Project

LIFE WOLFLUX: HELPING FARMERS AND WOLVES IN PORTUGAL

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1. Introduction

According to the last national census, in 2002–2003 there were approximately 300 Iberian wolves (*Canis lupus signatus*) in Portugal (Fig. 1), most of them north of the Douro River (Pimenta et al., 2005). This census provided the most recent snapshot at a national level of wolf population size in Portugal and will soon be updated by data from the ongoing Wolf National Census. Between 2004 and 2013 other studies developed medium-term monitoring programmes (of at least four years) for 22 packs (34% of the area covered by the 2002–2003 national census) showing a stable population trend (Álvares et al., 2015).

South of the Douro, there is a small subpopulation of fewer than 50 wolves which is currently fragmented and highly isolated from the rest of the Iberian population due to ecological and social barriers. The main threats to the species acting as barriers to conservation and connectivity south of the Douro are: habitat transformation due to agriculture and urbanisation along the Douro River; habitat destruction caused by fires and infrastructure; low diversity and abundance of wild prey and consequent dependence on livestock for feeding (which leads to a high conflict with husbandry in certain areas); and direct human persecution (Álvares et al., 2015).

At the European level, the wolf is a species of Community interest which currently has an Unfavourable-Inadequate Conservation Status in the Mediterranean biogeographical region (EEA, 2019). The wolf in Portugal is included in Annex II and Annex IV of the Habitats Directive, requiring special areas for conservation and strict protection. At the national level, the Iberian wolf has been a strictly protected species since 1988 (Law 90/88) and is listed as 'Endangered' in the Portuguese Red Data Book of Vertebrates (Cabral et al., 2005). Portuguese authorities recently approved The National Action Plan for the Conservation of the Iberian Wolf (PACLobo – Despacho 9727/2017) which aims to improve the situation of the species.

The LIFE WolFlux[1] project aims to promote the ecological and socio-economic conditions needed to support the viability of the Portuguese wolf subpopulation south of the Douro River. In order to achieve this, the project intends to promote the necessary con-

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Fig. 1 Iberian wolf pup photographed by camera trap within the LIFE WolFlux project area. *(Photo: Zoo Logical)*

ditions for the wolf to play its role as a top predator in the ecosystem, reducing its current dependence on livestock (Torres et al., 2015) and animal by-products (e.g. from aviaries) for feeding (Quaresma, 2002 in Pimenta et al., 2005), while at the same time increasing human tolerance towards the wolf and creating a spirit of coexistence in the region.

The 5-year project, which began in January 2019, is being coordinated by Rewilding Portugal, in partnership with Rewilding Europe, Zoo Logical, the University of Aveiro and Associação Transumância e Natureza. These partners bring to the project years of experience working with the Iberian wolf, its prey species and local stakeholders, as well as know-how about communications and nature-based enterprises, which together will allow the partnership to implement the foreseen project actions. The LIFE WolFlux project is also working closely with the Portuguese national authority for the environment, the ICNF (Instituto da Conservação da Natureza e das Florestas), and collaborating with other entities that also work on wolf monitoring and promotion of wild prey (e.g. ACHLI – Iberian Wolf Habitat Conservation Association), as well as entities involved in previous LIFE projects in the region (e.g. Grupo Lobo and ESACB – School of Agriculture of the Polytechnic Institute of Castelo Branco; LIFE Coex and LIFE MedWolf projects) in what concerns damage prevention measures.

2. Intervention Area

The project area includes the current known distribution of the Iberian wolf south of the Douro River, where there are estimated to be from seven to ten wolf packs according to data from 2003 to 2013 (Álvares et al., 2015), of which seven have been confirmed in several studies (Pimenta et al., 2005; Cadete et al., 2015; Palacios et al., 2017; Roque et al., 2017; Torres et al., 2018) (Fig. 2).

The Natura 2000 sites of Montemuro (Fig. 3) and Serras da Freita e Arada cover 35 to 50% of the wolf sub-population (ICNB, 2008). There are also some wolf packs in the centre of the project area that, due to their more central location and breeding stability, can play an important role connecting Montemuro/Freita e Arada with the rest of the Iberian population through the Spanish border. This is extremely important considering that the wolf subpopulation is very isolated genetically, particularly the packs in Cinfães/Freita and Arada (Silva et al., 2018). In the east, the Natura 2000 sites of Douro International and Mal-

