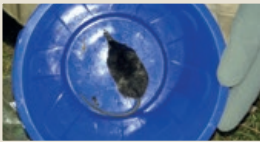


PREVIOUS STUDIES

Due to its predominantly nocturnal habits, the Iberian desman is a discreet and mysterious animal which is rarely sighted, that is why it remains a great unknown, not only for society in general but also for the scientific community given the lack of studies on the species.

As a result, the initial and most crucial, tasks approached by the LIFE+ Desmania project have been aimed at determining the dispersion of the species in the working areas, evaluating the status of their populations and contributing to improve knowledge of their biology and ecology. To this end, more than 700 km of riverside kilometres have been covered to search for signs of the species' presence, adhering to the methodology established in the project. Furthermore, over a thousand samples of faeces and hair have been collected and genetically analysed to confirm its presence. The efforts made have enabled the areas of the Iberian desman's real and potential presence to be determined in the provinces involved in the project, and a detailed characterisation of the habitat has been carried out to determine the most favourable parameters for the species. This information has allowed establishing strong basis for the future management of the Iberian desman.

The work carried out has also enabled highly relevant and previously unavailable information, such as the discovery of three small, and previously unknown, populations of the Iberian desman in the province of Ávila. All technical and scientific information compiled has been key to the qualitative and quantitative improvement of the project, and played a key part in the results of the conservation actions clearly impacting on desman populations.



MONITORING

Over the past few decades, the Iberian desman has undergone a sharp decline in population, particularly in Mediterranean distribution areas, where, in general, the species has declined and local extinction has occurred in many instances. Population numbers are also unknown, although we do know that populations are greater in Atlantic climate regions than Mediterranean regions due to summer droughts. In light of this situation, the LIFE+ Desmania project has studied these aspects in more depth and confirms the reduction of desman populations in some of the project areas.

The project has also carried out surveys with the help of staff from the regional administrations involved and professionals hired for such purposes, with the applied methodology based on previous studies on the species which have been honed and adapted to the needs and characteristics of the work areas — this is reflected in the proposal to monitor the Iberian desman populations and their habitat. This methodology will be used from now on since regional administrations and basin organisations are keen to continue monitoring and evaluating desman populations.

The samples collected during these surveys have also enabled populations to be genetically characterised, determining their genetic variability, establishing kinship relationships among individuals and determining the level of isolation between different desman populations.



INVOLVEMENT OF RIVER USERS

One important line of work saw fishermen, irrigation communities and other river users involved in the conservation of the Iberian desman, its habitat, and the other species around it. A broad number of campaigns to provide information and raise awareness among these collectives have been put in place and comprise presentations, talks, and information stands on the project and the species. Of note is the huge impact created by the turnout and presence of the project at annual events held around the area of activity, for instance León International Trout Week, the annual Pesca León meetings, the Master de Pesca Mosca de la Vera, and the Cherry Blossom Day and "Ya Torman" event, both held in Valle del Jerte. These activities have all raised awareness in the industry of the importance and impact of higher quality water, rivers and river banks, not only for the desman but for society in general and fishermen in particular.

