

**THE CANOVIS PROJECT**  
**IMPROVING LIVESTOCK GUARDIAN DOG EFFICIENCY**

**ACTIVITY REPORT 2013**  
**ASSESSMENT AND OUTLOOK 2014-2017**



Confrontation between a livestock guardian dog (left) and a wolf (right)



Fitting the GPS collars on livestock guardian dogs

**RESEARCH ON DOGS' APTITUDE FOR FLOCK PROTECTION AND THE INFLUENCE OF THE WORKING ENVIRONMENT ON THEIR ABILITIES**

**- IPRA -**

Institute for the Promotion of and Research into Guardian Animals

December 2013

CanOvis Project – Activity Report 2013

Assessment and Outlook 2014-2017 – IPRA

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# Introduction

Wolf damage to livestock herds in the southern French Alps and Prialps (e.g. Mercantour National Park (MNP) and the Canjuers Plateau) continues to be a chronic problem, with more than 2,400 head of livestock killed by wolves in 2013. The effectiveness of livestock guardian dogs (LGDs) in those regions is reaching its limit. Moreover, no shooting permits (to defend the flock or cull a wolf) are issued in MNP and the Canjuers area represents a typical Mediterranean landscape, slowly re-colonized by wolves. Therefore, these two territories represent two major study areas for gaining an understanding of which are the limiting factors and situations that favour or limit the effectiveness of protection systems, especially LGDs. Gathering information on the relationship within the "wolf-LGDs-flocks" system will help to understand the failures of the present system, in order to maximize flock protection.

# Abstract

The wolf's return to the Alps has led to dramatic changes in shepherding. Despite the extensive use of livestock guardian dogs (LGDs), depredation is increasing in some areas. In 2013, we began a research project on internal and external factors that can influence effectiveness of LGDs on pastoral units (PUs). We observed night-time interactions between LGDs and wolves using an infrared camera and tested GPS collars on LGDs. We recorded 9 events with wolves and at least 23 with other wildlife species. Preliminary results show that wolves can often be present on PUs in proximity to LGDs and shepherd huts, without necessarily interacting with dogs or shepherds. We observed LGDs chasing wolves and having close encounters (n=3) with them (e.g. wolf sniffing an LGD, presenting aggression, attacks or displays of fear). Our observations show that LGDs interrupt wolves' on-going behaviour without making them flee. Further, barking and marking do not prevent wolf attacks or necessarily stop on-going behaviour. LGDs might therefore not permanently change wolf behaviour, suggesting that no long-term avoidance learning occurs. Our data also suggest that both LGDs and wolves evaluate the risk of a fight and that the latter must weigh up costs against benefits. We discuss the need to find new selective criteria based on innate protective abilities, resource holding potential, motivation and aggressiveness (temperament). We emphasize the importance of teaching young wolves that encounters with LGDs may be unsafe. We speculate that this information can be taught to subsequent generations through social learning.



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*Morning GPS collar removal – Longon PU*



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*Three of the eleven LGDs guarding part of the flock– Longon PU*

# Activities 2013

## The Study Team 2013

- Jean-Marc Landry (JML): biologist, ethologist – canids (wolf, LGD) and pastoral expert
- Jean-Luc Borelli (JLB): environmental engineer, wolf, pastoral mountain and night – time vision expert
- Gus Lyon (GL): environmental engineer, computer expert
- Gérard Millischer (GM): guard at Mercantour National Park; Head of Wolf Damage Control, night-time vision expert



