

PRESENT DISTRIBUTION AND STATUS OF RAPTORS IN MOROCCO

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ABSTRACT

At the present time, the raptor population of Morocco is as follows: 25 breeding species, 3 regular wintering species (*Buteo buteo*, *Circus cyaneus*, *Falco columbarius*) and one migratory species (*Fernis apivorus*). Three former breeding species are now extinct as such and are only seen occasionally (*Aquila heliaca*, *Torgos tracheliotus*, *Aegypius monachus*). Finally, three species only reach the country extremely rarely (*Aquila clanga*, *Circus macrourus*, *Falco vespertinus*).

Preliminary distribution maps are presented, based on the first results obtained by the Moroccan Breeding Atlas enquiry and the records registered after 1975 by the Centrale Ornithologique Marocaine.

A detailed table gives past and present status and also the reasons for the decline of breeding species. Several species have declined, although all birds of prey are legally protected in Morocco. The main reasons for this decline are direct hunting, destruction of nests and breeding sites, and the use of pesticides (strychnine officially and regularly used to destroy 'carnivorous mammals'). Tourism and disturbance affect only coastal species.

INTRODUCTION

Following a pattern familiar in many other countries, the avifauna of Morocco has become much reduced since the beginning of the twentieth century and this decline has been particularly pronounced among the *Falconiformes*. It is nevertheless difficult to trace its stages, since the ornithological literature on Morocco is very sparse up to 1950 (Lynes; Hartert, etc.) and chiefly concerned with accounts of travels. It was only after 1950 that sustained and thorough studies were made, notably by Brosset, Olier, de Naurois, Valverde and, above all, the major work of Heim de Balsac & Mayaud (1962) which embodies the full state of knowledge at that time. Since then, new surveys have been made (Pineau & Giraud-Audine), but none specifically concerned with falconiform populations. The summary presented here has been made possible largely through data, mainly unpublished, supplied by collaborators of the Centrale Ornithologique of the Scientific Institute of Rabat. We take this opportunity to extend to them our warmest thanks.

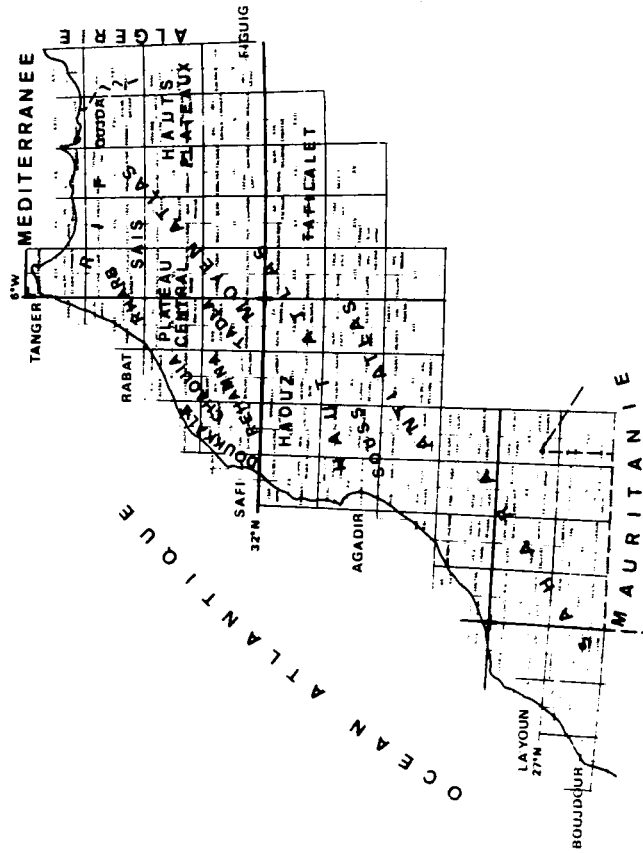


Figure 1. Morocco, showing location of principal regions mentioned in the text.

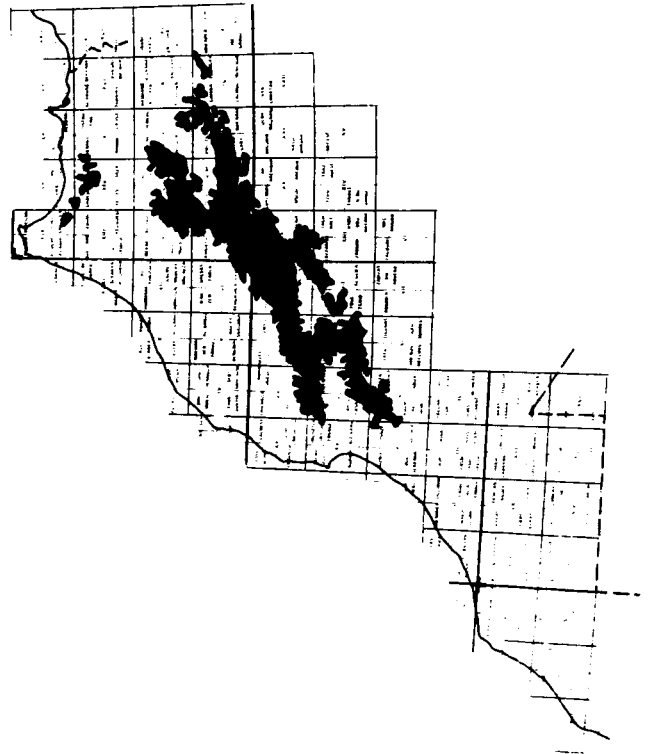


Figure 2. Morocco, showing highland regions at elevations greater than 1500 metres.

THE RAPTOR POPULATIONS

Twenty-nine species are regularly seen in Morocco, of which twenty-five breed, three are regular winter visitors (*Buteo buteo*, *Circus cyaneus*, *Falco columbarius*), and one is a passage migrant (*Pernis ptilorhynchus*).

Three species which formerly bred there are now extinct as breeding species and are seen only occasionally (*Aquila heliaca*, *Torgos tracheliotus*, *Aegypius monachus*). Finally, three others occur only extremely rarely (*Aquila clanga*, *Circus macrourus*, *Falco vespertinus*).

DISTRIBUTION AND STATUS

The maps presented at the end of this paper are based on the initial information obtained by the 'Atlas of Breeding Birds of Morocco' enquiry. They indicate the present distribution of breeding species north of the 27th degree of latitude north (Figure 1). The symbols used diminish in size according to whether the breeding status is certain, probable or likely. The 'squaring' corresponds to the divisions of the topographical map, scale 1:100,000, each rectangle representing approximately 48km x 54km. The status of each species is given briefly below.

Osprey (*Pandion haliaetus*)

About 20 pairs still breed on the Mediterranean coast (Berthon & Duhautes, pers. comm.). Also strongly suspected of breeding on the Atlantic coast, at least occasionally, in a few places: Merdja de Sidi bou Rhaba (Thévenot 1976), Oued Tinkert (pers. obs.), Oued Massa (Doubois 1979; pers. obs.), but this has never been proved.

A spring and autumn migrant, with a few birds regularly remaining to winter in suitable areas, both on the coast and inland. The nine recoveries obtained in Morocco originated in Scandinavia (eight from Sweden and one from Finland).

Red Kite (*Milvus milvus*)

One of the raptors about which there is least information. In particular, no recent proof of breeding. However, there is no doubt that this kite, albeit in reduced numbers, still inhabits the forests of the Rif, pre-Rif and western Middle Atlas. During the breeding season it has, moreover, been observed on several occasions in eastern Morocco, the Central Plateau and central High Atlas.

Black Kite (*Milvus migrans*)

Widespread and locally common in all suitable biotopes in the north, extending even to zones bordering the desert. Earliest arrivals appear at the beginning of February, but the majority arrive between March and May, and again between August and October. Recoveries include 30 birds from Switzerland, 8 from France, 6 from Germany and 4 from Spain. It winters very rarely, the five birds recovered in January being early migrants. It is very probable that the flocks of several dozen birds seen in June and July, chiefly in the Middle Atlas, are made up of immatures, as indicated by the 12 recoveries covering this period (nine 1st-year birds and three 2nd-year).

Black-shouldered Kite (*Elanus caeruleus*)

Its distribution is fragmented into three separate regions: the triangle formed by Casablanca-Fez-Tangier, Haouz, and Sous. Never very common: in the hinterland from Casablanca, there is only one pair per 50km², despite the fact that its territory averages only 400ha. The reason for this probably lies in its very limited

breeding success, combined with a conspicuous appearance which makes it particularly vulnerable (Bergier, in press).

Short-toed Eagle (*Circaetus gallicus*)

Map 5
Widespread in all wooded mountain areas north of the pre-desert zones; apparently rarer south of the High Atlas. The first birds are seen at the end of February and the last in mid-October. During winter a few individuals are occasionally seen in the south of Morocco.

