



LIFE07 NAT/GR/000285

Concrete Conservation Actions for the Mediterranean Shag and Audouin's Gull in Greece, including the Inventory of Relevant Marine IBAs

After-LIFE conservation plan



LIFE- Nature project

**Concrete Conservation Actions for the
Mediterranean Shag and Audouin's Gull in
Greece, including the Inventory of Relevant
Marine IBAs
(LIFE07 NAT/GR/000285)**

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Preface

The present report constitutes an After-LIFE Conservation Plan of the LIFE-Nature project «Concrete conservation actions for the Mediterranean Shag and Audouin's Gull in Greece, including the Inventory of relevant marine IBAs» (LIFE07 NAT/GR/000285), which was implemented by the Hellenic Ornithological Society (HOS) in collaboration with the Hellenic Society for the Study and Protection of the Monk Seal (MOM), the Hellenic Centre for Marine Research (HCMR), the Technological Educational Institution (TEI) of Ionian Islands and the Portuguese Society for the Study of Birds (SPEA / BirdLife Portugal) in 17 Greek SPA sites during the period 2009-2012. The project aimed at significantly improving the conservation status of the Mediterranean Shag and Audouin's Gull, as well as the identification of important marine areas for the two species in Greece. It included a series of concerted actions for the delineation of marine Important Bird Areas (Marine IBAs), rat eradication operations, pilot Yellow-legged Gull population control operations and assessment of accidental trapping in fishing gear (bycatch) and chemical pollution, according to the guidelines and priorities identified by the International Action Plans for the two species.

The actions described below are those which comprise the continuation and expansion LIFE-project actions to be carried out by the project partners. Funding for the majority of these has already been secured. The present document highlights the continuation of each separate action of the project in the context of the results already achieved within it, as well as in the framework of future activities undertaken by the project partners.

Introduction

The Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*) and Audouin's Gull (*Larus audouinii*) are two of the main seabird species of conservation concern in Greece. The main characteristics of the species are provided below.

Mediterranean Shag (*Phalacrocorax aristotelis*)

The **Mediterranean Shag** (*Phalacrocorax aristotelis desmarestii*) is the subspecies of the European Shag (*Phalacrocorax aristotelis*) endemic of the Mediterranean and the Black Sea (Albania, Algeria, Bulgaria, Cyprus, Egypt, France, Gibraltar, Greece, Italy, Libya, Russian Federation, Slovenia, Spain, Tunisia, Turkey and Ukraine). Its global population size is estimated at less than 10,000 pairs with significant fluctuations in breeding numbers from year to year in several Mediterranean colonies. The Greek national population size is estimated at 1,300-1,450 pairs. The national population trend is estimated to be stable. The Mediterranean Shag is a colonial breeder nesting on rocky coasts of larger and often inhabited islands and on uninhabited islets in Greece. The size of colonies ranges from few pairs to more than 100 pairs. The species exhibits high nest-site fidelity and is very sensitive to disturbance during breeding and at roosting sites. It is an exclusively diurnal feeder, feeding on coastal fish not far from land. During the post-breeding season some individuals may disperse.

Map 1: Global distribution of the European Shag. The Mediterranean Shag is its subspecies, endemic to the Mediterranean and Black Sea.



Audouin's Gull (*Larus audouinii*)

The global breeding distribution of the **Audouin's Gull** is confined primarily to the Mediterranean basin, namely Spain, Italy, Greece, France, Portugal, Cyprus, Croatia, Turkey, Tunisia, Algeria and Morocco. It winters on the coast of North and West Africa from Libya west to Morocco and south to Mauritania, Gambia, Senegal and Gabon and there is a small wintering population in the east Mediterranean along the Aegean coast of Turkey. The global population size has been estimated at circ. 21,500 pairs. The Greek national population is estimated at 350-500 pairs, indicating a significant reduction over the last decade, when in 1998-99 the estimated breeding population size was 700-900 pairs. The Audouin's Gull is a colonial breeder nesting on uninhabited rocky islets in Greece. The size of the colonies ranges from few pairs to several tens of pairs. It feeds primarily on coastal fish near the coast but may also follow fishing vessels to open sea, feeding on fishing bait and discards.

Map 2: Global distribution of the Audouin's Gull.



Conservation and protection status

The Mediterranean Shag is listed as Least Concerned (LC) in the IUCN Red List (IUCN 2012) and as Near Threatened (NT) in the Greek Red Data Book of Threatened Fauna¹. The Audouin's Gull is listed as Near Threatened (NT) in the IUCN Red List and as Vulnerable (VU) in the Greek Red Data Book. With respect to the SPEC categories used by BirdLife (Species of European Conservation Concern), the Mediterranean Shag is categorised as a Non-SPEC species (SPEC-4 in the past) as it has a favourable conservation status in Europe and the Audouin's Gull is listed in the SPEC-1 category as it is a species of global concern. The European Threat Status category of the Mediterranean Shag and Audouin's Gull is Secure (provisional status) and Localized, respectively. The Mediterranean Shag and Audouin's Gull are both listed in the Annex I of the EU Birds Directive and Annex II of the Bern Convention. Additionally, the Audouin's Gull is listed in the Appendix I and Appendix II of the Bonn Convention and in the Agreement on the Conservation of African-Eurasian Migratory Waterbirds. Finally, an International Species Action Plan has been prepared and 'endorsed' by various international treaties for both species.

