ALBATROS PROJECT *MONOGRAPH* *2012*

ELEONORA'S FALCON

Falco eleonorae

Updated state of knowledge and conservation of the nesting populations of the Mediterranean Small Islands

Hamid Rguibi (University Chouaib Doukkali)
Abdeljebbar Qninba (University Mohammed V of Rabat)
Abdelaziz Benhoussa (University Mohammed V of Rabat)

Reviewing and data providers:

- *Vicente Urios (University of Alicante)*
- *Danae Portolou (HOS-BirdLife-Greece)*
- *Olivier Peyre (Naturalia Environnement)*
- *Joan Mayol Serra (Servei de Protecció d'Èspècies, Mallorca)*

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CONTEXT

Mediterranean Small Islands Initiative :

The Conservatoire du Littoral has been coordinating, since 2005, an international programme for the promotion and assistance for the management of Mediterranean insular micro-spaces, known as the PIM Initiative for the Mediterranean Small Islands, which is financed by the Fonds Français pour l'Environnement Mondial (FFEM) (French Global Environment Facility), the Agence de l'Eau Rhone Méditerranée-Corse and city of Marseille. The PIM Initiative is developing a mechanism for the exchange and sharing of knowledge which is necessary for the emergence of good management practices of exceptional spaces. The Albatross project has been set up within the framework of this programme to enhance the knowledge of Mediterranean nesting bird species. To update the knowledge on these species, the PIM Initiative has coordinated the preparation of monographs for each of the project species.
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GENERAL DATA

Scientific Name: Falco eleonorae
French name: Faucon d'Éléonore
Spanish name: Halcón de Eleonora
Arabic name :صقر اليانو
Italian name : Falco di Eleonora

Protection Code :

Barcelona Convention : Annex II
Bird Directive : Annex I, List of Ornis comitee
Berne convention : Annex II
UICN : least concerned

DESCRIPTION OF SPECIES

The Eleonora's Falcon is of average size. Elegant and very slim. It measures from 35 to 42 cm length with a wingspan of 85 to 105 cm. It has long narrow wings and a long tail. It is fawn-coloured at the lower part of its body, and the contrast between the dark grey of the under-wing covers, and the clear grey of the primary feathers, as much as the white cheeks contrast with the black stripe of the "moustache". Both sexes have a similar appearance.
The species dimorphism thus does not intervene at the level of the sexes (females and males are almost identical), but a melanism (abnormal high proportion of black pigments on the feathers) is very frequent. Indeed, an individual out of four is born dark. These are entirely dark whereas light coloured individuals, which occur more frequently, have wings and a black head, a white throat and a reddish belly striated with black. They have a beautiful well drawn "moustache" and a long tail which characterizes well the species.

The adult has two colour variations. The clear morph, most widespread, has a blackish slate-grey top, a cream-coloured area behind the blackish moustache and a chamois cream-coloured throat with light-coloured stripes on the chest area. The lower part is chamois to russet-red, strongly striated with black and a uniformly coloured belly. The orbital circle are yellow.
The dark morph is a very brownish dark slate- grey colour with an often cream-coloured throat and the bottom area of the lower parts is sometimes a russet-red. The orbital circles of the male are yellow. The orbital circles of the female are of a clear pale blue.
The juveniles have two morphs, but with the cream fringed top to russet-red and the lower part chamois with russet-red, and brownish. The pectoral striae are thick but finer on the belly and the feathers of the feet. Around the beak is bluish and the legs are green.

It is advisable to be careful as for the identification of this species, particularly with dark adult plumage and immature plumage. 1/4 of the population has a dark morph which can be confused with the adults of the Sooty Falcon *Falco concolor* (very scarce in the Mediterranean). The adults with a lighter morph are brown grey on the upper part, somewhat lighter-coloured than the individuals with a darker morph. The lower face is marked with brown or black stripes.
Eleonora's Falcon has an extremely gracious flight, very agile and rapid. It is capable of making great vertical dives and extraordinary speeds. It has deep and regular wing beats when hunting but can also fly slowly with seemingly leisurely wing beats. It is able to be immobilized in the air by deploying its tail and its outstretched wings like the buzzards.
In flight, the bottom view, the male clear morph shows a cream-coloured throat, a striated body, a plain belly, a greyish tail striped with russet-red and with a dark spot. The covers are brown dark and the dark remiges have a paler base. In flight, the dark morph appears completely black, and the colour seems even darker in the females than in the males.
Eleonora's Falcon is vociferous and cries a lot when it starts hunting. It is a very noisy species. It is a rather harsh sound "kia-kia-kia". Frequently, it emits only one "kiyet". It has also a "kiei-kiei-kiei" by stressing the two last syllables. Simple "ki-ki-ki-ki" can be heard followed by a shrill «kiii-kiiii-kiiii". When they feed the young in the nest, they emit low and very raucous sounds.

