otters. An adult female was found dead by Firas Baddour on the eastern bank of a narrow mountainous stream of the Wadi Qandil plain to the south of the village of Wadi Qandil (35°42'N 35°52'E), *ca*. 3.5 km from the seashore in Latakia Province on 27 January 2020 (Fig. 3A & B). Interviews with local villagers

indicated that another otter (unknown sex) was found dead, decomposed, and buried by the villagers at the same place later on. The dead otters did not show any signs of physical injuries such as hunting wounds. The villagers indicated that pesticides (mainly insecticides) are widely used in the adjacent farms. These might have contributed to both otters' deaths. Moreover, the villagers also indicated that they believe otters raid their poultry and livestock, so are vulnerable to poisonous baits set for stray dogs.

The general landscape of the site resembles the Eastern Mediterranean Forest Ecregion (Olson et al., 2001) of the mountain forests and wooded valleys infiltrated by narrow freshwater streams, creeks, and springs which extending along the northwestern Syrian coast. Cultivated fields of citrus fruit and vegetable farms, Pine *Pinus* sp., Olive *Olea europaea*, Oriental Alder *Alnus orientalis*, and Oriental Plane *Platanus orientalis* trees lined with hedges are extending along the meadows of Wadi Qandil plain (Fig. 3C).

Figure 3. Adult female Eurasian otter (*Lutra lutra*) in Wadi Qandil plain in Latakia Province, A: ventral view; B: Dorsal view; C: general landscape of the site. Photos © Firas S. Baddour

CONCLUSIONS

Based on the very few historical records, dated from 1989–1998 (see Masseti, 2009), the current status of Eurasian Otter in the Lower Syrian Euphrates valley in eastern Syrian plateau remains enigmatic. Jacques (1998) suggested that if Eurasian Otter was present in the Euphrates River in eastern Syria, then it might have come from up- or downstream reaches, in bordering countries. Furthermore, Masseti (2009) reported that a small population of the Eurasian otters is still present in eastern Syria between the confluence of the Euphrates with the Khabur River and the border with Iraq. Al-Sheikhly et al. (2020) reported the occurrence of the Eurasian Otter in the Euphrates River in the vicinities of Anah and Rawa on extreme northwestern Iraq close to the Syrian borders. Al-Sheikhly et al. (2020) also mentioned that two distinct isolated populations of the Eurasian Otter might be present in the Upper Euphrates River Basin across the area of western Iraq and eastern Syria where the species appears to be rare. Based on the above, the current records represent the first photographic documentation for the species's persistence in eastern Syria, and a remarkable extension of known range to the north.

The finding of the Eurasian otter in the coastal region is significant; the occurrence of the species in the northwestern Syria has never been reported. The specimens of Wadi Qandil plain represent the first documented record of the occurrence of the Eurasian Otter in the coastal region of the Mediterranean Sea in northwestern

Syria. This suggests that a small isolated population may inhabit northwestern Syria, possibly originating from the Anatolian population in southern Turkey (see Thol-Schmitz, 2004) but this requires further investigation. In spite of the increase of the knowledge on the species' distribution in recent years, however, the current records suggest the possible occurrence of at least two (eastern and northern) distinct subpopulations and mark out a significant expansion of the species' known range in northwestern Syria.

The Eurasian Otter is occupying a large geographic range where its global population is increasing in some parts, and in much of it broadly stable. However, in other parts, the species facing a dramatic decline due to man-made impacts on aquatic ecosystems, the lack of information from many regions of its range, and the sensitivity of the species to sudden changes in threats; therefore, it has been listed as Near Threatened by the IUCN Red List (Roos et al., 2015). In the Middle East, the Eurasian Otter populations are highly endangered due to illegal killing, dam construction, water shortages and pollution, marshland drainage, and lack of legal protection or law enforcement (Duplaix and Savage, 2018). The species is endangered and declining in Turkey and rare and isolated in Syria, Jordan, and is becoming extremely rare in Iraq (Naderi et al. 2017; Al-Sheikhly et al. 2020). A total of 30,000 otters are killed in Turkey annually and the species is targeted where/whenever possible in Iraq due to conflict with fishermen and for the fur trade (Smit and van Wijngaarden, 1976; Conroy et al., 1998; Al-Sheikhly and Nader, 2013; Al-Sheikhly et al., 2014). Moreover, strangulation and drowning in drift nets and other fishing nets has been highlighted as a major cause of mortality of Eurasian otters across multiple countries (Reuther and Hilton-Taylor, 2004; Roos et al., 2015). In Syria, Eurasian otters seem to be threatened by direct persecution which is evident by our recent observations; however, further information is needed to be sure. Aidek (2010) indicated that illegal hunting (using of electrocution, dynamite, and poisoning) and pollution are the major threats to the wildlife of the Lower Syrian Euphrates. In western and central Europe, pollutants such as the organochlorines dieldrin and DDT/DDE, polychlorinated biphenyls (PCB), and the heavy metal mercury, were harmful to otters (Roos et al. 2012). In regard to the Eurasian otter's vulnerability to climate change, consistent losses are predicted for the species's southern portion of range, especially in Central Asia, eastern Himalaya, China, South East Asia, North Africa, and the Middle East (Duplaix and Savage, 2018). In sum, urgent conservation actions are warranted for Eurasian otter populations throughout the Middle East and Iraq (Al-Sheikhly et al., 2014). Nowadays, reflecting current unrest and very poor coverage by researchers, data on the mammalian fauna in the Lower Syrian Euphrates valley are scarce and rarely available (Murdoch and Aidek, 2012). However, further field surveys and *in situ* monitoring is required to reveal the full status and, notably, the main threats of this species in Syria, especially in southern regions that adjacent to Jordan and Lebanon where a small population may still present.

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RÉSUMÉ LES PREMIERS ENREGISTREMENTS PHOTOGRAPHIQUES D'UNE LOUTRE EURASIENNE *Lutra lutra* EN SYRIE: SA PRÉSENCE MYSTÉRIEUSE EST RÉVÉLÉE

La loutre eurasienne (*Lutra lutra*) n'a été signalée que rarement en Syrie. Bien que connue exclusivement de quelques localités dispersées dans la partie orientale du pays, son statut actuel est extrêmement peu clair. Les observations de terrain précédentes et les informations des communautés locales manquent de document photographique. En juin 2019 et décembre 2020, deux loutres eurasiennes ont été tuées dans la vallée du Bas-Euphrate syrien ; une seule loutre eurasienne a été tuée à Deir ez-Zor et une autre dans les provinces d'Ar Raqqah, dans l'est et le nord de la Syrie, respectivement. De plus, en janvier 2020, deux loutres eurasiennes mortes ont été trouvées dans la région côtière montagneuse de la province de Latakia, dans l'extrême nord-ouest de la Syrie.

Ces enregistrements actuels représentent le premier document photographique de la persistance de la loutre eurasienne dans l'est de la Syrie et des extensions remarquables de l'aire de répartition connue dans les régions nord et nord-ouest. En outre, l'aire de répartition de l'espèce dans les pays voisins a également été examinée.

RESUMEN

PRIMEROS REGISTROS FOTOGRÁFICOS DE LA NUTRIA EURASIÁTICA *Lutra lutra* EN SIRIA: SU MISTERIOSA PRESENCIA ES REVELADA

La Nutria Eurasiática (*Lutra lutra*) ha sido registrada muy raramente en Siria. Se la conoce solamente por unas pocas localidades dispersas en la parte oriental del país, pero su status actual es extremadamente poco claro. Observaciones en terreno previas, y las informaciones de las comunidades locales, carecieron de documentación fotográfica. En Junio de 2019 y Diciembre de 2020, fueron muertas dos Nutrias Eurasiáticas en el valle del Eufrates Sirio Inferior; una fue muerta en la provincia de Deir ez-Zor, y otra en la de Ar Raqqah, en Siria oriental y del norte, respectivamente. Adicionalmente, en Enero de 2020 se encontraron dos nutrias Eurasiáticas muertas en la región costera montañosa en la Provincia de Latakia, en el extremo noroccidental de Siria. Estos registros actuales representan la primera documentación fotográfica de la persistencia de la Nutria Eurasiática en Siria oriental, y constituyen remarcables extensiones de la distribución conocida en las regiones norte y noroeste. Además, revisamos la distribución de la especie en los países vecinos.

الخلاصة

أول توثيق بالصور لكلب الماء (القضاعة الأوراسية *Lutra lutra*) في سوريا: تم الكشف عن تواجده الغامض

تتواجد القضاعة الأوراسية (*Lutra lutra*) أو ماتعرف بكلب الماء بشكل نادر في سوريا. حيث سجّل في مناطق متفرقة في القسم الشرقي من البلاد ولكن لايزال وضعه الحالي غير واضح بشكل كبير. لقد خلت المشاهدات الحقلية السابقة والمعلومات التي اخذت من السكان المحليين من أي توثيق بالصور. في حزيران عام 2019, قتل كلب الماء في محافظة دير الزور شرق سوريا, وفي كانون الأول عام 2020, قتل كلب ماء أخر في محافظة الرقة في شمال البلاد. اضافة الى ذلك, وجد اثنان من كلاب الماء نافقتين في المنطقة الجبلية الساحلية في محافظة اللاذقية في اقصى شمال غرب سوريا في كانون الثاني من العام 2020. أن التسجيلات الحالية تمثل أول توثيق بالصور يدل على أستمرار تواجد كلاب الماء في شرق سوريا مع امتداد متميز لرقعة انتشاره المعروفة الى المنطقة الشمالية والى المنطقة الشمالية الغربية. وللمزيد ايضاً, فقد تم مراجعة انتشاره في الدول المجاورة.

R E P O R T

OTTER SURVEY ALONG THE SANIBHERI RIVER AND ITS TRIBUTARIES, THE PELMA AND UTTERGANGA RIVERS IN RUKUM DISTRICT, WESTERN NEPAL

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Abstract: The distribution of three Otter species purported to occur in Nepal is poorly documented. A survey was conducted to document otter sign and habitat parameters of the Sanibheri River and its upstream tributaries, the Pelma River and Utterganga River in Rukum District, Western Nepal. The survey was conducted in the mid-hills region, on an elevation gradient from 747-2159 m asl. Otter scats were observed at 109 sites in 27 of the 71 study transects, and used as a proxy for otter presence. Otter scats were recorded in the narrow river valley of the upper swiftly flowing tributaries, as well as on the limited narrow banks of river at the lower stretches. Scat density was 2.67 scat km^{-1}, 2.38 scat km^{-1} and 1.14 scat km^{-1} for the Utterganga River, Pelma River and Sanibheri River respectively. Bank substrate was almost equally divided between boulders (27%), large stones (22%), small stones (26%) and sand and mud (24%). Low levels of human disturbance were recorded along 18% of the river, while 43% and 15% were lightly or moderately disturbed, and 17% was severely disturbed. Otter sign was scarce, but found throughout the study rivers.

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Keywords: Otters, Rukum District, Nepal

INTRODUCTION

Three species of otters, Smooth-coated otter (*Lutrogale perspicillata*), Asian small-clawed otter (*Aonyx cinereus*) and Eurasian otter (*Lutra lutra*), were historically reported to be present in Nepal (Hodgson, 1839). But apparently, at the present time, researchers have reliably confirmed only a small population of Smooth-coated otters in Nepal. Neither Eurasian otters nor Asian small-clawed otter have been observed in the wild for many years.

The Smooth-coated otter was reported from the major river basins of Nepal, the Koshi, Narayani, Karnali and Mahakali Rivers until several decades ago (Shrestha,

2003). But recently, only a small, isolated population of Smooth-coated otter is known to occur in the southwestern wetlands, primarily restricted to protected areas, i.e., Bardia National Park and Suklaphanta National Park (Acharya, 2017; Bhandari, 2019; Thapa, 2020).

Eurasian otter presence was believed to occur in mountain streams and rivers across Nepal (Acharya, 2006) with an estimated population range of 1000-4000 (Jnawali et al., 2011). The species was reported from Rara Lake of Rara National Park (Bolton, 1976) and from Begnas and Rupa Lakes in the Pokhara Valley in 1991 with photographic evidence (Acharya and Gurung 1994). But a study conducted in 2008 by Bhandari and Bijaya, (2008) found no remaining otters in Begnas and Rupa Lakes. The Biodiversity Profile Project (1996) suggested the presence of Eurasian otter in Annapurna Conservation Area, Makalu Braun National Park, Lake Rara National Park, Bardia National Park and districts of Saptari, Chitwan, Kapilvastu, Bardia, Kailali, Kanchanpur, Bajhang, Bajura, Ilam, Panchthar, Taplejung and Sankhuwasabha; same year from Kanchenjunga region (Yonzon, 1996). Shrestha (1997) reported Eurasian otter presence in eight districts in the Terai and 13 districts in the hilly region, but without the specific locations; Yonzon (1998) reported presence in West Seti River; Ghodaghodi Lake of Kailali district (Kafle, 2007); streams and streamlets in Pyaudikhola watershed and Kapringkhola watershed of Gorkha District (Kafle, 2011). All of these studies, however, were based on key informant interviews or observations of local villagers, and lacked confirmation. Basnet et al. (2020) conducted a literature review of reports of Eurasian otters in Nepal, and concluded that there have been no reports of the species in the country since 1991 that have been substantiated by photographs or genetic analysis, throwing into question prior estimates of Eurasian otter presence.

Likewise, Hodgson (1839) mentioned the presence of the Small-clawed otter in Nepal but recorded no specific location (Acharya and Rajbhandari, 2011), and there has been no documented evidence of the species presence since.

The decline of otter species in Nepal is linked to natural habitat degradation (extraction of sand and stones from river banks, shoreline vegetation removal, industrial and agricultural pollution,) reduced food availability due to overfishing and prey species poisoning, human intrusion in river banks for settlement, livestock grazing and dam construction (Acharya and Gurung, 1994; Acharya, 2006; Acharya and Lamsal, 2010; Acharya and Rajbhandari, 2011), and retaliatory killings over fish predation (Bhandari and Bijaya, 2008). The illegal trade in otter pelts is also a current threat; Savage and Shrestha (2018) reported a total of 755 otter pelts seized in Nepal in between1989 -2017. Thus, status of otters in Nepal is ambiguous and lacks proper documentation of its distribution and species identity (Acharya and Rajbhandari, 2011).

This study presents data on otter distribution and habitat along the Sanibheri River and its upstream tributaries, the Pelma River and Utterganga River, in Rukum East and Rukum West Districts, Western Nepal. The study had three objectives: 1) to document the distribution of otters in the Sanibheri River and its tributaries, 2) to characterize habitat parameters along the study rivers and, 3) to describe potential threats to otters in the study area.

