

WP/17

BIRDSTRIKE PROBLEMS ON AIRBASE DECIMONANNU/SARDINIA/ITALY

(Results of more years ecological research)

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Summary: Since 1965 GAF is training pilots on the Italian air force base Decimomannu/Sardinia. Between 1968 and 1979 more than 100 birdstrikes have been reported on the air base and in its vicinity. Ecological investigations led to special proposals to solve the birdstrike problem.

This report is based on investigations of the author as well as of Dr. Jürgen Becker and Dr. Ekkehard Küsters from GAF.

1. Statistics GAF

Between 1968 and 1979 115 birdstrikes with aircraft of GAF have been reported and that 52 in the airfield area itself, 18 within the Frasca Range and 45 in the surroundings of the airfield. The distribution of birdstrikes in the different years (Fig.1) shows differences which may be caused by the different number of movements. The monthly distribution (Fig.2) shows clear maxima between April and July and in October (fall migration); the diurnal variation (Fig.3) shows a clear maximum during the morning hours.

Only at 17 incidents rests of birds could be determined, and that: Black-Headed Gull (*Larus ridibundus*), Swallow (*Hirundo spec.*), Tree Sparrow (*Passer montanus*) and Falcon (*Falco spec.*) within the airfield area, Herring Gull (*Larus argentatus*), Gulls (*Larus spec.*), Swift (*Apus apus*) and Buzzard (*Buteo spec.*) in the Frasca Range area and Gull (*Larus spec.*), Buzzard (*Buteo spec.*), Spanish Sparrow (*Passer hispaniolensis*), Jackdaw (*Corvus monedula*), Swallow (*Hirundo rustica*), House Martin (*Delichon urbica*) and Redwing (*Turdus iliacus*) enroute.

In winter and springtime danger by gulls seems to be very strong, in summertime small birds and in autumn birds of prey as well as thrushes dominate.

As to the flight height an exponential decreasing of the bird-strike-risk with increasing flight levels could be stated but in heights more than 1500 ft (GND) the relative quota of birdstrikes causing damage was increasing (Fig.4).

In total nearly 40 % of incidents caused damages.

2. Ecological investigations

2.1. Climatic situation

The climatic situation in Sardinia is characterized by a rainy winter period and a dry summer-period; the average yearly air temperature is 17° C in the Campidano plain and the average precipitation is 512 mm (Fig. 5).

Humid/moist soils on the airfield and in the Frasca Range area during precipitation periods favour appearance of starlings, gulls, lapwings and limicols.

Depending on changing temperature- and humidity-conditions the main vegetation period is between March and May and in October/November after beginning of precipitation period.

The humidity-preferring soil animals, f.i. beetles, myriapodae, survive dry periods in the deep soil layers. Xerotherme insects, f.i. field grasshoppers, reach its maximum in summertime and in early autumn. So birds will find various food depending on seasons.

2.2. Vegetation

The airfield of Decimomannu (Fig.6), situated in the Campidano plain 17 km NW of Cagliari has a size of 400 ha, a runway of nearly 3.000 m and is characterized by grassland and smaller shrubbs. The grassland is highly rich in weeds growing up to maximum 50 cm. Some smaller areas are grown over with *Arundo donax* - reed or very dense mats with *Asphodelus* and thistles which are favouring bird appearance by covering. Some areas are in agricultural using (oats, broad beans); moreover there exist moist ditches and tree plantings with *Eucalyptus*, Pine trees and *Acacias*.

The surrounding areas show agricultural using f.i.cereals, vine, beans, beets, artichokes fenced in by *Opuntias*. Harvest of corn and pods in July/August as well as vintage favour appearance of birds.

The Frasca Range (appx. 65 m above NN) shows a typical *Asphodelus*-field in consequence of pasturing which causes also large-size wet areas which are attractive for gulls.

