

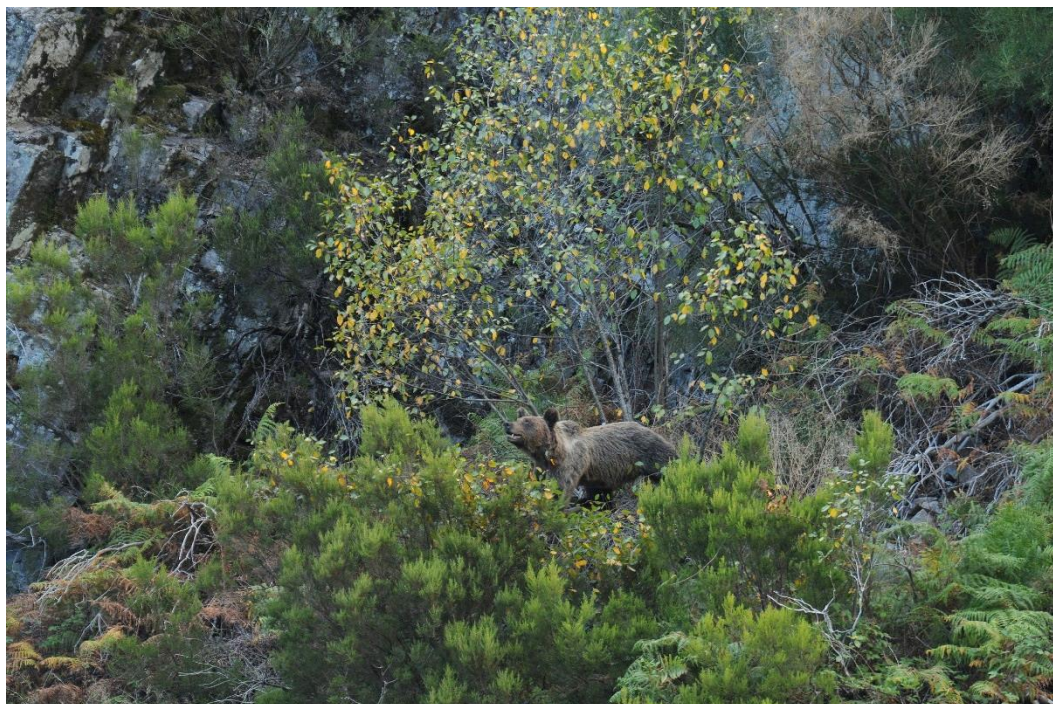
OSO COUREL



LIFE16 NAT/ES/000573

Final Report – Simplified version

Covering the project activities from 01/07/2017 to 30/04/2021



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OSO COUREL



Socios:



**XUNTA
DE GALICIA**



ASOCIACIÓN GALEGA DE
CUSTODIA DO TERRITORIO

Con el apoyo de:



GOBIERNO
DE ESPAÑA

MINISTERIO
PARA LA TRANSICIÓN ECOLÓGICA



20
AÑOS

Naturgy

2. List of key-words and abbreviations

AGCT	Asociación Galega de Custodia do Territorio (Associate beneficiary)
FOP	Fundación Oso Pardo (Brown Bear Foundation, Coordinating beneficiary)
XG	Xunta de Galicia (Regional Government, Associate beneficiary)
MVMC	Monte Vecinal de Mano Común (communal forest property model in the project area)
TECOR	Terreo Cinexeticamente Ordenado (name of official Hunting areas in Galicia)
UMIB	Biodiversity Research Unit of the University of Oviedo
UO	University of Oviedo
USC	University of Santiago de Compostela
CEIP/CPI	School of infantile and primary education
IES	High school



3. Executive summary

3.1. Project objectives, key deliverables and outputs

The **general objective** of this project is to favour long-term cantabrian bear population viability promoting its expansion towards the southwest and its permanent establishment in the Serra do Courel (Lugo, Galicia), contributing in this way to the numerical and spatial expanding of the population, needed to reach a Favourable Conservation Status (FCS). The **specific objectives** are 1) To favour permanent settlement of bears in Serra do Courel improving trophic availability and connectivity between high quality habitats, 2) To guarantee connectivity between main bear reproductive nucleus in the western Cantabrian subpopulation, 3) To prevent and solve conflicts between bears and people, and 4) To increase information and awareness of local stakeholders and population.

The **deliverables** of the project and its progress are presented in detail in the description of action F1 in this report. Main deliverables are brochures, boards and other identification and communications materials, reports from preparatory actions, environmental education material, KPI tables, reports about land purchase and purchase and restoration of stone structures for beehive protection, monitoring actions results, replicability and transferability plan, socioeconomic and ecosystem services impact reports, Layman's report, After-Life plan and economic audit..

The **main outputs** will be an improvement in habitat quality facilitating the ongoing increase in the presence of bears in Serra do Courel a reduction in human-bear conflicts and better information, awareness and social acceptance of bears. The main quantifiable results will be the plantation of >100.000 autochthonous trees for connectivity and trophic availability, purchase and restoration of 15 ha of abandoned pastures, improvement of connectivity, clearing of 100 hunting sites to improve visibility in hunting drives, protection of all the beehives in the project with electric fences, purchase and rehabilitation of 5 antique stone structures for beehive protection, training and outfitting of an intervention team for problematic bears, informative encounters with local stakeholders, one educational campaign for 750 schoolchildren and other awareness raising actions.

3.2. General progress

The project has been developed satisfactorily, meeting the planned objectives, with some delays and modifications in the implementation of the actions derived from the covid-19 pandemic or the progress of the project itself. As noted in previous reports, the project area is a rural territory with new presence of brown bear after more than a century of absence, and no specific actions have been developed until now on the prevention and reduction of conflicts, what has contributed to a relatively difficult social scenario with a great lack of information and abundance of myths and false beliefs. Most efforts at the beginning of the project have been directed towards the information and involvement of stakeholders and inhabitants (Actions E2, C3, C4), prevention of beehive attacks (Action C4) and seeking alliances with social organizations (Action A1).

3.3. Achievements, deviations, problems and corrective actions taken

The project has been adequately developed, although with some delays and situations that have forced some modifications to improve the fulfilment of the objectives:

Preparatory actions. They have been adequately completed within the foreseen term. Action A1 was extended in time to sign agreements throughout the project development process.

Land purchase action. Action B1 has been more complicated than expected, both due to the need to achieve enough trust with potential buyers and the difficulty in reaching agreements between heirs or having adequate legal documentation. The action has suffered a significant delay, although the objectives have been met and the restoration action of the purchased lands has not been affected.

Conservation actions. Action C1 has been completed very successfully. Action C2 has been modified as proposed in the first Progress report. Action C3 for the clearing of hunting areas and Action C4 for the prevention of conflicts with beehives have been prioritized, working with hunting societies and distributing electric fences above the expected number and before the foreseen schedule, together with strong efforts for the information and awareness of beekeepers and hunters. Action C5 has been adequately developed, although with some delays due to the covid19 pandemic and with some administrative difficulties that have been addressed without problem.

Monitoring actions. Actions for the monitoring of the impact of the project have been adequately developed, and detailed information has been collected on the presence of bear, its incidence on beehives, development of project actions and social perception. Social monitoring has been reinforced by conducting a final opinion survey due to the importance of knowing the social scenario and the impact of the project. Relevant data have been included into the KPI Database Webtool. Adequate scientific support has been established.

Dissemination and awareness actions. Actions E, for public awareness and dissemination, have been intensely activated. Opportunities and contacts with local organizations have allowed to inform and raise awareness in activities sometimes not foreseen in the proposal (summer course, sustainable tourist document, rural development event...). The covid19 pandemic has greatly altered the information and awareness actions in the second part of the project, forcing modifications and adapting approaches with good results. Thanks to the interest of the media and the attention that has been given to them, a good informative result has been achieved with positive messages of brown bear conservation and human-bear cohabitation.

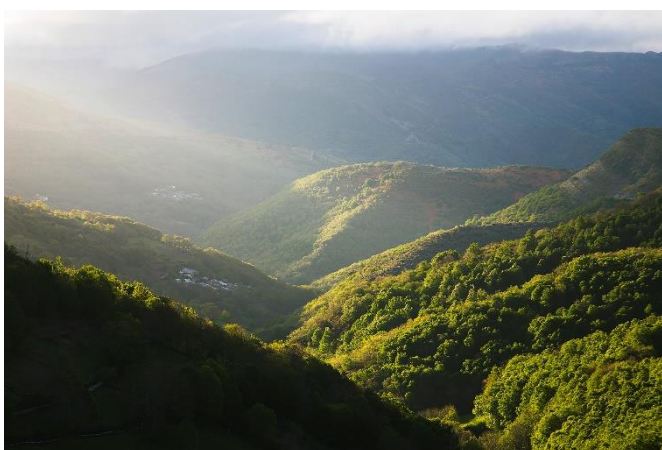
4. Introduction

4.1. Description of background, problems and objectives

Brown bear (*Ursus arctos*) is a species of Community Interest in Europe, with a conservation status in the atlantic part of Spain considered "Unfavourable/inadequate" according to the last Spanish National Summary for Art.17. Cantabrian population is recovering after years of conservation efforts, several LIFE projects and awareness actions. As a result of the increase in the number of bears, young males disperse to new territories, giving rise to extraordinary opportunities for the expansion of the population, but also to complex challenges for their conservation and coexistence with human activities. One of the most promising expansion areas is Serra do Courel in Galicia, included in the Natura 2000 site ES1120001 "Ancares-Courel". This project goes directly to the improvement of the establishment of the bears in this area and, in this way, to the conservation status of the species at the whole cantabrian population level.

The general objective of this project is to favour long-term viability of the cantabrian bear population promoting its expansion towards the southwest and its permanent establishment in the Serra do Courel (Lugo, Galicia), contributing in this way to the numerical and spatial expanding of the population, needed to reach a Favourable Conservation Status (FCS). The specific objectives are 1) To favour permanent settlement of bears in Serra do Courel improving trophic availability and connectivity between high quality habitats, 2) To guarantee connectivity between main bear reproductive nucleus in the western Cantabrian subpopulation, 3) To prevent and solve conflicts between bears and people, and 4) To increase information and awareness of local stakeholders and population.

The Ancares-Courel Natura 2000 site is a mountain and cultural territory faced with a process of abandonment, aging and rural crisis. Human activity has shaped a landscape mosaic with large areas of heathland and forests. The main conservation issues addressed by the project are the expansion of the small distribution range of the Cantabrian brown bear population, the improvement of connectivity and habitat quality in these new areas and the reduction of conflicts with human activities. In this project area, the risk of conflicts between bears and human



Extensive forests and chestnut groves interspersed with small villages in the Serra do Courel (Galicia, Spain)

activities is clearly superior since it is an area in which the species has been absent for many years and traditional prevention practices have been lost. There are, for instance, dozens of old stone structures for the protection of beehives, called *alvares* or *alvarizas*, abandoned or demolished, while the abundant modern beehives are unprotected. Neither have social awareness actions been developed, nor advice to collective of local hunters has been made to reduce risks for the bears during the hunting practices. Misunderstandings and mistaken ideas about bear presence are common among local people.

4.2. Expected longer term results

The main long-term expected results of the project will be an increase in the presence of bears in the Serra do Courel, an improvement in habitat quality and connectivity in the most interesting areas for bears, as well as better information and awareness of local stakeholders and population and an increase in social acceptance of bears. All of this will facilitate range expansion and will improve the conservation status of the whole cantabrian bear population.

The main quantifiable results, as described in the proposal, will be the following:

- Plantation of 100.000 autochthonous trees for connectivity and trophic availability in small forests with a total surface of 100 ha (15 ha of abandoned pastures purchased and 85 ha of surface managed and restored under Land Stewardship Agreements with private owners).
- Improvement of coverage in the surroundings of the A6 highway and other infrastructures.
- Clearing of 100 hunting sites (surface about 40 ha) to improve visibility in hunting drives, avoid mortality risks for bears and raise awareness between local hunters.
- Protection of all the beehives in the project with electric fences and purchase and rehabilitation of 5 antique stone structures for beehive protection.
- Training and outfitting of an intervention team for problematic bears.
- Informative encounters with local stakeholders, sectorial exchanges with people from other bear areas, planting events with volunteers, educational campaign for 750 schoolchildren and the design and implementation of an interpretative route about bears and honey.
- Other actions and resources for information and awareness raising (agreements with social organizations, web page, social networks, brochures, special bulletin, notice boards, project documentary, etc).

The replicability and transferability of project results will be achieved with the establishment of an information exchange network with other projects and teams working in territories with similar problems and the development of a final international workshop with researchers and managers of other small bear populations. It is not foreseen as a simple information or dissemination meeting, but the objective will be to agree on a replicability plan with learned lessons and specific recommendations for other areas in Europe.

5. Administrative part

5.1. Project management process

From the administrative point of view, the project has been developed according to the foreseen planning. Project staff has been hired and two partnership agreements have been signed as detailed in the progress report (agreements included in the First Progress Report). Two addenda to both partnership agreements to adjust them to the official template have been signed in 2018 at the request of EASME, and 3 additional addenda have been signed in 2019 and 2020 at the request of XG to redistribute the amounts allocated to each annual budget application.

A project Management Committee has been constituted and has had regular meetings during the project, in addition to a very fluid and frequent contact between its members by phone or email.