Eleonora's Falcon's pellets are often abundant under the nest. They quickly become matt and a lighter grey, when dry. These droppings measure 20-26 mm wide over 40-60 mm length; they are generally of a narrower diameter. They have a very cylindrical form, are often rounded at both ends and superficially show less bone.
Eleonora's falcon's droppings are liquid and white with some dark nucleus

ECOLOGY and HABITAT

▪ Reproduction

The nest is a simple scraped hollow, at the edge of a rock face. More often, Eleonora's Falcons lay their eggs inside rock excavations, never far away from the sea. The species are not fussy in the construction of their nests, some nest are directly on the ground or hidden under a bush. No material is brought to the nest.
The colonies of Eleonora's Falcons are confined to sea cliffs. They can move away from the nesting places to hunt, but the nests are almost always on small islands and are located above the shore. They nest in colonies on the rocky ledges of coastal cliffs, in natural anfractuosities or in the old nests of other species.

The female lays 2-3 (4) eggs in late July and broods for 28-33 days. During this period, it is supplied by the male. The young birds remain in the nest for 28-35 days.

During the nuptial display, the Falcons do not fly in pairs but in noisy groups. Often they stop suddenly in the air and then make a vertiginous dive into the water. Often when the male comes near, the female backs away with claws drawn out very briefly but without the two partners touching.

- **Feeding behaviour**

Eleonora's Falcon only hunt flying and seems especially to like small birds, but the scarce prey in the Mediterranean islands means that it must also feed on insects, lizards and small mammals and sometimes have to hunt far away from its nest. Its diet is basically insectivorous and it benefits from the abundant prey which is available during the autumn migration of the passerines to nourish its young.

In the breeding areas, Eleonora's Falcon specially hunts migrating birds right up to the size of a turtle-dove, Eurasian hoopoes, shrikes, warblers, swifts, nightingales and larks. In its winter quarters it feeds exclusively on insects such as the cicadas, locusts, grasshoppers and coleoptera.

They are sociable birds and probably playful in view of their behaviour on the cliffs where they carry on acrobatics, slaloms between the thin pines, hedgehopping over the waves. When hunting, Eleonora's Falcon spends much time in gliding with outstretched wings. During the breeding period, it uses a particular method of hunting in which mainly the males take part. The Falcons form a tight front which is staggered in terms of height and at sunrise await the arrival of their prey. They attack them in flight, before they reach the ground. They seize them and carry them directly to the nest and start all over again.

As for the colony of the Essaouira archipelago, the Falcons feed mainly on insects before they start raising the young within a wide perimeter around the archipelago. Sometimes the Falcons explore sectors several dozens of kilometres away from the Essaouira archipelago. The same behaviour is observed for Balearic individuals, before the laying period they go until the mainland (Cuenca or the Costa Brava)

During the feeding period of the young, the adults confine themselves especially around the archipelago and hunt mostly migratory birds (basically but not only sparrows) which fly close to the Essaouira islands.

As for "family-group" relations, the behaviour of the older and stronger young Falcons can be in the form of harassment of the young brothers and sisters rather frequently, so that occasionally these jousts can lead to the death of one of the young birds. The young do not fight for food during the last 10 days in the nest. The parents induce training flights for their offspring by showing them to catching prey rather than to take them in the nest.

