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SMALL WILD CATS SPECIAL ISSUE

SHORT COMMUNICATION

INSIGHTS INTO THE FEEDING ECOLOGY OF AND THREATS TO SAND CAT *FELIS MARGARITA* LOCHE, 1858 (MAMMALIA: CARNIVORA: FELIDAE) IN THE KYZYLKUM DESERT, UZBEKISTAN

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INSIGHTS INTO THE FEEDING ECOLOGY OF AND THREATS TO SAND CAT *FELIS MARGARITA* LOCHE, 1858 (MAMMALIA: CARNIVORA: FELIDAE) IN THE KYZYLKUM DESERT, UZBEKISTAN

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Abstract: Little is known about the ecology of the Sand Cat *Felis margarita* throughout its range in the deserts of northern Africa to central Asia. We present observations of the Sand Cat in the southern Kyzylkum Desert, Uzbekistan, potentially preying upon a large bird and returning to the kill on subsequent nights. This record contributes to the knowledge about the feeding ecology and varied diet of the Sand Cat and its opportunistic hunting strategy.

Keywords: Asian Houbara, Bukhara region, camera trapping, *Chlamydotis macqueenii*, conservation needs, opportunistic feeding, scavenging.

The distribution of the Sand Cat *Felis margarita* ranges from northern Africa to central Asia across which it almost exclusively inhabits sandy and stony deserts (Schauenberg 1974). Very little is known about its ecology and while some aspects have been studied in Israel (Abbadi 1991), Morocco (Sliwa et al. 2013; Breton et al. 2016; Sliwa et al. 2017; Breton & Sliwa 2018), and Iran (Ghafaripour et al. 2017), the Central Asian Sand Cat *F. m. thinobius* remains particularly understudied. Burnside et al. (2014) confirmed a breeding population to be still present in the southern Kyzylkum Desert, Uzbekistan (Fig. 1), aligning modern data with the species distribution reported by Heptner & Sludskii (1992).

Felis margarita is classified as Least Concern in the IUCN Red List (Sliwa et al. 2016). In Uzbekistan, while *F. m. thinobius* is not listed in the Red Data Book of the country (Khassanov 2009), it has been recommended for inclusion in the next edition of the book, which is yet to be published (Gritsina pers. comm. 18 April 2018). Apart from local knowledge and anecdotal evidence, nothing is known about the ecology, distribution, population sizes, or trends of the species in Uzbekistan (Gritsina 2014) nor anywhere in central Asia. Therefore, any new observation contributes to the knowledge base on this species. Here we present opportunistic observations on the feeding ecology of a Sand Cat in Uzbekistan.

MATERIALS AND METHODS

As part of long-term research into the ecology of Asian Houbara *Chlamydotis macqueenii* in the southern Kyzylkum Desert west of Bukhara, field research teams have been spending 3.5 months in the study area each year from 2012–2018 as described in Burnside et al. 2014. During this fieldwork, they occasionally observe Sand Cat, but as the work is diurnal it does not overlap well with the nocturnal activity of Sand Cat, which reduces the probability of detecting the species. The

