Distribution and status of the Fishing Cat (Prionailurus viverrinus rhizophoreus SODY, 1936) in West Java, Indonesia
(Mammalia: Carnivora: Felidae)

With 1 Map and 1 Table

ROLAND MELISCH, PRIYO BUDI ASMORO, IRWANSYAH REZA LUBIS & LISTYA KUSUMAWARDHANI

Abstract. Results of a wetland survey carried out in West Java, Indonesia, during the years of 1993 and 1994 are presented. Findings of this survey and other recent information revealed five extant, but fragmented subpopulations of Fishing Cats in West Java. Footprint measurement results are shown on a table, and present and historical records are displayed on a map. The conservation status of this cat subspecies is considered by the authors to be IUCN Critically Endangered.


Introduction

Despite its beauty, the Fishing Cat has long been neglected in recent research and its elusive life has rarely been documented by photographic material (Neumann-Denzau & Neumann-Denzau, 1986; A. Compost, pers. comm., 1994). The range of the Fishing Cat patchily covers South and Southeast Asian wetlands. On its western distributional fringe, isolated populations of the Fishing Cat live in the lower Indus Valley of Pakistan (Roberts, 1977), South West India (Bhattacharya, 1992) and Sri Lanka (Alsop, 1973). Its major distribution ranges from Nepal and Assam (Pocock, 1939) to Myanmar (U Tun Yin, 1967), Thailand (Leakagul & McNeely, 1977) and Indochina (Delacour, 1940), Bree & Khan (1992) recently recorded the Fishing Cat from Peninsular Malaysia but see also Melisch’s note

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from 1995. In Indonesia *Prionailurus viverrinus* occurs isolated on Java (MELISCH, 1992), where it constitutes the eastern limit of its range. Doubtful records from Bali and Borneo have been discussed by BREE & KHAN (1992). Records from Sumatra have been controversially discussed in the past (DELSMANN, 1932a; SOBY, 1931 & 1936a; JACOBSON, 1936; ZON, 1979). In 1985, NASH & NASH found footprints of a Fishing Cat in South Sumatra, but did not secure plastecasts. In 1992, a HIMBIIO team secured a dead Fishing Cat in Berbak, Jambi Province. However, there is not much known about the species’ occurrence on Sumatra and no museum specimens are yet known for the island (BREE & KHAN, 1992). CORBET & HILL (1992) indicate East Java as distributional range of *P. viverrinus* but there is, however, no recent evidence available (PFEFFER, 1965; HOOGERWERF, 1974; M. GRIFFITHS, M. INDRAWAN & S. HEDGES, pers. comm. 1994). The easternmost records of Fishing Cats come from the north coast of Central Java and date back to the 1930s (BREUGERSMA, 1935; JACOBSON, 1933).

Conclusively, West Javan populations of *P. viverrinus* remain the only known living examples in Indonesia. Fishing Cats share the island of Java with two other felids, the Leopard Cat *Prionailurus bengalensis* and the Javan Leopard Panthera pardus melas. The Javan Tiger is most probably extinct (SANTITAPILLAI & RAMONO, 1992; M. GRIFFITHS & A. RAFAELIANO, pers. comm. 1994). SOBY (1936b) proposed the name *P. viverrinus rhizophorae* for the West Javan race of the Fishing Cat. The Fishing Cat, *P. viverrinus*, is protected by Indonesian law (ANONYMOUS, 1979), and is listed as IUCN ‘insufficiently known’ (GROOMBRIDGE, 1993). The recent IUCN/SSC Cat Action Plan (NOWELL & JACKSON, 1996) considers this cat at species level in the second highest category of vulnerability.

This paper analyses the current situation of the cat on Java, with suggestions for its conservation.

**Methods**

For our survey work, which was carried out between July 1993 and May 1994, we chose nineteen representative wetland areas of West Java, covering most of the national parks, nature reserves and remaining mangrove areas. A total of 591 survey sites, each one consisting of 400-600 m stretches of shorelines or of transects were subsequently selected. Sites were positively identified for the presence of Fishing Cats if footprints or faeces were found. On Java, faeces of the Fishing Cat are considerably larger than the ones of the feral domestic cat Felis catus and Leopard Cat *Prionailurus bengalensis*, but smaller than Javan Leopard Panthera pardus melas, Dhole Canis alpinus and feral dogs (personal observations, 1992-1994). The faeces of the cat family differ in shape and size from viverrids and mustelids. Footprints of cats are easy distinguishable from other carnivores, in having the typical four-toe imprint and not showing any claw marks. Footprints of Fishing Cats also differ in size from other cats (SOBY, 1936c; STRIEN, 1983). The footprints were cast using dentist’s plaster (STRIEN, 1983) and deposited in the plastercast reference collection of Wetlands International – Indonesia Programme in Bogor. Additionally, available literature has been reviewed for historical and modern records of Fishing Cats from West Java.

