



MEDITERRANEAN SHAG

Phalacrocorax aristotelis desmarestii

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

Nicolas Bazin and Mathieu IMBERT

Le Conservatoire
d'Espaces Naturels
de Provence-Alpes
Côtes-d'Azur



In collaboration with :

Reviewing or data providing by:

Stefano Sponza (University of Trieste)
Jelena Kralj (Institute of Ornithology of Zagreb)
Aïssa Moali (Université de Bejaïa)
Michael Miltiadous (BirdLife-Cyprus)
Bernard Cadiou (Bretagne vivante & GISOM)
Danae Portolou (HOS BirdLife-Greece)
Jordi Muntaner (Conselleria de Medi Ambient)

*With the support of
support :*



For bibliographical purposes, the present document is to be cited as follows:

Bazin N., Imbert M., 2012. *MEDITERRANEAN SHAG Phalacrocorax aristotelis desmarestii Updated state of knowledge and conservation of the nesting populations of the Mediterranean Small Islands*. Initiative PIM. 19p.

The Mediterranean Small Islands Initiative

The Conservatoire du Littoral has been coordinating, since 2005, an international program 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 et and the city of Marseille – Corse. 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 program 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.

Citation of document.....	2
CONTEXT	2
INDEX	3
GENERAL DATA	4
DESCRIPTION OF SPECIES	4
ECOLOGY AND HABITAT	6
DISTRIBUTION OF POPULATIONS	7
MONITORING OF COLONIES	12
MAIN THREATS IDENTIFIED IN THE INSULAR ENVIRONMENT	14
CONSERVATION ACTIONS ADVOCATED FOR THE MEDITERRANEAN SMALL ISLANDS ..	Erreur ! Signet non défini.
REFERENCES	18

Scientific name : *Phalacrocorax aristotelis desmarestii*

French name : Cormoran huppé de Méditerranée

Spanish name : El Cormoran moñudo

Italian name: Marangone dal ciuffo mediterraneo

Protection Code :

Bird directive: Annex I

Berne Convention : Annex II

IUCN: Least concerned

Barcelona Convention: Annex II



Louis-Marie Préau – Initiative PIM

DESCRIPTION OF SPECIES

The Mediterranean Shag belongs to the *Phalacrocoracidae*. The different species of this family constitute a relatively homogeneous group as far as the morphological characteristics are concerned (DIF, 1982).

These average sized seabirds have a long neck, a thin and hooked beak and a relatively long tail.

The Shag's plumage is only partially water-tight and traps very little air so that it can plunge easily into the water (DIF, 1982).

The Shag is endemic in the Mediterranean basin and looks similar to the *aristotelis* sub-species but it is much more slender (Issa *et al.*, 2007).

Three types of plumage can be identified out in the field, that of the juvenile, immature/sub-adult and adult.

▪ Juvenile to sub-adult plumage :

1st year:

The plumage of the young *desmarestii* Shags presents a clear contrast between the dark brown upper plumage and the off-white lower plumage.

The dark brown upper plumage has a non uniform pale area on the wing cover. There are also close and parallel transversal lines corresponding to the pale edges of the plumes (Issa *et al.*, 2007).

The underside is either off-white or perfectly white, is evenly light-coloured from the base of the neck right up to the sub-caudal. The throat is also evenly white. Only the base of the neck is slightly spotted forming a slightly darker area (Svenson *et al.*, 1999).

The head is rather light in colour with a dark brown patch. The eyes are blue, the lower mandible of the beak and around the eyes the colour is a pale yellow. The upper mandible is dark coloured.

The feet are a pale yellow and sometimes flesh-coloured depending on the light.

2nd year:

The contrast between the upper and lower plumage is slightly attenuated compared with the plumage of the 1st year and the white lower part has evenly distributed spots.

The head becomes darker and only a small white highly visible spot remains on the base of the beak.

As for the wing feathers, the pale edges of the juvenile feathers are still there but attenuate progressively and the more diffuse wing strip is still visible.

The plumage of the immature individuals varies from one to another because of the greatly extended breeding period (Issa *et al.*, 2007). The yellow colour of the lower mandible of the beak becomes darker.

3rd year:

The contrast between the bird's upper and lower part is no longer so clearly visible. The plumage is evenly black with green reflections. Depending on the birds, the chest remains slightly white and the belly has more or less white spots.

A small white area is still visible at the base of the beak under the commissures.

