

BIRDS OF CONSERVATION CONCERN IN SLOVENIA'S SEA



The Mediterranean Shag is a fish-eating seabird of the cormorant family, which inhabits coastal sea waters up to the depth of 80 m. It is only found in the Mediterranean and Black Sea. The number of breeding pairs distributed within numerous colonies is estimated at 10,000. The Slovenian coast is a popular summer residence for about 1,500–2,000 birds coming here from the Adriatic islands further south.

Mediterranean Shags coming to the Northern Adriatic require sufficient food supplies, roosting sites, and safety in the post-breeding period. Their needs are met both by the natural conditions of this marine ecosystem, which offers an abundance of fish for Shags to feed on, as well as by the area's artificial biotopes, especially shellfish farms, where they can roost. Mediterranean Shags feed on fish species which do not feature strongly in human diet, mainly on the black goby (*Gobius niger*).

Slovenia's sea is a small part of the Adriatic Sea. Teeming with life, the area is home to the following habitats and species of EU importance: coastal lagoons, river estuaries, marine reefs, and submarine meadows, which are inhabited by seahorses, fan mussels, Mediterranean fan worms, marine birds, dolphins, and sea turtles. Their presence here is a constant reminder that Slovenia's sea is something worth protecting.

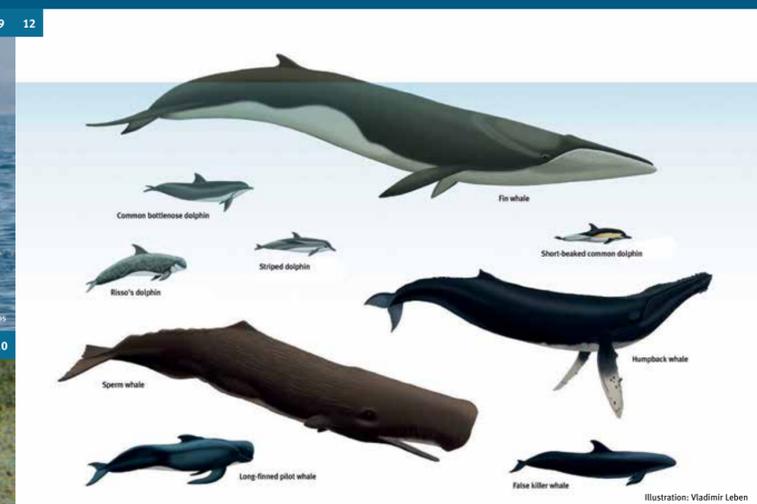
MARINE BIRDS

- Every bird counts!
- 1. BLACK-THROATED LOON (*GAVIA ARCTICA*)**
This migratory bird of the northern hemisphere breeds on the lakes of Scandinavia and northern Russia, and winters mostly along the Mediterranean coast.
 - 2. MEDITERRANEAN GULL (*LARUS MELANOCEPHALUS*)**
This passage species and rare breeder which occasionally winters in the area occurs in highest numbers along the sea coast. On its migration from the Black Sea breeding grounds to its main wintering grounds of the Tyrrhenian Sea, several thousand Mediterranean Gulls stop on the Slovenian coast for a few weeks.
 - 3. YELLOW-LEGGED GULL (*LARUS MICHAEILLIS*)**
The largest colony of this typical member of the gull family is in the Sečovlje salt pans, where nesting pairs are joined in the post-breeding period by thousands of birds from other countries. According to the records, the number of Yellow-legged Gulls was highest in 2004, totaling more than 25,000 individuals.
 - 4. COMMON TERN (*STERNA HIRUNDO*)**
The Common Tern is a summer guest to Slovenia, and a rare colonial breeder. It nests on the gravel or among big rocks if the ground is muddy. Common Terns are elegant and skillful in flight.
 - 5. LITTLE TERN (*STERNULA ALBIFRONS*)**
The Little Tern is the smallest tern in Europe. It breeds in colonies, on sandy and pebbled shores, on islands just off the coast, or on the shores of lakes and big rivers further inland. In Slovenia, the species only breeds in the Sečovlje salt pans and in Škocjanski zatok.
 - 6. SANDWICH TERN (*THALASSEUS SANDVICENSIS*)**
Outside the breeding period, most Sandwich Terns leave Europe for the coasts of Africa all the way to South Africa. Smaller groups stay in the Mediterranean; the species regularly winters along the Slovenian coast.
 - 7. MEDITERRANEAN SHEARWATER (*PUFFINUS YELKOUAN*)**
The bird spends most of its life at open sea. It only comes to land to breed on the remote islets of the central and eastern Mediterranean. The species is of regular occurrence along the Slovenian coast, which sporadically occurs in flocks up to 1,000 birds.
 - 8. MEDITERRANEAN SHAG (*PHALACROCORAX ARISTOTELIS DESMARESTII*)**

