(Projects funded under the Call 2014 onwards must use this format)

LIFE Project Number

LIFE NAT/ES/ 000184

Final Report

Covering the project activities from 01/09/2018 to 30/09/2022

Reporting Date[1]

16/01/2023

LIFE PROJECT NAME or Acronym

LIFE SALINAS

Data Project

Project location:	San Pedro del Pinatar (Región de Murcia, Spain)
Project start date:	01/09/2018
Project end date:	30/09/2022 **Extension date:** N/A
Total budget:	€ 1,790,845
EU contribution:	€ 1,002,618
(%) of eligible costs:	75

Data Beneficiary

Name Beneficiary:	Salinera Española, S.A. – Sucursal San Pedro del Pinatar
Contact person:	Mr. Gustavo Ballesteros
Postal address:	C/Salinas Marítimas s/n, 30740
Telephone:	+34 620504342
E-mail:	Gabp1@um.es
Project Website:	https://lifesalinas.es/

[1] Include the reporting date as foreseen in part C2 of Annex II of the Grant Agreement

This table comprises an essential part of the report and should be filled in before submission

Please note that the evaluation of your report may only commence if the package complies with all the elements in this receivability check. The evaluation will be stopped if any obligatory elements are missing.

Package completeness and correctness check	
Obligatory elements	**✓ or N/A**
Technical report	
The correct latest template for the type of project (e.g. traditional) has been followed and all sections have been filled in, in English *In electronic version only*	✓
Index of deliverables with short description annexed, in English *In electronic version only*	✓
Mid-term report: Deliverables due in the reporting period (from project start) annexed Final report: Deliverables not already submitted with the MTR annexed including the Layman's report and after-LIFE plan Deliverables in language(s) other than English include a summary in English *In electronic version only*	✓
Financial report	
The reporting period in the financial report (consolidated financial statement **and** financial statement of each Individual Beneficiary) is the same as in the technical report with the exception of any terminated beneficiary for which the end period should be the date of the termination.	✓
Consolidated Financial Statement with all 5 forms duly filled in and signed and dated *Electronically Q-signed or if paper submission signed and dated originals* and in electronic version (pdfs of signed sheets + full Excel file)*	✓
Financial Statement(s) of the Coordinating Beneficiary, of each Associated Beneficiary and of each affiliate (if involved), with all forms duly filled in (signed and dated). The Financial Statement(s) of Beneficiaries with affiliate(s) include the total cost of each affiliate in 1 line per cost category. *In electronic version (pdfs of signed sheets + full Excel files) + in the case of the Final report the overall summary forms of each beneficiary electronically Q-signed or if paper submission, signed and dated originals**	✓
Amounts, names and other data (e.g. bank account) are correct and consistent with the Grant Agreement / across the different forms (e.g. figures from the individual statements are the same as those reported in the consolidated statement)	✓
Mid-term report (for all projects except Ips): the threshold for the second pre-financing payment has been reached	N/A
Beneficiary's certificate for Durable Goods included (if required, i.e. beneficiaries claiming 100% cost for durable goods) *Electronically Q-signed or if paper submission signed and dated originals* and in electronic version (pdfs of signed sheets)*	N/A
Certificate on financial statements (if required, i.e. for beneficiaries with EU contribution ≥750,000 € in the budget) *Electronically Q-signed or if paper submission signed original and in electronic version (pdf)*	N/A
Other checks	
Additional information / clarifications and supporting documents requested in previous letters from the Agency (unless already submitted or not yet due) *In electronic version only*	✓
This table, page 2 of the Mid-term / Final report, is completed – each tick box is filled in *In electronic version only*	✓

**signature by a legal or statutory representative of the beneficiary / affiliate concerned*

1. Table of contents

2. List of key-words and abbreviations

ABs	Associated Beneficiaries
ANSE	Asociación de Naturalistas del Sureste (Association of Naturalists of the Southeast)
CB	Coordinating Beneficiary
DGMN	Dirección General de Medio Natural (General Directorate for the Environment, Autonomous Community of Murcia Region)
GA	Grant Agreement
KOM	Kick-off meeting
MDA	Mae d'agua
Salinera	Salinera Española S.A.
San Pedro	Local Authority in San Pedro del Pinatar municipality
UMU	University of Murcia
BOE	Official State Gazette
TBC	Workers for the Benefit of the Community

3. Executive Summary

The Project LIFE Salinas can be considered as an outstanding example of sustainable development. It improves the conservation of priority wildlife species and habitats in the European Union and enhances the value of ecosystem services whereas increases the production and quality of salt produced in protected salt marshes.

A summary of the main results achieved by action are provided below:

Action A1: 5 technical documents were drafted for the conservation actions, which helped to obtain the necessary authorisations.
Action A2: a Land Stewardship agreement was signed between Salinera and ANSE for the 4 years of the Project, and 10 additional years when it ends.
Action C1: Construction of 1,850 m salt levees. It has been used in 2022 by 240 pairs of Audouin's gull, a species whose conservation is one of the main objectives of the LIFE SALINAS project, and other bird species included in Annex I of the Birds Directive (2009/147/EC). The start of this action was delayed due to flooding caused by annual torrential storms.
Action C2: the "Coterillo" pond has been connected to the saline circuit. A water inlet channel and an outlet channel have been adapted with a system of floodgates to control water levels and maintain salinity between 40-90 grams/litre. The start of this action was delayed due to the prioritisation of Action C1 after the annual torrential storms.
Action C3: fencing of more than 800 linear metres (760 initially planned) and 2,500 m of sand collectors have been installed, part of them had to be repaired after the storms. In addition, 572 m of *Posidonia oceanica* banquettes have been deposited to maintain the dune system.
Action C4: Replanting with native species of 3 ha in the area of Action C3. Collection of plant material and sowing in a nursery (20,000 seedlings). More than 1,000 seedlings were given by the Autonomous Community. Delays: Loss of plant due to flooding of the nursery on 2 occasions, which required an additional effort from the staff.
Action C5: a total of 242 m^3 and 68.16 tonnes of invasive alien species have been removed. This action ended later than expected due to the prioritisation of resolving the damage caused by the annual torrential storms in action C3 and the need to use the plants for action C4.
Action D1: the new levees (C1) has been found to provide habitat for 240 pairs of *Ichthyaetus audouinii*, 146 pairs of *Sternula albifrons*, 63 pairs of *Recurvirostra avosetta*, 2 pairs of Himantopus himantopus, 7 Pairs of *Charadrius alexandrinus*, 3 pairs of *Burhinus oedicnemus* and a colony of *Phoenicopterus ruber* of up to 250 specimens (in 2022). In addition, macroinvertebrate population have improved.
Action D2: The study of the evolution of the dune cordon has estimated an increase of 33.2 cm in the dunes due to the installation of sand collectors.
Action D3: Analysis of a DPSIR, analysing the PORN, PRUG, PGI Mar Menor and PGI Franja litoral sumergida, with a high level of coherence in the project proposals. Carrying out of 40 surveys of stakeholders to evaluate current perception and proposed solutions. In order to assess the condition of the plant material, 400 seedlings of 19 species were characterised, with measurements taken on 11 attributes. 9 plots were selected to study the vegetation cover.

Action D4: This action was delayed due to the removal of IAS in the control plots. 18 plots were established, two of which were lost and re-established. The results show that *Agave americana* has been removed in 60% of the sampling plots and *Carpobrotus* has been eradicated in all plots. Other species such as *Aeonium*, *Myoporum* or *Eucalyptus* were eliminated. In addition, changes in the chemical properties of the soil were analysed.
Action D5: study on the increase in salt production and on the economic and social impact on tourism through surveys (2,610 interviews). The impact of the actions on visitor numbers has been monitored by conducting two monthly counts. In 2022, the Park received an estimated 343,000 people. A study of the ecosystem services provided by the Park based on the CICES (Common International Classification of Ecosystem Services) methodology has been carried out, without being initially planned. This international classification has described 90 services that ecosystems can offer, of which the Regional Park offers 32.
Action D6: The progress of the Project actions has been monitored by updating the values of KPIs in 2020 and at the end of the Project with the final results obtained in 2022.
Action E1: A) 300 environmental education activities with more than 4000 participants. The start of the campaign was delayed due to budgetary problems. B) Organization of 1 training course with the participation of 6 Environmental Agents. 4 courses with the participation of 24 Salinera employees. C) 58 volunteer sessions with 1.344 people. E1d) Website created on 12/02/2019. Between February 2019 and September 2022, 61,041 visits were registered. E) Edited informative material: 1500 brochures, 4 Roll-ups, 600 notebooks, 1 Photocall, 500 posters, 1,000 stickers, 800 T-shirts, 500 caps, 750 pens, 500 didactic notebooks, 2,000 bookmarks, 2,000 salt shakers, 500 cloth bag and 5 online digital games. F) The San Pedro del Pinatar City Council set up 5 interpretive panels. G) The Layman report has been published.
Action E2: E2a) Opening ceremony of the project on 2/02/2019. E2b) 2 newsletters have been updated and 2 international forums are active (coastal erosion and biodiversity in salt flats). E2c) Participation in 38 events. E2d) Participation in Greenweek was delayed until 2021, due to mobility difficulties in the EU caused by the impact of Covid19. E2e): It was decided to replace the organisation of the Wetlands Committee of the Environment Ministry by a final conference of the project to disseminate its results (8-9 September 2022, 34 attendees). E2f) 12 publications have been produced and the manuals have been produced.
Action E3: A process and methodology has been created with documentation to be provided and quality indicators to certify salt production in protected natural areas.
Action E4: A) 15. Visits to projects in Spain. B) 12 from other EU countries and 1 from China. The visit to Cabo de Gara-Níjar had to be replaced by salt flats of Ibiza.
Action F1: Signing of agreements with the partners. Drafting of 1 project management manual, 1 replicability and transferability strategy and 1 sustainability protocol in the purchase and green tender. Management of 28 authorizations to start conservation and monitoring actions. Monitoring of the work plan and objectives, rectifying deviations. Organisation of 10 meetings of the Management Committee. Supporting partners throughout the project. Coordinate the flow of information.
Action F2: Attendance at the meeting to launch LIFE projects in Brussels on 6-7/11/2018. 5 team training meetings and 3 extraordinary meetings.
Action F3: EuroVértice Consultores, S.L. carries out the financial monitoring, carrying out 1 training session on financial and administrative issues, preparation of financial reports in

December 2018, March 2019, June 2019, December 2019, April 2020, August 2020, December 2020, April 2021, August 2021, December 2021, April 2022, and September 2022, and giving support to the partners to solve doubts about financial execution and justification of expenses.

4. Introduction

General objectives:

To improve the conservation status of the Audouin's Gull and priority habitats 1510*: Mediterranean Salt Steppes (*Limonietalia*) and 2250*: Coastal Dunes with Juniperus spp. In addition, other species and habitats are favoured.

Specific objectives and expected results:

1. To increase the breeding habitat of Audouin's Gull and other water birds.

2. To improve water circulation in the Coterillo pond.

3. To stop the erosion of the dune system of the Llana beach, which improves the conservation of the priority habitat 1510*, another 10 habitats of Annex I of the Habitat Directive.

4. Controlling exotic-invasive plant species.

5. Establish a long-term land stewardship agreement between Salinera and ANSE.

6. Enhance ecosystem services and increase salt production and quality.

7. Design and implement a quality and environmental protection certificate for the salt from the Salinas, especially those included in the Natura 2000 Network.

1. Improving the breeding habitat of water birds

Increase of the breeding habitat for Larus audouinii and other water birds by 17% by building a green infrastructure with 1,800 m of new salt levees, where the sedimented substrate of heating pools is applied.

2. Connect the Coterillo pond to the salt circuit:

The recovery of biodiversity in 8.3 ha of the Coterillo pond. Connection of the pond with the saline circuite by building a green infrastructure.

3. Stop the erosion of the dunes on La Llana beach

Fencing dunes to stop the erosion of 2 ha of dunes on La Llana beach, placement of sand collectors, removal of paths, prohibited access to dunes and revegetation of degraded habitat with priority species.

4. Control of invasive alien species (IAS)

Removal of 115.5 ha of IAS from the entire dune front manually or mechanically to prevent recolonisation.

Results obtained compared to those expected

Contribution to the application, development and implementation of European nature and biodiversity policy and legislation:

With respect to the Birds Directive:

Actions C1 and C2 have increased the breeding and feeding habitat of *Larus audouinii* and are known to have favoured 4 species from Annex I of the Birds Directive with relevant populations in the EU: *Sternula albifrons, Recurvirostra avosetta, Himantopus himantopus* and *Charadrius alexandrines,* so the actions have given expected results. It should be note that 32 species listed in Annex I of the Birds Directive are present during wintering, breeding or migration in the action area, so they will also be benefited.

With regards to the Habitats Directive

It improves the conservation of 14 habitats included in Annex I to the Habitats Directive, including 2 priority ones (*): 1210, 1310, 1410, 1420, 1510*, 2110, 2210, 2230, 2250*, 2260, 92D0 (actions C1, C2, C3, C4 and C5).

The Coterillo pond has been colonised by *Aphanius iberus*, an endemic fish, catching 1638 specimens in 2022.

The risk of the Mediterranean Sea becoming flooded during storms has been reduced for salt ponds located next to colonies of Audouin's Gull, other water birds and various habitats included in Annex I of the Habitats Directive.

The action on invasive alien species (Action C5) has controlled and/or eradicate the *American Agave, Carpobrotus acinaciformis, Eucalyptus camaldulensis, Nicotiana glauca* and *Myoporum acuminatum*, which compete with the native ones for habitat, and which are distributed along the dune ecosystems of the beaches of La Llana, Torre Derrida and surrounding gardens.

Quantification of environmental benefits during the project and 5 years later:

Action C1: Increase of 1,850 m of breeding habitat (50 m more than planned) for *Larus audouinii* and 4 other waterbird species included in Annex I of the Birds Directive. According to the proposal, this action was expected to breed 700 pairs of *Larus Audouinii* in 2022, however, 498 pairs were bred. This figure is expected to be reached within 5 years.

Action C2: It has allowed the recovery of biodiversity in the 8.3 ha of the lagoon.

Action C3: Improvement of the flood resistance, thanks to fencing of more than 800 linear metres (40 m more than planned); installation of sand collectors on 2,500 m; and 572 m of *Posidonia oceanica* banquettes have been deposited to maintain the dune system.

Action C4: The repopulation of 3 ha on Llana beach (1 ha more than planned) will fix some 20.58 Tn/year of CO2. A total of 16,361 specimens have been planted, including endangered species such as *Juniperus turbinata,* which have rooted correctly.

Action C5: 242 m^3 and 68.16 tons of invasive alien species have been eliminated, worked on the 115 ha of sandbanks provided for in the proposal.

The conservation and maintenance of all these actions are included in the After LIFE plan.

5. Administrative part

Management process

The project management has been in charge of Gustavo A. Ballesteros who has been contracted for the coordination of the project by Salinera Española since October 2018. The **project coordinator** has been supported by an external assistance (EuroVértice) that is in charge of financial issues of the project (regular update of project expenses, supervision of financial reports, checking of supporting documentation, etc.). The coordinator has a permanent contact with each AB to monitor the technical implementation of project actions. Each AB has a contact person who is responsible for the project in each organization. Besides, a responsible for administrative and financial issues can also exist (Table 1).

Table 1. Key people at LIFE SALINAS project

Partner	Technical contacts	Administrative contacts
Salinera	Gustavo A. Ballesteros Julio Fernández	Carlos Alarcón
ANSE	Jorge Sánchez Balibrea	Montse Rompao
San Pedro	Eva Pagán	Eva Pagán
UMU	Francisco Belmonte	Silvia Garrido
MDA	Renato Neves	Renato Neves
DGMN	María Monteagudo	Marisa Ballesta

Partners have met regularly in **coordination meetings** to inform about the progress of actions and comment and take agreed decisions about possible deviations.

On 18/09/2018 took place the Kick off meeting of the project. Main points addressed were the revision of budget, actions and responsibilities of each partner and the management process to be followed during this LIFE project. The administrative and financial rules of the LIFE Programme were explained by EuroVértice to the CB and all the ABs, following the recommendations given in the LIFE17 KOM for coordinating beneficiaries. Partners had the opportunity to know each other and to start the planning of implementation of preliminary actions. Since the start of the project, 10 coordination meetings have been held in Salinera's headquarters in San Pedro del Pinatar. Additionally, technical meetings to discuss actions on the ground have been also done on the motion of some partner, as well as meetings of the coordination team (including the project coordinator, the external assistance and Salinera).

The project coordinator has created a Google Drive folder where partners can share the project documentation (proposal, approved budget, deliverables, partnership agreements, etc.). Each partner has also an individual folder where they should regularly upload the financial documentation that supports the expenditures declared in their financial reports.

Regarding the **partnership agreements,** they were signed between Salinera Española as CB and each AB (DGMN, ANSE, San Pedro and UMU) at the beginning of the project (during July, August and September 2018). The partnership agreements set the responsibilities of each part regarding the implementation of project actions, obligations derived from the Grant Agreement and the procedures to be followed for a correct implementation of the project.

These partnership agreements were reviewed by the external monitor of the project and, as a result, an addendum was included in 2019 to modify dispositions number 4 and 6 regarding the common obligations of the CB and ABs, and the functions and obligations of the CB, to comply with the article II.2.1 of the Regulation of the LIFE Programme for the period 2014-2020.

Communication with the EASME and Monitoring team

The coordination team maintain a fluid communication via email with the monitoring team, being a great support to guide the technical and financial implementation of the project according to the rules of the LIFE Programme.

The project has received the monitor on 5 times: 14/02/2019; 19/05/2020 (online meeting due to the COVID-19 pandemic); 25/05/2021; and 24/05/2022; and 25/10/2022. Afterwards, EASME has sent letters to request additional explanations about some technical and administrative issues (Ref. Ares(2020)3336925 – 26/06/2020; Ref. Ares(2019)1293324 – 26/02/2019; Ref.Ares(2020)7055787; Ref.Ares (2021)4157284; Ref. Ares (2022)4579400). Agendas and minutes of meetings are available attached in the 02 Technical Annex (Action F2_Coordination meetings).

In general, the project has not suffered any important deviation. The COVID 19 pandemic and storms "DANA" and "Gloria" have caused delays in some conservation actions. Action C2 was completed within the buffer time addressed in the proposal (30/11/2020). The major part of C4 was done on time, but planting continued until February 2022. Action C5 is the action with the longest delay, finishing 7 months later than the buffer period. This was due to prioritisation to finish other actions (C3 and C4).

6. Technical part

6.1 Technical progress, per Action

A1. Technical projects of conservation actions

✓ **Completed action**

Foreseen start date: 01/10/2018	Foreseen end date: 30/06/2019
Actual start date: 01/10/2018	Actual end date: 30/07/2019

Participants and responsibilities

Salinera: writing projects for actions C1, C2. ANSE: writing projects actions C3, C4, C5.

Description of activities undertaken and quantified outputs:

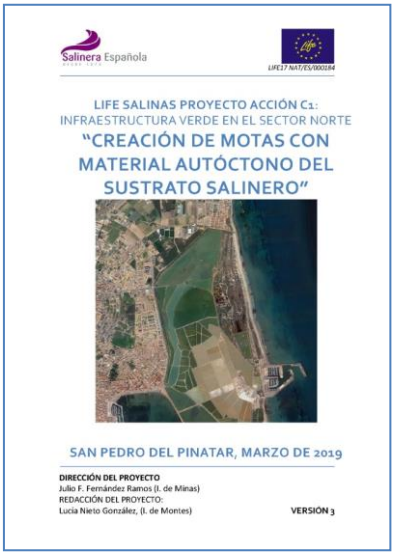
Technical documents or projects for the implementation of conservation actions, integrated in actions C. 1, C. 2, C. 3, C. 4 and C. 5, were drafted between November 2018 and June 2019. This work was outsourced to specialized companies.

These documents were drawn up after a previous collection of field data, adjusting and specifying the actions in the office, in order to optimize resources and establish exactly how they will be carried out, as well as reflecting the responsibility and traceability of the work to be carried out.

The documents are accompanied by the corresponding planimetry and elements necessary to specify the actions and define their modus operandi, and the corresponding health and safety studies. The technical documents or projects implementing actions C.1, C.2, C.3, C.4 and C.5 were as follows:

Salinera:

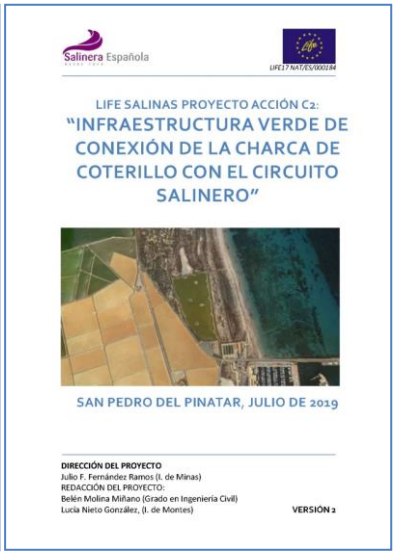
- Project for the implementation of Action C1: "Green infrastructure: adaptation of flecks with native material from the salt substrate".
- Project for the implementation of Action C.2: "Green infrastructure: connection of the Coterillo pond with the salt circuit".


Salinera Española

LIFE SALINAS PROYECTO ACCIÓN C1:
INFRAESTRUCTURA VERDE EN EL SECTOR NORTE
"CREACIÓN DE MOTAS CON MATERIAL AUTÓCTONO DEL SUSTRATO SALINERO"

SAN PEDRO DEL PINATAR, MARZO DE 2019

DIRECCIÓN DEL PROYECTO
Julio F. Fernández Ramos (I. de Minas)
REDACCIÓN DEL PROYECTO:
Lucía Nieto González, (I. de Montes)
VERSIÓN 3


Salinera Española

LIFE SALINAS PROYECTO ACCIÓN C2:
"INFRAESTRUCTURA VERDE DE CONEXIÓN DE LA CHARCA DE COTERILLO CON EL CIRCUITO SALINERO"

SAN PEDRO DEL PINATAR, JULIO DE 2019

DIRECCIÓN DEL PROYECTO
Julio F. Fernández Ramos (I. de Minas)
REDACCIÓN DEL PROYECTO:
Belén Molina Miñano (Grado en Ingeniería Civil)
Lucía Nieto González, (I. de Montes)
VERSIÓN 2

ANSE:

- Project for the implementation of action C3: " Stabilisation and reinforcement of the dune ecosystem of La Llana beach".
- Project for the implementation of action C.4: "Revegetation with native species in the dunes of La Llana beach".
- Project for the implementation of action C.5: " Enhancing the environmental services of priority habitats through the control of Invasive Alien Species"

Main problems encountered and solutions provided:

No problems found

Achieved results

In addition to describing how the work should be carried out, these projects have also been used to obtain the necessary authorisations from the administrations with responsibility for the management and conservation of the Salinas y Arenales de San Pedro del Pinatar Regional Park:

- San Pedro del Pinatar Local Authority.
- General Directorate for the Natural Environment of the Autonomous Community of the Region of Murcia.
- General Directorate of Coasts of the Autonomous Community of the Region of Murcia.
- Coastal demarcation in Murcia of the Ministry for Ecological Transition and Demographic Challenge.

The drafting of the projects was carried out within the time frame set out in the timetable. Important coordination work was carried out between national, regional and local administrations during the administrative processes for obtaining environmental authorisations.

Remaining results:

None.

Variations in action:

There have been no delays which have affected the normal further development of other actions.

Action evaluation

The drafting of the projects provides a description of how the work is to be carried out and is also essential for applying for the necessary authorisations from the public administrations that

are responsible for the management and conservation of the the Salinas y Arenales de San Pedro del Pinatar Regional Park.

Deliverables and milestones:

Code	Type	Name of deliverable	Deadline	Monitoring
H9	Milestone	Drafting of technical documents	31/10/2018	OK 31/10/2018

A2. Land-stewardship agreement

✓ **Completed action**

Foreseen start date: 01/10/2018	Foreseen end date: 31/12/2018
Actual start date: 01/10/2018	Actual end date: 01/02/2019

Participants and responsibilities

Salinera and ANSE.

Description of activities undertaken and quantified outputs:

Salinera and ANSE signed a Land Stewardship agreement on 25 January 2019 to facilitate the development of the conservation actions foreseen in this Project and to carry out joint conservation actions once the LIFE-Salinas Project has concluded. (See: https://lifesalinas.es/salinera-espanola-y-anse-firman-un-acuerdo-de-custodia-con-una-duracion-de-14-anos/)

Within the framework of this agreement, Salinera and ANSE are committed to close collaborate in order to achieve the objectives of the LIFE-Salinas Project, as well as to give continuity once it has been completed, especially to actions related to:

- Control of yellow-legged gull.
- Control of Invasive Alien Species.
- Biodiversity conservation, environmental volunteering and environmental education.

Salinera will contribute with financial resources and ANSE will present an annual planning of activities to be discussed with the company.

The Project was signed at the beginning of the LIFE-Salinas Project and will have a minimum validity of 10 years after the end of the LIFE-Salinas Project in October 2022, although it can be renewed for an indefinite period.

Main problems encountered and solutions provided

No problems have been encountered in the development of this action.

Achieved results

The signing of the agreement is meeting the expectations created, generating close cooperation for the implementation of conservation actions where both partners should work together (C3).

Remaining results:

None

Variations in action:

There have been no delays in the implementation of this action.

Action evaluation:

Salinera and ANSE are collaborating in the correct development of the LIFE-Salinas Project, especially there is close coordination in the execution of action C3 "stabilisation and reinforcement of the dune ecosystem of La Llana beach" which is being carried out jointly.

Deliverables and milestones:

Code	Type	Name of deliverable	Deadline	Monitoring
H13	Milestone	Land Stewardship Agreement	31/12/2018	OK 25/01/2019

C1. Construction of salt levees

✓ **Action ended**

Foreseen start date: 01/09/2019	Foreseen end date: 30/10/2021
Actual start date: 05/12/2019	Actual end date: 30/10/2021

Participants and responsibilities:

Salinera is responsible for this action.

Description of activities undertaken and quantified outputs:

The contract to construct the new salt dams was subject to an open tender procedure. The contract announcement was published in the BOE (Official State Gazette) on October 28, 2019. After evaluating the offers received, the contract for the execution of the work was signed on December 5, 2019, beginning on January 13, 2020.

The levees have been built according to the initially planned project, using medium and large-sized quarry rocks, which give consistency to the speck in the face of storms. They were transported by trucks and stacked in authorised places, where a backhoe and rotary shovel handled them. The machine moved over the speck distributing and compacting the stones, using some 12.000 m^3 of rocks.

Subsequently, the levee was filled and crowned. The salt substrate was spread over the stones, a sandy material that is the appropriate habitat for the reproduction of aquatic birds.

The section of the motte has the shape of a trapezoid with a lower base of 6 m, an upper floor of 5 m and an average height of 1,40 m (Figure 1).

Figure 1.New levee finished

Salinera completed this action on schedule, building a total of 7 sections with a total length of 1,850 m of sand dykes to separate the salt flats, 50 m more than initially planned in the project.

Table 2 contains the news published with this action.

Table 2. Publications related to Action C1

Content	Link
Start of works for the adaptation of the levee.	https://lifesalinas.es/inicio-de-las-obras-para-la-adecuacion-de-motas/
LIFE Salinas completes part of its green infrastructures to improve biodiversity	https://lifesalinas.es/el-life-salinas-finaliza-parte-de-sus-infraestructuras-verdes-para-mejorar-la-biodiversidad/
The number of breeding pairs of birds increases in the Regional Park of las Salinas y Arenales de San Pedro del Pinatar	https://murciaregioneuropea--es.insuit.net/-/aumenta-el-numero-de-parejas-de-aves-que-crian-en-el-parque-regional-de-las-salinas-y-arenales-de-san-pedro-del-pinatar

Main problems encountered and solutions provided

Due to the DANA of September, this action has accumulated a certain delay for its start (from September to December 2019). This storm had a severe impact in the Region of Murcia, with special intensity from 12/09 to 14/09/2019, causing severe damage to the salt mine infrastructure, which had to be repaired urgently. DANA also caused a delay in the start of the contracting process which was completed in early December. However, in December, the storm "Gloria" brought the work to a standstill for 20 days.

Despite these delays, the construction of the sand levees was completed within the time frame of the proposal.

Achieved results

The levees were timely built and accordingly to the technical project.

Remaining results

None

Variations in action

Despite the DANA in September and the storm in December, there have been no delays or deviations from the planned timetable in the execution of the works of this action.

Action evaluation

The news levees were used in 2022 by 240 pairs of audouin's gull (ichthyaetus audouinii), a species whose conservation is one of the main objectives of the LIFE SALINAS Project. Other bird species included in Annex I of the Birds Directive (2009/147/CE) also bred:

- 2021: 45 pairs of little terns (*Sternula albifrons*) and 22 pairs of avocets (*Recurvirostra avosetta*) (Figure 2), and the attempt to breed two pairs of pink flamingos (*Phoenicopterus ruber*).

Figure 2. Avocet's nest in the new specks.

- 2022: in addition to the 240 nesting pairs of Audouin's Gull (*Ichthyaetus audouinii*), 146 pairs of Little Terns *(Sternula albifrons*), 63 pairs of Eurasian Avocets (*Recurvirostra avosetta*), 2 pairs of Black-winged Stilts (Himantopus himantopus), 4 Pairs of Kentish Plover (*Charadrius alexandrinus*), 3 pairs of Stone Curlew (*Burhinus oedicnemus*) and a colony of Common Flamingo (*Phoenicopterus ruber*) of up to 250 specimens, which did not breed.

The monitoring of this action was carried out in Action D1.

In addition, the entire perimeter of the new salt dams has been colonized by the fartet (*Aphanius iberus*), an endemic fish included in Annex II of the Habitats Directive (92/43/CEE).

The continuity of this action after the end of the project is guaranteed, Salinera is responsible for the care and maintenance of these infrastructures.

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H25	Milestone	Adaptation of the first salt levee	29/02/2020	OK 29/02/2020

C2. Connection of "Coterillo" salt pan

✓ **Action ended**

Foreseen start date: 01/10/2019	Foreseen end date: 28/02/2020 (30/11/2020 – buffer period)
Actual start date: 06/07/2020	Actual end date: 30/11/2020

Participants and responsibilities

Salinera is responsible for constructing a green infrastructure to facilitate the connection of the Coterillo pond with the salt circuit.

Description of activities undertaken and quantified outputs:

The objective of this green infrastructure has been to provide the Coterillo pond with a water inlet and outlet that generates circulation and renewal of water with salinity values below 90 g/l. to favour the development of biodiversity.

Once the authorisation for this work was obtained, on 27 January 2020, an open recruitment process took place, the announcement of which was published in the Official State Gazette on 14 February 2020. As the criteria were not met after the deadline for contracting, the deadline for submission of tenders was extended to 23 March. After the lockdown period due to the COVID19 pandemic, the work finally began on 6 July 2020 in the area of the salt packing sheds, which corresponds to the industrial sector and does not interfere with the biological activity of the salt ponds (Figure 3).

Figure 3. Action C2´s works in the section around industrial premises.

The water inlet channel was made to coincide with the existing one and a water outlet channel was built at the other end, in order to favour the circulation of water within the pond.

At the water outlet, an underground channel has been built that crosses the existing recreational area, continuing through a section of green infrastructure on the surface until it ends in a salt pond conditioned for this purpose.

In those sections of the pond that were obstructed, sediments were removed and used to reinforce the deteriorated sections of mote that cross the Coterillo pond and that separate the water that comes from the inlet channel of the gate built for the outlet of water.

A gate system has been built at the water inlet to the pond and another at the water outlet of the pond to avoid sudden fluctuations in the level of the water sheet and avoid episodes of unexpected increase in salinity (Figure 4).

Figure 4. Coterillo pond water outlet gate

Some articles on this action can be found below:

https://lifesalinas.es/infraestructura-verde-conexion-de-la-charca-de-coterillo-con-el-circuito-salinero/

https://lifesalinas.es/reinicio-de-las-obras-en-la-charca-de-coterillo/

https://lifesalinas.es/concluyen-las-obras-en-la-charca-de-coterillo/

Main problems encountered and solutions provided

The delay in the start of Action C1 by the DANA in September and the storm "Gloria" in December 2020 affected Action C2, as it was decided to give priority to the completion of the work on Action C1, so that it would be completed within the deadline of February 2020, and not be with both works started but not completed before the water birds breeding period.

This has represented a delay in the start of implementation of Action C2. Furthermore, the Coastal Demarcation Resolution of the Ministry for Ecological Transition and Demographic Challenge authorising the work was issued on 27 January 2020. Salinera preferred to wait for

the authorisations before launching the contract announcements to ensure that the conditions of the contract reflected any additional requirements that could be included in the environmental authorisations.

This procedure also took longer than expected because there were no bids that met the conditions required in the contract announcement, so the deadline for submitting bids had to be extended, but this period also coincided with the state of alert declared in Spain as a result of the COVID-19 pandemic. Finally, the contract to start the work was signed on 25/05/2020, but this date is within the breeding and nesting period, so work in the Park is limited. The Natural Resources Management Plan of the Salinas y Arenales de San Pedro del Pinatar Regional Park only allows work to be carried out outside the industrial zone between 1st September and 28th February. In order to avoid further delays in the start of the action, it was decided to begin work on the industrial land within the Salinera facilities themselves, thus avoiding interference with the biological cycles of the Park's species.

In August 2020, the work along the industrial section inside Salinera was completed.

The resumption of the works of the Coterillo lagoon and its surroundings as of September 2020 made it possible to conclude them before the end of the buffer period of the Project in December 2020, that is, within the term established in the proposal.

Achieved results

The implementation of Action C2 was brought forward during the summer period (July-August) within the Salinera industrial area so as not to interfere with the reproduction of waterfowl. The completion of the El Coterillo reservoir works was in November 2020, within the buffer period provided for in the Project (September to December 2020).

Remaining results

None.

Variations in action

Despite the delay in its start, Action C2 was completed within the time frame foreseen in the Project, taking into account the buffer period. This deviation did not affect the development of any other action.

Action evaluation

The planned objectives have been met, as the colonisation of the aquatic vegetation and the circulation of water below 90 g/l, has allowed the recovery of the population of the endemic fish of the salt flats, the fartet (Aphanius iberus). The monitoring of this action was carried out in action D1.
Although it was not initially planned in the Project, the visit on 27 May 2019 to the LIFE NAT/02/NAT/E/8608 Project in the Natural Park of the Salinas de Santa Pola, provided interesting ideas that led us to create an island for the reproduction of waterbirds included in Annex I of the Birds Directive (2009/147/EC), which has been very successful: 16 pairs of Little Terns (Sternula albifrons), 8 pairs of Avocets (Recurvirostra avosetta), 2 pairs of Kentish Plovers (Charadrius alexandrinus) and 1 pair of Curlew (Burhinus oedicnemus) bred in 2022.

See: https://lifesalinas.es/el-fartet-vuelve-a-la-charca-de-coterillo-esta-vez-para-quedarse/

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H24	Milestone	Connection of Coterillo's pond with the salt circuit	31/12/2019	OK 30/11/2020

C3. Stabilization of dunes

✓ **Action ended**

Foreseen start date: 01/11/2019	Foreseen end date: 31/12/2020 (28/02/2021 – buffer period)
Actual start date: 01/11/2019	Actual end date: 30/06/2022

Participants and responsibilities:

ANSE: has coordinated the installation of the sand collectors and other field implementation work.
Salinera: has supported with the provision of workers, machinery and materials.
San Pedro del Pinatar City Council: has supported with the contribution of workers.
UMU: advice on the most suitable orientation for the installation of the collectors.

Description of activities undertaken and quantified outputs:

In the LIFE proposal, the work to be undertaken within the framework of this action included perimeter fencing and the installation of collectors. These actions were broadened as a result of the drafting of dunes stabilisation project (action A1), including also the deposit of *Posidonia oceanica* banquettes (like foredune) and the excavation of an existing blowout in a salt pond to provide sand for the reconstruction of the dune ridge (this last measure was not authorised by the coastal demarcation despite the consensus existing in the LIFE project team).

The timing of the actions was as follows: 1) Installation of hunting fence to protect the area and the regeneration process from human pressure 2) Deposit of *Posidonia oceanica* banquettes 3) Installation of collectors.

The hunting fence has a length of more than 800 linear metres (compared to the 760 initially planned in the technical document resulting from Action A1) and was installed for the first time in November 2019 to withstand the first eastern storm, which caused slight damage to a section that was quickly repaired. The installation proved to be more complex than initially planned, as the irregularity of the terrain (dunes) meant that a winding installation had to be installed to suit the relief. However, the fence was completely lost as a result of the Gloria storm and the regression of the dune cordon (see Main problems encountered and solutions provided) (Figure 5) forcing the removal of the old fence, the recovery of all the posts, the acquisition of a new mesh and the installation of the new fence. The fence was reinstalled in the spring of 2020 (the 500 metres were damaged). The fence is now fully operational and has effectively prevented the trampling of dune habitats. After the new installation protected by the *Posidonia oceanica* banquettes, there has been no damage despite the storms (Figure 6).

Figure 5. a) Fence knocked down after storm Gloria. b) Fence protected by Posidonia Oceanica banquettes after storm

Figure 6. Currently state of the fence

The deposit of *Posidonia oceanica* banquettes has been a notable improvement regarding the initial proposed action. In the summer of 2019, a collection of banquettes from the removal of the beaches El Mojón was carried out at the Salinera Española facilities. This collection was kept in the area until it was moved to La Llana beach. We began with the deposit of banquettes in January 2020 just before the Gloria storm, which removed all the deposited material. After the storm, the material collected was deposited on Llana beach with the participation of Salinera's machinery, without reaching the 572 linear metres planned as the material collected was exhausted. This first chain of Posidonia was reinforced by the San Pedro del Pinatar beach cleaning service during the summer of 2020, when the arrivals were moved from the "Torre Derribada" beach to "La Llana" beach. With this second action, the planned 572 metres have been completed and the previous cordon has been reinforced. The *Posidonia* cordon that protects (and feeds) the dune system was reinforced (in 2021) and maintained, with the support of the San Pedro del Pinatar City Council and Salinera Española, and with the contribution of material donated by the San Javier City Council (Figure 7). During the year 2022, the protection

of Posidonia has been maintained with banquettes from El Mojón. It was carried out by San Pedro del Pinatar City Council.

Figure 7. Foredune elaborated with Posidonia oceanica banquettes to protect the dune from the storm

For its part, the installation of sand collectors began in May 2020 and concluded in Spring-Summer 2022. The total installed length has been 2,500m, with 500 sand collectors (including reparation and rebuilding). At the beginning of the project, the collectors presented construction problems due to the low quality of the wire, which could not withstand the seawater, as well as the lack of stability, as the wind moved the sand and unearthed them. For this reason, constructive modifications were made (to give them more stability), the height and characteristics of the reeds were change and the degraded collectors were replaced. The performance and resistance of the new collectors has been much better (Figure 8).

Figure 8. a) Removal of low-quality collector that were replaced. B) Reconstruction of collector with better quality, thinner and shorter (Spring 2022)

In addition, successive storms (DANA October 2019, Gloria January 2020) brought large quantities of materials to the beaches, including driftwood (Figure 9). These elements were recovered from the beach and introduced into the dunes as a key element for the functioning of the ecosystems and as an indicator of the naturalness and good state of conservation of the dune cords. Even so, the measure has not been well received by society and part of the wooden deposits were removed by the beach cleaning service.

Figure 9. Driftwood deposited on La Llana Beach for restorations works

It would be important to make coastal managers and beach cleaning services aware of the need to integrate driftwood into the dune ecosystems; these measures have continued to be developed from time to time.

Main problems encountered and solutions provided:

Problem: The "Gloria" storm (the largest eastern storm ever recorded in the Region of Murcia and therefore a catastrophic event) meant the almost total destruction of the fence with a loss of up to 5 metres of dune cord and part of the deposited arrivals. This situation forced the recovery of the fence posts and the purchase of the metal mesh that ran parallel to the beach line. The loss of the fence allowed the entrance of people inside the fence who degraded the dune system and part of the plantations. **Solution:** Purchase new mesh, discuss among partners and relocation of the fence that was set back from its initial location. In addition, the area was protected with *Posidonia* banquettes.

Problem: The confinement decreed by the coronavirus health alarm limited the movement of personnel to the field areas. Similarly, this fact limited the number of staff from Community Benefit Works who participated in the project. **Solution:** The field work was somewhat delayed. ANSE staff was been reinforced.

Problem: The coastal demarcation in Murcia has introduced limitations to the execution of the project (excavation of the blowout) which would have provided very useful sand to recover the functionality of the dune chain. **Solution:** Reinforcing collectors and plantations. Reinforce the supply of arrivals.

Problem: There have been some problems in the supply of materials, as the sticks required for the collectors had non-standard measurements that had to be adjusted by Salinera Española personnel. In addition, some of the ponds were not of commercial quality. **Solution:** Adaptation of the material by Salinera personnel, return the material.

Problem: The use of driftwood has not been well accepted by beach users so some have been removed despite the effort made. **Solution:** Develop awareness campaigns which should be started by the public authorities.

