R E P O R T

THE PRESENCE AND RELATIVE ABUNDANCE OF OTTERS (CARNIVORA: MUSTELIDAE) IN NORTHERN NAMIBIA

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Abstract: Four species of otter (Carnivora: Mustelidae) occur in Africa, of which the African clawless otter (*Aonyx capensis*) and spotted-necked otter (*Hydrictis maculicollis*) are known to occur in Namibia, although very little is known about their biology and distribution. Both species are listed as Near Threatened by the IUCN Red List of Threatened Species because of a reported decline in their numbers. The presence of the species in the Kunene and Okavango rivers was determined by recording local community sightings of the African clawless and spotted-necked otters, as well as signs (footprints and latrines). In addition, 40 camera traps were deployed along the banks of the Okavango River within the Bwabwata National Park in the winter of 2022, collecting data for a total of 967 camera days. Based on this, a relative abundance index (RAI) of 0.3 for African clawless otters was calculated. The RAI for the Okavango River was the lowest compared with similar studies conducted at six other natural areas in Southern Africa. There is an evident need for conservation of wetlands and restoration of water quality in the region. Furthermore, more expansive studies on the taxonomy, distribution, diet, and population density of otters that occur in all northern perennial rivers of Namibia are recommended as the most important steps towards ensuring the future of otters in Namibia.

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INTRODUCTION

Four species of otters are known to occur in Africa: the Eurasian otter (*Lutra lutra*), spotted-necked otter (*Hydrictis maculicollis*), the African clawless otter (*Aonyx capensis*), and the Congo clawless otter (*Aonyx congicus*) (Jacques et al., 2009). Otters occur in an array of environments and aquatic habitats, from freshwater lakes to marine shorelines and surprisingly in episodic rivers in arid areas, provided that freshwater sources are fit for consumption and sufficient food is available. African otters are semi-aquatic predators that prey primarily on aquatic species such as fish, frogs, and crabs, as well as some insects and other taxa (Butler and Du Toit, 1994; Nel and Somers, 2007; Jordaan et al., 2015). Perrin and Carugati (2000) stated that the otters observed in the

Drakensberg mountains of KwaZulu-Natal preferred undisturbed areas with rock cover and dense natural vegetation.

Knowledge of the distribution of African otters is attained from museum specimens, sightings (not always reliable where two or more species are sympatric), and signs, e.g., distinctive tracks and spraints (faeces), or from diaries and expedition reports of earlier travellers (Nel and Somers, 2007). African clawless and spotted-necked otters are known to occur in Namibia, although very little is known about their biology and distribution. The International Union for Conservation of Nature (IUCN) Red List (Jacques et al., 2021; Reed-Smith et al., 2021) indicates the status of African clawless and spotted neck otters to be near threatened due to a decline in their numbers. This decline is primarily due to habitat loss and destruction, mainly from unsustainable agricultural land expansion, invasive species, pollution (Reed-Smith et al., 2021), and a continent-wide decrease in river water quality (Jacques et al., 2021). Human activities (e.g., fishing, cutting of reeds, domestic use of water, possible water pollution) along the northern rivers of Namibia are also a cause for concern.

In this study we aim to assess the presence of otters in the northern perennial rivers of Namibia, and to determine the relative abundance of otters occurring along the Okavango River in Namibia.

MATERIALS AND METHODS

Study Area

The study was conducted along the Kunene and Okavango rivers in northern Namibia. The Kunene (or 'Cunene') River is 1,050 km long with a basin area of 106,560 km² flowing from west central Angola to the border with Namibia, where it then flows west along the border until it reaches the Atlantic Ocean (Midgley, 1966). It is one of the few perennial rivers in the region. The Okavango (or 'Cubango') River is 1,700 km long with a basin area of 530,000 km² in southern Africa (Mendelsohn and El Obeid, 2004). It is the fourth-longest river system in southern Africa, running south-eastward for 1,600 km from central Angola to the Kalahari Desert in northern Botswana (Mendelsohn and el Obeid, 2004).