Sparrowhawk (*Accipiter nisus*)

Map 6
Breeds in the High and Middle Atlas, the Rif, the Central Plateau and the woods of the north Moroccan plains, where it seems reasonably frequent. However, it is not often seen in spring, probably because of its retiring habits. There are considerably more sightings in autumn and above all in winter, when a large contingent of immigrants arrives from Europe (recoveries of two from Germany and one from Switzerland).

Goshawk (*Accipiter gentilis*)

Map 7
A very rare breeder, confined to the pre-Rif forests of the Tangier peninsula (Maes 1978) and possibly the northern Middle Atlas. A few dozen birds cross the Straits of Gibraltar, but the species is rarely seen outside its potential breeding range; it is then chiefly encountered in the north Atlantic plains.

Chanting Goshawk (*Melierax metabates*)

Map 7
Restricted to at most a few dozen pairs in the Sous plain. They are threatened by the degradation of the argan tree plantations which form part of the habitat. Remarkably the only sightings outside the breeding area have been confined to the north, near Tangier (Pineau & Giraud-Audine 1979), and the region of Oujda (Leconte in Thévenot *et al.* 1982).

Long-legged Buzzard (*Buteo rufinus*)

Map 8
One of the commonest raptors in Morocco. Resident and widespread throughout the country up to an elevation of about 2500m.

Bonelli's Eagle (*Hieraetus fasciatus*)

Map 9
Retiring by nature, this eagle is as a rule seldom seen. It is, however, widespread, from the Mediterranean to the pre-desert regions, where it occupies most suitable biotopes. Its status has probably altered little over the past 20 years, since the pairs observed by Brosset and de Naurois have recently been verified.

Booted Eagle (*Hieraetus pennatus*)

Map 10
Equally at home in rocky or forest habitats, this species is locally relatively common in the northern High Atlas and does not exist south of this range except in the Sous plain. The first birds appear at the beginning of March, the last being seen at the end of October. A few scattered individuals are regularly observed wintering in some favourable biotopes such as the Palmeraie of Marrakesh.

Golden Eagle (*Aquila chrysaetos*)

Map 11
Still widespread throughout the country, from Tangier district to the Sahara, but far less in density than Bonelli's Eagle. Found at altitudes up to at least 3000m, it also occurs at sea level if the terrain is sufficiently mountainous (rocky canyons etc.). All known breeding sites are on rock-faces; tree-nesting has not been reported for a long time.

Steppe Eagle (*Aquila rapax*)

Map 12
Formerly found in the wooded or semi-wooded zones of a large part of Morocco down to the Mediterranean coast, as borne out by Heim de Balsac & Mayaud (1962) and the skins in the collection of the Scientific Institute. Today this eagle seems to occur only in regions south of the High Atlas, particularly Sous, where the only two recent cases of breeding occurred. There are only four records to the north of the High Atlas for the 1970s and it is feared that the small remaining population is declining, due to the rapid development of their breeding areas, notably the argan tree plantations.

Egyptian Vulture (*Neophron percnopterus*)

Map 13
Widespread throughout Morocco but at much lower density than the abundance of food would permit, especially from traditional stock farming. The species is wholly migratory, the first birds arriving in mid-February and the last being seen in October. None remains to winter.

Bearded Vulture (*Gypaetus barbatus*)

Map 14
As in other North African countries, the range of the Bearded Vulture has shrunk: today the species is probably extinct in the Rif, the Central Plateau and most of the Middle Atlas. It only still occurs, in reduced numbers, in the High and Anti-Atlas, and possibly in the mountains of Figuig province.

Griffon Vulture (*Gyps fulvus*)

Map 15
Even though this bird can be seen in spring in most parts of Morocco, its colonies are very few and comprise in all less than 100 pairs. Most of those known a few decades ago are no longer to be found. The present breeding sites are confined to the east of Morocco, the Rif, the Central Plateau, the Middle Atlas and Sous. Many of the birds seen probably come from Spain, since the passage of some 1000 individuals across the Straits of Gibraltar in autumn has been established. There have also been three cases of birds ringed as nestlings in the provinces of Huesca and Terruel (Spain) and recovered 18 months later at Timhadit (Middle Atlas), Taroudant (Sous) and Jebel Moussa (Tangier).

Marsh Harrier (*Circus aeruginosus*)

Map 16
In Morocco the subspecies *harterti* is not exclusively confined to wetlands and may nest in sites far from water (Giraud-Audine & Pineau 1974). It is local in the great plains and neighbouring regions in the north; also in the eastern coastal marshes and a few places in the Middle Atlas. In autumn and spring the country is traversed by migrants from Europe, a fair number of which stay to winter, as shown by recoveries of ringed birds: 9 from Germany, 4 from Holland, 1 from Denmark, 1 from Britain and 1 from Poland, recovered between September and April.

Montagu's Harrier (*Circus pygargus*)

Map 17
Apparently confined to the Atlantic coastal plains in the north, and the Mediterranean marshlands in the east. Since the wet zones which it formerly frequented have considerably diminished, it now often nests in cornfields, where mechanized harvesting destroys a fair number of broods, probably accelerating the decline already noted several decades ago. The species is wholly migratory and is seen in Morocco only between mid-March and the end of September.

Lanner Falcon (*Falco biarmicus*)

Map 18
Well distributed through the desert and pre-desert regions, on the high plateaux of eastern Morocco and in the plains and plateau of the Atlantic Atlas.

Réhamna, etc.). It also occurs in the north, but in smaller numbers. In wooded areas it is local and hardly ever strays above 1500m. in the mountains.

Peregrine Falcon (*Falco peregrinus*)

Map 19

Barbary Falcon (*Falco 'pelegrinoides'*)

We assign to the race *F. peregrinus brookei* all birds breeding north of the pre-desert zones, and to the subspecies *F. 'pelegrinoides'* those breeding in the south of the High Atlas. *F. brookei* is a sturdy bird, with or without a red nuchal streak, identical to those found in southern Europe. *F. 'pelegrinoides'* is visibly much smaller, intermediate between Peregrine and Kestrel, and with a red nuchal streak; the back is dark grey, the breast a pale buff, barely flecked with black. The two races are sympatric on coastal cliffs near Tiznit, whilst the status of the birds of Sous is as yet undetermined.

F. brookei is still very common within its range, and widespread from sea level to at least 2100m. The status of '*pelegrinoides*' is much less clear, the difference between these two races having only been recently established, and further study is needed. So far as we know, it does not seem to be very common.

Eleonora's Falcon (*Falco eleonorae*)

Map 21

The only two Moroccan colonies, situated on the Atlantic coast, today total about 75 pairs (Thévenot *et al.* 1981). The colony at Essaouira comprises 45 pairs (200 in 1958); for the past few years it has been guarded, which gives hope for stabilization, even an increase in numbers. The colony at Salé numbers about 30 pairs (c. 70 in 1970) but it appears doomed to disappear in the near future due to the urban sprawl of Rabat-Salé. Wholly migratory, the birds arrive at the end of April and depart in early November.

Hobby (*Falco subbuteo*)

Map 22

A locally common breeder, particularly in the forests of the northern plains, the Rif and the Middle Atlas. It possibly still nests in eastern Morocco, as several authors have stated, but this region has not been recently investigated. On the other hand, it has not been found in the High Atlas. A few rare specimens are seen in winter, but most birds are only present between mid-April and mid-September.

Lesser Kestrel (*Falco naumanni*)