Problem: Despite the provisions of the proposal, in the first moment, the installation of fencing and collectors have been carried out exclusively by staff of ANSE and Salinera, without the participation of staff of San Pedro City Council. **Solution**: An application was sent to the City Council with the staffing requirements, so finally the City Council staff was involved in the project's final phase, which contributed to achieving the project's objectives.

Problem: The ANSE worker suffered an accident that kept him on leave for 10 days. **Solution:** ANSE reinforced its staff to speed up the installation of the collectors.

Problems: Initial Sand collector didn´t work due to the low quality of the reeds. **Solution.** An important part of the sand collectors has been reconstructed by changing the construction system and replacing the reeds. The results in terms of functionality and resistance have improved considerably. However, they require considerable extra effort (dismantling degraded reeds and removing them, reassembling them by reinforcing the wire and increasing the number of stitching points). After the meeting between ANSE, Salinera, San Pedro City Council and the Directorate General for the Natural Environment, it was agreed to reduce the height of the new collectors, reduce their number and change the orientations.

Achieved results:

The objectives set out in the proposal have been achieved, obtaining even better results than expected with the inclusion of new tasks. There are specific actions to evaluate the results of the action in terms of erosion control and recovery of the vegetation cover.

Remaining results:

None.

Variations in action:

The action included new tasks like using *Posidonia* leaves for foredunes to protect the ecosystem and using driftwood important elements in dunes ecosystems. The action was extended until June 2022 (16 additional months) since it was necessary to rebuild sand collectors, maintain the fencing and feed the *Posidonia* barrier with more banquettes until the very end of the project.

Action evaluation:

The action is evaluated positively because the objectives have been achieved despite the various difficulties (storms, pandemic, supply problems) solved by partners' collaboration. The action has been a replicable example of dune restoration using soft techniques, mainly manual, using local materials (reed) or even considered as "waste" such as Posidonia leaves or driftwood.

Deliverables and milestones:

Milestone name	Deadline
Beginning of the installation of sand collectors in the dunes of La Llana beach.	11/2019 OK

C4. Restoration of dunes with autochthonous species

✓ **Action ended**

Foreseen start date: 01/11/2019	Foreseen end date: 31/12/2020 (28/02/2021 – buffer period)
Actual start date: 01/12/2018 (plant production)	Actual end date: February 2022

Participants and responsibilities

ANSE

Description of activities undertaken and quantified outputs:

The tasks developed in the Project have consisted of:

- *Collection of plant material for dune plants and processing seeds and propagules until they are sown in the nursery.*

Both the collection of plant material and the use of available material already collected necessary for the production of some 20,000 seedlings have been carried out throughout the project, but mainly in the first year.

- *Propagation, cultivation and hardening of seedlings in the nursery*

More than 20,000 seedlings were produced for the project in the 2019-2020 campaign (Figure 10, Figure 11). During the rest of the project, small quantities of seedlings were produced. Table 3 shows in detail the saplings produced in ANSE's nursery.

Table 3. Saplings produced in ANSE's nursery for LIFE Salinas project

Specie	Amount	Specie	Amount
Calystegia soldanella	64	*Lycium intricatum*	507
Crithmum maritimum	9.022	*Pistacia lentiscus*	305
Cyperus capitatus	458	*Sarcocornia fruticose*	564
Elymus farctus	4.028	*Scirpus holoschoenus*	1.706
Eryngium maritimum	1.346	*Sporobolus pungens*	852
Helianthemum marminorense	505		
Helichrysum decumbens	647	*Teucrium dunense*	1.625
Helichrysum stoechas	836		
Juniperus turbinata[2]	598		22.190
Juncus acutus	695		

In addition, the nursery of the Autonomous Community has ceded around 505 *Helianthemum marminorense*, 216 *Medicago marina*, *386 Pancratium maritimum* and 50 *Asparagus*

macrorrhizus. Finally, it was required to purchase *Lotus creticus* and *Juniperus turbinata* in commercial nurseries. In 2022 it was required to purchase 525 *Limonium cossonianum*.

Figure 10. Propagation of dune plant in nursery

Figure 11. Cultivation of plant dunes in ANSE's nursery in July 2019

However, it should be borne in mind that these are maximum counts, as the seedlings are prepared before planting by discarding the dead or those that do not meet an acceptable quality. Furthermore, the figures may vary slightly depending on the time of the count (inventory) and the final destination of the plant. Similarly, the two floods of the nursery reduced the availability of some species (Figure 12), as specimens were lost by immersion and the subsequent attack of fungi.

Figure 12. Volunteers during plants rescue tasks in the flooding of the nursery

The authorization of the Autonomous Community reduced the use of some species foreseen in the LIFE project proposal (e.g. *A. macrorrhizus*), leaving the final figure of seedlings at around 16,000.

Planting began in November 2019 and ended in February 2022 with a total of 16.361 plants introduced of 24 species for 44 plots in 2 hectares (Figure 13). It should be noted that the storm in January 2020 destroyed part of the dune belt, affecting the plantations in a very localised manner, except in the blowout, an area which was immediately replaced.

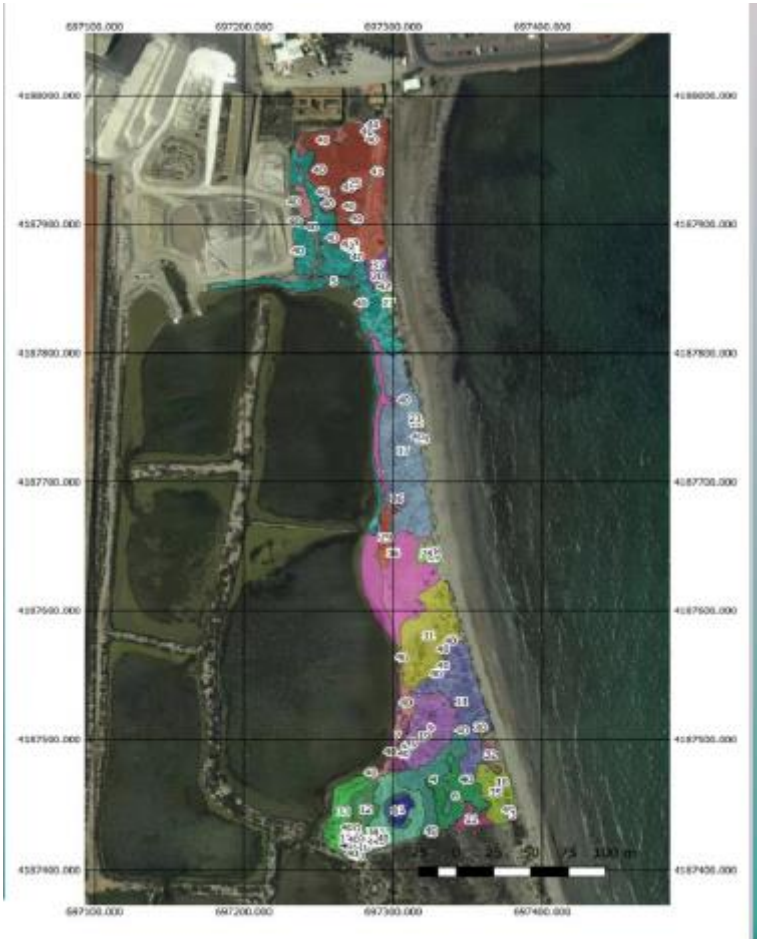


Figure 13. The 44 plots in 2 ha used for plantation design.

The following table contains the total number of plants introduced in the restoration areas (Table 4).

Table 4. Total number of introduced plants in the restoration areas

Species	Nº of seedlings	Species	Nº of seedlings
Asparagus macrorrhizus	50	***Lotus criticus***	901
Calystegia soldanella	64	***Lycium intricatum***	54
Crucianella maritima	216	***Medicago marina***	216
Cyperus capitatus	458	***Pancratium maritimum***	386

Echinophora spinosa	2	***Pistacia lentiscus***	305
Elymus farctus	4028	***Periploca angustifolia***	6
Eryngium maritimum	702	***Rhamnus lycioides***	98
Helianthemum marminorense	505	***Sarcocornia fruticose***	564
Helichrysum stoechas	836	***Scirpus holoschoenus var. romanus***	1818
Juncus acutus	695	***Sporobolus pungens***	1431
Juniperus turbinata	340	***Teucrium dunense***	1708
Limonium cossonianum	978		
TOTAL PLANTONES: 16.361			

Below are some photos of the work carried out (Figure 14, Figure 15, Figure 16).

Figure 14. Plantation tasks.

Figure 15. Holes tasks for implementation of dunes in La Llana (December 2019). Planting of seedlings in the dune area using manual techniques.

Figure 16. Juniper tree seedling growing on the dunes

Main problems encountered and solutions provided

Among the problems encountered for the development of the action have been:

Problem. The nursery was flooded twice. This required an additional effort and was part of the loss of plant production. **Solution**: Increase the effort of the staff and volunteers. Purchase of some species in commercial nurseries or assignment by the CARM.
Problem. The January storm removed the fence allowing free access to beach users in the area. This meant the trampling of part of the plantations. **Solution**: Replace the fence. Placing protectors on seedlings (unplanned expense).
Problem. The work was carried out exclusively by ANSE personnel. **Solution**: Increase the personnel effort.
Problem: Budget limitations as the project had a mistake in allocating only 4,000 euros in materials for the production of more than 20,000 seedlings. **Solution**: Increase expenditure on consumables.

Achieved results

More than 16,000 plants associated with dune areas have been planted, including highly endangered species such as *Juniperus turbinata* and *Asparagus macrorrhizus*. The drone images show the success of this action, having recovered a large area of dune vegetation thanks to the plantings and the installation of sand collectors (Figure 17, Figure 18).

Figure 17. Photographs before and after planting.

Figure 18. Planting area´s photograph before and after

Remaining results

None

Variations in action

The start of this action was brought forward. This action was prioritised in order to carry out the planting at the ideal time (autumn-winter) and to take advantage of a particularly rainy year. It was necessary to increase the cost of consumables to produce the nursery seedlings.

Action evaluation

The success of this action has been measured specifically in the monitoring action. As the drone images show, the recovery of vegetation cover and habitats of community interest in the area

has been achieved. The more than 16,000 seedlings introduced have rooted well, and endangered species such as *Juniperus turbinata* are now well established.

It is more than likely that dune restoration actions will continue near the area of the LIFE project. In this sense, nature-based solutions can be a good management measure for the sands of La Manga, a tourist area to the south of the Regional Park which suffers from serious problems of the dune ecosystem deterioration. Similarly, the dunes of "La Torre Derribada" beach (located in the Regional Park but to the north of the Port) need to be recovered and restored due to the intense trampling. In this sense, what has been learnt in the LIFE project will be very useful for the environmental recovery of the area.

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H22	Milestone	Start of revegetation actions with autochthonous species in dunes of La Llana beach	01/11/2019	OK 01/11/2019

C5. IAS control

✓ **Action ended**

Foreseen start date: 01/10/2019	Foreseen end date: 31/12/2021 (28/02/2022 – buffer period)
Actual start date: 06/06/2019	Actual end date: 30/09/2022

Participants and responsibilities

ANSE has been responsible for the development of the action. The San Pedro del Pinatar City Council, Salinera Española and the Directorate General for the Environment have supported eliminating invasive alien species.

Description of activities undertaken and quantified outputs

The work of removing invasive alien species began in June 2019 on La Llana beach with the development of voluntary activity as a graduation activity for High School students of Hellín. Fifty students attended this activity removing Carpobrotus.

Subsequently, during the summer of 2019, the removal of IAS continued in the area planned for actions C3 and C4 before their implementation. In addition to ANSE staff, volunteers participated in the activity (see action E1). In November 2019, invasive alien species removal work continued when staff were released from implementing actions C3 and C4, before fencing and planting. The tasks consisted of reinforcing and reviewing the actions carried out by the volunteers, as well as collecting the IAS removed and placing them on tarpaulins on the dunes to dry them out and prevent them from taking root. Subsequently, in January 2020, Salinera Española's machinery removed the invasive exotic vegetation accessible without stepping on the dune, specifically a large patch of *Cylindropuntia and* several *Lantana camara*.

All this plant material was stored near the La Llana beach car park, awaiting removal by an authorised manager until 2020. Subsequently, in July 2020, work began to remove IAS on La Llana beach. Work was carried out in all SECTOR 4 (the area with the greatest presence of IAS) (Figure 19), removing almost 30 Tn, which is about 90 m^3 (lots of it, dry plant material). Smaller portions of IAS were removed by the Directorate General for the Natural Environment and San Pedro del Pinatar municipality City Council, in areas that are difficult to access, these quantities could not be included in the quantification. After NEEMO monitoring visit, in May 2021, an area was detected near the Salinera facilities with an intense invasion of *Carpobrotus* and *Agave* (among others) not included in the project (SECTOR 4). That required the use of machinery and a huge volume of remaining IAS stands were extracted.

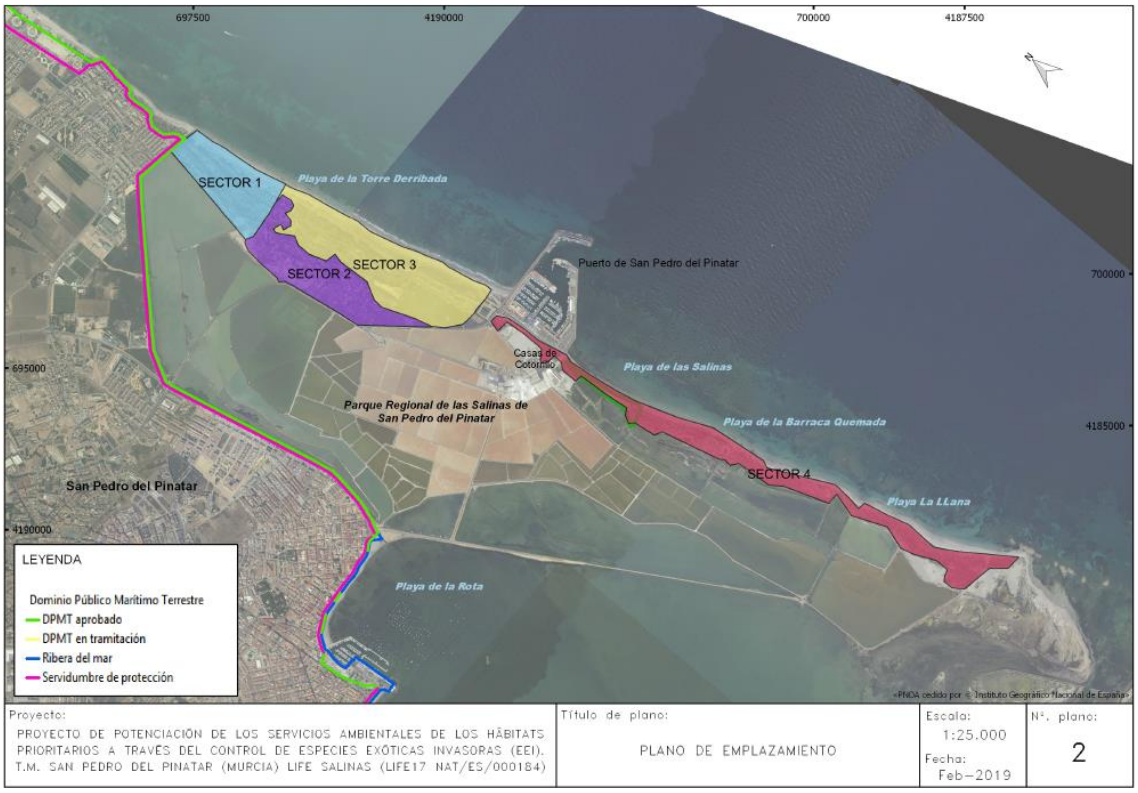


Figure 19. Location of the different sectors

Subsequently, work was carried out in SECTOR 3, in areas of difficult access where a ramp was used to remove vegetation. In SECTOR 3, following the indications of the park managers, an old fence that reduced the naturalness of the dune and was not functional was dismantled. In addition, this fence made it difficult to remove IAS.

With the removal of invasive exotic species, action has been taken in the four sectors described, and the presence of *Carpobrotus sp*, *Agave americana*, *Aeonium sp*, *Myoporum acuminatum*, *Kalanchoe, Eleagnus angustifolia Yucc*a, *Lantana camara* and *Eucalyptus camaldulensis* has been controlled. All species were removed by mechanical methods, except for *Eucalyptus (*Figure 20, Figure 21*)*, which was eliminated by injecting herbicide into the vascular system

to prevent regrowth. In some cases, it was necessary to use herbicides to remove the regrowth of *Eleagnus* and *Yucca*.

Figure 20.Banding of Eucalyptus trees prior to herbicide treatment.

Figure 21. Eucalyptus after herbicide treatment

In addition, during the last year of the project, action has also been taken in the gardens closest to the dunes.

After four years of work, a total of 242 m^3 and 68.16 tonnes of invasive alien species have been removed (Table 5). It should be noted that a large part of this weight is dry weight.

Table 5. Number of invasive alien species removed by 2021 and 2022

Year	M^3	Tn	Comments
2021	90,00	30,00	
2022	152,00	38,16	(15,4 Tn were removed by San Pedro del Pinatar City Council)

Total	242,00	68,16	

In the framework of the project, work has been carried out on the 115 ha of sandbanks provided in the proposal (Table 6), although it was based on outdated data (see Sánchez, B. (2006)) which were adapted to the current situation through the intervention project which used more up-to-date data ("Memoria del seguimiento de la red de hábitats terrestres de interés comunitario mediante teledetección de los parques regionales Salinas y arenales de San Pedro del Pinatar, Calblanque y Espacios Abiertos e islas del Mar Menor").

Table 6. Area occupied by each species

Nº	**Specie**	**Occupied area (m^2)**
1.	Agave americana	10.890
2.	Arundo donax	373
3.	Carpobrotus sp.	2.945
4.	Cylindropuntia sp.	43
5.	Lantana camara	35
6.	Yucca sp.	251
TOTAL		14.537

In addition, interventions have been carried out in additional locations such as:

- IAS points provided by the Park Conservation Manager to detect additional or undisturbed spots (24 February 2022).
- Existing landscaping in the surroundings of sandbanks (Gardens of the IMIDA Marine Cultivation Centre, Marina´s Gardens, Mar de Sal restaurant Garden´s). In the first case, removal will be done by the centre's gardeners following the inventory of allochthonous flora and the environmental agents' request. The removal was carried out in the marina gardens by LIFE project staff. In the latter case, the person in charge of the restaurant made various difficulties by starting and stopping the intervention on several occasions, so the Environmental Agents took charge of the corresponding request to complete the removal.
- Arenales de El Mojón (outside the Protected Area) where *Carpobrotus* has been removed with volunteer activities.

The control of IAS has been carried out by ANSE personnel, persons serving sentences for minor crimes, although San Pedro del Pinatar City Council and the General Directorate of Natural Environment have collaborated to remove some remaining stands in areas of difficult access.

An attachment with photographs of this action has been included in the Annex 02 Technical Annex as Action C5_Photographs.

Main problems encountered and solutions provided

Like the other actions, Action C5 was affected by the state of alarm measures due to COVID19. The problems encountered in the implementation of action C3 and the need to take advantage

of the plant available for action C4 make this the most delayed action. However, once the state of alarm was over, the incorporation of community service workers was resumed, a great effort was made in volunteering, and ANSE staff was reinforced until the end of the project. In the last months of the project, the number of staff was increased to achieve the objective, with the support of San Pedro del Pinatar City Council.

Achieved results

All the invasive alien species removal work foreseen in the project has been carried out, with a greater effort in removal during the last year of the project. The removal of IAS has concluded with 242 m^3 of exotic species and 68.16 tonnes of material removed. Work has been carried out on all park´s dunes and various reworks operations have been carried out to ensure the success of the intervention.

Remaining results

None

Variations in action

Despite the delay due to COVID-19, the action was completed and the results were more than positive.

Action evaluation:

This action has involved a great effort in terms of time and personnel, but in the end, it has been possible to eliminate many IAS. Action D4 assesses the effect of the most common invasive alien species in the Park on the main soil properties and nutrients.

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H21	Milestone	Start of action C.5	01/10/2019	06/06/2019 OK

D1. Biological monitoring

✓ **Action ended**

Foreseen start date: 01/10/2018	Foreseen end date: 30/09/2022
Actual start date: 01/10/2018	Actual end date: 30/09/2022

Participants and responsibilities

UMU: Monitoring fartet populations, aquatic macroinvertebrates and water birds. ANSE: Monitoring waterbirds: Ringing in waterbird colonies.

Description of activities undertaken and quantified outputs:

Three selected biological indicators have been monitored to evaluate the success of actions C1 and C2.

Indicator: Fartet (Aphanius iberus)

Methodology

Three samplings per year (in spring, summer and autumn) of the *Aphanius iberus* population have been carried out during 2019, 2020, 2021 and 2022 to test the effect of the new levees construction (Action C1). Passive trapping with minnow-traps has been selected as the capture method. The activity period of the traps is between 20 and 24 hours. The abundance of the species is standardised in catch per unit effort (CPUEs), which corresponds to the number of individuals caught per trap and day. Five traps per sampling station have been placed parallel to the shore. To study the fartet status conservation, an index is applied that integrates data on catches (guilds of size and sexes) and the availability and quality of habitats, assigning a score between 0 (poor conservation status) and 100 (high conservation status).

Final results

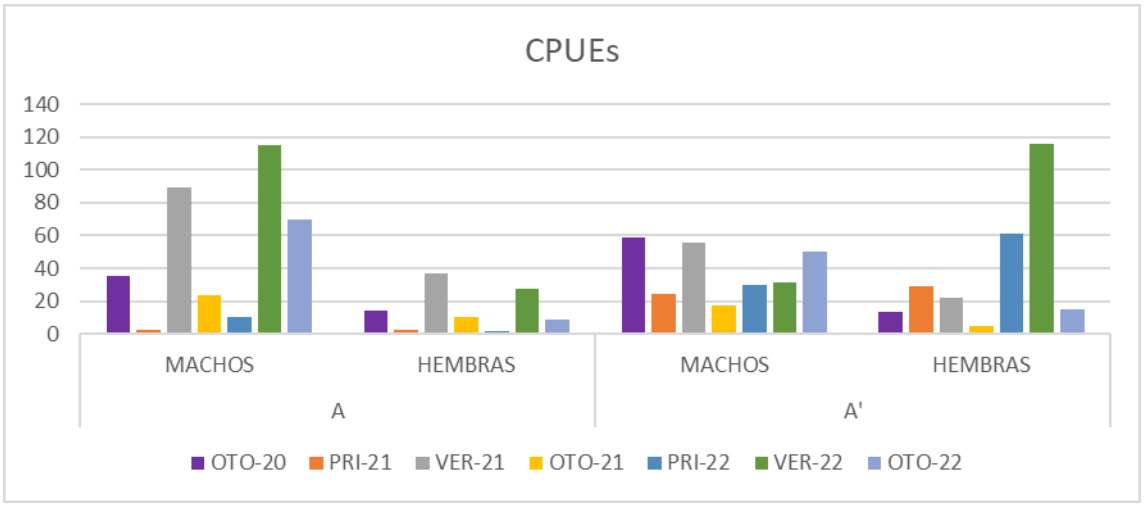
Presence/Absence

An integrative index, developed by the University of Murcia and Biocyma Consultancy, has been applied. This index considers presence/absence, abundance (catch per unit effort) and population structure.

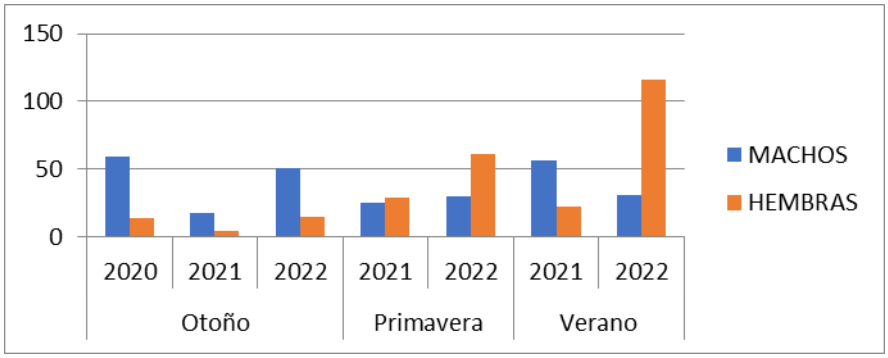
In the surveys carried out after the implementation of Action C1 (in 2020 surveys), *Aphanius iberus* specimens were detected in the new levees. Since then, the species has been detected in all surveys, presenting a VERY GOOD status in the summer and autumn surveys of 2022. However, the applied index has shown a negative trend in the spring of both 2021 and 2022.

Abundance and population structure (abundance of sexes and size and age groups)

On the other hand, the analysis of Catch Per Unit Effort (CPUEs) shows a clear predominance of females by the new mottles created with rocky substrate in the breeding months (**¡Error! No se encuentra el origen de la referencia.**). This selection was best seen in the 2022 summer sampling, where the sex-ratio difference was most evident (Graphic 2).



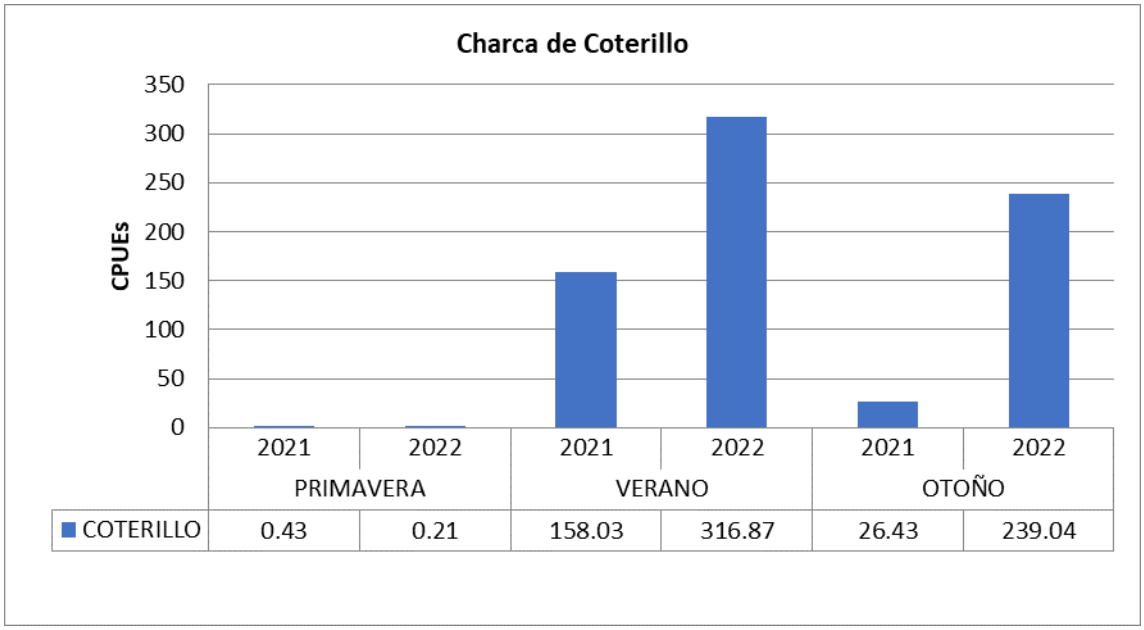
Graphic 1. Sex ratio detected in the action zone compared to the non-action zone.



Graphic 2.CPUEs of males and females in the action pond

Population trends

The evolution of the catches in the sampled sites reflects the irregularity of the fartet populations in the pond where the new motes have been built. In the Coterillo pond, the fartet population has proved to be higher in summer sampling, while in spring the CPUEs are very low (Graphic 3).



Graphic 3. Evolution of relative abundance (CPUEs) of fartet in the Coterillo pond

The application of the Fartet index, which integrates population and habitat quality parameters, assigns a high value to the action C1 area (Table 7). The index remains relatively constant in this action pond, with good and very good quality in the last two years.

The control area shows stable values, although it is true that in spring it obtains a lower score, mainly associated with the reduced catches of breeding females.

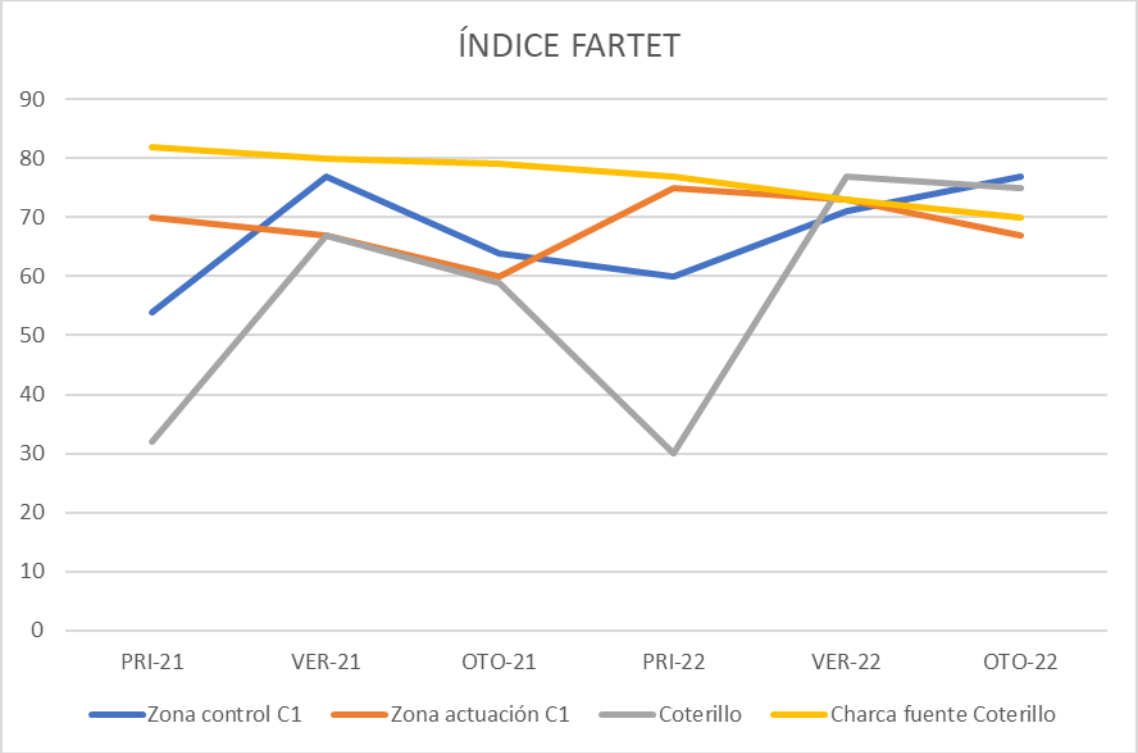
Meanwhile, in the action area, the index is higher in the spring and summer months (especially in the last spring of 2022), due to the high presence of gravid females (Graphic 4).

Finally, the Coterillo source pond continues to show high values, thus showing its suitability to act as a source area to recover the historical populations of fartet in the Coterillo pond.

Table 7. Result of Fartet index

	CONTROL AREA C1	ACTION AREA C1	COTERILLO	COTERILLO SOURCE POND
SPRING-21	MODERATE	GOOD	DEFICIENT	VERY GOOD
SUMMER-21	VERY GOOD	GOOD	GOOD	VERY GOOD
AUTUMM-21	GOOD	GOOD	GOOD	VERY GOOD
SPRING -22	GOOD	GOOD	DEFICIENT	GOOD
SUMMER-22	GOOD	VERY GOOD	VERY GOOD	VERY GOOD
AUTUMM-22	VERY GOOD	GOOD	VERY GOOD	GOOD

Graphic 4. Evolution of the fartet index score in the monitored localities



In conclusion, the results obtained so far show the effectiveness of action C1 for the creation of a new microhabitats for the fartet. The high rate of catches of breeding females reflects the acceptance of these green infrastructures as breeding and spawning areas.

Indicator: Community of aquatic macro-invertebrates

Methodology

At the beginning of the project, in 2019, strategic sampling sites were selected to evaluate and identify changes in the aquatic macroinvertebrate community that may be associated with implementing actions C1 and C2. During these four years, periodic sampling has been carried out excluding the winter period due to the lower taxonomic richness.

The method used for monitoring is known as "Dipping", which consists of carrying out sweeps with an entomological sleeve on the surface of the substrate and along the water column, thus

collecting benthic and nectonic species (Figure 22). In order to cover the greatest possible heterogeneity of habitats, three sweeps of 20 m in length each are carried out (≃1 min/sweep).

The specimens captured are taken to the laboratory for their taxonomic determination. To assess the ecological status of the sampling locations in terms of aquatic macroinvertebrate community, it has been decided to apply the SALINDEX index, which evaluates the biological component from factors such as: the richness of families, the dominance of taxonomic orders or the presence of species that indicate the quality or degradation of the habitat. The final score, calculated from the sum of all the metrics, allows one of the ecological status categories to be assigned: bad, deficient, moderate, good and very good.

Figure 22. Macroinvertebrate sampling in salt marshes (left) and specimen of Nebrioporus ceresyi (adut in the center and larva on the right).

Final results

Number of species of conservation interest or naturalness indicators

16 aquatic macroinvertebrate taxa have been identified in the total project, with the richest being in the Coterillo and the source pond (with 13 taxa in both). Except for one species, Gammarus sp, the rest of the species identified are bioindicators of habitat quality.

The most abundant species in the last two years of the project have been *Hydrobia acuta*, family Chironomidae and *Cerastoderma edule*.

Specific richness, abundance and diversity of the macroinvertebrate community.

The connection of the Coterillo pond with the salt circuit (C2) has had an impact on the aquatic macroinvertebrate community, and the quality of this community is now better than it was at the start of the project (according to the SALINDEX index) (Table 8).

On the other hand, the pond of Action C1 has not obtained good results. In adittiom, the ecological status of the source pond connected to the Coterillo pond has deteriorated, possibly due to the softening of the water.

Table 8. Total abundance (number of specimens) of aquatic macroinvertebrate taxa detected in the localities monitored by the project. Green shows the species indicating habitat quality; red indicates degradation (sweetening/eutrophication)

2019	**CHARCA ACTUACIÓN C1**	**COTERILLO**	**CHARCA FUENTE COTERILLO**
SPRING	MODERATE	GOOD	GOOD

SUMMER	GOOD	GOOD	GOOD
AUTUMN	MODERATE	GOOD	GOOD
2020			
SPRING	MODERATE	MODERATE	GOOD
SUMMER	DEFICIENT	MODERATE	GOOD
AUTUMN	MODERATE	GOOD	GOOD
2021			
SPRING	GOOD	GOOD	DEFICIENT
SUMMER	GOOD	VERY GOOD	DEFICIENT
AUTUMN	DEFICIENT	GOOD	MODERATE
2022			
SPRING	MODERATE	VERY GOOD	GOOD
SUMMER	GOOD	VERY GOOD	MODERATE
AUTUMN	MODERATE	GOOD	MODERATE

Evolution of the macroinvertebrate community

The SALINDEX index does not show significant changes in the ecological quality of the pond where the C1 action has been implemented. On the other hand, the ecological status of the source pond connected to the Coterillo pond has deteriorated, possibly due to the softening of the water (Figure 23).

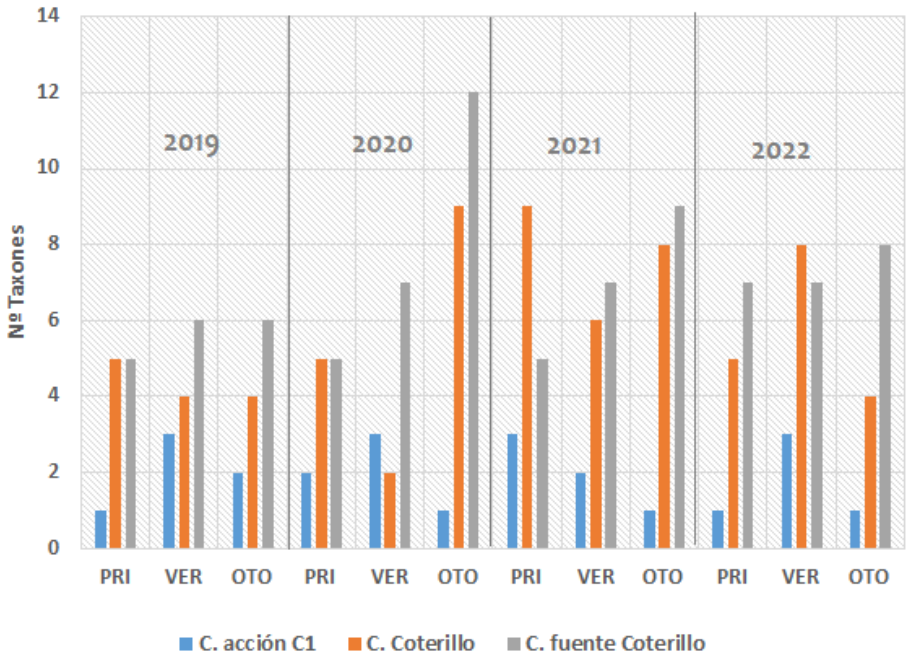


Figure 23. Number of taxa detected in the monitored locations.

In conclusion, no improvement in the macroinvertebrate community has been observed so far in the area where action C1 has been carried out. The results obtained in the Coterillo source pond confirm the suitability of this pond to reduce its salinity and favour the development of a robust macroinvertebrate community.

Indicator: Waterbird Community

Monitoring waterfowl populations has made it possible to evaluate the success of actions aimed at improving and expanding potential nesting areas (actions C1 and C2). The established monitoring was divided into three lines of action 1) Monthly censuses; 2) Monitoring of breeding colonies; 3) Ringing of chicks in breeding colonies.

The waterfowl censuses have been carried out in a sectorised way on the entire surface of the salt motes. The monitoring of the colonies to determine the number of pairs and other reproductive parameters has been carried out through successive in situ visits to the salt motes, and the marking of Audouin's gulls has included the placement of PVC rings for remote reading.

Although the main objective has been to evaluate the effect of the actions on Audouin's gull, the other species of waterbirds that use the salt motes have also been taken into account, as several of them are species included in Annex I of the Birds Directive. For this reason, the data relating to the target species, Audouin's Gull, are separated below from the rest of the species for which data have also been obtained from monthly censuses.

Final results

a) Monthly census

A total of 43 censuses have been carried out (from december 2019 to September 2022) in which 111.288 birds of 67 different species have been observed. The waterbird community is mainly dominated by larids, with abundant *Larus michahellis* standing out. The variations observed in the rest of the community are mainly due to the seasonality and migratory nature of certain taxonomic groups such as sterids (summer) and waders (winter) (Figure 24).

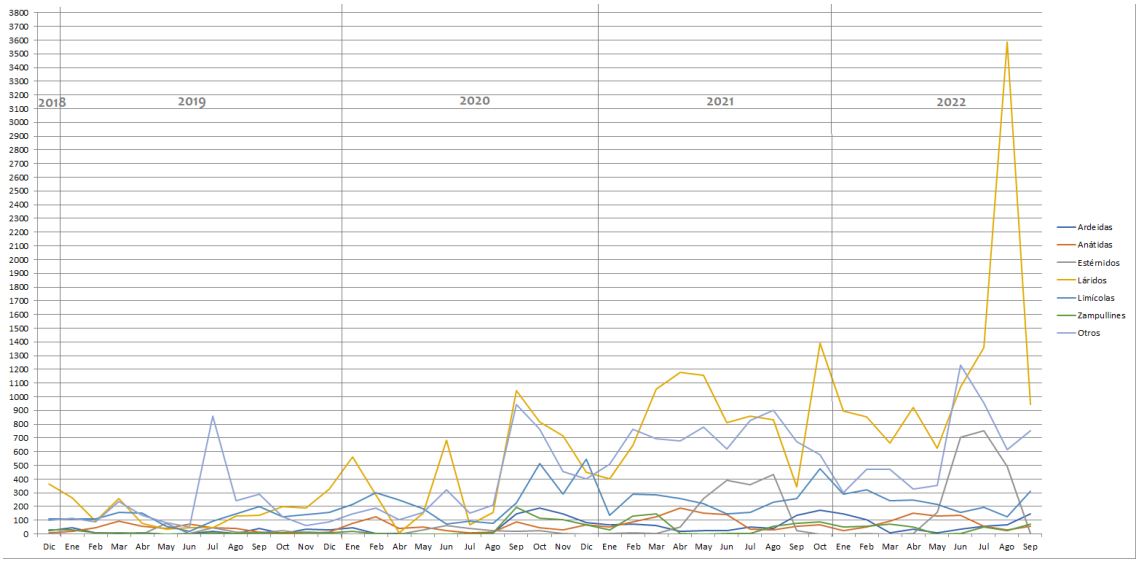


Figure 24. Temporal evolution of waterbird populations in the San Pedro del Pinatar salt flats.

Action ponds have a relatively similar inflow to non-action ponds. However, the creation of new ponds has allowed the nesting of several species of waterfowl (Figure 25).

