

AVIFAUNA OF THE NATIONAL PARK MLJET: FOCUS ON TARGET SPECIES AND THEIR THREATS

Avifauna Nacionalnog parka Mljet: naglasak na ciljne vrste i njihove ugroze

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ABSTRACT

The island of Mljet is located in the southern Adriatic Sea. The island is heavily forested and surrounded by smaller, barren islets. The western part of the island and surrounding sea are declared a National Park and a Special Protection Area (SPA). The research was conducted from April 2007 to June 2024, primarily focusing on five target species: the Audouin's Gull, the Mediterranean Shag, the Peregrine Falcon, the European Honey-buzzard, and the Common Tern. Other species were also recorded to update the existing avifauna list. During the research, we noted threats that could affect the target species. The status (breeding, wintering, passage, vagrants) was determined for every species, and both literature data and previous field data were analysed. A total of 154 species were recorded, of which 54 breed on the island of Mljet, and out of those, 37 breed within the National Park. This study aimed to monitor the target species and to update the inventory of the avifauna of the National Park Mljet and the rest of the Island of Mljet.

Keywords: Mediterranean, seabirds, invasive species impact, ornithological surveys

INTRODUCTION

The Mediterranean region has a high diversity of breeding bird species. This diversity arises from different biogeographic realms converging in the Medi-

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terranean region. While there is some regional specificity, there are no biogeographic breaks in avifauna between the northern and southern areas, or between the eastern and western parts (COVAS & BLONDEL 2008). Another factor influencing the abundance of avifauna is the presence of migratory and wintering birds. Small Mediterranean islands are very important stopover sites for migratory birds. Birds migrating along the central or eastern flyways must cross ecological barriers such as the Sahara Desert and the Mediterranean Sea. After crossing these barriers, birds are depleted of fuel, and islands in the Mediterranean Sea are the first land where they can rest and refuel during their northward migration (BARBOUTIS *et al.* 2022).

The island of Mljet is located in the southernmost part of Croatia, divided from the Pelješac Peninsula by the Mljet Channel, spanning a distance of 8 km. The western part of the island was declared a National Park in 1960 due to its exceptional landscape beauty, rich forest coverage, valuable cultural heritage, and distinctive relief features. Apart from the National Park, the area is listed as a Natura 2000 site, with the entire Park designated as a conservation area important for species and habitat types ("Nacionalni park Mljet" HR5000037), while the sea and surrounding islands are also designated as a Special Protected Area protected under the Birds Directive (HR1000037 "SZ dio NP Mljet").

There are 26 species of mammals recorded on the island (JAVNA USTANOVA NACIONALNI PARK MLJET 2017). Only one native species, the Beech Marten *Martes foina*, predated or poses a threat to birds. Several species have been introduced, including the Wild Boar *Sus scrofa*, the Domestic Cat *Felis silvestris forma catus*, as well as the Small Indian Mongoose *Herpestes javanicus*, introduced to the island in 1910 to control the population of Horned Vipers *Vipera ammodytes* (TVRTKOVIĆ & KRSTUFEK 1990). The Small Indian Mongoose is listed as an invasive alien species of Union concern according to Regulation (EU) No 2016/1141.

The barren islets within the SPA "SZ dio NP Mljet" (HR1000037) are important for the breeding of three target species (BARIŠIĆ *et al.* 2010): Audouin's Gull *Larus audouinii*, Peregrine Falcon *Falco peregrinus*, and Mediterranean subspecies of European Shag *Gulosus aristotelis desmarestii*. Other important breeding species include the European Honey-buzzard *Pernis apivorus* and the Common Tern *Sterna hirundo*. Audouin's Gull is the most threatened gull species in Croatia and is a sparse breeder, with one of its main threats being the Yellow-legged Gull *Larus michahellis*. The population of Mediterranean Shags breeding on islets around Mljet makes up a significant portion of the Croatian breeding population, especially for the southern population of Croatia. The islets around Mljet are crucial for the survival of the species in the southern part of the Adriatic.

The first comprehensive research on the avifauna of the island of Mljet was conducted in 2007 (JURINOVIĆ *et al.* 2008). Before that, few researchers had published their occasional, mostly incidental, field research data (LUKAČ *et al.* 1997, RUCNER

1998, KUS 1999, VREZEC 2001, JURINOVIĆ 2005). Our research aimed to monitor the target species and important breeding species and to update the knowledge on the avifauna, with an emphasis on the birds found in the National Park.

MATERIALS AND METHODS

The island of Mljet is mostly heavily forested. The area of the National Park is almost entirely covered by forest, with very few open habitats or scrubland. The most widespread type of forest within the area is a mixed forest consisting of Aleppo Pines and Holm Oak (*Quercus ilicis-Pinetum halepensis*). On the south and southwest exposures, there is a mix of Aleppo Pines and Phoenician Juniper (*Juniperus phoeniceae-Pinetum halepensis*). There are not many pastures within the Park, but the best-developed pasture is on the islet of Glavat, mainly due to the presence of sheep. Within the Park, there are only around 50 hectares of arable land, mostly around inhabited areas. Most of the former agricultural lands have overgrown into maquis and forests (JAVNA USTANOVA NACIONALNI PARK MLJET 2017). Some of the larger fields in the National Park are Velika and Mala Poma, Pomijenta, Polače field, and Kneže fields. Outside the Park, there are a few larger fields: Ivanje field, which is on the border of the Park, and fields around Babino Polje, field Struje and Blatsko fields. The sea and small barren islets around the Park are important habitats for foraging and breeding seabirds.

Fieldwork was divided into three parts, covering the breeding of target species and species of interest, migration and wintering seasons from 2007 until 2024 (JURINOVIĆ 2023). A total of five to eight field visits were conducted per year: once in January, April, July or August, and September or October, and twice in late February to the end of March and once or twice during May. No research was conducted in 2016, and in 2015, only the second half of the breeding period was covered (June and August). In 2012, the census of Yellow-legged Gulls was not done due to bad weather conditions. Additionally, during fieldwork all other bird species were recorded to update the existing avifauna list (JURINOVIĆ 2023).

To estimate the breeding numbers of Audouin's Gulls, Yellow-legged Gulls, Common Terns, Peregrine Falcons, and Mediterranean Shags, a complete census of breeding pairs was conducted within the National Park and the SPA borders from February until August (Fig. 1). The survey was carried out by boat, and additionally, for Mediterranean shags, a census of active nests was done on the islands by visiting the colonies. Estimates for the number of breeding European Honey-buzzards were made from vantage points by observing breeding behaviour; however, no effort was made to find the nests due to the species being threatened by disturbance.