CanOvis team "penned" – Longon PU

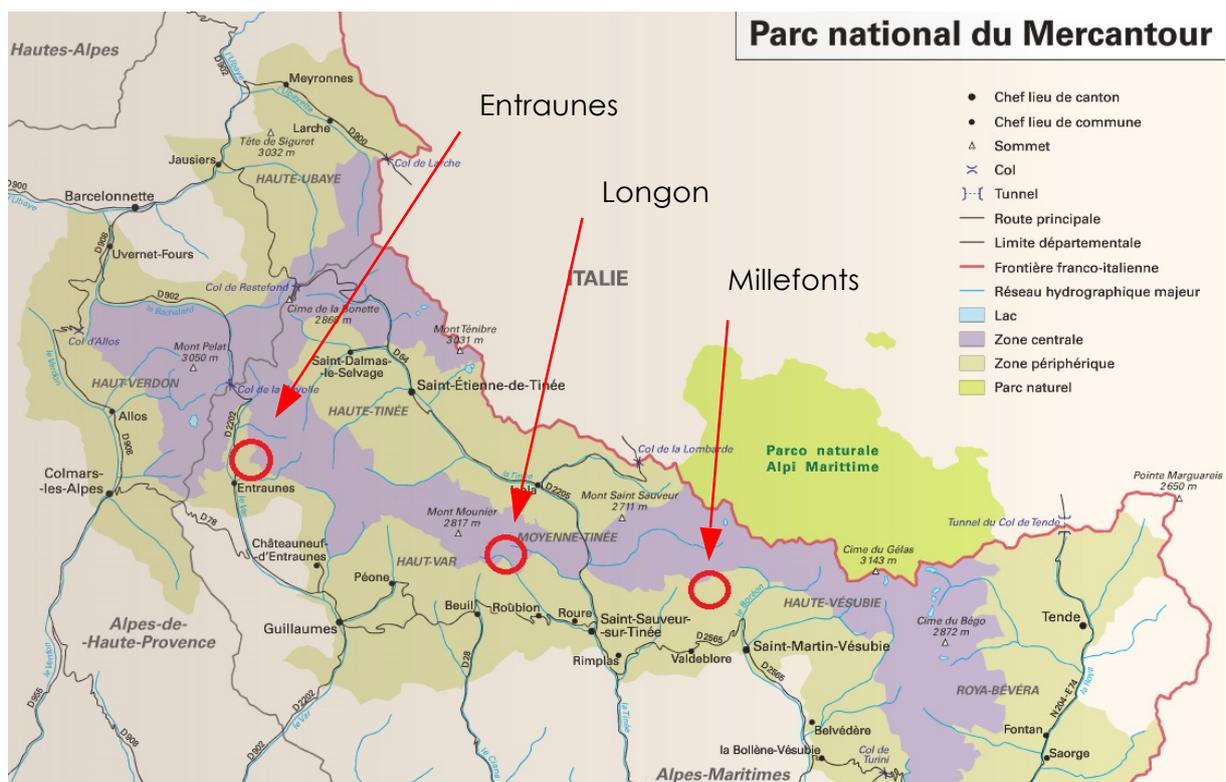
# Activities

## 1. Field Work

### Organization

We selected three flocks that graze in pastoral units (PU, alpine pastures where a particular sheep flock grazes during the summer season) based on three criteria: past and current pressure of wolf attacks (high and low), the PU's accessibility and the willingness of the sheep owners to participate in the project. Two PUs had high wolf pressure. One of the flocks grazes in the core area of MNP where no shooting permits are issued (to defend the flock or cull a wolf). The number of sheep per flock ranged from 1,750 to 2,500 head and altitudes range from 1,500 to 2,550 MASL. One PU had two flocks at the beginning of the grazing period (500 and 2,000), which were then amalgamated into one herd at the end of the summer (owing to frequent wolf predation on the small herd). All flocks were protected by LGDs, mainly Great Pyrenees (GP) or crossbreds (GP with Maremma sheep dog). One of them had 11 LGDs and the other two had 4 LGDs each.

We observed flocks over five surveillance sessions, for a total of 23 nights (3-7 nights per session).



Location of the pastoral units

## LGD Behaviour Study

- **Identity of each LGD:** all information that could be collected (age, sex, etc.).
- **LGD behaviour:** interaction between dogs, interaction with the environment, relationship with owner and shepherds.
- **GPS study:** test of GPS models, processing of the data (night-time LGD movements).



*LGDs' morning location.*



*Interaction between LGDs (eating a dead sheep)*

## Wolf-LGD-Flock Interactions

Night-time interactions between LGDs, wolves and wildlife in general were recorded with long-range infrared binoculars with recording capabilities. Various parameters, like topography, weather and flock activity, were recorded.



*A group of 4 wolves crossing the Longon PU*



*Observation site – Longon PU*

## Sheep stress study

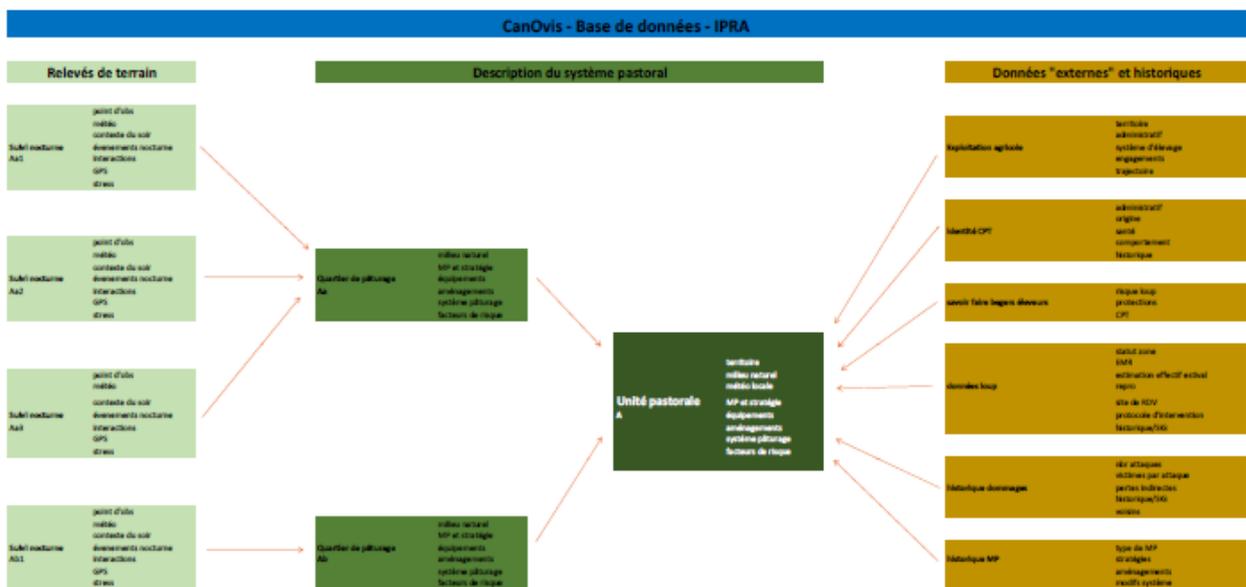
Stress analysis through heart rate variability (HRV). Material test on 10 sheep. Day-time sheep behaviour observations (this part complemented the repellent collar project).