Financial support to the project. FOP has applied in 2017 and 2018 to a specific call for LIFE projects co-financing convened by Biodiversity Foundation (Ministry for the Ecological Transition) and has established collaboration agreements with the private company Naturgy (previously known as Gas Natural FENOSA): two signed in 2018 and 2019 for the co-financing of the project and other signed in 2020 to finance after life actions during 2021.

5.2. Communication with the EASME/CINEA and Monitoring team

Communication is fluid and helpful. Because of the covid19 pandemic, some of the monitoring visits have taken place online. In the reports and visits, all the demands made by EASME/CINEA or the monitoring team have been answered. All the indications and requirements specified in the EASME/CINEA letters have been answered in this and previous reports (see point 6.3 of this Final Report).

5.3. Amendments to the Grant Agreement

Amendment 1 to the Grant Agreement has been signed at the request of EASME modifying the definition of conditions for natural persons, submission of VAT certificate and threshold for submission of the certificate on the financial statements and has enter into force on 05/10/2018.

Amendment 2 to the Grant Agreement was signed on 11/04/2020, extending the project execution period for an additional 4 months until 04/30/2021 to be able to solve the delays generated by the covid19 pandemic. The extension was requested by FOP in September 2020 and accepted by EASME.

6. Technical part

6.1. Progress per action

ACTION A.1: Signing of agreements with local administrations, social organizations and owners

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2018	Actual end date: 30/03/2021

As described and explained in the First Progress Report, the planned signature of agreements with local administrations has been replaced by the signing of agreements with social organizations. Contact with stakeholders and owners is a continuous process, closely intertwined with other actions of the project and dependent on the demonstration effect of the first agreements signed, so this action has been extended until Mars 2021 to sign new agreements for the development of plantations.



Signature of the collaboration agreement between FOP and AGA on February 19, 2018.

FOP has signed 4 agreements that have allowed different joint actions within the framework of the LIFE project, as indicated in the following table.

Date	Social organization	Main actions developed
07/02/18	University of Santiago de Compostela (USC)	Use of Courel Scientific Station, organization of summer course and other events, scientific collaboration, participation of USC researchers in Scientific Committee.
19/02/18	Galician Beekeepers Association (AGA)	Information to beekeepers in Courel, joint activities of dissemination, awareness, and social acceptance of the bear, collaboration in bear and honey route in Courel.
16/03/18	Serra do Courel Rural Development Association (ADRSC)	Favour bear acceptance, prevent conflicts and support sustainable ecotourism, promoting information and awareness among associates and inhabitants and visitors. Developing joint guidelines for sustainable tourism in Courel. Collaboration in afterlife actions.
05/02/19	Fundación Uxío Novoneyra (FUN)	Collaboration between cultural and environmental projects in Courel, promotion of awareness and information about coexistence with bears and nature protection.

Collaboration with the 4 organizations has been very productive and has been extended to different actions of the project.

At the end of the project, in April 2021, an addendum to the collaboration agreement between FOP and ADRSC has been established to collaborate in the development of AferLIFE actions

and the transfer to ADRSC of 36 electric shepherds for distribution among beekeepers after completion of the project.

To develop plantation action (C1), AGCT has established 20 Land Stewardship Agreements with communal MVMC and private owners.

Date	Signatory	Municipality	Nº of planted trees	Restored Surface (ha)
25/10/18	MVMC Escrita e Monteiros	Folgoso do Courel	8.877	9,92
21/12/18	MVMC Vilamor	Folgoso do Courel	3.185	6,20
29/06/19	MVMC Horreos	Folgoso do Courel	180	0,16
16/12/19	MVMC Froxán	Folgoso do Courel	9.030	14,43
26/12/19	MVMC Cortes	Folgoso do Courel	4.541	8,39
26/12/19	MVMC Moreda	Folgoso do Courel	9.350	8,85
07/02/20	MVMC A Seara	Quiroga	8.195	10,86
07/02/20	MVMC Visuña	Folgoso do Courel	5.041	6,22
14/02/20	Private owner - Mostaz	Folgoso do Courel	3.185	8,51
05/07/20	MVMC Folgoso do Courel	Folgoso do Courel	3.685	3,54
03/09/20	Private owner - Bustofrío	Samos	13.926	19,54
03/09/20	Private owner - Bustofrío	Samos		
03/09/20	Private owner – Bustofrío	Samos		
03/09/20	Private owner – Bustofrío	Samos		
03/09/20	Private owner - Bustofrío	Samos		
01/10/20	Private owner - Vilarbacú	Quiroga	9.661	8,92
01/12/20	MVMC Toca	Samos	11.930	12,05
02/02/21	MVMC Louzarella	Piedrafita do Cebreiro	2.629	2,25
02/02/21	Private owner - Louzarella	Piedrafita do Cebreiro		
22/03/21	MVMC Foxos	Piedrafita do Cebreiro	8.750	8,93

ACTION A.2: Plan of forestry actions for habitat connectivity

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 30/06/2018	Actual end date: 30/06/2018

The action has been developed according to the proposal, with the collaboration of a scientific team from the Biodiversity Research Unit of the Oviedo University (UMIB) coordinated by Dr. José Vicente López-Bao (contract signed 28/10/17 between FOP, Oviedo University and Foundation Oviedo University). The agreement established with this team includes both the development of action A2 and scientific support throughout the project. The deliverable document resulting from this action was included in the First Progress Report.

ACTION A.3: Plan of defragmentation actions in the A6 highway and other infrastructures

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 30/06/2018	Actual end date: 30/06/2018

The action has been developed according to the proposal by the specialized company Consultores en Biología de la Conservación S.L. (offer 19/10/17), with the support of FOP team. The results of this preparatory action confirm a high permeability on the A6 highway, and no clear intervention needs by planting cover forests are detected, which makes it advisable to propose changes in Action C2. The deliverable document resulting from this action was included in the First Progress Report.

ACTION A.4: Inventory of apiculture farms and traditional beehive protection structures (*alvares*)

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 30/06/2018	Actual end date: 30/06/2018

The action has been developed by the company ARCA, People and Nature S.L. (offer 02/10/17) with the support of FOP and AGCT teams. During the field work, 174 apiaries (with about 3.000 beehives, and others temporarily displaced outside the project area), and 192 *alvares* (old antique stone structures for the protection of beehives against the bear) have been detected in the project area. The inventory of traditional *alvares* has been completed at the end of the project with the inclusion of new records collected during the project's field work and the database shared with the Montañas do Courel Geopark team. **A total of 267 traditional *alvares* have been registered and mapped in the six municipalities of the project.** A cartographic viewer of all the registered traditional *alvares* has been prepared and included in the project web. The deliverable document resulting from this action was included in the First Progress Report.

<https://fundacionosopardo.org/wp-content/uploads/2021/06/Alvares-seleccionados.html>

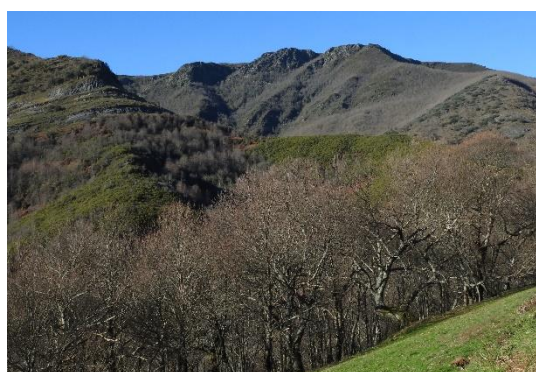
ACTION B1: Land purchase for enrichment forests plantation

COMPLETED	Foreseen start date: 01/01/2018	Actual start date: 01/01/2018
	Foreseen end date: 31/12/2019	Actual end date: 31/03/2021

This action has been completely carried out, although with a significant delay because of the difficulties that have arisen. On the one hand, it has been necessary to advance in obtaining enough trust with potential owners after an initial stage of the project with a lot of misinformation, fears and myths. And on the other hand, the lack of agreement between family heirs or the absence of adequate legal documentation have prevented the purchase of some parcels and have forced to increase search and negotiation efforts. Finally, 16.83 ha of land have been purchased, most of them located in the Río Pequeno valley, an area of high environmental value and that establishes a corridor between the Lor and Seceda-A Escrita valleys, in Courel, with the Louzara valley and Sierra del Oribio.

The solution for difficulties for the legal acquisition of the *alvares* foreseen in Action C4 has been the acquisition of the land plots where the *alvares* of interest are located, whenever it was possible, convenient and timely to carry out restoration actions on the property that would guarantee the adequate fulfilment of the eligibility criteria for land purchase. In this way, 3 *alvares* have been purchased in 3 acquisition units including different land surfaces, with a joint price for each unit based on negotiation and quality of the land in each area.

Acquisition unit	Area	Municipality	Nº of land plots	Surface	<i>Alvar</i>
1	Paderne,	Folgoso do Courel	10	3,56 ha	-
2	San Mamede,	Triacastela	1	1,6 ha	<i>Alvar</i> de S. Mamede
3	Pedrafita do Courel	Folgoso do Courel	39	8,2 ha	-
4	Paderne,	Folgoso do Courel	1	0,37 ha	<i>Alvar</i> de Paderne
5	A Escrita,	Folgoso do Courel	2	3,1 ha	<i>Alvar</i> da Escrita



Devesa de Paderne communal owned forest

With the purchase of the first unit of land, the opportunity has arisen to acquire at no additional cost associated, a participation in 17 plots in a “proindiviso” communal property that are part of the Devesa de Paderne forest. It is a forest of high environmental value and very important for the brown bear, so the co-ownership of it by the AGCT is considered an advantage to guarantee its conservation, favouring participation with other co-owners in the maintenance of natural values and promoting the integration of the AGCT in the territory after LIFE.

ACTION C1: Creation of connectivity and enrichment forests

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 30/04/2021

Plant production

In the first phase of the project, 659 kg of fruits have been collected to produce plants of local origin (458 kg of cherry fruits, 16 kg of alder buckthorn fruits and 0.75 kg of birch seed in 2018; 113 kg of cherry fruits in 2019; 72 kg of cherry fruits in 2020). The seeds have been cleaned and processed by the project team and transferred to the collaborating nurseries (Os Trollos official forest nursery of the Xunta de Galicia and viveros Braña S.L.). There have been some difficulties with the germination of cherry seeds, which has made it necessary to complete the purchase of certified local plant from a professional specialized nursery (Vivero Fuenteamarga) and to receive a plant transferred from another official nursery (Valladolid central official nursery).

Selection of planting areas

Based on the information from preparatory Action A2, detailed contact has been made with numerous private or community forest owners (24 meetings) to propose the plantation. 20 Land Stewardship Agreements have been signed for the plantation (see Action A1) and a joint work has been carried out to define the location and composition of the small forests.

Plantation

Two full planting seasons have been developed in the fall-winter of 2019-20 and 2020-21. 142 small connectivity and enrichment forests have been planted, with a total of 107,805 native trees and shrubs in a total area of 145.60 ha.

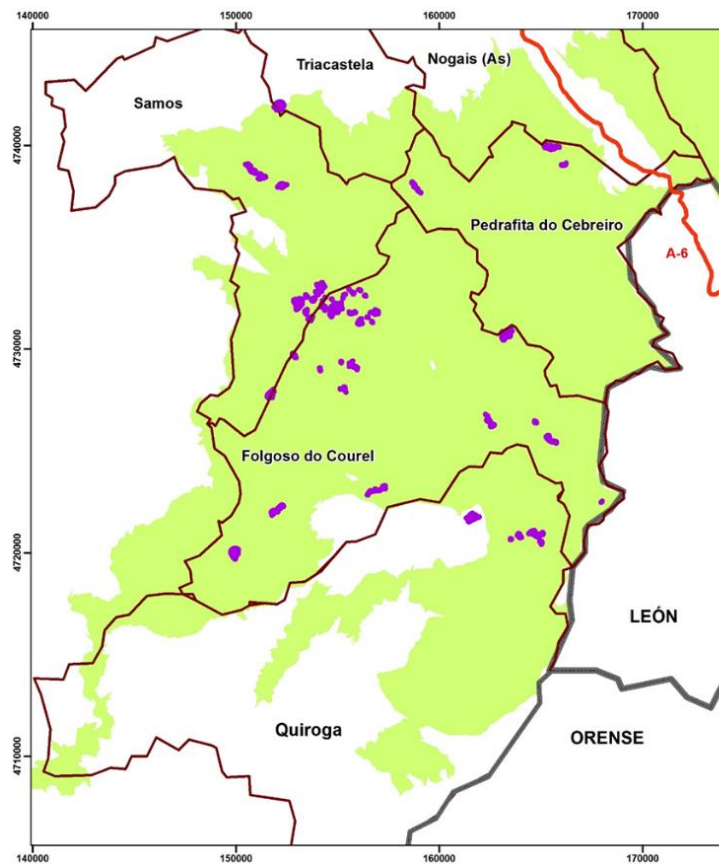
The small forests have been planted as planned, with a Nature-based Solution (NbS) model: size between 0.5 and 1 ha, irregular shape, mixed species depending on each location, high densities of 700- 1,100 plants/ha as a natural regeneration stand and conservation of soil and existing vegetation.