Winter monitoring has been conducted since 2020. During January, a complete census was conducted at sea, using a boat, and on the main island, where all the marshes and lakes were surveyed. During autumn migration, from August

until October, the survey was carried out on the main island. Since 2019, during autumn, we have spent one week mist-netting passerines to determine the number of migrating passerines and to increase the chances of recording species that migrate through the island of Mljet in small numbers. The mist-netting was done during different periods every year, allowing us to capture early, middle, and late migratory species.

We also analysed historical data and occasional, mostly incidental, field research data (LUKAČ *et al.* 1997, RUCNER 1998, KUS 1999, VREZEC 2001, JURINOVIĆ *et al.* 2008 and JURINOVIĆ 2005). The scientific and common names of species have been adapted from HBW & BIRDLIFE INTERNATIONAL (2024).

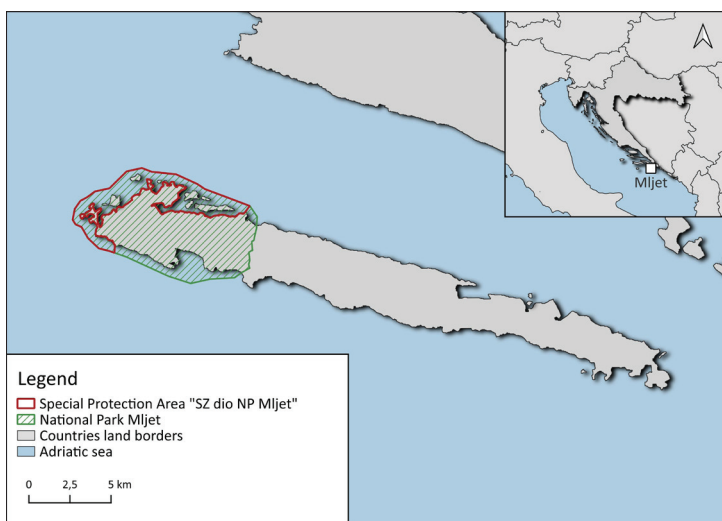


Figure 1. The area of the National Park Mljet and the SPA "SZ dio NP Mljet"
Slika 1. Područje Nacionalnog Parka Mljet i POP "SZ dio NP Mljet"

RESULTS

During research on the island of Mljet from 2007 until 2024, 154 species have been observed. Fifty-four species breed on the island of Mljet, and out of those 37 species breed within the National Park. The complete list is provided below with the information about the status and locations of observation.

SPECIES LIST

Little Grebe – *Tachybaptus ruficollis*

Little Grebe breeds in the marsh Blatina near the village Blato with 2-3 pairs, and possibly on Slatina near Kozarica.

Black-necked Grebe – *Podiceps nigricollis*

Black-necked Grebes are common wintering birds on the Croatian coast but were recorded only once in January 2021 near Polače.

Scopoli's Shearwater – *Calonectris diomedea*

Scopoli's Shearwaters were observed all year round. They do not breed on the Mljet archipelago; the closest breeding colonies are on the Lastovo archipelago (app 20 km away). Birds seen around Mljet probably belong to this population and were seen while foraging.

Yelkouan Shearwater – *Puffinus yelkouan*

Yelkouan Shearwaters were observed all year round. Like Scopoli's shearwaters, they breed on pelagic islands in the Adriatic Sea and the closest breeding colony is on the Lastovo archipelago. Birds seen around Mljet probably belong to those populations and were seen while foraging.

Great Cormorant – *Phalacrocorax carbo*

Great Cormorants winter in small numbers in the area, and individual birds can be seen in sheltered bays or on the coasts of islands.

Mediterranean Shag – *Gulosus aristotelis desmarestii*

Mediterranean Shags are resident breeding species in the area. They breed on cliffsides on the main island and on some islets (Kobrava, Ovrata, Borovac, Vranji and Utrnji škoj, Veli Maslinovac, Moračnik, Glavat, Tajnik). The breeding population size has ranged from a high of 33-38 pairs to a low of 14-19 pairs (Fig. 2). The islet with the largest number of breeding pairs is Borovac, with 7-12 pairs. During field research in 2012, a Small Indian mongoose was spotted on the islet of Kobrava. At that time, the islet had at least 10 pairs of shags breeding, but in the following years, the number started dropping until 2018 when no breeding pairs were found on the islet. From then until 2023, it had 1-3 pairs, but since 2023 the population appeared to start recovering, with 7-8 pairs observed in the last two years. This species begins breeding early in the season, in December and January, and the nestlings leave their nests in March and April. Outside the breeding season, during the summer and autumn months, most of the Croatian population gathers in large numbers near Trieste and Venice in Italy (KRALJ *et al.* 2013, SCRIDEL *et al.* 2024). Recoveries of shags ringed in the Mljet archipelago suggest that they stay further south, beginning of summer around the Pelješac Peninsula and later, with recoveries of one bird from the island of Krk near Rijeka, and two around Pirovac near Šibenik, Croatia. Only one recovery from the area of Trieste was reported.

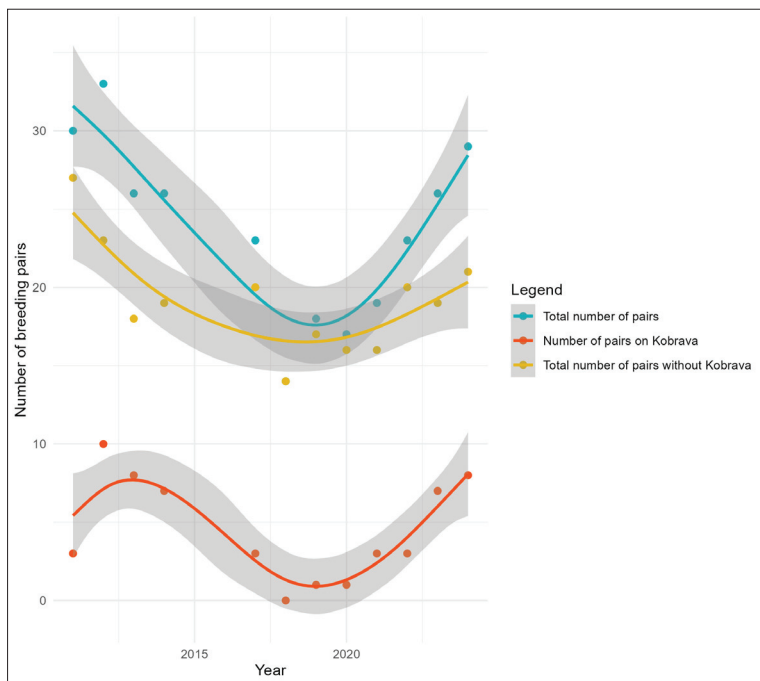


Figure 2. Breeding numbers of Mediterranean Shags *Gulosus aristotelis desmarestii* within the National Park Mljet

Slika 2. Broj gnijezdećih parova morskih vranaca *Gulosus aristotelis desmarestii* unutar Nacionalnog Parka Mljet

Pygmy Cormorant – *Microcarbo pygmaeus*

Two birds were seen on Veliko Lake in June 2011. These species are passage migrants in the area, with the closest breeding site being Vransko Lake (around 180 km away) in Croatia, Skadarsko Lake (around 150 km away) in Montenegro, and Hutovo Blato (around 40 km away) in Bosnia and Herzegovina.

