



REPORT

Preventing damage by large carnivores:

A comparative overview of the use of the European Agricultural Fund for Rural Development to protect livestock in the Alpine countries

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Abbreviations

CAP – Common agricultural policy

CF – Cohesion Fund

CSF – Common Strategic Framework – framework for funding the ESIFs

EAFRD – European agricultural fund for rural development

EAGF – European Agricultural Guarantee Fund

EMFF – European Maritime and Fisheries Fund

ERDF – European regional development fund

ESF – European social fund

ESIF – European social and investment funds

EU – European Union

FCS – Favourable conservation status

LEADER - Liaison Entre Actions de Développement de l'Économie Rurale – community led EU financing programme

LIFE + Programme – EU funding programme for the environment

MFF - Multi-Annual Financial Framework – 7 year funding programme for the European Union

Natura 2000 – network of protected sites for the EU designated under the Birds and Habitats Directives

PAFs – Priority Action Frameworks – member states plans for financing Natura 2000

PMC – Programme Monitoring Committee – established to monitor the rural development programmes

SAC – special area of conservation

WISO – Large Carnivores, Wild Ungulates and Society Platform for the Alpine Convention

Introduction

The three large carnivore species present across the Alps brown bear (*Ursus arctos*), wolf (*Canis lupus*) and Eurasian lynx (*Lynx lynx*)¹, present a conservation and coexistence challenge. Their large, cross-border ranges mean they require management which goes beyond territorial borders and integrates existing national and local management structures.

Large carnivores' biological needs can potentially bring them into conflict with a range of human interests and economic activities. Conflict around large carnivore management tends to be particularly intense in areas where large carnivores have been absent for long periods and are currently returning (as is the case in most Alpine countries). Conflict may not be purely about the economic impacts of large carnivores (Linnell 2013), however compensating and especially preventing or mitigating the economic damage they cause is seen as an essential step in helping to reduce conflict or preventing it developing in the first place.

This report examines how the Alpine countries are using available EU funding, in particular, the European Agricultural Fund for Rural Development (EAFRD) to prevent or mitigate large carnivore damages. The report was commissioned by the Alpine Convention's WISO Platform in order to provide information to its membership on this topic.

1.1 Large carnivores and livestock in the Alps

The populations of large carnivores in the Alps follow the trends across much of Europe (Chapron et al, 2014) with significant declines up until the mid-twentieth century, and then a partial recovery in population numbers and range in the second half of the twentieth century. The situation for the individual species is described briefly below.

Lynx were almost eradicated from the Alps in the 1800's and early 1900's but were reintroduced in the 1970's. Currently, it is estimated that ca. 130 lynx (Schnidrig et al., 2016, LIFE Lynx, 2018) live in the Alps, mostly in the northwestern Alps of Switzerland and the south-eastern Alps of Italy and Slovenia. The biggest conservation problem they face is inbreeding due to the small population. This is currently addressed by activities to reinforce the population from the Carpathian Mountains. In general, lynx generate less conflict than bear or wolves in the Alps though regionally, conflict can be high.

The main Alpine population of bears is concentrated in two core areas: the Adamello-Brenta nature Park in the Italian region of Trentino (population of approximately 52 to 63 individuals including cubs, Groff et al., 2018) and the Slovenian Alps (population of around 50 individuals, Skrbinšek et al. 2018). In addition, the presence some dispersed animals was recorded in other areas in 2016, especially in the south of Switzerland.

Wolves are mainly located in the French and Eastern Italian Alps but there are also smaller populations in Switzerland the central and eastern Italian Alps and Slovenia. The sporadic presence of scattered individuals has also been recorded in the Austrian Alps. The latest status of the Alpine wolf population assessed by the Large Carnivore Initiative Europe in 2012 reports around 280 individuals (Kaczensky et al., 2012)², while the Alpine Wolf Group documented for the same year 35 packs and 3 pairs, the majority of which were between Italy

¹ The *golden jackal* (*Canis aureus*) is also returning to some Alpine countries but is not yet widely present.

² Update currently being carried out. New figures should be available by the end of 2018.

and France (Wolf Alpine Group, 2014). Wolves generally cause the greatest conflict with livestock managers.

1.2 Protection of livestock against large carnivores

Effective mitigation of damage to livestock caused by large carnivores is seen as essential to prevent conflicts. Over centuries, humans developed ways to guard livestock against large carnivores. However, in parts of Western Europe, large carnivores were effectively absent for much of the twentieth century and the need for protecting livestock was reduced. This, together with new farming techniques, and rural lifestyles, led to a decline of shepherding and the use of guarding dogs (Kaczensky, 1999).

The return of large carnivores to almost the entire European continent (Chapron, et al 2014) has led to a renewed interest in the protection of flocks and herds against large carnivores. The main measures used (Eklund et al, 2017) are listed below:

- Enclosure of livestock - fencing, mobile and stationary electric fencing
- Shepherding of livestock
- Use of livestock guarding dog
- Averse conditioning of large carnivores e.g. shock collars
- Visual and auditory deterrents for large carnivores

In Europe, the first three measures are most commonly used. Eklund et al (2017) reported a lack of peer-reviewed research into the effectiveness of all deterrent measures. None-the-less the studies that exist, indicate that these three measures can be effective, so long as they are carefully targeted for the large carnivores present, the livestock to be protected and the natural conditions of the area. If the measures are applied in an inappropriate manner, they can be useless or even counter-productive for example by trapping livestock but not effectively preventing carnivores entering the area. Studies also suggest that often a combination of measures, such as livestock guarding dogs, shepherding and fencing, is most effective at preventing attacks (de Roince, 2017).

1.3 The Alpine Convention's WISO Platform

The Alpine Convention was signed in 1989 with the aim for the Alpine Countries to jointly look for the balance between protection and sustainable development of the Alpine area. Article 2 of the Framework Convention lists the priority areas of work, amongst which are spatial planning and nature protection and landscape conservation. The different topics are addressed further with specific thematic protocols; such as one on "Nature protection and landscape conservation" (Alpine Convention 1989). Specific topics are selected for further development in the Multiannual Work Programme, set in place for 6 years. For the period 2017-2022, "Conserving and valuing biodiversity and landscape" is one of the priority areas.

For the active engagement of contracting parties and observers on different topics of the Convention, so called thematic working bodies are established. To address the relation between wildlife and society and to exchange experience and look for joint work in the future on wildlife management the X. Alpine Conference in 2009, established the Large Carnivores, Wild Ungulates and Society Platform (WISO). The set objective of WISO is "to find solutions to manage large carnivores and wild ungulates harmoniously, and based on an integrated

approach". The Platform goes beyond a strictly ecological approach and endeavours to take into account economic and social aspects in a balanced manner. The Platform focuses on promotion of information exchange, dialogue and coordination among the Contracting Parties and among authorities, wildlife managers, hunters and foresters.

In the mandate period 2017-2018, the platform, on an exceptional basis chaired by the Permanent Secretariat of the Alpine Convention, focused on sustainable damage prevention and compensation, through the report and exchange of national and regional approaches and good practices. This included the following activities: an agreement to analyse possible application of the EU Agricultural Fund for Rural Development (EAFRD) for financing damage prevention measures (addressed through this report); the development of recommendations for internationally coordinated Brown Bear management actions at the Alpine level, taking into account the results of the LIFE DINALP BEAR project, the Bear Alpine Group indications and other relevant initiatives; the further development of programmes for alpine-scale coordinated genetic monitoring of large carnivores; and the promotion of initiatives to counteract inbreeding in alpine lynx sub-populations.

2 The Policy Framework

2.1 Requirements for large carnivore conservation and management

Large carnivores in the Alpine area are protected under the 1979 Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention, signed by all Alpine states) (COE 1992) and in the EU countries under the 1992 Habitats Directive (European Council 1992).

The Bern convention is a binding international legal instrument, covering the European continent and parts of Africa, which lists habitats and species to be protected by the convention signatories. Species included in Appendix II are strictly protected: it is prohibited to deliberately capture, kill or disturb these species or their refuge areas/habitat. Species included in Appendix III are protected: they can be hunted but hunting should be regulated in order to keep the populations out of danger, e.g. measures such as closed hunting seasons and temporary or local bans to allow population recovery. Signatories could make reservations to not consider particular species as protected under the convention.

