

**FALCONRY FOR BIRD CONTROL
ON AIRDROMES
(THE SPANISH EXPERIENCE AFTER 26 YEARS)**

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ABSTRACT

The paper contains a resume of the Spanish Air Force experience on the use of falcons for the bird control on the different Air Force Bases and Airports of Spain. The experience started in April 1968 with Operation "Bahari", directed by Prof. Felix Rodriguez de la Fuente.

A full description of the technique used today, together with the operation costs, infrastructure, logistic needs and the number and type of birds flown in the daily operation are detailed in this work.

(Keyword: Falcon, Falconry)

FALCONRY FOR BIRD CONTROL ON AIRDROMES
(26 YEARS OF SPANISH AIR FORCE EXPERIENCE)

1. INTRODUCTION

1.1. Spain is located in one of the two main bird migration routes from North Europe to Africa and viceversa. The iberian route is used by many different kind of birds like cranes (*Grus grus*, *Ardea cinerea*, *Anthropoides virgo*), storks (*ciconia ciconia*), ducks(ansars), pigeons (*columbiformes*), etc. Although some of these migrating birds feed and nest in the Iberian penninsula, the main hazard to the military air navigation in Spain are neither those hundreds of thousands of migrating birds nor the flocks of nestings birds.

1.2. The greatest risk to the low level air navigation is the constant presence in the iberian skies of FALCONIFORMES, mainly vultures like the common vulture (*Gyps fulvus*), the black vulture (*Aegyptius monachus*), the "alimoche" (*Neophoron percnopterus*) and the "quebrantahuesos" (*Gupaetus Basbatus*).

1.3 Two recent census for the common vulture, carried out in 1979 and in 1989 by the Spanish Enviromental Agency (ICONA) in cooperation with the Spanish Society of Ornithology (SEO) came out with a figure of more than 8000 nesting couples in Spain, with a growth rate of 80% to 90% for that decade. Probably more than 20000 vultures fly today in Spain.

1.4 In fact, on the past 18 months the Spanish Air Force suffered two major and one minor bird strikes during low level navigation due to common vultures, and not a single one with any other bird specimens.

1.5 At the Spanish Air Force Bases and their vicinity the main hazard are still different species of local birds: from sea gulls to cranes, storks, geese, stone curlews or litle burstars, depending on the geographical location of each particular Air Force Base.

For that reason, in April 1968, after a series of bird strikes at the Torrejon Air Force Base, home at that time of the 12th Fighter Wing (Spanish Air Force) and of the Sixth Air Force (USAF), a bird control program using falcons was establish.

1.6 From August 1967 to March 1968 a total of seven bird strikes were recorded at that particular air base: 4 bird strikes during the take off phase, 1 on final, 1 on missed approach and 1 during the landing phase. All of those bird strikes were due to the locally called "SISON" (Little Bustar), which is the size of a duck.

During that period of time a total of 33.598 sightings of Little Bustar (*Otis tetrax*, sison in Spanish) and 2.984 sightings of Lapwing Plover (*Vanellus vanellus*, avefria in Spanish) were recorded on the airfield by the FOD (Foreing Object Damage) control team.

1.7 After the falconry program was started, and for the same period of eight months, the sightings were reduced to 2.071 Little bustars and 2.304 Lapwing Plovers.

1.8 The program to reduce the bird strikes with the use of falcons was called Operation "Bahari" (Bahari is an ancient spanish word for falcon, the word root is arabic). The operation started in April 1968 and it has been running continuously and successfully since then.

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From April 68 to May 94 not a single bird strike has been recorded at Torrejon Air Force Base.

1.9 As the use of Falconry has shown its effectiveness, the program has been applied progressively to other Air Force Bases throughout Spain. Nowadays five military airdromes and four International Airport are using falconry to control the Bird Hazard (see Figure 1).

2. OPERATION BAHARI

Operation "Bahari" started after an agreement was reached between the United States Air Force, the Spanish Air Force and professor Felix Rodriguez de la Fuente, a famous Naturist who died in an aircrash in Shaktoolik (Alaska) in March 1980. The operation was designed in two phases: training and implementation.

2.1. **TRAINING PHASE:** After four months of hard training, all the of nine falcons and the two tiercels (all of them Pelegrin and only one Saker) were able to kill in flight mainly against the Little Bustard. Some of them were trained to hunt from "waiting on", some "from hand". Two expert falconers and Prof. Rodriguez de la Fuente himself took part in this phase. During this training phase all the falcons were flown daily.