Shearing and depilation of a ewe before fitting the electrode chest belt – Longon PU

## 2. Data Management

Creation of database sheet to store our data (GPS, HRV, wolf-dog interactions, etc.).



Structure of the CanOvis data base (version July 2013)

### 3. Coordination and Communication

We worked with:

- MNP (**A. Morand** – Scientific Office and **H. Parmentier** – Agricultural Office)
- Departmental Directorate for Land and Sea (DDTM 83) (**J. Vert** – Environmental and Forest Office).

Management of the actions, logistics, relationships with local actors and partners, fundraising.

Publishing and dissemination of a project presentation leaflet for the partners, experts and public. Participation with TV coverage (FR3 PACA).

Oral presentations:

- Slovenia: “Wolf Conservation in Human Dominated Landscapes”
- St Martin Vesubie (FR): “*Vivre ensemble avec le loup ?*”

Presentation – return of the field results to the partners and sheep owners:

- Wolf Departmental Committee Group 83
- MNP Scientific Committee
- Departmental Directorates (06 and 83)

Construction of a website: [www.ipra-landry.com](http://www.ipra-landry.com) (still under construction)

## Outlook 2013

### Concerning the Actions

#### 1. Organization

- Positives:

Reactivity and adaptability of the team – good knowledge about the field, local actors and the issue.

Good relationships and coordination with the project's sheep-owner and shepherd partners – partners' long experience of flock protection.

Relevant area studies: limited time access, “open” landscape, good observation points, wolves regularly passing through.

- Difficulties:

Lot of work (nearly 24 hours a day) – Recharging the batteries every day (meaning you have to come back down each day), environmental constraints (weather, terrain, etc.) having a negative effect on some observational sites, lack of resources (equipment and material)



*Nice atmosphere at the shepherd hut (enjoying a Swiss fondue) (Longon PU)*



*LGD fitted with a GPS collar (Longon PU)*

## 2. LGD Behavioural Studies

### - LGD GPS and night observation study

- Positives:

A lot of observations (day and night), good observation comfort, adequate working methodology to catch the dogs every day to fit them with the GPS collars.

- Difficulties:

Time-consuming to fit and remove the GPS collars (the collar itself was not suitable), downloading the data and recharging the GPS batteries every day, recognizing LGDs at night.

## - Night-Time LGD-Wolf-Flock Interactions

- Positives:

Exceptional observing tool (long-range infrared binoculars) – good organization (management of materials, choice of hides, good seasonal planning).

**We observed wolves during every session!**

We observed many interactions between LGDs and wolves, interactions between LGDs, wolves near the flock (more than 10 hours of recordings):

- 12 “wolf events” with LGDs or with the flock
- 15 “LGD events” with other wildlife: chamois, fox, red deer, hare + stray dogs

- Difficulties:

Weather limitations (fog) – battery range (infrared camera + recorder), camera and tripod weight and fragility – difficult to record all the night-time events (e.g. all LGD barking), during LGD-wolf interactions, it is not always easy to record all the scenes, bivouac material to improve (tent no longer waterproof, sleeping bag not sufficiently warm).

## - LGD Vocalizations Study

Reflection on the material and the methodology to use – No action in the field due to lack of time and money.

## - LGD Stress Study

Temporary withdrawal – Possible future PhD project for a student.