The drowing and land preparation has been carried out by walking spiders in most cases, through contracts with 3



Project forest teams working and walking spider preparing the holes for planting.

small companies or forest cooperatives in the area. The plantation work has been carried out by two teams made up of 2 foremen and 8 forestry laborers who have been hired among unemployed people in the project area. In some cases with high incidence of herbivory, plastic protective tubes have been placed, but in most plantations it has been preferred to plant at high density and not use protectors.



Distributions of small forests planted (blue) and natura 200 sites (green) in the project area

The land plots acquired by the project have also been restored by planting small forests or creating enrichment plantations. In some plots an agreement has been established with a local rancher to carry out a mixed use with controlled grazing that allows maintaining some areas of valuable herbaceous ecosystems.

The project plantations have had a favourable initial implantation. In the first campaign there has been an average loss of 10.3% of plants in the first year (between 3 and 16% depending on the area), which have been replaced in the second campaign. These data fall within

what is expected in this type of plantations, also assuming that it is planted at high density to allow that the evolution of the forest leads to a lower density that favours fruiting.

Plantation work was affected by the covid19 pandemic, specially at the beginning of the declaration of the state of alarm, although it was later resumed with strict protection and social distance measures. During the closure of non-essential activities decreed by the Government, work has had to stop, although a mechanism has been established to recover working hours and maintain the conditions of staff contracts.

More information is collected in the final follow-up report on the project's actions, including orthophotos of all the forests planted in this action.

Trees planted in the 2020-2021 campaign will be proposed for inclusion in the EU 3 billion trees pledge.



Plant survival monitoring.

ACTION C2: Defragmentation actions in A6 highway and other infrastructures

MODIFIED	Foreseen start date: 01/07/2017	Actual start date: 01/01/2019
	Foreseen end date: 31/12/2020	Actual end date: 31/12/2020

The action has been modified and has begun in January 2019, according with its redefinition as proposed in the Progress Report. Reforestation activities have been transferred to Action C1.

As suggested by EASME, an alternative to tree plantation is proposed in view of reinforcing the action. The work carried out in the preliminary action A2 has left in evidence that infrastructures are highly permeable, specially the A6 highway, and that most dangerous sections for wildlife-vehicle collisions are those of the national road that run parallel to the location of the main viaducts on the highway. With respect to highway permeability, it has also been clear that the location and current quality of existing passages (large viaducts) is very adequate and that it is much more important to try to guarantee the maintenance of the current situation than to raise doubtful actions of habitat improvement or plantation.

To achieve this, meetings with road infrastructure responsables have been developed in February and March 2020 to expose the current situation and the importance of maintaining the infrastructure permeability in a long term. Meetings and discussions have been established with:

- Head and staff of the State Roads Unit in Lugo of the Ministry of Transport, Mobility and Urban Agenda.
- Head Engineer of the Roads and Works Service of the Diputación Provincial of Lugo
- Technical responsables of the municipality of Folgoso do Courel

In addition, and as a consequence of the discussions, a technical document of proposals for the maintenance of good permeability conditions in these sections has been elaborated and included in the Replicability and Transferability Plan and has been distributed and disseminated among managers.

One of the bears genetically identified during the monitoring Action D1 has been located in 2018 in the Serra do Courel and in 2020 in the Serra de Ancares, demonstrating the movement of bears through the existing passages in the infrastructures that separate these two mountainous areas.

ACTION C3: Clearing of hunting areas to reduce risks of bear mortality

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 31/12/2020

As explained in previous reports, the clearing of hunting areas has been advanced and extended to achieve greater involvement and improve the acceptance of the project and the bear by the hunters. With the collaboration of the Galician Hunting Federation, previous contacts and an information campaign have been established for local hunters on the importance of knowing that they carry out their activity in a bear territory, the need to properly identify the animals during a hunting activity and how to behave at the appearance of a bear.

The project has established 32 agreements with 10 hunting areas (tecores) for the clearing of 229 hunting posts (62.2 ha), to facilitate the visibility and identification of the animals. Both manual and mechanized clearings have been carried out in the area depending on the conditions. The actions have been agreed with those responsible for the hunting grounds and terrain owners and after a detailed field review by the life team have been commissioned to 4 different local forestry companies.

Tecor	Concello	Nº agreements	Surface (ha)	Nº hunting points
Cavicaça	Folgoso do Courel	3	8	34
A Cabana	Folgoso do Courel	5	11,2	42
Serra de Oribio	Samos	4	5,47	20
A Conexeira	Samos	3	6,37	21
Pedrafita do Cebreiro	Pedrafita do Cebreiro	7	10,60	37
Piapáxaro	Folgoso do Courel	2	3	13
Lóuzara	Samos	3	3,40	16
Quiroga-Eiras	Quiroga	3	1,13	6
Herrería de Soldón	Quiroga	1	10,88	30
O Castro de Parada	Samos	1	2,15	10
		32	62,20	229

The good acceptance of this action among the group of hunters has allowed the number of cleared hunting points to be doubled and the area of intervention increased, establishing many agreements that have also been a useful way to sensitize hunters. The close contact with the hunters in the design of the interventions has allowed to overcome some reluctance.

ACTION C4: Prevention of conflicts between bears and apiculture

COMPLETED	Foreseen start date: 01/01/2018	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 30/04/2021

C.4.1. Protection of apiaries

This action has been adequately completed and has been increased to better reach the high number of beekeepers in the project area, starting before the planned schedule to promote favourable social scenario. Beekeeping is a very important activity in this area, both professional and amateur. Action A4 and the first meetings and contacts with beekeepers have shown that numbers of electric shepherds foreseen in the proposal were insufficient and for that reason, a modification has been established increasing the number of electric shepherds from 50 to 190. Steel wire has also been provided to beekeepers to facilitate the placement and use of suitable materials.

154 solar electric shepherds have been distributed to beekeepers in the project area, and 36 more have been delivered to the Association for Rural Development of the Serra do Courel (ADRSC) through an addendum to the collaboration agreement to continue the distribution in the afterLIFE of the project. The distributed electric shepherds have protected more than 3,000 hives.

The delivery of devices and material is not enough to ensure proper functioning, especially in a territory where the "culture" and knowledge of prevention has been lost. Therefore, a significant effort has been invested in the detailed in situ review of 96 apiaries (with 1,574 protected hives), advising the beekeepers and suggesting improvements and modifications when necessary. Of those reviewed: 27 were correctly installed and maintained, 13 had serious installation failures (low number of threads, poor insulation, etc), 37 minor failures or deficiencies and 19 were in the process of improvement or modification. The importance of a good installation and maintenance is made clear by the fact that at least 6 attacks on apiaries have been recorded in which the bear has entered with the electric enclosure installed (causes: 3 due to very high vegetation covering and touching cables, 1 due to lower cable cut by brush cutter and 2 by excavation in loose soil with low conductivity earth). Despite the high number of protected apiaries, during the project period there have been 104 attacks on apiaries, advising to continue and extend contact with beekeepers because as the apiaries are protected, the bears are concentrating their attention on other unprotected ones.



Delivery of an electric shepherd to a beekeeper (left) and adequately protected apiary in which a bear has tried to enter by digging but has not succeeded (right).

C.4.2. Purchase and rehabilitation of traditional *alvares*

After a complete survey of available *alvares* in the area and meetings with owners, we have found that their property is characterized by legal uncertainty since all these constructions lack usually their own cadastral reference or any other documentation that allows their individual purchase with the necessary legal certainty. 3 *alvares* have been acquired but it was also necessary to buy the land plots in which they were included in order to legally guarantee their property. In addition, many of the *alvares* are located in a communal forest, so it is not possible to buy the land and, by extension, the alvar either. This has made it difficult to buy more *alvares* and for this reason we have opted to sign long-term agreements (30 years) with different owners to restore some interesting *alvares*.



Dry stone masonry work for the restoration of the walls of one of the acquired alvares

In this part of Action C4, 6 *alvares* have been restored: 3 have been bought and 3 have been restored through an agreement with owners. Two of the *alvares* that have been bought are near Paderne, in the valley of the river Pequeno. The third is located near the Sierra del Oribio, next to the Camino de Santiago. The *alvares* with a stewardship agreement are in the village of Seceda (Folgozo do Courel), associated with the Bear and Honey route in O Courel and in the village of A Toca (Samos).

The restoration work has been carried out by local companies following traditional uses and respecting as much as possible the original construction characteristics of this type of structures. A part of the work had to be manual, due to the difficulty of move machinery to the settlement site of the *alvar*.

The restored *alvares* will have an important effect of tourist and cultural attraction, reinforcing the historical link of the brown bear to this territory and providing a positive vision of its current presence. There are already collaborative initiatives for the installation of beehives in three of the restored *alvares* (O Campón, Val Maior and Chao Sanude), apitouristic use in another (Escontrela) and cultural revitalization of another (San Mamede in Triacastele, close to the Camino de Santiago).



Restored alvar of Escontrela

ACTION C5: Preparation and equipment of an intervention team for human-bear conflicts resolution

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 07/04/2021

C5.1. Preparation and equipment for the intervention team.

XG has completed the provision of equipment for the intervention team. The material has been purchased. A list of the purchased material was included in the Midterm Report.



Enclosure for maintenance and treatment of bears

The enclosure for maintenance and treatment of bears has been adequately constructed and located in the XG Wildlife Recovery Center in O Veral (Lugo), where there are veterinary facilities and equipment that will be available for any intervention with bears.

C5.2. Training of the intervention team and environmental rangers

The proposal included holding two courses, one theoretical and more general and the other practical and more specific for the intervention team. The first course was properly held, but the second was delayed for operational reasons and was finally affected by the covid19 pandemic. After several attempts to celebrate, it was decided to organize an online course. When conditions permitted, an intensive practice day was subsequently held for all the rangers involved.

- 11/04/18: Specialized training course for XG environmental rangers about beekeeping and beehives damage assessment
- 12/06/18 course “Brown bear conservation and conflict prevention”, for 52 XG rangers, technicians, members of SEPRONA Civil Guards and other security bodies.
- 06/10/20 online course “Training for environmental technicians and rangers from XG on interventions with bears” with 29 technicians and rangers. Course taught by technicians from XG, Junta de Castilla y León, Principality of Asturias and the Cabárceno Zoo.
- 06-07/04/21. Practical training workshop about interventions with bears. Carried out with strict covid19 measures in the Wildlife Recovery Center of XG in Veral (Lugo), with the participation of 33 rangers and 3 veterinarians from Lugo and Ourense delegations.



Rangers during the practical course using the culvert

All the rangers involved have been adequately trained, have the necessary equipment, will organize periodic practices and are ready for any necessary intervention. Selected rangers from different territories with bear presence in Galicia have been trained so that they can deal with any incident throughout the whole bear range.

ACTION D1: Monitoring the effects of project actions

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 30/04/2021

D1.1. Monitoring of the results and effects of actions C1 and C2

This part of the action collects the information on the monitoring indicators related to the successful execution and effectiveness of the forest plantation actions. During the second planting season (2020-21) a comprehensive review was carried out with inspection and counting of all the plants installed in the first season (2019-20). 5,695 losses in 55,089 installed plants, which represents an average survival rate of 89.7%. The losses have been mostly due to adverse weather conditions (summer drought, breakage due to accumulation of snow in winter), and damage due to herbivory has hardly been detected (<3%). The survival evaluation of plants installed in the second season has only been carried out until the end of the project, in April 2021, with an estimated survival percentage of 99.7% (159 out of 52,716 plants). During the afterLIFE actions of the project, the plant survival review will continue, and possible replacement or management actions will be defined based on results.

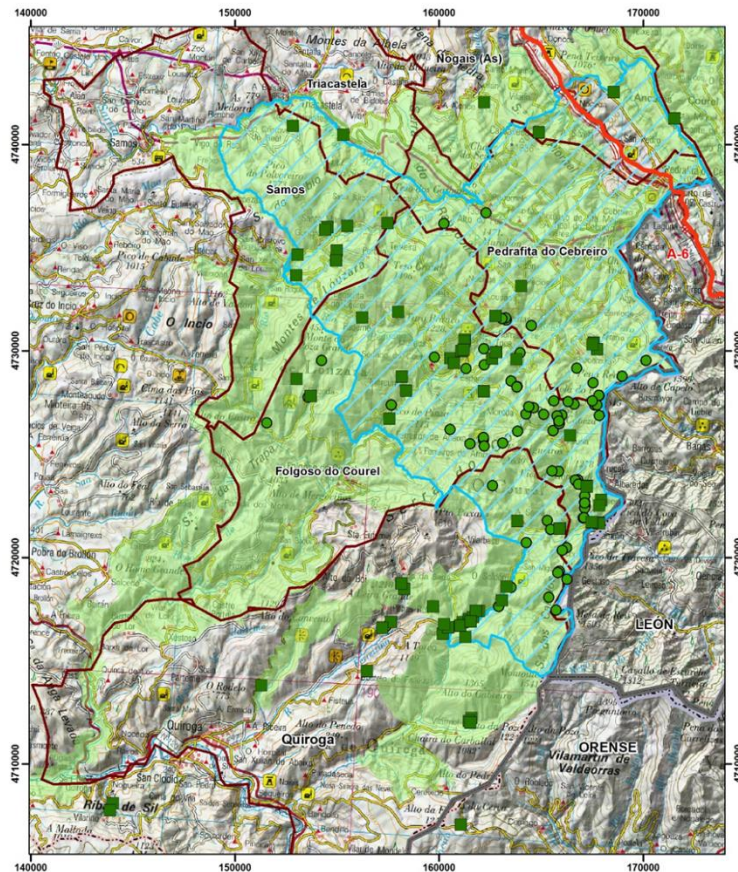
D1.2. Monitoring of risks and social conflict and efficiency of actions C3, C4 and C5

225 data of brown bear presence in Serra do Courel have been collected. Transects are carried out to search for signs of presence in the project area, photo trapping cameras are placed opportunistically in places of passage and apiaries attacked, and a first campaign of bear samples has been developed for genetic analysis. 47 samples of hair and faeces have been collected and analysed in Courel (and another 35 in peripheral areas of Lugo and León), of which 27 have been genetically individualized (and another 19 in nearby areas). 4 different bears identified by genetic analysis and photo trapping in the Serra do Courel, all of them males, (and another 10 in Serra de Ancares and other peripheral areas). One bear has been identified both in the Serra do Courel and in the Serra de Ancares and another in Ancares and in the northern part of the project area.



