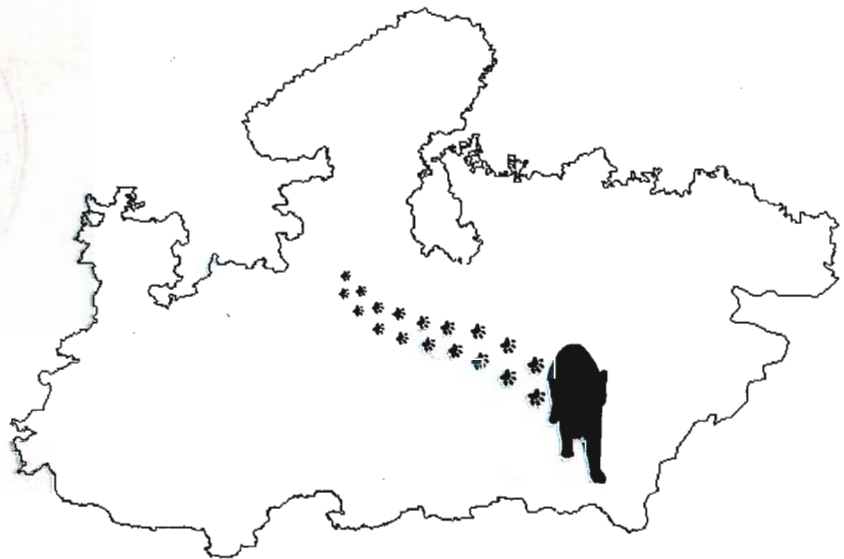


Small cats in human-dominated landscapes in Madhya Pradesh.

Report and Recommendations

Submitted to the Madhya Pradesh Forest Department

2013



Shomita Mukherjee,

Principal Scientist,

Sálim Ali Centre for Ornithology and Natural History,

Anaikatty Post, Coimbatore 641108

SACON Library



PR111



PR111

LIBRARY COPY

Shomita

Small cats in human-dominated landscapes in Madhya Pradesh.

Report and Recommendations

Submitted to the Madhya Pradesh Forest Department

2013

SACON Library



PR111

Shomita Mukherjee,
Principal Scientist,



Sálim Ali Centre for Ornithology and Natural History,
Anaikatty Post, Coimbatore 641108



Mukherjee S. (2013) Small cats in human dominated landscapes in Madhya Pradesh. Report and recommendations submitted to the Madhya Pradesh Forest Department in March 2013. SACON, Coimbatore.

Contents:

	Pages
Acknowledgements	1
Chapter I	3-6
Chapter II	7-12
Chapter III	13-17
Chapter IV	18-21
Chapter V	22-23

Acknowledgements:

This report was prepared on the request of the APCCF (Wildlife) of Madhya Pradesh, Mr Suhas Kumar. I thank him for taking an interest in a group that is not very prominent in conservation circles especially in a State that is one of the strongholds for the tiger, a species that gets all the attention. I also thank Mr Suhas Kumar for asking me to prepare this document.

I thank the Director, SACON for facilitating small cat research and enabling me to compile this document. Some of the information has been compiled and generated while writing grant proposals and conducting surveys through SACON.

I thank Vaibhav Chaturvedi for encouraging me to compile this information ever since a couple of jungle cat kittens were located in a cropfield in MP in 2012. I am grateful to Ranjini J. for supporting me through the preparation of the document, for her valuable suggestions and for bringing in a lot of cheer.

For the chapter on caring for orphaned kittens I am indebted to Gowri Mallapur, Brijesh Raj, Umesh Karkare and Mike Stafford Johnson, veterinarians who taught me much about kitten and cat care.

Chapter I: Introduction to cats

Cats are unique in many ways, the most obvious being their strong requirement for meat. They are obligate carnivores and hence are unable to survive without meat (Allen et al. 1995, Morris 2002). Some crucial dietary requirements of amino acids and vitamins that other mammals can manufacture within their bodies can be available to cats only through meat (Morris 2002). This is crucial in understanding their ecology and also in instances when young cats need to be hand reared. Every aspect of their morphology is strongly selected for hunting and meat eating. Shortened muzzles with reduced dentition (cats have between 28-30 teeth as opposed to 42 teeth in canids) lending a greater bite force, retractile claws (this protects claws since they are crucial in the act of killing), flexible wrists, supple spine, very defined jaw articulation with skull, binocular vision (the most well developed among carnivores), among others (Kitchener 1991, Sunquist and Sunquist 2002). Such extreme specialisation towards the same function of killing has resulted in the 36 species of felids being very similar in appearance. So, the largest cat, the tiger, looks like an enlarged version of the smallest cat, the rusty spotted cat. This makes identification of similar sized cats confusing at times. Yet there are differences (apart from the very obvious difference in size among some species).

