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Conservation measures for dune habitat protection

Gull exclusion areas (action C2)

Project LIFE Ilhas Barreira

Faro | February | 2021

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Conservation measures for dune habitat protection – Gull exclusion areas (action C2)

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CIMA/UAlg – Centro de Investigação Marinha e Ambiental da Universidade do Algarve

CIMA/UAlg project coordination
Óscar Ferreira (CIMA, UAlg)

Technical / scientific team
Lara Talavera, Susana Costas, Óscar Ferreira, Luísa Bon de Sousa, Margarida Ramires, Ana Rita Carrasco

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Summary/Resumo

This report describes the design and implementation of gull control and exclusion areas in two zones located in the grey dunes of Barreta Island showing vegetation disturbance. Due to frequent inspections performed after their installation, the exclusion areas were modified twice to further improve their efficiency in preventing gull trespassing, trampling, occupation, and nesting.

The installation of control and exclusion areas in Barreta Island is part of the conservation measures previously defined in the project proposal. Their location was defined after the analysis provided in the deliverable A2 (LIFE Ilhas Barreira, 2020). The control and exclusion areas will allow to compare locations with and without gull pressure on the grey dunes at Barreta Island and to assess their evolution and recovery.

Este relatório descreve o desenho e implementação de áreas de controlo e exclusão de gaivotas em dois locais das dunas cinzentas da Ilha Barreta que apresentavam degradação da vegetação. Após frequentes inspeções realizadas depois da sua instalação, as áreas de exclusão foram modificadas por duas vezes para melhorar ainda mais a sua eficiência em evitar a invasão, pisoteio, ocupação e nidificação por gaivotas.

A instalação de áreas de controlo e exclusão na Ilha Barreta foram medidas de conservação previamente definidas na proposta de projeto e a sua localização foi definida após a análise expressa no deliverable A2 (LIFE Ilhas Barreira, 2020). Estas áreas de controlo permitirão comparar locais com e sem pressão das gaivotas nas dunas cinzentas da Ilha Barreta e avaliar a sua evolução e recuperação.

1 | Introduction

In 2008, the Portuguese Marine IBA (Important Bird Area) inventory (published by SPEA), identified a marine IBA at Ria Formosa. The existing baseline information proved to be insufficient, and this IBA never became legally binding. Between 2012 and 2015, Portugal made an important step towards the implementation of the Natura 2000 network in the marine environment, by establishing new marine SPAs (Special Protection Areas). Nevertheless, this process was not aimed towards the conservation of Audouin's Gull (*L. audouinii)*. At the time, the breeding information and distribution data for this species in Portugal was considered insufficient. Since then, further work has been developed and new insights indicate that, nowadays, there is a stable meta-population breeding in the uninhabited Barreta Island. Climate change and derived sea-level rise are global-scale problems threatening most of the coastal habitats, among which the barrier islands are not an exception and, as holders of unique ecosystems, they need urgent attention. These islands are also threatened by human pressure and it is urgent to implement measures that can reduce these threats. LIFE Ilhas Barreira aims to characterize the local ecological requirements and conservation threats of the target species and habitats in Ria Formosa, and particularly at Barreta Island, to implement effective conservation actions. This project represents an important step towards the present and future sustainable management of the SPA at Ria Formosa.

1.1 Project objectives

The main project objectives are to:

1. Understand the main threats to the target species (Audouin's Gull and Little Tern *S. albifrons*) and habitats, both on land and at sea;
2. Recover the Grey Dunes habitat and assess the effect of gulls on this habitat;
3. Promote the sustainable use of the Ria Formosa barrier islands and marine area, focusing on fisheries and tourism;
4. Evaluate the effect of climate change and other drivers of change on the eco-morphology of the barrier islands system;
5. Understand the breeding ecology, foraging behaviour and spatial distribution of Audouin's Gull and Little Tern;
6. Evaluate and mitigate bycatch impacts on seabirds and assess the future effect of the discard ban policy on Audouin's Gull local population, engaging the local fisherman community;
7. Evaluate possible competitive interactions and predation from Yellow legged-gull (*L. michahellis)* towards the target species;
8. Protect breeding areas for Audouin's Gull and Little Tern (restricting tourist access, controlling predators, increasing surveillance and implementing environmental awareness campaigns);
9. Review the marine IBA limits and update the marine area of the SPA.

