BSCE 19/WP 7

Madrid, 23-28 May 1988

SPANISH BIRDS AND THEIR INFLUENCE ON FLIGHT AND MISSION PLANNING

by

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SUMMARY

This paper presents some ideas for hazard level comparition between the different bird species.

It addresses resident Spanish birds, especially vultures (Gyps fulvus) and similar ones.

Later some facts about Spanish migratory movements and their relationship to weather conditions, isophenic lines, and the most dangerous season time are presented.

Finally, the paper gives, conclusions about strike avoidance and some proposals.

This work is dedicated to Mr. Mariano Vicente Jordana, meteorologist whom after 38 years of working in Meteorological Applications to Defense, encouraged us to finish it.

The authors.

1.- INTRODUCTION.

The goal of this work is to present some new ideas to improve one's knowledge of the Spanish bird fauna, primarily in the areas concerning detection and control.

Obtaining more information and knowledge is the only way to avoid - at least partially - the bird hazard on general aviation flights and especially during low level,high speed military flights.

Explanations concerning bird control near bases and airports will be omitted in this report. The only program to be mentioned will be the highly effective system of falconry near airport runways. This program whose best example was the (*1) "Bahari Operation" began in August 1968, under the direction of Dr. Felix Rodriguez de la Fuente. It was developed at the request of then Capt. José Sanchez Mendez, and is still providing excelent results at Torrejón Air Base and Madrid Barajas Airport. The successful falconry program at Moron Air Base, lead by Mr. Jesús Brizuela Martínez, must also be mentioned.

Other methods such as poisoning, ditress sounds, explotions, hunting, etc. have been shown to be less effective, and in some cases very dangerous. One such case occurred in 1966 when a very high number of sisones (Tetrax tetrax) at Torrejón A.B., forced the Flight Safety Officers -USAF and SAF (*2)- to try to frighten them off by using an M-79 grenade-launcher. After the first test they decided to abandon the method since the shrapnel fragments presented more danger than did the birds.

Falconry is seen as an elegant, effective, and inexpensive method that must be used in conjuntion with other non-destructive methods to realize total erradication of birds near terminal areas and runways.

(*1) Bahari is a kind of falcon
(*2) SAF = Spanish Air Force

This work doesn't deal with the bird hazard in the air terminal area -a topic has been thoroughly covered in similar works- but deals with the hazard birds present enroute. To reach this objetive, the first step must be to classify the different known species by their hazard level. Later we will talk about both, sedentary and migratory species and in the last portion will present some conclusions and proposals.

2.- POTENTIAL HAZARD CLASSIFFICATION

The first step in studying bird hazards is to classify the better known species by order of their potential risk to the pilot. We propose an empirical mathematic formula which can help us determine this potential.

In the first step we will treat the birds as if they were rigid airplanes. Nothing could be further from the truth, but this will allow us to study the birds through the application of some aerodynamic formulas. We will omit a lot of factors that affect the hazard level, such as flying muscle strength, speed of reflex action, changes in wing geometry, etc., because they are difficult to measure.

In spite of this we will continue with the next step. We can define the potential danger of a flock of birds with the following equation:

$$P = \emptyset\left(W,\ Vr,\ \frac{1}{p},\ \frac{1}{n},\ De. \right)$$

In which the potential danger (P), varies directly to weight (W), relative speed (Vr), spatial density (De); and varies inversely to banking speed (p), and load factor (n) better known as the "G pulling" capability.

We know through aerodynamics that

$$p = \frac{2\ V\ \ K_1}{b} \quad ; \quad \text{and} \quad n = \frac{K_2}{W/S}$$

where (V) is the bird cruising speed, (b) is its wingspan, (W/S) is the wing load factor, (K) and (K) are constants that depend basicly on the wing shape and for our purposes will be considered to be the same for all bird species.

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We will define spatial density of a flock (De) as the number of birds that would hit the aircraft as it passed through the flock. We will represent with the following:

$$De = \frac{N}{St \quad L}$$

(N) is the number of birds in the flock, (St) is the maximum cross section of the aircraft , (L) is the length of the flock measured in the direction of the Vr vector (aircraft path).

The Vr factor is squared due to the quadratic influence than the speed has on the kinetic energy.

$$Ec = \frac{1}{2} \; m \; V^2$$

Only the aircraft can exercise maneuverability, because we assume -with wisdom- that the bird cannot outfly the approaching aircraft in the direction of the aircraft's path.

We square the rolling capabilty (p) and the load factor (n) because those factors can only move the bird within two dimensional space to avoid strike against the aircraft.

The spatial density (De) has a tri-dementional effect which is the reason we cube it. Therefore,

$$P = W \; Vr^2 \; \frac{b^2}{4 \; V^2 \; K_1^2} \; \frac{W^2}{S^2 \; K_2^2} \; De^3 =$$

$$= K_3 \; \frac{W^3 \; Vr^2 \; b^2 \; De^3}{V^2 \; S^2} \; ;$$

Now if we assume that the bird speed (V) is almost constant for a large number of species and that the relative speed (Vr) is almost equal to the aircraft speed, which could easily be 480 knots and which we can consider constant for a large number of aircrafts, then

$$P = K_4 \; \frac{b^2 \; W^3 \; De^3}{S^2}$$

In order to simplify this example, we are going to assume that there is only one bird flying, then (De) will be equal to one (De = 1). On the other hand we know that the wing surface (S) is obtained by multiplying the average aerodynamic cord (c) by the wingspan (b), (S = b c); therefore

$$P = K_4 \frac{W^3}{c^2}$$

This formula -we call Clement's formula- gives us a relative value of the potential hazard of a bird as a function of its weight and average aerodynamic cord. We must enphasize that weight has a great influence on the P value. Applying the formula to the best known species, we can order them from high to low danger as such: common vulture (Gyps fulvus), crane (Grus grus), flamingo (Phoenicopterus ruber), white stork (Ciconia cinonia), goose (Ansarinae), ducks (Anatidae), gulls (Laridae), doves (Culumbidae), and swallows (Hirundinidae).

3.-RESIDENT BIRDS

The vulture (Gyps fulvus) is considered the most dangerous bird to an aircraft, due to its high weight, large size, low reflex action and sluggish maneuverability. Although the vulture is considered a resident (nonmigratory) bird, some experts have found birds in Central Morocco that were banded in Navarra (North of Spain). These are very rare incidents, though, and we consider the vultures resident birds.

Based on the vulture census that was performed in 1979 by the Sociedad Española de Ornitología (SEO)(Spanish Society of Ornitology) and kindly provided by Mr. Eduardo de Juana, we can make a map like that of FIGURE N°1, in which appears the vultures nesting areas and their zone of influence. It is possible to group these areas into a mountainous terrain system from which we obtain ten vulture groups (see FIGURE N°2). The most important of them are:

N°1) Pirenaico Group
Located in the Pyrenee of Navarra and Huesca. Average altitude of the vulture sites 2.900 ft.MSL

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(Mean Sea Level). Approximately 700 pairs. May be the most important group due to its proximity to Bardenas Reales air-to-ground range.

N°3) Norteiberico Group

Located in the Rioja region, south of Zaragoza and a section of Soria. Average altitude of the vulture sites is 3.200 ft. MSL. Approximately 300 pairs. Part of this group is close to the Bardenas Reales air- to- ground range. This group includes a portion of D-104 which is a danger area reserved for military air exercises conducted at low level and high speed.

N°4) Subiberico Group

Includes Teruel and zones near Castellón and Tarragona. Average altitude of the vulture sites is 2.900 ft. MSL. Approximately 250 pairs. This group includes most of D-104 and Caude air-to-ground range near Teruel.

N°10) Gaditano Group

Includes Sierra Betica between Ronda and Gibraltar Strait. Average altitud of the vulture sites is 1.400 ft. MSL. This is the most densely populated group in Spain. Approximately 650 pairs.

By looking at FIGURE N°1 and N°2, the pilot can determine which zones he will fly near or through during his mission and can exercise extra caution as necessary.

Due to its large size, a vulture can easily can be detected approximately one half nautical mile (1/2 NM) away. If we are flying 480 knots, this means there are only about four (4) seconds of reaction time. The aircraft should be maneuvered because it is likely that the bird will not notice the aircraft until it has flown past the bird.

To avoid the bird the pilot in most cases, should execute a pull-up, because birds usually execute a dive in order to achieve the maximum acceleration in the minimum amount of time and with the minimum muscular activity.

Knowing the terrain where vultures live is also very helpful in avoiding them. They almost always will be found near their nests in very steep terrain. When a pilot flies near a ridge, he must be especially careful siace it is highly probable that a vulture is flying nearby.

On a sunny day with thermal or orographic updrafts one is likely to find soaring vultures. On a windy day it is possible to find birds using the sloping effect of the wind against a mountain to soar. For this reason as well as for other safety reasons, a pilot should always account for the wind strength and direction when flying low level over mountainous terrain.

Only in a day with very good weather conditions and high thermal updrafts is there the possibility of finding vultures and other gliding birds above flat terrain; especially at noon time when the sun is at its maximum thermal activity.

In addition 80% of the vulture couples nest on lime-based rock areas, while other 20% nest on silicon-based rock areas. On the lime-based rock areas we can find vulture colonies of 40 to 100 couples, but in the silicon-based rock we may only find colonies of about 20 couples, (except for the outstanding colonies of the Monfragüe National Park).

In an intuitive way, with the previously mentioned data and with the help of FIGURE N°1 and N°2, it is possible to determine , at a given moment, the zones with the highest probability of finding vultures or other kind of birds.