STUDY AREA

The study was conducted on three rivers, the mainstream Sanibheri Bheri and two upstream tributaries, the Pelma River and Utterganga River, based on the quality of potential otter habitat assessed during a reconnaissance field study. The Utterganga River originates in the Dhorpatan Hunting Reserve and flows into the Pelma River

which in turn flows into the Sisne River, and then into the Sanibheri River. Farther downstream, the Sanibheri River and Thulibheri River join to form the Bheri River. This study was carried out from Rimnaghat (28.693301°N 82.279888°'E; 747 m asl), at the confluence of the Sanibheri and Thulibheri Rivers, continuing east to the Utterganga River and the Upper Sera hinterland (28.573783°N 82.818617°E; 2159 m asl), at the edge of the Dhorpatan Hunting Reserve. The survey covered stretches of potential otter habitat, 71 km of river, including the entire Sanibheri River stretch (51 km), 8 km of Pelma River, and 12 km of Utterganga River (Fig. 1).

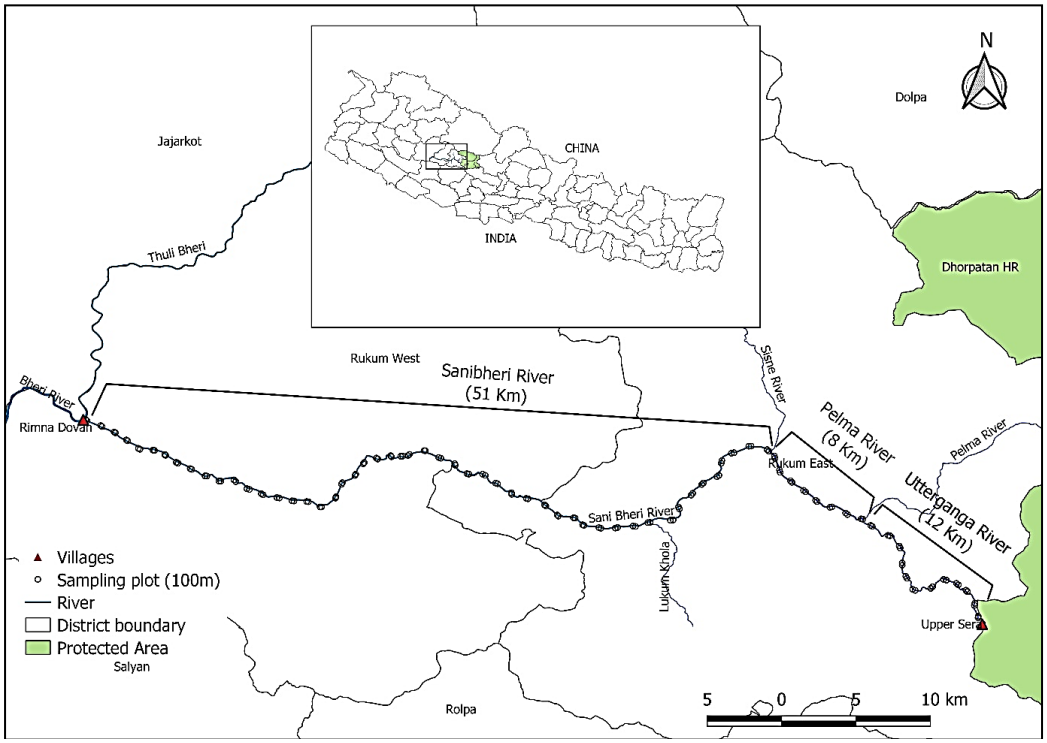

Figure 1. Map with study river stretch and sampling plots (black circles).

METHODS

Field surveys of otters often rely on the observation of tracks, scat, latrines, prey remains and dens (Mason and Macdonald, 1987; Macdonald, 1990; Wilson and Delahay, 2001). Scat distribution is here used as a proxy for otter distribution (Reuther et al., 2000; Sittenthaler et al., 2020).

A survey for otter sign was conducted for 17 days in October, 2019, after the monsoon, when water levels in the rivers drop, leaving mud and sand banks exposed to record otter sign. The entire study rivers length (71 km) was divided into 1 km transects placed along one riverbank (Jamwal et al. 2016). One plot was placed at the start of each transect, measuring 100 m (along the riverbank) by 10 m (away from the river's edge) for a total of 71 plots. Otter scat was recorded in each plot. In addition, because otter scat was scarce, it was also recorded whenever encountered along the transect, unless precluded by inaccessible terrain.

A plot or transect with presence of otter scat was defined as an "otter positive" site. Scat was identified by prey species remnants (fragments of fish, frog or crab), and a fishy odor (Macdonald, 1990) and photographs of scats were confirmed by research specialists at the IUCN Otter Specialist Group. Scats were recorded separately when more than 5 m apart (Melquist and Hornocker, 1983; Newman and Griffin, 1994). In a few sites, there were deposits of several scat, but since it was unclear if they represented

an otter latrine, these were recorded as a single occurrence. An abundance of tracks, especially dog tracks, made it difficult to confirm tracks as otter. Each scat location was marked by GPS, retrieved in Quantum Geographical Information System (QGIS) and a distribution map was produced.

Habitat variables were also recorded in each plot. River width, or distance between banks, was visually estimated in the field due to the lack of a range finder, but later validated using Google Earth. Bank slope was measured with a clinometer (Nawab and Hussain, 2012). Mean vegetation cover and mean substrate attributes were calculated by averaging the midpoint of each percent category. Habitat was characterized in categories by: 1) percent vegetation cover, and 2) percent bankside substrata. Vegetation was estimated by percent cover class, 1) 0-5% or nearly bare, 2) 5-25% or lightly vegetated 3) 25-50% or moderately vegetated, 4) 50-75% or mostly vegetated and, 5) 75-100% or heavily vegetated. Substrate attributes were binned by diameter category as 1) sand (< 5 mm), 2) pebbles (5 mm-5 cm), 3) small stones (5-50 cm), 4) large stones (50-100 cm), and 5) boulders (>100 cm) (total percentage may not equal 100% because of use of mid-points of values in calculations). Habitat disturbance (abundance of dog and cow tracks, trash, and proximity to houses) was recorded as none, light, moderate or severe (Jamwal et al. 2016). Potential threats (habitat loss/fragmentation, excavation and mining, infrastructure development, human disturbance and water quality) were noted and broadly characterized.

Since few scats were observed in the plots, scat density per kilometer (scat km^{-1}) was calculated for each study river stretch separately (Table 1). Total scat recorded throughout the study rivers was correlated against bank substrate parameters and vegetation cover using Pearson's correlation test.

RESULTS AND DISCUSSION

Spatial Distribution of Scats

Most otter species are difficult to observe (Mason and Macdonald, 1986; Macdonald, 1990) and field surveys are frequently based on observed otter sign, usually on the presence of scat (Macdonald, 1990). Even though the validity through tracks and scats have been questioned and number of otter sign is not easily translated into a measure of abundance, scat is a useful marker for studying otter presence and distribution (Ruiz-Olmo and Gosálbez, 1997). No direct observation of otters was made during the survey, and scat is the only otter sign reported here (Fig. 2). Along the 71 km of riverbank surveyed, scats were recorded at 109 sites in 27 transects. The remaining 44 transects were devoid of scat or other otter sign. Thirty-eight % of the transects were thus otter positive and 62% otter negative. Of the 109 scats counted, only 3 scats were observed in the plots and 106 scats, were observed outside the plot in the transects. Of the 109 scats, 58 (53%) were located on the banks of the Sanibheri River, 19 (17%) along the Pelma River and 32 (29%) along the Utterganga River. The scat density along Utterganga River (2.67 scat km^{-1}) and Pelma River (2.38 scat km^{-1}), were both somewhat higher than along the Sanibheri River (1.14 scat km^{-1}) (Table 1). While the data gives some indication of the distribution of otters, no direct relationship can be assumed between number of scat and the number of animals present, although higher scat density does suggest more otters present.

Along the downstream reach, scat distribution was absent or irregular and disjunctive. Scats in the Chhinkhet area (A in Fig. 3) and Chisapani-Dhape area (B in Fig. 3) were scarce, with 4 scats in 2 km of river (Transects SB27 & SB28 in Fig. 4) and 15 scats in the 4 km of river (Transects SB18 - SB21 in Fig. 4) in Chisapani-Dhape

area. Fewer otter signs may be found where populations are at low levels or fragmented (Macdonald, 1990) as in the Chinkhet and Chisapani-Dhape areas.

Figure 2. Varied shapes of scat observed in the study area.

Table 1. Study rivers, survey length, otter positive and negative transects, scat count and scat density.

Study River	River length (km)	Transect		Scats		Scat density (Scat km^{-1})
		Otter Positive	Otter Negative	Number	Percent	
Sanibheri	51	13	38	58	53%	1.14
Pelma	8	5	3	19	17%	2.38
Utterganga	12	9	3	32	29%	2.67
Total	71	27	44	109	100%	

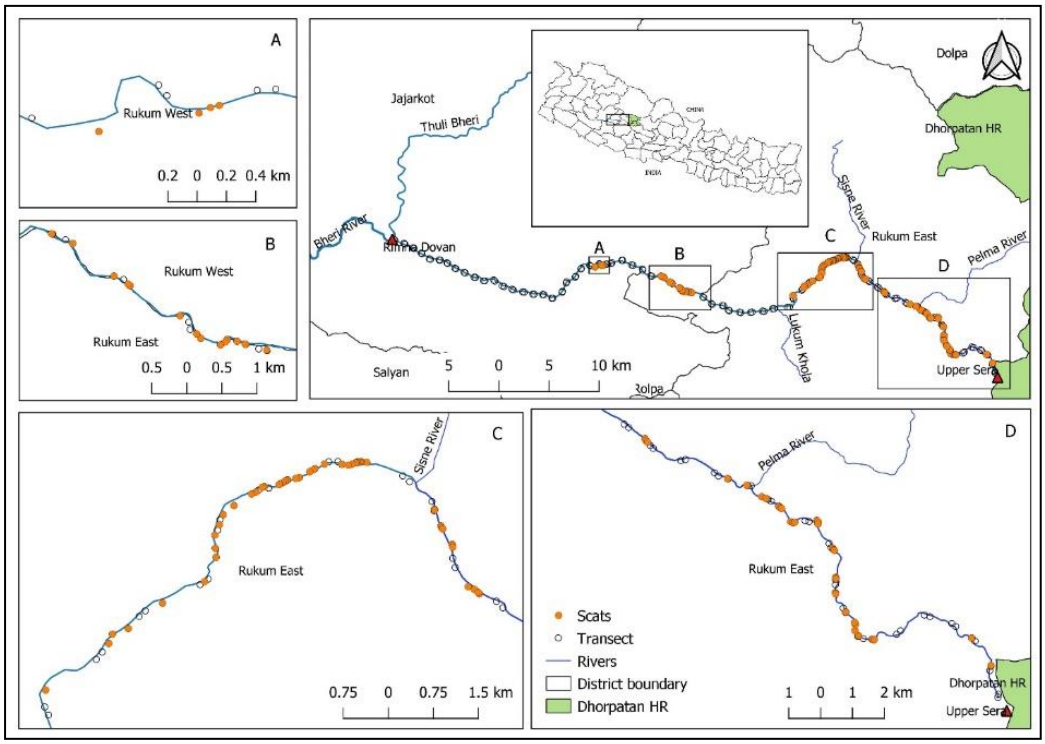

Figure 3. Map showing otter scat sites (orange circles); A) Chhinkhet area, B) Chisapani-Dhape area, C) Naighat-Jamma bagar area, and D) Rangsi Triveni-Upper Sera area.

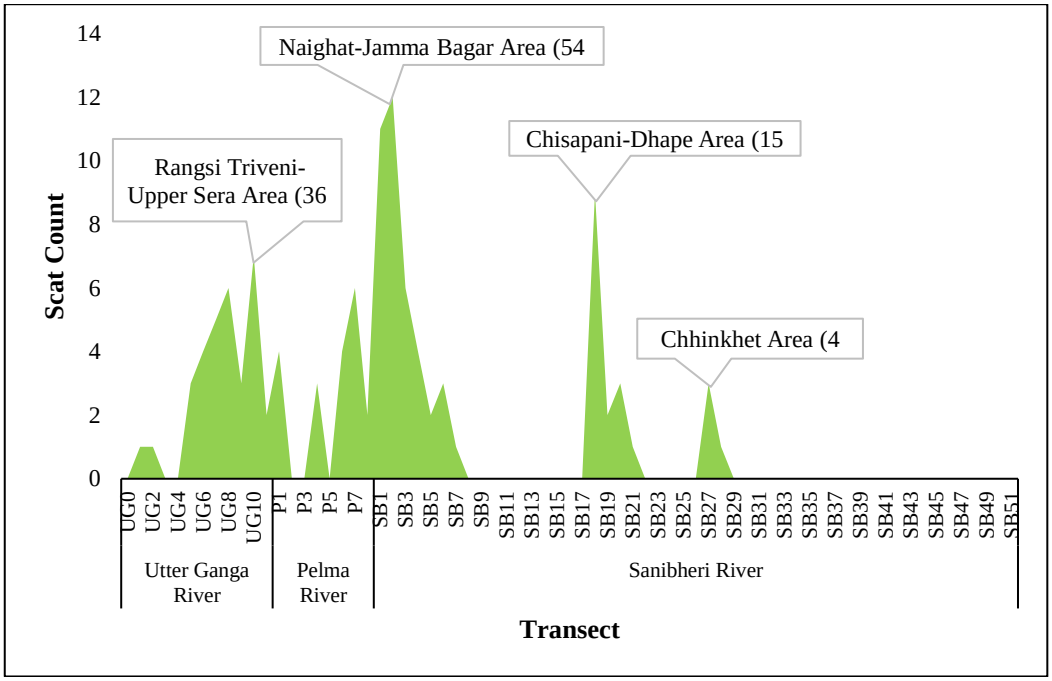

Figure 4. Spatial distribution and number of scats along surveyed rivers.

Scats were relatively more numerous in the upstream reaches. A total of 54 scats were found between the Naighat-Jamma Bagar area (C in Fig. 3) from the 11 km river segment (Transect P4, P6-P8 & SB1-SB7 in Fig. 3) with the most concentrated scats at the Naighat area (Transects-SB1, SB2 & SB3 in Fig. 3). Further upstream, 36 scats were found between the Rangsi Triveni-Upper Sera area (Box-D in Fig. 3) from 10 km (transects P1, UG1, UG2 & UG5-UG11 in Fig. 4). Scats along the surveyed rivers were

most abundant in areas with precipitous geographic terrain that constrained the swiftly flowing river into a narrow valley with bank slopes between 30-40° and riverbanks width between 20-80 m (Fig. 5).