1.2 Deliverable context and objectives within the project

The Action C2 deliverable: ‘’Conservation measures for dune habitat protection’’, was planned to promote the conservation status or health of fixed dunes with herbaceous vegetation (i.e. “grey dunes”; priority habitat 2130), contributing to achieve the project objectives 2, 3, and 4 and minimise threats 7 and 8. The background information needed to define the conservation measures for action C2 (and C1) was provided in the deliverable A2 (LIFE Ilhas Barreira, 2020), where the dune critical areas, in terms of conservation, were analysed and defined, and the causes of dune disturbance were identified, namely pressure from Yellow-legged and Audouin’s Gull colonies and to a much minor extent, human infrastructures and activities.

1.3 Approach

The installation of control and exclusion areas were performed in two distinct zones within in the grey dunes of Barreta Island, where the analysis of aerial photographs revealed high levels of dune vegetation disturbance (Figure 1). The location and characteristics of these control and exclusion areas were decided based on a field recognition survey performed over the zones previously identified in the aerial photographs and following ecomorphological criteria. After the selection of the locations, an initial configuration was designed, and materials chosen for the implementation of the areas. The latter had to be modified twice after successive visits confirmed they inefficiency in avoiding gull tresspassing, trampling, and even nesting, for the first setup, and the possibility of bird trapping for the second one.

Additionally, this action includes conservation measures to improve and restore the existing walkways network present in Barreta Island, which will be further described in another deliverable.

Figure 1 | Aerial view of two large areas (western and eastern) showing disturbed vegetation in the grey dunes at Barreta Island.

2 | Objectives of Action C2

This action is planned to conduct a set of measures to promote the conservation of the grey dune habitat (Habitat 2130 - Fixed dunes with herbaceous vegetation), contributing to achieve the following objectives of the project:

- Recover the grey dunes habitat and assess the effect of gulls on this habitat (objective 2);
- Promote the sustainable use of the Ria Formosa barrier islands and marine area, focusing on fisheries and tourism (objective 3);
- Evaluate the effect of climate change and other drivers of change on the eco-morphology of the barrier islands system (objective 4),

and minimise threats identified in the project proposal:

- Insufficient knowledge about the effects of recent Gull colonization at Barreta island (threat 7), and
- Dune and shoreline decrease in some barrier islands, including the evaluation of shoreline trends (retreat and/or progradation) (threat 8).

3 | Gull exclusion and control areas

3.1 Aerial photo analysis and field recognition of disturbed dune areas

Several orthophotos, Google Earth images and drone footage were used to identify the location and determine the initiation time of the grey dune degradation in Barreta Island previously identified thorugh *in situ* visits. The disturbance was localised in two main areas located along the higher dune ridges in the central part of the barrier (highlighted with vertical grey rectangles in Figure 2), coinciding with the distribution of the Yellow-legged and Audouin's Gull colonies (Deliverable A2; LIFE Ilhas Barreira, 2020). These areas clearly showed a significant increase in the cover of sand (Figure 2b and c) that resulted in a shift of the dune vegetation state from optimal coverage in 2008 to disturbed in 2017 (Figure 2d), based on the disturbance index developed in Deliverable A2.