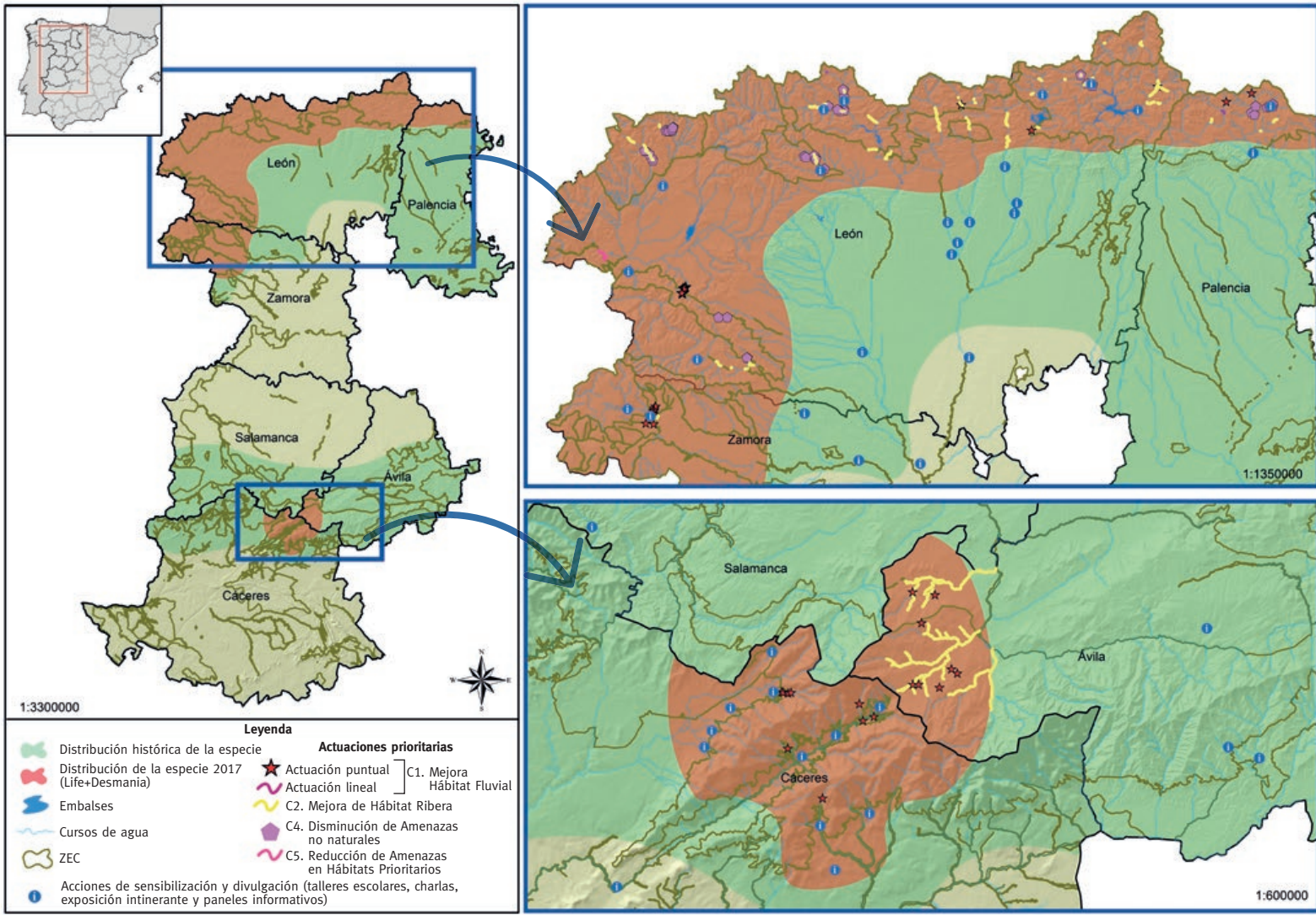
River users have been the target of the project's other actions due to their important role in preserving this habitat. The action protocol set up in the LIFE+ project framework to control *Phytophthora alni*, is aimed at fisherman and river users, among other collectives, seeking to prevent the spread of this fungus through alders. Furthermore, a model to sustainably manage the Iberian desman's habitat has been created to minimise the threat and pressure the species comes under, and to protect and maintain its habitats via the participation and involvement of those using its environment. Finally, another result from the project has been the collaboration agreement signed with the Spanish Federation of Fishing and Casting (FEPYC) to develop conservation actions around the desman.

An approach to the species and its role as a bioindicator for local populations has also given rise to an extremely positive atmosphere of understanding, receptiveness and willingness to collaborate, which will undoubtedly have an effect on its conservation in the medium and long term.



The desman is an Iberian endemism, which means its distribution is uniquely and exclusively circumscribed in the Iberian Peninsula and northern part of the Pyrenees. It lives in mountain rivers and streams in northern Portugal, the Sistema Central mountains, the Sistema Ibérico mountains, the Cantabrian mountain range, the Mountains of León, and the Pyrenees. Originally, its area of dispersion was much broader; however, in recent decades calculations show it has decreased by 70%.

