Distribution of Smooth-coated Otters *Lutrogale perspicillata* (Mammalia: Carnivora: Mustelidae): in Ratnagiri, Maharashtra, India

Swanand Patil¹ & Kranti Yardi²

¹ Arcane Conservancy (www.arcaneconservancy.org/home, A/207 Saikrupa BS Road, Dadar West, Mumbai, Maharashtra, 400028, India.
² Bharati Vidyapeeth Deemed University Institute of Environment Education and Research, Pune, Maharashtra 411043, India.
¹ swanandpatil6@gmail.com (corresponding author), ² kranti@bvieer.edu.in

Abstract: This report describes the distribution of Smooth-coated otters in Ratnagiri, Maharashtra, and investigates the utility of scat counts for quantifying otter occurrence. The study duration was from February to June 2020. Surveys were conducted along the Jog River in Anjarle and Aade River in Aadekond using camera traps. The results subjected to principal component analysis indicated that the occurrence of Smooth-coated Otters at Anjarle is 76% and at Aadekond 48%. We also mapped the distribution and threats associated with Smooth-coated Otters. This study serves as a baseline for efforts to support long-term otter research and conservation.

Keywords: Anjarle, conservation, distribution, Otter, scat counts, status, threats.

Otters are prime indicators of the status of wetland ecosystems, where they are often the key predators. According to the IUCN Red List, the conservation status of the Smooth-Coated Otter *Lutrogale perspicillata* is ‘Vulnerable’ (Image 1). It is listed in the CITES under Appendix I, and in India, it is a Scheduled II species under the Wildlife (Protection) Act, 1972, which prevents/prohibits any person from hunting, trapping, trade of its products and killing of the species.

In Maharashtra, otters have been largely overlooked, and with growing concerns over deforestation, the shrinking of wetlands, and the constant conversion of wetlands for development, the focus needs to be shifted to small carnivores like otters. This paper aims to provide scientific data on the distribution and status of otters in Anjarle, Ratnagiri. Spraint/ scat surveys have been widely used and provide a reliable picture to assess the distribution of otters (Mason & Macdonald 1987). However, direct observations and counting individuals are difficult especially since the Smooth-coated Otter is both elusive and has a large home range. For such species, indirect field census methods (Tracks, scat, territory marking sites, dens) have been developed to estimate their distribution, and their population trends (Wilson & Delahay 2001; Sittenthaler et al. 2020).
METHODS

Study area

Ratnagiri is a district situated on the western coast of Maharashtra, having nine talukas (townships). Being open to the sea, it has a large population dependent on fishing for their livelihood. Our selected field site for research on otters is Anjarle (17.846N & 73.087E) (Image 2), a small village situated in Dapoli Taluka. It is more significant for wildlife than other talukas, as the Anjarle beach is a nesting site for Olive Ridley Sea Turtles *Lepidochelys olivacea* (Image 3). Every year, tourists flock to see the hatchlings going into the sea.

Part of the local population is aware of the otters and their whereabouts; however, knowledge of otters is scarce amongst the general population in India, and the villagers and tourists coming to Anjarle are no different.

Scat surveys have become the method of choice to monitor species distribution, population trends, and habitat use (Sittenthaler et al. 2020). The total length of the Jog River, about 33.3 km, and the Aade River, about 10.62 km, was digitized using Google Earth and QGis; 2.5 km survey grids were placed on the river.

In each grid, a transect was done; in each transect was of 50 × 250 m (left and right bank of the river) was used. Six survey replicates were conducted in each grid (Mason & Macdonald 2009; Borker 2014).

Surveys were carried out from February to June 2020, as the summer season is the best time to survey otters, as sightings and otter signs are easier to detect. During tramsects surveys, otter signs (pugmarks, grooming sites, holts/dens) were recorded. GPS essentials were used to mark the latitude and longitude of any otter sign. Plots with otter signs were considered as ‘used plot’ and plots adjacent to that (upstream and downstream) were termed ‘available plot’ (this is done to reduce the dependency of plot use).