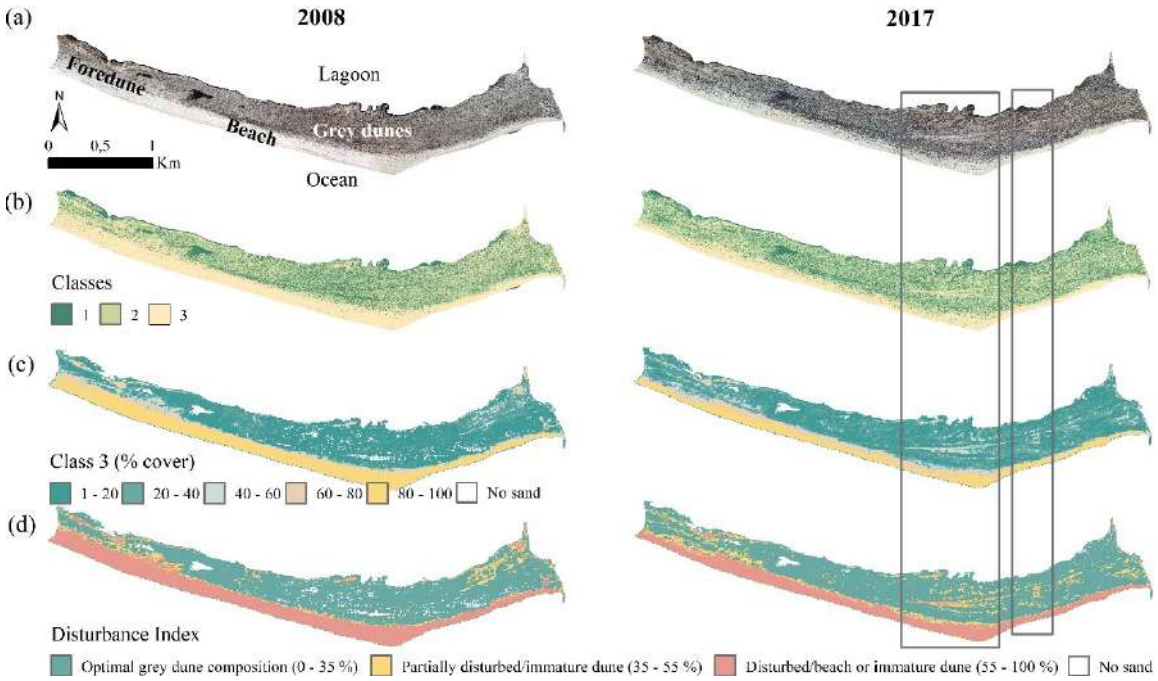

Figure 2 | Application of the disturbance index in Barreta Island (2008 and 2017). (a) 2008 orthophoto and 2017 Google Earth image, (b) Classified imagery, (c) Distribution in percentage of Class, and (d) Computed disturbance indexes. The grey vertical rectangles highlight the larger areas in which vegetation was found under disturbance in 2017 with respect to 2008.

3.2 Location

On Februay 2020 a field recognition survey was performed *in situ* in both degraded areas in order to select the most suitable locations for the installation of the gull exclusion and control areas. The locations chosen were within the identified disturbed areas, but easily accessible from the main wooden walkway (Figure 3a). The locations were also chosen based on ecogeomorphological

criteria and thus both extend from the crest to the trough of the highest dune ridge on the island (Figure 3b). This way the areas were similar in terms of morphology for comparison of disturbance/recovery between the western and eastern degraded areas. Furthermore, exclusion and control areas were also similar in size and spatial coverage to effectively assess how the presence (absence) of Gulls influences the vegetation disturbance (recovery), and so both presented absent or scarce vegetation (Figure 3c and d).