OTHER ANIMALS AND PLANTS

- Fast and furious, but vulnerable
- 9. COMMON BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*)**
The only dolphin species regularly occurring in the Slovenian part of the Adriatic Sea is the Common bottlenose dolphin. Its Northern Adriatic population is approximately 100 animals.
 - 10. GLAVATA KARETA (*CARETTA CARETTA*)**
Like for the Mediterranean Shags, the Northern Adriatic is a popular feeding ground for young Loggerhead turtles. This is the only sea turtle species that is regularly seen in the Adriatic Sea.
 - 11. NEPTUNE GRASS (*POSIDONIA OCEANICA*)**
forms extensive marine meadows in the Mediterranean, and provides many marine organisms with a habitat, source of food, and shelter from predators. It releases oxygen, stabilises sediments, and reduces erosion by slowing down the force of waves.
 - 12. Other cetacean and whale species are sporadic visitors to the Northern Adriatic.** The total of nine recorded species includes marine giants like the Fin whale (*Balaenoptera physalus*) and the Humpback whale (*Megaptera novaeangliae*), as well as several smaller-sized toothed cetaceans.
 - 13. The silt and sand seabed is the predominant seabed habitat type in the Gulf of Trieste.** It is home to various marine organisms such as sea cucumbers, starfish, brittle stars, and gobies. Black gobies are the main source of food for Mediterranean Shags in Slovenia's sea.

OTHER PLANTS AND ANIMALS TYPICAL OF SLOVENIA'S SEA



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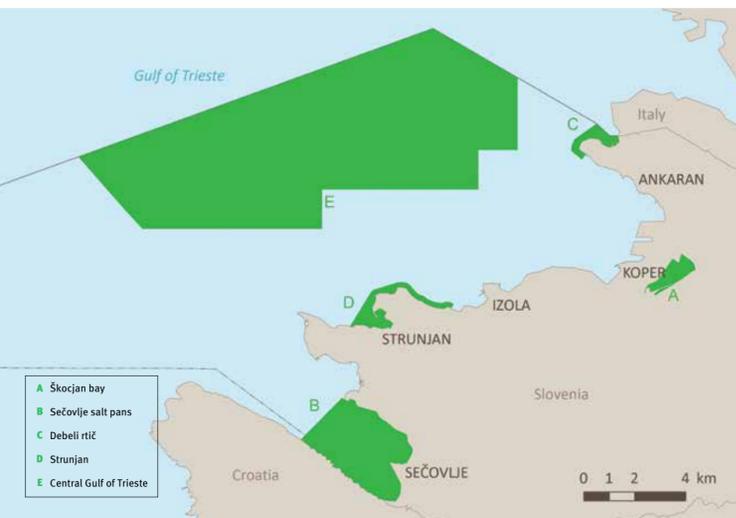
The Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*) in Slovenia's sea



The Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*) is a fish-eating species of the cormorant family, distributed solely in the Mediterranean and Black Sea. In summer and autumn months, large numbers of Mediterranean Shags come to the shallow Northern Adriatic to feed in its fish-rich waters. The SIMARINE-NATURA project identified the most important Mediterranean Shag conservation areas along the Slovenian coast, which will be included in the network of Natura 2000 sites.

IMPORTANT BIRD AREAS (IBAs) AND NATURA 2000 IN SLOVENIA

Important Bird Areas (IBAs) are worldwide bird habitats which make important breeding, feeding, roosting and migrating routes for birds. In the framework of the IBA programme and under the auspices of BirdLife International, these areas are identified, monitored, and managed in a manner that ensures long-term conservation of bird populations. The primary focus of the programme activities and funding is on threatened species, for example the Mediterranean Shag, which is endangered on account of its limited distribution range and small population in the heavily exploited Mediterranean and Black Sea areas.