The population trend and a large number of natural and anthropogenic threats have put its conservation at risk, causing the species to be included in different official catalogues of wildlife protection. For instance, it appears under the "vulnerable" category in the Spanish Catalogue of Endangered Species, while populations in the Sistema Central are considered "in danger of extinction".



DISSEMINATION AND AWARENESS

In view of the general unfamiliarity with the Iberian desman population, one of the main objectives of the LIFE+ project has been to enhance knowledge and awareness of its existence and role as a bioindicator for the quality of water resources and habitats in order to instill the need to preserve the species in society. Therefore, great efforts have gone into raising awareness and providing information for different collectives such as school pupils, university students and the general public.

To this end, different types of graphic material —T-shirts, posters, informational manuals, storybook and teaching units for Primary and Secondary school pupils— were created and distributed. Dissemination activities were also developed in areas with the real and potential dispersion of the desman, and were primarily made up of workshops and talks in environment education centres and

schools, voluntary environment campaigns, information sessions for river users and the local population, information panels, and a touring exhibition containing information on the project and the species in 32 different places; in total, these awareness activities have managed to reach 36000 people.

Within the framework of these dissemination and awareness-raising activities, six technical seminars offering the chance for all interested sectors to participate locally and regionally in the project were held.

Finally, the project has also reverberated around social networks and the media, with a total of 350 news items appearing in different media. This impact, along with the www.lifedesman.es website, has brought the general population closer to the species and features all materials produced inside the project framework.



Socios



Administraciones colaboradoras



Cofinanciadores



HABITAT IMPROVEMENT

The Iberian desman is a bioindicator of the health of Spain's rivers. The main dams are highly susceptible to pollution, and the desman is associated with clear, fast-running and shallow water in the best-conserved rivers and streams. As a result, the species is confined to a very specific and sensitive habitat, affected through different human activities and the effects of climate change, which is why it is important to shine a spotlight on the habitat and its improvement and recovery to ensure and expand the desman's distribution area. Furthermore, given that it is an umbrella species, all conservation and habitat improvement activities will have a positive effect on the other species in the same environment.

The LIFE+ Desmania project has carried out a significant number of actions to restore river banks. These largely involve improving degraded areas with a lack of vegetation, enriching riparian vegetation, removing waste and carrying out riverside silviculture work to improve the structure of the habitat. The aim is to protect and improve the river ecosystem, restoring degraded areas and recovering vegetation cover, implementing treatments which are suited to priority habitats and enriching riverside vegetation to eliminate diseases which have predominated in rivers over recent decades — the cause of the disappearance or reduction of the desman. Actions have been put into effect across more than 200 kilometres of rivers and streams inside the project's area of implementation. A simulation model to calculate the hydrological balance in the river Esla basin was also carried out. Its results show that in the last five years the flow has diminished below the draught level, threatening the species conservation if the minimum water level calculated for the basin is not observed.

These measures will all affect the maintenance of a community of diverse and abundant benthic macroinvertebrates, the food base of not only the desman but also numerous other species.



REDUCING NATURAL THREATS

The American mink (*Neovison vison*), which was brought by man to Iberian rivers because of escapes and illegal releases from fur farms, is among the 20 exotic species which cause the most damage to Spain's biodiversity. This is due to its high predatory capacity, strong competition with other semi-aquatic mustelids and the fact that it carries the highly contagious Aleutian disease, which can often be fatal for the native mustelids sharing the habitat, such as the European polecat (*Mustela putorius*) or the endangered European mink (*Mustela lutreola*). It is also a predator of the Iberian desman, which can have a serious impact on the desman population, particularly on the smallest and most isolated populations.

The project has carried out annual campaigns to control American mink in areas with desman presence, mostly in the priority areas for the species, in the stretches with the lowest population density, to attempt to stop the progress of the allochthonous species in even the highest areas of the river. Moreover, intensive training sessions have been conducted with environmental agents and specialists from the provinces involved in the project in order to monitor and control the mink while the project is carried out and once it has finished. As an experiment, capture test sensors have been set up to inform of whether a trap has closed, thus lowering the time the specimens spend in a cage and minimising the monitoring costs of the action to ensure long-term viability.

