LIFE WOLFALPS EU

Action D2

Assessment of socio-economic impact
of the project and ecosystem functions

LIFE18 NAT/IT/000972 - LIFE WolfAlps EU
"Coordinated actions to improve wolf-human coexistence at the alpine population level"
Action D2

TECHNICAL REPORT
Final assessment featuring the socio-economic and biological background analysis of project areas compared to the project goals (Updated Version)

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List of abbreviations
LWA= LIFE WolfAlps
LWA EU= LIFE WolfAlps EU
IT=Italy
AT=Austria
F=France
SI=Slovenia
/=No data available
BP= Baseline situation is the beginning of the project

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Introduction

Regular monitoring of LIFE project outcomes is essential to assess the impact of Conservation Actions on the territories, using outcome indicators defined at the project level and those established in the multiannual work program.

This action is intended to evaluate the effectiveness and success of the project efforts in enhancing the ecosystem, as well as the well-being of local wolf populations, the economy, and social welfare within the project area. The primary objective of the LWA EU project is to enhance wolf-human coexistence across the alpine population, collaborating with 20 partners across four alpine countries (Fig.1).

The following list displays the primary expected results and impacts included at the beginning of the project. Most of these expected results were far exceeded:

- Establishment of **5 international alpine working groups**: a technical, a scientific, a communication, an administrative and a policy committee with at least one member per partner and country.
- Define **common methodologies and criteria** to enable efficient transboundary wolf monitoring and conservation at population level.
- Create at least **24 "Wolf Prevention Intervention Unit - WPIU**", with at least 812 WPIU intervention over the Alps.
- Adequate **training for wardens and other technicians** in techniques of wolf surveillance (88 workshops for at least 2000 trained operators), anti-poaching, assessment of damage to livestock and damage prevention (at least 26 WPIU trainings).
- Capture of at least **2 detected hybrids** and recover of at least **2 injured wolves**.
- **Decrease wolf depredations by 70%** where attacks occurred in wolf presence areas, and implementation of preventive measures by WPIU.
- Use of **damage prevention methods by at least 80%** of the farmers involved in the preventive measure action.
- Formation of at least **7 new anti-poisoning dog units**, and maintenance of 5 dogs from LWA.
- Overall **reduction of wolf mortality rate due to poisoning** is expected to be at least 20% in identified "hot spot" areas.
- **Develop wolf eco-tourism** with at least 16 new wolf-friendly products, 8 wolf-friendly ecotourism packages, 64 wolf-friendly ecotourism events.
- Develop **first guidelines** for responsible wolf-tourism.
- Involve at least **5.000 kids in the Life Alpine Young Ranger Program** and set up an international network of at least 29 Alpine Protected Areas adhering to the Program.

- Conduct **4 local predator-prey-hunter evaluations** with at least 1 radio-collared wolf and 10 radio-collared prey each.
- Establish at least **11 platforms of discussion among Institutions and stakeholders**, at least one per country.
- **Increase the knowledge and attitude scores of stakeholders**, in particular hunters, local inhabitants, public opinion and schools by at least 15% from the first poll.
- **Increase the number of positive media reports** on wolves by at least 10%.
- **Collect at least 1000 items for an international Alpine Wolf press review** and publish at least 50 project news items.
- **Stop conflict rate growing in general public** over the years and reduce by 30% in the selected conflict hotspots.
- **Consider spatial requirements of wolves in environmental impact assessment studies**, protecting key areas for reproduction, in at least 29 Natura 2000 sites, considering the EIA Guidelines.
- **Decrease wolf traffic mortality** through mitigation measures on traffic routes in identified sink areas (Val Susa, Italy) for at least 50% on mitigated road and railway sections.
- **Involve at least 3000 schoolchildren in the 4 countries** in kids' education actions and train at least 300 new project ambassadors.

Fig. 1. LWA EU project area

Methods

Choice of indicators

To measure the impact of the project's actions and ecosystem functions in the project areas, 3 different typologies of indicators were established: social, economic and bioecological. These indicators needed to be measured each year of the project to analyze temporal variations of the selected variables. Bioecological indicators focus on the conservation status of wolves in the project area and consider the estimation of primary population parameters within the framework of the project's conservation actions. Besides the monitoring program, indicators were collected across a broad spectrum of conservation measures designed to enhance population viability through habitat protection, transboundary monitoring, road safety interventions, and anti-poaching initiatives. Since it is not sufficient to work on the ecological evidence to solve the societal challenge of coexistence with predators, both scientific and socio-economic evaluations are considered. The inclusion of social and economic aspects in biodiversity conservation has been widely advocated by both conservation biologists and economists to provide policy makers with the necessary tools to evaluate different decisions and to share the project results with the community of residents, and stakeholders. According to the project goals, the economic indicator can be divided into the three priority areas: 1) Damage prevention; 2) Economic growth; 3) Jobs created. From a social point of view, human-wolf conflict is widespread across the Alps, and therefore the acquisition of an understanding of the values and concerns of the community is an important first step in developing a sociological impact assessment. This analysis will allow the understanding of the perception of community members on how the LWA EU project will affect their lives. A critical analysis of the factors contributing to current knowledge and social acceptance is essential to support any future decision on how to proceed with the development and protection of the project areas. Following the indications of LIFE projects for qualitative and quantitative outcome indicators at project level, three priority areas were selected: 1) capacity building; 2) governance; 3) communication, dissemination, awareness rising.

A total of 87 indicators have been finally selected (Tab. 1)

Tab 1. Final list of indicators used for the D2 impact assessment

Indicator descriptor		Measurement unit
Bio-ecological	Areas progressing towards improvement	no. of Natura 2000
	Areas progressing towards improvement	km of high-risk roads rendered safe
	Wolves or prey equipped with GPS collars in the project area	no. of wolves or prey equipped
	Wolf mortality rate caused by traffic accidents in areas with mitigation measures	no. of dead individuals on mitigated road sections
	Increase in the number of wolf packs	no. of packs
	Increase in wolf distribution area	km^2
	Wolf mortality caused by poaching and poisoning	no. of poached/poisoned individuals found
	Dog units' interventions against illegal killing and poisoning	no. of interventions
	Number of hybrids captured and managed	no. of hybrids
	Number of injured animals captured and managed (This indicator only concerns ITALY)	no. of injured animals
Economic	Wolf friendly products	no. of products
	Producer of wolf friendly products	no. of producer
	Wolf friendly eco-tourism packages	no. of packages
	Estimated revenues from wolf friendly products	revenue in €
	Market size in the number of customers participating in wolf-friendly ecotourism events	no. of customers/tourists
	Operators receiving revenues from wolf friendly eco-tourism packages	no. of operators
	Replication of LIFE Alpine Young Ranger Wolf Program during the project period	no. of LAYR replication
	Jobs (please count permanent and additional staff)	no. of FTE
	Livestock protected by WPIU interventions	no. of livestock
	WPIU interventions over the project area	no. of WPIU interventions
	Wolf depredations after WPIU interventions	no. of wolf depredations
	Fence sets distributed in the project areas by WPIU	no. of fences

	Total material costs at WPIU interventions (cost for fences and/or guardian dogs distributed by LWA EU)	total expenditure in Euro
	Livestock killed after WPIU intervention	no. of livestock killed
	Total project related expenditure during the project period	total expenditure in Euro
	Capital expenditures to acquire equipment for setting up project actions	capital expenditures in Euro
	Guarding dogs distributed in the project areas	no. of guardian dogs
	Wolf friendly eco-tourism events	no. of events
	Persons employed in activities related wolf friendly eco-tourism packages	no. of person
Social	Training courses or workshops for operators and professionals	no. of courses/workshops organized
	Operator and professionals trained in courses or workshops to contribute to the project actions and output continuation	no. of operators trained
	Kids involved in the Life Alpine Young Ranger Program	no. of kids
	Nature guides and tourist operators trained to conduct eco-tourism events	no. of guides/operators
	Protocols/guidelines published within the project for national and international use	no. of documents
	Volunteers and interns involved in the project actions	no. of person involved in the organization
	Children involved in education actions (nursery and primary school)	no. of children
	Children involved in education actions (secondary school)	no. of children
	Students in higher education (university) involved in education actions	no. of students
	Views of the project video	no. of views
	Unique visits to the website	no. of unique visits
	Visit duration on website	average of minutes spent on website
	Downloads from project website	no. of downloads
	Likes on Facebook page	no. of likes
	Publications concerning wolves and project activities (leaflet, brochure…)	no. of publications
	Project videos	no. of videos
	Newsletter subscriptions	no. of subscription

	Public events/exhibitions	no. of events
	Participants/visitors at public events or exhibitions organized by the project	no. of participants
	Project stewards	no. of stewards
	Articles or intervention in the media about the project (newspaper, radio, tv…)	no. of interventions
	Positive media reports on wolves	% positive reports
	Scientific publications, presentations at conferences	no. of appearances
	Entities/decision makers/duty holders involved (RFI…)	no. of entities involved
	Hunters involved in the predator prey evaluation in all project areas A4	no. of hunters involved
	Hunters involved in the predator prey evaluation in all project areas C3	no. of hunters involved
	Networking with other projects for exchange of knowledge and experience	no. of projects contacted for exchange
	Farmers assisted by the WPIU intervention teams	no. of farmers
	WPIU trained and established	no. of WPIU
	Attitude about/toward wolves among the general public	% positive responses
	Fear toward wolves among the general public	% of responses indicating fear
	Knowledge about wolves among the general public	% of responses
	Attitude about/toward wolves among person working in tourism	% positive responses
	Fear toward wolves among person working in tourism	% of responses indicating fear
	Knowledge about wolves among person working in tourism	% of responses
	Attitude about/toward wolves among hunters	% positive responses
	Fear toward wolves among hunters	% of responses indicating fear
	Knowledge about wolves among hunters	% of responses
	Attitude about/toward wolves among farmers	% positive responses
	Fear toward wolves among farmers	% of responses indicating fear
	Knowledge about wolves among farmers	% of responses
	Attitude about/toward wolves among environmentalists	% positive responses

	Fear toward wolves among environmentalists	% of responses indicating fear
	Knowledge about wolves among environmentalists	% of responses
	Attitude about/toward wolves among education professionals	% positive responses
	Fear toward wolves among education professionals	% of responses indicating fear
	Knowledge about wolves among education professionals	% of responses
	Attitude about/toward wolves among journalists	% positive responses
	Fear toward wolves among journalists	% of responses indicating fear
	Knowledge about wolves among journalists	% of responses
	Participants at stakeholder platforms	no. of participants
	Potential actions elaborated within the platform for an improved and more widely accepted management of wolves	no. of potential actions elaborated
	Ambassadors' teachers trained	no. of ambassadors trained
	Antipoisoning dog units	no. of dog units
	Project press releases produced and released by the partners	no. of press releases
	Additional project supporters	no. of supporters
	Number of discrete Project Reports drafted	no. of reports
	Person involved in the international Alpine wolf population working group	no. of person involved

Data collection and analysis

To set the baseline at the beginning of the project, an ex-ante assessment report has been conducted featuring the socio-economic and biological background analysis of the project areas related to the indicators defined in the first year of the project. This data has been used to compare the situation before, during and at the end of the project and to estimate the projects' impacts (see Annex 1).

Each indicator was linked to one or more actions and every partner designated at least one person responsible for collecting data annually for the activities they were responsible for. Each partner was required to submit the data for the previous calendar year by February 28. To support this process, special forms were provided for the annual collection of indicators (Fig. 2), along with multiple spreadsheets accessible in the Action Plan. The collected data were then compiled into a single table and analyzed to assess the potential effects of the project (see Annex 2). Certain actions extended over multiple years, incorporating extensive datasets provided by numerous partners for a single indicator. To mitigate the risks of double-counting or omitting data—particularly data generated or reported at year-end—some indicators were reported as a single aggregated value at the conclusion of the project, rather than as annual figures.

As the leader of the related action, please provide the requested data for the **WHOLE** project area and the **WHOLE** action

Indicator descriptor	Related action(s)	Measurement unit	Project period 01.09.2019 - 31.12.2020
Children involved in education actions (nursery and primary school)	E4	no. of children	
Children involved in education actions (secondary school)	E4	no. of children	
Students in higher education (university) involved in education actions	E4	no. of students	
Views of the project video	E1.2	no. of views	
Unique visits to the website	E1.2	no. of unique visits	
Visit duration on website	E1.2	Average of minutes spent on website	
Downloads from project website	E1.2	no. of downloads	
Likes on Facebook page	E1.2	no. of likes	
Publications concerning wolves and project activities (leaflet, broschure...)	E1.2	no. of publications	
Project videos	E1.2	no. of videos	
Newsletter subscriptions	E1.2	no. of subscription	
Public events/exhibitions	E1.2, E5, E6	no. of events	
Participants/visitors at public events or exhibitions organized by the project	E1.2, E5, E6	no. of participants	
Articles or intervention in the media about the project (newspaper, radio, tv,...)	E2.2	no. of interventions	
Positive media reports on wolves	E2.2	% positive reports	
Ambassadors teachers trained	E4	no. of ambassadors trained	
Networking with other projects for exchange of knowledge and experience	E1.3	no. of projects contacted for exchange	

Please provide the requested data related to the LIFEWolfALPS Eu project for **YOUR** organisation only

Indicator descriptor	Measurement unit	Project period 01.01.2022-31.12.2022	Comment
Jobs (please count permanent and additional staff)	No. of FTE (FTE consider 8 hours per day as equivalent to one full working day, and 220 full working days per year as		Example: if you have 1 permanent staff working on the project with 40% and one additional staff with 100%, the FTE is 0.4+1= 1.4 FTE
Volunteers and interns involved in the project actions	no. of person involved in YOUR organization		

Fig 2. Example of a data collection template

Adjustments

During the project, several adjustments were made to accommodate changes in action implementation, incorporate newly available data collection opportunities, and support the collection of KPI indicators (see Tab. 2). The milestone titled "Definition of the indicators to evaluate the impact of the project on the socio-economic situation" includes the indicators established in 2020. The deliverable, "Report: ex-ante assessment featuring the socio-economic and biological background analysis of project areas compared to the project goals" (Annex 1), considered all changes made between 2020 and 2022, except four indicators deleted later.