Table 1: Conservation status of the Mediterranean Shag and Audouin's Gull

Common name	Mediterranean Shag	Audouin's Gull
Season status	Resident	Resident
IUCN RLC (2012)	LC: Least Concern	NT: Near Threatened
Greek RDB (2009)	NT: Near Threatened	VU: Vulnerable
SPEC category	- ^E : Concentrated in Europe but with a Favourable Conservation Status	1: Species of global conservation concern i.e. classified as Globally Threatened
ETS	(S): Secure– provisional status	L: Localised
Birds Directive	Annex I: species subject of special conservation measures concerning their habitat	Annex I: species subject of special conservation measures concerning their habitat
Bern Convention	Appendix II: Strictly Protected Fauna Species - Vertebrates	Appendix II: Strictly Protected Fauna Species - Vertebrates
Bonn Convention		Appendix I: species in danger of extinction throughout all or major parts of their range Appendix II: species which would benefit from international cooperation in their conservation and management
AEWA		√
SAP	√	√

KEY: IUCN RLC (2012) - Red List Categories according to the IUCN Red List of Threatened Species; Greek RDB (2009) - Greek Red Data Book; SPEC Species of European Conservation Concern; ETS European Threat Status; Birds Directive - EU Council Directive on the Conservation of Wild Birds (2009/147/EEC); Bern Convention - Convention on the Conservation of European Wildlife and Natural Habitats; Bonn Convention - Convention on the Conservation of Migratory Species of Wild Animals (CMS); AEWA: Agreement on the Conservation of African-Eurasian Migratory Waterbirds; SAP – International Species Action Plan

¹ Handrinos, G. and T. Kastritis (2009) Birds In: Legakis, A. and P. Maragou (eds.) The Greek Red Data Book of Threatened Fauna. Hellenic Zoological Society, Athens.

Several sites hosting the two species possess European and national protection status. In total, eight Natura 2000 sites (i.e. SPAs) have been designated in Greece for the Mediterranean Shag and 15 sites for Audouin's Gull, thus the species are trigger species of these sites.

Threats

The Mediterranean Shag and Audouin's Gull face numerous threats in their terrestrial and marine environment. The main threats have been identified in the relevant International Species Action plans and they include:

- Predation by introduced mammals
- Competition with other species
- Accidental catch (bycatch)
- Depletion of food resources
- Chemical pollution
- Oil pollution
- Human disturbance
- Habitat loss and alteration (in the marine and terrestrial environment)

The main threats, their effects and importance for the Mediterranean Shag and Audouin's Gull are provided in Table 2, below. Along with the existing threats, additional potential threats resulting from the possible future installation and operation of wind farms have been included.

Table 2: Main threats or potential threats for the Mediterranean Shag and Audouin's Gull. Their importance has been estimated based on the available information in Greece and abroad.

Threat category	Threat	Effect	Mediterranean Shag	Audouin's Gull
Predation by introduction of mammals	Introduction of predators (mainly rats, but also cats, dogs)	Egg and/or chick predation / reduced breeding success	Medium	Medium
Competition with other species	Competition with Yellow-legged Gull	Lower prey availability / Lower quality nesting habitat Predation	Medium	Locally high
Bycatch	Accidental bycatch in fishing gear (longlines)	Mortality	Low	Medium, locally high
	Accidental bycatch in fishing gear (nets)	Mortality	Medium, locally high	Low
Depletion of food sources	Change in prey availability	Increase of adult mortality Reduced breeding success	High	High
Chemical pollution	Chemical pollution	Reduced breeding success	Low	Low
Oil pollution	Marine accidents and pollution	Marine habitat degradation / Mortality	Locally high	Locally high
Disturbance	Human presence on islets or at sea	Reduced breeding and/or foraging success	Medium, locally high	Low, locally medium
Habitat loss and alterations	Habitat degradation due to coastal development	Breeding and/or foraging habitat loss	Low, potentially locally high	Low, potentially locally high
	Installation and operation of wind farms on islets	Loss of nesting habitat / disorientation and collisions	Potentially medium, locally high	Potentially medium, locally high
	Installation and operation of in- & off-shore wind farms	Loss of foraging habitat	Potentially medium	Potentially medium

LIFE-Nature project

The LIFE-Nature project «Concrete conservation actions for the Mediterranean Shag and Audouin's Gull in Greece, including the Inventory of relevant marine IBAs» has been implemented by the Hellenic Ornithological Society in collaboration with the Hellenic Society for the Study and Protection of the Monk Seal (MOM), the Hellenic Centre for Marine Research (HCMR), the Technological Educational Institution (TEI) of Ionian Islands and the Portuguese Society for the Study of Birds (SPEA) in 17 Greek SPA sites during the period 2009-2012.