Grey Heron – *Ardea cinerea*

Grey Herons are passage species in the area that are mainly seen in the marshes on the main island. Individual birds are observed feeding and resting in the marshes.

Purple Heron – *Ardea purpurea*

The species was noted only by Kus (1999) in April 1998 while during this research none were observed. The Purple Heron is probably an uncommon passage species in the area. Also, Purple Herons are observed on the Neretva Delta during migration where they also breed, in southern Italy, and Malta confirming they are using the Adriatic migration route (KRALJ *et al.* 2013).

Great White Egret – *Ardea alba*

Great White Egrets are uncommon passage species in the area. It was recorded once in April 2007 at Veliko Lake.

Little Egret – *Egretta garzetta*

Little Egrets are uncommon passage species in the area. It was recorded in May 2020 on Utrnji škoj and by Kus (1999) in April 1998 at Slatina near Kozarice.

Cattle Egret – *Bubulcus ibis*

A Cattle Egret was seen in May 2020 resting on Utrnji škoj in a mixed flock with Little Egrets and in May 2024 on Vranji škoj. The Cattle Egret was considered a rare species in Croatia until recently, but its range has been expanding, and it was recorded breeding in a mixed heron colony in the Nature Park Lonjsko Polje in Croatia (VASILIK 2015).

Squacco Heron – *Ardeola ralloides*

The Squacco Heron is an uncommon passage species in the area. It was seen once in April 2009 near Blace.

Black-crowned Night-heron – *Nycticorax nycticorax*

The Black-crowned Night-heron is a passage species in the area. It roosts and hunts on the coast in the shelter of bushes or on leaning pines. Individual birds were seen, or their calls were heard at night.

Common Little Bittern – *Ixobrychus minutus*

The Common Little Bittern is a possible breeder in Blatine near the village of Blato, where it was recorded three times, twice during April and once during September. It is a difficult species to observe as it hides and hunts in the reeds.

Eurasian Bittern – *Botaurus stellaris*

The Eurasian Bittern is a passage species in the area. A dead individual was found during fieldwork by Jakov Nodilo in March 2021 on the trail between Hljeb Peak and Grabova Bay.

Black Stork – *Ciconia nigra*

It was recorded only once in the area in September 2014. It was a first-year bird fitted with a satellite transmitter in Slovenia. It is a passage species in the area.

White Stork – *Ciconia ciconia*

It is a passage species that was recorded only once, one bird landed on the ferry from Prapratno to Sobra.

Common Shelduck – *Tadorna tadorna*

The Common Shelduck is a passage species in the area. It was recorded once in June 2001 by Vrezec near the islet of Šij.

Common Teal – *Anas crecca*

Common Teals were observed twice during winter: once in the marsh near Prožura in 2022 and once in Blatine near the village of Blato in 2023. It is an uncommon wintering species in the area.

Mallard – *Anas platyrhynchos*

Mallards are scarce breeders in Blatine near the village of Blato, where up to five pairs breed. They can be observed wintering in larger numbers on marshes on the island.

Garganey – *Spatula querquedula*

The Garganey is an uncommon passage species in the area and its surroundings. This species was recorded twice: four birds in August 2012 at Blatina near the village of Blato, and four birds in March 2022 near Lastovska Bay.

Ferruginous Duck – *Aythya nyroca*

The Ferruginous Duck is an uncommon passage species in the area and its surroundings. This species was recorded once at Blatina near the village of Blato in January 2024.

Common Pochard – *Aythya ferina*

The Common Pochard is an uncommon passage species in the area and its surroundings. This species was recorded once in January 2023 at Blatina near the village of Blato and in the marsh near Prožura.

European Honey-buzzard – *Pernis apivorus*

The European Honey-buzzard is both a breeding and passage species in the area. It is numerous during spring migration, with flocks of fifty or more individuals observed in April and May. Two pairs breed in the forested area of the National Park Mljet, one from Polače fields to Kneže fields, and another around Grabova. Outside the National Park, one pair breeds in the forested area around Sobra. Since the research began in 2007, there has been one pair breeding within the National Park, and since 2020 there have been two pairs. Mljet Island is one of two islands in the Adriatic part of Croatia where this species is known to breed (RADOVIĆ *et al.* 2003).

Red Kite – *Milvus milvus*

One individual fitted with a satellite transmitter was on the island of Mljet in September 2017. The species is listed as a regionally extinct breeder in Croatia and is an irregular passage and wintering species.

Black Kite – *Milvus migrans*

The Black Kite is a passage species for the area. Two individuals were recorded in July 2020 flying over Veliki Grad near Babino Polje.

Egyptian Vulture – *Neophron percnopterus*

An individual hatched in captivity fitted with a satellite transmitter in Italy flew over Mljet a couple of times during April 2021. The Egyptian Vulture is a regionally extinct breeder in Croatia.

Short-toed Snake-eagle – *Circaetus gallicus*

Short-toed Snake-eagles are breeding species in the eastern part of Mljet, with an estimate of one to two pairs. They were regularly recorded from April to September in Babino Polje. They were not recorded within the area of the National Park Mljet, probably because they avoid forests while foraging.

Western Marsh-harrier – *Circus aeruginosus*

Western Marsh-harriers are regular passage species in the area. They were usually recorded in small flocks (1-4 birds).

Eurasian Sparrowhawk – *Accipiter nisus*

The Eurasian Sparrowhawk is a regular breeder, passage, and wintering species in the area. It usually inhabits the forested areas of Mljet.

Northern Goshawk – *Accipiter gentilis*

The Northern Goshawk was recorded once in January 2023 near Prožura marsh. It is an uncommon passage species in the area.

Long-legged Buzzard – *Buteo rufinus*

One individual was seen flying over the trail towards Kotli in September 2019. They are irregular species in Croatia.

Eurasian Buzzard – *Buteo buteo*

The Eurasian Buzzard is a wintering and passage species in the area. It is regularly seen from September to April in open areas and fields.

Common Kestrel – *Falco tinnunculus*

The Common Kestrel is a breeding species in the area. In the area of National Park Mljet, 5-7 pairs breed on the cliffs. It is the most numerous bird of prey in the area and mostly inhabits open habitats on the island.

