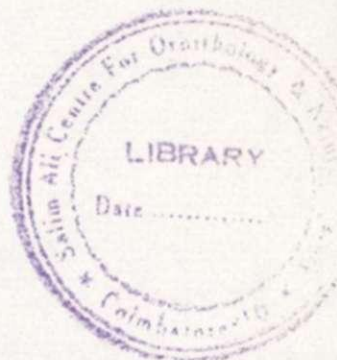
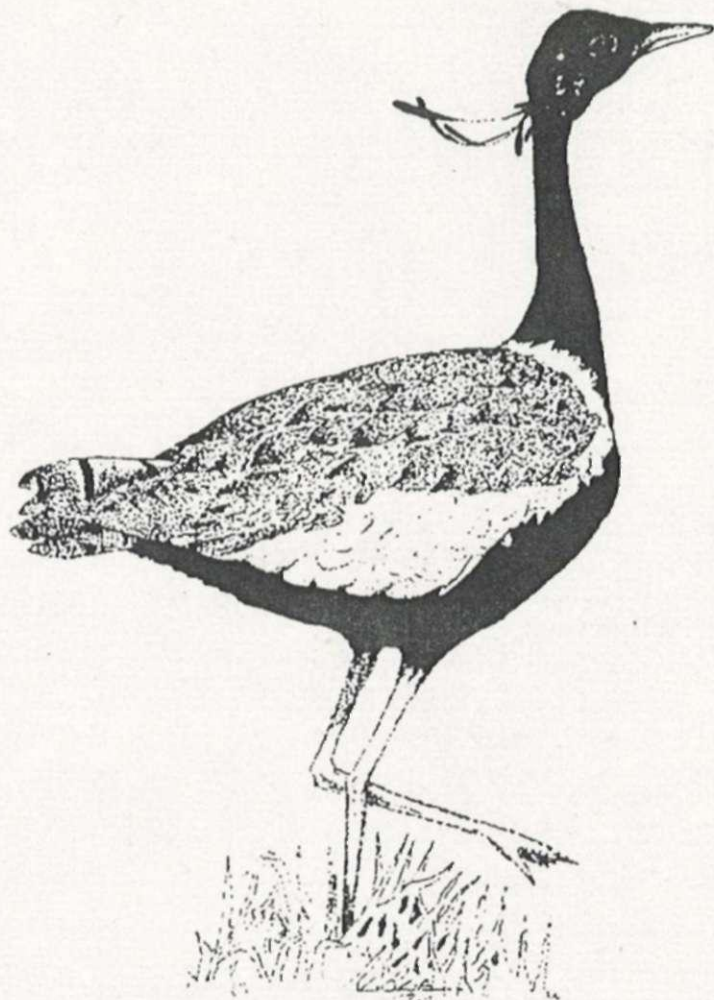


**The status of the
Lesser Florican *Sypheotides indica*
in 1999**



R Sankaran

Sálim Ali Centre for Ornithology & Natural History

in collaboration with

Bombay Natural History Society

June 2000

R Sankaran is a scientist in the division of Avian Ecology. He was awarded a doctorate from the Bombay University for his studies on the breeding behaviour of the Lesser Florican *Sypheotides indica* and the Bengal Florican *Houbaropsis bengalensis*. He has worked in diverse habitats that include the terai of Uttar Pradesh, the subhumid grasslands of western India, the Thar desert, and the Andaman & Nicobar islands. The other species that he has studied include the Nicobar Megapode *Megapodius nicobariensis*, the Edible-nest Swiftlet *Collocalia fuciphaga*, the Red Junglefowl *Gallus gallus*, the Swamp Deer *Cervus duvauceli*, and the hog deer *Axis porcinus*.

Funded by: Sálim Ali Centre for Ornithology & Natural History, Coimbatore
 Bombay Natural History Society, Bombay
 Duncan Wilson, Jersey
 Oriental Bird Club, Cambridge

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**The status of the
Lesser Florican *Sypheotides indica*
in 1999**

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Supported by

**Gujarat Forest Department
Madhya Pradesh Forest Department
Rajasthan Forest Department**

The status of the Lesser Florican *Sypheotides indica* in 1999

Introduction

Six species of bustards occur in the Indian subcontinent. The Great Indian Bustard *Ardeotis nigriceps*, the Lesser Florican *Sypheotides indica* and the Bengal Florican *Houbaropsis bengalensis* breed in India, while the Great *Otis tarda*, the Little Bustard *Tetrax tetrax*, and the Houbara Bustard *Chlamydotis undulata* are occasional to common winter migrants. The Lesser Florican and the Great Indian Bustard are endemic to the Indian subcontinent, while a subspecies of the Bengal Florican is found in Kampuchea and Vietnam as well (Osborne *et al.* 1984). All the three resident bustards, the Great Indian Bustard, the Lesser and Bengal Florican are critically endangered (Collar & Andrews 1994).

The popularity of the Lesser Florican as a game bird resulted in frequent mention of this species in literature; perhaps the earliest of which was by the Moghul emperor Jehangir (Alvi and Rahman 1968). The late nineteenth and early twentieth century, the era of the gentleman sportsman, added considerably to our knowledge about the floricans through the annals of sporting and natural history journals. Once the commonest and most widely distributed Indian bustard, the Lesser Florican is now rare. As early as 1879, Hume and Marshal wrote, "Owing to the un-sportsmanlike manner in which these beautiful birds are massacred during the breeding season, they are everywhere diminishing perceptibly in numbers, and will, in another half century, be, I fear, almost extinct". With the extensive changes in land use practices, particularly over-grazing of its grassland habitat, the Lesser Florican is seriously threatened with extinction.