The EU Habitats Directive implements the Bern convention in the European Union (EU), adding stronger enforcement and reporting mechanisms. A key concept of the Directive is that all the species and habitats listed (no matter which annex) must be maintained in or restored to favourable conservation status (FCS). The types of action required and / or permitted to achieve FCS, vary depending on species or habitat. Annex II lists the species which require the designation of special areas of conservation (SACs), Annex IV lists strictly protected species (defined in the same way as the Bern Convention) and Annex V lists species which can be exploited but only if this is compatible with maintaining them in FCS. There is however some overlap between the Annexes: while species listed in Annex IV are strictly protected, derogations under article 16, permit removals from the population (lethal management) under particular circumstances (for example for protecting other fauna and flora or for preventing serious damages e.g. to crops or livestock or for public safety). This means that, even in member states where large carnivores are included in Annex IV, they may effectively be hunted in a targeted manner if required as a management measure.

Bear and wolf are strictly protected under Appendix II of the Bern Convention in all Alpine countries with the exception of Slovenia, which made reservations to the Appendix II for the species of wolf and brown bear. This is however irrelevant given their protection under the Habitats Directive. Lynx is protected under Appendix III in all Alpine countries. In the Alpine countries, which are EU member states, bears, wolves and lynx are strictly protected under Annex IV of the Habitats Directive.

The European Commission completed a thorough evaluation of both the Birds and the Habitats directives (European Commission,2016). The evaluation found that the directives remain highly relevant and are fit for purpose within the framework of broader EU biodiversity policy. Nonetheless, there are some common problems with their implementation in the member states. The European Commission therefore developed the Action Plan for nature, people and the economy (European Commission,2017) which lays out 15 actions to be carried out between 2017 and 2019. These included actions to update guidance on species protection and management (action 1); bring together authorities and stakeholders at the biogeographical region level to address common challenges, including on cross-border issues (action 6); and further develop species and habitat action plans as well as stakeholder platforms on the

coexistence with conflict species (action 7). This includes providing continued support to the EU-level stakeholder representatives group, the EU Platform on coexistence between people and large carnivores³. The Action Plan does not propose to re-examine the protection-level of species or habitats (no changes will be made to the Annexes of the Directives under the action plan).

A further legislative framework is provided by the Alpine Convention, signed by all eight Alpine countries (Alpine Convention, 1995). Although the Alpine Convention does not contain any specific provision related to large carnivores, several references to the protection of species can be found in its Protocol on Conservation of Nature and Landscape Protection which follow the requirements of the Habitats Directive. Specifically, Paragraph 1 of Article 14 of the Protocol ("Protection of the Species") envisages that "the Contracting Parties undertake to pursue the measures appropriate for preserving the indigenous animal and plant species with their specific diversity and in sufficient populations, particularly ensuring that they have sufficiently large habitats". Moreover, Article 15 envisages that "the Contracting Parties shall prohibit the capture, possession, injuring and killing of certain animal species, and disturbing them particularly during their periods of reproduction, growth and wintering [...]". Exceptions to this provision are regulated by Paragraph 4 of the same Article, which states that such exceptions can be applied as required by the needs of a.) scientific nature b.) protecting the fauna, the wild plants or the natural environment c.) public health and safety and d.) preventing significant economic damage, particularly for crops, breeding, forests, fishing and waters. The Article foresees that these "exceptions are allowed on condition that there are no other suitable solutions and the actions are not such as to threaten the natural balance of the complex of the species concerned." The exceptions "must be accompanied by control measures and, if necessary, means of compensation".

2.2 EU funding to support large carnivore conservation and management

The EU provides funding for a broad range of projects and programmes covering areas such as: regional and urban development; employment and social inclusion; agriculture and rural development and research and innovation. The spending for different areas is broadly agreed in the Multi-Annual Financial Framework (MFF) normally for a period of seven years. Discussions on the next MFF (2021-2028) are currently ongoing.

The biggest EU funds are the Common Agricultural Policy (CAP), which makes up around 38% of the budget, and the five European Social and Investment Funds (ESIF). The CAP is funded through the European Agricultural Guarantee Fund (EAGF), also known as Pillar 1 and the European Agricultural Fund for Rural Development (EAFRD), Pillar 2. Pillar 1 is entirely financed by the EU whereas the fund supporting Pillar 2 (the EAFRD) is one of the five European Structural and Investment Funds (ESIF) which all need to be co-financed by the member states in order to draw down the European funding. The other funds are the European Regional Development Fund (ERDF); European Social Fund (ESF); Cohesion Fund (CF); European Maritime and Fisheries Fund (EMFF). The ESIF are managed together under Common Strategic Framework (CSF) which lays out their common objectives. Member states

³ The EU Platform on coexistence between people and large carnivores is a grouping of seven organisations representing different interests groups which have agreed a joint mission: "To promote ways and means to minimize, and wherever possible find solutions to, conflicts between human interests and the presence of large carnivore species, by exchanging knowledge and by working together in an open-ended, constructive and mutually respectful way": http://ec.europa.eu/environment/nature/conservation/species/carnivores/coexistence_platform.htm

must sign up to Partnership Agreements with the Commission describing how they will manage their ESIFs to meet the commonly agreed targets.

Both the CAP and the ESIFs have objectives related to species and habitat management (compare Figure 1 and Figure 2). One of the CAP specific objectives (for both Pillars) is to provide environmental public goods while the ESIFs have six priorities, number four being “restoring, preserving and enhancing ecosystems”. These funds are the EU member states main means to reach the goals of the Habitats Directive. Funding is not ring-fenced for this purpose but member states must describe how they will target funding in documents called Priority Action Frameworks (PAFs). The only European financial instrument which is specifically targeted at biodiversity is the LIFE + Nature and Biodiversity instrument. At 3.4 billion in the 2014-20 funding period, much smaller in size than the above-mentioned funds, it supports projects co-financed by the beneficiaries. The projects tend to concentrate on innovative or demonstration actions which have the potential for wider role out through the above-mentioned funding streams. A number of LIFE projects have already been used to trial measures to reduce depredation of livestock. In the Alps, LIFE DINALP BEAR and LIFE WOLFALPS have been particularly influential in this regard (LIFE DINALP BEAR 2018, LIFE WOLFALPS 2018). A further relevant project under development is the LIFE Lynx project.

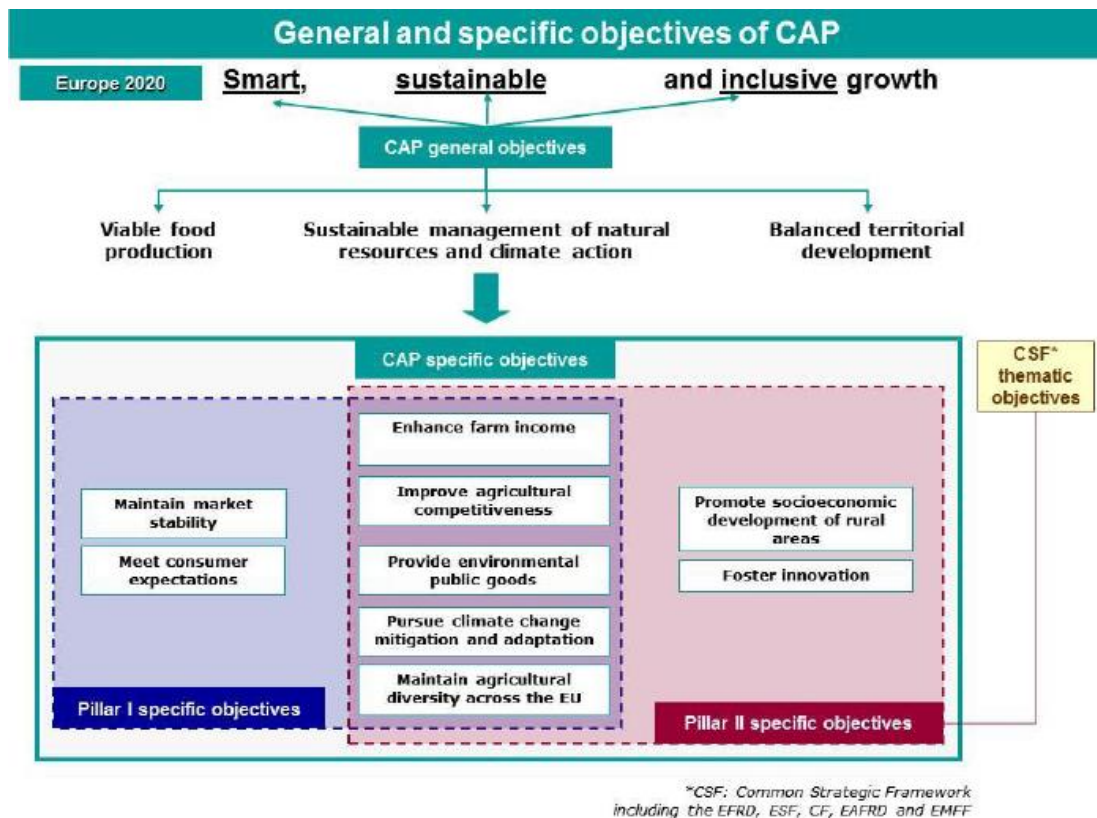


Figure 1. Objectives of the CAP (source: European Commission).