*Footprint of a bear on a path in Courel.
May 2020*

Data	2017	2018	2019	2020	2021 until April	Total
Attacks to beehives	23	30	19	29	3	104
Excrements	2	16	6	15	1	40
Footprints and other	2	7	7	8	-	24
Phototrapping pictures/videos	2	7	9	27	2	47
Direct observations	-	1	5	3	1	10
TOTAL	29	61	46	82	7	225



Bear damages data are collected by the XG rangers (official procedures) and also by LIFE team in cases of damages not communicated to administration. 104 bear damages to apiaries have been registered in the area and 152 electric shepherds have been distributed allowing the protection of more than 3.000 beehives, and more have been planned for afterlife actions. 229 hunting points have been cleaned and conditioned in 10 different hunting areas and 77 hunters and 168 beekeepers have been informed and sensitized about bear presence and best practices for hunting in bear areas and preventing bear damages.

Distribution of bear presence locations 2017-2021



Phototrapping pictures of a bear in Serra do Courel, recognizable by the white mark on its shoulder

ACTION D2: Monitoring and measurement of LIFE performance indicators

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 30/04/2021

After EASME letter of 11/12/2017 asking for the fulfilment of KPI database, initial indicators data have been included into the KPI webtool and revised by monitoring team. Monitoring of the indicators has been undertaken during the project and an updated final table of the indicators values has been elaborated. KPI values have been included in the KPIwebtool. The final value of the main performance indicators are the following:

1.6. Humans (to be) influenced by the project

- 900 Persons who may have been influenced via dissemination or awareness raising project-actions (reaching).
- 320 Persons with improved capacity or knowledge due to project actions.

7.3. Natural and seminatural habitats

- 145 ha of forests planted throughout the territory

7.4 Wildlife species

- 67.842 ha of surface of species area at the end of the project estimated from the presence data collected.
- 4 different bears identified by genetic sample in Serra do Courel during the project

8.2. Carbon sequestration

- 7,435 kg/ha/year carbon sequestration terrestrial habitat

10.2. Involvement of non-governmental organisations (NGOs) and other stakeholders in project activities

- 512 individuals involved

11.1. Website

- 10,757 unique visits to project website

11.2. Other tools for reaching/raising awareness of the general public

- 7 events/exhibitions, 4 displayed information, 159 print media, 11 other media

11.3. Surveys carried out regarding awareness of the environmental/climate problem addressed

- 205 individuals surveyed

12.2. Professional training or education

- 104 individuals trained or educated

13. Jobs

- 4.3 FTE jobs

ACTION D3: Assessment of the impact of the project on the ecosystem functions

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 30/04/2021

The methodology used to evaluate the effects of the project actions on the most relevant ecosystem functions and services has been that proposed by the EU for the evaluation of ecosystem services in the LIFE projects, based on the Mapping and Evaluation of Ecosystems and their Services (MAES) and the typology of ecosystem services included in the Common International Classification of Ecosystem Services (CICES).

The relevant ecosystem in the scope of the project and considering the actions developed is “Woodland and forests”, which in the Serra do Courel is characterized above all by the mixture of oak groves of different types, chestnut orchards and other forest formations, although there is also an important surface of coniferous plantations. The project has affected on this ecosystem mainly by planting 142 trophic enrichment and connectivity small forests, made up of autochthonous species that produce fleshy fruits, and widely distributed throughout the territory following a model of Nature-based Solutions. Other actions of the project with effects on ecosystem services have been the protection of apiaries, the cleaning of hunting points or the awareness of the local population.

A total of 24 ecosystem services directly affected by the actions of the LIFE Oso Courel project have been identified (4 provision services, 12 regulation-maintenance services and 8 cultural services). The quantification of the effect of the project has been established by means of a set of indicators.

Some of the values of the most relevant evaluated indicators are, for example:

- 130,256 kg of cherries and 17,095 kg of Alder buckthorn fruits produced annually (from the 5th year)
- 145,60 ha of new forest surface
- 1,078 t CO₂ eq per year fixed in the plantations.

The most relevant services have been "the improvement of the bear habitat by planting small enrichment forest" and "the increase in carbon fixation by planted trees and shrubs" and their information has been included in the KPI WebTool.

ACTION D4: Assessment of the socio-economic impact of the project

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 30/04/2021

To evaluate the socioeconomic impact of the LIFE Oso Courel project, the information available on three variables of interest has been analysed:

- the direct economic investment generated by the project in the work area, which generally represents a relevant part of the project budget, due to its own characteristics and because it is expressly sought in its development. The LIFE Oso Courel project has generated a direct economic investment in the project municipalities and their surroundings of € 670,600.83 between contracts and expenses made in the area and goods and services developed in the project area, which represents 40.89% of the budget. The most important investments have been the hiring of local unemployed personnel and forestry companies to carry out the project's actions and the acquisition of apiary protection systems and tourist and informative resources with a positive view of the presence of the brown bear. The project has generated 18 direct jobs, in addition to another 30 indirect jobs due to the hiring of external assistance. The indirect investment derived from the project activity has not been determined, although it can be considered relevant above all due to the existence of actions to disseminate the values of the territory, and to attract interested public to it.
- the scope of information and awareness actions for the local population, which has been one of the pillars of the project in a complementary way to direct conservation actions. More than 80 meetings and/or activities have been carried out in which the local population has been informed and sensitized about bears, coexistence and the actions of the project. 32 informative meetings have been celebrated, but also other meetings and contacts established with hunters and beekeepers in the delivery of electric shepherds, visits to apiaries, discussion about hunting points cleaning or forest planting in addition to the involvement of hired workers, indirect jobs and teachers and children participating in the environmental education campaign. The participation of more than 800 local people in these information actions is estimated.
- the degree of knowledge and appreciation that the local population has for the bear, the coexistence and the project actions. A significant evaluation effort has been made through social surveys of the local population in the final phase of the project. The general perception of the brown bear in the project area can be considered positive (3.7 overall assessment of compatibility between bear and human activities on a scale of 1 to 5), although it coexists with caution regarding the evolution of the bear population in the territory and institutional measures to facilitate coexistence. The project has contributed to improving social opinion about the bear, and its actions aimed at promoting coexistence between humans and bears in the Courel have been received mostly in a positive way. The hunting sector is the one that expresses the most reluctance, while beekeepers, despite being the sector most affected by attacks on apiaries, are committed to compatibility and preventive measures.

A project such as the LIFE Oso Courel can have an important social impact, and experience indicates that in areas of recent expansion the management and improvement of the habitat is a very important aspect, but obtaining a favourable social scenario is the true key to achieving

human-bear coexistence and long-term bear conservation. For this reason, we have given importance to the evaluation of social perception.

To know the social perception of main stakeholders about the bear at the beginning of the project, a pilot survey was carried out voluntarily and anonymously by 29 beekeepers in 2018 during the delivery of the first electric shepherds, and its results provided a first image about the opinion of the socioeconomic sector with greater interaction with the bear. In the final part of the project, at the beginning of 2021 a second opinion study was carried out in order to know the evolution of social perception about the bear and the actions carried out to date. Among the participants in the study, four groups of special interest were distinguished, given their close relationship with the territory and greater probability of interaction in socioeconomic terms with the presence of the bear in the Courel: (i) beekeepers, (ii) hunters, (iii) livestock breeders and (iv) hotel and/or tourism sector. A total of 205 people were surveyed during February and March 2021.

The profile of the beekeepers surveyed was similar in both surveys, although with a higher proportion of amateur beekeepers in 2021 and showed a similar ranking of concerns. However, in 2018 the bear occupied second place, while in 2021 it moved to third position, behind the diseases of bees and the arrival of the Asian hornet. A more extensive list of reasons for concern is collected in 2021. Beekeepers who suffered damage to their hives caused by the bear reached a 72% frequency in 2018 (21 of the 29 surveyed), while in 2021 it decreased to 46%, although this represents a total of 51 people affected. The appreciation for the bear in 2018 received a neutral score of 3.3 points out of 5, which rose in 2021 to 3.6 points in terms of general opinion about the bear, and 3.5 in terms of private opinion of its presence in the territory. The perception of compatibility with the rural life in 2018 was 3.6 points, rising to 3.8 in 2021 for the beekeeper group and similar (3.7) for the general population.

Regarding knowledge of the LIFE Oso Courel, 85% of the people surveyed affirmed that they knew to a greater or lesser extent the project. Regarding profiles, tourism group knew best the project, followed by the beekeeper and, lastly, the hunting sector. Of the people who knew about the project, the majority (67%) responded that their opinion of the brown bear remained the same as before, while a quarter of the respondents (25%) said that their opinion had improved and 3% indicated that their opinion had deteriorated. Regarding the valuation of the actions of the project, all were valued in a positive or very positive way. In the ranking of scores, the implementation of environmental education campaigns in schools was the best valued action, closely followed by the delivery of electric shepherds and the restoration of *alvares*, the organization of informational meetings, forest plantations with native species and, lastly, the cleaning of hunting points. The tourist group represents the most positive opinion group, followed by the beekeeping group and the cattle ranchers, while the hunting group was positioned as the most critical.

ACTION E1: Dissemination planning and execution

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 30/04/2021

E1.1. Networking

Twelve networking activities have been developed.

Date	Area	Participants	Activities
10/04/18 7-8/05/18	CIMA FOA	LIFE Oso Courel / LIFE Natura2000+Oso / LIFE Piroslife FPNCyL / FOA / CIMA (Cantabria)	Organization of Information Exchange Network environmental education programs in bear areas. Discussion experiences. Field visits.
24/09/17 28/09/17	Rumania Montes Fagaras	LIFE Oso Courel / LIFE Carpathia Restoration / Foundatio Carpathia / The European Nature Trust (TENT)	Field visit to LIFE11/NAT/RO/823 forest restoration and ecotourism activities with bears. Technical meeting and LIFE Project presentations
17/11/17	Trujillo (Cáceres)	LIFE Infonatur / LIFE Oso Courel / LIFE Natura2000+Oso Other projects and media	Workshop presentation, exchange of experiences and discussion about Natura2000 communication techniques and projects
22/02/18 25/02/18	Matachel Valley (Badajoz)	LIFE Iberlince / LIFE Oso Courel / LIFE Natura2000+oso Technicians and rangers from Junta de Extremadura	Field visit to LIFE10/NAT/ES/000570 reintroduction area in Extremadura, and expansion pop. Management. LIFE projects presentation meetings)
12/03/18	Cantabrian Mountains	LIFE Oso Courel / WOODNET project team (Madrid Polytechnic University and Lyon University)	Field visit to former FOP LIFE Project areas to discuss collaboration ideas with WOODNET research Project (habitat quality and connectivity)
From June 2018	Remote collab.	LIFE Oso Courel / BEARCONNECT Biodiversa Horizon 2020 Project	Participation of FOP in the project as a stakeholder. Sharing of information and exchange of results.
28/10/18 30/10/18	Sevilla University / Matachel (Badajoz)	LIFE Iberlince / LIFE Oso Courel / LIFE Natura2000+oso	International Workshop about Iberian lynx conservation and social conflicts. Field visit to LIFE10/NAT/ES/000570 lynx reintroduction area in Extremadura
26/01/19	Cantabrian Mountains (Asturias)	Proyecto CUSTOINTEGRA Reserva de la Biosfera Alto Bernesga / LIFE Oso Courel	Visit to former LIFE projects developed by FOP. Explanation to stakeholders about LIFE Bear Defragmentation and LIFE Oso Courel actions and results.
07/02/19	Seoane do Courel (Lugo)	LIFE Oso Courel / Instituto Universitario de Xeoloxía (Universidade da Coruña)	Scientific collaborations and information exchange between LIFE team and IUX-UC.
June 2019	Antwerp (Belgica)	LIFE Oso Courel / LIFE Natura 2000+Oso / Other projects and authorities from Natura2000 Biogeographical Process	Third Natura 2000 seminar for the Atlantic Region, European Commission, Antwerp, June 2019
2-4/03/21	Virtual LIFE Platform meeting	“Lessons from LIFE on ecological connectivity towards a coherent, functional and resilient network of protected areas”	Presentation of the experience acquired by FOP in LIFE projects for the involvement of stakeholders in conservation of connectivity.
10/03/21	Pyrenées (France)	Office Française de la Biodiversité, Fédération Départementale des Chasseurs des P. Atalntiques et Haute Garonne,	On-line meeting to discuss proposals for a new LIFE in French Pyrenés and transferability of LIFE Oso Courel and LIFE Natura2000 + Oso actions.