The present Lesser Florican conservation initiative began with the objectives of:

1. Assessing the status of the Lesser Florican every five years
2. Identifying sites where the Lesser Florican still breeds, and sites if protected will attract floricans
3. Organising workshops to:
 - a. Formulate a conservation strategy;
 - b. Generate awareness;
 - c. Identify action groups at the district level who will be able to create an inventory of protected *Vidis* in their districts, identify priority conservation areas and educate people on why grasslands need to be protected;
 - d. Prepare and distribute educational material on the Lesser Florican.

This report documents the status of the Lesser Florican in 1999. It has excerpted material from:

- Sankaran, R. 1994. Status of the Lesser Florican in 1994. Unpubl. Report. Salim Ali Centre for Ornithology & Natural History, Coimbatore.
- Anonymous 1994. Management and restoration of grasslands for people and the Lesser Florican. An Action plan. Salim Ali Centre for Ornithology & Natural History, Coimbatore.
- Sankaran 1996. Background paper for the workshop on conservation of the Lesser Florican. Kota. Salim Ali Centre for Ornithology & Natural History, Coimbatore.

The Lesser Florican

The Lesser Florican breeds during the southwest monsoon, which normally begins by end June. During this period, a distinct movement into Gujarat, eastern Rajasthan, western Madhya Pradesh and some parts of the Deccan is seen (e.g. Jerdon 1864). The post-breeding movements are still unclear. The Lesser Florican appears to disperse into suitable habitat over much of the Indian subcontinent, with the majority moving into southern India (Jerdon 1864, Sankaran *et al.* 1992). Breeding may occur in southern India as a response to breeding failures, due to drought or otherwise, in western India (Sankaran & Manakadan 1990).

Ali and Ripley (1983) described their habitat as 'tall grassland with scattered bushes, and standing crops of cotton and millet.' The primary habitat requirement for breeding is grassland where sufficient grass cover is available during the breeding season. The Lesser Florican does not use marshes or wetlands, dense forests, extreme deserts and barren land.

In western India, the Lesser Florican breeds in:

a) Pure grasslands

The Lesser Florican's preferred breeding habitat are grasslands where the grass grows long during the monsoon. Presently, such habitat is fragmented and patchily distributed throughout the species' breeding range; grassland patches that exist are protected by the government or by agriculturists for fodder. These protected grasslands are known as *Bheed*, *Veed*, *Vidi*, *Rakhaal* or *Jod* in different regions. Grazing is banned once the monsoon starts. The subsequent rains cause a rapid growth of grass, which by the end of the monsoon grows to about a metre or more in height. At the end of October, when the grass has matured, the grasslands are harvested for hay. Once harvesting is completed, the grasslands are practically devoid of vegetation until the following monsoon.

These grasslands are of the *Sehima nervosum*-*Chrysopogon fulvus* type. Other grass species include *Heteropogon contortus*, *Apluda mutica*, *Cymbopogon martini*, *Aristida funiculata* and species of the genera *Bracharia*, *Eragrostis*, *Dicanthium*, *Digitaria*, *Setaria*, *Bothriocloa* and *Pseudoanthesterea*. Wild rice, *Oryza rufipogon* grows where water accumulates during the monsoon. The few trees present include *Butea* *Butea monosperma*, *Acacia leucophloea*, *Acacia* spp., *Mahua* *Madhuca indica*, *Mango* *Mangifera indica*, *Peepul* *Ficus religiosa*, *Phoenix* palms etc. Shrubs include *Zizyphus* spp. In some grasslands *Butea* and Teak *Tectona grandis* are seen in profusion, but are stunted and have the appearance of bushes.

The *Bheed* or *Vidi* is the preferred breeding habitat of the Lesser Florican and constitutes the major proportion of available breeding habitat.

b) Grass patches in crop areas.

These are small isolated patches of grassland amidst crop fields, which have not yet been brought under the plough. These patches are small, usually 2 acres or less and are the remnants of earlier large grasslands that have been ploughed up. They form an important habitat because: a) grass patches amidst crop fields are the only remnant habitat left in large areas of the Lesser Florican's breeding range b) though they are more disturbed than pure grasslands, they are less disturbed than crop fields, and some breeding takes place in these patches.

c) Crop fields

The Lesser Florican also breeds in crop fields, the preferred ones being soyabean *Glycine max* and groundnut *Arachis hypogea*. Crop fields of cotton *Gossypium* sp., sorghum *Sorghum vulgare*, maize *Zea mays*, sugarcane *Saccharum* sp., rice *Oryza sativa*, mustard *Brassica campestris*, groundnut *Arachis hypogea*, lentils and wheat *Triticum vulgare* are also used.

d) Though not for breeding, the Lesser Florican also uses lightly wooded country, grazed lands and scrubland dominated by *Zizyphus* spp.

Ownership and Management of Protected Grasslands

Grassland ownership can be broadly classified into three: (i) State, (ii) Private and (iii) Cooperatives or Trusts. Though the overall management objective of all the above categories is to protect the grassland from grazing during the monsoon and harvest the hay subsequently, variations in the management, particularly with reference to grazing patterns, exist (see Sankaran 1996 for details).