Figure 2. Priorities of the ESIF (source: European Network for Rural Development, ENRD).

3 The European Agricultural Fund for Rural Development (EAFRD)

This report focuses specifically on the EAFRD which funds Pillar 2 of the CAP and its potential to support large carnivore management. The EAFRD provides the EU level financing to the national or regional rural development programmes which every EU member state must put in place to “help the rural areas of the EU to meet the wide range of economic, environmental and social challenges of the 21st century”. The EAFRD provides €100 billion over the seven-year funding period of 2014-2020 which the member states must co-finance with their own funding.

The rural development programmes, funded by the EAFRD, have high potential to support measures related to human-large carnivore coexistence. The advantages of this funding stream is that it is available in all member states, is significantly larger than the (more targeted) LIFE fund and it is possible for a wider range of beneficiaries to access it. The programming approach means that member states have a significant amount of flexibility as to what they support through their rural development programmes and how they do it. Rural development support is therefore appropriate for addressing all types of issues faced by rural stakeholders including the prevention of depredation of livestock by large carnivores.

The EAFRD is already used by many member states to support measures related to the protection of livestock and beehives from large carnivores (Marsden et al. 2016).

3.1 Establishing a rural development programme

Regulation (EU) 1305/2013 of the European Parliament and of the Council on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) (European Union 2013) lays out the requirements for member states or regions in establishing their rural development programmes and drawing down EAFRD financing. This is supplemented by regulations laying out the common provisions and horizontal rules for the CAP as well as by the delegated and implementing regulations⁴.

Establishing a national or regional rural development programme is compulsory for all member states. The programmes cover a seven-year period (2014-20 currently) and describe the implementation of a national rural development strategy to meet EU priorities. Article 8 describes the structure of a rural development programme which member states must follow when setting up their programmes. The programmes must include: an ex-ante evaluation of the situation in the area targeted by the programme; a SWOT analysis of the situation and identification of needs; a description of the strategy; and financial tables describing how the budget will be distributed and the component of national or regional financing that will be added.

⁴ See the ENRD website for a full list of the regulations and further background information: https://enrd.ec.europa.eu/policy-in-action/rural-development-legislation_en

3.2 Rural development measures

Included in every national or regional programme (chapter 8 in the structure pre-defined by the EU) is a description each of the measures and sub-measures selected by the member state / region and the conditions attached to them. The measures are referred to by measure numbers in the EU regulations and the national programmes (see Annex 1, Part 5 of the implementing regulation (European Commission, 2014)). There are 20 measures and 60 sub-measures available which should contribute specifically to the priorities for rural development identified in the ex-ante and SWOT.

Measures and sub-measures can have varying characters and cover a wide range of activities: from land management measures such as agri-environment-climate measures⁵; to support developing a new business; to help with rolling out broadband in rural areas. While the majority of the measures are aimed at farmers, they can be open to different types of beneficiaries e.g. foresters, other land managers, advisory services and local communities.

The financing of rural development measures also varies. Certain measures compensate the applicants for actual costs to meet the programmes objectives. Others are paid at a set rate per hectare calculated based on a national or regional level average. Unlike Pillar 1 of the CAP, the EAFRD does not provide direct income support though certain measures can be used to kick-start private businesses with the final aim of increasing income. For the measures aimed at delivering environmental benefits, beneficiaries should be compensated for income lost or additional costs.

The voluntary or compulsory nature of the measures also varies. Certain measures must be included in every rural development programme, for example, all programmes must include the LEADER approach⁶ and agri-environment-climate measures. Additionally, member states must ensure that at least 30% of the total EAFRD contribution goes to environmental measures (agri-environment climate, forest-environment, areas of natural constraint, organic farming). Applying for rural development support is however optional for farmers or other beneficiaries (there is no obligation for example, for farmers to apply for rural development funding as a condition of receiving support from other parts of the CAP).

3.3 Decision making and monitoring

The regulation also establishes strict monitoring and evaluation requirements for the rural development programmes. Member states or regions in charge of a rural development programme (referred to as managing authorities), are obliged to establish a Programme monitoring committee (PMC). The PMC shares the responsibility for monitoring with the managing authority. There are requirements about including a range of different stakeholders on the committee (conservation interests, farming and forestry representatives, rural

⁵ Agri-environment measures provide payments to farmers who subscribe, on a voluntary basis, to environmental commitments related to the preservation of the environment and maintaining the countryside. In the 2014-20 funding period, the concept has been expanded to include measures to protect the climate.

⁶ LEADER, also known as Community-Led Local Development, is a bottom-up local development method which has been used for twenty years and which was included in the European Rural Development regulation in 2007 (previously funded through the structural funds. It involves the establishment of Local Action Groups to carry out projects of their own conception and design.

communities). As well as monitoring the implementation of the programme, the PMC can make suggestions for alterations, additions or deletions of measures within the programme.

The programme is evaluated using a set of common indicators on the EU level which have been agreed between the member states and the European Commission. These indicators, which make up the Common Monitoring and Evaluation System, include output, result, impact and context indicators⁷ which should be used to monitor both pillars of the CAP. The evaluation framework aims to show whether or not the rural development programmes are meeting their targets and also provide an opportunity to learn from the programmes.

⁷ https://ec.europa.eu/agriculture/cap-indicators_en

4 Potential to use the rural development programmes to support coexistence

The current use of the rural development programmes for coexistence measures across the EU was analysed in 2016 (Marsden et al. 2016) for the EU Platform on coexistence between people and large carnivores and an update of this work is currently being carried out (see Marsden 2018).

4.1 Current use

Four main sub-measures of the EAFRD are currently used to support protection measures in Europe. These are:

- 4.1: Support for investment in agricultural holdings;
- 4.4: Support for non-productive investments linked to the achievement of agri-environment-climate objectives;
- 7.6: studies/investments associated with the maintenance, restoration and upgrading of the cultural and natural heritage of villages, rural landscapes and high nature value sites; and
- 10.1: Agri-Environment-Climate.

The main actions funded through these sub-measures are capital costs of installing equipment including the establishment of electric fences, the purchase of livestock guarding dogs as well as alert systems and video surveillance. In many of the rural development programmes supported through the EAFRD in which such actions are included, the actual costs for installing the systems or buying the dogs are funded up to a certain percentage. Some member states, however, pay a top-up per hectare through agri-environment climate for the maintenance of the above measures. Staff costs for shepherding are also covered as well as advice provision (in France only). Table 1 describes the types of action which are currently paid for through these measures (see Marsden et al. (2016) for information on which member states use which measures.

Table 1 Description of the main measures used for coexistence

Code and measure	Example actions covered	Points to note
4.1, art 17: Support for investment in agricultural holdings	Covers a percentage of the costs of buying equipment. Examples include: <ul style="list-style-type: none"> • Buying fencing material; • Costs of building fences; • Costs of improving existing fencing systems; • Electrical systems; • Bee-hive protection; • Initial costs of buying dogs; • Improving infrastructure needed for shepherding (accommodation, etc.) 	This measure can be used in the case that the infrastructure has other purposes in addition to livestock protection e.g. increasing the viability of the farm.

Code and measure	Example actions covered	Points to note
4.4, art 17: Support for non-productive investments linked to the achievement of agri-environment(-climate) objectives	Covers 100% of the costs of buying the equipment described above.	The infrastructure must be clearly targeted at preventing depredation or other agri-environmental objectives. Land manager cannot use the measure to increase profitability of their business / meeting other farming objectives.
7.6, art 20: Studies for supporting village and rural landscapes	Can cover a percentage of the costs of buying the equipment described above. Additional actions:; <ul style="list-style-type: none"> • Vulnerability analysis; • Technical advice; 	Similar to 4.1, this measure covers costs of infrastructure but can also be used to cover accompanying studies and advice. Such actions could also be covered under other sub-measures (see below).
10.1, art 28: Agri-environment-climate	Area-based , annual payment covering 100% of income foregone and additional costs associated with measures linked to agri-environment objectives. Covers annual costs associated with: <ul style="list-style-type: none"> • Using livestock guarding dogs; • Putting shepherding in place; • Fence maintenance; • Changing grazing practice (through fencing etc.). 	Annual payment which can be used in combination with the above measures to cover the maintenance costs associated with new infrastructure.