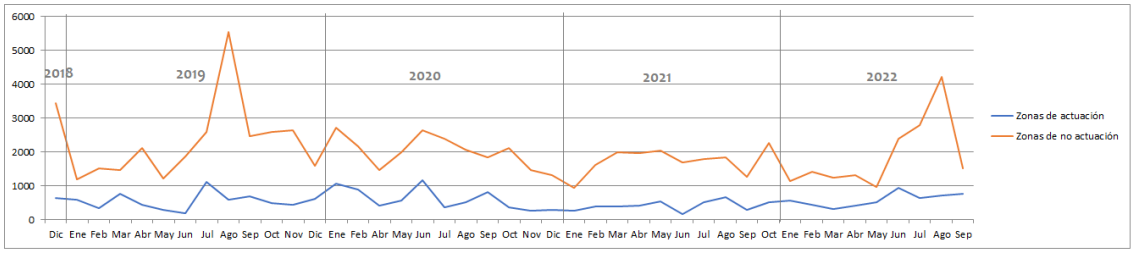


Figure 25. Temporal evolution of waterbird populations: Action areas VS Non-action areas.

b) Monitoring of breeding colonies

Censuses of nesting waterbirds have been carried out during four years of the project (2019-2022). Nests of a total of 22 species of waterbirds have been censused, although the target species, as they are included in Annex I of the Birds Directive, are 8 (the results of the censuses during these four years are presented in Table 9).

Table 9. Nesting species (Annex I of the EU's Birds Directive) in the Regional Park

	2019	**2020**	**2021**	**2022**
Himantopus himantopus	49	126	91	46
Recurvirostra avosetta	48	151	55	92
Burhinus oedicnemus	4	2	4	13
Charadrius alexandrinus	43	44	40	32
Gelochelidon nilotica	216	257	3	95
Sterna hirundo	307	219	271	355
Sternula albifrons	298	202	236	224
Thalasseus sandvicensis	265	342	6	475

The breeding data for 2020 are exceptional, as the breeding waterbirds were favoured by the Gloria season in December, with intense rains that allowed the existence of waterlogging in spring in many places of Regional Park .

The gull-billed Tern is a particular case, affected by the situation of the Mar Menor. This species breeds in salt motes but feeds in agricultural areas and irrigation ponds in the Cartagena countryside, hence its decline. However, looking at the data for 2022, it could be finding other areas to feed in.

Several species of waterbirds included in the EU's Birds Directive have bred in the new motes created during the project (Table 10).

Table 10. Number of pairs of birds included in EU's Birds Directive that have bred in the new motes

	2020	**2021**	**2022**
Himantopus Himantopus	0	17	2
Recurvirostra avosetta	22	41	63
Charadrius alexandrines	1	8	7
Ichthyaetus audouinii	0	0	240
Gelochelidon nilotica	0	0	16

Sterna hirundo	0	2	0
Sternula albifrons	45	3	146
Burhinus oedicnemus	0	0	3

In addition, in 2022, 16 pairs of *Sternula albifrons*, 8 pairs of *Recurvirostra avosetta*, 2 pairs of *Himantopus himantopus* and 3 pairs of *Charadrius alexandrinus* have bred on the island created in Coterillo (Figure 26).

Figure 26. Colonies established on the specks built within the framework of action C1.

c) Ringing in waterbird colonies

In the four years of the project's development, a total of 1.621 birds have been marked, 299 of which were also fitted with remote reading rings (Table 11). It is worth mentioning the coordination with the technicians of the Endangered Fauna Monitoring Programme of the Natural Environment General Directorate of Region of Murcia and with the Ecotoxicology team of University of Murcia for the marking and sampling of Audouin's gull colonies.

Table 11. Number of birds marked in the ringing of each year. The number of individuals marked with PVC rings for remote reading is specified in parentheses.

SPECIES	2019	2020	2021	2022
Himantopus himantopus	0	5		
Recurvirostra avosetta	0	8	2	20
Charadrius alexandrinus	2	4	9	
Ichthyaetus audouinii	47 (47)	193 (90)	140 (116)	125 (46)
Gelochelidon nilotica	103	196		47
Sterna hirundo	31	100	29	43
Sternula albifrons	78	196	75	115
Thalasseus sandvicensis	139	199		176
Larus michahellis	4	0		

The specific results relating to Audouin's gull monitoring are as follows:

– Number of breeding pairs of Audouin's Gull (census during the summer period).

Audouin's Gull has increased the number of its breeding population since 2019 compared to the trend observed in recent years (Figure 27).

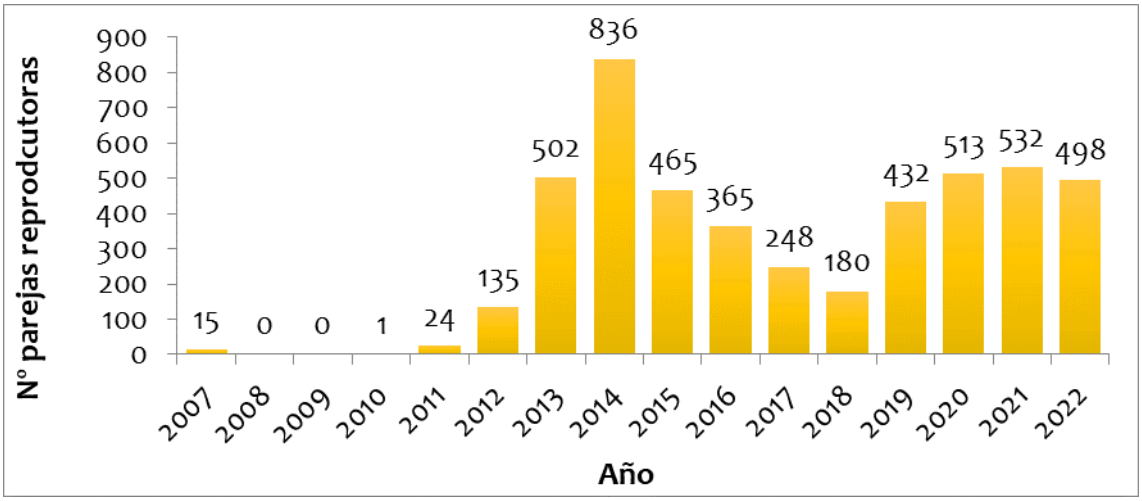


Figure 27. Population dynamics of the Audouin's Gull in the San Pedro del Pinatar Saltworks.

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The new levees built within the framework of action C1, with the aim of increasing the availability nesting habitat, have been successful. In fact, one of the main project´s objectives has been achieved in 2022: the Audouin's gull has nested in the new motes (240 nesting pairs).

– Reproductive parameters of the Audouin's Gull population: reproductive success, hatching rate, productivity hatching rate, productivity, flight rate and survival-mortality (Table 12).

Table 12. Ringing of Audouin´s Gull

	2019	2020	2021	2022
Ichthyaetus audouinii	47 (47)	193 (90)	140 (116)	125 (46)

Since 2020, ringing of Audouin's Gull chicks has remained relatively stable, with more than 100 chicks ringed each year during the season.

– Number of Audouin's Gulls (monthly censuses).

The presence of Audouin's gulls in the Salinas de San Pedro shows peaks of greater abundance in the breeding months, while from September onwards individuals seem to disperse and choose other places to settle. These censuses have shown the importance of suitable habitat for the species during the nesting months, when a large number of individuals are attracted to the salt flats to build their nests.

– Study of the activity and use of the habitat by Audouin's Gulls inside the salt ponds (feeding, resting or nesting).

During the months when the species is observed outside the breeding season, it is usually resting. This makes sense, as it is a species that tends to move out to the open sea to feed (Figure 28).

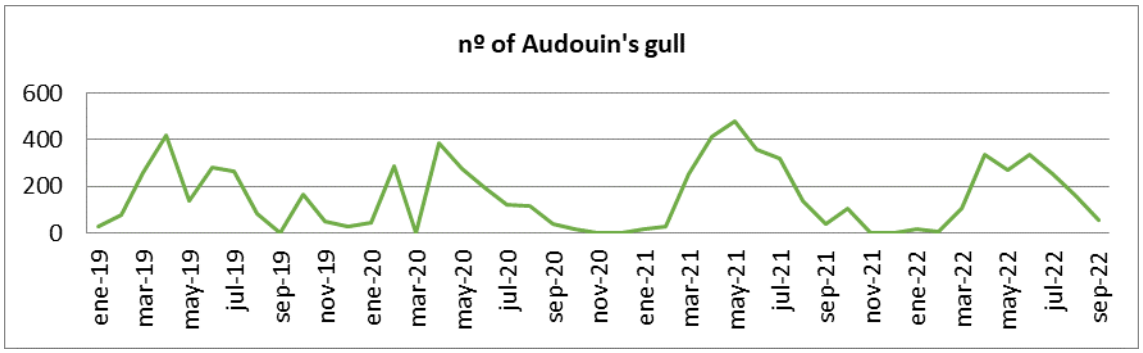

Figure 28. Nº of Audouin´s Gull

Main problems encountered and solutions provided

Implementing most of the activities under Action D1 went smoothly, except for the impossibility of carrying out the monthly census in March 2020 due to the confinement and the change of staff associated with the project in November and December 2021.

Achieved results

The results meet the expectations set out in the Project, having achieved the main objective of the LIFE: improve the Audouin's gull nesting habitat.

The macroinvertebrate community has improved substantially in Coterillo, after reconnecting this pond with the salt circuit. The Coterillo source pond seems to have suffered an alteration of the macroinvertebrate community, possibly associated with the decrease in salinity of the water due to the abundant rainfall. Meanwhile, the C1 action pond has remained relatively stable over the 4 years of the project.

The action pond seems to host an important population of breeding *Aphanius iberus* females in the spawning months. Finally, several species of breeding waterbirds have settled in the new motes. Among these species is the Audouin's gull, which in 2022 bred for the first time in the motes created by the project.

Remaining results

None

Variations in action:

No changes have taken place.

Action evaluation:

Action D1 has confirmed the success of Action C1, forming a rocky environment used as a refuge and reproduction area by the fartet. In addition, this green infrastructure has shown good and rapid acceptance by the waterbird community as a breeding area, including Audouin's gull.

At the same time, together with ANSE, the University of Murcia has worked on the ringing of nesting waterbirds with the aim of knowing their main sources and feeding routes, key

information to be able to explain possible changes in their population trends. In turn, the LIFE team has facilitated and supported the development of a doctoral thesis from the University of Murcia that studies the interaction and trophic overlap between the breeding sternids of Salinas y Arenales de San Pedro Park (black-footed tern, common tern, little tern and black-legged pagoda).

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H3	Milestone	Implementation of the programme for biological monitoring	01/10/2018	OK 01/10/2018

D2. Dune monitoring

✓ **Action ended**

Foreseen start date: 01/10/2018	Foreseen end date: 30/09/2022
Actual start date: 01/10/2018	Actual end date: 30/09/2022

Participants and Responsibilities

UMU: Monitoring of actions to stabilize and reinforce the dune ecosystem of La Llana beach for erosion control.

Description of activities undertaken and quantified outputs:

Action D2 provides for the Action C3 monitoring, which aims to stabilise and reinforce the dune ecosystem on the Regional Park beach to control erosion, as well as monitor and study the evolution of the beaches in the target area.

Introduction

Before its approval, during the drafting of the project, the University of Murcia selected the area for Action C3 The location was due to the limited width of the beach in that area due to the great erosion it suffers, the great refraction of the waves due to the southern breakwater of the Port of San Pedro, and the vulnerability of the salt mines in that area.

Action D2 includes the monitoring of stabilisation and reinforcement actions in the dune ecosystem of the park's beaches to control erosion, as well as the monitoring and study of the evolution of the beaches in the target area.

1. **Methods**

The University of Murcia established the locations of the sand collectors before ANSE installed them. For this purpose, the climatic data of the area and especially the predominant wind directions were used. Through the installation of wind erosion collectors, the University of Murcia also examined the capacity to strip sand and mobilize it.

The initial height of the dunes was calculated using LIDAR processing technology. For this purpose, the free software Cloud Compare, QGIS, and Grass were mainly used. Using the LIDAR data and these programs it was possible to perform a 3D topographic survey of the dunes and beaches.

From the installation of the sand collectors, the variation of the dunes was measured with GPS. Four sectors with different characteristics were established to analyse the differences in height changes.

For the analysis of the trails generated by the visitors, a field study was carried out, taking data from GPS. The methodology consisted of analyzing the routes present in the pre-Life. The data was collected once per quarter from December 2018 to the third quarter of 2022, except for the second quarter of 2020 due to the coronavirus lockdown.

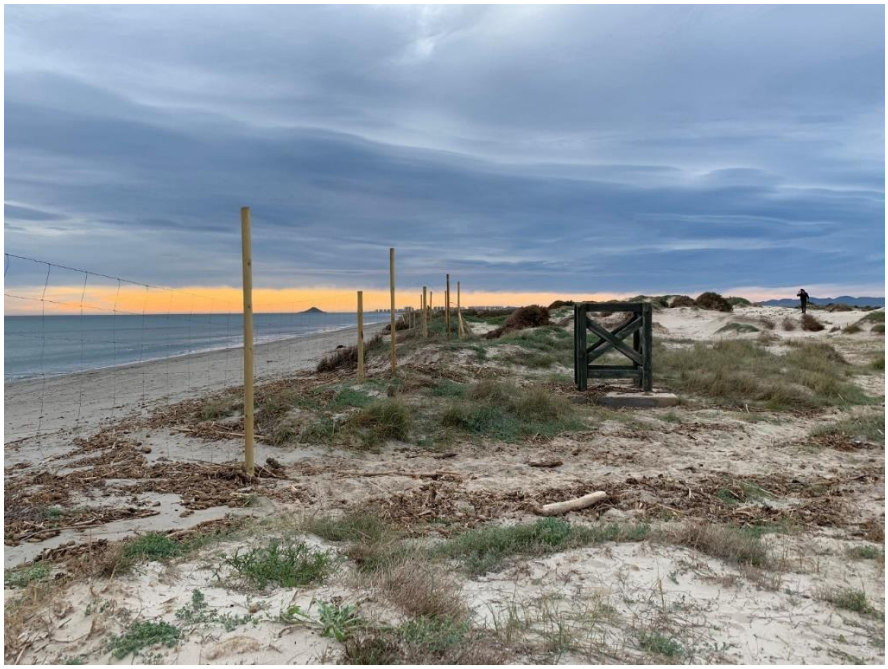

Figure 29. Dune area after the wire fence installation

Three variables have been taken into account in this action:

A) Effects of Action C2 on tourist-generated trails

The footprints of park visitors generated a network of 179 m before the Life Salinas Project. These corridors had been reduced by September 2022 to small, unconnected sections. There has been a change in the area primarily due to the installation of the perimeter fence, but also in light of the location of the sand collectors, which block possible transit routes.

B) Analysis of the effects of the sand collectors

The dune action zone has been divided into 4 sectors to analyse the direct effect of the sand collectors.

1) Sector with scarce sand stock associated with the beach area threatened by wave refraction during storms.
2) Sector with large volumes of sand, affected by the rupture of the foredune.
3) Sector of the main blowout
4) Wide southern sector

C) Estimating the evolution of the shoreline

The dunes are not independent from the beach. It is necessary to study the coastal dunes as a dune-beach system, so it is also important to calculate the erosion of the beach. Beach erosion should be measured in the long term. A study of the evolution of the beach over decades is the ideal time scale for understanding erosion/accretion situations.

For this purpose, the University of Murcia digitalized the shoreline from all the information that was possible to obtain:

- Old cartography: by means of the georeferencing of this cartography, we were able to obtain data of the situations of the coast line at the end of the XIX century.
- Aerial photographs: All aerial photographs useful for this purpose were used.

The results of the study show that Las Salinas beach, the most visited due to its accesses, has grown from an average width of 77.74 m at the end of the 19th century to 21.37 m today.

SECTOR 1

There was little variation in the height of the dunes in the first sector (Figure 30). The catchers in this sector didn't catch much sand except at the southern end.

Figure 30. Sector 1.

SECTOR 2

This sector had a large number of blowouts before Project Life. After the installation of the sand collectors, these blowouts disappeared. The control points show an average increase of 19.7 cm (Figure 31).

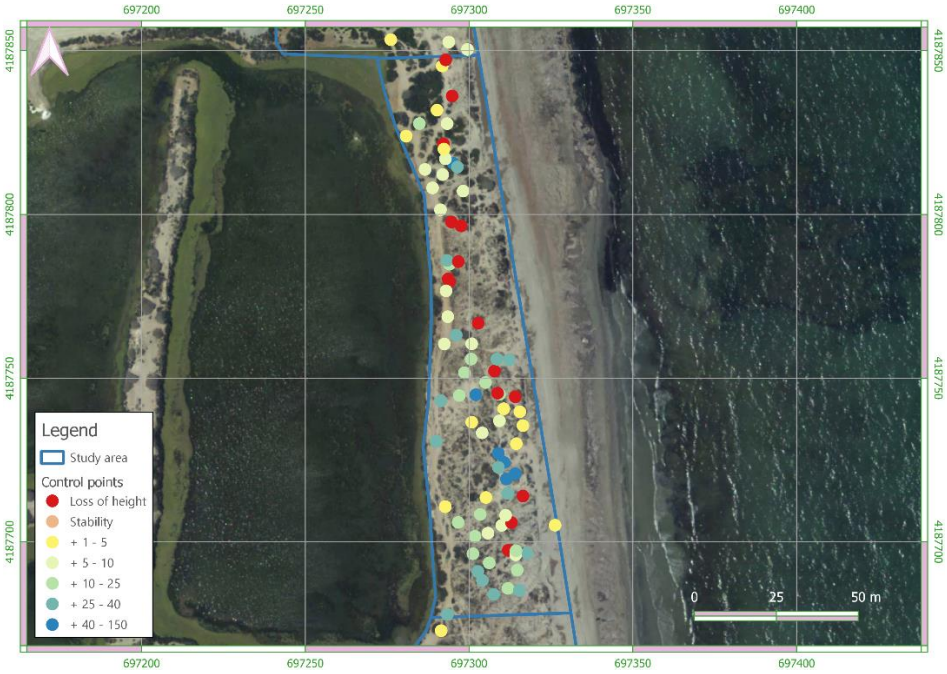

Figure 31. Sector 2.

SECTOR 3

This sector was the most degraded of the project's whole target area and where the action has been most successful (Figure 32). The average sand increases in the dunes located at the control points are 33 cm. The most important thing is the disappearance of the large blowout that dominated the area.

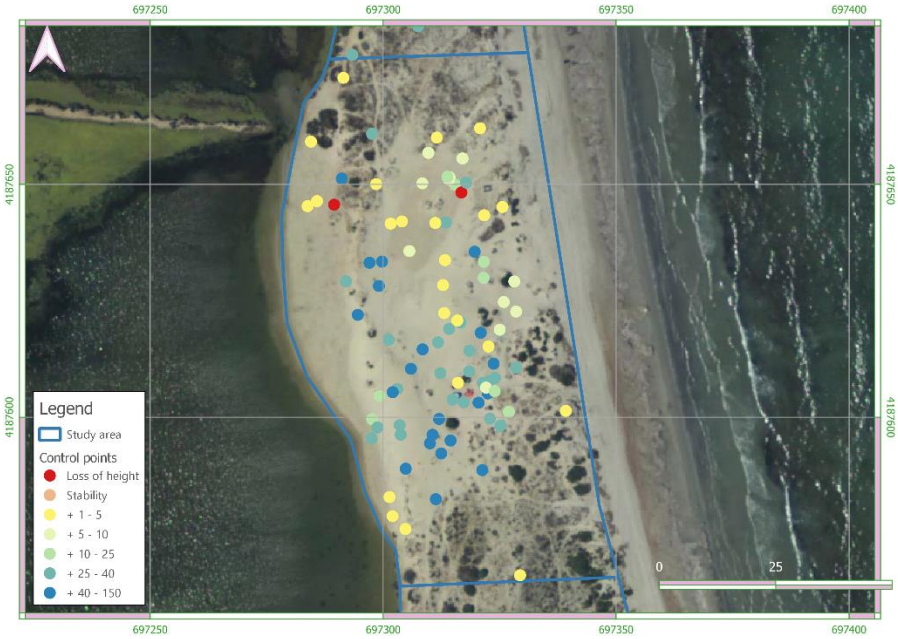

Figure 32. Sector 3.

SECTOR 4

The average increase in Sector 4 was 10 cm (Figure 33). This is a complex area where most of the corridors caused by the passage of visitors to the park have disappeared.

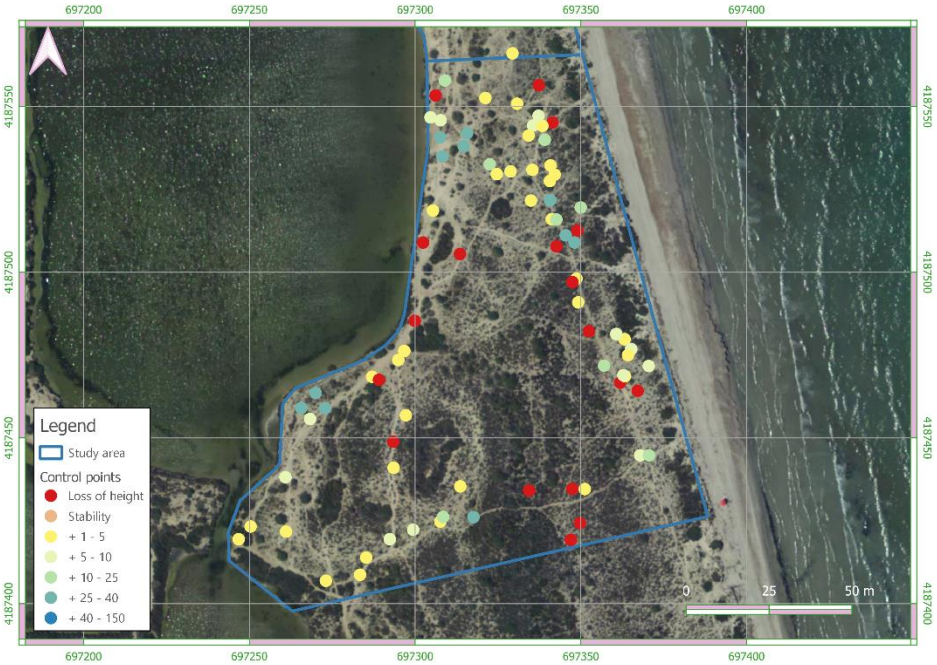

Figure 33. Sector 4.

Table 13 contains a summary of the increase in dune height by sector.

Table 13. Dune Height increase.

Sector	Dune height increase (cm)
1	0,8
2	19,7
3	33,2
4	9,9

The control points show the increase in dune height associated with the collectors since the placement of the catchers in May 2020.

Effects of Gloria Storm-surge

Storm Gloria was the strongest storm to hit Spain and southern France since January 1982. After rapidly crossing the Atlantic, Gloria made landfall in northern Spain on January 19 with strong winds and moderate rainfall. In the Spanish Levant, the storm was very strong and seriously affected the coast of the Salinas y Arenales de San Pedro del Pinatar Regional Park.

This storm devastated an important part of the dune belt of La Llana beach. The damage caused by the storm occurred mainly in the fenced area. However, after GPS measurements along 3 km of beach, it was estimated that the differences in the foredune before and after the storm surge were 4.5 m on average, while the average height of sand lost was 90 cm in several points from which references could be obtained (Figure 34, Figure 35, Figure 36).

Figure 34. Swell over the foredune during the storm.

Figure 35. Foredune after the storm.

Figure 36. Dune monitoring after DANA

Estimation of the effect of *Posidonia oceanica* on the mitigation of the erosion of the dune-beach systems

Posidonia oceanica is a marine phanerogam whose meadows have an extensive presence along the park's coastline. The Posidonia loses leaves that usually accumulate on the beach, this mitigates the effect of storms.

The *Posidonia oceanica* banquettes installed in the action C3 have eliminated all the trough blowouts that cut perpendicularly to the foredune and has significantly increased the height and width of the dunes. In the future, it will protect the secondary dunes from storms..

Other issues

It´s important to notice that University of Murcia will continue to monitor and study the evolution of La Llana beach through its research projects, partly with its funds. of La Llana beach, through its research projects, partly with its funds, the University allocates funds to the different research groups and in part by raising funds, for example through the biodiversity funds, through the Biodiversity Foundation or the Seneca Foundation, an entity that contributes to the promotion and execution of the and execution of scientific and technological research in the Region of Murcia.

Main problems encountered and solutions provided

Problem 1: It was not possible to obtain permits for drone flights, which would have facilitated the work and provided more accurate data for the topographic survey. This is due to the proximity of a civil and a military airport. **Solution:** Data collection was eventually carried out using GPS.

Problem 2: Confinement due to the coronavirus prevented data collection between March and June. Data from these months were useful for analysing the recovery of the dune-beach system. **Solution:** Although we were not able to solve this problem completely, we obtained data immediately before and after the storm, as well as data on the current situation. The data we obtained were sufficient to analyse the evolution of the beach in the months after the storm.

Achieved results

This monitoring action has permitted to assess the effect of action C3 regarding the effects of the fencing and the sand collectors for the protection of dunes. The interaction between both actions has also allowed to improve progressively the management measures taken in C3 regarding the type and orientation of sand collectors. It has also assessed unexpected events like annual storms or new management actions implemented like the *Posidonia* protection barrier.

Remaining results

None

Variations in action

There are no deviations from the dates initially proposed, except those caused by the lockdown. There was also no change in the budget which was calculated at the beginning of the project.

Action evaluation

It has been possible to see that the conservation measures for the dune line have given positive results, favouring dune regeneration. It has also been possible to assess that the first line of dunes is vulnerable to rising sea levels and to extreme climatic events.

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H2	Milestone	Implementation of the programme for monitoring the dune ecosystem in La Llana Beach	01/10/2018	OK 01/10/2018

D3. Monitoring of revegetation

✓ **Action ended**

Foreseen start date: 01/09/2019	Foreseen end date: 30/09/2022
Actual start date: 01/11/2019	Actual end date: 30/09/2022

Participants and responsibilities

ANSE

Description of activities:

According to the project proposal, 3 monitoring reports have been developed:

1) "Pre-implementation report".

It addresses three main issues whose analysis is discussed below:

- 1.1. Evaluation of the pre-operational state (vegetation cover).

It began with the collection of transect data in the dune system to evaluate the vegetation cover. The sampling was carried out just before the storm, so the entire reference system (which was precisely the fence) was destroyed and the morphology and extension of the dune system was completely altered. In addition, this system presents difficulties such as the replicability of the measurements (as it is a transect, the simple displacement of the strip by the wind would vary the measurements). For this reason, the possibility of estimating the vegetation cover of the dune by indirect methods through the analysis of orthophotography and available drone flights was transferred to the project monitor. In any case, as will be seen below, the monitoring finally focused on bare areas of vegetation in order to evaluate the colonization and restoration processes in greater detail (Figure 37, Figure 38).

Tipo	Vegetación Alta	Vegetación Baja	Arenales	Total
Sumatorio	13374,1	7029,34	16168,81	36572,25

Figure 37. Results of the GIS analysis of the pre-operational state of the La Llana dunes.

Figure 38. Monitoring of the pre-operational state of the dunes of La Llana

-1.2. DPSIR analysis.

A general DPSIR analysis has been carried out which has analysed the following documents (Table 14):

- Natural Resources Management Plan of the Regional Park of Las Salinas y Arenales de San Pedro del Pinatar.
- Master Plan for the Use and Management of the Salinas y Arenales de San Pedro del Pinatar Regional Park.
- Integral Management Plan for the protected areas of the Mar Menor and the Mediterranean coastal strip of the Region of Murcia.

Table 14. Document analysed

Document analysed	**Ítems**	**Aspects**
PORN	7	Space zoning
PRUG	24	Pressure State Impact Intensity
PGI Mar Menor	15	Pressure State Impact Intensity
PGI Submerged coastal strip	22	Pressure State Impact Intensity

Subsequently, a DPSIR threat analysis was conducted focusing on the salt mines and the issues addressed by the restoration projects evaluated (Table 15).

Table 15. Analysis of pressures and impacts

(D)RIVING FORCES	**(P)RESSURES**	**(S)TATES**	**(I)MPACTS**	**(R)ESPONSES**	**EXPECTED RESULT**	**MONITORING**
Increased demand for recreation, tourism, aquaculture and salt	Construction of the Port of San Pedro	Alteration of the North-South sediment transport coast dynamics. Reduction of sand inputs to the beach located to the south of the Port. Reduction of La Llana Beach in the first 500 m from the Port. Holidaymakers crossing	Compaction of dunes. Deterioration of vegetation (loss of biodiversity, cover and ecosystem services). Increase in erosion	Fencing installation. Deposit of Posidonia oceanica remains in the form of a cordon. Installation of sand collectors. Revegetation with native species. Prohibition of access to people.	Retain sand. Eliminate trails. To stop the erosion processes. Stabilize and reinforce the dunes. Increase the plant cover with native species from the 1510* and 2250* habitats. Increase carbon fixation. To conserve biodiversity. Ensuring the provision of ecosystem services. Reducing	Dune formation in the collectors (number and volume). Disappearance of tracks (direct records [footprints] and indirect records [rubbish]). Presence and coverage of native species communities. Response to extreme weather
	Extraction of sand to regenerate beaches in the Mar Menor					

productio n	Beach cleaning - removal of *Posidonia oceanica* arrivals	the dunes and creating paths to the best preserved stretches of beach.	processes of wind origin.	Maintenance and monitoring of actions.	the risk of flooding salt ponds and waterbird colonies.	events (impacts or not on ponds). Citizen perception of the actions.
Dune fixing and gardenin g	Introduction of invasive alien species: *Agave americana, Carpobrotus acinaciformis, Eucalyptus camaldulensis, Nicotiana glauca, Myoporum acuminatum*	Negative effects on dune communities and their environment: competition for resources and/or alteration of the ecosystem (loss of mobility of the substrate, increase in nutrients, etc)	Displacement and/or extinction of native species (emphasis on endemic and/or protected species). Loss of biodiversity and ecosystem services.	Mechanical control by starting and cutting mainly by manual means. Monitoring of the actions and elimination of resprouts. Installation of panels and explanatory posters.	Reduce or eliminate populations of invasive species. Avoiding re-colonisation or future invasions To stop the loss of biodiversity. ensuring the conservation of priority habitats 1510* and 2250 and the provision of ecosystem services	Presence and coverage of communities of native and alien invasive species Public perception of the actions.

As expected, the measures proposed in the context of LIFE Salinas are consistent with the analyses carried out in the various planning documents, helping to alleviate the pressures on the space.

2. Evaluation of the decision-making process involving the interested public (August 2020)

In total, 40 surveys were collected, distributed in 3 profiles (resident (14), holidaymaker (16) and worker inside the Park (10)), the surveys were conducted anonymously. The "resident" and "holidaymaker" surveys were collected inside the Park through surveys carried out on the beach, while most of the "worker" surveys were collected through online surveys carried out in the work centres. The survey was made up of three blocks: characterisation of the respondent, perception of the situation and proposed solutions to reverse the situation.

Results on perception of the situation

The majority of those surveyed are aware of the regression situation on La Llana beach. However, they give little importance to the factors that determine such regression, some of them pointing to the eastern storms, the alteration of the coastal dynamics and the cleanliness of the beaches (Figure 39, Figure 40).

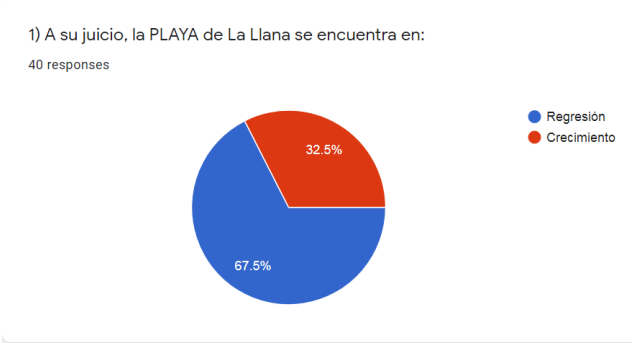

Figure 39. Answers on the state of La Llana

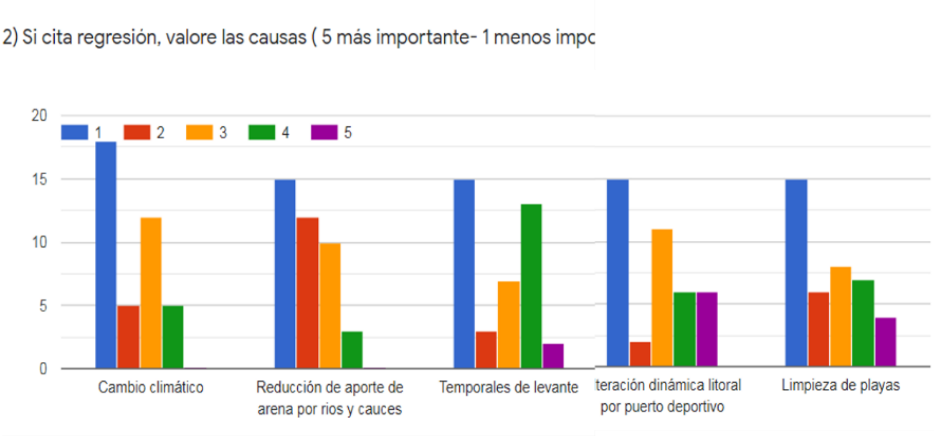

Figure 40. answers on the causes of the regression of La Lana

In relation to the dune system, none of the respondents assigned it a "Very Good" state of conservation, but almost half perceived it to be in a "Good" state of conservation. The other half assigned it a status of "Bad" or "Fair". Interestingly, none of the respondents recognised it as being in a "Very Bad" state (Figure 41).

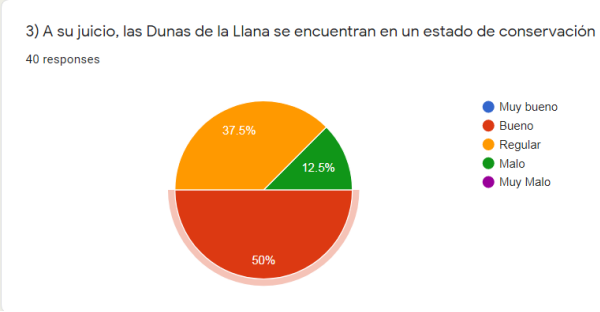

Figure 41. Answers about dune system conservation

The majority of the respondents give little consideration to the processes of degradation of dune systems, perhaps because of this perception of a "good" state of conservation, although it seems that "trampling", "beach erosion" and "rubbish" are the factors most indicated as important in the degradation.

Results in proposed solutions to reverse the situation

In terms of possible measures to improve the state of conservation of the beach, respondents place a higher value on measures to "restore dune system", "do not remove materials from the beach" and "correct the harbour", while "provide sand" or "implement dikes" appear to be the least valued measures. A singular comment deserves the measure "to eliminate the port" which presents very polarised responses, with a large sector giving it little importance but with a significant number of respondents considering it a "very important" measure (Figure 42).

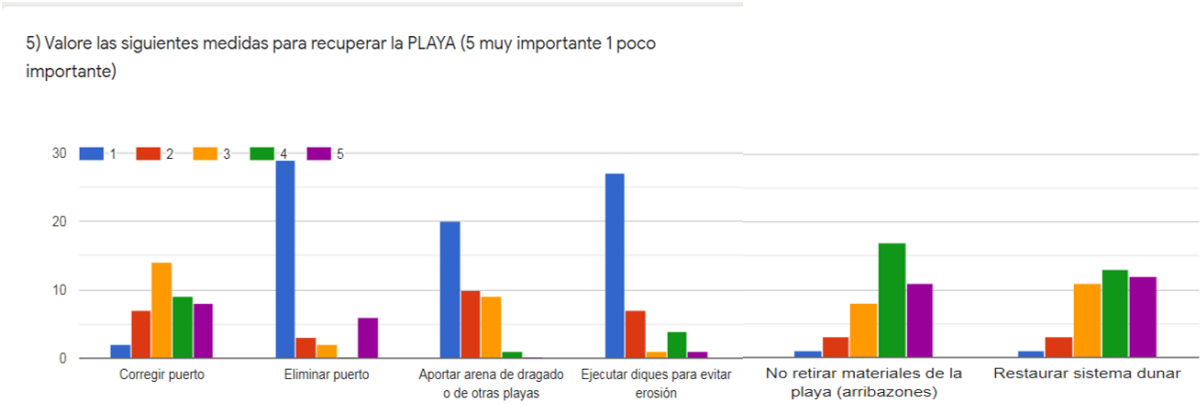

Figure 42. Answers on dune reclamation measures

As far as possible measures to restore the dune are concerned, none of the measures were considered to be "unimportant" by any of the respondents. Revegetation, fencing and posidonia barrier were considered to be the most important measures.

In general, there is a widespread perception of the problem of coastal erosion, although knowledge of the factors determining it does not seem to be well known. The proposals made in the framework of LIFE Salinas seem to be well accepted by the respondents. The full results are in Annex 02 Technical Annex as "Action D3_technical annex".

2) "Report on habitat recovery actions"

3. Evaluation of the quality of the plant material used (before planting)

In order to assess the condition of the plant material, 400 seedlings of 19 species (about 20 seedlings per species) were characterised, with measurements taken on 11 attributes (Figure 43).

- Height of the aerial part (cm): Height of the largest branch of the seedling measured from the base of the substrate;
- Height of the root ball (cm): Height of the substrate in which the seedling grows, measured from the base of the root ball to the edge of the aerial part. The heights are the same for the same production (species tray);
- Volume of the root ball (litre): Amount of substrate in which the seedling grows that fits inside the container. The values are the same for each production (species tray);
- Trunk diameter (mm): Thickness of the trunk measured with a caliper;
- Age (sap): Number of vegetative periods the plant has undergone, which can vary between 8 and 12 months if the planting is done in spring or autumn;
- Wounds (presence/absence): Weaknesses in the aerial part of the plant;
- Multiple stems (presence/absence): Branches of the main branch. Data usually taken for forest tree species for forestry purposes or repopulation, not significant for shrub or herbaceous species. Although it was evaluated it was not considered significant in the quality of the species of the dune ecosystem except in the case of *Juniperus turbinata* and *Pistacia lentiscus*.

- Root deformations (presence/absence): Important root deformations analysed through observation of the substrate, such as rolling or rotting;
- Poor root development (presence/absence): Poorly developed roots, analysed through the firmness of the substratum within the root ball (seedlings with poor root development usually have poorly developed substrates);
- Dry/mouldy/mouldy/pathogenic (presence/absence): Weaknesses in the aerial part and in the subterranean part of the pants;
- Apical buds (presence/absence): There are plants that do not develop terminal buds with cataphiles and in some cases they take several years to appear, and others that do not depend on the apical buds to guarantee success in the field. Data usually taken for seedlings of forest tree species for productive or repopulation purposes.

Figure 43. Interns assessing plant quality at the ANSE nursery

The **overall results** for each attribute are presented below (Figure 44):

- Height of the aerial part: Data taken from the 19 species. Variation between 130 and 0 cm. Average: 29.6
- Height of the root ball: Data taken from the 19 species. Variation between 9 and 18 cm. Average: 14.8 cm.
- Volume of the root ball: Data taken from the 19 species. Variation from 0.2 to 2 litres. Average: 0.4 litres.
- Trunk diameter: Data taken for 7 species. Variation between 2 and 10 mm. Average: 4.6 mm.
- Age: Data taken for seedlings produced in the ANSE nursery (15 species). Variation between 1 and 3 sages, the majority (12 species) of 1 sap produced directly in a root ball tray.
- Wounds: Data taken for the 19 species. 367 NO (97.09%), 1 YES (0.26%), 9 LITTLE FOLIAGE (2.38/%), 1 WITHOUT LEAVES (0.26%).
- Multiple stems: Data taken only for Juniperus turbinata and Pistacia lentiscus: 38 NO (95%) and 2 YES (5%).

- Root deformations: Data taken for all 19 species. 359 NO (94.97%) and 19 YES (5.03%)
- Poor root development: Data taken for the 19 species. 321 NO (84.92%) and 57 YES (15.08%).
- Dry/mouldy/muddy/pathogenic parts: Data taken for all 19 species. 370 NO (97.88%) and 8 YES (2.12%).
- Apical buds: Data taken for 3 species: Juniperus turbinata, Pistacia lentiscus and Rhamnus lycioides. 51 WITH YEMAS (85%) and 9 WITHOUT YEMAS (15%).

Figure 44. Evaluation of the quality of a Juniperus turbinata seedling

As for the **conclusions** of the report:

The results observed lead to the conclusion that the plants analysed were of good crop quality, so that the field survival of the plants produced and planted in the field by ANSE should also follow this trend. The only alarming parameter detected was the root development in *Teucrium dunense* (Zamarrilla de dunas) - 80% of the plants analysed showed poor root development. This data should be contrasted with the general production data from the nursery in order to reach more accurate conclusions, since no other abnormal parameter was considered in this species that could be related to the poor root development. In addition, there are no records in the literature of *Zamarilla* root development in dunes at the nursery, so the problem in the plants analysed will probably be related to some of the cultivation phase(s). This scarce root development is probably related to the flooding that the nursery suffered during the autumn 2019 winter of 2020.