2.3. Ornithological situation

The Avifauna of Sardinia depends on season; nearly 60 % of birds are residents; additionally 50 bird species spend the wintertime on the Island, f.i.limicols, ducks, lapwings and starlings; in summertime the avifauna of Sardinia is enriched by appx. 40 breeding birds which are wintering in Africa. From February until April and from September until November 40 bird species migrate over Sardinia and rest there fore a short time (Fig.6).

For flight safety on the airfield the following bird species are important because of its size or weights:

- Babara Partridge (*Alectoris barbara*)
- Quail (*Coturnix coturnix*)
- Little Bustard (*Tetrax tetrax*)
- Kestrel (*Falco tinnunculus*)
- Scops Owl (*Otus scops*)
- Pigeons (various species and types)
- Gulls (*Larus spec.*)

In the surroundings of the airfield (southern area) a garbage dump under the approach is very attractive for Black-headed- and Herring Gulls].

The most important area in the surroundings is the Laguna of Cagliari with a high population of:

- flamingos (*Phoenicopterus ruber*), September until April, up to 2.500 individuals, short distance migration especially in the early morning- and late evening hours,
- herons (various species), March/April, September/October, more than 1.000 individuals,
- ducks (various species), in wintertime, some thousands,
- gulls, all over the year, in summertime some hundreds, in wintertime some thousands,
- limicols, March/May, September/October, some thousands in large flocks.

The Frasca Range area is situated under a migration route (leading line); the most dangerous bird species are besides small birds during migration periods especially Ravens (*Corvus corax*), Buzzards (*Buteo spec.*), Hooded Crows (*Corvus corone sardonius*) and Starlings (*Sturnus vulgaris*).

On the low level route from Decimomannu to Frasca Range the Valley of Cixerri will be dangerous by Golden Eagles (*Aquila chrysaetos*), Griffon Vulture (*Gyps fulvus*) and a high population of Buzzards (*Buteo buteo*). Therefore special flight procedures should be worked up.

Fall migration of birds will reach Sardinia already during the last August decade (swifts), in September appear limicols and Passeriformes; most birds cross Sardinia during the last decade of October; flamingos arrive in the Cagliari area in October/November together with large flocks of ducks as wintering species.

Spring migration begins at the end of February, ducks are migrating in northern direction, small birds are arriving from Africa. The highest intensities are reached in March with re-migration of flamingos, limicols and small birds.

Nevertheless bird migration on Sardinia seems to be smaller than on the Italian mainland; but it is characteristic for the migration situation that it concentrates on the coastal district (leading line) and on the southern point of Sardinia (congestion).

The migration intensity on Sardinia is influenced by meteorological conditions. During dry periods in autumn migrating birds will rest only for a short time because of lack of food but in moist autumn periods migration may pass for some weeks; moreover southerly winds in autumn will stop migration and intensify bird concentrations on Sardinia.

In springtime migration situation will be influenced by weather situation in Middle Europe, f.i. long lasting cold periods.

Close cloud conditions in the mountain areas of Sardinia may change migration routes so that the Campidano plain will show highest concentrations which are important for low level flights between the airbase and the range.

The quantity of migrants and resident birds is influenced by rain during wintertime; high quantities of rain will induce high concentrations of gulls, lapwings and limicols.

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3. Other animals

3.1. Vertebratae

They are very important as food for birds of prey, owls, crows, herons and various gull species. There have been investigated 57 pellets of owls and falcons which showed residues of 184 animals (individuals), and that maximum 8 residues of various animals. The compounds were as follows:

- mice (*Mus musculus musculus*, *Crocidura russula*,
Suncus etruscus, *Sylvaemus sylvaticus*) 164 x
- rats (*Rattus spec.*) 7 x
- birds 6 x
- beetles (invertebrates) 6 x
- snails (invertebrates) 1 x

Moreover there have been found pluckings of quails and serins as well as rests of rats and grasshoppers.

During summertime this compound is changed and that: 85 % insects, 10 % small vertebrates, 3 % lizards, 2 % birds and 1 % snails.