Eleonora's Falcon – *Falco eleonora*

The Eleonora's Falcon is an endangered breeding species in Croatia (TUTIŠ *et al.* 2013). It breeds in the nearby archipelagos of Vis and Lastovo. The species starts breeding in July, and before returning to their breeding colonies, they can be seen throughout the Adriatic Sea. The species has been observed in the area irregularly, and historical data indicate it has been seen on Mljet (LUKAČ *et al.* 1997).

Eurasian Hobby – *Falco subbuteo*

The Eurasian Hobby is a passage species in the area; it was recorded once, flying over Velika Poma in October 2007.

Peregrine Falcon – *Falco peregrinus*

The Peregrine Falcon is a breeding species in the area. It nests on cliffs above the sea. In most years, two pairs bred in the Park: one on the north side of the island and one on the south.

Lanner Falcon – *Falco biarmicus*

The Lanner Falcon is a rare passage species in the area. An adult bird was recorded once in March 2013.

Common Quail – *Coturnix coturnix*

The Common Quail is a passage species in the area. It was recorded once in April 2009. One individual flew from the tall grass west of Kulijer. They are probably more numerous during migration, but due to their secretive behaviour, it is difficult to record them.

Common Crane – *Grus grus*

The Common Crane is a passage species in the area. Flocks have been recorded once in March 2004 flying above the western part of Mljet towards the Pelješac Peninsula.

Water Rail – *Rallus aquaticus*

The Water Rail was recorded wintering at Blatina near the village of Blato. This secretive species spends most of time in dense vegetation near water or in reeds, and only its characteristic call was recorded.

Common Moorhen – *Gallinula chloropus*

The Common Moorhen breeds in Blatina near the village of Blato and on Slatine near Kozarice. It can be seen in small numbers, and the breeding population is estimated to be three to five pairs.

Common Coot – *Fulica atra*

The Common Coot breeds at Blatina near the village of Blato and on Slatine near Kozarice. The breeding population is estimated to be five pairs, but during migration and wintering, it can be quite numerous, with up to 150 birds observed.

Eurasian Oystercatcher – *Haematopus ostralegus*

The Eurasian Oystercatcher is an occasional passage species in the area. It was recorded at Soline, Pristanište in 2007, and on a small island near Borovac in 2019. It feeds and stays close to the coast.

Black-winged Stilt – *Himantopus himantopus*

The Black-winged Stilt is a passage species in the area. It is recorded irregularly resting on the coast of Veliko Lake or small islets.

Eurasian Golden Plover – *Pluvialis apricaria*

In November 2022, Osvin Pečar recorded an individual Eurasian Golden Plover on Sapljunara. The Eurasian Golden Plover is a passage and wintering species in the area.

Grey Plover – *Pluvialis squatarola*

In March 2021, Aleksandar Popijač recorded an individual Grey Plover in wintering plumage at the inlet Blace, on Saplnara. The Grey Plover is a passage species in the area.

Kentish Plover – *Charadrius alexandrinus*

The Kentish Plover is a passage species in the area. One individual was recorded once in May 2011 on the island of Galicija. The closest breeding grounds of this species are on the Neretva Delta (around 25 km away).

Common Snipe – *Gallinago gallinago*

The Common Snipe is a passage species recorded once in March 2018 while resting on the island of Šij.

Whimbrel – *Numenius phaeopus*

Whimbrels are regularly observed as passage species in the area, with only a few individuals observed. This species has been recorded resting on the coast of islands.

Common Greenshank – *Tringa nebularia*

The Common Greenshank is a passage species in the area. They were recorded flying over Kulijer in March 2019 during the night and were seen in April 2023 on the island of Galicija.

Green Sandpiper – *Tringa ochropus*

The Green Sandpiper is a regular passage species in the area; that was recorded on the coast of Soline.

Wood Sandpiper – *Tringa glareola*

Wood Sandpipers are passage birds in the area, recorded on the coast and in Blatina near the village of Blato.

Common Sandpiper – *Actitis hypoleucos*

Common Sandpipers are relatively numerous passage birds in the area. They are present during autumn migration already from July. Usually, individuals or small groups consisting of two to three birds were seen.

Curlew Sandpiper – *Calidris ferruginea*

The Curlew Sandpiper is a passage species in the area. An individual bird was seen at Limuni Bay on the eastern side of the island in July 2020.

Long-tailed Jaeger – *Stercorarius longicaudus*

An individual Long-tailed Jaeger was found injured in the western part of the National Park in September 2022. Unfortunately, the bird passed away a day after it was found. It is a rare species in Croatia, and this was the fifth recorded sighting in the country.

Razorbill – *Alca torda*

During the winter of 2022/2023, there were numerous sightings of Razorbills in the Mediterranean Sea, mainly along the Italian and Greek coasts (BALESTRIERI *et al.* 2023), while only two sightings were recorded in Croatia. In February 2023, one individual was seen in Soline near Veliko Lake. This is the fourth sighting of the species in Croatia since 1909 (CROATIAN BIRD RARITY COMMITTEE DATABASE, BARIŠIĆ pers. comm).

Little Gull – *Hydrocoloeus minutus*

The Little Gull is a regular passage and irregularly wintering species in the area.

Mediterranean Gull – *Larus melanocephalus*

One individual was seen in Polače in September 2023. The species is a relatively scarce passage species in Croatia, especially in the coastal areas.

Audouin's Gull – *Larus audouinii*

The Audouin's Gull is an irregular breeder and partial resident species in the area. Until 2008, 10-18 pairs bred regularly within the National Park, on the small islets of Galicija, Glavat, Kobrava, Vranji Škoj and Ovrata. They commonly change the locations of their colonies (LAMBERTINI 1993). Since 2009, a single pair has bred within the National Park in 2013, 2018, and 2020. In 2024, four pairs breed in the National Park on the islet of Glavat, with only one other pair found to breed in the rest of Croatia. Due to arriving at the colonies almost a month after Yellow-legged Gulls, they breed on the edges of Yellow-legged Gull colonies in less favourable parts of the islets. Additionally, Yellow-legged Gulls are larger and more aggressive than Audouin's Gulls and can predate on Audouin's Gull eggs and chicks while feeding their fledglings. Two ringed chicks from Mljet were found to breed in the Lastovo archipelago, where most of the Croatian population of Audouin's Gulls breed until 2024. From January until March, a couple of adult birds can be seen within the borders of the National Park. Most of the recoveries of birds ringed in the archipelago are from the summer months (June, July, and August) along the Adriatic coast of Italy near the city of Bari, with two recoveries in Spain: one in the Basque Country and one in Catalonia.