Data Collection

We used several approaches to obtain data on the presence and relative abundance of otters. Surveys for otter signs, especially observation and sampling of spraints, were conducted at different locations along the Kunene and Okavango riverbanks. The Okavango River was selected for determining the relative abundance of otters because of the high density of people living near the river (Mendelsohn and el Obeid, 2004; Kgathi et al, 2006).

Searches for signs of otter presence (e.g., latrines, spoor or holts) were undertaken along the Kunene and Okavango rivers, Namibia during the following times: 12 to 14 January 2022; 20 to 24 March 2022; and 21 to 31 July 2022. Two people used a four-wheel drive vehicle to travel up a road near the river until an accessible path to the river was found. When an accessible path to the river was found, a set distance of 400 m was walked along the riverbank to collect spraints and search for any otter sign. This was done within 10 m of the water's edge. Otter spraints were identified according to their shape, size, content, and characteristic odour (Somers and Nel, 2003).

In addition to sign surveys, we interviewed several community members on an opportunistic basis and recorded their reported sightings of otters. We also consulted iNaturalist (https://www.inaturalist.org/) and accessed logged records of otter and otter sign sightings in the study area (accessed on 21 August 2023).

Furthermore, we determined the relative abundance of otters in an area with confirmed otter presence. We set up 40 camera traps (Panthera PoacherCam (n = 20), Primos Proof Cam03 (n=10), and Browning Dark Ops (n=10) along the Okavango River in the Bwabwata National Park (Buffalo and Mahango Core Areas) from 16 July to 20 August 2022.

Camera traps were positioned within 15 m of the water's edge in areas considered to be accessible to otters (i.e. where the slope of the riverbank was accessible). Care was taken to avoid placing camera traps close to any latrines to approximate random probabilities of encounters and make our results comparable to previously recorded estimates of otter abundance (see Majelantle et al. 2021 and Lewis 2021). Whilst they generally faced in the direction of the water, camera traps were specifically positioned to record animals passing along terrestrial areas adjacent to the water's edge at each site. Accordingly, we did not avoid animal paths, but rather preferentially aimed camera traps at areas considered likely to be used for terrestrial movement. Only locations where the slope of the riverbank was accessible to the field team were considered. Camera traps were placed at least 100 m apart, with most of the cameras mounted on trees, while the rest were mounted on wooden stakes at average heights of 50 cm (max. 100 cm) and tilted slightly downwards. Camera traps were set to record a burst of four images when triggered, with the minimum delay between trigger events set to 10 s. All camera trap images were processed manually. When an otter was identified in an image, the study site, camera station, date, time, and group size were recorded.

Following Lewis (2021), a relative abundance index (RAI) for African clawless otters was calculated using the following equation:

$$\text{RAIspa} = \left(\frac{events * 100\ camera\ trap\ nights}{sampling\ effort}\right)$$

where RAIspa = relative abundance index for species 'a'; events = number of independent records per species; 100 camera trap nights = unit of standardisation to compare data with other studies; sampling effort = total number of nights that the camera trap stations were working (Arroyo-Arce et al., 2017).

RESULTS

The Presence of Otters

We recorded no signs of otter during the surveys along the Kunene River in the Kunene Region, Namibia. Excluding the camera trapping survey, we recorded 16 presence records of African clawless otters in the study region (iNaturalist=12, Community member reports=4) and 20 of spotted-necked otters (iNaturalist=10, Community member reports=9; Observation during survey=1) (Fig. 2). All spotted-necked otter reports were along the Okavango River, and no spotted-necked otter reports were found along the Kunene River, whereas African clawless otter reports were recorded from both river systems.

Both African clawless and Spotted-necked otters have been reported as present by the community as well as by iNaturalist contributors in the Okavango Region (Fig. 1). The dates of the Spotted-necked otter signs and sightings on the iNaturalist website in the Okavango region are between the years 2015 to 2023, whereas those for the African clawless otter are between the years 2017 to 2023.