**Results**

A distance of 286 survey kilometres, divided into 581 survey sites, resulted in 41 sites positively identified for the Fishing Cat. The inhabited sites were all in the area of Indramayu and mainland Ujung Kulon National Park (25 sites and 16, respectively, please see map).

In both areas, *P. viverrinus* inhabited tidal forests with sandy or muddy shores. In Ujung Kulon, forests were in the natural state, having an understorey consisting of seedlings or smaller bushes. At Indramayu, positive records of the Fishing Cat were correlated to habitats consisting of older mangrove stands or abandoned mangrove plantation areas, interspersed with fishponds. No Fishing

Map 1: Distribution of the Javan Fishing Cat *Prionailurus viverrinus rhizophorae* in West Java, Indonesia [Verbreitung der Javafischkatze *Prionailurus viverrinus rhizophorae* in Westjava, Indonesien].
Distribution of the Javan Fishing Cat
Prionailurus viverrinus rhizophoreus Sody, 1936
in West Java, Indonesia

Reference:
Survey area 1993/94
Present distribution
Historical records
Provincial boundary
Main town
Subspecies type location

(for location reference numbers refer to text)
Cats were found in habitat without vegetation cover at Indramayu, e.g. intensive Milkfish Chanos chanos fishponds or prawanponds with bare dams. The closest distance to human settlements at which footprints of Fishing Cats were found was one kilometre in Indramayu mangroves, and 20 kilometres in Ujong Kulon.

At Indramayu, all faeces (n=13) were found on bare ground on the top of fishpond-dams, but vegetation cover was never further away than two or three metres. In Fishing Cats’ faeces of the Indramayu mangroves we found hair, bones and skull parts of rats, scales of Tilapia Oreochromis mossambicus and crab remnants. Surveys in Ujong Kulon revealed only a single faecal deposit at an advanced disintegrated state, which did not enable us to determine its prey content. A more detailed faeces analyses will be presented later (Lubis, in prep.).

Mammalian prey availability was much higher in Ujong Kulon as compared to Indramayu mangroves. Only while surveying Ujong Kulon did we find evidence of Macaca fascicularis, Sus spec., Bos javanicus, Muntiacus muntiac, Cervus timorensis, Tragulus javanicus and Rhinoceros sondaicus, whereas the only larger mammals present at Indramayu were feral dogs and domestic goats. Among the small mammal community, we found no squirrels or tree-shrews in Indramayu. Rats and aquatic prey such as fish, water snakes and invertebrates were abundant in both Ujong Kulon and Indramayu. Habitat overlap between Fishing Cat and other carnivores was highest in Ujong Kulon (Panthera pardus) occurred in 39% of all sites positive for Fishing Cat, Paradoxurus hermaphroditus 39%, Herpestes javanicus 29.3%, Prionailurus bengalensis 22%, Viverricula indica 7.3%, Lutrogale perspicillata 2.4% compared to Indramayu mangroves (Herpestes javanicus 46.3%, Viverricula indica 34.1%, feral dogs 34.1%, Prionailurus bengalensis 12.2%, Aonyx cinerea 4.8%, Prionodon linsang 2.4% and Lutrogale perspicillata 2.4%). Infrared triggered camera-trapping showed good results for Asian Small-clawed Otter and Leopard Cat, but was unsuccessful in obtaining any Fishing Cat photographs.

According to A. COMPOST (pers. comm. 1993 & 1994), P. viverrinus was also present on Pulau Dua, a small strictly nature reserve of eight hectares in Batuan Bay, on the North coast of Java. This former island is now connected to the mainland at low tide. Just during submission of this article, information on recent rediscovery of a Fishing Cat population in Muara Gembong has reached one of us (IRL).