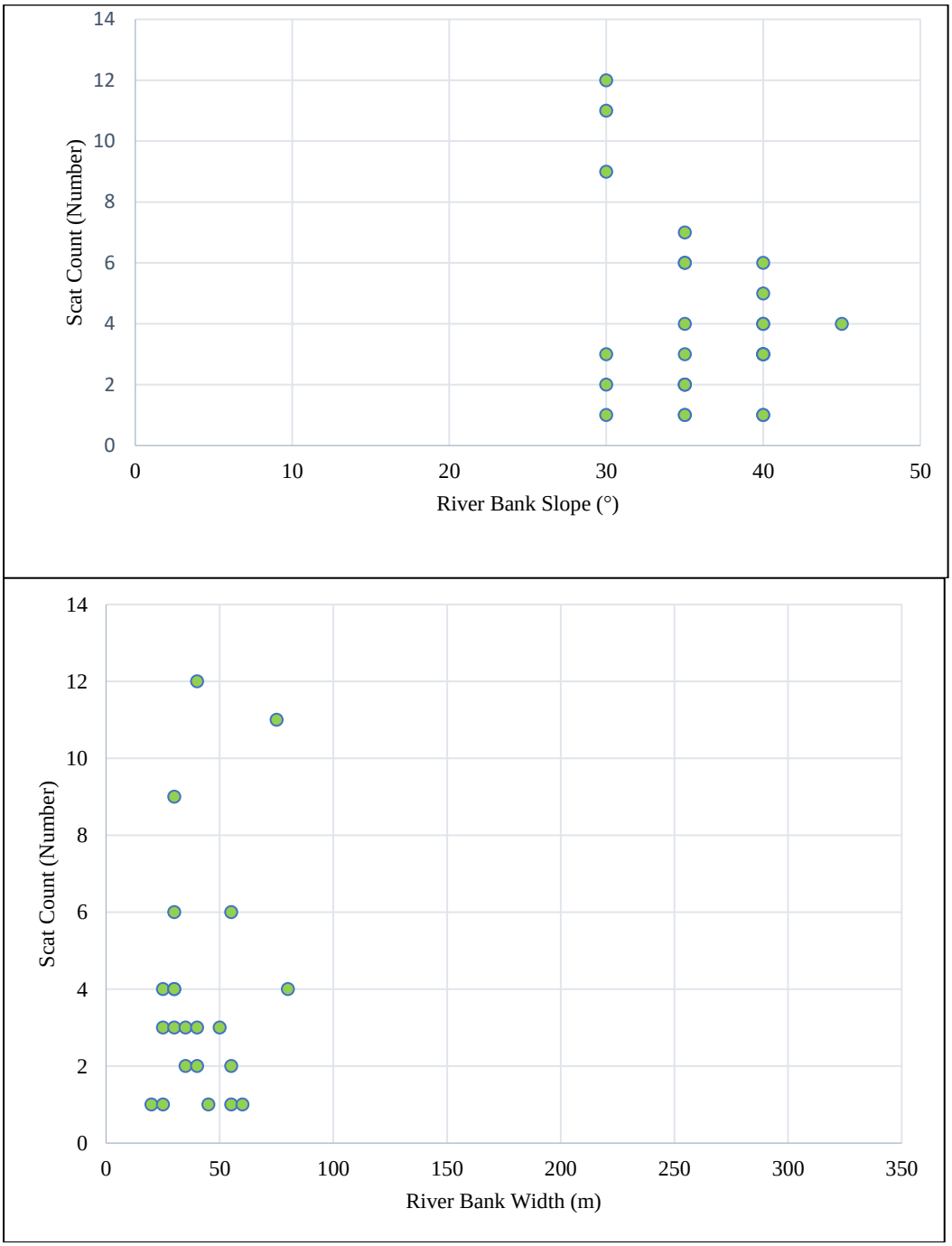

Figure 5. Distribution of scat varied by riverbank slope (above) and river bank width (below) along the surveyed river.

The survey recorded scats from 914 m asl in Chinkhet area to 2123 m asl in the Taka area (between 747-2159 m asl). Half of all scats were found between 1280-1491m asl; the other half were sparsely distributed between 975-1280m asl or 1491-1768m asl. No scats were found in the lower elevation below 975 m and above 1768 m.

Habitat Parameter Characteristics

The river width in the lower stretches was significantly wider than in the upper stretches, varying from 20m to 320m, with about half of the river width ranging between 35-180m. A quarter of the rest of the river ranged between 20-35m and the remaining quarter between 180-320m. Riverbank slope varied from 15° to 45° with about half between 20°-35°. A quarter of the rest of the bank slope was between 15°-20° and the remaining quarter between 35°- 45°.

Bank vegetation ranged from subtropical plant species along the downstream stretches and temperate vegetation upstream. Downstream vegetation was dominated by *Shorea robusta*, *Acacia catechu*, *Dalbergia sissoo*, *Sapium insigne*, *Eupatorium adenophorum.*, *Diploknema butyraceae,* and *Imperita cylindrica;* upstream vegetation included *Woodifordia fruticosa*, *Albizia procera.*, *Pinus roxburghii*, *Schima wallichhi*, *Ficus semicordata*, *Debregaesia longifolia. Himalayacalamus asper,* and *Salix sp*. A majority (65%) of the banks of the entire study area is nearly bare, 26% is lightly vegetated, and 9% is moderately vegetated. Bank substrate percentages were: 24% sand and mud, 26% small stones, 22% large stones and 27% boulders. Human disturbance was estimated as: 18% none, 43% light, 15% moderate, and 17% severe.

Otters are sensitive to habitat characteristics (Hung and Law, 2016). Throughout the study area, otter scats were positively correlated with large flat rock and boulders (r=0.69, $P<0.05$) (Table 2). Otters prefer sites with vegetation or large boulders for protected resting sites and large flat rocks on which they consume their prey (Jamwal et al., 2016). Chettri and Savage (2014) noted positive correlation of otter sign with boulders (r=0.94) and with vegetation (r=0.52). But this study obtained a weak correlation between scats and vegetation cover (Table 2), perhaps because the majority of riverbank vegetation cover is nearly bare.

Table 2. Correlation between scat presence and bank substrate and bank vegetation cover ($P<0.05$)

Bank Substrate	Pearson's Correlation (r)	Significance
Sand and Mud	-0.47	0.00
Small Stones	-0.50	0.00
Large Stones	-0.03	0.77
Rock & Boulders	0.69	0.00
Bank Vegetation cover		
0-5%	-0.15	0.38
5-25%	0.15	0.39
25-50%	0.03	0.89

Human disturbance can play an important role in the distribution of otters. The upstream reaches of the Sanibheri River watershed are relatively undisturbed, and human settlement is sparse and distant from the river (Fig. 6). In contrast, the downstream stretches are characterized by a wide valley, with a meandering, low-velocity river divided into braided channels. Human settlements are common in the flat terrain, as is development, including the ongoing construction of a highway adjacent to the riverbank. Dirt and gravel are dumped onto the riverbanks, degrading water quality and burying otter habitat. Mining, fishing and grazing are also more common in the downstream reaches (Fig. 7). Planned hydropower plants are a threat to otter survival on the upper stretches. Thus far, three hydropower projects have been approved for construction in Sanibheri River by Department of Electricity Development, Nepal (DoED, 2021). Local villagers also report that otter habitat may be affected by the occasional shifting of the river course.

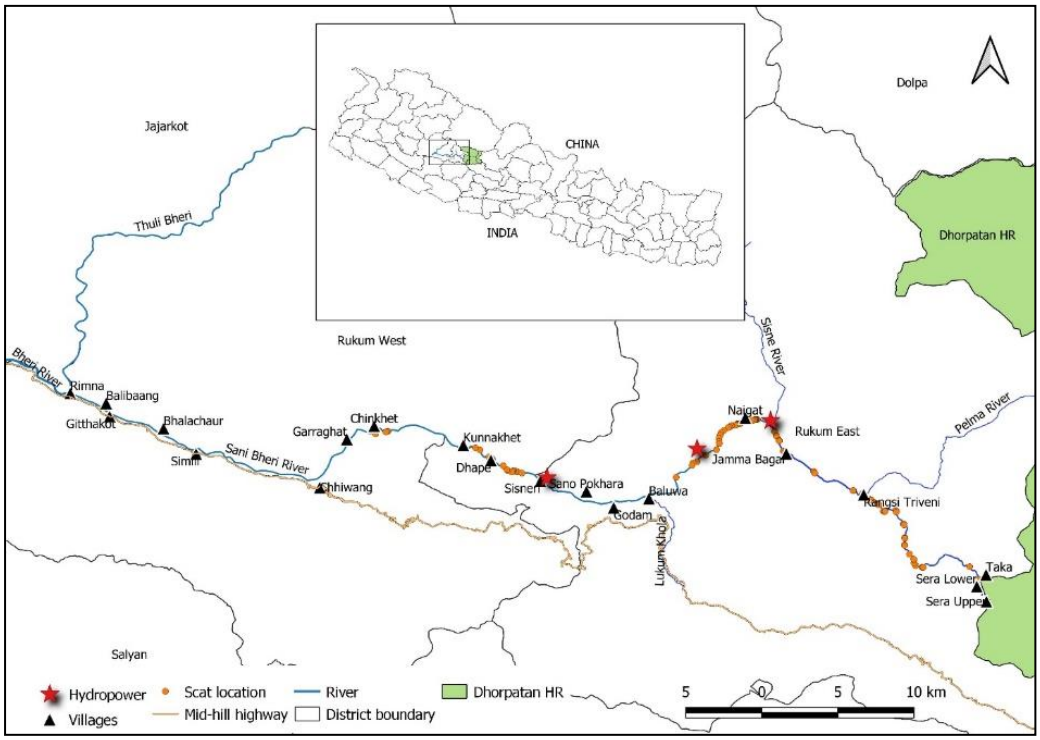

Figure 6. Human settlements (black triangles), proposed hydropower (red star) and observed otter scat (orange circles) along the study rivers.

Figure 7. Human activities observed at lower reaches of study river: A) fishing, B) highway under construction, C) grazing in the flood plain, and D) stone crusher at the riverbank.

CONCLUSION

Along the Sanibheri River and its upstream tributaries, the Pelma and Utterganga Rivers, observation of otter scat suggests the presence of otter in all three rivers. Scats observed along the upstream reaches were frequent, whereas scats along the downstream reaches were disjunctive or absent. Human disturbance appears to have

affected the suitability of the habitat of the lower stretches, while the upper stretches appear to offer better otter habitat. Habitat destruction, fishing intensity, mining, road construction, and possibly low prey abundance appears to limit otter populations along these rivers, particularly in the downstream reaches. The otter species present was not identified, but the elevation and fast-flowing river current suggests that the species may be Eurasian otters (Harris, 1968; Mitchell, 1977; Foster-Turley et al., 1990). Genetic analysis of scats is needed to confirm the species found in this study area.

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RÉSUMÉ

SUIVI DE LA LOUTRE LE LONG DE LA RIVIERE SANIBHERI ET DE SES AFFLUENTS, LES RIVIERES PELMA ET UTTERGANGA DANS LE DISTRCT DE RUKUM, A L'OUEST DU NEPAL

La répartition de trois espèces de loutres censées se produire au Népal est mal connue. Une étude a été menée pour documenter les indices de présence de loutre et les paramètres de l'habitat de la rivière Sanibheri et de ses affluents en amont, les rivières Pelma et Utterganga dans le district de Rukum, à l'ouest du Népal. Le relevé a été réalisé dans la région des moyennes collines, sur un gradient d'altitude de 747 à 2.159 m. Des épreintes de loutres ont été observées sur 109 sites dans 27 des 71 transects de l'étude, et utilisés comme indicateur de la présence de loutres. Des épreintes de loutres ont été

répertoriées dans l'étroite vallée fluviale des affluents supérieurs à courant rapide, ainsi que sur les berges étroites et restreintes de rivière dans les tronçons inférieurs. La densité des épreintes était de 2,67 épreintes par km, 2,38 épreintes par km et 1,14 épreinte par km pour la rivière Utterganga, la rivière Pelma et la rivière Sanibheri respectivement. Le substrat de la berge était réparti de manière presque égale entre rochers (27 %), grosses pierres (22 %), petites pierres (26 %) et sable et boue (24 %). De faibles niveaux de perturbation humaine ont été enregistrés sur 18 % de la rivière, tandis que 43 % et 15 % ont été légèrement ou modérément perturbés, et 17 % ont été gravement perturbés. Les indices de présence de loutre étaient peu nombreux, mais ont été trouvés sur toutes les rivières étudiées.

RESUMEN

RELEVAMIENTO DE NUTRIAS EN EL RÍO SANIBHERI Y SUS TRIBUTARIOS, LOS RÍOS PELMA Y UTTERGANGA, EN EL DISTRITO DE RUKUM, NEPAL OCCIDENTAL

La distribución de las tres especies de Nutrias que ocurren en Nepal está pobremente documentada. Condujimos un relevamiento para documentar signos de nutria y parámetros de hábitat en el Río Sanibheri y sus tributarios de la cuenca superior, los Ríos Pelma y Utterganga, en el distrito de Rukum, Nepal. El relevamiento fue conducido en la región de laderas y elevaciones medias, en un gradiente altitudinal de 747-2159 m s.n.m. Fueron observadas fecas de nutrias en 109 sitios, en 27 de las 71 transectas estudiadas, y fueron utilizadas como proxy de la presencia de nutrias. Las fecas ueron registradas en el angosto valle fluvial de los tributarios superiores correntosos, así como en las pocas barrancas angostas del río en los tramos inferiores. La densidad de fecas fue de 2.67 $km^{-1,}$, 2.38 scat km^{-1} y 1.14 scat km^{-1} para los Ríos Utterganga, Pelma y Sanibheri respectivamente. El sustrato en las barrancas estuvo casi igualmente repartio entre grandes bloques de roca (27%), piedras grandes (22%), piedras pequeñas (26%) y arena y barro (24%). Registramos bajos niveles de disturbio humano a lo largo de 18% del río, mientras que 43% y 15% estaban levemente o moderadamente disturbados, y 17% severamente disturbado. Los signos de nutrias fueeron escasos, pero encontrados todo a lo largo de los ríos estudiados.