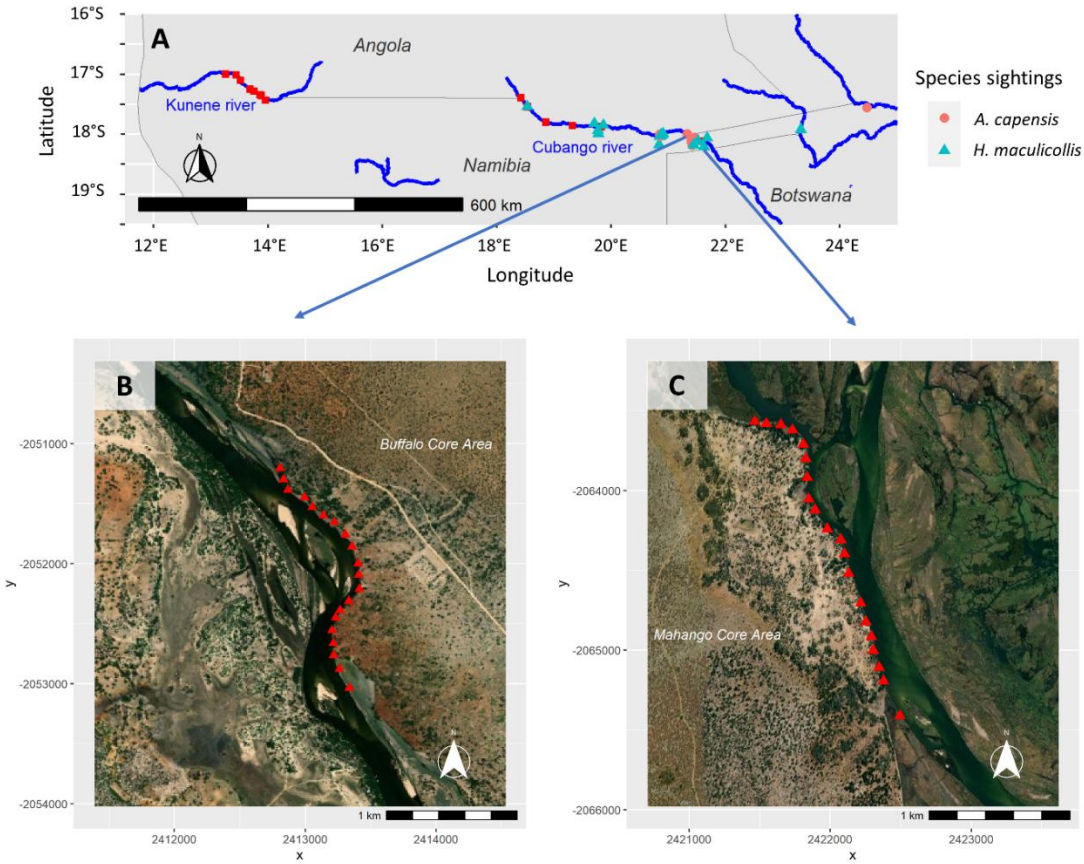

Figure 1. (A) Survey sites (red squares) and species-specific community sightings reported on iNaturalist. Locations where camera traps were placed along the Okavango (Cubango) River in the Bwabwata National Park are illistrated for the (B) Buffalo Core Area, and (C) Mahango Core Area.

The 40 camera traps recorded a total of 42,256 images. Three African clawless otter encounters were photographed (see Fig. 2). No spotted-necked otters were photographed. This resulted in a calculated RAI of 0.31 for African clawless otters in Bwabwata National Park.

Figure 2. Image of an African clawless otter captured by one of the camera traps in 2022.

DISCUSSION

According to a tour guide at Epupa River Lodge, Kunene Region (Kamburu, *pers. comm*, 2022), otters were last spotted in year 2020 in that area. Other local inhabitants claim to not have seen any otter during the previous decade. Furthermore, there are no recorded signs or sightings of either otter on iNaturalist for the Kunene Region. During the survey, extensive human activity was evident along and near the Kunene River, whereby people had cleared areas to make space for gardening, burning down of palm trees to keep monkeys and baboons away, and cutting down vegetation that was good for otters to hide in. Given the requirement of otters for adequate vegetation in floodplains and lacustrine habitats in the form of long grass, reeds, dense bushes, overhanging trees, and large boulder piles (Reed-Smith et al., 2021), such habitat destruction may have had a strong negative impact on the likelihood of otters using the area.