In February 1992, a fresh footprint of P. viverrinus was recorded in Rawa Danau Nature Reserve (6°11'S, 105°59'E), which was the first inland record of the species in over fifty years, the first documentation of a Fishing Cat from a Javan freshwater swamp-forest and the first for the reserve (MELISCH et al., 1993). A living individual has since been spotted in October 1994 by R. BERGMANN (ROMPAY, in litt. 1995). In West Java, the following vernacular local names are in use for P. viverrinus: meong congkok, kucing akar, kucing leuwung (ZON, 1979); goor, macan batu, ucing memeng, blacan, kucing bakau (SODY, 1931 & 1938). The name most commonly used by Indonesian scientists is kucing bakau. For present and historical records from West Java please refer to the map.

Reference table for historical records of P. viverrinus on West Java:

<table>
<thead>
<tr>
<th></th>
<th>Reference</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HOOGERWERF,</td>
<td>1970</td>
</tr>
<tr>
<td>2</td>
<td>DELLSMAN,</td>
<td>1932a</td>
</tr>
<tr>
<td>3</td>
<td>SODY,</td>
<td>1949</td>
</tr>
<tr>
<td>4</td>
<td>DELLSMAN,</td>
<td>1931</td>
</tr>
<tr>
<td>5</td>
<td>DRONGERSMA,</td>
<td>1935</td>
</tr>
<tr>
<td>6</td>
<td>SODY,</td>
<td>1931</td>
</tr>
<tr>
<td>7</td>
<td>UNAS,</td>
<td>1989</td>
</tr>
<tr>
<td>8</td>
<td>SODY,</td>
<td>1936b</td>
</tr>
<tr>
<td>10</td>
<td>JACOBSON,</td>
<td>1933</td>
</tr>
</tbody>
</table>
Table 1: Footprint measurements of the Javan Fishing Cat Prionailurus viverrinus rhizophaerous from West Java, Indonesia [Triffsiegelmale der Javafischkatze Prionailurus viverrinus rhizophaerous von West-Java, Indonesien].

<table>
<thead>
<tr>
<th></th>
<th>Average total length (max/min)</th>
<th>Average total width (max/min)</th>
</tr>
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<tbody>
<tr>
<td>Front paw imprint (FF)</td>
<td>-</td>
<td>74(50-65), n=3</td>
</tr>
<tr>
<td>Hind paw imprint (HF)</td>
<td>-</td>
<td>66(71-60), n=2</td>
</tr>
<tr>
<td>undetermined (HF &amp; FF)</td>
<td>40(54,33), n=4</td>
<td>47(85,22), n=9</td>
</tr>
<tr>
<td>solepad width</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>(undeterminable whether HF or FF)</td>
<td>-</td>
<td>26(37,15), n=6</td>
</tr>
</tbody>
</table>

Material from collections in the Netherlands and Indonesia was reviewed by Bronsersma (1935) and Studt (1949). Apart from the two skins deposited at the Staatliches Museum für Tierkunde, Dresden, no records of Javan Fishing Cats were found in German museums.

Discussion

Distribution

Taking into account present survey results and historical records, we consider Fishing Cats on Java to be restricted to coastal wetlands. No record has been reported further inland than 15 km from the sea, and no single record has been found above 20 m a.s.l., albeit records of Fishing Cats dwelling at 1500 m a.s.l. in the Himalayas (Guggisberg, 1975) exist.

From Myanmar observations, the Fishing Cat’s distribution seems highly correlated with vegetation cover (U Tung Yin, 1967). Sunquist & Sunquist (1989) emphasized the importance of hunting cover for most felids, as they need to get as close as possible to prey before making the final attack. Our findings from Java correspond to the previous two authors, as *P. viverrinus* was never detected in habitat without vegetation cover (e.g. intensively managed fishponds), despite a high abundance of prey. In West Java, preference for coastal aquatic habitats (mangroves, rivers, estuaries, ponds) seems obvious from our survey results and compiled data of the prey taken by Fishing Cats, as compared to habitat preference of the Leopard Cat, a species not restricted to wetlands and coasts in Java (personal observations). However, aquatic habitats are not favoured by one smaller cat species alone in Southeast Asia, as prey consumption in association with water and swimming has been reported for Flat-headed Cats *Prionailurus planiceps* (Mool & Lim, 1970; Ewer, 1973). Due to the only marginal distributional overlap (possibly in the north of the Malay Peninsula) and the preference for wetland environments, we tentatively conclude that *P. planiceps* replaces *P. viverrinus* in Borneo, Sumatra and most of Peninsular Malaysia.