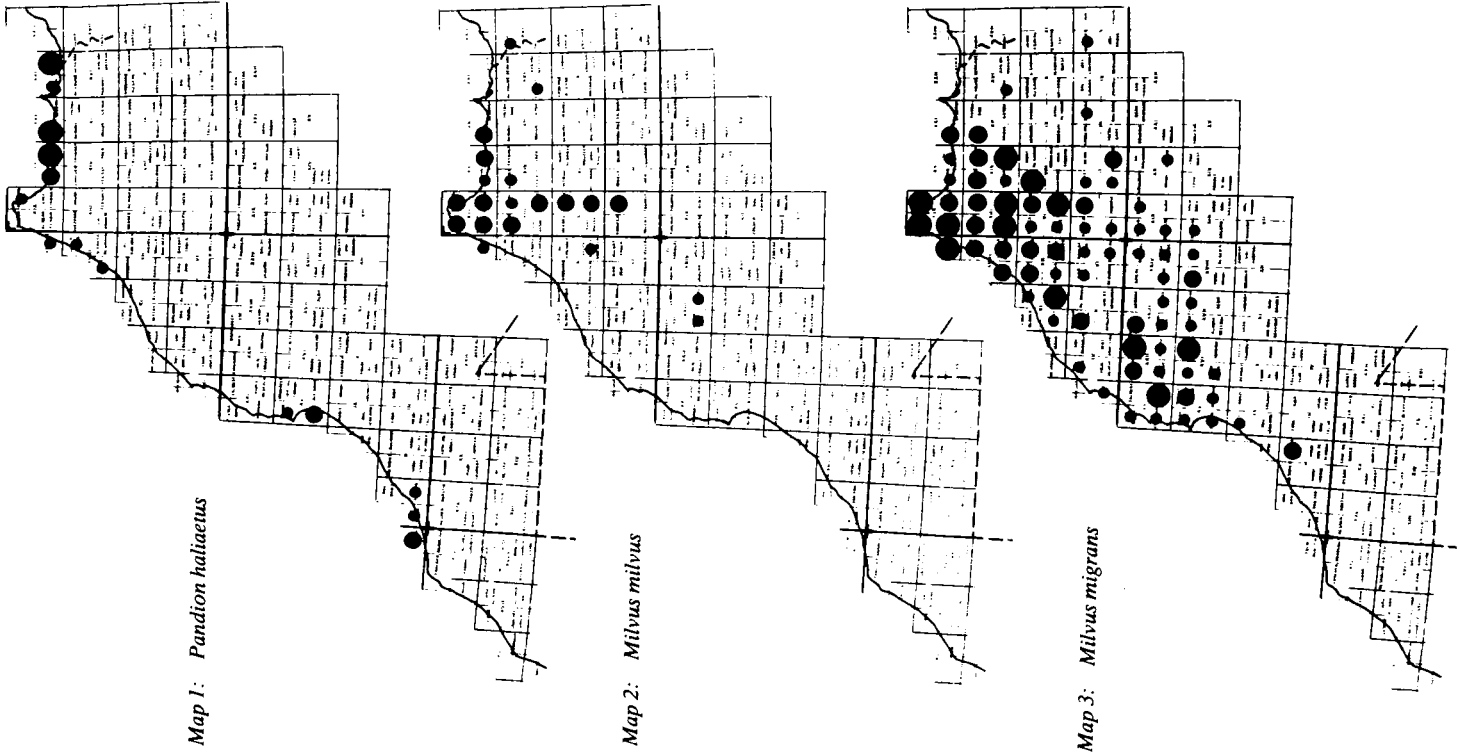
Map 23

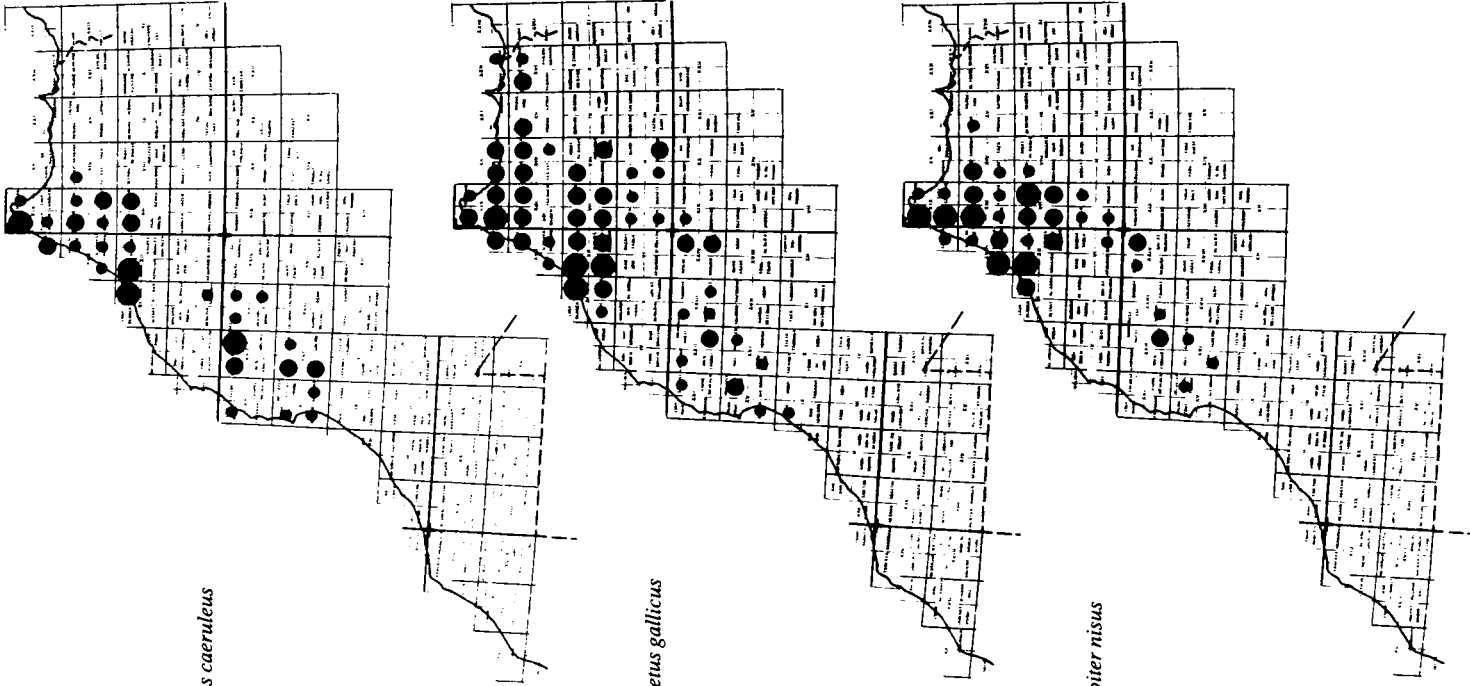
Does not appear to breed south of the High Atlas and, if one excepts the Atlantic coastal zone, shows a strongly increasing density from south to north. Although certain colonial sites have been recently abandoned, chiefly due to repeated disturbance and the rebuilding of old walls, this falcon still occurs in substantial numbers. A small part of the population winters, but most migrate in September; their return may be very early, starting in January.

Kestrel (*Falco tinnunculus*)

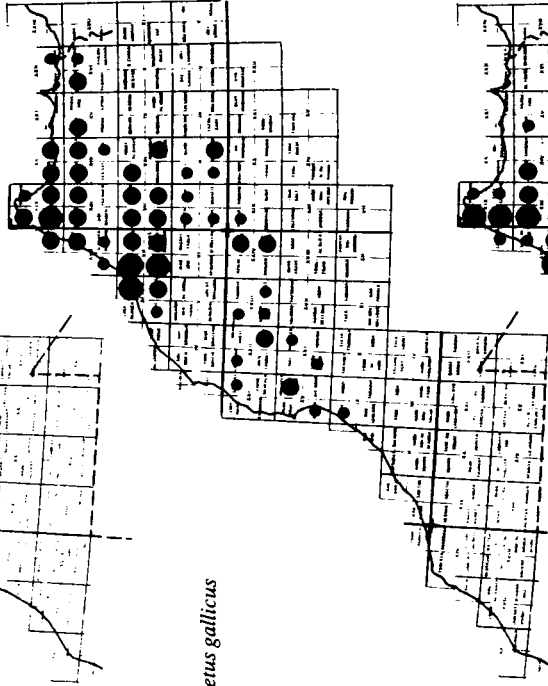
Map 24

The commonest and most widespread raptor in Morocco. It nests from the coastal cliffs up to at least 2600m, and is widespread over the pre-desert regions. It may on occasion form compact colonies of several dozen pairs (maximum known: >50), an exceptional occurrence for this species. In autumn in addition, a flood of migrants from Europe fly in (recoveries: 14 from Holland, 5 from France, 5 from Switzerland, 3 from Spain, 2 from Denmark, 2 from Finland, 2 from Britain, 1 from Germany, 1 from Belgium and 1 from Sweden) and these have been found even in Sous, but the species is known to cross the desert.