While both species are present in the Okavango region, the RAI (0.31) of African clawless otters in the Bwabwata National Park is low. Lewis (2021) reported RAI values obtained from a similar camera-trapping approach for six other study sites in southern Africa; these values ranged between 1.27 and 5.19 otters per 100 days of camera trapping effort. Such low densities of otters in our study area are seemingly further supported by the recent report of the National Geographic Okavango Wilderness Project (NGOWP) (2021), which indicated that the team observed only five spotted-necked otters when they travelled the length of 487 km over 17 days of the Okavango River from Angola to Botswana. No other otter species were recorded in that report (NGOWP, 2021).

Five of the study sites surveyed by Lewis (2021) are nature reserves and one is a wildlife ranch with little direct anthropogenic disturbance. These sites represent natural systems with potential otter predators, including African rock pythons (*Python sebae*), aerial predators such as fish eagles (*Icthyophaga vocifer*), and sometimes other large carnivores such as leopards (*Panthera pardus*) (Lewis, 2021). However, Nile crocodiles (*Crocodylus niloticus*) and hippopotamus (*Hippoputamus amphibius*) are notably absent from these sites. In contrast, the Okavango River is inhabited by abundant populations of both crocodiles and hippopotamuses (Aust et al., 2009). Given that predators such as crocodiles, pythons, large carnivores, domestic dogs, and fish eagles prey on the African clawless and spotted-necked otters (Reed-Smith et al., 2021), we speculate that the high abundance of crocodiles in the Okavango River could be one reason for the low relative abundance. Furthermore, the fear of the landscape with higher predator abundance can effectively alter the space use patterns of otters in their area, making the results obtained less comparable with those of the six study sites (Lewis, 2021) that do not have these predators.

Spotted-necked otters were not captured by any of the camera traps used in the present study, but one individual was observed swimming near the Shametu Lodge, Okavango River, next to the reeds on 21 July 2022. The lack of camera trap records of spotted-necked otters could be due to their movements being highly localised and restricted to areas around the lodges and not venturing to areas that are more open because of fear of predators (there are reeds around the lodges). Furthermore, spotted-necked otters are considered to be more aquatic than African clawless otters, potentially limiting their interaction with shore-based camera traps (Perrin and Carugati, 2000).

Fisherman– otter conflict could also contribute to the low relative abundance of otters. In many African countries where fishing and small-scale fisheries (using natural fish stocks) are common, communities depend on fish as a source of protein and/or

financial income (Chan et al., 2019). Local communities are in permanent conflict with fish predators such as crocodiles and otters because of their dependency on fish (Akpona et al., 2015). Because the spotted-necked otter is an opportunistic feeder (Jordaan et al. 2020) and their social organisation may be variable, leading to territoriality (Reed-Smith et al. 2014), the minimum area needed to support a viable population is likely to depend on the availability of food resources. The availability of prey is vital because it affects factors such as population density, length and success of the breeding period, carrying capacity, time spent feeding in different patches, and mortality (Akpona et al., 2015). However, local communities also depend on food resource accessibility within the waterways for their subsistence, and this is typically the principal cause of conflict between fishermen and otters (Akpona et al., 2015). With the increase in local population and natural habitat degradation, the capacity of fishermen to obtain a reasonable harvest has been reduced (Akpona et al., 2015). Under such circumstances, it becomes difficult for local communities to tolerate otter damage to their nets as well as predation on the fish. Therefore, they may hunt and kill otters. The greatest cost of otter predation is equipment damage rather than the fish loss. In a single feeding bout, one otter can take fish from (and in this way harm) numerous lines and nets (Akpona et al., 2015).

Changes in top predator populations are usually the first noticeable indication of habitat deterioration (Kubheka et al., 2013). Otters may, therefore, be considered useful indicators of the health of the wetlands that they inhabit (Butler, 1994). Therefore, the relatively low otter abundance in the Okavango River and clear absence in the Kunene River can be an indication of habitat deterioration in the area. There is therefore an urgent need for further assessment of potential drivers of otter presence and abundance in the northern rivers of Namibia, and elsewhere in Africa.

