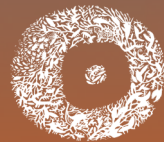


AUDOUIN'S GULL

*(Ichthyaetus audouinii
Payraudeau, 1826)*

STUDIES IN TÜRKİYE 2023



Doğa
20 years

Citation: Yaylalı Ö. Arslan Ş. & Özuslu S. (2023). Audouin's Gull (*Ichthyæetus audouinii* Payraudeau, 1826) Studies in Türkiye. Doga Dernegi. İzmir. 20 pages.

ISBN Number: 978-625-99419-0-5

Doga Dernegi (BirdLife in Türkiye)

Adres: Orhanlı Mahallesi 7102 sokak No:1 Seferihisar / İzmir

Phone: 0850 840 60 49

Fax: 0850 303 92 12

Email: doga@dogadernegi.org

Web: www.dogadernegi.org

Graphic Design: Esra Yılmaz, Gökçe Sümerkan

Cover Photo: Sezai Göksu

TABLE OF CONTENTS

SUMMARY	4
1. General Information	5
2. Global Distribution	7
3. Distribution in Türkiye	8
4. Population	10
5. Conservation Status	11
6. Threats	11
7. Research and Conservation Studies	13
8. Conclusion	15
References	16

SUMMARY

The Audouin's gull is a Mediterranean endemic seabird with a conservation priority with its vulnerable (VU) status at the global and European scale, according to the International Union for Conservation of Nature (IUCN). The species' population has been globally declining since 2010, with its largest colony in Spain's Ebro Delta mostly disintegrating after 2006. The number of known breeding areas of this species is limited in Türkiye. With the high dispersal ability of the species, it is predicted that some individuals leaving the Western European colonies will disperse to other colonies. In contrast, others will seek new suitable areas. Therefore, conducting further studies has gained particular importance. Competition with yellow-legged gulls, changes in fishing activities, decrease in food resources, stray dog pressure, rats, land use changes, pollution, habitat loss, and bycatch are among the main threats to the Audouin's gull. This article aims to gather the studies on Audouin's gulls in Türkiye and to draw attention to the threats to the species, restoration efforts, and expert opinions.

1. GENERAL INFORMATION

With a length of 44-52 cm and a wingspan of 117-138 cm, the Audouin's gull is one of the few endemic seagulls of the Mediterranean (Oro & Ruxton, 2001; Mañosa, 2004; Svensson et al., 2017; Furtun et al., 2021). Although wintering populations occur along the Atlantic coast, their breeding range is limited to the Mediterranean (Yapan, 2018). The body mass of the Audouin's gull belonging to the Laridæ family varies between 451 and 770 grams (Svensson et al., 2017; Furtun et al., 2021). After systematic studies, it was removed from the *Larus* genus and included in *Ichthyæetus* in 2005 (Keller et al., 2020). Morphologically, it shows similarities with the lesser blacked-backed gull and the yellow-legged gull (IUCN, 2020). Slightly smaller and slender than the yellow-legged gull (*Larus michahellis*), its wings are narrower and more pointed. Its beak is thick, relatively short, hooked, and deep red; the tip of the beak is yellow but can be seen as black from afar (Figure 1). The part near the end of its beak is black. It has a flat, elongated forehead, and its feathering extends towards the nostril (Svensson et al., 2017; Furtun et al., 2021; BirdLife International, 2023). It distinctively stretches its neck in case of alarm. Often glides (Svensson et al., 2017). Adults can be distinguished by their white head and body, grey back and underwing. The primary feathers are black except for the small white dots at the tips of the primaries. It has a dark iris and a red eye ring. Legs are long and dark greyish green (Svensson et al., 2017; Furtun et al., 2021; BirdLife International, 2023). The cover feathers of the juveniles are greyish brown, and the underwings have a black-and-white striped pattern. The flight feathers and tails are dark in colour. The tips of the tail feathers are white, and a U-shaped white band is at the tail roots (Svensson et al., 2017; Furtun et al., 2021). The beak is grey, the base of the beak pinkish, the tip of the beak black, legs dark grey (Furtun et al., 2021). At the age of 2 and 3, the upper parts become grey, and the darkness of the tail and wings decreases (Svensson et al., 2017). The morphology of males and females is similar (BirdLife International, 2023). When perching, their head is usually tilted forward (Svensson et al., 2017; Furtun et al., 2021). Eggs are mottled, light green-olive green (Yapan, 2018). There are no subspecies worldwide and in Türkiye (Kirwan et al., 2010).



Figure 1: Adult individual of Audouin's gull

Coastal and pelagic zone (offshore) species (Svensson et al., 2017). They mainly prefer rocky, sandy beaches and bays with little vegetation (Kirwan et al., 2010; Svensson et al., 2017). While they can breed in colonies or solitarily on rocky islands (now mainly eastern populations), they preferred a different habitat for the first time with their colonisation of Spain's Ebro Delta in 1981 (Oro & Martínez-Vilalta, 1992; Svensson et al., 2017; Onmuş & Gönülal, 2019). In this delta, the salty coastal marshes and the vegetation growing in the sand form flat mosaics (Oro & Martínez-Vilalta, 1992). Large colonies generally depend on fishing (Oro & Martínez-Vilalta, 1992; Cama et al., 2013; Svensson et al., 2017). In winter, they are found on pebbly/sandy beaches, sheltered coves, cliff edges, and open seas, but they do not prefer to move away from the shore. The habitat characteristics they use can vary from region to region and even year to year. They have a wide range of habitat preferences, usually from sea level to 100 m high, from bare cliffs to 85% scrub, and 0 to 90 degrees slope. However, they generally prefer medium vegetation cover, as it probably provides shelter to the young from the heat and predators. They especially like the points where fresh water comes out, such as the mouths of the streams on the coasts. The breeding colony's densities in the western Mediterranean are thought to be due to low salinity and abundance of Clupeidæ (BirdLife International, 2023).