The project aimed at the significant improvement of the conservation status of the Mediterranean Shag and Audouin's Gull, as well as the identification of important marine areas for the two species in Greece. It included a series of concerted actions for the delineation of marine Important Bird Areas (Marine IBAs), rat eradication operations, pilot Yellow-legged Gull population control operations and assessment of accidental trapping in fishing gear (bycatch) and chemical pollution, according to the guidelines and priorities identified by the International Action Plans for the two species. During the course of the project's implementation the following were realised:

- Compilation of a marine IBA Inventory using all available information collected through the present project as well as all previous HOS project related to the marine environment. The marine IBA Inventory consists of 33 sites which fulfill IBA criteria for their populations of Mediterranean Shag and Audouin's Gull. Of these, the Mediterranean Shag is a trigger species in 22 sites and the Audouin's Gull in 21 sites (Map 3), using all available information collected through the present project as well as through all previous projects related to the insular and marine environment of Greece that HOS was involved in^{2,3,4,5}. Apart from the 17 project sites, marine IBAs for the two target species have been identified for all other sites in Greece where sufficient information was available. It is considered that the Inventory contains almost all important marine areas for the two seabird target species in Greece. The process involved the application of the standardized marine IBA identification approach developed by BirdLife International, including boat- and land-based observations, tracking of individual birds, analysis of seabird diet, collection of oceanographic, marine biological and fisheries data, statistical, geographic and modeling approaches of data

² 'Survey and Conservation of Seabirds in Greece', Hellenic Ornithological Society supported by the A.G. Leventis Foundation

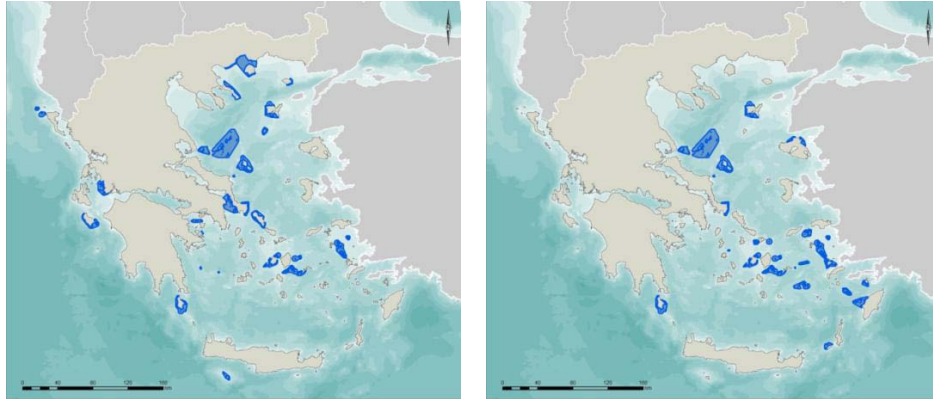
³ LIFE-Nature 'Conservation actions for *Larus audouinii* in Greece', Hellenic Ornithological Society, (LIFE96 NAT/GR/003221)

⁴ LIFE-Nature 'Conservation actions for *Falco eleonora* in Greece', Hellenic Ornithological Society, University of Crete-Natural History Museum of Crete, Greece Royal Society for Protection of Birds (RSPB), Hellenic Ministry of Agriculture (LIFE03 NAT/GR/000091)

⁵ Evaluation of 69 Important Bird Areas as Special Protection Areas, Ministry of Environment, Energy and Climate Change

analysis and finally application of IBA criteria. The marine IBA Inventory was presented in the publication “Important areas for seabirds in Greece”⁶.

Map 3: Marine IBAs designated for the Mediterranean Shag (left) and Audouin’s Gull (right)



- A series of rat eradication operations on 9 islet complexes consisting of 19 islets with a total surface area of 250.4 ha. These rat eradication operations are expected to bring about beneficial effects to 12.0-16.2% of the national breeding population of the Mediterranean Shag and 13.0-51.5% of the national breeding population of the Audouin’s Gull. Rat eradication operations were planned on the basis of islet complex prioritization using cost-benefit analysis. Additionally, molecular methods have been applied in order to determine rat eradication units and rat re-invasion risk for rat free islets, thus allowing for optimal planning and implementation of rat eradication operations and mitigation measures to prevent rat reinvasions.

⁶ Fric, J., Portolou, D., Manolopoulos, A. and T. Kastritis (2012). *Important Areas for Seabirds in Greece*. LIFE07 NAT/GR/000285, Hellenic Ornithological Society (BirdLife Greece), Athens.

Map 4: Locations of islet complexes and LIFE project sites



- A series of pilot population control operations at 5 Yellow-legged Gull colonies on islets that also host Mediterranean Shag and Audouin’s Gull colonies, based on the assessment of available gull control methods and island prioritization.
- Assessment of seabird bycatch in all types of fishing gear based on data from on-board observations, questionnaires for fishermen and other records of seabird bycatch. Based on the data collected, available bycatch mitigation measures were assessed and with the contribution from fishermen, a series of seabird bycatch mitigation measures were proposed to be implemented in Greece.
- Assessment of chemical pollution affecting seabirds in major Mediterranean Shag and Audouin’s Gull colony breeding areas.
- Support of the position of the BirdLife European Marine Coordinator to promote international coordination of BirdLife partners. This facilitated the establishment of BirdLife’s Marine Task Force, the publication of several communication and scientific reports and the coordination and international approach on issues regarding marine IBA identification, invasive species eradication and island habitat management.
- Significantly increased public awareness and the appreciation of the general public and of specific social groups through the production of an environmental education kit and the implementation of its activities, the production and dissemination of focused communication material, the launch of a public awareness campaign on numerous islands in the Aegean and Ionian Sea, media work at local level, the promotion of project results to the scientific community and the promotion of bycatch mitigation measures. Additionally, public awareness campaigns promoted environmentally friendly practices

and sustainable activities, from an environmental, social and economical point of view, at the project sites.

