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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

2020

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TABLE OF CONTENT:

1 PREFACE 4
2 GENERAL RECOMMENDATIONS FOR LIVESTOCK PROTECTION IN THE ALPS 6
3 REPORTS BY COUNTRY 8
3.1 AUSTRIA 8
3.1.1 Damages caused by large carnivores in Austria 9
3.1.2 Damage prevention measures in Austria 14
3.2 FRANCE 33
3.2.1 Damages caused by large carnivores in France 34
3.2.2 Damage prevention measures in France 38
3.3 GERMANY 56
3.3.1 Damages caused by large carnivores in Germany 57
3.3.2 Damage prevention measures in Germany 60
3.4 ITALY 87
3.4.1 Damages caused by large carnivores in Italy 88
3.4.2 Damage prevention measures in Italy 104
3.5 LIECHTENSTEIN 157
3.5.1 Damages caused by large Carnivores in Liechtenstein 158
3.5.2 Damage prevention measures in Liechtenstein 159
3.6 SLOVENIA 179
3.6.1 Damages caused by large Carnivores in Slovenia 180
3.6.2 Damage prevention measures in Slovenia 184
3.7 SWITZERLAND 205
3.7.1 Damages caused by large carnivores in Switzerland 206
3.7.2 Damage prevention measures in Switzerland 209
4 TECHNICAL GUIDELINES FOR ESTABLISHING A RELIABLE PROTECTION OF LIVESTOCK 235

1 PREFACE

Large carnivores were eradicated from most of the Alps about 100 years ago. A small relic population of brown bears (*Ursus arctos*), however, remained present in Trento, Italy, while the Eurasian lynx (*Lynx lynx*) was reintroduced to the region in the 1970s. Grey wolves (*Canis lupus*), for their part, started to recolonize the western and central Alps about 30 years ago from a remnant population in Italy, and the eastern Alps some 10 years ago from the Dinaric population. As a result, lynx and wolves are today regularly present in all member states of the Alpine convention. Numbers of bears in the Alps have also been increasing in the last 20 years, especially in Trentino and Slovenia. With the increasing presence of large carnivores in all Alpine countries, protection of human property against carnivore attacks is becoming a necessary part of animal husbandry in this region.

In the absence of large carnivores, traditional practices of livestock protection disappeared from the Alps and led to the present situation where free-range, unprotected grazing by livestock is a common practice in many Alpine territories. With increasing numbers of large carnivores, damages to livestock started to occur. However, it is reassuring that good practices in livestock protection also started to develop simultaneously in many Alpine areas. We are convinced that the widespread use of such practices and their further improvement will ensure the future of livestock grazing in the Alps in the presence of viable populations of large carnivores. The Large Carnivores, Wild Ungulates and Society Platform of the Alpine Convention (WISO) is committed to resolving issues concerning large carnivore depredations on grazing animals.

In the previous mandate of WISO, a study entitled "*A comparative overview of the use of the European Agricultural Fund for Rural Development to protect livestock in the Alpine countries"* was conducted by Adelphi to examine how the Alpine countries are using EU funding to prevent or mitigate large carnivore damages. In this mandate, in order to have a wider overview of the general situation on the relation between damages and damage prevention in each Alpine country, the WISO platform joint the effort with the LIFE WOLFALPS EU project and prepared this document focusing on damage prevention practices, which are currently evolving throughout the Alps. The

contribution of LIFE WOLFALPS EU project personnel was especially important in preparing the report for Italy and in collecting data on damages for Austria and France. WISO members prepared the section on damage prevention and AGRIDEA provided the report for Switzerland.

The main objectives of this report are to (1) present an overview of the systems of livestock protection against large carnivores and sources of financing, (2) highlight examples of good practice and (3) prepare general and technical recommendations regarding livestock protection for all members of the Alpine convention.

2 GENERAL RECOMMENDATIONS FOR LIVESTOCK PROTECTION IN THE ALPS

WISO and project LIFE WOLFALPS EU members who contributed to this report have recognized some key elements which need to be considered for the prevention of damages caused by large carnivores in all Alpine countries. These key elements are:

- Prevention of damages needs a long-term strategy. Good planning of livestock protection measures is essential and can prevent many conflicts.

- An organized consulting system of competent experts is the key to success for the sustainable implementation of herd protection measures through trust and competence. To improve methods and management, the collection of positive as well as negative examples is crucial.

- The agricultural policy framework is the basic prerequisite for livestock protection in order to enable structural adjustments and planning security.

- Regular control of proper implementation and monitoring of efficiency of damage protection measures needs to be done on a regular basis to adapt the implementation and direct the support of effective measures. Technical guidelines listed at the end of this document must be respected to enshure the efficiency of the implemented protection measures.

- It is necessary to provide legal basis for the owners of livestock guarding dogs. The legal foundations are necessary for flock protection in order to anchor the resource use of dogs, shepherds and farmers in the long term. Additional emphasis must be given to the relationship between livestock guarding dogs and humans.

- Wolves can learn to circumvent livestock protection measures (overcome fences, enter stables, tricking livestock guarding dogs). If this remains an exception, removal of such individuals is recommended. If the occurrence of the learned behaviour is repeating by different individuals, protection measures need to be improved.

- The acceptance of protection measures is still critical among many stakeholders. Constant communication is necessary in order to foster acceptance and allow adaptation of protection measures. Other stakeholders like tourism organizations must be involved in communications as especially in the Alpine regions pastures are often crossed by hiking routes which can lead to problems.

3 REPORTS BY COUNTRY

3.1 AUSTRIA

Prepared by:

Theresa Walter, Georg Rauer, and Felix Knauer (*Chapter Damages*)

Theresa Walter, Georg Rauer, and Felix Knauer *(Chapter Damage prevention)*

3.1.1 **Damages caused by large carnivores in Austria**

REPORTING COUNTRY /	Austria
WHICH REGIONS DOES THE REPORT INCLUDE?	The whole country
REPORT PREPARED BY	Theresa Walter, Georg Rauer, Felix Knauer
INTRODUCTION / COMMENT OF THE SITUATION	
We find that numbers of wolves increased during the last years and we expect this trend to continue, also due to increasing populations surrounding Austria. Wolves and therefore depredation events can occur anywhere in Austria. Depredation events are currently caused by relatively few individual wolves compared to the number of wolves detected in the country, however the number of wolves causing damages might change with increasing numbers of wolves present. We see a certain pattern emerging of some single wolves causing damages and then never being identified anywhere else in the country. Up to now, the main livestock species killed in depredation events were sheep. Sheep can also be found everywhere in Austria, with the highest numbers of around 20% each in the federal states Tyrol and Lower Austria. To a certain degree, depredation hotspots have occurred in both of these federal states. While 60% of all sheep kept on alpine pastures can be found in Tyrol, in Lower Austria no sheep can be found on alpine pastures. Consequently, when analysing the depredation data in Austria, prevention measures in Austria should be implemented at its best everywhere where sheep are kept.	

LARGE CARNIVORES POPULATION TRENDS IN THE PERIOD 2010-2019

	WOLVES		BROWN BEARS
YEAR	Population estimates	Confirmed packs	Population estimates
2010	8	0	4
2011	3	0	3
2012	4	0	4
2013	6	0	5
2014	8	0	4
2015	8	0	3
2016	15	1	7
2017	20	1	3
2018	35	3	3
2019	49	3	2

DAMAGES CAUSED BY WOLVES IN AUSTRIA IN THE PERIOD OF 2010-2019

YEAR	SHEEP		CATTLE		OTHER	
	Damage cases	Animals affected[1]	Damage cases	Animals affected	Damage cases	Animals affected
2010	10	18	2	2	1	1
2011	6	12	1	1	1	2
2012	1	10				
2013	2	21	2	2		
2014	8	15	2	3	1	2
2015[3]	15	79	1	1		
2016[4]	2	10			7	28
2017[5]	6	23	1	1	1	1
2018	26	93	1	1	7	25
2019	19	81	3	3	2	2
TOTAL	**95**	**362**	**13**	**14**	**20**	**61**

1 – Animals affected: killed or injured animals during attacks.
2 – Damage compensation paid is only available for the last three years (2017-2019) and only listed by predator (bear, wolf), however not divided by animal species affected. For details see table below.
3 – In 2015, in one attack on sheep, also 2 cows died, which are not listed in the table for 2015.
4 – In 2016 in two attacks on sheep also 3 goats were killed, which are not listed in the table for 2016.
5 – In 2017 in one attack on sheep, also five goats were killed, which are not listed in the table for 2017.

DAMAGES CAUSED BY BEARS IN AUSTRIA IN THE PERIOD OF 2010-2019

YEAR	SHEEP		CATTLE		OTHER[2]	
	Damage cases	Animals affected	Damage cases	Animals affected	Damage cases	Animals affected
2010	10	55			5	24
2011	5	27			19	40
2012	15	49			26	60
2013	4	12	2	2	16	30
2014	7	8	3	3	12	22
2015	5	5			11	18
2016	12	60			6	10
2017[1]		10		1		115
2018[1]		35		2		48
2019[1]		29		2		
TOTAL	**58**	**290**	**5**	**10**	**89**	**367**

1 – There is no data available on the damage cases for the last three years.
2 – In the category "OTHER" beehives are included. Beehives make up most of the damages. One beehive damage counts as "one animal". Fishing ponds are included in the category "OTHER", where one pond counts as "one animal".
3 – Damage compensation paid is only available for the last three years (2017-2019) and only listed by predator (bear, wolf), however not divided by animal species affected. For details see table below.

DAMAGES COMPENSATION PAID (IN EURO) IN AUSTRIA FOR WOLFS AND BEARS IN THE PERIOD YEARS 2017-2019

YEAR	BEAR	WOLF	TOTAL
2017	57 679,19	2 691,10	**60 370,29**
2018	10 015,64	33 539,50	**43 555,14**
2019	16 319,27	50 643,10	**66 962,37**
TOTAL	**84 014,10**	**86 873,70**	**171 287,80**

3.1.2 **Damage prevention measures in Austria**

ELECTRICITY

TECHNICAL OVERVIEW OF THE IMPLEMENTED MEASURES	
COUNTRY	***Austria***
REPORTING PERIOD	***2012-2019***
IMPLEMENTED MEASURES	• **Federal states of Burgenland, Kärnten, Steiermark, Wien and Oberösterreich:** no measures implemented by the federal states • **Federal state of Lower Austria:** "wolfproof fencing" funded since 2019 (50% of investment) • **Federal state of Salzburg:** stockage of 4 intervention kits with electric fences, funding of electric fences (December 2019 35% of investment, since January 2020 85%) • **Federal state of Tirol:** stockage of 8 intervention kits with electric fences from 2019 onwards • **Federal state of Vorarlberg:** funding of electric fences • **Pilot project** in Salzburg: fencing of an alpine pasture from 2012 – 2016 with mobile electric nets and wires • **Within LIFE WolfAlps EU:** establishment of three "wolf prevention intervention teams" (WPIU) to intervene after damage events and support farmers with fences and workforce. • **Additionally some private initiatives by farmers**
TARGETED TYPE OF PROPERTY	Mainly sheep, but also goats
HERD / PROPERTY SIZE	No data.

TECHNICAL DETAILS OF IMPLEMENTED MEASURE(S)	Technical details of implemented fencing vary and are not standardized over the federal states. The recommendations from the ÖZ are: **Mobile electric nets:** • Height: minimum 90 cm • Minimum voltage 3500 V **Wire fences** • minimum 4 electric wires (20-40-60-90cm) • Height: minimum 90 cm • Minimum voltage 3500 V • Lowest wire not higher than 20 cm **Non-electric fences:** • minimum one electric wire on the outside of the fence at 20cm height • Height: minimum 90 cm • Minimum voltage of the electric wire 3500 V • Electric wire not higher than 20 cm The WPIU within LIFE WolfAlps EU will also work according to these recommendations. These recommendations are also listed on websites from the regional chamber of agriculture and of the sheep and goat breeders association. Technical details of the fences used in the pilot project in Salzburg: **Mobile electric nets:** • Height: 105 cm **Wire fence** • 5 electric wires In both fence types some plastic poles were stabilized using additional wooden poles.

IMPLEMENTATION	Implementation of electric fencing has to be done by farmers themselves. The time invested by the WPIU within LIFE WolfAlps EU and their material are financed by the project. The pilot project in Salzburg was implemented by the "Nationale Beratungsstelle Herdenschutz" together with the respective farmers and for the first installation of fences also 10 students from a farming school helped.
CHALLENGES	Currently, funding and advice on the professional use of preventive measures like electrical fences is scarce and many farmers have to pay for the investments themselves. The location of fences and electrification must be adapted to the environmental conditions: slope, holes, type of soil, weather conditions, etc. The first set up of a fence on alpine pastures can be time consuming. Every pasture is different and individual solutions have to be found. When sheep of different herds and farms are to be kept in a herd together during summer, health management of the sheep has to be set up and implemented before the sheep are brought on the alpine pastures. Regular controls of the fences are necessary to ensure their functionality.
CHALLENGES AND BASIC REQUIREMENTS	See above.
CONTACT INSTITUTION AND PERSON	Albin Blaschka (ÖZ) office@bear-wolf-luchs.at and the responsible people in the nine federal states
MORE INFORMATION AND INFO-MATERIALS	Brochure on recommended minimum standards for technical prevention measurements developed by the ÖZ:

	https://baer-wolf-luchs.at/downloads Brochure by the federal state of Salzburg on prevention measures: https://www.salzburg.gv.at/agrarwald_/Documents/Herdenschutz-A5-WEB.pdf Final report »Nationale Beratungsstelle für Herdenschutz«: https://www.tirol.gv.at/fileadmin/themen/land-forstwirtschaft/agrar/LWSJF/Grosse_Baeutegreifer/Nationale_Beratungsstelle_Herdenschutz_Abschlussbericht_Stand_16.10.2017.pdf

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
• **Federal states of Burgenland, Kärnten, Oberösterreich, Wien, Steiermark, Tirol:** no subsidies • **Federal state of Lower Austria:** 50% of the costs for setting up fencing is funded since 2019 • **Federal state of Salzburg:** Since 2018 35% funding for electric fences, since 2020 increase to 80% (up to € 3.000). Measures are supported if there has been an officially recorded incident of wolf attacks within a radius of 30 km within a period of 12 months before the application is submitted • **Federal state of Vorarlberg:** subsidies of up to € 2.000 are paid for damage prevention with fences of up to 200m length per alpine pasture, electric fence energisers are funded with up to € 250. • **LIFE WolfAlps EU:** financing of the development and education of the WPIU, as well as the required materials and time for their interventions • **Pilot project Salzburg:** the pilot project was financed by the respective ministry, the federal states and the WWF.
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
No.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	For LIFE WolfAlps EU an international protocol for the set-up of the WPIU and the monitoring of interventions is developed. Monitoring of interventions will be done by the WPIU members. The pilot project in Salzburg was supervised by the Fachgremium Herdenschutz at the respective financing ministry. For all other implemented measures no data are available.
HOW MANY PEOPLE ARE INVOLVED?	The LIFE WolfAlps EU WPIU will involve between 8-12 people per team, equalling 24-36 people in Austria.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	For the WPIU an international protocol will be developed (not ready yet).
WHICH FEATURES ARE MONITORED OR INSPECTED	See above.
HOW MUCH TIME DOES ONE CONTROL TAKE?	No data.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	No data.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Not yet implemented for LIFE WolfAlps EU.
WHAT ARE THE RESULTS?
Not yet implemented.

Additional information (photographs, technical details, charts, links to websites, etc.):

Ad: Photographs

Building the fence at the ridge in the pilot project in Zederhaus/Salzburg. © G. Rauer

LIVESTOCK GUARDING DOGS

COUNTRY	*Austria*
REPORTING PERIOD	***2011 – 2020***
IMPLEMENTED MEASURES	**Livestock guarding dogs (LGDs)** are used by single farmers on private initiatives. A pilot project was supported in Osttirol from 2014-2017.
TARGETED TYPE OF PROPERTY	▪ Sheep ▪ Goats
TECHNICAL DETAILS	▪ **Breeds recommended by the federal state of Salzburg:** Maremmano Abruzzese & Patou

	▪ **Breeds used in the pilot project:** Maremmano Abbruzzese from Italy
SOURCES OF LGDs (working lines, genetic lines, etc.)	So far, there has been no official program in Austria for breeding, developing or maintaining pure genetic or working lines. If farmers want to get dogs, they have to get them freely from what is available.
IMPLEMENTATION	Farmers can get financial assistance for the purchase of a LGD only in the federal state of Salzburg. No further data on the implementation available.
EDUCATION PROCESS	No standardized education process.
SUPERVISION OF EDUCATION PHASE	Not available in a standardized form.
CERTIFICATION OF LGDs	No existing certification of livestock guarding dogs in Austria.
PROTOCOL OF CERTIFICATION	/
LEGISLATIVE RESPONSIBILITY OF DOGS' ACTIONS	The use of livestock guarding dogs may offend in several aspects against the legal regulations in Austria concerning dog-keeping. The owner of livestock guarding dogs in action faces an unreasonable risk of being prosecuted. First attempts to adapt the legal framework were heavily opposed by animal welfare proponents.
ANIMAL WELFARE OBLIGATIONS	In general, the law requires owners to take care of their dogs – to provide food, water and shelter, regardless the type of dog. Dogs have to have the possibility to socially interact with humans at least two times per day.
CHALLENGES	Up to now, there is no certified breeding program for LGD in Austria. There is also no certification process for LGD. Many shepherds don't know how to work with LGD.

	Animal welfare law requires breeders to look after the dog at least 2 times per day to allow for social interactions and provide a form of shelter if the dog is living outside i.e. a doghouse. The integration of many small sheep herds to become one large sheep herd, which is to be protected by LGD, is a challenging process, which needs time. Breeders complain about the responsibility they assume by using guard dogs because of the risk of conflicts and accidents with neighbours, hikers and mountain bikers. Hikers and mountain bikers do not know how to interact with LGD.
CONTACT INSTITUTION AND PERSON	Albin Blaschka (ÖZ) office@bear-wolf-luchs.at

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
• **Pilot project Nationale Beratungsstelle Herdenschutz:** was financed by the respective ministry, the federal states and the WWF. • **Federal state of Salzburg:** Since 2020: Investments in LGD with a flock size of up to 200 sheep will be subsidised at 80% of the cost of two guard dogs, up to a maximum of EUR 1 600 per dog; for a flock of 200 sheep or more, an additional guard dog will be subsidised for every additional 100 sheep. For all other livestock, 80% of the purchase price of two or more guard dogs, up to a maximum of EUR 1 600 per dog, provided that the use of guard dogs is appropriate in individual cases, taking into account the size of the herd.

Measures are supported if there has been an officially recorded incidence of wolves of the respective species within a radius of 30 km within a period of 12 months before the application is submitted. • **All other federal states:** no subsidies.
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
Non available.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	The pilot project in Osttirol was supervised by Fachgremium Herdenschutz at the respective financing ministry. No data is available for all other implementations.
HOW MANY PEOPLE ARE INVOLVED?	The pilot project involved at least two shepherds per year, as well as nine to ten farmers who were involved with their sheep. No data is available for all other implementations.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	No data
WHICH FEATURES ARE MONITORED OR INSPECTED	No data
HOW MUCH TIME DOES ONE CONTROL TAKE?	No data
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	No data

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
There was no standardised measurement of effectiveness in the pilot project.
WHAT ARE THE RESULTS?
There were no trained LGD available in Austria, so they had to be imported from abroad. Familiarization of LGD with the herd were a key point to success. It is necessary to have shepherds who are used to working with herding dogs, in order to manage the herds in a way that LGD can do their job. The health management of sheep before they are on the alpine pastures was a challenge, as involving sheep with parasites and other diseases in the project lead to resistance in the farmers and they no longer wanted to participate.

Additional information (photographs, technical details, charts, links to websites, etc.):

Ad: Photographs

Lifestock guarding dog in the pilot project in Osttirol. © C. Sonvilla |www.sonvilla-graf.com

Final report from the "Nationale Beratungsstelle Herdenschutz" (German):
https://www.tirol.gv.at/fileadmin/themen/land-forstwirtschaft/agrar/LWSJF/Grosse_Baeutegreifer/Nationale_Beratungsstelle_Herdenschutz_Abschlussbericht_Stand_16.10.2017.pdf

SHEPHERDS

COUNTRY	***Austria***
REPORTING PERIOD	***2014-2017***
IMPLEMENTED MEASURES	**Guarding animals using shepherds** was applied in the pilot project from the Nationale Beratungsstelle Herdenschutz in Osttirol.
TARGETED TYPE OF PROPERTY	Sheep
ROLE OF SHEPHERDS (JOB LIST)	The job of the shepherds in the pilot project was to keep the sheep herd together and to direct them into a night fence in the evening as well as herd management during the daytime. Additionally feeding and management of herding and guard dogs.
ARE THEY WORKING WITH LIVESTOCK GUARDING DOGS? IF YES, WHO IS THE OWNER OF DOGS?	The shepherds worked with LGD supplied by the project; some worked with their own herding dogs, some with rented herding dogs.
HOW MANY ANIMALS DO THEY TAKE CARE OF?	There were between 2-4 guarding dogs and 2-4 herding dogs per year on the pasture.
DO THEY REPORT THEIR WORK?	There was a final project report.
ORIGIN OF SHEPHERDS	The shepherds were from Austria and Germany.
ARE THE SHEPHERDS ORGANIZED IN ORGANIZATION?	No, not in Austria.
SALARY (per month, season, etc. – define)	No data available.

ARE THE COSTS COFINANCED? WHICH COSTS? ▪ salary, ▪ insurance, ▪ food, ▪ other?	No.
IMPLEMENTATIO N	There is no data on how and where shepherds are really used for guarding animals in Austria.
INSURANCE	Insurance issues depend on the employment contract.
FOOD	No data available.
SHELTER	Shepherds' accommodation is the responsibility of their employer.
ARE THERE ANY DIFFERENCES BETWEEN SHEEP AND CATTLE SHEPHERDS?	No data available on cowherds.
HOW DO THE SHEPHERDS LEARN ABOUT THEIR WORK?	No structured or standardized training available in Austria. The Austrian shepherds in the pilot project were not trained. The German shepherd was a professional shepherd in Germany. Shepherd is no defined occupation in Austria, but in Germany.
RESPONSABILITI ES OF SHEPHERDS	Responsible for the health and well-being of the herd.
IS THERE ANY PROMOTION OF ROLE / JOB OF SHEPHERDS?	No, there is no structured promotion of this job.
WHAT ARE THE SHEPHERDS DOING OUT OF	No data.

WORKING SEASON?	
CHALLENGES	The profession of shepherd faces several challenges : - No training offer; - no real “job” in Austria; - A lack of data; - a lack of recognition and valorisation of skills; - Tough living and working conditions ;
CONTACT INSTITUTION AND PERSON	Albin Blaschka (ÖZ) office@bear-wolf-luchs.at

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES	
SUBSIDIES AND PAYMENTS FOR EQUIPMENT	
Not implemented.	
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD	
Not implemented.	
SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE ?	Not implemented.
HOW MANY PEOPLE ARE INVOLVED?	Not implemented.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	Not implemented.
WHICH FEATURES ARE MONITORED OR INSPECTED	Not implemented.
HOW MUCH TIME DOES ONE	Not implemented.

CONTROL TAKE?	
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	Not implemented.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Not implemented.
WHAT ARE THE RESULTS? Not implemented.

OTHER DAMAGE PREVENTION MEASURES AND TECHNIQUES

COUNTRY	*AUSTRIA*
REPORTING PERIOD	***2019-2020***
IMPLEMENTED MEASURES	▪ **GPS collars for sheep for herd protection (federal state Salzburg):** funding of GPS bands since 2020 ▪ **GPS collars for sheep for herd protection (HBLFA Raumberg-Gumpenstein):** the idea is to be able to control herds without shepherds from home by analyzing their movements ▪ **Feasibility study on prevention measurements on alpine pastures in Tirol:** a study initiated by the federal state of Tirol to analyze the feasibility of different prevention measures on different types of alpine pastures
TARGETED TYPE OF PROPERTY	▪ **Both GPS collars initiatives:** sheep flocks without shepherds ▪ **Feasibility study:** analysis of four different alpine pastures with sheep herds
TECHNICAL DETAILS	▪ **GPS collars (federal state of Salzburg):** no technical details on funded GPS bands available. ▪ **GPS collars (HBLFA Raumberg-Gumpenstein):** testing of the usage of GPS trackers from vehicle surveillance which use the GSM network in 2019 and 2020. The producing companies are Infostars (60 trackers), Qtrack (52 trackers) and Simpletrack (20 trackers). The goal is to be able to identify unusual movement patterns and panic within the herd via movement analysis. The trackers should last for at least 150 days (battery life) and will be tested on different alpine pastures. GSM reception is necessary to be able to send the positions recorded by the trackers. ▪ **Feasibility study:** the study compiled four different alpine pastures with different natural influence factors (e.g. topography, number of sheep, size of the pasture) and social

	influence factors (e.g. cultivation management, form of organization, tourism). Data on the pastures was gathered on the ground and also all available digital data was compiled (maps of the pastures etc.). After data analysis a strategy for damage prevention was developed (if deemed possible) and costs were calculated (salary for people working on the pasture, fence management, accommodation on the pasture, LGD and herding dogs).
FINANCIAL SOURCES	➢ **GPS collars (federals state of Salzburg):** funded by the federal state of Salzburg ➢ **GPS collars (HBLFA Raumberg-Gumpenstein):** funded as a research project by the HBLFA Raumberg-Gumpenstein, by the federal state Steiermark and LIFE WolfAlps EU ➢ **Feasibility study:** funded by the federal state Tirol
IMPLEMENTATION	• **GPS collars (federal state of Salzburg):** In 2020 first time investments in GPS bands (inkl. straps) are subsidised at 80% of the cost, up to a maximum of EUR 80 per piece; sheep/goats have to be at least one year old and remain at alpine pastures for at least 60 days/year. Overall up to 600 GPS bands can be funded in 2020. For every livestock owner a maximum number of 3 GPS collars is funded: for up to ten sheep/goats according to the definition one GPS system, for eleven to 20 sheep/goats according to the definition another GPS system and for 31 to 50 sheep/goats according to the definition a third GPS system. Measures are supported if there has been an officially recorded incidence of wolves of the respective species within a radius of 30 km within a period of 12 months before the application is submitted.

	▪ **GPS collars (HBLFA Raumberg-Gumpenstein):** testing of different trackers on different alpine pastures in different federal states; trackers are bought together to have lower prices, and farmers are trained by the respective companies. Positions can be taken up to every minute, which makes it easier to check on the sheep because their whereabouts are known. Analysis of movement patterns are possible. ▪ **Feasibility study:** The study was implemented on four alpine pastures and one pasture, which is used before animals are moved higher onto an alpine pasture. For one pasture only costs remained as a restraining factor (and did so for all five pastures which were reviewed!) and the feasibility was assessed as good. For one pasture the feasibility was assessed as currently not given (due to – among other things - the complexity of the area, tourism use and problems with acceptance), for the other three pastures feasibility varied between those two (main challenges: costs, acceptance, forming of herds).
SURVEILLANCE	▪ **GPS collars (HBLFA Raumberg-Gumpenstein):** HBLFA Raumberg-Gumpenstein
EFFECTIVENESS	▪ **GPS collars (HBLFA Raumberg-Gumpenstein):** pilot project currently running, analysis will be done by the end of 2020. First experiences show that most alpine pastures have enough GSM reception for data transfer, number of positions taken will have to be reduced be able to cover the whole period on the pastures.
CHALLENGES	▪ **GPS collars (HBLFA Raumberg-Gumpenstein):** better maps should be used by the providers; if GSM reception is bad, battery performance is less effective; panic detection in the movement is yet to be analyzed and tested.

	▪ **Feasibility study:** The main challenges found by the study are the unavailability of shepherds and a culture of shepherding, the way farms are structured and traditions on alpine pasture management, breeding of sheep versus production of meat and the socio-economic challenges for the implementation of damage prevention (funding and time).
CONTACT INSTITUTION AND PERSON	**GPS collars (federal state of Salzburg):** Hubert Stock, federal state of Salzburg; hubert.stock@salzburg.gv.at **GPS collars (HBLFA Raumberg-Gumpenstein):** Reinhard Huber, HBLFA Raumberg-Gumpenstein, Abteilung Schafe und Ziegen; reinhard.huber@raumberg-gumpenstein.at **Feasibility study in Tirol:** Josef Gitterle, Land Tirol, Abteilung Landwirtschaftliches Schulwesen und Landwirtschaftsrecht; josef.gitterle@tirol.gv.at

3.2 FRANCE

Prepared by:

Ricardo N. Simon (*Chapter Damages*)

Sylvie Rizo (*Chapter Damage prevention*)

3.2.1 **Damages caused by large carnivores in France**

REPORTING COUNTRY / WHICH REGIONS DOES THE REPORT INCLUDE?	FRANCE THE WHOLE COUNTRY
REPORT PREPARED BY	Ricardo N. SIMON, technical coordinator of the LIFE WOLFALPS project at the French biodiversity agency (OFB)
INTRODUCTION / COMMENT OF THE SITUATION	
The abundance and distribution of wolves in France has been progressing yearly since the natural recolonization of the country by individuals coming for the Italian population in the early 1990s. The species has expanded from its initial arrival point in the southern French Alps to colonize the northern section of the chain, as well as mostly mountainous terrain further north and west, including part of the Pyrenees Mountains at the border with Spain. However, most if not all reproducing packs are still located in the Alps. The latest estimate of population size indicates over 500 wolves in the country and maintenance of gene flow with the Italian population. Wolf experts in France therefore considered the population viable over the next 5 to 50 years. Wolf depredation on livestock is a major issue in the country. France has some of the highest rates of the wolf damages on livestock in Europe, mostly implicating sheep in the southern section of the Alps. Sheep flocks in this area might be kept in alpine pastures year round, increasing exposure to wolves. The French state subsidizes protection measures for flocks (guard dogs, electric fencing, shepherd assistants, technical support and vulnerability analysis) and compensates breeders for direct and indirect losses. In addition, the French state has put in place a protocol for lethal control – based on derogation to the species' strictly protected status in accordance with dispositions of the 1992 Habitats Fauna Flora Directive – in an attempt to reduce wolf depredation on livestock. Under strict control by state agents, currently up to 19% of the wolf population can be removed yearly, which corresponds to about 90 to 100 wolves a year.	