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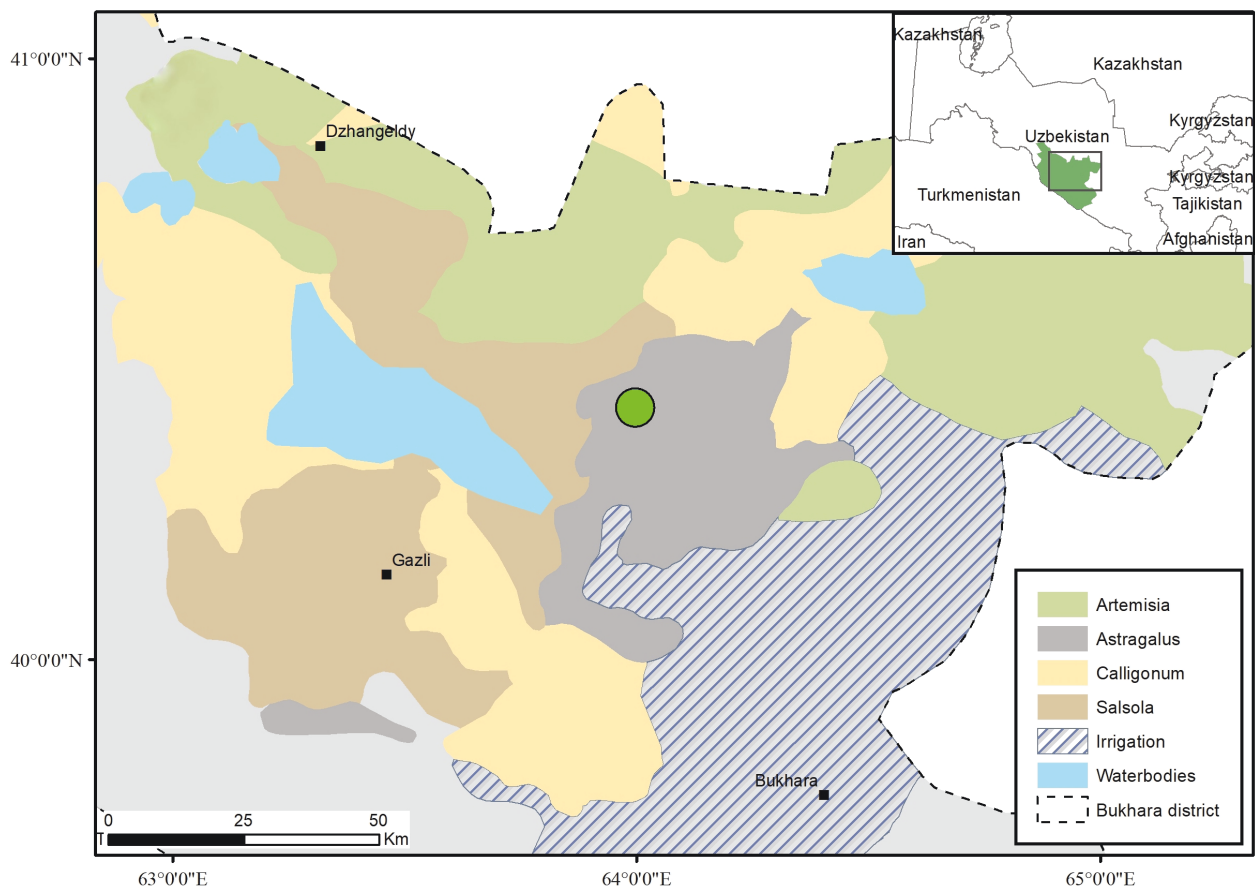


Figure 1. Study area, *C. macqueenii* Research Project, Kyzylkum Desert, Uzbekistan, showing Sand Cat observation (green dot) and the different vegetation zones. © R. Burnside.

data is thus generally limited to opportunistic diurnal observations. This equivalent field effort in each field season resulted in an average of one Sand Cat report per year, with the exception of 2014 (Burnside et al. 2014) and 2018 (this article) when the species was also recorded through camera traps.

Part of our work is to monitor the survival of released captive-bred *C. macqueenii* and establish causes of its mortality in the field. In the period after their release, captive-bred birds are more susceptible to predation than their wild counterparts (Burnside et al. 2016). On 26 March 2018, we located a freshly-killed and partially-eaten *C. macqueenii*, identified by its leg rings as a recently released captive-bred yearling male. The evidence found around the carcass suggested that the predator was a cat. We deployed a trail camera (Bushnell Trophy Cam HD Essential, model #119836) 2m from the kill, low to the ground and concealed in a shrub, for three nights. We set it to record motion-triggered, 15s-long videos both during the day and night (PIR sensor) and then returned to collect it three days later.

RESULTS

The carcass of *C. macqueenii* was found on a small hill of consolidated sand with low shrubs dominated by *Astragalus villosissimus* and *Salsola* spp. and sparse grass cover. The discovery was made after sighting feathers distributed in shrubs up to 10m around the kill at 40.423°N & 63.986°E. Feathers did not show signs of chewing but had been plucked. The pectoral muscles were partially eaten and the entire head and neck were missing. The legs and wings were intact and undamaged. This is unlike a kill by Red Fox *Vulpes vulpes*, another common predator of released captive-bred *C. macqueenii* in the area (Burnside et al. 2016). A Red Fox usually chews the limbs, removing and caching them, while leaving chewed feather quill tips as opposed to plucking them at kill sites (Robert J. Burnside, unpublished data).