4. Monitoring of the execution of the works to guarantee the correct performance of the actions.

During the execution of the actions carried out by ANSE personnel and Salinera workers, a detailed follow-up of the execution of the actions has been carried out, both by ANSE technicians and with the support of personnel from the University of Murcia. Similarly, technicians from the Regional Park, Environmental Agents and staff from City Council have provided the project with recommendations and observations.

The main points to follow in the execution have been:

- Perimeter fence. Ensure the stability of the fence, minimize the winding route, adjust the lower part of the fence to the level of the sand base.
- Deposit of arrivals. Control effects on the dune cordon by burial, control adequate height, control sufficient width.
- Collectors. Correct orientation. Sufficient anchoring.
- Planting. Correct distribution of the plants by environments. Correct burying of the plant (deep planting). Control of the hydration of the plants before planting.
- Removal of IEE. Localisation of stains that have not been removed. Supervision of collections to avoid rooting.

3) "Report on the monitoring of the success of the restoration"

Monitoring of plantations of habitats of Community Interest (December 19–Spring 2022)

As anticipated to the project monitor, it was not feasible to take measurements of the 16,000 plants introduced including GPS data. For this reason, the monitoring has focused on taking data on a number of plots. A total of 9 plots were selected, choosing the areas of action with the least vegetation cover, i.e. the blowout and the trails. The plots included a representation of different environments: salt marsh (2) and dune (7). In addition, a survival count of *Juniperus turbinata* was carried out to test the success of the plantations. In total, 670 plants were monitored, of which 397 were seedlings from plantations, 187 were wild plants and 95 were maras.

As can be seen in the Table 16, already in 2020 one of the delimited monitoring plots was lost due to the disappearance of the stakes delimiting the sampling area.

Table 16. Plots to be monitored.

		2020	2021	2022
Plot	**Environment**	**%**	**%**	**%**
1	Dune	7,64	66,18	112,95
2	Dune	12,73	28,14	99,95
3	Dune	**LOST**	**LOST**	**LOST**
4	Dune	8,24	6,45	116,71
5	Dune	22,83	55,48	118,54
ss1 (sendero)	saltmarsh	7,05	9,92	80,94
ps2	saltmarsh	0,89	16,45	30,11
sd1 (sendero)	Dune	19,43	29,02	93,8
sd2 (sendero)	Dune	33,88	20,06	27,22

Figure 45. Workers doing the monitoring

The table shows how the highest vegetation growth was detected in the 2022 sampling, both on the dunes and on the trails. However, it should be noted that the percentage is an indicator, not the actual vegetation cover.

This cover indicator has been measured taking into account the width and length measurements (measuring crosswise).

Furthermore, after analysing in detail the specific composition of the cover from wild plants, it has been detected that in 2020 a large part came from annual species (*Suadea spicata, Cakile maritima*) indicating degradation (or recovery, as we have seen) of the dune systems, while in 2021 and 2022 these species have lost prominence, and the species that have been planted throughout the project have gained in importance. The most abundant species in the areas sampled was *Lotus creticus*, a species that rapidly covered the dune surface. Other species that were also very abundant during this last sampling were *Sarcocornia* and *Elymus.*

Table 17. Area covered by vegetation established at the last sampling in 2022.

Species	Area in the sampling areas (cm²)
Sarcocornia	445.136
Cutandia maritima	61.413
Echium	11.843
Elymus	410.704
Eryngium	27.171
Lotus creticus	1.996.536

In addition, a count was made of the survival of *Juniperus turbinate* (Table 18), a species classified as Endangered by Decree 50/2003, in the plantations carried out. In this case, the

proximity of the plantation area to the Mediterranean Sea and the susceptibility of this species to the sea must be taken into account. For this reason, it was necessary to install opaque protectors to avoid damage from storms. Although in the survival counts 32% of the planted specimens were affected, in 2022 many of the surviving specimens already show a high growth rate.

Table 18. Counting of Juniperus turbinata to assess the success of the restoration

Specie	Environment	Total_census	Live	Wildlife	Marras	% Marras
Juniperus turbinata	duna	182	123	0	59	,32

During these four years of the project, the success of the action has been confirmed, and the images taken with the drone have been able to represent the change that the area of action has undergone, with a great increase in the space occupied by dune and salt marsh vegetation (Figure 46, Figure 47).

Figure 46. Changes in the area of action

Figure 47. Area of action before and after the LIFE project

Comparison pre- and post-LIFE

In addition, at the end of the project, a drone flight was carried out to compare the evolution of the vegetation cover from the pre-operational state to the current state after the project (Figure

48). The results indicate a notable increase in vegetation cover, both in terms of the cover of bare spaces and the closure of paths by vegetation (Table 19).

Figure 48. Drone flying over the area of action

Table 19. Comparison Pre- and Post- LIFE

Vegetation cover	**Total**
Pre-LIFE	20.403,44 m^2
Post-LIFE I	26.748,99 m^2

The initial vegetation cover after the development of revegetation was 20.403,44 m^2 whereas the final vegetation cover has been 26.748,99 m^2.

Figure 49. GIS image of vegetation cover

Regarding the social perception on the success of restoration through the testimonies of users and interested public, most of the surveyed population considered as excellent the actions to protect and avoid dunes erosion.

Main problems encountered and solutions provided

Problem: one related to the difficulties of implementing projects on the ground (floods, DANA, Covid19) which have been reported to the monitoring team. Moreover, the monitoring objectives set are disproportionate to the budget available for the action (3.800). **Solutions**: The monitoring has been sized for existing resources. Support has been provided by interns and project operators.

Problem: One of the monitoring plots to assess the success of the restoration was lost. **Solution**: A plot was established in the area next to the lost plot, with the same dimensions.

Achieved results

The planned objectives have been achieved. The plantations have been very successful and the coverage has been increased. In addition, the paths that used to cross the salt mine area are being covered by vegetation due to the establishment of the perimeter enclosure of the area.

Remaining results

None.

Variations in action

As mentioned above, it has been necessary to adjust the monitoring to the available budget without this having a significant effect on objectives, deliverables or other actions.

Action evaluation:

We consider that the action carried out achieves the general objectives set, and success has been confirmed with the samplings carried out. Due to the low budget, it is considered a cost-effective action. There is interest in maintaining the monitoring of the area of action in the medium to long term.

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H19	Milestone	First sampling activity for monitoring revegetation actions	01/09/2019	Delayed 01/11/2019

D4. Monitoring of IAS control

✓ **Action ended**

Foreseen start date: 01/09/2019	Foreseen end date: 30/09/2021
Actual start date: 1/10/2020	Actual end date: 30/09/2022

Participants and responsibilities

ANSE

Description of activities undertaken and quantified outputs

The IAS monitoring work in the action areas started at the end of 2021, when two visits were made to the different sectors to establish 10 monitoring plots.

Once the plots had been delimited, monitoring work began as progress was made in eliminating IAS.

In 2022, once most of the IAS removal had been completed, further plots were established, bringing the total number of plots to 18. All these plots were marked out in the field by establishing stakes to delimit them. However, the growth of vegetation, storms and the change of the dune itself have caused the loss of 2 of these plots (approximate location marked in white), making it impossible to find them during sampling. Therefore, two new plots were established at the time of monitoring marked in green. The rest of the plots are shown in red in the image (Figure 50).

Figure 50. Location of the plots

As mentioned, the IAS sampling was carried out in 2022. During this year a total of 3 samplings were carried out in the exotic removal areas (in January, May and September). Table 20 shows the IAS monitoring results. **¡Error! No se encuentra el origen de la referencia.**

Table 20. Results of IAS monitoring

	Nº of plants			Plants/m2			
	1 sampling	2 sampling	3 sampling	1 sampling	2 sampling	3 sampling	Conclusion
Agave americana	145	107	8	6,3	4,7	0,35	**High decrease**
Carpobrotus	0	8	0	0	0,5	0	**Erradicated**
Yucca	0	22	7	0	2,5	0,79	**High decrease**

The most recurrent species sampled were *Agave americana* and *Carpobrotus*.

Agave americana has been eliminated in 60% of the sample plots, with a high decrease in the number of new plants. However, for this species, it is advisable to continue eliminating specimens that may be emerging.

However, *Carpobrotus* has been eradicated in all plots.

In the monitoring plots, species such as *Aeonium* and *Myoporum* were also removed and have not been detected again after their removal. On the other hand, numerous *Yucca* specimens were eliminated, which seem to continue to grow in the park. Herbicide treatment is being used to treat these specimens.

Finally, some *Eucalyptus* were removed, eliminated with herbicide, and no new resprouts were detected.

In addition, a characterisation of soil chemical properties was carried out under invasive species, native species and in areas where invasive species have recently been removed. The species evaluated were *Agave americana* and *Carpobrotus acinaciformis*, which are by far the most common and abundant invasive species in the dunes of San Pedro del Pinatar. Concerning native species typical of the dune ecosystem, *Elymus farctus* and *Lotus creticus* were chosen, which have a widespread and abundant presence in the dune ecosystem, although there are other equally characteristic species.

During June 2022, soil samples were taken from the rooting zone of each of the four species, with a total of three replicates for each species (a total of 12 samples). Soil samples were also collected in areas where the invasive species *Agave americana* and *Carpobrotus acinaciformis* had recently (early spring 2022) been removed, with a total of three replicates per species. A total of 18 samples were collected.

To show the results the species are coded as *Carpobrotus acinaciformis* (CP), *Agave americana* (AG), *Elymus farctus* (EL), *Lotus creticus* (LO). The codes for soils where *A. amerciana* and *C. acinaciformis* have been deleted are, respectively, AGX and CPX.

A soil much richer in organic C has developed under the invasive species than under the native species. This effect is especially under CP and is clearly related to the larger size and production of the invasive species (Figure 51). This is also reflected in the content of the macronutrients

K and P and less clearly for N. All this induces a higher activity in the biogeochemical cycles of N and P and less clearly in the C cycle.

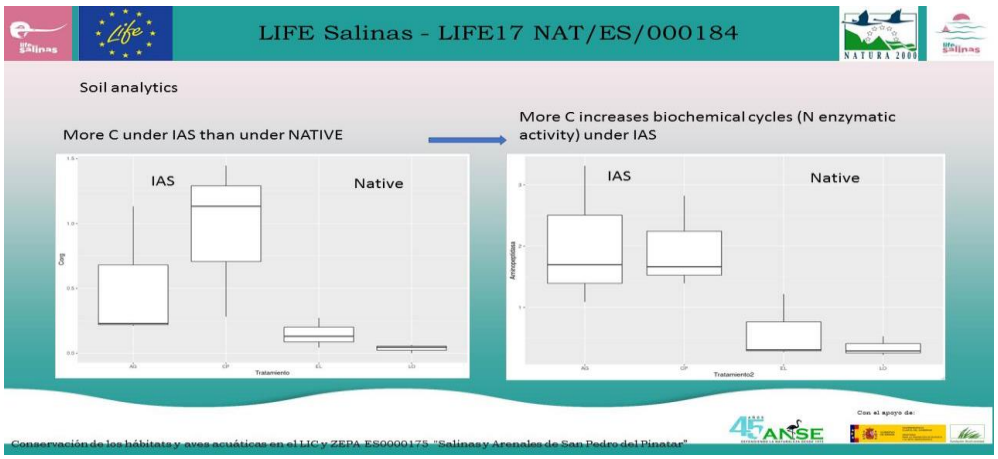

Figure 51. Effect of IAS on C content and enzymatic activity.

The suppression of the invasive species causes an increase in organic C content and the macronutrients N, P and K under CP, which originally has a much higher organic matter content than AG (Figure 52). After the suppression of both species, S increases, but to a greater extent in CP than in AG. Interestingly, K content decreases after AG suppression and increases after CP suppression. Enzyme activities related to the biogeochemical cycling of C and N show a clear increase after CP suppression but not AG suppression. For CP, all these facts can be clearly related to a decomposition shock of the roots of the invasive species remaining in the soil after suppression, enzyme activity increases as there are abundant organic residues to decompose and decomposition releases nutrients to the soil. For AG these effects are non-existent or less intense than in CP. This may be due to the much lower organic matter content under AG than in CP which results in a shorter decomposition shock (reflected in similar enzyme activities in AG vs AGX) and little increase in macronutrient content.

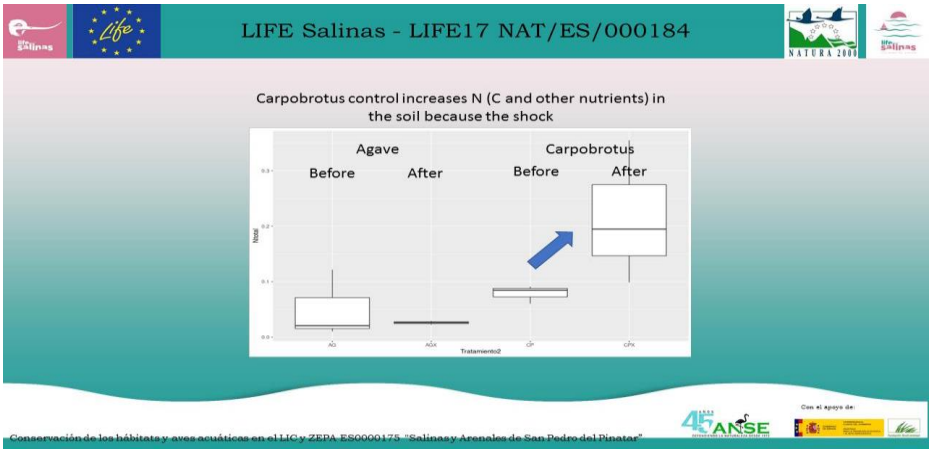

Figure 52. Effect of IAS control on soil

Main problems encountered and solutions provided

The only problem that appeared was the loss of two of the plots that had been set aside for IAS sampling. The solution was the establishment of two new plots.

Achieved results

Three samplings have been carried out in the IAS monitoring plots, and it has been possible to detect the most problematic species in terms of total eradication. In this way, it has been possible to plan the work for the coming years in terms of continuing to keep IAS at bay.

It has also been possible to evaluate the effect of the most common invasive alien species in the Park on the main soil properties and nutrients.

Remaining results

None

Variations in action

The monitoring action for IAS has been delayed compared to the initial schedule. This delay was due to the need to remove propagules of invasive alien species in the areas where monitoring plots were established.

Action evaluation:

Monitoring the plots where IAS have been removed during the project has shown the need to establish a post-LIFE work plan, as some of the species that have been removed can easily resprout. Meanwhile, other species such as *Carpobrotus* seem to be easier to control, being difficult for them to resprout.

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H18	Milestone	Start of actions for IAS control	01/09/2019	1/10/2020

D5. Monitoring of socio-economic impact

✓ **Action ended**

Foreseen start date: 01/10/2018	Foreseen end date: 30/09/2022
Actual start date: 01/10/2018	Actual end date: 30/09/2022

Participants and responsibilities

UMU

Description of activities undertaken and quantified outputs

1. Evaluation of the economic repercussion of the production of salt increasing and its evolution compared with the product before the actions carried out in the salt ponds.

To assess the project's economic impact, a study was carried out on the increase in salt production after the extension works of 1,800 linear metres of livees. The study also includes the comparative evolution of salt production in previous years, using data from 2007,

comparing, by sales sector, the average price in euros per tonne per year. Salinera Española allocates its production to four sectors: water treatment, industrial, road ice control and food.

In all four salt sales sectors the price per ton has remained constant or has increased, as can be seen in the technical report of this action (Action D5_Technical annex, included in Annex 02 Technical Annex). The predictions for the coming years are that LIFE Salinas´s action will have a positive economic impact and increase salt production.

The main objective was to find out whether the construction of 1,800 linear meters of new levees and the communication of the Coterillo pond with the salt circuit would improve the capacity to evacuate fresh water in the event of heavy rains, and therefore, whether the salt ponds are less dependent on adverse climatic phenomena. So far, the salt concentration after the work carried out has increased by two degrees baumé, so an increase in production is expected.

2. Evaluation of the economic impact of the Project on sun and beach tourism, due to the improvement of La Llana beach by containing coastal erosion

A study has been carried out on the economic and social impact on the population, in which all the agents involved in or affected by the Project's actions have participated. Firstly, a pilot survey was carried out between August and December 2019, from which 262 responses were obtained. The results were used to guide the design of the final survey. The five final survey types were: 1.Residents and tourists; 2. General or local administration staff; 3. Environmental and sports associations; 4. Business people, entrepreneurs or workers in the tourism sector; 5. Cultural or scientific agents. The surveys were launched online in March 2020 and by February 2022 a total of 2,364 final surveys had been obtained exceeding the planned target.

The survey was conducted mostly online due to the restrictions and other consequences caused by COVID-19. For this reason, much publicity was given to the online questionnaire through the project's social networks and email. The surveys have been anonymous and the results have already been obtained. The response rate was 2% of the total number of invitations sent.

The total number of final surveys received per social agent was: 688 from residents or tourists, 142 from persons linked to the General or Local Administration, 124 from persons linked to environmental associations, sports associations, federations, etc., 78 from businessmen, entrepreneurs, workers and other persons linked to the tourism sector and 1.332 from cultural or scientific agents.

Regarding the evaluation of direct effects the expenditure by the different administrations and private companies was assessed. Most of the administration´s technicians don´t know how much is invested in the Regional Park, although most work part-time in the Regional Park. As for the businessmen or workers in the tourism sector, more than half preferred not to give this information, although the majority stated that their business depended directly on the degree of conservation of the protected area.

As for indirect effects, these are mainly attributable to the capacity of attracting people generated by the SCI/ZEPA. Most tourists surveyed would repeat their visit to the protected natural area and spent less than 25 euros on their visit to the Regional Park.

As for the induced effects, most participants were unaware of the LIFE Salinas Project before the survey was carried out.

Finally, regarding the willingness to pay for access to La Llana beach, most participants from all social agents would be willing to pay €5.

3. Evaluation of the social impact among people visiting the SCI/ZEPA and La Llana beach.

In order to know the social impact of the Project on visitors, the following data were obtained: most of the people who visit the Regional Park are from Murcia. The average age of visitors is between 40 and 54 years old. A high percentage of those interviewed have university or higher education. Most of the participants rated their experience in the Regional Park very highly, only some aspects such as the control of the access road to the area or the availability of public toilets would be improved.

Finally, respondents indicated that the activities they do most frequently are sunbathing, swimming, walking, jogging, cycling, photography and nature observation. Reading, writing or drawing are also among the most frequently performed activities.

4. Estimates of the influx of visitors and/or tourists to the SCI/ZEPA and to La Llana beach in a differentiated way.

Since January 2019, two monthly counts, one on a weekday and one on a holiday, have been carried out in the Salinas y Arenales Regional Park in San Pedro del Pinatar. The protected space received approximately 306,000, 268,500 and 387,000 visitors in 2019, 2020 and 2021 respectively (including periods of home confinement or by autonomous communities due to COVID-19). Up to September 2022, the average number of visitors to the protected area has been 343,000 visitors. At the end of the present year 2022 we will be able to know the average and evolution of this influx of visitors to the protected area during the completion of the Project.

During the development of the Project, identification and mapping of the ecosystem services offered by the protected area has been carried out, to offer a clear visualisation of the services and highlight the heterogeneity of the natural space. This study is part of the doctoral thesis carried out within the framework of this Project and its results will be published in journals of high scientific value. In general terms, 32 ecosystem services were identified (4 provisionings, 14 regulating/maintaining and 14 cultural) according to the CICES classification system. The elements of the protected area were then digitised using QGIS software, associating a database with the land cover and obtaining a representation of the ecosystem services in four different categories:

i) Biotic and abiotic factors (CICES classification)

The Regional Park of the Salinas y Arenales de San Pedro del Pinatar offers 32 ecosystem services, 23 of which are provided by biotic factors (2 provisioning; 11 regulating and maintaining; 10 cultural) and 9 by abiotic factors (2 provisioning; 3 regulating and maintaining; 4 cultural) and whose cartographic representation can be seen in the following figure (Figure 53):

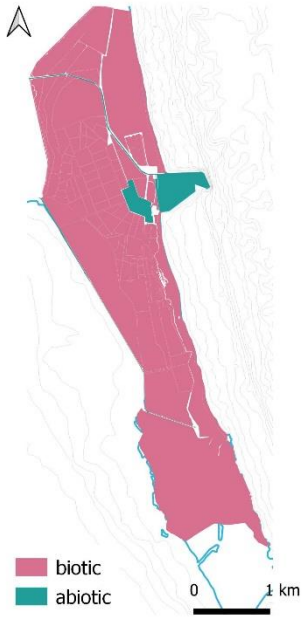

Figure 53. Biotic and abiotic factors mapping

ii) Provisioning, regulating and/or maintenance and cultural services (CICES classification).

Among the ecosystem provisioning services, in terms of surface area, the salt service stands out, due to the strong relationship between the park and its production. This service is present in 58.35% of the protected area. Fishing and seed collection services occupy more than a fifth of the Park's surface area (22.82% and 20.34%, respectively) (Figure 54).

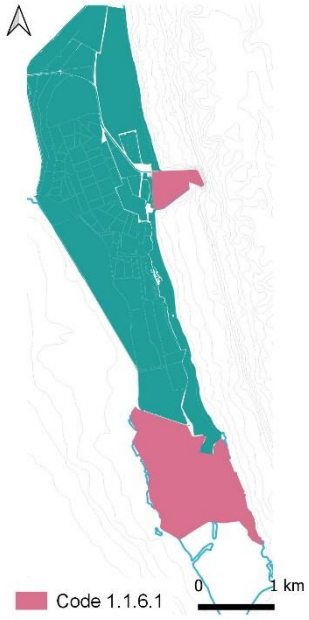

Figure 54. Provisioning: the ecosystem service with CICES code 1.1.6.1 is shown. Fisheries. The map represents those places in the protected area where fishing is allowed.

Regulation and/or maintenance services cover the park's entire surface area. These include the maintenance of soil quality through the decomposition of organic matter and greenhouse gas sinks thanks to living organisms, both of which account for 94.27% of the park (Figure 55).

Figure 55. Regulating and/or maintenance: shows the ecosystem service with CICES code 2.2.1.1. Capacity of the forest cover to prevent and mitigate the reach and strength of waves.

Cultural services occupy the largest area of the park. Four of them cover the entire surface of the park: Environmental Education, Artistic Inspiration, Cultural Icon and Nature Documentaries/Reportage. These services occupy 99.48% of the total surface area (Figure 56).

Figure 56. Cultural services: The ecosystem service with code CICES 3.1.1.1 is shown on the map where sport tourism is allowed.

iii) Classification by actions of the LIFE Salinas Project of the European Union's LIFE Program

The actions of the project acting directly or indirectly on the ecosystem services of the protected area were studied, and then a spatial representation was made.
The following image shows an example of ecosystem service 2.2.2.1. (Pollination) on which Action C4 of the Project (Revegetation with native species in the dunes of Coterillo beach) acts directly. Revegetation with species will promote pollination in other areas of vegetation in the dunes (Figure 57).

Figure 57. Example LIFE Salinas´s action that act directly or indirectly on ecosystem services (Action C4)

Action D5 of the LIFE Salinas Project is the only action that intervenes in the whole park. In terms of surface area, actions D2 and D1 are also important, these actions are present in 68.28% and 67.19% of the park, respectively.
Concerning the actions to raise awareness and disseminate the results of the LIFE Salinas Project, actions E1 and E2 are reflected throughout the park. Action E4 is also widely represented in 51.96% of the park's coverage. Action F2 involves the entire surface of the protected area.

iv) Classification by spatial units

Finally, spatial units were classified depending on whether the system is biotic or abiotic (Table 21).

Table 21. Spatial units classified is biotic or abiotic

	Spatial unit	Area (ha)
Biotics	Salt ponds	434,50
	Las Encañizadas	167,56
	Dunes	120,37
	Hillocks	42,70
	Beaches	16,12
	Sludge pond	9,61
	Coterillo pond	7,01
	Total	***797,87***
Abiotics	Port of San Pedro	23,27
	Instalaciones Salinera Española, S.A.	10,73
	Roads	6,89
	Total	***40,88***
	Total área Regional Park	***838,75***

On the other hand, in order to find out the economic valuation of ecosystem services, the surveys addressed to all social actors had a second part in which they were asked the following

questions: "Ecosystem services are those resources of nature that benefit human beings. Rate from 1 to 5 the services of the Regional Park that are most useful to you, with 1 being the most relevant and 5 the least relevant. Then choose the amount you would be willing to pay per year for these services (hypothetical, remember that the survey is anonymous)."

Next, the survey participant could read the list of the 32 ecosystem services. After choosing the 5 services, they made an economic valuation of 0, 1, 2, 2, 3, 4 or 5 Euros.

The category of regulation or maintenance was the most chosen by all social agents, with the service "Maintenance of habitats where all species live" (CICES Code 2.2.2.2.3.) being the most chosen within this category. In the following sections corresponding to the results by social agent, the category most chosen by each of them, the most relevant ecosystem services and the economic valuation given are indicated. Also the service least chosen by the participants.

- Residents and tourists. The most relevant service was "Maintenance of habitats where all species live", but they were not willing to pay anything for this service. The ecosystem service not chosen in any case was "Cultural icon".
- People linked to the General or Local Administration. The most relevant service was "Maintenance of habitats where all species live", with an economic valuation of 7.5€/year. The ecosystem service not chosen in any case was "Atmosphere as a pollution sink".
- People linked to environmental associations, sports associations, federations, etc.. The most relevant service was "Maintenance of habitats where all species live", with an economic valuation of 7.5€/year. The ecosystem services not chosen in any case was "Artistic Inspiration/Cultural Icon/Cultural Icon/Documentaries/Reportage in nature".
- Businessmen, entrepreneurs, workers and other people linked to the tourism sector. The most relevant service was "Fishing", with an economic value of €2.5/year. The ecosystem service not chosen in any case was "Symbolic importance".
- Cultural and scientific agents. The most relevant service was "Maintenance of habitats where all species live", with an economic valuation of 7.5 €/year. The ecosystem service not chosen in any case was "Artistic inspiration".
- Students and Teaching and Research Staff of the University of Murcia. The most relevant service was "Maintenance of habitats where all species live", with an economic valuation of 7.5 €/year. The ecosystem service not chosen in any case was "Cultural icon".

Main problems encountered and solutions provided

Despite the problems encountered in conducting in-person surveys after the health crisis caused by COVID-19, the expected surveys were obtained, but mostly online. We do not believe that the results of this online survey modality affected the quality of the results.

Achieved results

The total number of responses to the final surveys was 2.364, 95% of which were online due mainly to the restrictions caused by COVID-19. These 2,364 responses together with the 262 responses to the preliminary survey total 2.626 surveys, a number that represents a margin of

error of ±2% and a confidence level of 97% for a universe of 320.500 visitors/year to the protected area.

Variations in action

During the state of alarm provoked by the COVID-19 health crisis, no face-to-face surveys could be carried out, although a good number of responses were obtained telematically. In addition, efforts were also directed at carrying out an in-depth study of the state of the ecosystem services of the Regional Park.

Action evaluation:

Although the action has been affected by the health crisis, the objectives foreseen in the project have been met. For the design of the survey, a pilot survey was conducted that was not foreseen in the proposal. The pilot survey provided interesting information that guided the design of the final survey. In addition, although it was not included in the project, an in-depth study of the ecosystem services offered by the Regional Park was conducted. This aspect is included in the surveys and the participants not only made a contingent valuation of La Llana beach, but also carried out an economic valuation known as "Valuation by Choice Experiments" for the 32 ecosystem services of the protected area. In addition to being identified, these ecosystem services have been mapped and the result will be published in a journal of high scientific value. This and other published results will be posted on the Project's website and will be disseminated on the Project's social networks.

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H5	Milestone	Start of the assessment for the monitoring of socio-economic impact and ecosystems services	01/10/2018	OK 01/10/2018

D6. LIFE KPI Webtool

✓ **Action ended**

Foreseen start date: 01/09/2019	Foreseen end date: 30/09/2022
Actual start date: 01/09/2019	Actual end date: 30/09/2022

Participants and responsibilities

Salinera

Description of activities undertaken and quantified outputs:

Between March and September 2019, the project indicators were introduced in the LIFE KPI webtool. Subsequently, in July 2020, the target values introduced in the webtool were reviewed to assess compliance the objectives. At the end of the project, the indicators were updated with the results obtained up to 30/09/2022.

It is observed that all the objectives of the Project have been met, and even some additional actions have improved the overall results.

Main problems encountered and solutions provided

The access and use of the LIFE KPI webtool has been initially hard. It has been solved thanks to the collaboration of the NEEMO external monitoring team.

Achieved results

The progress of the Project's actions was monitored by updating the indicator values in 2020 and at the end of the Project with the final results obtained in 2022.

Indicators have been updated where appropriate

Remaining results

None

Variations in action

None

Action evaluation:

By updating the indicator values, it has been possible to monitor the results of the project.

Deliverables and milestones:

Code	Type	Name of deliverable	Deadline	Monitoring
H20	Milestone	Initial update of KPI	30/09/2019	OK 30/09/2019
H26	Milestone	Update of KPI for midterm report	30/09/2020	OK 30/09/2020
H31	Milestone	Update of KPI for progress report	30/09/2021	OK 30/09/2021
H33	Milestone	Final update of KPI	30/09/2022	OK 30/09/2022

E1. Dissemination

✓ **Action ended**

Foreseen start date: 01/10/2018	Foreseen end date: 30/09/2022
Actual start date: 01/10/2018	Actual end date: 30/09/2022

Participants and responsibilities

a) Environmental campaign: DGMN; b) Staff training: Salinera; c) Volunteering: ANSE; d) Website and social networks: Salinera; e) Production of dissemination material: Salinera; f) Noticeboards: San Pedro

Description of activities undertaken and quantified outputs:

a) <u>Environmental campaign</u>

The environmental campaign can be divided into three types depending on the target audience:

– Campaigns for secondary school students

These campaigns took place from 09/12/2021 to 27/05/2022. A total of 81 activities were carried out. These activities have consisted of 50 minutes talks (Figure 58), guided tours of 3 hours (Figure 59) or workshops.

This work was developed through the contract an external assistance of environmental profile (AMBIENTAL S.L.).

The materials used for the activities has:

- A power point presentation with contents adapted to secondary schools. It reviews the value of the salt mines, the Regional Park, and their relationship.
- A laminated field notebook for the guided tours, copies of which were made so pupils could complete the activities proposed along the route.
- A simulation game on the perception of different social groups of *Posidonia oceanica* banquettes presence on the beaches.
- Didactic cards with information on the birdlife of the salt mines and on the salt activity.

Figure 58. Guided tours with high school students

Figure 59. Talks with high school students

– Campaigns for primary students

These activities took place from 23/09/2021 to 19/05/2022. Two types of activities were offered: a talk and a guided tour of the Regional Park. In general, an attempt was made to offer the package of talk + visit to provide a more comprehensive service to the visitors.

This work was developed through the contract an external assistance of environmental profile (BIOCYMA).

The didactic materials used in this campaign correspond to those indicated in the TEACHING GUIDE, RESOURCES AND CONTENTS FOR THE ENVIRONMENTAL EDUCATION CAMPAIGN OF LIFE SALINAS, which includes guidelines, general and specific objectives, means of dissemination and development of presentations in different formats for talks, workshops, design of contents for guided visits in primary schools, as well as the equipment and means available for their development.

Finally, 126 activities were carried out, including talks, guided tours and workshops, with 1885 attendees (Figure 60; Figure 61).

It is important to note that 12 of the 22 schools that took part in the guided tour were paid bus trips from the school to the regional park.

Figure 60. Talk with primary school pupils

Figure 61. Guided tour with primary school pupils

– <u>Campaigns for general public and regional park workers</u>

More than 869 people took part in the 109 actions carried out (from 02/07/2021 to 29/08/2022), including talks to associations and general public, to workers in the Regional Park, guided tours or visits and celebrations of world days. In addition, around 300 users of the beaches and the access train to the Regional Park have been informed about the objectives of the project and the campaign in up to 13 dissemination and outreach sessions.

The didactic materials used in this campaign correspond to those indicated in the TEACHING GUIDE, RESOURCES AND CONTENTS FOR THE ENVIRONMENTAL EDUCATION CAMPAIGN OF LIFE SALINAS mentioned above.

Below are some images of the activities carried out (Figure 62; Figure 63; Figure 64).

Figure 62. Guided tour for English-speaking visitors

Figure 63. Project dissemination talk to workers of Salinera Española

Figure 64. Guided tour for visit

In total, 300 activities were carried out during the environmental education campaign, with the participation of more than 4.000 people.

Table 22 shows a summary of all the activities that have been carried out with the number of participants.

Table 22. Summary of environment education activities

Type of actions	Nº	Participants
Environmental education campaign in secondary schools (Environmental)		
Talks	27	707
Guided tours	27	707
Workshop	27	-
Environmental education campaigns in primary schools (Biocyma)		
Talks	42	991
Guided tours	42	894
Workshop	42	-
General public and Park workers campaign (Biocyma)		
Talks	32	58
Guided tours	48	428
World Days	8	63
Salinera Talks	4	24
Port Talks	1	6
Dissemination on beaches	7	>200
Diffusion on the access train	9	>90
TOTAL	300	>4.168

Some of the talks were held online to adapt the campaign to the health situation.

The environmental education programme was promoted, establishing contacts with secondary schools, mainly in San Pedro del Pinatar, Los Alcázares, San Javier and Cartagena. In addition, the campaign was disseminated by all possible means, both conventional and new technologies: telephone, radio, television, radio and television. through new technologies: telephone, e-mail, Facebook, and Twitter.

B) <u>Staff training</u>

Course for Salinera Española staff: 4 trainings on the project have been organised with the attendance of 24 employees (Figure 65).

- Content: Introduction, Project objectives and responsible persons, Coordination and financing, Actions to be carried out during the project, Phases and duration, Environmental improvements, Project partners.
- Dates of the courses and number of participants: 31/05/2019 (5 employees), 16/05/2019 (10 employees), 17/05/2019 (7 employees), 30/08/2019 (2 employees).

Figure 65. Salinera staff in training

Training for public authority agents: The training was held on 26 November 2018, with the attendance of 6 Environmental Agents from the Autonomous Community of the Region of Murcia (Figure 66).

Figure 66.Enviornmental agents attending to the training

C) Volunteering: ANSE

A total of 58 volunteer sessions (from 6/10/2018 to 17/09/2022) have been held with the participation of 1.344 people who have been involved in various tasks of the project, from scientific monitoring to restoration work and the removal of marine waste. The format of the activities was basically morning activity, although a volunteer camp (former work camps) was developed. The participation of a local entity (Pinatar Natura) in the activities has guaranteed

the continuous mobilization of an important number of activities, which have been coordinated at all times with the information service of the regional park.

Table 23 below shows the details of each volunteering activity held.

Table 23. Volunteering activities

ID	Date	Activity	Nº	Participants
01	6/10/2018	Birds World Day	1	36
02	12/01/2019	Census of wintering water birds	1	3
03	17/02/2019	Wetlands Day	1	31
04	9/02/2019	Dune plant propagation	1	7
05	25/05/2019	Stop plastic in sludge baths	1	29
06	2/06/2019	World Environment Day. Guided tour "Cycling through the Salt Flats"	1	20
07	4/06/2019	Dune plant propagation. Programme Erasmus Student Network Cartagena	1	13
08	6/06/2019	Withdrawal of IAS. Graduation activity of students from Secondary School Hellín	1	52
09	9/06/2019	Activity I Love La Llana. Removal of cigarette butts	1	17
10	16/06/2019	Rubbish cleaning	1	24
11	2/08/2019	Withdrawal of IEE. International Days on Coexistence	1	21
12	20/08/2019	Cleaning of marine litter	1	33
13	1/09/2019	Cleaning of marine litter	1	27
14	29/09/2019	Cleaning of marine litter	1	32
15	5/10/2019	Birds World Day	1	27
16	13/10/2019	Beaches cleaning	1	18
17	7/12/2019	Chameleon census	1	18
18	11-12/01/2020	Census of wintering water birds	2	8
19	18/01/2020	Plantation	1	11

20	2/02/2020	Wetlands Day. Planting in nursery	1	4
21	8-9/02/2020	Corporative planting activity with Navantia.	1	30
22	17/02/2020	Plantation with students of the Secondary School Carthago Spartaria (Cartagena)	1	35
23	29/02/2020	Cleaning and study of marine litter	1	23
24	23/07/2020	IAS removal in “La Torre derribada” beach	1	14
25	13/08/2020	Removal of plant protectors and Chameleon census	1	16
26	01/10/2020	Paint nesting boxes for common shelduck	1	6
27	10/10/2020	Rubbish cleaning	1	22
28	29/03/2021	Rubbish cleaning	1	15
29	29/03/2021	Photography contest	1	40
30	02/05/2021	IAS removal	1	13
31	21/05/2021	IAS removal	1	12
32	3,9,10, 16/05/2022	Cleaning of marine litter and characterisation with Manuel Tárraga Secondary School	4	125
33	7,21, 22/04/2022	IAS removal	3	150
34	27/03/2022	Activity with the pensioners' club of Ceutí	1	90
35	26/02/2022	Activity "speed and birds".	1	9
36	28/02/2022	*Limonium* plantation with IES El Palmeral from Orihuela	1	8
37	06/02/2022	Plantatio	1	20
38	29/01/2022	Wetland day	1	16
39	15/01/2022	Waterbird census	1	10
40	24/10/2021	Salt harvesting	1	26
41	17/09/2022	Rubbish cleaning	1	25

42	03/08/2022	Rubbish cleaning and chameleo census	1	20
43	07/07/2022	IAS removal and chamelea census	1	28
44	21/09/19	Rubbish cleaning	1	22
45	14/08/21	chamelea census	1	13
46	7/08/21	chamelea census	1	17
47	11/07/21	Turtle territory	1	19
48	2/07/2021	chamelea census	1	17
49	14-18/07/2019	Volunteer camp (days of effective work at LIFE)	4	72 (4 x 18)
TOTAL			58	1.344

Images of the volunteer work are shown below (Figure 67; Figure 68; Figure 69; Figure 70).

Figure 67. Dicember/19 Chamaleon census and January/20 Wintering aquatic birds census

Figure 68. January/20 Plantation in La Llama and seedling in nursery

Figure 69. Students from IES Carthago Spartaria on La Llana beach and cleaning and waste removal

Figure 70. Removal of IAS 13/08/2020.

D) Website and social networks

Salinera Española S.A., coordinator of the project, was responsible for the creation and maintenance of the website, as well as the social networks Facebook and Twitter. In addition, although it was not contemplated in the proposal, Instagram and YouTube accounts were created.

The Project's website is http://www.lifesalinas.es and was created on 12 February 2019. The website has 6 pages: Home, The Project, Networks, Publications, News and Contact. Some of these pages have drop-down menus. Normally a weekly news item was published with information about the progress of the Project, describing the Regional Park "Salinas y Arenales de San Pedro del Pinatar" and other related aspects. Between 12 February 2019 and 20 September 2022, 23,635 unique users and 61,041 visits have been registered. The average session duration has been 1 minute and 26 seconds, while the average number of pages or sections viewed in each session is 2.

The Figure 71 shows the growth in the number of visits to the website over the years.

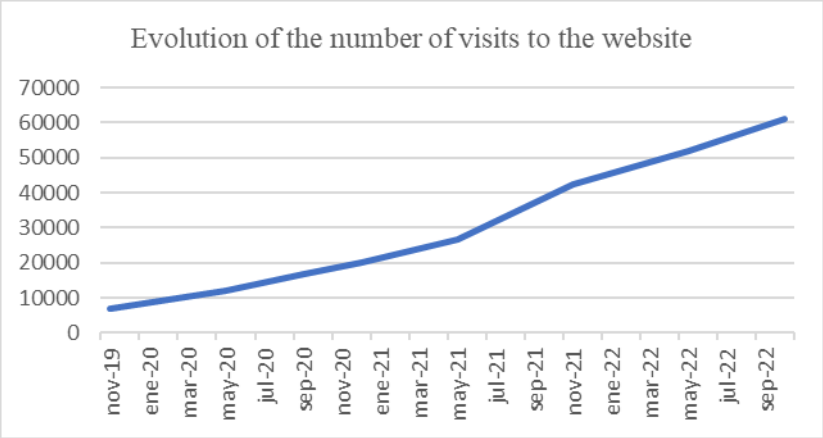

Figure 71. Evolution of website visitors

Around 90.6% of the website audience were occasional users, while 9.4% were regular users. Following the improvement of the health situation brought about by COVID-19 and the start of the environmental education campaign in July 2021, increased activity in Project participation and a substantial increase in website visits began (Figure 72).

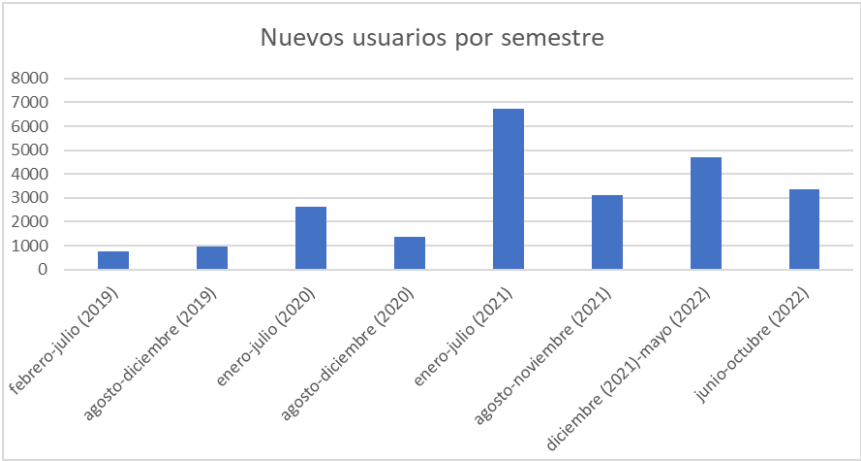

Figure 72. New users per semester of the web.