▪ Adult plumage

The adult's plumage is evenly black with bright green reflections. The feet have become darker and the beak's commissures remain yellow. During the nuptial period, the beak's mandibles become dark and only some of the nesting birds and the inter-nuptial birds retain the lower mandible of the yellow beak. The eyes are emerald green.



Juvenile

Immature

Sub-adult

Adult

The Mediterranean Shag is a coastal marine bird, long lived and philopatric, frequenting rocky coasts and builds its nest in the cliffs generally in natural crevices, in rocky bits, on ledges and sometimes in the vegetation. The nest is built with different plant materials and generally re-used from one year to the next (Guyot, 2007).

As it nests in the winter, the Shag is to be found in the breeding colonies from the end of October to end June. Egg laying takes place from the end of November to May, with a peak in January/February. Replacement egg laying can be observed in case of the first clutch being unsuccessful and also after the first successful fledge (Flitti *et al.*, 2009). The young birds fly off between the end of February and the end of June.

On average three eggs are laid (a minimum of one and a maximum of 6). Incubation lasts for about thirty days and the young fledge approx. eight weeks later.

The sedentary European Shag remains close to the breeding colonies throughout the year or can be considered as short-range migrant. There is still a strong post-nuptial dispersion from May-June to August and even until October-November. Most of the birds are immature and non-nesting and spend the summer away from the breeding sites and sometimes search for new territories (Tatin *et al.*, 2005 ; Issa *et al.*, 2007; Sponza *et al.*, 2010).

The European shag *Phalacrocorax aristotelis* is a foot propelled pursuit diver, feeding on fish predominantly near the seabed (Sponza *et al.*, 2010). The foraging areas have depths ranging between 7 and 80 m, with an average of 30 m (Guyot, 1988; Wanless *et al.*, 1991, 1993; Lea *et al.*, 1996; Wanless *et al.*, 1997; Grémillet *et al.*, 1998).

The species feeds on a wide range of benthic, demersal and schooling pelagic fish, and for this reason it is classified as opportunistic in its feeding (Cosolo *et al.*, 2011) During incubation, Shags are estimated to have an average daily requirement of 389 g of fish, while a bird with three chicks requires about 920 g (Wanless *et al.*, 1993).

Even though the Atlantic subspecies is well studied, very little is known of the diet, general biology and population of the Mediterranean subspecies *P. aristotelis desmarestii*, which is endemic to the Mediterranean and Black Seas. The main preys of the subspecies are fishes belonging to the family of the *Atherinidae*, the *Pomacentridae*, the *Labridae*, the *Centracanthidae*, the *Gobiidae* and the *Sparidae* which are of little economic value to the fishermen. (Morat, 2007; UNEP - MAP - RAC/SPA, 2006).

A difference of diet is observed between breeders and post-breeders individuals in Adriatic Sea: Post-breeding Shags in the Gulf of Trieste focused on demersal and relatively immobile *Gobiidae*. The most frequent prey species was *Gobius niger* (Sponza *et al.*, 2010). In the breeding season at Oruda island, Croatia, the diet was more varied. Breeding Shags fed on benthic-pelagic, mobile prey (Cosolo *et al.*, 2011). These results suggest that movement are existing from breeding sites to gulf of Trieste just after the breeding period in response of a lack of specific preys in the breeding zones (Cosolo *et al.*, 2011).

This sub-species of the Mediterranean Shag which is endemic to the Mediterranean basin, has a distribution area limited to the Mediterranean coasts and those of the Black Sea.

Its world population was estimated at under 10 000 pairs (Guyot & Thibault, 1996), half of them breed in the western Mediterranean (East coast of Spain, Balearic islands, Corsica, Sardinia, Tuscan archipelago, Lampedusa, Crete and the Ionian islands). Albania, Bulgaria, Cyprus, Libya, Tunisia and Algeria have colonies of the European Shag but only marginally (Issa *et al.*, 2007).

There are strong inter-annual variations in the breeding numbers in several colonies which are monitored in the Mediterranean so that it is difficult to get an accurate census and it means having good coordination for all the colonies in a given region (UNEP - MAP - RAC/SPA, 2006).

Within the framework of the 1st meeting on the Mediterranean Action Plan for the conservation of the coastal and marine birds in 2006, a synthesis of the data on the breeding population numbers of the Mediterranean Shag has been prepared. As for its different missions and contacts, the PIM Initiative has coordinated, collected and centralized numerous information so that it is possible to update some of the data and thus to see the trend of the numbers and the distribution of the breeding population of the Mediterranean Shag.