Of course not in all seemingly ideal nesting terrain will one find vultures, because their presence and nesting are determined by other factors, such as the availability of food, good weather conditions, etc. For example in the Cantabro-galaica zone (north-west Iberian Peninsula), which provides good terrain condition for nesting, there are no nesting vultures due to the high number of cloudy and cold days per year. As well, vultures could possibly nest in the Alicante zone, but there is little food due to the small livestock industry, little hunting, and the lack of artifitial feeding places.

4.-MIGRATORY BIRDS

There are many species of migratory birds which cross Spain the year round. We will consider only those species which present a bird strike hazard.

The bird migration is a very complex phenomenom which is affected by a number of factors such as season, food availability, wind strength and direction, barometric pressure, phenologic plants state, etc,.

The migratory routes aren't as stable nor predictable as one would like. Experts in this field, like Dr. Francisco Bernis (President of the Spanish Ornitology Society and professor of Zoology in the Complutense University), after years of study have reached the conclusion that it is very difficult to predict at what moment the birds will begin their migration and which routes they will use. For this reason we state that the migration routes shown in FIGURES N°3, N°4 and N°5 only indicate the general direction of the migration movements. One exception to this is the crane (<u>Grus grus</u>) which every year flies the same route.

We can classify the migratory birds in groups by their migration habits.

Winter birds

These are birds that spend the winter time in Spain. When Spring arrives they leave the Iberian Peninsula with a southwest-northeast (SW-NE) flow, heading to Scandinavia and Central Europe where they normaly make their nests.

When they finish reproducing -in early Fall- they begin migration in a northeast-southwest (NE-SW) flow, escaping the cold weather and looking for more benign and warmer countries such as Spain, where they spend the entire winter. Some winter species and their routes are shown in FIGURE N°3 and N°4. The arrows indicate the inbound direction in Fall; the same routes in the opposite direction are flown outbound from Spain in Spring with (SW-NE) flow.

Summery birds

These are birds that spend the summertime on the Iberian Peninsula where they normally nest. At the end of the summer when they have finished reproducing, they begin migrating south, crossing to Africa almost always by way of the Gibraltar Strait, in order to look for warmer weather in Central and North Africa. When Spring arrives, they escape from the hotter African countries following wide bands flowing more or less south-north (S-N). Upon reaching the Iberian Peninsula, they spread out in a dispersive mode. We call this wide front migration. This migration spreads throughout the entire Spanish territory. These species of migratory birds nest during Spring and early Summer, thus completing the annual cycle. See FIGURE N°5.

Most birds have the migratory habit of not following fixed routes. They migrate in wide front pattern. A tipical example is the swallow (Hirundo rustica). In order to locate this migration in space and time, we use isophenic lines. The lines indicate the points where the same phenomenom takes place simultaneously. In FIGURES N°6 and N°6-A -which was provided by the Instituto Nacional de Meteorologia (INM)- we see the isophenic lines of the swallow and white stork arrivals.

Of course there are other migration habits, (partial migrations, accidental migrations, nesting birds, etc,), but we don't deal with them due to their complexity and their lack of data.

There exists a close relationship between the time and intensity of migration movements and the meteorological conditions, especially when one consider strong winds in the direction of migration. Thanks to the data provided by meteorologist Mr. Lorenzo García Pedraza, we can learn something concrete about this relationship.

In reference to the summer birds, the most intense migration movement (flow S-N) coming from Africa is influenced by a weather condition similar to the one shown in FIGURE N°7 in which the moderate tailwinds -called Lebeche wind- make for an easy crossing of the Gibraltar Strait.

The north-south (N-S) flow, from Spain to Africa is helped by a meteorological condition like the one shown im FIGURE N°8. The birds take advantage of the strong tailwinds -called Tramontana wind- by flying most of the time behind a cold front which is sweeping the Iberian Peninsula from north to south.

Concerning the winter birds, the migratory movement into Spain is helped by the meteorological condition shown in FIGURE Nº9, in which the strong cold winds coming from Central Europe, help the north-east to south-west bird flow. The contrary flow, from south-weast to north-east, is helped by a meteorological condition like the one shown in FIGURE Nº 10, in which the warm south-weast winds help the birds reach Central Europe and Scandinavia.

It is known that migratory movements take place during the entire year, a rather useless conclusion in itself, but in looking at FIGURE Nº 11, we can see that it is possible to identify the seasons with the most migratory activity.

The overlap which exists between winter and summer birds, produces high migratory activity during the entire month of March and the second half October.

5.-CONCLUSIONS:

- The vulture (Gyps fulvus) is considered the most dangerous bird to low level flights.

- The nesting points and vulture colonies are shown in FIGURE Nº 1.

- The most dangerous zones for military low level flights are the nº 1,3,4 and 10 groups (see FIGURE Nº 2).

- During March and April one can expect high migratory activity with a south-west to north-east flow, especially during those days that have meteorological conditions like those shown in FIGURE Nº 10. The most dangerous zone will be the north-east quarter of the Iberian Peninsula, especially the Pyrenees.

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- During the second half of October and all of September, one can expect high migratory activity with a north-east to south-west flow, especially on those days that have meteorological conditions like those shown in FIGURE Nº 9; the Pyrenees zone will again be the most dangerous.

- During February and March the migratory movement will be a south to north flow, especially on those days that have meteorological conditions like those shown in FIGURE Nº 7. The most dangerous zone will be the Gibraltar Strait.

- During July, August, September and October the migratory movement will be with a north to south flow especially on those days thet have meteorological conditions like those shown in FIGURE Nº 8. The most dangerous zone will be the Gibraltar Strait.

- March, whose weather conditions are shown in FIGURE Nº 7 and 10, is the most dangerous month of the year. The second most dangerous time is the second half of October, on those days that have weather conditions like those shown in FIGURE Nº 8 and 9.

- After Gibraltar Strait and Pyrenees, the most dangerous zones are those marked with a circle - for examples passing zones - in FIGURES Nº3 and Nº4.

- All National and Natural Parks are considered dangerous due to the presence of birds (see Visual Navigation Chart 1/1.000.000 published by the Centro Cartográfico y Fotográfico del Ejercito del Aire.)

- The maneuver to avoid a bird strike will almost always be a resolute "pull up" but always while maintaining aircraft control.

- When flying in a low level formation, the leader must take into account the danger zones, and advise his wingman(men) to fly in a "deffensive" formation. If the overflight is performed in an "offensive" formation, then birds may be frightened by leader and may then strike the wingman(men). See FIGURE Nº 14.

- Every pilot who has a bird strike, should complete the OACI (ICAO) bird strike form that exists in all Spanish Air Force Squadrons. See FIGURE Nº 12.

- Any observation or dangerous situation related to birds must be relayed to the nearest Control Agency or to other aircraft in flight, and to the Squadron Flight Safety Officer.

6.- PROPOSALS

- To obtain and maintain good bird movement information, it is necessary to periodically (each 2 or 3 years) perform a bird census. A census is expensive, but it is possible to cooperate with the Sociedad Española de Ornitologia (SEO) whose aim is to sponsor census studies of new migratory routes. This society (SEO) consist of technicians and ornithologists who aid in developing new regilations to prevent birds strikes near aerodrome and airport zones.

- It would be possible to publish the most important bird map and graphs in order to show pilots the zones and the seasons that could be most dangerous. Those publications could be added to the low and high level Flight Manuals.

- It would be possible to make a complete study of the BIRDTAM System - used in the NATO countries - which is a National Radar-Visual Surveillance Net, that provides the most important bird movements each hour of the day and night. This net is paired with the meteorological net and transmits BIRDTAM notices by way of the same communication System.

- It would be interesting to ask the Instituto Nacional de Meteorologia (INM) for its cooperation in printing new phenologic maps and graphs of the most important bird species.

- It would be possible to ask the Instituto Nacional para la Conservacion de la Naturaleza (ICONA), for its cooperation in locating and moving if necessary those vulture feeding areas that are established near air-to-ground bombing ranges especially Las Bardenas Reales, which has a large population of vultures and similar birds.

- Ask the cooperation of the Guardia Civil in locating the illegal vulture feeding zones near the areas of heavy air traffic.

- Entrust the Meteorologic Services at each base, airport and air-to-ground range with the daily task of filling out the "Daily Bird Survey" form shown in FIGURE Nº13. By analyzing the data provided through these surveys, it would be possible to determine the need to apply special methods for the zones that require them. From statistical analysis of this data it would be possible to obtain valuable operational conclusions.

After a long and laborous study of the facts we feel that with a small economic investment it would be possible to save on costly repairs, aircraft lost, and possibly human lifes. ■

FIGURE Nº2

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FIGURE Nº2

GROUPS OF SPANISH VULTURE ZONES.

1) Pirenaico Group: Pyrenees of Navarra and Huesca. Average altitude of the vulture sites is about 2900 ft. MSL. About 700 couples.

2) Cantabrico Group: North of Burgos and near Santander, Asturias and País Vasco. Average altitude of the vulture sites is about 2.500 ft. MSL. About 120 couples.

3) Norteiberico Group: Rioja, south of Zaragoza and some sites in Soria. Average altitude of the vulture sites is about 3.200 ft. MSL. About 300 couples.

4) Subiberico Group: Teruel and near Castellón and Tarragona. Average altitude of the vulture sites, about 2.900 ft. MSL. About 250 copuples.

5) Castellano Group: South of Burgos, Soria, Segovia on one side and Guadalajara, Cuenca, and Madrid on the other side; high lands of the Duero and Tajo rivers. Average altitude of the vulture sites 3.100 ft. MSL. About 400 couples.