These adjustments have improved data quality and enhanced the ability to present the project's outcomes transparently and openly.

*Tab 2. Adjustments to the indicators were made in the first two years of the project to enhance the quality of the impact assessment. *Deleted 2024, change not considered in the Deliverable Ex-Ante Report*

Indicator description	Modification	Justification
Farmers assisted by the project action C1	Added	Increase quality of KPI indicators
Children involved in education actions (nursery and primary school)	Added	Increase quality of KPI indicators
Children involved in education actions (secondary school)	Added	Increase quality of KPI indicators
Total installation costs for prevention measures distributed during the project (delivery costs, advising hours)	Added	Increase quality of KPI indicators
Senior expert operators and professionals contributing to the project actions (COUNTED ONLY IN 2021)	Added	Increase quality of KPI indicators
Project videos	Added	Increase quality of impact assessment
Attitude about/toward wolves among journalists	Added	Increase quality of impact assessment
Fear toward wolves among journalists	Added	Increase quality of impact assessment
Knowledge about wolves among journalists	Added	Increase quality of impact assessment
Nature guides and tourist operators trained to conduct eco-tourism events	Added	Increase quality of impact assessment
Additional project supporters, requests to participate in project actions (stewards)	Modified Indicator “stewards/supporters” was split into 2 indicators	Increase quality of impact assessment
Additional project supporters	Modified Indicator “stewards/supporters” was split into 2 indicators	Increase quality of impact assessment
Volunteers and interns involved in the project actions	Modified Indicator “Volunteers, students, interns involved in the project actions” was split into 2 indicators	Increase quality of KPI indicators
Students in higher education (university) involved in education actions	Modified Indicator “Volunteers, students, interns involved in the project actions” was split into 2 indicators	Increase quality of KPI indicators
Publications concerning wolves and project activities (leaflet, brochures…)	Modified Indicator “Publications concerning wolves and project activities” was split into 2 indicators In 2020 leaflets, brochures and videos collected together, in 2021 data for videos collected separately	Increase quality of impact assessment
Estimated revenues from wolf friendly eco-tourism packages	Modified New indicator “Operators receiving revenues from wolf friendly eco-tourism packages”	Original assessment was not possible due to privacy concerns

Total cost of damages reimbursed by public bodies to breeders using livestock protection from the LWA EU project	Deleted	Assessment was not possible due to privacy concerns and the reluctance of farmers to share data
Direct economic loss/wolf attack in the project area using WPIU	Deleted	Assessment was not possible due to privacy concerns and the reluctance of farmers to share data
Number of wolf territories	Deleted	Technical limitations in data collection
Number of wolves reproductions recorded annually	Deleted	Technical limitations in data collection
Health status and sanitary conditions of population	Deleted	Technical limitations in data collection
Inbreeding decrease in the Central Alps part of the population	Deleted	Technical limitations in data collection
Level of connectivity with the Dinaric, Central European and Apennine population measures with genetic samples	Deleted	Technical limitations in data collection
Number of non-invasive genetic samples collected	Deleted	Technical limitations in data collection
Number of simultaneously inspected sites via camera-trapping in Slovenia, Italy, France and Austria (ITALIA)	Deleted	Technical limitations in data collection
Profits from selling wolf friendly products in proportion to economic losses in wolf attack*	Deleted	The wolf-friendly label was expanded beyond breeders to include professionals in commerce and tourism. As a result, quantifying losses and prevention investments became unfeasible, making the indicators irrelevant and eliminating them.
Profits from selling wolf friendly products in proportion to expenses for prevention measures*		
Effectiveness of eco-tourism packages to increase the ecological knowledge of participants*	Deleted	Questionnaires to assess the treks' impact were scrapped after professionals warned they could harm the experience. With delays from the Covid-19 pandemic, the team chose to avoid adding further challenges.
Overnight stays in areas with wolf friendly eco-tourism packages	Deleted	Assessment was not possible due to privacy concerns
Improved wildlife hunters' management plans for management of key wolves' prey species*	Deleted	Implementation one focus in the After LIFE
Change in attitude in ambassador teacher trained	Deleted	Technical limitations in data collection
Effectiveness of training for ambassador teachers on knowledge level	Deleted	Technical limitations in data collection
Quality/Sufficiency of skills trained to the teachers and nature guides	Deleted	Technical limitations in data collection

Results

The following sub-chapters will explore the key impacts of the LWA EU project at the bio-ecological, economic, and social levels. A comprehensive list of indicators and their corresponding data can be found in Annex 2.

Bio-ecological impact

The LWA EU project incorporates an integrative approach to the conservation of the wolf population in the Alps, reflecting a comprehensive understanding of ecological dynamics and anthropogenic impacts. Besides the transboundary monitoring program, the project encapsulates a broad spectrum of conservation measures designed to enhance the population viability through habitat protection, transboundary monitoring, road safety interventions, and anti-poaching initiatives.

Monitoring the success of the wolf conservation actions Monitoring the presence of wolves in the Alps has seen a notable increase over the past 25 years, with their distribution expanding from west to east across the region. To manage and conserve this species effectively in such a transboundary landscape, Action C4 of the LWA EU project focused on implementing a comprehensive and standardized monitoring system. This monitoring initiative, developed with strategies from Action A5, aimed to cover the entire Alpine range. It addressed the challenges posed by the wolves' extensive territories and cross-border movements, aligning with the European Commission's guidelines for large carnivore management. The two indicators, "Increase in the number of wolf packs" and "Expansion of the wolf distribution area," served as reference points for assessing the development of the wolf population across the transnational Alpine region. The indicator "Increase in number of wolf packs" was only assessed in the first year of the project, after which only the wolves' distribution areas were calculated, as the number of packs was high and difficult to count. More information can be found in the Final Report of Action C4 (not available at the moment of writing this report).

Tab 3. Wolf distribution area in the Alps over the course of the project. The occupied range on a national level was calculated by intersecting the grids of the TOTAL range in the territory of the individual countries, so the sum of the various occupied areas on a national level does NOT correspond to the total ALPS RANGE

	2020/2021	2021/2022	2022/2023	2023/2024
Range Italian Alps	36200	40600	47400	50400
Range French Alps	35800	39800	41700	42500
Range Austrian Alps	7100	9100	11300	15900
Range Slovene Alps	4300	3500	5100	3200
Range Alps TOTAL	91000	100300	113400	120300

The coordinated monitoring efforts have provided a robust framework for understanding and managing the Alpine wolf population. In Italy, the monitoring program continued from the previous LWA project, with seasonal surveillance sessions organized across key regions. These sessions were designed to provide detailed

insights into the wolf population's presence and movements, coordinated by the Centro Grandi Carnivori at the Ente di Gestione delle Aree Protette delle Alpi Marittime. France conducted its surveillance through a national network of operators, employing both systematic and opportunistic sampling methods. This approach ensured comprehensive coverage across the French Alps, capturing data on wolf distribution and population health. In Slovenia, systematic monitoring was established using data from various sources, such as predation events and direct observations, to identify potential wolf presence areas. Field teams performed snow-tracking and genetic sampling, including testing a new High-Throughput Sequencing (HTS) protocol for enhanced genetic analysis. Austria coordinated its wolf surveillance through the https://www.vetmeduni.ac.at/en/Veterinary Medicine University Vienna, focusing on opportunistic genetic sampling and public reports. The collection of genetic material from wildlife and livestock kills, along with other non-invasive sources, contributed to understanding the distribution and status of wolves in the Austrian Alps.

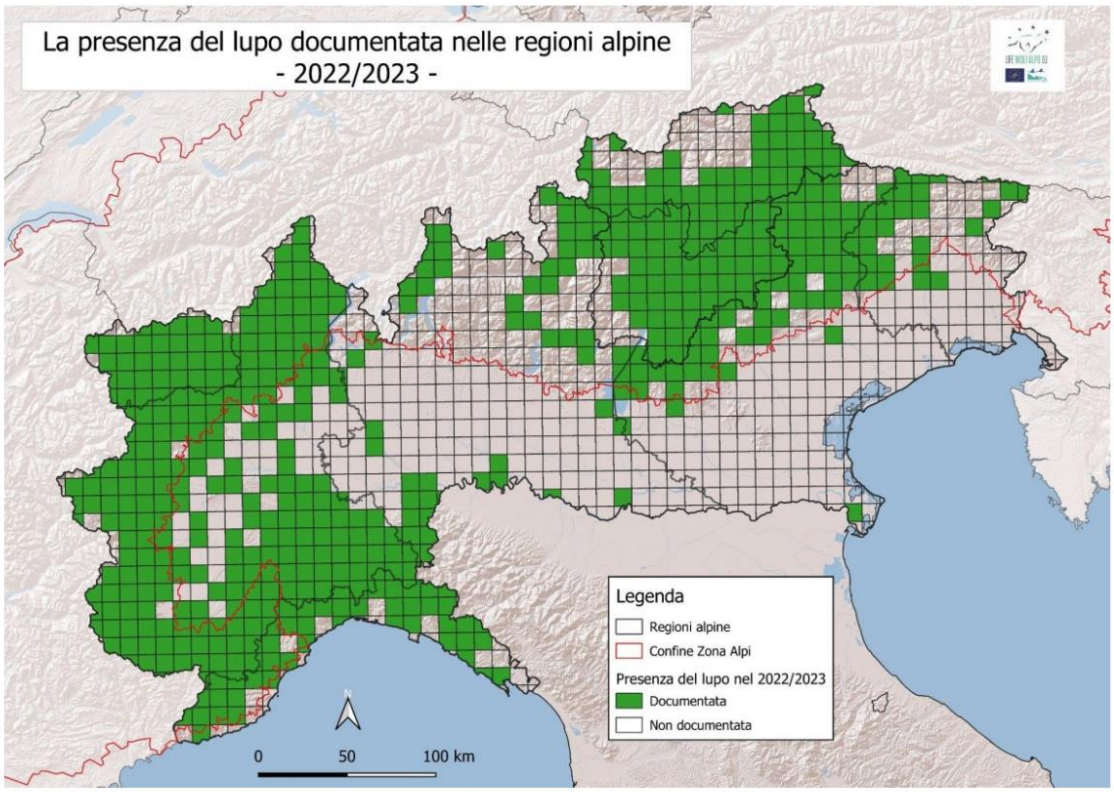

Figura 2. Distribuzione del lupo documentata nelle regioni alpine nel 2022/2023, rappresentato come range minimo occupato dalla specie sulla base dei dati raccolti durante l'anno biologico (1° maggio 2022 – 30 aprile 2023). È evidenziato il confine in rosso della zona Alpi, rappresentata dal range della Convenzione delle Alpi.

Fig 3. Distribution map produced within the LWA EU project (update will follow for 2023-24 in the C4 Final Report)

The final report from Action C4 (2020-2024 INTERNATIONAL ALPINE FINAL report on the trend of the alpine wolf population status) will offer detailed figures and trends, further elucidating the success of this international surveillance system and its impact on wolf conservation in the Alps. For an in-depth analysis of wolf population dynamics, we therefore refer to the final report of Action C4.

Nature, Species and Biodiversity The return of wolves to the Alps has introduced significant conflicts with human activities, particularly livestock farming, as farmers have raised concerns about livestock predation by wolves. This has led to debates on coexistence strategies and compensation schemes. Additionally, hunters have expressed concerns over competition for prey. To address these complexities, Action C3 of the LWA EU project was designed to investigate the intricate interactions between wolves, ungulates, and humans. Action C3 was designed to evaluate the predation pressure exerted by wolves on wildlife and domestic animals, incorporating human practices such as hunting through a collaborative approach with hunters (Fig. 4). Throughout the project period, three wolves, 20 red deer and 37 roe deer were equipped with GPS collars. This tracking data offered valuable insights into predator-prey dynamics and spatial behavior of tracked animals.

