

LION META POPULATION OF GIR - A REPORT ON TRANSECT SURVEY

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Introduction

The Gir ecosystem falls in biogeographic zone 4 (the semi-arid) and biographic province 4-B Gujarat Rajwara is the last abode of Asiatic Lion. The total area of Gir Sanctuary and National Park is 1412.12 km². Besides, an area of 470.5 km² constitutes buffer zone of reserve, protected and unclassed forests. Thus an area of 1882.6 km² forms the Gir forest.

Gir ecosystem is a unique and vibrant ecosystem located in the southern part of Saurashtra peninsula on the Western Coast of India. It harbours diverse variety of flora and fauna which include several endangered and threatened species and provides breeding ground for several migratory as well as resident birds. Gir forest is the catchment of several important rivers like Hiran, Singoda, Raval, Datardi, Machhundri, Shetrunji.

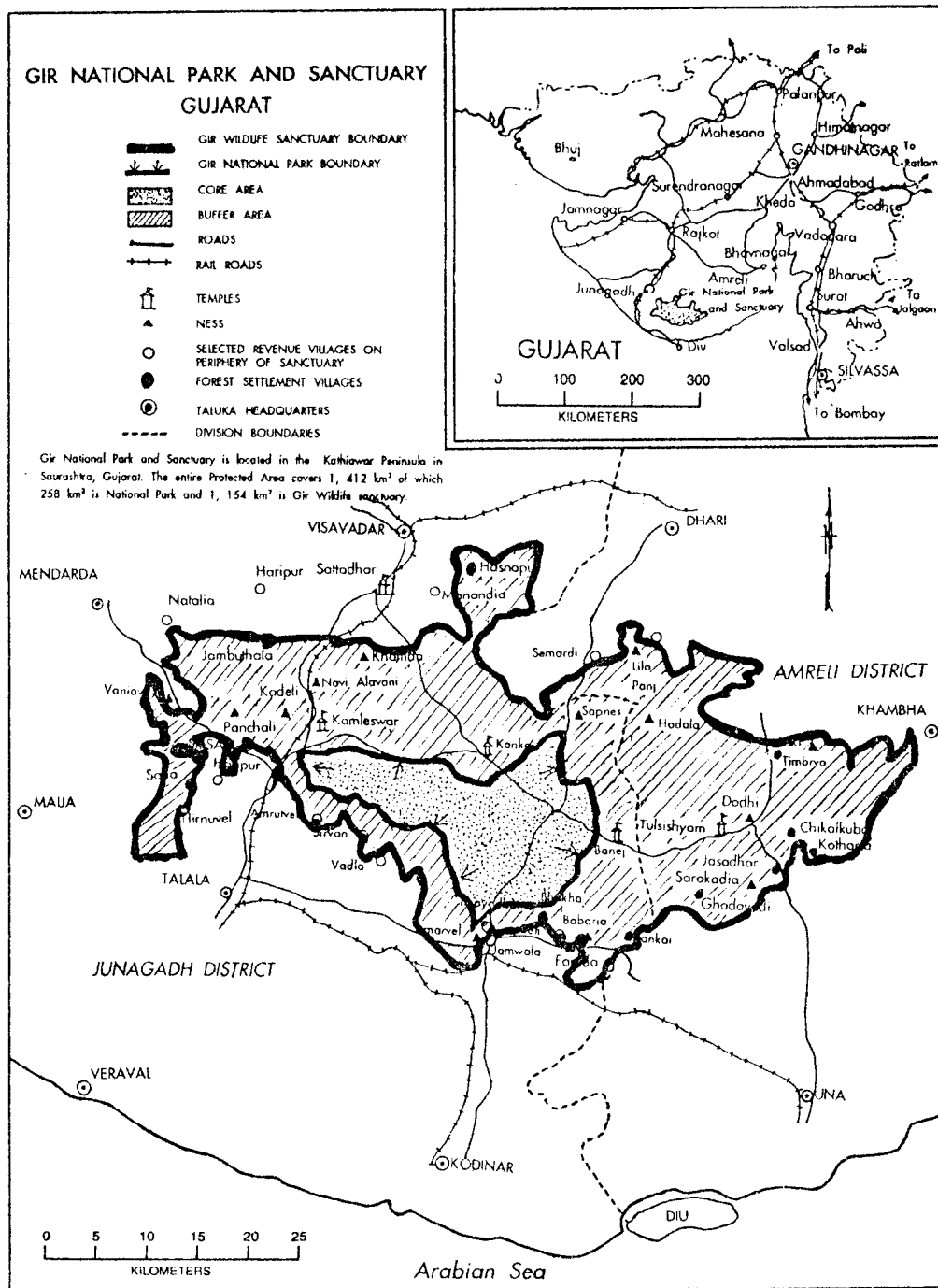
Today the population of Asian Lion is confined to Gir where they have shown fluctuating trends in the past ninety years. These demographic variations in a single isolated population can cause the population to go extinct because of the intrinsic as well as extrinsic threats it faces. It is susceptible to changes in environment such as increase in human and livestock population, grazing pressures, habitat destruction, vehicular movement, intentional and unintentional