Unlike other big gulls, they rarely scavenge. Still, with the increase in fishing activities (trawling and purse seine fishing) in recent years, this situation has changed, especially for western colonies, to feed more on dead individuals (Pedrocchi Rius et al., 2007; Svensson et al., 2017; BirdLife International, 2023). They feed on epipelagic fish (e.g., Clupeiformes family, mainly sardine *Sardina pilchardus* and anchovy *Engraulis encrasicolus*), aquatic and terrestrial invertebrates, sometimes small birds, and plants such as peanuts, olives, and grains (Mañosa, 2004; Svensson et al., 2017; Calado et al., 2018; Furtun et al., 2021; BirdLife International, 2023). This specialised food preference, which is not very common in seagulls, is thought to be one factor explaining the species' limited distribution (Mañosa, 2004). Benthic and mesopelagic zone fishes are also included in their diet when fed with fishing scraps (Pedrocchi Rius et al., 2002). They show nocturnal feeding behaviour (Mañosa, 2004; BirdLife International, 2023).

Studies conducted in Morocco and the Ebro Delta have determined that this species can display foraging behaviour up to 200 km during the breeding period. Still, it mostly only goes up to 40 km from their colonies (BirdLife International, 2023). In other words, protecting a 25 km radius of a colony means saving about 30% of the population.

It is a long-living species with a high survival rate (estimated between 0.83 and 0.95) and lower reproductive success (BirdLife International, 2023). It is partially migratory and shows dispersal. It is monogamous, and its colonies comprise only one species (Oro et al., 1999; Yapan, 2018; BirdLife International, 2023). They build their nests in a shallow hollow, flat area using plant roots, moss, and other plant material. Their brood generally consists of 2-3 eggs (Kirwan et al., 2010; Yapan, 2018). The egg-laying period lasts from the second half of April to the beginning of May, and after the incubation period of 26-33 days, fledgling takes place in the first two weeks of July (Yapan, 2018; BirdLife International, 2023). Parental care can continue for up to 75 days (Yapan, 2018). Juveniles can disperse long distances throughout the Mediterranean Basin after breeding (BirdLife International, 2023). Almost all individuals migrate across the Strait of Gibraltar during July-October and return to their breeding grounds in late February-mid-April (Sanpera et al., 2007; BirdLife International, 2023). They return to their previous breeding area (philopatry) (BirdLife International, 2023).

2. GLOBAL DISTRIBUTION

The Audouin's gull is distributed along the Mediterranean coast (Svensson et al., 2017). It has an uneven distribution from the Southwest Atlantic coast of Morocco to Türkiye, Greece, Tunisia, and Cyprus in the Mediterranean, including the Balearic Islands, Corsica, and Sardinia (Figure 2) (IUCN, 2020; BirdLife International, 2023). It is distributed annually in Cyprus, France, Gibraltar, Greece, Italy, Morocco, Spain, and Türkiye (Burger et al., 2020; IUCN, 2020). Apart from these countries, Audouin's gull breeds in Algeria, Croatia, Portugal, and Tunisia, and winters in Gambia, Libya, Mauritania, and Senegal (IUCN, 2020). The largest breeding colony before 2006, accounting for two-thirds of the global population, was in the Ebro Delta, Spain (Gutierrez & Guinart, 2008; BirdLife International, 2023). Due to the increase in fishing activities, the breeding population in the region has exceeded its carrying capacity. Due to other threats, their numbers in the delta decreased sharply from 15,396 couples in 2006 to 1,355 in 2019 (Gutierrez & Guinart, 2008; Genovart et al., 2018; BirdLife International, 2023). The northern colonies they constantly occupy in Italy are being abandoned rapidly, and new colonies are being formed in the south. Similarly, 2 out of 3 colonies were abandoned in Portugal (BirdLife International, 2023). As the individuals leaving all these colonies joined others or formed new ones, new locations were added to their distribution range throughout the Mediterranean (Keller et al., 2020).