A plot was only considered a ‘new plot’ if otter signs are present, and there was a 5 m or more distance between the new and old otter signs. Camera trapping was used to record species identification (Image 5, 7; Video 1), but mostly focused on otter activity and group size (Mudappa et al. 2012; Khan et al. 2014; Prakash et al. 2014).

Identifying the current status of otters

Threats faced by otters were visually identified and recorded during the surveys. These threats were taken into account during the analysis, which acted as covariates to measure impact on distribution.

Data analysis

It was assumed (Foster-Turley 1992; Barrios 2020) that otters in human-modified areas would be nocturnal or crepuscular, and that this would create difficulty in using direct observation to estimate occupancy. As a
result, distribution and frequency of spraint and tracks (indirect signs) were used. To estimate the percentage of area occupied by otters, we used principal component analysis (PCA) coupled with logistic regression with forward stepwise analysis. Scores of those were considered as the percentage of occurrence of otters.

**RESULTS**

The estimated length of the Jog River surveyed is about 33.3 km starting from Sondeghar, flowing to Matwan to Sakurde to Bandhativare to Sarang to Tadil to Kongale to Murdi, and ending into Anjarle (Arabian Sea) on the western Coast of Maharashtra, India. The estimated proportion of the length of Jog River occupied by Smooth-coated Otters was 76.2% based on our sign survey as shown in Figure 1.

The estimated length of the Aade River surveyed is about 10.6 km starting from Aade to Adekond to Lonvadi to Borthal dam. The estimated proportion of the length of Aade River occupied by Smooth-coated Otters was 47.6% based on our sign survey as shown in Figure 2.

**Threats to the Otter population**

Habitat loss: For otters, the requirement to breed, rest, and defecate is vital. In our study area, these roles are carried out within the mangrove forests. Places like sandbanks, soil, or even leaf litter act as grooming and defecation areas for otters along the river banks. Such areas are in decline owing to illegal sand mining and increasing conversion of wetlands into agricultural areas (Image 6).

Sand mining poses a direct threat to habitat of many species, as uncontrolled extraction of benthic sand from rivers (Image 6) and from riverbanks leads to an increase in water depth, loss of prey base, and habitat degradation and loss. Some stretches of the rivers are completely degraded because of sand mining.

**Otter-fisherman competition**

In certain areas with high fish resources, high fishing activity and high otter activity have been observed, showing a positive correlation of 0.663 with otter presence (Table 1).

These are potential otter conservation zones, but measures need to be taken to ensure fishermen who are dependent on the particular zone are provided with some alternative, or that sustainable methods that allow otters to coexist are adopted.

**DISCUSSION**

Otters are widely distributed in Anjarle and Aadekond, and a survey of spraints using standard methodology gives a reliable picture of otter distributions. According to informal interviews, food-rich zones are prime areas for...
Figure 1. Map showing Smooth-coated Otter distribution in Jog River, Anjarle.

Figure 2. Map showing Smooth-coated Otter distribution in Aade River, Aade.
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Image 5. Camera trap image showing otters in Anjarle.

Image 6. Extensive sand mining at the field site.

Image 7. Video snapshot of romp of Smooth-coated Otters.

Table 1. Table showing positive correlation of 0.663 between otter and fishing activity.

| Correlations | Fishing activity | Otter sign |
|--------------|------------------|------------|
| **Fishing Activity** | **Pearson Correlation** | 1 | .663** |
| | **Sig. (2-tailed)** | .000 |
| | **N** | 54 |
| **Otter_Sign** | **Pearson Correlation** | .663** | 1 |
| | **Sig. (2-tailed)** | .000 |
| | **N** | 54 |

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 3. Plot of fishing intensity v/s otter signs.
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Conclusion

Though this is a preliminary study, baseline data was created to guide future otter conservation efforts in Ratnagiri, facilitated by Arcane Conservancy, an NGO for long-term research and conservation to improve the protection of otters.

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