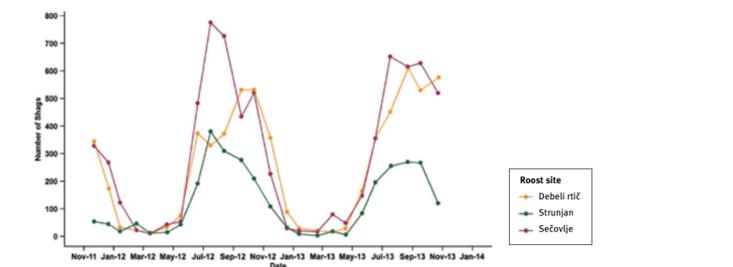


Area name	Surface area	Sea surface	Protected seabirds	Importance for	Year of Natura 2000 inclusion
Škocjan bay	123 ha	0 ha	Common Tern	breeding	2004
Sečovlje salt pans	973 ha	287 ha	Yellow-legged Gull	breeding roosting feeding	2004
			Black-headed Gull		
			Common Tern		
			Black-throated Loon		
Debeli rtič	91 ha	91 ha	Mediterranean Shag	roosting feeding	2013
			Little Tern		
			Sandwich Tern		
Strunjan	188 ha	153 ha	Mediterranean Shag	roosting feeding	2013
			Black-headed Gull		
			Sandwich Tern		
Central Gulf of Trieste	7,963 ha	7,963 ha	Black-headed Gull	feeding	proposed in 2015

Species	Breeding	Wintering (ind.)	Summering (ind.)	Natura 2000
Mediterranean Shag (<i>Phalacrocorax aristotelis desmarestii</i>)		550	1500	Debeli rtič, Strunjan, Sečovlje salt pans, Central Gulf of Trieste
Yellow-legged Gull (<i>Larus michahellis</i>)	40-220		15,000-25,000	Sečovlje salt pans
Black-headed Gull (<i>Larus melanocephalus</i>)			6,000-20,000	Strunjan, Sečovlje salt pans
Sandwich Tern (<i>Thalasseus sandvicensis</i>)		10-20		Strunjan, Sečovlje salt pans
Common Tern (<i>Sterna hirundo</i>)	80-165			Škocjan bay, Sečovlje salt pans
Little Tern (<i>Sterna albibronis</i>)	20-70			Sečovlje salt pans
Black-throated Loon (<i>Gavia arctica</i>)		10-50		Sečovlje salt pans



In particular towards the end of summer and in autumn, Mediterranean Shags gather in large groups, some consisting of more than 300 birds, and prey on schools of small pelagic fish such as the Mediterranean sand smelt (*Atherina sp.*) in shallow coastal waters. The catch depends on the group efforts of birds to herd these little fish towards the coast where they can easily be caught and eaten. In this activity, Shags are often attended by gulls, socially foraging for food but not assisting in the herding.



1. A SAMPLE OF OTOLITHS
2. BROWN COMBER (*SERRANUS HEPATUS*)
3. BLACK GOBY (*GOBIOUS NIGER*)

Shags feed mainly on fish species not used in human diet. By far the most important food source is the black goby (*Gobius niger*), a species dwelling on the muddy and sandy bottom of the Shags' main foraging site, the Gulf of Trieste. Here, Shags can find plenty of alternatives to their usual prey, such as the black comber (*Serranus hepatus*) and red bandfish (*Cepola macrophthalma*). The list of species that account for more than 1% of the Mediterranean Shag's prey biomass includes the big-scale sand smelt (*Atherina boyeri*). Schools of this fish found in the coastal shallows up to the depth of 10m attract large groups of shags and gulls that can rise in number to several hundred individuals.