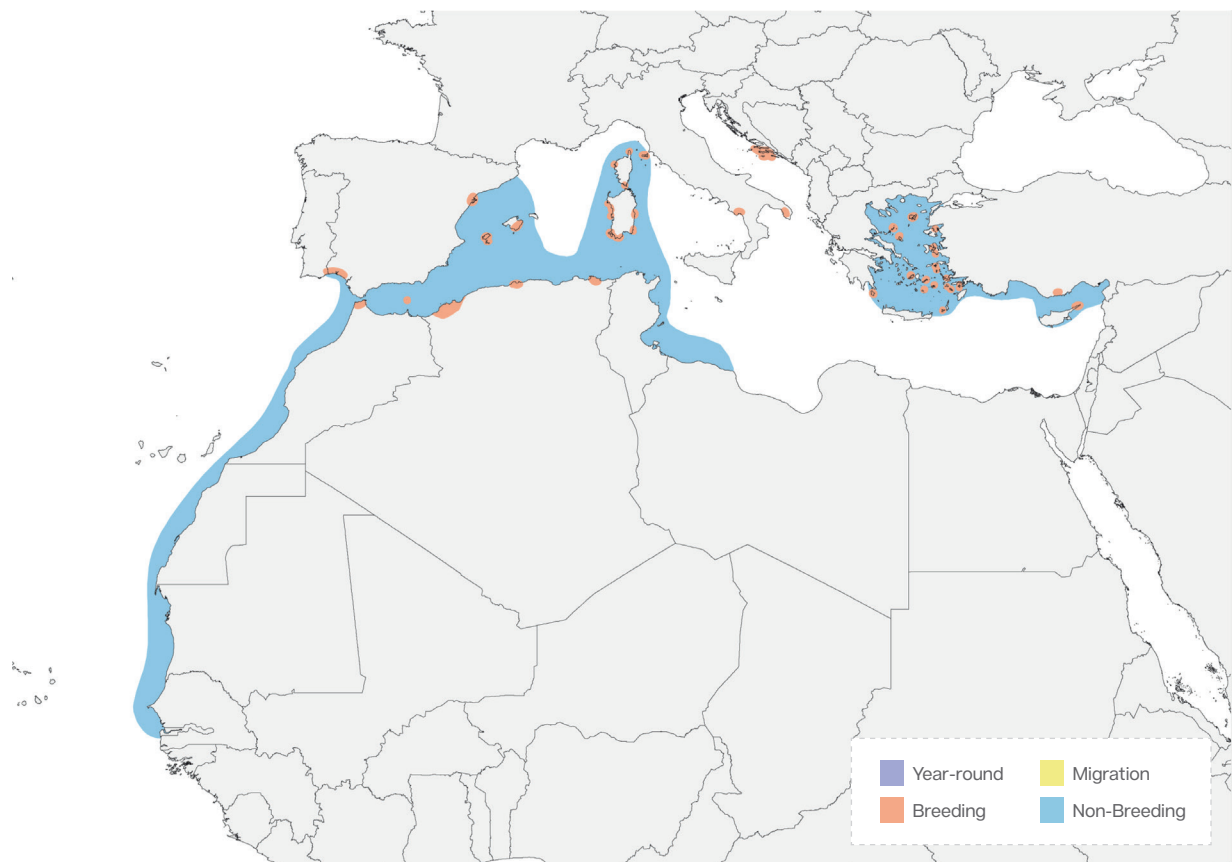


Figure 2: Global distribution area of the Audouin's gull. Blue represents wintering grounds, and orange breeding grounds (taken from <https://birdsoftheworld.org>).

3. DISTRIBUTION IN TÜRKİYE

The Audouin's gull is distributed on the Aegean and Mediterranean coasts and islands within the borders of Türkiye (Furtun et al., 2021). It was first recorded to breed in Türkiye by Witt in 1973 in Aydıncık (Kirwan et al., 2010). Records on the south and southwest coasts are scarcer and mainly consist of resident populations. Most of these records were taken between April and early October. It has occasionally been observed on the Marmara Sea and twice on the Black Sea coast (Trabzon, May 1995; Batumi, October 1984) and generally seen in small groups (10 < individuals) (Kirwan et al., 2010). They have been observed regularly in the Göksu Delta since the first recording in 1952. Non-breeding individuals congregate in this area and others, such as Milas Airport, Ayvalık Pan, and Beymelek Lagoon, starting from July (Kirwan et al., 2010; Yapan, 2018). An individual ringed in Greece was also detected in this region in June 2012 (Yapan, 2018). It was recently discovered that few individuals breed in Karaburun (Büyükada and Karaada) (18 pairs). Still, no activity was detected in the next two years of the study (Korkmaz & Coşkun, 2014; Yapan, 2018). In addition to other observations suggesting that they breed on the uninhabited and small islands of the Mediterranean, it is known that there are colonies in Aydıncık, Alaçatı, Güllük, Bodrum Peninsula, and Palamutbükü (Datça Islands) (Yarar & Magnin, 1997; Eken, 1997; Ertan et al., 1989; Kirwan et al., 2010; Onmuş & Gönülal, 2019). It was determined that they established a colony (35 pairs) on Gökçeada- the Aegean Sea in 2018 (Onmuş & Gönülal, 2019).

In the breeding colony near Mersin Aydıncık, 25 pairs were identified in 1973, 24 in 1974, approximately 20 in 1985, and 30 in 1987. However, this number decreased to 6 pairs in 1996, and no individuals could be observed in 2004. It is thought that the reason for this is the yellow-legged gull population that started to breed on the island (Kirwan et al., 2010).

In accordance with the studies carried out in the Chafarinas Islands and the Ebro Delta, Mitochondrial D-Loop region polymorphism of Audouin's gull samples taken from the nests found in Yılanlı Island (16 individuals- 2016) and Aydıncık Small Island (southwest end, 20 individuals- 2017, 15 individuals- 2018) in 2016-2018 was found to be much lower than expected, so the population structure could not be analysed (Genovart et al., 2003). This study also found no genetic differences between distant populations of this gull (a genetic bottleneck or high gene flow from distant populations may explain this situation). Furthermore, Yapan (2018) described a close relationship between the species and the Relict gull (*Ichthyæetus relictus*) and revealed a correlation between habitat type and mammal presence with nest density.

According to eBird records, 507 Audouin's gull records have been entered since the first observation, and 204 of these records correspond to the breeding period (Accessed on 10 August 2023, Figure 3). 6 individuals were observed from Adana, 124 from Antalya, 22 from Aydın, 33 from Balıkesir, 1 from Bursa, 190 from Çanakkale, 8 from Hatay, 1 from Istanbul, 31 from İzmir, 912 from Mersin and 614 from Muğla. During the breeding period, the highest number of individuals was recorded from Mersin (eBird, 2023).

Table 1: Breeding grounds of Audouin's gull in Türkiye.

	Ayaş et al., 2008	Oro et al., 2000	Kirwan et al., 2010	Yapan, 2018	Onmuş & Gönülal, 2019
Karaburun	2001- 2003, 18 pairs	1996, 1 pair 1998, 3-4 pairs	1996, at least 1 pair 1997, 2-4 pairs	2001, 18 pairs	2001 and 2003, 2-23 pairs
Mersin/ Aydıncık	1974, 28 pairs 1987, 30 pairs 1996, 6 pairs 2001, 17 pairs 2002, 8 pairs	1987, 30 pairs 1997, 10 pairs	1973, 25 pairs 1974, 28 pairs 1985, 20 pairs 1987, 30 pairs 1996, 6 pairs 2004, no pair	1973, 28 pairs 1987, 30 pairs 1996, 6 pairs 2001, 17 pairs 2002, 16 pairs 2003, no pair 2016, 6-8 pairs (Yılanlı island) 2017 and 2018, 7- 10 pairs	1997, 28-30 pairs 2001, 17 pairs
Datça	-	-	-	-	2002-2002, 20-30 pairs
Bodrum	-	-	-	-	2004, 2-10 pairs
Güllük	-	-	-	-	3-5 pairs
Çeşme	-	-	-	-	1995, 20 pairs
Gökçeada	-	-	-	-	2018, 35 pairs



Figure 3: eBird observation points of the Audouin's gull in Türkiye (Accessed on 10 August 2023).

