



LIFE ARTINA PROJECT

Final Conference
May 9-11, 2023
SEGET DONJI, CROATIA
- Book of abstracts -

LIFE ARTINA PROJECT

Final Conference

May 9-11, 2023

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[LIFE Artina project video](#)

Project LIFE Artina - Seabird Conservation Network in the Adriatic (LIFE 17 NAT/HR/000594)

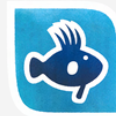
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Coordinating beneficiary: Association Biom

Associated beneficiaries: Association for Nature, Environment and Sustainable Development Sunce, Public Institution Lastovo Islands Nature Park, BirdLife Malta



**LASTOVSKO
OTOČJE** Park prirode
Nature park



This booklet is a deliverable of Action E.5. Dissemination of LIFE Artina project results, sub-action E.5.3. Organization of project closing conference. Design & editing by Vida Zrnčić, Melani Glavinić & Dries Engelen.

Foreword

Across the world, thousands of birds are endangered, leading to a continuous decline in their numbers each day. Not only are these birds at risk, but also the numerous habitats they rely on, are primarily affected by human activities. To preserve their populations, it is crucial to sustainably manage these habitats, including migratory routes, wintering grounds, and feeding areas. Changes in bird populations can provide clear insights into ecosystems that are disrupted, the strong impact of climate change, and the areas where intervention in biodiversity protection and conservation is most needed.

The "LIFE Artina - Network for the Conservation of Seabirds in the Adriatic" project has been dealing with the main challenges in the conservation of three Mediterranean seabird species: the Audouin's Gull, the Scopoli's Shearwater, and the Yelkouan Shearwater, in Croatia. After nearly five years of work it is time to celebrate the achievements of the project, to reflect on what has been done and to look to the future to make sure the conservation of these three seabird species is safeguarded. Therefore, a final conference was organized from May 9th to May 11th, 2023, at Hotel Medena, Seget Donji, Croatia. The conference brought together participants from the fields of nature conservation, fisheries, civil society organizations, and governmental institutions, as well as regional and international experts who shared and discussed the best international practices and lessons learned from the project. They discussed ongoing and future efforts to preserve populations of Adriatic and Mediterranean seabirds, with a focus on methods for monitoring the status of seabirds, the involvement of local communities in seabird conservation, eradicating rats from seabird colonies, and establishing and managing marine protected areas. Summaries of each of the presentations held, as well as some key points from each of the thematic session discussions are gathered in this book of abstracts, accompanied by some photo impressions.

Let us be proactive in protecting and preserving the Audouin's Gull, the Scopoli's Shearwater, and the Yelkouan Shearwater, as well as their habitats in the Adriatic region. By fostering collaboration among governments, (non-governmental) organizations, researchers, and communities, we can ensure the implementation of sustainable practices and the designation of essential marine protected areas for the benefit of these magnificent seabird species. Together, we can make a difference and secure a brighter future for the seabirds of the Adriatic. Every action, no matter how small, counts towards the larger goal of safeguarding our marine biodiversity.



Agenda

DAY 1 - Tuesday, May 9

Start time: 09:00

Welcome & Introduction

- 09:00 - 09:30 **Registration**
- 09:30 - 09:40 **Welcome speech**
Ivana Jelenić & Gabrijela Šestani (Ministry of Economy and Sustainable Development)
- 09:40 - 09:50 **Welcome and introduction to the conference**
Željka Rajković (BIOM)
- 09:50 - 10:05 **From one LIFE to another – conservation work on seabirds in Malta**
Nicholas Barbara (BirdLife Malta)
- 10:05 - 10:30 **Overview of LIFE Artina project and its results**
Željka Rajković (BIOM)
- 10:30 - 11:00 **COFFEE BREAK**
LIFE Artina Project video

Session 1: Rat eradication from large (inhabited) islands

- 11:00 - 11:30 **Tackling rodents on Italian islands: different methods for different situations**
Paolo Sposimo (NEMO)
- 11:30 - 11:45 **LIFE Artina - Rat eradication work in the Lastovo Archipelago**
Dries Engelen (BIOM)
- 11:45 - 12:05 **Best practice examples of Biosecurity in the U.K. and Australia**
Jaclyn Pearson (Wildlife Trust & RSPB)
- 12:05 - 12:20 **Feasibility assessment for Black rat eradication on Sušac island, Croatia**
Martin Austad (BirdLife Malta)
- 12:20 - 13:15 **Discussion: Next steps in Croatia/ Adriatic/ Mediterranean**
Moderator: *Ivana Selanec (BIOM)*
- 13:15 - 14:15 **LUNCH**



Agenda

DAY 1 - Tuesday, May 9

Parallel sessions

Session 2a: Census methods for burrow-nesting seabirds

Session 2b: Community involvement in seabird conservation

14:15 - 14:35 Session 2a **Monitoring and estimating colony sizes of burrow-nesting seabirds: relevance to red lists and understanding trends**
Antonio Volcano (BirdLife Europe & Central Asia)

Session 2b **Community involvement in seabird conservation**
Jaclyn Pearson (WildLife Trust & RSPB)

14:35 - 14:50 Session 2a **LIFE Artina - Yelkouan and Scopoli's shearwater censuses**
Dries Engelen (BIOM)

Session 2b **Community involvement through LIFE Artina**
Bruna Đuković (PI NP Lastovo Islands)

14:50 - 15:05 Session 2a **Estimating population size of burrow-nesting seabirds on the Maltese Islands, with a focus on acoustic monitoring**
Martin Austad (BirdLife Malta)

Session 2b **Improving community engagement in marine conservation projects: case studies in Portugal**
Tânia Nascimento (SPEA)

Session 2a: Census methods for burrow-nesting seabirds

Session 2b: Community involvement in seabird conservation

15:05 - 15:15 Session 2a **Very concise overviews of census work carried out in Greece, Italy and Spain**
Danae Portolou (HOS), Paulo Lago (SEO), Nicola Baccetti (ISPRA)

Session 2b **Tackling rodents on Italian islands: Engagement of island communities**
Paolo Sposimo (NEMO)

15:15 - 15:45 COFFEE BREAK

15:45 - 16:30 Session 2a **Discussion: Census methods and their implications for conservation**
Moderator: Sven Kapelj (BIOM)

Session 2b **Discussion: How to improve community involvement in seabird conservation?**
Moderator: Željka Rajković (BIOM)