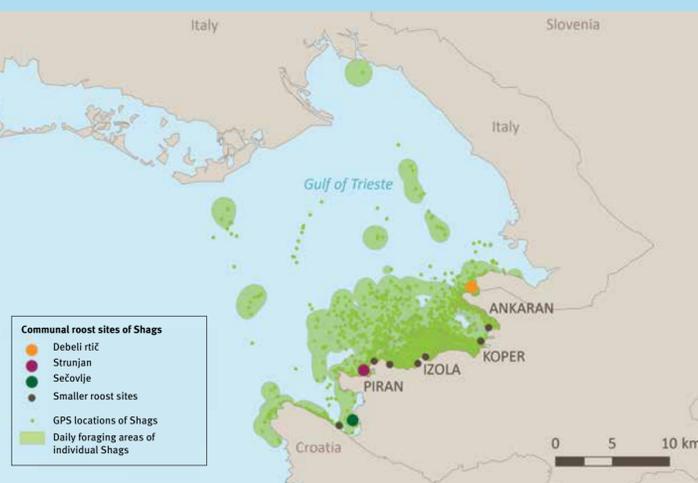
Mediterranean Shags swallow their prey whole and then regurgitate undigested parts, e.g. scales and skeletal remains, as balls coated in slimy mucus which then stick to the surface and dry up. The contents of the pellets, especially the otoliths (ear bones) and pharyngeal teeth, provide valuable insight into the type and quantity of prey. About 500 pellets were collected from the communal roosting sites in Debeli Rtič, Strunjan, and Sečovlje. The pellets were then analyzed by ichthyologists, who found that Mediterranean

Natura 2000 and seabirds

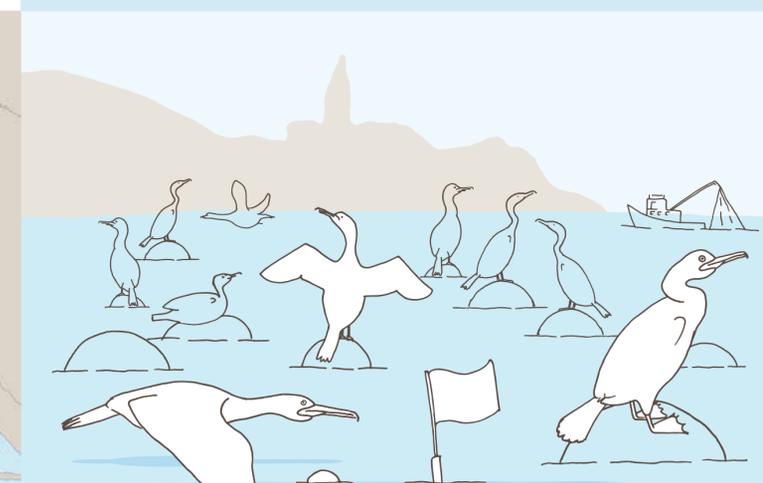
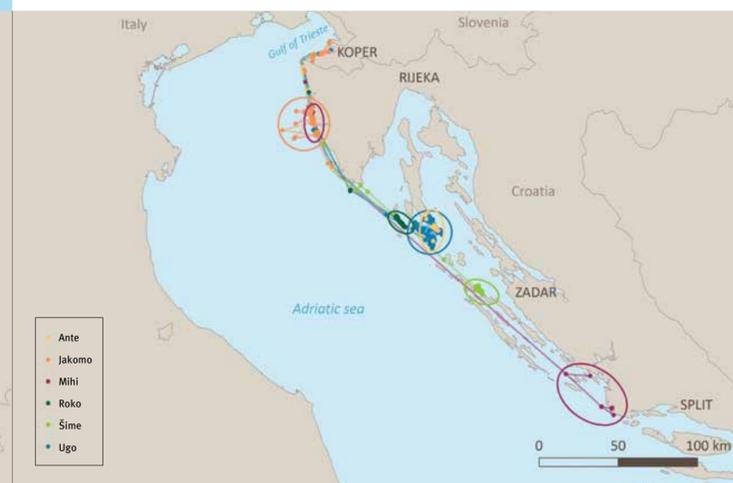
In the European Union, IBAs are included in the Natura 2000 network, which acts as the European legal nature conservation platform. The aim of Natura 2000 is to protect endangered species and their habitats, taking also into account human activities and wellbeing.

Natura 2000 for seabirds in Slovenia

- 5 areas
- Total surface area 9,338 ha
- Sea surface area 8,494 ha
- 7 seabird species



Population counts at three communal roost sites on shellfish farms were conducted to determine the number of Mediterranean Shags roosting along the Slovenian coast and establish trends in the species' population dynamics throughout the year. The times of departure from roost sites and the shape and colour-based selection of buoys were studied in a separate study. According to the study, Shags are not the earliest of risers; most of them only left their roosts after 8 a.m. (in summer). They prefer buoys in the colours of their plumage (black, white). They are slightly less attracted to red, yellow, and blue buoys, while vertically floating buoys are much less suitable for roosting due to their poorer stability.