Two non comisioned officers, from the 401th Tactical Wing (USAFE), were trained to act as falconers during this period.

2.2. **IMPLEMENTATION PHASE:** Once the training phase completed the number of falcons flights were diminish to four of them daily. Only two falconer were needed to implement this phase of the program. The aim of this part of the operation was to maintain the level of preasure on the local birds, until they give up trying to return to their nests and feeding areas.

2.3. **CONCLUSIONS:** As Operation Bahari was about to be converted into a permanent program, three years after its start, some conclusions about the use of falconry to control bird folks were then pointed out:

a. Not all Air Bases/Airports are suitable for falcons, there must be a field wide enough around the flight line (some 500 mts.) where falcons can perform their task. There must not be a wood or a water extension in the immediate vicinity of the airfield were birds can search for shelter.

b. Aircraft take off/land frequency should be not more than every 3 minutes.

c. The birds to be scared must belong to the species that falcons can hunt with sufficient easiness and training.

d. One of the key factors for the success of the bird control by falconry is the professionalism of the falconer. He must follow and direct the operation continously.

e. Before the start of the operation the falconer must demonstrate the ability to direct the kill of the birds that are the intended target of the operation on the very airfield.

f. After a high intensity campaign of continuous and regular hunting and killing performed by the falcons on the flocks of birds of about 4 to 6 months, a good result is to be expected.

g. When the first result is obtained, as in paragraph "e.", the frequency of the flying and hunting of the falcons can be reduced, but should never be suspended, because without a daily control, the flocks of birds will return for sure to the area.

3. PRESENT DAY OPERATIONS

Four Air Force Bases are running programs alike Operation Bahari, these are: Torrejon AFB, Moron AFB, Talavera AFB and San Javier AFB (see Figure 1). Fast jets operate from all those airfields in a 24 hrs basis. In all of them the bird strike hazard is present, but the species of birds are different from one Base to the other, so in every case a particular modification of the standard program has to be established.

3.1 In every case the operation is divided in two phases: HIGH PRESSURE, implemented by two to three falconers and six falcons, flown daily; and CONTINUATION phase, in this one the goal is only to maintain the pressure on the local birds, it is run by one single falconer with a team of six (6) fully trained falcons and tiercels, but only four of them are flown on a daily basis. Most of the falcons are Peregrine, but some are Sakers and just a few of them are Jers (*Falco rusticolus*). All of them were obtained by reproduction in captivity, through an officialy authorised organisation. The attrition rate has been an average of five birds a year for the complete operation in the four Bases.

3.2 The operation run at the Ibiza International Airport is also going to be mentioned in this paper because the situation is similar to that present in San Javier AFB (which begun the bird control with falcons at the end of the last spring), so the experience in that one is going to be use to control the bird factor in San Javier.

3.3. IBIZA INTERNATIONAL AIRPORT BIRD CONTROL.

The International Airport of the Ibiza island (figure 2) is located in an isthmus and very close to a huge area of open air salt works.

3.3.1 The estimated population of different species of sea-gulls (*Larus argentatus*, *Larus audouinii*, *Larus ridibundus*) in the year 1988 was of 13.460 couples, with an annual growth rate of 130%. Other birds also feed and nest in this area: cranes (*Ardea cinerea*, *Egretta garcetta*), eagles (*Pandion halietus*, *Circus aeruginosus*), storks (*Himantopus himantopus*) and swallows (*Apus apus*, *Hirundo rustica*).

3.3.2 The bird population has caused various bird strikes in the recent history of the airport, the most serious of them are as followed:

- 1980: During the climb, after take off, a Spanish Navy "Sea King" takes an eagle in the left engine, the helo has to make an emergency let down resulting in a hard landing. The engine has to be changed due to the extensive damage of the bird

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- 1989: an AVIACO DC-9, with 120 pax on board, flew into a sea-gull flock during the take off, at 120 ft. he lost both engines due to the ingestion of many birds. The pilot managed to restart one of the engines and made an emergency landing.