Yellow-legged Gull – *Larus michahellis*

Yellow-legged Gulls are the most numerous gull species in the area, and they can be seen all year round. They breed on almost all of the islets around Mljet. The breeding population is estimated to be 900 to 1,200 pairs, with around 500 to 600 pairs breeding on the islet of Glavat. Due to their negative effect on the population of Audouin's Gulls, a complete census was conducted almost every year to monitor changes in their population size. During this study, we have not observed a significant change in the number of breeding pairs. However, looking at the trend over the last ten years, there has been a slight increase in their numbers (Fig. 3). After the breeding season in June, young birds leave the colony and

wander for three to four years until reaching maturity. Birds ringed at the colonies have been found in Italy, Poland, Romania, Hungary, Serbia, and Lithuania.

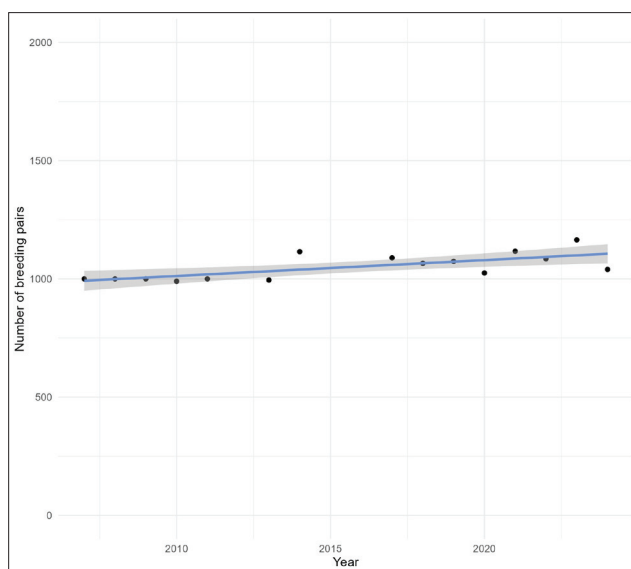


Figure 3. Breeding numbers of Yellow-legged Gulls *Larus michahellis* within the National Park Mljet

Slika 3. Broj gnijezdećih parova galebova klaukavca *Larus michahellis* unutar Nacionalnog Parka Mljet

Black-headed Gull – *Larus ridibundus*

The Black-headed Gull is a passage species in the area. It was seen in Pomena, in March 2015 and October 2021.

Sandwich Tern – *Thalasseus sandvicensis*

The Sandwich Tern is a scarce passage and wintering species in the area. They were seen twice in November 2018 and March 2019, near the island Šij.

Common Tern – *Sterna hirundo*

The Common Terns is an extinct breeding species in the area. They bred on the island Crna Seka near Galicija until 2017 when Yellow-legged Gulls started breeding on the island. They are breeders in the surrounding area.

Rock and Feral Pigeon – *Columba livia domestica*

Rock and Feral Pigeons are part of the same species, and they regularly mate with each other, so sometimes it is impossible to separate them. Breeding of Rock Pigeons was not recorded in caves or on cliffs in the area; only flocks of probably Feral Pigeons were seen.

Common Wood Pigeon – *Columba palumbus*

The Common Wood Pigeon is a regular passage and wintering species in the area. They are regularly seen from October to April.

European Turtle-dove – *Streptopelia turtur*

European Turtle-doves are breeding birds that inhabit the area from April to September. They inhabit a mosaic of arable land and forests.

Great Spotted Cuckoo – *Clamator glandarius*

The Great Spotted Cuckoo was seen only once in the area, during August 2014. A juvenile bird was seen in the fields near Polače (JURINOVIĆ 2015).

Common Cuckoo – *Cuculus canorus*

The Common Cuckoo is a sparse breeding and passage species in the area. They can be seen in mosaic habitats and near inhabited areas.

Common Scops-owl – *Otus scops*

The Common Scops-owl is a common breeding species in the area. They are found around inhabited areas and agricultural fields. They feed mainly on insects that they hunt on the ground or walls, and they are often seen hunting moths that gather near light sources. They nest in holes in house walls and trees.

Eurasian Eagle-owl – *Bubo bubo*

Eurasian Eagle-owls breed in the less forested eastern part of the island of Mljet. The most western recorded pair breeds above Babino polje but has not been recorded in the past few years. Historical records list them as breeders of bay Zakamenica (RUCNER 1998), but due to overgrowth, there is no longer a suitable habitat for their breeding within the area of the National Park.

Tawny Owl – *Strix aluco*

The Tawny Owl is a numerous and widespread breeder in the National Park. In the eastern part of the island, which is less forested, they are scarce breeders. They have been recorded nesting and hiding in caverns and caves. Tawny Owls are present on the Dalmatian islands only on the islands of Mljet, Lastovo, Korčula, and Brač.

Little Owl – *Athene noctua*

Little Owls were recently recorded only once in April 2018. Historical data lists them as a breeding species (up until the 1970s) (RUCNER 1998). During that time, no Tawny Owls were breeding on the island. Probably due to the forestation of the island, they stopped breeding in the area.

Northern Long-eared Owl – *Asio otus*

Small flocks of Northern Long-eared Owls winter in Dalmatia and on some islands. Small flocks have been seen in the area during winter in 2022.

Short-eared Owl – *Asio flammeus*

One individual was seen in September 2014 crossing the Park from the direction of the Pelješac peninsula.

European Nightjar – *Caprimulgus europaeus*

European Nightjars are breeding and passage species in the area. They breed near Babine kuće in the National Park and on Dugo Polje near the National Park. They inhabit open habitats and avoid forested parts of the area.

Common Swift – *Apus apus*

Common Swifts are breeding species in the area. Colonies have been recorded on Zavrta and Crna Seka near Galicija. They breed in cracks and holes on cliffs and boulders. They have not been recorded to breed in cracks in the walls of houses on the island.

Pallid Swift – *Apus pallidus*

Pallid Swifts are breeding species in the area. Breeding colonies were recorded on Vranji Škoj and Zavrta. Pallid Swifts on Zavrta breed in a mixed colony with Common Swifts.

Alpine Swift – *Tachymarptis melba*

Alpine Swifts are breeding species in the area. In the National Park, they breed only on Zakamenica, but they also breed in Odysseus cave near Babino Polje.

Common Kingfisher – *Alcedo atthis*

Common Kingfishers are passage and wintering species in the area. They can be seen more often in the area of Veliko and Malo Lake and along the coast.

European Bee-eater – *Merops apiaster*

European Bee-eaters are regular passage species in the area. They can be seen and heard during spring and autumn migration. The nearest breeding grounds for them are in the Lumbarda area on Korčula Island.