3.2. Invertebratae

The following groups of invertebrates could be observed:

- Snails (Gastropoda) with shell outlasting dry periods and serving as food for gulls, lapwings, pigeons, crows and starlings,
- Spiders (Araneae), day- and night-active species (Lycosidae, Erigonidae, Atypidae, Drasodidae) as food for small birds,
- Isopodes/Myriapodes, living in the upper soil layer or in organic material, high activity during wintertime and food for small birds,
- Orthoptera (Blattodea, Mantodea, Saltatoria, Dermaptera), day- or night-active, with increasing populations from April until October; grasshoppers (f.i. *Anacridium aegypticum*, *Pamphagus sardeus*) are of high importance for small birds as well as for starlings, crows, lapwings, gulls and birds of prey,
- Heteroptera/Homoptera, living in the weed- and shrubb-layers of the vegetation during summertime,
- Beetles (Coleoptera), especially in springtime and summer, day- or nights-active, food for all species of birds incl. birds of prey and owls,
- Hymenoptera/Diptera, f.i. bees, Bumble bees, Wasps, flies and mosquitos especially in summertime main food for swallows, swifts etc.,
- Butterflies (Lepidoptera), mostly night-active species and food for swifts and owls,
- Larvae and worms, living in the soil and coming on the surface during rainy periods as food for lapwings etc.

So the animal food in the airfield shows a large spectrum and guarantees bird appearance during every season of the year.

4. Provisions against birds

4.1. Grassland areas

The existing yearly grass-length , mostly between 15 and 25 cm, should not be changed because of the high mice population and the fire danger. The weeds in the grassland are not relevant, they are necessary for a dense vegetation; only higher growing weeds like affodil, thistles and reed should be removed.

For the springtime rolling of grassland is recommended in order to destroy the nests; in case of mowing the grass-material should be removed.

Agricultural using on the airfield should be stopped.

4.2. Small animals

It seems necessary to minimize animal food for birds especially populations of mice, snails and grasshoppers by baits or spraying with insecticides.

4.3. Removal of bird concentration areas

The following provisions should be carried out in order to remove or to change bird concentration areas:

- Removal of water ditches and periodical swampy areas,
- Removal of garbage dumps,
- Regular control of hangars and shelters for nesting birds in early springtime.

4.4. Pyroacoustics

Only against resting birds during migration periods and at actual danger at take-off and landing as well as before beginning flight operations in the morning or evening.

4.5. Bird observations and warnings

On the airfield it will be possible to start a special visual observation program regarding the periods of high bird activities during migration periods, after precipitation periods in wintertime as well as during ripeness and harvest of vine and crops in the surroundings.

On the Frasca Range birdstrike-risk is higher than on the airfield; for direct provisions are impossible, observation of birds and warnings to pilots (cancellation of shooting operations) should have priority. Only a drainage of the large moist and swampy areas should be discussed.

4.6. Flight operation procedures

Special periods with increasing birdstrike risk and special districts of southern Sardinia with high periodic bird populations should be regarded at flight planning.