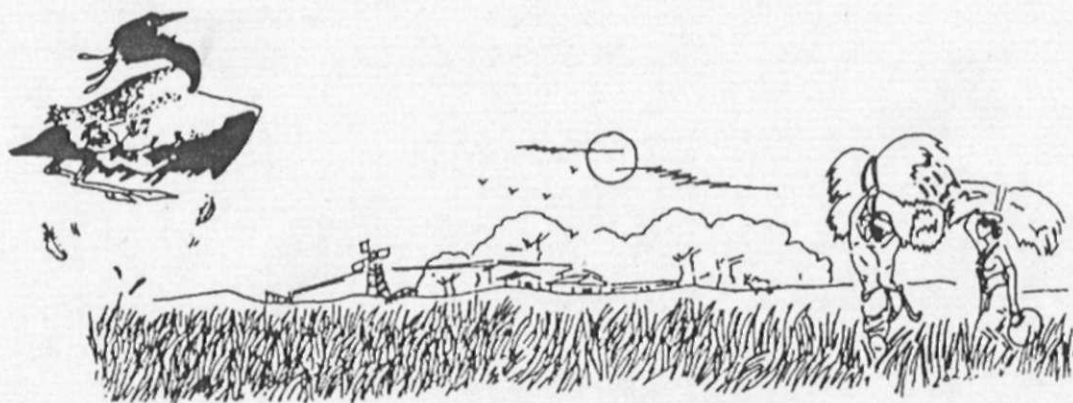
Local Names

In M.P., the Lesser Florican is called *Khar mor* (= grass peacock). Bheels call it *Bhatt kukde* or *Bhatt teetar* or *Kar kukde* or *Khar teetar*. In Saurashtra and Kutch it is called *Tilor*, and is differentiated from the Houbara which is called *Siyara tilor* (siyara = winter). In parts of eastern Rajasthan, it is called 'floricin' (there is no other local name!). In Tonk, it is called *Bir Wan*.

Legal Status

The Lesser Florican is protected under Schedule I of the Wildlife (Protection) Act 1972, and its hunting, trapping or shooting is prohibited in India. Only two sanctuaries have been declared for the Lesser Florican; the Sailana Kharmor Sanctuary and the Sardarpore Florican Sanctuary.

This report details the findings of a status survey conducted in Gujarat, Madhya Pradesh and Rajasthan, between end July and mid September 1999.



Objective

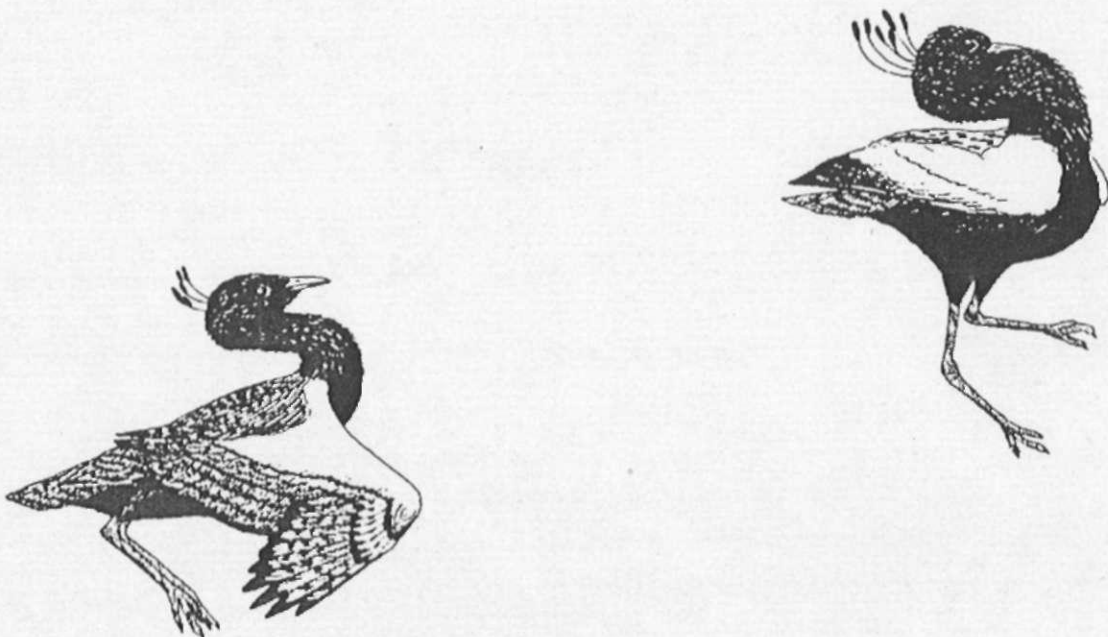
To assess the population status of the Lesser Florican in 1999.

Methods

Based on data collected in past surveys, grassland sites distributed across the known breeding range have been identified. These sites were visited and extensively covered on foot, by between two and six observers, and a total count of the males present were made. As males are territorial and very conspicuous during the breeding season due to their aerial display, a fairly accurate count of the number of males present in grassland can be made.

An assessment of the status of the Lesser Florican is possible only during the breeding season, when males are conspicuous. The major limitations are that the species is nomadic and movements into and within breeding areas are dependent on the quantum and distribution of rainfall (Sankaran 1991). Thus, to determine the status of the Lesser Florican, the survey must cover the entire breeding range in a single season, i.e. within two months. Furthermore, though the majority of floricans are found in large grasslands, they are also present in small grasslands or in grass patches in crop fields (Sankaran 1991), and within the breeding range it is possible to find florican virtually anywhere. As the present breeding range covers as much as 340,000 sq. km, the logistics make location and survey of all major breeding concentrations impossible.

Variations in densities at a single site in different years must be interpreted cautiously, because densities at a site vary depending on the rainfall patterns. For example, the change in population at the Naulakha grassland at Sailana Florican Sanctuary (Ratlam district, Madhya Pradesh) from about 12 in 1986 to 1-2 in 1987, and seven in 1989 - was due to the effects of rainfall and not necessarily because of a decline in the population (Sankaran 1991). Comparisons of densities between years can only be made when distribution over the entire breeding range is similar.



Results & Discussion

Population estimate of the Lesser Florican in 1999

The details of the survey results are given in Appendix 1. 240 floricans (223 males and 17 females) were located during this survey, and if birds reported but not seen (80 males and 12 females) in the areas surveyed are included, then the total is 332. Of these, 131 were in the Malwa plateau, 163 in the Kathiawad Peninsula (Saurashtra and Kutch), and 38 in Central Rajasthan (Table 1). The steps leading to a population estimate are given in Appendix 2. The 1999 status of the Lesser Florican is given in Table 2 with the estimates for previous years. The present population of the Lesser Florican is about 3530 birds (but see below).