Another natural threat on the desman habitat in the area of the project is the disease caused by the *Phytophthora alni* fungus, which kills alders as it rots the roots and base of the trunk and causes serious damage to the structure and composition of riparian forests. The LIFE+ Desmania project has set up measures to minimise the disease affecting these trees, such as identifying the places to which the disease has spread, developing analyses for trees which appear to have been affected, and felling and destroying affected bases.



REMOVAL OF NON-NATURAL THREATS

The biggest threats to the Iberian desman come from the impact of human activities, which harm and fragment riverside habitats and cause losses of habitat. In addition to the direct deaths of specimens and the loss of these activities on benthic macroinvertebrate communities — the base of the desman's diet — the impact on their habitat can hinder or impede the movement of individual animals up and down rivers, causing the isolation of their populations and stopping the colonisation of new stretches. Some of the impacts of human activity are a loss of water quality caused by untreated water spills, the extraction of aggregates from river beds, the movement of soil from river proximities, lower volumes of water through excessive water abstractions that do not respect the ecological flow of water, a deterioration of river banks caused by the drastic or total reduction of riverside vegetation, forest fires or pipelines.

Through the LIFE+ Desmania project, a large number of works have been carried out to mitigate these effects on rivers with real or potential presence of the desman, and to ultimately improve their longitudinal connectivity and facilitate their movements and population networks. The actions implemented include fixing 7 water channels, eliminating or modifying 12 dams, installing 18 natural ports and 17 flumes, restoring 4 tips, permeating 8 irrigation pools, in addition to other actions which aim to improve water quality and guarantee the minimum ecological flow of water in rivers.

Furthermore, certain desman populations have been monitored to assess the efficiency of conservation actions carried out in the framework of the project and to categorise the infrastructures that interrupt the connectivity of desman populations. The data obtained has enabled the effectiveness of the works and remedial measures carried out to be assessed and the characteristics of the potentially impermeable infrastructures to be analysed, as well as determining any necessary alterations.



What did the project involve?

Despite the Iberian desman's uniqueness and endangerment, it remains a great unknown, which is why the LIFE+ Desmania project seeks to bring the species and its habitat and problems closer to society, raising awareness of potential actions to improve the situation.

The project has implemented a series of actions to improve the conservation status of the habitats it occupies, thus enhancing knowledge about its dispersion, biology and ecology, reducing the threats it is exposed to and raising awareness of the importance of the desman as a bioindicator. The ultimate aim is to reverse the negative population trend of the species and ensure its future conservation.

Where is it implemented?

The project has been carried out in 33 Special Areas of Conservation (SACs) –or the Natura 2000 Network– spread across the provinces of León, Palencia, Zamora, Ávila, Salamanca and Cáceres.

What is the Natura 2000 Network?

The Natura 2000 Network is a European network of conservation areas of biodiversity, and aims ensure the long-term survival of the most valuable and threatened habitats in Europe. The Natura 2000 Network model aims to ensure that the conservation of nature is of benefit to both citizens and socioeconomic development. It is made up of Special Areas of Conservation (SACs), Sites of Community Importance (SCIs) and Important Bird and Biodiversity Areas (IBAs) designed to protect and ensure the continued existence of the most unique and/or threatened natural habitats and species of wild flora and fauna in Europe, decisively contributing to the fight against biodiversity losses brought about by the negative impact of certain human activities. The Iberian desman, as a priority species of special interest according to the Habitats Directive (92/43/EEC), constitutes one of the key species in the declaration of the 33 SACs LIFE+ Desmania acts within.

Which organisations have taken part in LIFE+ Desmania?