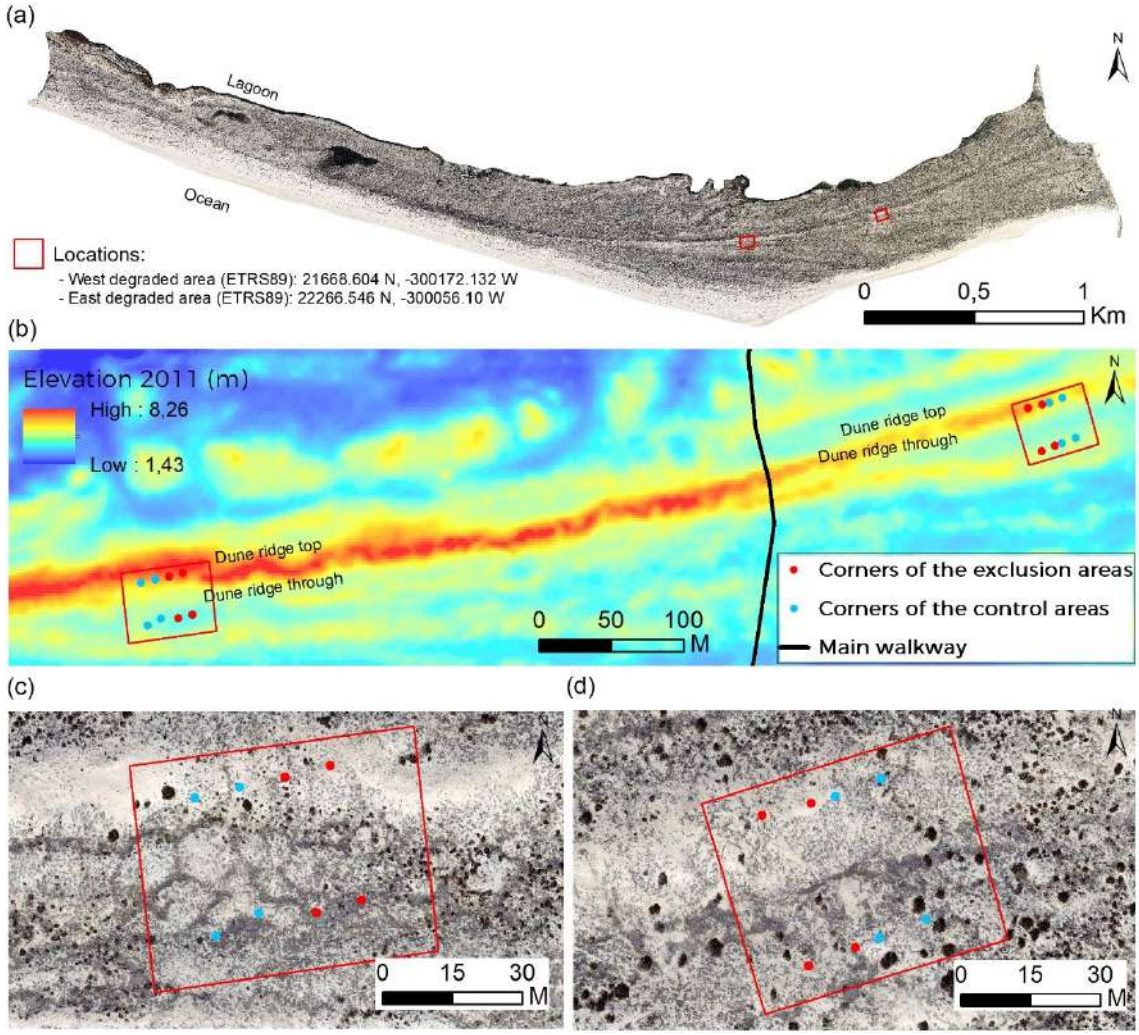

Figure 3 | (a) Location of the western and eastern degraded areas (image from 2014), (b) Corners of both the exclusion and control areas (blue and red dots, respectively) extending from the dune top to the dune trough (background image obtained from the Lidar 2011, DGT), (c) vegetation within the western exclusion and control areas (image from 2019), and (d) vegetation within the eastern exclusion and control areas (image from 2019).

3.3 Design and implementation

3.3.1 Structure

The exclusion and control areas were set on February 2020 and consisted in two rectangles of 10 (longshore) x 30 (cross-shore) m^2 separated by a distance of 5 m approximately. The same design was used in both the weastern and eastern degraded zones. The control areas were marked using four iron rods (1 m length and 2 cm diameter, approximately) spiked on the ground in each one of the four corners (see the corners represented by blue dots in Figure 3c and d) whereas seventy-seven of them were used for the exclusion areas and were spiked forming a grid with inner rectangles of 1 m x 5 m. All the iron rods were spiked on the ground with the help of a hammer and their tips were covered with corks for safety.