6) Salmantino-Zamorano Group: Duero river and its tributaries near the Portuguese border. Average altitude of the vulture sites 1.800 ft. MSL. About 180 couples

7) Extremeño Group: Caceres and Badajoz. Most of the vultures live near the Tajo River. Average altitude of the vulture sites 1.600 ft. MSL. About 400 couples.

8) Marianico Group: Sierra Morena in Ciudal Real, Jaen, Cordoba, and Sevilla. Average altitude of the vulture sites 750 ft. MSL. About 70 couples.

9) Betico Group: Sierras Beticas, such as Sierra Cazorla which extends from Murcia to the south of Cordoba. Average altitude of the vulture sites 4.500 ft. MSL. About 60 couples.

10) Gaditano Group Sierra Betica, from Ronda to the Giblatar Strait. Average altitude of the vulture sites 1.400 ft. MSL. About 650 couples.

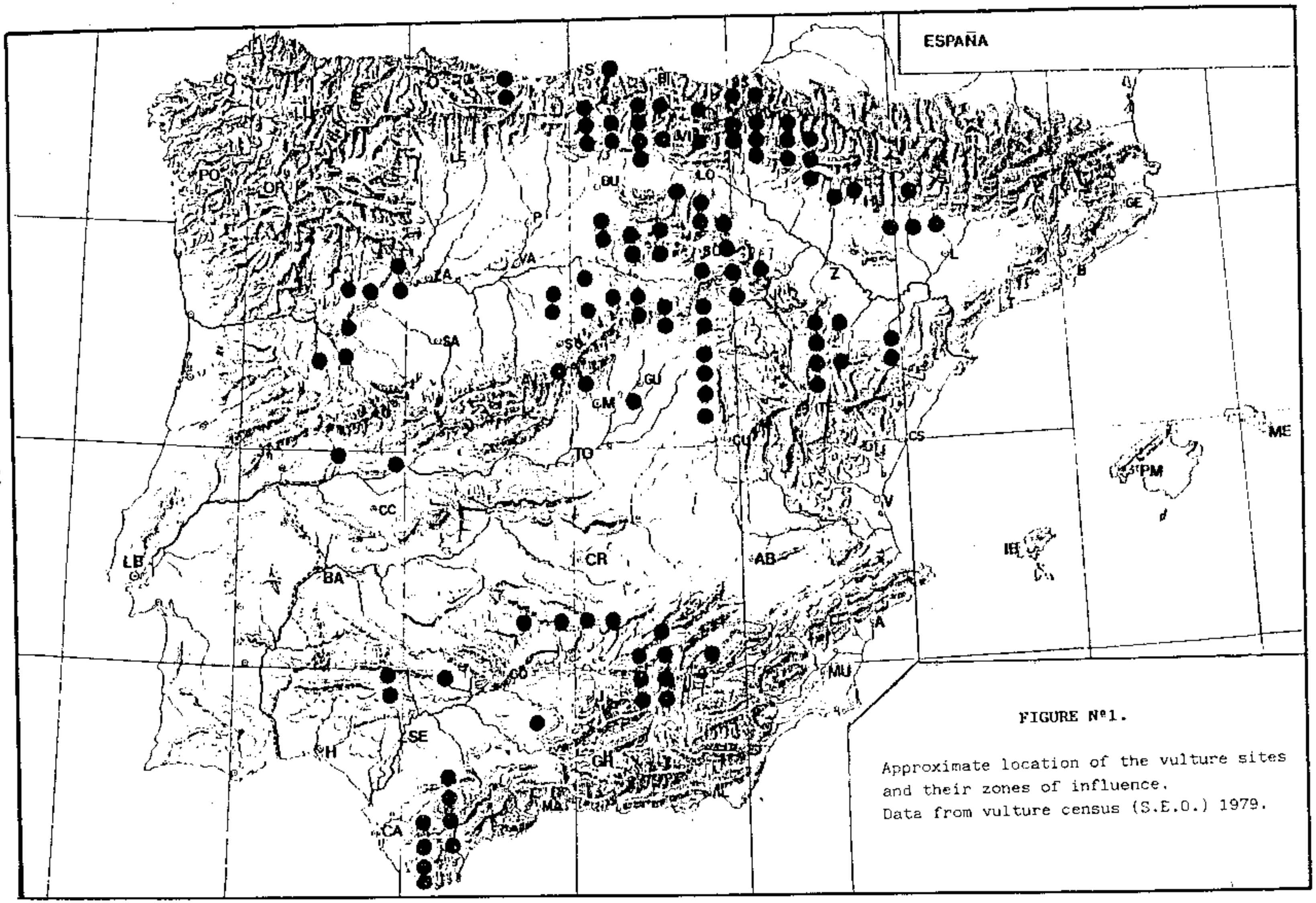
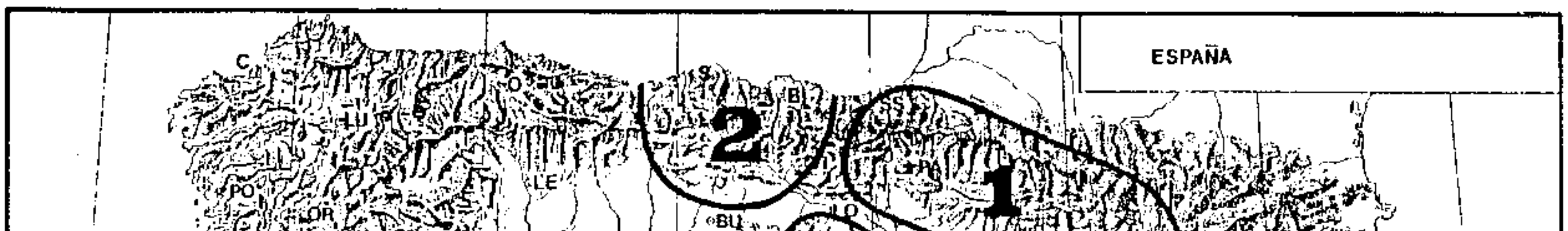


FIGURE Nº1.

Approximate location of the vulture sites
and their zones of influence.
Data from vulture census (S.E.O.) 1979.



