International Journal of Progressive Sciences and Technologies (IJPSAT)
ISSN: 2509-0119.

http://ijpsat.ijsht-journals.org
Vol. 29 No. 2 November 2021, pp.643-648

Movement of Leopard Cat (Prionailurus Bengalensis) in Several Habitat Types

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Abstract-- This study aims to observe the movement of the leopard cat (*Prionailurus bengalensis*) in several habitat types. Recording of tiger root activities in the field, namely photos, coordinates, and video recordings was taken from January 2016 to June 2016 in the PT. True Palm Sun. Followed by grouping and analyzing photo data, coordinates, and video recordings at the Ecology Research Laboratory, Andalas University, Padang, West Sumatra. Data collection in the field is done through direct observation in the field. The subject's animal movement was followed by using a radio telemetry device. Movements are observed with the help of radio telemetry and GPS. The parameters measured for the movement of Leopard cat were: 1) DMD, 2) SLD, 3) DMR, 4) IM, 5) ST, 6) SLD/DMD ratio, 7) DMR%. The factors that influence the movement of the leopard cat are gender, how to care for the child, the weather, and the time of observation. By using the GLM model, it is known that the type of movement is significantly influenced by five independent variables, namely (DMD), (SLD), SLD/DMD ratio, while (IM), (DMR), DMR%, (ST) is not significantly influenced by five independent variable factors. Leopard cat have a small roaming area in oil palm plantations (1.43 Km^2) compared to primary (8.1 Km^2) and secondary (5.2 Km^2) forests, this is because in oil palm plantations the abundance of prey is very abundant so it is not too many rooted tigers expend more energy on hunting than in primary and secondary forests.

Keywords: Leopard cat, Movement, Oil Palm Plantation, Radio Telemetry

I. INTRODUCTION

The Leopard Cat (*Prionailurus bengalensis*) is one of the wild cats belonging to the Felidae family that has a spotted pattern on its body. Leopard Cat whose natural habitat is in primary and secondary forests move to find new habitats to hunt for food because of the abundance of small mammals so that Leopard Cat adapt to live in oil palm habitats to hunt, mate, breed and also live-in oil palm plantations (Haines, Grassman and Tewes, 2004; Rajaratnam et al., 2007). Camera trap survey results show that the advantage of the presence of maca root in oil palm plantations is that they are active predators of rats and are thought to be biocontrol agents for rat pests in oil palm plantations (Silmi, Anggara and Dahlen, 2013). The presence of Leopard cat in oil palm plantations is an advantage as a bicontrol agent for rat pests. The Leopard Cat uses rats as the main food in oil palm plantations, then reptiles, birds and insects as additional food (Mohamed et al., 2016).

Radio telemetry is a tool used to detect the position of an animal. Much of the software that accompanies radio-telemetry systems will calculate geographic coordinates for the estimated position ("fixes") and this data can be transferred into a GIS (Global Information System) for data storage and analysis. Research on the movement type of the Iriomote Leopard Caton the island of Iriomote, Japan. They categorized the movement of the Iriomote Leopard Catinto several types, namely daily movement distance (DMD), straight-line distance distance (SLD), daily movement range (DMR), Intensity of Movements (IM), Speed of Travel (ST), SLD/ DMD and DMR% (Schmidt et al., 2003; Chen et al., 2016).

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Leopard cat are more tolerant of habitat changes than other forest cats, so they are often encountered in areas of agricultural and plantation land. However, this causes the Leopard Catto be vulnerable to meeting humans. Leopard Cat may experience higher mortality rates in oil palm plantation areas (Rajaratnam, 2007). Haines et al., (2004) reported that the survival rate of Leopard Cat in protected forest areas is around 92%, while in areas with high human activities it is lower around 53-82%. So that the Leopard Catneeds shelter for protection from the threat of humans and other predators.

II. METHODS

Research was conducted from February to June 2016 in the oil palm plantation area of PT. Surya Sawit Sejati, Central Kalimantan. The location is located in Sungai Rangit SP6 Village, Pangakalan Lada District, West Waringin City Regency, Central Kalimantan. The research was conducted in the pepper estate division 1 which has an area of 2500 ha. This area before being planted with oil palm was agroforestry owned by the surrounding community. The contours of the pepper estate are relatively flat with an altitude of 1-18 meters above sea level.

The study used survey methods and direct observation with the help of radio telemetry to observe the daily activities and home range of the Leopard Cat. The Leopard Cat data was observed using instantaneous scan sampling and time block methods with a time range of 17:00-00:00 PM and 00:00-07:00 AM. A radiotelemetry collar is used to find the position of the presence of the Leopard Cat. The data were processed using Microsoft excel and QGis ver.3.6 and GLM on R studio. The tools and materials used in the research were a digital thermometer, Global Position System (GPS), Radiotelemetry TRX-48S set, AAA batteries, medium mammals trap, plastic box size 60x100 cm3, stationery, and rubber gloves.