- 1990: a CON-AIR Airbus-300, with 220 pax on board, took two sea-gulls in the left engine while on the take off phase of the flight, at an altitude of 60 ft. As a result of the bird impact the left engine exploded and came off the wing. The pilot managed to make an emergency landing on runway 06, but the contact with the runway was so hard that the main landing gear collapsed. The airplane did not exploded because all the fuel was dumped previously by the crew before the landing.

3.3.3 After this last accident, the Airport Authority decided to initiate a bird control program with shot guns and scaring devices, but the result was very poor, and still some minor incidents were reported.

3.3.4 In April 1992 a bird control program with falcons was started. The first result were evident just a few weeks after the program began. The birds have left the runway, which they used as a shelter and as a rest area and they have changed their habits as well.

3.3.5 It took three months until the sea-gulls quit coming back to the runway after the daily routine flights of the falcons.

The birds have also changed their daily migrations routes, from the open air salt works, south of the airport, to the city rubbish dump, far away to the NE of the airport, as shown in figure 3, in order to avoid what they now consider a very dangerous area.

3.3.6 Not a single incident involving birds has been reported at the Ibiza International Airport since the start of the falconry program, in april 92.

3.4. TALAVERA AIR FORCE BASE

The program started at this military station on March 94. During that first month the bird census was as follows:

- Little Bustard (*Otis Tetrax*)_1164 sightings
- Stork (*Ciconia ciconia*) 59 sightings
- Pigeon (*Pipionis*) 82 sightings
- Crane (*Egretta*) 23 sightings
- Perdix (*Alectoris ruf*) 60 sightings
- Mag pie (*Pica pica*) 73 sightings

3.4.1 Only two months after the falcons were flown on a regular maner, in may, the total sightings of birds was only 364 (a total of 422 sightings during the month of april), being the following the most significant species:

- Little bustard
- Stork
- Mag pie
- Pigeon

3.4.2 Not a single incident involving birds has been reported since the beginning of the program at this military installation.

3.4.3 The daily routine starts at around 07:30 hrs, 30 minutes before the first flight of the day, with a complete check of the runway and taxi ways, to confirm that the area is clear of birds or to take immediate action against the intruder birds. This routine is repeated 3 to 4 times during the morning and one more time during the afternoon.

3.4.4 Four falcons, out of six, are flown every day, and always the falconer is in close coordination with the control tower and on radio contact. Only one falconer is needed for every routine "turn to the runway".

3.4.5 The main target of this program is to eradicate the sedentary birds that are an enticement for other species of birds, like the migratory birds.

3.4.6 During the migration season an intensive action should be maintained on the airfield, this is due to the fact that seasonal birds are looking for a safe place to nest and feed during the summer, and the presence of sedentary flocks are a symptom of the safety of the spot for new comers.

3.5. SAN JAVIER AIR FORCE BASE & AIR FORCE ACADEMY.

This program started during the last days of April 94. Based on the previous experience at the Ibiza airport, which has about the same bird fauna and flora, with that experience as a background it is foreseeable to think that this new program is going to be a complete success.

3.5.1 The Air Base is located ashore a salt lake (called the "Mar Menor" - small sea), very close to the Mediterranean sea (see figure 4) and surrounded by marshes and open air salt work areas.

3.5.2 The first bird census at the airfield itself was performed during April 94, and the result of it was as follows:

- Sea gull (*Larus*): 305 sightings
- Stone Curlew (*Burhinus oedichnemus*): 132 sightings
- Pigeon: 20 sightings
- Cranes: 4 sightings
- Short-Toed Lark (*Calandrella cinerea*): 390 sightings
- Trail: 29 sightings
- Upe (*Upupa epos*): 147 sightings
- Red Partridge (*Perdix*): 42 sightings
- Goose (*Anser anser*): 13 sightings
- Harrier (*Circus aeroginosus*): 3 sightings
- European Kestrel (*Falco tinnunculus*): 2 sightings
- Kite: 1 sightings
- total: 1088 birds seen.

3.5.3 As it can be noted that sea gulls are, by far, the most dangerous bird for aircrafts at San Javier, due to its size and number, but the presence of geese is also a major concern, so this bird has become the first target of the program.