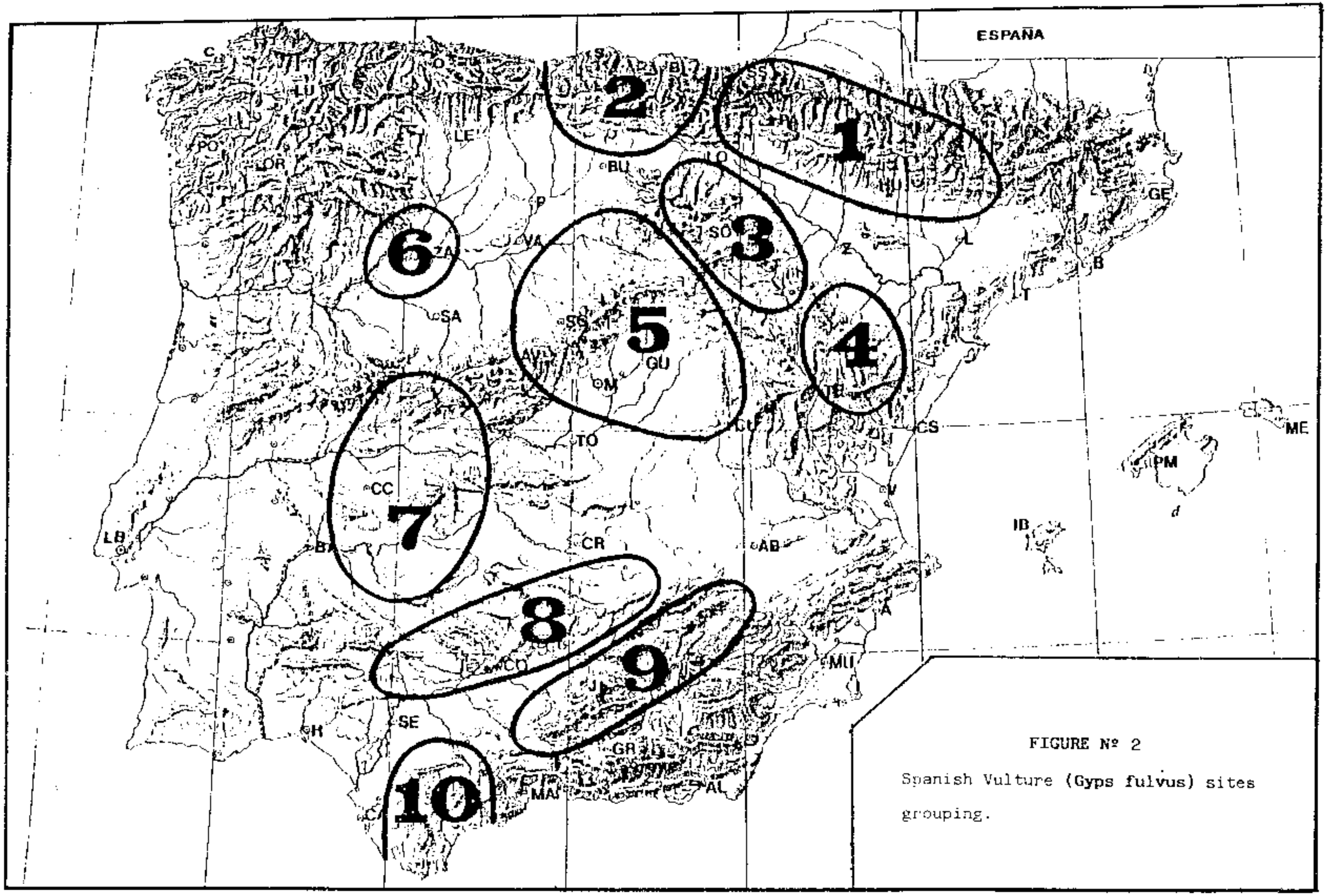
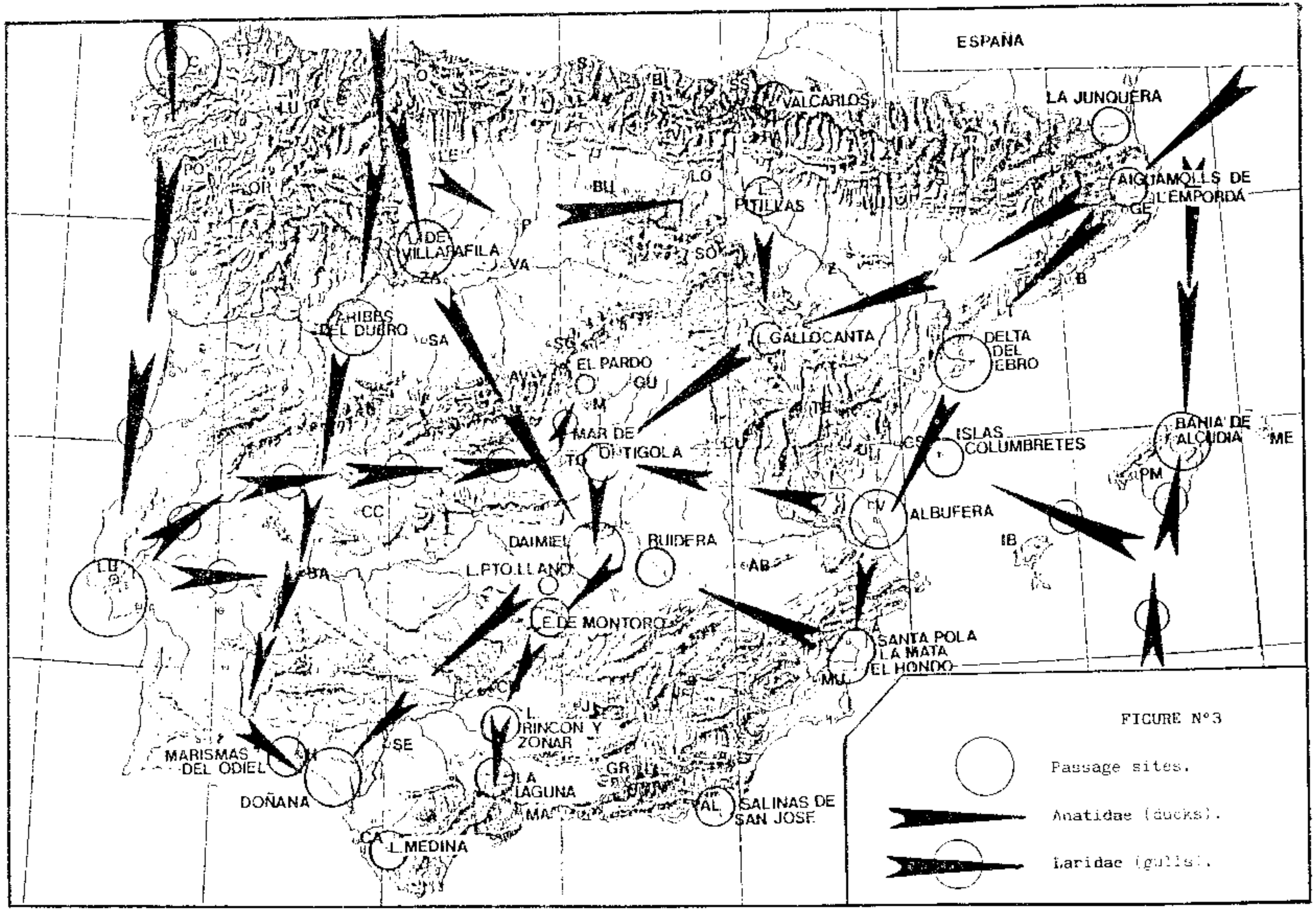


FIGURE Nº 2

Spanish Vulture (Gyps fulvus) sites grouping.


ESPAÑA
FIGURE N°3
Passage sites.
Anatidae (ducks).
Laridae (gulls).
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PITILLAS
L. DE VILLAFAFILA
ARRIBES DEL DUERO
L. GALLOCANTA
DELTA DEL EBRO
EL PARDO
MAR DE ONTIGOLA
BAHIA DE ALCUDIA
ISLAS COLUMBRETES
ALBUFERA
DAIMIEL
RUIDERA
L. PTO. LLANO
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SANTA POLA
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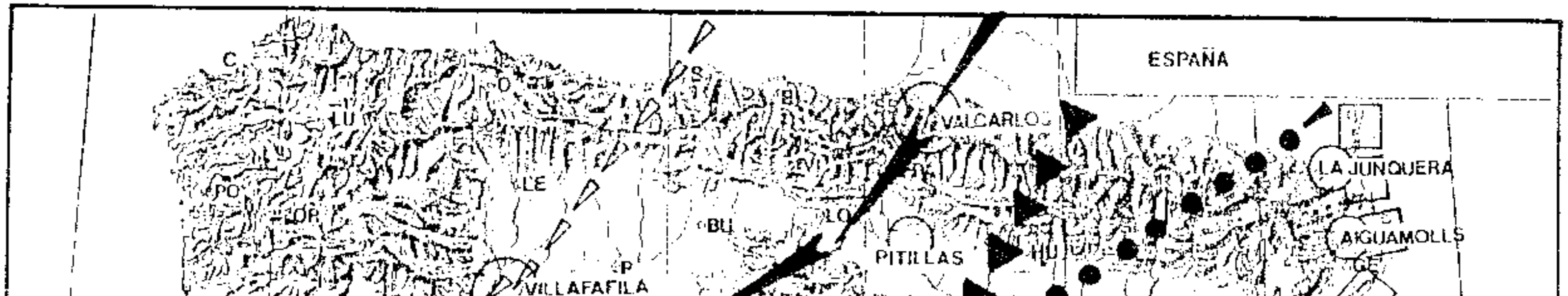
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Laridae (gulls).

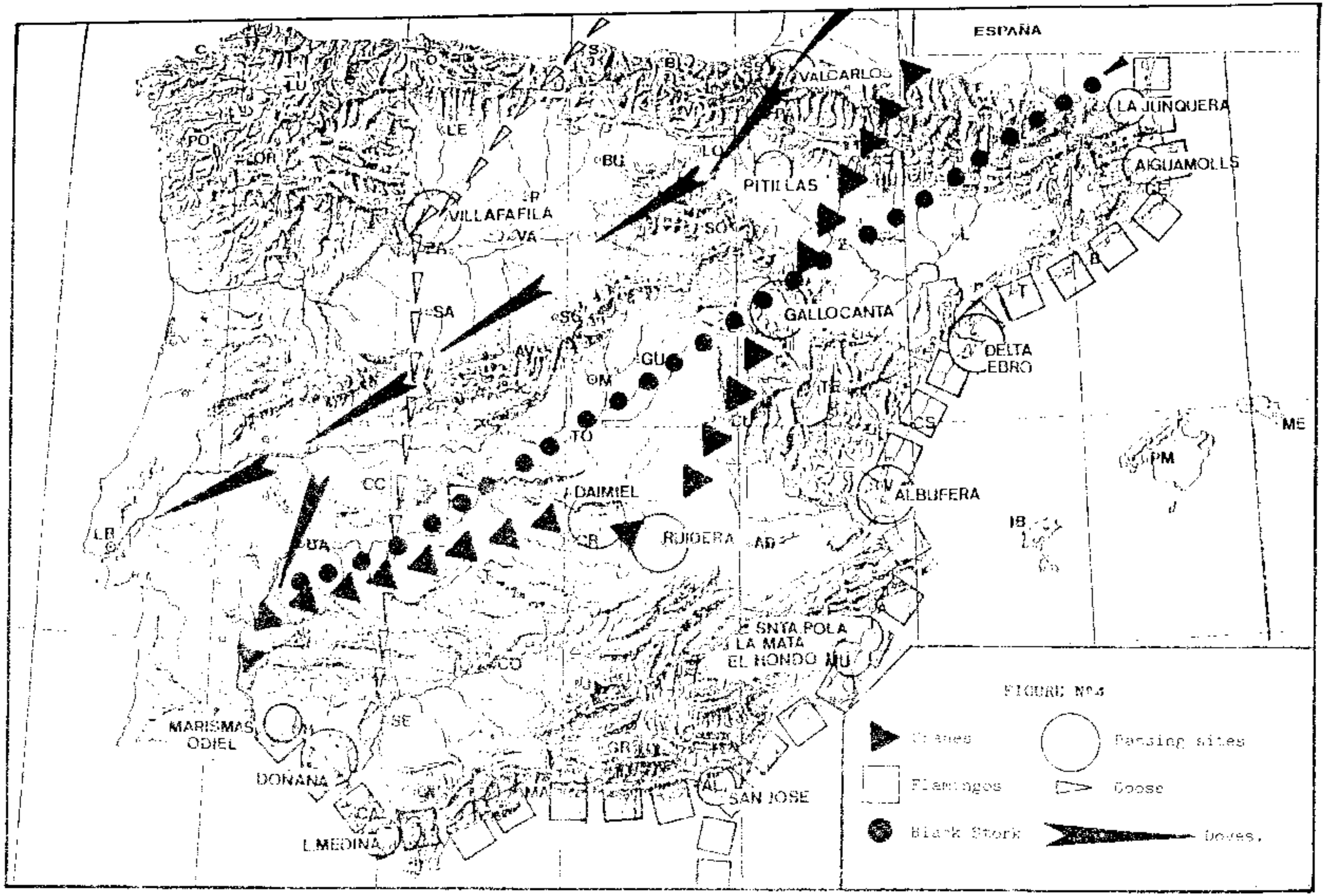
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FIGURE Nº4
Cranes
Passing sites
Flamingos
Goose
Black Stork
Doves.