4. POPULATION

According to estimates, after the collapse of the largest breeding colony of Audouin's gulls in the Ebro Delta, Spain, the population has decreased rapidly since 2010 (BirdLife International, 2023). It is thought that the reduction in the trawling fishing scraps they feed on and high mammalian predation caused this decrease (García-Tarrasón et al., 2015; Calado et al., 2018; Payo-Payo et al., 2018; BirdLife International, 2023). A study showed that introducing carnivores to the colony island increases species' habitat use, shifts individuals to areas where carnivores are less accessible, and causes individuals to exhibit different post-reproductive dispersal patterns. As a result, the age structure of the colony changed, and reproductive success decreased (Payo-Payo et al., 2018). While their populations tended to increase due to fishing activities and the effectiveness of conservation actions before the dissolution of their largest colonies in the Spanish Ebro Delta, it is estimated that the rate of decline in their numbers is close to 15% in only three generations. However, although it is unknown whether this population trend will continue in the same way, it is suspected that the decrease rate will reach 31-40% between 2006-2030 (in 3 generations) (IUCN, 2020; BirdLife International, 2023). In addition, Garcia-Tarrasón et al. (2015) determined that the foraging pattern is different for the two sexes; while the females search for food in the open seas during the week, the males head to different areas such as rice fields on the weekends when the fishing activities are stopped. In this case, it

will be different for the sexes to be affected by threats such as bycatch during fishing activities. In addition, a study conducted by Manosa et al. (2004) determined that the foraging effort of males was associated with breeding success. As mentioned above, this may mean that feeding males more on fishing scraps may have a more significant impact on reproductive success with changing fishing activities and regulations.

Gutiérrez and Guinart (2008) reported that their population has grown rapidly since 1981. While the global population reached 21,161 pairs in 2008, BirdLife International (2023) reported that the population peaked in 2007, reaching approximately 25,000. However, this number has tended to decline within a few years, and the European population is thought to have fallen to 15,900-21,800 pairs. Together with the small groups known to breed outside of Europe, this number corresponds to 33,000-46,000 adults.

It is thought that 47-90 pairs of Audouin's gulls breed in Türkiye, one of the breeding areas (IUCN, 2015; BirdLife International, 2023).

5. CONSERVATION STATUS

The category of this critically endangered (CR) species in the 1980s was demoted to near endangered (NT) and then least concern (LC) in 1981 with the formation and expansion of a new colony (Genovart et al., 2018; IUCN, 2020). However, global and European populations were placed in the vulnerable (VU) category in 2020 after the species' colony, which comprised 70% of the population, was largely disbanded (in 2017, home to only 3%) (Arcos & Oro, 1996; Genovart et al., 2018; Furtun et al., 2021; BirdLife International, 2023). It is estimated that their population has declined very rapidly since 2010 (IUCN, 2020).

6. THREATS

Major threats to the species include habitat change at breeding sites, bycatching due to changes in fishing methods, competition with yellow-legged gulls, egg collection, human presence on breeding grounds, rats, potential for depletion of food sources, and oil-based pollutants. This species is highly vulnerable to bycatching in longline fishing (Jones et al., 2008; Laneri et al., 2010; Calado et al., 2018; BirdLife International, 2023). Studies in the Chafarinas Islands have shown that the yellow-legged gull mainly damages the brood and eggs through aggression, dominance, and predation, especially when the density of Audouin's gull is low (Oro & Martínez-Vilalta, 1992; Paracuellos & Nevado, 2010; IUCN, 2020). However, some studies have also concluded that competition does not have a significant effect on their populations, as the species avoids dense colonies of yellow-legged gulls (Martínez-Abraín et al., 2003; Oro & Martínez-Abraín, 2007). On the other hand, the same study also suggested that decreasing food sources increases competition (Martínez-Abraín et al., 2003). Another study claimed that the density of the gull in an area affects the exposure to predators and its reproductive success. This means interspecies

competition can vary from colony to colony, depending on time and food availability (Oro et al., 2006).

Similar studies have shown that the availability of food sources influences egg volume and brood size, i.e., reproductive success, rather than the survival of adults, and the food shortage increases the emigration probability of young individuals (Oro et al., 1999; Oro et al., 2004; Tavecchia et al., 2007). In addition, predation is another threat to the reproductive success of this species. The same studies determined that interspecies predation could reduce reproductive success and cause dispersal (Oro et al., 1999). The finding that the species' global population dynamics are driven by the survival and reproductive success of its immature individuals suggests that the sudden reproductive failure of two-thirds of the population will result in an even more catastrophic population decline (Genovart et al., 2018; BirdLife International, 2023).

Offshore wind farms and coastal tourism development severely threaten the species (IUCN, 2020). Terrestrial mammals such as dogs (*Canis lupus familiaris*), red foxes (*Vulpes vulpes*), and badgers (*Meles meles*) are also predators of this species (Oro et al., 1999; Tavecchia et al., 2007; IUCN, 2020). Feeding Audouin's gulls on fishing scraps, especially during the breeding period, may cause pollutants such as heavy metals to affect this species in the long term adversely (Arcos et al., 2002; IUCN, 2020). However, no adverse effects of contaminants have been found in a scientific study so far. It should also be noted that heavy metal pollution of rivers and streams flowing into the Aegean Sea is the primary source of pollution in Izmir Bay, which is very close to Karaburun, where colonies are located (Ayaş et al., 2008).