E1.2. Dissemination materials and publications

The dissemination material foreseen in the proposal and other additional ones have been prepared and distribute:

- ✓ Project presentation brochure with information about objectives and actions (1,000 in Spanish and 1,000 in galician).
- ✓ Brochure for beekeepers with instructions on how to properly install and maintain an electrified fence (500)



- ✓ 4 roll-up information boards about the project and bear cohabitation, placed in different public places of the project area and used in all public events.

- ✓ A special bulletin with 24 full colour pages, inserted in number 404 of the Quercus nature magazine (October 2019). 18,000 copies have been distributed with the magazine and another 2,000 directly by the project area. It has included collaborations from different people and local organizations and has served to present the progress of the project, the reality of the presence of the bear in this territory and promote the natural values of the area, linked to the conservation of the bear.



- ✓ Layman report. (2,000 copies). Published with all the information on the results and impacts of the project for distribution throughout the project area, in addition to a digital version that has been sent to all the organizations and entities involved.
- ✓ As a request of the ADRSC, a document of “Good Practices for Nature Tourism in Serra do Courel” has been prepared by LIFE team, and has been discussed with tourism entrepreneurs and different experts, and a few number of copies have been edited for distribution in project area. An informative triptych on the route of the bear and the honey of Courel (Action E2) and a triptych on coexistence with bears in Courel have also been published.
- ✓ A new brochure about nature tourism in bear areas in Courel has been published and distributed between tourism centres, information centres and municipality facilities (1,000 in Spanish, 1,000 in galician).

Website has been online since 01/03/2018, as a page in the LIFE section of the FOP website (lifeosocourel.fundacionosopardo.org). All relevant news have been included regularly in the website section “Life in action” and some of them have been disseminated in social networks (91 posts generated on social networks: 43 on Facebook, 40 on Twitter and 8 on Instagram). 56 news items have been included with updates on the progress of the project's actions and 24 materials and documents are available for download or consultation. The website has received 20,266 visits (10.757 unique visits) between Jul 1, 2017 and Apr 30, 2021. A deliverable with web news and a social networks report have been elaborated.

Videos. In addition to the final video with the results of the project that was envisaged in the proposal, a video tutorial on installation and maintenance of electrified enclosures to prevent brown bear attacks has also been prepared, in collaboration with the LIFE Natura2000 + Oso project, with versions in Spanish, Galician and English. It is considered a technical material of great interest and usefulness and has been distributed by associations related to beekeeping and conflict prevention.

<https://www.youtube.com/watch?v=Ur5deQrf5dU>
https://www.youtube.com/watch?v=SiOzGDeFE_0
<https://www.youtube.com/watch?v=WACnO1OUSL8>
<https://www.youtube.com/watch?v=y8gwM33-uHo>
<https://www.youtube.com/watch?v=3t4EdzkXX8E>



Press news. As part of the E1 dissemination action, the project team has attended the media, especially local and regional, to inform about the project's progress and to contribute to a positive perception of the brown bear and bear-human cohabitation. The Galician media have shown a high interest in the news related to the project and in general with the presence of the brown bear. The LIFE Oso Courel has generated at least 159 news items in 66 media, and most of it (63.52%) has been reproduced in the local and regional media that are disseminated in the project area, reaching almost all of them: print newspapers (4), digital media (12), radio (4) or television (2). Some media with a high regional and national impact have reflected the actions of the project and the territory.

ACTION E2: Information and awareness of stakeholders, environmental education and transferability

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 30/04/2021

E.2.1. Informative meetings with interested social agents.

The proposal established the celebration of 20 meetings with an estimated number of 300 people. Finally, during the project period, 32 meetings have been held with 384 local participants. Some of the meetings have been clearly aimed at specific sectors (such as beekeepers or hunters), although in general many of them have had a mixed audience because there is overlapping of professional profiles and because it has been preferable to take advantage of the opportunities. The number of participants has been very variable, from more than 30 in some public act to 4 or 5 in various meetings in private residences. Holding meetings on a fine scale, spread out over the territory and often with a small number of participants has been necessary and useful. It is a way of reach dissemination and awareness to each door. But this is especially important in a territory such as Serra do Courel, where lack of knowledge about bear presence and distrust leads to the propagation of fake news. The meetings have allowed to deny concepts (such as that the bears have been released, or that they are very dangerous) and to promote confidence, which is reinforced with the day-to-day development of project actions.



Meeting with hunters in the Courel Scientific Station and meeting in a private home in Seceda with beekeepers and livestock breeder of the village

E.2.2. Sectoral exchanges.

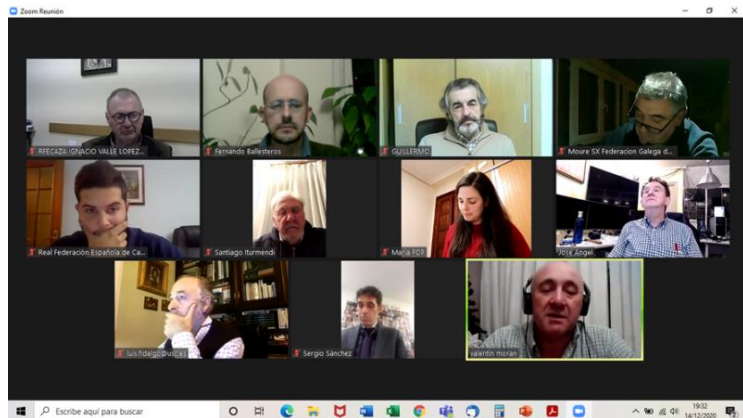
A demonstrative trip and two thematic exchange meetings are planned in the proposal. The demonstrative trip was advanced to facilitate the social environment, and a trip to the Natural Park of Somiedo has been celebrated on 16/05/18 with 43 beekeepers, cattle breeders, hunters and inhabitants of Courel. In Somiedo, municipality representatives, natural park staff and cattle breeders, hunters, beekeepers and tourist entrepreneurs explained advantages and challenges of living with bears and peer to peer relationships have been established. The holding of the two planned sectoral exchanges was delayed to fit in with project actions and was finally affected by the covid-19 pandemic that forced a change in the planned schedule. Substituting the two planned meetings, the following activities have been held:

- ✓ On June 10, 2019, an event was held to present the document “Good practices for nature tourism in the Serra do Courel”, prepared by FOP and ADRSC with the collaboration of experts and entities. Sustainable tourism was discussed, committed to protecting the natural and cultural values of the Serra do Courel and linked to bear presence.

- ✓ From September 4 to 6, 2019, USC and FOP, in collaboration with the Lugo Provincial Council, held the Summer Seminar 'The conservation of large carnivores in expansion areas: The case of the brown bear in the Serra do Courel '. This activity has been developed within the LIFE Oso Courel project, has been directed by the USC professor Antonio Rigueiro, and the LIFE coordinator, Fernando Ballesteros, and has had the participation of 30 registered students and numerous inhabitants of the area that have participated as listeners. Within the course, a public debate was held with social actors from the territory.



- ✓ An online meeting was held on December 14, 2020, between the FOP teams of the LIFE Oso Courel and LIFE Natura 2000 + Oso projects with representatives of all regional hunting federations in northern Spain and the Royal Spanish Hunting Federation to discuss proposals and experiences and establish a new communication campaign and the involvement of hunters in the long-term conservation of the brown bear. The success of the clearing of hunting posts carried out in Courel was discussed and proposals were made for their continuity and extension to other areas.



- ✓ On April 20, 2021, a meeting on "Natural sites: economic driver for rural areas" was held at the Courel Scientific Station, organized by the project and ADRSC, as the final meeting of the project, to establish positive keys on coexistence with the bear, biodiversity and natural spaces and the opportunities that are generated in rural areas. The mayor of Somiedo, Belarmino Fdez Fervienza, the coordinator of the LIFE project, Fernando Ballesteros, the president of the Montañas do Courel Association, Roberto Castro, the coordinator of the scientific stations of the USC, Xosé Luis Otero, and the responsible of AGCT, Oscar Rivas. It was held with a capacity reduced to 25 people due to covid19 and broadcast online (> 150 views).

The video tutorial on preventing attacks on apiaries explained in Action E1, also replaces to a certain extent the sectoral meetings with beekeepers from other territories, since it collects the opinion and information of other beekeepers and specialists outside of Courel to contribute to the improvement of knowledge and information in the Serra do Courel.

The new brochure prepared on nature tourism in bear areas arises as a synergy between the LIFE projects Oso Courel and Natura 2000+bear, but also as an activity that replaces in some way meetings with representatives of tourist sector, and as a demand of the Courel tourism sector, very committed to bear conservation, requesting a communication tool to inform and raise awareness among visitors and users.

E.2.3. Environmental education campaign

Specific didactic material addressing bear and coexistence at different educational levels has been prepared and distributed to 15 schools in the project area and main nearby villages (12 CEIP/CPI and 3 IES) for its use in the academic year 2018-19. Material has been included in the First Progress Report. To facilitate its use, a workshop with teachers has been developed on 10/11/18 in the CEIP of Seoane do Courel, with the participation of 20 teachers from 8 schools. On 13/11/19, another meeting was held with 14 teachers from different schools of the project, at the CPI of Seoane do Courel, to discuss new educational proposals. Project team and an educator specifically hired to carry out environmental education activities have developed 12 classroom activities with 254 children in 2019. Two other activities have been developed in 2018 with 35 children. As a consequence of the covid19 pandemic, it was not possible to continue with more activities in the classrooms and it has been preferred to advise the teachers in the use of the didactic material prepared by the project and provide additional materials (such as a children's video about the lives of two cubs " Truffle and Vanilla "or other informational materials of the project).

Date	Center	Nº of groups	Nº of students
19/04/18	CEIP Triacastela	1	10
09/05/18	CEIP Uxío Novoneira, Seoane do Courel	1	25
06/05/19	CEIP San Xoán, Becerreá	3	140
07/05/19	CEIP Samos, Samos	1	9
10/05/19	CEIP Pobra de Brollón	2	29
14/05/19	CEIP Uxío Novoneira, Seoane do Courel	2	29
16/05/19	CEIP Ricardo Gasset, O Incio	2	25
21/10/19	CEIP Uxío Novoneira, Seoane do Courel	2	22

E.2.4. Interpretive route Bear and Honey in Courel

An interpretive route has been designed, conditioned and marked as a self-guided tour about the bear and the honey in Courel. The route is near Seceda village, close to some restored alvares and in a very interesting bear habitat and honey production area. The objective of this interpretive route is to contribute to the socioeconomic development of the territory linked to the presence of the bear and its positive image, due to its potential touristic interest and the promotion of the territory's honey and ethnographic values. It has been developed with the participation of representatives of the Association of the Neighbors Aldea de Seceda, the owners of communal forest, the Galician Beekeeping Association and the town hall of the Folgoso do Courel. The works of conditioning, design and installation of informative posters

have been carried out by local companies and the project's team of workers. The proposed route, with a total length of 16 km, is structure in three different parts, offering various options depending on the interest of each visitor.

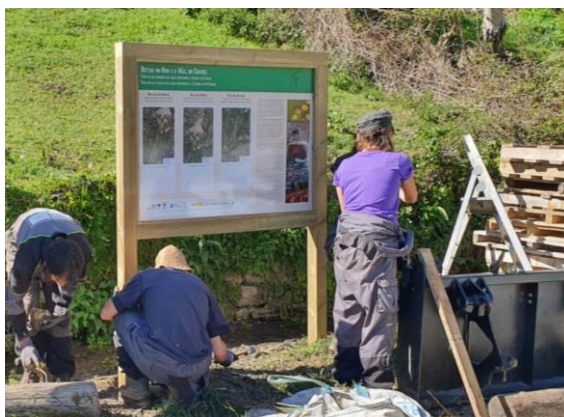
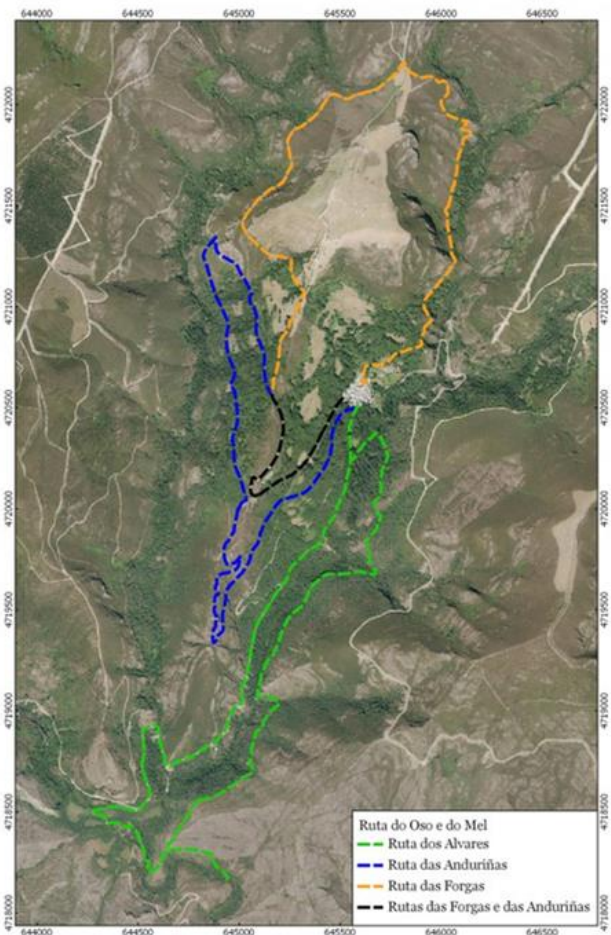
- Route 1. As Forgas-Lago: 4.51 km
- Route 2. As Anduriñas-Castro: 6.37 km
- Route 3. Circular alvares de Seceda: 4.94 km,

The informational posters are included in the website of the project. In addition to the signs, detailed information has been prepared that can be consulted online on the project's website, and an informative brochure has been published.