FIGURE Nº3 and Nº4

Approximate location of the migratory routes of each species shown. Inbound migration with north-south flow from the first half of October until the end of November. Outbound migration with south-north flow from March to April.

Flying altitudes vary from 1.000 to 1,500 ft. MSL. for flamingos (Phoenicopterus ruber) and some geese (Ansarinae), upto 11.000 fts. MSL. for some ducks (Anatidae). Flamingos usually fly in a corridor about 50 Kms. wide on eitherside of the coastline.

DIFFICULT PASSAGES: These pasages are said to be difficult primarily because of the mountainous terrain found in the Pyrennee System, especially la Junquera (Gerona) and Valcarlos (Navarra), and the Sistema Central (Molina de Aragon, Ayllon and Sierra of Guadarrama and Gredos). The Gibraltar Strait zone is classified as a difficilt passage zone due to the high density of birds, primarily found in Doñana Natioal Park. The number of winter birds here may reach one million.

FIGURE Nº5

Approximate location of the migratory routes of some summer species. Inbound migration with a south-north flow in February and March, with a highly dispersive movement when reaching the Peninsular territory. Outbound migration with north-south flow from July to October, crossing the Strait heading to Africa.

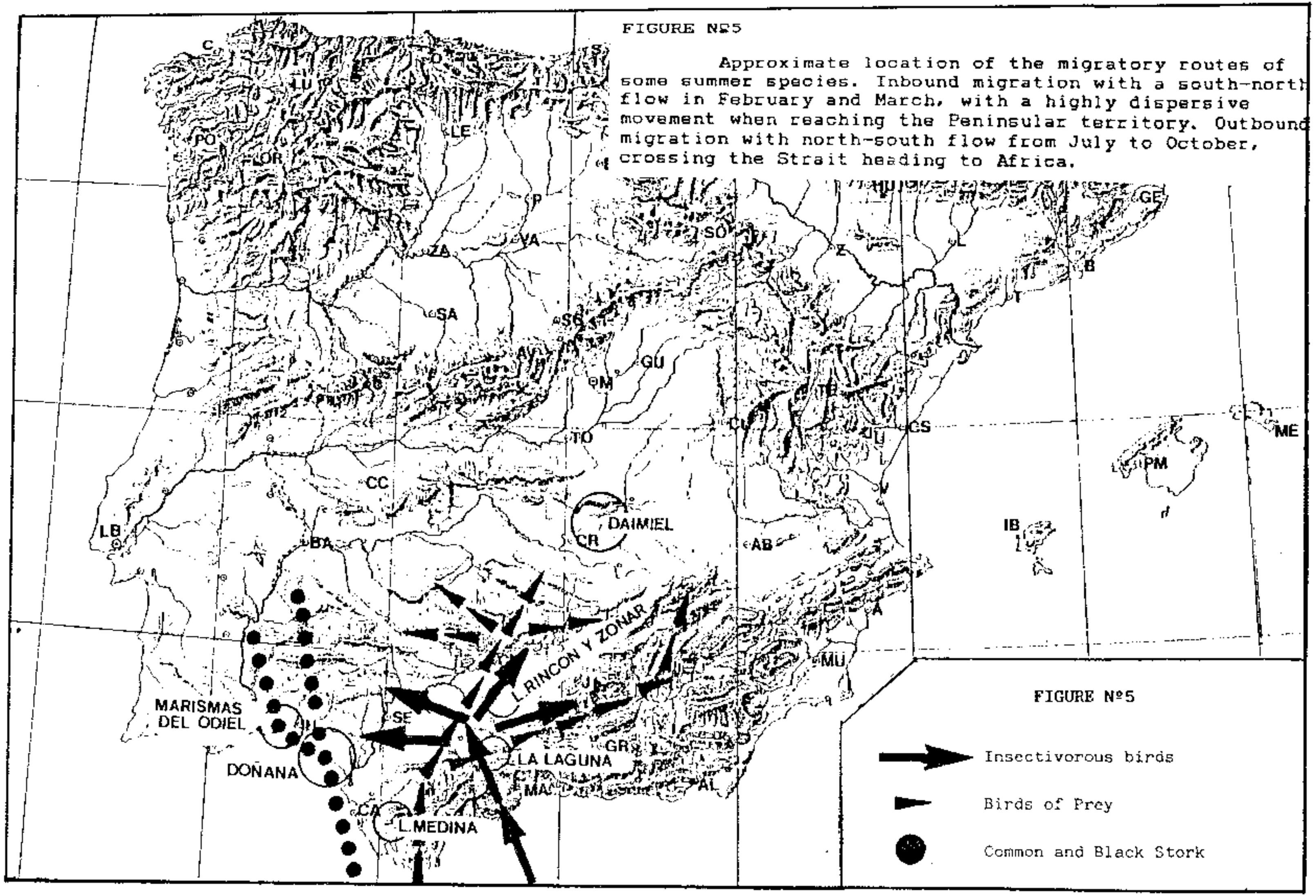


FIGURE Nº5

Approximate location of the migratory routes of some summer species. Inbound migration with a south-north flow in February and March, with a highly dispersive movement when reaching the Peninsular territory. Outbound migration with north-south flow from July to October, crossing the Strait heading to Africa.