Departure
from hotel
18:30

DINNER IN TROGIR



Agenda

DAY 2 - Wednesday, May 10

Start time: 09:00

Session 3: Designation & Management of Marine Protected Areas

- 09:00 - 09:25 BirdLife International Important Bird and Biodiversity Areas (IBAs): a case study in Croatia, with an overview of the history, criteria and tools for implementation
Jonathan Handley (BirdLife International)
- 09:25 - 09:45 IBA designations through LIFE Artina and considerations for management
Željka Rajković (BIOM)
- 09:45 - 10:15 Ecological recovery, classification and management of the Praia islet nature reserve (Azores, Portugal)
Pedro Manuel Lopes dos Santos Raposo (Government of Azores)
- 10:15 - 10:30 Assessing and tackling seabird bycatch in Mediterranean MPAs: replication of good practises/experiences through Life PanPuffinus!
Paulo Lago (SEO)
- 10:30 - 11:00 COFFEE BREAK
LIFE Artina video on bycatch in Croatia
- 11:00 - 12:00 Discussion: MPA Management and designation
Moderator: *Željka Rajković (BIOM)*
- 12:00 - 13:00 LUNCH

Parallel sessions

Session 4a: Conservation of Audouin's gull in Central and Eastern Mediterranean

Session 4b: Marine Toolkit

- 13:00 - 13:30 Session 4a **What Audouin's gulls taught us over the past 35 years?**
Daniel Oro (CEAB)
- 13:00 - 16:00 Session 4b **The Marine Toolkit mini-workshop: a practical session supporting the toolkit development, with a focus on identification of Mediterranean-wide priority conservation sites (IBAs) for Yelkouan Shearwaters.**
Jonathan Handley (BirdLife International)
- 13:30 - 14:00 Session 4a **Monitoring & conservation of Audouin's gull in Italy, during the last 26 years**
Nicola Baccetti (ISPRA)
- 14:00 - 14:10 Session 4a **Status of Audouin's gull in Croatia**
Dries Engelen (BIOM)
- 14:10 - 14:20 Session 4a **Status of Audouin's gull in Greece**
Danae Portolou (HOS)
- 14:20 - 14:35 Session 4a **LIFE Ilhas Barreira: Conservation and management of Audouin's gull and Little Tern in South Portugal**
Tânia Nascimento (SPEA)
- 14:35 - 15:05 COFFEE BREAK
Video on Audouin's gull monitoring in Italy
- 15:05 - 16:00 Session 4a **Discussion: Future conservation efforts AG in the region**
Moderator: *Antonio Vulcano (BirdLife Europe & Central Asia)*



Agenda

DAY 3 - Thursday, May 11

Start time: 09:30

Field visit

09:30 - 16:30 Boat trip to Šolta (passing one of the newly designated IBAs/ SPAs) with lunch. During the trip **Ana Miletić (Sunce)** will have a short talk on **Testing fishing gear to reduce seabird bycatch in Croatia.**

DAY 4 - Friday, May 12

Start time: 08:30

BirdLife Marine Toolkit - Closed workshop for BL partners

08:30 - 16:30 **The Marine Toolkit workshop: a practical session supporting the toolkit development, with a focus on identification of Mediterranean-wide priority conservation sites (IBAs) for Yelkouan Shearwaters.**
Jonathan Handley & Bethany Clark (BirdLife International)





Introduction





From one LIFE to another – conservation work on seabirds in Malta



Nicholas Barbara
(BirdLife Malta)

From its humble beginnings as a NGO of volunteers set up in 1962, BirdLife Malta has over the years grown into one of the largest environmental NGOs thanks to the organisation's ability to secure a number of strategic and consecutive LIFE projects.

Hosting the largest Mediterranean colony of Mediterranean Storm-petrel, and regionally important populations of the Scopoli's and Yelkouan Shearwater, brought with it a number of obligations, amongst which to protect and set up protected areas for these Annex I (Birds' Directive) species. In 2006, thanks to the assistance of the RSPB, BLM developed its first LIFE-funded project based on the largest colony of Yelkouan Shearwaters on the islands. The project was a marriage of governmental and non-governmental bodies and roped in some essential tasks which pioneered our seabird work in future years – a first try at telemetry, rat control, bycatch studies, management plan preparations and restricted areas to limit disturbance to seabirds are aspects which we kept expanding in future projects to date.

Malta's responsibility over a Fisheries Management Zone extending beyond its shores meant that it needed to identify and designate Marine SPAs. The LIFE+ Malta Seabird project achieved a 27% designation of Malta's waters as result of research conducted then. Same research also showed that there was much still to do about Yelkouan Shearwaters with the discovery of new colonies, and threats needing to be addressed – the ingredients for yet another project. The LIFE Arcipelagu Garnija Project (2015 -2020) solidified BirdLife Malta's capacity on seabird work, equipping a seabird team with a boat, vehicle and other necessary equipment to be able to access and research various areas of the Maltese Islands.

Nowadays our LIFE PanPuffinus! project is the largest and most ambitious to date stretching across partners in the Mediterranean from Portugal to Greece. BIOM's LIFE Artina project could mean a similar progression of seabird projects, having initially probed similar aspects from rat control to Marine IBA designation, and BirdLife Malta has been honoured to assist BIOM in the start of a possibly seabird-oriented future.





Overview of LIFE Artina project and its results



Željka Rajković
(BIOM)

Summary of the project was presented, including the objectives, and expected results. Project objectives are to (i) identify marine SPAs at sea in southern Croatia for the Audouin's Gull, the Scopoli's Shearwater and Yelkouan Shearwater; (ii) understand and assess the main threats affecting seabirds populations on land and at sea in the project area and define actions to mitigate them; and (iii) eradicate terrestrial invasive species (ship rats) on shearwater breeding colonies and control of Yellow-Legged Gulls at breeding colonies of Audouin's Gulls.

Seabird species status was presented, their distribution, colony size and breeding success. From 2019 to 2022 breeding success of Yelkouan Shearwater rose by 40%, of Scopoli's Shearwater by 9%, while that of the Audouin's Gull fluctuates. Rat eradication and control efforts in 14 islands were presented. On islands where rats have been eradicated / controlled, their impact on breeding seabird colonies is close to zero. For Audouin's Gull, the direct competition with / and predation by Yellow-Legged Gulls is a bigger problem than rats.

Summary results of the Feasibility Study for permanent rat removal from Sušac Island and of testing of the modified fishing gear to reduce the seabird bycatch were presented. Other assessments that were conducted are marine litter monitoring, assessment of the impact of recreational activities, plant community and herpetofauna before and after rat eradication. Also, public attitudes surveys in the beginning and at the end of the project, as well as the socio-economic impact of the project were assessed.