killing, reduction and loss of corridors etc. Although the Gir region is located near the coastal border and has been subjected to frequent cyclones and droughts in the past yet so far the adverse impact of such catastrophe on the Asiatic Lion have not been recorded. But the possibility that the severity of such natural catastrophe wiping out the population can not be ruled out. Similarly, fire, either man-made or natural has threatened the forest time and again. That this will not prove annihilating is difficult to admit.

The present population of Lion is distributed in various pockets with Gir having the largest concentration, others being Girnar, Coastal Zone and Mitiyala. Within the coastal zone also there are three major pockets where the population resides normally - Sutrapada, Mul Dwarka and Nava Bandar. These isolated populations keep migrating in and out of Gir and keep interacting with the parent population of Gir. These interacting populations are technically known as meta populations. Each meta population again is affected by environmental variations, habitat quality, diseases, human impact, inbreeding depressions etc. and some of the meta populations may go extinct for a short period till such time it is again replaced by the immigrant individuals or groups. As these meta populations become more inbred the chances of reduced survival and

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Fig. 1



reproduction decreases and with every external challenge the population enters into a phenomenon called extinction vortex.

Due to the conservation efforts launched in the past there is no doubt that the population of Lion has increased by leaps and bounds. Simultaneously with the increase in human activity in Gir and the onset of industrialization especially the cement factories, the landscape of the area has changed.

It will not be out of place to mention here that Lions roared in Girnar, Barda and Mitiyala in the early part of the century. Fenton, in *The Kathiawar Lion* (1908), mentions the presence of this majestic beast in the rugged but safe environs of Barda and Aleche hills in the South and in the wild tracts around Chotila. Worth mentioning are the places like Dhrangadhra, Jasdan and a few other princely States in the North of the province and also the rough country extending between Dhank and Chorvad. There are unconfirmed reports that Lions could be seen in the coastal areas during monsoon in 1960s and '70s. Local inhabitants when contacted confirmed these reports.

In fact the population of Lion was forcibly confined to Gir due to the impact of extrinsic factors in other areas. Once the conservation efforts started in early twentieth century, Gir was zealously protected vis-a-vis other neighbouring areas. As a result Lions disappeared from other areas during the later part of the 20th century. In Gir, the population stabilised after 1936 but it was only in the eighties that the population probably crossed the carrying capacity and started outward movements. Natural dispersal of Lion

started after 1987-88 and 17 Lions were recorded outside the Gir during 1990 census that increased to 42 in 1995 census.

The Survey

An extensive Foot Transect Survey was carried out on 6 December, 1997 with the following objectives :

Objectives

1. To find out migratory route of Asiatic Lion to and from coastal zone.
2. To study the corridor and its habitat.
3. To study the impact of animal movement of human population along the route.