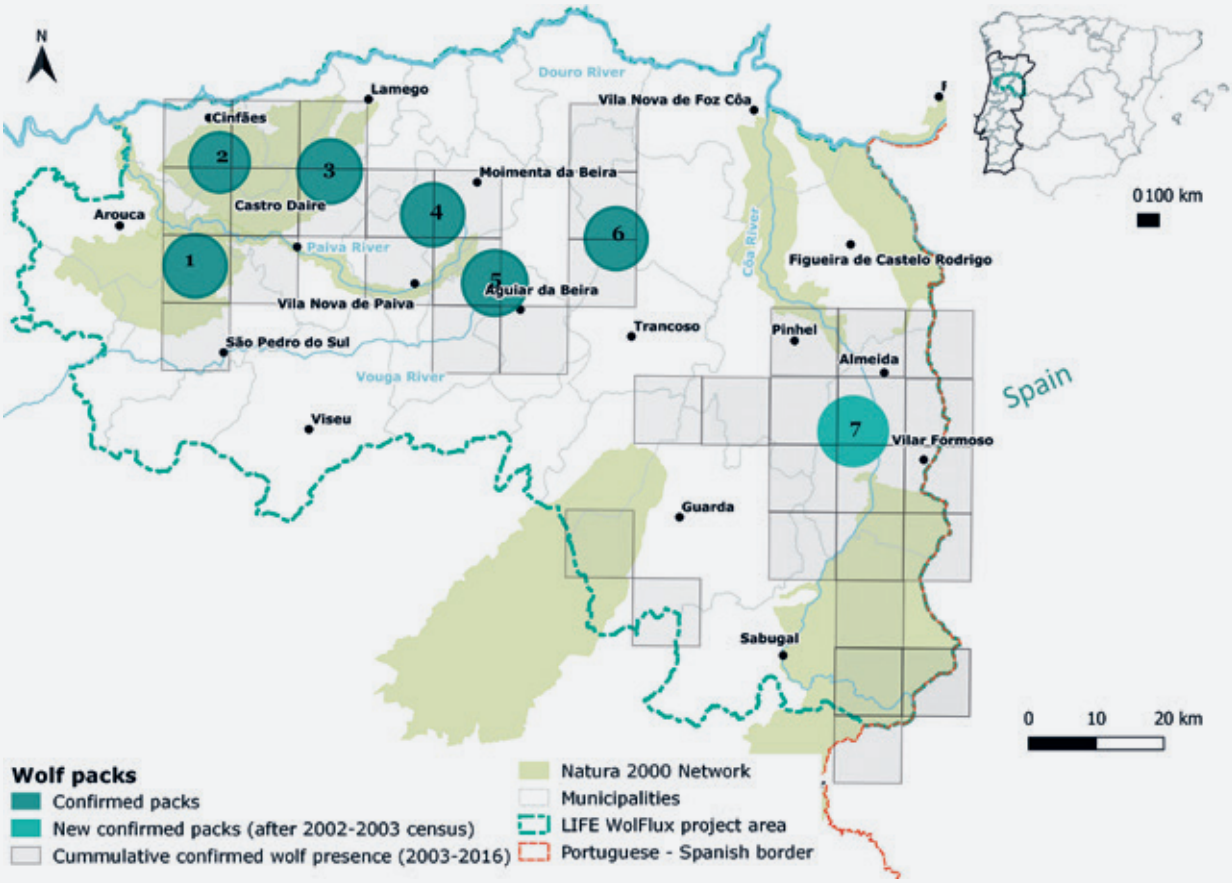

Fig. 2 Location of the project area, confirmed wolf packs from 2002 to 2016 and cumulative wolf presence (10 × 10 km UTM squares) (Sources: Pimenta et al., 2005: Cadete et al., 2015; Palacios et al., 2017; Roque et al., 2017; Torres et al., 2018). Wolf presence has been confirmed throughout the years by different projects with different methods and sampling efforts. The location of the pack territories is approximate and based on Pimenta et al. (2005).

cata, next to the border with Spain, are currently the known limits of wolf distribution. This is a transborder area of more irregular wolf presence (Álvares et al., 2015).

3. Project Actions

During 2019, a set of preparatory actions took place to better understand:

- Wolf distribution, density, genetic flow and feeding ecology through a non-invasive genetic monitoring programme and camera trapping.
- The distribution and abundance of prey species, particularly roe deer (*Capreolus capreolus*), through camera trapping and transects.
- Attitudes towards the wolf and potential social barriers by interviewing key stakeholders on the ground, such as livestock breeders and hunters, among others.
- Recent hotspots of predation, through the analysis of official damage records.