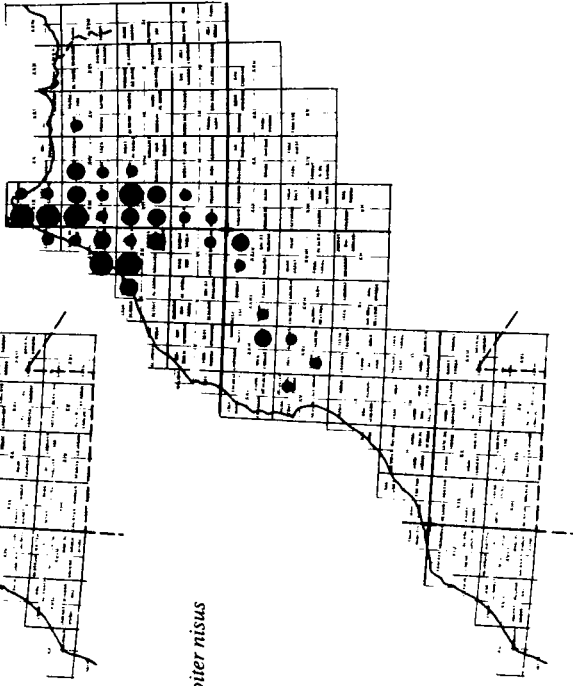




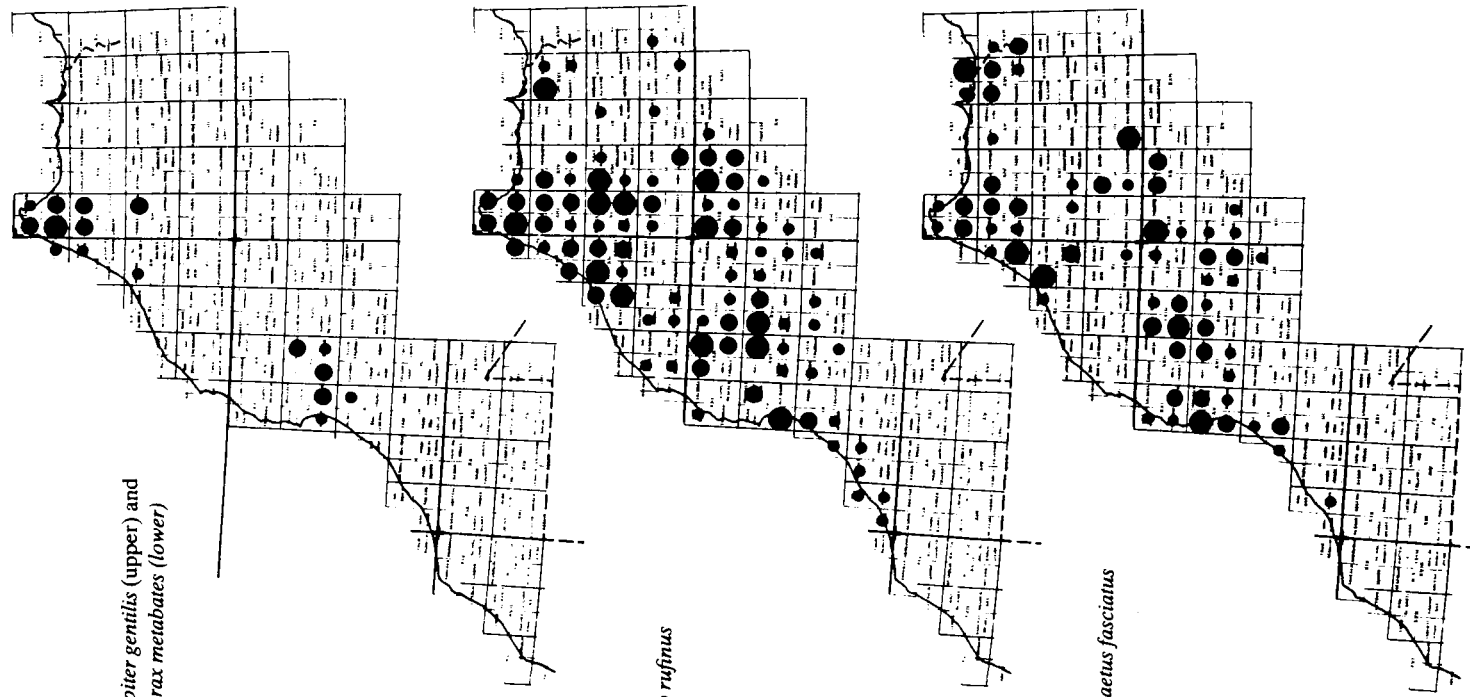
Map 4: *Elanus caeruleus*



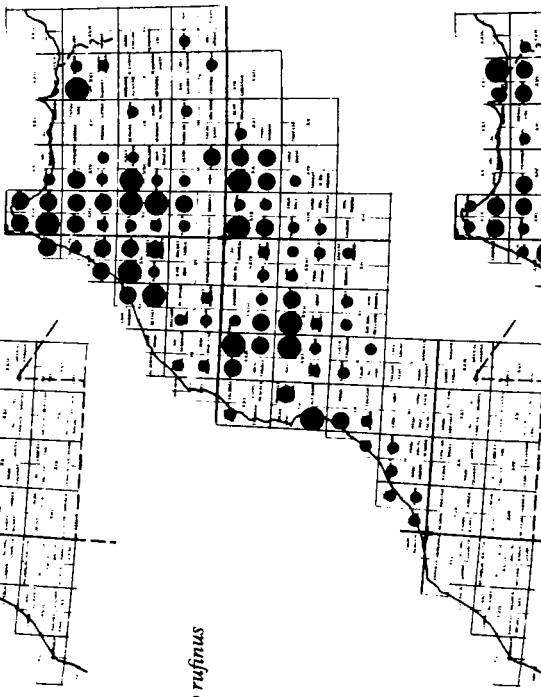
Map 5: *Circaetus gallicus*



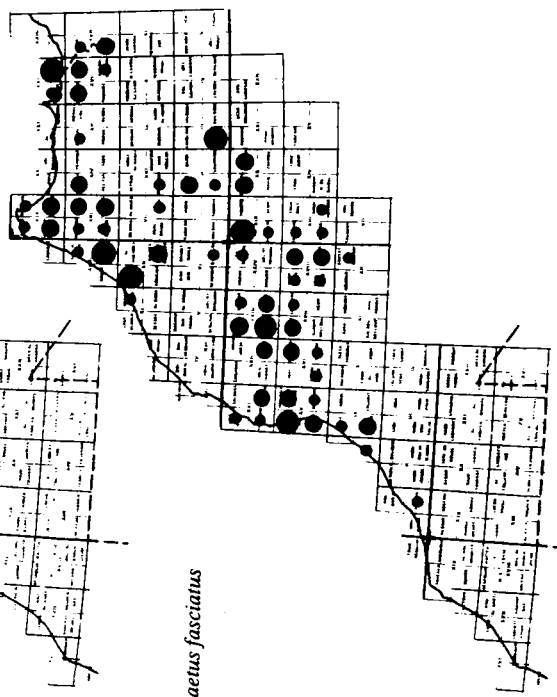
Map 6: *Accipiter nisus*



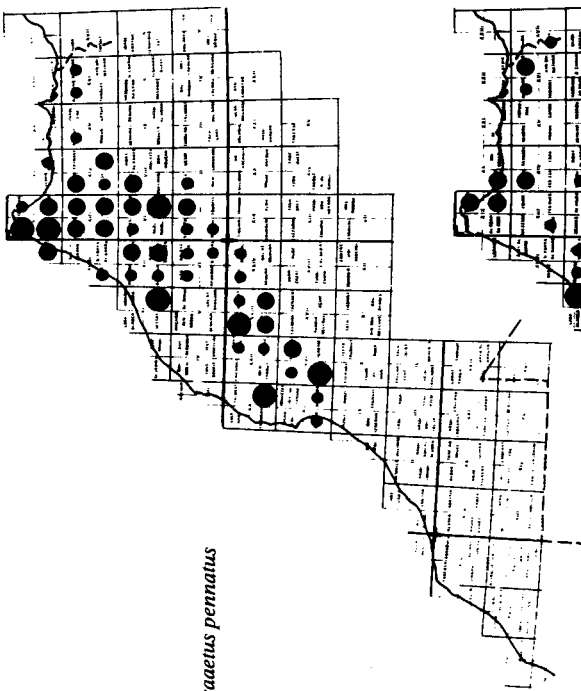
Map 7: *Accipiter gentilis* (upper) and
Mellerax metabates (lower)