As a general rule cats living in open habitats (scrub, grassland, wetlands) have short tails, less than 50% of their head-body length, e.g. jungle cat, caracal and fishing cat, whereas forest dwelling cats have tails much longer than their total length e.g. clouded leopard, marbled cat (Figure 1) (Pocock 1939). The ones with intermediate tail lengths are perhaps not very specific to habitat structure e.g. leopard cat and rusty spotted cat. This is borne out

from records of their distribution which does not indicate any specific requirement for habitat structure (Nowell and Jackson 1996).

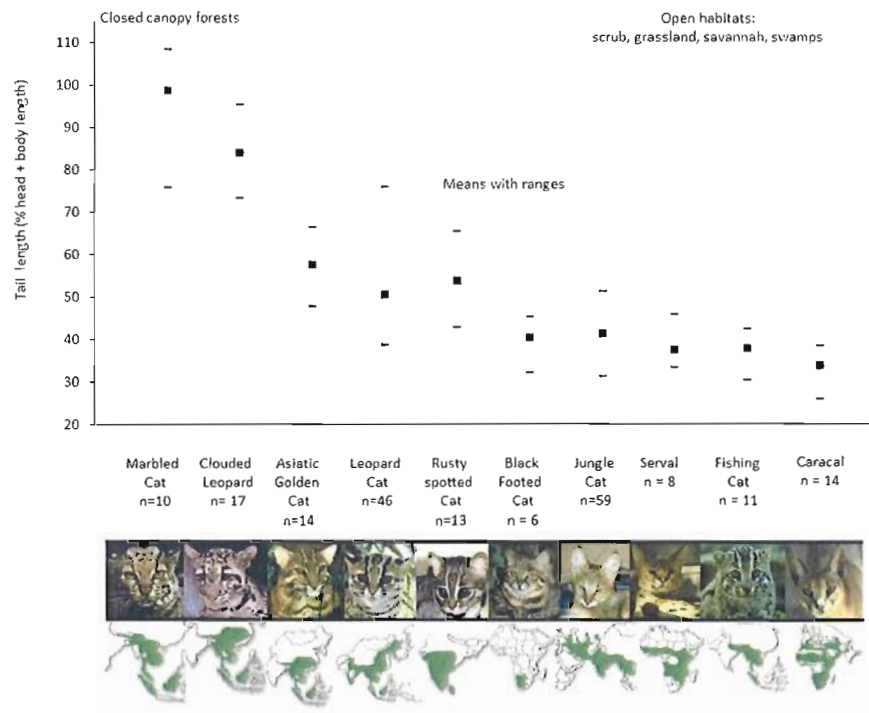


Figure 1: Tail lengths of cats as a percentage of head and body length

With 15 species of cats India is the richest anywhere in the cat world (Nowell and Jackson 1996). Of these 15, 11 are small to medium sized and occur across several habitats in the country (Sunquist and Sunquist 2002). Several species of cats occur together in a region and most species also occur outside protected areas. Some such as the jungle cat (*Felis chaus*), rusty spotted cat (*Prionailurus rubiginosus*), leopard cat (*Prionailurus bengalensis*), fishing cat (*Prionailurus viverrinus*), desert cat/Asiatic wild cat (*Felis silvestris ornata*) and perhaps even the caracal (*Caracal caracal*) are often found in crop fields and around human habitation and even breed there (Sunquist and Sunquist 2002). From a human perspective it is strange that they choose to come into 'un-natural' or artificial landscapes to live and breed. But from a cat's perspective it is habitat. For them the structure of the habitat

matters and agricultural fields are an imitation of grasslands and scrub. Also there are rodents to satisfy their food requirements. In fact irrigated agriculture is a great boon for species such as the jungle cat and perhaps also the rusty spotted cat (Guggisberg 1975, Nowell and Jackson, 1996, Mukherjee 2010a). The only and perhaps major problem is during harvest that coincides with birth in cats (usually in the winter months) since cover is lost and many kittens are exposed and eventually are either killed by dogs or die of starvation since their mother is forced to run away (Mukherjee 2008). Several such instances take place throughout the country and in some places forest departments have to deal with having to raise kittens and often are unable to identify the species since kittens of various species look very similar (http://articles.timesofindia.indiatimes.com/2012-11-09/flora-fauna/35015968_1_jungle-cat-mother-cat-leopard-cubs).

Another challenging aspect in the conservation of cats, especially small cats is the paucity of information available on their distributions. Added to this is the difficulty in identifying very similar looking species such as the jungle cat and caracal which can lead to erroneous reporting which in turn could lead to incorrect distribution maps and a waste of conservation efforts. A recent example is of a new record of caracal from Melghat Tiger Reserve by Narasimmarajan et al. (2011) which was later confirmed as jungle cat (<http://jresearchbiology.com/documents/ErratumVolume1Issue6.pdf> downloaded on the 29th of March 2013). This is a reflection of the difficulty in studying small, rare and cryptic species. Nevertheless, with the introduction of molecular tools in ecology in India, it is now relatively easy to monitor small cat populations as well as update their distributions through surveys using non-invasive methods (Mukherjee et al. 2010a & b, Mukherjee et al. 2012).