In Greece, it was observed that intra- and inter-species (yellow-legged gull) competition intensified due to the consumption of fish stocks by fishing in 2010. It has been reported that 14% of eggs and hatchlings are preyed upon by rats, 9% by other seagulls, and even in some colonies, all eggs and hatchlings are hunted by birds of prey. It has been determined that 2.5% of breeding colonies are affected by bycatching (Yésou et al., 2012). It has also been determined that the short foraging range of the species (10-12 km) makes the species dependent on local fish populations in these regions.

Even when the gull showed exponential growth in 1991 and 1992, a temporary ban on fishing in the Ebro Delta caused fluctuations in reproductive success with knock-on effects on reproductive parameters and phenology (Oro & Martínez-Vilalta, 1992; Gutierrez & Guinart, 2008). This has prompted delta's colonies to seek different food sources, such as dumps and freshwater crayfish, which are abundant in rice fields (Gutierrez & Guinart, 2008). In other words, the restrictions imposed on fishing by the laws of the European Union have a high potential to adversely affect the species (García-Tarrasón et al., 2015; BirdLife International, 2023). Again, using these fishing scraps to manufacture pet food in the industry can lead to the same situation (IUCN, 2020). In addition, overfishing of small pelagic fish due to high demand, especially in tuna farms, threatens the food sources of the species (IUCN, 2020; Arcos et al., 2008).

In Türkiye, it was reported that they abandoned in Karaburun and Aydınçık Islands in 2003 due to intense fishing, grazing, egg collection, and competition (Çağlayan, 2003; Ayaş et al., 2008). In

addition, Yapan reported that the mortality rate of the offspring was high on Yılanlı Island, where human influence and pollution were significant in 2016, and no individuals could be detected on the island in the next two years of study. In this study, it was also reported that recreational activities such as scuba diving and angling were performed in the region, and it was stated that the aggressive flight of seabirds to many visitors decreased reproductive success by increasing the exposure of eggs and juveniles to heat.

Post-reproductive and reproductive dispersal is widespread in this species, providing genetic diversity and buffering against adverse environmental conditions through migration and colonisation (Oro & Ruxton, 2001; IUCN, 2020). Therefore, continuity of dispersal is crucial for these populations.

7. RESEARCH AND CONSERVATION STUDIES

An international action plan for Audouin's gull was prepared by BirdLife International on behalf of the European Commission in 1996 and included in the European species action plan for globally endangered species (The Mediterranean Action Plan, 2017; BirdLife International, 2023). Lebanon has prepared a species action plan to restore its Palm Islands Nature Reserve breeding colony. Between 1992 and 2006, several projects were carried out under the EU LIFE program aimed at recolonising breeding islands in Italy and Spain (BirdLife International, 2023). In addition, an official research group affiliated with the Ministry of Environment has been established in Spain to determine its status and protect the Audouin's gull. France also has a national action plan for conserving this species (The Mediterranean Action Plan, 2017). In Greece, on the other hand, it has been reported that the population size has increased thanks to the support of the EU LIFE program. In 2010, 33 colonies were recorded on many islands, such as Chios, Lesbos, Rhodes, Samos, and Crete, which are also very close to Türkiye (Figures 4 and 5). The yellow-legged gull and rat population was controlled in these colonies by coating the gull eggs with oil and rat poisoning (Yésou et al., 2012). In Türkiye, as mentioned above, observations and studies were done for the identification of nesting areas, the heavy metal ratio in the shell of Audouin's gull eggs was investigated in a study, and the phylogenetic analysis of colonies in the Antalya region became the subject of a thesis.

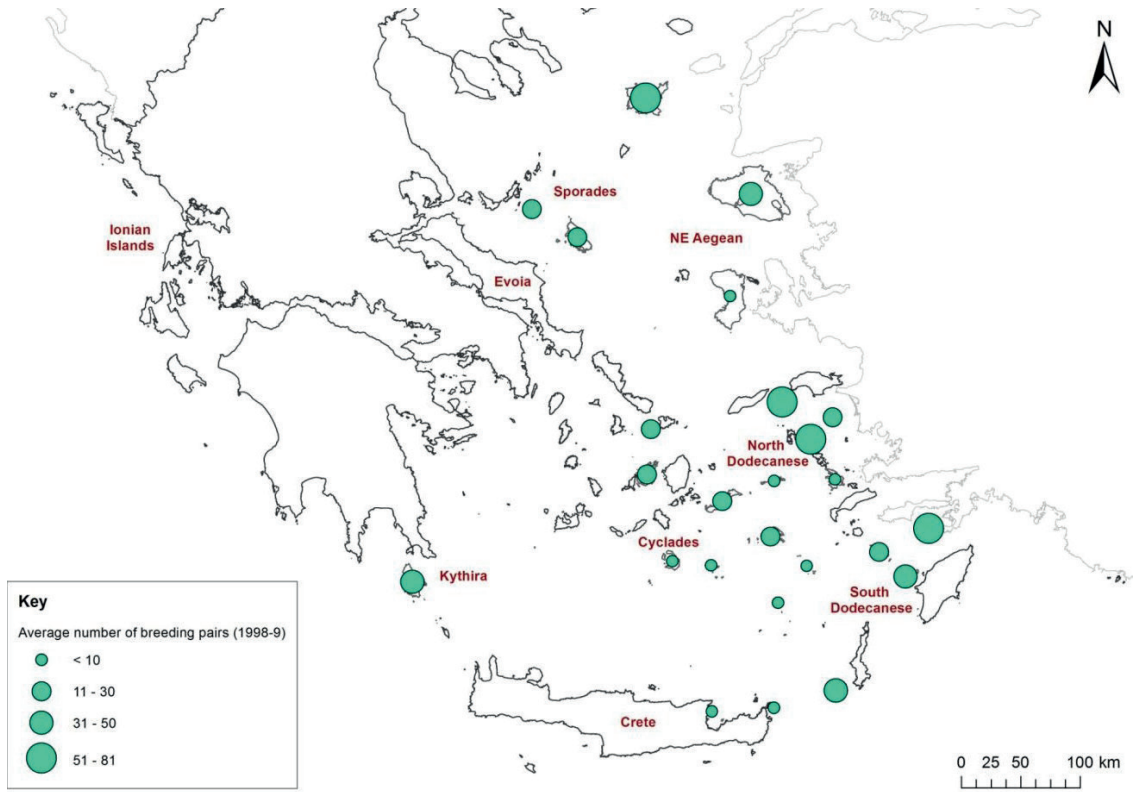


Figure 4: Distribution of Audouin's gull colonies during the first national census in Greece (1998-1999) (Yésou et al., 2012).