## 3. Sheep Behavioural Study

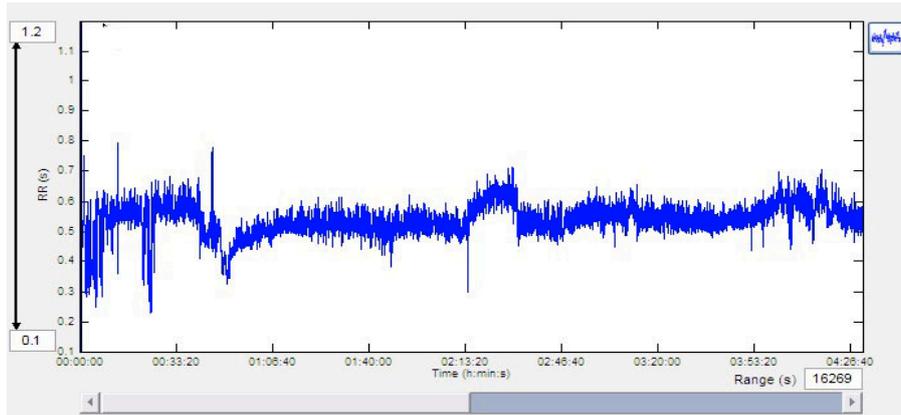
### - Sheep stress study

- Positives:

New data for the repellent collar project, easy sheep catching thanks to the sheep owner.

- Difficulties:

Preparing the sheep (shearing and depilation), setting and maintaining the electrode chest belt and the watch (we lost two of them), difficulties with recording the HRV depending on sheep physique.



*Tachogram: example of a sheep without acute stress*

## - GPS Sheep study

- Positives:

A lot of observations (day, during night sheep are penned), good observation comfort, adequate working methodology to catch the sheep thank the help of the owner to fit them with the GPS collars.

- Difficulties:

Time-consuming to fit and remove the GPS collars (the collar itself was not suitable), downloading the data and recharging the GPS batteries every day.

## 4. Complementary Studies

### - Monitoring of External and Circumstantial Factors

- Positives:

Overview of the parameters to take into account (collected through reading, interviews, our field experience) and data collection methodology tested in the field.

- Difficulties:

Choice of the values and terminology to be confirmed – Rigorously entering the data collected in the field every day.

## - Historical Data

Environmental data, wolf biology, monitoring of the means of protecting flocks in the research area, wolf damage to the flock.

Owing to a lack of time and money, no data were collected (but that was not the priority).

## - Pastoral Know-How – Surveys

Several “open interviews” with sheep owners and shepherds – No surveys (lack of time and money).

## - Data Analysis

- Positives:

Lots of exceptional data on LGD-wolf-flock interactions. Design of a database sheet (could be used by other organizations in the future).

- Difficulties:

Choice of the values to be included in the data base sheet and appropriate terminology to be confirmed. Video analysis represents an incredible amount of work (lack of time and money).



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*LGD-chasing vultures feeding on dead sheep*

## 5. Preliminary Thoughts

### - Preliminary Analysis of LGD-Wolf-Flock Interactions

- Wolves are present: regularly pass by the flock without necessarily trying to attack or interact with LGDs or, on the other hand, displaying hesitance.
- Some LGD-wolf interactions seem "peaceful" and close (indifference? gauging? intimidation?). Both LGDs and wolves seem to evaluate the risk of escalating confrontation. The "Resource Holding Potential" theory may explain the issue of certain confrontations (See Landry *et al.* 2014).
- Close contact with LGDs or the persistent presence of one or two wolves near the flock could be young wolves (leaving the pack or learning to hunt).
- Some LGD chases can be long (> 1 km), where the LGDs keep going, working like hunting dogs after prey. They can run more than 40 km/h.
- LGDs seem to stop their chase within an invisible perimeter (limit) taking into account: wolf behaviour? distance to the flock? risk? LGD territorial limit? LGD temperament? attachment to the flock?
- Behavioural differences between LGDs during calm periods or during wolf interactions (proximity to the flock, leadership, teamwork, motivation, aggression towards wolves).
- Female(s) on heat in the flock or in the vicinity decrease the protection efficiency of the LGD pack (reduced vigilance, wounded males due to internal fights, LGDs roaming). Heat (and birth) management may be one of the key factors in flock protection).
- Correlation of experience and background of sheep owners and shepherds with our own observation on LGD and wolf behaviour.