These actions will allow us to compile baseline information for the conservation measures which will be implemented from 2020 onwards. The measures will include:

- Setting up a surveillance team to monitor important areas for Iberian wolves such as rendezvous sites, as well as to strengthen fire prevention monitoring during the summer months.
- Setting up a veterinary team trained in the use of damage preventive measures, consisting of two local vets; working with livestock breeders to deploy 100 livestock guarding dogs (LGDs) in at least 50 livestock holdings and at least ten fences. Fixed metal or electric fences will be used, depending on the type of management, needs and conditions of the terrain. Interventions will be designed with the livestock owners to ensure long-term use and efficacy.
- Restoring habitat for roe deer and carrying out population reinforcements in areas of low density to ensure roe deer are a viable source of food for wolves.

Fig. 3 High grazing areas in Serra de Montemuro, part of the wolf range south of the Douro River. *(Photo: Rewilding Portugal)*

These actions are expected to address the main threats to the long-term viability of the Iberian wolf subpopulation. Additional communication, awareness-raising and enterprise-related actions are foreseen in the project, to ensure local communities are informed about project actions, become better informed about ways to coexist with large predators and also benefit from their presence, improving local rural economies through nature-based enterprises. Specifically, the project will:

- Carry out informative sessions with stakeholders throughout the project area.
- Support the development of wildlife tourism in the area, especially that related to the Iberian wolf.
- Develop a brand that recognises local products benefiting the conservation of wildlife in the region.
- Carry out an environmental education programme in local schools.
- Set up media partnerships to ensure a more balanced narrative about coexistence with Iberian wolves in Portugal.

In addition to these actions, the project team will also seek ways to collaborate with other LIFE projects. Furthermore, the project will try to establish cooperation with Spanish authorities such as the Junta de Castilla y Léon, to promote transboundary cooperation on wolf conservation.

4. Improving damage prevention

Conflict with husbandry is identified as one of the main threats to the wolf in Europe (Boitani, 2018). A characterisation of wolf damage on livestock has been carried out, based on official records from 2012 to 2016, made available by the ICNF, and damage hotspots have been identified (Aliácar, 2019). In this report, areas with the highest incidence of wolf attacks were mapped and priority areas for the implementation of conservation measures were selected (Fig. 4).

Looking at predation occurrence, intensity and economic impact of wolf attacks, there are 17 parishes which have been identified as damage hotspots. Parishes with more than eight attacks per year on average during the period 2012–2016 were considered damage hotspots. In terms of management, this provided a good coverage of parishes within the home ranges of all wolf packs and made possible the identifica-