Common Hoopoe – *Upupa epops*

Common Hoopoes are regular passage species in the area, and during spring migration, they can be quite numerous.

Eurasian Wryneck – *Jynx torquilla*

The Eurasian Wryneck is a passage species that was observed once in Ivanje field, in 2007.

Great Spotted Woodpecker – *Dendrocopos major*

An individual Great Spotted Woodpecker was seen once in September 2019. It was probably just a wandering bird.

Black Woodpecker – *Dryocopus martius*

Black Woodpeckers were seen twice in the Park: one bird in November 2019 near Konaštra and one bird in October 2020 near Poma. Both individuals were probably observed during dispersal.

Wood Lark – *Lullula arborea*

Wood Larks are passage and wintering species in the area. They were recorded in open habitats in small flocks feeding on the ground.

Collared Sand Martin – *Riparia riparia*

Collared Sand Martins are passage species in the area. They can be seen in mixed flocks with swallows.

Barn Swallow – *Hirundo rustica*

Barn Swallows are breeding and passage species in the area. They breed in inhabited areas on the island.

Red-rumped Swallow – *Cecropis daurica*

Red-rumped Swallows are regular passage species in the area seen during spring and autumn migration.

Northern House Martin – *Delichon urbicum*

Northern House Martins are scarce breeding species in the area, nesting in inhabited parts of the island. Confirmed breeding was observed in the village of Blato.

Western Yellow Wagtail – *Motacilla flava*

Western Yellow Wagtails are breeding and passage species in the area. Two pairs breed only on the islet of Glavat. During migration, they have been recorded on larger fields on the main island. Recorded individuals belong to the subspecies *feldegg*.

Grey Wagtail – *Motacilla cinerea*

Grey Wagtails are wandering species in the area, observed outside the breeding season. They were recorded feeding near the sea and lake coasts.

White Wagtail – *Motacilla alba*

White Wagtails are irregular breeding species in the area. They were recorded breeding in Pomena in 2005 and 2006, but in later years, they were only recorded during migration.

Tree Pipit – *Anthus trivialis*

Tree pipits are passage species in the area, recorded on fields and agricultural fields.

Eurasian Golden Oriole – *Oriolus oriolus*

Eurasian Golden Orioles are passage species in the area, recorded on the island during autumn and spring migration.

Red-backed Shrike – *Lanius collurio*

Red-backed Shrikes are breeding and passage species in the area. They breed in larger fields on the island where they hunt larger insects.

Northern Wren – *Troglodytes troglodytes*

Northern Wrens are passage and wintering species in the area, recorded in numerous types of habitats on the island.

Dunnock – *Prunella modularis*

Dunnocks are passage and wintering species in the area, recorded in similar habitats as wrens but less frequently due to their secretive behaviour.

European Robin – *Erithacus rubecula*

European Robins are numerous passage and wintering species in the area, inhabiting all types of habitats except open fields on the island.

Common Nightingale – *Luscinia megarhynchos*

Common Nightingales are breeding and passage species in the area, nesting in dense bushes, maquis shrubland, and undergrowth in pine forests.

Black Redstart – *Phoenicurus ochruros*

Black Redstarts are breeding, wintering, and passage species in the area, sometimes quite numerous during autumn migration.

Common Redstart – *Phoenicurus phoenicurus*

Common Redstarts are passage species in the area, recorded during autumn and spring migration.

Whinchat – *Saxicola rubetra*

Whinchats are passage species in the area, recorded only during spring migration (in April) when they are quite numerous and present in various open habitats.

Common Stonechat – *Saxicola torquatus*

Common Stonechats are passage species in the area, recorded during spring and autumn migration, mainly in tall grass fields.

Northern Wheatear – *Oenanthe oenanthe*

Northern wheatears are passage species in the area, recorded in open habitats and on islands.

Black-eared Wheatear – *Oenanthe hispanica*

Black-eared Wheatears are passage and breeding species in the area, observed near the Blatsko field in 2007. While they are regular breeding species on some Croatian islands in the Adriatic Sea, they do not breed within the National Park, likely due to the lack of fields with bare or sparsely overgrown rocks.

Blue Rock-thrush – *Monticola solitarius*

Blue Rock-thrushes were recorded only a few times within the National Park area and are probable breeders on the coastal cliffs. They breed in the eastern part

of Mljet in more open rocky habitats or inhabited areas. Three to five pairs breed in Babino polje.

Eurasian Blackbird – *Turdus merula*

Eurasian Blackbirds are relatively scarce breeding species in the area, also seen during passage and wintering. They reside in habitats with shrubs where they can hide and seek food.

Song Thrush – *Turdus philomelos*

Song Thrushes are regular passage and wintering species in the area, inhabiting forested habitats with shrubs. They can join small flocks of Blackbirds and other thrushes.

Cetti's Warbler – *Cettia cetti*

Cetti's Warblers are breeding species found in shrubs and bushes in fields in wetter places or near water. They are numerous near marshes but also present in some fields without water, such as Ivanje field.

Great Reed-warbler – *Acrocephalus arundinaceus*

Great Reed-warblers are passage species in the area, recorded in the marshes on the island during autumn and spring migration.

Sedge Warbler – *Acrocephalus schoenobaenus*

Sedge Warblers are passage species, caught during ringing in autumn.

Common Reed-warbler – *Acrocephalus scirpaceus*

Common Reed-warblers are passage and possible breeding species in Blatina near the village Blato, nesting in reeds near the water. One singing male was recorded in 2007.

Marsh Warbler – *Acrocephalus palustris*

Marsh Warblers are passage species, recorded once during autumn migration in 2007.

Icterine Warbler – *Hippolais icterina*

Icterine Warblers are passage species in the area during early autumn.

Melodious Warbler – *Hippolais polyglotta*

Melodious Warblers are possible breeding species. One singing male was heard in May 2018 near Pomona.

Olive-tree Warbler – *Hippolais olivetorum*

The Olive-tree Warbler is a rare breeding species, recorded in the field Struje near Maranovići and close to Kulijer.

Eastern Orphean Warbler – *Curruca crassirostris*

Eastern Orphean Warblers were not recorded within the area of NP Mljet. A singing male was recorded in the village of Blato in 2007, likely indicating it as a scarce breeding species of the island.

Garden Warbler – *Sylvia borin*

Garden Warblers are passage species, found in bushes and shrubs in the fields, usually in mixed flocks with blackcaps.

Eurasian Blackcap – *Sylvia atricapilla*

Eurasian Blackcaps are numerous breeding, passage, and wintering species. They breed in shrubs and bushes in wetter habitats, in the fields and valleys while outside breeding season they are found in all habitats with overgrowth.

Common Whitethroat – *Curruca communis*

Common Whitethroats are passage species, observed in fields on the main island.