This document is specifically for cats occurring in Madhya Pradesh and provides a key to identification of species of cats in the state and outlines new monitoring techniques that can be used in human dominated landscapes through non-invasive methods. It also provides the necessary steps to be followed once kittens are found in agricultural landscapes or elsewhere and are picked up by well-meaning humans. Additionally a list of measures is provided that can be taken to prevent such instances so that the mother is not forced to abandon or lose her kittens.

References:

- Allen, M. E., Oftedal, O. T., Earle, K. E., Seidensticker, J., and Vilarin, L. (1995). Do maintenance energy requirements of felids reflect their feeding strategies. In *Proceedings of the 1st Annual Conference of the AZA Nutrition Advisory Group, Toronto, Ontario, Canada*. p (pp. 97-103).
- Guggisberg C.A. (1975). Wild cats of the world. Taplinger, New York, 328 pp.
- Kitchener A. (1991). The Natural History of the Wild Cats. Ithaca, New York, Cornell University Press, 280 pp.
- Morris J.G. (2002). Idiosyncratic nutrient requirements of cats appear to be diet-induced evolutionary adaptations. *Nutrition Research Reviews*, 15: 153–168.
- Mukherjee S. (2008) Field Mouser. Natural History. pp. 48.
- Mukherjee S., Adhya T, Thatte P. and Ramakrishnan U. (2012). Survey of the Fishing Cat *Prionailurus viverrinus* Bennett, 1833 (Carnivora: Felidae) and some aspects impacting its conservation in India. *Journal of Threatened Taxa* 4(14): 3355–3361.
- Mukherjee S., Krishnan A., Tamma K., Home C., Navya R., Joseph S., Das A. and Ramakrishnan U. (2010a) Ecology driving genetic variation: A comparative phylogeography of jungle cat (*Felis chaus*) and leopard cat (*Prionailurus bengalensis*) populations in India. *PLoS ONE* 5(10): e13724. doi:10.1371/journal.pone.0013724.
- Mukherjee, S., Ashalakshmi, Home, C. and Ramakrishnan, U. (2010b). A PCR-RFLP technique to identify Indian felids and canids from scats. *BioMed Central Research Notes*, 3:159 (doi:10.1186/1756-0500-3-159).

Narasimmarajan K, Bidyut Bikas Barman and Lalthan Puia. (2011) A new record of Caracal (*Caracal caracal*) in Melghat Tiger Reserve, Maharashtra, Central India - After decades. Journal of research in Biology 6: 399-402.

Nowell, K. and Jackson, P. (eds.). (1996). Wild cats, status survey and conservation action plan. IUCN, Gland Switzerland, 382 pp.

Pocock, R.I. (1939). The fauna of British India, including Ceylon and Burma. Mammalia 1: Primates and Carnivora. (In part). 2nd edn. (Reprint edition, 1985 NewDelhi: Today and Tomorrow's Printers and Publishers,). Chicago: University of Chicago Press.

Sunquist, M.E. and Sunquist F.C. (2002). Wild Cats of the World. Chicago: Univ. Chicago Press, 452 pp.

Chapter II. Cats in Madhya Pradesh

The biogeographic classification of India (Rodgers and Panwar 1988, Rodgers et al. 2002) provides a comprehensive base for depicting distributions of species in an ecologically meaningful manner. This chapter provides an overview of the cats that currently occur in Madhya Pradesh through a compilation of records that have been authenticated with photographs, peer reviewed publications and recent surveys using molecular techniques. Five cats currently occur in Madhya Pradesh and these are the jungle cat (*Felis chaus*), caracal (*Caracal caracal*), rusty spotted cat (*Prionailurus rubiginosa*) (the smallest cat species in the world), Asiatic wild cat (*Felis silvestris ornata*), tiger (*Panthera tigris*) (the largest cat species in the world) and leopard (*Panthera pardus*) (Nowell and Jackson 1995, Sunquist and Sunquist 2002).

While much attention is paid toward the conservation of the tiger in the state (Gopal et al. 2010), the small cats remain unknown to most. The distributions of some species such as the rusty spotted cat, caracal and Asiatic wild cat in the state are not clearly recorded. The jungle cat and rusty spotted cat are not uncommon and are widely distributed in India but the caracal is very rare and has a more restricted distribution within India (Pocock 1939, Sunquist and Sunquist 2002). All cats except for the jungle cat are placed under Schedule I of the Wildlife Protection Act (1972). The jungle cat is placed under Schedule II. The rusty spotted cat, though widely distributed within the country, is endemic to India and Sri-Lanka (Nowell and Jackson 1996).

Figure 3 depicts the distribution of two species that occur commonly in Madhya Pradesh. These are not comprehensive records but just ones that have been noted in literature (Digveerendrasinh 1995, Patel and Jackson 2005, Patel 2006, Kolipaka 2010, Mukherjee et

al. 2010a & b). Given their distribution through the country they would be more widespread within Madhya Pradesh than shown in the figure. This is especially true for the rusty spotted cat that is relatively common across the border in Gujarat (Patel 2006). Reports of the Asiatic wild cat and caracal are very sparse (Kolipaka 2010).