The movement of the Leopard Cat was measured from the coordinates when it was first observed until it returned to the shelter. Movements are observed with the help of radio telemetry and GPS. The parameters measured for the movement of the Leopard Cat are: (1) Daily Movement Distance (DMD) is the daily movement distance during a radio tracking session, (2) Straight Line Distance (SLD) is the straight-line distance from one point to the next, (3) Daily Movement Range (DMR) is the daily movement range, (4) Intensity of Movements (IM) is the intensity of movement, (5) Speed of Travel (ST) is the speed of movement, (6) SLD/DMD ratio, (7) DMR% (Izzawa et al., 2009; Chen et al., 2016).

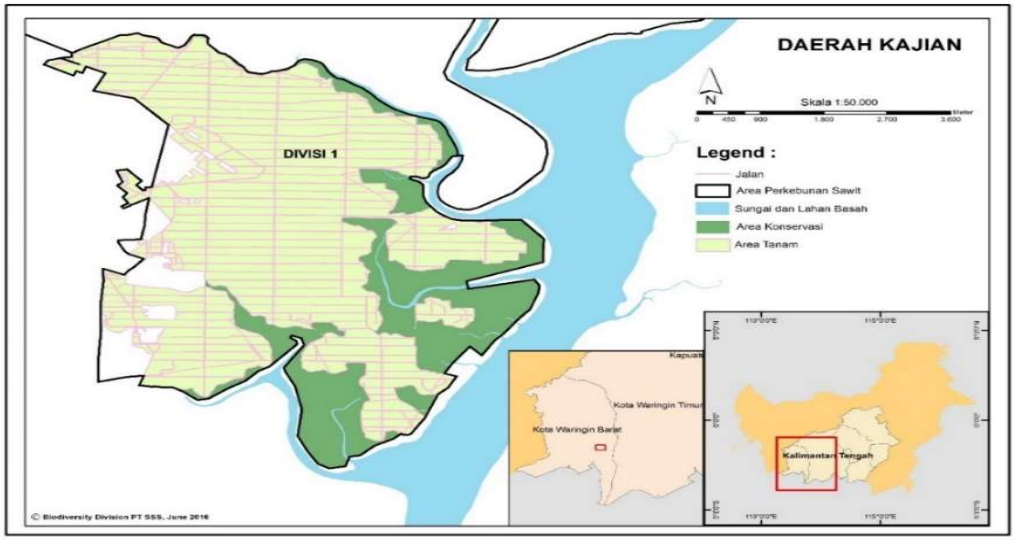

Figure 1. Map of Research Locations for Leopard cat (Source: Zoologist Officer PT. Surya Sawit Sejati Central Kalimantan)

III. Results and Discussion

Table 1. Comparison of movement (DMD, daily movement distance; SLD, straight line distance and velocity) and home range characteristics of various Felidae species.

Spesies	DMD (Km)		SLD (Km)		ST (Km/Jam)		Daerah Jelajah (Km^2)		Reference
	M	F	M	F	M	F	M	F	
Lynx lynx	9.0	6.8	3.3	1.5	1.5	1.0	248	133	Schmidt et al., 1997; Jedrzejewski et al., 2002
Lynx rufus	-	-	2.1	1.4	-	-	26	15	Wassmer, Guenther & Layne, 1988
Lynx pardinus	8.7	6.4	-	-	-	-	25	20	Ferreras et al., 1997
Panthera tigris altaica	9.6	7.0	-	-	-	-	1000	450	Yudakov & Nikolaev, 1979; Nowell & Jackson, 1996
Panthera pardus	12.2	8.4	-	-	-	-	451	188	Stander et al., 1997
Panthera tigris tigris	2.7–9.6		2.8	2.2	0.7		60	17	Sunquist, 1981
Puma concolor	-	-	2.4	2.2	-	-	826	685	Hemker, Lindzey & Ackerman, 1984; Iriarte et al., 1990
Leopardus pardalis	3.8	1.9	-	-	-	-	10.6	3.4	Ludlow & Sunquist, 1987; Nowell & Jackson, 1996
Prionailurus bengalensis iriomotensis	3.2	2.2	1.0	0.6	0.3	0.2	2.8–5.8	1.4–4.0	Schimidt, 2003; Izawa & Doi, 1994; Sakaguchi, 1994
Prionailurus bengalensis	-	-	0.6–1.0	0.8	0.3 (max 1.4)		8.1	2.5	Emmons, 1988
	-	-	1.0–1.6	0.6	-	-	3.1–5.8	2.5	Grassman, 2000
	2.02–6.63	1.07–1.13	0.10–1.67	0.19–0.40	156–491	93–107	6.5	2.0	Chen, 2016
	8.74	5.61	0.71	0.52	0.49	0.22	1.43	0.85	Research now (2020)
Felis silvestris	5.8–8.2	5.2			0.8–1.1	0.5	5.7	1.8	Stahl, Artois & Aubert, 1988

Tabel 2. Comparison of movement (DMD, daily movement distance; SLD, straight line distance and velocity) and home range characteristics of various Felidae species.