LARGE CARNIVORES POPULATION TRENDS IN FRANCE IN THE PERIOD 2010-2019

	WOLVES	
YEAR	**Population estimates (95% CI)**	**Confirmed packs (for wolves)**
2010	120 (90-160)	18
2011	140 (105-175)	19
2012	190 (140-260)	19
2013	160 (130-230)	21
2014	270 (230-310) [1]	27
2015	250 (210-280) [1]	30
2016	260 (215-290) [1]	35
2017	360 (315-400) [1]	44
2018	430 (385-475) [1]	57
2019	530 (480-575) [1]	70

1 – Estimates obtained via a mathematical relationship, established for the period spanning between 1996 and 2013, between wolf numbers obtained by genetic capture-mark-recapture and wolves counted during winter in areas of permanent presence (i.e., areas in which wolf signs, mostly tracks, were observed for two winters in a row).
2 – Estimates are minimum counts based on detection via non-invasive methods (tracks and other signs, camera traps, genetics) and corrected in light of new information (for instance, if an individual was not detected in year t, but is detected in year t+1, it is added to the estimate of year t).
3 – Detected minimum count prior to any correction.

DAMAGES CAUSED BY WOLVES IN FRANCE IN THE PERIOD OF 2010-2019

YEAR	SHEEP		CATTLE		OTHER[1]	
	Damage cases	Animals affected	Damage cases	Animals affected	Damage cases	Animals affected
2010	967	3781	31	34	84	146
2011	1430	4784	15	17	113	196
2012	1750	5792	31	48	158	279
2013	1729	5873	29	32	175	423
2014	2173	8278	40	51	175	321
2015	2286	8508	56	62	205	477
2016	2591	9487	62	106	236	500
2017	3025	11574	92	125	235	497
2018	3321	11518	105	151	320	615
2019	3331	11370	138	199	353	713
TOTAL	***22603***	***80965***	***599***	***825***	***1879***	***5144***

1 – Category includes goats, dogs, horses and other.
2 – Damage compensation paid in France are not differentiated between livestock species (see table below).

Data on damage compensation paid in France for wolf damages are not differentiated between livestock species. The data below are thus pooled for all livestock species. Yet about 95% of livestock depredated in France by wolves are sheep.

YEAR	DAMAGES (€)
2010	1 184 917
2011	1 559 808
2012	1 986 509
2013	2 208 988
2014	2 973 161
2015	3 050 136
2016	3 446 897
2017	3 956 348
2018	3 988 726
2019	4 207 895
TOTAL	***28 563 385***

3.2.2 **Damage prevention measures in France**

ELECTRICITY

TECHNICAL OVERVIEW OF THE IMPLEMENTED MEASURES	
COUNTRY	*France*
REPORTING PERIOD	***2011 – 2019***
IMPLEMENTED MEASURES	Funded measure includes two types of fences: - mobile electric nets - permanent wire pasture parks (minimum 4 wires)
TARGETED TYPE OF PROPERTY	Sheep, goats
HERD / PROPERTY SIZE	Funding is provided for a flock of a minimum size of 25 sheep or goats kept as breeding animals and identified. The amount of the funding depends on the size of the flock and on the flock management system chosen by the breeder.
TECHNICAL DETAILS OF IMPLEMENTED MEASURE(S)	**Mobile electric nets:** • Height: minimum 80 cm • Minimum voltage 3000 V **Permanent wire pasture parks** • minimum 4 electric wires • Height: minimum 80 cm • Minimum voltage 3000 V • Building of non-electric fences: minimum two electric wires per park, one of which is located at the bottom of the fence on the outside.
IMPLEMENTATION	An average of 1500 applications for financial assistance per year since 2015.

CHALLENGES	The location of fences and electrification must be adapted to the environmental conditions: slope, holes, type of soil, weather conditions, etc. The removal of the vegetation around electric fences is essential to ensure their effectiveness (no loss of current).
CHALLENGES AND BASIC REQUIREMENTS	See above.
CONTACT INSTITUTION AND PERSON	Sylvie Rizo (Ministry of agriculture / DGPE/BCCB) - sylvierizo@agriculture.gouv.fr
MORE INFORMATION AND INFO-MATERIALS	/

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
• A subsidy is provided from the 2014/2020 EAFRD for farmers located in eligible areas (based on the occurrence of attacks for the 2 previous years) • An emergency aid from national fund can be provided for farmers facing attacks or difficulties on new settlement.
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
The national regulation taken in application of the EAFRD provides different multi-annual funding ceilings for the 2015-2020 period. They vary from 3.200 € to 31.500 euros depending on the herd management system chosen (either fixed park, mobile electric fence or mixed). The ceiling can be increased by 25% for flocks over 1500 animals. An additional subsidy can be provided to cover the workload which is needed to set up, move and maintain the enclosure when it is made by the farmer. The rate amounts 28,30 € /day.
SURVEILLANCE OF THE IMPLEMENTED MEASURES

WHO IS IN CHARGE OF SURVEILLANCE?	Departmental state authorities of the ministry of agriculture under the responsibility of “Agence de Services et de Paiement”. This public institution is in charge of paying and controlling public aid to beneficiaries.
HOW MANY PEOPLE ARE INVOLVED?	No data
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	Departmental state authorities perform random controls. The breeders are warned in advance. An average of 5 % of breeders are controlled every year.
WHICH FEATURES ARE MONITORED OR INSPECTED	Inspectors verify the enforcement of legal commitments: - the form which reports guarding activities and movements for each flock must be completed; - the size of the flock; - implementation of protection measures chosen; - number of days of shepherding in eligible areas.
HOW MUCH TIME DOES ONE CONTROL TAKE?	No data
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	The aid granted can be reduced or cancelled, depending on the anomaly observed.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
A national study on the effectiveness of protection measures was launched on a national scale in 2014. This study was not focused on fences especially but on the use of all protection measures. In application of the national wolf plan for 2018/2023 a national observatory of protection measures will be implemented soon.
WHAT ARE THE RESULTS?

The national study on the effectiveness of protection measures showed that protection measures are most effective when deployed in combination; the effectiveness of combinations differs according to landscape and pastoral contexts; only combinations of three or more means are likely to limit the number of attacks; the use of shepherds and livestock guarding dogs show the best level of effectiveness (the more limited level of effectiveness of the shepherd is linked to the lack of trained shepherds and the difficult working conditions).

Additional information (photographs, technical details, charts, links to websites, etc.):

Ad: Photographs

Night mobile fence.

Reinforcement of a fixed fence with mobile nets.

Fixed fence.

LIVESTOCK GUARDING DOGS

COUNTRY	***France***
REPORTING PERIOD	***2011 – 2019 (June)***
IMPLEMENTED MEASURES	**Livestock guarding dogs (LGDs)**
TARGETED TYPE OF PROPERTY	▪ Sheeps ▪ Goats
TECHNICAL DETAILS	**Main Breeds concerned:** ▪ Great Pyrenees ▪ *Maremme* Abruzze ▪ Kangal (Anatolian shepherd)
SOURCES OF LGDs (working lines, genetic lines, etc.)	So far, in the Alps, there has been no official program for developing or maintaining pure genetic or working lines. Most of the dogs at work are not registered as pure breed. Farmers get dogs freely on the market. In application of the national plan for wolf 2018/2023, a program to improve the quality and safety of guarding dogs will be implemented; it will be based on the inventory of dogs at work and their characterisation. This will be a start to work on bloodlines with voluntary breeders.

IMPLEMENTATION	Farmers can get financial assistance for the purchase and for the maintenance of a guarding dog. In 2019: - 442 farmers applied for the purchase of 536 guarding dog, - 1516 applied for the maintenance. The approximate numbers of financed livestock guarding dogs at work is 4230.
EDUCATION PROCESS	A guide on good practices for the education of guarding dogs is available (in French). It recommends to use dogs born in the shepherd's care and which live in the flock with their mother from the birth to their eight week at minimum: this is the integration phase in the herd. From 8 weeks of age, the puppy can be separated from its mother (and its brothers and sisters – at least one) and placed alone in its new flock. The pup is regularly in touch with domestic animals and owners provide them with a safe place (e.g. box) where the pup can easily retreat from other animals. This is the attachment phase to the flock (2 – 3 weeks – depending on the dog). During this period, the breeder will have to set up a minimum of socialization and learn how to react in case of unwanted behaviour. The dog's education should progressively lead the animal to obey basic commands: knowledge of his name, notion of right and wrong, tying and walking on a leash, recall and order to return to the flock. In general, after two years the dog is considered reliable and ready for work.
SUPERVISION OF EDUCATION PHASE	The Ministry of Agriculture commissioned the "Institut de l'Elevage" (the National Institute for Breeding) to manage a network of 6 experts in guarding dogs experts (and 14 local relays). These experienced farmers know how to raise, educate and manage guarding dogs. They provide training and personal advice within the technical support measures. The counselling

	procedure aims at improving a dog's integration in the herd, its sociability and behaviour as guarding dog, but is not a control. It is based on voluntary participation of the dog owners. Within personal counselling, experts adapt to the farmer's case and needs; they can be present in the field and reached by telephone. Since 2018, in application of the EAFRD scheme of technical support, farmers can apply for training sessions and advices to improve their knowledge and practice of using guarding dogs. A financial aid is available for: - group training sessions; - individual advice concerning adult dogs (in owner's farm), - individual advice for the introduction of a puppy in the flock (in owner's farm).
CERTIFICATION OF LGDs	There is no existing certification of livestock guarding dogs.
PROTOCOL OF CERTIFICATION	Not implemented.
LEGISLATIVE RESPONSIBILITY OF DOGS' ACTIONS	Under the current state of the law, the owner of a guarding dog cannot be automatically exonerated from his civil and penal responsibilities in case of an accident. However, as for any other type of dog, a condemnation will only be possible if the judge considers that the owner is guilty of negligent behaviour. In the case of guarding dogs, the fact that they move freely, without muzzle and out of the supervision of their owner cannot be sufficient to constitute a fault.
ANIMAL WELFARE OBLIGATIONS	In general, the law requires owners to take care of dogs – to provide food, water and shelter, regardless the type of dog.
CHALLENGES	Breeders complain about the high level of responsibility they take on by using guard dogs because of the risk of conflicts and accidents with neighbours and hikers.

	An inventory will be carried out in order to measure the importance of these accidents and the legal responses that have been given so far. According to the results, the adaptation of the legislation will be discussed. In addition, various communication actions are carried out with mountain users (videos, billboards, etc.) to warn them of the presence of guard dogs and the right attitudes to adopt (see link below). Better use of guarding dogs should also be improved by implementing a breeding program.
CONTACT INSTITUTION AND PERSON	Sylvie Rizo (Ministry of agriculture / DGPE/BCCB) - sylvierizo@agriculture.gouv.fr

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
Within EAFRD scheme a financial support is available for: • Purchase of a guarding dog: 80% of the purchase price with a maximum aid of 375 €; • maintenance of a guarding dog: 652 € / year; • Dog behaviour tests (*): 100% / 500 €. Annual funding ceiling are applied depending on the size of the flock: 4000 € up to 450 animals, and 8000 € for more than 450 animals. <u>Technical assistance:</u> • group training sessions on guarding dogs: 100%. 150 €/ session and per year; • individual advice concerning adult dogs: 600 € per visit; • individual advice for the introduction of a dog in the flock: 600 € per visit. The total annual aid for technical assistance is at the maximum of 2000 €/ year.

(*): behaviour tests are decision-making tool for the farmer. It should help resolve or anticipate potential problems related to the dog's behaviour.
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
There is no extra subsidy to cover the workload which is needed to work with livestock guarding dogs.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	Departmental state authorities of the Ministry of Agriculture under the responsibility of the Agence des Services et des Paiements.
HOW MANY PEOPLE ARE INVOLVED?	No data
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	Departmental state authorities perform random controls. The breeders are warned. An average of 5 % of breeders are controlled.
WHICH FEATURES ARE MONITORED OR INSPECTED	Inspectors checked out the enforcement of legal commitments: - the form which reports guarding activities and movements for each flock must be completed; - the size of the flock; - implementation of protection measures chosen; - number of days of shepherding in eligible areas.
HOW MUCH TIME DOES ONE CONTROL TAKE?	No data.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	The aid granted can be reduced or deleted, depending on the anomaly observed.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
A national study on the effectiveness of protection measures was launched on a national scale in 2014. This study was not focused on dogs specially but on the use of all protection measures. In application of the national wolf plan for 2018/2023 a national observatory of protection measures will be implemented soon.
WHAT ARE THE RESULTS?
The national study on the effectiveness of protection measures showed that protection measures are most effective when deployed in combination; the effectiveness of combinations differs according to landscape and pastoral contexts; only combinations of three or more means are likely to limit the number of attacks; the shepherd and guarding dogs show the best level of effectiveness (the more limited level of effectiveness of the shepherd is linked to the lack of trained shepherds and the difficult working conditions).

Additional information (photographs, technical details, charts, links to websites, etc.):

Ad: Photographs

Kangal (Anatolian shepherd) © Idèle

Maremme *Abruzze* © *Idèle*

Patou (Great Pyrenees) © Idele

Billboard about guarding dogs for hikers

References:

- **Guide for guarding dog education and use**

http://idele.fr/domaines-techniques/sequiper-et-sorganiser/chiens-de-troupeau/chiens-de-protection/publication/idelesolr/recommends/guide-de-lutilisateur-du-chien-de-protection-des-troupeaux.html).

- **General information about guarding dogs**

http://chiens-de-troupeau.idele.fr

- **Communications tools:**

http://www.auvergne-rhone-alpes.developpement-durable.gouv.fr/depliants-brochures-panneaux-d-information-sur-les-a4010.html

SHEPHERDS

COUNTRY	***France***
REPORTING PERIOD	***2014-2019***
IMPLEMENTED MEASURES	**Guarding animals using shepherds**
TARGETED TYPE OF PROPERTY	Sheep, goats
ROLE OF SHEPHERDS	The job list depends the flock management system: <u>Permanent pasture fence management</u>: - ensuring daily surveillance of the herd, including several visits per day, - if necessary, nocturnal grouping of animals inside electrified parks or in a barn ; - ensuring the installation and maintenance of electric fences; - controlling the electrification of fences; - feeding and care of guard dogs. <u>In "guarding" management:</u> - ensuring a daily full-time presence of the farmer or shepherd, and possibly a herdsman with the flock to monitor the movements of the herd, and to manage the installation of mobile parks and guarding dogs.
ARE THEY WORKING WITH LIVESTOCK GUARDING DOGS? IF YES, WHO IS THE OWNER OF DOGS?	Shepherds usually work with guarding dogs owned by the breeder who employs them.
HOW MANY ANIMALS DO THEY TAKE CARE OF?	No data.

DO THEY REPORT THEIR WORK?	Breeders have to fill a form which report guarding activities for each flock. It indicates the period of grazing activities, the location and protection measures implemented.
ORIGIN OF SHEPHERDS	French and foreign workers may be employed. Usually employed by the owner of the flock but in some cases, the owner can also keep his own flock.
ARE THE SHEPHERDS ORGANIZED IN ORGANIZATION?	Several local and a national shepherd organizations exist and take part in national discussions about the wolf public policy. Still, only a minority of shepherds is involved as this profession faces a lot of turn over.
SALARY (per month, season, etc. – define)	The average net salary is around 1800 € /month and may vary with experience.
ARE THE COSTS COFINANCED? WHICH COSTS? ▪ salary, ▪ insurance, ▪ food, ▪ other?	EARDF subsidies can fund extra worktime for flock protection due to predators when done by the owner. EARDF co-finances the salaries of shepherds employed by owner of the flock. National subsidies can be provided to implement shepherd shelters. In some national parks , national subsidies directly finance shepherds units that are intended to help sheep owners who faces difficulties, for instance in case of a wolf attack.
IMPLEMENTATION	There is no specific data on the number of shepherds but according to a recent report on the subject (see below), it could be around 3000. The number of salaried shepherds has increased in the past years with the return of the wolf and the incentives to protect the flocks and the funds provided by the EARDF. In 2019, the equivalent of 455 full time jobs were funded. Only 10 % of the flocks are not guarded in the Alps. In accordance with UE regulation on conditionality, compensation of damages is conditional on the implementation

	of protection measures, and presence of a shepherd is one of them.
INSURANCE	Insurance issues depend on the employment contract.
FOOD	No data.
SHELTER	Shepherds' accommodation is the responsibility of their employer and a national regulation provides minimum standards. Housing conditions play an important role in the attractiveness of jobs for shepherds. The development and encouragement of shepherding has increased the need for new accommodation and the renovation of existing accommodation.
ARE THERE ANY DIFFERENCES BETWEEN SHEEP AND CATTLE SHEPHERDS?	No data on cattle shepherds.
HOW DO THE SHEPHERDS LEARN ABOUT THEIR WORK?	Several short and long training sessions are available but a large majority of shepherds learn by experience. The number of places for training is small and access to funding can be difficult.
RESPONSABILITIES OF SHEPHERDS	In addition to looking after the flock (see job list above), some shepherds in possession of a hunting permit and a specific authorisation can shoot the wolves to protect their flock.
IS THERE ANY PROMOTION OF ROLE / JOB OF SHEPHERDS?	The need to promote the shepherd's profession and improve working conditions has been clearly identified and is on the agenda of public policy on the wolf.
WHAT ARE THE SHEPHERDS DOING OUT OF WORKING SEASON?	In autumn, some shepherds work doing the lambing period. In winter, they generally find work in the tourism industry (ski instructor, ski patrol man, restaurant employee, etc.). Some shepherds may also be employed on a farm as employees or they can be farm managers. Nevertheless, many shepherds face unemployed periods in the off-season.

CHALLENGES	The profession of shepherd faces several challenges: - a lack of data ; - a lack of recognition and valorisation of skills ; - a limited training possibilities, little used; - harsh living and working conditions; - the need to increase the number and quality of housing ; - the need of involvement and cohesion of shepherds to build up collective projects (e.g. companionship, collective agreement, etc.)
CONTACT INSTITUTION AND PERSON	Sylvie Rizo (Ministry of agriculture / DGPE/BCCB) - sylvierizo@agriculture.gouv.fr

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
EARDF subsidies (see below).
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
Within the EAFRD scheme 2014-2020, a financial aid is available for flocks located in eligible areas (based on the occurrence of attacks on the 2 previous years). It covers 80% of the cost of a salaried shepherd (up to 100% in national parks) and is submitted to both monthly and annual ceilings: • 1.250 € / month for fixed park herd management; • 2.500 € / month for mobile electric fence or mixed herd management. • From 5.000 up to 32.000 euros/year including guarding dogs depending on the size of the flock and herd management system chosen. It is based on a rate of 22,64 € / gardening day for a farmer shepherding its own flock. Same annual ceilings are applied as for salaried shepherd.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE ?	Controls are carried out by the agency for services and payments.
HOW MANY PEOPLE ARE INVOLVED?	No data.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	Inspectors perform random controls. The breeders are warned. An average of 5 % of breeders are controlled.
WHICH FEATURES ARE MONITORED OR INSPECTED	Inspectors checked out the respect of legal commitments: - the form which reports guarding activities and movements for each flock must be completed; - the size of the flock; - implementation of protection measures chosen; - number of days of shepherding in eligible areas.
HOW MUCH TIME DOES ONE CONTROL TAKE?	No data.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	The aid granted can be reduced or deleted, depending on the anomaly observed.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
A national study on the effectiveness of protection measures has been launched on a national scale in 2014. This study was focused on the use of all protection measures. In application of the national wolf plan for 2018/2023, a national observatory of protection measures will soon be implemented.
WHAT ARE THE RESULTS?

The national study on the effectiveness of protection measures showed that protection measures are most effective when deployed in combination; the effectiveness of combinations differs according to landscape and pastoral contexts; only combinations of three or more means are likely to limit the number of attacks; the shepherd and guard dogs show the best level of effectiveness (the more limited level of effectiveness of the shepherd is linked to the lack of trained shepherds and the difficult working conditions).

3.3 GERMANY

Prepared by:

Irina Horrix, Katharina Steyer (*Chapter Damages*)

Irina Horrix, Manfred Wölfl (*Chapter Damage prevention*)

3.3.1 **Damages caused by large carnivores in Germany**

REPORTING COUNTRY	Germany
WHICH REGIONS DOES THE REPORT INCLUDE?	Germany (see tables) German/Bavarian Alps (see text)
REPORT PREPARED BY	Irina Horrix, LfU & Katharina Steyer, BfN
INTRODUCTION / COMMENT OF THE SITUATION	

Situation in the German/Bavarian Alps

In the last decades, no large carnivores have been residential in the Bavarian Alps. Yet, wolf attacks on livestock were proven in:

- 2010 in the Mangfall Mountains (14 sheep),
- in 2015 near the Mangfall Mountains (3 sheep),
- in 2017 near Bad Tölz (4 sheep)
- in 2018 in the Allgäu (3 sheep + 5 cows/calves)
- and currently in 2020 in three different regions (Allgäu, Werdenfelser Land, Chiemgau) (3+ 11 + 9 sheep).

Apart from the depredations in the Allgäu in 2018, solely sheep were affected even though in the alpine region cattle are predominantly kept and sheep husbandry plays a minor role. The debate about the wolf is sometimes conducted very emotionally in this part of Bavaria. Within the framework of the 'Bavarian Wolf Action Plan', 'non-protectable pastures' where fencing is not economically reasonable will be defined - alternative prevention methods are not yet considered. In such 'non-protectable pastures', the assessment of alternatives for the removal of a wolf does not include livestock protection measures and compensation payments are not bound to protection measures either. This process slows down advancements in the field of livestock protection. Thus, activities in the Bavarian Alps would have to focus on building awareness about the imperative of livestock protection and the promotion of different practicable options (e.g. emphasizing best-practice examples).

LARGE CARNIVORES POPULATION TRENDS IN GERMANY IN THE PERIOD 2010-2019

	WOLVES		BROWN BEARS
YEAR[1]	**Confirmed number of pups (→ minimum number)**	**Confirmed packs (for wolves)**	**Population estimates**
2010/11	35	7 packs, 7 pairs, 6 solitary	-
2011/12	57	14 packs, 6 pairs, 4 solitary	-
2012/13	63	18 packs, 12 pairs, 3 solitary	-
2013/14	102	25 packs, 11 pairs, 3 solitary	-
2014/15	134	31 packs, 20 pairs, 6 solitary	-
2015/16	175	47 packs, 15 pairs, 4 solitary	-
2016/17	219	60 packs, 13 pairs, 3 solitary	-
2017/18	273	73 packs, 30 pairs, 3 solitary	-
2018/19	394	105 packs, 25 pairs, 13 solitary	-

1 – *The German wolf population is monitored in so-called 'wolf monitoring years'. The wolf monitoring year is a period of 1st May to 30th April next year*

DAMAGES CAUSED BY WOLVES IN GERMANY IN THE PERIOD OF 2010-2019[1]

	SHEEP & GOAT		CATTLE		OTHER			Damages compensated by Federal States in total (€)
YEAR	Damage cases	Animals affected	Damage cases	Animals affected	Damage cases	Category[2]	Animals affected	
2010	38	114	3	3	2	1	23	25.551
2011	61	226	3	3	3	1	19	36.878
2012	47	153	2	2	5	1	20	17.614
2013	68	189	2	3	7	1	27	22.790
2014	99	344	17	19	10	1	23	59.051
2015	155	602	10	16	34	1	94	107.783
2016	202	881	55	67	27	1, 4	128, 3	135.140
2017	311	1397	125	140	36	1, 2, 3, 4	123, 2, 3, 2	187.895
2018	491	1752	115	136	33	1, 2, 3, 4	168, 5, 1, 5	231.790
2019	706	2559	116	127	65	1, 2, 3, 4	194, 11, 2, 1	418.246
TOTAL	**2178**	**8217**	**448**	**516**	**222**		**854**	**1.242.738**

1 – Data was compiled by the DBBW, the Federal Documentation and Consultation Centre on Wolves based on information of the Federal States. Further information and more details are available via www.dbb-wolf.de.

2 – Category Other 1: game kept in enclosures, 2: horse, 3: dogs, 4: others

3.3.2 **Damage prevention measures in Germany**

PREFACE

In the last decades, large carnivores have rarely been stationary in the Bavarian Alps. Therefore, we had to concentrate damage prevention measures in other parts of the country. Yet, there have been wolf attacks on livestock in the Mangfall Mountains in 2010 and lately, in 2018, in the Allgäu. These attacks and the general necessity of livestock protection (in regard to e.g. dispersing wolves and other predators) have led to some smaller prevention projects and fence material distribution in the region.

ELECTRICITY

TECHNICAL OVERVIEW OF THE IMPLEMENTED MEASURES	
COUNTRY	*GERMANY, Bavaria*
REPORTING PERIOD	***2010-2020***
IMPLEMENTED MEASURES	- Stockage of intervention kits at local level 2011-2020 - Distribution of fence material to livestock farmers after attacks - Distribution of fence material to livestock farmers near wolf territories - Fence construction help in urgent cases (i.e. repeated lynx attacks on the same enclosure, bear presence)
TARGETED TYPE OF PROPERTY	▪ Predominantly sheep and goats, 2019 and 2020 calves in rare occasions ▪ 2020: stationary beehive (breeding of queens) due to bear presence
HERD / PROPERTY SIZE	All
TECHNICAL DETAILS OF IMPLEMENTED MEASURE(S)	**Electric nettings** ▪ Mobile fences ▪ Height: 106 cm, 120 cm, 145 cm, 160 cm, 170 cm → currently predominantly 90-106 cm ▪ Minimum voltage 4000 V

	Multi-wire electric fences ▪ mobile fences ▪ Height: at least 90 cm ▪ Structure: at least 4 lines of hot wire ▪ Minimum voltage 4000 V **Lynx defense after repeated attacks on enclosures (not yet in the Alps)** ▪ Part time prevention by securing the complete enclosure with a mobile electric net (height 170/140 cm) ▪ Installing one or two wires on top of the enclosure fence (two wires attached at a separate construction angling about 45° outwards) 2019: enhancement of three enclosures with only one line of hot wire at the top-outside of the fences (see picture below)
IMPLEMENTATION	**Project budgets** (2010-2012) → **Prevention Fund** (2012-2020) ➢ Intervention kits are stored at local level (each: 20 nets with a height of 170 cm, 4 electric fence energizers, 8 batteries, 2 solar panels) ➢ Individual material supply to 29 livestock farmers
CHALLENGES	▪ Until today, we did not use the intervention kits, but the requirements towards the material have evolved. Thus, the stored nets (170 cm) are not appropriate in many cases due to more difficult handling. ▪ After the wolf attacks in 2019, only a single sheep farm received fence material, whereas the affected cattle farmers believed damage prevention in the Alps was not feasible. ▪ The proper use of the distributed material is not monitored.
CHALLENGES AND BASIC REQUIREMENTS	▪ The Bavarian Wolf Action Plan comprises the idea to define pastures which cannot be protected (= where prevention measures are not economically reasonable) in advance. The

	definition of an area as a “non-protectable pasture” shall facilitate the assessment of alternatives in special cases. An exceptional permission (according to federal nature conservation law) would still be necessary for the removal of a wolf. Current pilot work is focusing on fencing possibilities only, neglecting measures like using livestock guarding dogs or further developing grazing systems (e.g. herding practices, temporal fencing).
CONTACT INSTITUTION AND PERSON	**Bavarian Environment Agency (LfU)** Irina Horrix (Irina.horrix@lfu.bayern.de), Manfred Wölfl (Manfred.Woelfl@lfu.bayern.de)
MORE INFORMATION AND INFO-MATERIALS	▪ **Website:** ▪ https://www.lfu.bayern.de/natur/wildtiermanagement_grosse_beutegreifer/praevention/index.htm ▪ **Federal state aid program:** ▪ https://www.stmuv.bayern.de/themen/naturschutz/bayerns_naturvielfalt/wildtiermanagement/doc/foerderrichtlinie_investition_herdenschutz_wolf.pdf ▪ https://www.stmuv.bayern.de/themen/naturschutz/bayerns_naturvielfalt/wildtiermanagement/doc/mrkblatt_foeihw.pdf ▪ https://www.stmelf.bayern.de/agrarpolitik/foerderung/244077/

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
▪ **‘Prevention fund’** (2012-2020): The ‘prevention fund’ was initiated in 2012 after wolf attacks on livestock in the Mangfall Mountains. The LfU can buy material and grant it to livestock farmers who experienced attacks. Additionally, intervention kits were stocked at local level and fence material

for prevention (and a long-term material test) was purchased to farmers in proximity to wolf territories.

- **Federal state aid program 'FöRIHW'** (since May 2020): The environmental ministry finances 100 % of the purchase of equipment to farmers who graze their animals within a designated area around the territories of stationary wolves and around 'incidence areas' (see map on the website below). The agricultural administration processes the applications. With the start of the 'FöRIHW', the 'prevention fund' stays only available for cases in which lynx or bear are involved.

SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD

The FöRIHW covers the costs for a professional first-time installation of stationary fences for sheep, goats, calves and cattle up to 24 months.

Wandering sheep subsidy: In 2019, the Federal Ministry of Agriculture (BMEL) made a total of 1.05 million euros available to provide financial support for the extra workload made by **wandering shepherds** to protect their herds against wolf attacks (e.g. for fencing or use of LGDs). From July 15 to October 10, 2019, wandering shepherds who move with their flocks through wolf and wolf prevention areas could apply to the BLE for funding for protection measures against the wolf. If all necessary conditions for funding were met, a grant of **36 euros per wandering sheep** was granted. Due to very strict conditions, only seven applications were received from Bavaria, 2 of which were approved with a total amount of **21,636.00 €.**

For the future, subsidies for extra workload are planned to be financed within the framework of the national agricultural funding instrument *"Joint Task Improvement of the agricultural structure and coastal protection*" (GAK).

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	**'Prevention fund'**: The Bavarian Environment Agency (LfU) is in charge of control and evaluation. **Federal state aid program 'FöRIHW':** Both Bavarian ministries (environment & agriculture) are in charge of surveillance of the proper use of state aid funds.
HOW MANY PEOPLE ARE INVOLVED?	**'Prevention fund'**: The prevention fund is administrated by one project employee at the Bavarian Environment Agency (LfU). **Federal state aid program 'FöRIHW':** Inspection teams at the 'Office for Food, Agriculture and Forestry' in each 'Rural District Office' will randomly control 5 % of the supported livestock farmers each year. Additional controls are necessary but their implementation is still in progress.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	**Federal state aid program 'FöRIHW':** The procedure must still be elaborated.
WHICH FEATURES ARE MONITORED OR INSPECTED?	**'Prevention fund':** The correct use of the material is not monitored systematically. Only few farmers have been surveyed concerning the suitability of the tested material, so far. **Federal state aid program 'FöRIHW':** Presumably, the inspection teams will only check whether the details indicated in the application form (land area, amount of requested money) are in accordance with the actual situation in the field. **The inspection teams will inspect neither the number of animals, nor the fence height or the energy supply. → Additional controls are necessary.**
HOW MUCH TIME DOES ONE CONTROL TAKE?	**Federal state aid program 'FöRIHW':** Must still be elaborated.

WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	**Federal state aid program 'FöRIHW':** The state aid contract dictates a refunding of the subsidy, partly or completely, depending on the severity of the improper use or subsidy fraud.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
'Prevention fund': Not specifically measured. **Federal state aid program 'FöRIHW':** A protocol for the evaluation of the state aid program is still in progress.
WHAT ARE THE RESULTS?
None of the farmers who received material or emergency help has experienced (further) damages to their animals.

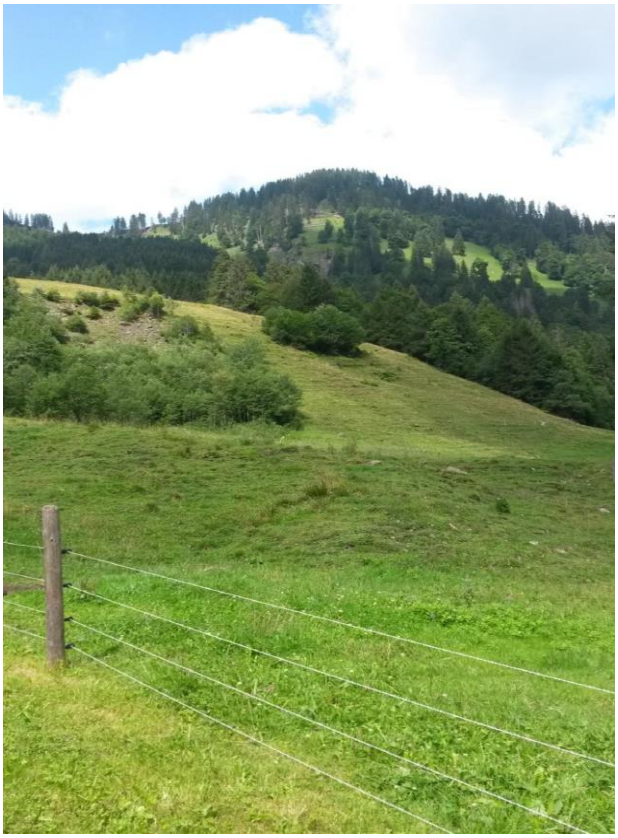
Additional information (photographs, technical details, charts, links to websites, etc.):

Ad: Photographs:

Intervention kit

106 cm electric nettings protecting goats and sheep.

120 cm electric nettings with one additional hot wire at 150 cm protecting goats.



4-wire electric fence (90 cm high) protecting cattle.

5-wire electric fence (120 cm high) protecting calves.

5-wire electric fence protecting goats.

5-wire electric fence (120 cm height), damage prevention due to bear presence.

Tested options of electric enforcement of deer enclosures after repeated lynx attacks.

LIVESTOCK GUARDING DOGS

COUNTRY	***GERMANY, BAVARIA***
REPORTING PERIOD	***2011 – 2016***
IMPLEMENTED MEASURES	▪ (2011: Pilot project in the Mangfall Mountains: Pooling animals of different flocks, **integration of LGDs** and shepherds with shepherding dogs, see 5.) ▪ **2012: Pilot project "Integration of livestock guarding dogs (LGDs) in two farms in Berchtesgaden"** ▪ (Information evenings, informational farm visits and excursions for farmers in order to promote LGDs)
TARGETED TYPE OF PROPERTY	▪ Sheep ▪ Ponies, horses
TECHNICAL DETAILS	**Breeds included**: ▪ Maremmano Abruzzese Two livestock owners purchased LDGs at age of approximately 2 years from a Swiss breeder.
SOURCES OF LGDs (working lines, genetic lines, etc.)	Walter Hildebrand, Swiss breeder at the livestock protection center Jeizinen, Switzerland.
IMPLEMENTATION	Inspired by informative meetings, expert visits on their farms and the demonstration of LDGs in the below-described *pilot project in the Mangfall Mountains*, two local livestock owners decided to integrate LDGs into their herds. The LfU arranged the contact to a Swiss breeder and supported the farmers within the scope of the 'prevention fund'. The **farmers themselves financed the purchase of the dogs**. One farmer purchased a single dog; the other farmer purchased two dogs. The following activities were financed via the '**prevention fund'**:

	➢ five days of supervised integration by the Swiss breeder Walter Hildebrand ➢ follow-up visit by the Swiss breeder Walter Hildebrand ➢ additional advice and trainings by German LGD-trainer/ cynologist ➢ LGD information boards ➢ Guided tours offered by the two farmers in order to they pass their experiences to multipliers.
EDUCATION PROCESS	The Swiss breeder Walter Hildebrand raised the three LGDs in sheep herds. In spring 2012, the LGDs joined their new owners under the surveillance of Walter Hildebrand, where they were slowly integrated in the herds. <u>Sheep farm:</u> At first, the owners provided a safe sleeping place in the barn (on the leash). On the second day, the dogs joined the herd on the meadow (leashed), whereas on the third day the dogs could already move freely on the pasture and the barn without the leash. Walter Hildebrand followed the integration and corrected any unwanted behavior (LDGs and sheep towards LGDs). Later the dogs stayed with the herd all the time. <u>Pony/Horse farm</u>: Due to the injury risk and the unknown livestock species for the dog, the integration of the LGD into the pony herd was much more time intensive. The LGD was very anxious in the beginning and had to be accustomed to the new animals by multiple leashed walks among the herd each day.
SUPERVISION OF EDUCATION PHASE	5 days of supervised integration by the Swiss breeder and one additional visit later on.

CERTIFICATION OF LGDs	In some German states, associations have elaborated different LGD certification tests, which are accepted by the states or which are performed on behalf of the state. In Bavaria, such a system is not in place, yet. A new Bavarian-Thuringian corporation was founded in 2019 and has already certified some LDGs in Thuringia (https://verbandherdenschutz.de/). The LfU has still not monitored whether the certification is satisfactory.
PROTOCOL OF CERTIFICATION	The protocol of the certification test generally includes an individual character check of the LGD (e.g. by testing the behavior towards the owner and towards strangers) and a test of the LDG /a team of two LGDs within (in some cases an unknown) herd. The general behavior in the herd (distance to the fence, territorial behavior, interaction with herd animals) and the reaction to different disturbances outside the fence (e.g. unknown person, bicycle driver, car, drone, dog) are tested. Sometimes a person (in a protection suit) may even climb over the fence and walk inside the paddock.
LEGISLATIVE RESPONSIBILITY OF DOGS' ACTIONS	No special status of livestock guarding dogs. The owner is fully responsible for all dog's actions, regardless the location (pasture and outside). In case of an attack, the procedure is the same for all types of dogs.
ANIMAL WELFARE OBLIGATIONS	In general, the law obligates owners to take care of dogs – to provide food, water and shelter, social contact to the owner and enough possibilities to move around freely, regardless the type of dog. Some phrases from the law left space for a discussion about the legality of keeping dogs behind electric fences and the obligation to provide a doghouse. In 2017, the German ministry for Food and Agriculture made clear that it is legal to use LGDs behind electric fences only a weatherproof and isolated place to lay down is necessary. Moreover, the ministry announced a**n**

	amendment of the animal welfare law for dogs, which clarifies the legal obligations concerning LDGs. However, this amendment is still under development.
CHALLENGES	LGDs are still in a very early state in Bavaria. A main problem is a still widespread negative attitude towards LGDs. Some people picture them as aggressive and dangerous and have little understanding for the necessity of their use (maybe due to still very low numbers of wolf attacks in Bavaria). Especially when LGDs are located near or inside villages or inside the barn during the winter months, neighbors often complain about the barking of the dogs or take legal action against the livestock owners. The status of LGDs in the German legislation is unclear and not yet defined. Some farmers fear the responsibility and legal consequences in case of an attack on people who enter a pasture guarded by LGDs. The above-described problems may explain why many livestock owners have adopted the idea that LGDs can only be used in remote areas. Keeping LGDs is extremely time- and cost-intensive. Livestock owners would very much prefer a financial aid for the maintenance expenses for the LGDs (food, veterinarian costs) instead of the lately introduced subsidies on the purchase of dogs. **Federal state aid program 'FöRIHW'**: Especially in the beginning, visits or the **availability of advisors** in case of troubles or everyday challenges might be necessary. However, such measures are not foreseen within the framework of the current program.
CONTACT INSTITUTION AND PERSON	Irina Horrix, **Bavarian Environment Agency (LfU)** (Irina.horrix@lfu.bayern.de)

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
Federal state aid program 'FöRIHW' (since May 2020): The environmental ministry finances the purchase of LDGs up to 3000 € per dog. LDGs are only promoted in a designated area around the territories of stationary wolves and around 'incidence areas' (this area is wider than the one regarding the promotion for fences, see map on the website below). With the start of the 'FöRIHW', the 'prevention fund' stays only available for cases in which lynx or bear are involved.
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
Wandering sheep subsidy: In 2019, the Federal Ministry of Agriculture (BMEL) made a total of 1.05 million euros available to provide financial support for the extra workload made by **wandering shepherds** to protect their herds against wolf attacks (e.g. for fencing or use of LGDs). From July 15 to October 10, 2019, wandering shepherds who move with their flocks through wolf and wolf prevention areas could apply to the BLE for funding for protection measures against the wolf. If all necessary conditions for funding were met, a grant of **36 euros per wandering sheep** was granted. Due to very strict conditions, only seven applications were received from Bavaria, 2 of which were approved with a total amount of **21,636.00 €.**

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	**Pilot project:** The intense contact to both pilot farms ended after the successful integration of the LGDs and the transmission of one report by each livestock owner. **Federal state aid program 'FöRIHW':** Both Bavarian ministries (environment & agriculture) are in charge of surveillance of the proper use of state aid funds.
HOW MANY PEOPLE ARE INVOLVED?	**Pilot project**: The livestock farmers were intensively supported by a national park employee who is as well a volunteer in the wildlife management of the LfU. One project employee of the Bavarian Environment Agency (LfU) and the Swiss breeder were involved, too.

	Federal state aid program 'FöRIHW': Inspection teams at the 'Office for Food, Agriculture and Forestry' in each 'Rural District Office' will randomly control 5 % of the supported livestock farmers each year.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	**Federal state aid program 'FöRIHW':** Must still be elaborated.
WHICH FEATURES ARE MONITORED OR INSPECTED?	**Federal state aid program 'FöRIHW':** Presumably, the inspection teams will only check whether the details indicated in the application form (e.g. number of financed LGDs) are in accordance with the actual situation in the field. **The inspection teams will presumably not inspect the condition of the dogs, nor their behavior as guarding dogs or their integration into the herd → additional visits/supervisors/advisors are necessary.**
HOW MUCH TIME DOES ONE CONTROL TAKE?	**Federal state aid program 'FöRIHW':** Must still be elaborated.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	**Federal state aid program 'FöRIHW':** The state aid contract dictates a refunding of the subsidy, partly or completely, depending on the severity of the improper use or subsidy fraud.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
'Prevention fund': Not specifically measured. **Federal state aid program 'FöRIHW':** A protocol for the evaluation of the state aid program is still in progress.
WHAT ARE THE RESULTS?
None of the new owners of LGDs has experienced damages to their animals.

Additional information (photographs, technical details, charts, links to websites, etc.):

Ad: Photographs:

Maremmano Abruzzese with sheep.

Maremmano Abruzzese with sheep at the Wimbach river.

Pony farm: Anxious Maremmano Abruzesse in the beginning of the integration.

Pony farm: Successful integration of LGD into a mixed pony and horse herd.

SHEPHERDS

COUNTRY	***GERMANY, Bavaria***
REPORTING PERIOD	***2010-2020***
IMPLEMENTED MEASURES	Experience with shepherding in the presence of predators has so far been limited and must first be regained. The active herding of a flock of sheep in the lowlands or low mountain ranges has nothing in common with the herding of a flock of sheep or cattle in the mountains, where in recent decades in Bavaria **the focus -if shepherds are present at all- has been more on animal control**. Bavaria does not have the distinctive shepherd culture in sheep like Switzerland, where shepherd dogs are also used in the mountains and the herd is fenced at night. For the whole of Bavaria, the demands on shepherds will increase considerably in the presence of predators. This applies also to shepherds on alps.
TARGETED TYPE OF PROPERTY	Mainly cattle, only about 3.000 to 4.000 sheep and goats graze on Bavarian alps.
ROLE OF SHEPHERDS (JOB LIST)	During the grazing season in the mountains, the shepherd **regularly checks and looks after** the herd entrusted to him (e.g. health control). Due to the size of the area, grazing without fencing - so-called "free grazing" - may mean that the shepherd cannot check all the animals every day. **This form of shepherding is not an effective protection against attacks by large carnivores.**
ARE THEY WORKING WITH LIVESTOCK GUARDING DOGS? IF YES, WHO IS THE OWNER OF DOGS?	In the Bavarian Alps, barely any livestock farmers/shepherds work with LGDs.
HOW MANY ANIMALS DO THEY TAKE CARE OF?	Herd size differs between 5-700 animals

DO THEY REPORT THEIR WORK?	Not implemented.
ORIGIN OF SHEPHERDS	External employees if the alp (not the animals!) is permanently shepherded (e.g. milk producing alps). Regularly control visits of the livestock owners in other cases (e.g. free grazing sheep), could be once a week or even less.
ARE THE SHEPHERDS ORGANIZED IN ORGANIZATION?	**No specific shepherd organization.** Livestock keepers are organized in the: ▪ Bavarian sheep keeper/ goat keeper association and/or ▪ Alpine pasture management associations: - AV0: https://almwirtschaft.net/ - AVA http://www.alpwirtschaft.de/über-uns/)
SALARY (per month, season, etc. – define)	No data.
ARE THE COSTS COFINANCED? WHICH COSTS? ▪ salary, ▪ insurance, ▪ food, ▪ other?	The use of a shepherd on a recognized alpine pasture/mountain pasture is subsidized by the state within the framework of the so-called 'cultural landscape program'. Salary, up to 2.750 € per grazing season
IMPLEMENTATION	Not implemented.
INSURANCE	Not implemented.
FOOD	Not implemented.
SHELTER	Not implemented.
ARE THERE ANY DIFFERENCES BETWEEN SHEEP AND CATTLE SHEPHERDS?	Not implemented.

HOW DO THE SHEPHERDS LEARN ABOUT THEIR WORK?	Specific further training of shepherds working in the mountains - not only, but also on the subject of large carnivore damage prevention - is currently **only available in Switzerland**. Shepherds in Bavaria receive further training in the alpine pasture and alpine management schools of the offices for nutrition, agriculture and forestry as well as in the alpine pasture management associations.
RESPONSABILITIES OF SHEPHERDS	Not implemented.
IS THERE ANY PROMOTION OF ROLE / JOB OF SHEPHERDS?	Not implemented.
WHAT ARE THE SHEPHERDS DOING OUT OF WORKING SEASON?	Not implemented.
CHALLENGES	▪ permanent shepherding demands a change of the current herding system in most cases ▪ the use of a shepherd is costly and labor-intensive, but only economic with a flock of around 200 sheep ▪ lack of experienced shepherds Due to the mostly small herd sizes, shepherding in Bavaria is therefore hardly feasible for most animal owners. One solution may be to combine several herds (see 5.). However, the advantages of shepherding with the problems of herd pooling (disease transmission, different husbandry systems, lack of coherent areas) must be openly discussed.
CONTACT INSTITUTION AND PERSON	Manfred Wölfl, LfU

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
-
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
For the future, subsidies for the maintenance of LGDs are planned to be financed within the framework of the national agricultural funding instrument *"Joint Task Improvement of the agricultural structure and coastal protection*" (GAK).

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	Not implemented.
HOW MANY PEOPLE ARE INVOLVED?	Not implemented.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	Not implemented.
WHICH FEATURES ARE MONITORED OR INSPECTED?	Not implemented.
HOW MUCH TIME DOES ONE CONTROL TAKE?	Not implemented.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	Not implemented.

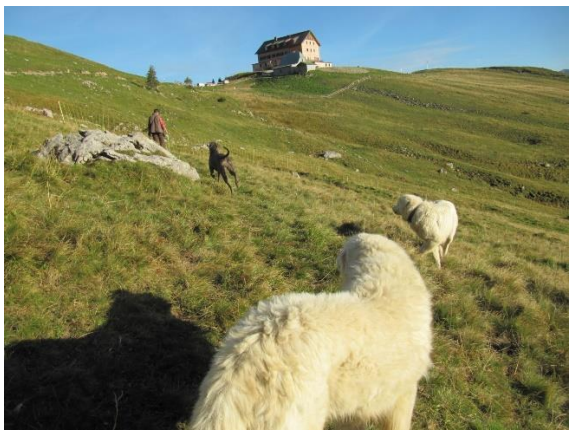
EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Not implemented.
WHAT ARE THE RESULTS?
Not implemented.

OTHER DAMAGE PREVENTION MEASURES AND TECHNIQUES

COUNTRY	***Germany***
REPORTING PERIOD	***2011; 2014***
IMPLEMENTED MEASURES	▪ **Pilot project** to demonstrate pooling of different sheep flocks and integration of livestock guarding dogs and shepherds with shepherding dogs, led by Swiss professionals (2011-09-26 - 2011-10-04)
TARGETED TYPE OF PROPERTY	Sheep flocks of three different owners
TECHNICAL DETAILS	▪ Shepherd pooled the three different groups and got them used to herding dogs ▪ Then two guarding dogs were integrated into the system, letting sheep and herding dogs get used to them ▪ exemplary drives of the total flock, use of a night pen ▪ behavior of guarding dogs towards tourists (hikers, cyclists, other dogs) ▪ demonstration of complete system for interested public
FINANCIAL SOURCES	➢ Prevention fund (state money)
IMPLEMENTATION	two weeks project to test and demonstrate new herding system in the Alps
SURVEILLANCE	LfU (report)
EFFECTIVENESS	Pilot project with no wolf around
CHALLENGES	▪ Loss of lambs ▪ difficulties due to inexistent herd structure / missing leader sheep
CONTACT INSTITUTION AND PERSON	Manfred Wölfl, LfU

Pilot Project with pooled sheep, LGDs and herding dogs.

Pilot Project: Integration of the LGDs into the herd.



Demonstration of LGDs to interested public.

3.4 **ITALY**

Prepared by:

Arianna Menzano (*Chapter Damages*)

Arianna Menzano (*Chapter Damage prevention*)

With the contribution of:

Regione Autonoma Valle d'Aosta: Christian Chioso, Fabrizio Truc

Regione Piemonte: Arianna Menzano, Francesca Marucco, Emanuele Parzanese, Paola Rasetto, Mauro Bruno

Regione Liguria: Giovanni Maceli, Sabrina Bertolotto

Regione Lombardia: Elisabetta Rossi, Sonia Braghiroli, Laura Cucè

Provincia Autonoma di Trento: Matteo Zeni, Paolo Zanghellini, Natalia Bragalanti, Claudio Groff

Regione Autonoma Friuli Venezia Giulia: Giuliana Nadalin

Regione Veneto: Sonia Calderola

3.4.1 **Damages caused by large carnivores in Italy**

REPORTING COUNTRY /	Italy
WHICH REGIONS DOES THE REPORT INCLUDE?	Regione Piemonte, Regione Liguria, Regione Valle d'Aosta, Regione Friuli Venezia Giulia, Provincia Autonoma di Trento, Regione Veneto, Regione Lombardia
REPORT PREPARED BY	Arianna Menzano with the collaboration of: - Regione Autonoma Valle d'Aosta: Christian Chioso, Fabrizio Truc - Regione Piemonte: Arianna Menzano, Mauro Bruno - Regione Liguria: Giovanni Maceli, Sabrina Bertolotto - Regione Lombardia: Elisabetta Rossi, Laura Cucè - Provincia Autonoma di Trento: Matteo Zeni, Claudio Groff, Natalia Bragalanti, Paolo Zanghellini - Regione Autonoma Friuli Venezia Giulia: Giuliana Nadalin - Regione Veneto: Sonia Calderola

INTRODUCTION / COMMENT OF THE SITUATION

We find that numbers of wolves increased during the last years and we expect this trend to continue with a strong expansion of individuals to the eastern Italian Alps. Wolves and therefore depredation events can occur anywhere in Italy. The most important livestock damages are caused by stable packs in new recolonized areas.

The number of depredation events can vary among Regions due to the number of wolves but, above all, to the different diffusion and the correct use of the protection systems. Data on damage attacks are very different depending on the considered Region.

The strong administrative and legislative fragmentation among the Italian Regions is connected to the absence of approach homogeneity in collecting data on damage attacks and on damage compensation methods. Even, it should be emphasized that, until 2016, the 4 Ligurian provinces treated the matter in a substantially

different way, while subsequently the Liguria Region adopted a uniform procedure. So, it is very difficult to collect, analyze and present those data.

Up to now, the main livestock species killed in wolf depredation events were sheep, followed by goats and cattle. The livestock number and species present in the pastures vary among Alpine Regions. As a whole, minor ruminal clearly prevail, with some minor exception for the western Alps and the central-eastern Alps where bovine predominant. Also the number of animals grazed by each breeder is not uniform in the territory, varying according to the Regional zootechnical evolution. For example, in the western Alps, where wolf returned at the end of '90s, a progressive disappearance of small flocks has been observed in favors of bigger ones (composed by different owners who gave their livestock in guard to a single shepherd).

Data are presented for each Regional situation due to the impossibility to combine them together in a unique table, due to the facts that:

- not always data on large carnivore presence are provided from the Administrations, above all for bear, or they are not available (Region Liguria);

- not always data on damages are available or provided from the Administrations in the format required.

LARGE CARNIVORES POPULATION TRENDS IN ITALY PER REGIONS IN THE PERIOD 2010-2019

Reporting region Valle d'Aosta

	WOLVES	
YEAR	**Population estimates**	**Confirmed packs**
2010	1-5	0
2011	1-5	0
2012	1-5	0
2013	1-5	0
2014	5-10	1
2015	7-15	2
2016	7-15	2
2017	20-30	3
2018	30-40	5
2019	40-50	7

Reporting region Liguria

	WOLVES	
YEAR	**Population estimates**	**Confirmed packs**
2010		
2011		
2012		
2013		
2014	59	6
2015		
2016		
2017		
2018		
2019		

Reporting region Piemonte

	WOLVES	
YEAR	**Population estimates**	**Confirmed packs**
2010	62	14
2011	70	15
2012	50	15
2013		
2014		
2015	133	21
2016	151	27
2017		
2018	195	32
2019		

Reporting region Lombardia

	WOLVES		BROWN BEARS
YEAR	**Population estimates [1]**	**Confirmed packs**	**Population estimates[2]**
2010			3
2011			2
2012			5
2013			1
2014	1 ind. Alps		3
2015	1 ind. Alps + 1 pack Alps (n. ind. unknown) + 4-6 packs Appennine (22-24 ind.)	1 Alps + 4-6 Appennine	2
2016	1 ind. Alps + 1 pack Alps (n. ind. unknown) + 4-6 packs Appennine (22-24 ind.)	1 Alps + 4-6 Appennine	3
2017	1 ind. Alps + 2 packs Alps (n. ind. unknown) + 4-6 packs Appennine (22-24 ind.)	2 Alps + 4-6 Appennine	1
2018	1 ind. Alps + 2 packs Alps (1 of 7 ind. and 1 n. ind. unknown) + 4-6 packs Appennine (22-24 ind.)	2 Alps + 4-6 Appennine	3
2019	2 individuals (1 Alps and 1 in plain) + 2 packs Alps (1 of 4 ind. and 1 n. ind. unknown)	2 Alps	4

1 – *Minimum number of individuals and of packs (with number of individuals), confirmed by genetic analysis or observations. Appenninne data are available only for 2015-2018.*

***Minimum number of individuals confirmed by genetic analysis and radio-collars. In Lombardy region we just have transitory presence of young males in dispersion and, only in last years, recurrent seasonal presence of adult males. No stable presence and no breeding activity.*

Reporting region Provincia Autonoma di Trento

	WOLVES		BROWN BEARS
YEAR	Population estimates	Confirmed packs	Population estimates*
2010			27
2011			33
2012			29
2013		1	40
2014		1	38
2015		1	41
2016		3	46
2017		6	48
2018		7	51
2019		13	66

** Source: Groff C., Angeli F., Asson D., Bragalanti N., Pedrotti L., Zanghellini P. (editors), 2020. 2019 Large Carnivores Report, Autonomous Province of Trento's Forestry and Wildlife Department.*

Reporting region Friuli Venezia Giulia

	WOLVES		BROWN BEARS
YEAR	Population estimates	Confirmed packs (for	Population estimates
2010			
2011			
2012			
2013	2		
2014	2		
2015	2		
2016			
2017	2		16[1]
2018	4	2	2[1]
2019	4	2	

1 – resident or vagrant bears identified by genetic analysis.

Reporting region Veneto

WOLVES		
YEAR	Population estimates	Confirmed packs (for wolves)
2010		
2011		
2012		
2013		
2014		1
2015		1
2016		1
2017		
2018		7
2019		

DAMAGES CAUSED BY WOLVES IN ITALY PER REGIONS IN THE PERIOD OF 2010-2019

Reporting region Liguria

	SHEEP AND GOATS			CATTLE			OTHER			TOTAL
YEAR	**Damage cases**	**Animals affected**	**Damages (€)**	**Damage cases**	**Animals affected**	**Damages (€)**	**Damage cases**	**Animals affected**	**Damages (€)**	**Damages (€)**
2010	27	61	6560,00	15	15	5292,00	0	0		11.852,00
2011	41	101	12481,70	13	15	6162,00	0	0		18.643,70
2012	21	69	6631,17	11	12	3602,00	4	4	3242,00	13.475,17
2013	44	155	14678,55	7	7	1753,40	0	0		16.431,95
2014	37	120	13969,68	6	6	2382,50	0	0		16.352,18
2015	35	98		6	6		9	4		31.757,05
2016	23	63	8407,05	3	3	3175,00	1	1	600,00	12.182,05
2017	52	80		8	9		1	1		11.469,57
2018	48	147		8	9		1	1		21.878,16
2019	64	124		10	12		1	1		23.050,08
TOTAL	**392**	**1018**	**62728,15**	**87**	**94**	**22366,9**	**17**	**12**	**3842**	**177091,91**

Reporting region Lombardia

YEAR	SHEEP AND GOATS		CATTLE		OTHER		TOTAL
	Damage cases	Animals affected	Damage cases	Animals affected	Damage cases	Animals affected	Damages (€)
2010							
2011							
2012	1	6					600
2013			1	1			700
2014	3	12					2116
2015							
2016	4	14					7450
2017	7	50					9724,8
2018	1	4	1	1	2	3	7980,9
2019	5	8					2360
TOTAL	**21**	**94**	**2**	**2**	**2**	**3**	**30.931,7**

Reporting region Valle d'Aosta

YEAR	SHEEP AND GOATS			CATTLE			OTHER		
	Damage cases	Animals affected	Damages (€)	Damage cases	Animals affected	Damages (€)	Damage cases	Animals affected	Damages (€)
2010									
2011									
2012	2	7	1023,20				3	4	738
2013	8	57	3112,26	2	5	1186,42	4	18	701,32
2014	5	40	5000,00						
2015	2	5	150,40	1	1	349,60			
2016	9	41	3412,16	3	4	1956,40	4	4	851
2017	10	70	4522,00	5	27	28.827,00	8	10	1659,39
2018	27	82	5394,60	14	17	250	16	42	2046,60
2019	34	100	8815,39	20	30	10063,00	11	19	8644,50
TOTAL	**97**	**402**	**31.430,01**	**45**	**84**	**42.632,42**	**46**	**97**	**14.640,81**

Reporting region Veneto

YEAR	SHEEP AND GOATS		CATTLE		OTHER		TOTAL		
	Damage cases	Animals affected	Damage cases	Animals affected	Damage cases	Animals affected	Damage cases	Animal affected	Damages (€)
2010									
2011									
2012							4	10	2.760
2013							7	7	5.180
2014							38	51	46.543
2015							43	48	48.643
2016							77	103	50.010
2017		251*		107		27	176	385	136.343,60
2018		292*		125		33	196	450	204.684,90
2019	79*	310*	81	112	38	58	198	480	198.755
TOTAL	**79**	**853**	**81**	**344**	**38**	**118**	**739**	**1534**	**692.919,5**

Reporting region Piemonte

YEAR	SHEEP AND GOATS	CATTLE	OTHER	TOTAL
	Animals affected	Animals affected	Animals affected	Damages (€)
2010	254	18		64955,22
2011	346	35	1	92655,94
2012	409*	49	2	67042,00
2013	590*	44		74770,00
2014	333*	54	1	37989,00
2015	388*	65	3	59551,00
2016	311*	37		49442,00
2017	433*	57		40552,71
2018	397*	57		32871,07
2019	552*	87		
TOTAL	**4013**	**503**	**7**	**519.828,9**

Reporting region Provincia autonoma di Trento

YEAR	SHEEP AND GOATS		CATTLE		OTHER		TOTAL		
	Damage cases	Animals affected	Damage cases	Animals affected	Damage cases	Animals affected	Damage cases	Animals affected	Damages (€)
2010									
2011									
2012									
2013							4		6.930,00
2014							10		9.200,00
2015							17		14.942,00
2016							32		34.567,93
2017	23	75	22	25	9	15	54	115	46.925,59
2018	33	161	27	29	12	32	72	222	76.589,94
2019	26	149	6	6	13	26	45	181	37.394,13
TOTAL	**82**	**385**	**55**	**60**	**34**	**73**	**234**	**518**	**226.549,6**

Reporting region Friuli Venezia Giulia

YEAR	SHEEP AND GOATS			CATTLE			OTHER		
	Damage cases	Animals affected	Damages (€)	Damage cases	Animals affected	Damages (€)	Damage cases	Animals affected	Damages (€)
2010	4	5 (3 G + 2	1086,00	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0
2013	2	2	130,00	0	0	0	1	2	0
2014	4	13	1375,50	0	0	0	0	0	0
2015	1	1	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0
2017	5	12	1438,00	0	0	0	0	0	0
2018	5	12	3612,00	1	1	300,00	0	0	0
2019	8	62*	9083,54	0	0	0	5	12	2303,6
TOTAL	**29**	**107**	**16.725,04**	**1**	**1**	**300,00**	**6**	**14**	**2.303,6**

DAMAGES CAUSED BY BEARS IN ITALY PER REGIONS IN THE PERIOD OF 2010-2019

Reporting region Friuli Venezia Giulia

YEAR	SHEEP			CATTLE			OTHER		
	Damage cases	Animals affected[1]	Damages (€)	Damage cases	Animals affected	Damages (€)	Damage cases	Animals affected	Damages (€)
2010	12	36	5320,00	0	0	0	0	0	0
2011	5	7	1100,00	0	0	0	1	5	2628,3
2012	9	19	2140,00	0	0	0	1	7	0
2013	9	24	2890,00	0	0	0	3	92	500,00
2014	6	10	1292,50	0	0	0	1	2	500,00
2015	1	3	0	1	1	225,00	0	0	
2016	0	0	0	1	6	4886,25	0	0	0
2017	1	7	900,00	1	6	812,00	1	1	0
2018	4	10	1061,50	1	1	675,00	0	0	0
2019	6	9	1362,50	0	0	0	0	0	0
TOTAL	**53**	**125**	**16.066,5**	**4**	**14**	**6.598,25**	**7**	**107**	**3.628,3**

Reporting region Veneto

YEAR	TOTAL[1]		
	Damage cases	Animal affected	Damages (€)
2010	24		21.824,00
2011	4		1.015,00
2012	13	14	12.250,00
2013	8	7	10.670,00
2014	39	60	48.974,00
2015	7	3	6.179,00
2016	7	3	4.084,00
2017	2	0	1.186,00
2018	0	0	
2019	1	0	2.473,00
TOTAL	**105**	**87**	**108.655,00**

1 – Just damage cases in total (including sheeps, goats, catlle and other) are reported.