Until recently it was believed that the leopard cat (*Prionailurus bengalensis*) exists in Madhya Pradesh but a recent study (Mukherjee et al. 2010a) using molecular techniques and niche modelling shows that the probability of the leopard cat occurring in Madhya Pradesh is very low and it is likely that the cat does not occur here naturally. The study showed that leopard cats are limited by high summer temperatures and do not occur in areas where temperatures cross 40° Celsius at any point. This is also supported by the total lack of evidence of leopard cat from Central India from museum collections across the world. In fact Pocock (1939) mentions never having come across this species during his expeditions in Central India and doubts its distribution in this region. Yet, the niche model from Mukherjee et al.'s (2010a) study shows some areas of Kanha Tiger Reserve to have a low probability of occurrence for this species. This has to be tested through rigorous surveys using camera trapping and molecular analysis of scats. The protocols for monitoring using molecular tools are described in Mukherjee et al. (2010b).

Monitoring of small cats can be done with the help of local wildlife enthusiasts, wildlife clubs, local youth and students from colleges and schools in various districts. Scats can be collected through the year from various land regimes including protected areas and samples can be analysed for identity and diet by students as part of their summer training projects. Students can contact researchers from various institutes that have laboratory facilities and who conduct ecological research. Apart from SACON, WII, ZSI, there are several other

institutes across the country that have well equipped laboratories and can host summer trainees. This will not just help in capacity building but also aid in monitoring of little known species in Madhya Pradesh. The state can set an example of citizen participation in science and conservation that can go a long way in the conservation and management of little known species.

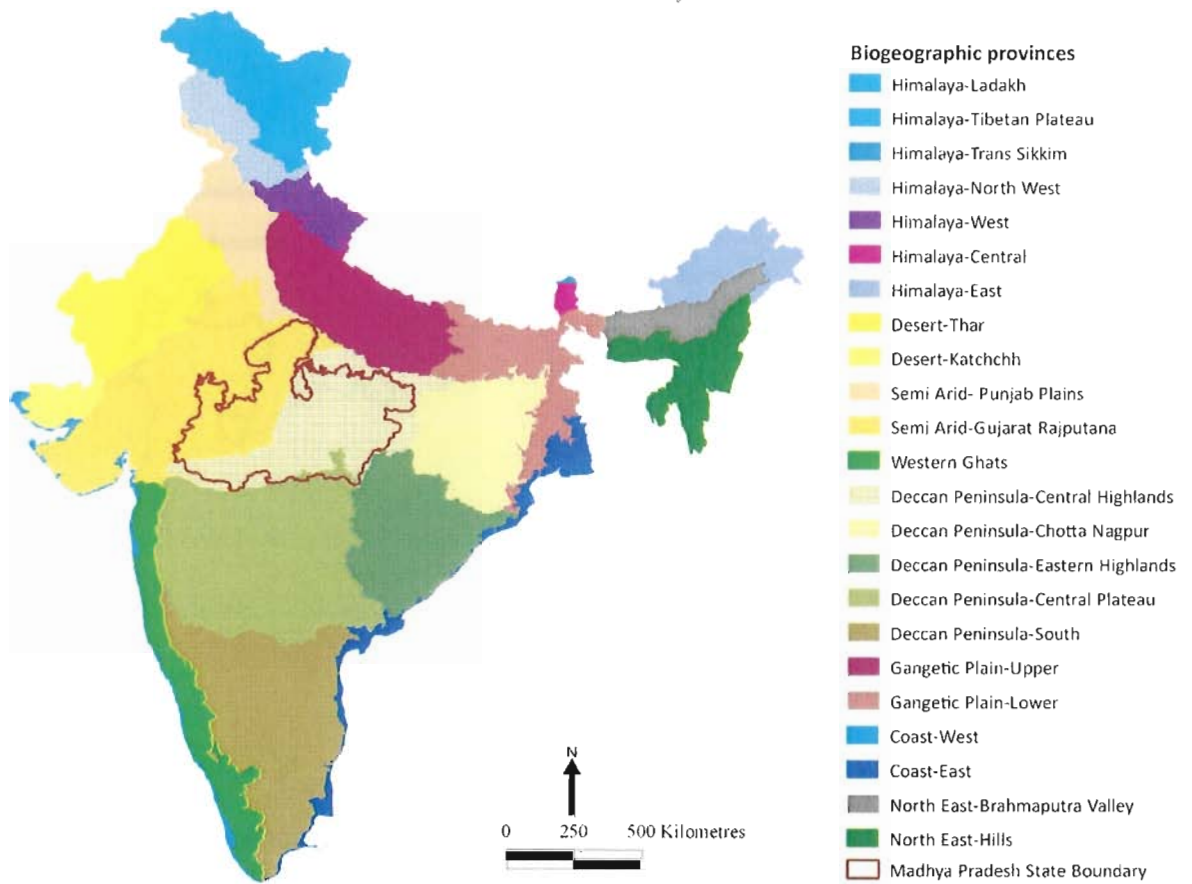


Figure 2: Map of the biogeographic provinces of India (Rodgers and Panwar 1988, Rodgers et al. 2002) with Madhya Pradesh state boundary showing the provinces covering the state (Deccan Penninsula Central Highlands and Semi-Arid Gujarat Rajputana).