<https://fundacionosopardo.org/life-oso-courel-ruta-das-forgas/>
<https://fundacionosopardo.org/life-oso-courel-ruta-das-andurinas/>
<https://fundacionosopardo.org/life-oso-courel-ruta-dos-alvares/>

The route was presented to the public on April 20, 2021 in a visit with local authorities and journalists. The Folgoso de Courel city council has included the route between the tourist resources of the municipality and has assumed its conservation and maintenance after LIFE.

This action has raised very good expectations in the territory as an example of sustainable development linked to the presence of the bear and the area's own resources such as honey or nature.



Project workers installing the route informative signals



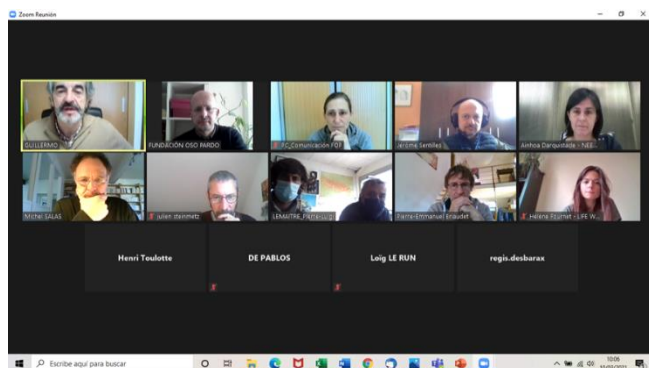
Official presentation of the route with representatives and stakeholders

E.2.4. International scientific meeting for replicability and transferability of results and lessons learned

At the end of the project, it was planned to hold an international meeting with experts from other small populations of bears to discuss similar lessons for their conservation in areas of population expansion. As a result of the covid19 pandemic, which has largely conditioned the second part of the project, the possibility of holding an international on-site meeting was finally ruled out and it was decided to replace it with an exchange of ideas and experiences between different experts working in areas of expansion of bears in Europe to share solutions and lessons learned and establish a proposal of recommendations to address these situations from an ecological and social point of view.

The proposal has aroused interest among experts and the exchange of information has been developed with the participation of researchers and managers from University of Zagreb, Provincia Autonoma di Trento, Generalitat de Catalunya, University of Ljubljana, Rewilding Apennines, Callisto Society and our LIFE project team. A document has been prepared based on the debate and the proposals of the different participants, which is included in the project's Replicability and Transferability Plan.

Several of the actions of the LIFE Oso Courel project have a high potential for replication. A Replicability and Transferability Plan of the project has been prepared, which includes the descriptive sheets of the main actions with interest, the lessons learned about their development and that can facilitate their replication, and the identified scenarios of major interest. In addition, specific information is included on the proposals for infrastructure management to favour connectivity (Action C2) and on the exchange of international experiences on the conservation of expanding bear populations described above. To promote replicability, a meeting with 10 specialists from the Office Française de la Biodiversité has already been established on 10/03/21 to assess the application of Courel experiences to a future LIFE project



in the French Pyrenees, contacts have been established with the NGO Rewilding Apennine to exchange experiences for a future LIFE in the Apennines, an exchange is being organized with environmental rangers from Andorra to learn about Cantabrian experiences and some actions have been replicated and adapted in the new LIFE Bears with a Future project that the FOP has begun to develop in 2020.

As required by CINEA in the letter after the last monitoring visit, the replicability and transferability plan include the specific document drawn up from the meetings with responsables for the management of road infrastructures (in Spanish, and in English for its possible demonstrative interest), as well as the results of the exchange of international experts on the expansion of brown bear populations.

ACTION F1: Overall project management

COMPLETED	Foreseen start date: 01/07/2017	Actual start date: 01/07/2017
	Foreseen end date: 31/12/2020	Actual end date: 30/04/2021

Project management has been developed as planned. All LIFE team jobs have been covered. Periodic meetings have been held regularly both over the terrain and at the central office of FOP in Santander. A Management Committee was constituted in the first institutional meeting between beneficiaries, and it has held some official meetings and continuous telephone, mail and personal contacts among representatives of project partners. In fact, there has been close contact with representatives on the ground in meetings and development of actions. The objective of this committee has been the discussion, planning and coordination of actions between partners, as well as the review of ongoing actions.

The Scientific Committee has been constituted with 10 researchers specialized in large carnivores' ecology, forestry and vegetation ecology from Santiago de Compostela, Oviedo, La Coruña and Madrid Autonomous Universities, as detailed in the First Progress Report. The first meeting of the Scientific Committee has been held on November 14-15, 2019 at the Courel Scientific Station, with the participation of 13 experts from the committee and members of LIFE team. Another on site meeting was planned at an advanced stage of the project, but it has had to be suspended as a result of the covid19 pandemic. To replace that meeting, a contact by email or telephone has been maintained with most of the members of the committee to consult different aspects of the development of the project.

An After LIFE Plan has been prepared, including 20 After-Life actions to develop over the next five years (2021-2026). The most relevant actions are the continuity of collaboration agreements and planting agreements, the maintenance of the acquired land and the planted forests, the proposal of new plantations, the development of an information campaign with hunters, continuity in the transfer of electric shepherds to beekeepers and dissemination of the brochure and the video tutorial, the operation of the team of environmental rangers of the Xunta de Galicia, and the continuity of monitoring and meetings.

The financial audit has been prepared according with the proposal.

Status of project Deliverables

The 27 deliverables scheduled in the proposal have been completed, although some have suffered delays and reorganization as a result of operational changes in the project and the effects of the covid pandemic¹⁹. In addition, two new deliverables have been incorporated.

Name of the deliverable	Action	Foreseen deadline	Actual deadline	Comments
Material identificativo del Proyecto	E1	01/10/17	01/10/17	COMPLETED. 2.000 brochures and 250 binders printed; more will be printed as needed. Included in First Progress Report.
Paneles informativos	E1	01/10/17	31/01/19	COMPLETED. Delay due to difficulties with municipalities, 4 boards produced to be placed in different public places. Included in Midterm Report.
Folleto sobre protección de colmenares	E1	31/12/17	15/02/18	COMPLETED. Delay. 500 brochures printed; more will be printed if needed. Included in First Progress Report.
Página web del proyecto	E1	31/12/17	01/03/18	COMPLETED and OPERATING. Contents included in Progress, Midterm and Final Report.
Inventario de explotaciones apícolas actuales y alvarizas tradicionales	A4	30/06/18	30/06/18	COMPLETED. In addition, a cartographic viewer with the location of the alvares has been prepared and work is being done to complete and disseminate the inventory. Included in First Progress Report.
Material educativo y material on-line para la campaña de educación ambiental	E2	30/06/18	30/06/18	COMPLETED. And distributed to schools in the Project area. Included in First Progress Report.
Plan de actuaciones para desfragmentación en el entorno de la autovía A6	A3	30/06/18	30/06/18	COMPLETED. Modifications proposed in in action C2. Included in First Progress Report.
Tabla actualizada de indicadores en el primer Informe de Progreso	D2	01/07/18	02/02/18	COMPLETED. No significative changes in indicators from those included in the KPI webtool.
Plan de actuaciones forestales para conectar fragmentos de hábitats de calidad en la Sierra del Courel	A2	31/07/18	30/06/18	COMPLETED. Included in First Progress Report.
Boletín especial revista Quercus	E1	31/12/18	01/10/19	COMPLETED edited with Quercus magazine 404 (October 2019). 18,000 copies distributed with the magazine and 2,000 distributed in the project area. Included in the Final Report.
Paneles de la ruta interpretativa sobre el oso y la miel	E2	31/12/18	20/04/21	COMPLETED. It has been delayed because of a readjustment of the action. Included in the Final Report.
Primer informe de progreso sobre compra de tierras	B1	31/12/18	31/12/18	COMPLETED, although land purchase is still in progress and negotiating with owners. Included in Midterm Report.
Primer informe parcial de seguimiento de la efectividad de las acciones del proyecto	D1	31/12/18	31/12/18	COMPLETED and work in progress. Included in Midterm Report.

Tabla actualizada de indicadores en el Informe Intermedio	D2	01/03/19	01/03/19	COMPLETED. Included in Midterm Report.
Segundo informe de progreso sobre compra de tierras	B1	31/12/19	31/03/21	COMPLETED. Action delayed but successfully completed with the purchase and restoration of 16.83 ha of land. Included in Final Report
Segundo informe parcial de seguimiento de la efectividad de las acciones del proyecto	D1	31/12/19	31/12/19	COMPLETED and work in progress. Prepared for the second Progress Report.
Tabla actualizada de indicadores en el segundo Informe de Progreso	D2	01/03/20	01/03/20	COMPLETED and work in progress. Prepared for the second Progress Report.
Documentación de compra de alvarizas e informe de restauración	C4	30/06/20	30/04/21	COMPLETED. Has suffered delay due to the difficulty in buying alvares. Included in the Final Report.
Plan de Replicabilidad y Transferibilidad	E2	31/10/20	30/04/21	COMPLETED. Deadline modified by the extension of the project. Included in the Final Report.
Informe final de seguimiento de la efectividad de las acciones del proyecto	D1	31/12/20	30/04/21	COMPLETED. Deadline modified by the extension of the project. Included in the Final Report.
Informe final del impacto del proyecto sobre las funciones ecosistémicas	D3	31/12/20	30/04/21	COMPLETED. Deadline modified by the extension of the project. Included in the Final Report.
Informe final del impacto socioeconómico del proyecto	D4	31/12/20	30/04/21	COMPLETED. Deadline modified by the extension of the project. Included in the Final Report.
Informe Layman	E1	31/12/20	30/04/21	COMPLETED. Deadline modified by the extension of the project. Included in the Final Report.
Plan After-Life	F1	31/12/20	30/04/21	COMPLETED. Deadline modified by the extension of the project. Included in the Final Report.
Tabla final actualizada de indicadores	D2	31/12/20	30/04/21	COMPLETED. Deadline modified by the extension of the project. Included in the Final Report.
Vídeo documental del proyecto	E1	31/12/20	30/04/21	COMPLETED. Deadline modified by the extension of the project. Included in the Final Report.
Informe de auditoría	F1	01/03/21	30/04/21	COMPLETED. Deadline modified by the extension of the project. Included in the Final Report.
NEW. Tríptico sobre turismo de naturaleza en áreas oseras de la Serra do Courel	E1	-	30/04/21	COMPLETED. New deliverable developed in collaboration with LIFE Natura2000 + Oso.
NEW. Video tutorial sobre prevención de ataques de oso a colmenares.	E1	-	30/04/21	COMPLETED. New deliverable developed in collaboration with LIFE Natura2000 + Oso.

Status of project Milestones

Eighteen milestones have been adequately completed (8 on time or advanced and 10 with different delays because of operational organization of the project or effects of covid19 pandemic). Four milestones have been suspended and replaced by other alternative activities.

Name of the Milestone	Action	Foreseen Deadline	Actual Deadline (Jun2018)
Constitución y primera reunión del Comité de Seguimiento	F 1	30/09/2017	COMPLETED 14/07/2017
Completado primer envío de semillas al vivero forestal	C 1	31/10/2017	COMPLETED 05/07/2018
Completada la firma de acuerdos con ayuntamientos	A 1	31/12/2017	SUSPENDED Replaced by agreements with social organizations (completed)
Finalización del inventario de explotaciones apícolas actuales	A 4	31/12/2017	COMPLETED 07/04/2021
Celebración del curso de formación del equipo de intervención	C 5	30/06/2018	COMPLETED 30/06/2019 Initial delay, and extended term due to covid-19 pandemic
Celebración del curso de formación para guardas sobre prevención de conflictos y riesgos para el oso	C 5	30/06/2018	COMPLETED 12/06/2018
Finalización del inventario de alvarizas tradicionales	A 4	30/06/2018	COMPLETED 30/06/2018
Inicio de los encuentros informativos	E 2	30/06/2018	COMPLETED 20/02/2018
Primera reunión del Comité Científico	F 1	30/09/2018	COMPLETED 14/11/2019
Completado segundo envío de semillas al vivero forestal	C 1	31/10/2018	COMPLETED 31/10/2018
Viaje demostrativo al Parque Natural de Somiedo	E 2	31/10/2018	COMPLETED Advanced 16/05/2018
Completada primera campaña de desbroce en puestos de caza	C 3	30/04/2019	COMPLETED 30/06/2018
Completada primera campaña de plantación	C 1	30/04/2019	COMPLETED 30/04/20 Reorganization of the plantation campaigns and held in 2019-20 and 2020-21
Segunda reunión del Comité Científico	F 1	30/09/2019	SUSPENDED Affected by a covid19 pandemic. Replaced by phone and mail contacts.