R E P O R T

FIRST EVIDENCE OF EURASIAN OTTER IN NEPAL IN THREE DECADES

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Abstract: This study presents the first evidence of Eurasian otter presence in Nepal since 1991. Camera trap images from the Barekot River in Jajarkot District, photographic images from Tubang River in East Rukum District evidence and the skull of a dead otter are presented as documentation. Twelve craniomandibular traits measurements were carried out on a skull specimen found in the Roshi River: condylobasal length (CBL) of the cranium, measured at 111 mm, and zygomatic breadth (ZB) at 66 mm, identify the specimen as a Eurasian otter (*Lutra lutra*). CBL and ZB measurements, flat shaped skull and longer rostrum were similar to those obtained by morphometric studies of Eurasian otter in other parts of its range.

Keywords: Eurasian otter, Barekot River, Tubang River, Roshi River, craniomandibular traits, Nepal

INTRODUCTION

The Eurasian otter (*Lutra lutra*) has been anecdotally reported in mountain streams and rivers across Nepal. Presence of Eurasian otter was reported from Rara Lake (Bolton, 1976) and both Rupa and Begnas Lakes with photographic evidence (Acharya and Gurung, 1994), but a study in 2008 (Bhandari and Bijaya2008) and later in 2018 found no otter presence in those lakes (Basnet et al., 2020). Anecdotally the presence of Eurasian otter was suggested in protected areas such as the Annapurna Conservation Area, Makalu Braun National Park, Bardia National Park, Rara National Park and outside protected areas in Saptari, Chitwan, Kapilvastu, Bardia, Kailali,

Kanchanpur, Bajhang, Bajura, Ilam, Panchthar, Taplejung and Sankhuwasabha Districts (Biodiversity Project Profile, 1996); from the Kanchenjunga region (Yonzon, 1996); from 8 districts in the Terai and 13 districts in the hilly region (Shrestha, 1997); from West Seti River (Yonzon, 1998); from Ghodaghodi Lake of Kailali District (Kafle, 2007); and from streams and streamlets in Pyaudikhola watershed and Kapringkhola watershed of Gorkha District (Kafle, 2011). However, these presence reports are based on indirect signs and through the public reports without verifiable evidence (Basnet et al., 2020).

Anthropogenic disturbances; natural habitat degradation, sand and stone extraction from rivers, overfishing, shoreline vegetation removal, livestock grazing, irrigation canal and dam construction, frequent human activity on river bank, industrial and agricultural pollution are the causes led the decline in Eurasian otter in Nepal (Acharya and Lamsal, 2010; Acharya and Rajbhandari, 2011). The seizure of 755 skins between 1989 to 2017 may indicate that the illegal pelt trade threatens otters in Nepal, although the seizures may largely reflect transit of the pelts from India to China (Savage and Shrestha, 2018). Retaliatory killing for predation on fishes in fish farm is a factor behind extirpation of Eurasian otter in Rupa and Begnas Lakes (Bhandari and Bijaya2008). The only and last photographic evidences of Eurasian otter in Nepal by Acharya and Gurung in 1991 was from these lakes (Basnet et al., 2020). We present physical evidence of Eurasian otter presence in Nepal, from the Roshi River, Tubang River and Satichaur River in Nepal.

MATERIALS AND METHOD

Evidence of Eurasian otter was collected from three rivers located in Nepal: 1) the Barekot River in Jajarkot District (camera trap images) 2) the Tubang River in East Rukum District (photographs) and, 3) the Roshi River in Kabhrepalanchok District (skull) (Fig. 1).

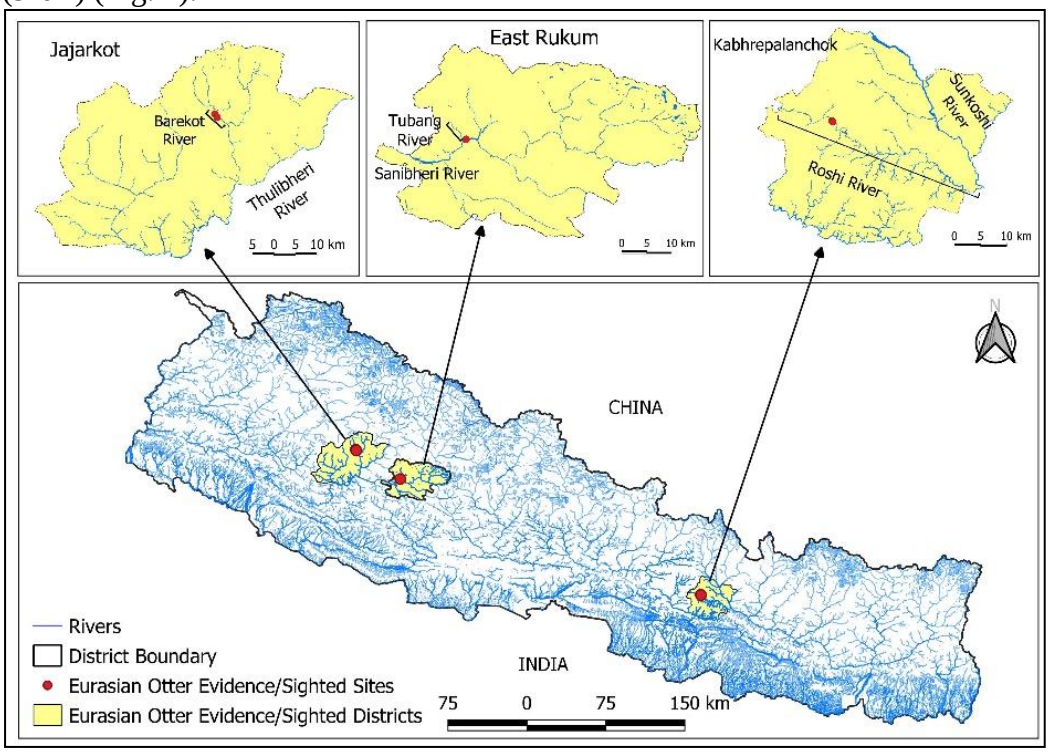

Figure 1. Sites of Eurasian otter evidence (red circles).

Barekot River

The Barekot River is located in the Barekot Rural Municipality of Jajarkot District. The Barekot River forms from the confluence of the Muslan River and Daha River which originate in the middle hills, and is joined downstream by the Karkijiula River, the Nalgad River and the Thuli Bheri River. The area has temperate climate with a dry winter and hot summer (Karki et al., 2016). River bank substrate is composed of boulders and large rocks with bank vegetation of *Rhus wallichii, Alnus nepalensis, Pyrus pashia, Salix sp., Acorus calamus Berberis asiatica, Arudinaria falcate, Rubus ellipticus, Artemesia indica, Imperita cylindrical, and Urtica doica*. Scattered settlements and farms in place of wider river banks prevail in the Barakot River. Two sets of camera trap (Bushnell) were set up in the Barakot River for 72 hours (8-10 June 2021) in two sites about 1200 m apart. Otter images were obtained at Golkhane Bagar (28.954360°N 82.247410°E; 1600 m above sea level (masl) and Satichaur (28.946210 °N 82.253270°E; 1549 masl) (Fig. 2). Eurasian otters were identified from these images by the IUCN Otter Specialist Group.

Figure 2. a) Camera trap locations on the Barakot River, at Golkhane Bagar b) in Satichaur c) lateral view of camera trap otter image, d) frontal view of camera trap image of otter and, e) camera trap image of body and tail of otter. (Photograph: G. Singh)

Tubang River

The Tubang River originate in the hills north of Pwang Village in Sisne Rural Municipality that flows southward to a confluence with the Sanibheri River at the Tiptara in Naighad Village. The Tubang River is a small tributary of the Sanibheri River. The water flow during the monsoon season increases, but decreases markedly in the winter season. The area has a temperate climate with dry winters and hot summers (Karki et al., 2016). The river bank is comprised of rock boulders and bank vegetation of *Woodifordia fruticosa, Bauhinia variegate, Phyllanthus emblica, Pinus roxburgii, Debregaesia longifolia, Artemesia indica, Imperita cylindrical* etc. An injured young otter was captured on 20 June 2021 from the Tubang River (28.675957 82.672678; 1337 masl) about 100 m before the river confluence with the Sanibheri River at the Tiptara in Naighad Village. The otter photographs were identified as Eurasian otter by the IUCN Otter Specialist Group (Fig. 3).

Figure 3. Eurasian otter photographs. (Photograph: S. Reule)

Roshi River

The Roshi River originates in the hills (27.576041°N 85.442487°E; 1900 masl)) at the western border of Kavrepalanchok District and flows through the Panauti Valley to the confluence with the Sunkoshi River downstream (27.450650°N 85.821285°E; 530 masl). The area has a temperate climate with dry winters and warm summers (Karki et al., 2016). River bank species include *Alnus nepalensis, Prunus cerasoides, Ziziphus incurve, Woordfordia fruticose, Choerospindias axillaris, Melia azedarch, Albizia procera, Urtica dioica, Bidens pilosa, Adenophora ageratina, Artemesia indica and Ageratum conyzoides.* In 2020, a skull of a dead otter was found in duck farmer's cottage near the Roshi River in the Panauti Suburb area (27.5771510°N 85.530524°E; 1374 masl) (Fig. 4). A single otter scat was also recorded on the boulder in a pool at the location (Fig. 4). Scat was identified by the prey species remnants, fragments of fish and and feather fragments and a fishy odor (Macdonald, 1990; Kruuk, 1995).

Figure 4. a) Duck in dammed pools in the Roshi River, b) otter scat with duck feathers, c) dorsal view of skull d) side view of skull e) frontal view of skull, and f) habitat site (Photograph: M. B. Shrestha).

The skull had dried with skin and muscle tissue attached (Fig. 4). We cleaned the tissue from the specimen and took 12 craniomandibular measurements following Law et al. (2016) (Fig. 5; Table 1). The skull was photographed from 4 perspectives: 1) cranium in dorsal view, photographed by orienting the palate plane parallel to the photographic plane; 2) cranium in ventral view, photographed by orienting the palate plane parallel to the photographic plane; 3) cranium in lateral view, photographed by orienting the midsagittal plane parallel to the photographic plane; and 4) mandible in lateral view, photographed by orienting the long axis of the dentary parallel to the photographic plane. Photographs were taken using Canon EOS Kiss X80 with 18-55mm kit lens. A ruler with 1 mm intervals was used for measuring and placed as scale bar.

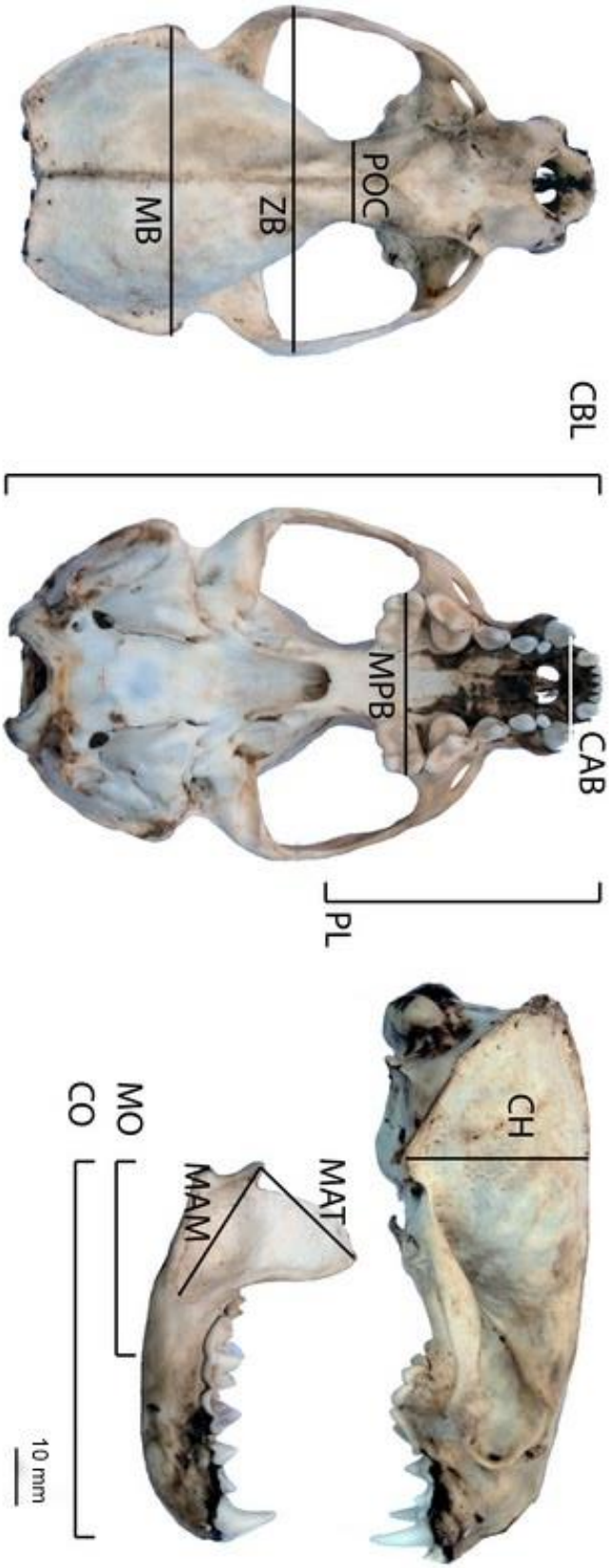

Figure 5. Measurement of 12 craniomandibular traits were used to evaluate the skull specimen. POC = Postorbital Constriction Breadth; ZB = Zygomatic Breadth; MB = Mastoid Breadth; CBL = Condylobasal Length; PL = Palatal Length; CAB = Canine Alveoli Breadth MPB = Maximum Palatable Breadth; CH = Cranial Height; CO = Canine Out-lever; MO = Molar Out-level; MAT = Moment Arm of Temporalis (in-lever); MAM = Moment Arm of Masseter (in-lever) (photograph: M.B Shrestha; edited by C.J. Law)

Table 1: Twelve craniomandibular traits used to evaluate the skull specimen.