Fig 4: Fitting a telemetry collar to a physically immobilized and blindfolded roe deer (Pagon N., Črtalič J., Simčič G., Pičulin A., Rot A., Kljun F., Vovk J., Potočnik H., Černe R. (2024): Study on the relationships between predators, prey and human activities in the Alps – Local report for Jelovica study area, Slovenia. Technical report, Action C3, Project LIFE18 NAT/IT/000972 - LIFE WolfAlps EU)

The involvement of 714 hunters in this study was instrumental in having a better comprehension of the predator-prey dynamics and developing updated management plans. Overall, the integration of GPS tracking data with stakeholder involvement has proven effective in understanding and managing the impacts of predation on wildlife. This approach not only enhances the accuracy of management recommendations but

also fosters stronger partnerships between conservationists and hunters.
For a thorough analysis and the results of action C3, please refer to the C3 final report and the relevant scientific paper. At the time of writing this report, the paper was still being published.

Areas progressing towards improvement Environmental benefits by tackling Nature2000 areas were connected to the outcomes of Action C6, dealing with the Threat "Habitat fragmentation" where the “Handbook of Environmental Impact Assessment Guidelines for wolf conservation” (Deliverable action C6.2) has been addressed to managers in land planning, development and management: it was created as a practical handbook to promote wolf conservation through the implementation of best practices for preserving the wolf ecological needs, particularly during the breeding season in compliance with European Dispositions and scientific knowledge on the ecology of the species. The application of these guidelines to spatial planning can yield broader ecological benefits both within and beyond the Natura 2000 Network, as the wolf serves as an "umbrella species,' supporting overall biodiversity conservation. Over the course of the project, the handbook "LINEE GUIDA PER INTEGRARE LA CONSERVAZIONE DEL LUPO NELLA PIANIFICAZIONE E NELLO SVILUPPO DEL TERRITORIO" was developed and presented to the managing entities reaching a total of 121 Natura 2000 sites in Piedmont, 110 in Lombardy and 36 sites between Valle D’Aosta and Liguria. The handbook was accepted by the managing entities as a valuable tool for the conservation of habitats essential for wolf reproduction and as a reliable reference for environmental impact assessments (it. VIA) and the identification of measures for site-specific conservation actions. This initiative builds directly on the previous LWA project, expanding and refining its scope to cover additional territories. As a result, the recommendations of the LWA EU handbook now serve as a reference for a total of 267 new Natura 2000 sites.

Road Safety Interventions and Mortality Reduction
Road and railway infrastructure significantly impacts wildlife populations by fragmenting habitats and increasing mortality due to vehicular collisions. This issue is particularly pronounced in the Alta Val di Susa, Torino, Italy, where the dense human population and heavy traffic from routes such as the Frejus A32 motorway, the Turin-Modane railway line, and the national roads 24 and 335, pose a significant threat to wolves and other wildlife (Fig. 5). The region, rich in wild ungulates and forests, is a highly attractive habitat for wolves, but the high rate of vehicular accidents turns it into a "sink" area, where wolf mortality is disproportionally high. To address this, Action C6 targeted reducing road-related wolf mortality and improving habitat connectivity. The Action C6.1 aimed at analyzing the overlap between wolf distribution and human activities, which requires a management policy based on sustainable compromise, dialogue and cooperation among all stakeholders as well as on the application of good practices to preserve the integrity of wolf breeding-site habitats.
Key measures in Chiomonte included the installation of 750 meters directing wolves toward safe crossing points combined with the improvement of 2 multifunction underpasses, rendering 2,5km of railway lines safe. While in Salbertrand substantial interventions could not be feasible (e.g. 3,000 meters of fencing could not be installed within the project period), two aligned underpasses were identified in Oulx, one on the railway and one on the highway. After clearing obstructive materials and installing fences for preventing wildlife access to the highway, wolves began to use these crossings, thereby enhancing ecological permeability and facilitating safe passages along 2 km of railway and 2 km of highway. In addition to physical barriers, 13 kilometers of blue roadside reflectors were installed in 2024 to reduce collisions (unfortunately, the effectiveness of this measure couldn’t be assessed in the project timeframe because implemented in the

summer 2024) A local awareness campaign was also conducted alongside the installation of road signs. Driver surveys conducted before and after these measures revealed that variable message boards had a stronger impact on changing driver behavior than fixed signs. The campaign successfully increased driver attention and reduced driving speeds, contributing to safer conditions for wildlife.

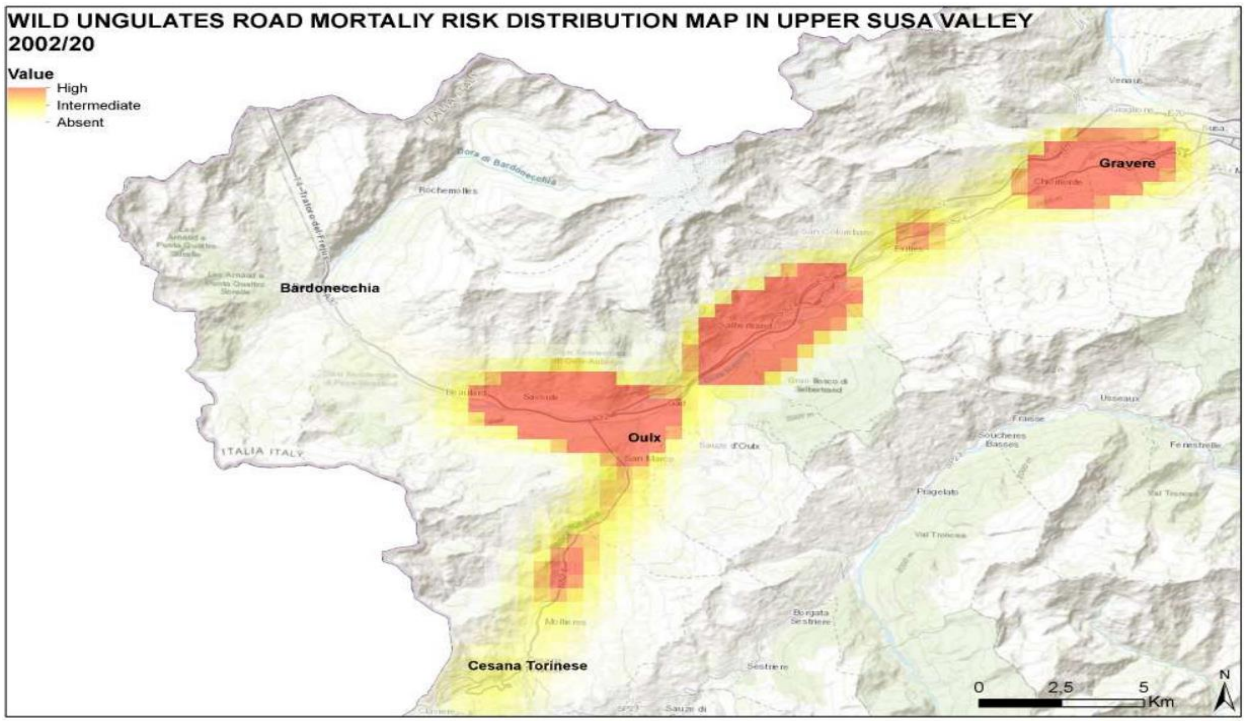

Fig 5: Wild ungulates road mortality risk distribution Map in upper Susa Valley P. Bertotto, P. Violino, F. Toso, M. Pavesi, S. Perrone, E. Eynard, E. Avanzinelli, F. Marucco (2020). Evaluation of previous studies and new data collected to identify corridors used by wolf in Susa Valley. Technical report, Progetto LIFE18 NAT/IT/000972 WOLFALPS EU – Action C6.

Though some interventions, like roadside reflectors, are debated in terms of effectiveness, the overall efforts have led to a notable decrease in wolf fatalities and an ecological improvement of 19,5 km of roads and railway line in the target area, to be monitored and confirmed in next years. Detailed results of this action can be found in E. Ramassa, P. Bertotto, E. Massobrio, L. Giunti, M. Rosso, N. Faure, M. De Biaggi, L. Scillitani, D.S. Perrone (2024) Report on the evaluation of effectiveness of mitigation measures implemented to prevent traffic related wolf mortality in sink areas. Technical report for LWA EU project LIFE18 NAT/IT/000972, Action D3.

Collaborations with roads, highway and railway authorities ensured strategic planning based on identified wildlife corridors, which helped inform targeted interventions. These measures not only benefit wolves but also serve a broader ecological purpose. By focusing on habitat connectivity and reducing road mortality, the project supported a wide range of species in the addressed high-risk areas.

Anti-Poaching and Poisoning Countermeasures Addressing poaching and poisoning has been a critical focus of the project, with substantial efforts dedicated to mitigating these threats through various interventions. Over the course of the project, 1218 interventions by Anti-Poaching dog units were conducted to combat

illegal killing and poisoning. These Anti-Poising dog units were already trained in the previous LWA project, and the activity was further expanded in the LWA EU project (Fig.6). Wolf mortality from poaching and poisoning remains a critical and ongoing issue. From 2019 to October 2024, a total of 58 wolves were reported as victims of these illegal activities. Annual reports show a consistent toll, with 6, 9, 10, 26 and 7 wolves affected in each respective year. Notably, 35 confirmed poisoning deaths occurred in Liguria and Piemonte alone, where toxic substances such as Brodifacoum and Bromadiolone were frequently identified as causes (Col. Giancarlo Papitto, App.Sc.Q.S. Claudia Cindolo (2024). Documented list, description and quantification of interventions of the Anti-Poisoning Dog Units. Action C2. deliverable to LIFE 18 NAT/IT/000972 WolfAlps EU project. September 2024, First Version). These numbers underscore the ongoing challenge of illegal activities affecting wolf populations. The steady presence of such incidents emphasizes the need for continuous vigilance and adaptive countermeasures to effectively protect and conserve the wolf population.

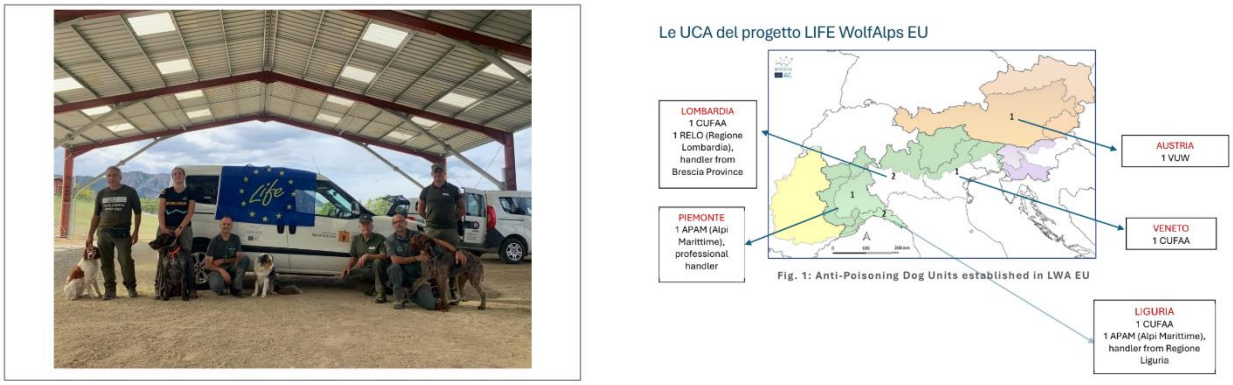

Fig 6: Left: Training Session with the expert trainer Roberta Bottaro. Coordination in training and field interventions among Anti-Poisoning dog units of different Institutions (Source: Aree Protette Alpe Marittime). Right: Location of the seven new Anti-Poisoning dog units established in the LWA EU project (Col. Giancarlo Papitto, App.Sc.Q.S. Claudia Cindolo (2024). Documented list, description and quantification of interventions of the Anti-Poisoning Dog Units. Action C2. deliverable to LIFE 18 NAT/IT/000972 WolfAlps EU project.September 2024, First Version)

Management of Hybrids and Injured Animals Throughout the project, significant efforts were dedicated to managing the genetic integrity and health of the wolf population. Four hybrid packs were identified and managed in the Cottian Alps and in the Apennine ecological Corridor, highlighting the need to monitor and preserve genetic diversity (Fig.7).