3.4.2 **Damage prevention measures in Italy**

ELECTRICITY

TECHNICAL OVERVIEW OF THE IMPLEMENTED MEASURES	
COUNTRY	*ITALY*
REPORTING PERIOD	***Variable 1998 – 2019***
IMPLEMENTED MEASURES	**ELECTRIC FENCES** **A. Italian Regions common aspects** With minor differences according to Regions/Province: ▪ Electric nettings of different high (105-120-145 cm) ▪ Multi-wire electric fences **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Lombardia*** o Smart fences ➢ ***Regione Friuli Venezia Giulia:*** o Permanent steel wire net fences of at least 145 cm ➢ ***Regione Liguria:*** ▪ Not electrified nets of 1 m. with the in front addition of 2 electrified wires
TARGETED TYPE OF PROPERTY	**A. Italian regions common aspects** With minor differences according to Regions/Province: ▪ **Electric nettings** ▪ sheep, goat, cattle, beehives, courtyard animals. ▪ **Multi-wire electric fences** ▪ goats, cattle, equides, beehives ▪ **Both type** ▪ goats, sheep, cattle, beehives, equides, llamas **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Friuli Venezia Giulia:*** ▪ **Permanent steel wire net fences**

	▪ pony, llama, sheep
HERD / PROPERTY SIZE	**A. Italian Regions common aspects** With minor differences according to Regions/Province: ▪ **Electric nettings** o Sheep: up to 2000 animals o Goat: up to 100 animals o Cattle: up to 50 animals o Equines: up to 10 animals ▪ **Multi-wire electric fences** o Sheep: up to 1000 animals o Goats: up to 100 animals o Cattle: up to 300 animals o Equines: up to 10 animals o Alpaca/Llamas: up to 20 animals o Beehives: up to 50 bee family ▪ **Both type** o Sheep and goats: up to 1500 animals o Cattle: up to 400 animals o Donkeys and llamas: up to 20 animals o Courtyard animals: up to 50 animals o Beehives: up to 100 bee families **B. Aspects different by Regions** Details by Regions/Province when given: ➢ **Regione Friuli Venezia Giulia:** ▪ **Permanent steel wire net fences** o Sheep: up to 60 animals o Equines: up to 3 animals o Alpaca: up to 3 animals
TECHNICAL DETAILS OF IMPLEMENTED MEASURE(S)	**A. Italian Regions common aspects** With minor differences according to Regions/Province: ▪ **Electric mobile nettings** o Height: 105 – 120 - 145 cm

	○ Circumference of enclosures: 50 – 500 m depending on the animal number, typology of management and on the strategy of protection defined ○ Voltage range: 3000 - 6000 V ○ Pulse range: 2-3 J ○ Portable battery-powered (and solar charged) low-impedance energizer that delivers a powerful shock ▪ **Multi-wire electric fences** ○ Variable: Mobile, semi-permanent and permanent fences ○ Height: variable from 108 to 155 cm ○ Structure: variable from 3 to 5 lines of metallic wire (generally all hot) ○ Circumference of enclosures: variable from 200 to 1400 m ○ Voltage range: 3000-6000 V ○ Pulse range: 2-3 J ○ Portable battery-powered (and solar charged) low-impedance energizer that delivers a powerful shock **B. Aspects different by Regions** Details by Regions/Province when given: ➢ **Regione Friuli Venezia Giulia:** ▪ **Permanent steel wire net fences** ○ Height: at least 145 cm ○ Structure: steel wire net fences augmented by 3 electrified wire (i.e always above the net fencing and just above ground level on the outside of the net fencing) ○ Minimum voltage: 6000 V ○ Portable battery-powered (and solar charged) low-impedance energizer that

	delivers a powerful shock. ➢ ***Regione Liguria*** ▪ **Not electrified nets + 2 electric wires in front of the fence** o Metal net height: 100-150 cm. o 2 electrified wires at 25 and 100/150 cm from the ground
IMPLEMENTATION	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia*** ➢ **D.P. Reg. 128/2009 (from 2008 until today)** o 38 sets of el. nettings (**livestock**) o 15 sets of el. nettings (**mobile beehives**) o 8 sets of el. nettings (**variable**) o 9 sets of multi wire el. fences (**permanent beehives**) o 4 sets of multi wire el. fences (**livestock**) o 2 sets of multi wire el. fences (**variable**) o 3 sets of permanent steel wire net fences (**variable**) ➢ **LIFE Arctos (2010-2011)** o 80 sets of el. nettings (variable: **permanent and mobile beehives, livestock**) ➢ ***Provincia Autonoma di Trento* (PAT)** ➢ **LIFE Arctos** (2011 - **2014**) o **279** sets of multiwire electric fences (**Livestock, courtyard animals, beehives**); ➢ **LIFE DINALP BEAR** (distribution in **2018**) o **19** sets of electric nettings and multiwire electric fences (**young cattle**); ➢ **PAT long term free loans** to prevent damage by **brown bears** (and wolves after the comeback, for fences

	protecting livestock) in Western Trentino (distribution from **1998** to **2019)**: ○ **703** sets of electric nettings and multiwire electric fences for **beehives**; ○ **205** sets of electric nettings and multiwire electric fences for **livestock and courtyard animals**; ➢ **PAT** financing of private equipment purchase to prevent damage by **brown bears and wolves**, for fences protecting livestock in Western Trentino: 90% of the equipment price for fences protecting beehives, sheep and goats; 60% of the equipment price for fences protecting cattle and equines (financing from **1998** to **2019**): ○ **34** sets of electric nettings and multiwire electric fences for **beehives**; ○ **78** sets of electric nettings and multiwire electric fences for **livestock and courtyard animals**; ▪ **PAT long term free loans** to prevent damage by **wolves** in Eastern Trentino (distribution from **2012** to **2019**): ○ **112** sets of electric nettings and multiwire electric fences for **livestock**; ▪ **PAT** financing of private equipment purchase to prevent damage by **wolves** in Eastern Trentino: 90% of the equipment price for fences protecting sheep and goats; 60% of the equipment price for fences protecting cattle and equines (Financing from **2012** to **2019**): ○ **35** sets of electric nettings and multiwire electric fences for **livestock**; ➢ **EAFRD** (financing from **2016** to **2019**) ○ **14** sets of permanent, traditional wood fences with electric wiring for **livestock**: cattle, horses;

	○ **5** wooden huts to protect **beehives** ("Bienenhaus"). ➢ ***Regione Piemonte*** ➢ **REGIONAL PLAN TO PROTECT LIVESTOCK FROM PREDATOR** (from **2012** to **2015**) ○ 290.000,00 €/year ➢ **EAFRD** (from **2016** to **2019**) ○ 277.440,01 € funded within Measure 10.1.6 ○ 4.610,46 € funded within Measure 4.4.2 ➢ **LIFE WOLFALPS** (distribution in **2014-2018**) ○ 19 sets of electronic nettings (sheep and goat) ○ 1 set of multiwire electrified fences (goats) ○ 6 sets of multiwire electrified fences (cattle) ○ **Piedmont Region Low 14/5/2019 n.9 –Art. 9 "Regional intervention program, for the year 2019 and 2020, to support costs for livestock defence".** (**2019 and 2020**) ○ 200.000,00 € per year ➢ ***Regione Lombardia*** ➢ **LIFE ARCTOS** (distribution in **2011-2014**) ○ 36 sets of electrified nettings (sheep) ➢ **LIFE WOLFALPS** (distribution in **2016-2018**) and **After Life WolfAlps** (distribution in **2018-2019**): ○ 32 sets of multiwire electrified fences; ○ 45 sets of electrified nettings. ➢ **EAFRD 2014-2020 financing scheme (2019)** ongoing. ○ 86 requests for funding under evaluation ➢ **Other** (distribution **from 2018**) – funded by CMO (EAGF) financed beekepers associations: ○ 15 sets of electrified nettings (mobile and stationary beehives) ➢ ***Regione Liguria***

	▪ **Genova Provincial project for the prevention of damage from predators** (**2004-2006**) o 3 experimental electrified fences were activated and technical assistance ▪ **Regional Project "The wolf in Liguria"** (implemented by the Antola Regional Park - **2006**). D.G.R. n.1328/2006 o installations of electric fences, technical assistance to farmers, information activities o 25.000 € financed ▪ **Regional Project "The wolf in Liguria"** (**2012-2018**) o 44 electrified enclosures ▪ **D.G.R 435/2016:** contributions for prevention and damage compensation ▪ **EAFRD 2014-2020** o A total of 1.000.000 founded within Measure 4.4.2.
CHALLENGES	**Italian Regions common aspects** With minor differences according to Regions/Province: Considering the increasing presence of different large carnivore species in the Alpine area, the challenges are: ▪ spreading correct information about presence of LC and good practices; ▪ test the feasibility of prevention measures to protect calving cow, calves, young cattle (< 15 months old) and huge or small flock that graze in remote areas with only periodic control by the shepherd/farmer. ▪ develop the coexistence not only between wolves and zootechnical activities, but also between wolves and the population as a whole, even in urban / peri-urban contexts, contrasting depredation also on pets and livestock belonging to amateur breeders.

	▪ leading the breeders towards a change in the management of their livestock, showing all the consequent benefits. The correct information and training of all subjects who can play a role in prevention activities (trade associations, professionals, veterinarians, local authorities) is also fundamental; ▪ create an effective support system corresponding to the real needs of each breeder.
CHALLENGES AND BASIC REQUIREMENTS	**Italian Regions common aspects** With minor differences according to Regions/Province: ▪ ordinary maintenance; ▪ the size of the fence is proportional to the number of animal/species/breed or oversize the area of the enclosure to enable the herd to move and graze within the enclosure also during night; ▪ the structure of fence to protect beehive in always the same; ▪ increase water-points availability; ▪ minimize incorrect use and bad construction of the fence (e.g. not enough electricity, the bottom part of the net doesn't follow the orography of the territory); ▪ underestimation of the importance of grounding system; ▪ shape of the fences area – has to be without sharp angles to enable the herd to circle within the enclosure; ▪ risk of entanglement if animals are not used to electricity and fences/nettings or in case of panic situation; ▪ presence of suitable shelters for shepherd recovery; ▪ constant presence of shepherds; ▪ minimize the risks for other species of fauna, especially ungulates; ▪ bad choice of location (e.g. under a terracing wall as high as the fence);

	▪ sometimes a second, light electric fence surrounding the animals' enclosure is needed, to keep predators away from the main netting/fence.
CONTACT INSTITUTION AND PERSON	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia*** ▪ **Regione Autonoma Friuli Venezia Giulia – Servizio caccia e risorse ittiche** Giuliana Nadalin (giuliana.nadalin@regione.fvg.it) ➢ ***Regione Autonoma Valle d'Aosta*** ▪ **Regione Autonoma Valle d'Aosta - Assessorato Ambiente, Risorse naturali e Corpo forestale** Christian Chioso (c.chioso@regione.vda.it) Fabrizio Truc (f.truc@regione.vda.it) ➢ ***Provincia Autonoma di Trento*** ▪ **Provincia Autonoma di Trento, Servizio Foreste e Fauna, Settore Grandi carnivori** Claudio Groff (claudio.groff@provincia.tn.it) Matteo Zeni (matteo.zeni@provincia.tn.it) ➢ ***Regione Piemonte*** ▪ **EAFRD** Regione Piemonte Direzione Agricoltura e Cibo Moreno Soster (moreno.soster@regione.piemonte.it) Rasetto Paola (paola.rasetto@regione.piemonte.it) Parzanese Emanuele (emanuele.parzanese@regione.piemonte.it) ➢ ***Regione Lombardia*** ▪ **Regione Lombardia - Struttura Natura e Biodiversità, Sviluppo sostenibile e tutela risorse dell'ambiente** Elisabetta Rossi (Elisabetta_maria_rossi@regione.lombardia.it) Laura Cucè (Laura_cuce@regione.lombardia.it)

	▪ **Regione Lombardia – Sviluppo delle Politiche Forestali e Agroambientali (EAFRD)** Maria Novella Bruno (maria_novella_bruno@regione.lombardia.it) ▪ **ERSAF** Lucia Ratti (Lucia.ratti@ersaf.lombardia.it) Sonia Braghiroli (Sonia.braghiroli@ersaf.lombardia.it) ➢ ***Regione Liguria*** ▪ **Dip. Agricoltura, Turismo, Formazione e Lavoro, Settore Fauna Selvatica, Caccia e Vigilanza Venatoria** Gianni Maceli (giovanni.maceli@regione.liguria.it) Sabrina Bertolotto (sabrina.bertolotto@regione.liguria.it)
MORE INFORMATION AND INFO-MATERIALS	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia*** ▪ **Prevenzione dei danni da predatori al patrimonio zootecnico** https://www.regione.fvg.it/rafvg/export/sites/default/RAFVG/ambiente-territorio/tutela-ambiente-gestione-risorse-naturali/FOGLIA52/allegati/Opuscolo_prevenzione_danni_lupo_web.pdf ▪ **Le recinzioni elettrificate** https://www.regione.fvg.it/rafvg/export/sites/default/RAFVG/ambiente-territorio/tutela-ambiente-gestione-risorse-naturali/FOGLIA52/allegati/Le_recinzioni_elettrificate_Vademecum_tecnico.pdf ▪ **Website**: https://www.regione.fvg.it/rafvg/cms/RAFVG/ambiente-territorio/tutela-ambiente-gestione-risorse-naturali/FOGLIA52/

	➢ ***Provincia Autonoma di Trento*** https://grandicarnivori.provincia.tn.it/ https://grandicarnivori.provincia.tn.it/Rapporto-Orso-e-grandi-carnivori ➢ ***Regione Piemonte*** LIFE WOLFALPS (in Italian): ○ Implementation of prevention system for sheep in area of recent wolf recolonization - http://www.lifewolfalps.eu/wp-content/uploads/2014/05/Annex_FR_C2_03_Deliverable_ufficiale_corr.pdf ○ Implementation of specific preventive measures for cattle in the western Italian Alps - http://www.lifewolfalps.eu/wp-content/uploads/2014/05/Report-C3.pdf ➢ ***Regione Lombardia*** http://www.naturachevale.it/specie-animali/azioni-per-la-tutela-di-orso-e-lupo/ ➢ ***Regione Liguria*** http://www.ambienteinliguria.it/lirgw/eco3/ep/home.do http://www.ambienteinliguria.it/eco3/DTS_GENERALE/20150730/Report%20_Progetto_Lupo2014_pavia_rid.pdf http://www.ambienteinliguria.it/eco3/DTS_GENERALE/20131003/Depliant_Lupo_190613.pdf http://www.agriligurianet.it/it/impresa/sostegno-economico/programma-di-sviluppo-rurale-psr-liguria/psr-2014-2020/publiccompetition/343-bando-sottomisura-4-4-2-%E2%80%93-presentazione-domande-di-sostegno.html?view=publiccompetition&id=343:bando-sottomisura-4-4-2-%E2%80%93-presentazione-domande-di-sostegno

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT

Aspects different by Regions

Details by Regions/Province when given:

- ***Regione Liguria***
  - **Regional funds** art. 43 RL n. 29/1994 (Regional rules for the protection of homeothermic fauna and for hunting) "
  - **EAFRD 2014-2020** - M**easure 4.4.2:** Call for submission of requests for support and payment - for the prevention of damage from fauna
  - **DGR 365/2016**: The contribution corresponds to 60% of the material cost with a maximum eligible expenditure of € 1,000.00, equal to a maximum contribution of € 600.00 per individual subject and for areas up to one hectare. For higher surfaces, the contribution is equal to 80% of the material cost, with a maximum eligible expenditure of € 2,000.00, equal to a maximum contribution of € 1,600.00.
- ***Regione Autonoma Friuli Venezia Giulia***
  - **Regional co-financing scheme:** AR FVG co-finances 90% of the purchase of equipment to companies and private citizens.
  - **Projects: LIFE Arctos** (2010-2014)
- ***Regione Autonoma Valle d'Aosta***
  - **Regional co-financing scheme**: Assessorato Ambiente, Risorse Naturali e Corpo Forestale co-finances 90% of the purchase of equipment to farmers
    - Up to 5000 € for fences (more than 50 cattle)
    - Up to 3000 € for fences (less than 50 cattle)
- ***Provincia Autonoma di Trento (PAT)***
  - **PAT**: other than provide –for free- temporary (to cover emergencies) and long term loans of electric nettings and multiwire electric fences, PAT finances private equipment purchase: 90% of the equipment price for fences protecting beehives, sheep and goats; 60% for fences protecting cattle and equines.
  - **LIFE Arctos Project** (2010-2014); **LIFE DINALP BEAR** (2014-2019).

- ***Regione Piemonte***
  - **EAFRD 2014-2020** (European agricultural fund for rural development - Investments in physical assets)
    - **Measure 4.4.2 - Farmers can access to a capital contribution to offset the prevention cost incurred.**

      Subsides cover 100% of the cost of the prevention system purchased (livestock guarding dog or electrified fences) with range from 1.000 to 30.000 € for each application.

      Totally 4610,46 € have been funded in 2018 (3 applications).
  - **LIFE Wolfalps Project** – The equipment is donated to cattle owners who decided to collaborate with the Project or that had to face situations of wolf-emergency (livestock in general).
- ***Regione Lombardia***
  - **EAFRD 2014-2020 financing scheme (2019)**: evaluation of requests is ongoing.
    - **Measure 4.4.1 -** Maximum 30.000 € per request for purchase of mobile electric fences and multi-wire electric fences and LGD's.
  - **Regional co-financing scheme**: DG Agriculture co-finances the purchase of electric fences to farmers for a maximum of € 5.000 for each request. The scheme finances also a 10% of work to put in place the equipment.

SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD

A. Total Regions: not provided

B. Aspects different by Regions

Details by Regions/Province when given:

- ***Regione Piemonte***
  - **EAFRD 2014-2020** (European agricultural fund for rural development - payment for agri-environment-climate commitments)
    - **Measure 10.1.6 - Within the EAFRD scheme 2014-2020, the area-based flat rate payment for mobile electric fences, livestock**

guarding dogs and constant human presence during grazing is 50,00 € / ha, only for mountain and hilly territories.

Subsidies cover the workload which is needed to setup, move and maintain the enclosure and the constant human presence.

Eighty farmers have been funded in the period 2016-2019, for a total of 277.440,01 €.

- **Regional Low 14/5/2015 n.9 –Art. 9 "Regional intervention program, for the year 2019 and 2020, to support costs for livestock defence".**
  Farmers not involved in EAFRD – Measure 10.1.6, and using electrified fences for night livestock recovery or livestock guarding dogs, can apply for payments.

  A maximum of 3.000,00 €/farmer can be funded in *de minimis* rules (REG UE n. 316/2019).

  Totally 200.000,00 € have been funded in 2019 and 2020.

- **Regional plan to protect livestock from predators** (2012-2015).
  Bonus defined on the basis of a score taking into account:
  - use of electrified fences for livestock night recovery
  - use of livestock guarding dogs
  - shepherd continuous presence during grazing
  - number of grazing animals

  A yearly maximum of 2.500,00 €/farmer can be given.

  About 250 farmers have been funded each year.

  Totally 290.000,00 €/year have been funded.

➢ ***Regione Lombardia***

- **Regional co-financing scheme:**
  DG Agriculture co-finances the purchase of electric fences to farmers .The scheme finances also a 10% of work to put in place the equipment.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia*** ▪ FVG AR, Servizio Caccia e risorse ittiche. Sometimes in collaboration with Friuli Venezia Giulia - Corpo Forestale Regionale (FVG RFC). ➢ ***Regione Autonoma Valle d'Aosta*** ▪ Struttura Flora e fauna-Ufficio per la fauna selvatica e ittica, Corpo forestale della Valle d'Aosta (CFVdA), Mont Avic Natural Park ➢ ***Provincia Autonoma di Trento*** ▪ PAT Officials -Servizio Foreste e fauna (Forest and Wildlife Service) ➢ ***Regione Piemonte*** ▪ **EAFRD** - ARPEA Piemonte (Piedmont Regional Agency for Providing Services in Agriculture) ➢ ***Regione Lombardia*** ▪ Regione Lombardia and ERSAF ▪ EAFRD – OPR (Organismo Pagatore Regionale) ➢ ***Regione Liguria*** ▪ Technicians of the Agriculture Department of the Regione Liguria, Nucleo Vigilanza Regionale and professionals in charge
HOW MANY PEOPLE ARE INVOLVED?	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** ▪ Approximately 50 officials from regional units. ➢ ***Provincia Autonoma di Trento*** ▪ 2 damage prevention & compensation managers of Large Carnivores Office of the Forest and Wildlife Service + 10 damage prevention assistants who work in

	10 different areas of the Province (with 10 substitutes) and by 53 damage supervisors. All of them are officers of the PAT Forest and Wildlife Service Police. ➢ ***Regione Lombardia*** ▪ Approximately 5 officials from ERSAF units. ➢ ***Regione Liguria*** ▪ Approximately 30 people including regional supervisory staff, technicians from Regione Liguria and external staff.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	**Aspects different by Regions** Details by Regions/Province when given: **Regular field controls and collaboration with farmers are crucial for ensuring the correct use the equipment.** ➢ ***Regione Autonoma Friuli Venezia Giulia*** No official protocol. There is a survey for each application when the owner installs the fence for the first time. If requested, it is possible to fill out the subsidy application with a technical support. FVG RFC does the next controls in the field during its ordinary activity; the controls can be announced and unannounced visits. The idea of controlling the use of the equipment is to check, if the equipment is correctly installed and to stay in touch with farmers. This is a kind of collaboration between farmers and officials, as they share useful feed-back information and improve the general knowledge about the use of these preventive measures. ➢ ***Regione Autonoma Valle d'Aosta*** *Ufficio per la fauna selvatica e ittica and CFVdA* damage officials perform regular, announced and unannounced, controls of the use of the equipment in the field, at least once per year, usually between May and October.

	The idea of controlling the use of the equipment is to check, if the equipment is correctly installed in the field and to stay in touch with farmers. This is a kind of collaboration between farmers and officials, as they share useful feed-back information and improve the general knowledge about the use of these preventive measures. ➢ ***Provincia Autonoma di Trento*** PAT Forest and Wildlife Service damage prevention assistants perform controls on the use of the equipment in the field. They make unannounced visits, usually between May and August. Damage prevention assistants check the enclosure (how it is built and maintained), measure the foreseen features and fill in a control form, which is sent to the Large Carnivores Office. The goal is to check if the equipment is correctly installed in the field and to stay in touch with farmers. This is a kind of collaboration between farmers and officials, as they share useful feedback information and improve the general knowledge about the use of these preventive measures. ➢ ***Regione Piemonte*** ▪ EAFRD - The control is administrative ➢ ***Regione Lombardia*** ▪ RegioneLombardia/ERSAF perform regular controls of the use of the equipment in the field. They make announced and unannounced visits at the protected properties at least once per year, usually between May and October. Damages officials control the general situation around the protected area, check the enclosure, measure the foreseen features and fill in a control form.

	➢ ***Regione Liguria*** ▪ **Project "The wolf in Liguria**" (2006) - The Antola Park technicians check and verify the correct installation and the effectiveness of the deterrent systems supplied. They make announced visits, throughout the year, with particular attention to the summer months. Visits to the company were frequently based on an interview with the breeders, in the event of problems related to the implementation of the prevention measure, or to improve their efficacy. This assistance activity was found to be very important to ensure continuity of the effectiveness of the intervention and also it was also highly appreciated by breeders. ▪ **DGR 365/2016** – Regional Vigilance staff or regional technicians/consultants, expert in prevention measures, carry out a technical inspection.
WHICH FEATURES ARE MONITORED OR INSPECTED?	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia- Regione Lombardia - Regione Liguria- Regione Autonoma Valle d'Aosta - Provincia Autonoma di Trento*** ▪ composition of the fence (height, number of single nettings); ▪ type of protected property; ▪ presence of electricity, correct voltage (near the source and in the middle of the perimeter) and grounding (number of rods used and installation), use of solar panel; ▪ maintenance of the fence route (vegetation, etc.); ▪ setup of nettings, proper installation, presence of passages under nettings, assessing the level of damages on the nettings (wear and tear);

	▪ description of damages; ▪ presence of animals in the fence; ▪ protective measures used, presence of LGD or others dog; ▪ description and photos of irregularities. ▪ length of the enclosure ▪ description of fence micro-location (type of terrain, slope) ▪ cadastral references
HOW MUCH TIME DOES ONE CONTROL TAKE?	**Aspects different by Regions** Details by Regions/Province when given: It depends on the kind of implemented measures used and if the owner is present. ➢ ***Regione Piemonte*** ▪ **EAFRD** – The administrative takes about an hour; the field inspection can take also a full day ➢ ***Regione Lombardia – Provincia Autonoma di Trento - Regione Autonoma Valle d'Aosta - Regione Autonoma Friuli Venezia Giulia*** ▪ Approximately 30-60 min. ➢ ***Regione Liguria*** ▪ Approximately 1-4 h.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia*** If improper use is detected, the first step is to contact the owner, inform him/her about the situation and give advice on how to improve the use of

	fences to assure its effectiveness. In these cases, the field controls are made more frequently. More controls are made also if damages occur on the protected properties. ➢ ***Regione Autonoma Valle d'Aosta*** If the fences are not correctly used, the subsidies are not paid. If during 2 subsequent checks, the 1st positive and the 2nd negative, the farmer must return the subsidy. ➢ ***Provincia Autonoma di Trento*** If improper use is detected, the first step is to contact the owner, inform him/her about the situation and give advice on how to improve the use of fences to assure its effectiveness. In these cases, the field controls are later repeated. More controls are made also if damages occur on protected properties. If the irregularities occur again, the procedure is to warn again the owner about the situation. If this further step is not enough, equipment given for free will be taken back by Forest and Wildlife Service Police Officials. If a presumed Large Carnivore damage happens, an inspection by one of the 53 damage supervisors almost always follows. 100% of the damaged item/livestock/apiary's material value will be refunded. Livestock and apiaries prices are set every few years in agreement with stakeholders' organizations. Usually, PAT payment follows within 60 days after the damage assessment. No damage compensation is provided if the damaged person benefited from PAT financing or lending of damage prevention equipment, but didn't use or misused it. ➢ ***Regione Piemonte*** **EAFRD** - The Piedmont Region has approved a gradual penalty system which, based on the severity, duration and extent, reduces the contribution for the breeder until the aid complete exclusion.

	➢ ***Regione Lombardia*** If improper use is detected, the first step is to contact the owner, inform him/her about the situation and give advice on how to improve the use of fences to assure its effectiveness. In these cases, the field controls are made more frequently. More controls are made also if damages occur on the protected property. If the irregularities occur again, the procedure is to formally warn the owner about the situation. ➢ ***Regione Liguria*** If improper use is detected, the owner is contacted, informing him about the problems evaluated. If during the next inspection the required adjustments are not performed, no contribution is submitted.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Aspects different by Regions Details by Regions/Province when given: ➢ ***Provincia Autonoma di Trento*** ▪ No data about the effectiveness are yet available. ➢ ***Regione Piemonte*** ▪ **LIFE Wolfalps Project** - The average yearly damages that farmers had 3 years before the implementation of protective measures are compared with yearly damages after the implementation. ➢ ***Regione Lombardia*** ▪ The effectiveness is evaluated taking into account damages that farmers had before the implementation of protective measures with the feedbacks of the single farmers periodically contacted after the implementation of the measures.

WHAT ARE THE RESULTS?
Aspects different by Regions ➢ ***Regione Autonoma Valle d'Aosta*** The overall effect of the use of high electric fence in Aosta Valley is positive, but at the moment there are no percentages data about damage reduction. ➢ ***Provincia Autonoma di Trento*** A thesis about brown bears and human conflict mitigation in Trentino has been conducted in 2011 https://grandicarnivori.provincia.tn.it/content/download/11801/219829/version/1/file/Tarin_Tonon.1400839109.pdf). The study detected a problem in the construction and ordinary maintenance of electric fences: just 6 out of the 40 electric fences checked were considered perfectly built and maintained, and just about half of the 40 checked fences were considered adequately maintained. Since then, much progress has been made, but the proper maintenance of electric fences is still a matter of concern. ➢ ***Regione Piemonte*** ○ **LIFE Wolfalps Project** - The overall effect of the use of electric fence is **very positive**: ○ **No damages recorded** when using **multi-wire electric fences** for cattle and goats; ○ Only **occasional attacks** with few deaths when sheep and goats are closed in the electric nettings. ➢ ***Regione Lombardia*** ○ The overall effect of the use of electric fences is **very positive:** ○ **No farmers have experienced damages after the implementation of electric fences;** ○ **Beekeepers have not experienced any damage after the implementation of electric fences**, except one case where the electrification of the fence was not in use. ➢ ***Regione Liguria*** **No farmers have experienced short-term damages** after the implementation of preventive measure.