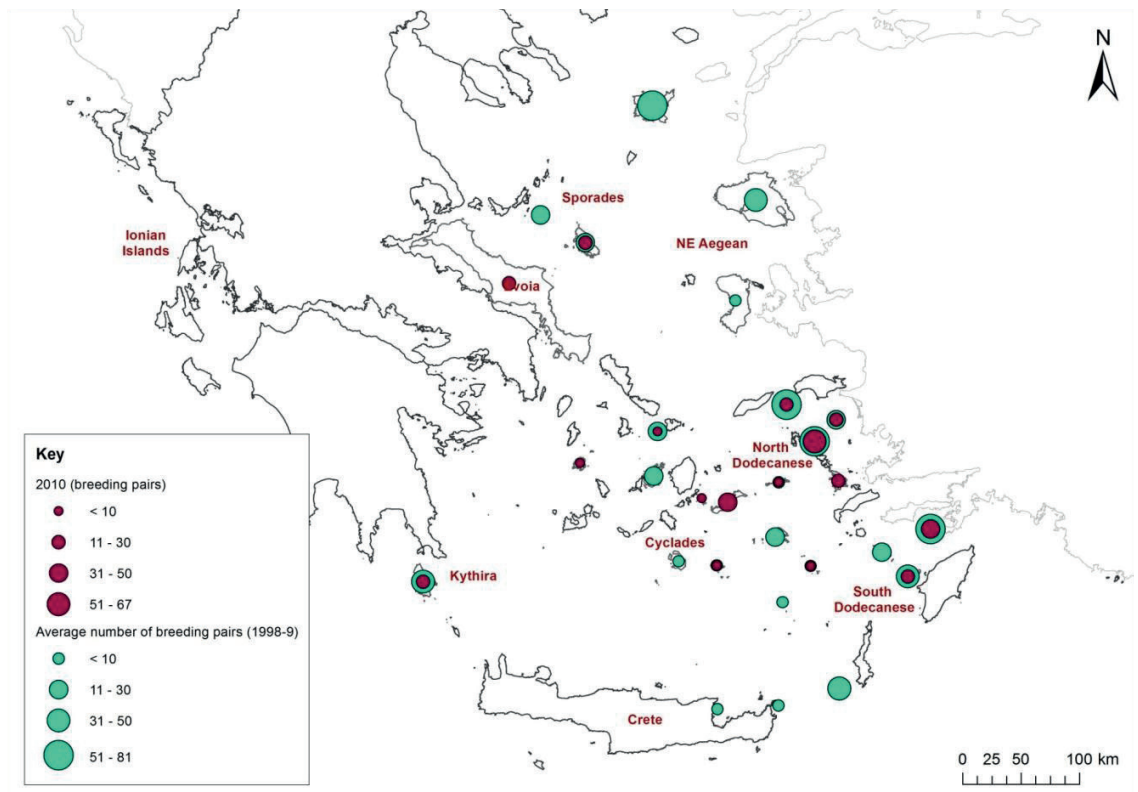


Figure 5: Distribution of Audouin's gull colonies during the second national census in Greece (2010) (Yésou et al., 2012).

Efforts are underway to take measures on fishing vessels to reduce the bycatching of seabirds, but the use of tools for this on ships in the Mediterranean is currently rare (BirdLife International, 2023). Control studies of invasive rat species were also effective in some colonies (Paracuellos & Nevado, 2010; BirdLife International, 2023). Between 2000 and 2009, yellow-legged gulls were eradicated by poisoning the adults and puncturing the embryos in the eggs with a metal needle due to food stealing and predation in Spain. In addition, from 2009 to 2012, the European Union LIFE project was carried out to eradicate rats and identify Important Marine Natural Areas on the islands home to populations of half of the Greek species. In 2014, identifying marine protected areas in Spain contributed to the protection of the species (BirdLife International, 2023).

Between 2018 and 2022, a project called MedBycatch was carried out in partnership with BirdLife Europe & Central Asia, FAO, IUCN, ACCOBAMS, RAC/SPA, and MEDASSET, including Doga Dernegi, WWF Türkiye, TUDAV and DEKAMER from Türkiye, aims to identify and mitigate the impact of bycatch on vulnerable species. The study's target group in the region between İzmir and Mersin was determined as marine species, including the Audouin's gull.

Identifying newly established colonies through all breeding areas of the species, especially on the North African coasts, identifying areas that may support the breeding of the species, using satellite tracking technology to quickly identify other breeding sites, monitoring and inspecting known breeding colonies, strict prohibition of interference with breeding sites, monitoring of coastal areas and infrastructure activities near the colony, control of invasive species competing with this species and terrestrial mammals, regulation of fisheries management policies, habitat restoration, actions to reduce pollution, including oil spills and chemicals, and sanctions on fishing equipment are among the practices proposed by experts to protect this species (The Mediterranean Action Plan, 2017; BirdLife International, 2023). Nevertheless, it should be noted that in a study conducted in 2004, radio telemetry caused a decline in the reproductive success of Audouin's gull (Mañosa, 2004).