Table 1: Summary of surveys - 1982, 1989, 1994, 1999

Year of survey	Malwa Plateau				Kathiawad Peninsula				Rajasthan	Total
	82	89	94	99	82	89	94	99	99	99
Total no. floricans sighted/reported	34	31	73	131	78	14	111	163	38	332
No. ♂ floricans sighted	-	-	43	95	-	-	84	120	8	223
No. ♂ floricans reported	-	-	16	22	-	-	18	30	28	80
No. ♀ floricans sighted	-	-	13	10	-	-	7	6	1	17
No. ♀ floricans reported	-	-	1	4	-	-	2	7	1	12
Total no. of grasslands surveyed	12	12	32	35	81	43	45	40	9	84
Total grassland area ¹ surveyed (sq km)	-	-	157.4	135.7	-	-	211.8	162.4	40.5	338.6
Suitable no. grassland sites	-	13	27	35	-	29	41	39	9	83
Suitable surveyed grassland area (sq km)	-	77.2	111.9	135.7	-	129	167.6	152.4	40.5	328.6

Note: Malwa Plateau includes Western Madhya Pradesh (Ratlam, Mandsaur, Dhar and Jhabua); Eastern Gujarat (Panchmahal), Southeastern Rajasthan (Pratapgarh tehsil in Chittaurgarh); Kathiawad includes Saurashtra and Kutch; Central Rajasthan includes Pali, Ajmer, and Bhilwara. (1982 - Magrath *et al.* 1983, Yahya 1982; 1989 - Sankaran *et al.* 1992; 1994 - Sankaran 1994; 1999 - This study)

Trend in breeding status: A comparison of 17 years of survey - 1982 to 1999

Sankaran *et al.* (1992), using data available in Magrath *et al.* (1983) estimated the 1982 population at 4374 floricans, but by 1989 the population had fallen to 1672, a loss of about 60 %. This loss in numbers was attributed to the severe drought in western India between 1985 and 1987, as there were apparently no significant variation in numbers in the pre-drought years (Sankaran *et al.* 1992). In the subsequent five years, between 1989 and 1994 the population had increased from 1672 to 2206 birds, an increase of about 32%, which was attributed to the 5

consecutive years of moderate to good rainfall that western India had (Sankaran 1994). The years between 1994 and 1999 have also had relatively good monsoons, and in 1999, the population has apparently further increased to 3530 birds.

Table 2: Population estimate of the Lesser Florican

Year	Area surveyed	Males seen reported	Male density per km ²	Total male	Total population
1982	56.92	65	1.14	22178	4374
1989	206.26	90	0.436	836	1672
1994	279.48	161	0.576	1103	2206
1999	328.61	303	0.922	1765	3530

n.b. Total available grassland habitat (7364.3 km²) and suitable grassland habitat (1914.72 km²) assumed to be constant for all three years.

Data from 1982 - Magrath *et al* 1983, Yahya 1982; 1989 - Sankaran *et al.* 1992; 1994 - Sankaran 1994; 1999 - this study.

Has the population really undergone a growth of about 50% between 1994 and 1999?

One factor that has not been considered in estimates of population has been loss of habitat. The basis of all population estimates has been extent of suitable grassland habitat, which in turn has been calculated with data available in Magrath *et al.* (1983). While grasslands, particularly government owned continues to be intact, and in many cases in good health, there has been a considerable loss of privately owned grasslands, and more particularly of grass patches in between crop fields (Sankaran 1994). The loss of privately owned grasslands could be as high as 50%, and that of grass patches between crops possibly probably much higher. It is therefore more than likely that the large number of birds sighted in 1999, may be reflective of a greater concentration of floricans at a few sites as a result of loss of habitat, and not of significant increases in population.

There are several pointers that this may indeed be the case.

1. Panpura grassland near Sardarpur, Dhar. Even when floricans were plentiful in the area, this site never had more than two or three males, often none, within it. The reason being that the terrain of the area was sub-optimal. However, over the last three or four years, up to 15 males has been sighted there. In nearby Chadawad and Dhulat, which once had over 15 to 20 male floricans establishing territories, now very few, if any, are seen. The reason - loss of habitat (see also Sankaran 1994). It is likely that the higher number of floricans seen at Panpura in recent years is reflective of a loss of habitat in the surrounding areas.

2. In Junagadh and Jamnagar districts of Gujarat, there are several grasslands, owned by the Forest Department and in excellent condition. Several of these sites had fairly large numbers of male florican during the pre-drought years (Magrath *et al.* 1983). However, in several surveys of these sites, between 1989 and 1999 floricans have not been seen though there have been