4.2 Potential use

Marsden et al. (2016) identified potential for the EAFRD including using further measures to contribute to additional actions to support coexistence with large carnivores. A mapping exercise comparing good practice identified through case studies collected by the EU Platform and the measures available through the EAFRD was carried out and showed potential to fund the following activities:

- Advice – under measure 2, “advisory services”. This measure is generally used to provide agricultural and environmental advice but could include advice on how to put prevention measures in place and maintain them. It is open to advice providers.
- Awareness raising activities – under measure 1, “knowledge transfer”. This measure could be used to raise awareness about prevention measures e.g. by organising advisory events for farmers, information campaigns or knowledge platforms. It is applicable to advice providers / NGOs.

- Establishing innovative businesses e.g. eco-tourism or labelling schemes – under measure 6, “farm business development”. Individual businesses could apply to this measure to support e.g. labelling schemes to show that cheese or meat is produced in a manner which promotes coexistence with large carnivores. It is most applicable to farmers and other rural business owners.
- Pilot projects and collaborations for sharing of good practice – under measure 16, “cooperation”. This could include encouraging groups of farmers to work together to share information on prevention techniques. It is most applicable to NGOs or authorities.

These activities could be supported on a project basis, open to the above-mentioned beneficiaries. The potential to use these measures for these purposes already exists in many member states but has not yet been put into practice.

5 Overview from the Alpine countries

The following tables show the current use of the EAFRD to support measures to prevent depredation by livestock in the Alpine area. The information was gathered through structured telephone interviews with the WISO Platform members or experts identified by the members in the Alpine countries. Background information was also collected on the non-EU countries who are members of the Alpine convention. Clearly for these countries, however, the more detailed information on the use of specific EU funds is not relevant.

5.1 Austria

The large carnivore population in Austria is very small. One wolf pack is established outside the Alpine area. Within the Alpine area, individual wolves pass through as do individual male bears. There is a small lynx population in Upper Austria and some lynx cross the border from Switzerland.

Nonetheless, the main conflict regarding large carnivores is currently the risk of wolf taking livestock. The actual number of livestock affected is low (21 sheep in 2017, the high was 160 individuals), however, the return of the wolf has been widely discussed since 2009 when individuals began to enter Austria and the level of conflict is relatively high.

The management system in Austria is influenced by the federal structure of the state, which means that the main responsibility for decision resides at the level of the States (*Länder*). Compensation schemes vary between regions. Prevention measures were researched through a National Advice Centre (*Nationale Beratungsstelle*) established in 2012 following the established of national guidelines on wolf management. The advice centre carried out two pilot projects to look at protection measures. It was found that there were significant barriers to putting prevention measures in place (including cultural and socio-economic problems as well as some physical problems) Currently there is no broad-scale funding for prevention measures, meaning that farmers must fund them themselves.

Table 2. Austrian fiche

Background information	
Alpine area	54,592 km ²
Alpine human population	3,318,045 inhabitants
Management bodies	Entirely regionalised. Large carnivores are normally managed under hunting law or nature protection law in each region. Agricultural support is federalised and managed by the Ministry of Sustainability and Tourism (<i>Bundesministerium für Nachhaltigkeit und Tourismus</i>)
Management plans	National guidelines on wolf and bear management, (<i>Wolfsmanagement in Österreich. Grundlagen und Empfehlungen</i> (KOST, 2012)) and <i>Managementplan Braunbär Österreich</i> (KOST 2005)) provides a template / advice for management for the Regions.

Background information	
Stakeholder groups	<p>The Cross-regional Coordination Office for Brown Bear, Lynx and Wolf (<i>Länderübergreifende Koordinierungsstelle für den Braunbären, Luchs und Wolf</i> (KOST 2018)) brings together a core group of the regional administrations with some stakeholders (hunters, livestock, etc.) involved in the extended group. Meets 1-2 times a year.</p> <p>A working group on livestock protection was set up as part of the work on the National guideless and was instrumental in establishing the National advice centre.</p> <p>Some regional administrations are establishing stakeholder groups focusing on wolf e.g. in lower and upper Austria, Styria and Salzburg</p>
Main conflict	<p>Livestock depredation.</p> <p>Fear of large carnivores is also an issue.</p>
Large carnivore populations in the Alpine area (2017)	
Wolf	Individuals passing
Bear	Males passing (sporadically resident)
Lynx	Small population in Upper Austria (reintroduction). Few individuals crossing the border from Switzerland (first evidence of reproduction in Vorarlberg in 2017).
Depredation of livestock in the Alpine area (2017)	
Compensation scheme	Varies between regions. Often covered by hunting insurance or by regional administration or a mixture of the two (direct losses are paid through insurance and indirect losses by the administration) e.g. in Salzburg and Carinthia, compensation is covered by regional hunting laws (<i>Jagdgesetz LGBl.Nr.100/1993 §91 Abs 5, Kärntner Jagdgesetzes am 1.3.2018,LGBL. Nr. 13/2018</i>) and in Tyrol it is covered by a decision of the Tyrolean regional authority producing a Guideline for the phase-out of damages by wolves and bears
Number of livestock killed	21
Level of compensation	Unknown
Prevention measures in the Alpine area (2017)	
Prevention scheme	Measures were researched by the National advice centre. Salzburg recently introduced support for partially covering the costs of fencing (35%)
Level of prevention payments	Unknown
EAFRD measure used	None

5.2 Germany: Bavaria

Similar to Austria, there are few large carnivores in the German Bavarian Alps, only individual wolves passing through. The wolf population in Germany as a whole is however growing, with around 60 packs and 13 pairs in the country in 2017 and around 10 territorial wolves in Bavaria.

The wolf returned to Germany only in 2000 (crossing from Poland), so the expansion of the population size and its distribution has been rapid. The level of public debate on the return of the wolf is therefore high.

In the Bavarian Alps, the main conflict around large carnivores is the potential for wolves to cause damage to pastoral farming, particularly Alpine sheep and cattle production. So far, there have not been any losses in the Alps, however there have been some small-scale losses of livestock to wolves in lowland Bavaria, outside the perimeter of the Alpine Convention.

There is an established compensation scheme in Bavaria but no schemes to support farmers in putting in place prevention measures. The environment and agricultural ministries are however working on such a scheme and intend to submit it to the European Commission as state aid this year. The scheme should start in 2019 and will support fencing, livestock guarding dogs and their maintenance. Currently there is no plan to use EAFRD support as rural development financing is regarded as important for farmers for other purposes.

Table 3. German, Bavaria fiche

Background information	
Alpine area	11,160 km ²
Alpine human population	1.476,519 inhabitants
Management bodies	The Bavarian State Ministry of the Environment and Consumer Protection, for large carnivore management and conservation (<i>Bayerische Staatsministerium für Umwelt und Verbraucherschutz</i>) The Bavarian State Ministry of Food, Agriculture and Forestry is in charge of agricultural policy (<i>Bayerisches Staatsministerium für Ernährung, Landwirtschaft und Forsten</i>)
Management plans	The environment and agricultural ministries are working together on a Wolf Management Plan in consultation.
Stakeholder groups	A working group has been established discuss the Wolf Management Plan, currently under development. Several other “users” groups and conservation focussed groups exist. German national level Wolf Round Table (<i>Runder Tisch Wolf</i> . National level Documentation and Advice Centre for the regions (<i>Dokumentations- und Beratungsstelle des Bundes zum Thema Wolf</i> , 2018)
Main conflict	Potential for livestock depredation
Large carnivore populations in the Alpine area (2017)	
Wolf	Single wolves passing through
Bear	None
Lynx	None

Depredation of livestock in the Alpine area (2017)	
Compensation scheme	100% of the price of livestock lost is paid by a consortium of NGOs. The environment ministry refunds the NGOs 80% of the total costs.
Number of livestock killed	None
Level of compensation	None
Prevention measures in the Alpine area (2017)	
Prevention scheme	No scheme currently. Under development.
Level of prevention payments	None
EAFRD measure used	No

5.3 France

Wolves began returning to France from Italy in the early 1990s. Since then, the population has increased annually to reach the current numbers of 52 packs (around 360 individuals). Bear and lynx populations in France are still small and geographically contained.