Craniomandibular Traits	Description
Condylobasal Length (CBL)	Distance from the anterior-most point on the premaxillae to the plane of the posterior surface of the occipital condyles
Postorbital Constriction Breadth (POC)	Least distance across the postorbital constriction
Zygomatic Breadth (ZB)	Greatest distance across the zygomatic arches
Mastoid Breadth (MB)	Greatest distance across the mastoid processes
Palatal Length (PL)	Distance from the anterior-most point on the premaxillae to the posterior-most point on the palatine process of the palatine
Canine Alveoli Breadth (CAB)	Greatest distance across the lateralmost points on the canine alveoli
Maximum Palatable Breadth (MPB)	Greatest distance between the lateralmost points on the upper 1st molar alveoli
Cranial Height (CH)	Distance (perpendicular to the palate plane) from the lateralmost point of the mastoid process to the point of the sagittal crest directly superior to the mastoid process
Canine Out-lever (CO)	Distance from the lateralmost point of the condyle process to the anterior-most point of the lower canine alveolus
Molar Out-level (MO)	Distance from the lateralmost point of the condyle process to the lower 1st molar, specifically the point where the mesial and distal roots coverage on the root trunk
Moment Arm of Temporalis (in-lever) (MAT)	Distance from the lateralmost point of the mandibular condyle to the dorsal tip of the coronoid process
Moment Arm of Masseter (in-lever) (MAM)	Distance from the lateralmost point of the mandibular condyle to the anterior edge of the masseteric fossa

RESULTS AND DISCUSSION

The morphological characteristics of the images confirm the evidence as Eurasian otters: a flattened head; nostrils, eyes and ears in one line; webbed feet with thinly webbed hind paws; long, tapering and muscular tail; medium to dark brown coloration with pale fur at the throat/neck and underparts; and guard hairs of the wet fur in long regular spikes (Melissen, 2000; Duplaix, N., Pers. Comm.). The measurements of craniomandibular traits of the skull identify it as a Eurasian otter (Fig. 6): a CBL measuring 111mm; ZB-66mm; POC-17mm; MB-62mm; PL-62mm; CAB-25mm; MPB-25mm; CH-35mm; CO-65mm; MO-65mm; MAT-25mm; and MAM-25mm (Table 2).

Figure 6a. Dorsal and Ventral views of skull specimen (Photograph by M. B. Shrestha).

Figure 6b. Lateral view of skull and lateral view of mandible of skull specimen (Photograph by M. B. Shrestha).

Table 2. Measurement values of craniomandibular traits of skull

Craniomandibular Traits	Measurement (mm)
CBL	111
ZB	66
POC	17
MB	62
PL	61
CAB	25
MPB	35
CH	36
CO	65
MO	40
MAT	25
MAM	25

Of the Eurasian otter cranial morphology studies, selected craniomandibular traits are somewhat variable. Lynch and O'Sullivan (1993) had 11 craniomandibular traits; while Ansorge and Stubbe (1995) had 10 traits and Rasooli et al. (2007) had 6 craniomandibular traits in Eurasian otter skull study. Hwang and Larivière (2005) had 6 craniomandibular traits measurement in Smooth-coated otter skull study. Cranial morphology has been used in taxonomic studies of mammals (Lynch and O'Sullivan, 1993). But, the inconsistency in traits between the studies and mere cranial morphology study primarily in Smooth-coated otter skull have been a limiting factor for identification of otter species through cranial morphology. Of twelve craniomandibular traits of Eurasian otters have CBL and ZB as identifying traits (Lynch and O'Sullivan, 1993; Ansorge and Stubbe, 1995; Rasooli et al., 2007).

The measurements of this skull specimen of CBL (111mm) and ZB (66mm) match Eurasian otter skull values from other parts of the world. For example, CBL values in 26 male and 21 female Eurasian otter from Ireland ranged from 110.9-122.7 mm and 102.6-113.5mm respectively; and ZB values ranged from 66.6-76.5mm and 62.5-71.5mm respectively (Lynch and O'Sullivan, 1993). The CBL and ZB of the Roshi River skull show similar measurements to those in study by Ansorge and Stubbe (1995). CBL values in 102 male and 64 female Eurasian otters from Germany ranged from 106.1-124.3 mm and 104.1-121.0 mm respectively (Ansorge and Stubbe, 1995); and ZB values for 96 male and 58 female Eurasian otters, and ranged from 65.9-81.5 mm and 61.8-74.8 mm, respectively (Ansorge and Stubbe, 1995). Rosooli et al. (2007) measured CBL of 9 male and 12 female Eurasian otter in Iran ranged from 110.2-124.9 mm and 110.8-113.2mm respectively, and for ZB of 8 males and 9 female Eurasian otter, ZB values ranged from 71.6-81.2mm and 66.7-74.1 mm respectively (Rosooli et al., 2007).

The CBL and ZB value of the Roshi River skull specimen show similar values with the CBL and ZB value of female Smooth-coated otter by Hwang and Larivière (2005). However, the cranial morphology is different. The Smooth-coated otter has a high domed skull with the eyes set more forward and more widely spaced compared to the flat skull of Eurasian otters (Fig. 7) (Otterjoy, 2021). And the rostrum of the Smooth-coated otter is shorter (Hwang and Larivière, 2005) relative to the longer rostrum of the Eurasian otter (Fig. 8).

CONCLUSION

The camera trap images from the Barekot River, Jajarkot, photographs of Eurasian otter from the Tubang River, East Rukum and craniomandibular trait measurements of a skull specimen obtained in the Roshi River, Kavrepalanchok all confirm the continued presence of Eurasian otters in the hill streams in Nepal. Further study would elucidate the distribution of Eurasian otters in this region. A public awareness program for duck farmers and villagers along the Roshi River, including sensitization workshop for local conservation authorities, would help to conserve this rare species in Nepal.

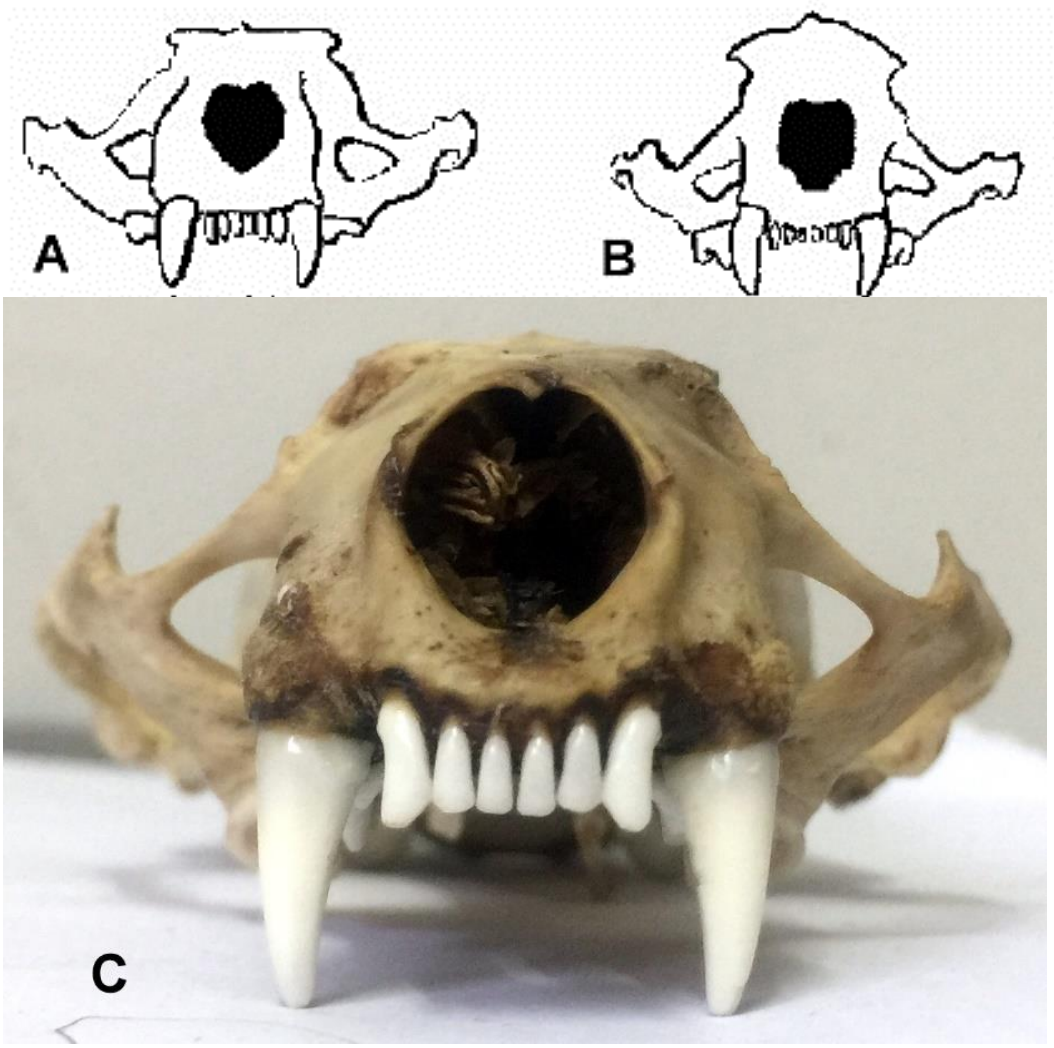

Figure 7. Sketch of frontal view of skull of otters. a) Eurasian otter *Lutra lutra*, b) Smooth-coated otter *Lutrogale perspicillata* and c) frontal view of skull from the Roshi river for comparison with sketch of *Lutra lutra* (a) and Smooth-coated otter (b) drawn by Bree (1968). (Photograph adopted from Otterjoy.com)

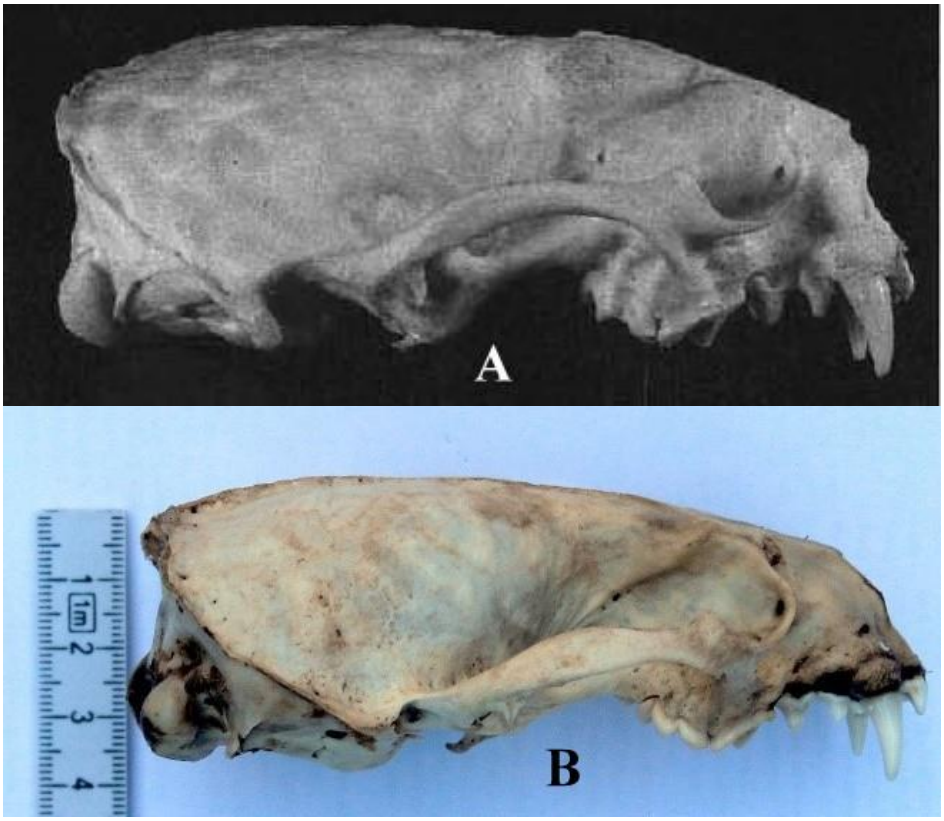

Figure 8. Lateral view of skull of a) *L. perspicilliate* adopted from Hwang and Larivière (2005) and b) *L. lutra* from the Roshi River for comparison of rostrum

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RÉSUMÉ: PREMIERE EVIDENCE DE LA PRESENCE DE LA LOUTRE EURASIENNE AU NEPAL EN TRENTE ANS

Cette étude présente la première preuve de la présence de la loutre eurasienne au Népal depuis 1991. Des images de pièges photographiques de la rivière Barekot dans le district de Jajarkot, des images photographiques de la rivière Tubang dans le district de l'Est Rukum et le crâne d'une loutre morte sont présentés comme documents. Douze mesures de traits cranio-mandibulaires ont été effectuées sur un spécimen de crâne trouvé dans la rivière Roshi : la longueur condylo-basale (CBL) du crâne de 111 mm, et la largeur zygomatique (ZB) de 66 mm, permettent d'identifier le spécimen comme une loutre eurasienne (*Lutra lutra*). Les mesures CBL et ZB, crâne de forme plate et rostre plus long, étaient similaires à celles obtenues par les études morphométriques de la loutre eurasienne dans d'autres zones de son aire de répartition.

RESUMEN : PRIMERA EVIDENCIA DE NUTRIA EURASIÁTICA EN NEPAL EN TRES DÉCADAS

Este estudio presenta la primera evidencia de presencia de Nutria Eurasiática en Nepal desde 1991. Presentamos como documentación, imágenes de cámara-trampa el Río Barekot en el Distrito Jajarkot, imágenes fotográficas del Río Tubang en el Distrito Rukum Oriental, y el cráneo de una nutria muerta. Llevamos a cabo doce mediciones de rasgos craniomandibulares en un cráneo encontrado en el Río Roshi: la longitud condilobasal (LCB) de la caja craneana, de 111 mm, y el ancho zigomático (AZ) de 66 mm, identifican al espécimen como una nutria Eurasiática (*Lutra lutra*). Las medidas LCB y AZ, el cráneo de forma achatada y el rostrum más largo, fueron similares a lo obtenido por estudios morfométricos de la nutria Eurasiática en otras porciones de su distribución.

R E P O R T

ON THE OCCURRENCE OF THE NEOTROPICAL OTTER (*Lontra longicaudis* OLFERS, 1818) IN THE ENVIRONMENTAL PROTECTION AREA OF LAGOA SANTA KARST AND SURROUNDINGS, SOUTHEASTERN BRAZIL

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Abstract: The Dry Diagonal is a South American domain is characterized by the predominance of open area habitats and rainfall restriction. The distribution of the Neotropical otter (*Lontra longicaudis*) in the region is very misunderstood. Herein we present confirmed recent records of *L. longicaudis* in Environmental Protection Area (EPA) of Lagoa Santa Karst and surroundings, Minas Gerais state, easternmost Cerrado of Dry Diagonal in southeastern Brazil. Between January 2018 and November 2020, vestiges of *L. longicaudis* (feces, mucus, and footprints) were found in five sites in Lagoa Santa and Funilândia municipalities. Those sites are distributed in restriction protection conservation unit (Sumidouro State Park), sustainable use conservation unit (EPA Lagoa Santa Karst), and outside the protected areas. We comment about conservation aspects of the species in the studied area.
Citation: **Quintela, F.M., Pinheiro, R.M., and Sokefun, O. (2021).** On the Occurrence of the Neotropical Otter (*Lontra longicaudis* Olfers, 1818) in the Environmental Protection Area of Lagoa Santa Karst and Surroundings, Southeastern Brazil. *IUCN Otter Spec. Group Bull.* **38** (5): 292 - 299
Keywords: Cerrado biome, conservation, Lutrinae, protected area, South American Dry Diagonal, sustainable use.