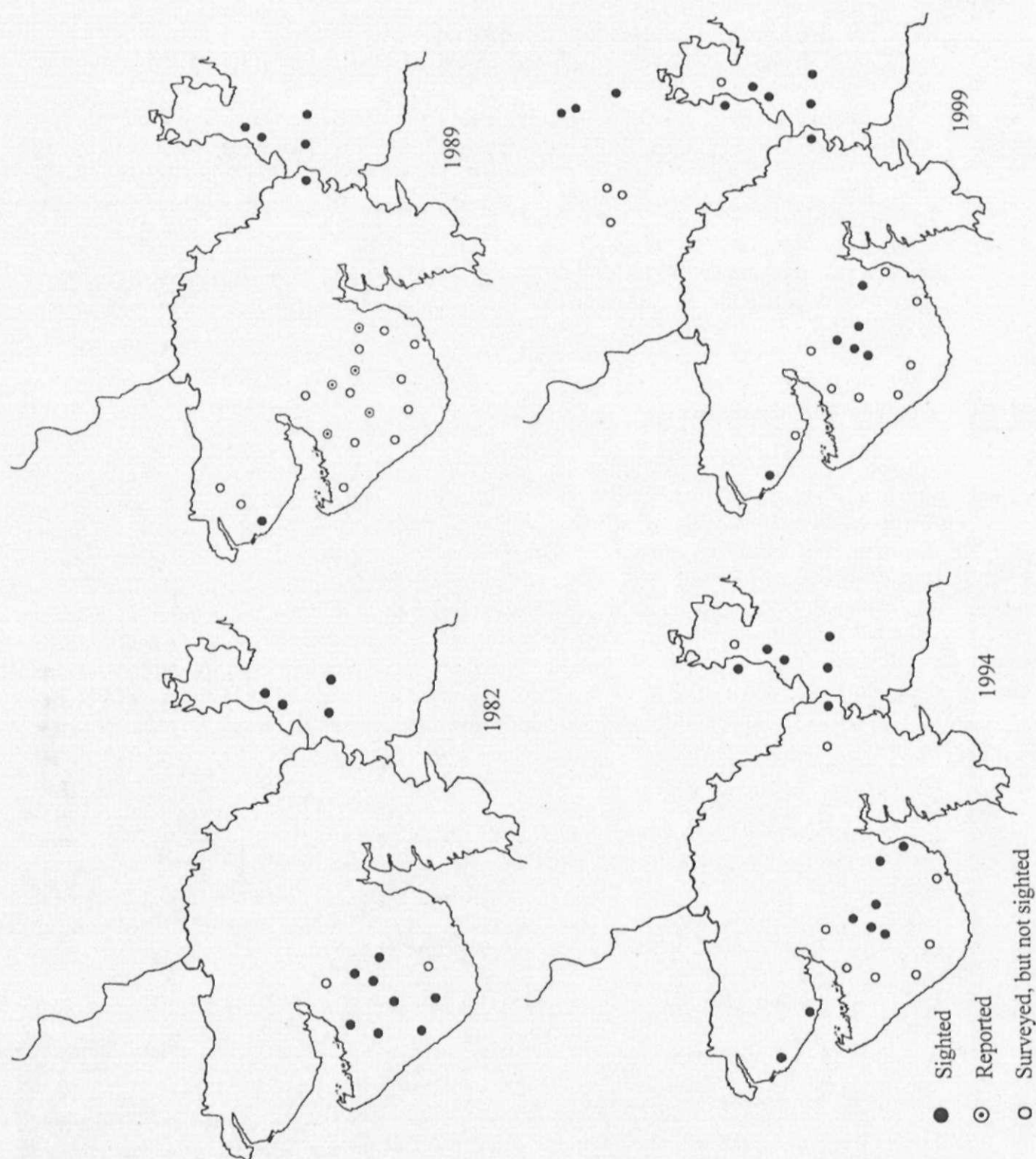


Figure 1. A comparison of sightings of the Lesser Florican during surveys between 1982 and 1999. The Lesser Florican has not recolonised several areas where breeding used to occur in 1982. Note that the symbols indicate general area, often the district or tehsil head quarters. They are not indicative of the number of sights surveyed in a given area.

occasional reports of a bird or two having been sighted (Figure 1). A significant increase in numbers of the Lesser Florican should have been reflected by an influx of birds into these grasslands, which has not been the case.

3. The third main factor which appears to be of significance is the low number of females sighted during the 1999 survey, which is actually lower than that sighted in 1994. An increase in the number of floricans should have been reflected in an increased sighting in the number of females, which has not been the case.

However, a large number of floricans were sighted in 1999, and despite the above it is probably correct to judge that there has been an increase in population over the last five years, though not as much as the estimate indicates.

Conservation perspective

Habitat loss: There has been little change in either quality or extent of Government owned grasslands between 1989 and 1999. The situation with privately owned grasslands is however alarming. Over 50% of the protected grassland at the Naulakha grassland within the Sailana Kharmor Sanctuary (see Sankaran 1991) has been lost to agriculture and/or has been leased to graziers between 1989 and 1999. This is true for other grasslands in western Madhya Pradesh, e.g. Ringnod, Daulatpura and Shikarwadi, where over 50% of the area has been ploughed up. Others still are poised for conversion. Hazariya has been sold to agriculturists and it is likely that this grassland too will be ploughed soon. Massive changes have occurred in the Sardarpur area. The large patches of grasslands between Dhulat and Chadawad have disappeared between 1989 and 1994, and have further declined over the last five years, a loss of at least 70% of the protected grasslands of that area.

Based on the known loss of habitat (qualitative) amongst areas that have been studied in the past, a guess would indicate that in the Malwa Plateau, about 50% of private grasslands have been converted to agriculture or leased to grazing between 1989 and 1999. This is very alarming because: a) the Malwa Plateau is the most important part of the breeding range of the Lesser Florican as this area is the least drought prone and b) the majority of the florican's grassland breeding habitat in the Malwa plateau is privately owned.

In Rajasthan, apart from the loss of privately owned grasslands, whose extent appears to be similar to that of the Malwa Plateau, the Government owned grasslands have been considerably degraded due to infestations of the weed *Prosopis juliflora*. The result is that many of these grasslands have little value both for fodder and the Lesser Florican. However, the Forest Department has begun actively eradicating this weed from some of the Grasslands (e.g. Gudda Endalajod, Pali, which will greatly improve the quality of these grasslands in the coming years.

There has been loss of privately owned grasslands in Gujarat, but the Government owned reserved *vidis* continue to be in very good health. However, the most alarming finding was of

the large scaled encroachment of grasslands in the Nalliya area of Kutch, one of the most important breeding areas for the Lesser Florican. The encroachers were mainly immigrants from Harayana.