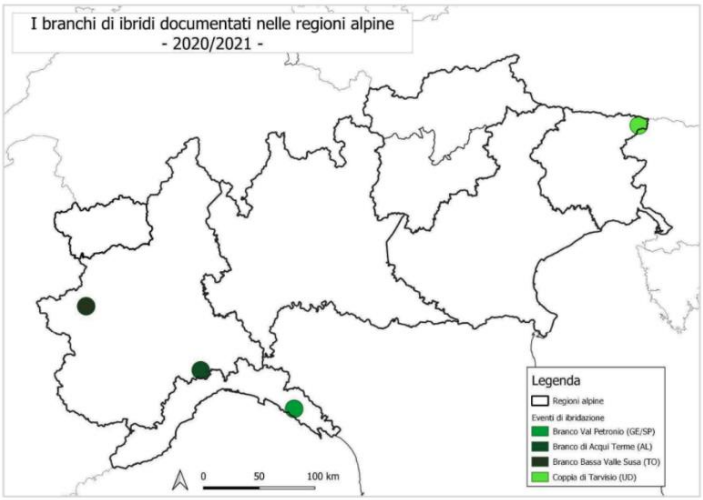

Fig 7: Distribution of documented cases of hybridization between wolves and dogs in the Alpine regions, updated to winter 2020-2021, with contributions from Liguria Region, Piemonte Region (Agency for the Management of Protected Areas of the Apennine Piedmont and Agency for the Management of Protected Areas of the Cottian Alps), and Project Lince Italia (Map extracted from Marucco et al. 2022, p. 54). Perrone D.S., G. Maceli G., I. Russo, G. Ferraro, L. Molinari, R. Cottalasso, L. Anselmo, L.Giunti, E. Ramassa, U.Vesco, G. Quaranta, M. Mauthe Degerfeld, L. Rossi, M. Coraglia, R.Turvani, D. Grande, E. Rossi, F. Cappa, S. Neé, M. Debiaggi, L. Scillitani, F. Marucco(2024) Report sugli interventi di gestione degli ibridi lupo-cane e di recupero di lupi feriti.Technical report for LIFE WolfAlps EU project LIFE18 NAT/IT/000972, Action C5.

In addition to some concrete outcomes (i.e. 9 interventions implemented to address hybridization control, and 4 hybrid/introgressed wolves managed, despite 2 expected) the project led to the development of new managerial and operational expertise within public bodies, for long-term sustainability and adaptability. This was achieved through the formation of local multidisciplinary taskforces, involving public Institutions (e.g. Parks, Regions, and University), operating in collaboration with ISPRA. The project also involved the capture and management of 13 injured wolves. Among these 13 wolves, seven were successfully treated and released back into their natural habitats, three died due to their serious conditions, two had to be euthanized and one had to be transferred to a specialized care center due to poor prospects for survival in the wild (Fig. 8). However, three wolves did not survive their injuries and were either euthanized or passed away despite intervention. These extensive efforts demonstrate a strong commitment to protecting wolves and addressing critical issues related to their health and genetic diversity. The work undertaken highlights the dedication to tackling these challenging concerns and reflects a proactive approach to wolf conservation. For more information, see the final report of the C5 action “Report of documentation of every project intervention, concerning wolf-dog hybrids and/or injured wolves recovery”.

La lupa rilasciata nell'area protetta del Centro Uomini e Lupi di Entracque | G. Bernardi.

Fig 8: The injured wolf released in the protected area of the Uomini e Lupi Center in Entracque.

Broader Ecological Implications and ecosystem services The interventions carried out through the LWA EU project extend their benefits beyond the direct conservation of wolves, impacting broader ecological systems. Through conservation actions aimed at promoting healthy wolf populations, the regulatory function of wolves as apex predators and 'keystone species' was enhanced fostering healthier and more resilient ecosystems. In its function as umbrella species, by prioritizing road safety and habitat connectivity, the project's activities promoted a healthier environment for a wider range of wildlife species. These efforts highlight another crucial role of wolves, beyond their function as keystone species and regulatory factors: their role as an 'umbrella species'. By addressing the habitat requirements of this species, a wide range of other animal species that share the same habitat benefit as well. In addition to its focus on road safety and habitat connectivity, the project has tackled the critical issue of poisoning, which poses significant risks to both domestic and wild animals. The implementation of measures against illegal wolf killing and release of poison baits is just linked to a low acceptance of the species. The project documented that 58 wolves were illegally killed during the project, thanks to more than 1200 dog units interventions against illegal killing and poisoning performed in the field. The aim was performing interventions to discover and prevent poaching events, that directly act on the whole ecosystem, because e.g. the release of poison baits causes negative effects to many other zoological communities (e.g. birds and small carnivores, not only to wolves). Additionally, these activities, mainly carried out by environmental Policies (i.e. Carabinieri Forestali) or park rangers provide improved opportunities of territory inspections and patrolling, acting as a deterrent against many types of environmental crimes.
Collectively, these strategies enhance ecosystem health and functionality by supporting diverse species and addressing various threats. The broader ecological benefits of the project underscore its far-reaching impact and the importance of integrated conservation efforts.

Economic impact

The economic impact of the project, based on the available economic indicators, reveals several key insights.

Economic growth One of the key challenges to *Canis lupus* conservation in the Alps is its lack of social acceptance, as the wolf is often perceived as a threat to both mountain agriculture and Alpine tourism. The goal was to shift this perception by promoting eco-friendly tourism packages and wolf-friendly products that benefit local communities while supporting conservation efforts. This initiative created the ECO EXISTENCE label (https://ecoesistenza.it/) to highlight those who support coexistence with large carnivores, especially wolves, in their daily activities. The label offers a map showcasing farmers, guides, and producers who commit to environmentally friendly practices, nature tourism, and accurate wildlife information. By participating, these actors play a vital role in promoting coexistence between humans and wild animals in their regions. Between 2021 and 2024, 23 wolf-friendly products were developed with 27 producers, orientated by the pilot experience of the "Land of Wolves" brand, successfully run as part of the LWA project, and with the inspiring experience of LIFE DINALP BEAR project, who developed a bear friendly label to promote products and services that contribute to better coexistence with bears. The wolf-friendly products developed include a range of handcrafted and themed items and local dairy products aimed at promoting coexistence between humans and wolves. These include children's books, nature-inspired illustrations, wooden and crochet toys, practical items like brushes, cushions, and potholders, and high-quality dairy products each designed with a

message of conservation and respect. These products not only foster a positive perception of wolves but also support local artisans and communities by offering sustainable alternatives and educational tools (Fig. 9).

Fig 9. Examples of wolf-friendly products developed during the LWA EU project (© 2024 ecoesistenza.it).

The project also developed 17 wolf-friendly eco-tourism packages in Italy and Slovenia tailored to different target groups. These packages feature itineraries focused on biodiversity, wolf biology, tracking signs of wolf presence, traditional pasture grazing, and fostering human-wolf coexistence (ex.: https://www.viaggiemiraggi.org/speciali/life-wolf-alps/). In total, 143 eco-tourism events attracted more than 3260 customers during the project period.

Another activity was the installation of the Life Alpine Young Ranger Wolf Program. This action engages young park visitors by inviting them to join the Natural Park Service family, offering kids and families the chance to explore and learn about the wolf as a key species across Alpine Nature Parks (Fig. 10). Through the Alpine Junior Ranger Program, participants can earn badges and stamps in their Life Alpine Young Ranger passport for completing activities focused on each park's unique ecological features, encouraging exploration of various protected areas. The initiative uses the wolf's appeal to inspire environmental stewardship among youth, successfully replicating the LIFE Young Alpine Rangers program 40 times to foster long-term support for wolf conservation in the Alps.

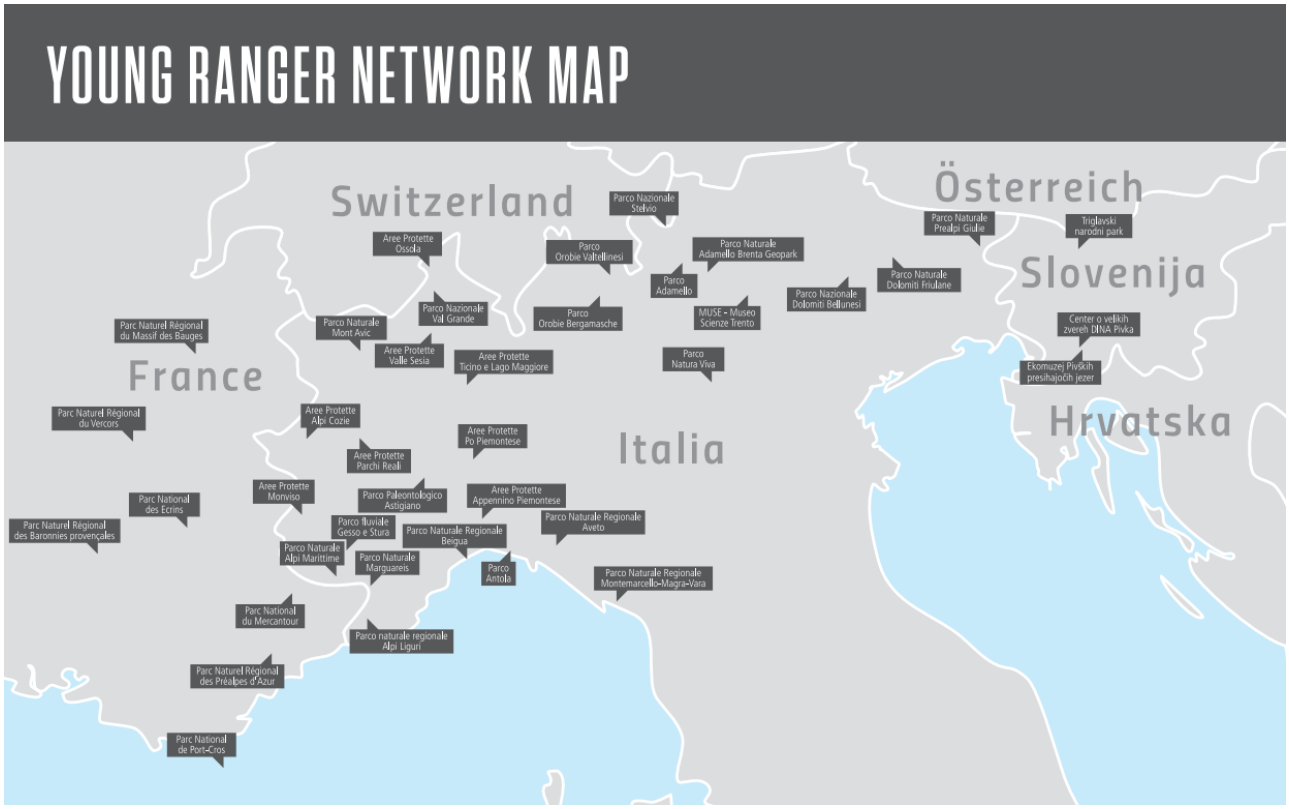

Fig 10. Map of the networking Parks, that participate in the Life Alpine Young Ranger Program

Financially, the project saw a significant increase in total expenditure, growing from €744,897.23 in the initial period (01.09.2019 - 31.12.2020) to €9,518,898.47 (state 30.06.2024). This growth in expenditure underscores the project's expanding scope and the resources required to sustain its activities. Similarly, capital investments in equipment to support project actions rose to €735,606.02 by 30.06.2024, indicating substantial investment in the necessary infrastructure and tools.

Jobs created: Throughout the project, 26.35 full-time equivalents (FTEs) contributed to its execution. FTE consider 8 hours per day as equivalent to one full working day, and 220 full working days per year as equivalent to one annual FTE. Of the 26.35 FTEs, 15.92 FTEs were generated through the LWA EU project (additional staff), illustrating the positive economic impact of the initiative. Initially, the approved budget forecasted 32.13 FTEs, but the actual number as of 30/09/2024 is lower. This discrepancy can be explained by the fact that several partners reallocated budget funds to the EXTERNAL category. This shift involved the engagement of external personnel through internal agencies (APAM, APAP, RELI), outsourcing tasks initially budgeted under personnel (METO), and employing fewer staff than projected (OFB). As a result, fewer hours were logged under the PERSONNEL cost category.

Damage prevention 43 Wolf Prevention Intervention Units (WPIU) had a substantial impact on reducing damage to livestock throughout the project. In total, WPIU interventions protected over 190,000 livestock, with 1,869 interventions carried out. As part of these efforts, 375 fencing kits were distributed, 15 livestock guardian dogs were introduced, and over 1,000 farmers received on-site consultation and practical assistance. A detailed account of the WPIU interventions and their effectiveness is provided in the final report, titled

"Effectiveness of Mitigation Measures Implemented to Reduce Wolf Damages on Livestock" (currently in progress).

Social impact

The project has made significant strides in generating social impact across various dimensions. Through comprehensive educational initiatives, targeted public engagement, and robust stakeholder involvement, the project has successfully fostered greater ecological knowledge, shifted public attitudes, and facilitated the adoption of sustainable practices.

Capacity building The project emphasized education and capacity building as key drivers of social change. Through the organization of training courses and workshops, the project has reached a substantial number of operators and professionals, with over 9600 individuals trained in 313 courses by mid-2024 (Fig. 11). These training sessions have been instrumental in equipping participants with the knowledge and skills necessary to contribute to the project's long-term objectives, ensuring continuity and sustainability. Additionally, over 650 volunteers and interns played a crucial role in implementing the project's actions, gaining valuable experience in cutting-edge scientific research, environmental communication, European project administration, and international collaboration. At this point, it's essential to recognize the importance of a comprehensive monitoring network, which significantly impacts the accuracy of population estimates. This network is meticulously organized across the Alpine region, involving numerous public agencies and a wide range of professionals, including rangers, forestry officers, wildlife conservation officers, technicians, veterinarians, biologists, and dedicated volunteers. This locally coordinated network of individuals represents a major achievement of the wolf monitoring program and is a crucial foundation for long-term biodiversity conservation in the Alps. To maintain and strengthen this network, workshops and training sessions have been held annually, often replicated beyond the project area, to expand expertise and foster collaboration.