Half the project is co-financed by the European Union via LIFE+ funding, and coordinated by Spain's Ministry of Agriculture and Fisheries, Food and the Environment via the Fundación Biodiversidad. The Ministry also participates as a partner by way of the Directorate General for Quality, Environmental Assessment and the Natural Environment, in addition to the autonomous regions of Castilla y León (Directorate-General for Development and the Environment) and Extremadura (Directorate-General for the Environment and Rural Development, Agricultural Policy and Territory), the Fundación Patrimonio Natural de Castilla y León (FPN), the Fundación Centro de Servicios y Promoción Forestal y de su Industria de Castilla y León (CESEFOR), Tragsatec, and the Sociedad Pública de Infraestructuras y Medio Ambiente de Castilla y León (SOMACYL). Moreover, the project has been co-financed by the Valencia de Don Juan Council and the Municipal Associations of Southern León.



The LIFE+ Desmania Project

Title	<ul style="list-style-type: none"> Recovery and conservation Program for <i>Galemys pyrenaicus</i> and its habitat in Castilla y León and Extremadura
Objective	<ul style="list-style-type: none"> To reverse the negative population trend of the Iberian desman and to ensure its future conservation.
Length	<ul style="list-style-type: none"> 5.5 years (2012–2018)
Budget	<ul style="list-style-type: none"> 2.6 million euros, 50% co-financed by the European Union
Action areas	<ul style="list-style-type: none"> 33 SPAs in Castilla y León (León, Palencia, Zamora, Ávila and Salamanca) and Extremadura (Cáceres)
Coordinated by	<ul style="list-style-type: none"> The Fundación Biodiversidad from the Ministry of Agriculture and Fisheries, Food and the Environment
Partners	<ul style="list-style-type: none"> The Ministry of Agriculture and Fisheries, Food and the Environment <i>Directorate General for Quality, Environmental Assessment and the Natural Environment</i> The Autonomous Government of Castile and León <i>Directorate-General for Development and the Environment</i> The Autonomous Government of Extremadura <i>Directorate-General for the Environment and Rural Development, Agricultural Policy and Territory</i> CESEFOR Foundation Fundación Patrimonio Natural de Castilla y León, from the Autonomous Government of Castile and León Sociedad Pública de Infraestructuras y Medio Ambiente de Castilla y León Tragsatec
Co-financing partners	<ul style="list-style-type: none"> The Valencia de Don Juan Council The Municipal Associations of Southern León

www.lifedesman.es

 Fundación Biodiversidad. 911210920. desmania@fundacion-biodiversidad.es



Recovery and conservation Program for *Galemys pyrenaicus* and its habitat in Castilla y León and Extremadura

Layman report. LIFE+ 11 NAT ES/691 project



The Iberian Desman, a Peninsular endemic species

In recent decades, populations of the Iberian desman (*Galemys pyrenaicus*) have diminished by an average of 70% in Spain. The species, only found on the Iberian Peninsula and in the French Pyrenees, is classified as “vulnerable” in the Spanish Catalogue of Endangered Species, with the exception of populations from the Sistema Central mountains, which are deemed “in danger of extinction.”