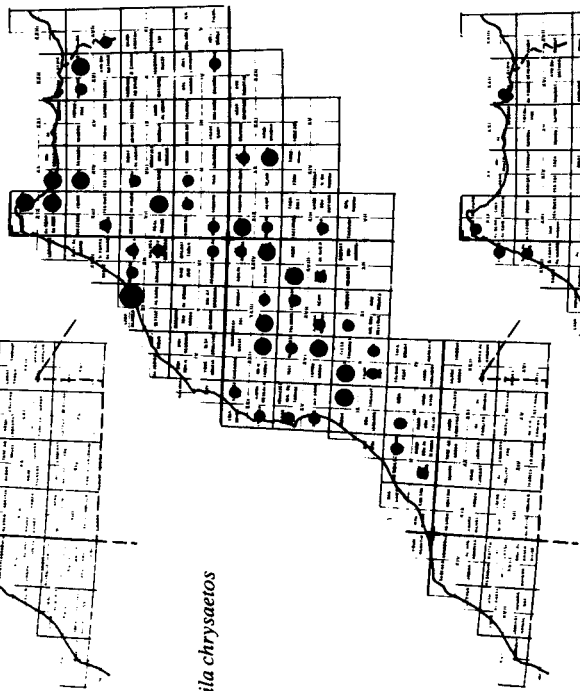
Map 8: *Buteo rufinus*



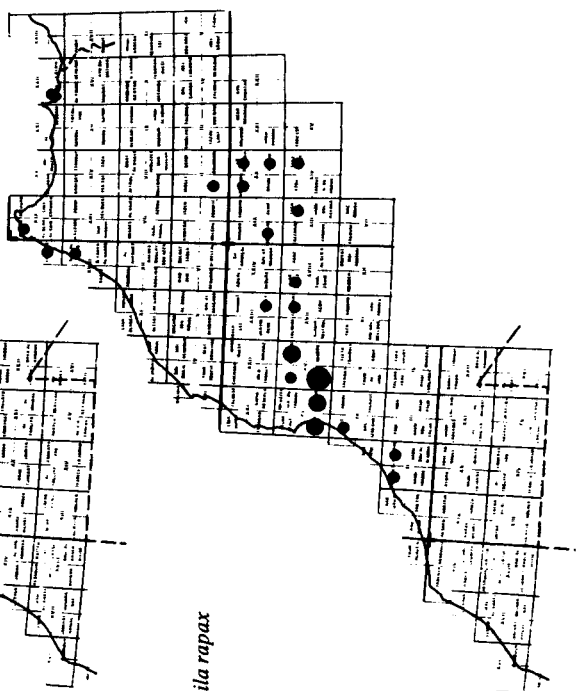
Map 9: *Hieraaetus fasciatus*



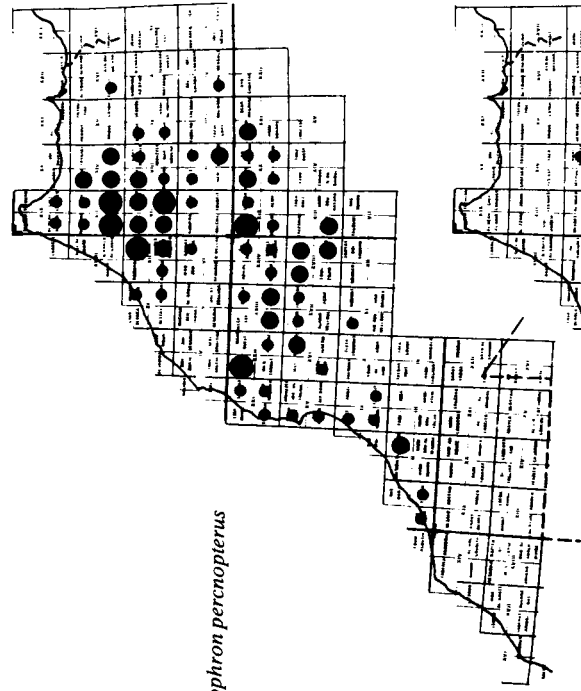
Map 10: *Hieraaetus pennatus*



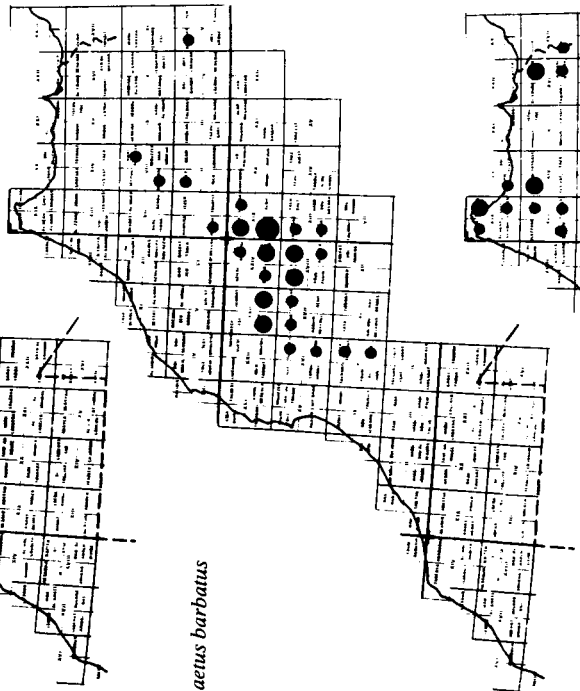
Map 11: *Aquila chrysaetos*



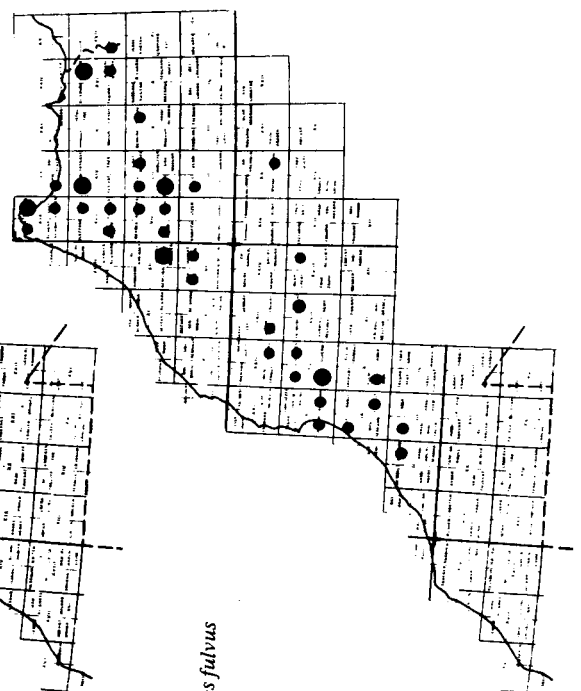
Map 12: *Aquila rapax*



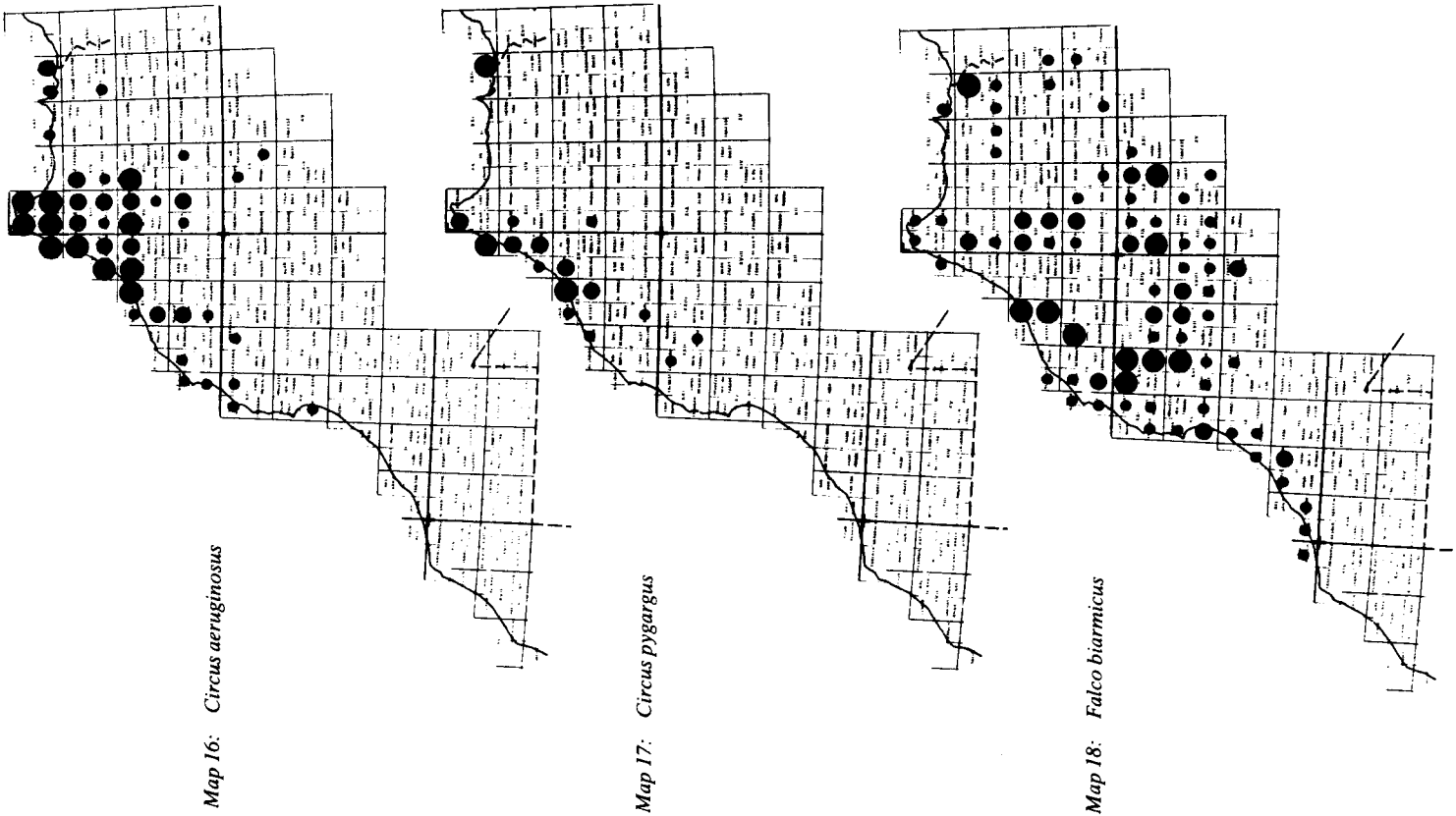
Map 13: *Neophron percnopterus*



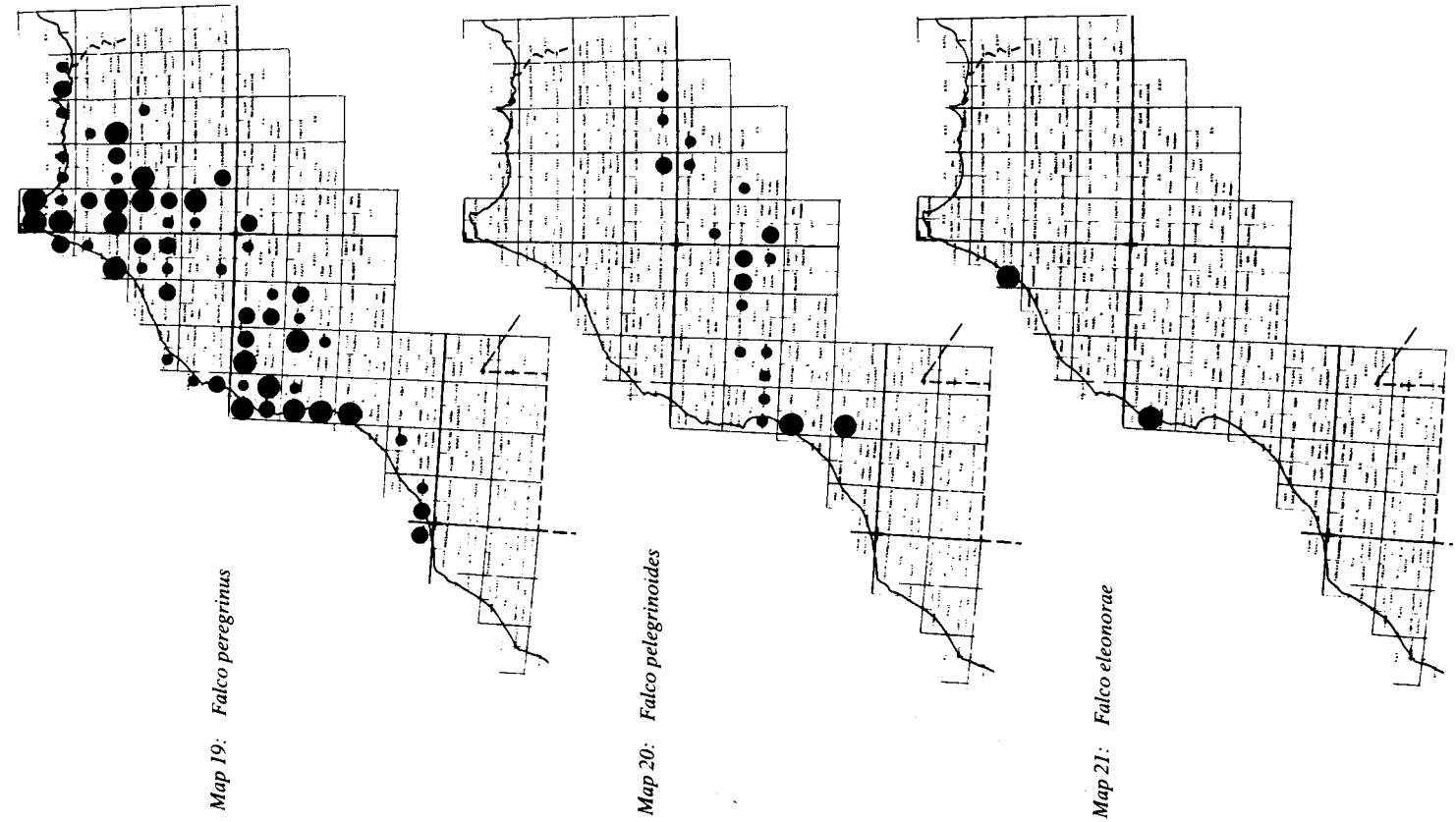
Map 14: *Gypaetus barbatus*



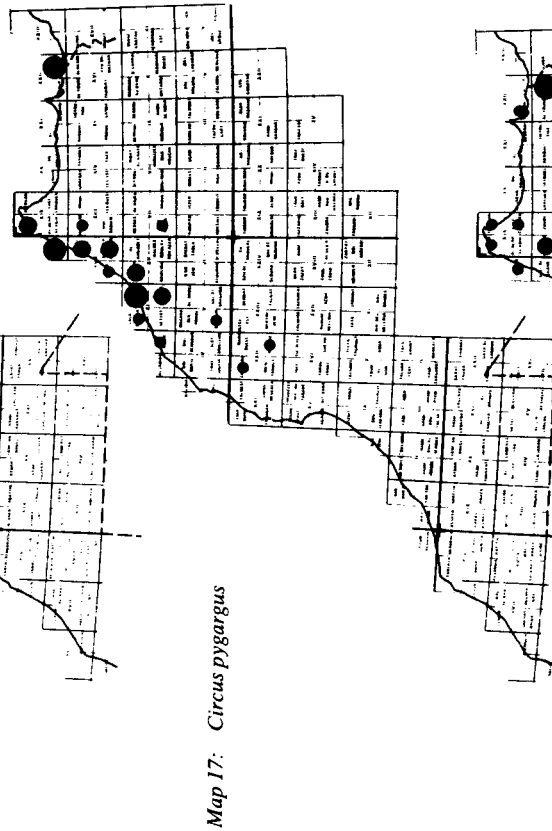
Map 15: *Gyps fulvus*



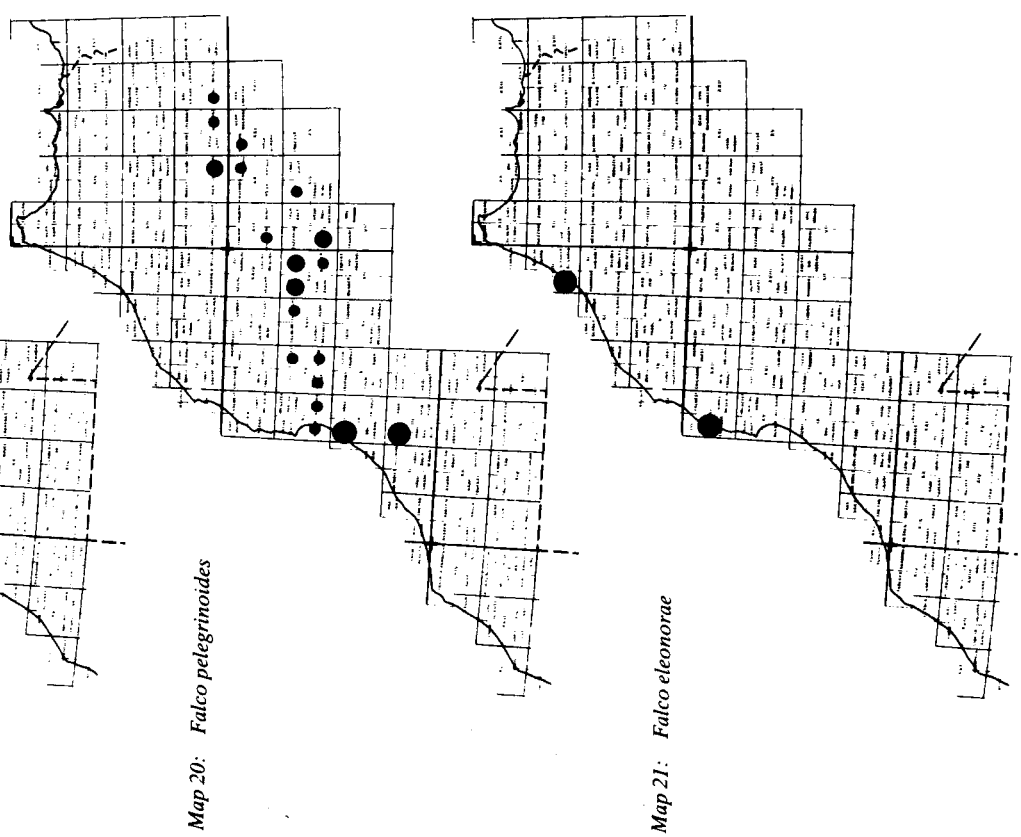
Map 16: *Circus aeruginosus*



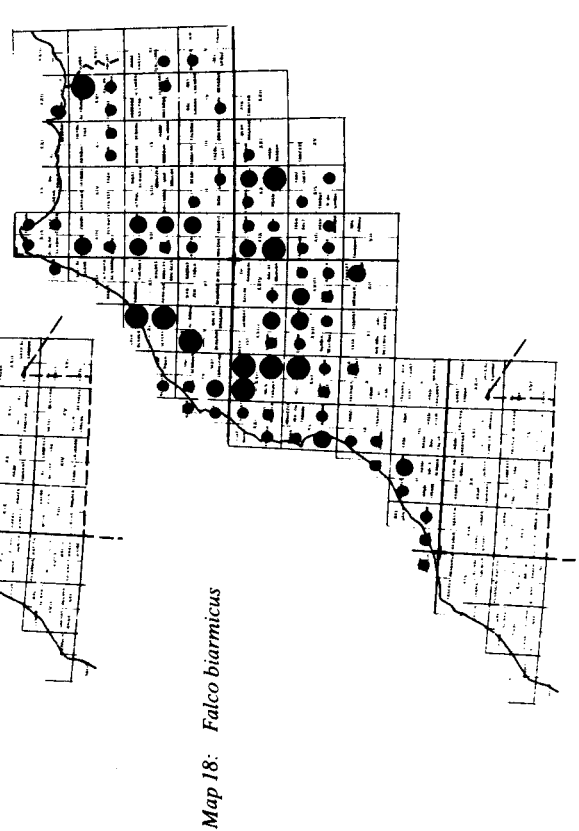
Map 19: *Falco peregrinus*



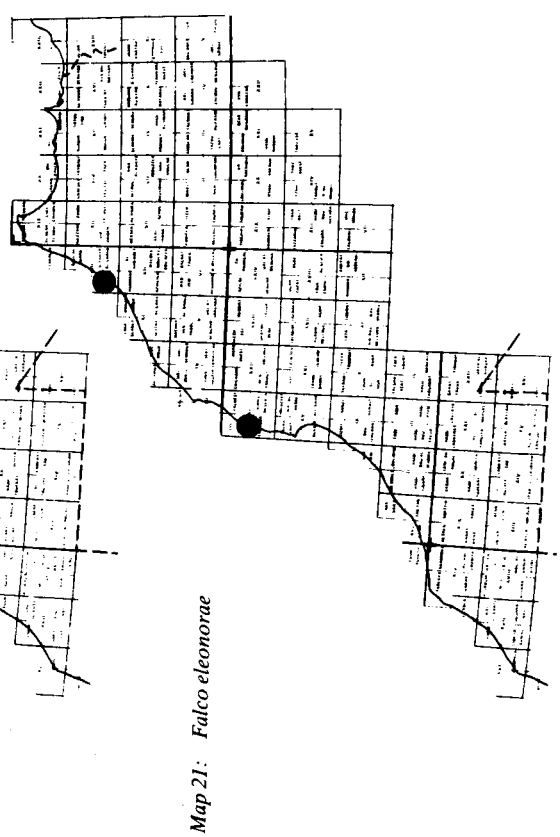
Map 17: *Circus pygargus*



Map 20: *Falco pelegrinoides*



Map 18: *Falco biarmicus*



Map 21: *Falco eleonorae*

Table 1: Status of breeding Falconiformes in Morocco.

Key: Present status and status before 1945: 1 = in danger of extinction; 2 = threatened; 3 = rare; 4-5 = little known; 6-7 = frequent; 8-9 = common; 10 = abundant.
 Factors causing decline: 1 = transformation of the biotope; 2 = toxic chemicals; 3 = direct killing; 4 = tourism and disturbance; 5 = shortage of food.
 Extent of Knowledge: 0-2 = very little known; 3-4 = little known; 5-6 = well known; 7-8 = very well known; 9-10 known in depth.