Regarding marine IBA and marine SPA designations, 5 new IBAs were designated (one of which is bordering Italy) and 2 existing ones were extended. Educational program and study visits for children of the 3 islands were presented and project communication activities and outputs, which included seabirds friendly code of conduct, exhibition, birdwatching tour program, interpretation trail, and 31 beach and underwater cleaning actions. For dissemination and replication, a series of webinars were organized, project final conference, as well as several hand-on-trainings for protected areas managers.





Session 1

Rat eradication from large (inhabited) islands

Photo: Biljana Ječmenica

FUTURE FOR SEABIRDS



Tackling rodents on Italian islands: different methods for different situations



Paolo Sposimo
(NEMO)

Since 1999, 11 Black rat eradication projects have been implemented on Italian islands, mostly funded through EU LIFE projects. In total these projects targeted 25 islands, two of which are larger than 1,000 hectares: Montecristo (currently the largest rat-free island of the Mediterranean) and Tavolara (home to roughly half the global population of Yelkouan Shearwater). Currently, rat eradication is attempted on all 4 (inhabited) islands of the Tremiti Archipelago, situated on the Italian side of the Adriatic Sea.

Throughout these projects, several techniques were used:

1. ground-based on accessible islands (including the second largest),
2. mixed operations on partially inaccessible islands, consisting of ground-based on most of the area supplemented with helicopter launching of homemade biodegradable bait stations along cliffs and other very steep areas
3. aerial baiting on 3 islands, where most of the area was not accessible.

Two eradications failed, one due to improper implementation (i.e. interruption of baiting due to lack of funds and personnel) and the other (Palmarola, mixed baiting) for unknown reasons. The main difficulties were (1) obtaining permission for aerial baiting from the National Baiting Authority, and (2) working in inhabited areas, where the main challenge seems to be detecting and removing the last rats.

Regarding adverse effects of rodenticide baiting to non-target species, the species most at risk are diurnal and nocturnal raptors, as well as Ravens and Yellow-legged gulls. However, these effects can be (partially) mitigated by choosing the right period for baiting, and ultimately the benefits for the target species strongly outweigh the mostly few cases of collateral damage during the eradication work.





LIFE Artina - Rat eradication work in the Lastovo Archipelago



Dries Engelen
(BIOM)

Throughout the implementation of LIFE Artina (2019-2023) a variety of methods have been carried out to control or remove rat populations on important shearwater and Audouin's gull colonies in the Lastovo archipelago. Rodenticide baiting (+ subsequent wax block monitoring) was mostly used, but in some cases live trapping (+ cervical dislocation) was preferred. In parallel to these methods, as well as during longer periods of absence from islands, A24 GoodNature traps were installed.

As a result, the entire Vrhovnjaci archipelago (9 islets) is now free of rats, as are 3 Lukovci islands. On the other hand, Veli & Mali Maslovnjak, Veli & Mali Rutvenjak, and Zaklopatica will need yearly rat population control, currently being implemented by the Public Institution of Lastovo Islands Nature Park. Rat eradication resulted in an increase in the breeding success of Yelkouan (+40%) and Scopoli's shearwater (+9%) was observed, but no effect was seen for Audouin's gull.

Important challenges faced during the eradication work were:

- 1) the distance of important seabird colonies to nearby rat-infested islands
- 2) assessing whether an island was re-invaded by rats or had surviving individuals
- 3) non-target species consuming bait (Hooded crows mostly)
- 4) lack of staff capacity.

These issues will be (partially) dealt with during the upcoming project: LIFE TETIDE.



Best practice examples of Biosecurity in the U.K. and Australia



Jaclyn Pearson
(Wildlife Trust & RSPB)

The Biosecurity for LIFE project has measurably improved biosecurity in the UK. Island communities, owners, and managers have bespoke biosecurity plans, enabling them to implement biosecurity. Stakeholders including fishermen and farmers have been trained in biosecurity measures and the project has supported the UK's first biosecurity dog. Overall, there has been an increase from 4 to 40 islands now using biosecurity measures in the UK. The LIFE Isles of Scilly Seabird Recovery Project continues to deliver biosecurity measures a decade after rats were eradicated from St Agnes and Gugh with the efforts of the 90 residents being key to the success.

On Lord Howe Island, NSW, Australia, rats, and mice were removed in 2019, but rats returned in 2021, likely from the cargo ship. Biosecurity measures are therefore being improved and successful incursion response delivery is informing best practice measures.



Biosecurity for LIFE project has a lot of resources available online.



Feasibility assessment for Black rat eradication on Sušac island, Croatia

(Austad, M., Varnham, K., Sposimo, P. & Engelen, D.)



Martin Austad
(BirdLife Malta)

We carried out a feasibility study for *Rattus rattus* eradication from the uninhabited Sušac island (403ha), in Nature Park Lastovo Islands. The island is, amongst others, important for *Puffinus yelkouan* (100-500 bp) and it is expected that the population would increase following rat eradication.

While a ground-based approach with rodenticide bait stations is technically feasible, an aerial approach would overcome the challenge of baiting steep cliffs and would not require trail cutting through dense vegetation. Eradication is sustainable because Sušac is beyond rat swimming distance from source populations and boat visitor frequency is low.

The lighthouse keepers and Nature Park Lastovo Islands are positive to the potential eradication, but wider community engagement is required to confirm social viability. The project would require legal derogation from the EU Biocide Regulation for aerial broadcast.

Risks to non-target species can be sufficiently managed to allow for environmental viability, but the conservation status of *Apodemus sylvaticus* needs further study due to potential eradication with aerial broadcast. Sheep need to be enclosed prior to aerial broadcast, but their complete removal is encouraged for further ecosystem restoration.

Both ground-based and aerial approaches are costed within LIFE funding which would ensure capacity for the project, but an aerial approach is less expensive and complex. In conclusion, eradication is feasible and would greatly benefit the biodiversity of Sušac.