Footprints

Data for measurable footprints are listed in Table 1. The measurements given in Hoogerwerf (1970) (front print maximum width 80 cm, sole pad 45 cm; rear print max. width 75, sole pad 35) correspond to our findings. In 1989, students from Universitas Nasional in Jakarta claimed to have positively identified footprints of a Fishing Cat from Citiliem river in Cikepuh Wildlife Reserve on Java’s south coast (Unas, 1989). However, the authors do not exactly indicate which parts of the footprints were measured, and sizes given are very small (range 25-30 mm, n=6). Although the record may be a misidentification, we took it into consideration for the distribution map.
Food

Only scattered reports exist of the species’ diet on Java (SODY, 1931; DELSMAN, 1932b), as most anecdotal discussions referring to Javan populations end up with the question whether it was a true Fishing Cat or not. Hence DELSMAN (1931) and SODY (1931) proposed a change of the Dutch vernacular name from viskat to mangrovekat. SODY (1931) reported fish, mangrove snakes and freshwater molluscs as the cat’s food and HOOGERWERF (1970) added shell fragments, crab claws and rat hair to the parts, found in faeces on the south coast of Ujung Kulon. Fishing cats have been blamed for attacking goats and even dogs (DELSMAN, 1932a), and they reportedly lick fish out of the water with their claws (in SODY, 1932; DENIS, 1964). The lack of larger or medium-sized mammal species in the Indramayu mangroves and the prevalence of aquatic prey indicates a diet consisting of rats, fish and aquatic invertebrates. A possible food supplementation with avian prey may be assumed from remarks made by HOOGERWERF (1970), stating that trappers succeeded in catching Fishing Cats with poultry-baited traps.

Co-occurrence with two other species Lutrogale perspicillata and Aonyx cinerea in Javan wetlands is understandable, as otters have a higher preference for aquatic prey. In Ujung Kulon and Indramayu mangroves Lutrogale perspicillata feeds on fresh and brackish-water shrimps and fish, whereas Aonyx cinerea has an overall preference for crustacean food, mainly consisting of crabs (ASSMORO et al., 1994; LÜBES, 1995). Furthermore, the solitary hunting strategy of the Fishing Cat differs widely from group hunting behaviour of both other species.

Threats and conservation

The main threat to the survival of the Fishing Cat on Java arises from human encroachment into forested and unspoilt wetland habitat. The important wetlands of Java have been listed in the Indonesian Wetland Inventory (SILVIUS et al., 1987), but mangrove and freshwater swamp-forest areas have decreased to 11% and 1%, respectively, of their original extent (GESEIN, 1994). Today there are virtually no mangroves left in the environs of Jakarta, which once was a stronghold of the Fishing Cat on Java. The main cause of habitat destruction on the island is encroachment of agriculture and aquaculture. Particularly important for the survival of the Fishing Cat’s Javan race, are the remaining areas along the Javan North coast (Indramayu), which are managed by the state-owned forest enterprise Perum Perhutani. In none of these managed mangrove forests does wildlife receive proper protection, although various proposals have been submitted in the past aiming at establishing conservation areas (e.g. ALLPORT & WILSON, 1984; BScC, 1992). In addition to land reclamation, remaining coastal wetlands suffer from increasing pollution, particularly from pesticide misuse. Other than upstream ricefield contamination, pesticides are applied in all of the coastal fishponds within the Fishing Cat’s habitat (100%, n=25). Despite a ban of most types of pesticides in wetlands (PRESSION R.I. 1985: No. 9: 6[1, 7[1]), 80% of these in use to eradicate both vertebrate and invertebrate pests in ponds, were found to be prohibited by law (MELISCH et al., 1994). Immediate toxicity causes harm to many aquatic organisms. Top wetland predators are under particular threat due to toxic accumulation in their fatty tissue (MASON, 1989; DJUANGSHI, 1994), which may result in decreased fertility or poisoning during periods of hunger.

Apart from direct hunting, indirect danger in Indramayu also originates from fish-traps big enough in their size for Fishing Cats to enter and drown (SODY, 1931; HOOGERWERF, 1970; HIMENO, 1992).

