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SEABIRDS IN THE GULF OF LIONS SHELF AND SLOPE AREA

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INTRODUCTION

One of the main characteristics of the Mediterranean marine avifauna is the high number of endemic taxa, despite the low diversity and small population densities; this is consistent with a low-productivity ecosystem compared to open oceans (Coll *et al.* 2010). All four Procellariiforms (petrels and shearwaters) present in the Mediterranean are endemic taxa: two at species level (*Puffinus mauretanicus* and *Puffinus yelkouan*) and two at subspecies level (*Calonectris d. diomedea* and *Hydrobates pelagicus melitensis*). Besides, one endemic cormorant (Shag *Phalacrocorax aristotelis desmarestii*), three gulls (Mediterranean *Larus melanocephalus*, Audouin's *Larus audouinii* and Yellow-legged *Larus michahellis michahellis*) and one tern (Lesser-crested *Sterna bengalensis emigrata*) also originate from the Mediterranean region.

Another characteristic of the Mediterranean marine avifauna is its long-term exposure to human influence. Through history, some aspects of human activity have had positive effects on seabirds (e.g. the creation of specific habitats like rice fields and salt pans, the provision of food through fishing discards, etc.) but overall and in the long-term the result of the human-seabird interaction has been detrimental for seabirds. Their current population sizes are nowhere near what they were before the 'humanisation' of the Mediterranean.

Today, despite the legal protection and the positive management of seabird colonies, several threats imperil the future of this unique seabird community, namely the interaction of seabirds with fisheries (causing unnecessary mortality and impacting heavily on their populations), overfishing (which decimates fish populations and heavily alters the habitats where marine organisms live) and climate change (causing disruptions in the ecosystem).

The *Protocol Concerning Mediterranean Specially Protected Areas and Biological Diversity in the Mediterranean* has two powerful tools to revert the negative trends of most Mediterranean seabird species: the establishment of a Specially Protected Areas of Mediterranean Importance (SPAMIs) list, and the protection and conservation of the species. This report focuses on the seabird species that: (a) are listed among the 25 of Annex II *List of Endangered or Threatened Species*; and (b) are present in our focus area, the Gulf of Lions shelf and slope.

The Gulf of Lions is one of the hotspots of productivity in the Mediterranean Sea. It offers ideal conditions for foraging seabirds, which concentrate on it over much of the year. Because the area offers few opportunities for rocky island-nesters, most of the birds present in the area come from colonies that are situated 150-500 km away (generally, a 4-16 hours' flight, depending on the species and wind conditions). Therefore, the conservation of the Gulf of Lions for seabirds has implications over a much wider area than could be immediately thought. The long-term preservation of its role as a major foraging ground in the north-western Mediterranean Sea is probably key to the stability of the populations that nest in Spain, France and Italy, and also to those that use it during the winter season and nest elsewhere.

MAIN SPECIES

Puffinus yelkouan – **Yelkouan shearwater**

General overview

The Yelkouan shearwater is a medium-sized Procellariiform strictly endemic to the Mediterranean (including the Black sea). It is of similar size and habits to the Balearic shearwater *Puffinus mauretanicus*. Until recently, both were considered to belong to the same species, but they have been separated based on differences in morphology, genetics, behaviour and ecology. The species tends to form large flocks and only nests in a few colonies on offshore islets and rocky outcrops. It is exposed to predation on the breeding islands and to human-induced mortality at sea, mainly as a result of interactions with fisheries.

Presence in the NW Mediterranean

The Yelkouan shearwater is present in the Gulf of Lions between October and July, with a peak in February-June, when an estimated 10,000 birds use the area for feeding during the breeding season (Bourgeois & Vidal, 2004). The French breeding population is relatively small, with an estimated 1350-1650 breeding pairs in 2006 (1100-1500 bp on Îles d'Hyères, plus 40-50 bp on islands off Marseille (Issa 2008), so the area presumably serves as foraging ground for birds from more distant colonies.

Foraging ecology and diet

Yelkouan shearwaters feed by surface-seizing and underwater pursuit, mainly on small pelagic fish such as sardines (family Clupeidae) and anchovies (family Engraulidae). Like for other shearwater species in the Mediterranean, discards from fisheries (mostly trawlers) are probably important, and may represent more than an opportunistic resource. Outside of the breeding season, Yelkouan shearwaters tend to concentrate in areas with large shoals of sardines and other Clupeiforms.

At-sea distribution

The species occupies the coastal area and feeds mainly in the nearshore (Péron & Grémillet *in press*) but is also known to forage in frontal areas (Beaubrun *et al.* 2000), where it can feed naturally or attend trawlers in search of discards. In fact, most birds observed in the open sea are travelling, which might suggest that there is little feeding in offshore waters, but the evidence that individuals of this species get caught in pelagic longlines (Bourgeois & Vidal 2004) indicates that some degree of foraging also takes place away from the coast.

Conservation status (IUCN) and threats

Near Threatened (NT) since 2008. The population is currently estimated at 100,000 individuals but may be larger because of poor knowledge of breeding numbers in Turkey and Greece (BirdLife International 2011). Reports of extremely low breeding success at several key breeding colonies indicate that current declines may accelerate markedly when current breeders approach the end of their life cycle, so it is currently listed as Near Threatened by the IUCN. Declines have probably been ongoing for long, and are projected to continue.
Yelkouans face specific threats on land and at sea. Breeding colonies are gravely affected by predation from alien invaders, mostly rats and cats. Several projects have been directed at addressing this issue and some are still ongoing targeting a reduction or even the eradication of alien predators. Dead shearwaters are regularly found in drift- and gill-nets and, more recently, in longlines. At-sea mortality is a major cause of the dramatic decline of the closely related *P. mauretanicus* and may be similarly affecting *P. yelkouan*. Breeding success may be affected by reduced abundance of anchovies and sprats due to competition from fisheries. Oil spills are an increasing risk due to increased maritime traffic in the Mediterranean.

International measures of protection

Puffinus yelkouan is listed in Annex I of the European Directive 2009/147/EC on the conservation of wild birds. It has been proposed as a candidate species for listing in Annex I of the Agreement on the Conservation of Albatrosses and Petrels, ACAP (Cooper & Baker 2008). It is listed in Annex II of the SPA/BD Protocol of the Barcelona Convention and in Annex II of the Berne Convention.