INTRODUCTION

The Neotropical otter *Lontra longicaudis* (Olfers, 1818) is widely distributed throughout Neotropical region, from Mexico to Buenos Aires Province in Argentina (Larivière, 1999; Rodrigues et al., 2013). However, within this range, the occurrence of the species is not fully understood in the northern part of a domain characterized by marked seasonal climate variation and rainfall restriction known as the South American 'Dry Diagonal' or 'Diagonal of Open Areas' (Rheingantz et al., 2014; Rosas-Ribeiro et al., 2017). The northern Dry Diagonal extends throughout central and northeastern Brazil and is occupied by the biomes Cerrado and Caatinga (Zanella, 2011). In relation to the indications of *L. longicaudis* distribution in such area, the available literature content is high variable. As example, some distribution maps from late 1990's did not indicate the species occurrence in easternmost Cerrado and northeastern Brazil (including Caatinga and northern Atlantic Forest) (Emmons and Feer, 1997; Larivière,

1999). More recent works represented the species distribution with gaps of variable sizes in northeastern Brazil, with the addition of scattered records in the coastal northeast (Astúa et al., 2010; Rodrigues et al., 2013; Rheingantz et al., 2014; Rosas-Ribeiro et al., 2017). Rodrigues et al. (2013) also extend the gap area to central Minas Gerais state, within the Cerrado domain. On the other hand, Rheingantz and Trinca (2015) represented the distribution of *L. longicaudis* as continuous throughout Brazilian Dry Diagonal. In summary, the distribution of *L. longicaudis* in Brazilian Dry Diagonal is still undefined due to scarce information based on confirmed records for that region.

Lontra longicaudis is globally classified as Near Threatened, with decreasing population trend (Rheingantz and Trinca, 2015). In Brazil, the species is also considered as Near Threatened, and it is subjected to several impacts such as the loss of habitat (deforestation of riparian zones), conflicts with fishing and fish farms, pollution, and the expansion of hydropower plants. However, when considered only the Brazilian Atlantic Forest, the species is considered as vulnerable mainly due to the degradation of riparian forests and the decreased protection of these habitats due to changes to the Brazilian Forest Code (Rodrigues et al., 2013). In Minas Gerais state, southeastern Brazil, *L. longicaudis* is classified as Vulnerable (COPAM, 2010) and few reliable recent records are available for the species. The Lagoa Santa Karste region, located in the central region of Minas Gerais, has a great historical importance as the "birth place" of mammalogy (including mammal paleontology) in Brazil through the studies of the Danish researcher Peter W. Lund, conducted between 1835 and 1844 (Leite and Costa, 2002). Lund referred to *L. longicaudis* (as *Lutra brasiliensis*) as part of the extant mammalian fauna at that time (Lund, 1842; compiled with revised taxonomy in Leite and Costa, 2002). Afterwards, few large- to medium-sized mammal surveys were conducted in Lagoa Santa region. Herrmann et al. (1998) inventoried the mammals from Environmental Protection Area (EPA) of Lagoa Santa Karst and did not record *L. longicaudis*. Later, Trolle et al. (2002) performed a survey of large- to medium-sized mammal in Caiuaia Farm and cited the occurrence of the species only through information obtained by interviews.

The EPA Lagoa Santa Karst occupies an area of 35,600 hectares distributed in seven municipalities located in a transitional area of Cerrado and Atlantic Forest biomes in central Minas Gerais state, southeastern Brazil. The EPA is inserted in the Metropolitan Region of Belo Horizonte, composed by the Minas Gerais capital Belo Horizonte and other 34 neighbouring municipalities which account for a population of more than 6 million people (IBGE, 2020). Despite constituting itself a conservation unit, the EPA Lagoa Santa Karst comprises other units, including the Sumidouro State Park, the Cerca Grande State Park, the Experiência da Jaguara Natural Monument, and others. Herein we provided current records of *L. longicaudis* in EPA Lagoa Santa Karste and surroundings, obtained through encounters of the characteristic vestiges of the species.

METHODS

A survey of mammals in EPA Lagoa Santa Karst and surroundings was conducted from January 2018 to November 2020 as part of the Karst Project. The hydrographic elements in the studied area comprise karstic lagoons, streams, and two main rivers. The vegetation around water bodies comprises Seasonal Semi-Decidual Forest fragments (streams and rivers) and marginal palustrine belts (lagoons) (Herrmann et al., 1998). For the verification on *L. longicaudis* occurrence in the study area, we performed random field trips to 20 sites (nine lagoons and 11 stretches of streams and rivers), which were selected based on the presence of arboreal and/or dense herbaceous

marginal vegetation, habitats suitable for the occurrence of *L. longicaudis* shelters and resting sites (Waldemarin and Colares, 2000; Quadros and Monteiro-Filho, 2002; Quintela et al., 2011). The areas of the sample lagoons range from 1.21 to 254 hectares and its margins were checked by foot and kayak. Smaller lagoons (20 hectares or less) were fully encircled while in the larger ones some points of marginal areas were selected due to the accessibility. In relation to rivers and streams, stretches ranging from 0.8 to 2 km long were checked by foot, comprising 11.3 km of sampled riverbank. Each sampled site was visited at least twice during the sampling period, covering the rainy and dry periods of the year. The records of *L. longicaudis* were obtained through the identification of characteristic vestiges (feces, mucus, and footprints). Samples of feces and mucus were collected, labelled, and kept frozen for ecotoxicological and genetic analyses to be performed as part of the project Neotropical Otter Conservation Program in Minas Gerais. All record sites were geo-referenced (Datum WGS84).

RESULTS AND DISCUSSION

We found vestiges of *L. longicaudis* in five from the 20 sites visited in the present study. Three sites are located within the perimeter of EPA Lagoa Santa Karst, and the other two are located at northern and southeastern surroundings of the EPA. Within the EPA, record sites comprised: (1) limestone outcrops at the bank of Sumidouro Lagoon (19º32'24"S, 43º56'28"; 649 m a.s.l.) within Sumidouro State Park, Lagoa Santa municipality; (2) under road drainage pipe linked to palustrine wetlands contiguous to Sangradouro Lagoon (19º34'39"S, 43º56'24"; 682 m a.s.l.), urban area of 'Lapinha' district, Lagoa Santa municipality; (3) under bridge in stretch with preserved riparian forest in Jacques stream (19º33'35"S, 43º55'10"; 644 m a.s.l.), 'Campinho de Baixo' district, Lagoa Santa municipality. At the surroundings of EPA Lagoa Santa Karst, record sites comprised: (1) unnamed lagoon with abundant emergent and floating vegetation and wooded banks in the immediate surroundings of EPA northern limits (19º24'41"S, 43º01'23"; 660 m a.s.l.; ca. 160 m from EPA limits), Funilândia municipality; (2) under bridge in a highly structured riparian forest of unnamed stream (19º42'02"S, 43º52'20"; 682 m a.s.l.), tributary of Ribeirão da Mata creek, Ribeirão da Mata locality, Lagoa Santa municipality (about 4 km from EPA southeastern limits) (Fig. 1,2).

Our study adds reliable records on the current occurrence of *L. longicaudis* in the easternmost Cerrado Brazilian Dry Diagonal, a region where the distribution of the species is little understood. In EPA Lagoa Santa Karst and surroundings, vestiges of *L. longicaudis* were found in urban and well-conserved areas inside strictly protected areas (Sumidouro State Park) and rural areas, but always associated to sites with high structured palustrine/riparian vegetation. The Environmental Protection Area is adopted by Brazilian government as a category of conservation unit of sustainable use, which implies that human settlements and the development of economic activities compatible with the environmental conservation are allowed. Meanwhile, considering such flexibility in relation to the property and use of the land, conflicts concerning the conservation of natural resources are likely to occur in EPAs (Cabral & Souza, 2005). The region of EPA Lagoa Santa Karst and surroundings is passing through and accelerated process of urbanization, which represents a serious threat to *L. longicaudis* remaining populations due to the loss and degradation of habitats. Many water bodies in the studied area had their riparian and palustrine vegetation suppressed or high altered. According to the MapBiomes (https://mapbiomas.org/), the counties included in our study area experienced a loss of the 1,975 hectares of original forest coverage (distributed mainly along water bodies) in the last three decades.

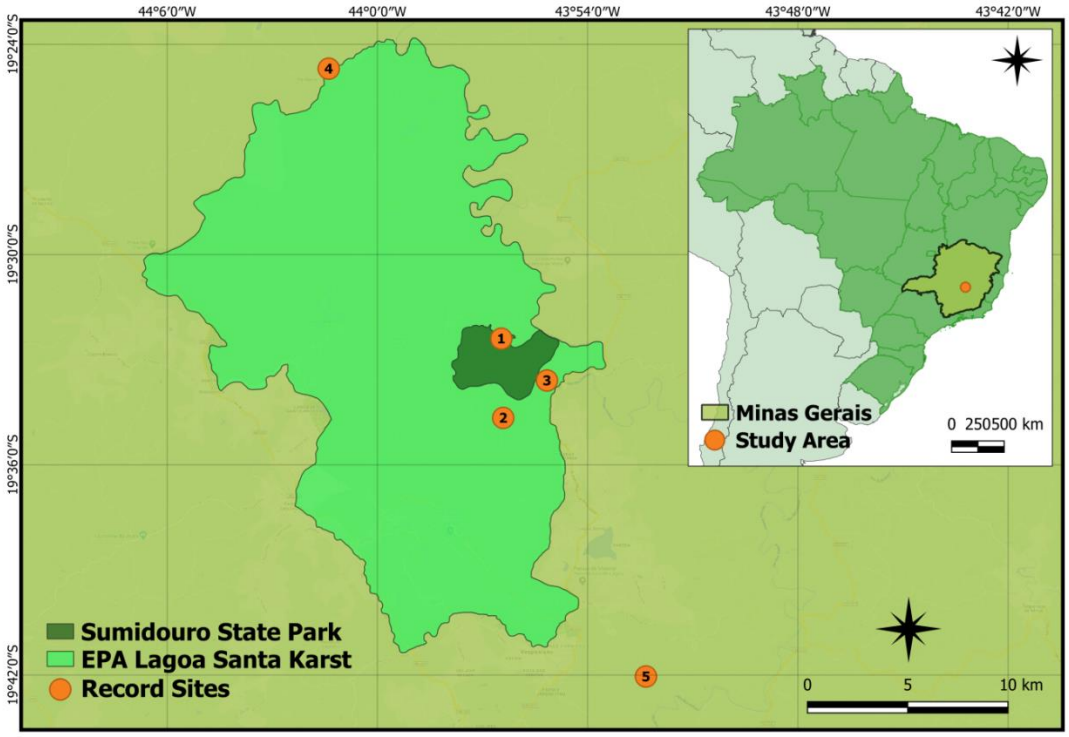

Figure 1. Location of Environmental Protection Area (EPA) of Lagoa Santa Karst and Sumidouro State Park at Minas Gerais State, southeastern Brazil, and the record sites of *Lontra longicaudis*.

Another serious threat is the potential risk of water contamination through limestone mining, industrial and domestic waste. It is known that the occurrence of *L. longicaudis* is conditioned to dense vegetated habits, which provide spatial resources for den and resting sites (Alarcon and Simões-Lopes, 2003; Carrilo-Rubio and Láfon, 2004). A recent study also demonstrated that *L. longicaudis* is tolerant to moderate levels of eutrophication, but a condition with very low water quality is incompatible with the species occurrence (Almeida and Pereira, 2017). Therefore, the conservation of riparian/palustrine vegetation and water quality in the aquatic habitats of EPA Lagoa Santa Karst and vicinities is essential for the maintenance of *L. longicaudis* in the region.

While a considerable part of lacustrine, swampy and lesser fluvial systems (streams, creeks) still keep highly or moderately structured habitats, the major hydrographic element in EPA Lagoa Santa Karst, the Rio das Velhas, has been long-term affected by human activities. The stretch of Rio das Velhas that crosses the Metropolitan Region of Belo Horizonte is acutely damaged in its structure (including the deforestation of riparian zones) and water quality, showing clear signs of eutrophication (high levels of total nitrogen and phosphorous, high conductivity and turbidity, high percentage of organic matter in sediment, low levels of dissolved oxygen) and low fish species richness (Pompeu et al., 2005). Such condition of habitat degradation is not favourable for the occurrence of *L. longicaudis*, considering the species requirement for riparian vegetation for shelters and resting sites (Waldemarin and Colares, 2000; Quadros and Monteiro-Filho, 2002; Quintela et al., 2011), the decrease on prey detection caused by the increase of water turbity, and the decrease of feeding resources due to the loss of aquatic biodiversity (Almeida and Pereira, 2017). The efforts made so far did not detected the presence of *L. longicaudis* in Rio das Velhas around EPA Lagoa Santa Karst, but considering the historical records in the river valley

(Lund, 1842), intensive searches will be conducted to better determine if the species still persists in such system.

Figure 2. Footprints and mucus (insert) of *Lontra longicaudis* recorded in Ribeirão da Mata creek affluent, Lagoa Santa municipality, Minas Gerais state, southeastern Brazil.

The conservation of the Neotropical otter in EPA Lagoa Santa Karst and surroundings is quite challenging. While some localities such as Sumidouro State Park and few other strict protection conservation units provide an effective basis for *L. longicaudis* conservation (habitat quality and inspection), the same is completely vulnerable to impacts outside those areas. Although EPAs represents an advance of Brazilian government in relation to the applicable restrictions on the land use in areas with relevant natural resources (including biodiversity) (Cabral and Souza, 2005), many conservation units are still deficient concerning the inspection on human interference with habitats and wildlife. Nevertheless, due to human occupancy and the flexibility on the use of natural resources, the EPA is a conservation unit category which needs further inspection efforts aiming to prevent environmental impacts, especially those related to deforestation (loss of habitats) and hunting. A study conducted in eastern Minas Gerais state identified causes of death of *L. longicaudis* related to hunting, entanglement in fishnet, domestic dog attacks, and roadkill (Quintela et al., 2012). Thus, *L. longicaudis* could also be subjected to such impacts in EPA Lagoa Santa Karst and surroundings. Finally, aiming for an effective conservation of the Neotropical otter in EPA Lagoa Santa Karst, we recommend:

(1) a vigorous inspection on hunting and deforestation by environmental agencies;

(2) adoption of a program for control of domestic dogs in natural environments;

(3) identification of critical points for wildlife roadkill and adoption of mitigating procedures (traffic signs, containment fences and wildlife passages); and

(4) development of Environment Education activities.