Discussion: Next steps in Croatia/ Adriatic/ Mediterranean



Moderator:
Ivana Selanec
(BIOM)

- 1) Two key factors were pointed out for a successful rat eradication on inhabited islands: Waste management has to be organized and effective prior to and during the eradication. Secondly, the involvement of and approval by the local community influenced by the eradication.
- 2) One challenge addressed lies in the conservation of the target species, whose population density and behaviour, besides being affected by predation by invasive species, is also altered by other factors. This can make it more difficult to measure the exact effects of predation by invasive species. The example of Yellow-Legged Gull as a predator on Audouin's Gulls eggs and chicks was discussed where removal of rats influences both bird populations. There is a need for a holistic approach where all ecosystem components being influenced by the invasive species removal will be considered and taken into account in the long-term goals.
- 3) The challenge of rodenticide uses and legislation has been mentioned, where we have to ensure that invasive species eradication is recognized by decision makers and legislation as an urgent need for saving the environment. This is particularly relevant to aerial broadcast of rodenticide and to natural areas without human settlement (as these tend not to be covered by laws which are generally focused on urban areas and sanitation of human settlements). Clarification of EU regulation will be proposed via the soon to start LIFE TETIDE project.
- 4) The seriousness of the threat of resistance to rodenticide in rats was discussed. Currently, there is no risk of resistance at the global level. The conclusion is that we have to work with different tools as much as possible and use rodenticide bait in as short a time period as possible.
- 5) The future brings many innovations and new methods, such as genetic modification of invasive species. As experts and scientists, we have to stay open to novelties and use these opportunities to increase efficiency and ensure sustainability of the eradication results.



Session 2a

Census methods for burrow-nesting seabirds

Photo: Bart Vercruyse

FUTURE FOR SEABIRDS

Monitoring and estimating colony sizes of three Mediterranean burrow-nesting seabirds: relevance to red lists and understanding trends



Antonio Volcano
(BirdLife Europe)

Monitoring seabirds is key to understanding population changes and producing good population estimates. Good monitoring data will inform the Red List status of the species, which could trigger the implementation of conservation and management measures.

For burrowing-nesting seabirds, this presents many challenges, linked to their ecology. Important gaps on the topic still exist and need to be addressed; several methodologies have been tested with different degrees of success.

Combining and comparing methods can ensure the most cost/resource efficiency. No general extrapolation model can suit all the species, but it is relevant to base trend estimates in demography or in partial counts from well-monitored (and representative) plots.

Direct counts can give an accurate number of the breeding population if most of the nests are reachable, but not if breeding happens mainly in non-accessible zones.

Monitoring can be done on a representative subset of a population, without knowing the population size; The design (when, where, and what you count or record) is absolutely critical to proper inference. For absolute population size estimation, a lot more effort is needed, so density estimation via spatial mark-recapture, or distance sampling is an option. For three Mediterranean species (Yelkouan shearwater, Scopoli's shearwater, European Storm Petrel), important gaps on the population size need to be filled in, as, overall, for some countries, we are still lacking good quality datasets and it is difficult to gauge to what extent improved monitoring is responsible for increased numbers.





LIFE Artina - Yelkouan and Scopoli's shearwater censuses



Dries Engelen
(BIOM)

In the Adriatic Sea, breeding populations of Yelkouan and Scopoli's shearwater are found in the Vis and Lastovo Archipelagos (Croatia), the Tremiti Archipelago (Italy) and the island of Sazan (Albania), and are estimated to be 351-560 and 1000-1600 pairs respectively.

Between 2019 and 2022, LIFE Artina staff and volunteers conducted thorough shearwater nest and colony searches in the Lastovo Archipelago, marking nests during the day and visiting them 3 times per breeding season. Over the four year period an increase was observed in the number of breeding pairs for both Yelkouan (from 91 in 2019 to 569 in 2022) and Scopoli's shearwater (from 96 to 369). This increase is partially a result of improved search efforts with increased experience, covering larger areas and more islands, but also due to the eradication work carried out during the project. The recruitment of new breeding individuals comes entirely from the existing pool of birds, not from chicks born during the project as they have not reached sexual maturity yet (as also indicated by our ringing efforts).

Obviously, the number of found nests represent the minimum population size of the archipelago, whereas technically one should still account for undetected nests (estimated at 25%) and unsurveyed suitable habitat (of which the nest density is based on surveyed habitat for each respective island separately). By doing so, a total population estimate for Lastovo would be in the range of 569–1167 breeding pairs of Yelkouan shearwater and 369–738 of Scopoli's.

Interestingly, even the lowest range limit for the Yelkouan shearwater population of the Lastovo archipelago (= 569) is higher than the current estimate for the entire Adriatic Basin. This shows that the species is most likely under-recorded in the region, but also that its breeding is strongly affected by the negative effects of rat presence on the colonies (resulting in a large proportion of non-breeding adults).



Estimating population size of burrow-nesting seabirds on the Maltese Islands, with a focus on acoustic monitoring



Martin Austad
(BirdLife Malta)

Several techniques are suitable to monitor burrow nesting seabirds, where cliff ledges and caves can be accessed by field workers. These include capture-mark-recapture, trail cameras, and direct nest counts.

However, several cliffs do not allow for human access which makes estimating the number of pairs breeding there problematic. Automatic Recording Units (ARUs) that record sound autonomously are a potential monitoring tool for the vocal shearwaters but require improved methods for analysing the recordings.

The soundscape indices calculated by the R package 'Soundecology' are positively correlated to the number of shearwater calls counted in a sample of recordings, and have been used to predict colony size. The disadvantage is that the indices are not species specific which make them less useful for mixed colonies.

Through LIFE Artina and a collaboration with FORTH, Crete, we are developing a model based on Deep Neural Networks to distinguish Scopoli's and Yelkouan shearwater calls, as well as a user-friendly platform to analyse recordings in bulk. First results are 85% and 69% detection rates for Scopoli's and Yelkouan shearwater calls respectively. If detection rates are constant between years, we believe that this can become a useful tool to detect trends in calling activity in long term monitoring programmes.



Very concise overviews of census work carried out in Greece, Italy and Spain



Danae Portolou
(HOS)



Paulo Lago
(SEO)



Nicola Baccetti
(ISPRA)

HOS/ BirdLife Greece monitors numerous colonies of Yelkouan and Scopoli's Shearwaters and European Storm Petrels. Colonies are initially located through coastal censuses and night acoustic surveys and then specific colony sites are visited during the day to mark nests. In large colonies, sample plots are surveyed, while in smaller colonies complete nest searches are endeavored. Nests are ideally visited twice or three times per breeding season to monitor occupancy, predation, and breeding success. In some colonies, acoustic recordings and constant effort mist-netting is implemented in order to estimate adult mortality. In colonies where nest monitoring is not possible, raft counts are performed, although not systematic. In two Storm Petrel colonies, mist-netting and playback monitoring is performed.

SEO/BirdLife (Spain) monitors the critically endangered Balearic Shearwater *Puffinus mauretanicus* on three islets near Ibiza since 2011. It consists of a visual search of accessible nests to carry out the population census and calculate breeding success. The colonies are visited twice during the breeding season. Adults, chicks and fledglings present in the nests are ringed. The long-term colony monitoring collecting capture-mark-recapture data have allowed to apply multi-event capture-recapture modelling. The results show a 14% annual decline with a low adult survival. These values are almost the same as those calculated a few years ago for another colony near Mallorca, where an estimated time to extinction of only 61 years was calculated.