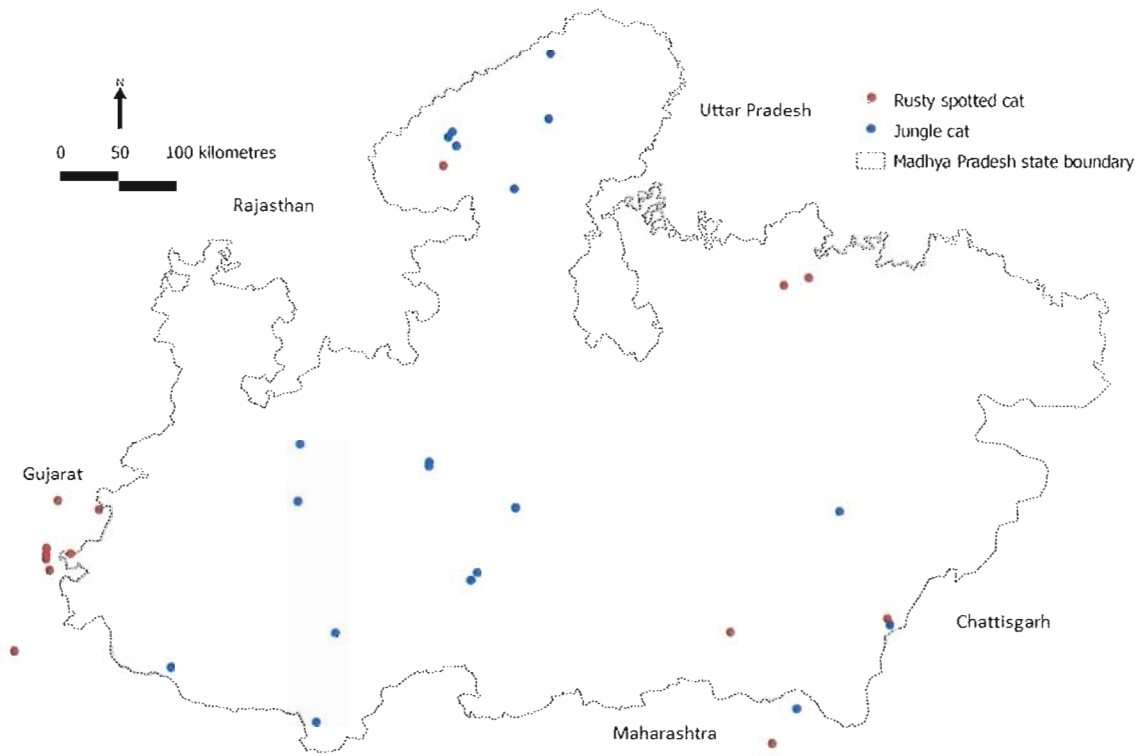


Figure 3: Map showing locations of jungle cat and rusty spotted cat in Madhya Pradesh. This is not a comprehensive record and needs to be updated. It however is an update for rusty spotted cat records in the state.

References:

- Anonymous (1972). The Wild Life Protection Act, (1972). Professional Book Publishers, New Delhi.
- Digveerendrasinh (1995). Occurrence of the rusty spotted cat (*Felis rubiginosa*) in Madhya Pradesh. Journal of the Bombay Natural History Society, 92: 407-408.
- Gopal, R., Qureshi, Q., Bhardwaj, M., Jagadish Singh, R. K., & Jhala, Y. V. (2010). Evaluating the status of the endangered tiger *Panthera tigris* and its prey in Panna Tiger Reserve, Madhya Pradesh, India. Oryx, 44(3), 383-389.
- Kolipaka S.S. (2010) The Conservation status and management of the Rusty Spotted Cat in the forest fringe areas of Panna, Madhya Pradesh, India. Report submitted to M.P. Forest Department.
- Mukherjee S., Krishnan A., Tamma K., Home C., Navya R., Joseph S., Das A. and Ramakrishnan U. (2010a) Ecology driving genetic variation: A comparative phylogeography of jungle cat (*Felis chaus*) and leopard cat (*Prionailurus bengalensis*) populations in India. PLoS ONE 5(10): e13724. doi:10.1371/journal.pone.0013724.
- Mukherjee, S., Ashalakshmi, Home, C. and Ramakrishnan, U. (2010b). A PCR-RFLP technique to identify Indian felids and canids from scats. BioMed Central Research Notes, 3:159 (doi:10.1186/1756-0500-3-159).
- Nowell, K. and Jackson, P. (eds.). (1996). Wild cats, status survey and conservation action plan. IUCN, Gland Switzerland, 382 pp.
- Patel, K. (2006). Observations of rusty-spotted cat in eastern Gujarat. Cat News, 45: 27–28;
- Patel, K. and Jackson, P. (2005). Rusty-spotted cat in India: new distribution data. Cat News 42: 27.
- Pocock, R.I. (1939). The fauna of British India, including Ceylon and Burma. Mammalia 1: Primates and Carnivora. (In part). 2nd edn. (Reprint edition, 1985 NewDelhi: Today and Tomorrow's Printers and Publishers,). Chicago: University of Chicago Press.
- Rodgers, W.A. and Panwar, H.S. (1988). Planning a Wildlife Protected Area Network in India. A report prepared for the Ministry of Environment and Forests and Wildlife, Government of India, volumes 1 and 2.
- Rodgers, W.A., Panwar, H.S. and Mathur, V. B. (2002). Wildlife Protected Area Network in India: A Review (Executive summary). Wildlife Institute of India. Dehradun.
- Sunquist, M.E. and Sunquist F.C. (2002). Wild Cats of the World. Chicago: Univ. Chicago Press, 452 pp.