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RÉSUMÉ

DE L'OCCURRENCE DE LA LOUTRE NÉORTROPICALE (*Lontra longicaudis*, OLFERS, 1818) DANS L'AIRE DE PROTECTION ENVIRONNEMENTALE CARSTE DE LAGOA SANTA ET ALENTOURS, BRÉSIL

La Diagonale Sèche est un domaine de l'Amérique du Sud caractérisé par la prédominance d'habitats d'espaces ouverts et de la restriction de pluies. La distribution de la loutre Néotropicale (*Lontra longicaudis*) dans cette région est très peu comprise. Nous présentons ici des registres récents confirmés de *L. longicaudis* dans l'Aire de Protection Environnementale (APA) du Carste de Lagoa Santa et ses alentours, dans état de Minas Gerais, extrémité de l'est de la Diagnonale Sèche du sud-est du Brésil. Entre janvier 2018 et novembre 2020, des traces de l'occurence de *L. longicaudis* (des fèces, du mucus, des foulées) ont été retrouvées dans cinq endroits dans les municipes de Lagoa Santa et Funilândia. Ces endroits sont distribués en: Unité de conservation de protection intégrale (Parque Estadual do Sumidouro), Unité de conservation d'usage soutenable (APA) Carste de Lagoa Santa et hors des aires protegées. Nous commentons sur des aspects de la conservation de l'espèce dans l'aire de l'étude.

RESUMEN

SOBRE LA PRESENCIA DE NUTRIA NEOTROPICAL (*Lontra longicaudis*, OLFERS, 1818) EN EL ÁREA DE PROTECCIÓN AMBIENTAL CARSTE DE LAGOA SANTA KARST Y ALREDEDORES, BRASIL

Diagonal Seca es un dominio de América del Sur caracterizado por el predominio de hábitats de área abierta y restricción de lluvias. La distribución de la nutria neotropical (*Lontra longicaudis*) en esta región es muy poco conocida. Presentamos aquí registros recientes de *L. longicaudis* en el Área de Protección Ambiental (APA) de la Carste de Lagoa Santa y alrededores, estado de Minas Gerais, extremo este de la Diagonal Seca del sudeste de Brasil. Entre enero de 2018 y noviembre de 2020, se encontraron rastros de la ocurrencia de *L. longicaudis* (heces, moco y huellas) en cinco ubicaciones de los municipios de Lagoa Santa y Funilândia. Estos sitios se distribuyen en una unidad de conservación de protección integral (Parque Estatal Sumidouro), unidad de conservación para uso sostenible (APA Carste de Lagoa Santa), y áreas protegidas exteriores. Comentamos aspectos de la conservación de la especie en el área de estudio.

RESUMO

SOBRE A OCORRÊNCIA DA LONTRA NEOTROPICAL (*Lontra longicaudis* OLFERS, 1818) NA ÁREA DE PROTEÇÃO AMBIENTAL CARSTE DE LAGOA SANTA KARST E ARREDORES, BRASIL

A Diagonal Seca é um domínio da América do Sul caracterizado pela predominância de habitats de áreas abertas e restrição de chuvas. A distribuição da lontra neotropical (*Lontra longicaudis*) nesta região é muito pouco compreendida. Apresentamos aqui registros recentes de *L. longicaudis* na Área de Proteção Ambiental (APA) do Carste de Lagoa Santa e arredores, estado de Minas Gerais, extremidade leste da Diagonal Seca do sudeste do Brasil. Entre janeiro de 2018 e novembro de 2020, vestígios da ocorrência de *L. longicaudis* (fezes, muco e pegadas) foram encontrados em cinco locais nos municípios de Lagoa Santa e Funilândia. Estes locais estão distribuídos em unidade de conservação de proteção integral (Parque Estadual do Sumidouro), unidade de conservação de uso sustentável (APA Carste de Lagoa Santa), e fora das áreas protegidas. Nós comentamos aspectos da conservação da espécie na área de estudo.

S H O R T C O M M U N I C A T I O N

RUBONDO ISLAND NATIONAL PARK, LAKE VICTORIA, TANZANIA: A FUTURE OTTER SANCTUARY?

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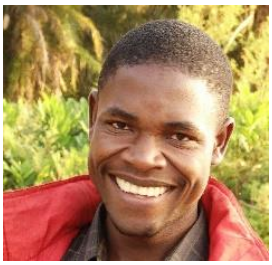


(Received 6th July 2021, accepted 27th July 2021)

Abstract: Studies of otters on Rubondo Island National Park were ongoing for several years. Ad hoc observations recorded between 2017 and 2021 are reported on here and it is suggested this location be considered as an otter refuge.
Citation: Reed-Smith, J., Mazelele, J.L., and Serfass, T. (2021). Rubondo Island National Park, Lake Victoria, Tanzania: A Future Otter Sanctuary? *IUCN Otter Spec. Group Bull.* **38** (5): 300 - 309
Keywords: Otter, Africa, Tanzania, refuge

INTRODUCTION

Lake Victoria covers roughly 68,800 km^2 (51% Tanzania, 43% Uganda, 6% Kenya) and its watershed is home to approximately 45 million people. The only protected waters of Lake Victoria (Mnaya and Wolanski, 2002) are those surrounding Rubondo Island National Park which encompasses 456.8 km^2 (236.8 km^2 dry land and 220 km^2 water) in the Tanzanian portion of Lake Victoria, just south of the equator (Latitude 2°18'10.3" and Longitude 31°51'26.9"). The entire Park consists of 11 islets and the main island (referred to here as RINP), which itself is formed by 4 hills of volcanic origin connected by lower elevation isthmuses. At its highest point RINP is 351 m above lake level, with a north-west axis of approximately 31 km and a width varying from 3 to 10 km (TANAPA 2003) (Fig. 1). Roughly 80% of the island is semideciduous and evergreen forest interrupted periodically by open grassland. The northern ¾'s of the eastern shoreline is characterized by rocky areas with dense vegetation and stretches of sandy beaches, some of which have some aquatic vegetation, primarily the Balsa wood tree (*Aeschynomene elaphroxylon*) along portions of the shoreline. The western shoreline and southern quarter of the eastern shore is characterized by large stretches of papyrus (*Cyperus papyrus*), water hyacinth (*Eichhornia crassipes*), reed grass (*Phragmites mauritianus*), and other emergent wetland species (Fig. 1, right)

Gazetted as a national park in 1977, this island is little known and occupied by a variety of introduced wildlife [e.g. elephant (*Loxodonta africana*), giraffe (*Giraffa*

camelopardalis), chimpanzee (*Pan troglodytes*), colobus monkey (*Colobus guereza*), suni antelope (*Neotragus moschatus*)] and numerous native avian, amphibian, reptile (e.g. crocodile (*Crocodylus* niloticus)), and mammal species (e.g. stitatunga [*Tragelaphus spekei*], bushbuck [*Tragelaphus scriptus*], vervet [*Cercopithecus aethiops*], hippopotamus [*Hippopotamus amphibious*], spotted-necked otter [*Hydrictis maculicollis]*, African clawless otter [*Aonyx capensis*], and marsh mongoose [*Atilax paludinosus*). As a result, the park has become a refuge for both otter species which are listed as Near Threatened by the IUCN (Reed-Smith et al., 2015, Jacques et al., 2015).

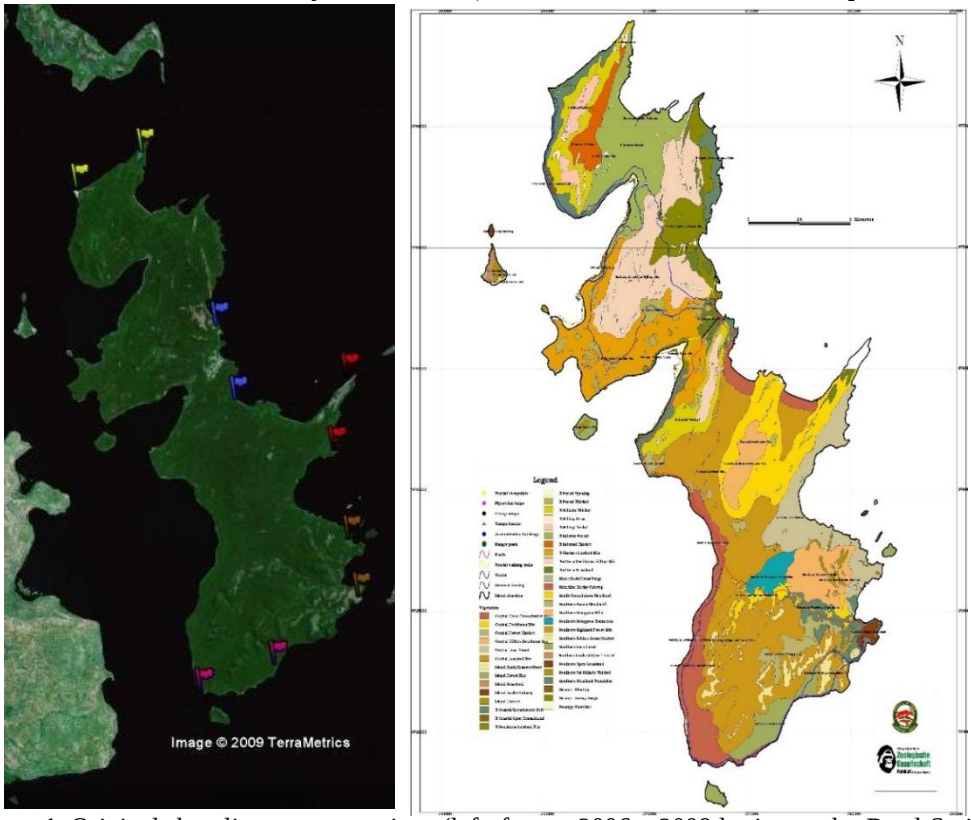

Figure 1. Original shoreline survey sections (left, from a 2006 – 2009 latrine study; Reed-Smith 2010), RINP NP Vegetation zone map (right, TANAPA 2003)

Kruuk and Goudswaard (1990) were the first to study the otters on Rubondo. Since that time several studies looking at behavior and latrine placement (Reed-Smith, 2010; Reed-Smith et al., 2014) as well as appeal to tourists (Stevens, 2011; Amulke et al., 2013), species identification and name confusion (Stevens et al., 2014) and traditional lore (Reed-Smith et al., 2010a) have been reported on. Additionally, the occasional article promoting Rubondo as a good place to see otters have been published (e.g., Reed-Smith et al., 2010b). All but Kruuk and Goudswaard (1990) have focused on the spotted-necked otter because the African clawless population appears to be primarily confined to the western side of the island where the terrain makes it hard to find or study them. However, there have been a few scats found along the eastern side of the island that seem to confirm that species still exists on the island. However, this is unknown at this time. Focused studies of the island's spotted-necked otter stopped in 2009, intermittent tracking occurred between 2010 and 2016, and volunteer, opportunistic observation, when the observer would position himself at known areas where otter had been seen, has occurred since 2017. These sessions occurred when time was available and at a location the observer was close to, no attempt was made to

capture specific time slots or to take samples evenly throughout the day. We review outcomes of these sessions here.

The areas where these opportunistic viewings occurred were all located at bay tips (defined as projections at either end of a bay projecting out into the lake), within bays or along rocky shorelines (Fig. 1, between blue flags; Fig 2). The most sightings occurred along the densely vegetated and rocky shorelines to either side of the small bay where the only tourist camp (Asilia area) is located (31 of 44 attempts), at the rocky point (Asilia Point) just to the north of that bay (Fig. 3) where the local otters have long had denning sites (33 of 38 attempts). The other areas where viewings occurred were an area known as the Staff Point just to the south of the main camp which is again a small projection along a densely vegetated shoreline (3 of 4 attempts), a shoreline that included a wide bay (Bandas) with dense vegetation and rocks along the arms of the bay and a sandy base (13 of 16 attempts), and the shoreline between the southern tip of this bay and Asilia point (Bandas/Asilia) (20 of 22 attempts). The observation attempts at the base of a very large bay known as Majimatakatifu (5 of 6 attempts) were the outliers as this is where otters are known to forage amongst the shoreline vegetation with long sandy/wetland shorelines. They have to travel through this area to reach favored resting/feeding/denning areas. Divisions are based on topography and viewing distance when sitting on the shoreline. The observer sat in locations where the greatest length of shoreline could be observed while still hidden from the otters. The length of each session was recorded, time otters were seen, how many, approximate distance from shore, what they were doing, and a GPS location recorded. Otter sightings included time points when otters changed behavior, e.g., they were swimming and went to rest, eat, etc. The longer observation periods sometimes included when the otters were resting (Figure 4,5,6) or had gone into a den. Thus, these periods do not always indicate continuous viewing but reflect a knowledge of where they were and a reappearance during the given time period.

Figure 2. Example of Banda/Asilia shoreline during the study of spotted-necked otter activity patterns, (Photo ©Reed-Smith November 2009)

Figure 3. Part of Asilia point taken in 2008, by 2011 most of these rocks were under water due to rising lake levels. The otters continued to use the area and remaining rocks for shoreline foraging and resting. (©Reed-Smith)

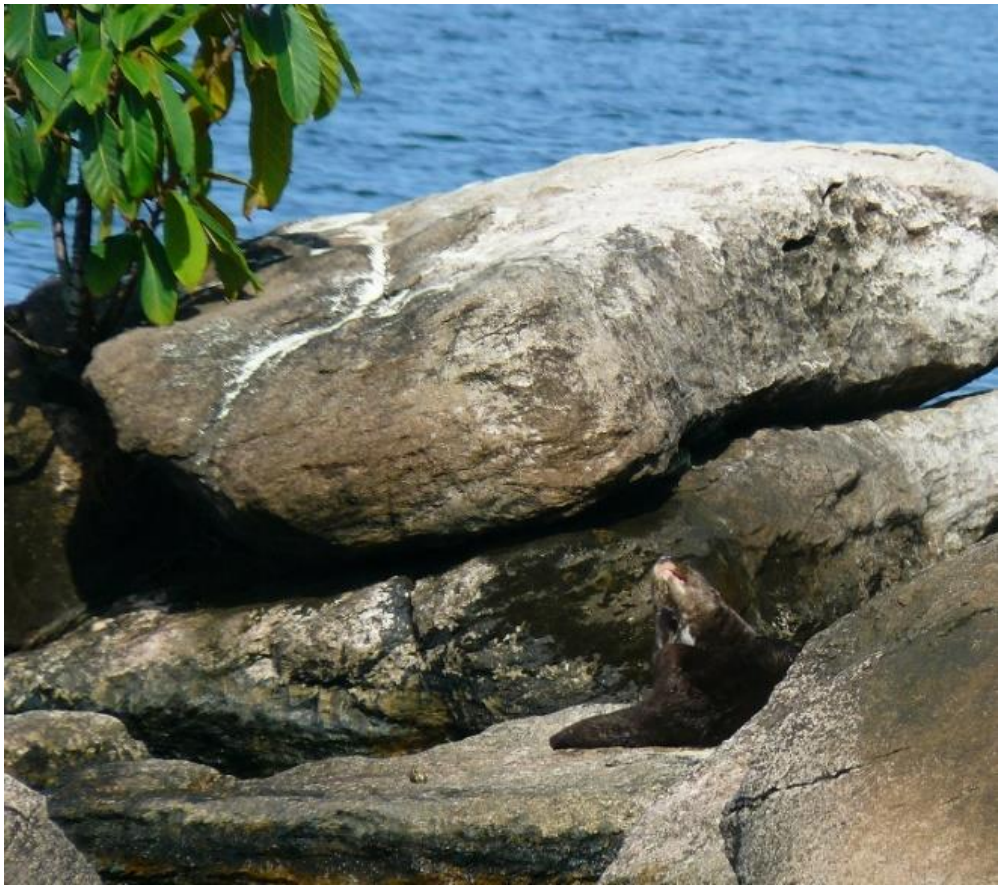

Figure 4. Otter resting at tip of Asilia Point during the study of otter activity patterns. (©Reed-Smith November 2013)

Figure 5. Male otter sleeping under rocks at the base of Asilia point, (©Reed-Smith November 2011), one of nine otters resting in the area.