Conflict with livestock managers is the most significant conflict for all large carnivore species. Conflict is particularly high relating to the presence of wolves since the population in the Alps recovered in a relatively short space of time and prior to this, there was little need to contain flocks or use livestock guarding dogs so free-ranging sheep flocks are common and depredation levels are high. Livestock depredation has increased with the number of wolves returning (from around 6,000 in 2013 to around 12,000 in 2017 (mainly sheep) in France as a whole) (DREAL, 2018). There is currently a national level compensation scheme which compensates farmers for livestock killed, livestock which disappear and indirect costs caused by stress, abortion of young, etc.

The prevention of livestock depredation is managed under the framework of the rural development programmes. Funds to support the prevention of depredation have been available since the previous programming period (2007-13) and have risen over this period (from 4.5m€ in 2008 to over 21m€ in 2017). In the current programming period, France has a national framework for rural development and 21 regional rural development programmes. The national framework puts in place the basic structure for the regional programmes and describes the measures which are considered to be national priorities as well as those which are optional. The same measure is therefore used for measures to prevent depredation in all regions. It is available to farmers in both Alpine regions: Provence-Alpes-Côte d'Azur (PACA) and Auvergne-Rhône-Alpes. As well as being identified as a priority nationally, it is identified as an "environmental risk" in the SWOT analysis for the PACA region.

Table 4. French fiche

Background information	
Alpine area	40,801
Alpine human population	2,683,801

Background information	
Management bodies	<p>The national ministries of Environment (<i>Le ministère de la Transition écologique et solidaire, MTE</i>) and Agriculture (<i>le ministère de l'Agriculture et de l'Alimentation, MAA</i>) are jointly responsible for the National Wolf Action Plan. The plan is coordinated by the Prefect (state representation in the region) of the Auvergne-Rhône-Alpes.</p> <p>The regional environmental authorities (<i>Direction régionale de l'environnement, de l'aménagement et du Logement (DREAL)</i>) are responsible for compensation claims.</p> <p>The regional agricultural authorities, (<i>Direction Régionale de l'Alimentation, de l'Agriculture et de la Forêt (DRAAF)</i>) are responsible for prevention measures.</p> <p>The National office for hunting and wildlife (<i>Office national de la chasse et de la faune sauvage (ONCFS)</i>) is a public institution which is in charge of implementing particular aspects of the Plan.</p>
Management plans	The National Wolf Action Plan (<i>Plan national d'actions 2018-2023 sur le loup et les activités d'élevage</i>) was agreed in 2017.
Stakeholder groups	The National Wolf Group (<i>Groupe National Loup</i>) meeting once to twice a year led by the Auvergne-Rhône-Alpes region and bringing together conservationists, farming groups and hunters to share information and comment on policy decisions. Similar groupings have been established on the regional level.
Main conflicts	Livestock depredation
Large carnivore populations in the Alpine area (2017)	
Wolf	44 packs
Bear	Only present in the Pyrenees
Lynx	10-20 individuals in the French Alps
Depredation of livestock in the Alpine area (2017)	
Compensation scheme	National level compensation scheme for livestock killed, livestock which disappear and indirect costs caused by stress, abortion of young, etc., where these can be linked to wolves. Tables at the national level set the amount of compensation depending on the type of livestock, labelling, organic, etc. Currently no obligation to have prevention measures (likely to change – proposal under discussion).
Number of livestock compensated (wolf)	10,805 individuals
Level of compensation	3,492,630 €
Prevention measures in the Alpine area (2017)	
Prevention scheme	Managed under the framework of the rural development programmes.
Level of prevention payments	21,294,653 € from the rural development programmes (co-financed at just under 50% of national financing for the two regions)

Prevention measures in the Alpine area (2017)	
EAFRD measure used	<p>Sub-measure 7.6: support for studies/investments associated with the maintenance, restoration and upgrading of the cultural and natural heritage of villages, rural landscapes and high nature value sites including related socioeconomic aspects, as well as environmental awareness actions</p> <p>The following prevention measures are available:</p> <ul style="list-style-type: none"> • Vulnerability analysis (funded 100%) • Shepherding and accommodation for shepherds (funded 80%) • Livestock guarding dogs (funded 80%) • Electric fenced sheep parks (funded 80%) • Technical advice for prevention measures (funded 100%) – opened 2018
Support available to	<p>Farmers, pastoral associations, groups of shepherds, local collectives, unions, associations of livestock breeders. Vulnerability analysis and technical assistance measures are open to associations and advisors.</p> <p>The measures are open to those within the core areas for large carnivore (circle 1) and the areas with passing wolves (circle 2).</p>
Effectiveness of measures	<p>Assessment found that a combination of measures works but individual measures likely to be ineffective (De Roince et al. 2017). Currently no obligation to choose a particular set of measures together, nor to seek advice. This gap is being addressed with a new measure focused on technical advice provision.</p>

5.4 Italy

Italy has a small bear population focused in Trentino which was never extinct and has grown following reintroductions from the Dinaric population to its current level of 53-63 bears and their young. The Italian wolf population joins with the French and the Apennine population in the Western Alps. There are around 31 packs here and the population is dynamic (it has grown from around 15 packs in 2012), gradually moving east. The wolf population in the eastern Alps is smaller and consists mainly of passing individuals, but six packs are now established between Veneto and Trentino effectively joining the Dinaric and Alpine populations. The Italian lynx population is small and decreasing (around 5 individuals near the Austrian border following a reintroduction there). A currently running project, LIFE Lynx intends to “rescue the Dinaric-SE Alpine lynx population from extinction and to preserve it in the long term” (LIFE Lynx 2018).

The main conflicts around the presence of wolves and bears are related to their depredation of livestock. In some areas fear of wolves is also causing conflict. Following incidents where people were injured by bears in Trentino, fear of bears has also increased.

Large carnivore management is divided between the national and the regional level. Protected species management (including establishing derogations and quotas) is a national competence. A national level working group has been focusing on the establishment of a Wolf Management Plan which has however been blocked due to controversy surrounding the issue of lethal management. A National Bear Management Plan was agreed in 2008 and modified in 2015 (PACOBACE, 2015). There is a duty for the regions to compensate for damages caused by wild species including large carnivores. The wolf management plan would also require them to support protection measures.

There are 6 regions in the Italian Alpine area: Aosta Valley (VD), Piedmont (PM), Lombardy (LM), Veneto (VN), Friuli Venezia Giulia (FVG) and Trentino Alto Adige which is divided into two autonomous provinces: South Tyrol / Bolzano (BZ) and Trentino (TN) which are dealt with separately here. Practical implementation of damage prevention measures as well as agricultural support measures (the regions all have their own rural development programmes) are regional competences and the regions take different approaches. Projects such as LIFE WOLFALPS have helped significantly with sharing information and testing protection measures, however, the interviews carried out for this report have highlighted how there is still potential for improving the sharing and exchange between the regional administrations.

Table 5. Italian fiche

Background information	
Alpine area	51,995 in total
Alpine human population	4,346,538 inhabitants
Management bodies	<p>Italy: State with Environment ministry and related technical institution (I.S.P.R.A.) for technical-scientific support.</p> <p>At regional and provincial level in the Alps:</p> <p>VD – Office “Flora, fauna, hunting and fishing” deals with the environment and protected species and also with payments and RD measures</p> <p>PM – Piedmont agricultural department</p> <p>LM- DG Environment and climate (<i>Direzione Ambiente e clima</i>), deals with environment and protected species management; DG Agriculture (<i>DG Agricoltura</i>) deals with agriculture and RD measures</p> <p>VN - Agri-environmental, game and fish department (<i>Direzione Agroambiente, Caccia e Pesca</i>), deals with agriculture and the environment</p> <p>FVG – Directorate General of landscape services and biodiversity (<i>Direzione generale servizio paesaggio e biodiversità</i>), Central Directorate for the management of agricultura, forestry and fishing resources (<i>Direzione centrale risorse agricole, forestali e ittiche</i>)</p>