8. CONCLUSION

This study aims to compile all the research, the current distribution areas, population status, and threats on the Audouin's gull. According to the IUCN, populations of this vulnerable species are declining rapidly after the abandonment of its largest colony in Spain. However, studies on this species are quite insufficient, especially in our country. The absence of current research on the tracking, counting, or determining colony areas of Audouin's gull creates uncertainty about the status of the species in Türkiye. A few studies clearly show that human activities seriously threaten this species. Reflections on the species should be increased and prioritised as soon as possible to protect the dwindling Audouin's gull and its habitats.

REFERANSLAR

Arcos J. M., Ruiz X., Bearhop S. & Furness RW. (2002). Mercury levels in seabirds and their fish prey at the Ebro Delta (NW Mediterranean): the role of trawler discards as a source of contamination. *Marine Ecology Progress Series*, 232, 281–290.

Arcos J. M., & Oro D. (1996). Changes in foraging range of Audouin's Gulls *Larus audouinii* in relation to a trawler moratorium in the western Mediterranean. *Waterbirds*, 19(1), 128–131. <https://doi.org/10.2307/1521817>

Arcos J. M., Louzao M. & Oro D. (2008). Fisheries ecosystem impacts and management in the Mediterranean: seabirds point of view. *American Fisheries Society Symposium*, 49, 1471. American Fisheries Society.

Ayaş Z., Celikkan H. & Aksu, M. L. (2008). Lead (Pb) and Copper (Cu) Concentration in the Eggshells of Audouin's Gull (*Larus audouinii*) in Turkey. *Turkish Journal of Zoology*, 32(4), 379–384.

BirdLife International. (2023). *Species factsheet: Larus audouinii*.

Burger J., Gochfeld M., Garcia E. F. J. & Sharpe C. J. (2020). *Audouin's Gull (Ichthyæetus audouinii)*, version 1.0. Birds of the World (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.audgul1.01>

Çağlayan E. (2003). *Population Studies on Audouin's gull (Larus audouinii) in the Karaburun and Aydıncık Islands, Turkey* (Doctoral dissertation, MSc Thesis. Hacettepe University, Institute for Graduate Studies in Pure and Applied Sciences).

Calado J. G., Matos D. M., Ramos J. A., Moniz F., Ceia F. R., Granadeiro J. P. & Paiva, V. H. (2018). Seasonal and annual differences in the foraging ecology of two gull species breeding in sympatry and their use of fishery discards. *Journal of Avian Biology*, 49(1). <https://doi.org/10.1111/JAV.01463>

Cama A., Bort J., Christel I., Vieites D. R. & Ferrer X. (2013). Fishery management has a strong effect on the distribution of Audouin's gull. *Marine Ecology Progress Series*, 484, 279–286. Erişim: <https://www.int-res.com/abstracts/meps/v484/p279-286/>

eBird. (2023). Access: 21 July 2023, <https://ebird.org/map/audgul1>

Eken G. (1997). The importance of Turkish coastal islands for seabirds. *Türkiye Kıyıları*. 453–466.

Ertan A., Kılıç A. & Kasperek M. (1989). *Türkiye'nin önemli kuş alanları*. Doğal Hayatı Koruma Derneği. (In Turkish).

Furtun Ö. L., Erciyas Yavuz K., & Karataş A. (2021). *Trakus: Türkiye'nin Kuşları* (2nd ed.). İstanbul: Türkiye İş Bankası Kültür Yayınları. (In Turkish).

García-Tarrasón M., Bécades J., Bateman S., Arcos J. M., Jover L., & Sanpera C. (2015). Sex-specific foraging behavior in response to fishing activities in a threatened seabird. *Ecology and Evolution*, 5(12), 2348–2358. <https://doi.org/10.1002/ECE3.1492>

Genovart M., Oro D. & Tenan, S. (2018). Immature survival, fertility, and density dependence drive global population dynamics in a long-lived species. *Ecology*, 99(12), 2823–2832. <https://doi.org/10.1002/ECY.2515>

Genovart M., Oro, D., ve Bonhomme, F. (2003). Genetic and morphological differentiation between the two largest breeding colonies of Audouin's Gull *Larus audouinii*. *Ibis*, 145(3), 448–456.

Gutierrez R. & Guinart, E. (2008). The Ebro Delta Audouin's Gull colony and vagrancy potential to northwest Europe. *British Birds*, 101(8), 442.

IUCN. (2015). *European Red List of Birds*.

IUCN. (2020). *The IUCN Red List of Threatened Species: Larus audouinii*. Erişim: <https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T22694313A183584708.en>

Jones H. P., Tershy B. R., Zavaleta E. S., Croll D. A., Keitt B. S., Finkelstein M. E. & Howald G. R. (2008). Severity of the Effects of Invasive Rats on Seabirds: A Global Review. *Conservation Biology*, 22(1), 16–26. <https://doi.org/https://doi.org/10.1111/j.1523-1739.2007.00859.x>

Keller V., Herrando S., Vorišek P., Franch M., Kipson M., Milanese P., ... & Kalyakin M. V. (2020). *European breeding bird atlas 2: distribution, abundance and change*.

Kirwan G., Demirci B., Welch H., Boyla K., Özen M., Castell P. & Marlow, T. (2010). *The Birds of Turkey*. Bloomsbury Publishing.

Korkmaz A. & Coskun, T. (2014). Opinions and Suggestions on Sustainable Fisheries of Industrial Fishing Enterprise's Captains in Sinop Province, Turkey.

Laneri K., Louzao M., Martínez-Abraín A., Arcos J. M., Belda E. J., Guallart J., ... & Oro D. (2010). Trawling regime influences longline seabird bycatch in the Mediterranean: new insights from a small-scale fishery. *Marine Ecology Progress Series*, 420, 241–252. Erişim: <https://www.int-res.com/abstracts/meps/v420/p241-252/>

Mañosa S, Oro D. & Ruiz X. (2004). Activity patterns and foraging behaviour of Audouin's gulls at the Ebro Delta, NW Mediterranean. *Patrones de Actividad y Comportamiento de Caza En La Gaviota de Audouin En El Delta Del Ebro, Mediterráneo Occidental*. CSIC- Instituto de Ciencias del Mar (ICM).