Updated exhaustive census data was collected for 6 countries: Cyprus (source: Birdlife Cyprus 2011), Spain (source : SEO/Birdlife 2007), Gibraltar (source : SEO/Birdlife 2007), France (source : GISOM 2011), Greece (source : HOS/BirdLife 2011). Croatia (from censuses and monitoring of colonies in proposed SPAs)

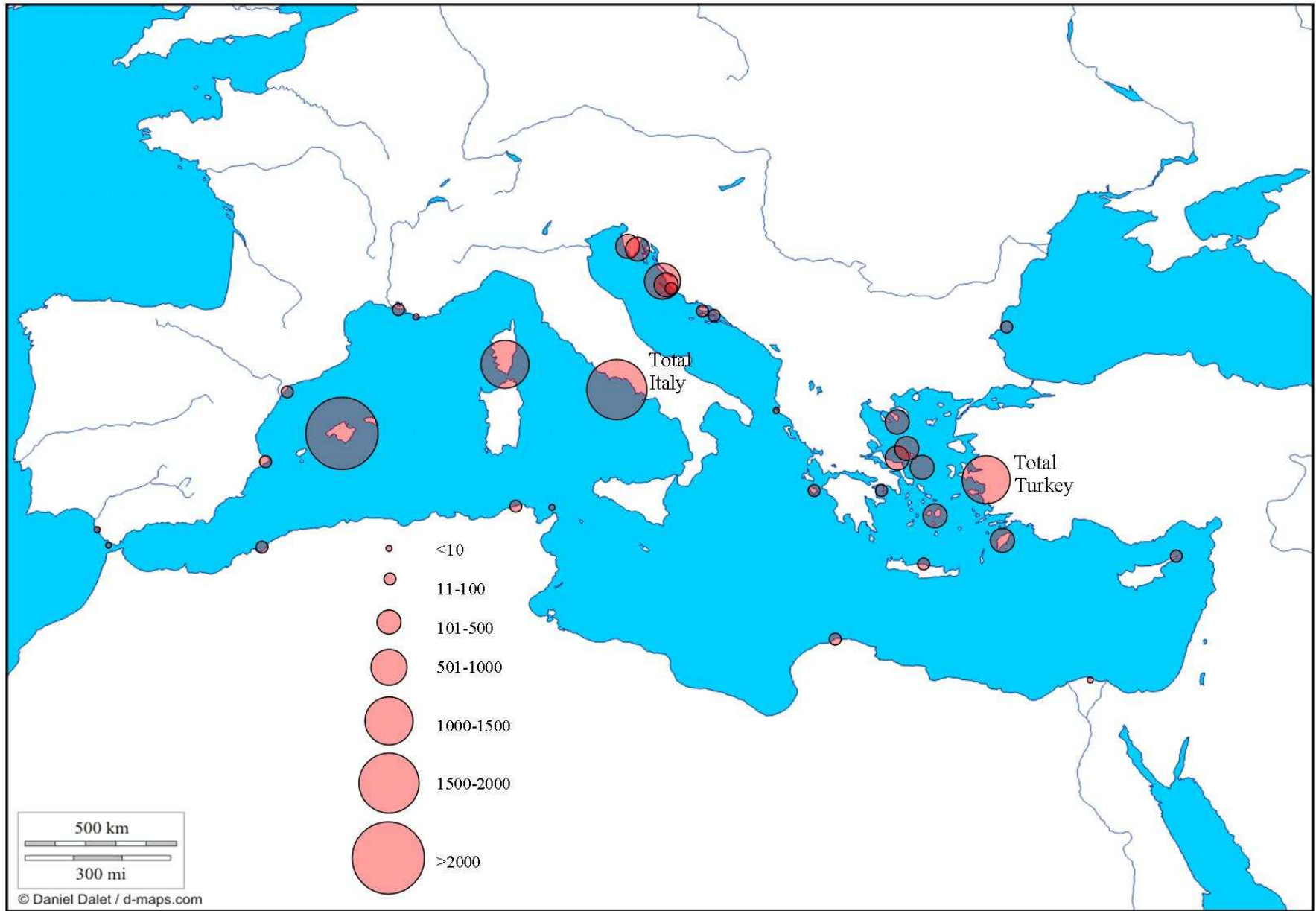
COUNTRY	LOCATION	BREEDING PAIRS	REFERENCE
Albania	Total Albania	5-10	UNEP - MAP - RAC/SPA, 2006
Algeria	Archipel des îles Habibas	13	PIM Initiative
	Total Algeria	<70	<i>Com. pers.</i> Aïssa Moali, 2011
Bulgaria	Total Bulgaria	80	UNEP - MAP - RAC/SPA, 2006
Croatia	Western Istrian Maritime Zone	150-180	Institute of Ornithology of Zagreb, 2010 <i>Comm. pers.</i> Jelena Kralj
	Kvarner Islands	350-400	
	North Part of Zadar Archipelago	500-550	
	Kornati National Park and Telascica Nature Park	200-250	
	Lastovo Archipelago	20-30	
	NW Part of Mljet National Park	25-30	
	Offshore Islands	5-10	
	Middle Dalmatian Islands and Peljesac Peninsula	20-50	
	NW Dalmatia and Pag Island	10-30	
	Total Croatia	1600-2000	
Cyprus	Kleides islands (Kasteletta islet), cliffs Cape Aspro - Akrotiri cliffs. Also cliffs Dhavlos.	11 - 31	<i>Com. pers.</i> Michael Miltiadous BirdLife Cyprus, 2011
Egypt	Total Egypt	10	UNEP - MAP - RAC/SPA, 2006