LIVESTOCK GUARDING DOGS

COUNTRY	***ITALY***
REPORTING PERIOD	***Variable 2011 – 2019***
IMPLEMENTED MEASURES	**Livestock guarding dogs (LGDs)**
TARGETED TYPE OF PROPERTY	**Italian Regions common aspects** With minor differences according to Regions/Province: ▪ Sheep, goats, cattle, equides, llamas, alpacas and captivity bred red deer (*Cervus elaphus*) in one experimental case.
TECHNICAL DETAILS	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte*** **(LIFE Wolfalps Project),** ***Regione Lombardia*** **(LIFE Wolfalps Project - Pasturs Project),** ***Provincia Autonoma di Trento*** ○ **Cane da Pastore Maremmano Abruzzese** Pups born in working lines (dogs' parents active livestock guarding dogs) were distributed to new owners at age of approximately 10-14 weeks and were immediately integrated in the new environment under regular surveillance of farmers. ➢ ***Regione Piemonte*** (**EAFRD** - 2014-2020) ▪ **Measure 10.1.6.** ○ **Cane da Montagna dei Pirenei** ○ **Cane da Pastore Maremmano Abruzzese** ○ **Pastore del Caucaso** ▪ **Measure 4.4.2.** ○ **Cane da Montagna dei Pirenei** ○ **Cane da Pastore Maremmano Abruzzese** No specific indications. ➢ ***Regione Lombardia*** (**EAFRD** - 2014-2020) ▪ **Measure 4.4.1.** ○ **Cane da Pastore Maremmano Abruzzese**

	No specific indivations. ➢ ***Regione Autonoma Friuli Venezia Giulia*** ○ **Cane da Pastore Maremmano Abruzzese** Pups born in working lines (dogs' parents active LGD) were purchased by the shepherd at age of approximately 8-10 weeks and were immediately integrated in the new environment, under regular surveillance of farmers. Required: all pups are equipped with regular pedigree ENCI, health book, microchip, registration in the canine registry and delivered only after 60 days of birth. ➢ ***Regione Autonoma Valle d'Aosta*** ○ **Cane da Montagna dei Pirenei** ○ **Cane da Pastore Maremmano Abruzzese** ○ **other breeds can be tested** No specific indications. ➢ ***Regione Liguria*** (**EAFRD -** 2014-2020) ▪ **Measure 4.4.2.** ○ **Cane da Montagna dei Pirenei** ○ **Cane da Pastore Maremmano Abruzzese** A LGD selection was made, in order to encourage the spread only of dogs having a strong aptitude for the defense of flocks, with a balanced and non-aggressive behaviour. ➢ ***Regione Liguria (*****Project "Farmers & predators")** ○ **Cane da Pastore Maremmano Abruzzese** LGD without genealogical certification.
SOURCES OF LGDs (working lines, genetic lines, etc.)	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia*** **D.P.Reg. 128/2009**: dogs are purchased by the companies or private citizens and then they received subsidies (i.e. 90%). ➢ ***Provincia Autonoma di Trento*** (2014-2019)

	Financing of single pups or (mainly) couples of pups. Working lines were established through a collaboration with experienced LGD breeders afferent to the Circolo del Pastore maremmano abruzzese, a National LGD club. When financing the purchase of a LGD, PAT explicitly requires that the pup must belong to a LGD breed suited to the work required from the dog; the pup must come from working lines and must be purchased only by authorized breeders. The use of particularly aggressive LGD breeds are discouraged by PAT administration, due to the widespread presence of tourists and outdoor enthusiasts on the mountain pastures. ➢ ***Regione Piemonte - Regione Lombardia*** **(LIFE Wolfalps Project)** Pups with Pedigree and belonging to working lines were purchased within the Project and donated to farmers (distribution 2015-2018). Pups came from the Centre of Italy. ➢ ***Regione Lombardia*** **(Pasturs Project)** Pups were purchased and donated to farmers (2016-2017). ***Regione Lombardia*** **(EAFRD)** ○ **Measure 4.4.2** – LGD must have Pedigree. ➢ ***Regione Piemonte*** **(EAFRD)** ○ **Measure 10.1.6** – LGDs must have Pedigree or have a certification attesting to belong to the suitable breeds. The certification must be produced by the Commission for the Morphological Evaluation of Dogs used for livestock defense from predators. ○ **Measure 4.4.2** – LGD must have Pedigree. No special mechanism of maintaining pure genetic or working lines. ➢ ***Regione Liguria*** ○ **EAFRD** - Puppies come from parents working with livestock but without Pedigree.

	○ **Project "Farmers and Predators")- L**GD without genealogical certification.
IMPLEMENTATION	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia*** ○ D.P.Reg. 128/2009 financing 2 pups ➢ ***Provincia Autonoma di Trento (PAT)***: ○ PAT financing 53 pups (from 2014 to 2019); ○ LIFE DINALP BEAR Project financing the hiring of a veterinarian LGD expert, paid by the project's budget, to check the integration process of the pup in the new herd and family. ➢ ***Regione Piemonte*** ○ **LIFE Wolfalps Project** financing: ○ 18 pups distributed to sheep/goats breeders ○ 7 pups distributed to cattle breeders ○ **EAFRD** ○ Measure 10.1.6 financing about 250 LGD ➢ ***Regione Lombardia*** ○ **LIFE Wolfalps Project** financing: ○ 3 pups distributed to sheep breeders ○ **ProgettoPasturs** financing: ○ 6 pups distributed to sheep breeders ○ **DifesAttiva project** distributed pups to farmers in the Appennine regional territory. In time single farmers are exchanging new pups born from these working lines parents that can be suitable to become a future LGD. ➢ ***Regione Liguria*** ○ **EAFRD** financing 156 LGD from 2015 to 2020
EDUCATION PROCESS	**A. Italian Regions common aspects** With minor differences according to Regions/Province:

	Experienced LGD breeders make the first step to choose some pups from the herd in the first two months of life, generally according to the 3 behavioural characteristics: being trustworthy, attentive and protective toward livestock. Pups of 8 weeks can join new owners, where they slowly get to know the herd. At first, the pups meet calmer animals from the herd. The pup is regularly in touch with animals and owners provide them a safe place (e.g. box) where the pup can easily stand back from other animals. The pup has to be checked regularly and step-by-step it can join the rest of the herd. When the pasturing season begins, the pup stays with the herd all the time. The owner has to follow the integration and correct any unwanted behaviour. In general, after two years the dog becomes reliable. It is suggested to introduce in a new flock at least 2 pups together to avoid playing behaviour with lambs with the risk of hurting them. **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Liguria*** As soon as the phase of insertion in the flock is finished, i.e. when the puppies have strong links with the flock (generally 15 days), the socialization move on to the phase with the shepherd dogs delegated to manage the flock. At first, the puppies know only the dogs that will work with the flock, in order to avoid that these can be assessed as potential dangers for the flock itself. At the same time, strangers are presented to the puppies initially accompanied by the shepherd and then alone. In order to avoid aggressive behaviours. Any aggressive behaviour must be immediately corrected with peremptory orders.

	All puppies are trained in the use of the collar and leash, as well as being manipulated, in order to ensure the manageability of the subject in case of veterinary care, etc.
SUPERVISION OF EDUCATION PHASE	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte – Regione Lombardia* (LIFE Wolfalps Project)** Specialized support is provided by an expert in dog behaviour who offers help to new owners by phone, e-mail and during field visits. ➢ ***Provincia Autonoma di Trento* (LIFE Dinalp Bear Project)** Each dog was periodically visited by a vet and LGD expert, paid by the project's budget, to check how the integration process of the pup was going on, and to offer support to the new owners (especially in case of unwanted behaviours). The vet visit was later guaranteed also for the puppies produced by 9 breeders who received the dog parents by the project. Every LGD breeder, from whom the dogs are coming from, offers support to new owners and advises them by phone, e-mail and during field visits. ➢ ***Regione Liguria*** Technical assistance was provided to garantee the correct insertion of the dog in the flock, a good socialization with other dogs and with people unrelated to the farm. The assistance provided by the technician is: • **preventive**, before delivering the puppies, instructing the shepherd / breeder of all the precautions to be activated in all the phases mentioned in the educational process; • **in progress**, after the delivery of the puppies, it is controlled about every 10 days, to check the different stages of the

	educational process. Furthermore, the farmer can ask for more indication in every moment (usually by phone). Evaluation of the dog's functionality is also made at the ages of 3 - 6 months, 6 - 9 months, 9 - 12 months, over 1 and a half years.
CERTIFICATION OF LGDs	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia*** Decreto Legislativo n. 529 del 30 dicembre 1992. ➢ ***Provincia Autonoma di Trento*** **(LIFE Dinalp Bear Project)** LGD were certified by "Circolo del pastore maremmano abruzzese" that guarantees the pedigree. Nine breeders who received the puppies established their own working lines and they distributed 25 pups to new owners. At the beginning of 2018, the owners of the dogs established an LGD Association to guarantee continuation in the appropriate management of the dogs, as well as proposing common initiatives. ➢ ***Regione Piemonte – Regione Lombardia*** **(LIFE Wolfalps Project)** Livestock guarding dogs with Pedigree were donated to farmers. ➢ ***Regione Piemonte*** **(EAFRD)** o Measure 10.1.6 – LGDs included in the application form must have Pedigree or have a specific certification attesting to belong to the suitable breeds (produced by the Commission for the morphological evaluation of dogs used for livestock defense from predators). o Measure 4.4.2 – LGD must have Pedigree.
PROTOCOL OF CERTIFICATION	**Total Regions: not provided.**
LEGISLATIVE RESPONSIBILITY OF DOGS' ACTIONS	**Italian Regions common aspects**

	No special status of LGD. The owner is fully responsible for all dog's actions, regardless the location (pasture and outside).
ANIMAL WELFARE OBLIGATIONS	**Italian Regions common aspects** In general, the law obligates owners to take care of dogs, to provide food, water and shelter, regardless the type of dog.
FOOD	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte (*LIFE Wolfalps Project)** During the Project the shepherds with LGDs have been supplied with high quality dog-food (Almo Natura) for a total of 24.000 kg.
CHALLENGES	**Italian Regions common aspects** With minor differences according to Regions/Province: ▪ There is no certification of working lines of LGD's. ▪ Some farmers complain regarding the responsibility and legal consequences in case of an attack on people who enter the pasturing area, guarded by LGDs. ▪ Manage the worries of farmers about the potential problems that LGDs can create: be aggressive toward people, harass non-target wildlife, roam beyond farm boundaries causing problems with neighbors and tourist, interfere with livestock herding and/or herd dogs.
CONTACT INSTITUTION AND PERSON	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia*** **RA FVG – Servizio Caccia e Risorse Ittiche** Giuliana Nadalin (giuliana.nadalin@regione.fvg.it)

	➢ ***Regione Piemonte*** **EAFRD -** Regione Piemonte Direzione Agricoltura e Cibo Moreno Soster (moreno.soster@regione.piemonte.it) Rasetto Paola (paola.rasetto@regione.piemonte.it) Parzanese Emanuele (emanuele.parzanese@regione.piemonte.it) **LIFE Wolfalps -** http://www.lifewolfalps.eu/ ➢ ***Regione Autonoma Valle d'Aosta*** **RAVdA - Assessorato Ambiente, Risorse naturali e Corpo forestale** Christian Chioso (c.chioso@regione.vda.it) Fabrizio Truc (f.truc@regione.vda.it) ➢ ***Provincia Autonoma di Trento*** **Servizio Foreste e Fauna, Settore Grandi carnivori** Claudio Groff (claudio.groff@provincia.tn.it) Matteo Zeni (matteo.zeni@provincia.tn.it) ➢ ***Regione Lombardia*** **Regione Lombardia - Struttura Natura e Biodiversità, Sviluppo sostenibile e tutela risorse dell'ambiente** Elisabetta Rossi (Elisabetta_maria_rossi@regione.lombardia.it) Laura Cucè (Laura_cuce@regione.lombardia.it) **Regione Lombardia – Sviluppo delle Politiche Forestali e Agroambientali (EAFRD)** Maria Novella Bruno (maria_novella_bruno@regione.lombardia.it) ➢ ***Regione Liguria*** **EAFRD -** Liguria Region - Department of Agriculture, Training and Work.

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT

Aspects different by Regions

Details by Regions/Province when given:

- ***Regione Autonoma Friuli Venezia Giulia***
  - **D.P.Reg. 128/2009**: dogs are purchased by the companies or private citizens and then they received subsidies (i.e. 90%). The subsidies include also the cost of delivery, training and management of the dog breeder.
- ***Regione Autonoma Valle d'Aosta*:** financing up to 1000 € for dog for year donated (90% financed from regional law); up to 800 € for year for food and veterinary expenses (90% financed from regional law)
- ***Provincia Autonoma di Trento*:**
  - **PAT** financing 90% of the pup cost for sheep and goat breeders; 60% for cattle and equines breeders. **Cost of each dog: 850€**, taxes and all other extra included (for 70-100 days old pups)
  - **LIFE DINALP BEAR Project:** financing hiring of a vet, LGD expert, to check the integration of the pups in the new herds and families
- ***Regione Piemonte*:**
  - **LIFE Wolfalps Project**: pups donated (100% financed by the project)
  - **EAFRD - Measure 4.4.2**.- Subsides cover 100% of the cost of the LGD with Pedigree for a maximum cost of 800,00 €/dog.
- ***Regione Lombardia*:**
  - **Pasturs Project**: pups donated (100% financed by the project)
  - **EAFRD - Measure 4.4.1.** - pups financed (**Cost of each dog: 800 €** for 8 weeks old pup)
- ***Regione Liguria*:**
  - **EAFRD - Measure 4.4.2.** - the aid intensity is 50% of the eligible expenditure, the maximum contribution for the purchase of each LGD, inclusive of

expenses for microchip, insertion in canine registry, vet ordinary costs, training, is in any case equal to € 500.00. It is possible to ask for 1 to 4 LGD.

SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD

A. Total Regions: not provided.

B. Aspects different by Regions

Details by Regions/Province when given:

- ***Regione Piemonte***
  - **EAFRD - Measure 10.1.6 - the area-based flat rate payment for mobile electric fences, livestock guarding dogs and constant human presence during grazing is 50,00 € / ha, only for mountain and hilly territories.** Subsidies cover also the workload which is needed to work with LGD. Eighty farmers have been funded in the period 2016-2019, for a total of 277.440,01 €.
  - **Piedmont Region Low 14/5/2015 n.9 –Art. 9 "Regional intervention program, for the year 2019 and 2020, to support costs for livestock defence".** Farmers not involved in EAFRD – Measure 10.1.6, and using electrified fences for night livestock recovery or livestock guarding dogs, can apply for payments. A maximum of 3.000,00 €/farmer can be funded in *de minimis* rules (REG UE n. 316/2019). Totally 200.000,00 € have been funded in 2019 and 2020.
  - **Regional plan to protect livestock from predators** (2012-2015):

    Bonus defined on the basis of a score taking into account:
    - use of electrified fences for livestock night recovery;
    - use of livestock guarding dogs;
    - shepherd continuous presence during grazing
    - number of grazing animals

    A yearly maximum of 2.500,00 €/farmer can be given.

    About 250 farmers have been funded each year.

    Totally 290.000,00 €/year have been funded.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia* –** Servizio Caccia e Risorse Ittiche ➢ ***Regione Autonoma Valle d'Aosta* -** Struttura Flora e fauna (Ufficio per la fauna selvatica e ittica), Corpo forestale della Valle d'Aosta (CFVdA) Mont Avic Natural Park. ➢ ***Provincia Autonoma di Trento* (LIFE Dinal Bear Project)** - LGD breeders (who distributed the pups) acted as advisor for new owners in the field. LGD breeders are experienced farmers, who know how to raise the dogs properly and how to integrate them in the herd. For new owners it is very important to have an advisor who can help them in case of troubles or everyday challenges. Furthermore, a vet, LGD expert, was also hired to advise new owners on how to raise the dogs, how to monitor them in the new environment, etc. ➢ ***Regione Piemonte – Regione Lombardia* (LIFE Wolfalps Project):** a specialized support was provided by a vet expert in how to raise the dogs with a correct behaviour, how to monitor them in the new environment. For new owners it is very important to have an advisor who can help them in case of troubles or everyday challenges. ➢ ***Regione Liguria*** – external technician.
HOW MANY PEOPLE ARE INVOLVED?	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta* -** Approximately 50 officials from regional units.

	➢ ***Provincia Autonoma di Trento*** **(LIFE Dinal Bear Project)** **-** 20 LGD breeders and a vet LGD expert. ➢ ***Regione Piemonte – Regione Lombardia*** **(LIFE Wolalps Project)** Veterinaries and cynology experts. ➢ ***Regione Liguria*** - 1 technician.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia*** Officers contact the owner to checks if the dog's integration proceeds as it should and everything is going well. ➢ ***Regione Autonoma Valle d'Aosta*** No particular protocol. The supervisors control if the dog is used in the herd like a guarding dog. ➢ ***Provincia Autonoma di Trento*** **(LIFE Dinal Bear Project)** After the control, the vet produces a report for the LDG owners, about the dog's health and behaviour. The document assessed the situation, and, in case of health or behaviour problems, gave advices on how to solve them. ➢ ***Regione Piemonte – Regione Lombardia*** **(LIFE Wolalps Project)** No particular protocol. The Veterinaries control, if the dog's integration proceeds as it should and advise owners in the field and by telephone. ➢ ***Regione Piemonte*** (**EAFRD)** The control is administrative ➢ ***Regione Liguria*** There are two evaluation protocols: o evaluation schedules produced within the Life Medwolf; o evaluation schedules produced within the Pasturs Project
WHICH FEATURES ARE	**Italian Regions common aspects**

MONITORED OR INSPECTED?	LGD health, its integration in the herd and with the owner, its behaviour as a guarding dog, and its attitude towards humans strangers.
HOW MUCH TIME DOES ONE CONTROL TAKE?	**A. Italian Regions common aspects** With minor differences according to Regions/Province: **Field controls:** from 30 min to 2 hours (up to a day for Liguria) **B. Aspects different by Regions** Details by Regions/Province when given: ➢ **Regione Piemonte** **EAFRD:** The administrative control can take about an hour.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Friuli Venezia Giulia – Regione Piemonte* (LIFE Wolfalps Project) - *Regione Lombardia* (LIFE Wolfalps Project)** – ***Provincia Autonoma di Trento*** (**LIFE Dinalp Bear Project)** Suggest the owner to contact the expert to educate dogs and avoid unwanted behaviours. ➢ ***Regione Autonoma Valle d'Aosta*** If the dog is not correctly used, the subsidies are not paid. ➢ ***Regione Liguria*** The technician advises the owner how to correct, if possible, the incorrect behaviors. In extreme cases the dog is removed from the flock.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Italian Regions common aspects With minor differences according to Regions/Province: The situation at each farm regarding the occurrence of damages is monitored.
WHAT ARE THE RESULTS?
Aspects different by Regions Details by Regions/Province when given: ➢ ***Regione Piemonte*** **(LIFE Wolfalps Project) –** ***Regione Lombardia*** **(LIFE Wolfalps Project)** – ***Provincia Autonoma di Trento*** (**LIFE Dinalp Bear Project)** Not specifically measured. However, none of the new owners of LGDs has experienced damages to livestock.

References

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- Coppinger R, Coppinger L. 1978. Livestock guarding dogs for U.S. agriculture. Hampshire College, Amherst, Massachusett s.Groff C., Angeli F., Asson D., Bragalanti N., Pedrotti L., Zanghellini P. (editors), Large Carnivores Report 2019 (and previous Reports), Autonomous Province of Trento's Forestry and Wildlife Department:
- Provincia Autonoma di Trento - https://grandicarnivori.provincia.tn.it/Large-Carnivores-Report
  - http://www.canislupus.it/un-cane-lupo/
  - https://www.almonature.com/it/humans-and-wildlife/
  - http://www.difesattiva.info/
  - https://pasturs.org/
  - http://www.medwolf.eu/

SHEPHERDS

COUNTRY	ITALY
REPORTING PERIOD	***2012-2019***
IMPLEMENTED MEASURES	**Guarding animals using shepherds**
TARGETED TYPE OF PROPERTY	**Italian Regions common aspects** With minor differences according to Regions/Province: ▪ Sheep/goats or cattle
ROLE OF SHEPHERDS (JOB LIST)	**Aspects different by Regions** Details by Regions/Province when given: ▪ More livestock owners give animals on guard to one shepherd. ▪ Shepherd stays with the herd all the time during the day. ▪ The herd has to be enclosed in a safe enclosure during the night (night pen or stable).
ARE THEY WORKING WITH LIVESTOCK GUARDING DOGS? IF YES, WHO IS THE OWNER OF DOGS?	**Italian Regions common aspects** With minor differences according to Regions/Province: Yes, sometimes their work is connected with LGD. Not always the shepherd is the owner of the LGD. It can be owned by different breeders who rent their dogs to work for the pasture season.
HOW MANY ANIMALS DO THEY TAKE CARE OF?	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** Up to 100 sheep or goats ➢ ***Regione Piemonte*** Up to 1200 sheep and goats

DO THEY REPORT THEIR WORK?	**Total Regions: not provided.**
ORIGIN OF SHEPHERDS	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte*** Usually they are the owners of the flock but sometimes the shepherds came from Eastern Europe. In some cases, the owners of different flocks give livestock in guard to a single shepherd to decrease management costs.
ARE THE SHEPHERDS ORGANIZED IN ORGANIZATION?	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte*** The owners of the livestock often belong to agricultural organizations.
SALARY (per month, season, etc. – define)	**Total Regions: not provided.**
ARE THE COSTS COFINANCED? WHICH COSTS? ▪ salary, ▪ insurance, ▪ food, ▪ other?	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte*** Subsidies for workload are included in **EAFRD** payments. ➢ ***Regione Autonoma Valle d'Aosta*** Subsidies for salary no more than 1500 €/month from May to October.

IMPLEMENTATION	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte*** **The EARDF funds (Measure 10.1.6)** enable owners to apply for subsidies for covering the workload which is needed to setup, move and maintain the enclosure and for permitting them to constantly be present during the livestock grazing. In the Alps, where predators are not yet present or are recently returned, the livestock is left unattended with only occasional human control.
INSURANCE	**Italian Regions common aspects** No special insurance are applied.
FOOD	**Italian Regions common aspects** Not supplied.
SHELTER	**Total Regions: not provided**
ARE THERE ANY DIFFERENCES BETWEEN SHEEP AND CATTLE SHEPHERDS?	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** Only sheep and goat shepherds can ask for subsidies. ➢ ***Regione Piemonte*** In most of the cases only sheep/goat shepherds are constantly present during the grazing.
HOW DO THE SHEPHERDS LEARN ABOUT THEIR WORK?	**Italian Regions common aspects** No training.

RESPONSABILITIES OF SHEPHERDS	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte*** Their main task is to enclose the animals in a safe enclosure during the night and to follow livestock during grazing, controlling LGDs behaviour with tourists.
IS THERE ANY PROMOTION OF ROLE / JOB OF SHEPHERDS?	**Italian Regions common aspects** No, there isn't.
WHAT ARE THE SHEPHERDS DOING OUT OF WORKING SEASON?	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte*** Some shepherds graze animals all the year, moving to plain areas. Others work in their own farm.
CHALLENGES	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte*** Promotion of typical shepherds in the alpine area as the role was abandoned during in the last century because of the absence of large carnivores.
CONTACT INSTITUTION AND PERSON	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** **RAVdA - Assessorato Ambiente, Risorse naturali e Corpo forestale** Cristian Chioso (c.chioso@regione.vda.it) Fabrizio Truc (f.truc@regione.vda.it)

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD

Aspects different by Regions

Details by Regions/Province when given:

- ***Regione Autonoma Valle d'Aosta***
  - Subsidies for salary no more than 1500 euro per month from May to October (90% financed from Regional Law).
- ***Regione Piemonte***
  - **EAFRD (2014-2020) - Measure 10.1.6** - The area-based flat rate payment for mobile electric fences, livestock guarding dogs and constant human presence during grazing is 50,00 € / ha. in mountain and hilly terrain.

    Subsidies cover the workload which is needed to setup, move and maintain the enclosure and the constant human presence.

    Eighty farmers have been funded in the period 2016-2019, for a total of 277.440,01 €.
  - **Piedmont Region Low 14/5/2015 n.9 –Art. 9 "Regional intervention program, for the year 2019 and 2020, to support costs for livestock defence" -** Farmers not involved in EAFRD – Measure 10.1.6, and using electrified fences for night livestock recovery or livestock guarding dogs, can apply for payments.

    A maximum of 3.000,00 €/farmer can be funded.

    Totally 200.000,00 € have been funded both in 2019 and 2020.
  - **Regional plan to protect livestock from predators** (Period 2012-2015)

    Bonus defined on the basis of a score taking into account:

    - use of electrified fences for livestock night recovery;
    - use of livestock guarding dogs;
    - shepherd continuous presence during grazing;
    - number of grazing animals.

A yearly maximum of 2.500,00 €/farmer can be given. About 250 farmers have been funded each year. Totally 290.000,00 €/year have been funded.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta* -** Struttura Flora e fauna (Ufficio per la fauna selvatica e ittica), Corpo forestale della Valle d'Aosta (CFVdA) Mont Avic Natural Park. ➢ ***Regione Piemonte* (EAFRD)** - ARPEA Piemonte (Agenzia Regionale Piemontese per l'Erogazione in Agricoltura – Piedmont Regional Agency for Providing Services in Agriculture)
HOW MANY PEOPLE ARE INVOLVED?	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** Approximately 50 officials from regional units.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** To verify the presence of shepherd with the animals.
WHICH FEATURES ARE MONITORED OR INSPECTED?	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given:

	➢ ***Regione Autonoma Valle d'Aosta – Regione Piemonte* (EAFRD)** Presence of shepherd with the animals.
HOW MUCH TIME DOES ONE CONTROL TAKE?	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** Approximately 30 minutes.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** If the shepherd is not present, the subsidies are not paid.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Italian Regions common aspects Not measured.
WHAT ARE THE RESULTS?
Italian Regions common aspects Not measured.

OTHER DAMAGE PREVENTION MEASURES AND TECHINQUES

COUNTRY	***ITALY***
REPORTING PERIOD	***Variable 2007 – 2019***
IMPLEMENTED MEASURES	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** ▪ Acoustic devices ▪ Light bollard for wildlife ➢ ***Provincia Autonoma di Trento*** ▪ Temporary, free loan of housing modules ➢ ***Regione Piemonte*** **(LIFE Wolfalps Project)** ▪ Alpine shelter ▪ Acoustic devices ▪ Optical devices (fladry) ➢ ***Regione Lombardia*** **(LIFE Wolfalps Project)** ▪ Acoustic devices ▪ Optical devices (fladry)
TARGETED TYPE OF PROPERTY	**Italian Regions common aspects** With minor differences according to Regions/Province: ▪ Cattle, sheep, goat
TECHNICAL DETAILS	▪ **Acoustic devices** Deterrents detect the approach of animals and people to livestock pasture areas and exert a dissuasive action through the emission of lights and high volumes sounds. The instruments, powered by battery and solar panels, work automatically without operator intervention. It is suitable for the protection of animals grazing or in shelters on limited areas and for periods not too long. Sounds are stored in a removable card and are played randomly.

	Characteristics: acoustic / luminous bollard activated by PIR sensors and internal timer. The instrument must have the following characteristics and equipment: - Construction certified for external use (IP54); - Presence of high power speaker and led lights; - Power supply from rechargeable battery and photovoltaic panel of at least 5 watts; - Activation by internal PIR sensor, programmable timer and external PIR sensor invasive with the central unit through wireless system; - Random sound emission to minimize habituation. ▪ **Optical devices** (**fladry**) made up of red flags (50 x 10 cm), attached to a wire and spaced 50 cm. one from the other. They are perceived by wolf as a sort of physical barrier and so they aren't crossed. ▪ **Alpine shelter**, specific for high mountain altitude, (external size of 2.41 x 2.56 x 2.70 m) has been donated to a sheep shepherd to permit his constant presence at the pasture.
FINANCIAL SOURCES	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** Regional co-financing scheme: Assessorato Ambiente, Risorse naturali e Corpo forestale) co-finances 90% of the purchase of equipment to farmers up to 2000 € ➢ ***Regione Piemonte*** **(LIFE Wolfalps Project)** ➢ ***Regione Lombardia*** **(LIFE Wolfalps Project)** ➢ ***Provincia Autonoma di Trento***
IMPLEMENTATION	**Aspects different by Regions** Details by Regions/Province when given:

	➢ ***Regione Piemonte*** **(LIFE Wolfalps Project)** ○ **Shelter** has been used in a sheep pasture ○ **Acoustic devices** have been used in 20 cattle pastures and in 2 sheep pastures ○ **Fladries h**ave been used in 20 cattle pastures and in 2 sheep pastures ➢ ***Regione Lombardia*** **(LIFE Wolfalps Project)** ○ **Acoustic devices and fladry** have been used in testing sheep pastures. ➢ ***Provincia Autonoma di Trento*** **-** Forest and Wildife Service acquires or rents the housing modules, finances the helicopter flights and supports the shepherds with their personnel.
SURVEILLANCE	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta*** Approximately 50 officials from regional units. ➢ ***Regione Piemonte*** **(LIFE Wolfalps Project)** In the testing period, project staff regularly had contact with breeders using the devices (by phone or field visits) and the Alpine shelter. ➢ ***Provincia Autonoma di Trento*** The Wildlife Service officers visit the farmers, checking if everything is ok. After the summer, housing modules are helitransported back and checked.
EFFECTIVENESS	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte*** **(LIFE Wolfalps Project)**

	All livestock protected with both devices remained undamaged despite the regular presence of wolf, which indicates the efficiency of these deterrents for limited periods. ➢ ***Provincia Autonoma di Trento*** Housing modules, allowing the shepherds to stay full time with the flock even if a permanent shelter is absent, may greatly improve the effectiveness of carnivore damage prevention, and the well-being of shepherds as well.
CHALLENGES	**Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** Both the **devices** can be used for emergency situations, for example when a calf is born far from the shelter area and there is not alternative way to protect it or when it is necessary to disturb recurrent wolf visits in areas of livestock presence. The Alpine shelter permits breeders to constantly be present with livestock at the pasture, permitting to use other the damage prevention tools. ➢ ***Provincia Autonoma di Trento*** ○ The housing modules must be properly secured on the ground, to avoid to be swept away by wind storms, and must be certified and properly secured against lightning bolts. ○ Other than housing modules, almost always PAT has to provide temporary, free loans of electric nettings, to protect the sheep at night; ○ Sometimes, PAT had to provide acoustic deterrents to the shepherds
PROBLEMS	**A. Total Regions: not provided.** **B. Aspects different by Regions**

	Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** ○ **Acoustic devices** - sometimes zootechnical dogs (LGDs or herding dogs) can be frightened by sound emission, due to this problem a shepherd suggested to record his own voice to which dogs were used. Livestock never showed any kind of reaction to the sounds. ○ **Fladry** – a constant check is necessary, at least once a week, to avoid their roll up around the wire. In case some flags are frayed and they must be replaced. A free movement of the flags is the basis of an effective deterrent action.
COSTS	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** ○ **Alpine shelter:** 25.000 € ○ **Acoustic device** (IDS ALARM) equipped with wireless system and 20 pre-sounds recorded in MP3 format, loaded on SD card, complete with rechargeable battery and 5 W photovoltaic solar panel costs about € 390.00 (VAT excluded). ○ **Fladry** – the cost of flags mounted on wire is about 76,50 €/100 m.
CONTACT INSTITUTION AND PERSON	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Autonoma Valle d'Aosta* - Assessorato Ambiente, Risorse naturali e Corpo forestale** Christian Chioso (c.chioso@regione.vda.it) Fabrizio Truc (f.truc@regione.vda.it)

	➢ ***Provincia Autonoma di Trento*, Servizio Foreste e Fauna, Settore Grandi carnivori** Claudio Groff (claudio.groff@provincia.tn.it) Matteo Zeni (matteo.zeni@provincia.tn.it)
MORE INFORMATION AND INFO-MATERIALS	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** ○ Implementation of specific preventive measures for cattle in the western Italian Alps - http://www.lifewolfalps.eu/wp-content/uploads/2014/05/Report-C3.pdf
IMPLEMENTED MEASURES	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** ▪ **Water points**
TARGETED TYPE OF PROPERTY	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** ▪ Cattle
TECHNICAL DETAILS	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** One of the problems connected to the pasture season, declared by many shepherds is the lack of water-points. The presence and correct location of an adequate number of water-points in

	relation to the number of animals on the pasture has a double positive effect: 1. it reduces the risk of depredation because it avoids long movements of cattle and above all avoids that mothers get too far away from newborn calves with the consequent isolation of some subjects; 2. it allows cattle to distribute uniformly during watering in fences, avoiding excessive trampling and accumulation of dejections in restricted areas with consequent soil damage. Depending on the cases it should be needed to implement high storage basin connected via pipes to as many watering systems as needed (tanks of 200 l.) and the use of water pumping systems powered by photovoltaic panels.
FINANCIAL SOURCES	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)**
IMPLEMENTATION	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** Six water-point systems has been implemented in 5 different areas of cattle pasture.
SURVEILLANCE	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** In the testing period, project staff regularly had contact with breeders (by phone or field visits).
EFFECTIVENESS	**A. Total Regions: not provided.**

	B. Aspects different by Regions Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** The implementation of water-points has permitted to maintain cattle for longer periods in the fences avoiding an excessive distribution of animals in the pasture area, above all during foggy days, and so decreasing the risk of depredation.
CHALLENGES	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** ▪ Animals can stay at the pasture also in case of long period of drought ▪ The soil is not spoiled by animals' trampling and dejections ▪ Not excessive movement of the animals for reaching points of natural water presence is required
PROBLEMS	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** They need a continuous maintenance.
COSTS	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** It depends on the type of intervention.
CONTACT INSTITUTION AND PERSON	**Total Regions: not provided.**

MORE INFORMATION AND INFO-MATERIALS	**A. Total Regions: not provided.** **B. Aspects different by Regions** Details by Regions/Province when given: ➢ ***Regione Piemonte* (LIFE Wolfalps Project)** Implementation of specific preventive measures for cattle in the western Italian Alps - http://www.lifewolfalps.eu/wp-content/uploads/2014/05/Report-C3.pdf

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3.5 LIECHTENSTEIN

Prepared by:

Cathérine Frick, and Olivier Nägele (*Chapter Damages*)

Cathérine Frick (*Chapter Damage prevention*)

3.5.1 **Damages caused by large Carnivores in Liechtenstein**

REPORTING COUNTRY /	Liechtenstein
WHICH REGIONS DOES THE REPORT INCLUDE?	State territory
REPORT PREPARED BY	Cathérine Frick, and Olivier Nägele
INTRODUCTION / COMMENT OF THE SITUATION	

In the last years there have only been 2 proofs of wolf presence in Liechtenstein (2018 and 2020). Both cases proved to be transient wolves crossing Liechtenstein state territory.