Background information	
	<p>BZ - Autonomous Province of Bozen/Bolzano, Fish and Wildlife office for large carnivore management (<i>Ufficio caccia e pesca/Amt für Jagd und Fischerei</i>).</p> <p>TN – Forest and Wildlife Service (<i>Servizio Foreste e Fauna</i>) for forestry and large carnivores, Agricultural Department for other agricultural support.</p>
Management plans	National level plans for bear (PACOBACE, 2015) and Wolf plan in elaboration.
Stakeholder groups	<p>VD – discussion and technical table on wolf management including local authorities</p> <p>PM – no</p> <p>LM - discussion table on bear management involving local authorities</p> <p>VN - regional discussion table on large carnivores. It involves environmentalists, farmers and agricultural associations and hunters (regional representatives), and local authorities. Newly established it met 2 times in 2017.</p> <p>FVG – no</p> <p>BZ – no</p> <p>TN – three round tables: users (farmers, beekeepers, breeders), information and participation (all stakeholders) and communication (public authorities and tourism). EU contract for regional coexistence platform</p>
Main conflicts	<p>VD – Livestock depredation; fear is also an issue.</p> <p>PM – Livestock is the biggest problem. Some conflicts with hunters but not as severe.</p> <p>LM - livestock depredation and damage to beehives. Fear also an issue.</p> <p>VN – Focus on wolf and livestock conflict. Fear of wolves is also an issue.</p> <p>FVG – livestock depredation and damage to beehives. Fear and competition with hunters also an issue.</p> <p>BZ – Pastoral farming and to a lesser extent beekeeping.</p> <p>TN – Fear of bears, livestock secondary issue.</p>
Large carnivore populations in the Alpine area (2017)	
Wolf	31 wolf packs
Bear	53-63 bears including young
Lynx	5 lynx individuals
Depredation of livestock in the Alpine area (2017)	
Compensation scheme	<p>VD - 100% of the costs of dead animals, injured animals, vet expenses and disposal of carcasses are covered through regional contribution and an insurance scheme. Currently there is no requirement to have prevention measures in place.</p>

Depredation of livestock in the Alpine area (2017)	
	<p>PM – Since 2012, an insurance scheme has been in place. Farmers must buy insurance in order to receive compensation. Estimate around 85% of farmers are covered. Insurance covers more than 100% of costs – also some indirect costs and higher payments for a second attack. Theoretically, farmers should have prevention measures in place to receive insurance but the responsibilities for checking this are not clear. The scheme is partially supported by the regional government.</p> <p>LM - 100% of the costs of dead animals, injured animals, vet expenses and disposal of carcasses are covered through regional insurance scheme. Currently there is no requirement to have prevention measures in place.</p> <p>VN – 100% of the costs of dead animals, injured animals, vet expenses and disposal of carcasses are covered. Currently compensation paid under the de minimis rules is not dependent on prevention measures being in place. Veneto plans to notify the compensation as state aid. Once this is done, farmers will be obliged to put in place prevention measures in order to receive compensation.</p> <p>FVG – Regional law addressing the conflicts with large carnivores covers compensation and prevention measures. Direct damages to livestock and beehives are compensated within one month.</p> <p>BZ – regional funds used to compensate 100% of costs as well as an extra indirect costs fee. Currently there is no requirement to have prevention measures in place. After a transition period with the new scheme, a requirement to have prevention measures will be introduced.</p> <p>TN – compensation scheme exists covering 100% of proved damage to livestock and apiaries, funded by the regional government.</p>
Number of livestock compensated	<p>VD – wolf: 30 sheep, 7 goats, 4 cows.</p> <p>PM – wolf: 354 animals</p> <p>LM – wolf: 60 sheep, bear: 1 sheep</p> <p>VN – wolf: 241 sheep, bear: 2 sheep / cattle</p> <p>FVG – wolf: 12, bear: 22 (in 2018, compensation also for golden jackal kills).</p> <p>BZ – wolf: 40 sheep, bear: 32 sheep / cattle, 1 apiary</p> <p>TN – bear: 144 compensation claims (38% apiaries, 20% crops, 35% livestock) ~700 livestock claimed; wolf: 120 livestock killed or lost</p>
Level of compensation	<p>VD - 9.781,39 €</p> <p>PM - unknown</p> <p>LM – 9,464 €</p> <p>VN – 121,186€</p> <p>FVG - 6,206.69€ (bear), € 1,438.00 (wolf)</p> <p>BZ – 16,000€</p> <p>TN - 82,979.54 € (bear), 46,925.59 € (wolf)</p>

Prevention measures in the Alpine area (2017)	
Prevention scheme	<p>VD - Measures financed through regional funding (financed according to the same regional law of compensation measures – l.r.17/2010).</p> <p>PM – Measures were funded through regional funding until the start of the last rural development regulation. They are now supported through the rural development programme (as well as some project funding).</p> <p>LM - Measures funded through LIFE WOLFALPS project and other regional funding (funded under the same regional law as compensation measures). A proposal for new regional budget has been previewed for 2018. A modification has been submitted to the rural development programme to include a measure.</p> <p>VN – Measures trialled through LIFE DINALP BEAR and LIFE WOLFALPS projects. The regional government has introduced a scheme which compensates farmers for the purchase of fencing. The regional government also supports advice in the field. European Social Fund financing has supported reintroduction of shepherding into certain areas. A modification has been submitted to the rural development programme to include a measure (see below).</p> <p>FVG – Prevention measures are funded under the same regional law as compensation measures. Prevention measures include electric fences, livestock guarding dogs, electronic alarms. Stakeholders can apply at any time of year the application should be processed within 2 months. Currently only regional financing is used as the number of large carnivores (and consequently the demand) is not very high. Stakeholder can also borrow fences to test them before buying them.</p> <p>BZ – A provincially funded prevention scheme is starting this year (2018) for supporting farmers buying electric fences. There may be interest in using the rural development programme in future.</p> <p>TN – Use a combination of regional funding and the rural development programme to support prevention measures. The rural development programme covers larger fencing projects over 4,000€ (see below). Regional funds are used for advice, smaller scale mobile fencing and livestock guarding dogs. The Forest service is in direct contact with the applicant and an on-site meeting is organised to agree the area that should be fenced, rotation etc. Normally they start with small application and add to this over time.</p>
Level of prevention payments	<p>VD – regional funds provided: 2017 16,084€; 2018 60,203€; regional funds estimated for 2019 and 2020 160,000€</p> <p>PM - The planned budget for the rural development programme 2014-2020 is 3,434,133m€ (with co-financing).</p> <p>LM – no budget allocated for rural development programme 2014-2020 still. Regional funds estimated on 100,000 € for 2018-2020</p>

Prevention measures in the Alpine area (2017)	
	<p>VN – Financing of 1M€ planned from the start of the scheme until end of 2020.</p> <p>Under the new RD measure, up to 30,000€ would be distributed to each project – 100% of costs.</p> <p>FVG – Planned total annual budget for prevention and compensation measures – 50,000€. In 2017 the following was spent on large carnivores prevention measures: 12,368,110€.</p> <p>BZ - NA</p> <p>TN – The planned budget for the rural development programme is 4.5m€ for whole period (around 1m€ per year) for the specific measure (which can also be used for other purposes). Around 60% was used by the end of 2017.</p> <p>In 2017, the following was spent on bear prevention measures: (total costs from regional and rural development support): 134,450€ (137 claims). Wolf 4,550€ (7 claims).</p>
EAFRD measure used	<p>VD – Not used</p> <p>PM – Uses both 4.4 non-productive investment and 10.1 “agri-environment-climate”:</p> <ul style="list-style-type: none"> • 10.1.6 Defence of livestock from predation by canids on hill and mountain pasture (measure open since 2016). Livestock breeders must use electric fences, livestock guarding dogs and continuous shepherding to receive a flat-rate payment of 350€ / ha. • 4.4.2 Defence of livestock from predation by canids in the pastures (only open in 2018 for this year). The measure covers the capital costs associated with the above (i.e. buying dogs and fencing equipment). <p>LM – modification submitted to include 4.4.1. non-productive investments this would cover costs for electric fences and guarding dogs</p> <p>VN – A modification has been submitted to the programme, sub-measure 4.4 “non-productive investment”:</p> <p>4.4.3. non-productive investment – equipment durable goods, etc. (waiting for approval). The measure will support 100% of the costs of equipment such as fencing.</p> <p>FVG – Not used.</p> <p>BZ – Not used.</p> <p>TN – 4.4. non-productive investment:</p> <p>4.4.2: traditional wooden fences, reconstruction of stone fences, prevention of damages by wolf and bear: electric systems to apply to traditional fences</p> <p>This measure was chosen to meet landscape requirements (attractive fences) and also help to manage livestock even where bear and wolf are not a problem.</p> <p>The measure can be well combined with 4.4.1 “restore habitats e.g. Natura 2000”. Fencing can also help prevent damage also from wild animals to protected habitats.</p>