Justification

Increase in Lion population over the years has caused the Lions to move outward possibly to avoid intraspecific conflicts. The emigrant population takes advantage of the riverine habitat that exists between Gir and the coastal area. Since the wild prey base in the coastal area is limited most of emigrant Lions rely on cattle and other domestic and stray animals in the area. As a result the human-Lion conflicts have increased. There have been a number of cases of human injury as well as poisoning of Lions. Preliminary data shows that some of the groups intermingle with the parent population in Gir whereas others remain confined to the coastal belt.

With the advancement in the industrial and agricultural development there is every possibility that the existing routes of the migratory population is irretrievably lost. The land between coast and the sanctuary

Fig. 2

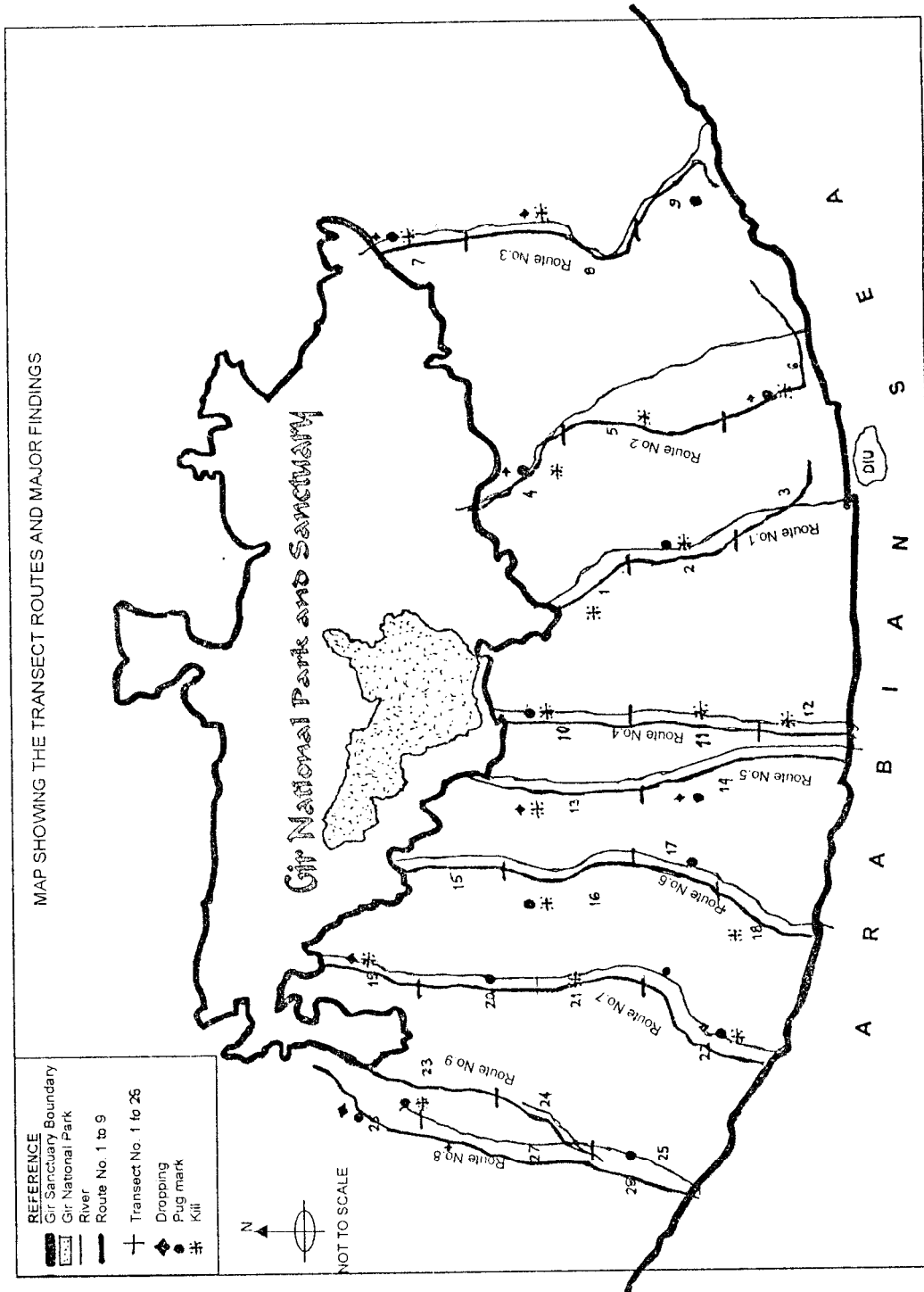


Fig. 3

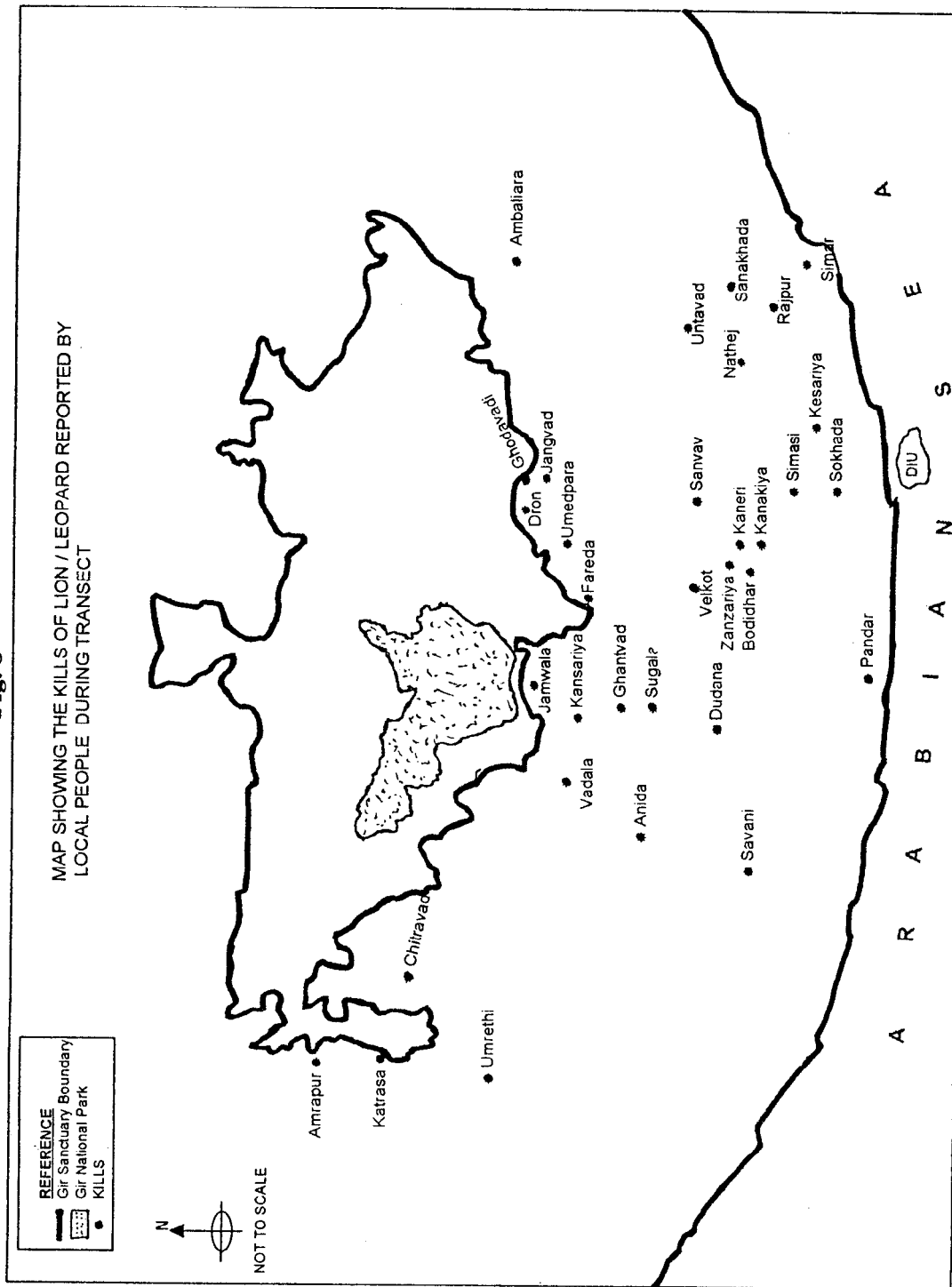


Table 1

Major findings of the transect

Route No.	Trans No.	Length (km)	Area	Forest type/ Land use	Sighting species	Drop-ping	Pug-mark	Kill	Group leader
1	2	3	4	5	6	7	8	9	10
1	1	12	Rasulpara-Dhrabavad	Wasteland <i>Prosopis</i>	Nil	Nil	Nil	Yes	R.F.O. Jasadhar
1	2	12	Dhrabavad-Chikhali	<i>Butea</i> , <i>Prosopis</i>	Nil	Nil	Yes	Yes	R.F.O. Hadala
1	3	12	Chikhali-Paldi	Gaucher, <i>Prosopis</i>	Nil	Nil	Nil	Nil	A.C.F. Digadhra
2	4	13	Ghodavadi-Ratad	Teak, <i>Zizyphus</i>	Lion Chinkara	Yes	Yes	Yes	Dy. C.F. Gir East
2	5	13	Ratad-Vansoj	Sugarcane field	Panther	Nil	Nil	Yes	R.F.O. Dalkhaniya
2	6	16	Vansoj-Simar	<i>Prosopis</i> Agri. Land	Nil	Yes	Yes	Yes	R.F.O. Scheme
3	7	13	Borala-Samdhiyala	<i>Acacia</i> Spps.	Lion	Yes	Yes	Yes	R.F.O. Tulsishyam
3	8	15	Samdhiyala-Samter	Agriculture crop (cotton)	Nil	Yes	Nil	Yes	A.C.F. Sasan