Species	Present status	Status before 1945	Factors causing decline	Estimated no. of pairs	Extent of knowledge
<i>Pandion haliaetus</i>	2	3	3, 4	20-25	5
<i>Milvus milvus</i>	2	4	1, 3	10-100	2
<i>Milvus migrans</i>	8-9	8-9	2, 3	>1,000	6
<i>Elanus caeruleus</i>	4-5	5	3, 4	100-500	7
<i>Circus galliscus</i>	6-7	7-8	1, 3	>1,000	5
<i>Accipiter nisus</i>	5	6	1, 3	500-1,000	4
<i>Accipiter gentilis</i>	2	3	1, 3	10-100	6
<i>Melierax metabates</i>	2	3	1, 3	10-100	4
<i>Buteo rufinus</i>	8-9	9-10	2, 3	>1,000	5
<i>Hieraetus fasciatus</i>	5	6	3, 4	500-1,000	6
<i>Hieraetus pennatus</i>	6	7	1, 3	500-1,000	5
<i>Aquila chrysaetos</i>	4	6-7	2, 3	100-500	5
<i>Aquila rapax</i>	2	4-5	1, 3	10-100	4
<i>Neophron percnopterus</i>	5	6-7	2, 3	500-1,000	5
<i>Gypsaetus barbatus</i>	2	5	2, 3	10-100	3
<i>Gyps fulvus</i>	1	4	2, 3	10-100	3
<i>Circus aeruginosus</i>	5	6	1, 3	100-500	7
<i>Circus pygargus</i>	2	5	1, 3	100-500	5
<i>Falco biarmicus</i>	6-7	7	2, 3	>1,000	5
<i>Falco peregrinus</i>	6-7	7	2, 3	>1,000	5
<i>Falco pelegrinoides</i>	4	?	?	>1,000	5
<i>Falco tectorius</i>	1	2	1, 3, 4	75	9
<i>Falco subbuteo</i>	5	6	1, 3	500-1,000	4
<i>Falco naumanni</i>	6	7	1, 3, 4	>1,000	5
<i>Falco tinnunculus</i>	10	10	3	>1,000	6

In conformity with what has been published elsewhere (Urban & Brown 1971; Brown 1977; Meyburg & Meyburg 1981), Table 1 gives the status and present extent of knowledge of the Falconiformes of Morocco. The values