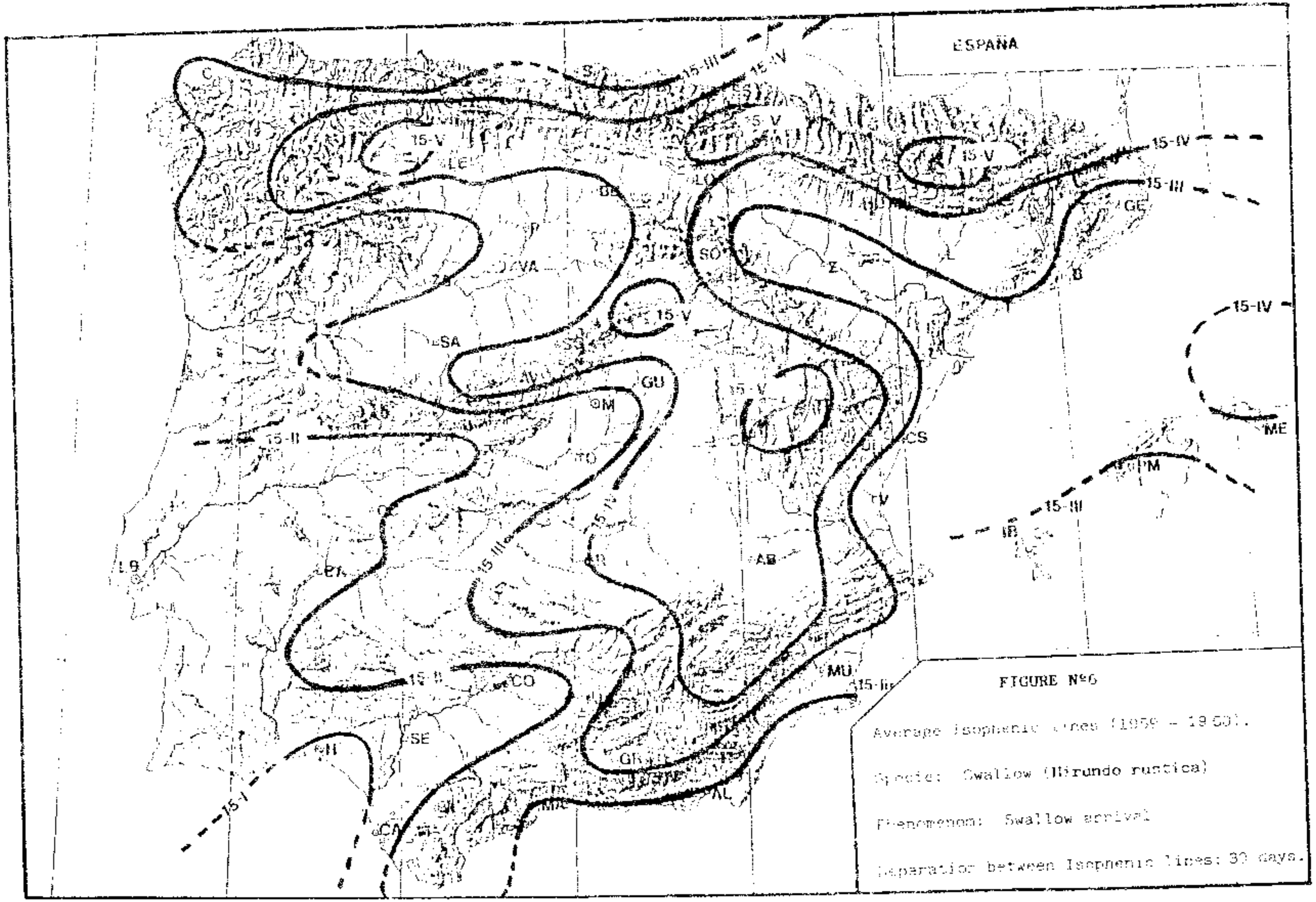


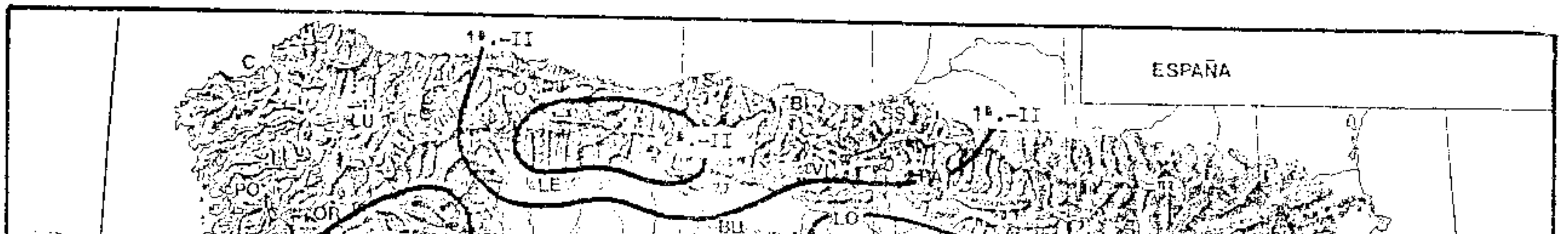
FIGURE Nº6

Average Isophenic Lines (1959 - 1960).

Species: Swallow (Hirundo rustica)

Phenomenon: Swallow arrival

Separation between Isophenic lines: 30 days.



Separation between Isophenic lines: 30 days.

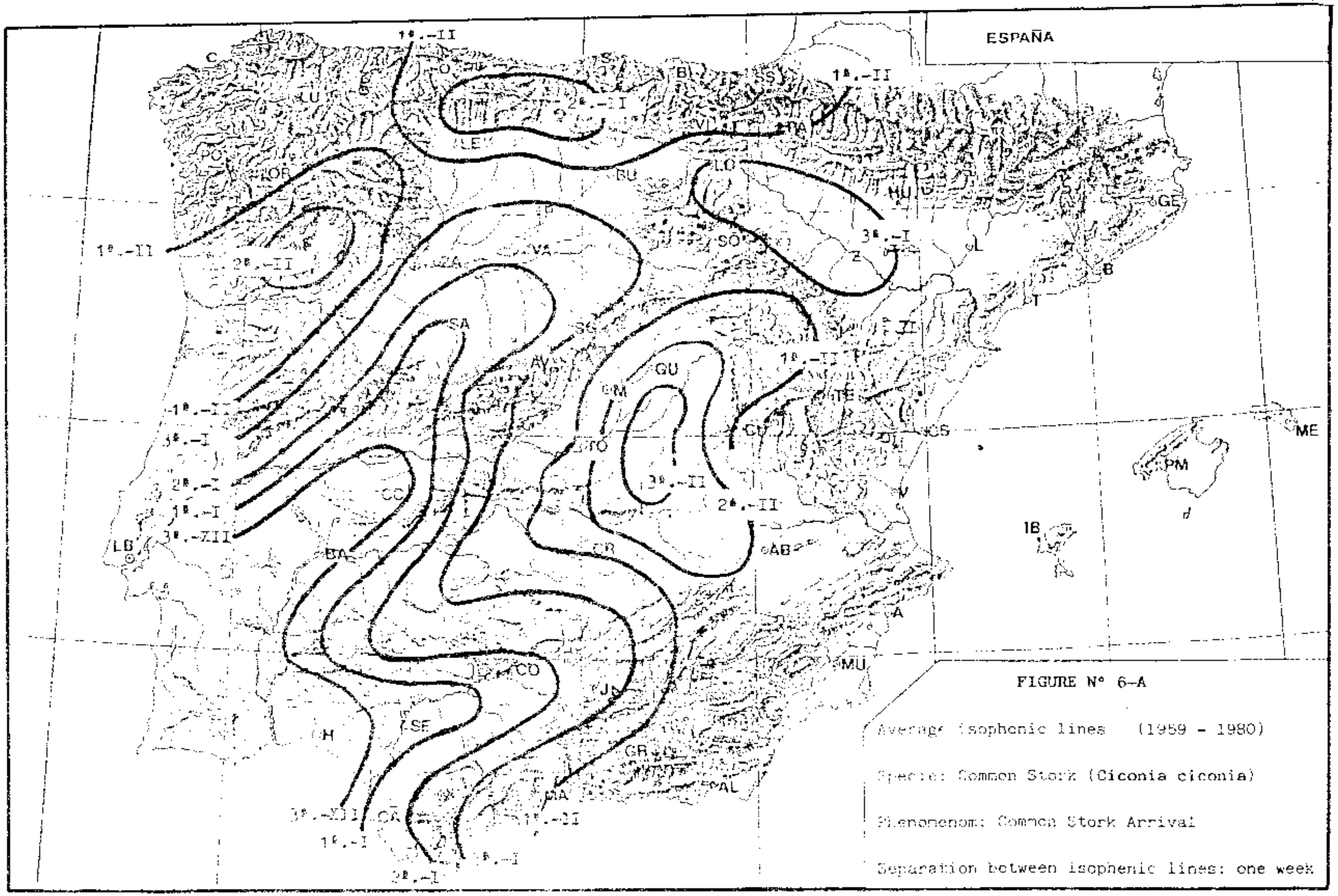


FIGURE Nº 6-A

Average isophenic lines (1959 - 1980)

Specie: Common Stork (Ciconia ciconia)

Phenomenom: Common Stork Arrival

Separation between isophenic lines: one week

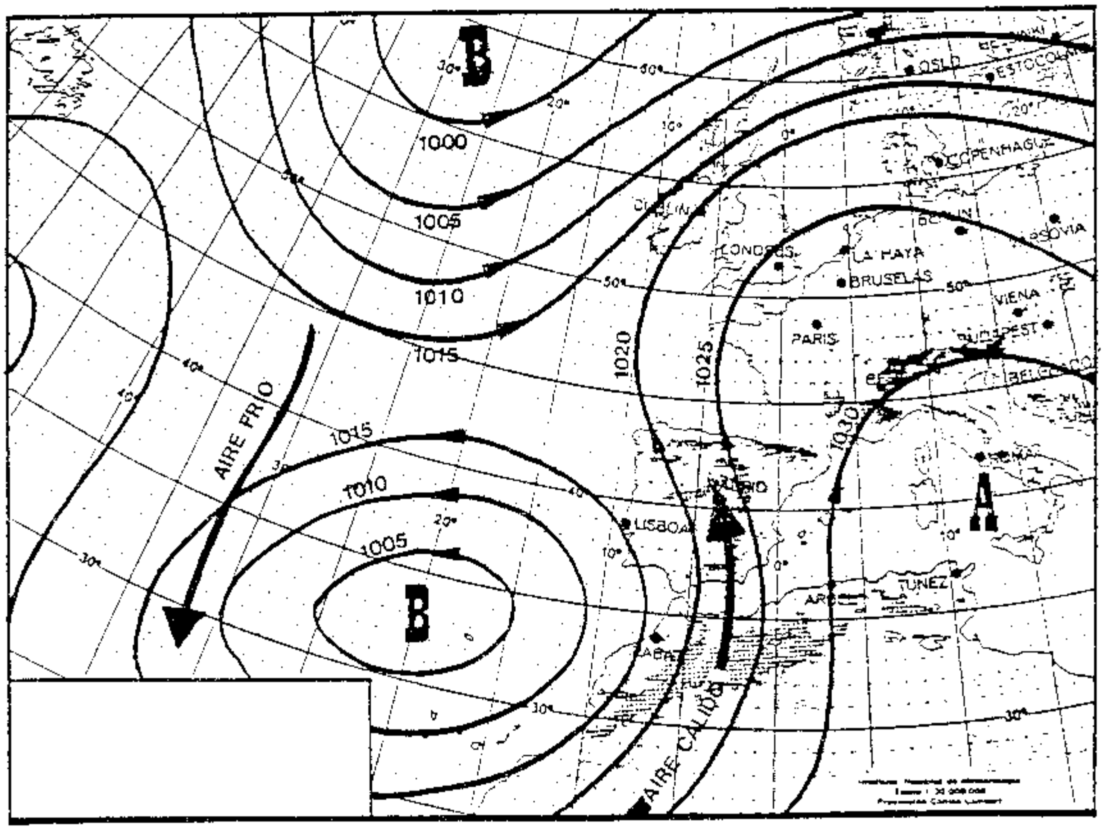


FIGURE Nº7

Meteorologic conditions which help the Spanish inbound migratory movement of Summer birds proceeding from Africa, during February and March.