National measures of protection

In France, *Puffinus yelkouan* is legally protected by *Arrêté du 29 octobre 2009 fixant la liste des oiseaux protégés sur l'ensemble du territoire et les modalités de leur protection* (art. 3) and considered a threatened species by *Liste rouge des oiseaux nicheurs de France métropolitaine* (2008), where it is listed as Vulnerable (VU) under IUCN criteria. The following Natura 2000 sites in the Gulf of Lions area have been established in France and its territorial waters for the protection of *Puffinus yelkouan*:

- FR9112034 – Cap Béar–Cap Cerbère (very important site)
- FR9112035 – Côte Languedocienne (very important site)
- FR9310019 – Camargue (very important site)
- FR9312007 – Îles Marseillaises–Cassidaigne (breeding; remarkable site)
- FR9310020 – Îles d'Hyères (breeding; remarkable site)

In Spain, the species is legally protected by *Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad* (Annex IV) and listed by *Real Decreto 139/2011, de 4 de febrero, para el desarrollo del Listado de Especies Silvestres en Régimen de Protección Especial y del Catálogo Español de Especies Amenazadas*. The following site has been identified as a marine IBA in Spain and has been proposed as a candidate Natura 2000 marine site in the Gulf of Lions for the conservation of *Puffinus yelkouan* (Arcos *et al.* 2009):

- ES411 – Mar del Empordà, for wintering birds (avg = 2100 in 2003-07)

Puffinus Mauretanicus – Balearic Shearwater

General overview

Of similar size to Yelkouan, the Balearic shearwater is restricted, as a breeding bird, to the Balearic Is., Spain. Until recently, both forms were considered to belong to the same species, but they have been separated on the basis of differences in morphology, genetics, behaviour and ecology. The nesting colonies of *Puffinus mauretanicus* are situated in caves and cliff cavities of the most of the Balearic Islands and surrounding islets. The species is highly gregarious despite the fact that the global population is small (probably less than 10,000 individuals, BirdLife International 2011), so sometimes a significant proportion of the global population is concentrated in a single flock. The species is classed as Critically Endangered by IUCN because it suffers unsustainable levels of mortality at sea which, coupled with predation on land by introduced cats and rats, is causing a steady decline in numbers.

Presence in the NW Mediterranean

Balearic shearwaters are present in the Mediterranean between September and June; most birds leave the Mediterranean and 'summer' in the Atlantic ocean (Galicia, Bay of Biscay, Brittany). Breeding birds from the Balearics forage off the continental coast of Spain, regularly reaching the S waters of the Gulf of Lions. Smaller numbers venture further N to forage off the coast of Bouches du Rhône and the PACA region of France.

Foraging ecology and diet

Much like Yelkouan, Balearic shearwaters feed by surface-seizing and underwater pursuit, mainly on small pelagic fish such as sardines (family Clupeidae) and anchovies (family Engraulidae). They regularly attend trawlers and reach sunken discards by diving underwater thus avoiding the competition of more aggressive species, particularly gulls. Studies show

that Balearic shearwaters increase their use of discards during the breeding season, when their demand of food is greatest (Navarro *et al.* 2009). Like Cory's shearwaters, they might resort to feeding astern of longline vessels on the days/hours when trawlers are not so easily available (Laneri *et al.* 2010). This would increase their risk of mortality, which is higher in longline fisheries.

At-sea distribution

Puffinus mauretanicus is also typically found on the nearshore, where it forages, migrates or gathers for roosting. However, in areas where the continental shelf extends further offshore, as in the Ebro delta or in the Gulf of Lions, they also frequent shallow waters away from the coast. The species frequently associates with areas of high productivity and cold waters, as are typically found around river mouths. *Puffinus mauretanicus* is highly gregarious, and may concentrate by the hundreds or thousands in favourable areas. Such ephemeral concentrations, which are of conservation importance, may move move back and forth considerably along the coast for several days before disaggregating.

Conservation status (IUCN) and threats

BirdLife International, on behalf of IUCN, has classed this species as Critically Endangered (CR) since 2004 because it has a tiny breeding range and a small population which is undergoing an extremely rapid population decline owing to a number of threats, in particular predation at breeding colonies by introduced mammals and at-sea mortality as a result of interactions with commercial fisheries. Population models predict an extremely rapid decline (Oro *et al.* 2004). However, recent records at sea indicate that this species may not have suffered declines as drastic as previously thought (BirdLife International 2011).

The main conservation concern for Balearic Shearwaters is adult survival, which is unusually low for a Procellariiform. Mortality at sea has long been suspected to take a heavy toll in this species; evidence points at longlines, particularly demersal, killing most birds, although this is a difficult event to watch (BirdLife International 2009). Mortality episodes with >50 birds dead have been reported and, although they are necessarily rare, they may take in a single occasion the equivalent of half the breeding birds in a medium-sized breeding colony (Oro *et al.* 2009). Other important threats at sea include overfishing (which reduces the availability of natural prey and forces birds to feed on discards and interact with fisheries), pollution (from oil and heavy metals) and climate change. On land, alien predators break eggs and kill adults and young at the breeding colonies. Human harvesting of eggs and young has been greatly reduced, but disturbance (by lights and noise) still continues at some places, and available habitat for breeding is decreasing through encroachment by mammalian predators and urbanisation of the coastal zone (Oro *et al.* 2009, BirdLife International 2011).

International measures of protection

Puffinus mauretanicus is listed in Annex I of the European Directive 2009/147/EC on the conservation of wild birds and is the subject of an International Species Action Plan (see Arcos 2011). It is listed in Annex I of the Convention on Migratory Species; whose Resolution 8.29 designated it for concerted action. The 6th Meeting of the Advisory Committee of the

Agreement on the Conservation of Albatrosses and Petrels, ACAP, agreed to propose listing of *Puffinus mauretanicus* in the Agreement, following the recommendations of Cooper & Baker (2008). If adopted by the Meeting of the Parties (MOP4 in 2012), the Balearic shearwater will become the first Northern Hemisphere species to be included in ACAP. The species is listed in Annex II of the SPA/BD Protocol of the Barcelona Convention and in Annex II of the Berne Convention.

National measures of protection

The Spanish Red Data Book, *Libro Rojo de las Aves de España*, lists *Puffinus mauretanicus* as Critically Endangered (CR) under IUCN criteria. The species is legally protected by *Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad* (Annex IV) and listed as In Danger of Extinction by the Spanish Catalogue of Threatened Species (*Real Decreto 139/2011, de 4 de febrero, para el desarrollo del Listado de Especies Silvestres en Régimen de Protección Especial y del Catálogo Español de Especies Amenazadas*). Such classification requires that a National Conservation Strategy is implemented in Spain; the current version was adopted in 2005. The following site has been identified as a marine IBA in Spain and has been proposed as a candidate Natura 2000 marine site in the Gulf of Lions for the conservation of *Puffinus mauretanicus* (Arcos *et al.* 2009):

- ES411 – Mar del Empordà (avg breeding season = 1850 birds in 1999-2007; avg winter = 235 birds)

In France, *Puffinus mauretanicus* is legally protected by *Arrêté du 29 octobre 2009 fixant la liste des oiseaux protégés sur l'ensemble du territoire et les modalités de leur protection* (art. 3) and considered a threatened species by *Liste rouge des oiseaux non nicheurs de France métropolitaine (de passage)* (2011), where it is listed as Vulnerable (VU) under IUCN criteria. The following Natura 2000 sites in the Gulf of Lions area have been established in France and its territorial waters for the protection of *Puffinus mauretanicus*:

- FR9112034 – Cap Béar – Cap Cerbère (important site)
- FR9112013 – Petite Camargue Laguno-Marine (presence)
- FR9310019 – Camargue (presence)
- FR9312007 – Îles Marseillaises – Cassidaigne (breeding; remarkable site) – It corresponds to IBA PA07 – Îles Marseillaises: Maire, Jarron, Jarre, Riou, Calseraigne, Congloue et Pomegues
- FR9310020 – Îles d'Hyères (breeding; remarkable site) – It corresponds to IBA PA11 – Îles d'Hyères

Calonectris diomedea – Cory's shearwater

General overview

Cory's is the largest Procellariiform species in the Mediterranean Sea, where it is still quite numerous (recent estimate for total breeding population: ~150,000-200,000 breeding pairs, Defos du Rau & Bourgeois *in press*). The Mediterranean race *C. d. diomedea* is endemic and is currently declining over the whole range; possibly, at a faster pace than the Atlantic subspecies *C. d. borealis*. Cory's shearwaters make the longest foraging trips of all Mediterranean seabirds, and birds from distant breeding colonies often converge spatially. It regularly attends trawlers and longlining vessels, and is the species suffering the heaviest mortality toll. Globally, it is considered of Least Concern (LC) under IUCN criteria because the world population is very large (possibly > 1,000,000 individuals, BirdLife International 2011) and recorded declines in the Atlantic still situate the species below the thresholds for threatened status.

Presence in the NW Mediterranean

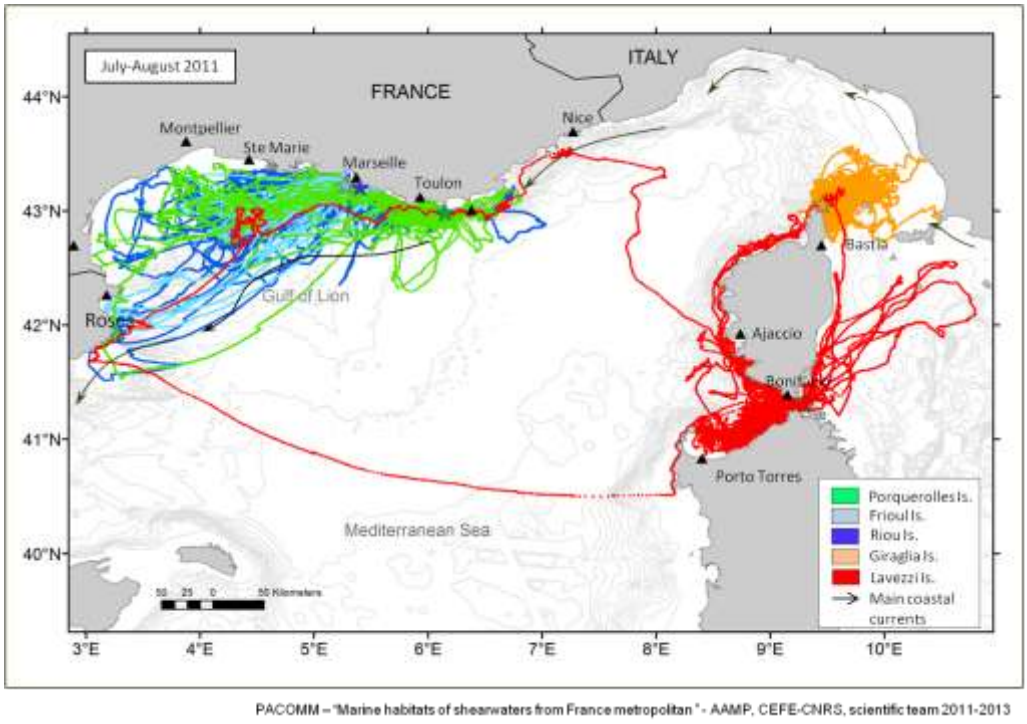
The Cory's shearwater is a long-distance migrant that leaves the Mediterranean to spend the non-breeding season in Atlantic waters off Africa and S America. It is present in the Mediterranean between March and October. There, it favours areas of wide continental shelf and the areas of influence of large rivers, where productivity is highest. Thus, the wider Gulf of Lions offers excellent foraging conditions and attracts birds from breeding colonies in the Balearics, the PACA region of SW France, Corsica, Sardinia and possibly even beyond.

Foraging ecology and diet

In the Mediterranean, Cory's shearwater feeds on medium-sized to small fish (regularly, sardine and anchovy), alone or in association with tuna and cetaceans. Squid is also an important component of its diet. It regularly attends trawlers when these are available, shifting to longline vessels when they are not, particularly during the pre-breeding and chick-rearing periods (Laneri *et al.* 2010). Fishing discards, a predictable source of food, have become a growing foraging option for Cory's shearwaters in the Mediterranean after the population decline of tuna and cetaceans, and the reduced availability of natural prey caused by overfishing. This increases the dependence of shearwaters on human activities, as the birds become attracted to fishing vessels, and modifies their foraging behaviour (Bartumeus *et al.* 2010).

At-sea distribution

When not in the vicinity of the breeding colony, Cory's shearwater is a true pelagic bird with a preference for offshore waters over the continental shelf and around the shelf break. Foraging birds tend to aggregate in areas of high trawler densities along frontal systems (Louzao *et al.* 2009). Cory's shearwater makes extensive use of the offshore waters in the central part of the Gulf of Lions area, both for foraging and for travelling, and is the dominant species in this sector of the Mediterranean (Zotier *et al.* 1999). The areas where most birds concentrate are: (a) in the SW, around Cap de Creus and its associated frontal zone; (b) along the shelf break and its associated canyons; and (c) in the NE, in the waters around Îles d'Hyères and offshore area.



PACOMM – "Marine habitats of shearwaters from France metropolitan " - AAMP, CEFE-CNRS, scientific team 2011-2013

Fig. 1 – Fine scale foraging tracks of 130 breeding adults from 5 different French colonies during the chick-rearing period, July-August 2011. This image clearly shows that the Gulf of Lions area is a major feeding ground for birds that nest not only in the vicinity (îles Marseillaises, îles d'Hyères) but also several hundred kilometres away (Corsica). From Péron & Grémillet (*in press*), courtesy of the authors.

Conservation status (IUCN) and threats

Considering the species globally, Cory's shearwater does not approach the thresholds for IUCN threatened status (BirdLife International 2011), even though there is evidence of ongoing declines in several of its populations. The Atlantic population (mostly in Azores, Madeira and Canary Is.) is still very large; however, evidence amounts that the endemic Mediterranean subspecies is declining, probably through its entire range, and so is given threatened status in Spain (EN) and France (VU). The bulk of that population is in its southern half, particularly around the centre of the Mediterranean (Tunisia, Sicily and Malta make up >80% of all breeding pairs); towards the N, the size of the populations is (or has

become) much smaller, with 1000-1300 bp in France (Issa 2008) and probably less than 4000 bp in Spain, as the population in Minorca (Balearic Is.) is much smaller than previously thought (Carboneras *et al.* 2010). Present population size around the Gulf of Lions area must represent a significant reduction compared to former times due to continuing threats on land (alien predation) and at sea (mortality through bycatch). The quality of the area as a foraging ground for the species has probably not degraded at the same speed, and there is currently more breeding habitat available than is being occupied. At the same time, a number of former colonies or colony sectors that had been occupied in the past and were later abandoned have not been recolonised.