Lesser Whitethroat – *Curruca curruca*

Lesser Whitethroats are scarce passage species, observed during autumn migration.

Sardinian Warbler – *Curruca melanocephala*

Sardinian Warblers are numerous breeding species, nesting in habitats with low shrubs distributed throughout the area.

Subalpine Warbler – *Curruca cantillans*

Subalpine Warblers are breeding and passage species, distributed throughout the area in habitats with sufficient bushes and shrubs.

Willow Warbler – *Phylloscopus trochilus*

Willow Warblers are passage species, recorded only during autumn migration.

Common Chiffchaff – *Phylloscopus collybita*

Common Chiffchaffs are passage and wintering species, with no breeding recorded during the research but listed as breeders in older literature (RUCNER 1998).

Wood Warbler – *Phylloscopus sibilatrix*

Wood Warblers are passage species, recorded in different habitat types with trees and shrubs where they search for food.

Dusky Warbler – *Phylloscopus fuscatus*

One individual was caught and ringed, marking the second record in Croatia.

Goldcrest – *Regulus regulus*

Goldcrests are relatively numerous wintering and passage species, often seen in mixed flocks with Common Firecrests, tits, and *Phylloscopus* warblers during winter.

Common Firecrest – *Regulus ignicapilla*

Common Firecrests are passage and wintering species, frequently seen with Goldcrests.

Collared Flycatcher – *Ficedula albicollis*

Collared Flycatchers are passage species in the area during early autumn.

European Pied Flycatcher – *Ficedula hypoleuca*

European Pied Flycatchers are passage species, regularly ringed during autumn. They have also been noted by Kus (1999).

Spotted Flycatcher – *Muscicapa striata*

Spotted Flycatchers are passage species, recorded more often in orchards and olive groves.

Coal Tit – *Parus ater*

Coal Tits were observed in the area twice: once in October 2023 and once in a mixed flock with other tits in January 2024.

Great Tit – *Parus major*

Great Tits are numerous breeders in the area, inhabiting all types of habitats with trees. They also breed in inhabited areas, with the highest numbers in Aleppo pine forests with developed angiosperm vegetation.

Eurasian Blue Tit – *Cyanistes caeruleus*

Eurasian Blue Tits are probable breeders in the village of Blato, nesting in old deciduous oaks. Outside the breeding season, they wander, observed in fields inside the National Park.

Corn Bunting – *Emberiza calandra*

Corn Buntings are breeding species in Blatsko field, where three to five pairs breed.

Rock Bunting – *Emberiza cia*

Rock Buntings have been observed on the Kneže field, likely breeding in more open habitats in the eastern parts of Mljet.

Cirl Bunting – *Emberiza cirlus*

Cirl Buntings are breeding species in larger fields (Blatsko, Pomijenta, Velika poma). Outside the breeding season, they are present in smaller fields and gardens.

Common Chaffinch – *Fringilla coelebs*

The Common Chaffinch is a numerous breeding, passage, and wintering species in the area. They are present in all types of habitats, and after the breeding season, they can also be seen in flocks in agricultural fields.

European Serin – *Serinus serinus*

European Serins are passage species in the area, observed feeding in agricultural fields.

European Greenfinch – *Chloris chloris*

European Greenfinches are breeding, passage, and wintering species in the area. They were observed breeding in the village of Blato, while during autumn and winter, they are widely distributed and can be found in villages and agricultural fields.

Eurasian Siskin – *Spinus spinus*

Eurasian Siskins are passage and wintering species in the area, most numerous during November and December, observable throughout the island and surrounding.

European Goldfinch – *Carduelis carduelis*

European Goldfinches are passage species, observed once during spring migration.

Common Linnet – *Linaria cannabina*

Common Linnets are passage and wintering species, possibly breeding in the open habitats of the eastern part of Mljet.

Hawfinch – *Coccothraustes coccothraustes*

Hawfinches are passage species, observed flying over the island on several occasions.

House Sparrow – *Passer domesticus*

House Sparrows are breeding species in the inhabited parts of the island, present in larger villages, and seen in fields after the breeding season.

Spanish Sparrow – *Passer hispaniolensis*

Spanish Sparrows are breeding and passage species, breeding only in the village of Blato, while during spring migration, they are observed in other villages and agricultural fields.

Eurasian Tree Sparrow – *Passer montanus*

Eurasian Tree Sparrows are scarce breeding species in the village of Blato.

Common Starling – *Sturnus vulgaris*

Common Starlings are passage species in the area.

Eurasian Jay – *Garrulus glandarius*

Eurasian Jays are breeding species, inhabiting the more forested areas of the National Park, with an estimated five to ten breeding pairs due to their relatively large territories.

Hooded Crow – *Corvus corone cornix*

Hooded Crows are breeding species, with some pairs nesting on trees in gull colonies on islands, and after the breeding season, they are observed closer to inhabited parts of the main island.

Common Raven – *Corvus corax*

Common Ravens are breeding species, with pairs breeding on boulders above the village of Blato in the National Park.

In historical records up until the 1970s (RUCNER 1998), Black-headed Bunting *Emberiza melanocephala* and Tawny Pipit *Anthus campestris* were listed as breeding

species of the island. However, due to the lack or very limited amount of suitable habitats for these species on the island at present, we did not include them on our list.

DISCUSSION

During our research, we observed 154 species on the island of Mljet. Of those, 54 species are breeders in the area, and 37 species breed within the National Park. Within the National Park, there are breeding grounds for the endangered Audouin's Gull, vulnerable breeders such as the Peregrine Falcon, and near-threatened species like the European Honey-buzzard, Common Tern, and Olive-tree Warbler (TUTIŠ *et al.* 2013).

The most threatened breeding species in the area, Audouin's Gull, used to have a small breeding population of up to 18 pairs. The breeding of this species was established in Croatia relatively recently, in 1996 (RUBINIČ & VREZEC 2000), so there is not much historical data on its breeding in Croatia. The area of National Park Mljet used to hold around 20% of the national population (BARIŠIĆ *et al.* 2010), with the rest of the population breeding at two other locations: the Lastovo archipelago and around the Island of Korčula. Over the last two decades, it has been an irregular breeder in Mljet National Park. The biggest threat to the species is competition and predation of chicks from the Yellow-legged Gull. The population of Yellow-legged Gulls at Mljet seems to be slightly increasing over the last two decades. Along the rest of the Mediterranean coast, their population is increasing (VIDAL *et al.* 1998, THIBAUT *et al.* 1996). One of the main reasons for their increase is human waste at rubbish tips. To control their population around the researched area, all rubbish tips in southern Croatia and parts of Bosnia and Herzegovina would have to be closed. Another threat to the species might be disturbance from tourism. On islets where colonies of Audouin's Gulls are found, access should be prohibited from April until the end of June to minimise disturbances to the colonies. Conservation work on this species is quite challenging, due to their nomadic way of life, location of nesting sites varies very much in subsequent years. However, they breed quite regularly within their traditional areas (LAMBERTINI 1993).