France	Bouches du Rhône	18	Cadiou B. 2010 (GISOM)
	Var	1	
	Corse	1021-1042	
	Total France	1040 - 1061	
Greece	Aegean	313 - 354	Data HOS-BirdLife Greece
	Crete	18 - 35	
	Cyclades	262 - 294	
	Dodecanese	184 - 246	
	Eyvoia	101 - 152	
	Ionian	41 - 68	
	Saronic	50 - 104	
	Sporades	143 - 210	
	Thrace	178 - 228	
	Total Greece	1290 - 1691	
Italy	Total Italy	1600 - 2000	UNEP - MAP - RAC/SPA, 2006
Libya	Total Libya	50	UNEP - MAP - RAC/SPA, 2006
Spain	Andalousia	4	ALVAREZ D. & VELANDO A., 2007 (Monografías SEO-BIRDLIFE)
	Murcia	0 (1)	
	Valencia Region	25	
	Catalonia	41 (1)	

	Baleares	2017	
	Total Spain	2087	
Gibraltar	Total Gibraltar	6	
Tunisia	Archipel de la Galite	26	PIM Initiative
	Archipel de Zembra	4	
	Total Tunisia	30	
Turkey	Total Turkey	820 - 2000	UNEP - MAP - RAC/SPA, 2006
TOTAL		8 699-11 126	

Remark: For Croatia the difference between their sum and the total estimation is of course due to the smaller number of colonies not covered by IBAs (about 79% of Shag population is covered by IBAs)

- Next page is presented a map outlining the Mediterranean breeding colonies of the previous table.



Phalacrocorax aristotelis desmarestii - Geographical distribution of the breeding populations (in breeding pairs) - PIM 2012

It is not easy to undertake a census and to monitor the European Shag. The breeding sites are difficult to access (rocky coasts, islands, islet...), the strong inter-annual variability of the breeding numbers and the asynchronous phenology of the different pairs in the same colony make the monitoring even more complicated.