As with other Procellariiforms, the threats for Cory's shearwaters in the NW Mediterranean come both from land and sea. At the breeding colonies, introduced cats and rats prey on eggs and small chicks, reducing breeding success significantly where they are present. At sea, several studies indicate that this is the species suffering the heaviest mortality from bycatch in longline fisheries, both demersal and pelagic (Belda & Sánchez 2001, Cooper *et al.* 2003, Laneri *et al.* 2010, Igual *et al.* 2009, García-Barcelona *et al.* 2010). The current levels of adult mortality are unsustainable in the long term, and annual declines of 4-6 % have been recorded putting some Mediterranean populations in serious danger of extinction (Carboneras 2004). The recent confirmation that the whole Mediterranean population might be larger than previous estimates due to improved survey methodologies at the Mediterranean stronghold in Zembra, Tunisia (Defos du Rau & Bourgeois *in press*), only means that extinction is further away in time, but equally inevitable if the current rates of decline are maintained.

International measures of protection

Annex I of the European Directive 2009/147/EC on the conservation of wild birds lists *Calonectris diomedea* (all subspecies). The species has been recommended for listing under the Agreement on the Conservation of Albatrosses and Petrels ACAP, together with the other Mediterranean shearwaters (Cooper & Baker 2008). Cory's is also listed in Annex II of the SPA/BD Protocol of the Barcelona Convention and in Annex II of the Berne Convention.

National measures of protection

In Spain, the Mediterranean race *Calonectris d. diomedea* is listed as Endangered (EN) in the Red Data Book, *Libro Rojo de las Aves de España* (Madroño *et al.* 2004) under IUCN criteria. The species is legally protected by *Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad* (Annex IV) and listed as Vulnerable by the Spanish Catalogue of Threatened Species (*Real Decreto 139/2011, de 4 de febrero, para el desarrollo del Listado de Especies Silvestres en Régimen de Protección Especial y del Catálogo Español de Especies Amenazadas*).

In France, *Calonectris diomedea* is legally protected by *Arrêté du 29 octobre 2009 fixant la liste des oiseaux protégés sur l'ensemble du territoire et les modalités de leur protection* (art. 3) and considered a threatened species by *Liste rouge des oiseaux de France métropolitaine* (2008), where it is listed as Vulnerable (VU) under IUCN criteria. The following Natura 2000 sites in the Gulf of Lions area have been established in France and its territorial waters for the protection of *Calonectris diomedea*:

- FR9112034 – Cap Béar – Cap Cerbère (important site)
- FR9112013 – Petite Camargue Laguno-Marine (presence)

- FR9310019 – Camargue (presence)
- FR9312007 – Îles Marseillaises – Cassidaigne (breeding; remarkable site) – corresponds to IBA PA07 – Îles Marseillaises: Maire, Jarron, Jarre, Riou, Calseraigne, Congloue et Pomegues
- FR9310020 – Îles d'Hyères (breeding; remarkable site) – corresponds to IBA PA11 –Îles d'Hyères

Hydrobates pelagicus melitensis **– [Mediterranean] Storm petrel**

General overview

The European Storm petrel is only above the size of a swallow (16 cm, 27 g) and is therefore the smallest of all seabirds in the Mediterranean region. Despite this, the species is extremely long-lived (reaches breeding age at ~4 years, then has an average lifespan of ~11 years) for an animal of its size. These data predict that the population ecology of the species will be based on high adult survival (0.87, Robinson 2005) and a comparatively low reproductive rate. In the Mediterranean, the endemic subspecies *melitensis* has a small population (<16,000 bp, Sultana & Borg in UNEP-MAP-RAC/SPA 2006) that is in slight decline in most breeding colonies.

Presence in the NW Mediterranean

Storm petrels are present in the Mediterranean in all months, although in the N Mediterranean and in the Gulf of Lions in particular, observations concentrate in spring and summer (Issa 2008, Feliu 2007 & 2010). Birds are present near the breeding colonies from February onwards; the breeding season is extended, with the late birds not fledging until October. It suffers heavy predation from terrestrial (introduced rats, cats) and aerial (gulls) predators, so selects rocky islands and islets for breeding. Nests are in natural crevices, fissures in rocks and cliff faces, amongst and under stones and boulders, in burrows, and in caves.

Foraging ecology and diet

This is a marine species feeding mainly on small fish, squid and crustaceans, but it will also feed on medusae and offal. It feeds mainly on the wing by pattering and fishing, and will occasionally follow ships and attend trawlers.

At-sea distribution

The Storm petrel is found over the external half of the continental shelf and in the high seas, often very far from land. The selection of this type of habitat, which is typical among the storm petrel family, minimises their probability of contact with humans and makes the species less vulnerable to interactions at sea than other Mediterranean seabirds. However, as a predator in the ecosystem, the species depends on the general health (e.g., from pollution) and productivity of the marine environment.

Conservation status (IUCN) and threats

Although little known due to its behaviour and habitat choice, it is generally believed that the Storm petrel population is still very large (over 1 million individuals) but has been undergoing a sustained decline over its entire European range (BirdLife International 2011). Even so, it does not approach the thresholds for threatened status under IUCN criteria. The endemic Mediterranean population is much smaller (<16,000 bp, or less than 50,000 individuals) and has probably been subject to the introduction of mammalian predators on its breeding islands and to habitat destruction for several centuries.

The main threats for the species on land are related to its small size and nocturnal habits: predation by introduced mammals, habitat occupation and degradation, luring of fledglings to built-up areas by artificial lights and the increase in generalist predators such as gulls favoured by poor management of rubbish dumps. At sea, storm petrels are threatened by pollution (although there is evidence that they are less affected by oil spills due to their aerial habits) and overfishing, particularly as they affect the food chain and reduce the availability of plankton and other small prey on which the species feeds.

International measures of protection

Hydrobates pelagicus is listed in Annex I of the European Directive 2009/147/EC on the conservation of wild birds, in Annex II of the SPA/BD Protocol of the Barcelona Convention and in Annex II of the Berne Convention.

National measures of protection

In Spain, *Hydrobates pelagicus* (all races) is listed as Vulnerable (VU) in the Red Data Book, *Libro Rojo de las Aves de España* (Mínguez 2004) under IUCN criteria.

The species is legally protected by *Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad* (Annex IV).