of the variables Present Status, Status before 1945, and Factors causing Decline, are identical with those given by Meyburg & Meyburg (1981). The assessment of extent of knowledge combines information given by Meyburg & Meyburg (1981) (habits, behaviour, breeding rate, etc.) with the precise knowledge of status in Morocco (geographical distribution, number of pairs, etc.).

STATUS OF MIGRATORY AND/OR WINTERING SPECIES

This section excludes those migratory species which nevertheless leave behind a breeding population in Morocco. The status of these species has been indicated in the preceding section and their migrations are summarized in Table 2.

Buzzard (*Buteo buteo*)

Some 3000-5000 birds cross the Straits and spread out through Morocco north of the High Atlas. Exceptionally, a few individuals reach the pre-desert zones: one bird from Finland was recovered at Goulmine. The majority of wintering birds appear to belong to the nominate race, but a few individuals of the subspecies *vulpinus* reach this far: one ringed on migration in Spain was recovered near Oujda; another, ringed at Cap Bon (Tunisia) on 22 May 1968, was recovered near

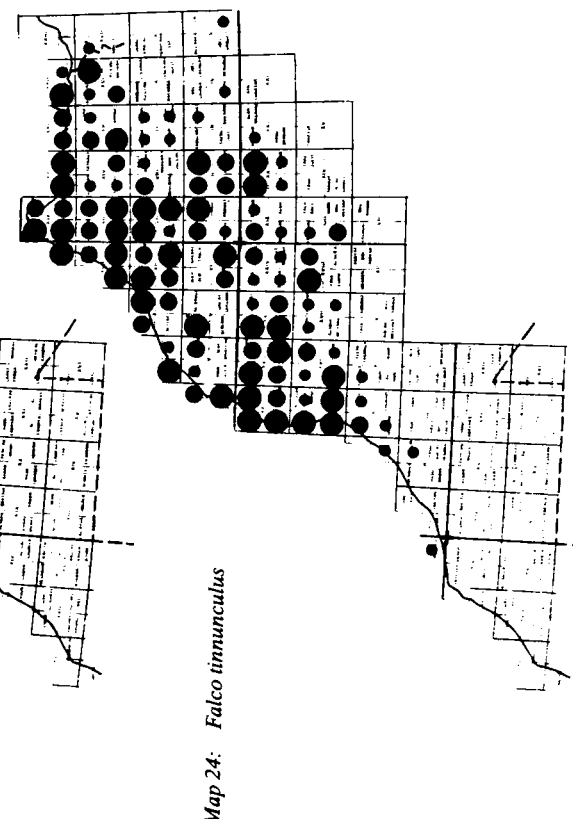
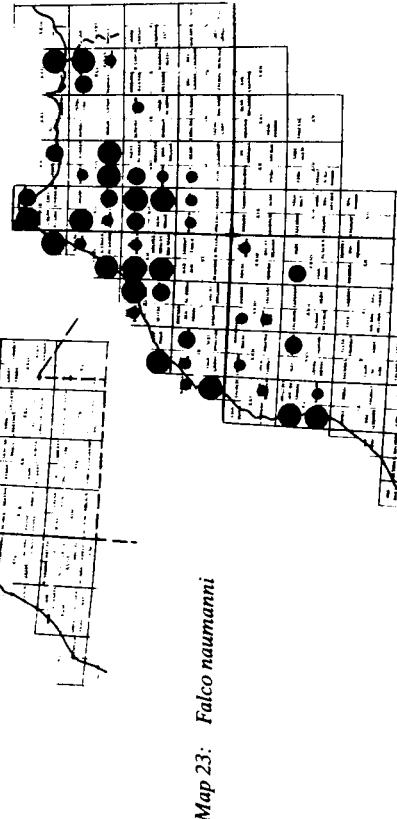
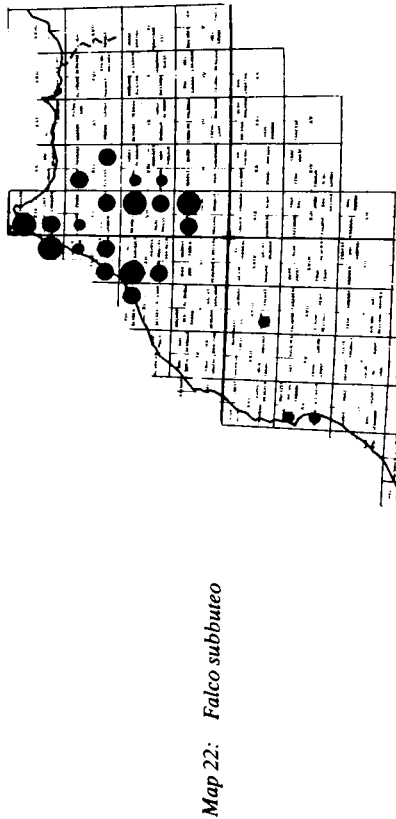


Table 2: Migrants: date of passage and numbers at the Straits of Gibraltar (after Pineau & Giraud-Audine 1979).