Chapter III: Identifying small cat species



Fig 1: Jungle cat. Note the white cheeks, long ears and legs, short tail. This is most common wild cat in India. Specialises on open habitats with water sources. Diet is chiefly rodents followed by birds.



Fig 2: Rusty spotted cat. The smallest cat in the world. Adults weigh 1-2 kg. Note the markings on the body but faint to no markings on tail. Diet perhaps chiefly comprises of rodents.



Fig 3: Caracal. Adults in India weigh on average 6 kg. Very rare. Note large, black ears with long tufts, very long legs, short tail and reddish coat and prominent black marking around cheeks. Diet is chiefly rodents and birds.

Identification of kittens found in crop-fields:

1. Are the eyes open and are they stable and moving around (not crawling)?

If yes: then the kittens are more than 10 days old.

At birth until 10 days of age kittens cannot open their eyes. Care should be taken to see if closed eyes are not because the kitten is asleep. Gently prod it to see if it opens its eyes and stands up and moves around. New born kittens cannot stand and crawl around. Also they are unable to retract their claws and claws are visible.



Fig 1. Jungle cat kitten below 10 days of age. Note the closed eyes, exposed claws, small ears, dome shaped head and fits in the palm of an adult human hand. The prominent white cheeks are the identifying feature for jungle cats. (Photo credit: Tiasa Adhya)



Fig 2: New-born leopard cubs. Note the profuse markings on face and head. Also note the size with respect to the hands holding them.

2. Size of kitten:

If eyes are closed, the ears still very small and not erect, cannot stand on feet, claws are exposed and it fits in the palm of your hand: a small cat – jungle cat/rusty spotted cat/caracal/domestic cat.

If the eyes are closed the ears still very small and not erect, cannot stand on feet, claws are exposed and they are larger than the palm of the hand then they are likely to be leopard/tiger cubs. Leopard cubs below 10 days will weigh around 300-500 gm. A small cat kitten less than 10 days old will weigh around 100 – 150 gm. or less!



Fig 3: New-born tiger cub. Note the size is much larger than the palm of an adult hand. Also note closed eyes, floppy ears, and exposed claws.

(<http://zoologicalwildlifefoundation.com/blog/tag/newborn-cub/>, 14th January 2013)

3. Pattern on body:

All kittens including jungle cat, rusty spotted cat, caracal and leopard will have spots on the body. If there are stripes, eyes are closed the ears still very small and not erect, cannot stand on feet, claws are exposed and they are larger than the palm of your hand then they could be tiger cubs.

If the kitten is multi-coloured then it is of domestic cat. Also if it is smaller than the palm of your hand but has stripes and not spots all over its body then it is domestic cat.

4. Does it have white cheeks, back of ears have black tips, short tail with stripes?

If yes: Jungle cat. The cheeks of jungle cat are very prominently white and at this young stage that could perhaps be the only identifying feature.



Fig 4. Jungle cat kittens at 15 days of age- eyes open but ears are still not erect. Note the white cheeks. Slight markings on head. (Photo credit: Uttara Mendiratta).

5. Are there strong markings on the forehead (brown and white stripes) but the tail does not have any markings?

If the tail is unmarked but the head and face are: Rusty spotted cat.



Fig 5: Rusty spotted cat kittens. More than 10 days old. Note the patterns on forehead, eyes and face. Also note the strong white bands around the eyes and tracing the contour of the nose. Also note size. This is the smallest cat in the world and adults weigh around 1-2 kg., so kittens are really small.

SACON Library
PR111

6. Are there black marks around cheeks and over eyes? Are the ears totally black from behind? Do they have long tufts of hair arising from the base of the ear?

If yes then it is a caracal.

The ear tufts will be very long and will hang over the ears but will develop only when the kittens are much older. The tail will be without any pattern and short. And the body colour will be a reddish-brown like the colour of red mud. The nose will most probably be black.



Fig 6: New-born caracal kittens. Note the black ears, black marks on cheek and over eyes and the colour of the body.