In France, *Hydrobates pelagicus* (all races) is legally protected by *Arrêté du 29 octobre 2009 fixant la liste des oiseaux protégés sur l'ensemble du territoire et les modalités de leur protection* (art. 3). The Mediterranean subspecies *melitensis* is considered threatened by *Liste rouge des oiseaux de France métropolitaine* (2008), where it is listed as Endangered (EN) under IUCN criteria. The following Natura 2000 sites in the Gulf of Lions area have been established in France and its territorial waters for the protection of *Hydrobates pelagicus*:

- FR9310019 – Camargue (presence)
- FR9312007 – Îles Marseillaises – Cassidaigne (breeding; remarkable site) – corresponds to IBA PA07 – Îles Marseillaises: Maire, Jarron, Jarre, Riou, Calseraigne, Congloue et Pomegues
- FR9310020 – Îles d'Hyères (important site) – corresponds to IBA PA11 – Îles d'Hyères

ADDITIONAL SPECIES

In the previous section, there was a review of the seabird species that are listed in Annex II of the UNEP-MAP-RAC/SPA Biodiversity Protocol and have populations that make important use of the Gulf of Lions shelf and slope area. The following paragraphs will review those seabird species that do not meet both of those requirements, either because their presence in the area is numerically of little relevance (because the bulk of their populations in the Mediterranean is situated outside of the Gulf of Lions) or because they are not listed in the Biodiversity (SPA/BD) Protocol (because their Mediterranean population are of little conservation relevance, i.e. they are not endangered or threatened in the Mediterranean):

Mediterranean shag *Phalacrocorax aristotelis desmarestii*

The Mediterranean shag forms an endemic subspecies and is a flagship species for Mediterranean seabird conservation. It is listed in Annex II of the SPA/BD and is legally protected in France and Spain. The Red Data Books of both countries list the Mediterranean shag as Vulnerable (VU) under IUCN criteria, and the Spanish Catalogue of Threatened Species also lists the species as Vulnerable (making a National Conservation Plan compulsory).

The Shag feeds by diving underwater for fish (mostly, non-commercial species); it selects shallow waters (generally <80 m deep) and shows a preference for foraging over *Posidonia* seabeds. The species therefore remains mostly in coastal waters and does not venture far offshore. In the Gulf of Lions area, small populations (<10 bp) of Shag persist around the SW (Cap de Creus) and NE (île de Riou, îles d'Hyères) ends. In both cases, the local populations are reinforced after the breeding season with disperses from the much larger Balearic and Corsican strongholds. The Shag occurs only very occasionally outside of these areas or in the high seas,.

Northern gannet *Morus bassanus*

This strictly marine species wanders mostly over the continental shelf, where it feeds on shoaling pelagic fish which it catches by plunge-diving from large heights. It also attends trawlers and will form large congregations where food is plentiful. Both young birds and adults winter regularly in the Mediterranean, and there are a few records of successful nesting inside harbours in the Bouches du Rhône area (Issa 2008).

The gannet has a large population of probably over 1 million individuals (BirdLife International 2011) that is continuing to increase, as it did over much of the 20th century when it started to recover from previous exploitation by humans. Its success is mostly attributed to the availability of fish discards and the legal protection afforded to its nesting colonies in the Atlantic Ocean. The species is not listed in the SPA/BD Protocol or in the Red Data Books of Spain or France, although it is legally protected in both countries.

Audouin's gull *Larus audouinii*

Audouin's gull is another flagship species for the conservation of Mediterranean seabirds. It is endemic and considered Near Threatened (NT) globally because its population size has increased substantially since the 1970s but still remains localised and is dependent on current fishing practices that make large quantities of discards available but are unsustainable (BirdLife International 2011). It is anticipated that a collapse in the fisheries would induce a population decline of *Larus audouinii*. For these reasons, it is legally protected in France, where it nests exclusively in Corsica; the French Red Data Book lists it as Endangered (EN). In Spain, the species is legally protected and listed in the Catalogue of Threatened Species as Vulnerable (and therefore requiring a Conservation Plan); the

Spanish Red Data Book lists Audouin's gull as Vulnerable (VU). Internationally, it is listed in Annex I of the European Directive 2009/147/EC on the conservation of wild birds, in Annex II of the SPA/BD Protocol of the Barcelona Convention, in Annex I of the UNEP-Bonn Convention on Migratory Species, in the African-Eurasian Waterbird Agreement (AEWA) and in Annex II of the Berne Convention.

The world population of Audouin's gull is estimated at <60,000 individuals; 90% of the breeding population is found in only 4 sites, and 70% concentrate in a single site (Ebro delta). The species scavenges around fishing vessels, and uses discards extensively and very efficiently. The species' association with fisheries is more pronounced in the western than in the central and eastern Mediterranean. However, it occurs only in small numbers N of Barcelona. It is regular but scarce along the coast in the Languedoc-Roussillon and PACA regions of France, particularly favouring Aude and Camargue, Issa 2008). Most birds are probably dispersers from the Spanish and Corsican colonies. Their numbers are small and irrelevant at population level, with <10 individuals recorded annually during regular spring migration surveys at Cap de Creus (Feliu 2007 & 2010).

Mediterranean gull *Larus melanocephalus*

The Mediterranean gull is a common but localised species that is present in the NW Mediterranean throughout the year. It nests in wetlands and lagoons, with a significant population (around 3,000 bp; Issa 2008) in the Camargue area. Outside of the breeding season the species becomes entirely coastal, favouring estuaries, harbours, saline lagoons and other sheltered waters. It may venture offshore (up to 25 nautical miles; Cama *et al.* 2011) following trawlers, from which it forages on discards. Regionally, in winter it is virtually absent from the western Gulf of Lions (Cap de Creus, Languedoc-Roussillon) but common in the central and eastern parts, between Hérault and Var with a few thousand birds present (Issa 2008).

The Mediterranean gull is legally protected in France and Spain and is listed in Annex I of the European Directive 2009/147/EC on the conservation of wild birds, in Annex II of the SPA/BD Protocol and in the African-Eurasian Waterbird Agreement (AEWA). However, it is not listed in the Red Data Books of any of those countries. Globally, it is considered of Least Concern (LC) following IUCN criteria because of its extensive range and stable population size (BirdLife International 2011).

Sandwich tern *Sterna sandvicensis*

The Sandwich tern is present in four continents and has a large population with a fluctuating trend, so it is globally considered of Least Concern (LC) (BirdLife International 2011). However, because it is extremely localised as a breeding bird, it is legally protected in France and Spain and is listed in their Red Data Books as Vulnerable (VU) and Near Threatened (NT), respectively. The species is listed in Annex I of the European Directive 2009/147/EC on the conservation of wild birds, in Annex II of the SPA/BD Protocol of the Barcelona Convention, in the African-Eurasian Waterbird Agreement (AEWA) and in Annex II of the Berne Convention.

The Sandwich tern behaves as a coastal species throughout the year. It nests on wetlands but forages mostly at sea; outside of the breeding season it frequents sandy beaches, estuaries, harbours and bays. Its diet consists predominantly of surface-dwelling marine fish 9-15 cm long as well as small shrimps, marine worms and shorebird nestlings. Its presence in the Gulf of Lions area is restricted to the coastal waters, predominantly along low-lying coasts. It is rare in the open sea, far from land.