Overall, the project has created lasting partnerships and co-operations with environmental, research and academic organizations, local authorities, stakeholders and individuals, providing a basis for the continuation of the present, as well as the implementation of future conservation actions for seabirds and the insular and marine environment. The information collected, as well as the experience and know-how acquired and tools developed have been optimally applied for the successful implementation of high-priority conservation actions to improve the conservation status of the Mediterranean Shag and Audouin's Gull in Greece. The project managed to address some of the threats on the national level and others on the local level, while some still remain, requiring the continuation and expansion of the conservation actions in the future. These remaining threats provide the basis for the continuation of the project actions after the end of the LIFE-Nature project, and are described in the following chapter.

After-LIFE conservation actions

The outcome from the implementation of the project's actions and the information collected allow the update of the conservation status of the Mediterranean Shag and Audouin's Gull in Greece and the strategic planning of future conservations for these two species. On a national level several of threats facing the two target species remain, thus the International Action Plans compiled for them continue to provide the main tool and guidelines with which to plan and implement future conservation actions in Greece.

The continuation and expansion of the project's actions have already been included in HOS future plans either among its core activities or through marine projects, the funding of which has already been secured (e.g. a 3-year HOS project on seabird conservation during 2013-2015, funded by the A.G. Leventis Foundation).

Marine IBAs

One of the main project achievements was the production of the marine IBA Inventory. The relevant process included the implementation of a standardized marine IBA identification protocol developed by BirdLife International, which was further elaborated and adapted to the specific conditions in the Aegean and Ionian Sea.

The current marine IBA Inventory is considered to contain almost all important marine areas for the Mediterranean Shag and Audouin's Gull in Greece, since all available data acquired during the project as well as during past HOS projects has been incorporated. This inventory has been submitted to the competent authority i.e. Ministry of the Environment, Energy and Climate Change. This is a major achievement towards the improvement of the legal protection status of the marine areas vital for the target species. Due to the common criteria used for the selection of IBAs and SPAs, i.e. criteria C, it is considered that there should be no technical difficulties in including these sites within the Natura 2000 network. HOS has been closely involved in the process of identifying new marine Natura 2000 sites, led by the Ministry of Environment and has already contributed a preliminary list of sites in 2010. Following the conclusion of the project, HOS will continue to support the inclusion of these sites in the Natura 2000 network as marine SPAs by providing additional information and clarifications or assisting in any way possible regarding the marine IBAs identified. MOM will provide additional support towards the improvement of the protection of the Mediterranean Shag and Audouin's Gull by promoting the conservation of the two species through the documentation of conservation measures to the National and EU authorities.

The Marine IBA Inventory has been produced as a publication "Important Areas for Seabirds in Greece" in English language only. One of the main activities following the completion of the project is the production of the publication in Greek language.

Update and revision of existing IBAs is a continuous process which takes place in cooperation with BirdLife International through the evaluation of up-to-date population data, acquired through regular monitoring of IBA sites. In order to achieve this, HOS will continue to monitor those IBAs identified for seabirds through a seabird project commencing in 2013 (funded by A.G. Leventis Foundation) and through the very effective

HOS network of IBA caretakers, who have been successfully monitoring the state of numerous IBAs all over Greece for almost a decade. Additional information on the Mediterranean Shag and Audouin's Gull will also be collected by MOM through specific actions which have been scheduled in the area of the Northern Aegean Sea over the next years. More specifically these actions are: a) Monitoring of the status of cetacean species *Delphinus delphis* and *Tursiops truncatus*, in the wider area of the Northern Sporades, b) Monitoring of the status of the Mediterranean Monk Seal in the area through the operation of the 'Rescue and Information Network' and through field expeditions during the breeding season at seal pupping areas in the Northern Aegean Sea.

Several data collection and data management tools related to marine IBAs have been developed during the implementation of the project. These will continue to be used for collection, storage and analysis of data related to seabirds, as well as data relating to the Greek insular and marine environments. One of these is the Hellenic Seabird DataBase which was originally developed as the *Falco eleonora* DataBase within the framework of the LIFE03 NAT/GR/000092 project and later on upgraded to allow also for the management of seabird data. This database was further developed during the current project and remains the main tool for data management regarding island and marine IBAs and SPAs. A new ESAS (European Seabirds At Sea) database was created for the purpose of boat-based surveys carried out during the project. This database was later on adjusted and made available to BirdLife partners in Turkey, Bulgaria and Romania for the purpose of the marine IBA identification process in the Black Sea (see section Networking among BirdLife partners below). Both afore-mentioned databases, as well as other databases, related to telemetry, coastal counts and seabird colonies will continue to be managed by HOS to their full extent after the end of the project.