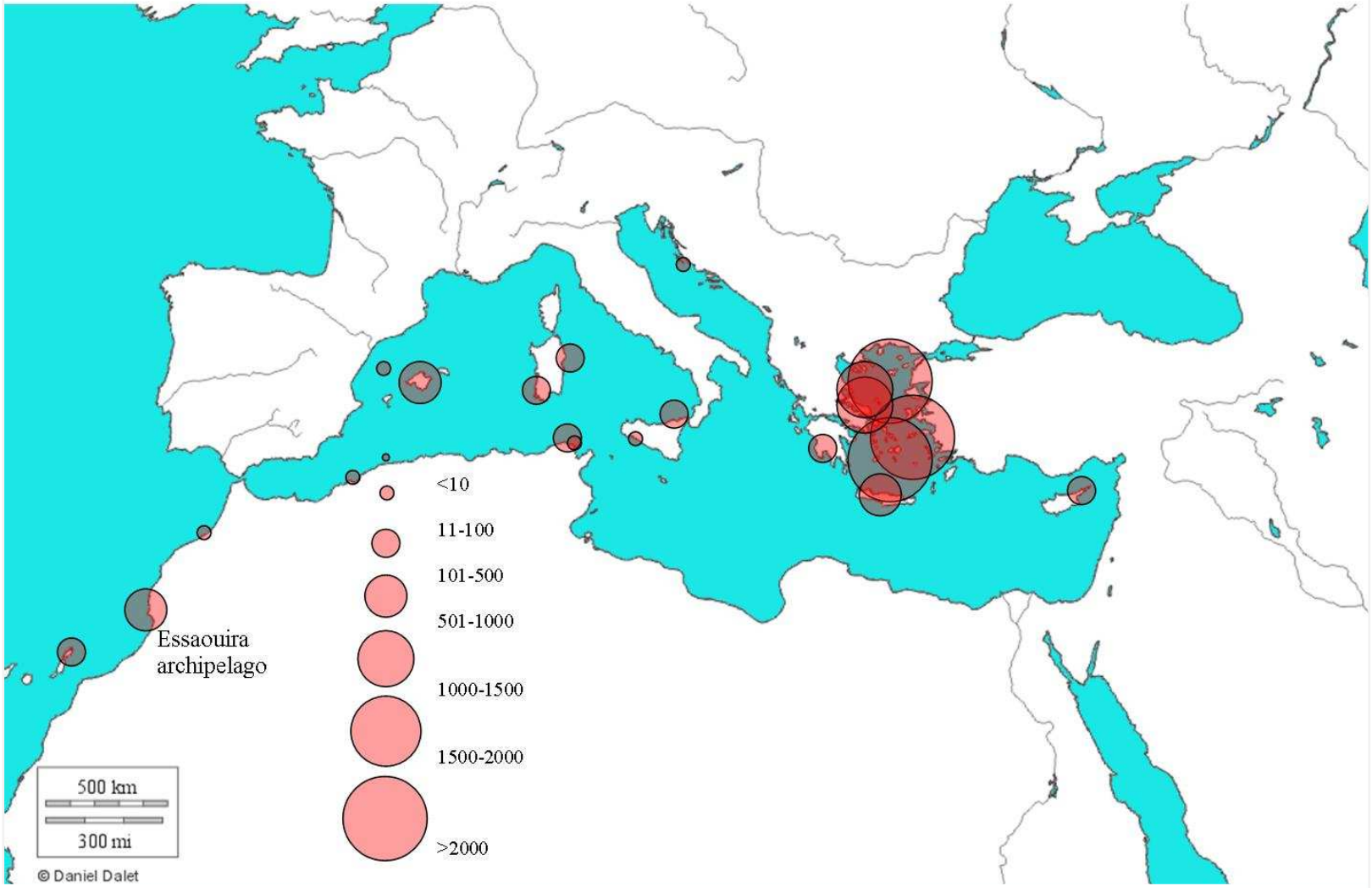
The data presented below have been collected from bibliographic references, direct communication with people in charge of monitoring or from the census carried out in the framework of PIM Initiative missions

Estimation of the world population of Eleonora'S Falcon (in breeding pairs)

Country	Region		Breeding pairs	Year	Reference
Spain	Canary	Montaña Clara	115	2007-2008	Lopez-Darias, Romeu 2010
		Alegranza	135		
		Roque del Este	55		
		Roque del Oeste	2		
	Columbretes		56	2004-2007	Del Moral 2008, SEO BirdLife
	Baleare Islands		629	2004-2007	Del Moral 2008, SEO BirdLife
	Total		**992**		
Italy	Sardinia	S. Pietro and S. Antioco	160-180	2001-2002	Spina & Leonardi 2007
		Gulf of Orosei	205-273		
	Sicily	Eoli Islet	89-120		
		Pelagie Islet	35-50		
	Total		**489-613**		
Croatia	**Total**		**65-100**	2010	Tutiš *et al.*, 2010 *in print*
Greece	Agean		2813-3457	2011	Danae Portolou HOS-BirdLife *pers.comm*
	Dodécanese		2557-2731		
	Cyclade		2623-2663		
	Saronic		1-1		
	Ionian		84-134		
	Eyvoia		1036-1055		
	Crête		921-921		
	Sporades		1025-1419		
	Total		**11060-12381**		
Cyprus	**Total**		**140-160**	1990-2004	Spina & Leonardi 2007
Turkey	**Total**		**20-100**	1990-2004	Spina & Leonardi 2007
Morocco	Essaouira Archipelago		816	2011	Rguibi Idrissi *et al.*, *In prep.*
	Sidi Moussa		14	2011	Rguibi *comm. pers.*
	Total		**830**		