IMPORTANT AREAS FOR THE CONSERVATION OF SEABIRDS IN THE GULF OF LIONS SHELF AND SLOPE AREA

The NW sector of the Mediterranean, and the Gulf of Lions in particular, are among the hotspots of productivity as a result of water dynamics, bathymetry and the influence of the river Rhône. High productivity extends over the continental shelf to the shelf break. Human fishing activities mimic the same distribution since, with the exception of pelagic longlining, they are generally restricted to reachable depths. The presence of fishing vessels acts as a visible mark for seabird distribution, and only the [Mediterranean] Storm petrel has a spatial distribution that does not overlap with the main fishing grounds.

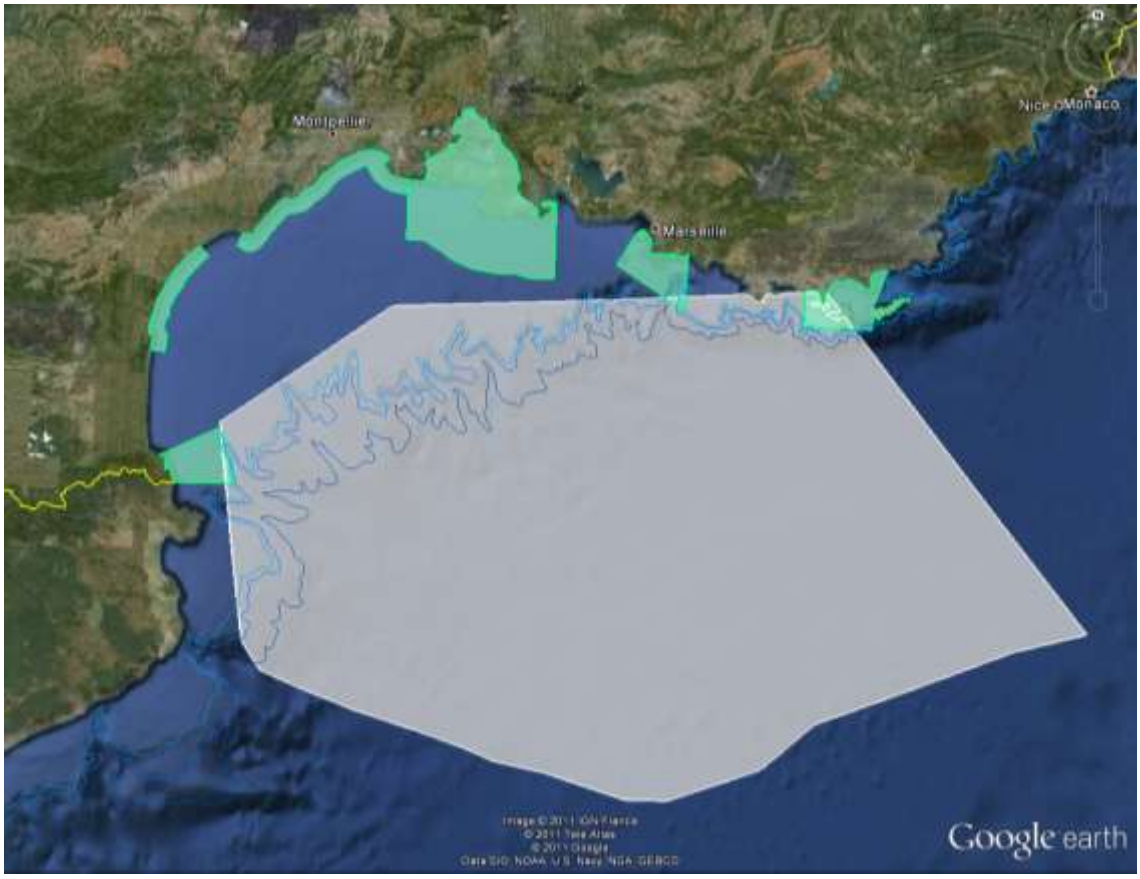


Fig. 2. Location of the study area (Gulf of Lions shelf and slope area, in white) in the context of the Natura 2000 sites (in green) officially designated by France as of November 2011. Source: French Marine Protected Areas Agency.

The study area as defined in this project (fig. 2) is rather heterogeneous as a potential habitat for seabirds. Considering the foraging needs of the species reviewed in the previous section, the following subareas can be identified:

a) W sector: Cap de Creus area
b) Central submarine canyons
c) E sector: Provence (Marseille – îles d'Hyères)
d) external waters (slope area)

W sector: Cap de Creus area

This area overlaps with the existing French SPA *Cap Béar – Cap Cerbère* (FR9112034) and the proposed Spanish SPA *Mar del Empordà* (ES0000514). However, the important area for birds extends further offshore to comprise the submarine canyons *Lacaze-Duthiers*, *Cap de Creus* and *Fonera*, and the whole of the continental shelf. The area is particularly important for all 3 shearwater species, Shag, Northern gannet and migratory seabirds. It is intensively fished (trawling, longlining, artisanal, purse-seining) and several episodes of bycatch have been recorded recently, so addressing this issue must be forefront of management policy. At the same time, fishing must be regulated in order to prevent excessive captures and the destruction of fish habitat. Other threats come from the intensive use of the coast for recreation and tourism, which reduce the space available for seabirds; no-go zones for boats and bathers should be established during the breeding season and in the summer months.