Finally, the 4 web news with the highest number of visits are presented (Table 24):

Table 24. News with the greatest reach on the web

Title	Number of visits	Link
Vegetation and flora in Salinas y Arenales de San Pedro del Pinatar Regional Park	1.385	https://lifesalinas.es/vegetacion-y-flora-en-el-parque-regional-salinas-y-arenales-de-san-pedro-del-pinatar/
Do you know what a ZEPA is?	1.368	https://lifesalinas.es/sabes-que-es-una-zepa/#:~:text=Una%20Zona%20de%20Especial%20Protecci%C3%B3n,utilizadas%20por%20las%20aves%20migratorias.

The Glossy Ibis in the salt flats of San Pedro del Pinatar, a new breeding species in the Region of Murcia	546	https://lifesalinas.es/el-morito-en-las-salinas-de-san-pedro-del-pinatar-nueva-especie-reproductora-en-la-region-de-murcia/
Beginning of environmental education activities for high school	528	https://lifesalinas.es/inicio-de-actividades-de-educacion-ambiental-para-secundaria/

Social networks

- **Facebook**

The following table shows a summary of the number and type of publications made on each social network (Table 25). The contents were about the progress, news, actions, singularities, characteristics of the Salinas de San Pedro del Pinatar, visits, participation in events, meetings, trips, volunteering, environmental education, etc.

Table 25. Summary of the number and type of publications

Social networks	Number of publications	Type
Facebook	591	Post
	188	Story
Instagram	419	Post
	188	Story
Twitter	419	Tweets
	1011	Retweets

The Facebook account was created in December 2018 and by the end of the project had 1.512 followers and 1,306-page likes. The scope of the Facebook page was 74.462 people.
In general, the posts with the highest reach were related to birds or volunteering activities. The post with highest scope was the attempt to breed a flamingo (*Phoenicopterus roseus*) in the motes built as part of the project with a total of 8.294 people (Figure 73).

Figure 73. Post publication of flamingo nesting attempt

Other publications with a high reach were related to volunteering activities (reach of 6,247 people), environmental education activities (reach of 6,053 people) and the link to a video posted on the Project's YouTube channel (reach of 5,591 people) (Figure 74).

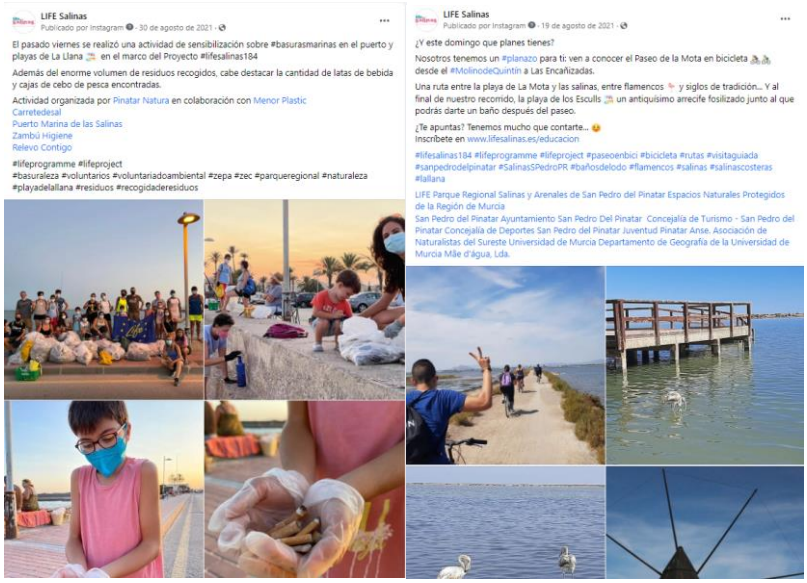

Figure 74. Publications with greater reach on Facebook.

– **Instagram**

The social network Instagram started its activity on 12 January 2019. In September 2022 it had 418 publications and a total of 1,184 followers (Figure 75).

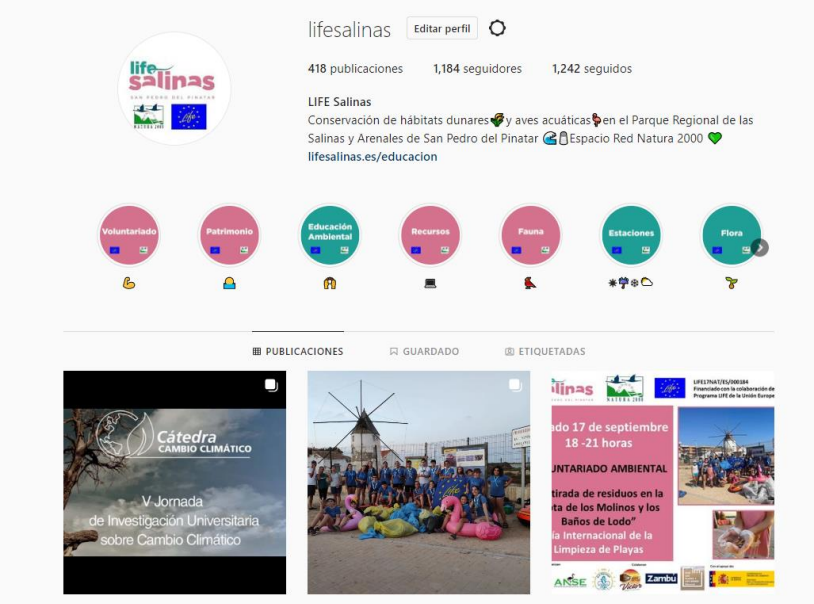

Figure 75. LIFE Salinas Instagram

– **Twitter**

Twitter was created in December 2018. As of September 2022, it had 687 followers. Below is the number of impressions (number of times a user is Tweeted on the timeline or in search results) by quarter (Figure 76).

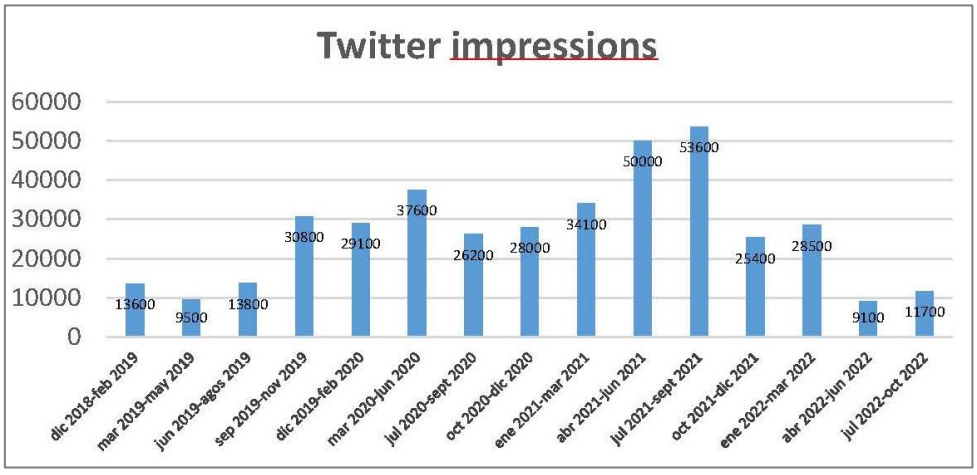

Figure 76. Twitter impressions per quarte

– **Youtube**

Until September 2022, 19 videos have been edited and published on the project's channel, with a total of 1.413 views (Figure 77).

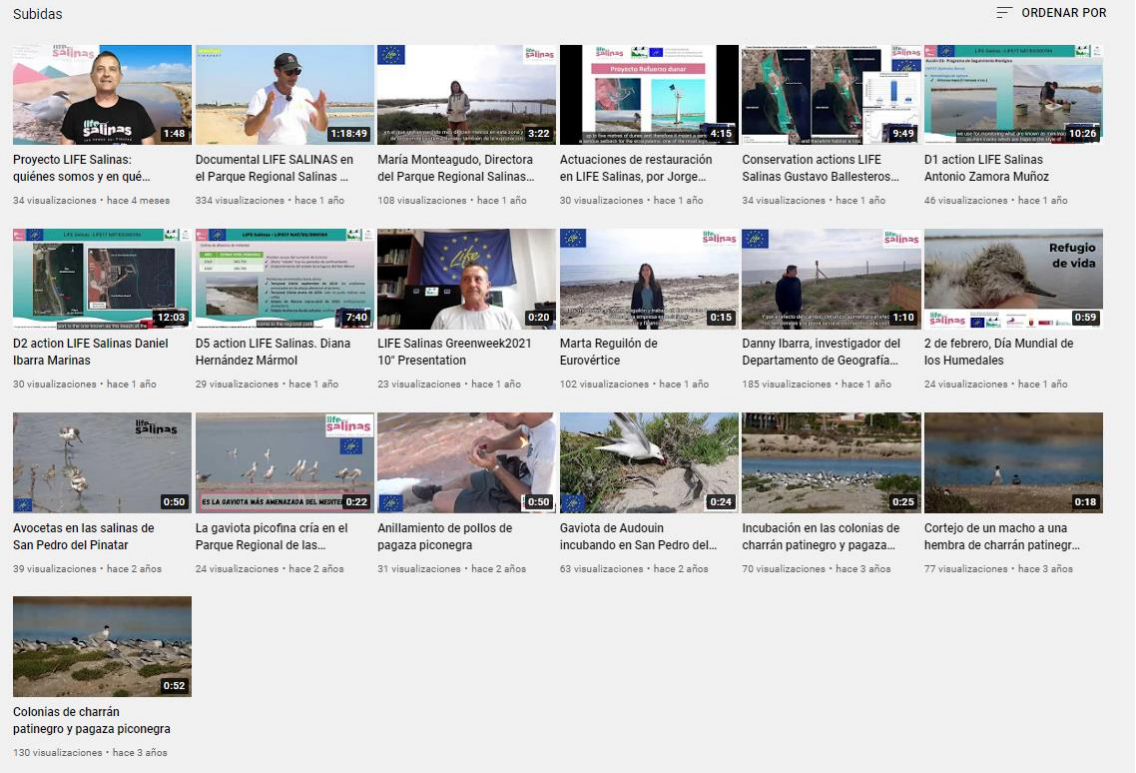

Figure 77. Videos published on the Project's YouTube channel.

E) Production of dissemination material

Informative and promotional material has been designed, edited and printed to be able to disseminate actions, objectives and results expected in LIFE Salinas Project. With this, the objectives (milestones), contemplated as part of Action E.1, are achieved, ending the publication of material in October 2019.

Table 26 shows a summary of the printed dissemination materials.

Table 26. Dissemination materials printed

Material	Units	Characteristics
Diptych	1.500	Contents: objects, actions and expected results of the LIFE Salinas project. The design and printing is full colour on recycled paper 210 x 210 mm, closed; 420 x 210 mm, open.
Roll-up	4	Contents: objects, actions and expected results of the LIFE Salinas project. Printed on canvas in full colour, with a size of 850 x 2,000 mm.
Didactic notebook	500	The design and printing is full colour on recycled paper, 210 x 297 mm. closed; 420 x 297 mm. open.
Photocall	1	The design and printing is full colour on Pegasus Lightforce, 1,000 x 1,500 mm.
Poster	500	Contents: show avocets (Recurvirostra avosseta). nesting water birds in the Salinas de San Pedro Regional Park. Size A2 (420 x 594 mm), on 250-gram thick paper with a gloss coating.

Stickers	1.000	Contents show some avocets (Recurvirostra avosseta), nesting water birds in the Salinas de San Pedro Regional Park 148 mm round stickers in white PVC, 90 μ thick
T-shirts	800	Contents: logo of the Project The material of the t-shirts is 100% cotton, 250 units in white and 250 units in black, in various sizes from S to XL
Caps	500	Contents: logo of the Project. The material of the caps is 100% cotton not dyed.
Pen	750	Contents: logo of the Project The pen's material is corn starch, biodegradable (53%) and recycled cardboard, with blue ink.
Notebooks:	600	Contents: the logo in black and white and a diagram inside with a summary of the Project's actions The material of 140-page notebook is recycled paper and contains a blue-ink pen made of recycled cardboard and biodegradable plastic.
Bookmark	2.000	The bookmark material is 300g thick paper, with a matt coating and includes sentences related to the History of Salt.
Salt shakers:	2.000	Contents: logo of the Project. They are made in glass jars with a metal cover, with a capacity of 30 gr. of Flor de Sal.
Cloth bag	500	Contents: logo of the Project They are pink TNT fabric bags with handles.
Digital games	5	Online digital games, 4 of them are themed question-and-answer games: (BIRDS, FAUNA, FLORA AND SALINAS) https://quizizz.com/collection/5d314f7e07dc54001adb3180 and 1 of pairs available at: matchthememory.com/lifesalinas

These materials have been distributed mainly among volunteers and winners of communication quizzes and competitions (~ 145 communication packs), San Pedro del Pinatar Tourism Office (100 didactic notebooks), environmental agents and personnel of the Visitors Center (12 communication packs), Salinera staff (125 communication packs) and project partners (30 communication packs).

The material designed can be found in the annex: Action E1_Dissemination material.

f) Noticeboards

According to the proposal, 5 noticeboards have been produced to inform about project actions. They have been installed in the following locations inside and around the Regional Park (Table 27):

Table 27. Noticeboard's locations

N°	Location	Coordinates	Type of information provided
1	Entrance to the Regional park	Latitude: 30° 50' 5.18"Length: 0° 46' 38.46"	Action C1 – Works in salt levees
2	Coterillo car park	Latitude:37°49' 25.10"Length: 0° 45' 36.06"	Action C2 – connection of the salt circuit with Coterillo pond
3	Entrance to La Llana beach	Latitude:37° 49' 4.13' Length: 0° 45' 32.11"	Action C3. Dunes stabilization
4.	Entrance to the Regional park (other access in Lo Pagán, Molino Quintín)	Latitude:37° 49' 12.04'Length: 0° 46' 30.79"	General information about LIFE-SALINAS
5.	Visitors Center	Latitude:37°50' 5.06"Length: 46° 46' 43.11"	General information about LIFE-SALINAS

One of the proposed locations was "Curva de la Culebra" but it has been changed by the second entrance to the Regional Park, opposite to Molino Quintín, since the first location has already various noticeboards and in the second one there is a high visitors affluence (Figure 78). Above, an image with the locations can be consulted.

Figure 78. Locations LIFE Salinas´s noticeboards

g) Layman report

A Layman report was elaborated by Salinera (Figure 79) in August of 2022. The contests are: Objectives, actions (methodologies and techniques used), results: environmental benefits, applicability and transferability and project´s dissemination.

Figure 79. Layman report front cover

The Layman report has been disseminated by: the Project Website, newsletter, Autonomous Community of the Region of Murcia; San Pedro del Pinatar Town Council and University of Murcia.

Main problems encountered and solutions provided

a) Environmental campaign: In 2019, DGMN had financial and budgetary constraints since until the end of 2019, the budget for the environmental campaign were not incorporated to the budget of this body. Then, the provided amount (15,000€) had to be executed in the same budgetary exercise. In 2020, the campaign has not been developed due to budget management and contracting problems and because of additional administrative delays caused by the COVID19 pandemic. The budget of the Autonomous Community of Murcia was not approved until April and, once approved, due to the lockdown situation the procedure for the execution of the campaign has not been done on time to be terminated before the end of 2020. Due to the problems mentioned above, all planned activities had to be carried out in the last two years of the project.
b) Staff training: no problems or unexpected events have been produced.
c) Volunteering: No special problems have been found when it comes to volunteering, except for limitations during the COVID state of alert. In this sense, the CARM has been quite conservative in authorising activities until the total lifting of the same, which has resulted in the restriction for organizing volunteering activities between February and July.
d) Website and social networks: Due to the delay in other actions of the Project and the state of alarm caused by the coronavirus, a lower volume of events that could be news have been generated. However, as a solution, publications have been made on other aspects such as the natural values of the protected area: flora, fauna, historical heritage, etc. In this way, the pace of publication on the website and social networks has been maintained.
e) Production of dissemination material: no significant problems have been produced.
f) Noticeboards: no important problems have been produced.

Achieved results

- The environmental education programme has raised awareness among 3.740 people.
- 300 environmental education activities have been organised.
- Salinera has developed the Project's website and the social networks Facebook and Twitter. Although the Project planned to update it monthly, both the website and the social networks are updated weekly with some exceptions (August holiday period). Furthermore, and although it was not foreseen in the Project, another account has been created in the social network Instagram and a channel in Youtube.
- 58 volunteer activities were carried out, exceeding the 48 planned activities and involving more than 1,200 people.
- 5 noticeboards installed in locations of high visitors affluence.
- Design and edition of foreseen materials (1500 diptych, 500 posters, 4 rollups, 800 T-shirts, 500 caps, 600 notebooks, 750 pens) that have been distributed among stakeholders of the project (personnel of Salinera and DGMN), volunteers and participants in communication actions.
- Design and edition of additional materials: photocall, stickers, bookmarks, salt shakers, cloth bags and digital games.

Variations in action

a) Environmental campaign: The start of the environmental campaign has been moved to 2021.
b) Staff training: The proposal included a training course for at least 10 workers from Salinera during 2020. Once the Project was launched, it was considered appropriate to bring this action forward to 2019 and to give 4 courses in which a total of 24 workers participated, so that they could rotate and not affect salt production tasks.

Action evaluation:

In general, the environmental education campaign has been very well received. The demand from schools has been amply met, despite the pandemic situation.

The publication and dissemination of the campaign on the EDUCARM portal meant that schools from all over the Region were asked to participate, although priority was given to those located in municipalities close to the Regional Park.

Most of the participants congratulated the team in charge of monitoring the campaign, surprised by the creativity of the workshops and the approach of the talks and guided tours. Another element that has been a success is the organisational scheme in "packages" of talk and guided visit, as it allowed to deepen the contents seen in the classroom with the experiential part of the guided visit.

The objective of explaining the objectives and contents of the LIFE Project to 24 workers in Salinera has been surpassed, exceeding the number foreseen in the planning which was a minimum of 10 workers.

The project's website and accounts on different social networks have been created, with a great number of followers and visits. In addition to a Youtube channel. All of this has given the project a wide reach.

Regarding volunteering has resulted to be a very valuable and cost-effective tool both for the implementation of conservation actions and for raising awareness, supporting the project and disseminating its objectives. The participation of local entities (Pinatar Natura) together with the close coordination with the information service of the Regional Park and the integration of a volunteer camp in the programme has made it possible to achieve the objectives set.

With the publication of material, the objectives set in the proposal have been surpassed, since additional materials have been designed and printed.

The installation of 5 information panels is fulfilling the objective of informing visitors of the actions being carried out. Once the Project is completed, the information panels will remain in their current location for an indefinite period of time.

We have been surprised by the high interest of the media in LIFE Salinas Project. No number of interventions had been specified in the Project, but most of the 106 participations have been at the request of the media, so the objectives of giving a wide diffusion of the Project have been fulfilled.

Deliverables and milestones

Code	Type	Name of deliverable	Deadline	Monitoring
H1	Milestone	Start of environmental volunteering activities	01/10/2018	OK 06/10/2018
H11	Milestone	Design of logo	30/11/2018	OK 20/12/2018
H14	Milestone	Installation of project’s noticeboards	31/12/2018	OK 27/03/2019
H16	Milestone	Design of webpage and start of its functioning	01/01/2019	OK 12/02/2019
D6	Deliverable	Report on dissemination material produced	31/10/2019	OK 31/10/2019
D9	Deliverable	Report on realization of training course for Salinera’s employees	31/10/2020	Delivered final report 31/10/2020
D10	Deliverable	Report on realization of training course for authority officials	31/12/2020	Delivered final report 31/12/2020
D15	Deliverable	Layman Report	30/09/2022	OK 30/09/2022

E2. Replicability

✓ **Action ended**

Foreseen start date: 01/10/2018	Foreseen end date: 30/06/2019
Actual start date: 01/10/2018	Actual end date: 30/06/2019

Participants and responsibilities

Coordinated by Salinera, who participates in all the actions.

UMU: organises conferences, forums and networks. Publications. National and international events. Cooperation

Description of activities undertaken and quantified outputs:

a) Organization of the initial conference of the Project

The Life Salinas opening ceremony was held in the University of Murcia Law Faculty on February 5th, 2019 (https://lifesalinas.es/jornadas-de-presentacion-del-life-salinas/). The opening ceremony was presided by Mayoress of San Pedro del Pinatar, the Director of Salinera Española, the Director of ANSE, the Vice-rector of Research and Transfer of University of Murcia, and the Director of the Natural Environment General Directorate of Murcia Region.

Julio Fernández (Salinera Española) explained the objectives and methodology of the project. Francisco Belmonte Serrato (University of Murcia) and Jorge Sánchez (ANSE) explained the actions of the Life Project (Figure 80).

Figure 80.Opening day of the LIFE-Salinas project

More than 100 people attended this event.

In addition, the event was attended by two exceptional guest speakers. Diyana Kostovska, is project coordinator at Bulgarian Biodiversity Foundation (BBF), and Derek Jackson, is professor at the Environmental Sciences Research Institute of the University of Ulster.

Figure 81. Banner of the presentation day

b) Organization of 1 international conference, production of two newsletters and creation of two international forums.

Organisation of an international conference

On 21 May 2021, the "Conference on coastal dynamics and biodiversity in coastal salt ponds" was held with a total of 10 presentations (https://www.facebook.com/LIFESalinas/photos/pb.100038813179833.-2207520000./2624313767868353/?type=3) (Figure 82) . Four of them from other European Union countries:

- Former salt mines restoration in Camargue: LIFE Mc-SALT project (2012-2016) (Brigitte Poulin&Marc Thibault - Tur du Valar, France),
- Waterbirds in Cagliari wetlands: figures and aspects on their management (Sergio Nissardi&Carla Zucca - Anthus snc, Italy),
- Portuguese salt mines: Waterbirds and biodiversity (Renato Neves - MDA Portugal),
- Design of three free and open-source tools for the analysis of sea level rise (EPR4Q, uBTM and BRGM) (Lucas Terres de Lima - University of Aveiro - Portugal)

The rest of the speakers were on the development of the LIFE SALINAS Project:

- Proposal for a quality certificate for salt produced in protected natural areas (Katia Hueso)
- Actions for the conservation of waterbirds and improvement of salt production in the San Pedro del Pinatar´s Salinas (Gustavo A. Ballesteros),
- Interventions for recovering habitats of community interest in the sandy areas of San Pedro del Pinatar (Jorge Sánchez Balibrea),
- Evaluation the success of LIFE SALINA's actions through biological monitoring (Antonio Zamora),

- Shrinking beaches: problems in paradise (Daniel Ibarra)
- Mapping seagrass meadows using remote sensing and machine learning (Pedro Escudero).

Figure 82. Banner of the international conference

Elaboration of 2 newsletter

On LIFE Salinas´s website there are several newsletters on two topics:

- Coastal Geography: https://lifesalinas.es/otros/
- Biodiversity in Coastal Salinas: https://lifesalinas.es/biodiversidad/

The Coastal Geography newsletter has had 397 visits by 336 different people, and the Biodiversity in Coastal Salinas newsletter has had 264 visits by 157 different people.

Creation of 2 international forums

There are two active international forums, hosted by social networks:

- Forum on coastal erosion and climate change (https://www.facebook.com/groups/531590370209685/): 461 members.
- Forum on biodiversity conservation in salt mines in the link (https://www.facebook.com/groups/251356095754119/): 57 members.

c) Attendance at events for the replicability and transferability of the Project

A total of 38 events were attended, scientific (conferences, seminars and congresses), educational (e.g. master's conferences) and technical (e.g. LIFE 2020 conference). Of these, 21 events were international, 11 national and 6 regional.

Table 28 contains a summary of the conferences, scope activities and participants in these events.

Table 28. Summary of conferences, scope and participants.

Date	Organised by	Activity	City/ Country	Scope	Participants

22/09/2018	Institute of Salt Heritage and Landscapes IPAISAL	Present and future of saltworks in Murcia and Spain. https://www.facebook.com/EspNaturalesMur/photos/jornada-presente-y-futuro-de-las-salinas-de-murcia-y-espa%C3%B1a-%EF%B8%8Fs%C3%A1bado-22-septiembr/541436159654725/	Murcia	National	-
26/10/2018	Faculty of Biology. University of Murcia	Seminar of the PhD Programme "Biodiversity and Environmental Management". https://www.facebook.com/373532809671783/photos/a.378713075820423/715138948844499/	Murcia	International	30
09/10/2018	Atlantida S.L.	Conference: Planning and Projects on Coastal Salt mines: salt mines and sustainable employment II Conference: "Successful the LIFE17 NAT/ES/000184 project". https://galpemur.es/wp-content/uploads/2018/08/Cartel-ProyectosMurcia.jpg	San Javier	National	-
11/10/2018	Atlantida S.L.	Conference on participation in public management linked to salt mines. Conference: "Coastal salt mines management models and synergies between actors". https://galpemur.es/wp- content/uploads/2018/08/Cartel-Participacion-Murcia- 2.jpg	Cartagena	National	-
08/11/2018	FRECT, Avinenca, Generalitat Valenciana, Diputacio de Valencia	VII State Conference on Land Stewardship https://drive.google.com/file/d/1WQMmticaFFuOtUgiLRQ0G2tS8VMHACUA/view	Valencia	National	82
23/01/2019	Faculty of Biology. University of Murcia.	Biodiversity and Environmental Management Seminars. Conference: "Presentation of the LIFE-SALINAS Project". https://lifesalinas.es/presentacion-del-life-en-la-facultad-de-biologia/	Murcia	International	25
27/02/2019	Faculty of Veterinary Medicine. University of Murcia	Master's Degree in Wildlife Management. Conference: "Presentation of LIFE-SALINAS project". https://lifesalinas.es/presentacion-del-proyecto-life-salinas-a-alumnos-y-alumnas-de-master/	Murcia	International	30
30/04/2019	Directorate-General for the Natural Environment	Governing Board of the Regional Park of the Salinas y Arenales de San Pedro del Pinatar. https://lifesalinas.es/reunion-de-la-junta-rectora-del-parque-regional-salinas-y-arenales-de-san-pedro-del- pinatar/	San Pedro del Pinatar	Regional	-
29-31/05/2019	International Doctoral School. University of Murcia	5th Doctoral Conference. Conference: Ecosystem services and socio-economic evaluation of San Pedro del Pinatar salt mines. https://www.facebook.com/photo/?fbid=2099397600359975&set=pcb.2099397763693292	Murcia	International	-
19/06/2019	Directorate-General for the Natural Environment	Technical seminar: "monitoring and management of avifauna and ichthyofauna in Mar Menor". https://www.facebook.com/photo?fbid=2113176665648735&set=pcb.2113177022315366	Murcia	National	-

21/06/2019	Directorate-General for the Natural Environment	Meeting: drawing up a tourist-interpretative map of the Regional Park. https://www.facebook.com/photo?fbid=2113176665648735&set=pcb.2113177022315366	San Pedro del Pinatar	Regional	-
19-21/07/2019	Amigos de las Salinas (Pozo de la Sal) and IPAISAL	20th Anniversary of the Asociacio Amigos de las Salinas de Poza and VIII Meeting of the Red Iberica de Salinas Tradicionales. https://ipaisal.org/celebrado-el-viii-encuentro-de- salinas-tradicionales-ibericas-en-poza-de-la-sal/	Poza de la Sal (Burgos)	International	70
25-29/08/2019	European Ornithological Union (EOU)	XII European Ornithological Congress. https://lifesalinas.es/miembros-de-la-umu-y-salinera-espanola-acuden-al-12o-congreso-de-la-union- ornitologica-europea/	Cluj-Napoca (Romania)	International	-
7-9/11/2019	Spanish Society for the Defence of Geological and Mining Heritage	III International Congress on Salt in Peralta de la Sal (Huesca). https://lifesalinas.es/life-salinas-participa-en- el-iii-congreso-internacional-sobre-la-sal-en-peralta- de-la-sal-huesca/	Huesca	International	-
13-17/11/2019	SEO/BirdLife	24th Spanish and 7th Iberian Ornithological Congress. https://lifesalinas.es/life-salinas-participa-en-el-en-el-xxiv-congreso-espanol-y-vii-iberico-de-ornitologia/	Huelva	International	-
13-14/11/2019	Spanish Ministry of Science and Innovation and CSIC	XI Conference on Biodiversity Information and Environmental Administration. https://www.facebook.com/LIFESalinas/posts/pfbid0P JJeT7WqV22B5eqpAVjtbBbGnjkthnN3CuXxWSFjRz svyVqTvC9pVuCLABygMEz7l	Murcia	National	-
11/12/2020	Directorate General for the Mar Menor	Meeting: Mar Menor Scientific Committee. https://canalmarmenor.carm.es/wp-content/uploads/20201211_acta.pdf	San Pedro del Pinatar	Regional	35
19/02/2020	San Pedro del Pinatar City Council	Meeting: Social Council of the City of San Pedro del Pinatar. https://www.sanpedrodelpinatar.es/participacion-ciudadana/el-consejo-social-de-ciudad-aborda-el- estado-del-mar-menor-los-presupuestos-participativos- y- el-proyecto-life-salinas/	San Pedro del Pinatar	Regional	-
20/02/2020	LIFE INDEMARES. Biodiversity Foundation	Meeting: Audouin's Gull Working Group. https://lifesalinas.es/participacion-en-el-grupo-de-trabajo-de-la-gaviota-de-audouin/	Almeria	National	-
26/03/2020	Faculty of Veterinary Medicine. University of Murcia	University Master's Degree in Wildlife Management: LIFE project. https://www.facebook.com/LIFESalinas/posts/pfbid02 kbFYJRX4DHysaEnvM9kqRcfpQSw9rcLkUo9UZjw PmNTMurDKe3pdioiHQqb5QhXvl	Murcia	International	25
26/05/2020	Instituto de Fomento de la Región de Murcia (Murcia Regional	Conference on the LIFE2020 Call for Proposals. https://lifesalinas.es/participacion-en-la-jornada-sobre- la-convocatoria-life-2020/	Murcia	National	-

	Development Institute)				
01/10/2020	LIFE15 NAT/LV/000900 CoHaBit	International Conference "Sustainable Management on Conservation of Coastal Habitats and species ". https://dabasparkspiejura.lv/images/E3_conference_report_f.pdf	Latvia	International	-
26/10/2020	Iberian Association of Limnology	XX Congress of the Iberian Association of Limnology. Communication presentation. https://lifesalinas.es/creacion-de-un-sello-de-calidad- para-la-sal-producida-en-espacios-red-natura-2000/?fbclid=IwAR3Fcnd20-J4GcjDyQ9JmviO5YNTqPoixkRDss8Iwdv6tZchNJaz wAFdm1whttps://www.limnetica.com/es/limnologia- 2020	Barcelona	International	-
10/03/2021	eumed.net University of Malaga	IV International Congress on Social Economy and Sustainable Local Development. https://congresos.eumed.net/congresos/54/presentacion	Malaga	International	-
25-26/03/2021	GOBERPARK. Conservation Anthropology/ University of Valencia	II Jornadas Internacionales de Antropología de la Conservación (2nd International Conference on Conservation Anthropology). https://lifesalinas.es/gustavo-ballesteros-presenta-el-proyecto-life-salinas-en-las-ii-jornadas-internacionales-goberpark/	Valencia	International	80
16/04/2021	Faculty of Veterinary Medicine. University of Murcia	Master's Degree in Wildlife Management. Presentation of the LIFE-SALINAS project." https://lifesalinas.es/presentacion-del-proyecto-life-salinas-a-alumnos-y-alumnas-de-master/	Murcia	International	-
4-7/05/2021	European Commission	Natura 2000 Mediterranean Biogeographical Region Seminar. "Third Mediterranean Seminar. https://ec.europa.eu/environment/nature/natura2000/platform/documents/third_Mediterranean_seminar_2021 /Med_Input_doc.pdf	Calabria (Italy)	International	-
18/05/2021	Department of Geography. University of Murcia	Geographical Research Seminars: Presentation of the LIFE-SALINAS Project. https://www.facebook.com/LIFESalinas/posts/pfbid02DWdVARWAPJxd4HfJQHJX9fjSY4gKxt3t1Q7pWqr NxJDsUD1BAWdSMxhP5xy6ozc5l	Murcia	Regional	-
22/06/2021	University of Murcia	VI EIDUM Doctoral Conference: presentation of communications. https://www.um.es/en/web/eidum/actividades/jornadas -doctorales/2021	Murcia	International	-
04/05/2021	International Society for Salt Lake Research	Organising committee and presentation of papers. https://www.icslr2021.es/	Murcia	International	-
07/07/2021	LIFE16 CCA/EN/000077 LIFE HEATLAND	Conference on climate change in Murcia. https://twitter.com/LSalinas184/status/1413102076981387264/photo/1	Murcia	Regional	-

29/09/2021	Association of Industrial Archaeology Industry-Culture-Nature (INCUNA)	XXIII International Conference on Industrial Heritage. https://incuna.es/wp-content/uploads/2021/09/English-Programme-Prov-XXIII-JORNADAS-INTERNACIONALES-DE-PATRIMONIO-INDUSTRIAL-3.pdf	Gijón	International	-
18-22/10/2021	International Society of Salt Lake Research	14 th International Conference of ISSLR on Inland Salt Lake and Salinas. https://www.icslr2021.es/ https://d.facebook.com/LIFESalinas/photos/a.2022457244720678/2722975044668891/?type=3&source=48	Murcia	International	206
14-17/12/2021	Association of Spanish Geographers	XXVII Congress of the Spanish Geography Association (AGE). https://www.age-geografia.es/site/wp-content/uploads/2021/12/Libro-Resumenes-Aportaciones-al-XXVII-Congreso-de-Geografia.pdf	La Laguna	National	-
21/04/2022	ANSE and Fundación Biodiversidad (Empleaverde Programme)	Conference: Meeting for the promotion of biodiversity in artificial wetlands. https://lifesalinas.es/el-proyecto- life-salinas-participa-en-el-taller-para-el-intercambio- de-ideas-en-la-integracion-de-la-biodiversidad-y-la-sostenibilidad-en-el-diseno-y-el-mantenimiento-en-humedales-artificiale/	Elche (Alicante)	National	21
13/11/2018	H2020 COASTAL (CSIC)	Meeting for exchange of experiences. https://h2020-coastal.eu/multi-actor-labs	Murcia	International	-
5-8/05/2022	Department of Geography. University of Oviedo	II Iberoamerican Congress of Biogeography and XII Spanish Congress of Biogeography. https://lifesalinas.es/el-proyecto-life-salinas-participa- en-el-ii-congreso-iberoamericano-de-biogeografia-y-xii-congreso-espanol-de-biogeografia/	Pola de Somiedo (Asturias)	International	-
22-23/09/2022	Chair of Climate Change Polytechnic University of Valencia	5th Conference on University Research on Climate Change. https://www.iiama.upv.es/catclima/wp-content/uploads/Bloque_3.pdf	Valencia	National	-

d) Participation in the Brussels Green Week (Grenweek)

LIFE Salinas participated in the European Union Green Week 2021 (Mar 2021), the most important annual conference on environmental policy in the Union. On the event´s website 6 videos of the different actions of the project were published (https://lifesalinas.es/life-salinas-participa-en-la-semana-verde-de-la-union-europea-2021/):

1. Presentation of LIFE Salinas Project,
2. LIFE Salinas ´s conservation actions,
3. Evaluation of the socio-economic impact and ecosystem services on LIFE Salinas

4. Monitoring of the actions to stabilise and reinforce the dune ecosystem of La Llana beach to control erosion
5. Biological monitoring action
6. Restoration actions

e) Organization the meeting of Wetlands Committee of the Environment Ministry

Since the editions of the Wetlands Committee meetings were held online since the start of the pandemic COVID-19, the project team decided to organized instead a final conference of the project to disseminate project results. It took place on 8 and 9 September 2022 and were attended by 34 people (https://lifesalinas.es/celebradas-las-jornadas-de-clausura-del-proyecto-life-salinas/).

The day of the 8th was held at the University of Murcia with the following programmed:

- The presentation of the Conference was given by Juan Faustino Fernández, Deputy Director of the General Directorate of Natural Environment, Francisco Belmonte, Professor of the University of Murcia and Gustavo Ballesteros Pelegrín, coordinator of LIFE Salinas.
- Two presentations were given by:
  - Andrés Alcántar from the IUCN: "The MedArtSal Project. Global vision of Mediterranean coastal salt mines"
  - Renato Neves of Mãe d'Água Lda: "European funding for the conservation of salt landscapes. 20 years of experience".
- Two round tables:
  - Moderated by María Monteagudo: "Management experiences in coastal salt mines of the Natura 2000 Network"
  - Moderated by Daniel Ibarra: "Experiences of protection and restoration dune ecosystems in the face of coastal erosion".
- In the afternoon, two workshops were coordinated by Marta Reguillón from EUROVÉRTICE and Gustavo Ballesteros entitled "Networking LIFE projects and other European nature conservation funds for the improvement and conservation of saline and dune ecosystems" and "Networking of biodiversity conservation initiatives in Mediterranean salt mines".
- Finally, a video summary of the LIFE SALINAS Project was shown and a salt tasting was held.

On 9 September, the event took place in the San Pedro del Pinatar salt mines, where a tour of all the conservation actions of the Project was carried out.

f) Good practice manuals for the transferability and replicability of the project.

Two manuals have been written:

1. "Good practices for the management and conservation of biodiversity in coastal environments: salt mines, beaches and dunes", jointly developed by University of Murcia, ANSE, MDA and Salinera and coordinated by Francisco Belmonte Serrato, Gustavo A. Ballesteros Pelegrín, Daniel Ibarra Marinas. It has 5 chapters.

2. Custody of the territory in salt exploitations developed by ANSE and coordinated by Jorge Sánchez Balibrea and Nerea Martínez. It has 4 chapters.

3. Articles in both informative and specialised journals

12 publications have been made, of which 2 are pending confirmation of publication by the journal to which they have been sent (https://lifesalinas.es/publicaciones-cientificas/). Of the 10 that have already been published, 7 have international and 3 national circulations, while the 2 articles pending publication have been sent to journals with international circulation (Table 29). 11 publications have a scientific character and 1 (Quercus magazine) has an informative approach.