(<http://www.oregonzoo.org/gallery/tags/caracal>, 14th April 2013).

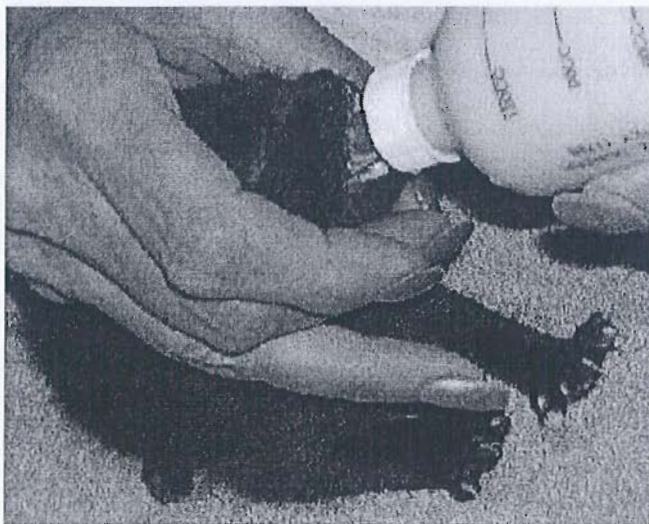
Chapter IV: Guidelines on measures to be taken on finding kittens in crop fields

The guidelines provided in this chapter are largely from personal observations as well as through discussions with several veterinarians and people who have raised young wild cats. Much information on raising young kittens is provided on the internet and the links are listed below. Most of this will be limited to raising house cat kittens but this can be safely applicable to wild cats too since their physiologies are very similar.

1. Remove all dogs and people from the site and observe them carefully from a distance until mother returns. This may take several hours since the mother has to be absolutely certain of safety to herself before returning. She may return only after dark. Until then someone should be there to see that no harm comes to the kittens.
2. Do not leave the kittens exposed, alone since they will be vulnerable to dogs or other predators. If kittens crawl out of the den site or are exposed, put them in a basket or box lined with soft cloth so that they cannot crawl out, make a shade with paper or grass and leave them at the same spot. Keep watch on them so that no predator harms them. It is important to shade them from the sun since they are very prone to dehydration and can die within hours. Also, DO NOT cover the basket or box with a cloth- just make a makeshift shade – like a den, so that the mother can still locate her kittens.
3. In case the mother does not return through the night, then take the kittens to a safe place; preferably a home. Make a nest with soft cloth to keep them warm. If there is a house cat with young kittens around, try and get these wild cat kittens to feed

from her. This is the absolute best solution. If that is not possible then follow steps below.

4. Weigh them and give them a diet according to their weight. New-born kittens will require milk equalling 25% of their body mass for the first 2-3 weeks. So if a kitten weighs 115 g, it will require $115 * 0.25 =$ approximately 30 ml of **undiluted** milk in a day. This should be spread over 10 feedings. UNDILUTED goat milk is the closest to cat milk. Cow and buffalo milk are NOT sufficiently nutritious for cats. Remember, they will gain weight rapidly and they should be monitored for their weight and their diet adjusted according to weight gain, EVERY DAY. Quantity of feed given should be 25% of body mass for the first 2-3 weeks.
5. Get the smallest possible baby feeding bottle or get a clean, new ink dropper to feed it. Add an egg yolk in the undiluted goat milk. 1 glass of goat milk and one egg yolk. Mix well and feed very slowly with dropper. DO NOT hold a kitten like you would hold a human baby. Observe or note how cats feed their kittens. The kittens lie on their stomach and feed. See figure below.



Cats cannot digest sugar and carbohydrate and so no sugar should be added to goat milk. It is also necessary to give them a high protein diet (egg yolk can be mixed in undiluted goat milk and given to them when they are very young) since a cat's nutritional requirement is very different from ours. Garlic and onion are poison for cats and should NEVER be given. Plain undiluted goat's milk is also ok in case egg cannot be obtained.

Add 2 drops of vegetable oil to one feed in the middle of the day or so. Only 2 drops should be given per day. This is to make sure they do not get constipated.

6. The kitten will be able to have just one or two dropper full of milk (5 ml, one teaspoon) at a time since their stomach is also very small. They will need around 10 feedings or around 40-50 ml per day spaced at every 2 hours for the first 10 days.
7. The feeder/dropper should be sterilised in boiling water before EVERY FEED. Kittens are very susceptible to infections and being so small in size it can be extremely dangerous so it is best to take precautions right from the start.
8. Rub the genital region of the kitten every 3 hours or so, very gently with a piece of soft wet cloth to induce urination. This is absolutely essential since they may not urinate otherwise and can die. Mother cats lick the region to induce urination in kittens.
9. Every morning rub the anal region gently with a piece of damp cloth to induce defecation. If the kittens do not defecate, consult a veterinarian. If veterinarian is not available urgently then feed 5 ml of liquid paraffin (available at chemists). DO NOT give it any medication without consulting the vet. Cats have a very different

physiology and many medicines that are fine with humans are extremely toxic for cats.