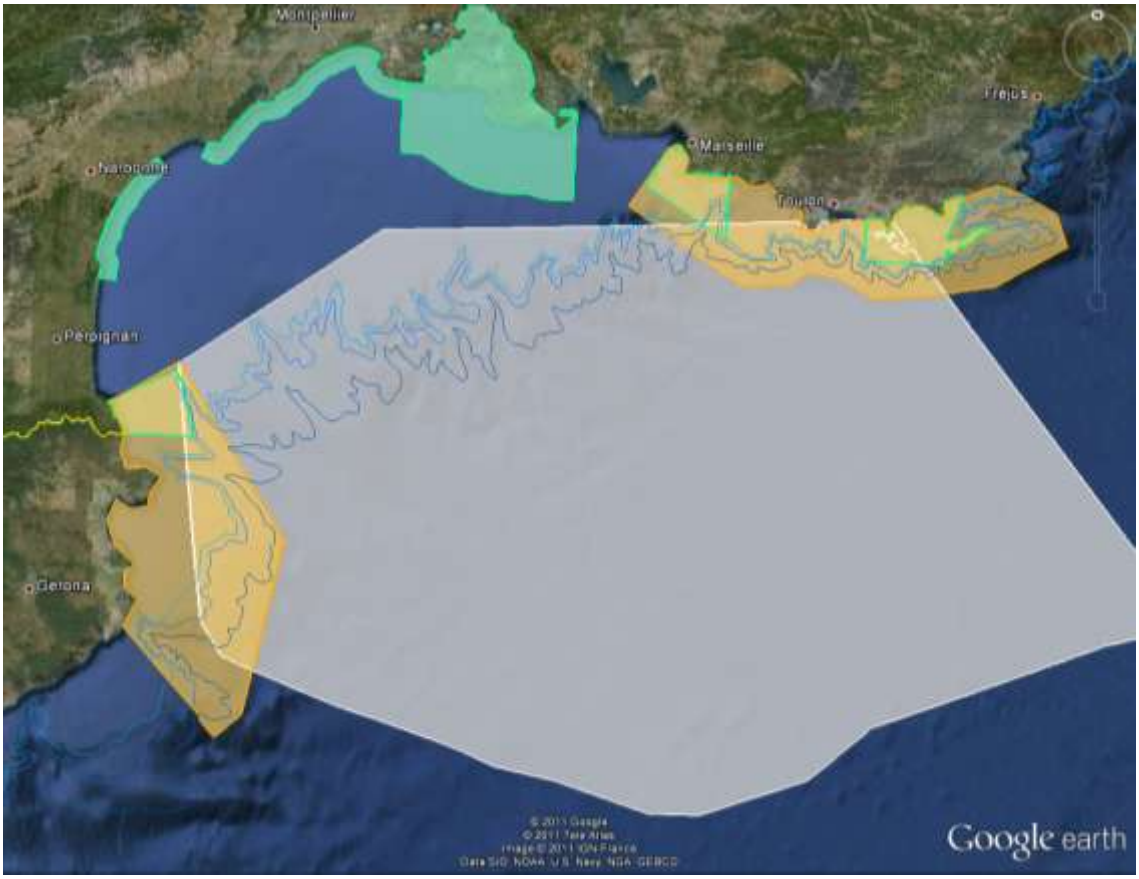


Fig. 3. Location of the important area for birds *W sector: Cap de Creus area* and *E sector: Marseille-îles d'Hyères* (in orange) in relation to the study area *Gulf of Lions shelf and slope area* (in white) and the Natura 2000 sites officially designated by France as of November 2011 (in green).

Central submarine canyons

This area overlaps partially with the area included in the original proposal put forward in 2008 by the French Marine Protected Areas Agency for consideration for a future Natura 2000 site *Plateau et Têtes de Canyon du Golfe de Lions* because of its value as principal foraging grounds for the 3 shearwater species, Storm petrel and Northern gannet. However, the proposal was not further supported and was therefore not included in the official documentation submitted by France to the European Commission in 2011. The reasons for this are unknown, but may be related to the difficulties of protecting large areas in the high seas.

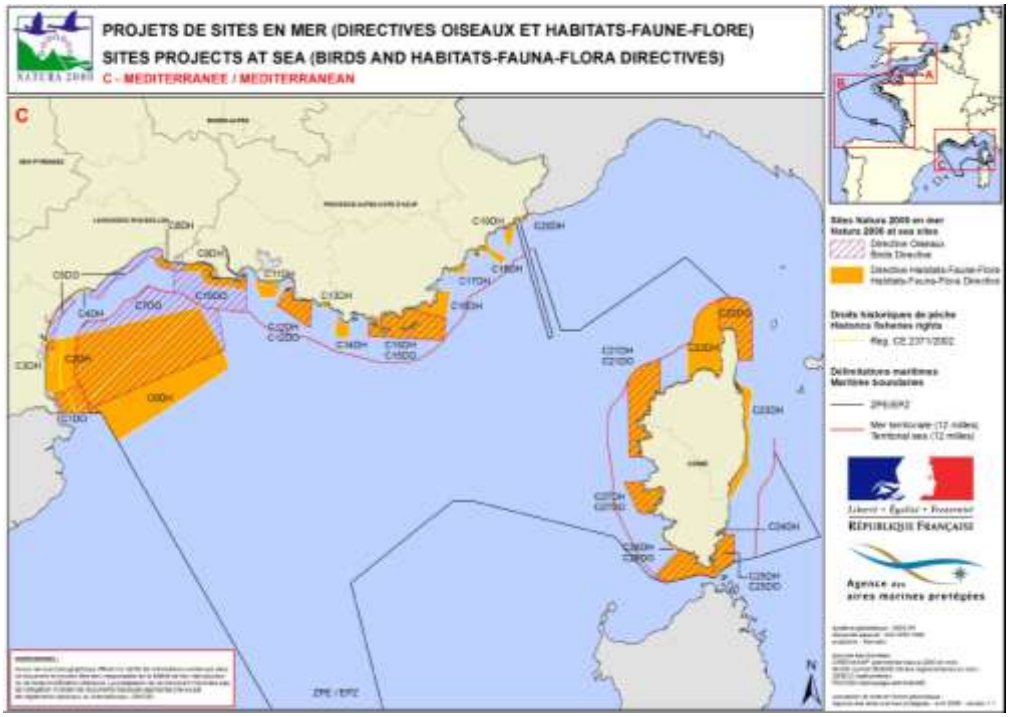


Fig. 4. The site *Plateau et Têtes de Canyon du Golfe de Lion* was included in the April 2008 version of the proposed Natura 2000 sites presented by the French Marine Protected Areas Agency on the basis of its value as foraging grounds for seabirds, including the endemic shearwaters.

Based on its conservation value for Mediterranean seabirds, an important area for birds is identified over the external continental shelf and heads of canyon in the central part of the Gulf of Lions, as shown in fig. 5. This area is frequented by large numbers of shearwaters of the 3 species and is also intensively fished, so the probability of interaction is high. Management measures should be directed at minimising the probability of mortality through bycatch (see Carboneras 2009) and at safeguarding the long-term maintenance of fish populations, particularly of anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*). A scientific observer programme, in collaboration with the fishing industry, is especially appropriate in this area. Its conclusions and recommendations, particularly as they regard the adoption of measures to reduce shearwater bycatch, should be implemented in the fisheries concerned.