Table 29. Summary of publications

Year	Articule	Magazine / book	Edited	Scope
2020	Project for the conservation of habitats and waterbirds in the Salinas de San Pedro del Piantar. (LIFE SALINAS). https://lifesalinas.es/wp-content/uploads/2020/09/Ballesteros_2020_LIFE-SALINAS.pdf	Conservation, management and restoration of biodiversity. 1st Ibero-American Congress on Biogeography	Universidad de Santander	Internacional
2020	Basis for environmental sustainability through green purchasing and green tendering. https://lifesalinas.es/en/bases-for-environmental-sustainability-through-purchase-and-green-bidding/	Revista Geografica Academica	Universidad Federal de Roraima (Brasil)	Internacional
2021	Identification and valuation of the Ecosystem Services of the Regional Park of Salinas y Arenales de San Pedro del Pinatar (Murcia, Spain). https://dialnet.unirioja.es/servlet/articulo?codigo=7979989	Investigaciones Geográficas	Universidad de Alicante	Internacional
2021	Evoluction of the Beaches in the Regional Park of Salinas and Arenales of San Pedro del Pinatar (Southeast of Spain)(1899-2019). https://www.mdpi.com/2220-9964/10/4/200	International Journal of Geo-Information	MDPI (Suiza)	Internacional
2021	Tourist carrying capacity of the beaches of the Salinas y Arenales de San Pedro del Pinatar Regional Park (SE España). https://xxviicongresodegeografia. es/wp-content/themes/genesis-sample/pdf/LIBRO_CONGRESO_TOMO_1.pdf	Geografía, cambio global y sostenibilidad XXVI Congreso AGE	Universidad de la Laguna	Nacional
2021	Mapping seagrass meadows on submerged beaches in the Mediterranean using artificial intelligence algorithms and multispectral satellite imagery. https://dialnet.unirioja.es/servlet/articulo?codigo=8285534	Geografía, cambio global y sostenibilidad XXVI Congreso AGE	Universidad de la Laguna	Nacional
2021	Analysis of Replicability of Conservation Actions across Mediterranean Europe. https://www.mdpi.com/2073-445X/10/6/598	Land	MDPI (Suiza)	Internacional
2022	Evolution of the population of the Little Tern Sternula albifrons (Latham, 1787) in the Parque Regional de las Salinas y Arenales de San Pedro del Pintanar (2010-2021). https://www.gimena.unican.es/documentos/XI%20Congreso%20Biogeograf%C3%ADa,%20actas.pdf	La Naturaleza atlántica: hábitats, patrimonio y vulnerabilidad. II Congreso Iberoamericano de Biogeografía	Universidad de Oviedo	Internacional
2022	Actions for the Conservation and Restoration of the Dunes and Wetlands in the Salinas of San Pedro del Pinatar: LIFE-Salinas	Eng	MDPI (Suiza)	Internacional

	Project (Murcia, Southeast of Spain). https://www.mdpi.com/2673-4117/3/4/28			
2022	The LIFE SALINAS Project: Conservation of the territory and biodiversity in the San Pedro del Pinatar Salt Flats (Murcia)	Quercus. Observación, estudio y defensa de la Naturaleza	Drosophila Ediciones S. L.	Nacional
2022	Landscape, environmental and socio-economic impact of an invasive species. The Yellow-legged Gull in the Salinas de San Pedro del Pinatar (Murcia SE Spain).	Anales de Geografía de la Universidad Complutense de Madrid (Pendiente)	Universidad Complutense de Madrid	Internacional
2022	Mapping of ecosystem services of the wetlands of Salinas y Arenales de San Pedro del Pinatar, Spain	Sustainability (Pendiente)	MDPI (Suiza)	Internacional

Main problems encountered and solutions provided

a) Organization of the initial conference of the Project

No problems have been found to perform this action.

b) Preparation of 2 bulletins and creation of 2 international forums

No problems have been found to perform this action.

c) Attendance at events for the replicability and transferability of the Project

Problem: The health crisis caused by Covid19 has cancelled or delayed most of the events in which we had planned to participate:

Activity	Planned date of completion	Venue	Comments
VI Doctoral Conference. University of Murcia	27-29 May 2020	Murcia	Cancelled
11th Spanish Congress and 1st Ibero-American Congress on Biogeography	22-25 June 2020	Santander	Cancelled
XVI National Meeting on Geomorphology	6-10 September 2020	Zaragoza	Postponed to 2022
Europarc Congress	30 September to 4 October 2020	Malaga	Postponed spring 2021
5th National Congress on Ecotourism	19-22 October 2020	Minorca	Postponed to autumn 2021
14th International Conference of the ISSRL - International Society for Salt Lake Research Inland Salt Lakes, Salt Flats and surrounding habitats	19-23 October 2020	Murcia	Postponed to autumn 2021

Solution: participation in the postponed events and in the new ones that were appearing.

d. Participation in Green Week in Brussels

Problem: Brussels Green Week was delayed to be held between September 14 and October 23, 2020. Given the high incidence of the Pandemic in Spain and the uncertainties regarding freedom of movement throughout Europe, we consider it appropriate to delay our participation. **Solution:** participate in the Brussels Green Week that was held on 2021.

e) Organization of 1 meeting of the Wetlands Committee of the Ministry of the Environment

Problem: The Ministry of Ecological Transition and Sustainable Development of Spain Government suspended the face-to-face meetings of February 2021 and February 2022 due to Covid-19. **Solution:** Carry out a Closing Conference of the LIFE SALINAS Project

f) Manuals of good practices for the transferability and replicability of the Project

No problems have been found to perform this action.

Achieved results

a) Organization of the initial conference of the Project

The proposal included the participation of MCSALT (Sardinia, Italy) and Conservatoire du littoral (Camargue, France). Finally, we decided to invite Professor Drek Jackson (University of Ulster) as an expert on coastal environmental change and Diyana Kostovska, who had coordinated the LIFE Salt (LIFE 11NAT/BG/000362), an experience that has been of great interest.

b) Preparation of 2 bulletins and creation of 2 international forums

The Coastal Geography newsletter has had 397 visits from 336 different people, and the Biodiversity newsletter has had 264 visits from 157 different people. The Coastal Geography forum has reached 461 members, and the Conservation of biodiversity in coastal salt marshes forum has reached 57 users.

c) Attendance at events for the replicability and transferability of the Project

A total of 38 events of all kinds were attended, both scientific (conferences, seminars and congresses), educational (e.g. master's conferences) and technical. Of these, 21 events were international, 11 national and 6 regional in scope.

e) Closing days of the life salinas project

The Closing Conference was attended by 34 people.

f) Manuals

Two manuals and twelve publications have been produced.

Remaining results

None.

Variations in action

a) Organization of the initial conference of the Project

It was held in February 2019, whereas it was scheduled to take place before 31 December 2018, as the organisation took longer than expected.

b) Preparation of 2 bulletins and creation of 2 international forums

There was no change

c) Attendance at events for the replicability and transferability of the Project

There was no change

d) Participation in Green Week (Greenweek) in Brussels

It participated in the 2021 call, when the proposal was planned for 2020. As indicated above, the decision to delay participation was due to the COVID-19 pandemic.

e) Organization of 1 meeting of the Wetlands Committee of the Ministry of the Environment

This action was replaced by the closing sessions of the LIFE SALINAS project.

f) Manuals of good practices for the transferability and replicability of the Project

No changes

Action evaluation

a) Organization of the initial conference of the Project

The action was a success due to the number of participants (100 people), as well as the publicity it received in the local media, favouring the exchange of knowledge. The event presented the Project's actions and objectives to both the general and specialized public. Moreover, the contributions made at the conferences were useful as a starting point for the future improvement of the Project's actions.

b) Preparation of 2 bulletins and creation of 2 web forums

The Coastal Geography newsletter has had 397 visits from 336 different people, and the Biodiversity newsletter has had 264 visits from 157 different people. The Coastal Geography forum has reached 461 members, and the Conservation of biodiversity in coastal salt marshes forum has reached 57 users. The bulletins had two fundamental benefits. Moreover, they gave visualization to the project, in addition, they achieved issues related to biodiversity and coastal geography in general.

c) Attendance at events for the replicability and transferability of the Project

In 22 of the 38 events that LIFE Salinas has attended, 604 people have participated, so it has had a great impact. The events related to transferability generated information, knowledge and ideas that, in the future, could be use by other projects.

d) Participation in Green Week (Greenweek) in Brussels

Six videos of the different actions of the project were published on the event's website so they can be consulted by key actors at any time. The videos provided insight into the project and, in the future, can be a starting point, ideas and ways of working for similar projects.

d) Closure event of LIFE SALINAS project

The closing days were attended by 34 persons and a very interesting debate was generated among the attendees, including the Directorate General for Coasts. Among the discussions, the importance of protecting the dunes from trampling by tourists, including the foredune reinforced with *Posidonia oceanica* leaves, was discussed. Another item of interest was the use of the methodologies provided by Life Salinas in other Mediterranean beaches.

f) Manuals of good practices for the transferability and replicability of the Project

Two manuals have been produced, one on land stewardship in salt exploitations and the other on good practices for the management and conservation of biodiversity in coastal environments: salt marshes, beaches and dunes. Ten articles have also been published in different journals and book chapters, one of which is of an informative nature, and there are another two articles that are pending acceptance by the journals to which they have been sent. The manuals will contribute data, ideas and methodologies to future projects. In addition, they are of great value for the scientific diffusion of aspects related to coastal natural areas.

Additionally, MDA also developed a census of breeding pairs of Audouin Gull (Larus audoiunii) at Castro Marim (Algarve). Since LIFE Salinas is very focused on this species, and its interaction with the habitat "salt marshes", bibliographic data collection and survey among some ornithologists were done to know the situation of the species in Portugal. The aim was to eventually replicate the experiences obtained by LIFE SALINAS to some Portuguese salt marshes. However, it turned out that the species in Portugal no longer nests in saltpans, but only on tidal flats in the interior of the Ria de Faro (Algarve).

Although there are ancient references (19th century) as to the possibility of the nesting of the Audoin gull in a place on the southwest coast (Sagres), its occurrence in Portugal was always considered more or less accidental during the 20th century. In 2000 a first couple nested in a semi-industrial salinas of Castro Marim, in the following year a small colony with about 12 couples was established in the same place. Later, other salterns with the same characteristics (semi-industrial) were occupied in the Tavira area, having nested around 4 dozen couples until at least 2008. From then on the first nesting records in the marshes of the Ria Formosa appeared, and the population gradually increased, although with somewhat reduced reproductive success rates; the colonies were abandoned in the salt marshes, a situation which we confirmed in 2020 through a survey in Castro Marim and Tavira, and no breeding couples were located. The breeding population is currently estimated at around 3,000 couples, concentrated exclusively in the marshes of the Ria Formosa.

Deliverables and milestones

Code	Type	Name of deliverable	Deadline	Monitoring
D4	Deliverable	Report on the initial project conference	31/12/2018	OK 22/02/2018
H15	Milestone	Organization of initial Project conference	31/12/2018	OK 05/02/2019
H17	Milestone	Set up of a network with other projects	31/03/2019	OK 05/02/2019
D5	Deliverable	Annual report about replicability, transferability and transnational cooperation 1	30/09/2019	OK 30/09/2019
D7	Deliverable	Report on visits to other projects	31/12/2019	OK 18/12/2019
D8	Deliverable	Annual report about replicability, transferability and transnational cooperation 2	30/09/2020	OK 30/09/2020
H28	Milestone	Sessions in management and conservation of coastal saltpans	31/10/2020	Ok 31/10/2021
H30	Milestone	Sessions on coastal erosion and climate change	31/05/2021	OK 31/05/2021
D12	Deliverable	Annual report about replicability, transferability and transnational cooperation 3	30/09/2021	Delivered final report 30/09/2021

D13	Deliverable	Publication about Land Stewardship in salt pans	31/12/2021	OK 31/12/2021
H32	Milestone	Organization of the meeting of the Wetlands Committee of the Spanish Ministry of Environment	31/12/2021	OK 31/12/2021
D14	Deliverable	Report on the meeting of the Wetlands Committee of the Spanish Ministry of Environment	31/05/2022	OK 31/05/2022
D16	Deliverable	Report on management and conservation of coastal saltpans	30/09/2022	Delivered final report 31/05/2022

E3. Quality certificate

✓ **Action ended**

Foreseen start date: 01/10/2018	Foreseen end date: 30/09/2022
Actual start date: 01/10/2018	Actual end date: 30/09/2022

Participants and responsibilities

Mãe d'Água Lda.

Description of activities undertaken and quantified outputs:

The action consisted in the design and implementation of a quality certificate for salt obtained in salt marshes belonging to the Natura 2000 Network and other natural protected areas. The final aim is to maintain the functioning of this certificate after the LIFE-SALINAS Project has ended.

Phase 1. Previous studies of other labels – October 2018 – September 2019

The pilot salt marshes under study were: San Pedro del Pinatar (Spain), Ibiza (Balearic Islands, Spain), Castro Marim (Algarve, Portugal), Samouco (Alcochete, Portugal).

Other salt-marshes in Portugal (Alcacer do Sal, Figueira da Foz, Lavos) were visited to assess their situation (whether or not there were salt producers and salt production), in order to motivate/interest the producers in the issue of certification.

During this first phase, a desk study on existing certificates, regulations affecting nature protection and food production and protected area planning instruments was developed. This study can be consulted in the Technical Annex as E.3.1 – Preliminary study of other certificates (in Spanish) (28 pp.).

Also, during this phase a first batch of field visits was done to San Pedro del Pinatar, Ibiza, Samouco and Castro Marim to understand the main features of the site (natural values, salt making process, challenges).

Phase 2. Design and characterisation of the protocols and procedures to be followed to obtain the certificate – October 2019 – July 2022

a) Characterisation of salt production procedure

A second batch of field visits to San Pedro del Pinatar, Ibiza, Samouco and Castro Marim was done to characterize the salt making process and link it with the indicators of the certificate. The design of the certificate was this way consulted with the people in the salt marshes and processes and critical points were studied in detail. This allowed to better characterize the salt production processes in different spaces and extrapolate them to other salt marshes. These field visits were planned for the spring/summer of 2020 but had to be delayed until the late summer of 2021 due to the pandemic and ensuing (inter-)national travel restrictions.

As a result, a report in the characterization of the salt production process was produced (attached in the Annex 02 Technical Annex).

b) Elaboration of a document on quality criteria and monitoring indicators.

Between May 2021 and May 2022 the report about the Design of the certificate (in Spanish) (30 pp.) was elaborated. It includes the objectives of the certificate, beneficiaries, implementation phases, quality indicators, documentation to be provided for the certification process, recommendations for salt making sites, and indicators control sheets. At this stage, the salt marsh of San Juan in Guadalajara (Spain) was also visited to have an example of inland salt marsh that it is also producing salt by evaporation processes in a natural protected area. Given that in Spain there are quite several indoor salt works in different stages of recovery, it was interesting to learn about the reality of an indoor salt works from the perspective of the certificate design. Their contribution (through a visit and an informal interview with their managers) were comments to the tool, which have been incorporated into the design of the certificate.

Afterwards, a pilot audit for the implementation of the certificate was done in San Pedro del Pinatar in July 2022. A "List of documents to be prepared by the requesting company (in Spanish, for the pilot audit)" was prepared and it is attached in the Technical annex.

Between July and September 2022, the "Certificate manual: indicators and procedure" (in Spanish, Portuguese, and English) (16 pp.) was produced. It includes the following annexes:

- Model of the Certification Agreement "Life in Salt" (in Spanish, Portuguese, and English)
- Model of certificate request "Life in Salt" (in Spanish, Portuguese, and English)

This Certificate manual replace the deliverable

Phase 3. Dissemination of results and continuity – July 2022 onwards

The certificate manual has been published on the project website (Acción E3.3 Manual del certificado: indicadores y procedimiento - LifeSalinas) and has been disseminated through publications in the social media profiles of LIFE Salinas project.

https://www.facebook.com/LIFESalinas/
https://twitter.com/LSalinas184/status/1600202032916271104
https://www.instagram.com/p/Cl1lW2wqpyV/

The publication has been also distributed through the Secretariat of the Spanish Wetlands Committee to its members (at least 35 technicians in the environmental regional administration

of the Spanish Autonomous Communities). The document has been also sent to the Ramsar Secretariat, MedWet, Human and Biosphere Programme, the Convention of Biological Committee and the Action Plan of the Mediterranean of the Barcelona Convention.

Additionally, the salt certification process have been disseminated through publications, conferences and teaching activity as it is explained in Action E2.

Achieved results

The main result of this action is the creation of a process and a methodology including documentation to be provided and quality indicators to certify the production of salt in natural protected areas. The salt certification scheme will have continuity through the creation of a Secretariat which will include Mae d'agua and the University of Murcia.

In parallel, the following activity has been done, in synergy with the project.

Study of microplastics in salt

A study of microplastics in salt was initiated to determine the presence, quantity and types of microplastics in the four Action E.3 study saltworks, as well as three other inland saltworks in Spain, one of them abandoned, one artisanal active site and a semi-industrial active site (in the provinces of Zaragoza, Guadalajara and Alicante). The study aims at identifying also at which stage of the salt making process potential microplastic contamination occurs, helping to pinpoint critical points in the production stages. This links with the quality certificate and specific analyses proposed in it. The study is being carried out in collaboration with the Environmental Research Group of the Department of Mechanical Engineering of the ICAI / Comillas Pontifical University in Madrid, coordinated by Professor María del Mar Cledera Castro. So far, samples have been collected and analysis equipment (filters, infrared spectroscopy) were calibrated in the laboratory.

The quality certification to be designed in Action E3 is focused on ensuring excellence in the salt production process. However, potential pollution by microplastics is a threat to achieve the highest possible quality and therefore it is important to understand its origin. The study is focused on identifying the potential sources of pollution by microplastics in the different stages of the production process and will contribute to prevent their presence. The study is novel in some respects, such as the breakout in the different stages (most studies focus on finished salt or even salt that has already been packaged). This will allow to be more precise in the goal of the study and to establish a long-term protocol for the prevention of microplastics in high quality salt. The participating companies have received internal reports on the microplastic analysis. The study is financed by the Comillas Pontifical University and IPAISAL in its integrity. No additional funds from the LIFE project were required.

Remaining results

None

Variations in action

Some of the contents of this salt certification scheme required a field visit, which was planned for the summer of 2020, but severely hampered by the COVID-19 pandemic. Fields visits were rescheduled to the spring of 2021, if the COVID-19 measures allow to do so.

Also, despite the initial plan to count with the support of EU Salt, the European association of salt producers, this was not possible after several trials to include them in this effort.

In the proposal, 2 salt marshes (San Pedro del Pinatar and Castro Marim) were proposed for the design of the certificate. Before the implementation of the action, it was decided to enlarge the number of studied sites (from 2 to 4) to have a better representation of different sites. Castro Marim and Ibiza salt marshes were added.

Action evaluation:

This certificate will encourage other salt producers to obtain salt in a way that is compatible with biodiversity conservation. The certificate is meant for any salt produced for commercial or demonstration purposes and is voluntary. This action increases the replicability and transferability of the LIFE-SALINAS Project in the long run, extending this certification to national salt producers and to all EU countries and possibly beyond.

The next steps for the consolidation of the salt certificate and that are part of the After-LIFE Plan are:

- Design of certificate name and logo – Proposed name “Life in Salt”.
- Review of certification agreement by legal experts.
- Formal presentation to salt making companies and sites (via online presentations and/or mailings).

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H4	Milestone	Start of characterization and environmental study	01/10/2018	01/10/2018
H29	Milestone	Design of the procedure to obtain the salt quality certificate and environmental protection of salt pans in the Natura 2000 network	31/12/2020	May 2021
D11	Deliverable	Publication about protocols and procedures to obtain the salt quality certificate and environmental protection of salt pans in the Natura 2000 network	31/01/2021 delivered final report	September 2022

E4. Networking

✓ **Action ended**

Foreseen start date: 10/11/2018	Foreseen end date: 30/09/2022
Actual start date: 01/10 /2018	Actual end date: 30/09/2022

Participants and responsibilities

Salinera is the coordinator of the action.

UMU and ANSE participate in the meetings and exchanging results with other projects.

Description of activities undertaken and quantified outputs:

a) Networks with other LIFE and other projects in Spain

A total of 15 actions have been carried out with other projects, both LIFE and others in Spain, of which 6 are LIFE projects, 3 projects developed by associations, 3 projects carried out by a company, 1 H2020, 1 project developed by a university and 1 project developed by a research center (Higher Council for Scientific Research of the Government of Spain CSIC). Table 30 shows a summary of projects visited.

Table 30. Summary of projects visited

PROJECT/ENTITY	City	Activity
Calblanque Association	Murcia	We were invited to give a lecture at the "Jornadas para el fomento del Patrimonio Cultural y Natural de las Salinas: presente y futuro de las salinas en Murcia y España" (2018). https://www.facebook.com/EspNaturalesMur/photos/jornada-presente-y-futuro-de-las-salinas-de-murcia-y-espa%C3%B1a-%EF%B8%8Fs%C3%A1bado-22-septiembr/541436159654725/
Atlantida Environment	Cadiz	We were invited to give a lecture at the "Conference on Coastal Saltworks Planning and Projects: Saltworks and Sustainable Employment" (2018). https://galpemur.es/wp-content/uploads/2018/08/Cartel-ProyectosMurcia.jpg
Atlantida Environment	Cadiz	We were invited to give a lecture at the "Jornadas sobre participación en la gestión pública vinculada a espacios salineros" (2018). https://galpemur.es/wp-content/uploads/2018/08/Cartel-Participacion-Murcia-2.jpg
Friends of the Salt Lakes Poza de la Sal	Poza de la Sal (Burgos)	We were invited to give a lecture at the "VIII Encuentro de la Red Ibérica de Salinas Tradicionales" (2019) https://ipaisal.org/celebrado-el-viii-encuentro-de-salinas-tradicionales-ibericas-en-poza-de-la-sal/
LIFE04 NAT/E/000044 LIFE JUNIPER	Valencia	We visit the dunes of the Albufera de Valencia Project"(2019). https://lifesalinas.es/trabajo-en-red-con-life-enebro-y-life-duna/
LIFE00 NAT/E/007339 LIFE DUNA	Valencia	We will be visiting the dunes of the Albufera de Valencia Project in 2019. https://lifesalinas.es/trabajo-en-red-con-life-enebro-y-life-duna/
LIFE NAT/02/NAT/E/8608 Recovery of Audouin's Gull Community of Valencia	Alicante	We visited the project and other conservation actions in the Santa Pola Salt Flats (2019). https://lifesalinas.es/visita-a-los-proyectos-de- conservacion-del-parque-natural-de-las-salinas-de-santa-pola-alicante/

LIFE07/NAT/E/000732 LIFE INDEMARES	Madrid	We were invited to participate in a meeting of the "Working Group on the Audouin's Gull of the Ministry of Ecological Transition and Demographic Challenge" (2020). https://lifesalinas.es/participacion- en-el-grupo-de-trabajo-de-la-gaviota-de-audouin/
AMARYPESCA. Barcelona University	Barcelona	We collaborate in the marking with the marking of Audouin's gull with GPS devices (2020). https://lifesalinas.es/biodiversidad-boletin2/
LIFE16 CCA/EN/000077 LIFE HEATLAND	Murcia	We were invited to participate in a conference on climate change in Murcia (2021). https://twitter.com/LSalinas184/status/1413102076981387264/photo/1
H2020 COASTAL (CSIC)	Murcia	We were invited to a meeting to present the experience of the LIFE- SALNAS Project (2021). https://h2020-coastal.eu/multi-actor-labs
LIFE17 GIE/EN/000515 LIFE INVASAQUA	Murcia	Transfer conference on conservation actions in the Regional Park of the Salinas y Arenales de San Pedro del Pinatar (2022). https://lifesalinas.es/en/conference-on-conservation-actions-in-the-regional-park-of-las-salinas-y-arenales-de-san-pedro-del-pinatar/
MedArtSal – IUCN	Málaga	They participated in the Closing Sessions of the LIFE SALINAS Project..https://lifesalinas.es/en/the-life-salinas-projects-closing-ceremony-took-place-last-week/
Climate Change Chair (Polytechnic University of Valencia)	Valencia	We were invited to give a lecture at the V Jornada de Investigación Universitaria sobre Cambio Climático (2022). https://www.iiama.upv.es/catclima/wp-content/uploads/Bloque_3.pdf
Ibiza Salt Mine	IBIZA	Visit to the salt mines of ibiza https://www.facebook.com/photo/?fbid=2645164399116623&set=pcb.2645164475783282

b) Networks with other LIFE projects and other types of the European Union

A total of 13 networking activities were carried out with other LIFE and non-LIFE projects of the European Union: 5 actions with organisations from Portugal, 3 from Italy, 1 from Slovenia and Croatia, 1 with Bulgaria, 1 with France and 1 with Latvia, to which must be added 1 Conference with the International Society Salt Lake Research of China. Of the 11 activities carried out jointly with entities of the European Union, 3 correspond to LIFE projects, 2 activities with administrations (Region of Calabria and Ecomuseum of Aveiro), 2 actions with 2 associations, 1 activity with the Research Center of the Tour du Valat, 1 activity with the University of Aveiro, 1 visit to the performances of the Samouco Foundation and 1 with the company Insonso SalMarim Lda. Table 31 shows a summary of projects visited.

Table 31. Summary of European Union projects visited

PROJECT/ENTITY	**Country**	**Activity**
LIFE11 NAT/BG/000362 SALT OF LIFE	Bulgaria	We invite you to give a lecture at the "Presentation of the LIFE SALINAS Project" (2019). https://lifesalinas.es/jornadas-de-presentacion-del-life-salinas/

LIFE10 NAT/IT/000256 MC-SALT	Sardinia (Italy)	We visit Cagliari (Sardinia) salt works project (2019). https://lifesalinas.es/redes-con-otros-proyectos-visita-a-cerdena/
LIFE 15 NAT/lv/000900 LIFE CoHaBit	Latvia	We were invited to give 2 lectures at the "Sustainable Management of Conservation Conference" (2020). https://dabasparkspiejura.lv/images/E3_conference_report_f.pdf
Calabria Region and Sila National Park	Calabria (Italy)	We were invited to give a lecture at the Third Mediterranean Seminar (2021). https://ec.europa.eu/environment/nature/natura2000/ platform/events/third_mediterranean_seminar.htm
Conservatoire du Littoral (Tour du Valat)	France	You are invited to give a lecture at the "Coastal Dynamics and Biodiversity in Coastal Salinas Conference" (2021). https://www.facebook.com/LIFESalinas/posts/pfbid0hEkPZTbWP7BSVgi6XHFfQ2Y2cgfsQwAeAVidpnDg1qJWzPwrEHjo95cs4S5nds6Rl
Anthus Association	Sardinia (Italy)	You are invited to give a lecture at the "Coastal Dynamics and Biodiversity in Coastal Salinas Conference" (2021) https://www.facebook.com/LIFESalinas/posts/pfbid0hEkPZTbWP7BSVgi6XHFfQ2Y2cgfsQwAeAVidpnDg1qJWzPwrEHjo95cs4S5nds6Rl
University of Aveiro	Portugal	You are invited to give a lecture at the "Coastal Dynamics and Biodiversity in Coastal Salinas Conference" (2021). https://www.facebook.com/LIFESalinas/posts/pfbid0hEkPZTbWP7BSVgi6XHFfQ2Y2cgfsQwAeAVidpnDg1qJWzPwrEHjo95cs4S5nds6Rl
Vita Nativa Association	Portugal	They visited us and showed us the Bio-Ilhas Project in the Olhão Salt Pans and exchanged experiences. Later, on our trip to Portugal, we returned the visit and they showed us their project on the ground (2021). https://twitter.com/LSalinas184/status/1405440592839118848
Ecomuseum of Aveiro	Portugal	We visited the environmental and heritage conservation actions, as well as the production of the Aveiro Saltworks (2021). https://www.facebook.com/LIFESalinas/posts/pfbid0jWtkkgpohyrTL4QdNbyhhGh44vbD4NcMyUD7XJM8eYWXMkazgMvAiVHMznYRgMR1l
Samouco Foundation	Portugal	We visited the environmental and heritage conservation actions as well as the production of the Samouco Saltworks (2021). https://www.facebook.com/LIFESalinas/posts/pfbid0jWtkkgpohyrTL4QdNbyhhGh44vbD4NcMyUD7XJM8eYWXMkazgMvAiVHMznYRgMR1l
Insonso SalMarim Lda.	Portugal	We visited the environmental and heritage conservation actions and the production of the Castro Marim Saltworks (2021). https://www.facebook.com/LIFESalinas/posts/pfbid0jWtkkgpohyrTL4QdNbyhhGh44vbD4NcMyUD7XJM8eYWXMkazgMvAiVHMznYRgMR1l
International Society for Salt Lake Research	China	We collaborated in the organisation of the ISSLR International Conference on inland salt lakes and salt pans. Presentation of communication and coordination of the 14th International Conference held in Murcia (2021). https://www.icslr2021.es/ https://d.facebook.com/LIFESalinas/photos/a.2022457244720678/2722975044668891/?type=3&source=48
Visit to the salt pans of Slovenia and Croatia	Slovenia and Croatia	Members of the team of Salinera Española, University of Murcia and ANSE, together with Katia Hueso from IPAISAL visited between 2 and 6 May 2022 a total of 5 salt pans (1 in Slovenia and 4 in Croatia). https://lifesalinas.es/integrantes-del-proyecto-life-salinas-conocen-diferentes-proyectos-en-salinas-de-eslovenia-y-croacia/

An annex has been included which specifies in more detail some of the visits carried out (Action E4. Visit to another project).

Main problems

The visit to the LIFE2000NAT/E/7304 Project "Improvement of the Management of the SCI and ZEPA of Cabo de Gata-Níjar" was scheduled for April 2020. The confinement by the Decree of the State of Alarm in Spain due to the crisis Health has prevented this visit. Subsequently, it was not possible to contact the current managers of the protected area.

On the other hand, at the beginning of the project, a visit to the Conservatoire du Littoral (Camargue, France) was planned. The visit of staff from the Bulgarian Biodiversity Foundation, made us change that planned trip for the Atanasovsko Lake Natura 2000. The reasons were the links established with them in the KOM for 2017 beneficiaries in Brussels, as well as the similarities between both projects. Although the trip was planned for June 2019, it was not possible to make it. Moreover, the lockdown prevented any further alternative.

Achieved results

A total of 28 networking activities have been carried out with other LIFE and non-LIFE projects, 15 from Spain, 13 from other EU countries (Portugal, Italy, France, Slovenia-Croatia, Bulgaria and Latvia) and the China Salt Lake Conservation Society. Experiences have been exchanged with 9 LIFE projects, including 3 from other EU countries (Italy, Bulgaria and Latvia), 9 associations and companies (1 from Portugal, 1 from Italy and 1 from China), 5 research centres and universities (1 from France) and 4 foundations and administrations (2 from Italy and 1 from Portugal).

Remaining results

None

Variations in action

As mentioned above, the visit to Cabo de Gata-Níjar (Almeria) could not take place, but instead the salt pans of Ibiza were visited. The visit to the LIFE17 Project NAT/BG/000558 (Bulgaria) was also not possible due to the loss of contact with the coordinator. Instead, the salt pans in Slovenia and Croatia were visited.

Action evaluation

The visits made to the different projects, have allowed us to know the operation and results of different projects both LIFE and non-LIFE, very useful for the LIFE-Salinas Project, such is the case of the visit made to the Natural Park of the Salinas de Santa Pola, which gave us new ideas to incorporate islands that facilitate the reproduction in the drafting of the Project of the "*Action C2: Green Infrastructure: Connection of the pond of Coterillo with the salt circuit"*

The collaboration with the AMARYPESCA Project allowed to know the feeding and migration routes of the Audouin's Gull, information that is of great interest to improve its management and conservation.

The visit to the salt pans of Ibiza allowed meetings to be held with the director of the salt pans and with the workers within the framework of action *"E3 Design and implementation of a quality and environmental protection certificate for salt from the salt pans of the Natura 2000 Network*", which has been developed by Mãe d'água.

In addition, during this visit, water samples were taken from the Salinas de Ibiza for the Project on microplastics in salt developed by the Universidad Pontificia de Comillas and in which the LIFE SALINAS Project collaborates. Samples were also taken at the salt pans visited in Portugal for the study on microplastics.

Deliverables and milestones:

Code	Type	Name of deliverable	Deadline	Monitoring
H10	Milestone	First contacts for establishing a network with other projects	01/11/2018	OK 07/11/2018

F1. Project management by Salinera

✓ **Action ended**

Foreseen start date: 01/10/2018	Foreseen end date: 31/08/2022
Actual start date: 01/09/2018	Actual end date: 31/08/2022

Participants and responsibilities

Salinera is responsible for the coordination and management of the project.

Description of activities undertaken and quantified outputs:

Salinera hired a project coordinator, Gustavo Ballesteros, in October 2018, taking charge of:

1. Management of the work plan in coordination with the partners.

2. Monitoring compliance with the work plan, analysing deviations and their causes, and maintaining fluid communication with all partners.

3. Review and coordination of agreements with partners.

4. Coordination of technicians involved in the project.

5. Call and preparation of 10 meetings of the Management Committee´s meetings: 11/12/2018, 07/02/2019, 04/04/2019, 04/07/2019, 27/11/2019, 06/11/2020, 17/02/2021, 04/03/2021, 08/11/2021 and 24/02/2022 .

In addition, the coordinator organised:

- Participation in the project kick-off meeting in Brussels on 6 and 7 November.
- Six meetings with the NEEMO monitor supervising the Project: 14/02/2019, 19/05/2020, 25/05/2021, 24/05/2022.

6. Administration, planning, dynamization and organization to ensure that project objectives are met on time and planned budget.

On the other hand, the execution of the Project has required the obtaining of 28 authorisations from 4 administrations: San Pedro de Pinatar City Council, the General Environment Directorate General (regional administration), the Coasts Directorate General (regional administration) and Coastal Demarcation of Murcia, dependent of Ecological Transition and the Demographic Challenge Ministry.

The authorisations have been requested by the coordinator and the partners. Project coordination has provided support, reviewed the documentation and held the necessary meetings with the different administrations to clarify issues. The authorisations have been requested and granted in their entirety throughout 2019 (Table 32).

Table 32. List of authorisations

Applicant	**Action**	**Administration**	**Registration date**	**Authorization date**
Salt mine	C1	Coasts Directorate General	15/04/2019	24/05/2019
		DG Costas CCAA		09/05/2019
		San Pedro Pinatar City Council		31/05/2019
		Demarcation Coasts	04/06/2019	12/09/2019
	C2	DGMN	25/07/2019	26/09/2019
		DG Costas CCAA		22/09/2019
		San Pedro Pinatar City Council	24/07/2019	05/11/2019
		Demarcation Coasts	19/11/2019	24/01/2020
ANSE	C3	DGMN	04/15/19	06/05/2019
		San Pedro Pinatar City Council		31/05/2019
		DG Costas CCAA	16/04/2019	09/05/2019
		Demarcation Coasts	13/06/2019	30/09/2019
	C3	San Pedro Pinatar City Council	15/02/2019	15/04/2019
		DGMN	08/12/2018	11/03/2019
		DG Costas CCAA	17/04/2019	06/05/2019
		Demarcation Coasts	29/05/2019	30/09/2019
	C4	San Pedro Pinatar City Council	15/04/2019	11/06/2019
		DGMN		24/05/2019
		DG Costas CCAA	16/04/2019	09/05/2019
	C5	DGMN	15/04/2019	24/05/2019
		San Pedro Pinatar City Council		11/06/2019
		DG Costas CCAA		09/05/2019
	D1	DGMN	03/01/2019	28/03/2019
	D3		13/03/2019	30/09/2019
University of Murcia	D2	DGMN	05/03/2019	28/03/2019
		DG Costas CCAA		08/03/2019
	D1	DGMN	20/02/2019	28/03/2019
City Hall San Pedro del Pinatar	E1	Demarcation Coasts	26/11/2018	20/03/2019

9. Execution and coordination in the preparation and delivery of reports and deliverables.

10. Coordination of the internal flow of information between the main and associated beneficiaries and the external monitoring team of the project.

12. Elaboration of the progress, midterm and final reports.

13. Negotiation and execution of contracts.

The contracts carried out can be consulted below:

- Procurement procedure for action C1: https://lifesalinas.es/pliego-de-contratacion-de-obras-para-construccion-de-motas-salineras-en-el-marco-del-proyecto-europeo-life-salinas-life17-nat-es-000184/
- Procurement procedure for action C2: https://lifesalinas.es/salinera-espanola-anuncia-la-contratacion-de-obras-para-la-conexion-de-la-charca-de-coterillo-con-el-circuito-salinero-en-el-marco-del-proyecto-europeo-lifesalinas-life17-nat-es-000184/

14. Preparation of external assistance contracts and coordination work.

15. Supervision of communication work: publication of social networks, maintenance of the website, etc.

16. Coordination of adequate and timely implementation of partners beneficiaries' s actions.

17. Development of a sustainability protocol for green procurement and tendering. This protocol was adapted for publication in the journal Academic Geographic. (https://revista.ufrr.br/rga/article/view/6171/3011)

18. In addition, the coordinator has carried out an institutional representation, attending different visits that have been interested in the Project, developing collaboration links and participating in different activities. The Table 33 lists the events in which the coordinator has participated and have not been included in any other section):

Table 33. Activities carry out by the coordinator

DATE	ENTITY	EXERCISE
20/10/2019	ANSE	Project presentation in ANSE. https://www.facebook.com/LIFESalinas/posts/pfbid033ELqtLfqaJzxZkzXZbYo2bTFABtvSx7TdBetNW4JhPZ3Q3f38DsNNVYRidB2Wzstl
01/12/2019	Tourist Office of San Pedro del Pinatar	Meeting to explain the LIFE Salinas objectives and contents and to establish collaboration mechanisms. https://www.facebook.com/LIFESalinas/photos/a.2001783103454759/2228807530752314
17/02/2020	San Pedro del Pinatar City Council	Meeting and field visit of the Environment department of San Pedro del Pinatar City Council https://www.facebook.com/LIFESalinas/posts/pfbid0333RQAqZGu7m7QTKZ5jZ5SenvvrskmUrkiPtbWQWrz9kedVkQHQZBJPpHRgq5kjxJl
20/02/2020	San Pedro del PinatarCity Council	Participation in San Pedro del Pinatar City Council. https://www.facebook.com/LIFESalinas/posts/pfbid02uiV5gFtCcPTFV6Jqzjcx3jP2Tz22QR3iKqUfNH9B6mg4Jg2KKHZfs3sbUa3MHXCsl
15/05/2020	Mar Menor General Directorate	Visit to the Salinas and LIFE Project of the Mar Menor Directorate General https://www.facebook.com/LIFESalinas/posts/pfbid0ijnrqAKPVPyGCTeUZSa3uVfpSA9AvVddBETv2SapgxJRXuRxyAfgRtRdKYFaa56Yl

16/07/2020	Salinas Marina	Meeting with Salinas Marina´s manager to collaborate in environmental education/volunteer activities. https://www.facebook.com/LIFESalinas/photos/a.2001783103454759/2405175619782170
31/10/2020	Water, Agriculture, Livestock, Fisheries and the Environment Ministry	Visit to the Salinas and the LIFE Project by Counselor and the Mayor of San Pedro del Pinatar. https://www.facebook.com/LIFESalinas/posts/pfbid02ZYdJWWoVkm3ZNpiGchVWbehiZz9xVqZ57uT4JEcH5wUxqbeWZ2venLFJw7P5dNSQl
06/05/2021	Ecological Transition and Demographic Challenge Ministry	Murcia Coastal Demarcation´s visits to review the actions carried out on La Llana Beach by LIFE SALINAS project https://www.facebook.com/LIFESalinas/posts/pfbid0dVRTX6EQHTD8XMKcwc31iqQHqCWzkoyY1R38RqsqJSVEtSrH5U2SDkxdkKHk15Lml
16/05/2021	Hippocampus Scout Group 503	Collaboration Agreement Signing for the joint implementation of volunteering and environmental education activities. https://www.facebook.com/LIFESalinas/posts/pfbid02rwwpxLRVufwZaQ6UAFJTjkYEBmsnEetqrCw2NppdQsU3J13LudVJNEYxpeBMrpZMl
08/06/2021	Ministry of Ecological Transition and Demographic Challenge	Review of the state of the Llana beach in order to deposit sand at the entrance to the beach, with sand coming from the Torre Derribada beach. https://www.facebook.com/LIFESalinas/posts/pfbid0fEDwHPVV1K2awZ4CGsxvQzNenEdtbymDq8aWcWxeaBgEsDJUgSenQps868UB2JuYl
30/07/2021	Eurovertex	Visit to the Salinas and the Project by workers of Eurovértice https://www.facebook.com/LIFESalinas/posts/pfbid0r9kXVq4zeBRXD7zWggnKwdF5j2cmCwrnyaUj1UDv58YC5sSJ9xqufq4fnWEbQ5HHl
08/07/2022	Sevilla University	Visit to LIFE Project by two professors from University of Seville. https://www.facebook.com/LIFESalinas/posts/pfbid0VfSGdqSNteYns7L8fxZ7NziQfUcqTPEG55v2eVfD1mwbLbF2hbE3GiRr4ZaiLGoMl
20/07/2022	Government of Noord Holland (Netherlands)	Delegation´s visit from the Noord Holland province (The Netherlands). https://www.facebook.com/LIFESalinas/posts/pfbid0UKnfTjpcpXib6jFvXsMQCMw1LBRfVMsf4DuTcykPDNMsCoHS2dKDTuJTuzD48qK7l

Main problems encountered and solutions provided

The main problems occurred during the complicated processing of the 28 authorisations necessary to implement the LIFE-Salinas project.

The LIFE Salinas coordinator has had to intervene in some way throughout all the administrative procedures. On the one hand, some requests were made by the partners, but a letter had to be written by the coordinator explaining the LIFE Salinas Project. On the other hand, another request was made directly by the coordinator of the Project.

Moreover, in some cases, it has been necessary to correct sections, ask for additional information and reports from the University of Murcia or have meetings with public administrations to explain specific project issues.

Despite that, the authorisations were requested within the established deadlines and were received in time, so there was no significant delay in the project actions.

Achieved results

The results have been the obtaining of authorizations, facilitating the coordination between the partners and the administrations for the adequate start and development of the actions within the foreseen deadlines, attending the media and participating in as many events as we have been invited to organize by the partners, administrations or other entities. The planned deliverables have been prepared.

The authorisations were obtained, with coordination between the partners and public administrations to development of actions within the planned deadlines.

Remaining results

None.

Variations in action:

None.

Action evaluation

LIFE-Salinas Project´s coordinator has been the necessary support to obtain the authorizations for the correct development of the projects, he has facilitated the coordination between the partners, has supported the partners in all their demands and needs, and he has supported Salinera could develop its actions, trough give advice and preparing the tendering procedures.

Likewise, all the media that, directly or indirectly, have requested LIFE Salinas participation have been attended (including articles in the press). LIFE Salinas also participated in all the events that has been invited.