Hunting: Hunting with guns or snares, continues to be widespread. In the 1999 survey, at least in two localities there had been hunting incidence, this being done by the local villagers. 'Sportsmen' from cities and towns also shoot florican still. The actual extent of hunting pressures and the number of birds killed is still unknown.

Pesticides: Insects form a large part of the diet of the Lesser Florican. The birds extensively use crop fields during the breeding season and presumably throughout the year. The effects of the indiscriminate use of pesticides in agriculture on the Lesser Florican are unknown.

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District	Taluk/ Village	Grasslands		No. of floricans reported in						
		Name	Own.	1981 1982 1989 1994 1999						
		area ha.		♂	♀	R♂	R♀			
Gujarat Contd....										
Junagadh	Sasan	Lakada	1	nv	2	nv	nv	-	-	-
Junagadh	Sasan	Itari/Lilwa	2	nv	nv	nv	0	0	-	-
Junagadh	Sasan	Kodiar	2	nv	nv	nv	0	0	-	-
Junagadh	Sasan	Amrapur/Jalandar/ Virdi	2	nv	nv	nv	0	0	-	-
Junagadh	Sasan	Manpur	2	nv	nv	nv	1	nv	-	-
Junagadh	Manavadhar	Sadarghad	1	nv	2	0	nv	nv	-	-
Junagadh	Manavadhar	Dadamdhar	1	nv	2	0	nv	nv	-	-
Junagadh	Manavadhar	Dadwa	1	nv	nv	0	nv	nv	-	-
Junagadh	Manavadhar	Sehdi/Untari/ Zinzari	1	nv	nv	0	nv	nv	-	-
Jamnagar	Pipartoda	Pipartoda	1	1	1	0	0	0	-	-
Jamnagar	Pipartoda	Khatia	1	3	3	0	0	0	-	-
Jamnagar	Pipartoda	Kengarpur	1	nv	10	0	0	0	-	-
Jamnagar	Ranjitsagar	Harshadpur	2	4	4	nv	1	nv	-	-
Jamnagar	Jamnagar	Sapa	2	1	0	nv	nv	0	1	-
Jamnagar	Jamnagar	Modpar	1	nv	nv	nv	0	0	-	-
Jamnagar	Bhatia	Gaga	1	nv	nv	0	nv	nv	-	-
Jamnagar	Jamjodhpur	Mahiki	1	2	3	0	0	0	-	-
Jamnagar	Jamjodhpur	Moti	1	4	5	0	0	2	0	0
Jamnagar	Jamjodhpur	Baivari	1	nv	nv	nv	0	nv	-	-
Jamnagar	Jamjodhpur	Vadavara	1	nv	nv	nv	0	0	-	-
Jamnagar	Jamjodhpur	Devria	2	nv	2	0	nv	nv	-	-
Jamnagar	Samana	Sadodad	1	7	3	0	0	0	-	-
Jamnagar	Samana	Jamvadi	1	nv	nv	0	0	0	-	-
11										

[illegible]

District	Taluk/ Village	Grasslands		No. of floricans reported in									
		Name	area ha.	Own.	1981	1982	1989	1994	♂	♀	1999	R♂	R♀
Gujarat contd....													
Rajkot		Umbavara	350	2	nv	4	nv	nv	nv	-	-	-	-
Rajkot	Rajkot	Padwala	(50)	2	nv	nv	nv	nv	2	0	2	-	-
Rajkot	Wankaner	Rampara	1902	1	0	0	0	0	nv	-	-	-	-
Rajkot	Wankaner	Tithwa	127	1	0	2	0	2	nv	-	-	-	-
Surendranagar	Chotila	Anandapur/	(1200)	2	nv	nv	0	0	nv	-	-	-	-
Surendranagar	Thanghad	Chorwira	1018	1	nv	nv	nv	0	nv	-	-	-	-
Surendranagar	Thanghad	Sangadra	320	1	nv	nv	nv	2	nv	-	-	-	-
Surendranagar	Zainabad	Chikasar	(500)	2	nv	nv	nv	0	nv	-	-	-	-
Kutch	Nalliya	Jakhau	(2000)	3	nv	nv	(5-8)	33	64	3	-	-	-
Kutch	Nakhatrana	Gugiliana	na	1	nv	nv	0	nv	nv	-	-	-	-
Kutch	Nakhatrana	Ratipal	na	1	nv	nv	0	nv	nv	-	-	-	-
Kutch		Banni	(8000)	3	nv	nv	0	nv	nv	-	-	-	-
Kutch	Mandvi	Layja/Bayat	400	1,2	nv	nv	0	3	0	-	-	-	-
Panchmahal	Dohad	Rampura	2700	1	nv	nv	15-20	5	9	2	-	-	-
Panchmahal	Dohad	Near Rampara	100	2	nv	nv	nv	0	nv	-	-	-	-
Panchmahal	Dohad	Navagaon	100	1	nv	nv	nv	0	0	-	-	-	-
Panchmahal	Dohad	Sharda/Panwa/	1500	1,2	nv	nv	nv	0	0	-	-	-	-
		Kharonda/Tatagolla											
Panchmahal	Dohad	Jekot	1500	1,2	nv	nv	nv	1	0	-	-	-	-
Panchmahal	Godhra	Bhadeli	750	1	nv	nv	nv	0	nv	-	-	-	-
Panchmahal	Godhra	Samli	1500	1	nv	nv	nv	0	nv	-	-	-	-