Fig 11. Impressions from different training sessions during the project

The Life Alpine Young Ranger Program is another critical component of the project's educational outreach. By involving 10,000 children in environmental education activities, the project has successfully instilled a sense of ecological stewardship in the younger generation, helping to secure the future of wolf conservation efforts.

Furthermore, "Ambassador teachers" trained during previous LWA project proved to be a powerful tool of dissemination, capable of multiplying the impact of the project's educational actions and extending their duration in the after-LIFE period. The LWA EU project therefore continued this activity and trained almost 800 new ambassador teachers, who played a crucial role in extending the impact of educational activities.

Additionally, anti-poisoning dog units were trained and established to counteract poaching activities, with seven units operational by the project's end. The adequate preparation of wardens in detection of illegal activities is important for wolf conservation and to counteract poaching. Poisoned baits and poaching can cause large wolf and wildlife mortality and be dangerous to people and pets. The previous LWA project has been successful in intensifying the level of poisoning detection and set up the first 5 anti-poisoning dog units in the Italian Alps, which proved to be extremely successful in poison detection.

In the LWA EU project the know-how and best practices developed on the topic have been transferred to the other alpine regions and constitute new anti-poisoning dogs in other areas, as well as reinforce the already constituted units, with an overall alpine coordination of the international and national environmental judicial policies.

Communication, dissemination, awareness raising The Alps are among the largest wilderness areas in Europe for tourism purposes, in fact, the flow of tourists in the alpine region is continuously increasing due to the popularity of activities such as hiking. The increasing number of tourists is a cause of serious disturbance to wildlife, both in terms of individual conditions and population dynamics. Therefore, the drafting of the Non consumptive use of wolves in tourism" endorsed by LCIE and developed in Action C7,

provides some guidelines for promoting a more sustainable and responsible tourism that does not compromise wolf conservation, and a respectful behavior, able to take into account the presence of wolf, but also of guardian dogs (LGD) at work. These suggestions were also provided in the 15 training courses for nature guides for improving the environmental impact of these guidelines.
Public engagement has been a cornerstone of the project, aiming to raise awareness and shift public attitudes towards wolves. The project's online presence has been particularly impactful, with unique visits to the project website increasing steadily each year, reaching around 100,000 views. This digital engagement is complemented by active social media outreach, with the project's Facebook page accumulating over 13,500 likes, demonstrating a growing community of supporters.

The project has also engaged the public through traditional media, with nearly 1,140 publications, including articles and media interventions, discussing the project and its objectives. Over the project period there have been published 20 protocols/guidelines for national and international use. Additionally, 223 public events and exhibitions have attracted almost 130,000 participants, providing valuable opportunities for direct engagement and education. Nonetheless the percentage of positive media had a steady decrease from 18% in 2020 to 11% in 2024.

The project also organized Thematic Dialogue Platforms (Action E3.1), which served as valuable tools for disseminating project results and detecting emerging issues. These platforms involved over one thousand participants, with over fifty potential actions elaborated for an improved and more widely accepted management of wolves, functioning as "antennas" to detect consensus on the project and to understand the issues and problems on which to intensify efforts. The partners periodically organized local different thematic platforms for discussion according to the local context, urgent issues and needs of the participants elaborating 66 potential actions within the platform for an improved and more widely accepted management of wolves. All the proceedings of the meetings are published on the project website and collected and published in a special booklet as project deliverable.

Changing Attitudes and Knowledge A central aim of the project has been to positively influence attitudes and knowledge about wolves among various stakeholder groups. For a detailed analysis of these findings and further insights into the dynamics of these changes, please refer to the final report of Action D1: *Skrbinšek, T., Ambrogini, C., Bele B., Berzins, R., Chioso, C., Faure, N., Gambini, I., Kavčič, I., Knauer, F., Majić Skrbinšek, A., Marucco, F., Mavec, M., Minola, L., Perrone, D. S., Rossi, E. M., Ruco, V., Simon, R. N., Trombin, J., Vettorazzo, E., Lionello, M., Walter, T., (2024), Public attitudes toward wolves and wolf conservation in Austrian, French, Italian and Slovenian Alps, Technical report, Project LIFE 18 NAT/IT/000972 WOLFALPS EU.*

Stakeholder Involvement and Networking The project has been proactive in involving a wide range of key stakeholders, including farmers and hunters. Involving these groups is essential for the practical implementation of conservation measures on the ground. For example, by 31.12.2023, the project had engaged 489 farmers through the Wolf Prevention Intervention Units (WPIUs), providing them with direct support and guidance on managing wolf-related challenges. More information on the WPIU interventions can be found in the final report of C1. Between A4 (37) and C3 (677) over 700 hunters took part in the predator-prey-hunter study, demonstrating the project's success in bridging social divides and fostering collaboration. Their proactive involvement enhanced scientific understanding, promoted a positive attitude through an inclusive approach, and facilitated greater acceptance of wolves.

One of the most innovative aspects of the project was the establishment of the Stewardship Office (Action E2.1), which mapped, built, and maintained a network of key stakeholders, including livestock farmers, hunter's organizations, environmental associations and operators engaged in other sectors like tourism, hiking tours or environmental educations. The Stewardship Office aimed to enhance engagement, multiply the project's impact, and share information and results directly with interested third parties. Through collaboration with stakeholders, this program pilot's various coexistence strategies, such as improved livestock protection, local education, and stakeholder training. The program also establishes stewardship agreements with participants to promote sustained involvement in conservation efforts. (Fig 1).

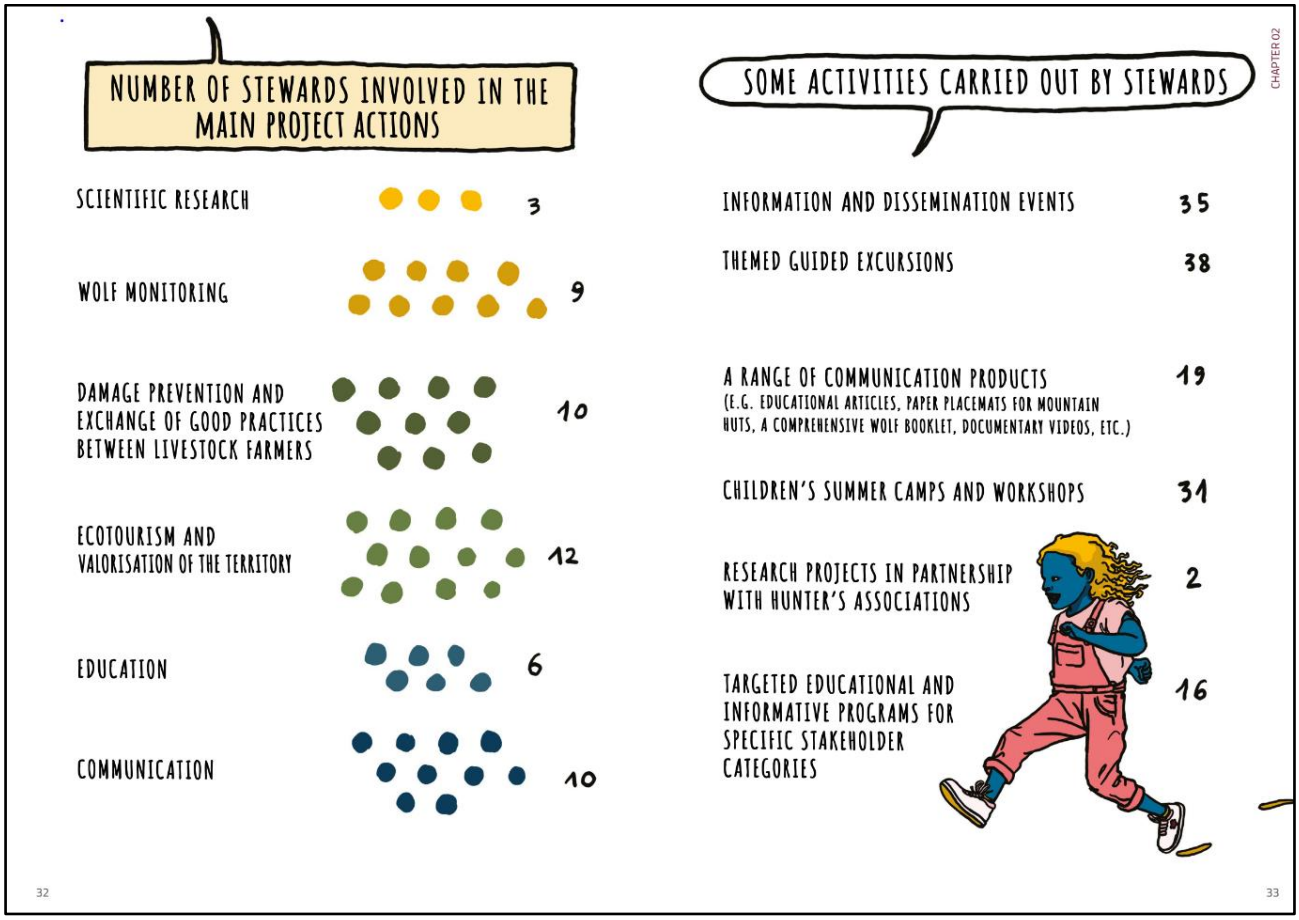

Fig 12. The main activities in which the stewards have been involved during the project (Bombieri G., Maiolini C., Scillitani L. (2024). Engaging in Coexistence. The LIFE WolfAlps EU Stewardship Experience. Action E2.1. deliverable to LIFE 18 NAT/IT/000972 WolfAlps EU project. MUSE, Trento)

The networking with 26 other initiatives and projects has further amplified the project's impact, enabled the exchange of knowledge and best practices and contributed to a broader conservation effort. LWA EU partner made presentations on the project outputs at scientific conferences (ex. Wolves Across Borders Conference 2023), exchanged hands on knowledge on protection measures (ex. Training Day Amedeo Amich stewards Regione Lazio, 2022), participated actively at other projects events (ex. final conference LIFE MIRCO LUPO, 2020) or organized best-practice exchange events (ex. Networking workshop on ecotourism and Young Ranger program, 2023).

Scientific Contributions and Governance The project's dedication to advancing scientific research is demonstrated through its substantial contributions to the academic community. By publishing scientific papers, developing protocols, creating internationally applicable guidelines, and presenting at conferences, the project has disseminated its findings and methodologies to ensure that the knowledge gained reaches a broader audience and assist future governance decisions. For instance, in response to Italy's lack of policies addressing wolf-dog hybridization, the LWA EU project crafted guidelines for managing this issue specifically within the Italian Alps. Additionally, the project has established and implemented integrated monitoring standards to annually assess the status of the wolf population across the Alpine region, as documented in the 2020-2024 INTERNATIONAL ALPINE FINAL report.

Socio-Cultural Ripple Effects of Wolf Conservation: Enhancing Biodiversity and Ecosystem Stewardship Similar to the bio-ecological perspective, the socio-cultural benefits of the project have extended beyond the wolf itself, generating positive impacts for a wide array of species. By enhancing public understanding and engagement with conservation, the project has cultivated a mindset that values ecosystem health. Educational efforts, such as those aimed at schools and the training of ambassador teachers, have promoted an appreciation for the interconnectedness of species, highlighting how actions aimed at protecting the wolf also create safer, more biodiverse habitats for other animals. For instance, the project's thematic dialogue platforms, originally established to address wolf-related conflicts, have also facilitated discussions about the broader importance of biodiversity conservation. These platforms brought together diverse stakeholders—farmers, hunters, environmentalists, and local communities—leading to increased awareness and collaboration on protecting a variety of species, not just wolves. This collaborative approach has helped shift public attitudes towards viewing conservation as a collective responsibility.

The project's public engagement campaigns have also fostered a broader cultural recognition of biodiversity's intrinsic value, encouraging local communities to protect not only the wolf but all species within their environment. By integrating this ecological awareness into the fabric of local culture, the project has created a more inclusive vision of conservation, where the protection of a single keystone species leads to broader ecological and cultural benefits, enriching the landscapes and the diversity of life within them.

Moreover, the involvement of local communities in eco-tourism and environmental education initiatives has resulted in the protection of other vulnerable species that share the same habitats as the wolf. For example, species such as the golden eagle and lynx have benefited from improved landscape management and reduced human disturbance as a direct result of conservation actions initiated through wolf protection. Attracting visitors from urban sites to visit areas of wolf presence and raising awareness about the complexity of the Alpine ecosystem and the work of livestock breeders who correctly implement preventive measures lead to a valuable discovery of local culture and traditional activities.

This broad mix and combination of socio-cultural as well as ecological gains is a testament to the project's holistic approach, demonstrating how wolf conservation can serve as a catalyst for the broader stewardship of ecosystems and biodiversity across the Alpine region.