Algeria	Habibas Archipelago	**30**	2008	Données PIM 2008
Tunisia	Galite Archipelago	117	2007	Ben Haj *et al.*, 2008 PIM initiative
	Fratelli Islands	20-30	2012	*Pers. com.* Rida Ouni
	Total	**137-147**		
Total		**13763 -15353**		

- Next page are presented these data on a map.



Falco Eleonorae - Geographical distribution of the breeding populations - PIM 2012

- **Reproduction phenology**

	No	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct
Settling												
Egg-laying												
Hatching												
Flight												

- **State of population dynamics**

The Case of Mogador, Morocco.

The breeding of Eleonora's Falcon was monitored on the Island of Mogador in 2010-2011 (two seasons). The first data from this work made it possible to monitor the formation of the pairs, the breeding biology, monitoring the chicks and the diet. The quantitative aim of this monitoring was to estimate the values of the main demographic parameters which govern the population. The first analyses made it possible to better understand the influence of environmental factors on the population dynamics of Eleonora's Falcon especially in connection with their migratory behaviour. Indeed, the results highlighted a correlation between the intensity of migratory flows of the quite fat passerines and the survival of the juveniles. It was estimated that a million and half of migrating passerines were consumed by the Falcon colony during egg laying and feeding the young. This aspect proves potentially significant for better integrating this dimension in the design and the monitoring of the population monitoring program on the Island of Mogador.

Concerning the Mediterranean populations

An net expansion of the species is observed in several countries: Spain, Morocca and Greece, thanks to the end of the direct persecutions. As an example, the chicks were still considered as food in Ibiza and in Morocco until the second part of the XX century, the adults were systematically shot. The end of these activities provoked a augmentation of the population, and one the evolution of conservation the most spectacular for the 50 last years.

MAIN THREATS IDENTIFIED IN THE INSULAR ENVIRONMENT

As there is a lack of information on the various colonies and countries, only the main threats identified in general will be described:

- the introduction of other species,
- human disturbances of the colonies,
- predation by rats and cats which can be quite high on a local level,
- persecution and illegal trade in some of the colonies,
- loss of habitats and persecution across the migratory routes and the winter quarters
- Pollution by onithocide substances

CONSERVATION CHALLENGES AND ACTIONS UNDERTAKEN HITHERTO IN THE SMALL ISLANDS

The conservation challenges for Eleonora's Falcon mean enhanced breeding success, namely by:

- reducing human disturbances,
- combatting the land predators and invasive species,
- combatting the destruction and vandalism of nests and chicks in some of the colonies.
- Measure the concentration of pollution in sensible areas.

▪ Typology of conservation actions implemented so far

- Declaration that Eleonora's Falcon is a protected species, specifically or among the birds of prey, in all the countries with breeding colonies;

- Declaration of Eleonora's Falcon as a vulnerable or rare species on the red lists elaborated by some countries;

- To register the majority of the nesting sites of Eleonora's Falcon (islands and small islands) as ZICO' S (IBA' S – Important Bird Areas), Protected areas, Specially Protected areas or Hunting Preserve.