THREATS

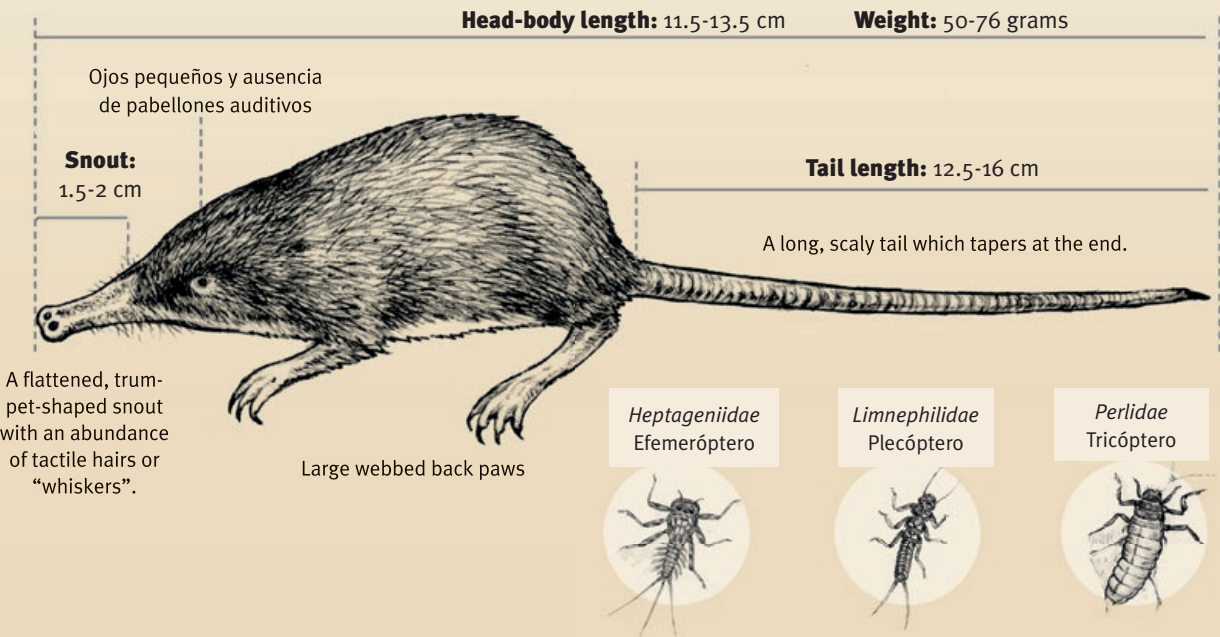
Although there are multiple factors causing the decline of the species, the main ones are:

- Lower quality water and the reduction of invertebrates for food due to untreated water, extractions of aggregates from riverbeds and land movements around rivers.
- Lower volumes of water in rivers caused by excessive water abstractions or the effect of droughts.
- The erosion of river banks caused by the loss or reduction of riverside vegetation, forest fires, pipelines, etc.
- The longitudinal and transversal discontinuity of riverbeds through the presence of dams and man-made river banks.
- Population isolation and a loss of genetic variability due to fragmented populations.
- Habitat diseases caused by exotic species such as the American mink, which preys on the species.

DID YOU KNOW?

Although it is related to the mole, the subfamily to which it belongs is characterised by its adaptation to aquatic life.

THE ONLY LIVING SPECIES OF ITS KIND



HOW DOES IT REPRODUCE?

It reaches sexual maturity in its first year of life. The breeding season occurs between January and May, and its young are born from March to July. The number of young in the litter fluctuates from between 1 and 5, with a lifespan of 3 to 4 years.

It is considered a bioindicator species since it only lives in well-preserved waterways.

WHERE DOES IT LIVE?

The Iberian desman has adapted to live in small, cold and shallow fast-running rivers, and, with its prey highly sensitive to pollution, it lives in very clean water.

WHAT DOES IT EAT?

It feeds on aquatic benthic macroinvertebrates larvae (found at the bottom of rivers with moderate to strong currents), particularly caddisflies, stoneflies and mayflies, or, very occasionally, small crustaceans and fishes.

What is the legal framework?

Conservation of the Iberian desman (*Galemys pyrenaicus*) in Spain, that was approved in 2013 by the Wild Flora and Fauna Committee from the Ministry of Agriculture and Fisheries, Food and the Environment. Within the framework of the project the Basic Plan for the Management and Conservation of values from the Natura 2000 Network of Castile and León, the Action Plan for the Iberian desman (*Galemys pyrenaicus*) in Castile and León, and the Recovery Plan for the Iberian desman in Extremadura, were also approved.

How was the project implemented?

The documents created in the first half of the project have laid the foundations for subsequent conservation activities, setting out from an analysis of the situation facing the species in order to assess the status of its populations, to evaluate the conservation status of its habitats and the main threats to the species. The results enabled a technical document to be drafted to improve and conserve the Iberian desman and its habitat in every province involved in the project, identifying the management practices and conservation actions required for the recovery of the species.

The second part of the project focused on developing actions to improve the longitudinal and transversal connectivity of rivers, restoration and conservation works on riverside habitats, and actions to control natural threats to the desman and its habitat.

Scientists and specialists on the species have provided guidance throughout the project via a Scientific Committee, and all studies or experiences on the desman from other regions and countries have been consulted to improve its habitat and contribute to its conservation.