3.3.2 Configuration of the exclusion areas and materials

In order to exclude gulls from entering, nylon cords were placed along each 1x30 m transect of the grid and tied at each iron rod at an approximate height of 0.40 m from the ground (Figure 4). In addition, two parallel nylon cords were placed along the exclusion area perimeter (separated 0.20 m approximately). The control areas had no restrictions for gull entrance.

Figure 4 | (a) Installing the nylon cords, (b) protected iron rod using cords, (c) iron rods in the eastern exclusion area

3.4 Monitoring and readjustment

The previous exclusion areas were monitored in May 2020 (field surveys and camera footage) and while the structure remained stable, the areas proved to be inefficient in avoiding gull trespassing, trampling, occupation and even nesting (Figure 5), so they had to be redesigned.

Figure 5 | Evidences of (a) Gull tresspassing, (b) gull trampling inside the exclusion areas, and (c) gull nesting at the eastern exclusion area.

In the second design, set in September 2020, half of the exclusion area (5 x 30 m^2) was reinforced with a new thicker (but less aggressive for birds) green rubber rope that substitued the previous nylon cords to make it more visible to the gulls, while the other half (5 x 30 m^2) was covered by a green net with squares of 20 cm x 20 cm to prevent gulls tresspasing also from the top. The whole perimeter of the exclusion areas (10 x 30 m^2) was reinforced using one or two green rubber rope cords (10 x 30 m^2) to better avoid lateral gull trespassing. All the corks were also replaced by new and bigger ones.

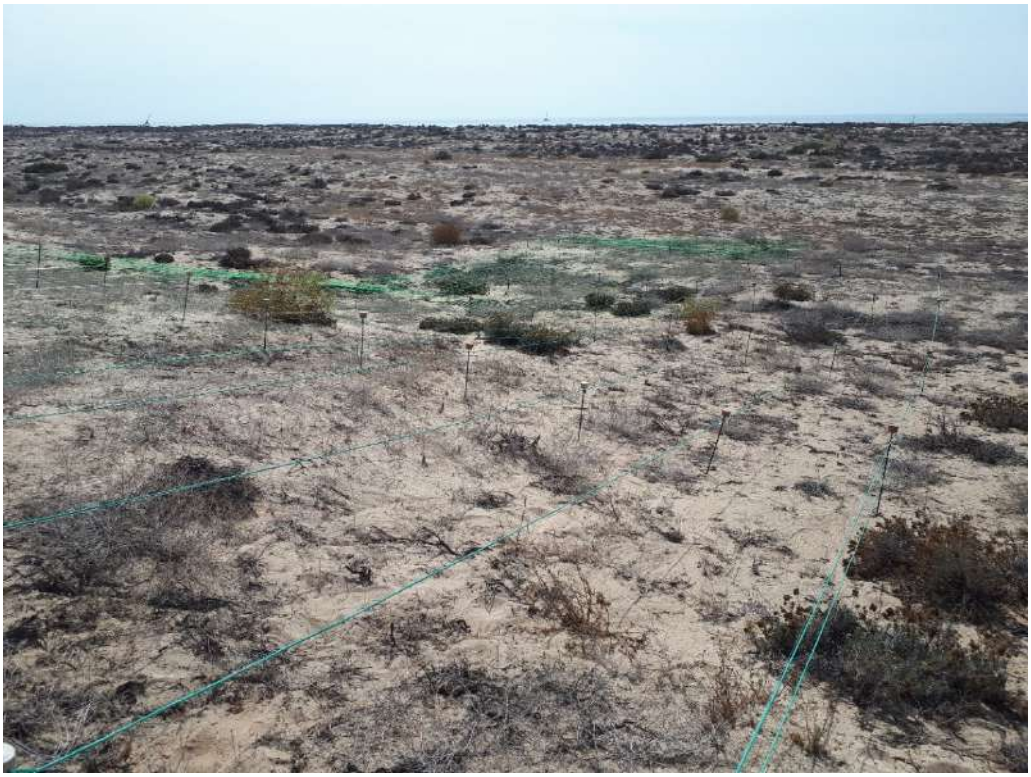

Figure 6 | Second exclusion area configuration with (a) the green net on one half (left) and the (b) green rubber rope on the (right).