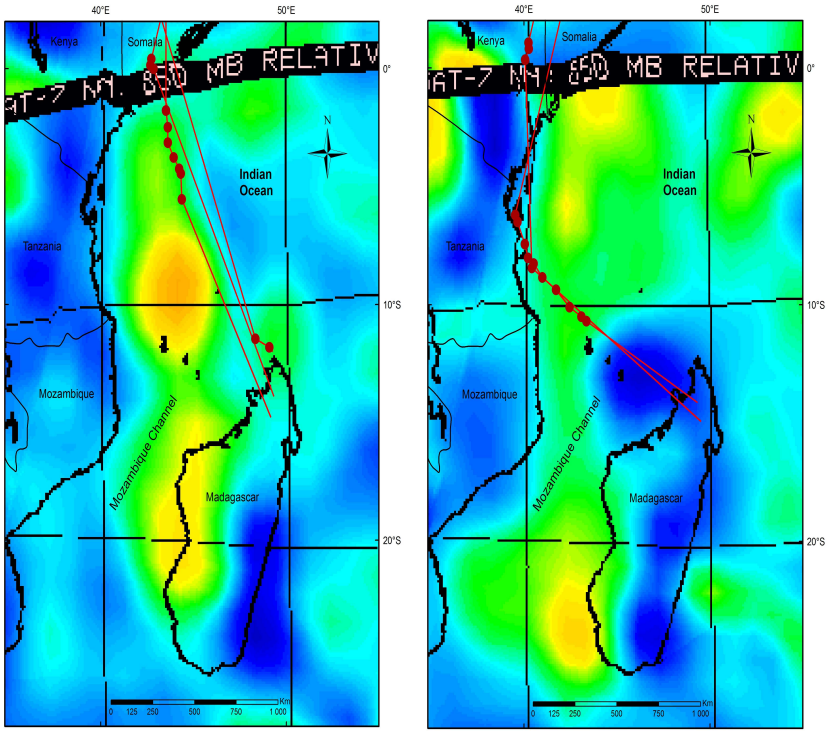
An individual equipped by an Argos device

To date, 18 Eleonora's falcons have been tagged with satellite transmitters in Balearic and Columbretes islands (Spain; Lopez-Lopez *et al*. 2009, 2010, unpub. data), 13 in Sardinia (Italy; Gschweng *et al*. 2008), 4 in Greece (Kassara *et al*. 2011) and 2 on the Island of Mogador (in prep.). In Spain and Morocco, birds were equipped with Microwave Telemetry Inc. 9.5-gram Argos solar-powered transmitter terminals affixed to their backs using a Teflon harness. (see the photograph above)

These researches highlighted that the species migrate on a broad front during both seasons, crossing the African continent and adjusting his behaviour according to the landscape, for example migrating during night especially when crossing the Sahara desert and showing slower speeds in the more hospitable regions of the Sahel (Lopez-Lopez *et al*. 2010).

Migration tracks identified for Spanish populations of Eleonora's Falcon

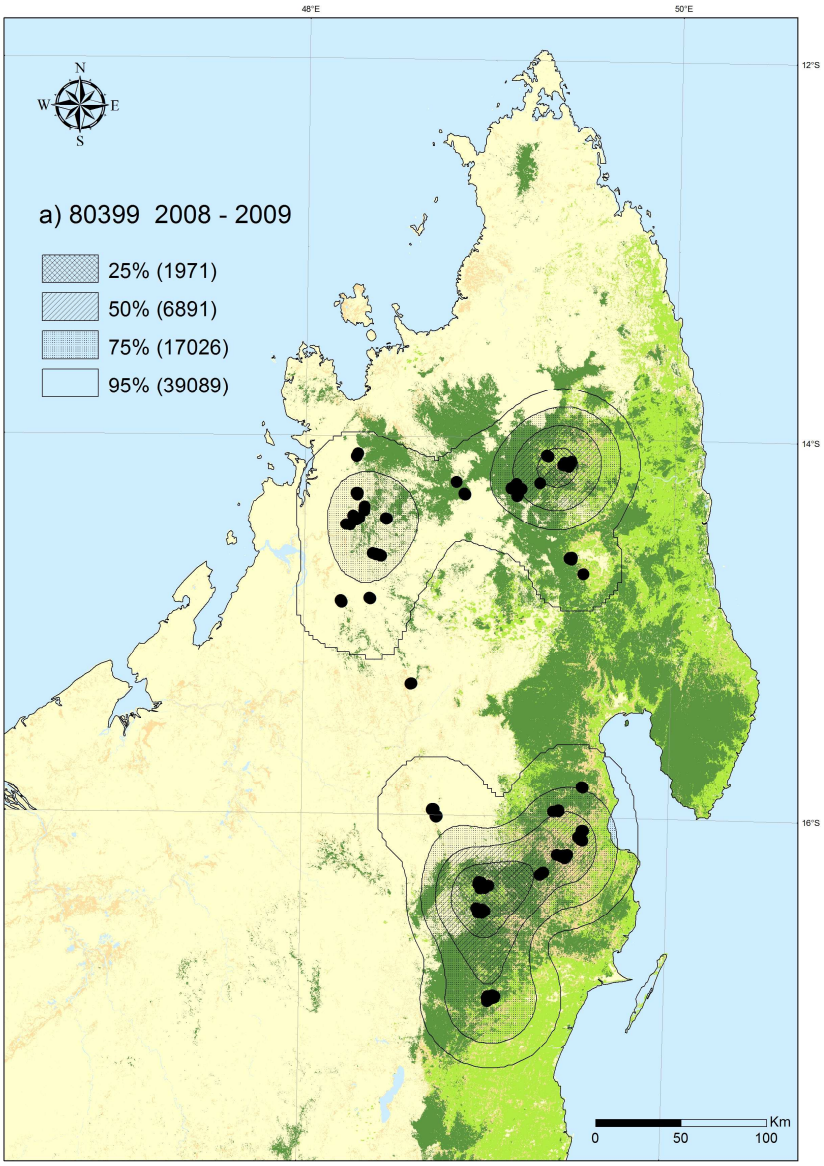
Moreover, the species show a high degree of flexibility in relation to weather conditions, when crossing the Indian Ocean (Mellone *et al*. 2011). The data obtained in different years illustrate that individuals show high behavioural plasticity and are able to change the migration route from one year to another in response to weather conditions, thus minimizing the risk of long ocean crossing by selecting winds blowing towards Africa for departure and changing the routes to avoid low pressure areas en route. The results suggest that weather conditions can really act as obstacles during migration, and thus, besides ecological barriers, the migratory behaviour of birds could also be shaped by "meteorological barriers". Since environmental conditions during migration could cause carry-over effects, forecasting how global changes of weather patterns will shape the behaviour of migratory birds is of utmost importance.