Local trading of smaller wild cats as pets and trade in stuffed specimens is still common in Java. The fact that only individuals of P. bengalensis were found for sale does not indicate the absence of hunting for Fishing Cats, on the contrary, it might in turn prove the species’ rarity. In Rotterdam Zoo, Fishing Cats show more social behaviour in comparison to other wild cats, e.g. pairs staying together while raising kittens (WESTERVELD, pers. comm. 1993). Where Fishing Cat kittens are hunted for the pet trade, this behaviour indicates an even more critical situation for this rare species, making the parents very vulnerable if they show the same behaviour in the wild.

In considering the present isolated records of the Fishing Cat on Java, we suspect that surviving
wild populations already suffer from immense genetic decline. The West Javan survey covered more than 90% of the mangroves of West Java. From these facts we deduce a total of five, isolated subpopulations of Fishing Cat from West Java. On the assumption, that no significant numbers of Fishing Cat live further east (based on up-to-date AWB Wetland Database information for coastal wetlands, particularly mangroves, 1994), and considering the species longevity records (FLOWER, 1931) we conclude that, using the new criteria of IUCN (IUCN, 1995), the Javan Fishing Cat P. viverrinus rhizophoraeus is now critically endangered. The effective reproducing number of wild individuals of this endemic race is split into geographically isolated subpopulations, all except the Ujung Kulon population are threatened by human pressures. Furthermore, the number of effective breeding Javan Fishing Cats is estimated to be less than 50 and most likely under the threat of extinction within a two or three generations of this subspecies. As a consequence, immediate conservation measures to safeguard the Fishing Cat’s remaining, isolated populations on Java should be undertaken. Measures suggested include strict hunting and trapping control in Pertum Perbatani areas, as well as a straight forward implementation of existing animal and fur trade laws in known market places. In addition we suggest the assessment of all captive P. viverrinus rhizophoraeus to be included and established in the Fishing Cat’s studbook (RAMOS, 1994). Supplementary awareness programmes should emphasize that the Fishing Cat remains the biggest feline predator on the Javan north coast. It is our hope that national authorities in conjunction with local NGOs will succeed in using such incentives to create local pride among the peasants. This might ultimately be the key to the Javan Fishing Cat’s survival.

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References

BScC (1992): Laporan hasil penelitian dan monitoring hutan mangrove di RPH Muara Gembong Tanjung Karawang Kabupaten DT II Bekasi, Jawa Barat. [Research and monitoring report]


BRONGESWA, L.D. (1935): Notes on some recent and fossil cats, chiefly from the Malay Archipe-


DJANGSHI, N. (1994): Impact of pollutants on tup predators [In Indonesian]. In PHPA/AWB-


GIESEN, W. (1994): Habitat changes in wetlands of the Greater Sundas and implications for biodi-


rang Bulu Licin (Larrogale perspicillum) berdasarkan fases dari Cagar Alam Rawu Danau, Hutan Bukit Pamanukan, dan Taman Nasional Gunung Gedé-Pangrango [Food analysis of Small-clawed Otter and Smooth-coated Otter ...; in Indonesian]. Thesis, PMIPA, Ju-
rusan Biologi, Universitas Padjadjaran, Jatinangor.


MELISCH, R. (1992): Checklist of the land mammals of Java. PHPA/Asian Wetland Bureau-Indo-

nesia, Bogor.


MELISCH, R., KUSUMANAWARDIANI, L., ASMORO, P.B. & I.R. LUBIS (1994): The role of otters (Mu-

stelidae, Carnivora) in ricefields and fisheries in West Java, Indonesia. In: TROPENZEN-

TRUM UNIVERSITAT HOHENHEIM. Tropentag 1994 «Nährstoffkreisläufe», Zusammenfas-

sung der Poster und Vorträge. Universität Hohenheim, Stuttgart.


NASH, S.V. & A.D. NASH (1985): The large carnivores, primates, and ungulates in the Padang-Su-

NEUMANN-DENZAU, G. & H. NEUMANN-DENZAU (1986): Seltene Begegnungen mit der südasi-


PRESIDEN REPUBLIK INDONESIA (1985): Undang-Undang Republik Indonesia Nomor 9 Tahun 1985 tentang Perikanan (The Republic of Indonesia’s law on fisheries).


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