The following inspection of the areas in late November 2020 revealed that the green rubber rope was limiting but not completely avoiding gull entrance in half of the exclusion area, and that the green net proved to be successfull in completely avoiding the entrance and trampling of gulls in the other half (Figure 7a). Nevertheless, a dead Alcatraz (*Larus marinus*) was found tied to the net and, thus, a new design fot the exclusion areas was implemented on December 2020. The green net was entirely removed and replaced by a black and thicker net with small squares of 5 cm x 5 cm covering an area of 5m x 10 m in the western exclusion area and an approximate area of 5 m x 15 m in the eastern one. It was fixed on the ground using several spikes aiming to minimise significantly gull accidental entrapments or capture (Figure 7b). The green rubber rope was tied along the remaining uncovered transects in that half of the exclusion area, and was also installed around the entire perimeter for reinforcement.

So far (February 2021) this third configuration has been proved efficient, as revelead by inspections performed by SPEA in late January and February 2021, with just a few spikes appearing detached from the ground.

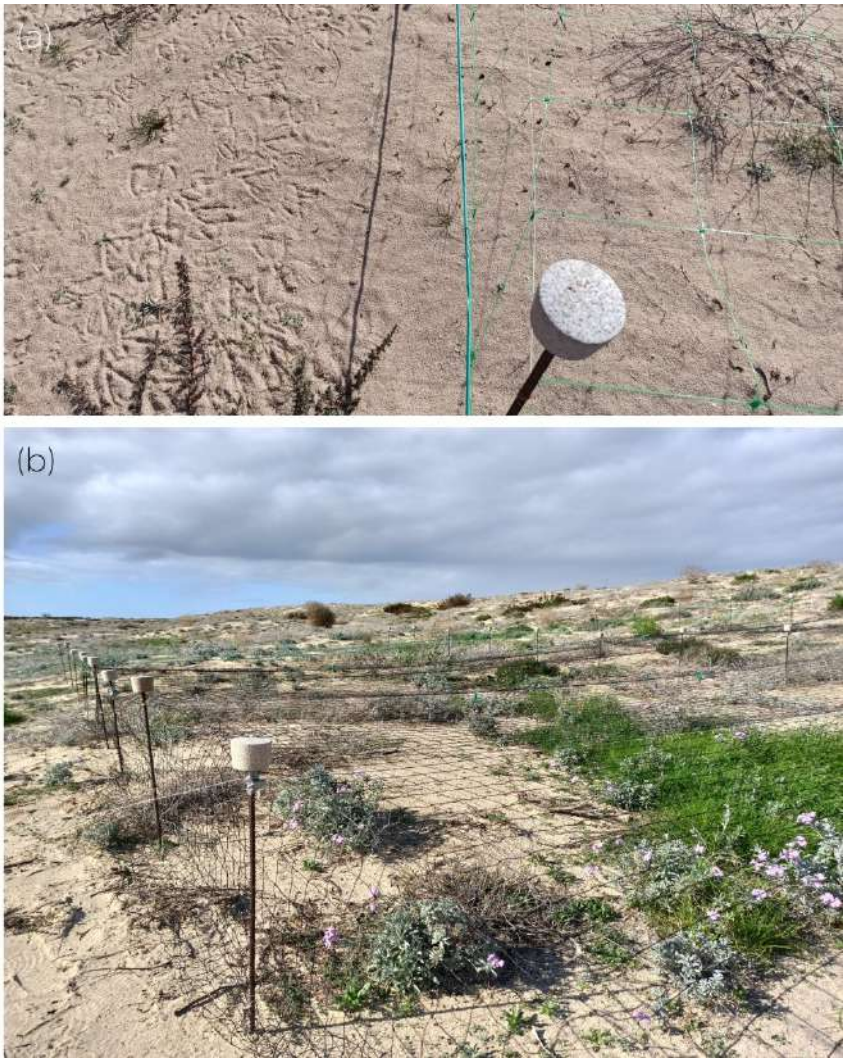

Figure 7 | (a) Green net avoiding gull trespassing and trampling, (b) Third exclusion area configuration.