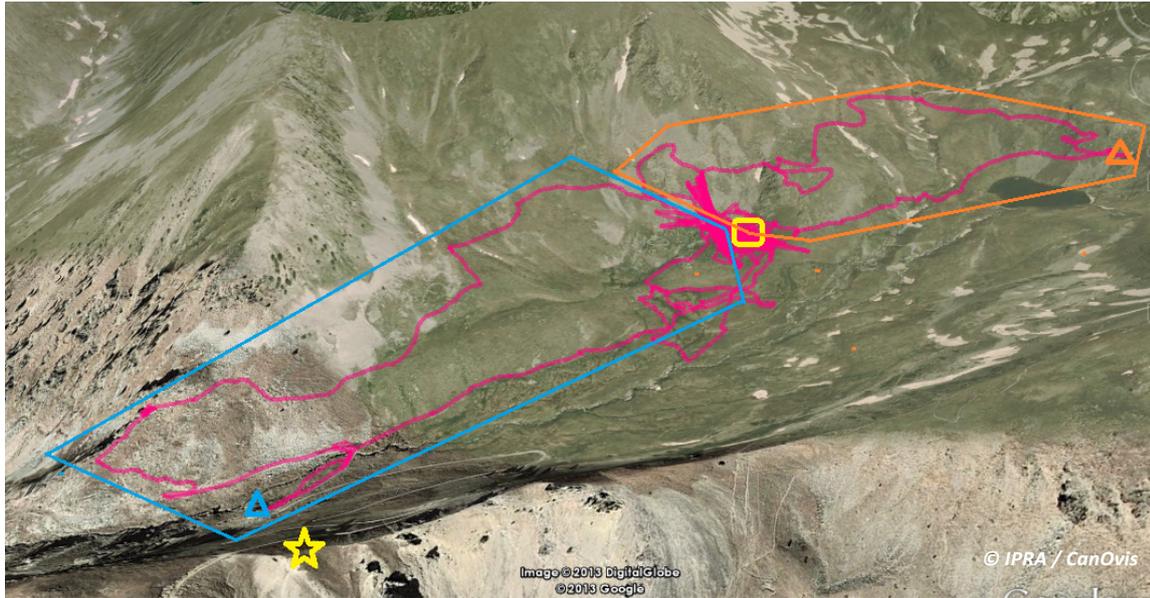
These first results seem to confirm that LGDs will interrupt wolf predatory sequences, but will not teach them not to come back (no associative learning occurs). LGDs could be considered a mobile primary repellent. Therefore, to be effective, the introduction methodology, education) and care (feeding, de-worming) are very important.

The age pyramid of experience within the LGD group, in which experienced dogs should be the most represented, may be another key factor in the success of flock protection. Indeed, mature dogs (3-6 years old) should be significantly over-represented, while young dogs and old dogs should be under-represented. The former need to gain experience and the latter are too old to face wolves and less active.

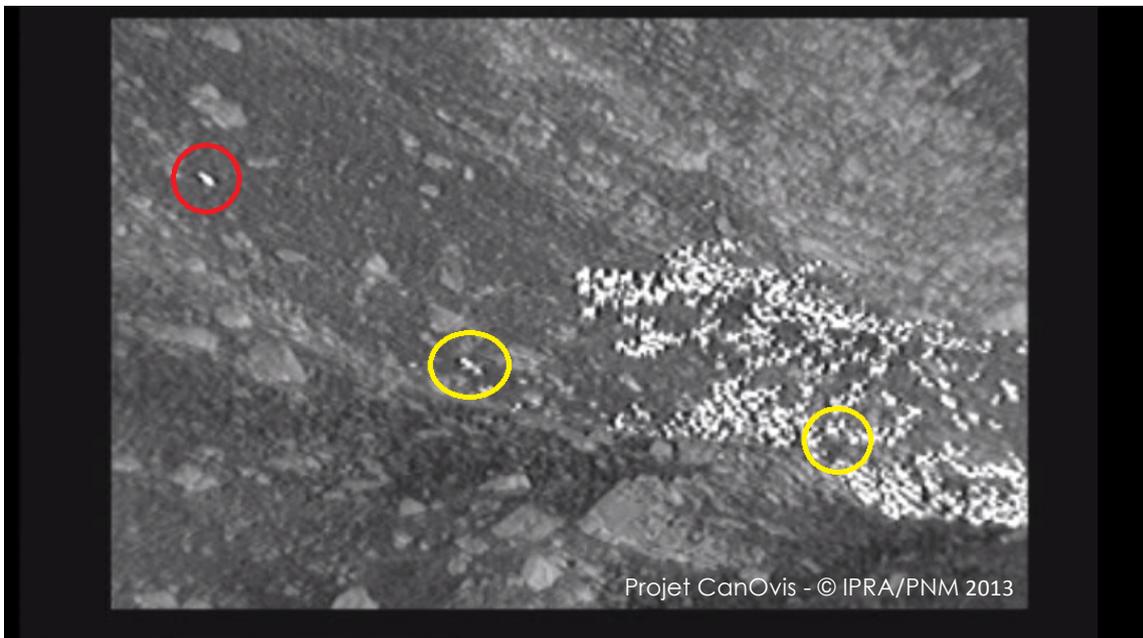
The LGD pack social structure may be another key factor in how they occupy their "territory", in their vigilance and in the deterrent effect on wolves.

### - Data Processing: Correlation between GPS Data and Footage

One interesting aspect of this project is the possibility of juxtaposing two types of data (see figure above), which has never been done before. This allows better understanding of LGD behaviours (e.g. chase distance, taking into account the number of wolves or the flock bedding place, etc.).



Routes of one LGD chasing a wolf (pink lines). The blue polygon encloses an anti-clockwise chase started at the shepherd hut (yellow square), where the flock was bedded, ending at the blue triangle. The orange polygon encloses a second chase, clockwise from the shepherd hut, ending at the orange triangle. Image from Google Earth.



Two LGDs (yellow circles) fitted with GPS collars are chasing a wolf (red circle) that attempted to attack the flock.