Aims

Actions

Results

To gain awareness of and analyse the distribution of the Iberian desman and to determine, where possible, its population numbers.

Field sampling of droppings and other evidence produced by the Iberian desman.

Determining areas with the real and potential presence of the Iberian desman in the provinces involved in the project.

Carrying out genetic analysis to confirm the species.

Establishing a methodology to monitor the species.

- Samples taken from over 700 stretches of river potentially occupied by the species.
- The confirmed presence of the Iberian desman in around 800 kilometres of river.

- An updated distribution range in the provinces of León, Palencia, Zamora, Salamanca, Ávila and Cáceres.

- Genetic analyses of over 1,200 samples.
- Molecular analyses allowed to evaluate the genetic variability of the species, determine the sex of the animals, extract phylogenetic information and establish kinship relationships.

- A procedure created to analyse the population and habitat of the desman.
- A proposal drawn up to monitor populations of the Iberian desman and its habitat in the area of the LIFE+ Desmania project.

To improve knowledge of the biology and ecology of the species in the areas of the project.

Characterising the desman's habitat and evaluating the best conditions for the species.

Analysing the current occupation of the species in the Sistema Central mountains, the trends it has followed in recent decades, and conservation problems.

- The characterisation of the desman's habitat in terms of the structure, composition and conservation of riverside habitats and hydromorphological parameters.
- An analysis of benthic macroinvertebrates and water quality to characterise the occupied and potential rivers for the species.

- A distribution model drawn up on the Iberian desman and the suitability of the habitat in the Sistema Central with specific proposals on the conservation and management of the species.

Drawing up documents to improve and conserve habitats occupied by the Iberian desman in each of the six provinces involved in the project.

Creating agreed management models which set out from an analysis of the Iberian desman's populations and habitat in order to regulate activities and uses with an impact on the habitat and conservation.

- The availability of detailed information on threats, and priority or recommended conservation measures which benefit the species.

- A model to sustainably manage the Iberian desman's habitat in the following circumstances: watercourses with water abstractions, stretches of water with intense fishing activity and stretches of alder with *Phytophthora alni* detected.

Carrying out work to improve the longitudinal connection of rivers and to facilitate the movement and networks of desman populations.

Implementing actions to protect and restore the riverside habitat to improve the availability of food and shelter for the desman and to reduce non-natural mortality.

Population control of American mink in areas occupied by the desman, mainly in the priority areas for the species, and impeding the expansion of the allochthonous species toward the highest stretches of rivers.

Carrying out actions to reduce the impact of non-natural threats to desman habitats in order to improve the quality of water and to ensure a minimum water volume for the species.

- Elimination or modification of 12 dams.
- Fixed 7 irrigation channels used by the desman.
- Improved permeability of 8 irrigation pools.
- 4 tips restored.
- 1.2 km of trails modified to avoid wading across the river
- 57 elements to avoid the delivery of sediments and ashes after forest fires

- Silviculture treatments to improve and enhance riverside vegetation across 78 km of river.
- Removal of different types of waste in 118 km of watercourses.
- 90000 trees or cuttings from different tree species planted.

- > 1300 American minks captured with a trapping effort of 55000 days.
- Over 400 specialists and agents trained.
- A remote sensor developed for traps.
- A mobile app developed to manage the trapping campaigns.

- 759 irrigation concessions analysed.
- 1 passive treatment point installed.
- 18 natural ports located in basins on the Duero and Miño-Sil rivers.
- 17 portable flumes installed to control the irrigation flow.
- 15 meetings and 13 agreements with irrigation communities.

To improve the Iberian desman's habitat and to reduce the impact of the threats it faces.

Aims

Actions

Results

To improve the condition of habitats and priority species sharing the ecological niche with the Iberian desman.

Conducting studies to evaluate the habitat quality of the white-throated dipper and otter in the area of the project.

- An evaluation carried out on the habitat quality for both priority species and established a road map with the necessary actions for the conservation of their habitat.