Deliverables and milestones:

Code	Type	Name	Deadline	Completion
H6	Milestone	Elaboration of a management manual of the project LIFE SALINAS	31/10/2018	OK 31/01/2019
H8	Milestone	Protocol on sustainability in purchase and green procurement	31/10/2018	OK 31/12/2018
D1	Deliverable	Integrated management manual of the project	30/11/2018	OK 31/01/2019
D2	Deliverable	Protocol on sustainability in purchase and green procurement	30/11/2018	OK 31/12/2018
H12	Milestone	Strategy for replicability and transferability of the project	30/11/2018	OK 30/12/2018
D3	Deliverable	Strategy for replicability and transferability of the project	30/12/2018	OK 30/12/2018

F2. Trainings and meetings

✓ **Action ended**

Foreseen start date: 01/10/2018	Foreseen end date: 30/09/2022
Actual start date: 01/10/2018	Actual end date: 30/09/2022

Participants and responsibilities

Salinera has been in charge of organising the internal training. ANSE, UMU, DGMN and MDA have participated in the training, as well as in the provision of knowledge.

Description of activities undertaken and quantified outputs:

Two members (project coordinator and the financial assistance) of LIFE-Salinas Project attended the kick-off meeting LIFE 17 ENV and GIE projects (6 and 7 November 2018 in Brussels). These two people briefly presented the objectives and contents of the Project and established contacts and networks with other LIFE.

The team integration meeting was held on 18/09/2018, 16 people attended. The first internal training was held during this meeting on the LIFE programme administrative and financial rules.

On 5/06/2020, the second internal training meeting was held. The progress made so far was discussed. Some bird colonies were visited in the motes built in the framework of the LIFE project. The ten team members who attended are listed below: 2 technician from the DGMN, 3 technicians from Salinera, 3 from UMU, 1 from the City Council of San Pedro and 1 technician from ANSE took part.

(https://www.facebook.com/LIFESalinas/posts/pfbid02Sr4KMtjaJFUqAH7hUtp3WcfshkLaY4VtWc7HiESVUhq2n7tzu87DL8bociff5R11l).

On 23/11/2020, the third internal training meeting was held. The actions carried out on La Llana beach and Coterillo pond were discussed. Eight people took part: 1 from the DGMN, 3 from the salt mine, 2 from the University, 1 from the City Council, 1 de ANSE (https://www.facebook.com/LIFESalinas/posts/pfbid0qBqVomZgqFZVKLngLLKaibEvrJtsQeQAs6cRtuzU26e6SvrTkKtpSfpehDfov6NXl).

On 26/03/2021, the fourth internal training was held. The works on La Llana beach and the measures taken after the storm "Gloria", which caused significant damage, were visited. Ten people participated: 1 from the DGMN, 3 from Salinera, 2 from ANSE, 1 from the City Council and 3 from the UMU.

(https://www.facebook.com/LIFESalinas/posts/pfbid02GK2a1CdduhqtedkjfXP1yS8v4a38aMfzwJD4qyhZ7dLLUoHjoCUwoZgaJXMtVWTGl).

On 02/05/2022, the fifth internal training meeting was held, in which a tour of the Salinas dunes was carried out, reviewing the actions related to the control of invasive alien species. Nine team members participated: 1 from the DGMN, 3 from Salinera, 2 from the UM, 1 from the City Council and 2 technicians from ANSE.

(https://twitter.com/LSalinas184/status/1569280631334649856).

Three other extraordinary meetings have been held to promote the exchange of information, training of the team and the sharing of topics of interest to the team's staff.

On 25/10/2019 a meeting was held to assess the sand collectors' location, which was attended by 14 people :1 from the DGMN, 4 from Salinera, 3 from the UMU, 1 technician from the city council, 2 from ANSE and 3 other technicians. of the DGMN that are not directly linked to the LIFE SALINAS Project.

(https://www.facebook.com/LIFESalinas/posts/pfbid02JhizAb9QwFscgpbH7Pf6gC2X629jvBUnMxW3WtwpPnUFGj8PoCsiQkGKs8xMCXxVl).

The next was held on 30/01/2020 to assess the damage caused by the storm "Gloria" and prepare a list of proposals aimed at the actions necessary to recover the meters of lost dunes. (https://www.facebook.com/LIFESalinas/posts/pfbid037YYYCMgozCPUuGeSU1ePWfdxtTW2Hw7xvonF8xCxZ8pZtvrtspLiNZ3GicHhEXKjl).

The third was held on 04/26/2021 to prepare the activities for the European Green Week, 7 people participated: 1 technician from Salinera, 5 from the UMU and 1 from ANSE (https://www.facebook.com/LIFESalinas/posts/pfbid0HWhqhj41e6h3AzVnLTkckygjjsC33MPZgDFMkXCj8FTrTGsDKLMun2M9azNqRZ9Jl).

Main problems encountered and solutions provided

There have been no significant problems in the development of this action.

Achieved results

Participation in the activity organized by CINEA (KOM LIFE17 projects), organization of 5 internal training and 3 extraordinary meetings.

Remaining results

None.

Variations in action

The second internal training meeting planned for 2019 was delayed as work began on the installation of fencing on La Llana beach (action C.3), revegetation with native species (action C4) elimination of exotic species (action C5), and the first phase of salt speck construction (action C.1).

All of these were affected by the “DANA” storm (September) and the "Gloria" storm (December), so it was considered appropriate to delay the second internal training to the first half of 2020 with some work advanced and when it would be easier to travel due to the withdrawal of COVID-19 restrictions.

Action evaluation

The participation in LIFE project launch (November 2018, Brussels) achieves the objectives of exposing the LIFE-Salinas contents and establishing networks with other LIFE projects.

The LIFE Salinas team integration meeting (September 2018) met expectations by setting the initial objectives and explaining the salt mine operation to the team members. The first internal

training meeting introduced staff to the LIFE financial guidelines and general information and project operation issues.

The second internal training allowed the team members to learn about the progress in the construction of the salt dams and the excellent result in the new dam's occupation by nesting waterfowl and the expansion of the fartet range within Salinas.

The third, fourth and fifth internal training meeting allows the exchange opinions about the progress on different actions mentioned above.

Deliverables and milestones

	Type	Name of deliverable	Deadline	Monitoring
H7	Milestone	Day for integration of personnel involved in the LIFE Project	31/10/2018	OK 18/09/2018

F3. Financial assistance

✓ **Action ended**

Foreseen start date: 01/10/2018	Foreseen end date: 30/09/2022
Actual start date: 01/10/2018	Actual end date: 30/09/2022

Participants and responsibilities

Salinera is responsible for the financial coordination of the project. Each AB is in charge of completing their financial report and provide the documentation supporting the declared costs each time is requested by the CB.

Description of activities undertaken and quantified outputs:

Salinera is assisted by an external company (EuroVértice Consultores, S.L.) for the monitoring of the financial implementation of the project.

During the KOM, a training session about financial and administrative issues was done for project's beneficiaries, dealing with this specific content: first steps for the project implementation, financial instructions, eligibility of costs, description of type of costs, calculation of personnel costs, how to complete timesheets, 2% rule, award of contracts, supporting documentation for each type of cost, minor and major changes, payment scheme, financial update, reporting schedule, how to fill the financial report, communication requirements for eligibility of costs, monitoring visits to the project.

Partners agreed on update the project expenses and the provide the supporting documentation to the CB on a timely basis, ideally every three months and for each monitoring visit or report to EASME/CINEA. Financial reports have been requested for December 2018, March 2019, June 2019, December 2019, April 2020, August 2020, December 2020, April 2021, August 2021, December 2021, April 2022, and September 2022. For sharing financial reports and documentation, each partner has Google Drive folder. The CB collect and check the information from the folder of each AB, review the costs declared and request additional information if something is missing or indicate if something is wrong. A template to track the monitoring of the financial documentation and declaration of expenditures has been created.

The external assistance also provides permanent support to any AB to solve their doubts regarding the financial implementation and justification of costs.

Main problems encountered and solutions provided

No major problems have arisen in this action.

Achieved results

Regular update of costs declared to the project (12 financial reviews of project expenditures in 4 years of project life).

Assistance provides to the CB and ABs for the justification of project expenditures.

Remaining results

None.

Variations in action

This action has not suffered any variation.

Action evaluation:

The financial implementation of the project has been successful. The declaration of project eligible costs is around 99%. The coordination among CB and ABs has been good and the information request has been usually quickly solved.

Deliverables and milestones:

	Type	Name of deliverable	Deadline	Monitoring
H27	Milestone	First financial audit	30/09/2020	N/A. According to the General Conditions the external audit is only necessary for beneficiaries whose EC Contribution is equal or major than 750.000 €, which is not the case of any beneficiary of the project
H34	Milestone	Second financial audit	30/09/2022	N/A

F4. After-LIFE Conservation Plan

✓ **Action ended**

Foreseen start date: 01/09/2022	Foreseen end date: 30/09/2022
Actual start date: 01/09/2022	Actual end date: 30/09/2022

Participants and responsibilities

Salinera has been the coordinator and supervisor of this action. Other partners, such as UMU, have participated in the drafting of the deliverable, but all the partners have collaborated in its elaboration by defining the actions to be continued after the project and the resources they commit.

Description of activities undertaken and quantified outputs:

A document has been drawn up on the actions necessary to guarantee the continuity of the results in the long term once the LIFE-SALINAS project has ended.

The plan details, for the period 2023-2027, the actions, the main objectives and priorities to maintain the conservation actions carried out. It also addresses the necessary coordination between the different partners and includes other possible entities that might be interested in participating.

The document has been agreed by all the partners of the Project.

Table 34 shows the actions to be maintained.

Table 34. Actions to be maintained

Actions	**Responsible**
Action A2. Voluntary agreement of Land Stewardship	Salinera/ANSE
Action C1. Adaptation of spots with native material from the salt substrate	Salinera
Action C2. Connection of the Coterillo pond with the salt circuit	Salinera
Action C3. Stabilization and reinforcement of La Llana beach´s dunes ecosystem	Auntamiento/ ANSE/Salinera
Action C4. Revegetation with autochthonous species of La Llana beach´s dunes	ANSE
Action C5. Control of Invasive Alien Species and the nesting of the Yellow-legged Gull	ANSE
Action D1. Monitoring actions to stabilize and reinforce to control the erosion in La Llana beach´s dune ecosystem	Universidad
Action D2. Monitoring of reinforcement of the Llana beach dune ecosystem	Universidad
Action D3. Monitoring revegetation actions of community interest habitats with native species	ANSE/ Universidad
Action D4. Monitoring actions to promote environmental services of priority habitats through the Invasive Alien Species	ANSE
Action D5. Assessment of socio-economic impact and ecosystem services	Universidad de Murcia
Action E1. Diffusion	DGMN/ANSE/ Salinera
E1.a Environmental Education	DGMN
E1.b Environmental volunteering	ANSE
E1.c Website and social networks	Salinera
E2. Replicability, transferability and cooperation	Universidad
E3. Design and implementation of a quality certificate and environmental protection for Salinas of the Red Natura 2000´s salt	Mãe d'água
E4. Networks with other projects	Universidad

Action A2. Voluntary agreement of Land Stewardship.

Within the framework of the agreement of Land Stewardship signed between Salinera and ANSE in December 2019, nature conservation activities will continue to be carried out both in the San Pedro del Pinatar salt flats and in other salt flats. In this case, ANSE has acquired the concession of the Salinas de Marchamalo and obtained funding to implement a project to rehabilitate them, which will be advised by Salinera.

Action C1. Adaptation of levees with native material from the salt substrate. Action C2. Connection of the Coterillo pond with the salt circuit

Each year, Salinera will have to carry out maintenance work on the salt infrastructures created within the framework of these two actions. These actions will be carried out with its own financial resources.

Action C3. Stabilization and reinforcement of La Llana beach´s dunes ecosystem

According to the maintenance and repair of sand collectors, resources will be allocated each year for their maintenance and repair, preventing their deterioration.

On the other hand, the San Pedro del Pinatar Town Council will allocate economic resources to maintain the vegetation cover deposited between the dunes on the beaches of La Llana.

Action C4. Revegetation with autochthonous species of La Llana beach´s dunes

A follow-up will be carried out to assess whether it is necessary to carry out any additional action to reinforce the revegetation of the dunes on La Llana beach.

Action C5. Control of Invasive Alien Species and the nesting of the Yellow-legged Gull

Invasive alien species (IAS) monitoring and control programmes will continue to be developed, involving the local population and general public through the volunteer programme.

It is of great interest that ANSE continues to carry out the maintenance and removal of IAS, since, by an agreement between ANSE and the Ministry of the Interior of the Government of Spain, ANSE can count on the permanent presence of people included in the Works for the Benefit of the Community programme, managed by a specialised operator contracted by ANSE.

ANSE will continue to carry out actions to control the nesting population of the Yellow-legged Gull to eliminate or reduce competition for the speck, which are an optimal breeding habitat for larolimicolae, to eliminate or reduce predation of other species and to ensure the safety of workers in the salt ponds.

Action D1. Monitoring actions to stabilize and reinforce to control the erosion in La Llana beach´s dune ecosystem. Action D5. Assessment of socio-economic impact and ecosystem services

The University of Murcia will continue to develop research projects in wetlands, which will allow the monitoring of aquatic macroinvertebrates, common scoter, Audouin's gull and other aquatic species of birds listed in Annex I of the Birds Directive. In respect of yellow-legged gull monitoring, it will be continued together with ANSE.

Likewise, the University of Murcia will continue the monitoring and evolution of the beach and dunes of La Llana study through its research projects. This will be carried out with the university's own funds, in addition to seeking funding through calls for proposals and public-private agreements.

Action D3. Monitoring revegetation actions of community interest habitats with native species. Action D4. Monitoring actions to promote environmental services of priority habitats through

the Invasive Alien Species and Action control. D5. Assessment of socio-economic impact and ecosystem services

The University of Murcia and ANSE will continue to evaluate: the recovery of the natural habitat in the dunes on the beaches of La Llana, the outbreaks and control needs of the different IAS, and the repercussions of the long-term economic, social and environmental impact of LIFE-SALINAS Project.

This action will be carried out with own funds, public-private agreements or research calls.

Action E1: Planning and execution of dissemination

a) Environmental education

The General Directorate for the Environment, through information and visitor assistance programs in protected areas, will continue to carry out environmental education activities for schoolchildren, the local population and tourists, contributing their own funds.

b) Environmental volunteering

Pinatar Natura and ANSE will maintain various volunteer programs in the long term, which will allow them to develop the monitoring and control of invasive alien species and carry out actions to maintain the vegetation of the dune ecosystem.

c) Website and social networks

The dissemination of the actions carried out through the website and social networks will be maintained for at least 5 years after the LIFE project ends.

Action E2. Replicability, transferability and cooperation. Action E4: Networks with other LIFE and non-LIFE projects

The professors and researchers of the Murcia University will disseminate and publish the project's results in congresses and specialised journals, which will favour the replicability and transferability of the project; therefore, the maintenance of this action does not require additional funds. Likewise, the University of Murcia has a network of contacts with other universities, research centres, administrations and another kind of organisations.

Action E3. Design and implementation of a quality certificate and environmental protection for Salinas of the Red Natura 2000´s salt

Mãe d'água, IPAISAL and the University of Murcia will collaborate in the creation of a secretariat in charge of disseminating the quality certificate among the European Union's salt mines and supervising that salt mines already certified continue to comply with the quality and environmental compatibility.

Main problems encountered and solutions provided

No problems have arisen

Achieved results

Elaboration of a document with the necessary measures to maintain the actions carried out within the framework of the LIFE Salinas Project, with a calendar of activities and identification of the institutions to be involved.

Remaining results

None.

Variations in action

There are no variations

Action evaluation

Development of the SALINAS after-LIFE plan.

Deliverables and milestones

Code	Type	Name of deliverable	Deadline	Monitoring
D17	Deliverable	Drafting of the Post-LIFE Conservation Plan	30/09/2022	Delivered final report 30/09/2022

6.2. Main deviations, problems and corrective actions implemented

Authorisations from administrations

The implementation of the conservation actions (group of actions C) and part of the monitoring actions (actions D) required a complex process of processing a total of 28 authorisations in 4 administrations, which were managed and obtained almost all of them during 2019.

September hurricane “DANA” and December 2020 storm "Gloria

The hurricane in September “DANA” and the storm "Gloria" in December affected the normal development of the first phase of actions C1 and C2. Both extreme weather events caused damage to saltworks infrastructure that had to be urgently repaired, leading to delays in the development of the actions. Storm "Gloria" forced a 20-day work stoppage. It was decided to give priority to the completion of the work on the first phase of Action C1, so that it could be completed within the February 2020 deadline, which led to a delay in Action C2.

The storm "Gloria" affected Action C3 with the almost total destruction of the dune fence at La Llana beach and a loss of up to 5 metres of dune cord. This situation forced the recovery of the fence posts and the purchase of the metal mesh that ran parallel to the beach line. The loss of the fence allowed the entry of people who degraded the dune system and part of the plantations.

The C4 action was also affected as the ANSE nursery was flooded twice, this required an additional effort from staff and volunteers, as well as the purchase of plants from commercial nurseries.

Offers for the development of the C2 action

The deadline for the submission of bids for the implementation of action C2 had to be extended, as no company submitted complete documentation after the initial deadline. This coincided with the state of alarm that led to an additional delay. Finally, the contract to start work on Action C2 was signed on 25/05/2020. Even so, the action will be completed within the time frame foreseen in the project.

Health crisis by COVID19

The confinement decreed by the coronavirus health alarm limited the movement of personnel affecting the normal development of the C3 and C4 action, and in addition to the limitations on movement of personnel, TB was not available. The delay was remedied by strengthening the staff dedication.

The limitations on movement between March and June affected Action D2, which was able to obtain the data immediately before and after the storm, sufficient information to analyse the development of the beach in the months following the storm.

It was also not possible to make progress in carrying out personal surveys (action D5), so during the confinement a great effort was made to disseminate the form through social networks and by email.

Volunteer activities (action E1c) were suspended or delayed during the confinement and were resumed in June 2019.

The delay in other actions has generated a lower volume of events that could be news for the website and social networks (action E1d). As a solution, publications were produced on the natural values of the salt flats: flora, fauna, etc.

Six congresses, conferences, etc. in which we had planned to participate have been cancelled or delayed (action E2c.)

Participation in the Brussels Green Week (action E2d.) was postponed from 2020 to 2021.

Some of the contents of the E3 action report required an on-site visit, which was planned for spring 2020. These visits were delayed until the first summer of 2021. Two visits planned in the framework of Action E4 (Cabo de Gata-Níjar (Almería) and Project LIFE17 NAT/BG/000558 (Bulgaria)) were stopped due to the pandemic, and when we were to be resumed in 2021, the contact persons could not be contacted, so they were replaced by other visits.

The second internal training meeting of the team (Action F2), initially scheduled for the last four months of 2019, was postponed to the first half of 2020 in order to be able to bring forward part of the actions and check on the ground the progress and degree of compliance with the proposed objectives, but after a further delay as a result of the health crisis, this activity could be held on 5 June 2020.

In the framework of the project, it was planned to organise a meeting with the Wetlands Committee of the Environment Ministry (E2e). Since the COVID-19 pandemic, the meetings of the Wetlands Committee were held online, so the meeting was replaced by a final LIFE Salinas event to disseminate the results, which took place in September 2020.

Financial and/or budgetary problems

The follow-up objectives of Action D3 are disproportionate to the budget available for the action (3,800 euros), and it has therefore been sized for existing resources.

Financial and economic constraints have affected Action E1a), as the budget for the environmental campaign was not incorporated into the DGMN budget until the end of 2019. The planned amount (15,000 euros) then had to be implemented in the same budget year. In 2020, the campaign was not implemented due to budget management and recruitment problems and additional administrative delays caused by the pandemic. The budget of the Autonomous Community of Murcia was only approved in April and, once approved, due to the deadlock, the procedure for implementing the campaign was not carried out in time to be completed before the end of 2020, as the type of procedure is an open tender. In 2021 the contract was made and all the environmental education activities of the previous years were included.

6.3. Evaluation of Project Implementation

ACTION	RESPONSIBLE	FORESEEN IN THE PROPOSAL (OBJECTIVES, RESULTS)	% ACHIEVED	EVALUATION
A1. Technical projects of conservation actions	Salinera	Drafting of technical projects for conservation actions: C1. Green infrastructure: adequacy of salt levees with autochthonous material of the salt pans. C2. Green infrastructure: connection of El Coterillo pond with the salt circuit. C3. Stabilization and strengthening of the dune ecosystem in La Llana beach C4. Revegetation with autochthonous species in dunes of La Llana beach C5. Reinforcement of environmental services in priority habitats types through IAS control	100	Successful. The technical projects were timely completed and are the reference documents for conservation actions.
A2. Land-stewardship agreement	Salinera	Signature of a land stewardship agreement between Salinera Española, as owner of the salt pans, and ANSE, as land stewardship entity. Objective: create a cooperation framework for conservation actions and ensure future collaboration beyond the project.	100	Successful. The agreement was signed in 25/01/2019.
C1. Construction of salt levees	Salinera	The objective was to build 7 sections (1,800 m) of new levees to favour the nesting of birds included in Annex I of Birds Directive (2009/147/EC), especially the Audouin's gull. Result: The new levee is 50 metres longer than planned and was completed on time. In 2022 the new levee was used by 240 pairs of Audouin's Gull (ichthyaetus audouinii) and other bird species listed in Annex I of the Birds D.	100	Successful. Although the construction of the levee was started later, due to the storm DANA, it was built on time, as priority was given to this action.
C2. Connection of "Coterillo" salt pan	Salinera	Objective: Improve the drainage system and the origin of the effluent to this pond in order to: – Improve aquatic vegetation and macroinvertebrates indexes. – Improve the habitat for fartet populations. Results: The colonisation of aquatic vegetation and water circulation below 90 g/l, has allowed the recovery of fartet population. In addition, an island was created for the reproduction of waterbirds included in Annex I of the Birds Directive (2009/147/EC), which has produced very good results.	100	Successful. Work on the El Coterillo reservoir was completed in November 2020, within the buffer period foreseen in the Project (September to December 2020).
C3. Stabilization of dunes	ANSE	Objective: Installation of a 470 m protective fence over 2 ha of dunes and installation of 3,000 m of sand collectors to stop the erosion of the dunes on La Llana beach (prevents the effect of the wind on the dunes and prevents trampling inside the dunes by cutting off access).	100	Successful. Despite the difficulties encountered: destruction by the storm "Gloria" of the fence and part of the arrivals deposited, and the reduction of available personnel due

ACTION	RESPONSIBLE	FORESEEN IN THE PROPOSAL (OBJECTIVES, RESULTS)	% ACHIEVED	EVALUATION
		Results: Finally, the hunting fence was installed over 800 linear metres. 500 sand colectors were installed over 2,500 m. In addition, although it was not addressed in the proposal, 572 m of *Posidonia oceanica* banquettes were deposited along the dune ridge to protect it.		to the pandemic, the objectives of the action were met.
C4. Restoration of dunes with autochthonous species	ANSE	Objective: Increase of vegetal coverage by revegetation with autochthonous species (habitat 1510* and 2250*) to contribute to halt erosion. Results: 16.361 plants were introduced of 24 species for 44 plots in 2 hectares.	100	Successful. Expenditure on consumables had to be increased, as the budget for the production of more than 20.000 seedlings was underestimated during the preparation of the proposal (4.000€) Most of the action was completed on schedule (December 2020), but planting continued until February 2022.
C5. IAS control	ANSE	Objective: Control of IAS by acting over the root system, especially in 115,5 ha of priority habitats (1150* and 2250*) but also over all the surface of the SCI. Results: a total of 242 m3 and 68.16 tonnes of invasive alien species have been removed	100	Successful. The action ended later than planned (September 2022) due to the need to prioritise actions C3 and C5. Thanks to the reinforcement of staff, the action could be successfully completed.
D1. Biological monitoring	UMU	Objective: Monitoring programme to assess the success of actions C1 and C2 regarding: – Population of aquatic birds. – Activity and use of the habitats (nesting, resting or feeding functions). – Population of fartet. – Evolution of macroinvertebrates. Results: - They have nested 240 *Ichthyaetus audouinii*, 2 *Himantopus Himantopus*, 146 pairs of Sternula albifrons, 63 of Recurvirostra avosetta, 16 *Gelochelidon nilotica*, 7 of Charadrius alexandrines and 3 of *Burhinus oedicnemus (2022).* - New habitats were created for Aphanius iberus. It has not had a substantial impact on the community of aquatic macroinvertebrates where action C1 has been carried out. However, the suitability of the Coterrillo pond (C2) to support the development of a robust macroinvertebrate community is confirmed.	100	Successful. The action went smoothly, except for the impossibility of carrying out the monthly census in March 2020 due to the confinement and the change of personnel associated with the project in November and December 2021.

ACTION	RESPONSIBLE	FORESEEN IN THE PROPOSAL (OBJECTIVES, RESULTS)	% ACHIEVED	EVALUATION
D2. Monitoring of dunes stabilization	UMU	Objective: Assess actions for stabilization and strengthening of the dunes system developed in action C3 by monitoring volume of dunes and surface occupied by irregular tracks caused by visitors trampling. Results: The dunes of all sectors have suffered an increase in height: Sector 1 – 0,8 Cm; Sector 2 – 19,7 Cm, Sector 3 – 33,2 Cm and Sector 4 – 9,9 Cm.	100	Successful. Despite it was not possible to obtain the permits for the drone flights, to collection data for the topographic survey, a GPS was used.
D3. Monitoring of revegetation	ANSE	Objective: Assess action C4 of revegetation with autochthonous species of habitats of community interests (quality of plants, survival rates, increase of coverage and height…) Results: - The dune vegetation has recovered in all the plots monitored. More than 90% of the current cover comes from plantations. - The paths that used to cross the salt mine area are being covered by vegetation 400 seedlings of 19 species were characterized with measurements taken on 11 attributes.	100	Successful. The loss of a plot for monitoring and the need to resize the action to adjust to the budget (since it was low for the proposed tasks) has not prevented the objectives of the action from being met
D4. Monitoring of IAS control	ANSE	Objective: Assess recuperation of priority habitats targeted by Action C5 in order to know the efficacy of the measures adopted and detect recolonization of IAS in order to modify the techniques applied in action C5. Results: the techniques used to eliminate IAS have been positively evaluated. The presence of *Agave americana* has been eliminated in 60% of the monitored plots and *Carpobrotus* has been completely eradicated.	100	Successful. Despite that this action started and ended later than expected (1-20-2020; 30-09-2022, it met the established objectives.
D5. Monitoring of socio-economic impact and ecosystem services	UMU	Objective: Assessment of the socio-economic impact of the project and of the ecosystem services by studying: - Economic impact of the increase in salt production. - Economic impact in beach tourism in La Llana beach as a result of improving the littoral erosion Results: - The salt concentration after the action of C1 and C2 has increased by two baumé degrees, therefore an increase in production is expected. - The survey to assess the impact of the project in the tourism sector received 2.364 answers. - Most of the participants rated their experience in the Regional Park very highly. The protected area received in 2022, 343,000 visitors.	100	Successful. Despite the difficulties encountered in carrying out the survey (due to the COVID -19 pandemic), the planned number of people surveyed has been exceeded. In addition to the proposal, the ecosystem services offered by the protected area were identified and mapped, being 32.

ACTION	RESPONSIBLE	FORESEEN IN THE PROPOSAL (OBJECTIVES, RESULTS)	% ACHIEVED	EVALUATION
D6. LIFE KPI Webtool	Salinera	Objective: Update of the webtool LIFE KPI by the start and end of the project and intermediate assessment of the targeted values. Results: The indicators were introduced in the LIFE KPI web tool: Between March and September 2019, in July 2020 and 09/30/2022. Being its values updated at all times.	100	Successful. The objectives of the project have largely been met.
E1. Dissemination				
a) Environmental campaign	DGMN	Objective: Development of an environmental education campaign in the municipalities of influence of the LIC, aimed at educational centers, local population, workers and tourists Results: 300 activities carried out and more than 4000 attendees	100	Successful. The campaign started later but the objectives of the action could be met.
b) Staff training	Salinera	Objective: Capacity building courses for authority agents and Salinera staff. Results: 1 training with 6 Environmental Agents from the Autonomous Community and 4 trainings with 24 employees	100	Successful. The planned trainings have been carried out.
c) Volunteering	ANSE	Objective: Environmental volunteering programme for the general population and especially for influence municipalities. A monthly activity Results: 58 volunteer sessions with 1.344 assistants.	100	Successful. Despite the stoppage of activities due to COVID 19, the objectives have been met.
d) Website and social networks	Salinera	Objective: Monthly update of the project webpage and social networks profiles created. Results: - Website: Between 2019 and 2022, 61.041 visits were registered. - Facebook: 591 publications, 1.512 followers and 1,306 page likes. - Twitter: 419 publications, 687 followers - Instagram: 419 publications and 1.184 followers	100	Successful. Additionally, although it was not addressed in the proposal, a YouTube channel was opened: 19 videos and 1.413 views.
e) Production of dissemination material	Salinera	Objective: Edition of dissemination materials. Results: 1500 brochures, 4 Roll-ups, 600 notebooks, 1 Photocall, 500 posters, 1,000 stickers, 800 T-shirts, 500 caps, 750 pens, 500 didactic notebooks, 2,000 bookmarks, 2,000 salt shakers, 500 cloth bag and 5 online digital games.	100	Successful. More material has been produced than planned
f) Noticeboards	San Pedro	Installation of 5 noticeboard in the SCI to inform about project actions	100	Successful.
g) Layman Report	Salinera	Objective: Communication report to inform about project results to the general public. Result: Layman Report completed and published.	100	Successful.
E2. Replicability				

ACTION	RESPONSIBLE	FORESEEN IN THE PROPOSAL (OBJECTIVES, RESULTS)	% ACHIEVED	EVALUATION
a) Organization of initial conference	Salinera	Inauguration conference, inviting similar projects in salt pans developed in other countries	100	Successful Done on 5 February 2019
b) Organization of international seminar, elaboration of 2 international newsletters and creation of 2 international forums	UMU	Objective: Promoting and favouring the replicability and transferability of LIFE Salinas. Results: - "Conference on coastal dynamics and biodiversity in coastal salt ponds" was held on 21 may 2021. - The Coastal Geography newsletter had 397 visits and the Biodiversity in Coastal Salinas newsletter had 264 visits. Two international forums were created with 518 members in total.	100	Successful. Al the actions planned were carried out.
c) Attendance to events	UMU	Objective: Participation in congresses, seminars and other national and international events to increase visibility, transferability, replicability and establish cooperation networks. Results: A total of 38 events were attended (21 international, 11 national and 6 regional).	100	Successful. The health crisis caused by Covid 19 cancelled or delayed events in which we had planned to participate. These events are replaced by others.
d) Participation in the Green Week	Salinera	Objective: Presentation of the project in the Green Week to increase international dissemination Results: Done in Mar 2021. On the event´s website 6 videos of the different actions of the project were published	100	Successful. Participation in Green Week was carried out although it was delayed from 2020 to 2021 due to COVID.
e) Organization of 1 meeting of the Spanish Wetlands Committee	Salinera	Objective: Organization of a meeting of this cooperation body among regional and national administrations, during the last semester of 2021 or the first semester of 2022. Results: Since the COVID 19 pandemic, the Wetlands Committee meetings had an online format. Therefore, instead, it was preferred to hold a final project event on September 8 and 9, 2022. 34 people attended.	100	Successful. In the final event, very interesting and enriching debates were generated.
f) Manual of good practices for the transferability and the replicability of the project	UMU	Drafting and publication of: - Manual on Land Stewardship in salt pans exploitations. - Manual on Management and conservation of coastal saltpans and their environment. - Articles in specialized and informative magazines. Results: - The 2 manuals were drafting and published. - 12 publications were made (2 are pending).	100	Successful. The project manuals and publications have aroused great interest.
E3. Quality and environmental protection certificate for salt of salt pans in	MDA	Objective: Design and application of methods, procedures and criteria that operations to obtain salt within Natura 2000 salt pans should follow to have a quality certificate.	100	Successful. Despite the mobility limitations imposed by the health crisis, which forced the delay of some

ACTION	RESPONSIBLE	FORESEEN IN THE PROPOSAL (OBJECTIVES, RESULTS)	% ACHIEVED	EVALUATION
the Nature 2000 network		Results: Publication of the objectives, requirements, information to present and indicators of the certificate.		visits, the certificate was completed on time.
E4. Networking	Salinera	Objective: Exchange of good practices and results with other LIFE and no LIFE projects in Spain and Europe. Results: - 15 actions have been carried out with other projects, both LIFE and others in Spain - 13 networking activities were carried out with other LIFE and non-LIFE projects of the European Union. - 1 Conference with the International Society Salt Lake Research of China	100	Successful. The COVID pandemic forced to change some visits to projects for others, but the objectives of the action were achieved
F1. Project management by Salinera	Salinera	Objective: Coordination and management of the project. Results: The necessary steps have been taken with the administrations for the appropriate development of conservation and monitoring actions. The internal coordination tasks were carried out and the needs of the partners were met. Other complementary actions not foreseen in the project were promoted.	100	Successful.
F2. Internal trainings, workshops and meetings for beneficiaries	Salinera	Objectives: Pooling of results about the development of project actions among the staff involved in the project of the beneficiaries through project meetings. Internal training and annual capacity building activities. Results: Participation in the activity organized by CINEA (KOM LIFE17 projects), organization of 5 internal training and 3 extraordinary meetings.	100	Successful. The second internal training meeting scheduled for 2019 was delayed due to prioritizing the repair of actions C3, C5 and C1 after the DANA and Gloria storm, which was added to the travel restrictions due to COVID. It was finally carried out in the first half of 2020. But all the planned actions could be carried out.
F3. Financial assistance	Salinera	Objectives: Elaboration of financial reports, monitoring of the financial implementation of the project and supporting partners in the declaration of project expenses. Results: 1 training on financial and administrative issues and 12 financial reviews of project expenditures in 4 years of project life.	100	Successful.
F4. After-LIFE Conservation Plan	Salinera	Objective: Drafting of After-LIFE Conservation Plan to schedule and plan actions to ensure the sustainability of the conservation actions performed. Results: After-LIFE drafted for 2023-2027 period.	100	Successful. The afterlife Conservation Plan was carried out within the stipulated period (30/09/2022).

6.4. Analysis of benefits

1. Environmental benefits

a. Direct / quantitative environmental benefits:

Action C1:

Before the start of the Project, the population of *Larus audouinii* in the Salinas de San Pedro del Pinatar showed a regressive trend, from the maximum concentration of 836 nesting pairs in 2014, the population had been reduced to 180 pairs in 2018, while in 2022 a total of 498 pairs had bred.

Sterna hirundo fluctuates in the Salinas de San Pedro del Pinatar from 150-250 pairs throughout the 21st century, with a population in 2018 of 238 pairs, while in 2022 they had bred 335 pairs.

Sterna albifrons has a stable population in the Salinas de San Pedro del Pinatar throughout the 21st century with a population of 75-10 pairs. The population in 2018 were 74 pairs. After the actions of the LIFE SALINAS Project the population has increased to reach a maximum of 236 pairs in 2021 and 224 pairs in 2022.

Sterna sandvicensis has shown a regressive trend since breeding a peak of 772 pairs in 2015. The population in 2019, prior to the start of the project works, was 265 pairs. In 2022, after the works, it reached a total of 475 pairs

During the LIFE SALINAS Project, 1.85 km of new habitat for waterbirds has been built (50 metres more than initially planned), which has favoured the nesting in these new habitats in of 472 pairs of 5 species included in Annex I of Directive 79/409/EEC (in 2022):

- 240 pairs of Audouin's Gull (*Larus audouinii*), 146 pairs of Little Tern (*Sternula albifrons*), 63 pairs of Avocet (*Recurvirostra avosetta*), 16 pairs of Gull-billed Tern (*Gelochelidon nilotica*) and 7 pairs of Kentish Plover (*Charadrius alexandrinus*).

Thanks to this new habitat created by the project, in 2021 the first breeding attempt of two pairs of common flamingo (*Phoenicopterus ruber*) took place in the Salinas de San Pedro del Pinatar, including the laying of eggs, an unprecedented event in the Regional Park.

In addition, the construction of new salt levees has meant the extension of the distribution of 1 species of Annex II of Directive 92/43/EEC: The entire perimeter of the new levees has been colonised by the fartet (*Aphanius iberus*).

Action C2:

The Coterillo pond has been connected to the salt circuit, in order to ensure the maintenance of a permanent sheet of water, a salinity of between 40 and 60 g/l, and create ideal environmental conditions for fartet (*Aphanius iberus*).

Shortly after connecting Coterillo with the salt circuit, the fartet was able to re-colonize the pond, currently maintaining a stable population. Regarding the community of aquatic macroinvertebrates, an improvement in the community has been observed in the Coterillo pond from 2021, with the quality index being good/very good in the last two years of the Project. In addition, a fixed island was also created in Coterillo to favour the breeding of aquatic birds, an action that has also given very good results, breeding in the spring of 2022 a total of 16 pairs of little terns, 8 pairs of avocets, 2 of stilts and 3 black-footed plovers.

Action C3:

This action has acted on 3 ha (in the initial project it was planned to be 2 ha). The hunting fence has prevented the passage of people since the spring of 2020, giving rise to a spectacular recovery of the vegetation cover: priority habitat 1510* and another 10 habitats of community interest: 1210, 1410, 1430, 2110, 2120, 2210, 2230, 2260 and 92D0 and allowing the development of introduced seedlings (among others, priority habitat 2250*).

The deposit of *Posidonia oceanica* banquettes on the dune is a practice that is contributing decisively to the success of the Project, firstly because it prevents the regression of the dune ridge and secondly because it supposes a very considerable contribution of sand to the beach (when removing large banquettes that include big quantities of sand).

The sand collectors are fulfilling the function of preventing the loss of sand from the dune to the salt marsh, favouring the development of a dune relief and encouraging the establishment of vegetation.

Action C4:

The planting of 1.631 specimens of 24 native species of dune systems has contributed significantly to increasing the vegetation cover of the 3 hectares of dunes on La Llana beach, such that in certain situations almost 50% or even more of the current cover comes from plantations. In addition, the specific composition of the wild vegetation cover comes from annual species (*Suadea spicata, Cakile maritima, Salsola kali*) that indicate the recovery of the dune systems. This increases the importance of the cover achieved with the plantations, which basically corresponds to *Elymus farctus, Sporobolus pungens* and, to a lesser extent, *Lotus creticus.*

The survival of *Juniperus turbinata* plantations, a species listed as Endangered by Regional Decree 50/2003 on Wild Protected Flora in the Region of Murcia and a majority component of priority habitat 2250*, was 68%.

b. Qualitative environmental benefits

The construction of 1,850 metres of new salt levees will, in the long term, continue to benefit the colonial populations of nesting waterbirds listed in Annex I to the Birds Directive (2009/147/EC), including *Larus audouinii*), but also *Himantopus himantopus, Recurvirostra avosetta, Charadrius alexandrinus* and *Sternula albifrons*, as well as the populations of *Aphanius Iberus,* a fish endemic to the Iberian Mediterranean coast, which has colonised almost the entire perimeter of the new levees.

The adaptation of the water circulation of the Coterillo pond will maintain in the long term a high biodiversity of aquatic macroinvertebrates, optimum populations of fartet and, on the islands that have been adapted, the colonies of water birds included in Annex I to the Birds Directive (209/147/EC), especially *Recurvirostra avosetta* and *Seternula albifrons*.

On the other hand, 3 hectares of the dune ecosystem of La Llana beach have been stabilised and reinforced by fencing to prevent human access, the installation of sand collectors, the planting of more than 16.000 specimens of native species and the placement of *Posidonia oceanica* banquettes in the first six hundred metres, as a natural corridor between the dunes

and the beach. These measures, in addition to controlling the erosion of the dunes in the long term, reduce the risk of flooding of the salt marshes closest to La Llana beach during storms and allow the long-term development of more than 50% of habitats of Community interest, such as the habitat 1510 Mediterranean salt steppes (*Limonietalia*), as well as increasing the area of distribution of the priority habitat 2250 Coastal dunes with Juniperus spp.

The improvement of the environmental services of the priority habitats through the control of invasive exotic species along the 116 hectares of dune ecosystem located next to the 6 kilometres of beaches, allows the recovery and long-term maintenance in a good state of conservation of the habitats of Community interest, in particular the priority habitat 1510 Mediterranean salt steppes (*Limonietalia*).

The signing of a long-term land stewardship agreement between Salinera Española and ANSE will enable joint biodiversity conservation actions to be carried out in the Salinas de San Pedro del Pinatar and other restoration initiatives to be undertaken in the Salinas de Marchamalo, close to the Salinas de San Pedro del Pinatar.

Once the project has been completed, the actions will be continued as follows:

A. Preparatory actions, elaboration of management and conservation plans

- A2: an agreement for the Custody of the Territory between Salinera Española and ANSE will be maintained for an indefinite period of time, which will allow the development of actions for the conservation of biodiversity in the long term.

C. Specific conservation actions

- C1 and C2: Periodic maintenance by Salinera Española of all the levees and infrastructure fitted out inside the salt ponds, so that they continue to fulfil their role in the salt circuit and as a breeding area for water birds.
  This work consists of the permanent revision of the levees and channels, in case erosion or heavy rains deteriorate any section or element, losing its functionality. The maintenance is guaranteed by Salinera Española since it is on its own benefit for the correct functioning of the salt activity.
- C3: The San Pedro del Pinatar City Council will continue to ensure the good condition of the sand collectors and other infrastructure fitted out on La Llana beach.
- C4: ANSE will monitor the replanting of the dune ecosystem, in case it is necessary to carry out a new plantation once the LIFE project is finished. In this case it may be necessary to produce more plants in the ANSE nursery from its own plant nursery and human resources.
  This work will involve the implementation of the following actions:
    1. Collection of seeds, planting in the nursery, monitoring and reinforcement, etc.
    2. Soil preparation and planting with plants from the nursery and sowing with seeds collected from natural populations on the same site.
- C5: ANSE will continue to develop actions to control and eradicate invasive alien plants through specific annual programmes that mobilise its volunteers.