Figure 6. Water entrance to den at base of Asilia point. (© Reed-Smith, November 2015)

Figure 7. Cub nursing in rocky/dense vegetation area at base of Asilia point. (©Reed-Smith November 2011)

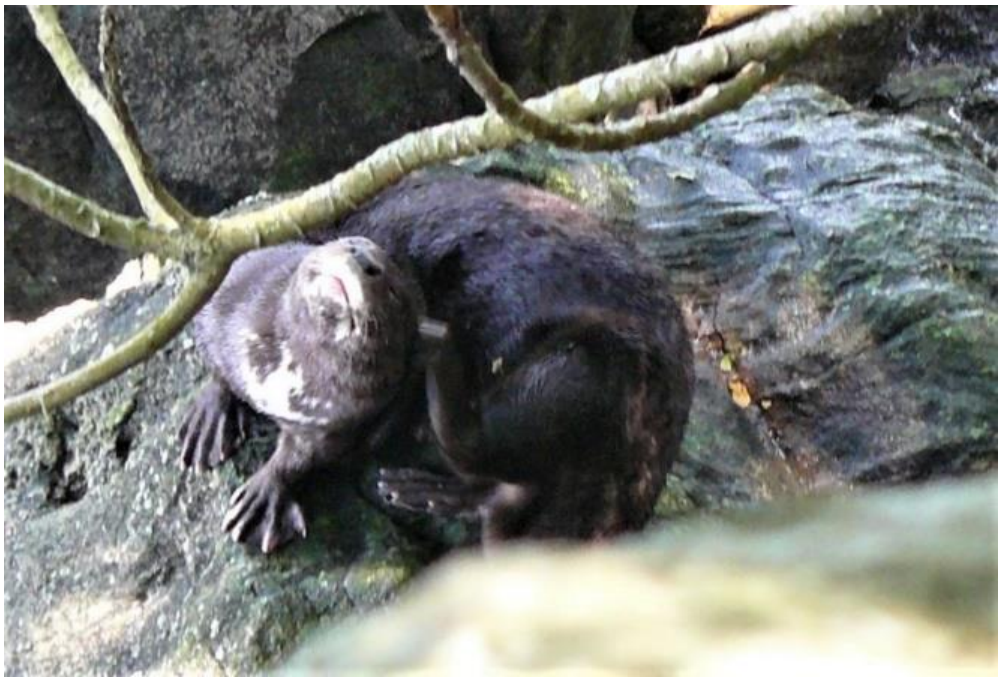

Figure 8. Single male otter grooming at Asilia point. (©Reed-Smith, June 2011.)

Figure 9. Female and yearling cub resting at tip of Asilia point. (©Reed-Smith, November 2011)

Observation session length varied as well as time of observations (Table 1,2,3). Of the 130 separate sessions, twenty-five sessions resulted in no otters being seen. Single otters were seen 50 times (Figure 8), duos were seen 26 times, (Figure 9) trios seen 14 times, 4 animals were seen together 8 times. Larger groups were seen 9 times with 3 of these consisting of 5 otters, 6 observations were of groups of 6, and two observations were of groups of 8 otter (Table 2).

Table 1. Rubondo Island NP – July 2017 through May 2021 Otter Sightings
Opportunistic sightings during sighting attempts of various total lengths when the volunteer observer sat quietly in a location where he would not be observed by the otters.

Location	# of sessions	# of sessions no sightings	Duration of sessions (total hours)	Duration of sightings (total hours)	% of sessions otters seen
Bandas	16	3	48	5.36	12
Bandas to Asilia	22	2	57.3	4.8	8
Asilia Area	44	13	166.5	15.5	9
Asilia Point	38	5	121	15.75	13
Asilia Staff Point	4	1	11.52	6 minutes	0.08
Majimatakatifu Bay	6	1	20.4	1.5	7

Table 2. Rubondo Island NP – Number of otters seen and duration of observation maximum/minimum (Minutes)

Location	Greatest # of Otters Observed together	Least # of Otters	Longest Observation*	Shortest Observation
Bandas	6	1	119	1
Bandas to Asilia	8	1	56	1
Asilia Area	6	1	120	1
Asilia Point	8	1	108	1
Asilia Staff Point	3	1	2	1
Majimatakatifu Bay	6	1	43	<1

* Some of these longer observations include periods when the otters were known to be sleeping on/under rocks or to have entered a den/resting site.

Table 3. Number of sessions when otters were seen & total number of otters seen per geographic section* by time slots

Location (*n*= total sessions when otters seen)	# sessions/#otters seen 6am – 10am Morning	# sessions/#otters seen 10am – 2pm Mid-day	# sessions/#otters seen 2pm – 6+pm Late afternoon
Bandas (*n*= 16)	6/10	11/13	7/7
Bandas to Asilia (*n* = 22)	10/23	10/10	10/16
Asilia Area (*n* = 44)	16/17	20/22	23/30
Asilia Point (*n* = 38)	16/19	19/29	18/32
Asilia Staff Point (*n* = 4)	1/0	1/1	2/3
Majimatakatifu Bay (*n* = 6)	2/7	2/0	2/8

* Some sessions lasted for more than one time period so marked in each time slot. Otter sightings were counted only for the time slot in which they occurred. Four sessions did not have times associated with the sightings so these were not counted. Larger groups of otters (4 to 8 animals) typically were sighted in the 2 to 6pm sessions, but not all of them.

Over the years much has been published regarding the changing ecosystem of Lake Victoria due to the introduction of the Nile perch (*Lates niloticus*) (Kruuk and Goudswaard, 1990), and eutrophication (Kolding et al., 2015). The dramatic spread of the fishing industry that occurred during the growth of the export market caused: massive destruction of shorelines and islands (see Figure 10); altered traditional fishing practices, impacted endemic fish fauna, resulted in an increase in poaching of fish, and the use of poisons to increase catches in some areas (Neuwinger, 2004). Since the early 2000's Nile perch stocks are believed to have fallen leading to increased pressures and the collapse of some of the industrial complex that arose around this industry (Economist, 2021) which is further impacting the economic security of people dependent on the fish industry.

There is an urgency to protecting some of the remaining natural habitats along Lake Victoria's shorelines to preserve fish nurseries and healthy ecosystems for the lake's wildlife, in particular the otter, which is considered competition for fish resources by many (Reed-Smith et al., 2010a; Mgomo and Reed-Smith, 2020). For this reason, and its position as a haven for spotted-necked otters, Rubondo Island NP was identified as a key project in The Global Otter Conservation Strategy (Rowe-Rowe et al., 2018). We encourage future studies of Rubondo Island NP as an otter refuge in Africa's great lakes.

Figure 10. Altered island landscape to facilitate the fishing industry.

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RÉSUMÉ

RUBONDO ISLAND NATIONAL PARK, LAKE VICTORIA, TANZANIA: LE PARC NATIONAL DE L'ILE RUBONDO, AU LAC VICTORIA, EN TANZANIE : UN FUTUR SANCTUAIRE POUR LES LOUTRES?

Des études sur les loutres dans le parc national de l'île Rubondo étaient en cours depuis plusieurs années. Les observations ponctuelles enregistrées entre 2010 et 2016 sont rapportées ici et il est suggéré que cet endroit soit considéré comme un refuge pour la loutre.

RESUMEN

PARQUE NACIONAL ISLA RUBONDO, LAGO VICTORIA, TANZANIA: ¿UN FUTURO SANTUARIO DE NUTRIAS?

Se desarrollaron estudios de las nutrias en el Parque Nacional Isla Rubondo, durante varios años. Aquí se reportan observaciones ad hoc entre 2010 y 2016, y se sugiere que ésta área puede ser considera un refugio para las nutrias.

C O N F E R E N C E

First Announcement
IUCN/SSC OSG XVth Congress
19-23 September 2022
Sospel, France

Dear friends

We are glad to announce, at last, the next IUCN SSC OSG XVth International Otter Congress "Communities and Otters"!

The Congress will be hybrid format: both in person and online through the platform Whova (similar to Zoom - https://whova.com/). We expect many people will prefer to attend via the online platform and they will be able to fully participate, both in the discussions and the panels. Posters will also be both online and shown at the Congress.

The Congress will be held in Sospel, France, 19-23 September 2022. Sospel is a village in the southern French Alps, close to the Italian border. Sospel is about 50 km from the Nice airport, and about 25 km from the Italian border (Ventimiglia, Italy).

The Congress will be held at the Camping Mas Fleuri - https://www.camping-mas-fleuri.com/. The Camping offers various accommodations, including camper parking, tent space, and bungalows for two to 17 people. It may also be possible to find Bed and Breakfast or Air B+B (or others).

We are still planning the program and will post it soon on the congress website. More details are on their way but save the date! Meanwhile, we still need to find a good logo for the Congress. If you have any ideas or suggestions, please email us.

Our best wishes to all of you and looking forward to seeing many of you later this year.

Nicole, Anna, and Margherita

O S G N E W S

NEW MEMBERS OF OSG

The Otter Specialist Group contains 353 members at 23 January 2022. New Members of OSG

Since the last issue, we have welcomed 9 new members to the OSG, and welcomed back a former member: you can read more about them in the Members-Only pages.

Returning:

Baird Fleming, New Zealand: I began my otter career by raising orphaned otters in Honduras at the age of 8. I spent over 8 years living with otters until embarking on my professional career which includes decades working within Zoo and rehabilitation facilities overseeing the husbandry, veterinary and exhibit needs of many species, including multiple species of otters. I an currently Director of Hamilton Zoo on North Island, New Zealand, that will soon house otters. I hope to focus my efforts on enhancing the ex-situ otter conservation capacity of zoos and aquariums through education programs and actual facility space for otter species that require greater ex-situ assistance and awareness.

New:

Anish Banerjee, UK: I am a third-year undergraduate student from the University of Manchester. I am currently pursuing a 4 year Integrated Masters in Zoology. I have been fortunate to track two families of Smooth Coated Otters in Singapore for a span of more than five years.I then volunteered for an otter occupancy survey in Balaghat District in Madya Pradesh conducted by the Centre of Wildlife Studies in early 2021. This included doing transects and setting up camera traps to verify the presence of Smooth Coated and European Otters. I plan on either doing my Masters or pHD thesis about otters in India. I have also founded my own wildlife NGO in India: Think Wild Foundation

Terence Carroll, USA: I am co-founder, President, and Research Director of the River Otter Ecology Project, a US non-profit conservation organization based in the San Francisco Bay Area. Amongst other things, I developed integrated cloud-based data collections, storage and retrieval, and designed and created a GIS-enabled mobile application for field data collection.

Alfredo Claverie, Argentina: I am biologist and currently I am doing my PhD in Ushuaia, focused in an integral research of the southern river otter (Lontra provocax).

Eva Claeys, Canada: I'm a wildlife rehabber at Aspen Valley Wildlife Sanctuary. For the last couple of years, I've been the main caregiver of our orphaned beavers and otters and I just love it. Otters are by far my favourite species with their funny personality and endless curiousity.

Kathy Hughes, Laos: As a highly motivated ecologist with 17 years' experience, I have a proven track record of developing, delivering and monitoring impactful freshwater conservation programmes and influencing environmental policy. My current role as WWF Freshwater Biodiversity Leader, and Asia-Pacific leader, and I am co-chair of the IUCN Freshwater Fish Specialist Group and would very much like to foster strong relations between our two groups

Daniela Lahn, Germany: I am a behavioural biologis, and have been working in zoos and animal parks for over 10 years. I have just moved to Rostock Zoo. For the previous two years I worked at the OTTER-ZENTRUM in Hankensbüttel, Germany as head of the animal husbandry and research department, particularly on feeding, enclosure structure and training. I also give public lectures on otters, and was recently an otter expert witness at the successful court case which prevented the culling of 6 otters in Southern Germany

Andrew Johnson, USA: I serve as a California Representative with Defenders of Wildlife, a U.S.-based national non-profit organization dedicated to protecting and restoring imperiled species and their habitats in North America. For 20 years, I led the Monterey Bay Aquarium's pioneering Sea Otter Research and Conservation program, and I have provided care, facilitated research, and participated in conservation activities for more than 30 marine mammal species over the past 43 years.

Lukas Keeve, Germany: I am an IT professional who has been providing services to otter supporters for some time. I am a member of Aktion Fischottershutz e.V., and the IUCN Commission on Education and Communication. My skills include Video, sound and image design, web and social media management and I speak German, English, Italian and Arabic.

Kyle Shanebeck, Canada: Though I am in Canada now, I am from California and started in sea otter research in 2010. I then did my Masters at the University of Bremen (Germany) investigating the parasites of sea otters in California and Alaska as well as seals in Germany. At that time, I also helped in the startup of *Lutra lutra* monitoring, performing necropsie on the first 15 otters they received. Now in Canada, I am doing my PhD on the effects of sub-lethal parasitic infection on energetic condition (health) and pollutants in river otters (*Lontra canadensis*) and mink (*Neogale vison*) in British Columbia and Alberta. I also do necroscopies on otters for other projects, looking at the effects of pollution from oil sands, and most recently testing otters and mink for covid-19.