Monitoring of shearwater species in Italy and the MSFD requirements (Baccetti, N., Pezzo, F., Zenatello, M. et al.)

An informal presentation on 3 MSFD indicators, namely Distribution, Abundance and Demography. Activities only refer to breeding colonies and Demography only to the breeding success. Abundance is mainly obtained from raft counts or passage through bottlenecks, both supported by actual movements of GPS-tagged birds.





Discussion: Census methods and their implications for conservation



Moderator:
Sven Kapelj
(BIOM)

- 1) Rather than focusing on population estimates that vary by effort, search area and method, trends in burrow nesting seabirds should be determined based on the demographic parameters adult survival and fertility, based on a representative sample of nests. Capture-mark-recapture of adults for survival estimation is ideally done while adults are attending nests (incubating) to avoid prospectors.
- 2) Sound recorders are a promising monitoring method, especially for largely inaccessible sites and since they can record over long periods of time. However, application is still constrained by analytical tools to detect species of interest and to translate detections into population estimates or trends.
- 3) Most methods of population estimation, except direct nest counts, are prone to inclusion of prospectors and non-breeders which make up a large proportion of seabird populations. Various ways of accounting for prospectors have been applied for various methods, including timing application of the method to the periods with least prospectors (the at sea counts in Italy or the trail camera counts in Malta), but cannot exclude prospectors entirely.
- 4) The immediate increases observed in areas following rat removal is not attributed to higher recruitment from returning young birds, but rather to less nests failing early on in the breeding season and possibly a larger proportion of the existing population deciding to breed.
- 5) Counting nests in sample plots can be a very good method since it provides direct counts of nests. Direct counts can still be underestimates since not all nests are visible and this can be corrected for using an upper estimate (increase by 25% used in Croatia). However, direct counts in sample plots cannot be directly applied to all island area without confirmation of breeding shearwater presence in remaining plots. Even in seemingly suitable habitat shearwaters are sometimes absent and thus ground thruthing is needed.





Session 2b

Community involvement in seabird conservation

Photo: Bart Verduyze

FUTURE FOR SEABIRDS



Community involvement in seabird conservation



Jaclyn Pearson
(WildLife Trust & RSPB)

The LIFE Isles of Scilly Seabird Recovery Project removed rats from St Agnes and Gugh in 2013 and continues to be the largest successful community-based rat eradication project (80 residents).

Lord Howe Island, NSW, Australia is in hot pursuit of the title of the largest island to have both rats and mice removed from an inhabited island (350 residents) after rodents were removed in 2019 and a successful incursion response was carried out in 2021.

Rathlin, Northern Ireland has begun a LIFE Raft project to remove ferrets and rats, with 150 residents currently undergoing the final stages of community consultation.

The success of these projects requires full community support to reduce alternative food for rodents and to provide property access for rodenticide bait stations. There are some key themes across all projects which can benefit similar projects as we progress to more ambitious projects on inhabited islands.

Community involvement through LIFE Artina



Bruna Đuković
(PI NP Lastovo Islands)

Community involvement in seabird conservation is a valuable approach to protecting these species and their habitats. However, there are certain difficulties that can arise when trying to engage communities in these efforts. Some common challenges that arise during LIFE Artina project were lack of awareness, lack of trust, resistance to change, negative preconceptions and difficulties in determining the appropriate time and place of events.

Successes in community involvement during LIFE Artina project were one on one approach in different topics like waste management and light pollution, reports from people about finding injured or dazed birds, awareness on marine litter, engaging in clean-up actions and education. An educational program was implemented in 3 schools on 3 islands and locals were familiarized with the threats to seabirds and know how they can contribute.

Community involvement plays a crucial role in seabird conservation efforts around the world. By working together with local communities, governments, and conservation organizations, we can continue to make positive strides towards safeguarding seabird populations and their ecosystems.



Improving community engagement in marine conservation projects: case studies in Portugal



Tânia Nascimento
(SPEA)

Through several marine conservation projects SPEA has been promoting educational activities with local communities to raise awareness and promote natural values, as well as environmental education in local schools.

Volunteering is also an important part of community involvement in marine conservation projects, without which many actions would not be able to be carried out in a timely manner. Volunteers help collecting field observations and surveys, wildlife monitoring, removal of invasive plant species and ringing campaigns.

The engagement with target stakeholders is key to a successful project, although some difficulties may arise. Local communities tend to have strong feelings against the eradication of introduced mammals on islands and the removal of invasive plants. It is important to involve the community since the beginning of the process, explaining the impacts of invasive species and showing the results of eradications.

Tackling rodents on Italian islands: engagement of island communities



Paolo Sposimo
(NEMO)

After a first phase of work, a priority list of Black rat eradication on Italian islands was drafted, based on monetary costs vs conservation benefits for the shearwaters. Islands with more than 50 inhabitants were excluded, for the higher reinvasion risk.

After 2014, several eradications had been attempted also on inhabited islands, aimed at providing both conservation outcomes and socio-economic benefits for the local community. Approaches for the population involvement and engagement are discussed.

Widespread disbelief and concern about risks for pets made the engagement difficult in the early stages of the operations, but after the work started, the rats really disappeared and there were no adverse effects, virtually all residents were in favor of eradication and many of them actively cooperated with the eradication.



Discussion: How to improve community involvement in seabird conservation?



Moderator:
Željka Rajković
(BIOM)

- 1) Collaboration with the local community is the key to successful conservation. Most work with the local community should therefore be matched to the conservation actions. Ideally the local community should be involved in the management, but without putting too much pressure on them. It is also good to have informal and “thank you” events to show that organizations value the contribution from the local communities. Such events are a good opportunity to share the message and hear the feedback.
- 2) Speaking about conservation to the local community is hard because results are not visible in the short term. Therefore, it is important to do small projects, to be on the ground and show positive examples. Events like cleaning actions are important, as they are visible and tangible.
- 3) When starting a conservation project within the local community, it is desirable for experts who make the initial contact to have good social skills. It is important to find locals who understand the project from the beginning, despite the initial resistance and to work with them and then a (little) ripple effect happens.
- 4) Budget and marketing are very important, as well as finding people whose stories can reach and influence others. Also, as part of conservation efforts, every little win should be celebrated.
- 5) Conservation efforts can be included in the promotion of the destination, as tourists who care about the environment visit because of the work conservation sector does. With next generations getting more environmentally aware, it could mean that they will care even more.