Spesies	DMD (Km)		SLD (Km)		Rasio SLD/DMD		DMR (Km^2)		IM (m/Km^2)		ST (Km/Jam)		Home Range (Km^2)		Habitat Type
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Prionailurus bengalensis (Emmons, 1988)	-	-	0.6–1.0	0.8	-	-	-	-	-	-	0.3 (max 1.4)		8.1	2.5	Primary Forest
Prionailurus bengalensis (Grassman, 2000)	-	-	1.0–1.6	0.6	-	-	-	-	-	-	-	-	3.1–5.8	2.5	Secondary Forest
Prionailurus bengalensis iriomotensis (Schmidt, 2003)	3.2	2.2	1.0	0.6	-	-	0.08–2.21	0.01–1.41	535.22–2217.50	511.62–1162.38	0.3	0.2	2.8–5.8	1.4–4.0	Subtropical Forest on Iriomote Island Japan
Prionailurus bengalensis (Chen, 2016)	2.02–6.63	1.07–1.13	0.10–1.67	0.19–0.40	0.05–0.41	0.16–1.38	0.11–1.23	0.01–0.06	301–987	542–571	0.15–0.49	0.09–0.10	6.5	2.0	Agricultural rice fields in the Meadow
Prionailurus bengalensis (Research now 2021)	8.74	5.61	0.71	0.52	0.18	0.36	0.086	0.054	6740.90	6600.32	0.49	0.22	1.43	0.85	Oil Palm

Movement Leopard Cat

Rajaratnam et al. (2007) in their study of 10 Leopard Cat stated that Leopard Cat prefer relatively open oil palm habitats compared to dipterocarp forests and fragmented secondary forests because oil palm has the highest abundance of *Maxomys whiteheadi* as the main prey of Leopard Cat in oil palm plantations. According to Grassman (2000) stated that the size of the home range of the Leopard Cat varies from 300-1,400 ha depending on the area where it lives. In Phu Khieu Wildlife Sanctuary, Thailand, the average range size of the Leopard Cat range is 12,700 ha while in other areas of Thailand the average is 4,500 ha and Kalimantan 3,500 ha. The estimated range size of the Leopard Cat range for the Iriomote cat ranges from 1,400-5,800 ha. It can be seen that Leopard cat are more often seen active in oil palm plantation habitats, namely in open palm oil areas (non-flat beat) and oil palm waste areas (flat beat) than in swampy habitats. This is due to the abundance of food or prey from Leopard Cat in the oil palm plantation area, namely the order Rodentia. According to Chen et al. (2016), Taiwanese Leopard Cat in the study area tend to avoid large artificial open areas such as agricultural land and artificial construction. The Taiwan Leopard Cat showed a pattern of crepuscular activity in the rainy season and arrhythmias in the dry season.

The abundance of food in oil palm plantations has made the Leopard Cat, which previously had a lot of activities in primary or secondary forests, switch activities on oil palm plantations. In the oil palm plantation area, there are two types of land, namely the open palm area (non-flat beat) and the palm waste area (flat beat). The Leopard Cat that have been seen active in swamp habitat are male Leopard Cat, while the female Leopard Cat have only been seen active around oil palm plantation habitats. Kitchener et al. (2002); Scott et al. (2004); and Jennings et al. (2015) reported in their research, that Leopard Cat are often seen in oil palm plantations and ecotone forests. In addition, the Leopard Cat is also an excellent swimmer so it can inhabit many islands. The factor that causes Leopard Cat to be more active in oil palm plantation habitats than in swamp and rain forest habitats is the abundance of prey such as groups of rats. Leopard cat have a small roaming area in oil palm plantations (1.43 Km^2) compared to primary (8.1 Km^2) and secondary (5.2 Km^2) forests, this is because in oil palm plantations the abundance of prey is very abundant so it is not Too many rooted tigers expend more energy on hunting than in the primary, secondary and other habitats.

The speed of movement of the male Leopard Cat is faster than the female Leopard Cat in oil palm plantations. The speed of movement of the Leopard Cat is very fast during the breeding season in sunny weather conditions. The male Leopard Cat has a faster movement than the female to maintain the home range and territory of the female Leopard Cat. According to Schmidt et al. (2003) male Iriomote Leopard Cat move faster (0.34 km/hour) than female Leopard Cat (0.25 km/hour). During the breeding season male Iriomote root, tigers move faster and their DMR is greater than that of female Iriomote Leopard Cat. Male Iriomote-Leopard cat, daily locomotion routes are massively extended to their home range throughout the year and maintain continuous territory over their home range. Research Chen et al., (2016) Taiwanese Leopard Cat moves at an average of 186 m/hour. The male Taiwanese Leopard Cat moves faster than the female.

IV. Conclusion

Leopard cat have a small roaming area in oil palm plantations (1.43 Km^2) compared to primary (8.1 Km^2) and secondary (5.2 Km^2) forests, this is because in oil palm plantations the abundance of prey is very abundant so it is not Too many rooted tigers expend more energy on hunting than in the primary, secondary and other habitats.

Acknowledgements

Thanks to PT. Surya Sawit Sejati for permission to conduct research and all employees who assist in carrying out the research. Thanks also to the Biodiversity Manager of PT. SSS, M. Ikhsan, Kharisma Putra, Ali Irzal, Hernandea Freida Forestriko, Fila Istina Machid and Sakti Anggara.

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