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3.5.4 Only one month after the program was initiated (may) the sightings decreased dramatically, been the total figure of birds less than 50% what was recorded on april. The may census was as follows:

- Sea gull: 169 sightings
- Stone Curlew: 72 sightings
- Pigeon: 10 sightings
- Cranes: 2 sightings
- Short-Toed Lark: 150 sightings
- Trail: 28 sightings
- Duck: 5 sightings
- total: 464 birds

3.5.5 To start with, and only during the first month of the program, 8 falcons and 2 to 3 falconers were used to get rid of the sedentary birds, then only 6 falcons and 1 falconer shall be used to maintain the pressure on the bird population, which is decreasing dramatically.

3.6. MORON AIR FORCE BASE.

The program has been running continuously for almost twenty years. The team is composed here by two falconers and 8/6 falcons. Since the beginning of the bird control not a single bird strike has been reported in the air base.

3.6.1 The terrain that surrounds the base is quite the same that on the base it self, as for the fauna and vegetation, the runway has no woods, ponds, villages or any major obstacles 10 km. around. This can be seen as the optimum scenario for the control of birds with falcons.

3.7. OTHER SPANISH LOCATIONS

A number of other national and international airports control the risk of bird strikes with falcons, those are: Malaga Int., Sevilla Int., Cuatro Vientos Nat., Barajas Int. and Rota Naval Air Station (Spanish Navy).

4. OPERATION COSTS

4.1 The global annual Spanish Air Force contract for every individual base cost is 6.500.000 pesetas (460.000 US \$).

4.2 Partial operation costs are as follows:

- A Full trained peregrine falcon: 300.000 pts (2.200 US \$).
- Falconry devices and various equipment for falcons: 200.000 pts (1.400 US \$).
- Each falcon/tiercel eat one quail (*coturnix coturnix*) or the equivalent of chicken meat (80 to 100 grams).
- Feeding: 500 pts (3.5 US \$) a day per falcon/tiercel.
- Complete set of Receiver, Homing device and 6 x Transmitters: 250.000 pts (1.700 US \$). This equipment is a must to diminish the falcon attrition rate.
- First aid kit for falcons: 50.000 pts (350 US \$).
- Annual medical expenses: 600.000 pts (4.200 US \$). Every year two out of every six birds suffer from different diseases, like micosis, and they cannot be flown for a number of days.

4.3 During the hot season the birds need to change their feathers, so a lower performance is to be expected from the birds. The operation has to be run on a low profile, supported by scaring devices.

4.4 There are the companys that work for the Spanish Air Force on the bird control with falcons, those are:

- JESUS BRIZUELA MARTINEZ
C/Garcia Marin, 16. 41539-MORON-(SEVILLA)
Tel/Fax 34.5.485.25.04
- AMPARO SAEZ CASTRILLO
C/Cervantes, 35. 28816-CAMARMA-(MADRID)
Tel 34.1.886.60.56

5. SUMMARY

As a summary of the Spanish experience, that started many years ago, we can validate almost all the conclusions from Operation Bahari, and to add the following:

- The effective area of falcon influence is 1km around the area flown by the hunting bird.
- Four routine flight periods are needed. The first starting about 30 min. before the first flight of the day.
- The basic training of a new bird takes three to four months but to be fully trained the bird need at least two years.
- For a highly motivated falconer it will take a year to be fully proficient in handling efficiently the trained falcons.
- A minimum of three months are required to reduce the bird population down to 80% at the target airport.
- Tiercels (male falcons) are preferred against small birds, and falcons (female) to hunt medium to large birds. Never the less both produce the same scaring effect against birds.
- To support the effect of falcons other means are used, those are as follows:
 - . Dog (setter).
 - . Detonators, only rarely.
 - . Scaring devices.
 - . Traps.

These methods are to be flexible and adapted to the birds response. Rigidity does never work with birds.

- In airports/bases near the sea the control of falcons is more difficult, and a higher falcon attrition rate is to be expected. In San Javier one falcon has been lost after only two months of operation.
- To reduce the risk to loose falcons a radio transmitter must be mounted on every bird. The device works on VHF and has an optimum range of 10 Km.
- If for any reason the falcons are not flown on the air base within 15 days, it is to be expected that the local birds will return to the airfield, increasing the risk of a bird strike.
- Falconry can not be used if:
 - The wind intensity is above 20/25 kts.
 - When fog is present.
 - During the hottest hours of the day (temp. above 36°C).
 - Against large birds like vultures.