Prevention measures in the Alpine area (2017)	
Support available to	<p>VD – farmers, shepherds and their associations PM – single or groups of breeders. The measure 4.4.1 is only open those who have applied to 10.1.6 in the last 3 years. A points system is used to allocate funding e.g. farmers in Natura 2000 sites receive more points.</p> <p>LM - farmers and their associations</p> <p>VN – farmers through open application system (call which opens every year)</p> <p>FVG – Not available</p> <p>BZ – Not available</p> <p>TN – Farmers (20%) and foresters (80%). Forest owners who put the measures in place and rent the land to graziers. Applications through an annual call 1 January-30 April (Fauna and Flora service 2018).</p>
Effectiveness of measures	<p>VD - the regional funding works well. They are used for compensations and prevention payments</p> <p>PM – Some of the conditions attached make the measures difficult to implement in practice (e.g. number of dogs required).</p> <p>TN – the combination of regional and rural development funding works well. The regional funding is used for smaller applications and for testing new methods. The rural development funding for established measures and bigger schemes such as fencing.</p>

5.5 Liechtenstein

In Liechtenstein, both prevention and compensation of damages caused by large carnivores are regulated through art. 28 c of the State law on the protection of nature. This article, which in fact refers to damages by all specifically protected species and not only large carnivores foresees prevention measures both of technical nature (fences or electric fences) and measures concerning livestock guarding (purchase of guarding dogs and herding).

The regulation on prevention and compensation of damages by protected species has been effective since October 1st 2018. It specifies prevention measures and distinguishes between measures that are compensated and measures that are not compensated by the State. For example, fences are compensated with 0.70 CHF per linear meter. Shepherding is viewed as a form of livestock guarding but cannot be compensated by this measure. The Office of Environment (*Amt für Umwelt*) provides free advice for livestock owners and also emergency help (fencing and counselling) in case of an incident.

In order to receive compensation payments, damage prevention measures are required to be installed before unless the incident could not have been foreseen. Moreover, the prevention measures have to be deemed appropriate for the location and keeping of animals in order to get compensation payments. The amount of the compensation payments is the same as in

Switzerland. Sheep and goats are compensated according to valuations of the Sheep and Goat Breeders' Associations.

The current budget is an estimation and will be adjusted with time. Based on the number of livestock in Liechtenstein and the experiences from neighbouring Swiss cantons, it is estimated that it will be between 10,000 and 30,000 CHF per year if wolves are constantly present in Liechtenstein.

5.6 Slovenia

Slovenia never entirely lost its large carnivore population and there is more experience living with large carnivores. Slovenia has a significant bear population in the country as whole (around 700-750 individuals, though the Alpine population is considerably smaller, around 50 individuals) and the trend has been an increase in the last decade (Skrbinšek et al. 2018). This recovered from a low at the end of the 19th century. The wolf population is smaller (14 packs; around 75 individuals, Bartol et al., 2018) and there is a very small lynx population (10-20 animals, MOP 2016) which may be boosted through a planned reintroduction through the LIFE lynx project.

Slovenia has been using its rural development programme to support prevention measures since it joined the EU. Support for prevention measures was supplemented by the two LIFE projects Slowolf and DINALP BEAR which trialled and provided advice on a number of different fencing and livestock guarding techniques. These measures are now available with the support of national financing from the Slovenian Environment Agency (ARSO). Thus, currently, a mixture of an area based payment supported through the rural development programme and a national fund for the capital costs of purchasing equipment is used.

Table 6. Slovenian fiche

Background information	
Alpine area	6,796 km ²
Alpine human population	385,973 inhabitants
Management bodies	Ministry of the environment and spatial planning (<i>Ministrstvo za okolje in prostor</i>) – protected species, compensation claims and some prevention funding Slovenia Forest Service– hunting (<i>Zavod za gozdove Slovenije</i>) Institute of the Republic of Slovenia for Nature Conservation (<i>Zavod Republike Slovenije za varstvo narave</i>)– opinion on hunting quotas Ministry of Agriculture, forestry and food (<i>Ministrstvo za kmetijstvo, gozdarstvo in prehrano</i>) – protection funding through Rural Development programme

Background information	
Management plans	Management or action plans were established for all three species (MOP 2018) but only the lynx plan is to date. The wolf plan finished in 2017 and the bear plan in 2012. Work is currently ongoing to update the plans.
Stakeholder groups	A stakeholder group meets once a year when the quotas are discussed. It involves hunters, agricultural unions, local representatives
Main conflicts	Damage to livestock from bear and wolf, damage to beehives and orchards from bear. Fear of bears and wolves is an increasing problem
Large carnivore populations in the Alpine area (2017)	
Wolf	14 packs (around 75 wolves)
Bear	Around 50 individuals in the Alps
Lynx	10-20 individuals
Depredation of livestock in the Alpine area (2017)	
Compensation scheme	A compensation scheme exists under the Nature Conservation Act. Officials from the forest service estimate the damage. The Environment Agency decides whether the damage should be compensated.
Number of livestock compensated (wolf)	88 livestock (85 sheep and 3 cows damaged by bear).
Level of compensation	19,816€
Prevention measures in the Alpine area (2017)	
Prevention scheme	Electric fencing distributed under LIFE DINALP BEAR project, national financing for fencing and rural development programme support for implementing prevention measures.
Level of prevention payments	LIFE DINALP BEAR – 50,000€ since 2015 (53 sets of fences – 17 for sheep breeders, 36 for bee keepers). Environment Agency funding – 39 farmers and beekeepers applied for funds to cover 80% of purchase costs for fencing (between 2015-mid 2018). The total amount of support distributed in this period is 42.188,72 €. EAFRD – 225,230€
EAFRD measure used	10.1 Payment for agri-environment-climate commitments. The following flat rate area-based payments are applied: 120€ / ha for mobile electric fences and electric nets, 112€ / ha for livestock guarding dogs, 108€ for shepherding. The following support was provided in the current funding period until early 2018. <ul style="list-style-type: none"> - high electric netting: 55 farmers (together: 1077 ha) - livestock guarding dogs: 22 farmers (together: 177 ha) - use of shepherd: 4 farmers (together: 819 ha)
Support available to	Open to farmers and stockbreeders carrying out livestock management on grassland in areas with large carnivores.

Prevention measures in the Alpine area (2017)	
Effectiveness of measures	<p>The support provided through the rural development programme has been criticised because the payments are applicable for only one measure at a time (dogs, shepherding or fencing) and there is no top-up for a combination of measures.</p> <p>The coordination of the national financing and rural development financing is not optimal. They are managed by different management bodies who are not informed about what the other is funding.</p> <p>Some other measures funded through the rural development programmes could have perverse incentives – e.g. electric fencing for livestock which is not wolf-proofed.</p>

5.7 Switzerland

In Switzerland, the Federation and the Cantons set the framework for prevention and compensation, specifically by the Federal Hunting and Protection of living Mammals and Birds Law (*Bundesgesetz über die Jagd und den Schutz wildlebender Säugetiere und Vögel*) and the respective implementing Federal Hunting Decree (*Verordnung über die Jagd und den Schutz wildlebender Säugetiere und Vögel*). This decree foresees the promotion of prevention measures by large carnivores as well as the integration of livestock protection by the Cantons in their spatial planning (Art. 10^{ter} as well as Art. 10^{quater} for the specific regulation of guarding dogs). Approximately 3 million Swiss Francs per year are allocated for prevention measures.

More detailed information on the proper enforcement of the legal bases are outlined in the specific management concepts for bear (DETEC/FOEN, 2009), wolf (DETEC/FOEN, 2016) and lynx (DETEC/FOEN 2016) and the guidelines for herd and bee protection (DETEC/FOEN, 2019) published by the Federal Office for the Environment FOEN (*Bundesamt für Umwelt, BAFU*).

An external organisation (at the moment AGRIDEA), mandated by the FOEN, is tasked with the coordination of the technical livestock protection as well as of the guarding dogs. The unit supports and provides consultancy to the Cantons on the technical measures available for livestock protection and their implementation – also through the management of the federal financial support – and also supports the Cantons on the issue of guarding dogs – including the monitoring of the dogs and the information to the public.