Completado tercer envío de semillas al vivero forestal	C 1	31/10/2019	COMPLETED 31/10/2019
Completada la protección de colmenares	C 4	31/12/2019	COMPLETED 30/04/2021 Extended until the end of the project due to the expansion of the number of apiaries to be protected
Completado cerramiento de fincas adquiridas en el proyecto	C 1	31/03/2020	COMPLETED 31/12/2020
Completada segunda campaña de desbroce en puestos de caza	C 3	30/04/2020	COMPLETED 30/04/2020 Extended until the end of the project
Completada segunda campaña de plantación	C 1	30/04/2020	COMPLETED 30/03/2021 Reorganization of the plantation campaigns and held in 2019-20 and 2020-21
Completadas las plantaciones de desfragmentación	C 2	30/04/2020	SUSPENDED Plantations transferred to action C1 other activities proposed
Completada la compra y restauración de alvarizas	C 4	30/06/2020	COMPLETED 30/04/2021 Extended due to difficulties in the legal purchase of alvares
Celebración seminario internacional de replicabilidad	E 2	01/10/2020	SUSPENDED Replaced by international Exchange of experiences and proposals. Celebrated until 30/04/2021

6.2. Main deviations, problems and corrective actions implemented

There have been no relevant deviations in the project, apart from some delays in the development of some actions and the effect of the covid19 pandemic, that has complicated the second part of the project and has forced to modify some actions. It has been necessary to suspend some of the meetings planned for the final part of the project and replace them with other activities aimed at fulfilling the project objectives. Other activities such as the training of XG rangers have been delayed, carrying out an online course and an on-site practical session with sanitary measures.

Among the main problems and difficulties encountered, and already mentioned in previous reports, is the complex social scenario of this territory, with high rural abandonment, complicated orography and a recent bear presence. The strategy to address this situation has been to advance and reinforce information and awareness actions and protection of apiaries and hunters involvement, which have been very well received by social actors. We have made a special effort in actions with a positive reading that link the presence of the brown bear with a positive reading for rural development. Another difficulty related to the rural abandonment and people detachment is the delay in land and *alvares* purchase. In many land and *alvares* of interest for the project it's been difficult to define the real property or find legal documentation, which forces to intensify efforts. Purchases have been made with a significant delay, although it has not prevented the corresponding restoration actions. Regarding the *alvares*, it has been necessary to acquire the plot of land in three cases and establish agreements with the owners in the other three *alvares*.

6.3. Evaluation of Project Implementation

Methodology applied: The basic methodology, based on lessons learned by FOP in previous LIFE projects, is to promote information and awareness on a small scale, establishing the greatest possible number of contacts and links with stakeholders spread across the territory. For this, collaboration and agreements signed with some well-established social organizations has been very useful. The main objective of this information and dissemination is to show with practical examples that human-bear cohabitation is possible and could be positive and that prevention is the better way of managing conflicts. Attempts have been made to reinforce and pay particular attention to the social actors with a positive initial perception or willing to know experiences. We have also insisted for example on aspects such as the revision and adequate training of beekeepers for the proper installation of electric fences. The initial perceptions are quite positive, which in a socially complex scenario such as this one is quite promising, so we think that the cost-benefit of the project is broadly favourable.

Comparison of results achieved against objectives and expected results foreseen in the proposal. Although there have been delays, especially in actions related to the purchase of land and *alvares* and some changes have been made to cope with the covid19 restrictions, in general the achievements are adequate and in line with the project's forecasts. In some actions the results foreseen in the proposal have been increased and some new activities have been developed. In the following table a comparison action by action is presented.

Action	Foreseen in the revised proposal	Achieved	Evaluation
A1. Signing of agreements with local administrations, social organizations and owners	<u>Objectives:</u> To establish a cooperation framework with administrations, organizations and landowners. <u>Expected results:</u> 6 agreements with municipalities and 10-15 Land Stewardship Agreements	4 Agreements with social organizations (Galician Beekeepers Association, Courel Rural Development Association, Santiago de Compostela University and Fundación Uxío Novoneyra) 20 Land Stewardship Agreements signed with MVMC and private owners.	Given the preference of municipalities for maintaining a less visible collaboration (to avoid the increase of social conflict or politicization), it was decided to strengthen collaboration with social organizations, which have been very relevant for the project. Land Stewardship Agreements have required a significant effort of discussion and presence in the territory but have been signed as planned.
A.2. Plan of forestry actions for habitat connectivity	<u>Objectives:</u> To evaluate the territory for the planification of Action C1. <u>Expected results:</u> 1 Plan of forestry actions for habitat connectivity	Plan of forestry actions for habitat connectivity completed in time.	Cartographic information has been available to support the location of enrichment and connectivity forests.
A.3. Plan of defragmentation actions in the A6 highway and other infrastructures	<u>Objectives:</u> Prepare the action C2 and evaluate permeability conditions in A6. <u>Expected results:</u> 1 Plan of defragmentation actions in the A6 highway and other infrastructures	Plan of defragmentation actions in the A6 highway and other infrastructures completed in time.	It has been proven the good permeability conditions in the existing viaducts on the A6 highway in the section evaluated. Because of the results, a modification of C2 has been proposed.
A.4. Inventory of apiculture farms and traditional beehive protection structures (<i>alvares</i>)	<u>Objectives:</u> Evaluate the situation of beekeeping activities in the area and the presence of traditional beehives structures. <u>Expected results:</u> 1 Inventory of apiculture farms and traditional beehive protection structures (<i>alvares</i>)	1 Inventory of apiaries and traditional beehive protection structures completed in time. 174 apiaries (with about 3.000 beehives) registered. 267 <i>alvares</i> (old stone structures for the protection of beehives against the bear) located and mapped in the project area Cartographic viewer of the traditional <i>alvares</i> prepared and disseminated.	The objective of evaluating the situation of current apiaries and traditional structures has been achieved. The inventory of traditional structures has been disseminated to contribute to their conservation. At the end of the project, the inventory of <i>alvares</i> has been updated with new information, reaching a total of 267 <i>alvares</i> located.
B1. Land purchase for enrichment forests plantation	<u>Objectives:</u> To purchase abandoned lands in areas of interest to achieve a demonstration effect and promote restoration. <u>Expected results:</u> 15 ha of land purchased and restored.	16,83 ha of land purchased (and restored in Action C1). Because of the purchase of a set of several land plots, a share in a communal pro-indiviso forest has been acquired without paying an additional cost	This action has suffered a significant delay as a result of the difficulty in reaching a sufficient degree of confidence in the territory to access the purchase of parcels of interest for the project, and due to the lack of legal documentation of some owners that has prevented the purchase. Finally, land of great interest has been acquired in time for the restoration actions.

C1. Creation of connectivity and enrichment forests	<u>Objectives:</u> Improve habitat quality and connectivity in an area of recent expansion of brown bear <u>Expected results:</u> 100,000 trees planted in small forest in a surface of 100 ha, scattered around the project area.	792 kg of fruits/ seeds collected to produce plants. 142 small forests planted throughout the territory (145 ha restored) 107,805 autochthonous trees and shrubs planted. Plantations developed in 12 collectively owned forests and various private lands.	The action has been carried out in accordance with the provisions of the proposal. The selection of plantation areas and the agreement with owners has required a great effort of meetings, visits and contacts to different towns in the area, which in turn has allowed good contact with the social actors. The hiring of local unemployed has been successful and highly valued.
C2. Defragmentation actions in A6 highway and other infrastructures	<u>Objectives:</u> Improve permeability conditions in A6 highway. <u>Expected results:</u> Planting of 1.400 trees and 5.600 shrubs near the main passages.	Modification proposed. Transfer of plants to action C1 and developed technical meetings with infrastructure managers to promote the conservation of current permeability conditions.	Once the good degree of permeability was verified with the preparatory action, which was also later confirmed with the genetic identification of a bear in Ancares and Courel on both sides of the highway, the action was appropriately modified. It has been possible to convey to the infrastructure managers the importance of connectivity and maintenance of the environment of underpasses and viaducts.
C3. Clearing of hunting areas to reduce risks of bear mortality	<u>Objectives:</u> Prevent risks for bears in hunting actions and involve hunters. <u>Expected results:</u> Clearing of 100 hunting points (40 ha).	Clearing of 229 hunting posts (62.2 ha) in 10 hunting areas. 32 agreements signed with hunters and landowners for the action.	This action has been widely accepted by the hunters, who at the beginning of the project were the most reticent and negative to the presence of the bear and the project actions. For this reason, the number of interventions has been greatly expanded and many agreements have been established, which have contributed greatly to informing and involving hunters.
C4. Prevention of conflicts between bears and apiculture	<u>Objectives:</u> Prevent conflicts between bears and beekeepers. <u>Expected results:</u> 50 electric shepherds and distributed and 5 traditional structures purchased and restored.	154 solar electric shepherds distributed (protecting > 3,000 beehives) 168 beekeepers informed 96 apiaries reviewed and improved Restoration of 6 traditional stone structures (<i>alvares</i>), 3 purchased by the project and 3 with agreements with owners.	From the beginning it was found that the project forecasts were insufficient and the number of electric shepherds to be distributed was increased. In addition, 36 more have been given to a local association for the after-LIFE care of beekeepers. The action has been very effective, not only for the protection of the apiaries but also for the transmission of the need to prevent bear attacks among the beekeepers. Many expectations have been created on the restoration of <i>alvares</i> for use in beekeeping or as a tourist resource.
C5. Preparation and equipment of an intervention team for human-bear conflicts resolution	<u>Objectives:</u> Prepare and train an official team to deal with problematic situations with bears. <u>Expected results:</u> Intervention equipment and bear maintenance facility. Two training courses for XG environmental rangers.	All intervention equipment purchased. Bear maintenance facility constructed and ready to use. 2 training courses for technicians and environmental rangers and 1 practical workshop developed	This action has acquired material and equipment but also allowed to involve and train environmental rangers, who are a fundamental part of bear conservation on the territory. The bear enclosure has suffered some delays due to administrative difficulties but has been properly completed on time. The covid-19 pandemic has made training courses difficult and delayed.

D1. Monitoring the effects of project actions	<u>Objectives:</u> Evaluation of the effectiveness of the actions, the risks for the bear and social conflict. <u>Expected results:</u> data and indicators of effectiveness and conflict.	All foreseen indicators evaluated. 225 bear presence data collected. 104 damages to apiaries registered. 4 bears genetically identified in Courel.	The action is proceeding according to the proposal. The action is collecting information about bear presence and level of conflicts that will be useful during LIFE and after-LIFE.
D2. Monitoring and measurement of LIFE performance indicators	<u>Objectives:</u> Monitoring KPI <u>Expected results:</u> updated KPI tables	Updated table of KPI included in Final Report and the KPI webtool	The action is developed according to the proposal.
D3. Assessment of the impact of the project on the ecosystem functions	<u>Objectives:</u> Monitoring the impact of project actions on ecosystem functions <u>Expected results:</u> Report of impact of project actions on ecosystem functions.	24 ecosystem services directly affected by the actions of the project have been identified (4 provision services, 12 regulation-maintenance services and 8 cultural services).	Assessment of effects in ecosystem functions completed based on the Mapping and Evaluation of Ecosystems and their Services (MAES) and the typology of ecosystem services included in the Common International Classification of Ecosystem Services (CICES).
D4. Assessment of the socio-economic impact of the project	<u>Objectives:</u> Monitoring the socioeconomic impact of project actions <u>Expected results:</u> Report of socioeconomic impact.	Socioeconomic impact has been evaluated considering the direct economic investment generated in the area, the information and awareness actions for the local population and the degree of knowledge and appreciation.	The action has been developed according to the proposal. An opinion survey has been carried out at the end of the project and has provided very interesting information to assess the situation and future proposals.
E1. Dissemination planning and execution	<u>Objectives:</u> Dissemination among stakeholders and inhabitants of the project area and abroad, and exchange of experiences. <u>Expected results:</u> Networking activities, Dissemination material, Informative boards, Special bulletin, Website and social networks, information to media, Layman report, video documentary.	12 networking activities developed Dissemination material and informative boards designed and edited. Website and social networks online (20,266 web visits). Special bulletin edited and distributed Layman report a new brochure about natura tourism on bear areas in Courel Final video a video tutorial with information on installation and maintenance of electric enclosures 159 press news.	The action has been developed according to the proposal, although some dissemination activities have been anticipated to allow a better social environment. A good stakeholder acceptance of the informative actions has been found, and a very productive collaboration with local entities. There has also been enormous interest from the media, which has been carefully attended to, generating a large number of news items with a positive approach.