Wolf presence in the greater area, especially in the neighbouring Swiss Canton of Grisons, has been increasing in the last years. Several packs and migrating individuals have been proven.

In the near future, more transient wolves are expected. Pack forming in close proximity of Liechtenstein or the subterritory of a pack on state territory is conceivable.

As a result, wolf presence can be expected anytime in Liechtenstein.
So far there have not been any damages to livestock by wolves. Livestock protection measures are currently not harmonized, even though several livestock owners do already practice different measures e.g. the usage of electric fences.
In summer 2020, free grazing on Alpine pastures is still practiced.
Since there are not (yet) any losses of livestock, the situation can only be assessed partially and the lack of losses is connected to a low occurrence of wolves.

3.5.2 **Damage prevention measures in Liechtenstein**

ELECTRICITY

TECHNICAL OVERVIEW OF THE IMPLEMENTED MEASURES	
COUNTRY	*Liechtenstein*
REPORTING PERIOD	***2018 – 2019***
IMPLEMENTED MEASURES	**ELECTRIC FENCES** Two types: ▪ Electric nettings (minimal height: 0.9-1.20 m) ▪ Multi-wire electric fences (minimal height: 0.9-1.20 m); lowest wire on 15 cm, highest wire on 1.20 m), lower wires should be close to each other
TARGETED TYPE OF PROPERTY	**PRIORITY 1:** ▪ sheep, goats **PRIORITY 2:** ▪ cattle, alpacas, llamas, other livestock
HERD / PROPERTY SIZE	▪ all sizes of herds
TECHNICAL DETAILS OF IMPLEMENTED MEASURE(S)	**Electric nettings** ▪ Mobile or permanent fences ▪ Height: 0.90-1.20 m (minimum) ▪ Minimum voltage 3000-4000 V **Multi-wire electric fences** ▪ Mobile fences ▪ Height: 0.90-1.20 m (minimum) ▪ Lowest wire on 15 cm, highest wire on 1.20 m ▪ Lower wires should be close to each other

	Optional, depending on the livestock management: Usage of night pens.
IMPLEMENTATION	Damage prevention measures in Liechtenstein are currently voluntary for livestock owners. Since autumn 2018 Liechtenstein has an official performance agreement with the Anlaufstelle Herdenschutz in the Swiss Canton of St. Gallen. Because of the small size of Liechtenstein (162 km^2) it is not possible to operate a separate center for livestock prevention. More information on the Anlaufstelle Herdenschutz: https://www.sg.ch/umwelt-natur/landwirtschaft/lzsg/Beratung/tierhaltung/Herdenschutz.html
CHALLENGES	In Liechtenstein there is not yet a stationary wolf or wolfpack. Lynx have been present in Liechtenstein since 2004 with the first documented reproduction in 2015. So far, there have not been any incidents with carnivores that included injured, missing or dead livestock. Brown bears are still absent from Liechtenstein. Since the pressure on livestock owners currently is low, implemented measures vary from livestock owner to livestock owner. Certain livestock owners do already implement sufficient measures.
CHALLENGES AND BASIC REQUIREMENTS	▪ Incorrect use (e.g. no electricity, damaged fence, topography) ▪ Underestimation of the importance of grounding system ▪ Grounding and setting up of fences in the mountain and alpine area

	▪ Shape of the fences area (no narrow fences, no sharp angles, enough space for the herd) ▪ In some cases, a double fenced night pen might be necessary ▪ Risk of entanglement if animals are not used to electricity and fences/nettings or in case of panic situation (connected with previous indents). ▪ Incorrect use of fences can endanger wildlife (colouring of nets, barricade tapes as additional visual signal)
CONTACT INSTITUTION AND PERSON	**Amt für Umwelt, Fürstentum Liechtenstein** Cathérine Frick (catherine.frick@llv.li) Olivier Nägele (olivier.naegele@llv.li) **Anlaufstelle Herdenschutz** Sven Baumgartner (sven.baumgartner@sg.ch)
MORE INFORMATION AND INFO-MATERIALS	Liechtenstein has mainly adapted Swiss management plans and measures concerning the management of large carnivores and livestock protection. »Vollzugshilfe Herdenschutz« Vollzugshilfe Herdenschutz: BAFU (Hrsg.) 2019: Vollzugshilfe Herdenschutz. Vollzugshilfe zur Organisation und Förderung des Herdenschutzes sowie zur Zucht, Ausbildung und zum Einsatz von offiziellen Herdenschutzhunden. Bundesamt für Umwelt, Bern. Umwelt-Vollzug Nr. 1902: 100 S. https://www.bafu.admin.ch/bafu/en/home/topics/biodiversity/publications-studies/publications/vollzugshilfe-herdenschutz.html Website and contact of the “Anlaufstelle Herdenschutz” in the Swiss Canton of St. Gallen with several fact sheets: https://www.sg.ch/umwelt-natur/landwirtschaft/lzsg/Beratung/tierhaltung/Herdenschutz.html

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
The »Verordnung über die Verhütung und Vergütung von Schäden« durch spezifisch geschützte Tierarten (Ordinance on the prevention and compensation of damages by specifically protected animal species) is the most important source for subsidies and payments for equipment. Electric fences for beehives will be subsidized by the Office of Environment with 100% of the cost. However the maximal contribution per beehive is 700.- CHF (approximately 650.- EUR). Electric fences for livestock protection, night pens and/or to fence out hiking trails will be subsidized with 0.70 CHF (approx. 0.65 EUR) per running meter. Source: https://www.gesetze.li/konso/pdf/2018182000?version=1 Direct subsidies for livestock are listed in the »Verordnung über die Förderung der Alpwirtschaft « (Ordinance on the support of alpine farming): The basic amount of subsidies for 1 »Stoss« of sheep, goats, llamas or alpaca depends on the livestock protection measures taken. 1 »Stoss« is defined as the following in Liechtenstein: 1 Stoss = 1 Grossvieheinheit (GVE) which is a key to compare livestock on the basis of their weight For each alp in Liechtenstein the amount of GVE in summer is definded individually. Source: https://www.gesetze.li/konso/pdf/2009264000?version=12 1 Stoss of sheep, goats, llamas or alpaca are subsidized with: - 210.- CHF (approx. 195 EUR) if a shepherd is present - 210.- CHF (approx. 195 EUR) if rotational grazing system is practiced with livestock protection measures (e.g. electrical fence) - 140 CHF (approx. 130 EUR) if rotational grazing system is practiced without livestock protection measures (e.g. no electrical fence sufficient for livestock protection) - 70.- CHF (approx. 65 EUR) for the rest (e.g. free grazing) The subsidies for cattle are not listed in this summary.

Source: https://www.gesetze.li/konso/pdf/2010168000?version=5 How the »Stoss« is calculated for different kinds of animals is defined in the Verordnung über landwirtschaftliche Begriffe und die Anerkennung von Landwirtschaftsbetrieben (Ordinance on agricultural terms and the approval of farms), appendix 3. For example: Dairy cow: 1 GVE Dairy sheep: 0.25 GVE Other sheep over the age of 1: 0.17 GVE Dairy goat: 0.20 GVE Other goats over the age of 1: 0.17 GVE Source: https://www.gesetze.li/konso/pdf/2009264000?version=12
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
Currently there are no subsidies or payments for extra workload in Liechtenstein.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	▪ Office of Environment ▪ Anlaufstelle Herdenschutz
HOW MANY PEOPLE ARE INVOLVED?	1-2 officials from the Office of Environment in Liechtenstein and 1-2 members of the Anlaufstelle Herdenschutz
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	▪ direct feedback from the livestock owners (phone calls and/or meetings) ▪ announced or unannounced inspections
WHICH FEATURES ARE MONITORED OR INSPECTED?	List of monitored features: ▪ animal genus of livestock, breeds, quantity of animals ▪ electricity: voltage (solar panels?), grounding ▪ maintenance of the fence (vegetation, passages, topography etc.) ▪ setup of nettings and poles (proper installation)

	▪ size, shape and length of the enclosure ▪ composition of the fence (height, number of single nettings) ▪ other protective measures used in combination with the fencing ▪ description and photos of irregularities
HOW MUCH TIME DOES ONE CONTROL TAKE?	Between 1-2 hours to ½ day (Alpine pastures)
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	Feedback to live stock owner if any improper use is detected. Improvement of the measures together in the field. Protocol. If repeated cases of improper use lead to damages compensation is cancelled.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Average yearly damages will be compared to the amount of large carnivores in the region and the implemented measures. Damages need to be assessed and measures improved, if there are damages.
WHAT ARE THE RESULTS?
There have not been any damages yet in Liechtenstein.

LIVESTOCK GUARDING DOGS

COUNTRY	*Liechtenstein*
REPORTING PERIOD	***2020***
IMPLEMENTED MEASURES	**Livestock guarding dogs (LGDs)**
TARGETED TYPE OF PROPERTY	▪ Sheep and goats ▪ If suitable for other livestock like cattle will depend on the outcome of the personal counselling.
TECHNICAL DETAILS	**Breeds included**: ▪ Pyrenean Mountain Dog ▪ Maremmano-Abruzzese Sheepdog ▪ Other breeds: Accepted if Einsatzbereitschaftsüberprüfung EBÜ (examination of readiness for duty) is positive
SOURCES OF LGDs (working lines, genetic lines, etc.)	Source of the Dogs: Verein Herdenschutzhunde Schweiz (Swiss Association for Livestock Guarding Dogs): https://www.cpt-ch.ch/ Breeders, owners and distributors of Pyrenean Mountain Dogs and Maremmano-Abruzzese Sheepdog in and for Switzerland and Liechtenstein. It is possible for a potential dog owner to acquire a GSD from another source than the Verein Herdenschutzhunde Schweiz. Such a dog needs to do the “Einsatzbereitschaftsüberprüfung” in order to qualify for subsidies.
IMPLEMENTATION	There are no official LGDs in Liechtenstein yet. The implementation will require a lot of public relations work to sensitise the public about the work and requirements of LGDs. Part of the public relation work will be a collaboration with the responsible organisations for tourism in Liechtenstein (e.g. visitor management).
EDUCATION PROCESS	The focus in the exucation process is divided in 4 areas: dog owner, livestock (e.g. bonding with the herd), dog pack and environment (e.g. behaviour with other people and other animals). Ausbildungskonzept des Vereins Herdenschutzhunde Schweiz (Educational concept by the Swiss Association for LGDs):

	https://www.cpt-ch.ch/wp-content/uploads/Ausbildungskonzept_HSH-CH_20180302.pdf
SUPERVISION OF EDUCATION PHASE	▪ Official breeders ▪ Verein Herdenschutzhunde Schweiz (Swiss Association for LGDs) Official GSD breeders need to be part of the Swiss Association. To become an official breeder, obligatory education trainings as well as an exam have to be passed. Ausbildungs- und Prüfungsreglement für Züchter von Herdenschutzhunden des Vereins Herdenschutzhunde Schweiz (Education and examination regulations for breeders of LGD oft he Swiss Association for LGDs): https://www.cpt-ch.ch/wp-content/uploads/Ausbildungs-und-Pr%C3%BCfungsreglement-Z%C3%BCchter_HSH-CH.pdf
CERTIFICATION OF LGDs	Verein Herdenschutzhunde Schweiz (Swiss Association for Livestock Guarding Dogs) https://www.cpt-ch.ch/
PROTOCOL OF CERTIFICATION	Verein Herdenschutzhunde Schweiz (Swiss Association for Livestock Guarding Dogs) https://www.cpt-ch.ch/
LEGISLATIVE RESPONSIBILITY OF DOGS' ACTIONS	The owner is fully responsible for the dog's action, regardless of the location (farm, pastures, summer grazing). Owning a dog in Liechtenstein is subjected to the following laws: Gesetz über das Halten von Hunden (Law on the keeping of dogs): https://www.gesetze.li/konso/pdf/1992056000?version=8 Verordnung über das Halten von Hunden (Ordinance on the keeping of dogs): https://www.gesetze.li/konso/pdf/2006284000?version=4 Tierschutzverordnung (Ordinance on animal protection): https://www.gesetze.li/konso/pdf/2010425000?version=8 In this ordinance LGDs are explicitly listed.

ANIMAL WELFARE OBLIGATIONS	See above. In general, the laws obligate owners to take care of their dogs, for example to provide food, water and shelter, and with LGDs especially to assure that no people, pets or wildlife are endangered by the keeping of a LGD.
CHALLENGES	See above.
CONTACT INSTITUTION AND PERSON	**Amt für Umwelt, Fürstentum Liechtenstein** Cathérine Frick (catherine.frick@llv.li) Olivier Nägele (olivier.naegele@llv.li) **Anlaufstelle Herdenschutz** Sven Baumgartner (sven.baumgartner@sg.ch)

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
The »Verordnung über die Verhütung und Vergütung von Schäden« durch spezifisch geschützte Tierarten (Ordinance on the prevention and compensation of damages by specifically protected animal species) is the most important source for subsidies and payments for equipment. https://www.gesetze.li/konso/pdf/2018182000?version=1 The amount of subsidies are equal to the subsidies in Switzerland. They are listed in the Swiss »Vollzugshilfe Herdenschutz«. Subsidies: Keeping of an official LSG: 100.- CHF (approx. 93.- EUR) per month Medical fees/vet: - 80% of the costs in case of an accident or disesase - 100% of fees for spaying or neutering if necessary - 100% of the costs on elbow dysplasia (ED) and hip dysplasia (HD) testing Presence on alpine pastures during summer grazing: - 2000.- CHF (approx. 1859.- EUR) for every summering period with constant sheep

shepherding or dairy goats - 500.- CHF (approx. 465.- EUR) for every summering period with sheep without a shepherd but year-round pastures or rotational grazing system or non-dairy goats - 500.- CHF (approx. 465.- EUR) for every summering period with cattle without a shepherd but year-round pastures or rotational grazing system or non-dairy goats There are also subsidies for breeding, importing and/or the training of official LGDs. »Vollzugshilfe Herdenschutz« Vollzugshilfe Herdenschutz: BAFU (Hrsg.) 2019: Vollzugshilfe Herdenschutz. Vollzugshilfe zur Organisation und Förderung des Herdenschutzes sowie zur Zucht, Ausbildung und zum Einsatz von offiziellen Herdenschutzhunden. Bundesamt für Umwelt, Bern. Umwelt-Vollzug Nr. 1902: 100 S. https://www.bafu.admin.ch/bafu/en/home/topics/biodiversity/publications-studies/publications/vollzugshilfe-herdenschutz.html (available in german, french and italian)
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
Currently there are no subsidies or payments for extra workload in Liechtenstein.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	Amt für Umwelt Liechtenstein (Office of Environment Liechtenstein) Anlaufstelle Herdenschutz in the Swiss Canton of St. Gallen (livestock prevention measures team) in collaboration with the Verein Herdenschutzhunde Schweiz (Swiss Association for Livestock Guarding Dogs) Amt für Lebensmittelkontrolle und Veterinärwesen Liechtenstein (Veterinary Office): Keeping of dogs.
HOW MANY PEOPLE ARE INVOLVED?	At least 2, depending on the case.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	The protocol and procedures are personalised for each case/LGD owner.

WHICH FEATURES ARE MONITORED OR INSPECTED?	General dog's integration in the herd and its behaviour as guarding dog; interaction with hikers, other dog owners et cetera.
HOW MUCH TIME DOES ONE CONTROL TAKE?	Personalised for each case/LGD owner.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	Feedback to GSD owner if any improper behavior is detected. Improvement of the keeping together in the field or on the farm. Protocol.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Average yearly damages will be compared to the amount of large carnivores in the region and the implemented measures. Damages need to be assessed and measures improved, if there are damages.
WHAT ARE THE RESULTS?
There have not been any damages yet in Liechtenstein.

SHEPHERDS

COUNTRY	***Liechtenstein***
REPORTING PERIOD	***2019***
IMPLEMENTED MEASURES	**Guarding animals using shepherds**
TARGETED TYPE OF PROPERTY	Sheep (cattle; see below)
ROLE OF SHEPHERDS (JOB LIST)	Sheep shepherds are responsible for: ▪ Controlled grazing: Sustainable use of land (vegetation, respecting protected areas), ▪ Compliance with the Sömmerungsverordnung (Ordinance on summer grazing: https://www.gesetze.li/konso/pdf/2020149000?version=1) ▪ Controlling of animal health: physical condition, disease control (e.g. footrot) ▪ Working with dogs (voluntarily): herding dogs (e.g. Border Collie), other working dogs or LGD ▪ Implementing livestock guarding measures, for example setting up night pens, working with electric fences or LGD in areas with the presence of large carnivores. Cattle shepherds have basically the same assignments, even though damages by large carnivores are a lot less likely to happen and livestock guarding measures therefore play an subordinate role.
ARE THEY WORKING WITH LIVESTOCK GUARDING DOGS? IF YES, WHO IS THE	No, so far their work is not automatically connected with livestock guarding dogs.

OWNER OF DOGS?	
HOW MANY ANIMALS DO THEY TAKE CARE OF?	The amount of animals is not regulated but depends on the approved number animals for a certain alp.
DO THEY REPORT THEIR WORK?	No.
ORIGIN OF SHEPHERDS	Liechtenstein, Switzerland, Austria
ARE THE SHEPHERDS ORGANIZED IN ORGANIZATION?	No.
SALARY (per month, season, etc. – define)	The salary is paid by the tenants of the pastures. However, there are guidelines for wages, depending on education and experience:

Function	**Category 1 (minimum wage)**	**Category 2 (minimum wage)**	**Category 3 (minimumwage**
Shepherd for dairy cows	155.– CHF (approx. 144.- EUR)	170.– CHF (approx. 158.- EUR)	225.– CHF (approx. 209.- EUR)
Shepherd for suckler cows	155.– CHF (approx. 144.- EUR)	170.– CHF (approx. 158.- EUR)	225.– CHF (approx. 209.- EUR)
Shepherd for young cattle or small livestock	145.- CHF (approx. 135.- EUR)	160.- CHF (approx. 149.- EUR)	195.- CHF (approx. 181.- EUR)

	Category 1: Newcomers without agricultural (or similar) education Category 2: Newcomers with agricultural (or similar) education Cagegory 3: Alpine herdsman with experience of 4 summers and more Source: https://www.zalp.ch/index3.php?content=richtlohn
ARE THE COSTS COFINANCED? WHICH COSTS? ▪ salary, ▪ insurance, ▪ food, ▪ other?	Direct subsidies for livestock are listed in the »Verordnung über die Förderung der Alpwirtschaft « (Ordinance on the support of alpine farming): The basic amount of subsidies for 1 »Stoss« of sheep, goats, llamas or alpaca depends on the livestock protection measures taken. 1 »Stoss« is defined as the following in Liechtenstein: 1 Stoss = 1 Grossvieheinheit (GVE) which is a key to compare livestock on the basis of their weight For each alp in Liechtenstein the amounf of GVE in summer is definded. Source: https://www.gesetze.li/konso/pdf/2009264000?version=12 1 Stoss of sheep, goats, llamas or alpaca are subsidized with: - 210.- CHF (approx. 195 EUR) if a shepherd is present - 210.- CHF (approx. 195 EUR) if rotational grazing system is practiced with livestock protection measures (e.g. electrical fence) - 140 CHF (approx. 130 EUR) if rotational grazing system is practiced without livestock protection measures (e.g. no electrical fence sufficient for livestock protection) - 70.- CHF (approx. 65 EUR) for the rest (e.g. free grazing) The subsidies for cattle are not listed in this summary. Source: https://www.gesetze.li/konso/pdf/2010168000?version=5

IMPLEMENTATION	In Liechtenstein there are currently no sheep shepherds. Since the eradication of large carnivores shepherding of sheep has not been a necessity. There are, however, cattle stockmen that are employed by tenants of an alp. During the summer grazing on alpine pastures they take care of the cattle.
INSURANCE	Not implemented.
FOOD	Not implemented.
SHELTER	Not implemented.
ARE THERE ANY DIFFERENCES BETWEEN SHEEP AND CATTLE SHEPHERDS?	There are currently no sheep shepherds in Liechtenstein. Sheep play a subordinate role in animal husbandry in Liechtenstein. Cattle is the most important livestock so cattle shepherds have always been present during the time of summer grazing on the alpine pastures. The Sömmerungsverordnung (Ordinance on summer grazing) defines who can work as a „shepherd“ (see: https://www.gesetze.li/konso/pdf/2020149000?version=1).
HOW DO THE SHEPHERDS LEARN ABOUT THEIR WORK?	For sheep shepherds there are specific training courses in Switzerland. For more information see: http://www.protectiondestroupeaux.ch/menu/hirten/ausbildung/ For cattle shepherds there are various courses (cattle shepherd, working with LGDs) for example at the Swiss »Plantahof« in the Swiss Canton of Grisons (see: https://www.gr.ch/DE/institutionen/verwaltung/dvs/lbbz/ausweiterbildung/Kurse/Seiten/Kurse.aspx)

	There is also always the possibilty go get an individual consulting by the »Landwirtschaftliches Zentrum St. Gallen« in the Swiss Canton of St. Gallen (See: https://www.sg.ch/umwelt-natur/landwirtschaft/lzsg/Beratung/Alpbetrieb.html). The »Landwitschaftlihces Zentrum St. Gallen« offers training days with different relevant and present topics each year. Part of the apprenticeship for farmers is the optional course »Alpwirtschaft« (Alpine farming). Individual consulting is also available by the Amt für Umwelt (Office of Environment).
RESPONSABILITIES OF SHEPHERDS	See “role of shepherds” (above).
IS THERE ANY PROMOTION OF ROLE / JOB OF SHEPHERDS?	No.
WHAT ARE THE SHEPHERDS DOING OUT OF WORKING SEASON?	Cattle shepherds are regional farmers (Liechtenstein or Switzerland) or seasonal workers.
CHALLENGES	With the expected growing presence of large carnivores in Liechtenstein and the surrounding area sheep owners who might decide to move their animals to the alpine pastures for summer grazing will be faced to decide between 1) taking the risk of damages, 2) quit summer grazing, 3) using electrical fencing during night and/or day time or 4) increase flock sizes to make cost-

	effective shepherding, in combination with working dogs like LGD, possible.
CONTACT INSTITUTION AND PERSON	Amt für Umwelt Abteilung Landwirtschaft Alpwirtschaft Daniel Kranz (Daniel.kranz@llv.li) Amt für Umwelt Abteilung Wald und Landschaft Berggebietssanierung Olav Beck (olav.beck@llv.li) Daniel Oertig (daniel.oertig@llv.li) Cathérine Frick (catherine.frick@llv.li) → sheep shepherding as damage prevention measure **Anlaufstelle Herdenschutz** Sven Baumgartner (sven.baumgartner@sg.ch) → sheep shepherding as damage prevention measure

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
The »Verordnung über die Verhütung und Vergütung von Schäden durch spezifisch geschützte Tierarten« (Ordinance on the prevention and compensation of damages by specifically protected animal species) is the most important source for subsidies and payments for equipment. https://www.gesetze.li/konso/pdf/2018182000?version=1 Direct subsidies for livestock are listed in the »Verordnung über die Sömmerung von landwirtschaftlichen Nutztieren im Jahr 2020« (Ordinance on summer grazing for livestock): https://www.gesetze.li/konso/pdf/2020149000?version=1
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD

Currently there are no subsidies or payments for extra workload.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	▪ Office of Environment ▪ Anlaufstelle Herdenschutz
HOW MANY PEOPLE ARE INVOLVED?	At least 2 (Office of Environment, Anlaufstelle Herdenschutz)
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	NA
WHICH FEATURES ARE MONITORED OR INSPECTED?	It is planned to monitor and inspect all measures that are officially subsidized or advised.
HOW MUCH TIME DOES ONE CONTROL TAKE?	NA
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	The Amt für Umwelt (Office of Environment) does support a constructive approach. If a measure is implemented improperly or in manners that are not effective, the responsible person will be given feedback and advice. As last consequences it is possible to cease subsidies. If wolf presence is permanent and evident in Liechtenstein and livestock owners are not willing to implement measures it is possible that damages are not compensated.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Average yearly damages will be compared to the amount of large carnivores in the region and the implemented measures. Damages need to be assessed and measures improved, if there are damages.
WHAT ARE THE RESULTS?
There have not been any damages yet in Liechtenstein.

OTHER DAMAGE PREVENTION MEASURES AND TECHINQUES

COUNTRY	***Liechtenstein***
REPORTING PERIOD	***2018 – 2019 (testing period)***
IMPLEMENTED MEASURES	**FREE CONSULTING FOR DAMAGE PREVENTION MEASURES** Livestock owners in Liechtenstein are able to get damage prevention consulting free of charge. The consulting is customized and includes: ▪ Animal genus of livestock, breeds, quantity of animals ▪ General organization of the keeping of animals ▪ Distinction of the keeping of animals during the different seasons ▪ Practical tips for the grounding of the fences ▪ Emergency action plan in case of an incident with a carnivore ▪ Information about funding of different measures **Sometimes operational adjustments in the keeping of animals can help with damage prevention (e.g. choice of breeds, seasonal differences) measures. In Liechtenstein livestock owners have the possibility to get free consulting for damage prevention measures.** **Next to the adjustment the consulting gives a possibility for measures that are maybe not yet tested or generally accepted.** **In Summer of 2020 there is no proof of residential wolves in the region.**
TARGETED TYPE OF PROPERTY	▪ Livestock
TECHNICAL DETAILS	Measures base on individual consulting
FINANCIAL SOURCES	Verordnung über die Verhütung und Vergütung von Schäden durch spezifisch geschützte Tierarten (Ordinance on the prevention and compensation of damages by specifically

	protected animal species). (https://www.gesetze.li/konso/pdf/2018182000?version=1) B. Sonstige Verhütungsmassnahmen Art. 7 Grundsatz 1) Sind förderungsberechtigte Verhütungsmassnahmen nicht ausreichend, geeignet oder umsetzbar, so kann das Amt für Umwelt weitere Verhütungsmassnahmen im Einzelfall mit bis zu 20 000 Franken fördern. 2) Das Amt für Umwelt berücksichtigt bei der Ausrichtung von Beiträgen die Voraussetzungen nach Art. 4.
IMPLEMENTATION	NA
SURVEILLANCE	In the testing period, responsible regularly visit the livestock owners.
EFFECTIVENESS	TBD
CHALLENGES	Finding effective measures or adjustments.
CONTACT INSTITUTION AND PERSON	**Amt für Umwelt, Fürstentum Liechtenstein** Cathérine Frick (catherine.frick@llv.li) Olivier Nägele (olivier.naegele@llv.li) **Anlaufstelle Herdenschutz** Sven Baumgartner (sven.baumgartner@sg.ch)

3.6 SLOVENIA

Prepared by:

Gregor Simčič, Tomaž Berce, Rok Černe and Jernej Javornik (*Chapter Damages*)

Tomaž Berce, Rok Černe and Jernej Javornik (*Chapter Damage prevention*)

3.6.1 **Damages caused by large Carnivores in Slovenia**

REPORTING COUNTRY /	Slovenia
WHICH REGIONS DOES THE REPORT INCLUDE?	Whole country
REPORT PREPARED BY	Gregor Simčič, Tomaž Berce, Rok Černe, and Jernej Javornik
INTRODUCTION / COMMENT OF THE SITUATION	

In the last decade wolf population in Slovenia has been increasing and spatially expanding. The most significant change in spatial distribution of the wolf population happened in 2019 when we recorded first wolf packs in Alpine and Pre-alpine region since the beginning of systematic wolf monitoring in 2010. A key challenge in the coming years will be to find solutions for coexistence - to dispel myths about the dangers of the wolves and to directly help farmers who are directly materially affected by the presence of the wolves. A big problem for the future is also wolf-domestic dog crossbreeding. Although this phenomenon is not as serious as in some other countries, the issue must be taken seriously.