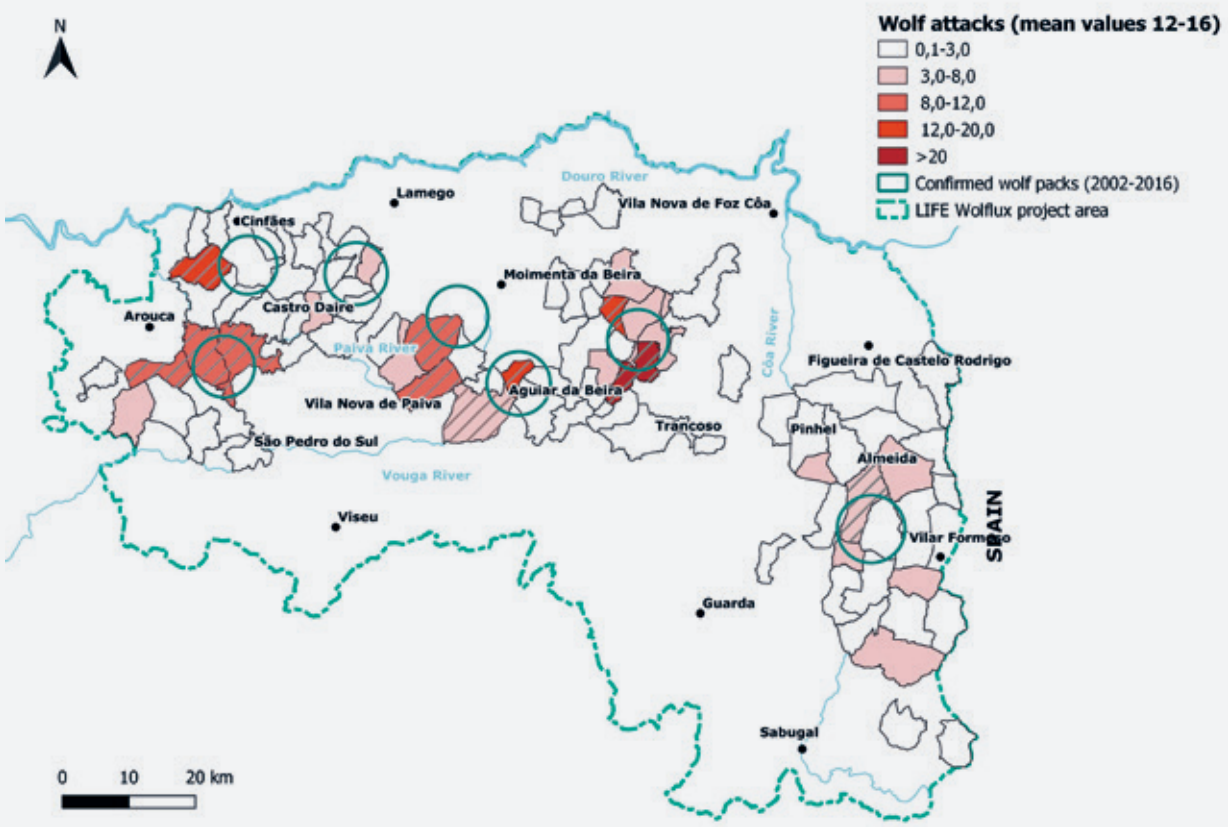

Fig. 4 Wolf predation occurrence per parish in the period from 2012 to 2016. Damage hotspots from 2012 to 2015 are highlighted with cross-hatching. Classes were defined manually. Source of data on damage: ICNF. Sources of data on wolf packs: Pimenta et al. 2005, Cadete et al. 2015, Torres et al. 2016, Roque et al. 2017.

tion of areas with higher risk of predation. Focusing the limited resources of a project on damage hotspots has proven to be an efficient strategy in previous LIFE projects (e.g. LIFE SloWolf – LIFE08 NAT/SLO/244) and it was recommended in a recent study that modelled the risk of wolf predation on livestock in Portugal (Pimenta et al., 2018), which also highlighted some of the same areas as damage hotspots at a national level.

Key actors in parishes with damage hotspots were interviewed in 2019. Key actors, including livestock breeders, were considered to be people who influence management of the area in a way that can affect the wolf and were selected using a non-random approach (based on Lopes-Fernandes et al., 2018). From a total of 53 interviewed livestock breeders, 57% reported having LGDs of native breeds, Estrela Mountain Dog and Castro Laboreiro Dog, or a shepherd (40%) or a combination of both (Aliácar et al., 2020). None of them had fences that protected livestock from wolves. Livestock breeders interviewed managed a total of 5,416 head of livestock: 2,517 sheep, 1,708 cattle and 1,191 goats. For the majority of them (74%, n = 39), breeding livestock was their main economic activity (Aliácar et al., 2020).

The most recent official data available on wolf damages south of the Douro, from 2016–2017, were explored in more detail to understand the baseline situation in the study area before project implementation. The most affected type of livestock was sheep (Fig. 5). Cattle accounted for 10% of attacks but for 35% of compensation payments due to their higher value (average compensation per cow was between 3.4 and 5.6 times higher than for sheep). This high-

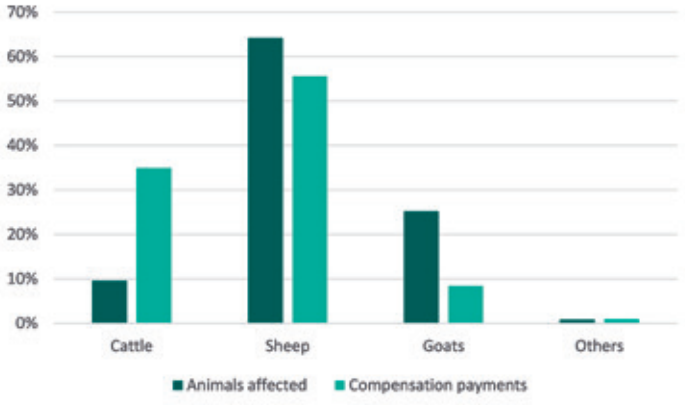

Fig. 5 Wolf predation on different types of livestock in the study area in 2016–2017 as a proportion of the total number of animals affected (1,278) and compensation paid (€183,395). 'Others' includes horses, donkeys and dogs. *Data source: ICNF*

lights the importance of the LIFE WolFlux project increasing the use of damage preventive measures among cattle holdings. For this reason, areas not identified as hotspots but with high economic losses due to current numbers of attacks have also been considered as priorities for project actions.