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Research Ethics/Best practice *- This research was conducted in the protected areas with proper permission obtained from the NCRST and the Bwabwata National Park (MEFT) given to the team via permit number: AN202203002. Ethical clearance was obtained from the University of Namibia via the number: SOS-0041. We adopted a non-invasive technique (field survey and camera trapping) to collect the data, and no animals were harmed or handled during this study.*

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RÉSUMÉ: PRÉSENCE ET ABONDANCE RELATIVE DES LOUTRES (CARNIVORA : MUSTELIDAE) DANS LE NORD DE LA NAMIBIE

Quatre espèces de loutres (Carnivora : Mustelidae) sont répertoriées en Afrique, dont la loutre à joues blanches (Aonyx capensis) et la loutre à cou tacheté (Hydrictis maculicollis) qui sont présentes en Namibie, bien que l'on ait peu d'informations sur leur biologie et leur répartition. Les deux espèces sont classées comme quasi menacées sur la Liste rouge des espèces menacées de l'UICN en raison d'un déclin recensé de leur nombre. La présence de l'espèce dans les rivières Kunene et Okavango a été évaluée par la collecte des observations des communautés locales de loutres à joues blanches et à cou tacheté, ainsi

que des indices de présence (traces de pas et latrines). De plus, 40 pièges photographiques ont été installés le long des berges de la rivière Okavango dans le parc national de Bwabwata durant l'hiver 2022. Ce dispositif a permis de collecter des données pour un total de 967 jours de caméra. Sur cette base, un Indice d'Abondance Relative (IAR) de 0,3 a été calculé pour les loutres à joues blanches. L'indice IAR pour le fleuve Okavango était le plus bas par rapport à des études similaires menées dans six autres zones naturelles d'Afrique australe. Il est évident qu'il est nécessaire de conserver les zones humides et de restaurer la qualité de l'eau dans la région. En outre, nous recommandons des études plus approfondies sur la taxonomie, la distribution, le régime alimentaire et la densité des populations de loutres présentes dans tous les fleuves pérennes du nord de la Namibie. Elles constituent les mesures les mieux adaptées afin d'assurer l'avenir des loutres en Namibie.

RESUMEN: PRESENCIA Y ABUNDANCIA RELATIVA DE NUTRIAS (CARNIVORA: MUSTELIDAE) EN NAMIBIA DEL NORTE

En África viven cuatro especies de nutria (Carnivora: Mustelidae), de las cuales la nutria sin uñas Africana (*Aonyx capensis*) y la nutria de cuello manchado (*Hydrictis maculicollis*) se sabe que ocurren en Namibia, aunque se conoce muy poco sobre su biología y distribución. Ambas especies están listadas como Casi Amenazadas por la Lista Roja de Especies Amenazadas de UICN, debido a que se ha informado una declinación de sus números. Determinamos la presencia de la especie en los ríos Kunene y Okavango, registrando avistamientos de las nutrias sin uñas Africana y la de cuello manchado, realizados por la comunidad, así como signos (huellas y letrinas). Adicionalmente, desplegamos 4 cámaras-trampa a lo largo de las barrancas del Río Okavango en el Parque Nacional Bwabwata, en el invierno de 2022, obteniendo datos de un total de 967 días-cámara. En base a esto, calculamos un índice de abundancia relativa (RAI en el texto en inglés) de 0.3 para la nutria sin uñas Africana. El RAI para el Río Okavango fue el más bajo comparado con estudios similares conducidos en otras seis áreas naturales en Sudáfrica. Hay una necesidad evidente de conservación de los humedales y de restauración de la calidad del agua en la región. Adicionalmente, se recomienda la realización de estudios más expansivos de la taxonomía, distribución, dieta, y densidad poblacional de las nutrias que viven en todos los ríos perennes del norte de Namibia, como pasos importantes para asegurar el futuro de las nutrias en Namibia.