Brown bear population in Slovenia is also increasing. The majority of bears are found in the southern part of the county (Dinaric mountains) where the highest bear densities are recorded. Bear monitoring is structured around genetic census that is carried out every 7 years. Estimates for years without genetic census are based on predictive modeling and age-at-harvest statistical methods.

From 2010 to 2019 the compensation payed for brown bear and wolf attacks on livestock amounted to 2.38M €. Although there has been a significant decrease in wolf attack on livestock from 2010 (575) to 2016 (93), in the last few years Slovenia is experiencing an increase of wolf damages (377 in 2019). This increase can be attributed to the wolf territory expansion to Alpine and Pre-alpine parts of the country. Damages on livestock caused by brown bear fluctuate between years. On average there are 145 attacks yearly. In addition to livestock, brown bears also cause damages on other human property, such as beehives, orchards, grass and corn silage etc. In the last few years there has also been an increase in damages that brown bear and wolf cause on larger grazing animals (mostly cattle), which represents a problem since most of our damage prevention technologies have been tested and developed for smaller animals (sheep, goats).

LARGE CARNIVORES POPULATION TRENDS IN SLOVENIA IN THE PERIOD OF 2010-2019

	WOLVES		BROWN BEARS
YEAR	**Population estimates**	**Confirmed packs (for wolves)**	**Population estimates**
2010	39 (34–42)		619 (564 – 655) [2]
2011	40 (38–43)		631 (574 - 670)[2]
2012	46 (45–55)	11[1]	689 (631 - 734) [2]
2013			697 (637 - 748) [2]
2014			760 (701 - 818) [2]
2015	52 (42–64)	11	711 (657 - 767) [3]
2016	59 (52–69)	14	788 (728 - 862) [2]
2017	75 (72–78)	14	883 (807 - 990) [2]
2018	95 (86–110)	14	975 (876 - 1128) [2]
2019[4]			

1 – Estimates form telemetry data (LIFE SloWolf project)
2 – Estimates based on predictive and age-at-harvest modelling. See Jerina et al. 2018 for methods details
3 – Genetic census based estimates
4 – No data for year 2019 available yet.

References:

Jerina K., and Polaina E. 2018. Reconstruction of brown bear population dynamics in Slovenia and Croatia for the period 1998-2018. LIFEDinaAlp Bear project report. University of Ljubljana, Biotechnical faculty, Department of forestry. Ljubljana, Slovenia: 46 pp.

DAMAGES CAUSED BY WOLVES IN SLOVENIA IN THE PERIOD 2010-2019

YEAR	SHEEP			CATTLE			OTHER		
	Damage cases	Animals affected[1]	Damages (€)[1]	Damage cases	Animals affected	Damages (€)[1]	Damage cases	Animals affected	Damages (€)[1]
2010	546	2.085	327.380	20	25	14.610	10	13	6.580
2011	440	1.707	252.950	13	15	8.840	14	24	9.420
2012	336	1.150	174.220	15	16	10.230	8	12	7.900
2013	139	492	77.670	15	17	9.020	7	7	3.250
2014	171	669	107.270	33	39	22.430	10	11	6.010
2015	93	393	64.910	21	26	17.520	16	21	9.860
2016	69	295	48.060	12	14	7.130	12	19	9.900
2017	145	721	115.490	29	34	26.440	16	24	13.390
2018	150	665	92.280	34	43	19.620	18	21	13.260
2019	280	1.244	181.870	48	60	27.940	46	77	38.440
TOTAL	**2.369**	**9.421**	**1.442.100**	**240**	**289**	**163.760**	**157**	**229**	**117.990**

1 – rounded to 10 €

DAMAGES CAUSED BY BEARS IN SLOVENIA IN THE PERIOD 2010-2019

YEAR	SHEEP			CATTLE			OTHERGRAZINGANIMALS			OTHER[2]	
	Damage cases	Animals affected	Damages (€)[1]	Damage cases	Animals affected	Damages (€)[1]	Damage cases	Animals affected	Damages (€)[1]	Damage cases	Damages (€)[1]
2010	188	707	117.760	11	15	10.530	7	9	6.370	371	10.4530
2011	129	361	55.930	23	27	18.180	3	3	650	149	34.780
2012	207	728	112.920	22	26	16.680	20	100	9.900	397	98.100
2013	158	420	66.670	20	25	16.470	15	24	12.230	202	62.580
2014	144	382	68.840	26	27	19.410	27	33	41.120	315	118.190
2015	102	270	40.710	27	32	27.980	11	72	7.600	245	81.240
2016	94	256	38.950	9	153	6.960	11	44	5.420	237	106.280
2017	122	350	57.520	25	29	19.900	8	46	5.410	312	126.360
2018	45	140	22.020	13	18	12.390	7	6	3.490	106	33.520
2019	56	107	16.910	33	45	31.660	14	17	10.630	303	100.810
TOTAL	**1.245**	**3.721**	**598.240**	**209**	**397**	**180.140**	**123**	**354**	**102.810**	**2.637**	**866.390**

1 – Rounded to 10 €
2 – Category “Other” include damages on: beehives, grass silage, fruit trees, corn.

3.6.2 **Damage prevention measures in Slovenia**

ELECTRICITY

TECHNICAL OVERVIEW OF THE IMPLEMENTED MEASURES	
COUNTRY	*SLOVENIA*
REPORTING PERIOD	***2011 – 2019***
IMPLEMENTED MEASURES	**HIGH ELECTRIC FENCES (height >150 cm)** Two types: ▪ High electric nettings (height 160 cm) ▪ Multi-wire electric fences
TARGETED TYPE OF PROPERTY	**High electric nettings:** ▪ sheep, goats, cattle, mobile beehives, orchards, silage bales, corn fields **Multi-wire electric fences:** ▪ stationary beehives
HERD / PROPERTY SIZE	**High electric nettings:** • Sheep: 20-250 animals • Cattle: up to 30 animals • Other type of property: variable **Multi-wire electric fences:** 1-2 beehives
TECHNICAL DETAILS OF IMPLEMENTED MEASURES	**Electric nettings** ▪ Mobile fences ▪ Height: 160 cm ▪ Circumference of enclosures: 300 – 500 m ▪ Minimum voltage 5000 V

	Multi-wire electric fences ▪ Fixed fences ▪ Height: 150 cm ▪ Structure: 6 lines of metallic wire (all hot) ▪ Minimum voltage 5000 V
IMPLEMENTATION	**REGULARLY IN USE FROM 2011:** ➢ **LIFE Slowolf** (distribution in 2011-2012) ○ 10 sets of el. nettings (sheep) ➢ **LIFE DINALP BEAR** (distribution in 2015-2019) ○ 18 sets of el. nettings (sheep) ○ 21 sets of el. nettings (mobile beehives) ○ 16 sets of multiwire el. fences (stationary beehives) ○ 2 sets of electric mats (stationary beehives) ○ 5 intervention sets ➢ **Interreg Carnivora Dinarica** (distribution in 2019) ○ 2 sets of el. nettings (sheep) ○ 3 sets of el. nettings (mobile beehives) ➢ **National scheme** (ARSO) (distribution from 2015) ○ 26 sets of el. nettings (sheep) ○ 26 sets of el. nettings (mobile beehives, stationary beehives) ○ 4 sets of el. nettings (crops, orchards, silage bales)
CHALLENGES	With the establishment of new wolf packs in the Alpine region, questions arise regarding the suitability of electric nettings in the Alps. There are many farms with small herds that graze on remote pastures on difficult terrains (steep slopes and high terrain ruggedness) and with occasional surveillance of the owners. With the presence of predators, the need to enclose the

	animals in the night enclosures at night and release them during the day seems to be unfeasible for many of them. Another challenge is to test the feasibility of high electric nettings for protection of calves – the most vulnerable group of cattle.
CHALLENGES AND BASIC REQUIREMENTS	▪ Minimum size of 300 m to enable the herd to move within the enclosure. ▪ Limited maximum length of the enclosure (max. 500 m). ▪ Underestimation of the importance of grounding system. ▪ Incorrect use (e.g. no electricity). ▪ Shape of the fences area – has to be without sharp angles to enable the herd to circle within the enclosure. ▪ Risk of entanglement if animals are not used to electricity and fences/nettings or in case of panic situation (connected with previous indent).
CONTACT INSTITUTION AND PERSON	**Slovenia Forest Service** Rok Černe (rok.cerne@zgs.si), Tomaž Berce (tomaz.berce@zgs.si)
MORE INFORMATION AND INFO-MATERIALS	▪ **Handbook**: Berce, T., Černe, R. 2016. Animal husbandry and coexistence with carnivores - Protecting livestock against large carnivores. Slovenia Forest Service. Financed by the Ministry of Agriculture, Forestry and Food. (*in Slovene*). Available here. ▪ **Website**: “Safe grazing” – www.varna-pasa.si (available in English and Slovene).

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
▪ **National co-financing scheme**: Slovenian Environment Agency co-finances 80% of the purchase of equipment to farmers who have already experienced damage on their property. ▪ **Projects**: LIFE Slowolf (2010-2013), LIFE DINALP BEAR (2014-2019), and Interreg Carnivora Dinarica (2018-2021)
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
Farmers can apply for payments from EAFRD (European agricultural fund for rural development - payment for agri-environment-climate commitments). **Within the EAFRD scheme 2014-2020, the area-based flat rate payment for mobile electric fences and electric nets is 119,90 € / ha.** Subsidies cover the workload which is needed to setup, move and maintain the enclosure.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	Damages officials from Slovenia Forest Service (hereafter SFS).
HOW MANY PEOPLE ARE INVOLVED?	Approximately 50 officials from SFS regional units.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	**Regular field controls and collaboration with farmers are crucial for ensuring the correct use the equipment.** SFS damage officials perform regular controls of the use of the equipment in the field. They make announced and unannounced visits at the protected properties at least once per year, usually between May and October. Unannounced field controls are performed twice (in case of livestock animals) or once (in case of beehives) per year. Damages officials control the general situation around the protected area, check the enclosure, measure the foreseen

	features and fill in a control form, which is sent to the Slovenian Environment Agency and SFS central unit. The purpose of such controls is to check, whether the equipment is correctly installed in the field and to stay in touch with farmers. This is a kind of collaboration between farmers and officials, as they share useful feedback information and improve the general knowledge about the use of these preventive measures.
WHICH FEATURES ARE MONITORED OR INSPECTED?	List of monitored features: ▪ type of protected property ▪ number of elements (animals, beehives, etc.) ▪ presence of electricity ▪ voltage (near the source and in the middle of the perimeter) ▪ grounding (number of rods used and installation) ▪ maintenance of the fence route (vegetation, etc.) ▪ setup of nettings, poles (proper installation) ▪ presence of passages under nettings ▪ assess the level of damages on the nettings (wear and tear) ▪ description of damages ▪ length of the enclosure ▪ composition of the fence (height, number of single nettings) ▪ description of fence micro-location (type of terrain, slope) ▪ presence of animals in the fence ▪ presence of livestock guarding dogs ▪ use of solar panel ▪ other protective measures used ▪ description and photos of irregularities
HOW MUCH TIME DOES ONE CONTROL TAKE?	Approximately 30-60 min.

WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	If improper use is detected, the first step is to contact the owner, inform him/her about the situation and give advice on how to improve the use of fences to assure its effectiveness. In such cases, the field controls are made more frequently. More controls are also made if damages occur on the protected property. If the irregularities occur again, the owner is formally warned about the situation. If this is not enough, the signed contract dictates the refund of the financed part of the equipment.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
We compare the 3 years average of the damages that owners had before the implementation of protective measures with 3 years average after the implementation.
WHAT ARE THE RESULTS?
The overall effect of the use of high electric fence in Slovenia is positive: • **95 % reduction of damages** when using only high electric fences, • **75 % reduction** when owners use also other less-reliable measures (e.g. grazing in lower fences during the day) or if they have other unprotected property of the same type (more beehive units, out of which, only some of them are protected with high el. fences) • **93 % of owners have not experienced any damage** after the implementation of high electric fences (8 out of 119) • **Beekeepers have not experienced any damage** after the implementation of high electric fences See Additional info presented in the table below.

IMPLEMENTATION OF HIGH ELECTRIC FENCES						
YEAR OF IMPLEMENTATION	Type of protected property	Number of users	BEFORE IMPLEMENTATION	AFTER IMPLEMENTATION		
			Yearly average of damages - 3 years before implementation	Yearly average of damages - ALL TYPES OF MEASURES	Yearly average of damages - ONLY HIGH ELECTRIC FENCES	SOURCE
2011	Sheep	5	79.314	17.312	0	SloWolf
2012	Sheep	5	17.868	3.984	0	SloWolf
2015	Sheep	12	27.680	15.673	6.206	LIFE DINALP BEAR, ARSO
	Beehive	11	2.507	0	0	LIFE DINALP BEAR
2016	Sheep	9	3.488	724	555	LIFE DINALP BEAR, ARSO
	Beehive	13	11.823	1.178	240	LIFE DINALP BEAR
2017	Sheep	12	3.279	307	307	LIFE DINALP BEAR, ARSO
	Beehive	17	5.045	0	0	LIFE DINALP BEAR, ARSO
2018	Sheep	11	3.427	833	0	ARSO
	Beehive	17	2.116	0	0	LIFE DINALP BEAR, ARSO
	Orchard, corn field	4	300	0	0	ARSO
2019	Sheep	8	1.353	0	0	ARSO, CARNIVORA DINARICA
	Beehive	9	2.514	0	0	
	Orchard, corn field	3	12	0	0	
TOTAL		**136**	**160.725**	**40.011**	**7.309**	

Table: The overall effect of the use of high electric fence in Slovenia.

Additional information (photographs, technical details, charts, links to websites, etc.):

- Ad: Photographs:

High electric nettings protecting goats.

High electric nettings protecting a mobile beehive.

Multi-wire electric fence protecting a stationary beehive.

The intervention kit applied for protection of young cattle on Pokojišče, Slovenia.

LIVESTOCK GUARDING DOGS

COUNTRY	***SLOVENIA***
REPORTING PERIOD	***2011 – 2019 (June)***
IMPLEMENTED MEASURES	**Livestock guarding dogs (hereafter LGDs)**
TARGETED TYPE OF PROPERTY	▪ Sheep
TECHNICAL DETAILS	**Breeds included**: ▪ Karst Shepherd ▪ Tornjak ▪ Caucasian shepherd ▪ Sharplaninac Pups born in working lines (dogs' parents active livestock guarding dogs) were distributed to new owners at age of approximately 8-10 weeks and were immediately integrated in the new environment under regular surveillance of farmers.
SOURCES OF LGDs (working lines, genetic lines, etc.)	▪ LIFE Slowolf: Single pups were purchased within Slowolf project and donated to farmers (distribution 2011-2012). ▪ LIFE DINALP BEAR: Working lines were established in project through a collaboration with experienced LGD breeders with working lines and from these lines 20 pups were co-financed to farmers between 2017 and 2019. No special mechanism of maintaining pure genetic or working lines.
IMPLEMENTATION	➢ LIFE Slowolf ○ 10 pups (two breeds: Karst Shepherd, Tornjak) distributed to sheep breeders ➢ LIFE DINALP BEAR

	○ 20 pups distributed to sheep breeders
EDUCATION PROCESS	Experienced LGD breeders make the first step in knowing some animals from the herd in the first two months after a pup is born. Pups of 8 week can join new owners, where they slowly get to know the herd. At first, the pups meet calmer animals from the herd. The pup is regularly in touch with animals and owners provide them a safe place (e.g. box) where the pup can easily stand back from other animals. The pup has to be checked regularly and step-by-step it can join the rest of the herd. When the pasturing season begins, the pup stays with the herd all the time. The owner has to follow the integration and correct any unwanted behaviour. In general, after two years the dog becomes reliable.
SUPERVISION OF EDUCATION PHASE	When the dogs are co-financed from projects, every LGD breeder, from whom the dogs are coming from, offers support to new owners and advises them by phone, e-mail and during field visits.
CERTIFICATION OF LGDs	No existing certification of livestock guarding dogs in Slovenia.
PROTOCOL OF CERTIFICATION	/
LEGISLATIVE RESPONSIBILITY OF DOGS' ACTIONS	No special status of livestock guarding dogs. The owner is fully responsible for all dog's actions, regardless the location (pasture and outside). In case of an attack, the procedure is the same for all types of dogs.
ANIMAL WELFARE OBLIGATIONS	In general, the law obligates owners to take care of dogs – to provide food, water and shelter, regardless the type of dog.

CHALLENGES	**Legislation**: The status of LGD in the Slovenian legislation is unclear and not yet defined. Some farmers complain regarding the responsibility and legal consequences in case of an attack on people who enter the pasturing area, guarded by LGDs. **National financing scheme**: As the LGDs proved to be an effective solution for protection of pasturing animals, they could be co-financed by the state, similarly to high electric fences (see above).
CONTACT INSTITUTION AND PERSON	Slovenia Forest Service Tomaž Berce (tomaz.berce@zgs.si)

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
▪ Project LIFE Slowolf: pups donated (100% financed from the project) ▪ Project LIFE DINALP BEAR: pups co-financed (400 € from the project; new owner pays 200 €) **Cost of each dog: 600 €** (for 8 weeks old pup)
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
Farmers can apply for payments from EAFRD (European agricultural fund for rural development - payment for agri-environment-climate commitments). **Within the EAFRD scheme 2014-2020, the area-based flat rate payment for working with livestock guarding dogs is 112,60 € / ha.** Subsidies cover the workload which is needed to work with livestock guarding dogs.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	In LIFE DINALP BEAR project, LGD breeders (who distributed the pups) acted as advisor for new owners in the field. LGD breeders are experienced farmers, who know how to raise the dogs properly and how to integrate them in the herd. For new owners it is very important to have an advisor who can help them in case of troubles or everyday challenges. In the project, also two cynology experts were hired to advise new owner on how to raise the dogs, how to monitor them in the new environment, etc.
HOW MANY PEOPLE ARE INVOLVED?	Approximately five LGD breeders and two cynology expert.
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	No particular protocol. The supervisors control, if the dog's integration proceeds as it should and advise owners in the field and by telephone.
WHICH FEATURES ARE MONITORED OR INSPECTED?	General dog's integration in the herd and its behaviour as guarding dog.
HOW MUCH TIME DOES ONE CONTROL TAKE?	Approximately 1 hour.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	Supervisors advise the owner on how to educate dogs and avoid unwanted behaviours.

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
We monitor the situation at each farm regarding the occurrence of damages.
WHAT ARE THE RESULTS?
Preliminary results show that none of the new owners of LGDs has experienced damages to their pasturing animals.

Additional information (photographs, technical details, charts, links to websites, etc.)

- **ad. Technical details**

Tornjak.

Karst shepherd.

Sharplaninac.

Caucasian shepherd.

References

Berce, T., Zahariaš, K., Sedmak, A., Bragalanti, N. 2018. Livestock guarding dogs. The LIFE DINALP BEAR project handbook.

SHEPHERDS

COUNTRY	
REPORTING PERIOD	***2014-2019***
IMPLEMENTED MEASURES	**Guarding animals using shepherds**
TARGETED TYPE OF PROPERTY	Sheep
ROLE OF SHEPHERDS (JOB LIST)	▪ Shepherd stays with the herd all the time during the day. ▪ The herd has to be enclosed in a safe enclosure during the night (night pen or barn).
ARE THEY WORKING WITH LIVESTOCK GUARDING DOGS? IF YES, WHO IS THE OWNER OF DOGS?	No, usually their work is not connected with livestock guarding dogs.
HOW MANY ANIMALS DO THEY TAKE CARE OF?	No data.
DO THEY REPORT THEIR WORK?	No.
ORIGIN OF SHEPHERDS	Slovenia. Usually owners of the flock.
ARE THE SHEPHERDS ORGANIZED IN ORGANIZATION?	No.
SALARY (per month, season, etc. – define)	Usually owners of the flock take care of the animals as shepherds.
ARE THE COSTS COFINANCED? WHICH COSTS? ▪ salary,	Subsidies for workload are included in EARDF payments (see below).

▪ insurance, ▪ food, ▪ other?	
IMPLEMENTATION	In Slovenia there are no typical shepherds. The EARDF funds enable owners to apply for subsidies for using shepherds, but usually the owners play the role of shepherds by taking care of the animals during the day. Their main task is to enclose the animals in a safe enclosure during the night. Only 5 farmers decided to apply for EARDF subsidies for shepherds. All of them are located in the Dinaric part of Slovenia and not in the Alps. In the Alps, the typical role of shepherds was abandoned. One of the reasons for that could be also the local extinction of large carnivores in this part of Slovenia.
INSURANCE	No special insurance are applied.
FOOD	NA
SHELTER	NA
ARE THERE ANY DIFFERENCES BETWEEN SHEEP AND CATTLE SHEPHERDS?	Only sheep shepherds are present.
HOW DO THE SHEPHERDS LEARN ABOUT THEIR WORK?	No training.
RESPONSABILITIES OF SHEPHERDS	Their main task is to enclose the animals in a safe enclosure during the night.
IS THERE ANY PROMOTION OF ROLE / JOB OF SHEPHERDS?	No.

WHAT ARE THE SHEPHERDS DOING OUT OF WORKING SEASON?	Farmers, as described above.
CHALLENGES	Promotion of typical shepherds in the alpine area as the role was abandoned during in the last century because the absence of large carnivores.
CONTACT INSTITUTION AND PERSON	Slovenia Forest Service: Tomaž Berce, (tomaz.berce@zgs.si)

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
Only EARDF subsidies (see below).
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
Farmers can apply for payments from EAFRD (European agricultural fund for rural development - payment for agri-environment-climate commitments). **Within the EAFRD scheme 2014-2020, the area-based flat rate payment for guarding animals using shepherds is 107,60 € / ha.** Subsidies cover the work of a shepherd.

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	The surveillance is only applied for controlling the subsidy obligations. Agency for Agricultural Markets and Rural Development is in charge for controls.
HOW MANY PEOPLE ARE INVOLVED?	/
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	/

WHICH FEATURES ARE MONITORED OR INSPECTED?	Presence of shepherd with the animals.
HOW MUCH TIME DOES ONE CONTROL TAKE?	/
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	/

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Not measured.
WHAT ARE THE RESULTS?
No results.

OTHER DAMAGE PREVENTION MEASURES AND TECHINQUES

COUNTRY	***SLOVENIA***
REPORTING PERIOD	***2018 – 2019 (testing period)***
IMPLEMENTED MEASURES	**ELECTRIC MATS**
TARGETED TYPE OF PROPERTY	▪ Stationary beehives
TECHNICAL DETAILS	The electric mat is basically a dense electric netting placed on a rubber mat on the ground. The mesh-wired net works as a conductor for electricity, and is placed on a rubber board, which insulates the conductor from the ground. The electric mat has to be placed around the property or in front of exposed sections. The animal which steps on the mat receives a painful electric shock that scares the animal away.
FINANCIAL SOURCES	➢ Project LIFE DINALP BEAR
IMPLEMENTATION	Two electric mats were tested from Autumn 2018 around three stationary beehives. At the end of the project, the electric mats were delivered to two interested beekeepers for further use.
SURVEILLANCE	In the testing period, project staff regularly visited the locations of use. After the project, SFS staff is in charge to control the correct use of the equipment.
EFFECTIVENESS	All protected beehive units remained undamaged despite the regular presence of bears, which indicates the efficiency of this type of deterrent.
CHALLENGES	The electric mat can be used for protection of stationary beehives, where the front exposed part is protected, and the rest of the beehive (in most cases) is made of solid materials, that cannot be damaged by bears.
CONTACT INSTITUTION AND PERSON	Slovenia Forest Service Tomaž Berce (tomaz.berce@zgs.si)

Additional information (photographs, technical details, charts, links to websites, etc.)

- ad. Photographs:

Photo 1: The electric mat installed around a mobile beehive unit.

3.7 SWITZERLAND

Prepared by:

Daniela Hilfiker, and Daniel Mettler; data provided by © KORA (*Chapter Damages*)

Daniela Hilfiker, Riccarda Lüthi, François Meyer, and Daniel Mettler (*Chapter Damage prevention*)

3.7.1 **Damages caused by large carnivores in Switzerland**

REPORTING COUNTRY /	Switzerland
WHICH REGIONS DOES THE REPORT INCLUDE?	Whole country (wolf population mostly in the alpine or Jura region, some in the lowlands; bear mostly in the southeast of Switzerland, only one bear reached Central Switzerland)
REPORT PREPARED BY	Daniela Hilfiker, Daniel Mettler
INTRODUCTION / COMMENT OF THE SITUATION	

The first wolf migrated in 1995 from Italy to Switzerland. For several years, there where different individuals (first only males, later on also females) migrating from the Italian-french alpine population to the alpine region in Switzerland. The first pack was confirmed in 2012 in the eastern alps of Switzerland. Until 2019, this pack reproduced each year. Seven years later, 2019, eight packs were confirmed in Switzerland. Seven packs have established in the alpine region of Switzerland and one pack was confirmed in the Jura region. Wolf depredation on livestock in Switzerland affect mostly sheep (about 94 % of the compensated livestock during the last ten years). Occasionally also goats get attacked (about 5.6 % of the compensated livestock since 2010). So far, cattle only got attacked as an exception (about 0.4 % of the compensated livestock since 2010). The upcoming challenge will be to protect cattle properly if these attacks start to increase. The evaluation of efficiency of protection measures is a challenge too.

Several Lynx have been reintroduced in the 1970s in Switzerland from the Carpathian population. In 2018, the Swiss lynx population was estimated on about 250 individuals. This population is split into the Jura- (about 75 individuals) and the alpine population (about 176 individuals). 2016- 2019 lynx in Switzerland predated between 40 and 80 farm animals each year – mostly sheep or goats.

Since 2010 there are every year 1-3 bears crossing the southeast of Switzerland. Only one bear reached Central Switzerland. So far, only male individuals have been confirmed, originating from the Trentino population in Italy. Bears in Switzerland cause occasional damage on beehives, and in a few cases, attacks occurred also on livestock.

LARGE CARNIVORES POPULATION TRENDS IN SWITZERLAND IN THE PERIOD 2010-2019

YEAR	WOLVES		BROWN BEARS
	Population estimates	Confirmed packs	Population estimates
2010	9	0	1
2011	10	0	1
2012	13	1	2
2013	21	1	1
2014	25	1	2
2015	34	2	2
2016	34	3	3
2017	41	4	2
2018	52	4	3
2019	77	8	2

DAMAGES CAUSED BY WOLF IN SWITZERLAND IN THE PERIOD OF 2010-2019

YEAR	SHEEP	CATTLE	OTHER
	Animals affected	Animals affected	Animals affected
2010	86	7	3 goats
2011	281	0	14 goats
2012	102	0	14 goats
2013	307	1	18 (17 goats and1 red deer kept as livestock)
2014	215	0	9 goats
2015	332	1	29 goats
2016	420	2	23 goats
2017	280	0	8 goats
2018	506	1	19 goats
2019	380	1	39 goats
TOTAL	**2909**	**13**	**176**

3.7.2 **Damage prevention measures in Switzerland**

ELECTRICITY

TECHNICAL OVERVIEW OF THE IMPLEMENTED MEASURES	
COUNTRY	*SWITZERLAND*
REPORTING PERIOD	***2014 – 2019***
IMPLEMENTED MEASURES	**ELECTRIC FENCES** Three types: ▪ electrified nets 90 cm (counted as official protection measure); 105 cm (compensated by the livestock protection budget of the federal office for the environment (FOEN)) ▪ mobile multi-wire electric fences: 4 wires, height 90 cm (counted as official protection measure); 5 wires, height 105 cm (compensated by FOEN) ▪ fixed multi- wire fences: 5-6 wires, height 120-150 cm to protect beehives from bears (compensated by FOEN)
TARGETED TYPE OF PROPERTY	**Electric nettings:** ▪ Sheep, goats **Multi-wire electric fences:** ▪ Sheep, goats, stationary beehives
HERD / PROPERTY SIZE	10-1000 sheep, 1-20 ha
TECHNICAL DETAILS OF IMPLEMENTED MEASURE(S)	**Electric nettings for sheep and goat** ▪ Mobile fences ▪ Height: 90 cm (counted as official protection measure) 105 cm (compensated by FOEN) ▪ Minimum voltage 3000 V ▪ Net must be well tensioned

	Multi-wire electric fences for sheep and goat ▪ Mobile fences ▪ Height and structure: 4 wires and height of 90 cm (counted as official protection measure); 5 wires and height of 105 cm (compensated by FOEN) ▪ Minimum voltage of 3000 V on each wire ▪ The lowest wire not higher than 20 cm from the ground ▪ Wires must be well tensioned **Multi-wire electric fences for beehives** ▪ Fixed fences ▪ Height: 120-150 cm ▪ Structure: 5-6 wires or strands ▪ Minimum voltage 5000 V ▪ The lowest wire not higher than 20 cm from the ground ▪ Wires/ strands must be well tensioned **Night pens on alpine summer meadows** ▪ 105 cm electric nettings for sheep and goat ▪ 90 cm electric nettings with LGD's ▪ 5 wires or strands with max. 10 cm from above the soil
IMPLEMENTATION	Farmer buys fence material by himself and gets compensated by the livestock protection budget of the FOEN afterwards.
CHALLENGES	▪ Fences often used on spring and autumn pastures, on alpine pastures it is often too steep or too rocky to build up a proper fence for protection aims in a reasonable time. ▪ 90 cm electrified nets are counted as official livestock protection measure if well tensioned and without vulnerable points (lowest point of net higher than 20 cm from ground, little river crossing the net, etc.). However, these nets are often used in sheep farming, to keep sheep together (also if there is no large carnivore presence).