Molecular analysis of Mediterranean Shag and Audouin's Gull diet proved to be a powerful tool for the analysis of prey remains, which allows for the recognition of prey items not only from seabirds but from other top marine predators as well. Technological advances in genetic methods have over the years become cheaper and simpler, thus it is expected that the current method may become one of the main tools for diet analysis. Standardized methods developed particularly for seabird prey species present in Greece provide the basis for further development to investigate prey remains in other marine organisms.

It should be noted that during boat-based surveys for the Mediterranean Shag and Audouin's Gull, numerous other species of marine fauna were also recorded, including other seabird species, marine mammals and turtles. These were made available to the relevant NGO's in Greece i.e. PELAGOS (cetaceans) and ARCHELON (sea turtles). Additionally, all information collected through other HOS projects, as well as the current LIFE project, relating to other seabird species of conservation concern (i.e. Cory's Shearwater, Yelkouan Shearwater and European Storm-petrel) allowed for the identification of several additional marine IBAs for these three seabird species which were also included in the marine IBA Inventory submitted to the Ministry of Environment. Thus, all available information on seabird species of conservation concern in Greece (i.e. Audouin's Gull, Mediterranean Shag, Cory's Shearwater, Yelkouan Shearwater and European Storm-petrel) were utilized in the process of identification of new marine IBA sites. The marine IBA Inventory for the latter

three species however, is far from being complete. Additional surveys are required particularly in the pelagic marine areas of the Aegean and Ionian Sea. These gaps are planned to be covered during future projects aiming at the Yelkouan and Cory's Shearwaters.

Rat eradications

Rats have been eradicated from 9 islet complexes, hosting a significant proportion of the national breeding populations of the target species. Thus, on a local level, the threat of rat predation on eggs and chicks has been eliminated. Molecular analysis used for the assessment of the risk of rat re-invasion for these islets revealed that rat reinvasion is unlikely to occur. Despite of this fact, permanent bait stations loaded with rodenticide, were positioned on all islets treated, in order to further reduce the chance of rat reinvasion. In order to ensure long-term benefits from the eradication operations and maintain islets rat-free, rat presence will continue to be monitored on these islets, while bait will be replaced in the permanent bait stations and seabird populations monitored annually. In an unlikely event of rat re-invasion however, the molecular tools developed by the HCMR will allow for the identification of the source of re-infestation and appropriate measures will be taken to remove rats.

The first successful pilot application of rat eradication in Greece was carried out between 2005-2007, within the framework of the project "Conservation measures for *Falco eleonora* in Greece" (LIFE03 NAT/GR/000091) and aimed at the improvement of the breeding habitats of the species. This pilot action allowed for the implementation of a full scale rat eradication operation within the present project, which addressed the threat on a national scale. The current project developed tools, by means of cost-benefit analysis, with which to prioritize islets where rat removal is expected to create the greatest ecological benefits, thus allowing for strategic planning of rat eradications on a national level. Additionally, the experience gained through the implemented rat eradication operations within the current LIFE project allowed for further improvement rat eradication techniques and their efficiency on Greek uninhabited islets.

Although since 2005, when the first rat eradications were implemented in Greece, rats have been removed from several islets hosting seabird and Eleonora's Falcon colonies, rat predation has remained one of the major problems for the Mediterranean Shag and Audouin's Gull, as well as other species of conservation concern, such as the Eleonora's Falcon, Cory's Shearwater, Yelkouan Shearwater and European Storm-petrel. Two LIFE-Nature projects currently running for the protection of priority bird species and biodiversity on Skyros (LIFE09 NAT/GR/000323) and Andros (LIFE10 NAT/GR/000637) islands, already implement additional rat eradication operations, which comprise direct continuation of the effort of the present LIFE project.

Further rat eradication operations are planned to be implemented in the future for the conservation of the Mediterranean Shag and Audouin's Gull, as well as other seabird species (Cory's Shearwater, Yelkouan Shearwater and European Storm-petrel). The selection of candidate islands will be based on the islet prioritization tool developed during the present project.

Finally, information collected during the current project was provided for a study carried out by the University of Michigan, aiming at establishing the beneficial effects of rat eradications on other animal groups (invertebrates, insects, lizards), as well as plants. The study is still in progress and is expected to conclude in 2013, providing the first guidelines on the applicability of rat eradication operations for the conservation of the fauna and flora of uninhabited islets, for which Greece holds a vital role.

Summarizing, due to the existence of the rat predation issue on uninhabited islets in Greece, planning and implementation of rat eradication operations remains one of the major tools and future objectives for the conservation of valuable islet ecosystems.

Yellow-legged Gull population control

Yellow-legged Gull population control operations share several common features with rat eradication operations. They aim to tackle a wide-spread problem caused by overabundant species, in this case Yellow-legged Gulls, the populations of which grow significantly in size due to abundant man-made food sources. Strategically, the implementation of gull population control operations should be planned to follow the same pattern as rat eradication operations, in order to achieve their full scale implementation and significantly benefit the species affected by over-sized Yellow-legged Gull populations. The first two stages of this process have already been achieved during the current project, including (1) the pilot implementation of various Yellow-legged Gull population control methods to assess their applicability, suitability and efficiency and (2) the prioritization of target Yellow-legged Gull colonies to select the implementation of those operations which will lead to optimal ecological benefits.