6 Discussion

6.1 Comparison of EAFRD use in the Alpine countries

Table 7 shows which EU member states in the Alps include damage prevention measures in their rural development programmes. The picture in the Alpine region is similar to that across the rest of Europe. The main activities covered are fencing, purchase of guarding dogs and flat rate payments for the implementation of prevention measures. Three EAFRD sub-measures have been used to support these in the Alps:

- 4.4 support for non-productive investments linked to the achievement of agri-environment-climate objectives
- 7.6 support for studies/investments associated with the maintenance, restoration and upgrading of the cultural and natural heritage of villages, rural landscapes and high nature value sites including related socioeconomic aspects, as well as environmental awareness actions
- 10.1 payment for agri-environment-climate commitments

Table 7 summarizes the information the Alpine countries and regions.

Table 7. Comparison of Alpine countries use of the EAFRD for damage prevention measures in the Alpine region

Country	National regional prevention support	/ EAFRD measures used	Actions supported by the EAFRD financing	Budget for rural development (EAFRD and co-financing)
Austria	No	No	-	-
Germany Bayern	– Under development	No	-	-
France	Co-financing of EAFRD	7.6	Vulnerability analysis, shepherding, dogs, fencing, (technical assistance – 2018)	21,294,653 (2017, EAFRD + national)
Italy				
– VD	Regional financing	-	-	-
– PM	Co-financing of EAFRD	10.1 4.4 (starting 2018)	Flat-rate payment of 350€ / ha for use of electric fences, livestock guarding dogs and continuous shepherding. <i>4.4 capital costs associated with purchasing equipment.</i>	3,434,133€ for period
– LM	Co-financing planned	4.4 (not yet approved)	100% costs of equipment durable goods	
– VN	Currently regional financing until modification to rural development programme approved	4.4 (not yet approved)	The measure will support 100% of the costs of equipment such as fencing (not yet approved).	-
– FVG	Regional financing	No	-	-

Country	National regional prevention support /	EAFRD measures used	Actions supported by the EAFRD financing	Budget for rural development (EAFRD and co-financing)
– BZ	Planned	No	-	-
– TN	Smaller scale interventions funded through provincial budget.	4.4	Traditional wooden and stone fences, electrification of traditional fences.	58,800€ (2017) 4.5m€ for period for the specific measure – 10-20% specifically large carnivores
Slovenia	Co-financing and LIFE and regional financing for the costs of buying infrastructure	10.1	Area payment. Choice between electric fences, shepherding, dogs	225,230€ (2017)

A number of different approaches to implementing and financing prevention measures are used in the Alpine countries. The approaches vary depending on the existing management structures and the relative experience of living with large carnivores.

In the case that large carnivores have recently returned to an area, there may be a lack of knowledge about how to implement prevention measures which hampers their rapid implementation. Additionally, in the case that there are strong conflicts around large carnivore presence, stakeholders may feel that accepting the implementation of prevention measures is akin to accepting the return of large carnivores and may therefore reject them.

Where large carnivores have been present for longer, the country or region has taken steps to introduce national or regional financed support for prevention measures. This has allowed them to experiment with different measures and applying them in the national circumstances. At this stage, LIFE financing has often also been used to develop measures further and examine effectiveness. In particular, the LIFE WOLFALPS and LIFE DINALP BEAR projects have been helpful for trialling measures and financing them in their initial stages.

In many cases, countries and regions have then moved on to using a mixture of national / regional measures for certain aspects of prevention and rural development support for the better trialled and more expensive measures. This approach allows the authorities some flexibility to adapt their approach to a developing situation (both in terms of large carnivore numbers and public acceptance). Use of the rural development programmes demands some acceptance of the presence of large carnivores by potential beneficiaries since the application process requires not insignificant effort from their side.

The measures included in the EAFRD are flexible enough to include all the actions most commonly used to protect livestock against large carnivore depredation. The choice of whether to use national funding or the rural development programmes is therefore made on a practical / political basis (whether national funding is available, the extent to which using rural development support for this purpose is politically acceptable).

6.2 The future

The European Commission released their legislative proposals for the CAP after 2020 on 1 June 2018 (European Commission, 2018). The Commission proposes that a strategic planning approach should be applied to both pillars of the CAP in future. Closer integration of the aims

of the two pillars and a common monitoring framework could be an opportunity to ensure better collaboration between managing authorities and to reduce the risk of measures conflicting.

The number of measures and sub-measures described in detail in the programme has been reduced significantly from 69 measures and sub-measures to 8 broad types of intervention. In the new CAP, the European level regulation should only provide a framework and that the member states will have the flexibility to define the specific details of the measures within this framework. It should be possible to continue all measures currently used for large carnivore management in the new programming period.

7 Recommendations for using rural development programmes

The EAFRD provides member states with a good opportunity to top up their national financing for prevention measures and to help to reach EU conservation goals. When considering including measures in their rural development programmes, the following points could be taken into account.

Coordination between administrators

In most countries and regions, the rural development programmes are managed by the agricultural administrations while large carnivore management is a competency of the environmental administration. Good coordination is therefore needed to make sure that prevention measures are put in place in appropriate locations and are coordinated with other funding streams.

Testing of measures

While countries and regions can learn from one another's experience, it is rare that measure can be transferred without adaptation from one region to another. In general, prevention measures should be well-tested when being implemented in a new area. The physical conditions, farming traditions, socio-economic conditions, culture and attitudes all make a difference to the likely success of measures. National financing or LIFE projects may be the most appropriate financing in a testing phase.

Combination of measures

In general, a combination of different prevention measures is considered to work better than putting in place single measures (e.g. guarding dogs, shepherding and fencing). Additionally, many of these measures have ongoing maintenance costs. A combination of the use of sub-measures 4.4 and 10.1 would allow both the upfront capital costs as well as the ongoing costs to be covered. France has also shown that 7.6 can support a wide range of capital and ongoing costs.

Advice provision

Experience from all the Alpine countries has shown that where advice is attached to the implementation of prevention measures, they have a much greater chance of being effective. Advisors can help to select the right combination of measures for the particular location and the farmers practice and ensure that fencing is properly put in place. Advice should be focused not just on the installation but also on the maintenance of the equipment.

Fit of prevention measures with the other goals of the programme

The rural development programmes should be examined as a whole to ensure that prevention measures are complimentary with other measures. Ensuring for example that fencing is also helpful for the farmers' management of stock, fits with the landscape or protects habitats from damage from livestock could be additional aims. Additionally, care should be taken that counterproductive measures are not financed. For example, in areas with high large carnivore densities, fencing financed with public funds should be required to be large carnivore proofed.

More innovative uses of the EAFRD

As described in chapter 4, rural development support can be used for a wide variety of measures for example, funding pilot projects, collaborative efforts, awareness raising or new businesses. There is therefore good potential to use the rural development programmes for other actions related to the presence of large carnivores. Rural development support is open to a range of rural actors - not only farmers and livestock managers - and rural communities could also benefit from support related to the presence of large carnivores.

Engaging stakeholders

Engaging a range of stakeholders in discussions around livestock protection measures may contribute to the success of their implementation. Stakeholders can provide feedback on whether a measure is likely to fit with farming practice or have impacts on other rural activities. Stakeholder can be engaged through specialist large carnivore platforms (addressing a range of issues associated with large carnivores) but also through the programme monitoring committees (PMCs) which are required to monitor the implementation of the rural development programme. A note of caution should be that where acceptance of the presence of large carnivores is extremely low or non-existent, targeted support in the areas most affected may be more appropriate than opening a broad scheme where uptake may be low.

Sharing information and experience

Sharing information on current uses of the EAFRD and discussing future potential is crucial for future planning. Cooperation amongst experts internationally to exchange information on what has worked well and what difficulties have been faced in the implementation of the rural development programmes in different regions is needed. Opportunities to exchange between experts and stakeholders are provided for example by the WISO Platform and the EU Large Carnivore Platform. Further exchange between these groupings and other national and regional large carnivore groupings should be encouraged.

Planning for the rural development programmes post 2020

The reform of the CAP may provide opportunities to better coordinate and integrate the approach to protection of livestock against large carnivores. Authorities involved in large carnivore management and in agricultural policy should aim to coordinate their approaches and discuss how appropriate protection measures should be included in the strategic plans for the CAP 2021-2027. All concerned member states should also consider highlighting the need for providing support for this purpose in their prioritised action framework (PAF)⁸ identifying their priorities and funding needs for the implementation of the Habitats Directive.

⁸ http://ec.europa.eu/environment/nature/natura2000/financing/index_en.htm

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