What are the main feeding grounds of the Mediterranean Shag in Slovenia's sea?

Population counts at the sea were conducted once a month along an 81 km route divided into shorter sections. All bird species and their behaviors were monitored and recorded during a boat ride at a constant travel speed. Considerably higher densities of Mediterranean Shags were reported in the sections of Slovenia's sea that are further off the coast than those nearer to the coast. The figure shows the average density of the Mediterranean Shags during summer months, when their number along the Slovenian coast is highest.

Monitoring daytime movements of Mediterranean Shags

Telemetry studies were conducted to determine the typical features of daytime feeding grounds of specific Shags. State-of-the-art GPS equipment was used to ensure precise and accurate capture of location in 30-minute intervals. The studies showed that Mediterranean Shags normally forage within a relatively small area during the day, and rarely wander around. Certain birds change their feeding grounds commonly but others remain loyal to a single site for months. The same finding was also made for roost sites.

Mediterranean Shags migrating to their roost sites in Croatia

Mediterranean Shags have no respect for national borders. On their yearly migrations, they visit the territorial waters of two or even three countries: Croatia, Slovenia, and Italy. Therefore, the conservation of their population in the Adriatic is a joint responsibility of all the countries which share their habitat. In its commitment to these objectives, Slovenia is bound by EU regulations and supported by the nature conservation system Natura 2000.

In the course of the project SIMARINE-NATURA (LIFE10NAT/SI/141), in-depth research was carried out in the years 2011-2014 in order to establish marine Important Bird Areas (IBAs) along the Slovenian coast. The IBAs were identified according to the international standard criteria on the basis of the population size and distribution range of the Mediterranean Shag.

ARI, THE MEDITERRANEAN SHAG

Ari was the first Mediterranean Shag in Slovenia to be tracked using GPS telemetry. Actually, Ari was a young female who spent the autumn of 2012 near Izola, Slovenia. The bird roosted on the levee of the Izola city harbour, and flew off every day to fish up to 2 km off the coast. Unfortunately, Ari died only ten days after it had been fitted with the tracking device. In an accident somewhere in the Gulf of Koper, Ari broke her left leg and got a severe bruise on her left hip, and could no longer dive or feed. Ari, the pioneer of GPS bird telemetry in Slovenia, was named after the lead character of the children's book 'The First Journey of Ari, the Mediterranean Shag', which was published within the framework of the SIMARINE-NATURA project. Since the sex of the bird was only determined after its death, the bird was given a male name - Ari.



CONSERVATION OF THE MEDITERRANEAN SHAG ALONG THE SLOVENIAN COAST

In order to ensure coexistence of the Mediterranean Shag and people, the following needs to be provided:

- **ENOUGH FOOD.** Mediterranean Shags may suffer hunger due to shortage of food (fish) caused by excessive fishing or degradation of seabed habitats.
- **SAFETY.** Mediterranean Shags can lose their lives getting caught in fish nets, colliding with fast vessels, and due to spills of oil and oil derivatives.
- **SUITABLE HABITAT.** Discontinuation of shellfish farming would result in loss of key habitats for safe and undisturbed roosts. Should this happen, supplementary roosts would need to be provided in the areas along the Slovenian coast.
- **PEACE.** Excessive disturbance of Mediterranean Shags may prompt the species to leave the areas which are key to its survival, for example its roosts and feeding grounds.

- Measures to ensure conservation of the Mediterranean Shag**
- Prevention of excessive fishing, especially of seafloor fish.
 - Prevention of accidental by-catch of Mediterranean Shags in fishing gear.
 - Conservation of suitable places for roosting.
 - Prevention of excessive disturbance at roosts.
 - Environmental safety in ports.

By means of Natura 2000 measures, Slovenia will preserve Mediterranean Shag habitats and the natural resources that are necessary for the survival of the species. It will thus protect crucial parts of the marine ecosystem, such as seafloor habitats and associations, as well as the fishing species which are a source of income for the coastal communities.