Immediate and mid-term results arising from the application of egg-oiling as a management measure have already demonstrated that this method is successful in reducing the number of Yellow-legged Gulls and is particularly effective in larger colonies where a significant proportion of the local Yellow-legged Gulls populations breed, leading to reduced pressure on other seabirds species, such as the Audouin's Gull and Mediterranean Shag. The method is most effective when carried out during continuous years. It is considered that the potential for its success may be greatly increased when associated with other management measures to reduce Yellow-legged Gull populations, such as reduction of available food sources (e.g. closure of landfills). Thus, the method is considered to be particularly suitable for areas which possess some kind of management scheme i.e. a Management Body, that has the authority to manage bird populations and other human activities. Therefore, this method has already being promoted for implementation to the Management Bodies of protected areas.

Following this concept and the results of the present project, Yellow-legged Gull control operations are also implemented on the islets of Skyros and Andros within the framework of the two LIFE-Nature projects (LIFE09 NAT/GR/000323 and LIFE10 NAT/GR/000637 respectively).

In order to establish the long-term results of the Yellow-legged Gull operations, the main breeding colonies of the species that were treated during the project and are affecting

Audouin's Gull and Mediterranean Shag colonies, will continue to be monitored in the following years, as part of HOS's core actions for seabirds.

The islet prioritization tool developed within the present project, in association with the experience acquired through the implementation of pilot gull control operations will be used for the planning and implementation of Yellow-legged Gull population control operations at other sites, targeting additional species, e.g. waterbirds, which are affected by competition and predation by the Yellow-legged Gulls.

Assessment of seabird bycatch and proposed mitigation measures

The current project has managed to carry out the first assessment of seabird bycatch in all major types of fishing gear used in the Aegean and Ionian Sea. This resulted in the identification of the main seabird species affected by interaction with fisheries, the main types of fishing gear responsible for bycatch and provided better estimates of the bycatch rates for all seabird species of conservation concern in Greece. Based on the data acquired, the importance of the threat for the Audouin's Gull and Mediterranean Shag in Greece are estimated to be *medium or potentially high* (mainly due to bottom longlines) and *low and occasionally high* (mainly due to nets), for the two species respectively. On the other hand, this assessment, which included contributions by fishermen, produced a list of proposed mitigation measures which are proposed for application in order to reduce seabird bycatch in Greece. The efficiency and applicability of these methods has already been confirmed by fishermen who implement them at their own initiative as a daily practice.

The results of the present action create opportunities, which will continue to be exploited in years following the LIFE-project. Fishermen in general held a positive attitude towards seabirds, and many were already aware of the measures that could be used to reduce interactions with seabirds and were implementing them. This provided an ideal opportunity to further promote these methods on the local level through means developed by the project such as a leaflet on seabird bycatch and through direct cooperation with fishermen on the local level. It is envisaged that cooperation with fishermen, that has taken place before and during the project, will continue in the future as part of the core activities of all Greek project partners. The results of the bycatch assessment, in association with the localized distribution of the Audouin's Gull and the Mediterranean Shag, indicate that bycatch poses a problem on a local level, particularly in the vicinity of their colonies. Therefore, the promotion of mitigation measures will focus on particular areas hosting the main colonies of these two species, facilitating this task. On the national level, the current results from the assessment of seabird bycatch were made available to the competent authorities i.e. the Ministry of Rural Development and Food, in order to provide complementary information on seabird bycatch from Greece in accordance to EU guidelines provided through the EU Plan of Action for Seabirds and the Common Fisheries Policy. On the European Level, BirdLife International, through its European Marine Coordinator and Marine Task Force, will continue to lobby for the reduction of seabird bycatch and the implementation of mitigation measures, using information provided by national BirdLife partners, including Greece.

On the methodological level, experience as well as data collection and management tools developed through the project (i.e. data collection protocols and databases) have already been shared with BirdLife International in order to establish a standardized method for the assessment of seabird bycatch. The assistance of the national BirdLife partners by the BirdLife International on issues related to seabird bycatch and its reduction will continue after the end of the project.

The main gaps in the knowledge regarding seabird bycatch relate to the precision of estimates for seabird bycatch rates, i.e. how many individuals of each species get caught in different fishing gears in Greece annually and the impacts of bycatch on their populations. Initial estimates of the impacts of bycatch on particular local populations of the Audouin's Gull and Mediterranean Shag have already been produced during the current project. The main Audouin's Gull and Mediterranean Shag colonies in Greece (i.e. in the Northern Dodecanese and Kavala/Thasos, respectively) will continue to be monitored as part of the core activities of HOS, as performed for more than 15 years now. Monitoring will provide additional information on the size and status of these colonies and on the factors affecting them. In this way, long-term population trends for these colonies will be estimated. Estimation of bycatch rates, on the other hand, proved to be more difficult a task due to the large size of the Greek fishing fleet. The limited sampling effort initially foreseen and realized by the project in association with the relatively low bycatch rates per single fishery, did not allow for a precise estimate of bycatch rates. Therefore possibilities of potential future monitoring project will be explored in order to incorporate recording of seabird bycatch.