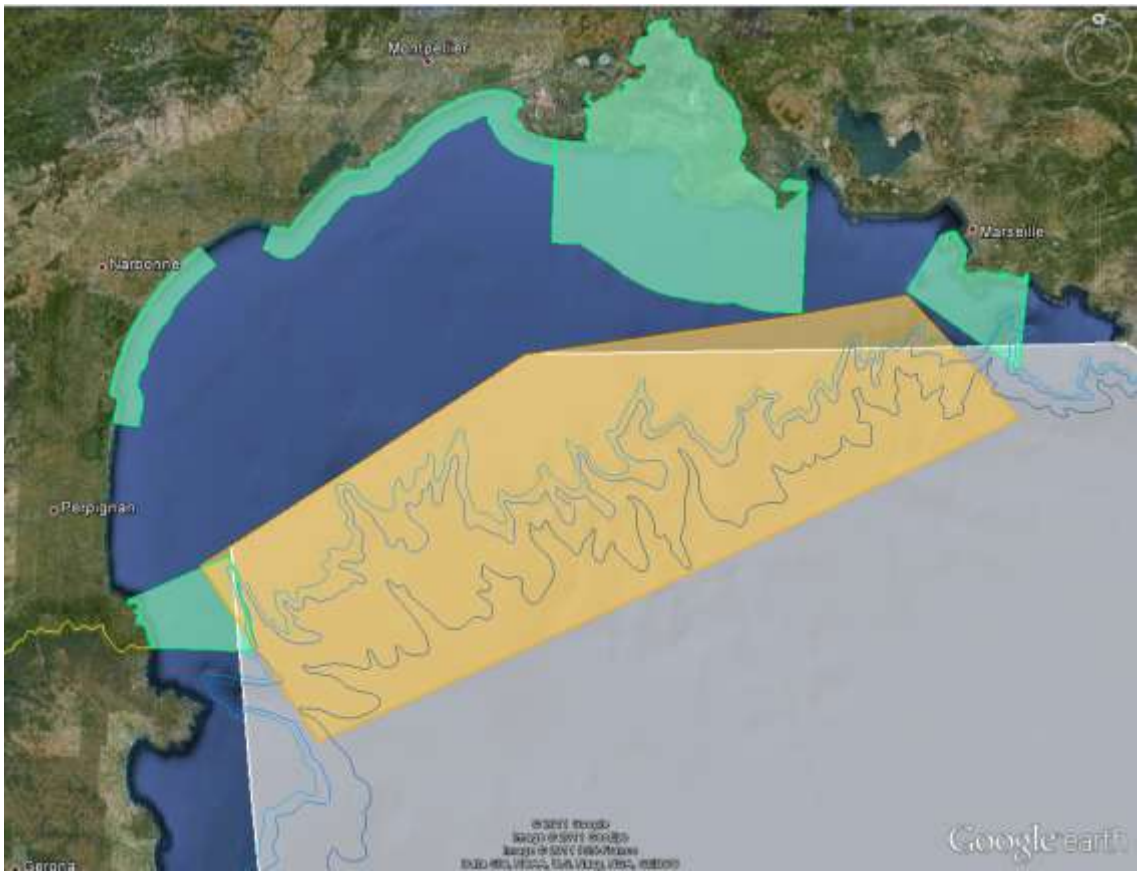


Fig. 5. Location of the important area for birds *Central canyons and continental shelf of the Gulf of Lions* (in orange) identified because of its value for foraging seabirds.

E sector: Provence (Marseille – îles d'Hyères)

The area overlaps with two SPAs established by France, Îles Marseillaises – Cassidaigne (FR9312007) and Îles d'Hyères (FR9310020). The important area for birds (fig. 3) links those protected sites and extends further offshore to include the heads of the submarine canyons *Cassis* and *Stoechades* so that the whole ecosystem is included. The area comprises the waters surrounding the main breeding areas in continental France for Yelkouan and Cory's shearwaters; the emerged land is already and adequately protected.

This area shares some characteristics with the *W sector: Cap de Creus* area important area for birds identified at the opposite end of the Gulf of Lions. Fishing and disturbance (tourism, recreational boating) are equally the main threats at sea, and management should be directed at addressing the risks of the interaction and minimising the probability of mortality through bycatch. At the same time, fishing regulations should seek its long-term sustainability and its minimal impact on the ecosystem. Disturbance should also be kept to a minimum near key spots on land (breeding colonies, resting places). The large city of Marseille and its active harbour, all within close distance of the bird-rich areas, represent an increased risk of pollution (oil, chemicals) that should be prevented.

External waters (slope area)

This area is comparatively large (roughly about two thirds of the study area) but is relatively poor as a potential habitat for foraging seabirds. The absence of significant features in the bathymetry or in the water column, and the dispersed fishing activity (mostly consisting of pelagic longlining), give homogeneity to the area and make it rather unattractive for foraging seabirds. Only [Mediterranean] Storm petrels regularly forage on these waters, and they do so at low densities. Thus, the S portion of the study area made of the external waters beyond the continental shelf is not identified as an important area for birds.

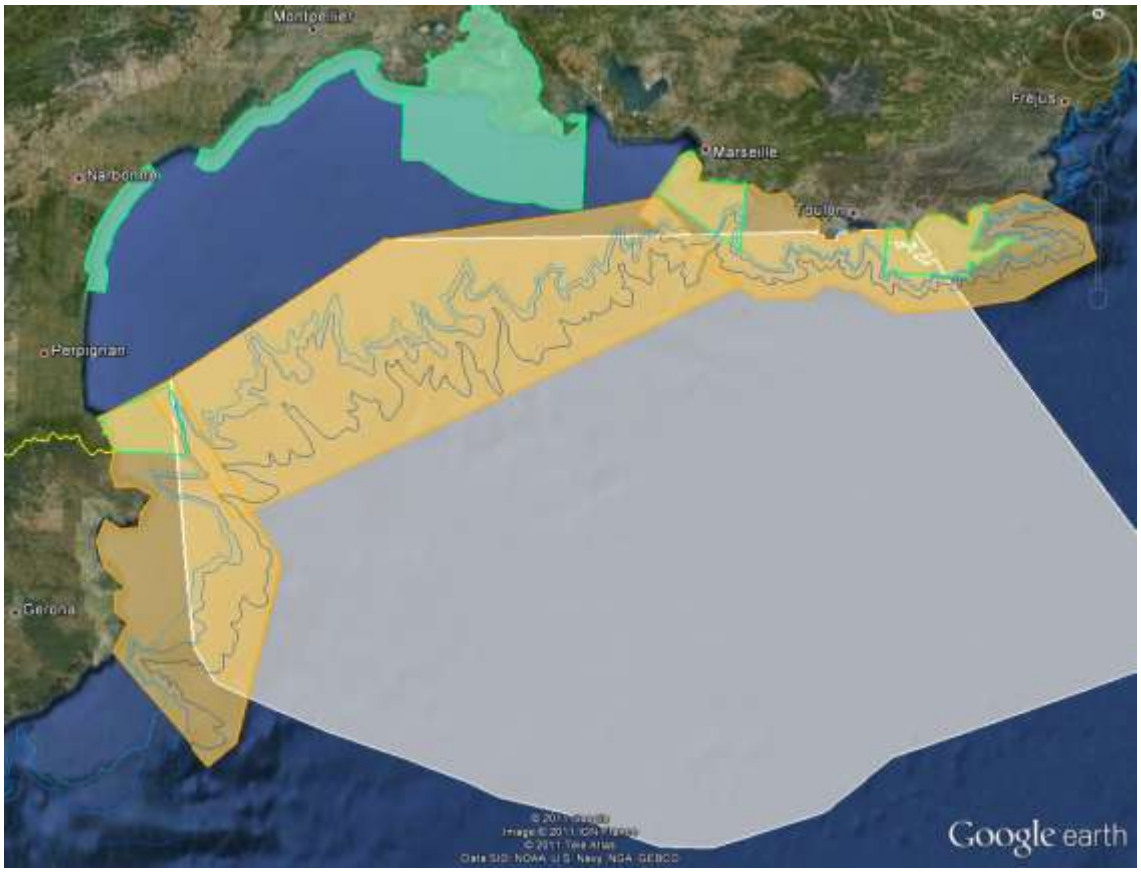


Fig. 6. General view of the study area (in white) and location of the three important areas for birds *W sector: Cap de Creus area*, *Central canyons and continental shelf of the Gulf of Lions* and *E sector: Marseille – îles d'Hyères* (in orange). The slope waters comprise the rest of the study area and are considered to be of undifferentiated value for foraging seabirds.

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