10. Kittens will have to be de-wormed when they attain the age of a month or so and this should be under the strict supervision of a veterinarian. A small dose of steroid is usually prescribed by most veterinarians, half hour before the de-worming medication to prevent any allergic reactions due to parasites dying in the intestine. After the medication 5ml of liquid paraffin is given to lubricate the intestinal passage for evacuation of worms. Not all veterinarians are aware of the protocols for deworming kittens and this should be noted. Preferably a vet dealing with domestic cats and dogs should be consulted over regular domestic livestock veterinarians.

Rehabilitating hand reared cats:

This can be a contentious issue since many conservationists feel that once a wild animal is hand reared it has to be confined to captivity. Though this is a philosophical debate, there is no clarity in why they should be confined. In the case of large cats it is obvious since they could potentially get into severe conflict that could jeopardise conservation efforts on the whole. However, with small cats, the conflict is never severe enough to cost human lives. Moreover, cats are hardwired to hunt and so can survive when released back into their natural habitat. Nevertheless, care should be taken to release them only after an initial introduction to the area (soft release) and after making sure of their ability to hunt. Cats learn hunting efficiently between the ages of 2 to 6 months though it is very likely that they hone their skills throughout their lifetime. This is the time when live prey, preferably

rodents, should be provided to them. If they are to be released, then it would be wise not to train them on chicken since that could lead them into conflict later.

Some important links and references:

<http://www.feralcat.com/raising.html>

Mellen, J.D. (1997) *Minimum Husbandry Guidelines for Mammals: Small Felids*.

American Association of Zoos and Aquariums.

Can be downloaded from:

<http://www.nagonline.net/HUSBANDRY/Diets%20pdf/Zoo%20Standards%20for%20Keeping%20Small%20Felids%20in%20Captivity.pdf>

Chapter V: The importance of small wild cats and why they need to be conserved

Cats have immense aesthetic and cultural value and figure prominently in folk lore. Apart from that, as prime predators cats occupy the apex of their food chains and hence are Indicators of habitat quality (Terborgh 1999). Studies have shown that the major diet of most small cats is rodents (Sunquist and Sunquist 2002). A study in Sariska Tiger Reserve (Mukherjee et al. 2004) revealed that each jungle cat ate around 3-5 rodents per day and by extrapolation, around 1500 rodents a year while each caracal ate around 3000 rodents per year. Rusty spotted cats would perhaps eat a little less, being smaller but still a substantial amount. This is a large number and hence they perhaps help farmers by keeping rodent populations from exploding and destroying their crops.

Though agricultural fields are mere imitations of natural scrub or grassland habitat for cats occurring in open habitats, in the current scenario of rapid land use change for human utilisation, this is still an important land regime for some species. Not only do individuals occupy these regions but help maintain genetic connectivity between populations that could otherwise have been isolated (Mukherjee et al. 2010a).

How can small wild cats be protected in crop fields?

One way is to be very observant during harvest and if any kittens are found then the area around the den/nest should be left un-harvested and monitored from far so that the mother does not abandon the kittens out of fear.

Another way out would be to leave patches of thick bushes/scrub around the crop fields as a boundary or even within the crop field, randomly, to provide den sites and escape sites for mothers to take their kittens to in case the process of harvest exposes kittens.

If it is known that a cat has littered in a particular area, it should be left un-harvested and the Forest Department should be supportive of such measures by farmers and appropriate compensation for that patch can be provided.

Regular monitoring of tracks and other signs of cats such as faecal matter in certain areas could indicate presence of the cat and den sites.

Novel ways to protect cats can be discussed in meetings with villagers so that they are also made aware of the presence and importance of cats in their surroundings. Most importantly it has to be stressed that small cats are extremely beneficial to farmers since they eat rodents.

References:

Mukherjee S., Goyal S. P., Johnsingh A. J. T. and Leite Pitman M. R. P. (2004) The importance of rodents in the diet of jungle cat (*Felis chaus*), caracal (*Caracal caracal*) and golden jackal (*Canis aureus*) in Sariska Tiger Reserve, Rajasthan, India. *Journal of Zoology*, London 262: 405-411.

Mukherjee S., Krishnan A., Tamma K., Home C., Navya R., Joseph S., Das A. and Ramakrishnan U. (2010a) Ecology driving genetic variation: A comparative phylogeography of jungle cat (*Felis chaus*) and leopard cat (*Prionailurus bengalensis*) populations in India. *PLoS ONE* 5(10): e13724. doi:10.1371/journal.pone.0013724.

Sunquist, M.E. and Sunquist F.C. (2002). *Wild Cats of the World*. Chicago: Univ. Chicago Press, 452 pp.

Terborgh J, JA Estes, P Paquet, K Ralls, D Boyd-Heger, BJ Miller, RF Noss. (1999). The role of top carnivores in regulating terrestrial ecosystems. *In* ME Soule, J Terborgh, (eds.) *Continental conservation: scientific foundations of regional reserve networks*. Washington, DC: Island Press, pp. 39-64.