3	9	12	Samter-Manekpar	<i>Prosopis</i> thicket	Nil	Nil	Yes	Nil	R.F.O. Sch. Sarasia
4	10	12	Jamvala-Sugala	Teak- <i>Wrightia</i>	Nil	Nil	Yes	Yes	C.F. Wildlife Junagadh
4	11	12	Sugala-Ranoj	<i>Butea</i> , <i>Prosopis</i>	Nil	Nil	Nil	Yes	R.F.O. Ankolwadi
4	12	8	Ranoj-Muldvarkar	Agriculture Land	Nil	Nil	Nil	Yes	R.F.O. Chhodavadi
5	13	12	Javantri-Mordiya	Teak Coppice	Nil	Yes	Nil	Yes	R.F.O. Visavadar
5	14	16	Mordiya-Kanajetar	Gaucher Westeland	Nil	Yes	Yes	Nil	R.F.O. dedakdi
6	15	15	Shirvan-Madhavpur	River bank <i>Butea</i> , Ber	Nil	Nil	Nil	Nil	R.F.O. Sasan
6	16	12	Madhavpur-Bhimdeval	Agriculture Land	Nil	Nil	Yes	Yes	R.F.O. Talala
6	17	10	Bhimdeval-Navagam	Agriculture Land	Nil	Nil	Yes	Nil	R.F.O. Babaria
6	18	11	Navagam-Triveni(Patan)	Agriculture Land	Nil	Nil	Nil	Yes	A.C.F. Talala
7	19	12	Sasan-Vripur	Farm Land	Nil	Yes	Nil	Yes	A.C.F. Porbander
7	20	10	Virpur-Dhusiya	Agriculture Land	Nil	Nil	Yes	Nil	Forester Sasan