District	Taluk/ Village	Grasslands		No. of floricans reported in						
		Name	area ha.	Own.	1982	1984	1986	1989	1994	1999
									♂	♀
									R♂	R♀
MADHYA PRADESH										
Mandsaur	Mandsaur	Naulakha	(125)	2	nv	nv	nv	nv	0	-
Mandsaur	Mandsaur	Rewas ki Magra	(1000)	2	nv	nv	nv	nv	nv	-
Mandsaur	Mandsaur	Seethamou	(30)	2	nv	nv	nv	nv	0	-
Mandsaur	Mandsaur	Suntodh	(150)	1	nv	nv	nv	nv	0	-
Mandsaur	Neemuch		(40)	2	nv	nv	nv	nv	nv	-
Ratlam	Jaora	Ringnod	(50)	2	3	nv	4	nv	0	-
Ratlam	Jaora	Kataliya	na	-	3	(4)	nv	nv	nv	-
Ratlam	Jaora	Jhalwa	(200)	-	3	-	nv	nv	nv	-
Ratlam	Jaora	Sherpur	-	-	nv	(20)	nv	nv	nv	-
Ratlam	Jaora	Near Polytechnic	na	2	(2)	nv	nv	nv	2	-
Ratlam	Jaora	Agra (Bal kheri)	(50)	(2)	nv	nv	nv	nv	nv	-
Ratlam	Jaora	Sugar mill	30	2	nv	nv	nv	nv	nv	-
Ratlam	Pipartoda	Naulakha	(100)	2	nv	nv	nv	nv	6	-
Ratlam	Sailana	Naulakha	354	1,2	9	15	12	11	6	2
Ratlam	Sailana	Hazariya	(90)	2	nv	nv	4-5	2-3	1	-
Ratlam	Sailana	Opp. Hazariya	(100)	2	nv	nv	nv	nv	1	-
Ratlam	Sailana	Davaikheda	(50)	2	nv	nv	nv	nv	3	-
Ratlam	Sailana	Nancha bheed	(75)	2	nv	(5)	3	1	3	-
Ratlam	Sailana	Dhamnod bheed	(200)	2	nv	nv	2	0	4	-
Ratlam	Sailana	Pallia	(50)	2	nv	nv	2	nv	nv	-
Ratlam	Sailana	Hamirpada &	(100)	2	nv	nv	1	0	1	-
		Tajpuria								
Ratlam	Sailana	Badshah ki	(150)	2	nv	4	6	0	0	-
		bheed & Shikarwadi								
Ratlam	Sailana	Beyond Badshah	na	2	nv	nv	2	nv	nv	-
		ki bheed								

District	Taluk/ Village	Grasslands		No. of floricans reported in									
		Name	area ha.	Own.	1982	1984	1986	1989	1994	♂	♀	R♂	R♀
Madhya Pradesh contd...													
Ratlam	Sailana	Khariya	(100)	2	nv	nv	nv	nv	5	1	-	-	-
Ratlam	Sailana	Ambha, Daulatpura, Sheopur	(500)	1,2	nv	5	12	9	7	5	1	1	1
Ratlam	Sailana	Besa Dabar	(50)	2	nv	nv	nv	nv	4	0	-	-	-
Ratlam	Nawabganj	Rati Talai	150	2	nv	nv	nv	nv	nv	1	-	-	-
Ratlam	Ratlam	Aamlipada	1400	2	nv	nv	nv	nv	nv	13	-	-	-
Ratlam	Ratlam	Ghoshala	640	2	nv	nv	nv	nv	nv	2	-	-	-
Ratlam	Ratlam	Karamdi Mali	(400)	1	nv	nv	nv	nv	nv	2	1	-	-
Jabhua	Tarkhedi	Thakur Sajjan	na	2	5	4	(11)	4(9)	3	1	-	-	-
Jhabua	Thandla	Singh's land	(400)	1	nv	nv	nv	nv	0	nv	-	-	-
Dhar	Sardarpur	Semalpada 17 km on	(100)	1	nv	nv	nv	2	nv	nv	-	-	-
Dhar	Sardarpur	Ratlam road	(800)	1,2	9	9	nv	7	10	1	1	4	0
Dhar	Sardarpur	Chadawat											
Dhar	Sardarpur	Dhulat, Rajabheda											
Dhar	Sardarpur	Karnawat, Piparni											
Dhar	Sardarpur	Panpura	2700	1	0	0	nv	0(2)	3	5	0	10	-
Dhar	Sardarpur	Morpipli	(400)	1	nv	nv	nv	nv	nv	nv	-	4	-
Dhar	Sardarpur	Gumanapura		2	1	nv	nv	nv	nv	nv	-	-	-
		Plantation		1	(2)	nv	nv	nv	nv	nv	-	-	-
		Holataris		2	(2)	nv	nv	nv	nv	nv	-	-	-
Rajasthan													
Baran	Sangod	Sorson Buld	1000	1,2,3	-	0	0	nv	nv	nv	-	-	-
Kota	Mandane	-	(200)	2	nv	nv	0	nv	nv	nv	-	-	-
		Railgaon Buld	na	2,3	nv	0	nv	nv	nv	nv	-	-	-