Fig. 2: Monthly Distribution of Bird Strikes at Sardinia/Italy - 237 -
1968-1979

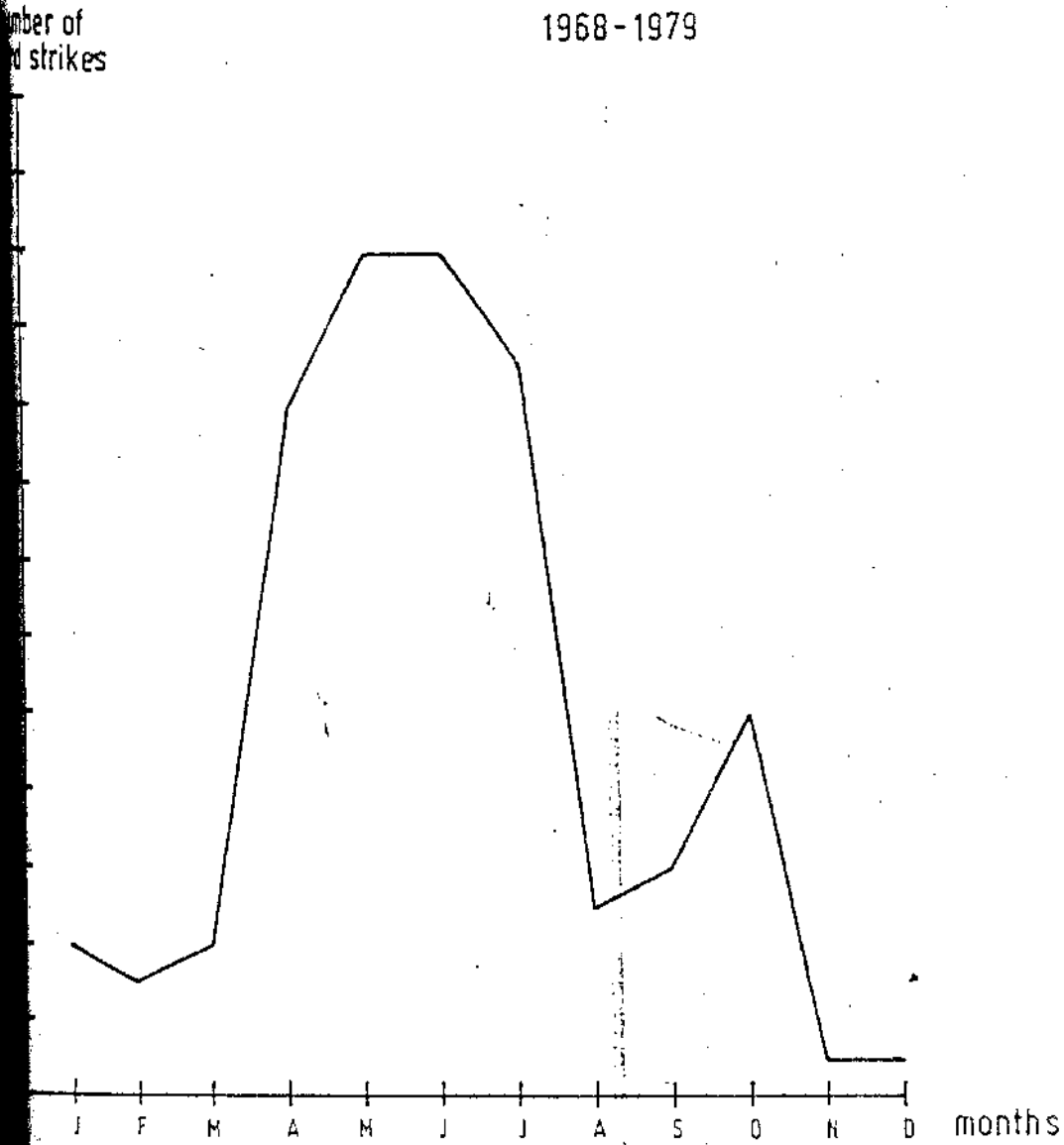


Fig. 3: Time of Day of Bird Strikes at Sardinia/Italy
1968-1979

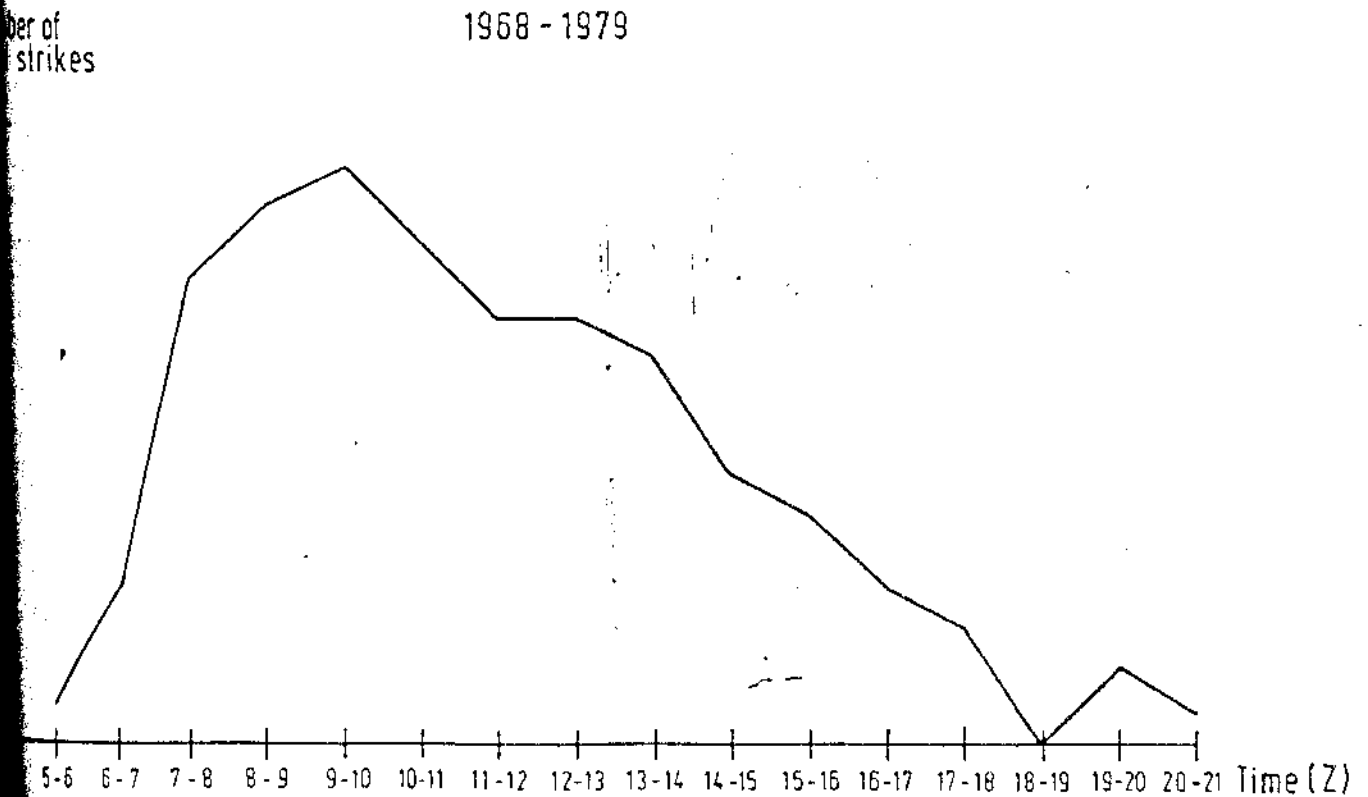