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1	2	3	4	5	6	7	8	9	10
7	21	8	Dhusiya-Ambaliyala	Gaucher Open hill	Nil	Nil	Nil	Yes	Forester Sasan
7	22	12	Ambaliyala-Veraval	Gaucher Wasteland	Nil	Yes	Yes	Yes	Dy.C.F. Sasan
8	23	15	Devaliya Kalibhada	<i>Prosopis</i> Agriculture	Nil	Nil	Yes	Yes	Dy.C.F. Gir West
8	24	12	Kalibhada-Gadu	Agriculture Land	Nil	Nil	Nil	Nil	Forester Sanctuary
8	25	10	Gadu-Chorvad	Agriculture Land	Nil	Nil	Yes	Nil	Forester Sanctuary
9	26	11	Devaliya-Babara	Vidi Land	Nilgai	Yes	Yes	Nil	R.F.O. Zoo, JND
9	27	13	Babara-Khorasa	Sajad, <i>Butea</i>	Nil	Yes	Nil	Nil	R.F.O. Devaliya
9	28	10	Khorasa-Vadodara	Agri. Land, <i>Prosopis</i>	Nil	Nil	Nil	Nil	Forester Mangrol

N.B.: Each Group had 4 members including Group leader and 1 person acquainted with the area.

is being subjected to heavy limestone and back stone mining leaving the area badly mauled. That be so it is all the more justified to study various aspects of the wildlife existing, corridors, land use pattern and trends, conflicting issues etc.

The present study is just a beginning in this direction. It is an effort to establish *prima facie* the changing scenario.

Methodology

After reconnaissance survey and careful study of records a total of nine routes were selected on river Malan, Ghodavadi, Machhundri, Singoda, Hiran, Sarawati. As all nine routes cover a distance of 30 to 40 km each was divided into transect routes with starting point and ending point. A total of 28 transects were laid on 9 routes. 28 teams were selected one for each transect respectively (Table 1). Each team consisted of four members with one group leader who was either Range Officer or Assistant Conservator or Dy. C.F. and C.F. and one

person conversant with the transect route. All the members of team were instructed to carry out specific task. One member was deputed to note direct sighting of animals, others to collect scat and other indirect evidences along the transect. Entire team was instructed to interact with the local people for sighting of Lions and for the kill made by Lions in the immediate and distant past. The team leaders were instructed to maintain detail field book and abstract forms.

The length of transect ranged between 10 to 16 km. The survey operation was started at 6.30 hours in the morning and completed by 17.00 hours. Before actual survey operation a training for group leaders was kept at Sasan and necessary information regarding sampling and data collection was given to them. All the teams were made to reach their respective starting point one day in advance.

After the completion of survey the group leaders assembled at Sasan and the

Table 2*Details of direct sighting of animals in Foot Transect Survey*

Route No.	Transect No.	Animal	Place	Time	Remark/ Vegetation
2	4	Lioness	Ghodavadi	7.00 A.M.	Teak-Zizyphus
2	4	Chinkara	Machhundri	13.00 P.M.	Teak
2	5	Panther	Vadaviyala	7.00 A.M.	Sugercane Field
3	7	Lion	Kantala	6.30 A.M.	Acacia spps.
9	26	Nilgai	Babra Vidi	13.00 P.M.	Grassland (24 Nilgai)

Table 3*Result of scat analysis of samples collected during Foot Transect*

Route No.	Transect No.	Place	Prey
Predator - Lion			
2	6	Delvada	Cow
2	6	Delvada	Cow
7	19	Chitrod	Nilgai
6	16	Anida	Cow and Goat
3	13	Pedhavada	Buffalo
3	8	Untavade	Sheep
3	7	Ambaliyala Vidi	Nilgai
5	14	Dhamnej	Cow
Predator - Leopard			
7	22	Savani	Goat