Martínez-Abraín A., González-Solis J., Pedrocchi V., Genovart M., Abella J. C., Ruiz X., ... & Oro, D. (2003). Kleptoparasitism, disturbance and predation of yellow-legged gulls on Audouin's gulls in three colonies of the western Mediterranean. *Scientia Marina*, 67(S2 SE-Articles), 89–94. <https://doi.org/10.3989/scimar.2003.67s289>

Martínez-Abraín A., Oro D., Forero M. G. & Conesa, D. (2003). Modeling temporal and spatial colony-site dynamics in a long-lived seabird. *Population Ecology*, 45, 133–139.

Onmuş O., & Gönülal, O. (2019). A newly identified breeding site in the Aegean Sea and a status update for Audouin's Gull *Larus audouinii* in Turkey (Aves: Laridæ). *Zoology in the Middle East*, 65(2), 186–188. <https://doi.org/10.1080/09397140.2019.1571745>

Oro D., Baccetti N., Boukhalfa D., Eken G., Hili A. E., Goutner V., Karauz S., ...& Ruiz, X. (2000). Current breeding distribution and status of Audouin's Gull *Larus audouinii* in the Mediterranean. 69–80. *Proceeding of the 5th Medmaravis Symposium Gazo Malta*, 29 September–3 October Malta 1998.

Oro D. & Martínez-Abraín A. (2007). Deconstructing myths on large gulls and their impact on threatened sympatric waterbirds. *Animal Conservation*, 10(1), 117–126. <https://doi.org/https://doi.org/10.1111/j.1469-1795.2006.00082.x>

Oro D., Cam E., Pradel, R. & Martínez-Abraín, A. (2004). Influence of food availability on demography and local population dynamics in a long-lived seabird. *Proceedings of the Royal Society of London. Series B: Biological Sciences*, 271(1537), 387–396. <https://doi.org/10.1098/rspb.2003.2609>

Oro D., Martínez-Abraín A., Paracuellos M., Nevado J. C. & Genovart, M. (2006). Influence of density dependence on predator–prey seabird interactions at large spatio-temporal scales. *Proceedings of the Royal Society B: Biological Sciences*, 273(1584), 379–383.

Oro D. & Martínez-Vilalta, A. (1992). The colony of the Audouin's Gull at the Ebro Delta. *Avocetta*, 16, 98–101.

Oro D., Pradel R. & Lebreton J. D. (1999). Food availability and nest predation influence life history traits in Audouin's gull, *Larus audouinii*. *Oecologia*, 118(4), 438–445. <https://doi.org/10.1007/s004420050746>

Oro D., ve Ruxton G. D. (2001). The formation and growth of seabird colonies: Audouin's gull as a case study. *Journal of Animal Ecology*, 70(3), 527–535. <https://doi.org/10.1046/J.1365-2656.2001.00511.X>

Paracuellos M. & Nevado, J. C. (2010). Culling Yellow-legged Gulls *Larus michahellis* benefits Audouin's Gulls *Larus audouinii* at a small and remote colony. *Bird Study*, 57(1), 26–30. <https://doi.org/10.1080/00063650903271936>

Payo-Payo A., Sanz-Aguilar A., Genovart M., Bertolero A., Piccardo J., Camps D., ... & Oro D. (2018). Predator arrival elicits differential dispersal, change in age structure and reproductive performance in a prey population. *Scientific Reports*, 8(1), 1971. <https://doi.org/10.1038/s41598-018-20333-0>

Pedrocchi Rius V., Oro D., González-Solís J., Ruiz Gabriel X. & Jover Armengol, L. de. (2002). Differences in diet between the two largest breeding colonies of Audouin's gulls: the effects of fishery activities. *Scientia Marina*, 2002, 66(3), 313–320.

Sanpera C., Ruiz X., Moreno R., Jover L. & Waldron S. (2007). Mercury and Stable Isotopes in Feathers Of Audouin's Gulls as Indicators of Feeding Habits and Migratory Connectivity. *The Condor*, 109(2), 268–275. <https://doi.org/10.1093/condor/109.2.268>

Svensson L., Mullarney K. & Zetterström, D. (2017). *Collins Bird Guide* (2nd ed.). London: Willam Collins.

Witt H. H. (1976). Beobachtungen zum Vorkommen und zur Brut einiger Non-Passerer an der türkischen Südküste bei Silifke. *Vogelwelt*, 97, 139–145.

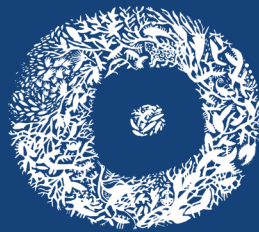
Tavecchia G., Pradel R., Genovart M. & Oro, D. (2007). Density-dependent parameters and demographic equilibrium in open populations. *Oikos*, 116(9), 1481–1492.

The Mediterranean Action Plan. (2017). *Report of the 20th Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocols*. Tirana, Albania.

Yapan B. Ç. (2018). *Breeding marine birds in the Southeast Mediterranean coasts of anatolia: Habitat population size relationship, and genetic structure of threatened audouin's gull population*. Deniz Bilimleri Enstitüsü.

Yarar M. & Magnin, G. (1997). *Türkiye'nin Önemli Kuş Alanları (Important Bird Areas of Turkey)*. Publications of Wildlife Protection Service, Doğal Hayatı Koruma Derneği, İstanbul, Turkey. (In Turkish).

Yésou P., Baccetti N. & Sultana, J. (2012). Ecology and Conservation of Mediterranean seabirds and other bird species under the Barcelona Convention.



Doğa
20 years