Conclusions and recommendations

The LWA EU project, through its multifaceted approach, has made substantial progress toward improving wolf-human coexistence in the Alpine region. The results show that by addressing bio-ecological, economic, and social dimensions, the project has contributed improving the framework for wolf conservation and provided many new innovative approaches towards a sustainable future for both wolves and local communities in coexistence. Experiences with data collection in D2 suggest that refining methodologies and strengthening communication between partners could add further support. Establishing shared indicators and data collection protocols from the outset would be helpful. The shorter data series provides valuable trend insights, though a full statistical analysis would benefit from extended data.

Bio-Ecological Impact

The project's conservation actions, including habitat protection, monitoring, and mitigation of human-wolf conflicts, have contributed to a positive trend in the wolf population across the Alpine region. The reported data on the increase in the number of wolf packs and on the expansion of their distribution area are key indicators of the success of the project's actions. However, challenges such as poaching, hybridization, and traffic-related mortality continue to pose threats to the population and need to be continuously monitored. Efforts like the establishment of anti-poisoning dog units, GPS monitoring, and road safety measures have been essential in mitigating these threats and recall for concrete interventions of the public administrations to reduce/remove them.

Economic Impact

The development of wolf-friendly products and eco-tourism packages has had a notable economic impact on local communities, contributing to both economic growth and job creation. The promotion of wolf-friendly eco-tourism events and the creation of new wolf-related tourism products have stimulated local economies and fostered a positive relationship between economic development and conservation. The positive impact of these initiatives on the large public shows that the wolf can stimulate local economy and sustainable tourism and knowledge and awareness raising.

While the reluctance of some farmers to share data limited the assessment of direct economic losses from wolf attacks, the success of the Wolf Prevention Intervention Units (WPIUs) in reducing depredations suggests that preventive measures have been effective in minimizing economic losses related to wolf predation.

Moving forward, a more comprehensive data collection strategy is recommended to accurately quantify the economic impact of wolves on livestock and tourism. Involving stakeholders, from the very beginning and more effectively in data-sharing initiatives, could improve transparency and the development of solutions tailored to specific economic needs. Further investment in eco-tourism and the diversification of wolf-friendly products should be pursued as these initiatives continue to offer viable economic opportunities in affected areas.

Social Impact

Socially, the project has made significant strides in fostering a more positive perception of wolves among local populations, stakeholders, and the public. The establishment of platforms for dialogue among institutions and stakeholders, as well as educational programs targeting children and adults, has helped shift attitudes towards wolves, making people understand, in the first place, the ecological importance of wolves in the Alpine ecosystem. The training of ambassador teachers, nature guides, and the involvement of students in wolf conservation activities have been particularly impactful. Additionally, media coverage and public events have increased awareness, leading to a more informed and engaged public. While the fear of wolves remains an issue among some groups, the overall increase in positive attitudes toward wolves is a testament to the project's successful communication and awareness-raising efforts.

To sustain and further enhance these social gains, it is crucial to continue and expand educational outreach, particularly in regions where fear and opposition to wolves are still prevalent. Developing more localized, culturally sensitive education campaigns can help bridge knowledge gaps and reduce resistance. Strengthening partnerships with local governments and influencers can also increase community buy-in and support for wolf conservation efforts.

Annexes

Annex 1: Deliverable_Report_D2_Ex Ante_Update 04/22

Annex 2: Final list of indicators and data collected for each year of the project

LIFE18 NAT/IT/000972 - LIFE WolfAlps EU

“Coordinated actions to improve wolf-human coexistence at the alpine population level”

Action D2

TECHNICAL REPORT

Ex-ante assessment featuring the socio-economic and biological background analysis of project areas compared to the project goals

UPDATE 04/2022

Authors:

Julia Stauder, Marco Ranzoni, Clara Tattoni, Elisa Martini, Andrea Omizzolo, Filippo Favilli

List of abbreviations

LWA= LIFE WolfAlps

LWA EU= LIFE WolfAlps EU

IT=Italy

AT=Austria

F=France

SI=Slovenia

/=No data available

BP= Baseline situation is the beginning of the project

Introduction

LIFE projects need to report on their outcomes and be regularly monitored and evaluated based on the outcome indicators defined at project level and based on those defined in the multiannual work-programme at programme level. Therefore, the purpose of this action is to evaluate the usefulness and the success of the project actions implemented to improve the ecosystem and the welfare of the local wolf populations, economy and social welfare in the project area. In the case of LWA EU the overall project goal is to improve wolf-human coexistence at the alpine population level. The main expected results and impacts are:

- Establishment of 5 international alpine working groups: a technical, a scientific, a communication, an administrative and a policy committee with at least one member per partner and country.
- Define common methodologies and criteria to enable efficient transboundary wolf monitoring and conservation at population level.
- Create at least 24 “Wolf Prevention Intervention Unit - WPIU”, with at least 812 WPIU intervention over the Alps.
- Adequate training for wardens and other technicians in techniques of wolf surveillance (88 workshops for at least 2000 trained operators), anti-poaching, assessment of damage to livestock and damage prevention (at least 26 WPIU trainings).
- Capture of at least 2 detected hybrids and recover of at least 2 injured wolves.
- Decrease wolf depredations by 70% where attacks occurred in wolf presence areas, and implementation of preventive measures by WPIU.
- Use of damage prevention methods by at least 80% of the farmers involved in the preventive measure action.
- Formation of at least 7 new anti-poisoning dog units, and maintenance of 5 dog from LWA.
- Overall reduction of wolf mortality rate due to poisoning is expected to be at least 20% in identified "hot spot" areas.
- Develop wolf eco-tourism with at least 16 new wolf-friendly products, 8 wolf-friendly ecotourism packages, 64 wolf-friendly ecotourism events.
- Develop first guidelines for responsible wolf-tourism.
- Involve at least 5.000 kids in the Life Alpine Young Ranger Program and set up an international network of at least 29 Alpine Protected Areas adhering to the Program.
- Conduct 4 local predator-prey-hunter evaluations with at least 1 radio-collared wolf and 10 radio-collared prey each.
- Establish at least 11 platforms of discussion among Institutions and stakeholders, at least one per country.
- Increase the knowledge and attitude scores of stakeholders, in particular hunters, local inhabitants, public opinion and schools by at least 15% from the first poll.
- Increase the number of positive media reports on wolves by at least 10%.
- Collect at least 1000 items for an international Alpine Wolf press review and publish at least 50 project news items.
- Stop conflict rate growing in general public over the years and reduce by 30% in the selected conflict hotspots.

- Consider spatial requirements of wolves in environmental impact assessment studies, protecting key areas for reproduction, in at least 29 Natura 2000 sites, considering the EIA Guidelines.
- Decrease wolf traffic mortality through mitigation measures on traffic routes in identified sink areas (Val Susa, Italy) for at least 50% on mitigated road and railway sections.
- Involve at least 3000 schoolchildren in the 4 countries in kids' education actions and train at least 300 new project ambassadors.

To measure the socio-economics impact of the project and ecosystem functions in the project areas, the project developed 3 different typologies of indicators: social, economic and bio-ecological. These indicators will be measured each year of the project to analyse temporal variations of the selected variables. Therefore, the responsible beneficiary will carry out systematic assessments of agreed indicators. Project teams will be updated on the trends of specific indicators once per year, and the implications for the project will be discussed at the project group meetings with specific attention in assessing the costs and benefits of the conservation actions implemented in the project.

Biological indicators will mainly focus on the conservation status of wolves in the project area and will be based on the estimation of primary population parameters, in the framework of the project conservation actions. The indicators are divided into the two priority areas 1) Nature, Species and Biodiversity and 2) Monitoring the success of wolf conservation actions.

Nevertheless, the ecological evidence cannot by itself solve the societal challenge of coexistence with predators, this goal can be achieved only when both scientific and socio-economic evaluations are considered. The inclusion of social and economic aspects in biodiversity conservation has been widely advocated by both conservation biologists and economists to provide policy makers with the necessary tools to evaluate different decisions and to share the project results with the community of residents, and stakeholders.

According to the project goals, the economic indicator can be divided into the three priority areas 1) damage prevention 2) economic growth and 3) jobs created.

From a social point of view, the acquisition of an understanding of the values and concerns of the community is an important first step in developing a sociological impact assessment. This analysis will allow the understanding of the perception of community members on how the LWA EU project will affect their lives. A critical analysis of the factors contributing to current knowledge and social acceptance is essential to support any future decision on how to proceed with the development and protection of the project areas. Following the indications of LIFE projects for qualitative and quantitative outcome indicators at project level, three priority areas were selected: 1) capacity building 2) governance 3) communication, dissemination, awareness rising.

To set the baseline at the beginning of the project, this report presents an ex-ante assessment featuring the socio-economic and biological background analysis of the project areas related to the indicators defined in the first year of the project. These data will be used to compare the situation before, during and at the end of the project and to estimate the projects' impacts. The main references used for the ex-ante analysis are the reports listed from LWA, desk research, information gathered directly from project partners and reports produced within the first year of LWA EU. Reports considered:

- Report_LIFE WOLFALPS_ ANNEX FR D4_6. “Assessment of socio-economic impact of the project and ecosystem functions in the core areas”
- Final technical report LIFE WOLFALPS (2018) Covering the project activities from 01/09/2013 to 31/05/2018
- Wolf Alpine Group (2018): Wolf population status in the Alps: pack distribution and trend up to 2016, with focus on year 2015-2016
- Berce T & Černe R (ed.) (2020) Prevention of damages caused by large carnivores in the Alps. Joint report prepared by: Large carnivores, wild ungulates and society working group (WISO) of the Alpine Convention and the project LIFE WolfAlps EU.

Most activities start with the beginning of the project and do not provide ex-ante data. In these cases, respective cells are empty. Baseline data from LWA were only considered if the respective action is implemented in the same way in LWA EU.

The LWA EU project area includes the LWA project area (see: Final technical report LIFE WOLFALPS 2018), Austria and areas in France (France Provence-Alpes-Côte d' Azur, Rhône-Alpes, Auvergne).

Biological and ecological indicators

Table 1. List of biological indicators and respective data for the year 2019 and/or before in the project area

Indicator descriptor	Measurement unit	Ex-ante assessment
Areas progressing towards improvement	No. of Natura 2000 sites	BP
Areas progressing towards improvement	km of roads	BP
Wolf packs	No. of packs	Alps[1]: 65 Alps IT[2]: 46 AT[3]: 3 Alps F[3]: 79 SI[3]: 14 SI Alps[3]: 0
Functional wolf territories	No. of territories	Alps[1]: 77 Alps IT[2]: 51 AT[3]: 3 Alps F[3]: 85 SI[3]: 14 SI Alps[3]: 0
Wolf reproductions recorded annually	No. of reproductions	50
Wolf distribution area	Km^2	Alps IT[2]: 15.600 km^2 Alps AT[3]: 2.500 km^2 AT[3]: 5.000 km^2 Alps F[3]: 55.796 km^2 SI[3]: 4600 SI Alps[3]: 0
Health status and sanitary conditions of population	No. of disease-specific mortality, morbidity, and disability	BP
Inbreeding in the Central Alps as part of the population	No. of inbreed packs	BP
Wolf mortality rate caused by traffic accidents in areas with mitigation measures	No. of dead individuals on mitigated road sections	7
Wolf mortality caused by poaching and poisoning	No. of individuals poached/poisoned	LWA area: 13 AT[4]: 1 F[5]: 18 SI[6]: 8 SI Alps[6]: 0
Level of connectivity with the Dinaric, Central European and Apennine population measures with genetic samples	No. of genetic samples referring to non-local population origins	BP
Dog unit interventions against illegal killing and poisoning	No. of interventions	967
Non-invasive genetic samples collected	No. of samples	BP
Wolves and prey equipped with GPS collars in the project area	No. of wolves/prey equipped	BP
Simultaneously inspected sites via camera-trapping in the project area	No. of sites	BP
Hybrids captured and managed	No. of hybrids	BP
Injured animals captured and managed	No. of injured animals	4

[1]Data refer to the situation in 2015-16; [2] Data refer to the situation in 2017-18; [3] Data refer to the period of 01.05.2018-30.04.2019; [4] Total number 2019 inclusive; [5] Total number between 2006-2019; [6]Total number between 1999-2020

The project aims at conducting the first coordinated wolf surveillance at an international population level in the Alps. For most indicators there are no data available at the population level yet and the baseline is the starting of the project.

The data of some indicators represent the situation at a national level or refer to the LWA project area. Comprehensive data on an alpine population level will be available as the project develops. Latter will be considered to define the baseline of the project. For now, the data from LWA (2015-16) and national data will provide the baseline situation, as comprehensive wolf number in the overall Alps are not available for 2019.

Baseline data were, if available, collected from the reference documents listed in the introduction. For specific details of national wolf conservation status in the project areas we contacted the University of Veterinary Medicine, Vienna for Austria, the Slovenian Forest Service for Slovenia and the Office National de la Chasse et de la Faune Sauvage for France. For some indicators, the information about the Slovenian project area will be additionally added as soon as the data are available for 2019.