E2. Information and awareness of stakeholders, environmental education and transferability	<u>Objectives:</u> Inform, educate and debate about human-bear cohabitation and exchange of experiences of other bear territories. <u>Expected results:</u> 20 meetings with 300 stakeholders, 1 demonstrative trip, 2 exchange meetings, 1 environmental education campaign, 1 route about bear and honey, 1 international workshop for replicability and transferability.	32 meetings celebrated with 384 local people. 1 demonstrative trip celebrated with 43 participants. 2 workshops for teachers, educational material for 15 schools and 12 classroom activities with 254 children. 1 Handbook of Good Practices for Nature Tourism in Serra do Courel 1 University Summer Course about big carnivores and cohabitation 1 route of the bear and honey in Courel developed, arranged and disseminated 1 final event 1 exchange of lessons learned on bear expansion with international experts	This action has been carried out as foreseen in the proposal, although with some variations. The interest of certain local organizations has favoured the development of activities not initially planned such as a good practices tourist handbook, a university summer course or a final meeting on rural development, all closely linked to the presence of the brown bear and its positive effects. On the other hand, the covid-19 pandemic has made it necessary to modify some activities such as the sectoral meetings or the international technical scientific meeting, which have been replaced by other activities with the same objectives. The local response to the activities in this action has been very positive, and some of them have been developed in collaboration with local associations.
F1. Overall project management	<u>Objectives:</u> To develop all needed activities for the best performance of the project. <u>Expected results:</u> LIFE team contracted, Management Committee, Scientific Committee, financial audit, after-LIFE plan	LIFE team contracted. Local unemployed have been hired and have performed their work very satisfactorily Management Committee constituted and working in collaboration for the development of the project Scientific Committee constituted, a meeting celebrated and online consultations made.	Project management has been developed satisfactorily, although the covid-19 pandemic has generated some difficulties that have forced the restructuring of some actions and contracts, suspending and replacing some activities, increasing online work and taking strict security measures in the development of some jobs.

Answers to all the technical remarks listed in EASME/CINEA letters. Below are itemized responses to all the technical remarks made in EASME/CINEA letters, although most of them have already been extensively clarified in previous reports and in the monitoring visits:

- 1. First Monitoring Visit letter. Website (E1).** Project website has been launched on time and fulfils all the requirements according to General Conditions (LIFE and Natura 2000 logos, mentioning of LIFE EU funding, disclaimer, etc.).
- 2. Midterm Report letter. Difficulties in acquiring the foreseen land and alvares (B1, C4).** Efforts have been made to purchase land and despite the difficulties and delay, the planned objective has been achieved and the planned environmental restoration work carried out on time.
- 3. Midterm Report letter. Postponement of the first plantation campaign (C1).** The first plantation campaign has been postponed because the preparation of the plants and the negotiations for the plantation agreements with private owners and MVMC have required time and previous advances in the project. Foreseen 100,000 plants have been planted in two campaigns (2019-2020 and 2020-2021). The last

plantations have been carried out in the final phase of the project, so an afterLIFE review and monitoring action has been planned and funds have been reserved for this. FOP regularly reviews and maintains all plantations carried out in LIFE projects and ex-post reports will be sent to the LIFE unit.

4. **Midterm Report letter. Alternatives to tree plantation along the A6 highway (C2).** The meetings with the administrations responsible for infrastructure management have been held and a document of good practices to maintain good permeability has been drawn up aimed specifically at the project area and the stakeholders involved. The document is included in Spanish and English in the Replicability Plan.
5. **Midterm Report letter. Assessment of the impact of the project on the ecosystem functions and assessment of the socio-economic impact of the project (D3, D4).** Information has been provided about indicators and the qualitative and quantitative information required for the corresponding evaluations has been monitored during the project. Both documents have been completed.
6. **Midterm Report letter. Cartographic viewer of the inventory of traditional *alvares* (E1).** The viewer is in the project website, and the inventory has been updated in the final phase of the project, reaching 267 *alvares*, which have been included in the viewer. In addition, it has been widely disseminated by the media.
7. **Midterm Report letter. Delay in the Informative Route 'Brown Bear and Honey' (E2).** The delay in the purchase of the *alvares*, together with those derived from the covid pandemic¹⁹ have generated a significant delay in the development of the informative route. However, the route has been completed, with full consensus and support from different social organizations, and has fulfilled the expectations, generating much interest and positive responses.
8. **Third Monitoring Visit letter. New Recovery Plan for the brown bear in Galicia.** Xunta de Galicia has provided their explanations about the delay in the renewal of the Bear Recovery Plan. Although the objective of approving the plan has not been met during the project's execution period, significant progress has been made and a favourable social scenario has also been created for the renewal of the plan. Xunta de Galicia has started information collection actions (i.e. genetic census) in collaboration with the other Cantabrian autonomous communities.
9. **Third Monitoring Visit letter. Acquisition of the ownership of different shares within the proindiviso communal forest (B1).** The acquisition of different parts of an undivided forest has been carried out as part of a lot of land plots and without additional cost. The nature clause has been included in the sale deed. More information on the opportunity and relevance of this participation in the proindiviso property is explained in a specific report. FOP's previous experience in the purchase of this type of property in previous LIFE projects has been satisfactory and will help in the management by AGCT.
10. **Forth Monitoring Mission letter. Monitoring of Performance Indicators (D2).** KPI database has been updated with the final results obtained and data has been included in the webtool.
11. **Forth Monitoring Mission letter. Replicability and Transferability Plan (E2).** A detailed and complete document has been elaborated. The Plan includes the document resulting from the meetings held under action C2 and the document prepared jointly with the ideas of different international experts on actions to favour the expansion of bear populations, and whose elaboration and debate replaces the international scientific meeting foreseen in the proposal. The Plan will be disseminated through direct contacts with technicians from various areas of interest

for replication (Spain, France, Andorra, Italy), dissemination through specialists with whom the expansion proposals have been prepared and dissemination online and on the web.

Amendment for the extension of the project. The extension of the project for four more months, until April 2021, has been essential to complete the actions. The objective has been to complete the plantation of small forests, which had been affected by the restrictions of the covid pandemic¹⁹, but the extension has also made it possible to complete the purchase of land and *alvares* and their restoration and to extend the actions of protection of apiaries and awareness and dissemination.

Policy impact and support for legislation. The project has provided a very significant impulse to bear management in this territory and has created a favourable scenario to advance planning. The initial objective of renewing the Brown Bear Recovery Plan in Galicia, which is operative but outdated, **has not been achieved**. The Xunta de Galicia is aware of the need to renew the document and has proposed to work in coordination with the other Cantabrian autonomous communities, which are in an advanced process of renewing their own documents, in the development of measures and information to facilitate it (genetic census of the entire population already carried out, approved problem bear management protocols, etc.). It has been verified that the expansion process is very dynamic and has spread rapidly to areas outside the project (i.e. in the province of Ourense), forcing a reconsideration of the established zoning proposals. FOP and AGCT will continue to promote the renewal of the plan. On the other hand, the development of the project has encouraged the demand for the declaration of a Natural Park in Serra do Courel among various local sectors and researchers, who see it as an opportunity to conserve nature and promote sustainable development.

The actions of the project, and in particular C5, have also facilitate the application of the recently updated National Strategy for the Conservation of the Cantabrian Brown Bear (which includes new recommendations such as the management of problematic bears or the regulation of bear tourism) and the Action Protocol for the management of problematic bears, also recently approved by the Ministry for the Ecological Transition and the autonomous communities.

EU added value of the project and its actions. As explained in the proposal, the consolidation of brown bear expansion in the Serra do Courel, both through the improvement of habitat quality and the reduction of social conflicts, has a clear contribution to the conservation of the Cantabrian bear population and therefore to nature and biodiversity policies of the EU. The social work developed in this project will contribute to raising awareness about the advantages of being included in Natura 2000. In fact, some movements of social actors interested in valuing Natura 2000 and promote the declaration of a natural park are already being appreciated. Working with tourism entrepreneurs seems promising and positive. The project has been labelled as significantly climate related, and although the plantation of forests has a direct effect on the carbon retention capacity, the main effect is the demonstrative character and the interest that this plantation model has aroused among managers and owners of MVMC.

6.4. Analysis of benefits

Environmental benefits. The actions on the territory, with the implantation of small forests of connectivity and trophic enrichment, suppose an effective improvement of the carrying

capacity of the bear habitat and the Natura 2000 site, but they have also had a demonstrative effect and have allowed the involvement of inhabitants and local owners, especially in communally owned forests. Positive interest has been generated in this model of autochthonous small forest plantations, both for their improvement of the landscape and natural value and for their potential economic interest, and above all for allowing a forest structure compatible with livestock uses and favourable for the prevention and reduction of forest fires. In addition to the planting of forests, all the restored areas have become a network of places covered by Land Stewardship Agreements, in which the conservation and maintenance of the vegetation is guaranteed for a minimum period of 30 years, conserving the natural values, natural plant succession processes, and the contribution to the conservation of the biodiversity of this territory. The expected effect on the bear is greater due to the importance of the selected species, which will produce fruit in a period of low trophic availability, and because of the dispersion of interventions throughout the Serra do Courel, which facilitates the creation of a mosaic of different formations.

Social work of information, awareness and normalization of the presence of the bear and the use of damage prevention measures has had also a remarkable impact. Some stakeholders initially reluctant to the presence of the bear, such as some leading beekeepers, are now favourable when verifying that prevention facilitates coexistence and that there are unexpected benefits such as a greater share of honey from the area or an interest in related beekeeping to the presence of the bear and the *alvares*. These social benefits greatly contribute to creating a favourable scenario and reducing risks and threats for the species.

The threats defined in the proposal have been addressed with the development of actions, especially the first (reduced distribution range and difficulties for expansion) and the second (conflicts with human activities), with significant advances, although the results will be visible in the medium or long term. The third threat (barriers to connectivity) seems less important in view of the evaluations carried.

Economic benefits. The project has directly generated 18 jobs (8 workers from the LIFE project team and 10 forest workers from the territory), in addition to another 30 estimated indirect jobs through the hiring of external assistances. The project has generated 4.3 Full Time Equivalent (FTE) jobs. The distribution of electric shepherds among beekeepers has been an economic advantage for these social actors, avoiding an unforeseen expense in protective equipment, but also for the loss of beehives, which in the case of small beekeepers not officially registered is not compensated by the administration. An economic benefit that is difficult to evaluate has been the positioning and promotion of the territory carried out by the media thanks to the project, which has also been linked above all to a positive image, of well-preserved nature and coexistence with bears and biodiversity.

Social benefits. The plantations and the cleaning of hunting points or the conditioning of an informative route have involved the hiring of unemployed people from the area. Some indirect impacts have been detected (e.g. MVMC owners inspired by the project to promote restoration of valuable habitats in forests, empowerment of social sectors favourable to the presence of the

bear among the inhabitants of the project). A very important aspect of the LIFE Oso Courel project is that all its actions have been carried out with local consensus and support, through meetings and conversations with local inhabitants, private owners, MVMC representatives, ranchers, beekeepers, tourist entrepreneurs and other inhabitants of the area. for the planning and development of actions and signing of agreements and conventions. The results of the social survey carried out at the end of the project are very interesting, showing a high degree of acceptance and positive perception towards the bear, but also draw attention to some more reticent groups and detect the main interests of the local population.



Word cloud that condenses the proposals for improvement suggested by the participants in the social survey

Replicability, transferability, cooperation. The LIFE Oso Courel project have a high potential for replication. A Replicability and Transferability Plan of the project has been prepared, detailing the main actions with interest, the lessons learned about their development and the identified scenarios for replication. An exchange of ideas and experiences between different experts working in areas of expansion of bears in Europe has been developed, sharing solutions and lessons learned and establishing practical recommendations. After the project, all who have participated will contribute to its dissemination and to use it as a roadmap for many areas where bear populations are expanding. Some replication actions have already been launched, as a meeting with 10 specialists from the Office Française de la Biodiversité and following contacts to applicate Courel experiences to a future LIFE project in the French Pyrenees, or contacts established with the NGO Rewilding Apennine to exchange experiences for a future LIFE in the Apennines.

The media interest on the project and the bear presence has contributed to disseminate in Galicia and nearby areas some conflict prevention practices such as electric fences and their appropriate installation. Some actions outside the framework of the LIFE project can contribute complementary positive impacts to the project's own actions (eg. actions developed in the Sierra de Ancares, outside the project area). Some actions in this sense have already been developed (distribution of electric fences by XG after bear damages, talks with farmers and visitors). Members of AGCT are involved in dissemination actions related to the coexistence between wolf and livestock and supporting management of communal forests that can be complementary with life project actions.

Policy implications. The involvement of stakeholders, the normalization of the presence of the bear and the dissemination of conflict prevention measures has contributed to achieving a favourable social scenario that can facilitate the updating of the Brown Bear Recovery Plan in Galicia. The provision of an intervention team of the Xunta de Galicia goes also in the same direction.

7. Key Project-level Indicators

There have been not significant deviations from the targets set initially.

Indicator related with species area has been updated, estimating the occupation area in Serra do Courel at the end of the project from the presence data collected during the project. This final area is more than double the area initially estimated (based on official documentation of the potential area), both due to the dynamic expansion of the species with a increasing presence outside the project area, as well as a better knowledge of the real situation. The indicator values for the estimated number of individuals are based on the minimum values obtained from samples and genetic analysis, although it is foreseeable that the number of specimens will be higher and, in any case, there are more bears considering the total area of expansion outside the project area.

Final actual values of the KPIs have been included in the online KPI database. All values (initial, middle and final) are presented and procedures for estimating and calculating the values are explained in detail in a specific report.