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6. CONCLUSIONS

Falconry is a very cost/effective method for the control of birds in airdromes, but not all the airfields are suitable for falcons. The key point for the success of the operation is a very motivated and profesional falconer and a thoroughly study of the air base characteristics (fauna, flora, topography) and the type of bird or birds to erradicate and a constant study of other scarcy methods to support the action of falcons.

Madrid 15 june 1994
THE SPANISH BSCE REPRESENTATIVES

- Manuel Chamorro González -
- Jorge Clavero -

FIGURE 1

AIR BASES/AIRPORTS BIRD CONTROL WITH FALCONS

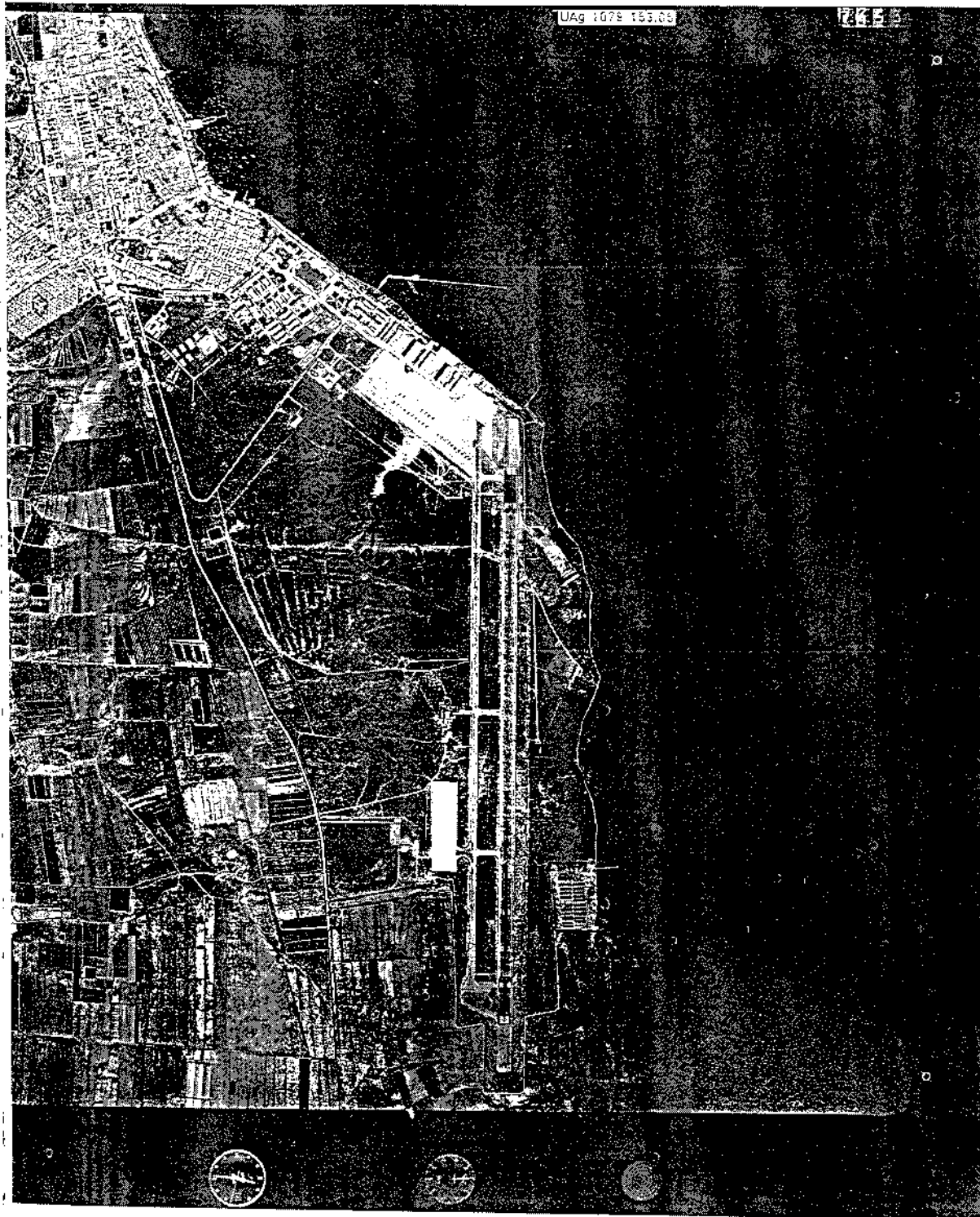


FIGURE 2

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