## Discussion

### **A Relevant Field Study**

Very little (or no) study has been conducted into LGDs' ability to protect a flock. More information therefore needs to be acquired. The results of our first research season are very encouraging. The use of long-range infrared binoculars enabled the observation (and recording) of direct confrontations between LGDs and wolves and the gathering of incredible data (complemented by GPS data).

### **Good Relationship**

Despite a difficult climate, due to the high level of wolf damages and the requests by sheep-owners' organizations for wolves to be eradicated, we could maintain good relationships and discussions with the sheep owners and shepherds involved in the project. Moreover, they were very interested in the project and some of them also looked through the infrared binoculars!

### **Backwardness in the 2013 Planning**

Due to administrative problems (field operations only began in mid-summer) and lack of money, various actions were not conducted (LGD vocalizations, pastoral survey, historical data compilation, data processing). For the same reason, we were not able to work in the other field area (Canjuers).

### **Financial Issues**

We lacked financial resources during this first year of the project. A difficult economic situation and controversy about wolves do not help to launch this sort of a project. IPRA has worked mainly on a self-finance basis (except a little help from MNP).



Deux loups à l'approche d'un troupeau ovin parqué pour la nuit  
Extrait vidéo IR - Mercantour - © IPRA/PNM - 2013

*Two wolves (on the left) approaching a penned flock – Entraunes PU*



*A sheep fitted with a GPS collar and an electrode chest belt*

# Outlook 2014 - 2017

## *General Matters*

**Owing to the complexity of the subject, the project should last at least four years (2014-2017). We will work in partnership with various local actors to collate the greatest possible amount of experience on the LGD-wolf-flock system.**

The general goals are:

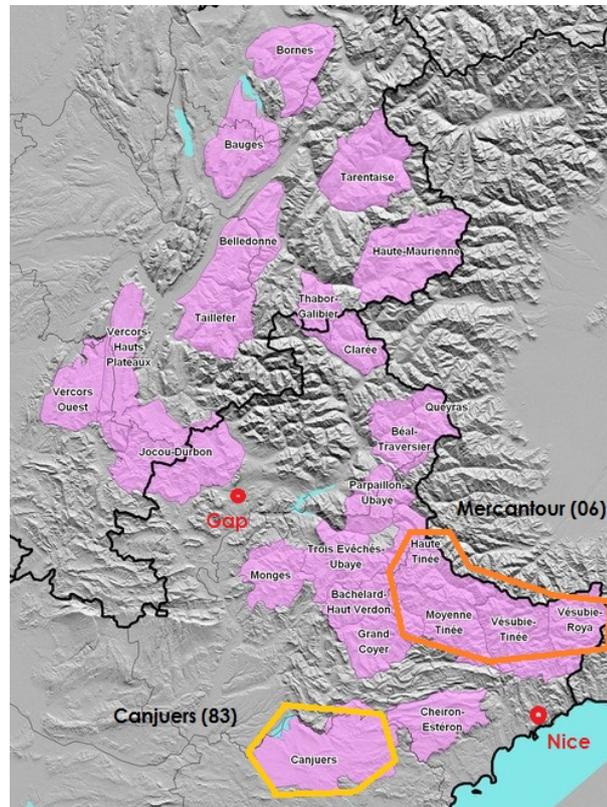
- To increase LGD selection and to propose a training and follow-up methodology
- To improve and adapt prevention strategies, with the consultation of sheep owners and shepherds
- To develop training tools (leaflet, DVD on LGD and wolf behaviours commentated by experts) – To disseminate knowledge and skills – To transpose the experiences we have gained in this project to other territories that will face or are facing the same problems

## *Work team CanOvis 2014-2017*

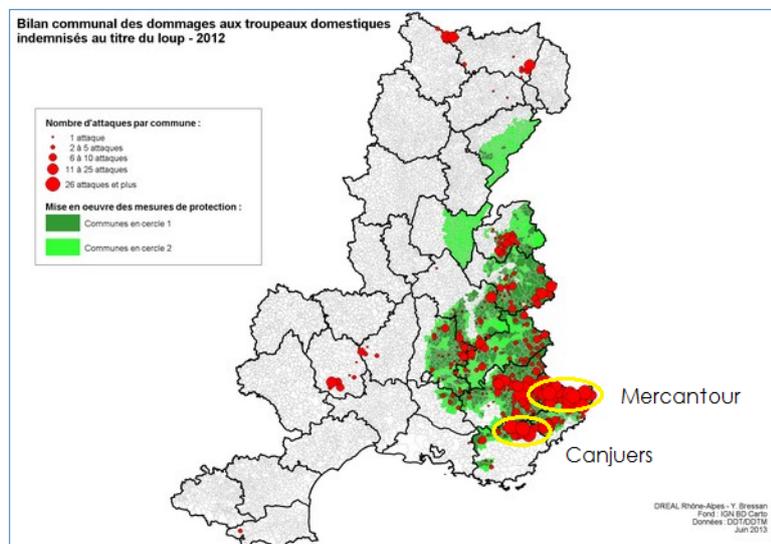
- Jean-Marc Landry (JML): Project leader – scientific lead, data collection
- Jean-Luc Borelli (JLB): Project organizer – data collection
- Gus Lyon (GL): Engineer – data analysis
- Vincent Tollon (VT): Biostatistician – statistical analysis
- Loïc Coat (LC): film maker – communication
- Gérard Millsicher (GM): MNP guard, responsible for the infrared camera, data collection
- Students