Table 4*Details of droppings collected
(Other than Big Cats)*

Route No.	Transect No.	Animal	Place
9	26	Nilgai	Babra Vidi
9	26	Chinkara	Babra Vidi
9	26	Wildboar	Babra Vidi
9	26	Hyeana	Babra Vidi
9	27	Nilgai	Babra Vidi
9	27	Nilgai	Amradhar
9	27	Nilgai	Amradhar
2	6	Nilgai	Nava Bundar

Table 5
Pugmarks observed during the Transect

Route	Transect	Animal	Time	Place	Remarks
1	2	Panther	13.30	Sekhavad	
2		Lion	7.15	Ghodavadi	
2	4	Lion	9.00	Jungawad	
2	4	Lion	11.00	Itvaya	
2	4	Panther	8.00	Jungawad	
2	4	Hyaena	8.30	Jungawad	
2	6	Lion	6.30	Nava Bundar	
2	6	Lion		Simar	
2	6	Lion		Sanjalia	
3	7	Lion	6.00	Saldhar	
3	9	Lion		Khatriwad	
3	9	Panther		Rajpara	
4	10	Lioness		Ghadvad	Pugmark of cub observed
4	10	Panther		Kansaria	
5	14	Lioness	16.45	Dhamrej	
6	16	Lion		Anida	
6	17	Hyaena	10.30	Umbari	
7	20	Lion	10.00	Chitravad	
7	20	Lion	8.00	Rajthada	
7	22	Hyaena		Umrethi	
8	23	Lion	7.15	Kando Hill	
8	23	Lion	9.15	Rajthada Dam	
8	23	Panther	8.30	Rajthada Dam	
8	23	Lion	9.00	Amrapur	
8	25	Panther	8.10	Visanvad	
9	26	Lion		Babra Vidi	
9	26	Lion		Babra Vidi	

matter was discussed at length with each group and findings as well as suggestions were recorded.

Major Findings

1. For the first time in 1987-88 Lions were captured from coastal area. Prior to this there is no official record of capturing Lions from this area.

2. Most of the groups observed that vegetal cover near the riverine area is sparse with predominance of thorny species. There are a few orchards just on river bank that may shelter the migrating animals (Table 2).

3. *Prosopis* thickets are noticeable only on coastal area.

Table 6*Kills of Lion / Leopard reported by local people during Transect*

Route No.	Trans No.	Village	Details
1	2	3	4
1	1	Fareda	Kill reported on 3th and 4th Dec. - By Lion
		Umedpara	Kill reported in Nov. '97 - By Lion
		Sanvav	Kill reported in Nov. '97 - By Lion
		Velakot	Kill reported in the last week of Nov.'97 - By Lion
1	2	Zanzaria	Kill reported in Nov.'97 - By Panther
		Bodidhar	4th Dec. '97 - Kill made by Lion
		Kaneri	Last week of Nov. - Kill made by Leopard
		Kanakia	Kill reported in Nov. - By Lion
		Simasi	Leopard was seen by local people
		Sokhada	Dec. 2, 1997 - Panther sighted
2	4	Godavadi	5th Dec., 1997 - Kill by Lion
		Dhron	4th Dec., 1997 - Kill by Lion
		Jangwad	6th Dec., 1997 - Kill by Lion
2	5	Kesaria	8th month before - Kill by Lion
2	6	Nathad	Before one week - Kill by Lion
3	7	Ambaliala	Before one month - 3 kills made by Lion
3	8	Untawad	During monsoon 1997 - Kill made by Lion
3	9	Sanakhada	Before 15 days - Kill made by Lion
		Khatriwad	5th Dec., 1997 - Kill made by Lion
		Simar	Before 15 days - Kill made by Lion
		Rajpar	Before one week - Kill made by Lion
4	10	Jamwala	5th Dec., 1997 - Kill made by Lion
		Kansaria	5th Dec., 1997 - Kill made by Lion
		Ghatwad	5th Dec., 1997 - Kill made by Lion
4	11	Sugala	20th Nov., 1997 - Kill made by Lion
		Aaswad-Dudana	Two months before - Kill made by Lion
4	12	Chauhan's mining area	Two months before - Kill made by Lion
		Panadha	3rd Dec., 1997 - Kill made by Lion