Gallery



Projekt LIFE Artina
Mreža za očuvanje morskih ptica u Jadranu
Seabird Conservation Network in the Adriatic



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Session 3

Designation & Management of Marine Protected Areas



BirdLife International Important Bird and Biodiversity Areas (IBAs): a case study in Croatia, with an overview of the history, criteria and tools for implementation

(Handley, J., Zec, M., Engelen, D. & Rajković, Ž.)



Jonathan Handley
(BirdLife International)

Decision-making products that support effective marine spatial planning (MSP) are essential for guiding efforts that enable conservation of biodiversity facing increasing pressures. Important Bird and Biodiversity Areas (IBAs) are a key tool for identifying globally important sites for the conservation of bird populations on the basis of an internationally agreed set of criteria.

We present an introduction to the IBA programme with a summary of the history, criteria and tools for identification of sites important for seabirds. In the context of supporting efforts to conserve threatened seabird species breeding in Croatia and supporting national MSP efforts, we showcase how seabird distribution (tracking data, at-sea surveys, colony locations) and abundance data (colony abundance estimates) were used to identify new, or redesign existing, IBAs for three threatened seabird species (Yelkouan shearwater *Puffinus yelkouan*, Scopoli's shearwater *Calonectris diomedea* and Audouin's gull *Larus audouinii*).

These IBA data are relevant for various different international and regional legal instruments. The instruments include the EU Birds Directive which requires the designation of Special Protection Areas in the European Union using the best available scientific criteria; typically, the IBA criteria.



IBA designations through LIFE Artina and considerations for management



Željka Rajković
(BIOM)

Newly designated marine IBAs (East Mljet Channel, Hvar Channel, Korcula Channel, Lastovo Channel, and Northern Adriatic CRO) and two existing marine IBAs that were extended (Lastovo Archipelago and Offshore Islands) were presented, as well as the overlap with the national protected areas and SPAs (Natura 2000 sites for birds).

The SPA designations are in line with the EU Biodiversity Strategy for 2030 that has a goal to legally protect at least 30% and strictly protect at least 10% of EU land and sea area via identifying and designating additional protected areas. SPA designation process in Croatia was presented and LIFE Artina project developed management measures for the designated and extended marine IBAs. Conservation objectives for existing sites are based on numbers of breeding pairs on colonies and target coverage of relevant habitats. For at-sea sites they are based on the numbers of the birds that use the marine area. It is necessary to establish a baseline regarding pressures and threats at sea and then monitor the threats (especially disturbance, bycatch impact and amount of marine litter) and monitor the colonies on the islands.

Proposed at-sea SPA conservation measures include no offshore renewables in the SPAs, improved waste management on land, reducing boat speed, and, where possible, regulating shipping lines (speed and light emitted). Since fisheries bycatch is still undetermined, it is first necessary to monitor it and, if bycatch happens, then mitigation measures should be introduced, including avoiding throwing bait remains or cleaning caught fish when setting gear, adding weights to longlines, installing bird-scaring lines, and, where possible, night setting of longlines and minimising their lighting. Designation of no-take areas within the SPAs to reduce overfishing and allow fish stocks to recover is one of the most important conservation measures. If conservation objects will not be achieved, different conservation measures, including restoration, should be considered.



Ecological recovery, classification and management of the Praia islet nature reserve (Azores, Portugal)



Pedro Manuel Lopes dos Santos Raposo
(Government of Azores)

The diversity of seabirds found on the Azores Archipelago was dramatically reduced following human colonization and consequent introduction of mammals in the 15th century and reduction of breeding habitat. Praia Islet (0,12 km) remains undoubtedly one of the most important seabird colonies in the archipelago and despite its small size, this Special Protection Area is home to one of the most diverse seabird communities in the region.

Restoration of seabird breeding habitat began in 1995 and over the last two decades it has involved 1) rabbit eradication, 2) control of soil erosion, 3) native plant reintroduction, 4) vegetation control 5) lizards control 6) starling control and 7) installation of artificial nests for Common Terns (*Sterna hirundo*), Roseate Terns (*Sterna dougallii*), Madeiran Storm-Petrels (*Hydrobates castro*) and Monteiro Storm-Petrels (*Hydrobates monteiroi*).

Since instigation of conservation measures, the terns have returned to breed on the islet and in 2015 the islet had the second largest colony of Roseate Terns in Europe. Breeding was also confirmed for Sooty Tern (*Onychoprion fuscatus*) in 2014 and for Bulwer's Petrel (*Bulweria bulwerii*) in 2019.

Between 2000 and 2014, the number of Monteiro's and Madeiran Storm-Petrel's pairs breeding in the artificial nests increased by 170% and 232%, respectively. The success achieved, their results, implications and lessons, support the possibility of trying to replicate the process on other similar islets (of the Azores archipelago). Currently, the ongoing conservation, restoration and monitoring actions take place within the scope of the LIFE IP AZORES NATURA project, with a duration of nine years and a total budget of around 19 million euros.



Assessing and tackling seabird bycatch in Mediterranean MPAs: replication of good practises/experiences through Life PanPuffinus!



Paulo Lago
(SEO)

LIFE Panpuffinus project aims to protect *Puffinus yelkouan* and *Puffinus mauretanicus*, two endemic and globally threatened Mediterranean seabirds, through a transboundary collaboration for joint large-scale conservation efforts in Spain, Portugal, France, Malta and Greece. The project tackles the threat of seabird bycatch in Natura 2000 marine sites transferring knowledge and experiences between countries.

Since 2012, in Spain, SEO/BirdLife has been assessing seabird bycatch using questionnaire surveys and self-reporting logbooks, and testing mitigation measures in collaboration with the fishing sector and a network of local observers. Following the same approach in 2020-2021 more than 1000 questionnaires were done within LIFE Panpuffinus project. At the same time an important advocacy work has been done to include the results into Spanish national and regional seabird bycatch action plans and in the marine protected areas management plans.

So far, some of the mitigation measures proposed to reduce seabird bycatch have been included in the management plans of some regional natura 2000 sites, and SEO/BirdLife is lobbying to implement a collaborative approach between NGOs, authorities, and fishing sector to tackle seabird bycatch in the management plans of the national Natura 2000 marine network.