## Study areas

**Mercantour Range – Alpes-Maritimes (06) / Canjuers Plateau – Var (83)**  
**Provence-Alpes-Côte d’Azur region (PACA) – France**



*Zones with wolf packs and CanOvis study areas  
 (Map from ONCFS 2012)*



*Flock damage in 2012 and the two CanOvis study areas (map from DREAL RA – 2013)*

Identify forms of the study areas – CanOvis project		
	Mercantour	Canjuers
<b>Geographical limits</b>	Core areas of the PNM	Canjuers military base
<b>Surface area</b>	215,000 ha	35,000 ha
<b>Relief</b>	Alpine landscape with forests (e.g. <i>Larix decidua</i> ), meadows and heaths	Plateau, small valleys, hills
<b>Climate</b> (influences)	Mediterranean-continental-alpine	Mediterranean-subalpine
<b>Environment</b>	Alpine meadows, heath and forests	Steppes-plains-scrub-forests
<b>Wolf situation in 2013</b>	5 permanent zones with packs: Minimum of 21 wolves	2 permanent zones Minimum of 10 wolves
<b>Pastoral situation</b> (trend)	Extensive sheep breeding (145,000 sheep) summer transhumance Sheep presence: June-October	Extensive sheep breeding (15,000 sheep) sedentary and winter transhumance Sheep presence: all year around
<b>Damage to the flocks (2012)</b> (in the department)	764 attacks compensated 2,417 victims compensated	248 attacks compensated 713 victims compensated
<b>Management and use</b>	National park – Forestry/ Tourism	Forestry – Regional park – Army, hunting



Canjuers plateau (Var)



Alpine pasture of Longon (Mercantour)

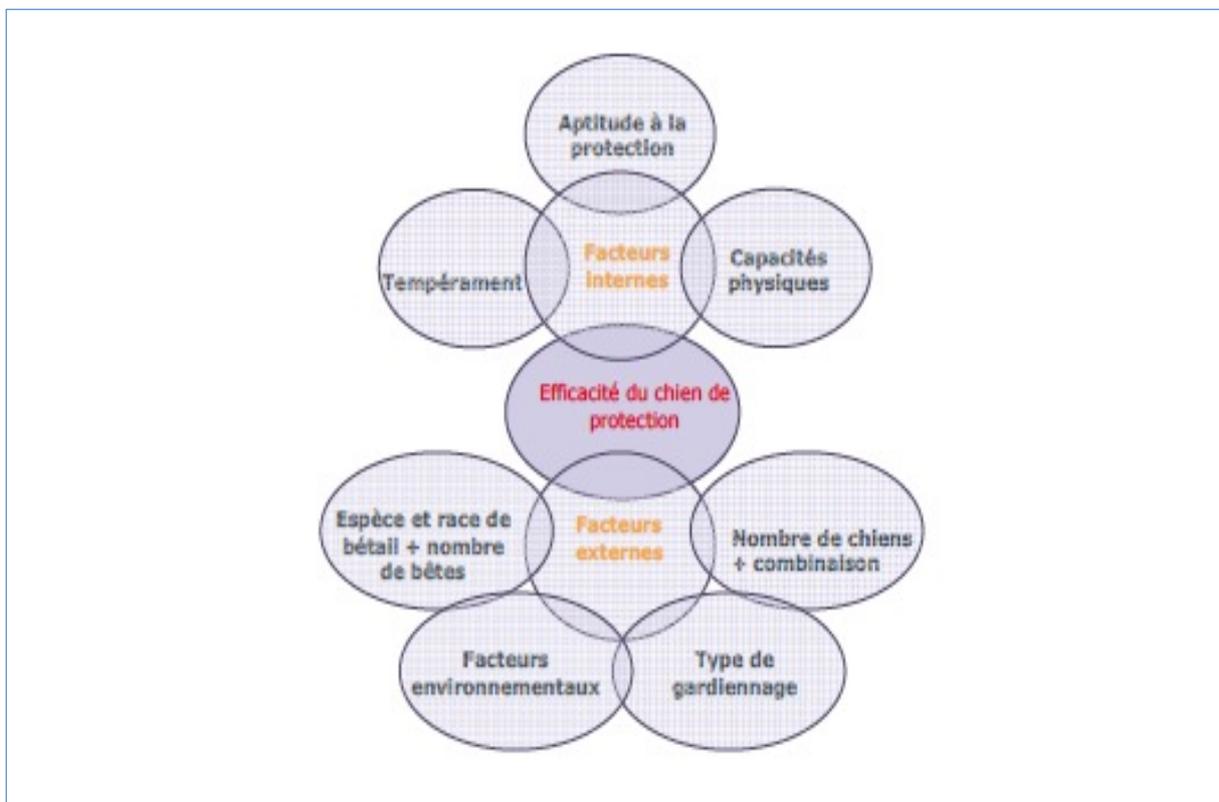
## Scheduled Methodology and Expected Results