An adaptive management approach will be adopted when implementing damage prevention measures during the project. In addition to hotspots, other areas may need to be taken into account, for instance areas recently recolonised by wolves. The willingness of local communities to cooperate with the project team is another critical factor when selecting intervention areas.

The project team has already identified 25 breeders of cattle and sheep interested in damage prevention measures in the project area. Interested livestock breeders are identified in a continuous process through several sources of information: the support of the ICNF rangers that are responsible for carrying out damage inspections, through project actions such as interviews (Fig. 6) and through other organisations that work in the area. All livestock breeders are visited in order to assess if they meet the criteria to be supported by the project. These include having suffered wolf attacks within the last five years or being in an

Fig. 6 Interviews were carried out with key actors throughout the project area to understand the reality on the ground.
(Photo: Rewilding Portugal)

area of high risk of predation (areas of irregular wolf presence with intermittent peaks of attacks); that preventive measures can be implemented and are likely to be effective considering the type of management and the problems experienced; and the person is willing and capable of implementing the measures correctly. Other criteria, such as the number of head of livestock or having correctly implemented preventive measures in the past, are also considered.

Priority areas for targeting support include damage hotspots, livestock holdings that suffer chronic attacks, areas where there is an anomalous peak of attacks likely to lead to social conflict and areas of recent wolf recolonisation that are important for increasing connectivity among packs but where damage prevention practices have been lost and it is vital to provide good examples. This last scenario occurs in the border area with Spain where extensive husbandry with cows predominates. In order to amplify and coordinate efforts and benefit from their know-how, the team will also work closely with Grupo Lobo and ESACB, who have vast experience implementing damage preventive measures, particularly working with native breeds of LGDs and permanent metal/electric fences. Their technicians will provide consultancy to the project team and training for staff and veterinaries involved in the LIFE WolFlux project, as an exchange of experience between LIFE projects.

Fig. 7 A juvenile male short-hair Estrela Mountain Dog guarding his sheep flock in the Montemuro Mountains.
(Photo: Rewilding Portugal)

A veterinary team has already been created, with two vets responsible for integrating LGD pups into flocks in Guarda and Viseu districts and monitoring their physical and behavioural development. Food and veterinary care are provided until the age of 18 months. Monitoring of behaviour will be more regular during this period, but close contact with farmers will continue until the end of the project. Three Estrela Mountain Dog pups have already been placed (Fig. 7): two with sheep flocks for meat production

Fig. 8 Male short-hair Serra da Estrela Mountain Dog pup placed with a sheep flock in the Pinhel region by the LIFE WolFlux project. *(Photo: João Cosme)*

that are also watched over by a shepherd inside fenced pastures or in the mountains and one with a herd of 52 cows that in summer grazes freely in the mountains during the day accompanied by two other guarding dogs and confined in a fence at night and in winter grazes in lower-lying pastures closer to the village and kept in stables at night. All livestock holdings have had damage in the past seven years and are in areas of high predation risk.

Pups came from working parents and were microchipped, vaccinated, dewormed and donated after weaning (at 2–3 months old). An agreement was signed with the livestock owners establishing conditions for their upbringing and welfare, as well as the responsibilities of the project team and of the livestock owners to ensure that conditions are in place for the pups to become good guardians. Whenever possible, dogs will be filmed during monitoring visits to record their behaviour in order to better assess their behavioural development, while providing relevant material for training and information actions planned for vets, technicians and farmers. These videos, about LGD behaviour, common problems and how to solve them, will be included in an online library to disseminate the knowledge gathered.

The project expects to reduce wolf attacks suffered by farmers who choose to implement damage preventive measures and will work closely with participating farmers to find the best solutions for each particular case. It is also expected to contribute to the dissemination and greater establishment of the use of adequate prevention measures (i.e. well-raised and protective LGDs, well-built and maintained fences), expanding and reinforcing the work developed in previous LIFE projects, and currently being done by Grupo Lobo in a few overlapping areas. Working closely with livestock breeders to address their specific problems and providing the necessary technical support will build trust with the project team, which is fundamental for successful implementation of the measures and to mitigate conflicts with wolves.

Ultimately, the long-term viability of the Iberian wolf south of the Douro River will depend on three critical aspects: the availability of suitable habitat and wild prey; social acceptance by local communities (which in turn requires the effective deployment and maintenance of damage preventive measures); and transboundary cooperation with Spain, to improve the genetic connectivity between Spanish and Portuguese packs in this region.

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