Fig. 4: Altitudes of Bird Strikes at Sardinia/Italy
1968 - 1979

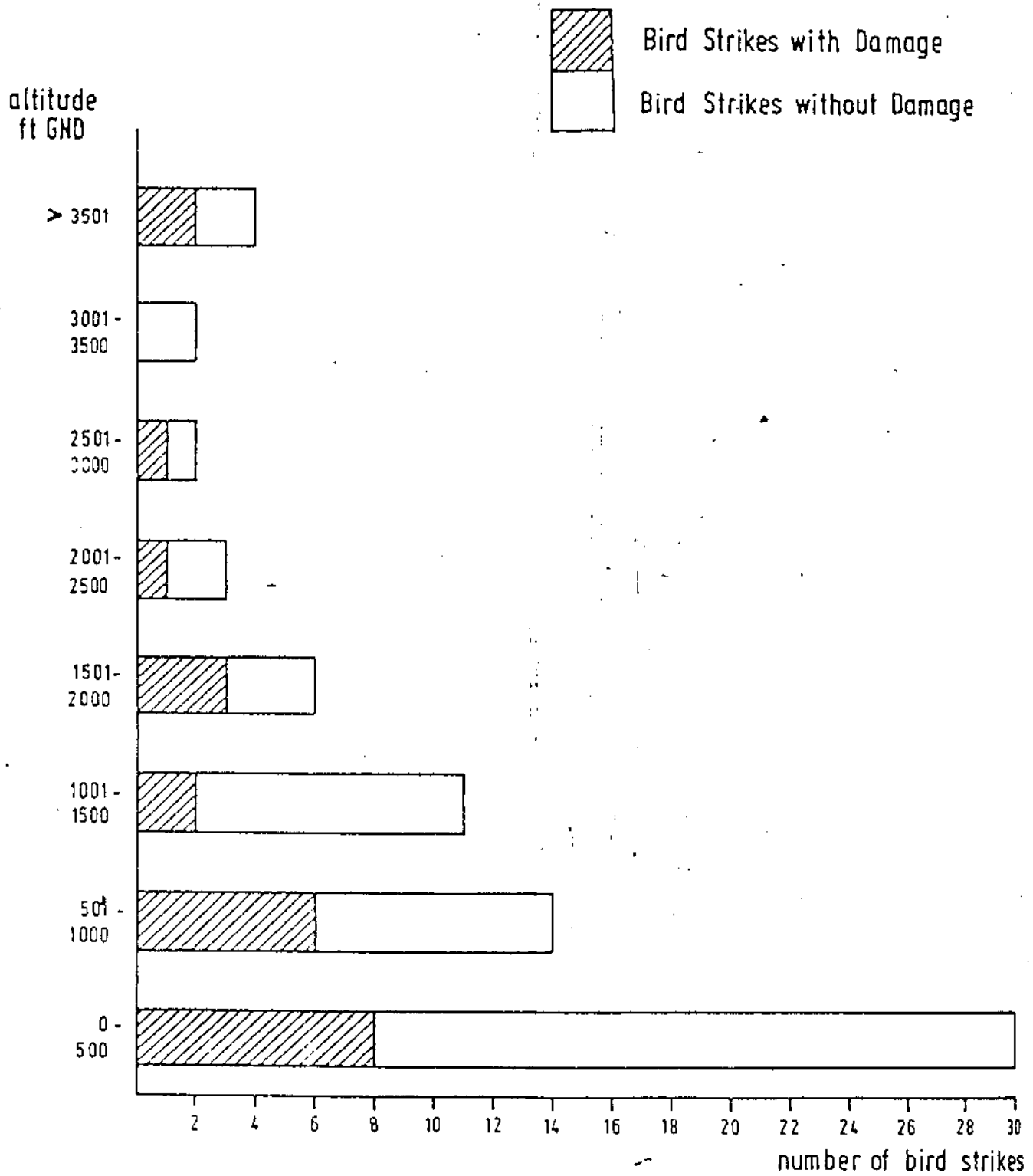
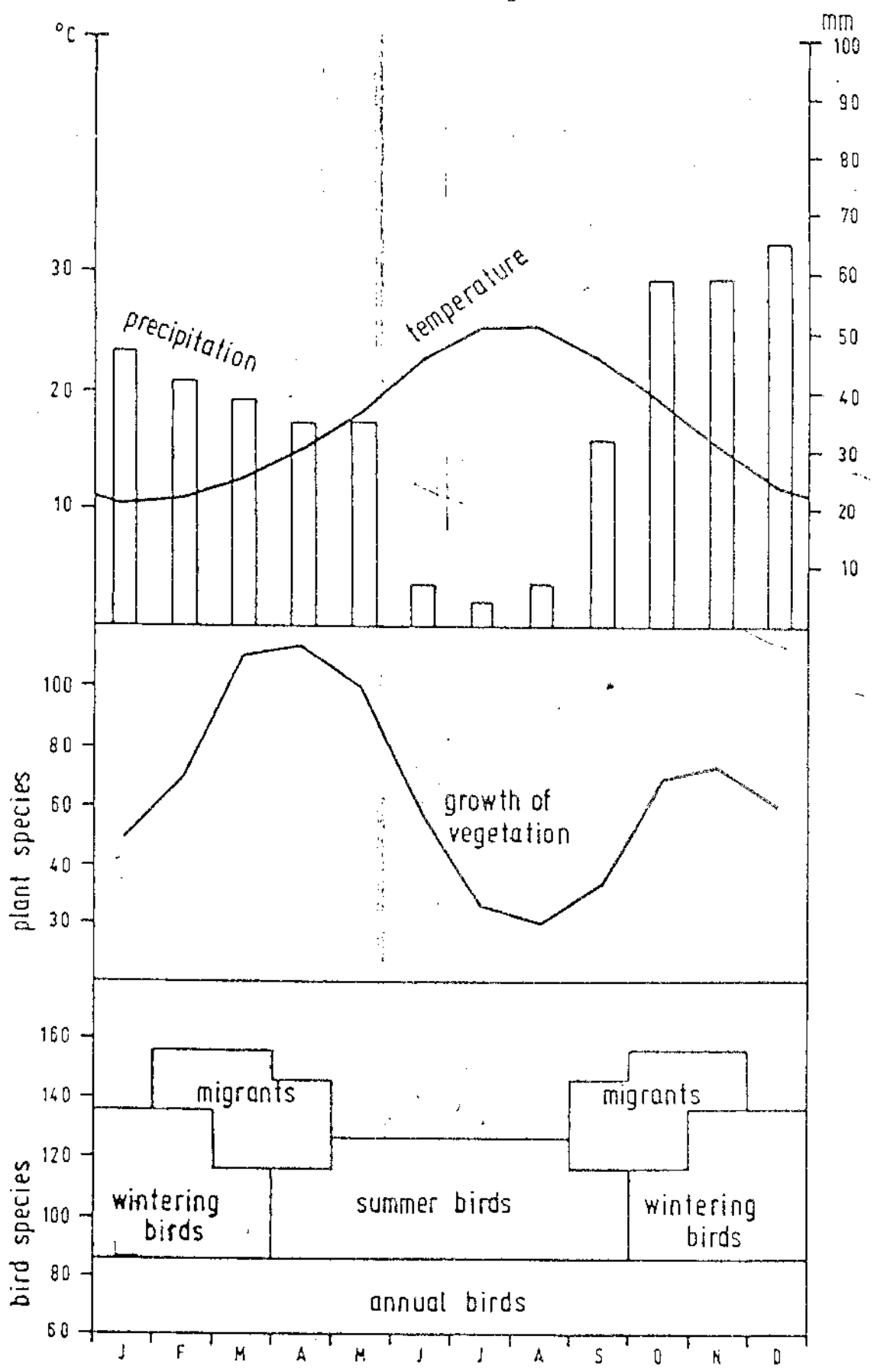
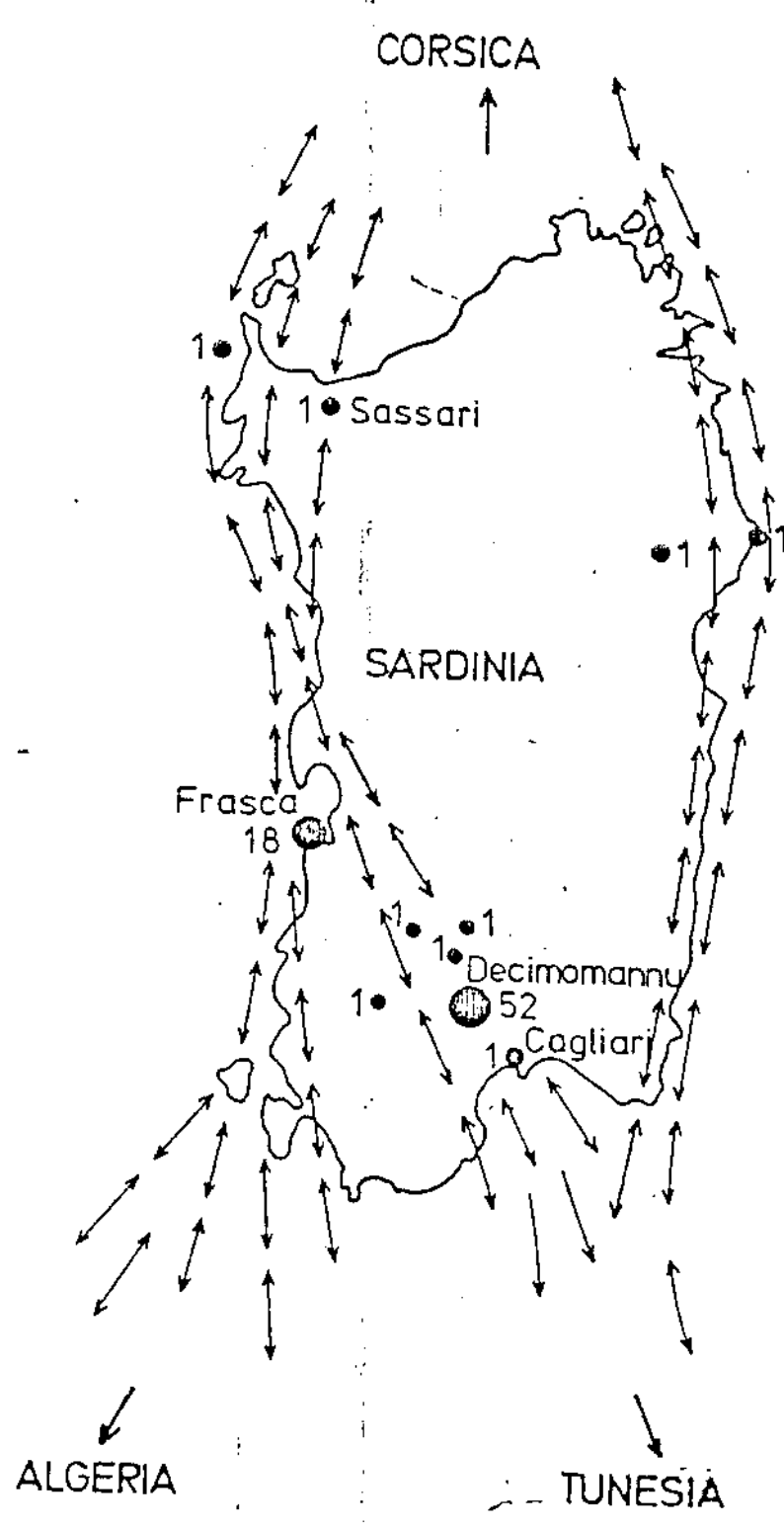


Fig.5: Phenology of Vegetation and Bird Species at Sardinia/Italy
(Climatic Date of Cagliari)



30
kes

Fig. 6: Bird Strikes German Air Force at Sardinia/Italy 1968 - 1979 and Narrow Front Migration Routes




KONINKLIJKE LUCHTVAART MAATSCHAPPIJ N.V.

Datum:

Mar 20, '84

Van Dienst/Bur./Afd. Flight Support Services Dept.

RAPPORT Nr.: 101

Onderwerp : Birdstrikes during 1983

Samensteller : C. Bakker

Aan	Ams/OL	Co	AMS/AC	AMS/AC
	Hr. C.H. Schoen		AMS/OA	SPL/CE
			AMS/OD	SPL/OA
			AMS/OV	RLD/LI
			AMS/HP	N.V.L.S.

1. General

Total number of detected birdstrikes during 1983 70 (100%)

Birdstrikes at Amsterdam Schiphol	29	(41.4%)
at Aerodromes inside Europe	20	(28.5%)
at Aerodromes outside Europe	9	(12.9%)
en route	2	(2.9%)
unknown	1	(1.4%)

2. Lists of birdstrikes at airports during 1983 (see attachments)

T = Take-off

C = Climb

A = Approach

L = Landing