Pounce marks found close to the carcass, approximately 4m away, were identified as that of a Sand Cat. Erasil Khaitov, an experienced tracker in the research team who has worked extensively in the



Image 1. Camera trap footage of a Sand Cat feeding on the carcass of a captive-bred Asian Houbara in the Kyzylkum Desert, Uzbekistan. © A. Brighten.



Image 2. Sand Cat pounce marks left during a hunt, with four paw-prints (highlighted with white dashed boxes) in the Kyzylkum Desert, Uzbekistan. © A. Brighten & R. Burnside.

Kyzylkum Desert, identified the species' prints without hesitation. Tracks leading up to the kill site showed a slow, creeping approach indicating that the cat was moving low to the ground. In two areas, the tracks deepened with the force of a pounce (Image 2), with all four paws visible; drag marks of approximately 6m were seen nearby leading to where the carcass was found.

The camera trap recorded footage of a Sand Cat returning to the carcass on 26 March 2018 (Image 1). It arrived after dark at 20.55h and spent 15min at the kill where it was seen to feed on the *C. macqueenii* (Video 1).

A Sand Cat was recorded on the camera trap visiting

the kill once more at 21.24h on 28 March 2018, after which there were no more observed visits by the cat or other vertebrate scavengers. The footage showed the Sand Cat to be a male. The morning after the second visit by the cat, however, the carcass had been removed. There was a single night trigger on 28 March, the second visit by a cat, suggesting there to be a battery failure limiting the firing of the infra-red flash. The removal of the carcass was, therefore, not caught on camera as the next trigger was 29 March at 10.32h showing the *C. macqueenii* to have been taken away. We were unable to confirm which scavenger removed the carcass.

DISCUSSION

Very little is known about the Sand Cat's feeding ecology. Components of its diet were described in Uzbekistan in the 1960s from stomach contents of hunted cats (Schauenberg 1974), which mainly consisted of small burrowing rodents. Other studies from central Asia summarised by Heptner & Sludskii (1992), using stomach contents, faecal samples, or a combination of both, found Sand Cat diet dominated by gerbils *Gerbillus* and jerboa species like *Allactaga*, *Dipus*, and *Paradious*; however, this also varied, comprising of other mammals such as Tolai Hare *Lepus tolai* and Souslik *Spermophilus leptodactylus*, reptiles such as snakes *Spalerosophis diodema* and *Coluber karelini* and gecko *Teratoscincus*, birds such as Turtle Dove *Streptopelia turtur*, Crested Lark *Galerida cristata*, Saxaul Jay *Podoces panderi*, and Desert Sparrow *Passer simplex*, a single observation of a Pallas Sand Grouse *Syrrhaptes paradoxus*, and arthropods such as *Coleoptera*, *Phalangids*, and *Scorpiones*. Sand Cats were observed preying on gecko *Stenodactylus* in Israel (Abbadi 1991), and on Cape Hare *Lepus capensis*, viper *Cerastes*, Greater Hoopoe Lark *Alaemon alaudipes*, and Domestic Fowl in the Sahara (Dragesco-Joffé 1993).

The southern Kyzylkum Sand Cat diet likely comprises fauna found in our Bukhara study area, such as small rodents, including several *Gerbillus* species, Long-clawed Souslik *Spermophilus leptodactylus* and Yellow Souslik *S. fulvus*, 30 reptile species including Toad-headed Agama *Phrynocephalus*, and four amphibian species (Showler 2017). Small bird species are also numerous in the area, Alaudidae in particular, including the abundant Crested Lark *Galerida cristata*, which are also probable prey of the Sand Cat. The accounts of Abbadi (1991) and Dragesco-Joffé (1993) both describe Sand Cat hunting strategy as opportunistic and our observations in the Kyzylkum Desert presented here support this assertion.