Discussion: MPA management and designation



Moderator:
Željka Rajković
(BIOM)

- 1) Both EU infringement processes and “30 by 30” process are good incentives for governments to push the designation of SPAs forward. LIFE projects are a great way to finalize Natura 2000 network through SPA designation and later management. Also, once a country joins the EU, there is funding to set up management of sites.
- 2) It is important that IBA/ SPA borders are easy to follow in the field, so that there are no ambiguities, and the enforcement can be efficient. Monitoring of the IBAs/ SPAs is an important tool to check if measures should be adapted or an IBA status revised.
- 3) While SPA designation is primarily based on scientific data, the management is the more difficult part, as it involves negotiations with other sectors, in the case of marine SPAs, primarily fisheries and tourism. Fisheries sector should be involved from the beginning of the process and co-management should be implemented, as nature conservation cannot deliver alone. Possibly, the development of offshore wind is where nature conservation and fisheries have a common ground and can work together. There are best practice examples in the EU as to the recovery of fish stocks, so fishers are more ready to cooperate. Jabuka Pit is a good example of transboundary cooperation.
- 4) Conservation measures in SPAs are obligatory, but there are still significant challenges regarding data collection in Croatia. The availability of fisheries data is also a concern, resulting in a lot of data being collected in parallel by NGOs and scientists. Bycatch mitigation measures should be promoted within fishers’ community even when no official bycatch data exists. Working closely with fishers could reveal a lot of bycatch, which is officially not recorded. Besides fisheries, the management of nautical tourism is also a big challenge in the Mediterranean.
- 5) Sustainable financing of SPA management is also a serious concern, as when a (LIFE) project finishes, there is not always enough funding to sustain the results.





Session 4a

Conservation of Audouin's gull in Central and Eastern Mediterranean





What Audouin's gulls taught us over the past 35 years?



Daniel Oro
(CEAB)

Over the last 35 years, I have coordinated the monitoring and ecological research on Audouin's gulls in Spain. Some crude numbers over these years are: 40.000+ ringed chicks, 95.000+ resights of marked birds at breeding colonies, 600.000+ counted nests with clutch size (in more than 150 breeding patches), 30.000+ measured eggs, 120+ GPS and satellite tracking individuals, 500+ hours of behavioural observations, 11 completed Ph.D. thesis, and 150+ scientific papers.

The lessons we have learned suggest the uselessness of most adaptive management approaches. The first lesson we learned was about breeding habitat: while up to the '90s, we believed that the species was a specialist in selecting remote rocky islets for breeding, we discovered that the species was using those sites as refugees. Once they colonized the Punta de la Banya, Ebro Delta, we realized that marshlands, sandy dunes with psammophilous vegetation, and saltpans were the most suitable habitat for the species. That site held up to 73% of the total world population, which represented a dramatic case of a very skewed range distribution. In recent years, gulls have colonized industrial ports, and the roofs of buildings showing high plasticity for colonizing new breeding habitats, very close to humans.

The second lesson we learned was about its feeding plasticity: while up to the 90s the species was described as a specialist preying on small pelagics at night thanks to its nocturnal vision, gulls showed their ability to exploit fishing discards from the trawler fleet. In Spain, gulls' diet showed up to 70% by biomass from discards. However, EU fishing policies are nowadays banning discard practices, and gulls will be hampered to exploit this foraging resource, although the marine ecosystem would be benefited in the long term. Further surprises are expected now that carnivores invaded many protected areas where colonial waterbirds became abundant after the legal protection of most Spanish wetlands in the late 80s, as well as the species' seeming range shift from the Mediterranean to the Atlantic.



Monitoring & conservation of Audouin's gull in Italy, during the last 26 years

(Amadesi, B., Baccetti, N., Liuzzi, C. et al.)

The presentation included:

- 1) how the monitoring is performed in Italy, describing survey methods and problems, with reference to the MSFD requirements;
- 2) the presentation of a documentary tutorial of 15' available at the link below (kindly subtitled in English by the Biom staff);
- 3) data on the population size (1200 pairs), nationally and by region, with a particular reference to the Apulian area (~200 pairs);
- 4) opposite trends are observed in different parts of Italy, with increases only in the South and marked decreases in the main range i.e. Sardinia and Tuscany;
- 5) conservation issues and threats, including ungulates;
- 6) temporary measures enforced during the breeding season, colony signaling by floats and posts, the anti-wildboar pipe;
- 7) specific designation of SPAs.

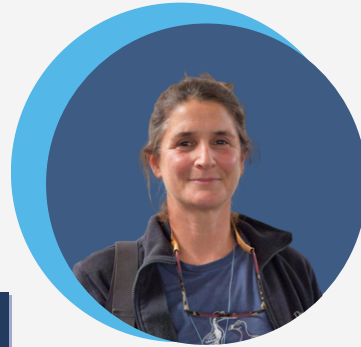
Tutorial video: <https://www.isprambiente.gov.it/it/archivio/notizie-e-novita-normative/notizie-ispra/2022/12/il-gabbiano-corso-in-sardegna>



Nicola Baccetti
(ISPRA)



Status of Audouin's gull in Greece



Danae Portolou
(HOS)

The Hellenic Ornithological Society /BirdLife Greece has been monitoring Audouin's Gulls in the Greek insular area since 1995 through numerous LIFE Nature projects, other smaller projects (2007-2013), as well as the MSFD programme (2021-23).

Two national censuses have been implemented, the first during 1997-99 (LIFE96 NAT/GR/003221) when 92 regions were surveyed of which 25 were occupied with an estimate of 750-900 breeding pairs. During the second census in 2010, 91 regions were surveyed of which 18 occupied with 350-500 pairs (LIFE 07 NAT/GR/00285).

The two censuses identified a decline of 28-33% (Birds in Europe 2) and a distribution shrinking towards the SE Aegean. Of the 69 marine IBAs identified to date in Greece, 32 are triggered for Audouin's Gulls. Currently, through the implementation of the MSFD, surveys are carried out in the 24 most important regions for the species, with colonies located only in 7 and an estimate of 130 breeding pairs. Compared to the same regions surveyed during the two national censuses this estimate represents a 59% decline and the loss of important breeding colonies. The species continues to breed mainly on uninhabited islets, while colony size (max 40 breeding pairs), clutch size and productivity have all declined.

Status of Audouin's gull in Croatia



Dries Engelen
(BIOM)

The Audouin's gull is considered endangered in Croatia with some 25-50 breeding pairs. It is mostly restricted to the Lastovo archipelago, but breeding also occurs around Mljet, Korčula and Pelješac.

Annual censuses in the Lastovo archipelago during LIFE Artina (2019-2022) found the species breeding on 10 islets across the different years (changing regularly). The species's breeding success varied between years and ranged from 2 to 20%. The main threat observed was competition with and predation by Yellow-legged gulls. The nomadic ecology of the Audouin's gull made it difficult to do targeted conservation work.