FIGURE

outbou
Africa

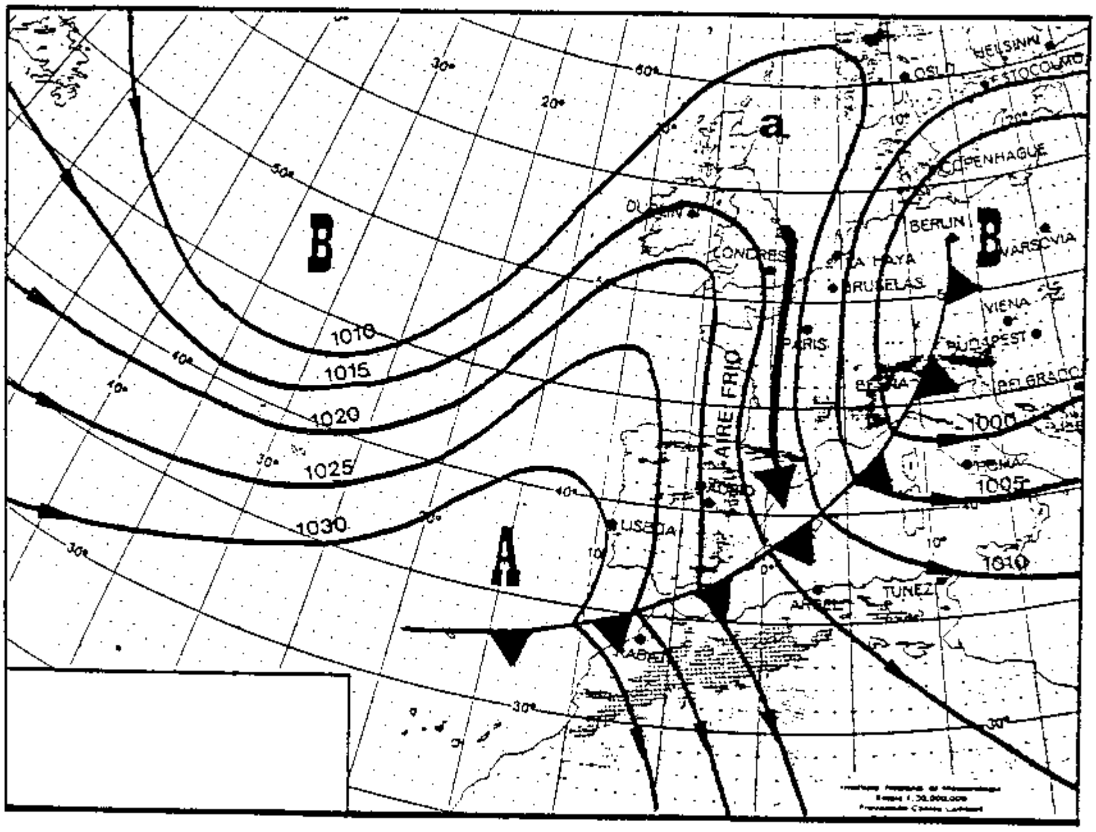


FIGURE Nº8

Meteorologic conditions which help the Spanish outbound migratory movement of Summer birds heading to Africa, during July, August, September and October.

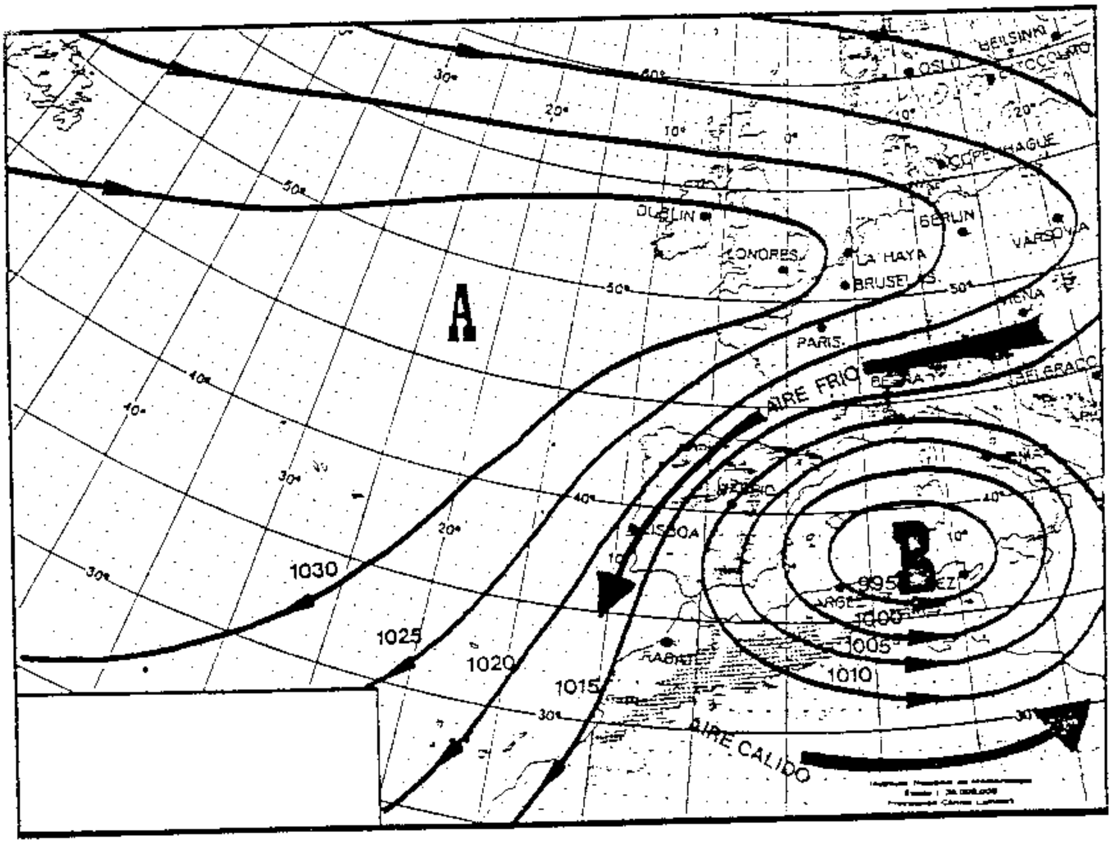
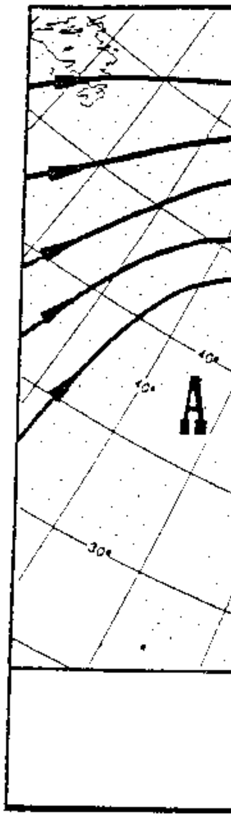


FIGURE Nº9

Meteorologic conditions which help the Spanish inbound migratory movement of winter birds proceeding from Central Europe and the Scandinavian countries, during the second half of October and the entire month of November.



FIGU

outbo
from
Scand

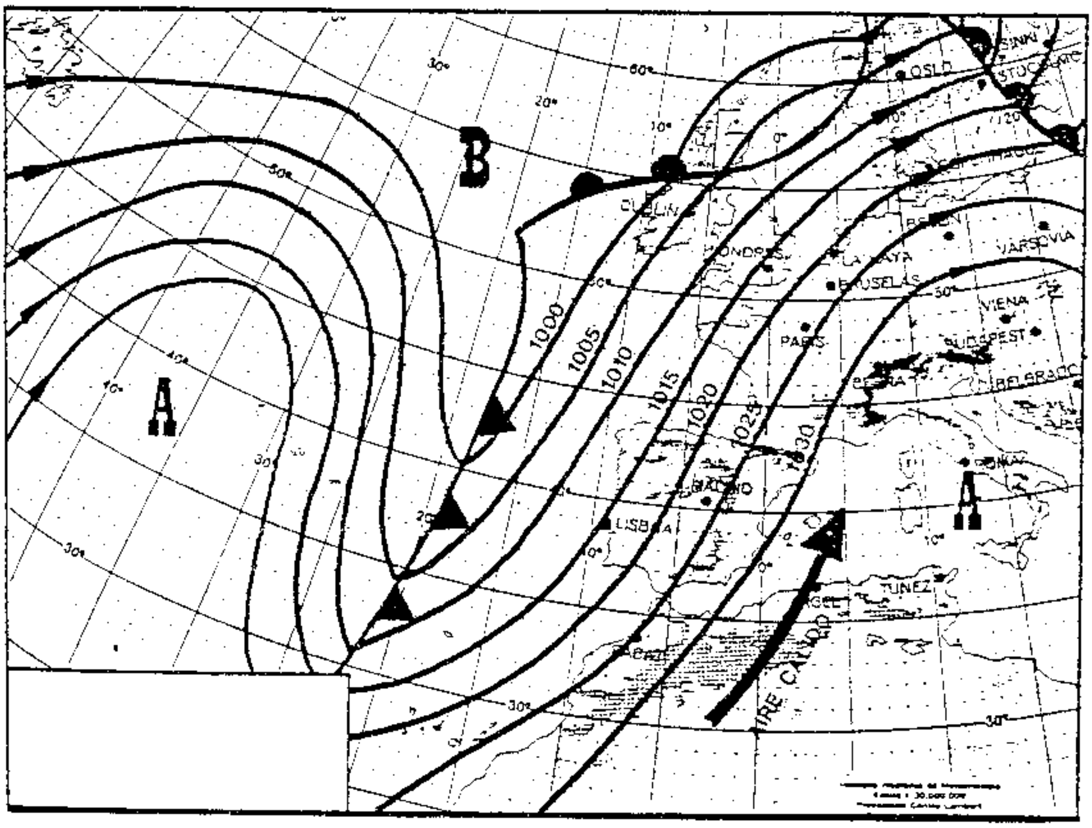


FIGURE Nº10

Meteorologic conditions which help, the Spanish outbound migratory movement of winter birds proceeding from Africa and heading to Central Europe and the Scandinavian countries, during March and April.