Finally, the bycatch assessment indicated that the most frequent victims of seabird bycatch in Greece are Cory's and Yelkouan Shearwaters. This fact, in association with the results of the global population assessment and the conservation status of the Yelkouan and Cory's Shearwater, as performed by BirdLife International in 2011 and 2012, urge for further surveys and conservation actions for these two species. HOS has already secured funding from the A.G. Leventis Foundation to continue surveys of seabirds during the following year, which will include also Cory's and Yelkouan Shearwater colonies. This is expected to improve existing knowledge on the population trend of particular major shearwater colonies in Greece, as well as the impacts of the bycatch on them.

Assessment of chemical pollution

Results from toxicological analyses revealed that the current level of chemical pollution is unlikely to have acute effects on the studied population of the Mediterranean Shag and Audouin's Gull, including those breeding colonies located in marine areas significantly influenced by land-based pollution sources (e.g. Gulf of Kavala). However, HOS will continue to collect data on the breeding success of the main colonies of the Audouin's Gull and Mediterranean Shag, as well as on potential new sources of chemical pollution affecting the marine environment, which could have adverse effects on the target species.

Networking among BirdLife partners

The current project together with the Portuguese project LIFE07 NAT/P/000649 supported the BirdLife International initiative to secure the position of the European Marine Coordinator, in order to improve international networking and cooperation regarding

marine and seabird issues. Prior to the creation of this position, no coordinated marine work took place across the European BirdLife partnership, while within the last four years, large improvements have been made in this field which resulted in the creation of the BirdLife's Marine Task Force, the publication of several communication and scientific reports and above all, the day-to-day coordination and international approach to the problem of marine IBA identification, alien-eradication and island management. This has led to a significant increase in the exchange of information and experience among European BirdLife partners and in the initiation of various projects related to seabird conservation and marine IBA identification, with the ultimate goal to contribute to the marine Natura 2000 network and effective management of these sites. On the other hand, the current project gained substantially from networking among BirdLife partners, by improving the implementation of all its major actions: the production of the marine IBA inventory, rat eradication, gull control operations and assessment of seabird bycatch, primarily through the support of other BirdLife partners who already have implemented similar projects. Apart from SPEA, which also was a project partner, these also included SEO/BirdLife Spain and the Royal Society for the Protection of Birds (RSPB / BirdLife UK).

On the regional level of the Eastern Mediterranean and Black Sea, this networking among BirdLife partners led to significant advances, particularly regarding the process of marine IBA identification. Since 2010, and with the support of the RSPB, close cooperation between HOS and BirdLife partners in Turkey and Bulgaria was established in order to initiate their marine IBA identification programmes. Knowledge, experience and know-how gained through the marine IBA identification process was utilized within the present project. In 2011, two project proposals were submitted for EU-funding, one for the identification of marine IBAs in the Adriatic Sea and the other for the identification of marine IBAs in the Black Sea, where HOS played an advisory role providing other BirdLife partners with technical support on issues relating to marine IBAs. The latter project was approved and commenced in 2012, and the marine IBA identification process initiated in the Black Sea, including Turkey, Bulgaria and Romania. This project is already in full progress. Additionally, HOS provided technical support to BirdLife Cyprus in its marine IBA identification process.

Networking among BirdLife partners proved to be one of the most important aspects of the LIFE project related to seabird conservation and marine IBAs. Firstly, it has optimized the outputs of particular national and international projects by utilizing all available knowledge and tools, leading to immensely enhanced value-for-money seabird conservation projects, most of which are financed through the LIFE programme or other EU financial tools. Secondly, it has promoted and created partnerships among BirdLife partners, which is reflected in the numerous trans-boundary conservation projects.

Therefore, the European level BirdLife's successful networking scheme and HOS's networking on the regional level are now considered essential core actions of BirdLife and HOS and will continue to operate in their full extent after the end of the LIFE project.

Renewable energy

The European Union aims to provide 20% of energy demands from renewable sources by 2020. In Greece the development of tidal and wave renewable energy units have not received particular interest, and the majority of renewable energy applications relate to solar and wind energy sources. Greece provides favourable conditions for the construction of onshore and offshore wind farms. All existing wind farms in insular areas are located on land, apart from one small offshore wind farm constructed in Irakleia island in the Cyclades. Up until the end of 2012, no onshore wind farms have been constructed at seabird colony sites nor inshore or offshore wind farms at major seabird foraging or migration marine areas. However a significant number of applications for offshore wind farms has been submitted to the Regulatory Authority for Energy (RAE), while large numbers of proposals are planned for onshore uninhabited islets, many of which host significant seabird breeding colonies.

Wind farms can negatively affect seabirds, both during the construction and operation stages. Improper siting of wind farms may lead to displacement of bird populations, degradation, destruction or loss of seabird breeding habitats on land or foraging and movement habitats at sea. Wind turbines may pose barriers to migration and local foraging movements, disrupt ecological continuity and increase the risk of collision causing mortality or injuries. Additionally, they may cause habitat loss and disturbance from operating turbines, ship traffic and human presence during maintenance.