Species	Number of birds crossing the Straits in autumn	Dates of passage	
		Spring	Autumn
<i>Pandion haliaetus</i>	50-100	15.3-30.5	16.8-28.10
<i>Milvus milvus</i>	100-150	25.2-5.6	15.8-20.11
<i>Milvus migrans</i>	30,000-50,000	5.2-5.6	22.7-3.11
<i>Circus gallicus</i>	5,000-10,000	26.2-2.6	12.8-6.11
<i>Accipiter nisus</i>	700-1,000	22.2-5.5	22.8-20.11
<i>Accipiter gentilis</i>	30-50	1.3-30.4	10.9-27.10
<i>Buteo buteo</i>	3,000-5,000	27.2-5.6	12.8-28.11
<i>Pernis apivorus</i>	60,000-120,000	2.4-23.6	7.8-23.10
<i>Hieraaetus pennatus</i>	10,000-16,000	1.3-9.6	21.7-23.10
<i>Neophron percnopterus</i>	3,000-5,000	22.2-15.5	28.7-20.10
<i>Gyps fulvus</i>	700-1,000	28.2-16.6	12.7-19.11
<i>Circus aeruginosus</i>	200-400	25.2-8.5	12.8-7.11
<i>Circus cyaneus</i>	100-150	25.2-18.4	17.8-27.11
<i>Circus pygargus</i>	800-2,000	17.3-10.5	27.7-17.10
<i>Falco peregrinus</i>	30-50	25.3-24.5	31.8-2.11
<i>Falco subbuteo</i>	200-300	13.3-9.6	7.8-23.10
<i>Falco columbarius</i>	60	March	10.9-31.10
<i>Falco naumanni</i>	300-600	11.2-8.5	30.7-20.10
<i>Falco tinnunculus</i>	900-1,300	29.2-21.5	15.8-7.11

Honey Buzzard (*Pernis apivorus*)

The most numerous raptor migrating across the Straits of Gibraltar. The migrations are very concentrated and chiefly occur in May and September. The only species to make both passages, yet provides no record of its occurrence in winter below our latitudes.

Hen Harrier (*Circus cyaneus*)

Between mid-October and mid-April, Morocco, situated at the end of this species' wintering range, receives a small contingent from Europe. These spread over the northern plains but may reach the pre-desert zones south of the High Atlas.

Merlin (*Falco columbarius*)

Only a small number, about 60, make the crossing of the Straits. Normally this falcon is hardly ever seen here: we have only 17 records since 1939, all to the north of the High Atlas, between October and April.

ACCIDENTALS 1: FORMER BREEDING SPECIES

Imperial Eagle (*Aquila heliaca*)

Still bred a few decades ago in the north (regions of Rharb, Tangier and possibly the Forest of Mamora near Rabat), but as a result of persecution and destruction of suitable biotopes, the small Moroccan population has now disappeared. Today it is only met with sporadically, with just one or two reports each year, probably of vagrants from Spain.

Lappet-faced Vulture (*Torgos tracheliotus*)

This species formerly bred in the Sahara: Valverde (1957) reported it from the Negyir (23°30'-15°00'W), Oued Auletis (region of Guelta Zemmur: 25°50'N-

12°10'W) and Sisi A. Larossi (Smara region: 27°N-12°W). It may possibly still hang on there. On the other hand, the small population which probably existed in the Middle Atlas has disappeared, the last capture dating back to 1935 (Heim de Balsac & Mayaud 1962). One individual said to have been seen in 1960 near Agadir, perched on the carcass of a camel in company with Egyptian Vultures (Dachsel, pers. obs.).

Black Vulture (*Aegypius monachus*)

Whereas it is virtually agreed that the Black Vulture has been extinct in the Tangier district since the first decades of this century, a few pairs may still have bred up to the 1970s in the Middle Atlas: two young were brought to Casablanca Zoo, one caught in October 1968 near Khenifria, the other in 1974 in the region of Beni Mellal. But these might well have been vagrants from Spain, since sporadic crossing of the Straits has been confirmed.

ACCIDENTALS 2: EXCEPTIONAL MIGRANTS

Greater Spotted Eagle (*Aquila clanga*)

A very exceptional visitor, since there is only one certain record: an adult on 22 September 1974 at Punta Ceres (Tangier district) (Pineau 1975).

Pallid Harrier (*Circus macrourus*)

Morocco lies well to the west of this species' normal wintering zones. Hartert & Jourdain (1923) mention an individual caught near Tangier and now in the Norwich Museum, and Brosset (1957) noted its presence on the high plateaux of eastern Morocco: one on 23 February and one on 6 March. More recently, Pineau & Giraud-Audine (1979) mention two sightings of males in the Tangier region (13 April and 31 December 1972), and we have observed it in the same region on 12 May 1981. Finally, two skins of females obtained on 15 October 1930 at Rabat and 11 November 1951 at Maaziz (Khemisset) are in the collection of the Scientific Institute.

Red-footed Falcon (*Falco vespertinus*)

Flocks of this species do not normally pass through Morocco, so that sightings are exceptional. There are only four records in spring: 27 April 1874 at Tangier (Irby 1875); 25 March 1971, a flock of a dozen near Marrakesh (Rencurel, unpubl.); 8 April 1981 at Errachidia (Dubois, pers. comm. and 2 June 1981 near Marrakesh (Barreau, pers. comm.); also two in autumn; 9 September 1975 near Rabat (Dubois & Duhautois 1977); 24 September 1981 at Errachidia (Destre, pers. comm.).

Hooded Vulture (*Necrosyrtes monachus*)

We mention for the record the sighting of two individuals of this Ethiopian species on 7 June 1955 in the Sahara (Sbayera, 24°45'N-13°45'W) (Valverde 1957).

FACTORS CAUSING DECLINE

Moroccan law protects all birds of prey. It is often ignored, however, and direct killing (hunting, trapping, destruction of nests) remains one of the principal causes of these birds' decline. No species is spared, and those which nest colonially suffer worst. Traditional customs play a not inconsiderable part in the decline of

raptor populations. Falconry, still practised albeit on a very limited scale, does not seem to have any lasting effect. Nevertheless, it is to be feared that in future falconers will come from abroad to draw on the Moroccan stock of *Falco peregrinus* and *Falco biarmicus*, since their normal sources of supply are drying up. Traditional medicine, still today very much practised, has a definite impact, numerous species, particularly eagles and vultures, being sought for the powers attributed to them.

Toxic chemicals equally cause severe damage. It is alarming to find that even today strychnine is officially used in massive doses, during campaigns to eradicate 'harmful' carnivores (jackal, fox, etc.), and obviously all birds which are to any extent carrion-eaters are destroyed at the same time. The use of Parathion in the war against *Passer domesticus/hispaniolensis* and *Sturnus vulgaris* must also be mentioned, and we know of several instances of raptors (especially *Falco peregrinus* and *Buteo buteo*) being contaminated after eating sparrows treated with it.

The effects of alterations to the biotope chiefly affect forest-dwelling raptors, since thousands of hectares of forest have been cleared during the past decade. For lack of historical data it is difficult, however, to define the extent, but it may be particularly serious for certain species with limited ranges (e.g. *Aquila rapax* and *Melierax metabates* in the Sous). There is also the drainage of wetlands, the demolition of old buildings (*Falco naumanni*) and, more important, the spread of towns such as Salé, which has already encroached on one of the only two colonies of *Falco eleonorae*.

The 'tourism and disturbance' factor seems of little significance at present, only affecting sections of the Mediterranean coast on a large scale. It may, however, be the most direct threat for the Moroccan population of *Pandion haliaetus*.

Finally, at our present level of knowledge, all species appear to find an adequate supply of food; this, therefore, is not a limiting factor in Morocco.

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