Mitigation was attempted by piercing eggs of YLG, but without much result. Furthermore, rats were permanently removed from several islets currently and historically important for the breeding of AG around Lastovo (e.g. Vlačnici). Although rats are not the main threat for the species, this activity contributes to the long-term improvement of their breeding conditions in the archipelago.



LIFE Ilhas Barreira: Conservation and management of Audouin's gull and Little Tern in South Portugal



Tânia Nascimento
(SPEA)

The project LIFE Ilhas Barreira focuses on the conservation of the Algarve Barrier Islands and the protection of its priority species and habitats.

The population of Audouin's gull breeding in the area is facing a 26% mean annual increase of breeding pairs, with currently 5393 pairs, and with a 22% increase of hatching success during the project actions. On the other hand, the number of breeding pairs of Little tern fluctuate between years, with currently 442 pairs in the region.

Conservation measures carried out aim to mitigate human disturbance with the installation of warning signs, the implementation of an enclosure area on Little tern colonies and creating public awareness through nest webcams. Furthermore, the predation of eggs and chicks is mitigated by controlling rodent populations and the removal of cats.

Our current work focuses on the review of the marine boundaries of the Ria Formosa SPA, and the need to assess and revise the Audouin's gull species action plan, which currently stems from 1996. The LIFE Artina project conference provides a good opportunity to discuss this second point and to set up an international working group to start working on it.



Discussion: Future conservation efforts for Audouin's Gull in the region



Moderator:
Antonio Volcano
(BirdLife Europe)

- 1) Despite being classified as Vulnerable at European level in the last Red list Assessment, the species, overall, is not declining in its entire range; there could be less birds in Eastern Mediterranean (also potential due of the fisheries discard ban), and the distribution range is uneven. In the Western Mediterranean meta-population (Spain and Portugal), the alternative breeding sites are not so abundant and look less suitable than the once-stronghold of Ebro Delta, but when we put total numbers over time, we are not able to say that the population is decreasing (e.g., what we are seeing is more of a shift in breeding colony locations (now the main colony being the one at Deserta Island in Southern Portugal) than a real reduction in population size.
- 2) The species is very plastic (e.g., in Spain has started to breed also in industrial and urbanized habitats, such as cities, ports and industrial areas); it is extremely difficult to predict the responses of the species to environmental change; Audouin's gulls are used to change sites often (ability to easily form new colonies in suitable habitats), and they tend to go where resources are abundant. It is hoped that due to their ability to easily form new colonies in suitable habitats, the species population size will stabilize.
- 3) Future projects: simultaneous counts/census at the Mediterranean level and tracking to inform the designation and creation of a comprehensive network of marine nature reserves and protected areas both on land (colonies) and at-sea.
- 4) Main threats to tackle and monitor: bycatch, depletion of food resources, disturbance and habitat alteration at breeding grounds. Indirectly the species is also affected by poor waste management (e.g. open landfills) as this increases the number of Yellow-legged Gulls which is both a competitor to and predator of the species. Lastly, it is important to monitor and protect wintering grounds, especially in West Africa.
- 5) Revision of the 1996 Species Action Plan is underway with experts involved from all relevant countries across the species range.



Session 4b
Marine Toolkit



Marine Toolkit Workshop



Moderator:
Jonathan Handley
(BirdLife International)

Workshop participants delivered on two primary areas for seabird and marine conservation more broadly in the Mediterranean and globally. Firstly, for the globally threatened Yelkouan Sheawater (*Puffinus yelkouan*) which breeds in the Mediterranean, participants reviewed the current network of globally important sites (Important Bird and Biodiversity Areas, IBAs) identified for this species. Using contemporary data collected by the participants, the current network of sites was then critically evaluated to ascertain where additional globally important sites might be identified or where existing sites could be refined. The final outcome of this review process will ensure that a contemporary network of globally important sites is identified for the threatened Yelkouan Sheawater. These are the sites where conservation efforts may be most essential to ensure the persistence of this species and the biodiversity it depends upon.

The second focus of the workshop saw participants testing an online toolkit (The Marine Toolkit) being designed to facilitate knowledge transfer of complex analytical techniques to conservation practitioners by providing best practice approaches for identifying important sites, and guidance about using complex data for achieving conservation solutions that act across national, regional and international scales. Participants each used data relative to their country of work and stepped through an online tutorial; providing critical feedback about how this global tool can be improved for a broader audience. Key opportunities for improvements to the toolkit realized in the workshop included how to make a global database for data curation more accessible, guidance on fieldwork protocols with respect to animal-tracking data, methods for improved data curation from field studies, aligning data to common data standards, which infographics should be developed to help explain key concepts to users, improvements to data-visualisations, and tailoring of the final user journey depending on skill level.

Ultimately, the workshop enabled participants to further conservation efforts for a globally threatened species and significantly improve a tool that can support conservation efforts for not only seabirds, but many other taxa where animal-tracking data is playing a role in necessary decision-making.





Field trip

Photo: Vida Zrncić

Testing Modified Fishing Gear to Reduce Seabird Bycatch in Croatia



Ana Miletic
(Sunce)

In the period from April 11 to October 7, 2022, mitigation measures that include using modified fishing gear were tested with 6 fishermen to evaluate the possibility of applying these solutions in Croatia, considering the specificities of boats, gear, and fishing methods. Signal (LED) lights for set nets, additional weights for demersal longlines and hookpods (devices for releasing the hooks of pelagic longlines under the sea) were tested.

The best-rated and accepted measure by fishermen is the measure of using additional weights on demersal longlines because weights are the fastest, simplest, and easiest method to use. No additional time is spent, and it does not affect the fishing activity itself or the amount of fish caught. The weights are simply attached to the longline with a clip when the birds are active around the fishing gear. It is the cheapest method of the three that were tested in this research, and is also applicable for fishing with a pelagic longline.

The need for future use of such fishing gear (hard mitigation) in Croatia should be carefully considered, regarding the cost of the modified fishing gear used for this testing, opinions of fishermen and the fact that seabird bycatch is present, but on a small scale. Modification or improvement of fishing practices (soft mitigation) could be a more effective and cheaper solution. For measures to be effective and to ensure that they are implemented by fishermen, they should be simple, appropriate to the fishery type, cost-effective, practical, safe, and accompanied by economic or social incentives. In addition, it is important to raise the awareness of fishermen, and other key stakeholders, about seabird bycatch and their role in it.



[LIFE Artina bycatch video](#)



LIFE ARTINA PROJECT

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Special thanks go to the local community from Lastovo and stakeholders who have actively engaged with us during the project. Your commitment to the protection of our shared natural heritage and the efforts to create a sustainable future for seabirds have been inspiring.

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