FIGURE Nº 11

KIND OF BIRD	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SUMMER			outbound	outbound						inbound	inbound	
WINTRY		inbound	inbound				outbound	outbound	outbound	outbound		
OVERLAP			■							■		

Periods of the greatest migratory activity of Wintry and Summer birds inbound and outbound from Spain.

Note the overlap periods which are the most dangerous.

FIGU

F

Envíese a:

Explotador ....

Marca/modelo de aeron

Marca/modelo de moto

Matrícula de la aeronav

Fecha *día.......* n

Hora local..........

alba □A *día* □B *cr*

Nombre del aeródromo

Pista utilizada........

Situación, si fue en ruta

Altura...............

Velocidad indicada....

Fase del vuelo

estacionamiento

rodaje

recorrido de despegue

ascenso

Partes de la aeronave

radomo

parabrisa

proa (con exclusión de 18 y 19

motor Núm. 1

2

3

4

hélice

ala/motor

fuselaje

tren de aterrizaje

cola

luces

otras partes (especifíquense)

Notificado por ....

(Facul

ESTA INFORMAC

FIGURE Nº12

ICAO Bird Strike reporting form.

FORMULARIO DE NOTIFICACIÓN DE CHOQUES CON AVES

Envíese a:

Explotador 01/02

Marca/modelo de aeronave.................. 03/04

Marca/modelo de motor 05/06

Matrícula de la aeronave 07

Fecha *día.......mes.......año*.......... 08

Hora local.................................. 09

alba ☐A *día* ☐B *crepúsculo* ☐C *noche* ☐D 10

Nombre del aeródromo 11/12

Pista utilizada.............................. 13

Situación, si fue en ruta..................... 14

Altura......................... *pies* 15

Velocidad indicada........... *nudos* 16

Fase del vuelo 17

estacionamiento	☐A	*en ruta*	☐E
rodaje	☐B	*descenso*	☐F
recorrido de despegue	☐C	*aproximación*	☐G
ascenso	☐D	*recorrido de aterrizaje*	☐H

Partes de la aeronave

	Golpeadas		*Dañadas*
radomo	☐	18	☐
parabrisas	☐	19	☐
proa (con exclusión de 18 y 19)	☐	20	☐
motor Núm. 1	☐	21	☐
2	☐	22	☐
3	☐	23	☐
4	☐	24	☐
hélice	☐	25	☐
ala/rotor	☐	26	☐
fuselaje	☐	27	☐
tren de aterrizaje	☐	28	☐
cola	☐	29	☐
luces	☐	30	☐
otras partes (especifíquense)	☐	31	☐

Consecuencias para el vuelo

ninguna ☐32
despegue interrumpido ☐33
aterrizaje por precaución ☐34
se apagaron los motores ☐35
otras (especifíquense) ☐36

Condiciones del cielo

cielo despejado ☐A
algunas nubes ☐B
cielo cubierto ☐C

Precipitación

niebla ☐38
lluvia ☐39
nieve ☐40

Especie de ave*............................... 41

Número de aves

	Observadas 42	*Golpeadas* 43
1	☐A	☐A
2-10	☐B	☐B
11-100	☐C	☐C
más	☐D	☐D

Tamaño de las aves 44

pequeñas ☐S
medianas ☐M
grandes ☐L

¿ Se advirtió el piloto del peligro? 45

sí ☐Y *no* ☐N

Observaciones *(descríbanse los daños y las lesiones y consígnense otros datos pertinentes)* 46-47

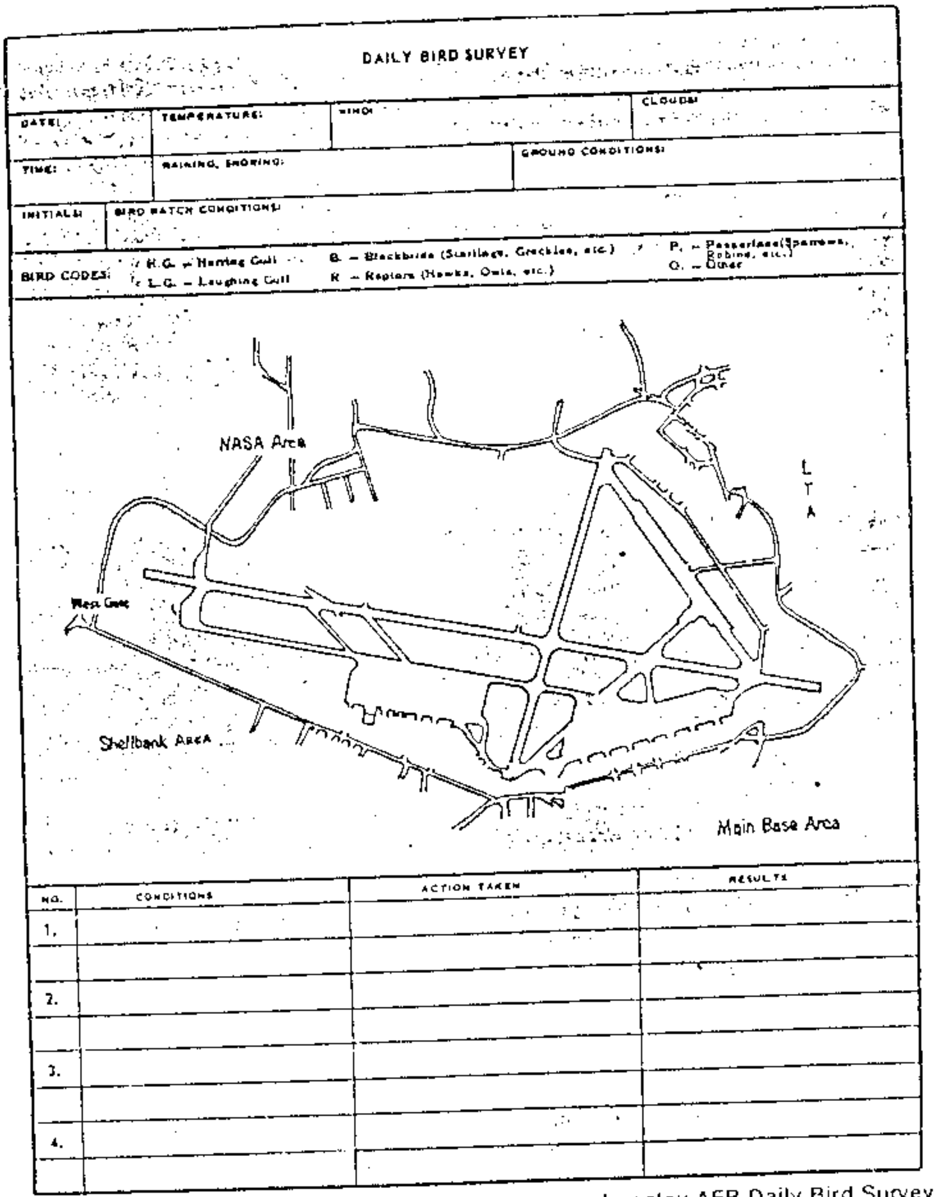
....
....
....
....
....

Notificado por ....
(Facultativo)

*Envíense los restos de las aves a

ESTA INFORMACIÓN SE NECESITA PARA FINES DE LA SEGURIDAD DE LA AVIACIÓN

Formulario de la OACI de notificación de choques con aves



DAILY BIRD SURVEY

DATE:	TEMPERATURE:	WIND:	CLOUDS:
TIME:	RAINING, SNOWING:	GROUND CONDITIONS:	
INITIALS:	BIRD WATCH CONDITIONS:		

BIRD CODES: H.G. – Herring Gull; L.G. – Laughing Gull; B. – Blackbirds (Starlings, Grackles, etc.); R. – Raptors (Hawks, Owls, etc.); P. – Passerines (Sparrows, Robins, etc.); O. – Other

NO.	CONDITIONS	ACTION TAKEN	RESULTS
1.			
2.			
3.			
4.			

LAFB FORM JUN 74 O-2

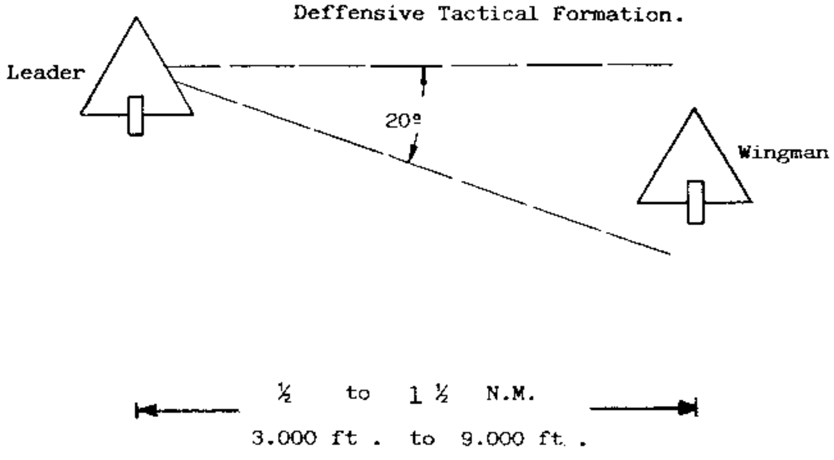
Langley AFB Daily Bird Survey

FIGURE Nº 13

Daily Bird Survey for an airport zone.

FIGURE Nº 14

Deffensive Tactical Formation.



Offensive Tactical Formation.