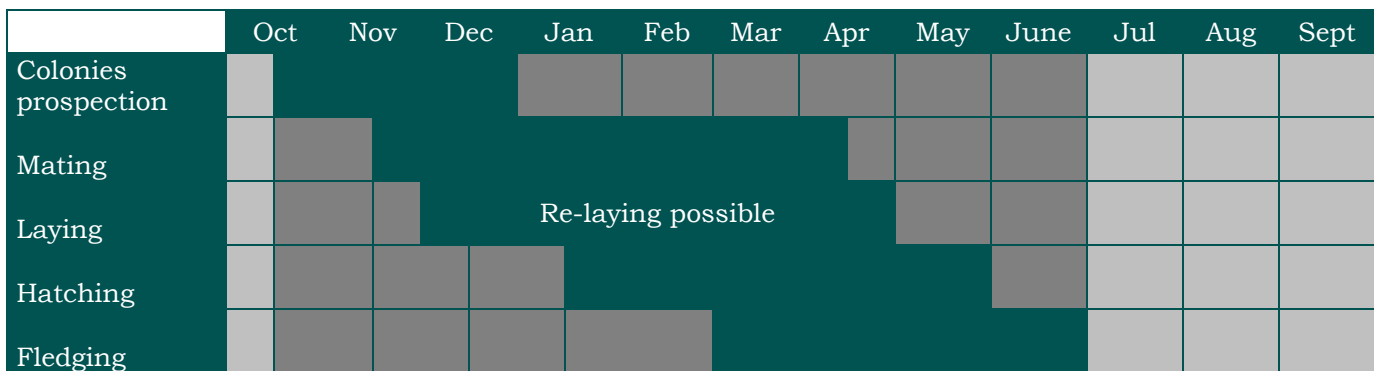
▪ **Census period**

The activity period of the breeding pairs is from the end of October to the end of June. The birds are particularly active until the end of February and observing the different types of behaviour (bringing twigs to the nest, the pair establishing itself at the entrance of a crevice---) can make it possible to locate the breeding site. The breeding birds can be recognized easily as they have a particularly noticeable crest visible only at the beginning of the breeding period.

From March to May, during the period before the time when the birds are fledging, the presence of young chicks also facilitates locating the breeding sites.

The best period for the census is the period when there is the greatest number of built nests, still empty or occupied which had young birds which had already flown off (Debout *et al.*, 2009, Cadiou & Fortin, 2009). This period is approx. between the beginning and half-way through the hatching period, between mid-February and mid-March for the European Shag.

Breeding Phenology of the European Shag (The case of the Islands of Marseille)



- Observable activity in the breeding colonies
- Presence of species during the breeding period
- Presence of species during the summer period

Please note that some differences of phenology between remote sites are observed: for example in Croatia fledging can be sometimes observed already in February.

▪ Census methods

[Cadiou B. (coord.), GISOM 2009 - Méthodes de suivi des colonies d'oiseaux marins : dénombrement de l'effectif nicheur et suivi de la production en jeunes - Document de travail préparé dans le cadre de l'enquête « oiseaux marins nicheurs de France 2009-2010 »]

1- Remote observation

This method is for colonies for which a remote census/from a distance is necessary or advisable to avoid disturbing the birds or when remote observation is the only method to be envisaged. The birds are counted from high-lying points or else from a boat at sea. Observations from the boat make it possible to complement this counting method which is used when on land for the caves, the rock walls not visible from the land and the hidden areas in the islands. Counting is done when the weather is good.

Firstly the nests must be identified and it might be difficult to locate some of the nests (caves, fissures ledges high up the cliff etc...) and secondly to count the Apparently Occupied Nest (AON). This refers to built nests and occupied by the adults and which are ready for egg laying (neatly prepared bits of material), nests with a breeder or a potential breeder (apparently incubating adults) and nests with visible chicks, and, if necessary, give an estimated number (minimum – maximum scale) for those difficult-to-see areas (birds seen from below, or watchful on the edge of a ledge etc.).

2 - Prospection of the colony on an island

For « flat » islands where the census from a distance is impossible, the prospection will be done on foot within the colony and counting takes place when the weather is good.

The problems in connection with the censuses are basically as follows:

- a highly extended breeding season ;
- the fragility of the chicks to cold, rain and strong sunshine;
- the adults are highly sensitive to disturbances and the neighbouring gulls are less sensitive to the same disturbances so that there is the inevitable higher predation of the Shags' nests by the gulls as soon as the nesting population of the gulls is considerable and dense. Great prudence is therefore necessary in view of the dangers which are aggravated by the particularly extensive egg laying period of these species.

A census should not be carried out under bad weather conditions (strong rain, fog, strong wind or rough sea) and be done rapidly when it is hot, so as to avoid sunstroke of the very young birds left behind in the nest by their parents who took off when the observers arrived.

▪ Monitoring of breeding

Precise monitoring of the breeding of the European Shag is difficult because of the extended breeding period, and the inaccessibility of numerous nesting sites such as the cliffs. The monitoring is done from an observation point on land and at sea from a boat. For each nesting site counted, the presence of the breeder adults or chicks is systematically noted. It is also important to note all behavioural observations to foresee the installation or the breeding of a pair (such as carrying twigs or food, display, adult at the entrance of a potential nest...).