From the evidence presented, it seems likely that the *C. macqueenii* was killed by the Sand Cat. The average weight of a captive-bred *C. macqueenii* yearling male is 1.5–2 kg, whereas Central Asian Sand Cats weigh on average 3.125kg for males (2.65–3.40 kg, n=6) and 2.194kg for females (1.35–3.10 kg, n=5) (Heptner & Sludskii 1992). The *C. macqueenii* was, therefore, large prey for a small cat. The species may not form a significant part of Sand Cat diet, but this predator-naïve, recently-released *C. macqueenii* may have offered an easy opportunity for the Sand Cat.

Our record is the first of a Sand Cat returning to a kill in the Kyzylkum Desert, and it did not cover the carcass. In Niger's Ténéré Desert, Dragesco-Joffé (1993) observed Sand Cats burying their prey in the sand when they killed

more than what they could eat, later returning to feed on the carcasses. Returning to kills and scavenging has been documented in only a few small wild cat species. Sliwa (1994) observed Black-footed Cats *Felis nigripes* killing and caching Southern Black Bustards *Afrotis afra* in South Africa and a scavenging event on a Springbok *Antidorcas marsupialis* lamb, while Avenant & Nel (2002) reported Caracal *Caracal caracal* feeding on the carcasses of Springbok that it had presumably killed.

In Uzbekistan and other parts of central Asia, the Sand Cat is likely threatened by increasing degradation and encroachment of its desert habitat through anthropogenic activities, both industrial and private. Particularly in the Bukhara region, this encroachment includes expanding industry and infrastructure, mainly construction of railways, roads, and pipelines, as well as mining for natural resources such as gas, oil, gold, sand, and gravel. Unlike large businesses, local communities in Uzbekistan still have limited access to reliable fuel resources due to the government's policies on gas export. The result is that the gathering of fuelwood continues on a large scale in the Bukhara region. Historically, this was limited to Saxaul *Haloxylon persicum*, but recently we have seen the collection become less discriminating, uprooting other woody shrubs. We encountered tractors undertaking such activities on an almost daily basis in the spring between 2016 and 2018 in the region. This resulted in changes to the shrub structure and increase in drifting sand (Robert J. Burnside, unpublished data).

Pastoralism is the most widespread anthropogenic activity in the desert. In general, it seems to have a low impact on vegetation communities and structure at the landscape-level and is at a stable level in the Bukhara region (Koshkin et al. 2014). As with other rangeland systems, however, there is a general mistrust of mammalian predators among the local people. We have first-hand reports of the prevalent negative perceptions and direct persecution of cats in general, both of Sand Cat and Asian Wildcat *Felis lybica ornata*, by the rangeland inhabitants in our study area. One recent account (Erasil Khaitov, pers. comm. 20 May 2018) involved the destruction of a Sand Cat den and killing of kittens by a shepherd in retaliation for the loss of a lamb, supposedly killed by a Sand Cat. The evidence was that the lamb was killed by a bite to the neck, which is indicative of a cat, although other cats and carnivores inhabit the area (Caracal, Asian Wildcat, Jungle Cat *Felis chaus*, Red Fox, Corsac Fox *Vulpes corsac*, and Grey Wolf *Canis lupus*).

Another threat to Sand Cat is human-introduced mammals such as the Domestic Dog *Canis familiaris*, which are potential predators of cats (Cole & Wilson

2015). In the Kyzylkum Desert, many rangeland farmers keep shepherding dogs. The killing of Sand Cats by these dogs was reported from the Moroccan Sahara (Sliwa 2013; Sliwa et al. 2013). Sliwa et al. (2013) identified an additional threat of disease transmission from Domestic Cat *Felis catus* to Sand Cat. While this may not currently threaten the Sand Cat population in the Bukhara study area, as there is a low density of human settlements and presumably low density of Domestic Cat, it may affect Sand Cat in rangelands or sandy deserts closer to larger human settlements of Uzbekistan.

The first steps in conservation action needed for the Sand Cat are two-fold. Firstly, assessment of the population status and improved understanding of its ecology to quantify the impacts of human activity on the population are needed. Secondly, education, changing perceptions, and resolving human-predator negative interactions are necessary to reduce persecution. As understanding the species' ecology is the first step to better quantifying the conservation status of Sand Cat and mitigating anthropogenic impacts on it in Uzbekistan, the observations presented here represent important information for understanding Sand Cat ecology, specifically the variability in the diet of this potentially threatened small wild cat.

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