The Common Tern is another species threatened by the Yellow-legged Gull in the area. Common Terns used to breed on the small islet Crna Seka until 2017, when Yellow-legged Gulls started breeding there. During monitoring in 2017, we found one dead individual near their nesting site.

Mediterranean Shags are target species of the SPA that breed on cliffsides on the main island and some islets. The most stable and largest colony in the area is on the islet Borovac. One reason for the decline in the population is the presence of the invasive Small Indian Mongoose on the islet Kobrava, which used to have a large population of breeding shags. Mongooses were found on the island in 2012, and since then, the population of around 10 pairs has been in steady decline

until 2018, when we did not observe a single breeding pair on the islet. Recently, the population seems to be recovering; however, without removing the biggest threat on the islet, the population is threatened to decline again.

One of the main features of the National Park is its widespread forest. The well-developed forest provides conditions for the development of an avifauna that resembles a continental one more than a Mediterranean one. The most numerous species in the area are Common Chaffinches, Eurasian Blackcaps, and Great Tits. Tawny Owls and European Jays are also common, although they are scarce on other southern Croatian islands. The area of the forest has been increasing over the last few decades. Historical data from RUCNER (1998) on the breeding of Little Owls on the island and the absence of Tawny Owls could also suggest significant forest overgrowth on the island in the last 50 years.

There used to be around 700 hectares of agricultural lands (mainly vineyards, olive groves, and pastures) within the National Park, while recently there have been around 50 hectares, mainly around inhabited areas (JAVNA USTANOVA NACIONALNI PARK MLJET 2017). The overgrowth of agricultural lands could have negatively influenced the numbers of Red-backed Shrikes, European Greenfinches, and European Turtle-doves, and might explain the absence of Black-headed Buntings. These species are widespread in agricultural lands in coastal Croatia, whereas on the island of Mljet, they are present in small numbers or, in the case of the Black-headed Bunting, absent. The abandonment of olive groves could also have a negative influence on the near-threatened breeder, the Olive-tree Warbler, which prefers olive groves and open small forests. Another habitat prevalent on other islands in southern Croatia, but scarce on the island of Mljet, is rocky, sparsely vegetated habitats. Consequently, some common species are either few in number or completely absent: European Nightjar, Short-toed Snake-eagles, Eurasian Eagle-owl, Blue Rock-thrush, Rock Bunting, Tawny Pipit, and Rock Partridge. The number of observed species is similar to historical data collected on other islands in southern Croatia. On the island of Hvar, 168 species were recorded (63 breeding species) (RUCNER 1977, Sušić *et al.* 1995), 134 species on the island of Brač (47 breeding species) (CVITANIĆ 1984), 103 species on the island of Korčula (34 breeding species) (KRPAN 1977), 156 species on Lokrum (31 breeding species) (SUŠIĆ & BARTOVSKY 1989), and 105 species on the island of Šolta (46 confirmed breeding species and 11 possible breeding species) (Sušić *et al.* 1990). On most of the mentioned islands, besides the species that inhabit rocky, sparsely vegetated habitats, there are a few species of more open habitats that breed or used to breed on them, which have not been observed breeding on the island of Mljet. Most notable among these are the Woodchat Shrike *Lanius senator*, the Greater Short-toed Lark *Calandrella brachydactyla*, the Wood Lark *Lullula arborea*, and the Common Whitethroat *Curruca communis*. Surprisingly, we have not observed the Eurasian Collared-dove *Streptopelia decaocto* on the island of Mljet.

The marshes on the island are not very important for breeding, and only a few species breed in them; however, they are crucial for numerous migratory species that use them as resting places and feeding grounds when flying over the Adriatic Sea. Because of the marshes, some species breed on the island of Mljet that do not breed on other islands in the area, such as the Little Grebe, Mallards, the Common Moorhen, the Common Coot, Cetti's Warbler, and the Common Reed-warbler. Also, something unique to Mljet, among other surrounding islands, is that it is one of only two known locations on the Croatian islands where European Honey-buzzard are known to breed, the other being the island of Cres (RADOVIĆ *et al.* 2003) in the northern Adriatic. Research in unique areas like Mljet is crucial for the protection of this threatened species.

Areas like the islands of Mljet are important for the breeding of some threatened bird species, and research like this one provides insight into the number of bird species that use the area and how the number of breeding birds changes over the years. Research should be continued so that the threatened populations can be monitored.

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SAŽETAK

Cilj ovog istraživanja bio je ažurirati popis avifaune Nacionalnog parka Mljet i ostatka otoka Mljeta s naglaskom na ciljne vrste očuvanja. Istraživanje je provedeno od travnja 2007. do lipnja 2024. godine. Status (gniježđenje, zimovanje, prelet, rijetke vrste) utvrđen je za svaku vrstu, a analizirani su i podaci iz literature i prethodnih terenskih istraživanja. Ukupno je zabilježeno 154 vrste, od kojih 54 vrsta gnijezdi na cijelom otoku, dok 37 vrste gnijezde unutar Nacionalnog parka. Najznačajnije gnjezdarice za područje Nacionalnog Parka i za područja očuvanja značajna za ptice (POP) kojima se tijekom ovog istraživanja pratila populacija su sredozemni galeb *Larus audouinii*, morski vranac *Gulosus aristotelis desmarestii*, sivi sokol *Falco peregrinus*, škanjac osaš *Pernis apivorus* i crvenokljuna čigra *Sterna hirundo*. Kako bi se pratio utjecaj najveće prijetnje sredozemnom galebu, pratila se populacija galeba klaukavca *Larus michahellis*. Populacija škanjca osaša, sivog sokola i galeba klaukavca na području Nacionalnog Parka je stabilna, dok su morski vranaci, zbog invazivne vrste malog indijskog mungosa, doživjeli pad populacije tijekom istraživanja, koja se nedavno tek počela oporavljati. Područje Nacionalnog Parka je tijekom uspostavljanja ekološke mreže u Hrvatskoj bilo jedno od tri područja gniježđenja sredozemnog galeba, dok je nedavno vrsta neredovita i malobrojna gnjezdarica. Tijekom istraživanja, crvenokljuna čigra prestala se gnjezditi na istraživanom području zbog utjecaja galeba klaukavca. Kroz kontinuirano praćenje i istraživanje, ovo istraživanje pruža temelj za daljnje očuvanje i upravljanje avifaunom na području Nacionalnog parka Mljet.