The breeding sites which are difficult to access and the birds' sensitivity to disturbances make it impossible to inspect the nest and to collect data on the number of eggs laid by the pair. Information on the number of young birds produced can be obtained through regular observations of the breeding sites to observe the chicks before flight, during their attempts at flight at the entrance to the nests.

MAIN THREATS IDENTIFIED IN THE INSULAR ENVIRONMENT

	Threat		Consequences of threat		Scale of threat		
			Colony (breeding birds)	Summer resting place	unknown	weak	strong
At sea	Tourism activities (comment n°3)	Birdwatching (kayak)	Escape, fly off	escape, fly off			x
		Public frequentation (walkers on the coast)	Disturbance	Disturbance		x	
		Pleasure boating mooring	"	escape, fly off			x
		Sports boats	"	escape, fly off, collision			x
		Jet ski	"	escape, fly off			x
		Evening on a boat	"	escape, fly off	x		
	Industrial Activities	Uncontrolled degassing	Eggs during incubation, Plumage of bird Ingestion	Eggs during incubation, Plumage of bird Ingestion			x
	Overfishing (see comment 4)	Lack of food resources	?	?	x		
	Fishing	Capture with nets, lobster pots or long-lines	Bird death	Bird death	x		x
	On land	Destruction of habitats	At sea: Marine habitats	Lack of sea resources	Lack of sea resources		x
At land: Concrete constructions along the littoral			"	"	x		
Introduction of mammals		Rats	?	?	x		
Comment n°2		Cats	?	?	x		

		Dogs	Death of chick and/or adult	?	x			
		Mongoose	Predation on chicks and adults	?	x			
	Competition with other species	Increased Yellow legged Gull colonies (comment n°1)	Predation of eggs and/or chicks	?	x			
	Poaching	Collection of eggs	Direct Impacts on the survival of the population	?			x	
		Capture	Direct impact on the survival of the population	?			x	



Comments concerning the previous table:

- 1- *Larus michahellis* not always represents a threats for the species, in some area the Shags are nesting under vegetation (ex: *Pistacia lentiscus* and *Phillyrea latifolia*)
- 2- Mongooses are present on Islands of the Southern Adriatic where they were introduced in the 1910's.
- 3- In the area the breeding period start earlier, sometimes the tourist season does not have starting when the specie is fledging, touristic activities in this case have not a important impact. However, boating still represent a negative impact on foraging of the individuals.
- 4- Recent studies have shown that the migration of Shags within the Adriatic Sea is driven by dietary requirements. In particular, the overfishing and hence the impoverishment of Croatian feeding grounds forced Shags to move immediately after breeding to more profitable areas as the Gulf of Trieste (Cosolo *et al.*, 2011; Sponza *et al.*, 2010).

CONSERVATION ACTION PROPOSALS FOR THE MEDITERRANEAN

References:

- RAC/SPA action plan for the conservation of bird species listed in annex II of protocol SPA and biological diversity in the Mediterranean
- Action realized in the framework of the Life project: Concrete Conservation Actions for the Mediterranean Shag and Audouin's gull in Greece including the inventory of relevant marine IBAs

Thematic issue 1: Identification of the important areas for the specie

- Census of breeding, roosting and wintering sites,
- Set up programs of telemetry,
- Map the critic habitats,
- Overlap Shag foraging areas with fisheries data

Thematic issue 2: Control of terrestrial predators

- Estimation of the impact of introduced mammals on the specie,
- Control of Rat, dog and mongoose populations introduced on the breeding sites,
- Breeding monitoring of the populations potentially impacted by predators,
- Control of the Yellow-Legged Gull populations impacting European Shag,

Thematic issue 3: Reduction of disturbance

- Reduce all types of disturbance on breeding colonies, on foraging areas and roosting area. Take in account the buffer zone around the mooring sites and the passing of pleasure boats so as to trace them in the marine protected areas,
- Take in account the disturbance due to monitoring and ringing activities
- Frequentation management (boats) on foraging areas and breeding sites,
- Create SPAs where the specie is breeding and encourage the creation of buffer zones around the breeding sites,

Thematic issue 4: Measure concerning fishing activities

- Estimation of the number of fishing by-catch, set-up a questionnaire for fishermen to evaluate this number
- Set-up buffer zone around the critical areas

Thematic issue 5: Public awareness

- Creation of communication tools to raise public awareness for young public, walkers, fishermen

Thematic issue 6: Set-up an efficient network of actors for coordinated actions at Mediterranean scale

- Set up actions based on experience sharing between natural areas managers and universities
- Set up monitoring protocols harmonized between a maximum numbers of monitored breeding sites.