	Therefore, it is difficult to measure the effectiveness of these nets. ▪ If there is a damage even if sheep have been protected by a fence, it is difficult to check afterwards, if at the moment of the attack, there was enough electricity, enough tension on the fence and if all sheep have been inside the fence. If the fence is laying on the ground after an attack, it is difficult to check if the wolf crossed the fence before the attack or if the sheep were scared by the wolf walking around the pasture ending up in damaging the fence by themselves and therefore the wolf was successful in sheep depredation.
CHALLENGES AND BASIC REQUIREMENTS	▪ Insufficient grounding system. ▪ Incorrect use (e.g. no electricity, weak points). ▪ Risk of entanglement if animals are not used to electricity and fences/nettings or in case of panic situation. --> Visibility of fence is crucial: in Switzerland nets and wires are often orange, which is perceived by humans as a warning colour. However, most mammals are not able to distinguish between orange and green. The use of wires with contrast colours (for ex. blue/white; yellow/black) or the use of barrier tape (blue/white or red/white) is recommended.
CONTACT INSTITUTION AND PERSON	**Swiss Center for livestock protection, AGRIDEA** Team AGRIDEA Andreas Schiess (Andreas.Schiess@agridea.ch)
MORE INFORMATION AND INFO-MATERIALS	**Fact sheets**: ▪ Andreas Schiess, Daniel Mettler, 2016. Wolf protection fences on small livestock pastures (*in German, French and Italian*). *Available here.* ▪ Daniela Hilfiker, Daniel Mettler, 2018. Protection of apiaries from brown bears (in German, French and Italian). *Available here*.

	Educational videos: ▪ Using fences to prevent livestock damages by wolf, 2019. (*in English, German, French and Italian*) *Available here*. **Website** ▪ http://www.herdenschutzschweiz.ch/ *(available in German, French, a part in Italian and English)*

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
▪ **Electrified nets and multi wire fences for pastures day & night:** 0.70 CHF (about 0.66 Euro) for each meter of fence ▪ **Night pen:** 80 % of the material ▪ **Fences for Beehives:** once fix contribution of 700 CHF (about 657 Euro) per beehive (every 7 year) ▪ Funded by the federal office for the environment (FOEN)
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
▪ **Electrified nets and multi wire fences for pastures day & night:** 0.30 CHF (about 0.28 Euro) for each meter of fence ▪ **Night pen:** no payment for extra workload ▪ **Fences for Beehives**: no payment for extra workload ▪ Civil Service people are engaged to help the shepherd additional workload ▪ Funded by the federal office for the environment (FOEN)

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	▪ Swiss Center for livestock protection, AGRIDEA, mandated by the FOEN ▪ Local responsible experts (expert for protection of the flock, local game keeper) ▪ Federal Office for the Environment (FOEN)
HOW MANY PEOPLE ARE INVOLVED?	2-3 experts from the region (Quality control), AGRIDEA (Efficiency Analysis) and the Federal Office for the Environment (FOEN)
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	Federal Forms applied over all the Cantons, approved by the FOEN
WHICH FEATURES ARE MONITORED OR INSPECTED?	Fence quality (Size, electrical power, type) and grazing type
HOW MUCH TIME DOES ONE CONTROL TAKE?	3-5 farmers a day in the same region get controlled, Control and Consulting is still linked together
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	Reduction or refuse of payment, no permission to shoot the wolf

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
Not measured on a regular base. ▪ Master thesis: Klara Hansen, 2018, Effectiveness of Fences as Livestock Protection (*available here in English*)

- Evaluation of beehive fencing: Daniel Mettler, 2012, HOW TO PREVENT DAMAGES FROM BEARS ON BEEHIVES, CDP news, Nr.12 (*available here in English*)
- Randomized quality control by AGRIDEA

Additional information (photographs, technical details, charts, links to websites, etc.)

Ad: technical details:

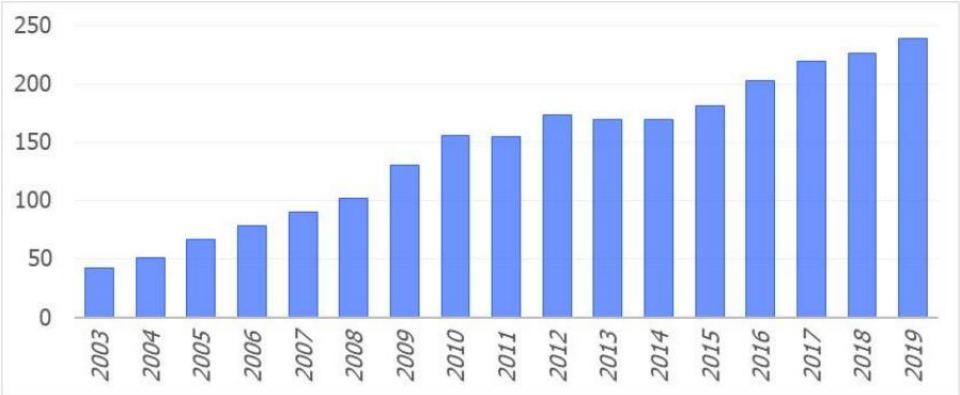
Electrified fence with multi-wires to protect sheep from wolves. Photo credit: AGRIDEA, Switzerland

Electric net protecting a herd of sheep. A blue and white barrier tape is used to improve the visibility of the fence. Photo credit: AGRIDEA, Switzerland

Photo 3: Multi-wire electric fence protecting a stationary beehive. Photo credit: AGRIDEA, Switzerland

LIVESTOCK GUARDING DOGS

COUNTRY	***Switzerland***
REPORTING PERIOD	***2003 – 2019***
IMPLEMENTED MEASURES	**Livestock guardian dogs (LGDs)**
TARGETED TYPE OF PROPERTY	▪ Sheep , goats, (cattle occasionally)
TECHNICAL DETAILS	**Breeds included**: ▪ Maremmano Abruzzese (MA) ▪ Montagne des Pyrénées (MP) Only LGDs bred or imported by the breeding association HSH-CH get distributed. Educated trainers and experienced LGD owners are allowed to train pups by themselves. Other farmers get LGDs only after the exam with about 1.5 years.
SOURCES OF LGDs (working lines, genetic lines, etc.)	In the 1990s, individual sheep farmers began to import livestock guardian dogs from Italy (MA) and France (MP) and bred them. Since 2003, AGRIDEA has been coordinating the use of livestock guardian dogs in Switzerland, financed by the FOEN. 2011 additionally the association HSH-CH was founded, of which the majority of LGD owners are members. This association is since then responsible for the targeted breeding of the livestock guardian dogs. It is also responsible for the training of breeders and trainers for LGDs. The association also coordinates the regular import of dogs from breeding lines to gain new genetics. AGRIDEA coordinates the exam, which the dogs have to pass before they are fully trained and can get distributed. Only dogs bred within the association and that passed the exam get distributed and financed. The FOEN finances the targeted breeding, training and the work around the use of the guard dogs.

IMPLEMENTATION	 *Figure: Number of official LGDs on Swiss alps. (c) AGRIDEA, Switzerland*
EDUCATION PROCESS	Pups are born within the flock (only of official LGD breeders). At the age of 12 weeks pups can join new owners (official trainers or experienced LGD owners) where they get integrated into the new herd and get to know other adult LGDs (at least two pups get placed together, pups are only placed on farms where there are already other adult LGDs). The integration is possible from autumn to spring – there are no integrations of pups on alpine pastures during summer. The pups are always in touch with livestock but owners provide them a safe place (e.g. box) where they can easily stand back from livestock. Besides a good integration into the new flock the trainers invest a lot of time to socialize the pups also with humans. During imprinting phase, the pups should meet different persons, children, new objects, they should learn to walk on a leash, to be in a car, they should come if you call them, etc. After about 1.5 years, if the dog passes the exam, it can work as an official LGD.
SUPERVISION OF EDUCATION PHASE	Education of pups is only done by official trainers that passed several exams organised by the association HSH-CH. Additionally, it is allowed for experienced LGD keepers to raise pups themselves. There are 7 consultants (LGD breeders and keepers by themselves, mandated by Swiss Center for livestock protection, AGRIDEA) who

	can be contacted anytime if there is questions or challenges during education phase. Exam after 1.5 year of education.
CERTIFICATION OF LGDs	Exam for certification when dog reaches about 1.5 years. Can be repeated once if not passed the first time.
PROTOCOL OF CERTIFICATION	Exam consists of two parts – one part within the flock and the other without the flock: **LGD within the flock** ▪ Farmer has to lead LGD (walking on leash, calling the dog off its flock, sending the dog back to its flock where the dog has to stay with the flock) ▪ Spatial distance of the LGD to livestock is measured for 24 hours with GPS collars to check if the LGD stays with its flock ▪ Evaluation of reactivity towards strangers: A possible defensive behaviour towards a person, the dog doesn't know, is tested, this must be adapted to the purpose. The LGD may not be dangerous to this person at any time. ▪ Evaluation of the reactivity towards foreign dogs: A possible defensive behaviour towards the companion dog is tested, this must be appropriate to the purpose. In any case, a suspicious focus of the LGD on the companion dog and not on the human is expected. **LGD outside the flock** ▪ Farmer has to walk with the dog on leash without any livestock ▪ Balance and serenity of LGD towards extraordinary environmental stimuli. ▪ LGD's tolerance towards strangers and companion dogs.
LEGISLATIVE RESPONSIBILITY OF DOGS' ACTIONS	In the Swiss Federal Ordinance on Hunting and Protection of Wild Mammals and Birds (Jagdverordnung, JSV; as of 1 march 2018), the use of LGDs is described as one of various means of preventing

	damage caused by large carnivores. The implementation of the measures is regulated by the Federal Office for the Environment (FOEN) Very important are art. 10quater of the JSV which defines LGDs in Switzerland and art. 77 of the Swiss Federal Ordinance on Animal Welfare (TSchV, as of 27 November 2018) which differs LGDs from companion dogs when it comes to the analysis of biting incidents. More information about the legislation are available here in German and French. Chapter 7.4.1 of the Implementation aid for livestock protection (*available in German, French and Italian here*) defines the requirements and the responsibilities of keeping an official LGD.
ANIMAL WELFARE OBLIGATIONS	Chapter 7.5.1 of the Implementation aid for livestock protection (*available in German, French and Italian here*) defines the legal obligations of keeping an official LGD.
CHALLENGES	**Cohabitation of hiker/ biker with LGDs in touristic regions:** ▪ Information boards, tourist guidance boards, Flyers, Comics that inform Tourists in the field (organised by Swiss Center for livestock protection, AGRIDEA). *Flyer, Comic in German, French, Italian and English available here.* ▪ Courses/ Excursions for interested person about the appropriate behaviour towards LGDs (organised by Swiss Center for livestock protection, AGRIDEA and the NGO *pronatura* Switzerland) ▪ Video about the appropriate behaviour towards LGDs – *available here*. (realised by Swiss Center for livestock protection, AGRIDEA) ▪ Online map with all Swiss alpine pastures on which official LGDs (financed by FOEN) are working on. If people are planning their tour online at home they can already include the presence of LGD in their planning. *Map available here and here*. (realised by Swiss Center for livestock protection, AGRIDEA)

	▪ Report about conflict management with LGDs for every farm written by Advisory centre for accident prevention in agriculture (BUL) to avoid incidents with LGDs in advance. ▪ Guide for the conflict management with LGDs with checklists to be completed by the LGD keeper for its farm and alp. *Available here in German, French and Italian*. ▪ Detailed report about every biting incident that happen with LGDs for monitoring reasons.
CONTACT INSTITUTION AND PERSON	**Swiss Center for livestock protection, AGRIDEA** Team AGRIDEA Felix Hahn (felix.hahn@agridea.ch)

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
Future LGD owner buys LGD: ▪ Pup (only possible for official trainers or experienced LGD keeper): 285 Euros/ pup ▪ LGD that passed the exam: 1140 Euros/ LGD **Afterwards payment of livestock protection budget of the FOEN:** ▪ Subsidy for each LGD keeper: 95 euros per month per LGD (covers food, basic veterinary expenses) ▪ If there is a bigger medical issue, 80 % of veterinary costs are paid.
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
On alpine pastures for each summer: ▪ With shepherd: 1900 euros per summer per alp (funded by FOEN)

- Without shepherd: 475 euros per summer per alp (funded by FOEN)
- About 75 euro per 10 sheep and per summer if livestock protection measures are used in addition to a shepherd or the rotational grazing system (fences used for herding the sheep not as livestock protection) (funded by FOAG)

For official breeders and trainers (trained by association HSH-CH):

- Contribution for breeding dogs: 66 euros per female breeding dog and month; 33 euros per male breeding dog and month.
- Contribution for litter: 7120 euros per litter if 4 or more pubs; 3560 euros per litter if less than 4 pubs
- Contribution for training: 190 euros per month and per dog (for 12 months)
- Contribution for exam: if LGD passes exam: 475 euros per dog that passes the exam

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	▪ FOEN (Federal Office for the Environment) ▪ Swiss Center for livestock protection, AGRIDEA ▪ Cantonal Offices ▪ "Surveillance" by educational trainings: LGD owner has to complete a theoretical course (1 day) before he gets LGDs, afterwards he has to complete a practical course (1 day) within one year with each LGD he received. Courses organised by Swiss Center for livestock protection, AGRIDEA.
HOW MANY PEOPLE ARE INVOLVED?	3 person in the office + 7 consultants in the field
WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	No particular protocol.

WHICH FEATURES ARE MONITORED OR INSPECTED?	▪ Each LGD and each LGD owner is registered in an LGD-specific database (GRIDS, Zooeasy) as well as registered in AMICUS as official LGD or LGD owner (the official database for all dogs in Switzerland). ▪ Each incident is reported (biting incident, straying, noise complaints, and damage despite of LGDs etc.)
HOW MUCH TIME DOES ONE CONTROL TAKE?	For the control of the dog legislation (TschG), the Cantons are responsible. For the quality control of the dogs the FOEN is responsible and supported by AGRIDEA and BUL (Advisory centre for accident prevention in agriculture) All the LGD's are tested and a prevention security report is realized before the LGD's start to work in a flock.
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	▪ written warning ▪ reduction of financial contribution by FOEN ▪ loss of the guaranteed financial contribution and prohibition of keeping official LGDs

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED?
As long as there is no damage when LGDs are working in wolf/bear/lynx regions, LGDs are counted as an effective measure on this fam. If there is a damage despite of LGDs all details are reported to gain more information about what went wrong to improve in future.

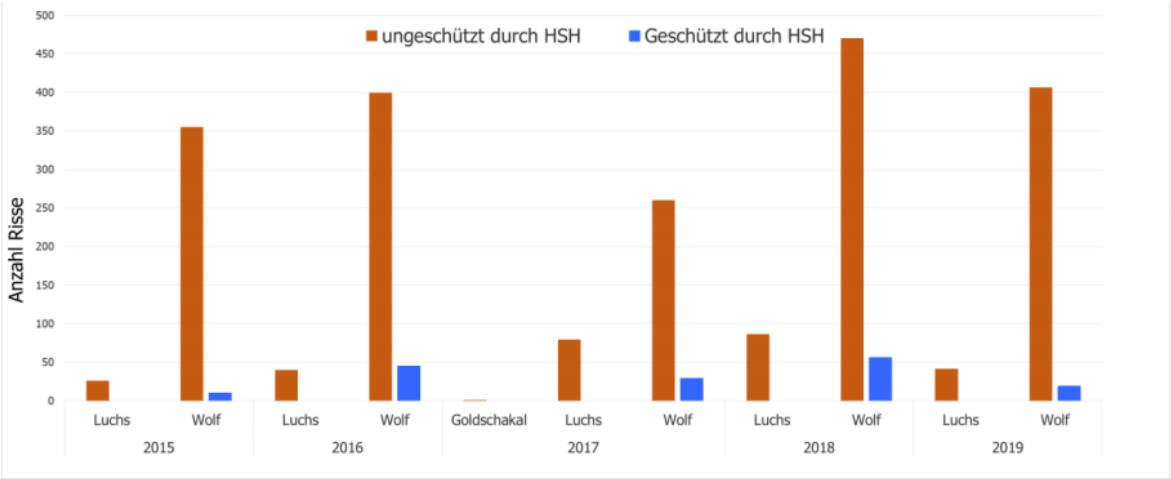


Figure: Predation of livestock in flocks with (blue) or without LGD (orange). Numbers of killed livestock by lynx, wolves, and golden jackals of the years 2015 – 2019 are shown. (c) AGRIDEA, Switzerland

Additional information (photographs, technical details, charts, links to websites, etc.)

Ad: Photographs:

Montagne des Pyrénées originally from France. Photo credit: AGRIDEA, Switzerland

Maremmano abruzzese originally from Italy. Photo credit: AGRIDEA, Switzerland

Visitor guidance board that informs hikers and bikers about livestock guardian dogs, about the right behaviour towards them and where it is expected to meet them in the particular region. (c) AGRIDEA, Switzerland

Information board about the right behaviour towards livestock guardian dogs. Photo credit: AGRIDEA, Switzerland

SHEPHERDS

COUNTRY	
REPORTING PERIOD	***2003-2019***
IMPLEMENTED MEASURES	Shepherds are a part of the summer grazing system. The alp owners are supported to afford the shepherd by the Federal Office of Agriculture (FOAG). The main objective of this support is to maintain the grazing tradition of transhumance, the biodiversity of the alpine regions and to facilitate to protection of the flocks.
TARGETED TYPE OF PROPERTY	Sheep, goats, (cattle, cows: other type of shepherding – see "Differences between sheep and cattle herding")
ROLE OF SHEPHERDS (JOB LIST)	Usually different sheep owners bring their flocks together and one shepherd (sometimes sheep owner himself, often not) takes care of all of them as one flock. Two types of shepherding: ▪ Sheep stay during winter at their owners place in the lowlands. In summer time several sheep owners bring their sheep together on an alpine pasture where a shepherd takes care of them during summer. ▪ Shepherd herds sheep all year long during winter in the lowlands and during summer in the alpine pastures (transhumance) (in Switzerland only about 30 flocks). Basic role of a shepherd: ▪ Shepherds stay with the herd all the time during the day ▪ They keep sheep or goats in the areas where they should graze ▪ They move with sheep/ goats in order to find the best grass and use the alpine pastures in a sustainable way ▪ They are responsible for the health of their flock (responsible for medical treatment if necessary and

	possible or responsible to call for help (sheep owner or veterinary if necessary), ▪ They bring sheep together during night, ▪ They set up different types of fences if needed, ▪ They take care of LGDs, ▪ If milk sheep or goats, they are sometimes also responsible for milking
ARE THEY WORKING WITH LIVESTOCK GUARDING DOGS? IF YES, WHO IS THE OWNER OF DOGS?	Since LGDs are a part of the flock, for which the shepherd is responsible, shepherds are also responsible for LGDs and work with them during summer time. Usually one of the sheep owners is also the owner of the LGDs. So he brings his sheep and his LGDs in the beginning of summertime on the alpine pasture where the shepherd takes care for them until autumn. The owner of the LGD is responsible that there is enough food for the LGDs – the shepherd will feed them appropriately.
HOW MANY ANIMALS DO THEY TAKE CARE OF?	350- 1800 sheep
DO THEY REPORT THEIR WORK?	Yes, they must report a “pasture journal” where they write down when the sheep/goats graze on which part/ sector of the alpine pasture. Additionally they report in the “journal of treatments” all medical interventions on individual sheep or groups.
ORIGIN OF SHEPHERDS	Switzerland, Germany, Austria, sometimes Italy and France.
ARE THE SHEPHERDS ORGANIZED IN ORGANIZATION?	No. Only the sheep-breeders and professional sheep-farmers are organized in specific organizations.

SALARY (per month, season, etc. – define)	120 – 175 Euro/ day (= 3600- 4350 Euro/ month). The amount of the salary depends on the flock size and the experience of the shepherd.
ARE THE COSTS COFINANCED? WHICH COSTS? ▪ salary, ▪ insurance, ▪ food, ▪ other?	Shepherds get a fix salary from the responsible for the alp. The responsible for the alp gets additional subsidies for the whole summer period if there is a shepherd working on the alp (paid by the federal Office for Agriculture (FOAG)) and also if there are LGDs working on the alpine pastures (paid by the FOEN). Insurance is normally paid by the responsible of the alp and food by the shepherd.
IMPLEMENTATION	During the shepherd training courses since 2009, more than 200 shepherds followed the courses. Actually 250 -300 shepherd are working during the summer season on summer alpine pastures, 30 shepherd are working during the winter in the low lands in a transhumant system. The subsidised grazing system is controlled by the Cantons and the FOAG. The report about the Swiss shepherd culture was published 2016.
INSURANCE	Accident insurance usually paid by employer (responsible of the alp)
FOOD	Usually paid by shepherd.
SHELTER	Organised by the responsible of the alp. Project of shepherd shelters, 2016 conducted by *Büro Alpe* on behalf of AGRIDEA, Pro Natura, WWF Switzerland and the association of Swiss sheep breeders: more Information (*in German and French*)

ARE THERE ANY DIFFERENCES BETWEEN SHEEP AND CATTLE SHEPHERDS?	Yes, there are differences: ▪ Sheep- shepherds most often are employed one for one flock, so they usually work alone; whereas cattle guardians more often work in a team of 2-4 persons, especially if the animals are milking cows. ▪ For a sheep-shepherd one or two good and well trained sheep-dogs are indispensable for the flock management- especially if the flock needs to be fenced in every night in case of the presence of predators. Cattle guardians do work more often with fences to manage their flock, herding-dogs are sometimes used but don`t need to satisfy very high demands. ▪ Sheep-shepherds usually work on higher situated, steeper and more dangerous alpine areas than cattle guardians. ▪ Salaries for sheep-shepherds are usually lower than those for cattle guardians.
HOW DO THE SHEPHERDS LEARN ABOUT THEIR WORK?	One possibility is the Swiss shepherd training, implemented in 2009. (Includes 10 days of theoretical courses, at least three weeks of internship at a sheep farm during winter and at least 12 weeks of internship on an alp working with sheep or goats during summer).More information here Especially the older generation of shepherds- quite a few coming from the neighbouring countries Italy, France and Germany- did learn the profession in a traditional way, passing the knowledge down from the father/ uncle to the son/ nephew etc. within the family.
RESPONSABILITIES OF SHEPHERDS	They are responsible to keep sheep or goats in the areas where they should graze, they move with the flock to find the

	best grass and are responsible to use the pastures in a sustainable way, for example to spare “sensitive surfaces” from grazing, they are responsible to set up fences for management reasons, they are responsible for the health of their flock (responsible for medical treatment if necessary and possible or responsible to call for help (sheep owner or veterinary, they are responsible to implement livestock protection measures on a daily basis like: bringing sheep together during night (if necessary into a night enclosure), setting up electric fences, and taking care of livestock guardian dogs if present.
IS THERE ANY PROMOTION OF ROLE / JOB OF SHEPHERDS?	▪ AGRIDEA organises an annual meeting or a field trip for all interested shepherds in Switzerland. ▪ To have more well trained shepherds in Switzerland, AGRIDEA organises together with three agricultural schools the Swiss shepherd training. More information here ▪ AGRIDEA started 2017 a newsletters with shepherd relevant information’s that is send twice a year to all interested shepherds (*in German and French*). *Newsletter here available*
WHAT ARE THE SHEPHERDS DOING OUT OF WORKING SEASON?	Diverse- often working on farms, working as craftsmen, in ski resorts etc.
CHALLENGES	- To recruit enough shepherds with the necessary skills and knowledge and a middle- to long-term commitment for the life as a shepherd. - To support a certain flexibility in sheepfarmers/ alp-responsibles to accept also new ways of flock-

	management, or new ways of employment like "job-sharing" models etc. - To improve the public view on the importance of the shepherds work in a bigger context (biodiversity, tradition, sustainable grazing, extensive production of meat and milk) and thus increasing the value of the shepherds work. - To find unbureaucratic ways to support shepherds in case of extra workload. Usually the shepherd has already a fulltime job being out with the flock all day – so it is often difficult to meet more expectations related to the implementation of livestock-protection measures.
CONTACT INSTITUTION AND PERSON	**Swiss Centre for livestock protection, AGRIDEA** Team AGRIDEA Riccarda Lüthi (Riccarda.Luethi@agridea.ch)

SUBSIDIES OR OTHER MEANS TO MITIGATE OR PREVENT LARGE CARNIVORE DAMAGES
SUBSIDIES AND PAYMENTS FOR EQUIPMENT
LGD's and electrical fences are systematically subsidised, based on the National legislation. Other measures could be supported by the Cantons or the Confederation if they are accepted as efficient and if they are the only alternative to LGD's and fences.
SUBSIDIES AND PAYMENTS FOR EXTRA WORKLOAD
A contribution of 30 cents/per meter of fence is integrated for the additional workload of fencing. Otherwise people from the Civil Service can be demanded for additional workload during the grazing season. (Coordination by AGRIDEA, funded by FOEN)

SURVEILLANCE OF THE IMPLEMENTED MEASURES	
WHO IS IN CHARGE OF SURVEILLANCE?	▪ FOEN (Federal Office of Environnement) ▪ FOA (Federal Office of Agriculture) ▪ Cantonal Offices ▪ Swiss Center for livestock protection, AGRIDEA ▪ BUL (Advisory centre for accident prevention in agriculture)

WHAT IS THE PROTOCOL / PROCEDURE OF EACH CONTROL?	Implementation Aid for livestock protection *(Available here)*
WHICH FEATURES ARE MONITORED OR INSPECTED?	▪ LGDs by FOEN/AGRIDEA/BUL ▪ Fences by AGRIDEA /FOEN ▪ Shepherd by FOA
WHAT ARE THE CONSEQUENCES OF THE CONTROL IN CASE OF IMPROPER USE?	Reduction of subsidies

EFFECTIVENESS OF THE IMPLEMENTED MEASURES
HOW IS THE EFFECTIVENESS MEASURED? Introduction of the statistics of grazing system by FOAG: Agrarbericht.ch *(available in German, French and Italian)*

Additional information (photographs, technical details, charts, links to websites, etc.)

Ad: Photographs:

Shepherd guarding the flock in the canton of Tessin. Photo credit: AGRIDEA; Switzerland

Shepherd ensuring the daily contact to the LGDs in the canton of Wallis. Photo credit: AGRIDEA; Switerland

OTHER DAMAGE PREVENTION MEASURES AND TECHINQUES

COUNTRY	***SWITZERLAND***
REPORTING PERIOD	***2004 – 2019 (testing period)***
Other MEASURES	For all this measures, there are neither systematic subsidies nor systematic evaluation.
Accoustic deterrent	Alarm Guards: punctual use at hot spots of wolves More information
Visual deterrent	Foxlights: frequent use for periodical risk of lynx areas More information
Lamas	Use for small pastures (not alpine pastures), normally in combination with a fence, More information
Structural measures on farms	The fusion or the reorganisation of pastures and farms could be an important first step for implementing further measures. The change management is coached by the agricultural consulting agencies. More information
Prevention measures for cattle	The main focus to prevent damages of wolves with cattle is the management of the calving season related to the risk periods of grazing. More informations
CHALLENGES of other Measures	All types of this measures should be applied with care and only in period of risk. The risk should be relatively low (no wolfpacks). The risk that the predators can get used to it are relatively high.
CONTACT INSTITUTION AND PERSON	**Swiss Center for livestock protection, AGRIDEA** Team AGRIDEA (website)

4 TECHNICAL GUIDELINES FOR ESTABLISHING A RELIABLE PROTECTION OF LIVESTOCK

Best practices tested and proved within intensive effort of many experts throughout Europe prove that a variety of solutions can be used to prevent the occurrence of damages caused by large carnivores.

Throughout different countries, technical solutions were tested and adjusted to fit specific landscape features and other environmental factors in the Alpine region. Within the present document, WISO and project LIFE WOLFALPS EU members have grouped these solutions into three main methods of protecting grazing animals:

(1) the use of electricity to surround a pasture to prevent large carnivores from reaching grazing animals;

(2) the use of livestock guarding dogs – dogs that are brought up within the herd of grazing animals to create a bond between the dogs and the animals they are protecting;

(3) the presence of sheperds guarding the herd during the day and closing the animals into a night pen to protect them from predators.

Within each method, a range of approaches has been developed to be implemented on different terrains and considering the needs of protected grazing animals. As there are no uniform solutions, every case has to be adapted to suit specific circumstances. Nevertheless, each method has a set of obligatory steps and procedures that need to be considered.

ELECTRIC FENCING

- Can be used as a night enclosure or permanent protection on the pasture.
- A constant presence of electricity is key to transmit electric shocks when predator touches the wires. The voltage of minimum 3000 - 5000 V ensures the transmission of the electric shock to the animal.
- Regular checking and maintenance of the proper installation (including regular removal of the vegetation under the fence) is necessary to maintain the barrier in an optimal state to transmit the shock.

- Regardless the height of the fence, the lowest electrified wire has to be maximum 20 cm above the solid ground along the circumference, to prevent animals from digging under the barrier.
- The grounding system has to be functional in all types of soil (including dry and rocky terrain) and therefore checked and maintained regularly.
- The shape of the fenced area has to be preferably oval or round to avoid sharp angles enabling the herd to circle within the perimeter of the fence and stay at distance from a visitor on the other side of the fence.
- The circumference of the fence must be large enough to allow the animals to move freely during panic reactions and must enable the flow of appropriate electric current.
- It is recommended to increase the visibility of the fence (e.g. by placing dangling pieces of tape on the upper wire at least every 5 m, preferably in blue and white colour) to prevent the entanglement of wild animals into the fence.
- All the temporal fences (nettings) have to be removed after the removal of the herd from the pasture to prevent large carnivores from getting to know the barrier without electricity.
- The effectiveness of the measure has to be monitored in order to improve it in case weak points are detected.

LIVESTOCK GUARDING DOGS

- If livestock guarding dogs (LGDs) are the only damage prevention measure implemented, at least three dogs must stay with the herd all the time to protect them in case of attack of a pack of wolves or by a larger bear.
- The number of LGDs has to be adjusted in relation to the size of the flock of grazing animals.
- In general, LGDs can be used both for protecting small (sheep) and large (e.g. cattle) livestock.
- Pure-bred guarding dogs ensure traceability of dogs' good features.
- A strict education with constant corrections of the unwanted behaviour of the young dog is key for obtaining a reliable mature LGD.

SHEPHERDS

- The most important shepherd's task is to protect the animals during the night by enclosing them into a night pen.
- Especially in remote Alpine areas, the presence of a shepherd is very important also during the day to prevent attacks.
- In regions, where many small herds are roaming freely, the option of pooling herds from different farmers together should be considered.
- Educational measures and the professionalization of the pastoral profession is highly recommended in order to achieve enhanced (social and financial) appreciation and to reach a higher level of attractiveness.