D. Monitoring the impact of project actions

- D1: The University of Murcia and ANSE will continue the monitoring of Audouin's Gull and other waterbird species, monitoring and assessing the long-term evolution of the populations, as well as of the habitats included in Annex I of the Habitats Directive (showing special attention to priority habitats 1510 and 2250).
  The long-term sustainability of the control of Yellow-legged Gulls in sensitive areas is guaranteed in the long term, as ANSE will continue this action thanks to the agreement of Custodia del Territorio with Salinera Española.
- D2: The University of Murcia will continue with the research tasks analysing the economic, social and environmental impact of the Project actions in the region.
- D3: As indicated in section C4, ANSE will continue to develop a monitoring of the actions of revegetation with native species.
- D4: The University of Murcia will continue to monitor the evolution of the dune chain and its recovery from erosive processes, under its own research programmes.

E. Public awareness and dissemination of results

- E1. Planning and execution of dissemination
  - The DGMN will give continuity to the environmental education campaigns initiated in the LIFE Project.
  - ANSE will continue with the Volunteer Programme.
  - Website: once the Project is finished, the website will be kept open for a minimum 5 years.
  - The information panels of the LIFE Project will remain indefinitely.
- E2. Replicability, transferability and international cooperation
  - The UMU will keep the international forum on coastal salt management going and coastal erosion.
  - The UMU will continue to organise and participate with its own funds in congresses, conferences, etc. both nationally and internationally, where the results of the LIFE-SALINAS Project will continue to be transferred for replication, in nature conservation and its compatibility with social and economic development.
  - The studies carried out during the development of the LIFE Project, as well as the continuity in the monitoring of the species, evolution of the dunes and the repercussion on the economic, social and environmental aspects, will allow the UMU to continue publishing scientific articles many years after the end of the LIFE Project.
  - The publications and good practice manuals for the replicability and transferability of the Project will remain on a website available to any interested party.
- E3. Implementation the quality and environmental protection certificate for the salt of the Natura 2000 Network salt flats
  - Mãe D'água, with the support of the European Association of Salt Producers (EUsalt), will establish a partnership to give long-term continuity to the quality seal, so that other salt mines in the EU and candidate countries can be certified on a voluntary basis once the LIFE Project has been completed.

2. Economic benefits

The dune restoration techniques for La Llana beach tested as part of the LIFE SALINAS project, as well as the creation of 1,850 metres of new levees, require continuous action over time, which stimulates the need for labour and employment.

The construction of new levees favoured an increase in the water flow within the salt ponds, which means greater evaporation and precipitation of suspended solids, so that the water is reaching the crystallising ponds with an increase of 2º baumé in temperature, which translates into an increase in salt production.

The actions carried out in the dunes of La Llana, as well as recovering the dunes, favours an increase in the supply of sand to the beach, increasing its tourist attraction, with a recovery of sun and beach tourism. The good results obtained have encouraged the San Pedro del Pinatar City Council to replicate the installation of a corridor between the dunes and the urban beach of El Mojón, located on the outer limit of the Regional Park of Salinas y Arenales de San Pedro del Pinatar, which is favouring the recovery of the tourist attraction of the beach of El Mojón, which was also very deteriorated.

Regarding the creation of jobs during the project, the number of FTE are presented by partner:

ANSE:

Unskilled employment: 1743.50 hours, 218 days, 0.83 FTE

Qualified employment: 2688.10 hours, 336.01 days, 1.29 FTE

UMU:

Qualified employment: 3157 hours, 394.62 days, 1.51 FTE

SALINERA:

Qualified employment: 3215.16 hours, 402 days, 1.54 FTE

MDA:

Qualified employment: 0.11 FTE

TOTAL:

Unskilled employment: 0.83 FTE

Qualified employment: 4.45 FTE

3. Social benefits

The development of the project has counted with the participation of people doing community service under the agreement established between ANSE and Prison Institutions, even one of these people has been hired in the development of the project once the sentence has been served. The Barlovento Association, made up of people affected by mental illness, has participated in the volunteer actions in an outstanding way. A volunteer activity was also carried out with the participation of a religious minority.

The *Posidonia oceanica* banquettes between the beaches and dunes, together with the repopulation with species from dune habitats, has increased the volume of sand on the dunes and increased the vegetation cover by more than 50%, which makes them an ally against

climate change, increasing their capacity to absorb CO2 and preventing water from reaching the adjacent salt ponds during storms. In addition, the fight against invasive species also involves fighting for people's health, as exemplified by invasive species such as the tiger mosquito, which transmits several tropical diseases considered to be emerging in the Spanish Mediterranean, such as Zika, Dengue and Chikungunya. By recovering the vegetation of the dunes we are also strengthening the food webs and increasing the presence of insectivores (birds and bats) that naturally control the presence of this and other species that are harmful to health.

The direct impact of these actions, together with the impact of the presence in social networks and other social media, has promoted alliances and synergies with environmental groups, the local population and citizens in general, generating a feeling of belonging that may persist over time. For the moment it is manifested in the good knowledge and valuation of the actions highlighted in action D2 of dune restoration and in D5 of the socio-economic impact and ecosystem services. The recovery of dune habitats and the creation of salt marshes in the long term is associated with the improvement of regulatory, social and economic ecosystem services that will benefit the general well-being of society, both direct and indirect users. Its recovery reduces erosion, improves beach quality, increases salt production, and prevents the catastrophic effects of coastal storms. It leads to an improvement in the quality of the ecological state of the salt marshes and dunes, increasing their variety of genetic resources (biodiversity), especially of native species, but it will also increase their service of controlling non-native species, limiting their number and expansion.

Finally, combining restoration actions with monitoring, research, training and dissemination activities favours social awareness and understanding on the part of the population and the agents involved, of the benefits obtained with this type of environmental action.

4. Replicability, transferability, cooperation

Nine research publications have been published (2 manuals of good practices and 1 article for dissemination of the results of the LIFE Project.

Of the 9 publications, 5 are articles in scientific journals and 4 book chapters:

Articles in scientific journals:

- Actions for the Conservation and Restoration of the Dunes and Wetlands in the Salinas of San Pedro del Pinatar: LIFE-Salinas Project (Murcia, Southeast of Spain).
- Analysis of Replicability of Conservation Actions across Mediterranean Europe - Evolution of the Beaches in the Regional Park of Salinas and Arenales of San Pedro del Pinatar (Southeast of Spain) (1899–2019).
- Analysis of Replicability of Conservation Actions across Mediterranean Europe
- Identification and assessment of the Ecosystem Services of the Regional Park of Las Salinas y Arenales de San Pedro del Pinatar (Murcia, Spain) based on user surveys.
- Basis for environmental sustainability through green purchasing and bidding.

Chapters of the book:

- Evolution of the population of the little tern Sternula albifrons (Latham, 1787) in the Regional Park of the Salinas and Arenales de San Pedro del Pintanar (2020-2021).
- Mapping of seagrass beds on submerged Mediterranean beaches, using artificial intelligence algorithms and multispectral satellite images.
- Tourist carrying capacity of the beaches of the Salinas y Arenales Regional Park in San Pedro del Pinatar (SE Iberian Peninsula).
- Project for the conservation of habitats and waterfowl in the SCI and ZEPA Salinas y Arenales de San Pedro del Pinatar (LIFE-SALINAS)

The good practice manuals are entitled:

- Good practices for the management and conservation of biodiversity in coastal environments: salt flats, beaches and dunes (146 pages)
- Custody of the Territory in salt exploitations (112 pages)

UMU has drafted and sent to a scientific journal a study that concludes that the methodology used in the nature conservation actions of the LIFE-Salines Project are transferable and replicable in a large part of the Mediterranean area, especially in coastal areas with salt mines with dune environments, that are within the Natura 2000 Network, but also in Ramsar and ZEPIM spaces.

The success of the actions carried out in the dunes of La Llana beach, to stop coastal erosion by placing *Posidonia oceanica* banquettes between the beach and the dunes, the control of invasive exotic species and the revegetation of native species, encouraged the San Pedro del Pinatar City council that has initiated a similar action in a nearby beach located outside the protected area. It has also attracted the attention of the Head of Coastal Demarcation in Murcia, of the Ministry for the Ecological Transition and Demographic Challenge of the Government of Spain, who paid a visit to the actions to assess their replicability in other coastal areas of the Region of Murcia. Finally, we received a visit from the Portuguese association Vita Nativa to find out the details of the LIFE SALINAS Project, since it is trying to implement similar actions in salt flats near the Ria Formosa located in the south of Portugal.

5. Best Practice lessons

a) The construction of 1.850 meters of new levees, made with material from the salt flats, has confirmed that it is a good practice. It improves ecosystem services with reproduction in the new leveed of 472 pairs of waterfowl included in Annex I of the Birds Directive and the improvement of salt production, since the water reaches the crystallising ponds with a temperature of 2º baumé.

b) The perimeter fencing, installation of collectors and revegetation of 3 ha of La Llana beach (Action C3 and C4) has allowed the total elimination of the network of roads that were deteriorating the dunes and the recovery of dune habitats in a very short time. The deposit of banquettes at the foot of the dunes to protect them from storms reinforces the good practice of the action.

6. Innovation and demonstration value

The project recognises the importance in saltwater ecosystems of the complex balance between uses and conservation of nature, as well as the complex relationships between the different entities that affect a territory. In these cases, an agreement has been reached between the different parties to carry out a nature conservation project that in turn generates a benefit in the tourist and socio-economic development of the area.

This project, coordinated by the private company that owns the land (Salinera Española), has involved the regional administration through the Directorate General for the Environment, the town council of San Pedro del Pinatar, a research centre (University of Murcia) and an environmental group (Association of Naturalists of the Southeast) and has the support of the state administration.

Among the innovation and demonstration values of this LIFE Project, the following stand out:

1) The interrelation between the conservation of nature and the production of salt, which has allowed the development of a series of actions through the creation of new levees that separate the salt ponds and the adaptation of a green infrastructure for the improvement of the water circuit of the Coterillo reservoir, which has favoured the creation of new breeding and feeding habitats for waterfowl included in Annex I of the Birds Directive. In addition, it has improved the conservation of priority habitats (1510 and 2250) and others included in Annex I of the Habitats Directive. It has also had a positive impact on the production and quality of salt.

The increase in production, the quality of the salt and the reduced dependence on climatic factors is due to the increased flow of seawater through the salt ponds, thanks to the new green infrastructure, which has allowed:

a) Increased capacity for evacuation of fresh water during heavy rainfall, which prevents it from mixing with the water in the salt pans, reducing their salinity and, therefore, production.

b) The higher the flow of seawater through the different salt ponds, the higher the sedimentation of the salt and thus the higher the purity of the sodium chloride in the crystallisation ponds where the salt is extracted.

2) The installation of 2.500 linear meters of sand collectors to stop the erosion of dune ecosystem, the revegetation of 3 hectares with 16.631 specimens of 24 native species, characteristics of dune habitats and the control of trampling in the most deteriorated section of the dune ring, benefits the habitats included in Annex I of the Habitats Directive. It also has a favourable impact on the tourist, and therefore economic attractiveness, of a beach (La LLana) that currently suffers coastal erosion problems. On the other hand, La Llana is located very close to the Mar Menor, a beach that is actually polluted. The degradation of the Mar Menor could cause displacement of tourists to the beach of La Llana. This impact on the tourist sector of La Llana has not been assessed.

Although it is not the direct objective of the Project, we calculate that the repopulation of 3 hectares on La Llana beach allows to fix some 20.58 Tn/year of CO2, which helps to reduce and fix the emissions of the main gas greenhouse.

3). This project demonstrates that the involvement of the private company that owns the land, the University of Murcia, the local and regional administration, an environmental group and an organization from Portugal, can join forces to promote a sustainable development project where the conservation of nature, improving tourism development in the area, improving the quality and production of salt, and improving the design and implementation of a certificate of quality and environmental protection for the Natura 2000 Network salt pans.

4) Network are improved.

300 environmental education activities have been carried out with more than 3,500 attendees, including local people, tourists, saltworks workers and port workers. In this way, it is demonstrated that there are models of sustainable development, such as LIFE-SALINAS, where it is compatible to conserve essential elements of European biodiversity and generate an economic resource through salt extraction and sun, beach and nature tourism, disseminating among all the people of different origins and ages that this model is possible.

7. Policy implications

A report has been sent to the Ministry for Demographic Transition and the Demographic Challenge for inclusion of *Asparagus macrorrhizu* in the Spanish Catalogue of Endangered Species, whose final inclusion is in the process of being processed.

Restrictions on access to certain areas that have allowed the improvement of habitats included in Annex I of the Habitats Directive (92/43/EEC) and of species listed in Annex I of the Birds Directive (2009/147/EC).

7. Key Project-level Indicators

Most of the KPI targets at project level have been achieved. Some actions have achieved better results than expected.

Indicator Code 1.5:

- Control of Invasive Alien Species (IAS) in dunes: as planned, IAS have been controlled in the 115,5 ha of the entire dune front of La Llana and Torre Derribada beaches.
- Stabilisation and reinforcement of the dune ecosystem of La Llana beach: The initial objective was to work on 2 ha of La Llana beach, but the work has managed to cover 3 ha.
- New habitats for the reproduction of aquatic birds: The initial objective was to create 1,800 m of new habitats suitable for the reproduction of aquatic birds, but the work has managed to reach 1,850 m
- Recovery of the biodiversity of the Coterillo lagoon: the conditioning of Coterillo lagoon water circuit by means of a green infrastructure, with a water inlet and outlet, has allowed the recovery of biodiversity in the 8.3 ha of the lagoon.

Indicator Code 1.6:

Environmental education campaign + social networks: 35.102 people.

ENVIRONMENTAL EDUCATION CAMPAIGN:

The LIFE SALINAS Project planned to develop 220 activities over the 4 years; however, in the end, a total of 353 activities have been carried out, in which 6.130 people have participated.

-300 activities (talks, workshops, itineraries through the salt flats) for primary and secondary schools: 4,647 participants.

-5 activities for undergraduate and master's degree students (lectures, Salinas itinerary): 113 participants.

-73 activities for the general public (dissemination of the beaches, train access to the park, local associations, etc.): 776 participants.

-58 environmental volunteering activities: 1.344 participants.

-1 itinerary to the company Eurovértice: 20 participants.

SOCIAL NETWORKS (30 September 2022):

Unique visits to the website: 23.635

In LIFE SALINAS proposal, it was calculated that the website would receive a minimum of 20,000 visits over the 4 years, so the planned objectives have been met.

Social networks information:

-Facebook followers: 1.512

-Instagram followers: 1.184

-Twitter subscribers: 687

-YouTube channel views: 1.413

Total unique visits to the website, followers, subscribers and views: 28.431 people.

FORECASTS 5 YEARS LATER (2023-2027):

Environmental education campaign + social networks= 2,400 + 6,000 = 8,400 people.

Environmental education campaign 24 activities/year x 5 years= 120 activities.
120 activities x 20 pupils/activity= 2,400 participants.

Social networks: 200 visits per month x 12 months = 2,400 visits/year x 5 years = 12,000 visits to social networks in 5 years.

35.102 people influenced until 30 September 2022 + 12.000 people influenced 5 years later= 47.102 people.

Visitors to the project area: The dune protection works with a Posidonia banquettes between the beach and the dunes and the perimeter fence were completed in June 2020.

Between July 2020 and the completion of the project in September 2022, there are 27 months.

Sampling carried out in the framework of action D5 "evaluation of the socio-economic impact and ecosystem services" calculated that La Llana beach are visited by an average of 122.000 people/year (average of 10.167 people per month).

10.167 people per month x 27 months = 274.509 people benefited between July 2020 and September 2022.

5 YEARS LATER (2023-2027):

122.000 people x 5 years = 610.000 people favoured by the Project between 2023 and 2027.

274.509 people benefited until 30 September 2022 + 610.000 people benefited between 2023 and 2027 = 884.509 people benefited from July 2020 to December 2027.

- People who have received training courses (e.g. employees):

11 training activities= 71 people

- 8 activities saltworks and port workers: 52 participants
- 2 activities for law enforcement officers: 14 participants
- 1 activity San Pedro del Pinatar Tourist Office: 5 participants.

5 YEARS LATER (2023-2027)

1 training course per year x 5= 5 training courses x 7 persons/course= 35 persons trained between 2023-2027.

71 persons (until September 2022) + 35 persons (2023-2027) = 106 persons receiving training courses.

Indicator Code 7.1:

Project Area:

- Stabilisation and reinforcement of the dune ecosystem of La Llana beach: work has been carried out on 3 ha, 1 ha more than initially planned in the Project.
- New habitats for the reproduction of aquatic birds: 1.850 m of new habitats have been created for the reproduction of aquatic birds, 50 m more than initially planned in the Project.
- Water connection of the Coterillo pond with the salt water circuit: Action C2 "Green infrastructure: connection of the Coterillo pond with the salt water circuit" has connected the Coterillo pond (8.3 hectares) with the salt water circuit, creating an inlet channel and an outlet channel, allowing adequate water circulation inside the Coterillo lagoon.

Indicator Code 7.2: (the reasons for the favourable state of the dune area of La Llana beach where the work has been carried out have already been explained in previous sections).

Ecosystem services-wetlands:

Action C1 "green infrastructure: adaptation of levees with the autochthonous material of the saline substrate" has allowed a greater flow of water through the salt ponds, allowing access of water to the crystallisation ponds (from where the salt is extracted) with an increase of 2º baumé in the salt concentration. It has not been possible to calculate the increase in salt production, due to the unusual storm "Gloria" in January 2020 (https://www.aemet.es/es/conocermas/borrascas/2019-2020/estudios_e_impactos/gloria), that caused significant damage to salt infrastructures and salt production was severely affected.

Ecosystem services - sea coast:

The actions carried out in action C3 "Stabilisation and reinforcement of the dune ecosystem of La Llana beach" have slowed down the erosive processes of the beach and dunes, which has improved the tourist use of La Llana beach, which is visited by 122,000 people per year.

Project area:

Action D5 "Socio-economic impact assessment and ecosystem services". The article Hernández Mármol, D., Ballesteros Pelegrín G.A., & Belmonte Serrato, F. (2021) has been published. Identification and valuation of the Ecosystem Services of the Regional Park of Salinas y Arenales de San Pedro del Pinatar (Murcia, Spain) based on user surveys. Geographical Investigations, (75), 167-186 (https://www.investigacionesgeograficas.com/article/view/16867).

It is concluded that LIFE SALINAS Project has a favourable effect on 31 of 32 ecosystem services of the SPA/SCI "Salinas y Arenales de San Pedro del Pinatar".

These are the following:

- Provisioning (biological): CICES code 1.1.6.1 and 1.2.1.1.

- Provisioning (abiotic): CICES code 4.3.1.1 and 4.3.2.1.

- Regulation and maintenance (biotic): CICES code 2.2.1.1/ 2.2.1.2/ 2.2.1.3/ 2.2.2.2.1/ 2.2.2.2.2/ 2.2.2.2.3.3/ 2.2.3.1/ 2.2.4.2/ 2.2.5.2/ 2.2.6.1.

- Regulation and maintenance (abiotic): CICES code 5.1.1.1/ 5.1.1.2/ 5.2.1.1.1.

- Cultural services (biotic): CICES code 3.1.1.1/ 3.1.1.1.2/ 3.1.2.1/ 3.1.2.2.2/ 3.1.2.3/ 3.1.2.2.4/ 3.2.1.1.1/ 3.2.1.3/ 3.2.2.1/ 3.2.2.2.2.

- Cultural services (abiotic): CICES code 6.1.1.1./ 6.1.2.1.1./ 6.2.1.1.1./ 6.2.2.1.

Indicator Code 7.3:

Project Area (Annex I Habitats Directive):

Stabilisation and reinforcement of La Llana beach´s dune ecosystem (1510-Mediterranean salt steppes and 2250-Coastal dunes with Juniperus spp.): has improved the conservation status of both habitats in the dunes of La Llana where the Project has intervened.

- Stabilisation and reinforcement La Llana beach´s dune ecosystem:

1510 Mediterranean salt steppes (Limonietalia).

Increase of this habitat in 0.3 ha La Llana beach´s dune ecosystem.

In this case, the target habitats already existed in the Natura 2000 sites where the LIFE SALINAS Project has been implemented. The objective is to restore/improve the existing habitats (no additional areas will be created/added).

- Water connection of Coterillo pond with the salt circuit:

1150 Coastal lagoons:

Action C2 "connection of the water circuit of the Coterillo pond with the Salinero circuit" has led to the recovery of the habitat 1150-Coastal lagoons. In this case, the target habitats already existed in the Natura 2000 sites where the projects work. The aim is to restore/enhance existing habitats (no additional area will be created/added).

2250-Coastal dunes of Juniperus spp.

Enhancement of this habitat on 0.9 ha of the dunes of La Llana beach.

Indicator Code 7.4:

- New habitats for breeding waterbirds:

Larus audouinii/Birds: The breeding population before the actions was 432 pairs in 2019. In 2022 they bred 498 pairs, maintaining a trend of moderate increase in these last 3 years with respect to previous periods. Although the expected 700 pairs have not been reached, if this trend continues, this number could be reached in 5 years (2027).

1.85 kilometres of new habitats suitable for breeding Larus auidouinii have been created, 50 metres more than planned.

- Recovery of biodiversity in the Coterillo lagoon:

Aphanius iberus has colonised the lagoon, currently maintaining a stable population in both the pond and the entrance channel. In this case, the target habitats already existed in the Natura 2000 sites where the projects are operating. The aim is to restore/enhance existing habitats (no additional areas will be created/added).

A total of 1638 *Aphanius iberus* were captured in the 10 traps set in the summer of 2022, of which more than 80% were sexually mature adult individuals.

The aquatic macroinvertebrate community has also been enriched thanks to the Project, with a Good/Very Good quality index at the end of the Project.

The improvement of the system as a whole is reflected by the results of the application of the SALINDEX index with a conservation status between Excellent and Good.

The conditioning of an island within the lagoon has facilitated the reproduction of 21 pairs of 4 species included in Annex I of the Birds Directive (in 2022): *Sternula albifrons* (8), *Recurvirostra avosetta* (8), *Himantopus himantopus* (2) and *Charadrius alexandrines* (3).

Indicator Code 7.5.1:

- Control of Invasive Alien Species:

Agave Americana subsp. Americana: estimated density of 0.01 plants/ha and a total affected area about 10,890 square metres.

Arundo donax: a density of 0.01 trees/ha and a total area affected of approximately 373 square metres.

Carpobrotus acinaciformis: the estimated density is 0.01 ha/ha and the total area affected is about 2,945 square metres.

Cylindropuntia imbricate: the estimated density is 0.01 ha/ha and the total area affected is about 35 square metres.

Lantana camara: the estimated density is 0.01 ha/ha and the total area affected is about 35 square metres.

Yucca gloriosa: the estimated density is 0.01 ha/ha and the total area affected is about 251 square metres.

Indicator Code 10.2.2.2:

- National Authority:

The Coastal Demarcation of the Ministry for Ecological Transition and the Demographic Challenge of the Spanish Government has provided us with the necessary authorisations to carry out the conservation actions within the Maritime-Terrestrial Public Domain. Subsequently, they were interested in the results of the actions on La Llana s beach and dunes and their possible replicability on other spaces of Murcia Region.

- Local authority:

San Pedro del Pinatar City Council is a partner of the Project, has participated in the design and placement of informative posters and in the actions of Invasive Alien Species Control. It is replicating the dune erosion control actions of La Llana beach on El Mojón beach, located on the outer boundary of the protected area.

- Regional authority:

The Directorate General for the Natural Environment of the Region of Murcia´s Autonomous Community is a member of the Project, has carried out the environmental education campaign and has collaborated, among other things, in the application for authorisations and in the decision making of all actions.

Indicator code 10.2.

- Public bodies

The Directorate General for the Natural Environment of the Autonomous Community of the Region of Murcia and San Pedro del Pinatar City Council are partners in the LIFE SALINAS Project. The Coastal Demarcation in Murcia of the Ministry for Ecological Transition and the Demographic Challenge of the Government of Spain, has facilitated the authorisation to carry out conservation actions within the Maritime-Terrestrial Public Domain, subsequently taking an interest in the good results of the erosion control of the beaches and dunes of La Llana and their possible replication in other coastal areas of the Region of Murcia.

- Private companies

Salinera Española is the main partner of the LIFE SALINAS Project.

They have also collaborated in the decision making process of all conservation actions, supporting education, dissemination and environmental volunteering activities, replicability and transferability, etc.

The following companies have collaborated in volunteer activities, conferences and visits to other projects: "Marina de las Salinas" Marina (San Pedro del Pinatar), Atlántida Medio Ambiente (Cádiz) and Info SalMarim Lda (Portugal).

- Non-Governmental Organisations (NGOs)

The Asociación de Naturalistas del Sureste (ANSE) is a member of the Project.

The following associations have collaborated in volunteer activities, conferences, talks, dissemination of material and other activities: Grupo Scout Pinatar Natura Hipocampo 503, Asociación Calblanque, Instituto Patrimonio y Paisajes Salinos, Asociación de Amigos de Poza de la Sal, Unión Internacional para la Conservación de la Naturaleza-Sede Málaga, Vita Nativa (Portugal), Asociación Anthus (Sardinia-Italy), Fundación Samouco (Portugal) and the International Society for Lake Research (China).

Indicator Code 11.1:

- Website visits:

Until 30 September 2022:

No. of unique users to the website: 23,635

No. of visits to the website: 61,041

Average length of visit (minutes): 1.26

Approximately 2,400 visits/year to the website x 5 years (2023-2027) = 12,000 visits between 2023-2027.

23,635 (until September 2022) + 12,000 visits (2023-227) = 35,635 visits to the website until 2027.

Indicator Code 11.2:

- Multimedia products (videos, brochures, etc):

In total 31 different materials have been created.

19 videos published on the YouTube channel (https://www.youtube.com/channel/UCwZ_BOPDNnfbeToBOwGNO7g/videos%29.).

Merchandising: 800 T-shirts, 500 caps, 500 notebooks, 750 pens, 500 posters, 600 notebooks, 1,000 stickers, 1,500 brochures, 2,000 salt shakers, 2,000 bookmarks, 1 photocall, 4 roll ups.

During the **5 years after the LIFE Project** (2023-2027), 5 new materials will be created.

- Number of events organised:

300 environmental education activities (ponds in educational centres and itineraries around the Salinas, celebration of world days), 58 environmental volunteer activities (bird censuses, propagation of plants in nurseries, cleaning of beaches, repopulation, removal of invasive exotic species, etc.), 7 training courses for Salinera staff, 2 training courses for law enforcement officers, 1 training course for port staff, 1 Greenwek, 1 initial day of the Project, 1 International Conference on Biodiversity in Salinas and Coastal Erosion and 1 Closing Conference of the LIFE Salinas Project.

For the period 2023-2027 (**5 years after the Project),** 12 environmental education activities will be carried out every year, making a total of 60 activities over the 5 years.

- Publications (magazines, conferences, congresses, conferences, etc.):

A total of 52 articles have been published in magazines, conferences, congresses, seminars, etc.

Participation in 38 workshops, congresses, conferences, seminars, round tables, etc.

Scientific journals: 7 (2 pending publication)/ Book chapters: 4/ Manuals of good practices: 2 / Popularisation journals: 1

After 5 years (2023-2027) there will be participation in 1 congress, conference, annual conference and/or publication of article in journals. which represents a total of 5 interventions.

- Information panels:

5 information panels installed in areas with a high influx of visitors to the Salinas de San Pedro del Pinatar. Once the LIFE-SALIANS Project has been completed, it is not considered necessary to add more additional posters.

- Number of articles in the printed media (newspapers, magazines, etc.):

105 articles and interventions in the media (press, radio and television).

During **5 years after** the Project (2023-2027), 5 interventions in the media per year will be carried out, for a total of 25 interventions.

- Number of hotlines:

LIFE SALINAS e-mail to request information about the Project (info@lifesalinas.es)

Indicator Code 11.3:

- Surveys:

Pilot survey in 2019 with 262 responses. Another final one with 2.364 respondents. A total of 2.628 completed surveys of visitors, local people, students, workers, etc. Almost all of them online.

Indicator Code 12.1:

- Members of interest groups:

At least contact with 29 people from the different organisations:

- Entities with which we have collaborated:

International:

LIFE10 NAT/IT/000256 MCSALT (Sardinia-Italy)

LIFE11 NAT/BG/000362 Salt of Life (Bulgaria)

LIFE 15 NAT/lv/000900 LIFE CoHaBit (Latvia)

Calabria Region and Sila National Park (Calabria-Italy)

Conservatoire du Littoral (Tour du Valat) (France)

University of Aveiro (Portugal)

Ecomuseum of Aveiro (Portugal)

Samouco Foundation (Portugal)

Vita Nativa Association (Portugal)

Anthus Association (Sardinia-Portugal)

Insonso SaltMarim Lda. Portugal

Migratory Birds for People Programme (United Kingdom)

Natural Reserve of the Marshes of Castro Marim and Vila Real de Santo António (Portugal)

International Society for Salt Lake Research (China)

Spain:

LIFE04 NAT/E/000044 LIFE-ENEBRO (Valencia)

LIFE00 NAT/E/007339 LIFE DUNA (Valencia)

LIFE NAT/02/NAT/E/8608 Recovery of Audouin's Gull Community of Valencia (Alicante)

LIFE07/NAT/E/000732 LIFE INDEMARES (Madrid)

LIFE16 CCA/ES/000077 LIFE HEATLAND (Murcia)

LIFE17 GIE/ES/000515 LIFE INVASAQUA (Murcia)

H2020 COASTAL (Murcia)

AMARYPESCA. University of Barcelona (Catalonia)

MedArtSal - IUCN (Malaga)

Climate Change Chair - Polytechnic University of Valencia (Spain)

Iberian Network of Geological Areas (Madrid)

Asociación de Amigos las Salinas Poza de la Sal (Burgos)

IPAISAL Institute of Heritage and Landscapes of Salt (Guadalajara)

Atlántida Medio Ambiente (Cádiz)

Calblanque Association (Murcia)

Indicator Code 13:

Economic benefits.

ANSE:

Unskilled employment: 4543.5 hours, 568 days, 2.64 FTE Qualified employment: 2693.6 hours, 336.7 days, 1.57 FTE

UMU:

Qualified employment: 6622 hours, 827.75 days, 3.85 FTE

SALINERA:

Qualified employment: 7400 hours, 925 days, 4.30 FTE

MDA:

Qualified employment: 0.51 FTE

TOTAL:

Unskilled employment: 2.64 FTE

Qualified employment: 10.23 FTE

Indicator Code 14.1:

Project cost and forecast in case of continuation:

Total cost of the project (2018-2022)= 1.849.061,84 €.

Dirección General de Medio Natural (committed for 2023)= 40.000 €.

Salinera Española= 12.000x5= 60.000 €.

Total=1.990.545

Indicator Code 14.2:

Expenditure foreseen in case of continuation:

Dirección General del Medio Natural (2023)= 40.000 €.

Salinera Española= 12.000x5 years (2023-2027)= 60.000 €.

Total: 100.000 €.

Indicator Code 14.3:

Beneficiary's own contribution:

Salinera Española= 12.000x5 years (2023-2027)= 60.000 €.

8. Comments on the financial report

8.2. Summary of Costs Incurred

PROJECT COSTS INCURRED				
	Cost category	Budget according to the grant agreement in €*	Costs incurred within the reporting period in €	%**
1.	Personnel	773,346.00 €	889,195.13 €	115%
2.	Travel and subsistence	66,609.00 €	33,077.70 €	50%
3.	External assistance	242,000.00 €	233,696.32 €	97%
4.	Durables goods: total non-depreciated cost			
	- *Infrastructure sub-tot.*	605,360	569,526.00 €	94%
	- *Equipment sub-tot.*		983.18 €	
	- *Prototype sub-tot.*		- €	
5.	Consumables	1,000.00 €	19,613.53 €	1961%
6.	Other costs	15,600.00 €	15,454.63 €	99%
7.	Overheads	86,930.00 €	86,882.00 €	100%
	TOTAL	1,790,845.00 €	1,848,428.49 €	

*) If the Agency has officially approved a budget modification through an amendment, indicate the breakdown of the revised budget. Otherwise this should be the budget in the original grant agreement.
**) Calculate the percentages by budget lines: e.g. the % of the budgeted personnel costs that were actually incurred

The total costs incurred by the project for its whole implementation have been € 1,848,428.49 which means 103% of the estimated budget. However, eligible declared costs € 1,328,131.92 have been under the initial amount foreseen € 1,336,825.00.

Although there have been some shifts between costs categories, the average remains below the 20% threshold allowed by the Programme flexibility (11%).

The more significant variances in costs categories regarding the proposed amounts are found in personnel, travel and subsistence and consumables. The final figures are commented below:

- Personnel: an overspending of 15% is registered in this cost category. This comes mainly because the real salary costs of some entities were higher than those registered in the proposal. This is especially the case of Salinera Española.
- Travel and subsistence: the final incurred costs have been half the amount foreseen. Movement restrictions due to the pandemic COVID-19 has avoid some transfer and dissemination activities that were to be done abroad and were finally made online or in nearer places.
- External Assistance: had no significant deviations compared to the original plan.
- Infrastructure: The final contracts have been finally higher than the budgeted costs (€ 157,260 budgeted for Coterillo works and € 159,526 the actual contract and € 386,100 budgeted for the construction of salt levees and € 410,000 actual costs). Nevertheless, eligible costs according to the depreciation rules of the beneficiary have not exceed the eligible amount approved in the Grant Agreement.
- Equipment: this cost (€ 983.18) was not initially foreseen, but a webcam for real time monitoring of nesting was purchased. This has served also for communication and dissemination activities.
- Consumables: the amount budgeted in this category has been overpassed (in 1961%) mainly because of the costs declared by Salinera and ANSE. On one hand, Salinera had in "Infrastructure" € 15,500 of eligible costs foreseen for Action C3 and described as materials for the construction of sand catchers (heather, stakes, wire, etc). These types of costs are better allocated under "consumables" and have been consequently declared in this category (€ 13.054,75). On the other hand, ANSE had only consumables budgeted costs for Actions C4 and C5 (€ 1,000) but not budget was foreseen for Action C3. Due to the several damages suffered in the fence to stop dunes erosion and their reparation, ANSE needed to purchase materials to speed up the works to be done. Although the costs for materials in Action C3 was in the budget of Salinera, ANSE has incurred also in some consumable's costs on C3 in order to be more operative, for a total of € 6.558,78 in consumables.
- Other costs: had no significant deviations compared to the original plan.

8.3. Accounting system

Accounting systems

ANSE

The name of the accounting system is OVERCON and the accounts associated to the project are 629000037-629000037.

SAN PEDRO

The accounting programme used in the municipality is GEMA and the project code is 1721 227 06 and 1721 227 01

DGMN

The costs associated to LIFE SALINAS are identified under the project code 46383 in the accounting programme SIGEPAL.

MDA

The project reference is 9425 - Life Salinas in the accountability programme CUSTO.

SALINERA

The accounting programme used is SAGE. There is a specific project created and named "LIFE" for a separate accountability of project costs.

UMU

In the programme JUSTO (software used for the economic management in the University), the project LIFE Salinas has assigned the code 30422.

Procedure of approving costs

ANSE

For travel costs, employees and volunteers should present a sheet collecting allowance and travel costs (km) incurred together with original tickets.

For outsourcing products or services above 12,000€, three offers need to be requested to different providers. The Directive Board decides based on economic and best value for money criteria the awarded offer.

SAN PEDRO

Regarding travel costs (accommodation, km, allowance), the reimbursement to the employee is requested as secondment and has to be approved by a responsible. These expenditures are incorporated to the project 1721 227 06 (Chapter II) in the accountability programme GEMA.

Award procedures must be compliant with the Law 9/2017 of Public Sector Contracts.

DGMN

The Regional Decree 24/1997, for personnel of the Public Administration of the Region of Murcia, establishes the amounts to be paid according to the service developed. The reimbursement of costs of accommodation, travel in self vehicle and allowance, are requested as secondment in a monthly basis. These expenditures are accounted in SIGEPAL, in the investment project 46383, subconcept 230.2 for allowances and 231.02 for travel costs.

Award procedures must be compliant with the Law 9/2017 of Public Sector Contracts.

MDA

For travel costs, all trips within the Project in Portugal will be made using company cars and trips to Spain (Murcia) will be made using rental cars.

The receipts of tolls, fuel invoices, meals and accommodation will constitute evidence of the journeys. In the case of company vehicles, a record will be made of the kilometres on departure

and arrival, indicating the date, route and total number of kilometres made. The values of the fees paid for the journeys correspond to the working hours made on those journeys.

SALINERA

Travel costs incurred are declared in travel sheets (format "travel costs control") providing the tickets or invoices related. They are revised by the Administration Department and verified by the Director in San Pedro del Pinatar with a signature. Alternatively, allowances according to the collective agreement of Salinera Española S.A. could be also claimed, as defined in its article 21. In both cases, costs will be paid in cash or by bank transfer.

For the contract of works, services or products, 3 offers will be requested when the amount is above 10,000€. Contracts valued above 135,000€ will have to be awarded through an open procedure.

UMU

Travel costs (allowance, use of own car and accommodation) are according to the Real Decree 462/2002 regarding compensation for secondment (Group 2 and Annex II). Secondment should be signed by the person that makes the trip and for the principal investigator of the project who gives the authorization.

The selection of providers (for goods and services) is made following best value for money criteria. Internal rules of the University do not oblige to request several bids if the estimated value is below 15,000€ for services or supplies or 40,000€ for works, which are minor contracts according to the Law 9/2007 of Public Sector Contracts. Procedures for minor contracts needs an agreement of authorization for the purchase of good or services issued by the Department of Economic Management of the University and a motivated report signed by the researcher, explaining the need of such minor contract and justifying that the contract is not split.

Type of recording system

Partners used manual timesheets according to the template of the LIFE programme and the guides provided in Annex X of the GA, about the elements to be included in time registration systems. The timesheets were filled daily by each worker and reviewed and approved monthly by each project responsible. The persons that worked for more than one LIFE project completed just one timesheet. Partners have followed the instructions received in the EASME letters (Ref. Ares(2019)1293324 - 26/02/2019 and Ref. Ares(2020)3336925 - 26/06/2020) to correctly fill the timesheets.

Invoices

The reference of the project (LIFE17 NAT/ES/000184) was sent to suppliers with the details for the invoice in order to include the project reference in any invoice including costs declared by the project. In some cases when including the reference is not possible (e.g. tickets), a stamp was included, but always as the last option and in the original document. In all cases, the

expenses have been included in the cost centre assigned to the project in each partner's accounting system.

8.4. Partnership arrangements

The associated beneficiaries were responsible of their financial documents and their financial reporting, they completed their own financial statement and provided the information required by the beneficiary coordinator.

The coordinator beneficiary requested an updated individual cost statement from each partner every three months and every time there was a Steering Committee meeting or a visit of the external monitoring team. Then, a consolidated statement was also updated in order to have a general view of the financial implementation of the project.

The financial transactions between partners during the project have been those related to the transfer to each partner of the first and second pre-financing payments. The fist pre-financing was distributed in September 2018; and the second pre-financing payment between December 2020 to July, 2021, as the second payment to the DGMN was delayed until they completed the tendering procedures for environmental education services.

8.5. Certificate on the financial statement

N/A.

8.6. Estimation of person-days used per action

Action type	Budgeted person-days	Estimated % of person-days spent
A1	60	145%
A2	10	90%
C1	665	43%
C2	240	43%
C3	404	102%
C4	304	104%
C5	150	105%
D1	261	101%
D2	235	106%
D3	20	100%
D4	15	100%
D5	230	99%

Action type	Budgeted person-days	Estimated % of person-days spent
D6	15	47%
E1	118	103%
E2	252	104%
E3	160	121%
E4	25	196%
F1	1024	48%
F2	80	156%
F3	0	0
F4	72	56%
TOTAL	4,340	79%

The explanation for the differences between estimated persons and budgeted and spent are provided below:

A1: the participation of DGMN in this action were not initially budgeted. However, the technicians responsible for the management of the Regional Park that were involved in the project were doing the follow-up of procedures and pushing other administrations for the resolution of permits. Thanks to their involvement, the project had timely all the required permits for conservation works.

E3: the partner MDA included additional pilot sites for the study of the certificate. This has involved an additional effort for the analysis of information and reviewing of documentation.

E4: UMU was not originally allocated with personnel budget for this action, though their participation was foreseen for replication and networking activities, and the travel budget for this purpose was included in the proposal. Declaring the hours spent results in a deviation from the original number of person-days.

F2: partners have not initially planned hours for this action although its necessarily implies the participation of partners because it is devoted to internal capacity building, workshops and meetings.