District	Taluk/ Village	Grasslands		No. of floricans reported in											
		Name	area ha.	Own.	1982	1984	1986	1989	1994	1999					
										♂	♀	R♂	R♀		
Rajasthan contd....															
Bhilwara	Shahpura	na	na	na	nv	nv	2	nv	nv	nv	-	-	-	-	-
Bhilwara	Sangamer	Kalsane I	(>10)	2	nv	7	0	nv	nv	nv	-	-	-	-	-
Bhilwara		Kalsane II	na	2	nv	0	nv	nv	nv	nv	-	-	-	-	-
Bhilwara	Shahpura	Loolas/Kalsas	>500	2	nv	nv	nv	nv	nv	nv	2	1	-	-	-
Bhilwara	Shahpura	Baldharka	(250)	2	nv	nv	nv	nv	nv	nv	0	0	14	0	0
Bhilwara	Shahpura	Dabla	(250)	2	nv	nv	nv	nv	nv	nv	0	-	-	-	-
Bhilwara	Shahpura	Jamoli	(100)	2	nv	nv	nv	nv	nv	nv	0	0	1	1	1
Tonk	Malpura	Bhoom-ka-bheed/ Dinghara/Rampara	na	2	nv	nv	0	nv	nv	nv	2	0	-	-	-
Ajmer	Naseerabad	Sonkhaliya/Kekri	na	1,2,3	nv	nv	0	nv	nv	nv	4	0	11	0	0
Ajmer	Gagwana	Gagwana	(250)	2	nv	nv	nv	nv	nv	nv	nv	0	0	2-3	2-3
Chittaurgadh	Pratapghad	Basad	(50)	2	nv	nv	nv	nv	nv	0	0	0	-	-	-
Chittaurgadh	Pratapghad	Bajranghad	(100)	2	nv	nv	nv	nv	nv	8	7	1	-	-	-
Chittaurgadh	Pratapghad	Kadiawath	(150)	2	nv	nv	nv	nv	nv	nv	10	1	-	-	-
Chittaurgadh	Pratapghad	Sidpura	(50)	2	nv	nv	nv	nv	nv	nv	6	1	-	-	-
Chittaurgadh	Pratapghad	Mohwdikheda	(50)	2	nv	nv	nv	nv	nv	nv	2	0	-	-	-

Surveys of Gujarat: 1981-Goriup and Karpowicz (1985); 1982-Magrath et al. (1982, 1985); 1989-Sankaran *et al.* (1991); 1994-Sankaran (1994); 1999-This study.

Surveys of M.P. & Rajasthan: 1982-Yahya (1982); 1984, 1986, 1989-Sankaran *et al.* (1991); 1994-Sankaran (1994); 1999-This study.

Key : Area = values in paranthesis approximate;

Own. = Land owned by 1 = Forest Department, 2 = Private, 3 = other agencies (e.g *Ghoushallas* or Revenue land);

1999 - R♂ R♀ = # of male or female reported. If two males were reported and one was sighted, only one male has been noted in this column; nv = not surveyed

Appendix 2

Population estimate of the Lesser Florican

The male Lesser Florican population in 1982, 1989, 1994 & 1999 was estimated from the relation:

$$P_m = T_a * P_g * P_s * D_m$$

where P_m =Male population, T_a =Total breeding range, P_g = Proportion of grasslands in T_a , P_s = Proportion of grassland suitable for Lesser Florican in total grassland area (P_g), D_m = Density of Lesser Florican.

(All areas are in km²)

1. T_a = Total breeding range

Total area of the present breeding range (actual and possible) of the Lesser Florican. Area of districts where floricans are/were/could breed (Source: Manorama Year Book 1989).

Gujarat (19 districts)	196084
Madhya Pradesh (8 districts)	59222
Rajasthan (10 districts)	87218
Total	<u>342524</u>

2. P_g = Proportion of grassland in T_a

Estimated from data available for 3 districts (Jamnagar, Junagadh and Rajkot) in Gujarat (Magrath *et al.* 1983).

Total area of the 3 districts	35935.0
Mean area for each grassland type	
Reserved grasslands (173.17 km ² , n=38)	4.56
Non-reserved grasslands (16.7 km ² , n=9)	1.86
Private grasslands (25.12 km ² , n=22)	1.14
Total no. of grasslands present of each category:	
Reserved grasslands	71
Non-reserved grasslands	198
Private grasslands (estimated)	70

$$\text{Thus } P_g = (4.56*71)+(1.86*198)+(1.14*70)/35935 = 0.0215$$

This was extrapolated over the entire breeding range and a constant grassland area was arrived at:

$$342524 * 0.0215 = 7364.3 \text{ km}^2 \text{ of grasslands within the breeding range.}$$

3. P_s = Proportion of grassland in P_g

on which male Lesser Florican were recorded (Magrath *et al.* 1983).

Out of 219.76 km² of grassland/surveyed in 1982, Lesser Florican were recorded in 56.92 km².

$$\text{Thus } P_s = 56.92/219.76 = 0.26$$

This was extrapolated over the entire breeding range and a constant suitable grassland area for all years was arrived at:

$$= 7364.3 * 0.26 = 1914.72 \text{ km}^2.$$

4. D_m = density of male florican in each year

1982: 65 males in 56.92 sq.km. of grassland = 1.142/km².

Thus, over entire breeding range = 1.142*1914.72 = 2187 males.

1989: 90 males seen/reported in 206.26 sq. km = 0.436/km²

Thus over entire breeding range = 0.436*1914.72 = 836 males.

1994: 161 males seen/reported in 279.48 sq. km = 0.576/km²

Thus, over entire breeding range = 0.576*1914.72 = 1103 males.

1999: 303 males seen/reported in 328.61 km² = 0.922/km²

Thus, over entire breeding range = 0.922*1914.72 = 1765 males

Limitation of the estimate

- a) This estimate is based on the extent of grassland habitat within the breeding range. It has been extrapolated based on data available for 3 districts (Magrath *et al.* 1983) Thus the accuracy of this estimate depends on whether or not data in Magrath *et al.* (1983) is complete.
- b) Not all the males in a grassland were seen during the survey. Our estimate assumes that 100% were seen, thus underestimating the population.
- c) The majority of the survey sites were protected grasslands. Floricans breed in crop fields also, and this has not been accounted for in the estimate.
- d) There has been a significant loss of habitat between 1982 and 1999. This loss in habitat has not been taken into consideration during analysis and the value for suitable habitat in 1982 has been used in 1999 as well. Thus, this would result in an overestimation of the population.