- The indicators *Areas progressing towards improvement* refer to a) No. of Natura 2000 sites considering the spatial requirements of wolves' reproductive sites in their EIA and b) of high-risk roads rendered safe
- *Wolf packs* and *functional wolf territories*: The last population estimation of pack number and territory in the overall Alps was conducted in 2015-2016. After that, only country estimations are present (not at the population level). In the Italian Alps, the last estimate available is from 2017-18, developed by LWA, with 46 packs and 5 pairs. In Austria, no wolf packs are present in the alpine areas. Here, we list the data considering the national territory. In France, data for the alpine area are available.
- *Wolf reproductions recorded annually*: There is no systematically collected data on reproductions recorded at the population level yet. The 50 reproductions annually are an estimation by experts of the field and can be used as baseline situation.
- *Wolf distribution area*: Until now, there is a lack of knowledge on the overall wolf distribution areas at the alpine population level. Baseline situation is the distribution at national level.
- *Wolf mortality rate caused by traffic accidents in areas with mitigation measures*: Baseline situation for this indicator are 7 individuals found dead on the selected road sections with up to now no mitigation measures in use. In the upcoming years, the LWA EU project will install measures on these sectors and compare the wolf mortality rate before and after the installation.
- *Wolf mortality caused by poaching and poisoning*: The experience from LWA showed the complexity and difficulty to estimate and measure the real amount of poaching and poisoning events. In LWA a total of 13 individuals were found in the project area. In France at total of 18 cases are known, in Austria 1 case. This will serve as a preliminary baseline and can be adapted as the project develops.
- *Dog unit interventions against illegal killing and poisoning*: The projects foresees the formations of at least 7 new anti-poisoning dog units and maintain the 5 units from LWA. In LWA a total of 967 interventions were conducted over the lifespan of the project in the Italian project areas and will be extended in the LWA EU project to new areas.
- *Hybrids captured and managed*: In SI, between 2019-2020, 4 hybrids were legally shot in the Alpine region and 3 in the Dinaric region. For the other project areas, data on hybridisation are incomplete or missing. The baseline for LWA EU is therefore the beginning of the project when coordinated monitoring actions are implemented.
- *Injured animals captured and managed*: During the LWA project 4 injured animals were captured between 2014-2016. This number reflects the baseline for the project as the activity will continue in LWA EU.

Economic indicators

Table 1. List of economic indicators and respective data for the year 2019 and/or before in the project area

Indicator descriptor	Measurement unit	Ex-ante assessment
Livestock protected by WPIU interventions	No. of livestock	BP
WPIU interventions over the project area	No of interventions	BP
Livestock killed after WPIU intervention	No. of livestock killed	BP
Wolf depredations after WPIU interventions	No. of wolf depredations	BP
Fence sets distributed in the project areas	No. of fences	135
Guarding dogs distributed in the project areas	No. of guarding dogs	34
Jobs	No. of FTE	BP
Replications of Life Alpine Young Ranger outside the project area during the project period	No. of replications	BP
Wolf friendly products	No. of products	10
Producer of wolf-friendly products	No. of producer	6
Wolf-friendly eco-tourism packages	No. of packages	1
Wolf-friendly eco-tourism events	No. of events	47
Estimated revenues from wolf friendly products	Income in €[1]	BP
Estimated revenues from wolf friendly eco-tourism packages	Income in €	BP
Market size in wolf-friendly ecotourism events	No. of participants	1127
Total material costs at WPIU interventions (cost for fences and/or guardian dogs distributed by LIFE WolfAlps EU)	Total costs in €	BP
Total project related expenditure during the project period (communication actions)	Total expenditure in €	BP
Capital expenditures to acquire equipment for setting up project actions	Total expenditure in €	BP
Profits from selling wolf-friendly products in proportion to economic losses in wolf attack	Profit/losses per farmer in €	BP
Profits from selling wolf-friendly products in proportion to expenses for prevention measures	Income/capital invested in €	BP
Persons employed in activities related wolf friendly eco-tourism packages	No. of person	BP
Overnight stays in areas with wolf friendly eco-tourism packages	No. of overnight stays	BP

[1] based on estimated spending of 100 €/day

For most indicators there are no data available on an alpine level or the specific project area. Therefor in many cases the baseline is the starting of the project. To encounter the conflict issue of damage prevention, innovative WPIU (Wolf prevention intervention unit) will be trained within LWA EU and locally established to act in hot spot areas of conflict for rapidly implementing preventive tool kits, using ad-hoc optimal preventive strategies based on successful experiences, to indicate the correct use of livestock guarding dogs, provide administrative assistance and active listening with a role of mediators. These hotspots areas are defined in the first period of the project and the respective ex-ante situation with no WPIU in use will be assessed and updated in the following project years. The use of fences and guardian dogs is also related to the activities of WPIU, therefore also the baseline situation should refer to the selected intervention areas to allow comparability of WPIU impact.

For now, and for the sake of completeness, we present the national data (status 2019) for the following indicators related to damage prevention for F, SI and AT. In IT the following data refer to the region of Piemonte, Liguria, Valle d'Aosta, Friuli-Venezia Giulia, Provincia Autonoma di Trento, Veneto and Lombardia. Data for the Piemonte region are from 2018.

As shown in Table 2, the baseline will be the beginning of the project or the data from LWA until more detailed data for the project regions with WPIU activities will be available.

- *Livestock killed after WPIU intervention*
  The following data refer to the situation in 2019 before WPIU were installed and include protected and unprotected livestock.
  IT: 1.668; AT: 86; F:12.282; SI: 1.381

- *Wolf depredations after WPIU interventions*
  The following data refer to the situation in 2019 before WPIU were installed and include protected and unprotected livestock.
  AT: 24; F: 3.822; SI: 374

- *Fence sets distributed in the project areas*
  In Austria single federal states provide funding for electric fences or provide intervention kits in case of need. The implementation of electric fencing must be done by farmers themselves and no data are available on the overall number of fences distributed in 2019.
  Data inconsistency and different collection methodologies limit the detection of the total number of fences distributed in the Italian project area. For more information, please refer to Berce T & Černe R (ed.) (2020). The national data from 2019 for F is 1.500 fences and for SI 8 fences.
  For now, the baseline for this indicator is the total number of 135 fences distributed during the LWA project between 2014-18.

- *Guarding dogs distributed in the project areas*
  In Austria, livestock guarding dogs are used by single farmers on private initiatives. So far, there has been no official program in Austria and no further data on private implementations are available.
  In SI and IT the data refer to the total number of dogs distributed between 2011-2019, with 30 dogs in SI and 457 dogs in IT. In France, 536 dogs were distributed on a national level in 2019.
  For now, the baseline for our assessment is the 30 dogs distributed within LWA between 2015-18.

The data for the following indicators refer to actions initiated, and results obtained in LWA over the entire 5 year-project period. These activities will be continued and extended to the LWA EU project areas:

- *Wolf-friendly products*
- *Producer of wolf-friendly products*
- *Wolf-friendly eco-tourism packages*
- *Wolf-friendly eco-tourism events*
- *Market size in the number of customers participating in wolf-friendly ecotourism events*

The indicator *Jobs* will be calculated with one annual FTE equivalent to 8 hours per day as equivalent to one full working day, and 220 full working days per year.

Social indicators

Table 3. List of social indicators and respective data for the year 2019 and/or before in the project area

Indicator descriptor	Measurement unit	Ex-ante assessment
Additional project supporters	no. of additional supporters	98
Project stewards	No. of stewards	BP
Person involved in the international Alpine wolf population working group	no. of person involved	BP
Networking with other projects for exchange of knowledge and experience	no. of projects contacted for exchange	BP
Potential actions elaborated within the thematic platforms for an improved and more widely accepted management of wolves	no. of potential actions elaborated	BP
WPIU trained and established	no. of WPIU	BP
Anti-poisoning dog units	no. of dog units	5
Operators and professionals trained in courses or workshops to contribute the project actions and output continuation	no. of operators trained	BP
Training courses or workshops for operators and professionals	no. of courses/workshops	BP
Quality/Sufficiency of skills trained to the teachers and nature guides	Level of sufficiency	BP
Improved wildlife hunters' management plans for management of key wolf's prey species	no. of management plans	BP
Entities/decision makers/duty holders involved	no. of entities involved	BP
Hunters involved in the predator prey evaluation in all project areas A4	no. of hunters involved	BP
Hunters involved in the predator prey evaluation in all project areas C3	no. of hunters involved	BP
Unique visits to the website	no. of unique visits	BP
Visit duration on website	Average of minutes spent on website	BP
Project videos	No. of videos	BP
Downloads from project website	no. of downloads	BP
Likes on Facebook page	no. of likes	7.000
Effectiveness of training for ambassador teachers on knowledge level	Ratio results knowledge ex ante / ex post surveys	BP
Effectiveness of eco-tourism packages to increase the ecological knowledge of participants	Ratio results knowledge ex ante / ex post surveys	BP
Ambassadors teachers trained	no. of ambassadors trained	867
Children involved in education actions (nursery and primary school)	no. of school children involved	BP
Children involved in education actions (secondary school)	no. of school children involved	BP
Students in higher education (university) involved in education actions	no. of students involved	BP
Participants at stakeholder platforms	no. of participants	BP
Public events/exhibitions	no. of events	BP
Participants/visitors at public events or exhibitions organized by the project	no. of participants	BP
Views of the project video	no. of views	BP
Kids involved in the Life Alpine Young Ranger Program	no. of kids	BP
Publications concerning wolves and project activities	no. of publications	BP
Articles or intervention in the media about the project	no. of interventions	BP
Project press releases produced and released by the partners	no. of press releases	BP
Newsletter subscriptions	no. of subscription	BP
Positive media reports on wolves	% positive reports	BP
Attitude about/toward wolves among the general public	% positive responses	53
Fear toward wolves among the general public	% of responses indicating fear	33
Knowledge about wolves among the general public	% of responses	65

Attitude about/toward wolves among person working in tourism	% positive responses	57
Fear toward wolves among person working in tourism	% of responses indicating fear	28
Knowledge about wolves among person working in tourism	% of responses	69
Attitude about/toward wolves among hunters	% positive responses	22
Fear toward wolves among hunters	% of responses indicating fear	54
Knowledge about wolves among hunters	% of responses	68
Attitude about/toward wolves among farmers	% positive responses	10
Fear toward wolves among farmers	% of responses indicating fear	66
Knowledge about wolves among farmers	% of responses	62
Attitude about/toward wolves among environmentalists	% positive responses	88
Fear toward wolves among environmentalists	% of responses indicating fear	10
Knowledge about wolves among environmentalists	% of responses	75
Attitude about/toward wolves among education professionals	% positive responses	65
Fear toward wolves among education professionals	% of responses indicating fear	26
Knowledge about wolves among education professionals	% of responses	67
Attitude in ambassador teacher trained	Ratio result attitude ex ante / ex post surveys	BP
Volunteers, students, interns involved in the project actions	no. person	BP
Protocols/guidelines published within the project for national and international use	no. of documents	BP
Scientific publications and presentations	no. of publications	BP
Farmers assisted by the WPIU intervention teams	no. of farmers	BP
Number of discrete project reports drafted	No. of reports	BP

Most social indicators listed lack an ex-ante reference as the activities are implemented for the first time in the project areas. The baseline for the indicator "Additional project supporters" is the 98 support letters in the LWA EU project application file.

The following social indicators refer the baseline data to the previous LWA project, in which single actions were implemented for the first time and find continuation and expansion to new project areas. These indicators are foreseen in the current project:

- *Anti-poisoning dog units*: 5 dog units from the LWA are the baseline for this project
- *Ambassadors teachers trained*: During the entire period of the project, the LWA project trained 867 teachers (2014-2017). Building on the experiences of LWA, LWA EU will continue this activity and extend it to new project areas.

The activities for school children will be extended and differ from LWA, therefore here the baseline is the beginning of the project.
LWA EU will create a new project website and integrate some contents from LWA. Here, the baseline is the beginning of the project.
The LWA-Facebook page will be updated to the new project content and include the information of the previous LWA. Therefore, the baseline for this project is the situation at the end of the LWA project:

- *Likes on Facebook page*: The baseline situation is current 7.000 likes (30/01/2019) on the LWA Facebook page.

The level of support for wolf conservation will be tested with questionnaire analyses twice during the project (Action D1.1 “Ex-ante assessment of attitudes and perceptions about wolves among general public and key stakeholder groups”). After a delay of the D1 action, the indicators could finally be collected in 02/2022. Further details on the collection and analysis that produced those results can be found in the D1 Deliverable “Report on ex-ante assessment of knowledge and attitudes of wolves”.
The impact of training activities for ambassador teacher will also be assessed by measuring the attitudinal change before and after the training starting with 2021.