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1	2	3	4
5	13	Vadala	One month before - Kill made by Lion
6	16	Anida	5th Dec., 1997 - Kill made by Lion
6	18	Badalpara	In monsoon 1997 - Kill made by Lion
7	19	Chitrawad	One month before - Kill made by Lion
7	21	Umrathi	Before one week - Kill made by Lion
7	22	Savani	One month before - Kill made by Panther
8	23	Katrasa	3rd Dec., 1997 - Kill made by Lion
8	23	Amrapur	One week before - Kill made by Lion

4. Blue bull population was seen on migration routes and crop damage by Blue bull and Wild boar was substantial. undergrowth is vanishing fast from the area. Loss of green cover affects the movement of Lions.
5. A few groups collected scat of Lion and Leopard along the transect routes which shows indirect evidences of big cat movements in the area (Table 3).
6. Local populace confirmed that movement of Lions was not a new phenomenon. They mentioned Lions presence in the coastal area to be as old as 30 years. But they also mentioned that these movements were more pronounced during monsoon.
7. *Prosopis* thickets and the coastal vegetation is an unusual habitat for the Lions and Blue bulls. There is hardly any under growth in the area and the area is water deficient. Yet Lions survive.
8. Lime stone mining was observed by most of the groups and the trend is on the increase. The tree cover and the
9. Migration of coastal population is noticed proceeding towards Gir forest for few kilometers and evidences indicate that they again go back to the coast.
10. Lions were sighted on Ghodavadi-Ratad area and Borala-Samdhiyala area. On other routes, dropping, pugmarks and kills were seen. This clearly indicates that all nine routes act as corridor for the movement of Lion. Whether these corridors serve as a link between Gir and coastal zone could not be established conclusively. Whether the meta populations exchange genes need to be established. Local people on migration route and in coastal area found well acquainted with the movement of Lions.
11. Water scarcity was observed on route No. 8 and 9.

The outcome of this study has opened new vista for the park management. Further studies will be required to establish conclusively whether exchange of genes is taking place and if yes, at what interval? If not, why not?

Survival of Asiatic Lion population will depend upon continuous exchange of genes amongst different prides, whether living inside the Sanctuary or in Girnar, Mitiyala or coastal belt. Under no circumstances these meta populations should become

isolated. Otherwise they will be exterminated either by human action, natural calamity or by genetic drift.

It is essential that the present sanctuary and the associated habitats be properly conserved and managed for the survival of this rare gene pool. At the same time the society has the responsibility to protect the bio-region even at the cost of losing money from mining and other activities.

SUMMARY

The population of Asian Lion is confined to Gir where it has shown fluctuating trends in the past ninety years. Therefore a population survey was carried out to find out its migratory route to and from coastal zone, the corridor and its habitat and impact of animal movements on human population along the route.

गीर सिंहों की संख्या - अनुच्छेद सर्वेक्षण का विवरण

असीम श्रीवास्तव, रामेश्वर लाल मीना, आर०डी० कम्बोज, महेश सिंह, पी०पी० रावल व मुकेश परमार

सारांश

एशियाई सिंहों की संख्या अब गीर में ही सिमट कर रह गई है जहाँ पिछले 90 वर्षों के दौरान उसमें घटा-बढ़ी होने की प्रवृत्ति देखी गई है। अतः सागरतटीय क्षेत्र से उनके आने-जाने के मार्ग, गलियारे, उसके प्राकृतावास तथा उसके मार्गकिनारे बसी मानव जनसंख्या पर इस पशु की गतिविधियों का प्रभाव मालूम करने के लिए इस जनसंख्या का सर्वेक्षण किया गया है।