HOS has been following closely the recent developments regarding works on a number of uninhabited islands and islets in Greece. These works include numerous proposals for large scale onshore and inshore wind farms on islands in the Ionian and Aegean Sea. Many of these islands and islets are part of the Natura 2000 network. The development of wind farms, if implemented inappropriately, could have severe negative impacts on sensitive island and marine ecosystems, including the project target species. Advocating for the prevention of these specific and other threats to wild birds, to IBAs and the Natura 2000 network through lobbying, national court hearings, press-releases and public events constitutes one of the priorities for HOS's Environmental Policy Department, and is often carried out in collaboration with other environmental NGOs in Greece and abroad, as well as with the local communities concerned. Additionally, HOS provides sound and updated scientific information to the competent authorities for the environmental permit procedure. Up to date, HOS has published "Guidelines for the implementation of the appropriate ornithological assessment of proposed projects"⁷, as well as an extensive "Identification and mapping of bird sensitive areas to wind farm development in Greece"⁸, both of which documents are extensively being used by the competent authorities. The wind farms

⁷ Dimalexis A., Saravia Mullin, V., Xirouchakis S., & K. Grivas. 2009. Assessment of the impacts of wind farms on birds: Guidelines for the implementation of the appropriate ornithological assessment of proposed projects. Hellenic Ornithological Society – Birdlife in Greece. Athens. 77pp (in Greek); http://ornithologiki.gr/gr/politiki/show_article.php?artID=391&locale=gr

⁸ Dimalexis A., Kastiris, T., Manolopoulos, A., Korbeti, M., Fric, J., Saravia Mullin, V., Xirouchakis, S., and D. Bousbouras. 2010. Identification and mapping of bird sensitive areas to wind farm development in Greece. Hellenic Ornithological Society – Birdlife in Greece, Athens. 126 pp. (in Greek with English summary); http://ornithologiki.gr/gr/politiki/show_article.php?artID=391&locale=gr

proposed on uninhabited islets have so far not acquired but the first stage of the permit process, the so called “production permit”. The proposed wind farms have not still completed an EIA and therefore have not proceeded onto the operation and installation permits that are necessary from the competent authorities.

HOS will carry out a sensitivity mapping after the completion of the project in order to assess potential threats and impacts which may result from the construction and operation of wind farms in seabird terrestrial and marine habitats. The analysis will be based on the information related to colonies and existing terrestrial IBAs and SPAs, as well as foraging dispersal and at-sea distribution determined by surveys and modeling within the framework of the present project and will present an update of the publication “Identification and mapping of bird sensitive areas to wind farm development in Greece”, utilizing newly acquired knowledge on seabirds. The results of the study will be reported to the competent authorities and will be made available at the project website in order to prevent any harmful wind farm installation at biodiversity sensitive sites.

Public awareness and environmental education

All project communication and environmental education activities proved to be extremely successful and an efficient tool for raising public awareness among the general public of Greek islands, as well as specific target groups and for ensuring long-term beneficial impacts of the project.

A multitude of communication and environmental education materials produced within the framework of the project will continue to be disseminated in order to raise public awareness on seabirds, their conservation and the LIFE project. More specifically, the project’s webpage will continue to be maintained, providing updated information. The environmental education material of the project has already been distributed and the activities carried out at numerous schools in the Aegean and Ionian Sea. The project’s environmental education programme has already been incorporated to the core annual educational programme of HOS and will continue to be implemented at schools all over Greece. Additionally, this environmental education material has also been adopted by the Environmental Education Centre of Korthi in Andros. Furthermore, the Environmental Education Centre of Lithakia in Zakynthos has also expressed the willingness to include the material in its annual activities.

The project’s communication material i.e. project leaflets, posters, seabird identification guides and special editions of the HOS magazine will continue to be distributed through core HOS, MOm, TEI and HCMR communication and public awareness activities, including information kiosks and centers, public events, Cretaquarium etc. In particular, MOm will continue to use these tools in the future, in continuation to this effort. MOm’s permanent exhibition will continue to operate as part of its exhibition in its Information Center in Alonnisos, while the project communication material will be disseminated to visitors of the Center. Visitors will also have a chance to watch the project’s documentary. More over, the project’s environmental education activities will be carried out on a daily basis during the summer period. The mobile exhibition has been constructed using materials suitable for easy transportation and outdoor use. It is anticipated that it will remain in use for the next few years through MOm’s and HOS’s future field activities in the Aegean Sea. Specifically

designed project banners have been already been set up in various sites in the Aegean islands (e.g. the town hall of Fournoi, in Skyros Information Centre, in the Information Centre of the Management Body of Karpathos - Saria, etc.) and will continue to create great interest to the local public. On Zakynthos, the project kiosk will continue to operate during the summer period by the TEI and HOS volunteers. Additionally, volunteers of the TEI will continue to implement project environmental education activities at schools around Zakynthos island. An environmental education seminar for educators is planned to be carried out in collaboration with the local Environmental Education Centre.

Collaboration with the shipping companies of Attica Group has been secured for the next year ensuring that the project's information material will continue to be disseminated to passengers of 9 ferry-boats owned by the company which sail in the Aegean. Attica Group has already accepted to reprint the communication material, should current stock be depleted.

Results and outputs of the project will continue to be presented at future workshops, conferences and in scientific publications by all project partners.