Report Update 2022

In the milestone 12/2020 a total of 77 indicators were defined to collect during the project. During the process of the project and especially during the D2 indicator collection period in 2021 adjustments were made to improve the assessment of project activities. In most cases, one initial indicator was split into two or more indicators to deepen the data collection. Five indicators were added. The following adjustments were made:

Original indicator from 12/2020	**New indicator introduced in 2021**
Additional project supporters, requests to participate in project actions	Additional project supporters
	Project stewards
Hunters involved in the predator prey evaluation in all project areas	Hunters involved in the predator prey evaluation in all project areas A4
	Hunters involved in the predator prey evaluation in all project areas C3
Schools’ children involved in education actions	Children involved in education actions (nursery and primary school)
	Children involved in education actions (secondary school)
	Students in higher education (university) involved in education actions
Attitude about wolves and wolf conservation among key stakeholder groups	Attitude about/toward wolves among person working in tourism
	Fear toward wolves among person working in tourism
	Knowledge about wolves among person working in tourism
	Attitude about/toward wolves among hunters
	Fear toward wolves among hunters
	Knowledge about wolves among hunters
	Attitude about/toward wolves among farmers
	Fear toward wolves among farmers
	Knowledge about wolves among farmers
	Attitude about/toward wolves among environmentalists
	Fear toward wolves among environmentalists
	Knowledge about wolves among environmentalists
	Attitude about/toward wolves among education professionals
	Fear toward wolves among education professionals
	Knowledge about wolves among education professionals
	Attitude about/toward wolves among journalists
	Fear toward wolves among journalists
	Knowledge about wolves among journalists
No indicator	Fear toward wolves among the general public

	Knowledge about wolves among the general public
	Project videos
	Farmers assisted by the WPIU intervention teams
	Number of discrete Project Reports drafted

The following 2 indicators were deleted in 2021 as the project partners were not able to gather these data from the regional and national authorities due to privacy issues or the unwillingness of livestock farmers to share that information:

- Total cost of damages reimbursed to breeders using livestock protection by public bodies
- Economic loss/wolf attack in the project area using WPIU

The following indicators were reformulated without changing their meaning or collection target:

Original indicator from 12/2020	**New indicator introduced in 2021**
Jobs created within the project	Jobs
Flocks/cattle in the project area protected with electric fences, and other preventive methods by WPIU	Livestock protected by WPIU interventions
Protected livestock (by WPIU) killed in the project areas	Livestock killed after WPIU intervention
Wolf depredations on (by WPIU) protected livestock documented in the project areas	Wolf depredations after WPIU interventions
Total costs for prevention measures installed during the project (fences, guardian dogs)	Total material costs at WPIU interventions (cost for fences and/or guardian dogs distributed by LIFE WolfAlps EU)

At the end of 2021 the D2 assessment considers 101 socio-economic and bio-ecological indicators to evaluate the project impacts.

Annex 2

ID	Type	Indicator descriptor	Related actior	Measurement unit	2019/2020	2021	2022	2023	Status 30/10/2024
1	biological	Areas progressing towards improvement	C6.2	no. of Natura 2000	0	0	0	0	267
2	biological	Areas progressing towards improvement	C6.1	km of high risk roads rendered safe	750m nets along railway, 4.5km railway, 2km highway, 13km roadside w/ blue reflectors (over project period)				
3	biological	Wolves or prey equipped with GPS collars in the project area	C3	no. of wolves or prey equipped	1 Wolf, 9 red deer	1 wolf, 6 roe deer, 1 red deer	1 wolf, 13 roe deer, 2 red deer	11 roe deer	7 roe deer, 8 red deer
4	biological	Wolf mortality rate caused by traffic accidents in areas with mitigation measures	D3; C6.1	no. of dead individuals on mitigated road sections	action not started yet	action not started yet	4	3	1
5	biological	Increase in the number of wolf packs	C4	no. of packs	no data for this period	243			see final report C4
6	biological	Increase in wolf distribution area	C4	km2	no data for this period	91,000	100,300	113,400	120,300
7	biological	Wolf mortality caused by poaching and poisoning	C2	no. of poached/poisoned individuals found	6	9	10	26	7
8	biological	Dog units interventions against illegal killing and poisoning	C2	no. of interventions	118	94	315	454	355
9	biological	Number of hybrid captured and managed	C5	no. of hybrids	5	11	11	12	12
10	biological	Number of injured animals captured and managed (indicator only concerns ITALY)	C5	no. of injured animals	1	0	4	5	3
11	economic	Wolf friendly products	C7	no. of products	no data for this period	3	1	6	13
12	economic	Producer of wolf friendly products	C7	no. of producer	no data for this period	5	1	3	18
13	economic	Wolf friendly eco-tourism packages	C7	no. of packages	1	7	3	6	0
14	economic	Operators receiving revenues from wolf friendly eco-tourism packages	C7	no. of operators	no data for this period				85
15	economic	Market size in the number of customers participating in wolf-friendly ecotourism events	C7	no. of customers/tourists	no data for this period	167	1,108	1,047	942
16	economic	Replication of LIFE Alpine Young Ranger Wolf Program during the project period	C8	N . of LAYR replication	25	1	13	0	1
17	economic	Jobs	All actions	No. of FTE*					26,35
18	economic	Livestock protected by WPIU interventions	C1	no. of livestock	4,354	71,734	56,747	50,027	14,784
19	economic	WPIU interventions over the project area	C1	no. of WPIU interventions					1,869
20	economic	Wolf depredations after WPIU interventions	C1	no. of wolf depredations					438
21	economic	Fence sets distributed in the project areas by WPIU	C1	no.of fences					375
22	economic	Total material costs at WPIU interventions (cost for fences and/or guardian dogs distributed by LIFEWolfAlpsEU)	C1	Total expenditure in Euro					223,103
23	economic	Livestock killed after WPIU intervention	C1	no. of livestock killed					1,125
24	economic	Total project related expenditure during the project period	whole project	Total expenditure in Euro	744,897.23	2,342,102.68	5,417,513.93	7,269,146.54	9,518,898.47
25	economic	Capital expenditures to aquire equipment for setting up project actions	whole project	Capital expenditures in Euro	26,360.42	198,495.64	447,939.92	626,372.10	735,606.02

26	economic	Wolf friendly eco-tourism events	C7	no. of events	no data for this period	8	61	24	50
27	economic	Persons employed in activities related wolf friendly eco-tourism packages	C7	no. of person	1	165	30	35	0
28	economic	Estimated revenues from wolf friendly products	C7	Revenue in €	no data for this period	no data for this period	3,000	1,200	11,000
29	economic	Guarding dogs distributed in the project areas	C1	no. of guardian dogs					15
30	social	Nature guides and tourist operators trained to conduct eco-tourism events	C7	no. of guides/operators					63
31	social	Training courses or workshops for operators and professionals	All actions	no. of courses/workshops organized	44	72	75	90	32
32	social	Operator and professionals trained in courses or workshops to contribute the the project actions and output continuation	All actions	no. of operators trained	1,843	2,178	2,169	2,242	1,231
33	social	Kids involved in the Life Alpine Young Ranger Program	C8	no. of kids	no data for this period	no data for this period	7,000	2,000	1,000
34	social	Protocols/guidelines published within the project for national and international use	All actions	no. of documents	10	6	3	1	1
35	social	Volunteers and interns involved in the project actions	All actions	no. of person involved	232	371	433	657	397
36	social	Children involved in education actions (nursery and primary school)	E4	no. of children	18	707	313	488	524
37	social	Children involved in education actions (secondary school)	E4	no. of children	120	283	651	189	310
38	social	Students in higher education (university) involved in education actions	E4	no. of students	299	125	116	148	225
39	social	Views of the project video	E1.2	no. of views	no data for this period	no data for this period	6,227	17,179	9,192
40	social	Unique visits to the website	E1.2	no. of unique visits	25,408	58,033	78,461	109,215	96,154
41	social	Visit duration on website	E1.2	Average of minutes spent on website	1:56	1:47	1:37	1:29	1:09
42	social	Downloads from project website	E1.2	no. of downloads	2,752	821	2,692	3,632	138
43	social	Likes on Facebook page	E1.2	no. of likes	9,035	10,681	12,203	13,527	13,695
44	social	Publications concerning wolves and project activities (leaflet, broschure…)	E1.2	no. of publications	no data for this period	2	6	2	4
45	social	Project videos	E1.2	no. of videos	11	21	4	3	19
46	social	Newsletter subscriptions	E1.2	no. of subscription	3.275	882	1043	94	272
47	social	Public events/exhibitions	E1.2, E5, E6	no. of events	12	18	58	86	25
48	social	Participants/visitors at public events or exhibitions organized by the project	E1.2, E5, E6	no. of participants	3,174	1,458	23,381	56,640	11,336
49	social	Project stewards	E2.1	no. of stewards	0	10	13	6	3
50	social	Articles or intervention in the media about the project (newspaper, radio, tv,…)	E2.2	no. of interventions	175	284	393	286	94
51	social	Positive media reports on wolves	E2.2	% positive reports	18	13	15	10	11

52	social	Scientific publications, presentations at conferences	All actions	no. of scientific publications or pp at conferences	2	3	3	3	5
53	social	Entities/decision makers/duty holders involved (RFI,…)	C6.1	no. of entities involved	3	4	4	4	4
54	social	Hunters involved in the predator prey evaluation in all project areas A4	A4	no. of hunters involved	0	37	Action completed	Action completed	Action completed
55	social	Hunters involved in the predator prey evaluation in all project areas C3	C3	no. of hunters involved	7	180	218	183	89
56	social	Networking with other projects for exchange of knowledge and experience	E1.3	no. of projects contacted for exchange	3	3	8	7	5
57	social	Farmers assisted by the WPIU intervention teams	C1	no. of farmers					1,077
58	social	WPIU trained and estabilished	A2	N . of WPIU	37	5	Action completed	Action completed	Action completed
59	social	Attitude about/toward wolves among the general public	D1	% positive responses	no data for this period	0.58	no data for this period	0.51	no data for this period
60	social	Fear toward wolves among the general public	D1	% of responses indicating fear	no data for this period	0.29	no data for this period	0.28	no data for this period
61	social	Knowledge about wolves among the general public	D1	% of responses	no data for this period	0.66	no data for this period	0.62	no data for this period
62	social	Attitude about/toward wolves among person working in tourism	D1	% positive responses	no data for this period	0.68	no data for this period	0.69	no data for this period
63	social	Fear toward wolves among person working in tourism	D1	% of responses indicating fear	no data for this period	0.17	no data for this period	0.26	no data for this period
64	social	Knowledge about wolves among person working in tourism	D1	% of responses	no data for this period	0.7	no data for this period	0.66	no data for this period
65	social	Attitude about/toward wolves among hunters	D1	% positive responses	no data for this period	0.26	no data for this period	0.34	no data for this period
66	social	Fear toward wolves among hunters	D1	% of responses indicating fear	no data for this period	0.51	no data for this period	0.31	no data for this period
67	social	Knowledge about wolves among hunters	D1	% of responses	no data for this period	0.7	no data for this period	0.74	no data for this period
68	social	Attitude about/toward wolves among farmers	D1	% positive responses	no data for this period	0.09	no data for this period	0.16	no data for this period
69	social	Fear toward wolves among farmers	D1	% of responses indicating fear	no data for this period	0.67	no data for this period	0.49	no data for this period
70	social	Knowledge about wolves among farmers	D1	% of responses	no data for this period	0.62	no data for this period	0.63	no data for this period
71	social	Attitude about/toward wolves among environmentalists	D1	% positive responses	no data for this period	0.9	no data for this period	0.73	no data for this period
72	social	Fear toward wolves among environmentalists	D1	% of responses indicating fear	no data for this period	0.09	no data for this period	0.19	no data for this period
73	social	Knowledge about wolves among environmentalists	D1	% of responses	no data for this period	0.76	no data for this period	0.76	no data for this period
74	social	Attitude about/toward wolves among education professionals	D1	% positive responses	no data for this period	0.75	no data for this period	0.8	no data for this period
75	social	Fear toward wolves among education professionals	D1	% of responses indicating fear	no data for this period	0.17	no data for this period	0.23	no data for this period
76	social	Knowledge about wolves among education professionals	D1	% of responses	no data for this period	0.67	no data for this period	0.68	no data for this period
77	social	Attitude about/toward wolves among journalists	D1	% positive responses	no data for this period	0.66	no data for this period	0.72	no data for this period
78	social	Fear toward wolves among journalists	D1	% of responses indicating fear	no data for this period	0.3	no data for this period	0.22	no data for this period
79	social	Knowledge about wolves among journalists	D1	% of responses	no data for this period	0.65	no data for this period	0.64	no data for this period
80	social	Participants at stakeholder platforms	E3.1	no. of participants	419	254	364	109	105

81	social	Potential actions elaborated within the platform for an improved and more widely accepted management of wolves	E3.1	no. of potential actions elaborated	19	13	21	11	7
82	social	Ambassadors teachers trained	E4	no. of ambassadors trained	30	78	166	517	14
83	social	Antipoisoning dog units	A3	no. of dog units	5	11	11	12	Action completed
84	social	Project press releases produced and released by the partners	All actions	no. of press releases	22	45	15	21	9
85	social	Additional project supporters	A8	no. of supporters	11	4	0	4	2
86	social	Number of discrete Project Reports drafted	all actions	No. of reports	3	3	4	6	13
87	social	Person involved in the international Alpine wolf population working group	A1	no. of person involved	no data for this period	57	Action completed	Action completed	Action completed

*FTE consider 8 hours per day as equivalent to one full working day, and 220 full working days per year as equivalent to one annual FTE