Evaluating the impact of the *Phytophthora alni* fungus on the priority habitat 91Eo* (alders) from the area of the project and determining the presence and scope of *Didymosphenia geminata* in rivers.

- Risk maps of *Phytophthora alni* in the area of the project.
- Phytopathological analyses of samples of alder bark and roots and the subsequent cutting and removal of specimens contaminated by the fungus.
- Determining the distribution of “rock snot” in the entire area of the project.
- Drawing up an action protocol to avoid the spread of both diseases.

To raise awareness in society of the existence of the Iberian desman and its role as an indicator of habitat quality.

Developing a communication, information and education campaign.

- The production of T-shirts, posters, stories and two teaching units for Primary and Secondary pupils, as well as an information manual.
- The participation of 8700 school children in 172 workshops held.
- 186 workshops or talks held in different environment centres.
- The participation of 390 volunteers in 17 campaigns of environment voluntary work.
- 15 briefings geared towards river users and the local population.
- A touring exhibition viewed by 36000 visitors in the 32 locations in which it has been mounted.
- 6 Technical Seminars held and the publication and distribution of 2 technical documents.
- A website put together and disseminated on social media and over 150 news items published on websites and in different media.
- 12 information panels on the species and its habitat installed in the area of the project.
- A video assembled on the project.

To strengthen the legal mechanisms to conserve the Iberian desman.

- The approval of the Basic Plan for the Management and Conservation of *Galemys pyrenaicus* and the Action Plan for the Iberian desman in Castilla y León Region.
- The approval of the Recovery Plan for the Iberian desman in Extremadura.

Increasing the training of environment agents and administration technicians respecting sampling methods and strengthening their implication in the monitoring of the species and the development of the conservation actions.

- Training for 400 agents and specialists from the CCAAs involved in: taking samples from the Iberian desman, identification through the analysis of hair, methods to monitor the desman, analysing their habitat, and controlling the American mink.

To provide governance, training for agents and collaboration with other administrations.

Actively and closely collaborating with River Basins Authorities (Tajo, Duero and Miño-Sil) to carry out actions in favour of the desman.

- Participation in updating Hydrological Basin Plans through the proposal of measures to manage aquatic species.
- Active collaboration in processing permits for the works involved in the project.
- Ongoing coordination and communication between LIFE+ Desmanía and confederations in the actions developed by both sides.
- Carrying out parallel actions with the project, such as the analysis of *Phytophthora alni*, analysing water concessions and habitat improvements.
- Carrying out studies of the desman's presence in the provinces of Ávila and Salamanca by the Tajo and Duero River Basins Authorities, adhering to the protocols established in LIFE+ Desmanía.
- Utilization of the information obtained in the LIFE+ Desmanía for the regulation of the management actions developed by the River Basins Authorities.

Exchanging experiences with experts and other projects related to the desman.

- Collaboration with 9 desman conservation projects, both in Spain and internationally.
- The participation of experts on the species in technical seminars and the project's scientific committee.

What about after LIFE+?

LIFE+ Desmania has been a pioneering and innovative experience in view of the scarcity of projects on the Iberian desman in Spain. Fortunately, it won't be the last. The close collaboration forged with administrations (national, regional, local), private bodies and basin organisations while the project was being implemented has ensured medium- and long-term actions which work to protect the species and its habitat throughout its distribution area.

Managing to grant visibility to this unknown species and its vital role in indicating the health of Spain's rivers to society in general and to locals, school pupils and river users, is a guarantee that we are on the right road to recovering the species, an issue which is underpinned by the project.

The **Biodiversity Foundation** from the Ministry of Agriculture and Fisheries, Food and the Environment, and the autonomous and local administrations and organisations participating in the project, will all continue their commitment to recovering this species. Therefore, both regional governments will continue to monitor desman populations, actively fighting against the proliferation of American mink populations and avoiding new colonisations, overseeing the maintenance of the species' habitat under ideal conditions, especially in the following aspects: the quantity and quality of water, improvements to riverside vegetation (silviculture treatments, cuttings, phytosanitary controls, etc.), the conservation of shelter areas, and other actions included in respective recovery plans.