- AGUILAR J.S. & FERNANDEZ G. (Coord.) (2001) - Action plan for the conservation of Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*). BirdLife International / Conseil de l'Europe : 18 pp.
- ALVAREZ D. & VELANDO A. (2007), El cormoran monudo en Espana. Poblacion en 2006-2007 metodo de censo. SEO/BirdLife. Madrid
- CADIOU B. (1999). Cormoran huppé de Méditerranée. In ROCAMORA G. & YEATMAN-BERTHELOT D., Oiseaux menacés et à surveiller en France. Liste rouge et priorités. Populations. Tendances. Menaces. Conservation. Paris, SEOF/LPO : 464.
- CADIOU B., PONS J.-M. & YÉSOU P. (2004). Oiseaux marins nicheurs de France métropolitaine (1960-2000). Éditions Biotope, Mèze.
- COSOLO, M., PRIVILEGGI, N., CIMADOR, B. & SPONZA, S., 2011. Dietary changes of Mediterranean Shags *Phalacrocorax aristotelis desmarestii* between the breeding and post-breeding seasons in the upper Adriatic Sea. *Bird Study* 58: 461–472.
- CULIOLI J.M. (2004) - Cormoran huppé (méditerranéen). European Shag. *Phalacrocorax aristotelis desmarestii*. In: Yésou, P. (ed), Oiseaux marins nicheurs de France métropolitaine (1960-2000), Ed. Biotope, Mèze: 87-91.
- CULIOLI J.-M. (2006). The Mediterranean Shag *Phalacrocorax aristotelis desmarestii* in the Mediterranean Sea. Proceedings of the first Symposium on the Mediterranean action plan for the conservation of marine and coastal birds, Vilanova i la Geltrú, Spain, 17-19 novembre 2005 : 49-51.
- CEEP (2007), Cahier de gestion des populations d'oiseaux marins sur les îles de Marseille, programme LIFE Nature 2003-2007 "Conservation des population d'oiseaux marins des îles de Marseille", Commission européenne, 80 p.
- DEBOUT G. (GONm), CADIOU B. (OROM, BV-SEPNB), FORTIN M. (BVSEPNB). In GISOM 2009. Méthodes de suivi des oiseaux marins nicheurs. Document de travail (non publié).
- DIF G. (1982). Les oiseaux de mer d'Europe - Edition Arthaud, Paris
- DUBOIS P.J., LE MARÉCHAL P., OLIOSO G. & YÉSOU P. (2001). Inventaire des Oiseaux de France. Avifaune de la France métropolitaine. Nathan, Paris.
- GUYOT I. & THIBAUT J.C. (1996) - Recent changes in the size of colonies of the Mediterranean shag *Phalacrocorax aristotelis desmarestii* in Corsica. *Western Mediterranean. Seabird.*, 18: 10-19.
- ISSA N., LEGRAND J., FLITTI A. & LASCEVE M. (2007), Le Cormoran de Desmarest

Phalacrocorax aristotelis desmarestii - Ornithos 14-2 : 95-107

LASCEVE M. & TRANCHANT Y. (2009). Cormoran de Desmarest *Phalacrocorax aristotelis desmarestii*. In FLITTI A., KABOUCHE B., KAYSER Y., et OLIOSSO G. (2009) Atlas des oiseaux nicheurs de Provence-Alpes-Côte d'Azur. LPO PACA. Delachaux et Niestlé, Paris pp. 94

SPONZA, S., CIMADOR, B., COSOLO, M. & FERRERO, E.A. 2010. Diving costs and benefits during post-breeding movements of the Mediterranean shag in the North Adriatic Sea. *Mar. Biol.* 157(6): 1203–1213.

TATIN D., MANTE A., VIDAL P., CUCHET T., 2005. - Le cormoran huppé de Méditerranée *Phalacrocorax aristotelis desmarestii* sur l'archipel de Riou (Marseille, France) : colonisation et premiers cas de reproduction. *Faune de Provence, Fr.*, 21: 71-77.

WANLESS, S., HARRIS, M.P. & RUSSELL, S. 1993. Factors influencing food-load sizes brought in by Shags *Phalacrocorax aristotelis* during chick rearing. *Ibis* 135: 19–24.