Several migratory roads used by Eleonora's Falcon depending the climatic conditions to reach Madagascar

WINTERING AREAS OF ELEONORA'S FALCON

The analyses of wintering habitats in Madagascar highlighted a preference for degraded humid forests and cultivations within areas where the pristine humid forests was the most abundant habitat. Probably Eleonora's Falcons could take advantage from a spill-over edge effect of preys in ecotonal open areas. The importance of humid forests for the conservation of the Eleonora's Falcon should be of concern, given the current loss of this habitat in Madagascar (Mellone *et al*. 2012).



Wintering areas regarding the typology of landscape in Madagascar

- **Management Actions**

- To fight against the invasion by domestic carnivores in the small islands which have colonies of Eleonora's Falcon;

- To promote pilot projects to develop sustainable tourism specially on the most sensitive coastal habitats;

- To ensure, if necessary, a monitoring/guarding of the breeding colonies to avoid disturbances and/or vandalism;

- To define the nesting sites and thus the zones to which access is to be prohibited from the 1st of July to the 1st of November.

- To defer the opening of the hunting season after the 1st of November for those nesting sites which do not have a protection status;

- To ensure the protection of the habitats in the wintering areas as well as some of the the migratory routes of Eleonora's Falcon;

- To encourage exchanges of information and experiences on the monitoring and management of nesting sites between the experts and the conservation organisms;

- To develop awareness creation tools to sensitizing the public on the necessity of protecting Eleonora's Falcon and its habitats.


ph. Vicente Urios

- **Research**

- To estimate the total breeding population of Eleonora's Falcon through the implementation of a standard census protocol,

- To carry out an annual census for the long term of the breeding numbers in some pre-selected colonies out of the whole distribution area of the species,

- An annual monitoring of the breeding success in pre-selected colonies,

- Monitoring of human activities and practices in small islets with colonies of Eleonora's Falcon,

- Monitor the socio-economic development in the vicinity of colonies of Eleonora's Falcon,

- To undertake research on the impact of terrestrial predators,

(- To study the migration strategies and the ranging behaviour through the deploying of GPS data loggers that could permit a much higher spatial and temporal resolution than current ARGOS satellite tracking)

- **Information and public outreach**

- Various tools must be elaborated within the framework of the project "Eleonora's Falcon in Mogador" in order to inform and sensitize the local and public stakeholders,

- Two posters, one presenting the monitoring program and the second one for education purposes, present the species of the Mediterranean Falcons,

- An exhibition in two languages (Arabic and French) and real size models of the species,

- An educational book,

- The installation of video systems to observe live or remote scenes of the Falcon's life in the breeding colonies in Mogador

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