1. **To study internal factors (LGD talent to protect the flock) of LGDs at work and to study their behaviour at work:** a) interactions between LGDs and wolves b) interactions between LGDs c) effect of LGD vocalizations on wolves and LGDs d) LGD movements in relation to the flock position e) assessment of LGDs and other preventive methods by sheep owners and shepherds.

**2. To study external factors (everything in LGDs' working environment that can influence their effectiveness):** a) wolf pressure (density, predation rate, etc.) b) environmental factors (topography, plant cover, weather conditions, land serving multiple purposes, etc.) c) pastoral practices and protection systems d) human factors (sheep owners' and shepherds' know-how and experience) e) circumstantial factors (events that temporarily lower the flock protection level).

These investigations into LGDs' ability to protect the flock (internal factors) and the influence of the working context on their protection abilities (external factors) will help to better define LGD efficiency, in order to propose concrete recommendations to optimize their use and to adjust preventive strategies.

We will create an LGD model, which will show clearly what could increase or decrease their efficiency. This model will help to choose quality indicators in order to improve their selection, training, their everyday use and their monitoring. Identifying external factors will help to modify how sheep are kept and increase LGD efficiency.



*Preliminary LGD model based on internal and external factors, which change the success of flock protection (Landry 2009-2013)*

## Working Organization

At different stages:

- Centralization and harmonization of historical data (HD) (collected from our project partners)
- Compilation of new data (monitoring campaign on the pilot PU)
- Interviews: expertise and know-how of the actors in the field
- Analysis: video interpretations, GPS monitoring – logging the data on the database sheet + GIS + statistical analysis, etc.
- Results, dissemination and communication

## Service, Promotion and Communication

- **Annual reports and abstract of the study**
- **Assessment tool and compilation of recommendations** intended for professional breeders, organizations in charge of flock protection, and pastoral territory managers
  - **Data management:** sheep database, which could be used by administrators to compile and make use of data from the field + analysis tool + GIS (vulnerability, damages, interactions, LGD behaviours)
    - LGD behaviour catalogue to be used for selection
  - **Results propagation:** seminar – scientific publications – international conference – education training
  - **Communication:** web page, media (press, radio, TV) – documentary (52mn)

## Main Partners and Contributions

- *Mercantour National Park*: expertise and logistical support – co-management of the project in MNP
- *DDTM 06 (Departmental Directorate for Land and Sea of Alpes-Maritimes Department)*: expertise, advice, data, information on protection resources, wolf damage on flocks, information about LGDs (it finances LGDs and other means of protection)
- *DDTM 83 (Departmental Directorate for Land and Sea of Var Department)*: co-management of the project on the Canjuers territory, expertise, advice, information about LGDs
- *CERPAM 83 (Centre for Pastoral Studies and Activities in the Alps-Mediterranean Region – association under the Law of 1901, co-partner in the Canjuers territory)*: expertise, advice, data, means of protection, vulnerability analysis;

- *ONCFS (National Hunting and Wildlife Agency)*: expertise, advice, data on wolves (damages and presence)

- *Côte d'Azur Prealps Regional Natural Park*: expertise, advice, data, logistical support

## Planning

• **2014-2015: First operational phase** – research and temporary assessment. Acquisition of new data – analysis – first results (working model of LGDs, effect on wolf behaviours, flock damage, identification of external factors) – development – adjustments and recommendations.

• **2016-2017: Second operational phase and final assessment.** Recommendation enforcement in the studied PU – monitoring – collection of new data – analysis – final results – evaluation and outlook – publications and restitution.



*Start of night-time observation – Entraunes PU*



Quatre loups poursuivis par un chien de protection  
Extrait vidéo IR - Mercantour - © IPRA/PNM - 2013

LGD chasing four wolves – Longon PU

## Acknowledgment

We would like to thank those involved at MNP for encouraging this project and allowing us to work in the park. We are also grateful to A. Morand and H. Parmentier (MNP) for advising us and to SAGEM, especially T. Dupoux, who provided the infrared binoculars. Very special thanks to the sheep owners that have participated in the project and made us feel welcome (B. Bruno, L. Vallet, R. Bouvet, P. Courron and M. Barengo), and to the shepherds who helped us in the field (B. Bruno, Y. Clément, M. Rodrigues and L. Briancon). We are also grateful to Mado for her generosity.

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