The configurations and materials used in each designed and implemented exclusion area are schematized in Figure 8.

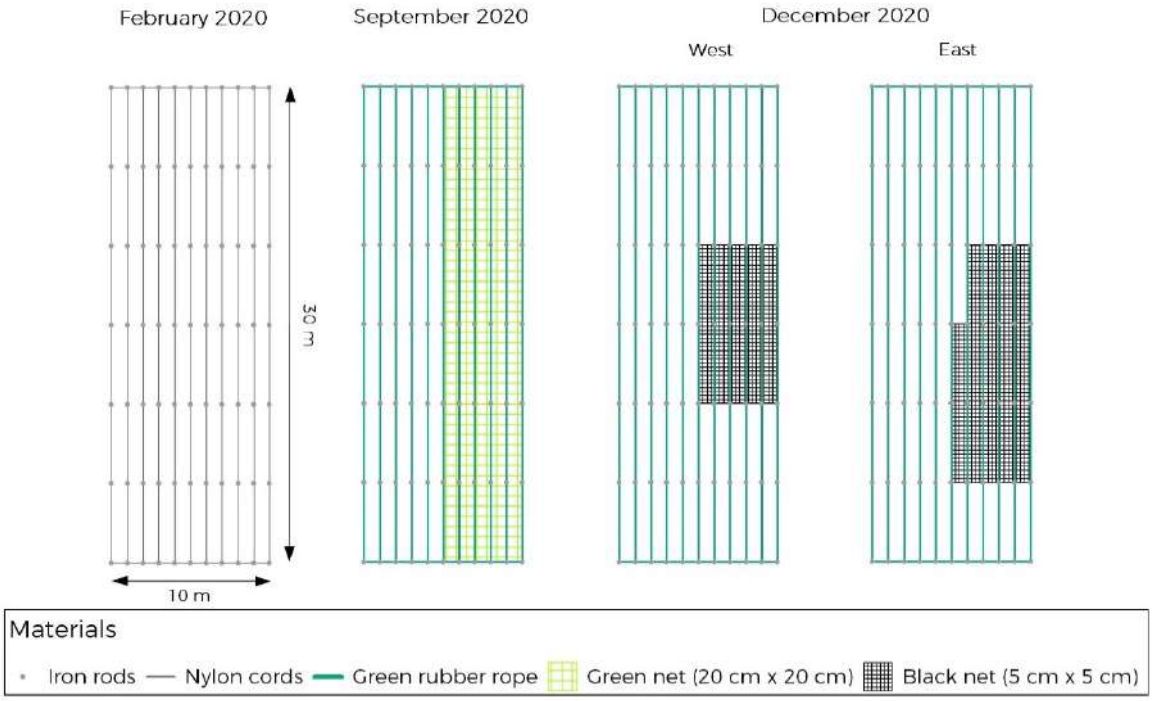

Figure 8 | Evolution of the configuration and materials of the gull exclusion areas tested in Barreta Island.

3.5 Final considerations

The exclusion areas will need constant monitoring and evaluation in order to check for their effectiveness but also for possible new accidental entrapments or captures. Furthermore, the effectiveness of this third configuration in excluding gulls will be definitely proved during the 2021 gull breading season, when there will be a much higher presence of both the Yellow Legged and Audouin Gulls in Barreta Island.

The monitoring of the exclusion areas to define their effectiveness in dune recovery is being currently executed under action D1, and several drone surveys have been already performed since September 2020 and every three months.

REFERENCES

LIFE Ilhas Barreira (2020). Mapping and health assessment of grey dune habitat in Barreta Island, Deliverable A2, 50 pages.