

STUDY ON MONITORING OF *CANIS LUPUS* L. POPULATIONS WITHIN THE NATURAL PROTECTED AREA FROM THE NORTH-WESTERN GORJ COUNTY

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Abstract

The Gorj County is located in the south-western part of the country, in northern Oltenia, on the Middle Jiu river. The physical-geographical framework reflects the richness and the diversity of the flora and the fauna of the county, too. The wolf (Canis lupus L.), together with the brown bear (Ursus arctos L.) and the lynx (Lynx lynx L.), is a priority species of European interest whose conservation requires the designation of the special conservation areas. To monitor the wolf populations (Canis lupus L.), it used both passive and active methods of study in the field. The monitoring period was between May 2014 and June 2015. During the researches done in the field, the Canis lupus species was identified within the ROSCI0129 site the North of the Western Gorj in the following areas: Bumbesti –Jiu area, forest habitat 1100 m altitude; Runcu area, forest habitat 1120 m altitude, Pestisani area, forest habitat 1633 m altitude, Tismana area, forest habitat 1140 m, altitude Motru area, forest habitat 1130 m altitude, Stanesti area 1280m altitude. The habitat area of Canis lupus was evaluated according to the field analyses at 40039.73 ha, related to the ROSCI0129 Site the North of the Western Gorj. The repartition area is stable, with a habitat enough extended to ensure the long-term surviving of the species. After the analyse of the gathered datas, it is considered that the increase of the wolf herd whose territory overlaps with the study area is of 75 specimens.76

Key words: Natural Protected Area, Canis lupus monitoring.

INTRODUCTION

The Gorj County is located in the south-western part of the country, in northern Oltenia, on the Middle Jiu river. The Parallel 45 crosses through the middle of the county and at the south of the Targu-Jiu city, its neighborhoods being at north Hunedoara County, at north-west Caras-Severin County, at east south-east and south-west Valcea, Dolj and Mehedinti counties, having a total area of 5.602 km², 2.3% of Romania territory.

The Relief of the county is various, including three major stages: mountains, Sub-Carpathian hills and the northern extremity of the Getic Plateau. The mountains cover 30% of the county area. The Sub-Carpathians hills (400 – 800 m altitude) go from Oltet as far as Motru, where they link with the mountains. At south of the Sub-Carpathians area, the relief is still high, the hills of the Getic Plateau are like ridges which go down to the south.

The climates temperate-continental with mild mediterranean influences, with a annual average temperature of 10.3⁰C. The hydrographic basin of the Gorj county covers the Jiu river (the middle course) which run through Lainici Pass, to the confluence with the Gilort river, gathering the waters on an area of 10469 km², The river Jiu increases its flow gathering the waters of the Tismana, Orlea, Bistrita, Jales, Susita, Sadu, Amaradia, Cioiana rivers. Others important rivers of the county are: Gilort, Oltet and Motru.

The Carpathian region of the Romania, though represents less than 2% of the Europe area, supports viable and stable populations of large carnivores: 30% of european effectives of wolves, 35% of effectives of brown bears and 25% of effectives of linxes. These large carnivores represent symbol species for the preservation of the biodiversity in Europe. They have an important role in the ecosystem exercising the “top-down” control on large

territories over the prey populations. Thus, the presence of these species indicates natural habitats with a high ecological value and functional ecosystems, which can be a model for the ecological reconstruction in other regions of Europe.

The physical-geographical framework reflects the richness and the diversity of the flora and the fauna of the county, too.

The large carnivores (the bear, the wolf, the linx) are top species of the trophic pyramide and are considered to be the key species in the operation of the ecosystem, implicitly in the maintaining balance in the ecological communities.

The Protected Natural Area the North of Western Gorj ROSCI0129 occupies an area of 86.958 hectares in 9 townships of the Gorj County - Bumbesti-Jiu (7%), Godinesti (8%),

Pades (23%), Pestisani (69%), Runcu (86%), Schela (84%), Stanesti (67%), Tismana (82%) and Turcinești (2%), and in 3 localities of Hunedoara County: Lupeni (<1%), Uricani (3%) and Vulcan (<1%) and the Baia de Arama locality (<1%) of Mehedinti County, too.. The geographic coordinates: 23°4'44" east longitude, and 45°9'5" north latitude. Altitude: maximum -1940m, medium - 835m, minimum -192m. (Figure 1)

(<http://www.rezervatiagorjului.ro>)

From the point of view of the use of the land in the area, with references specially at the major habitat types, the Protected Natural Area the North of Western Gorj is mainly covered by mixed forests and broadleaf forests (Figure 2)(<http://www.rezervatiagorjului.ro>)

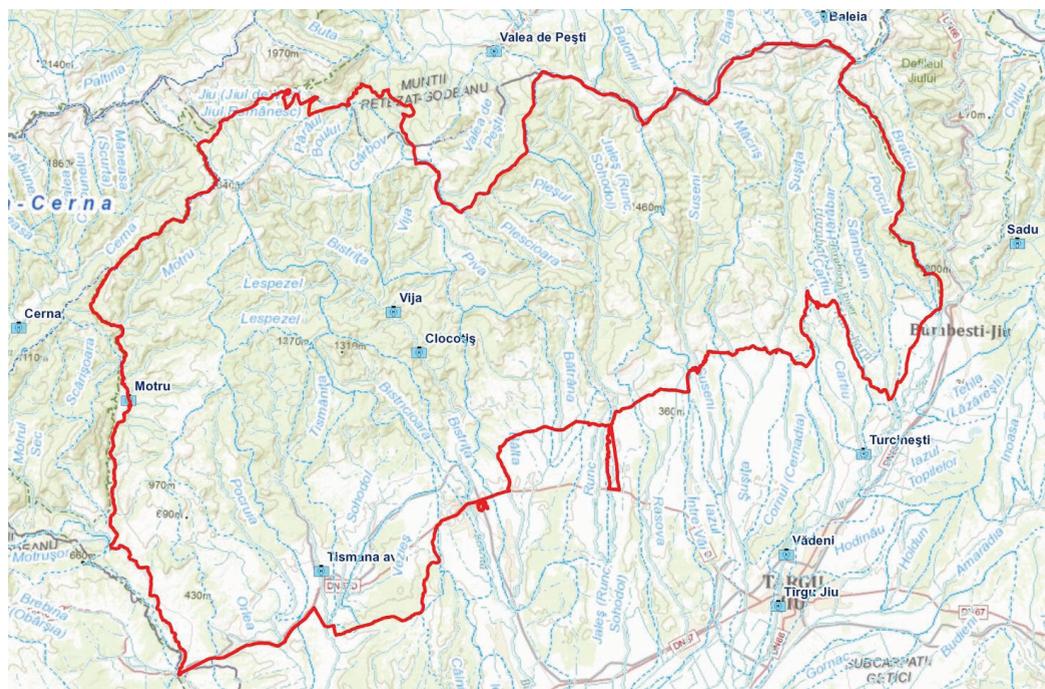


Figure 1. The limit of the Protected Natural Area the North of Western Gorj

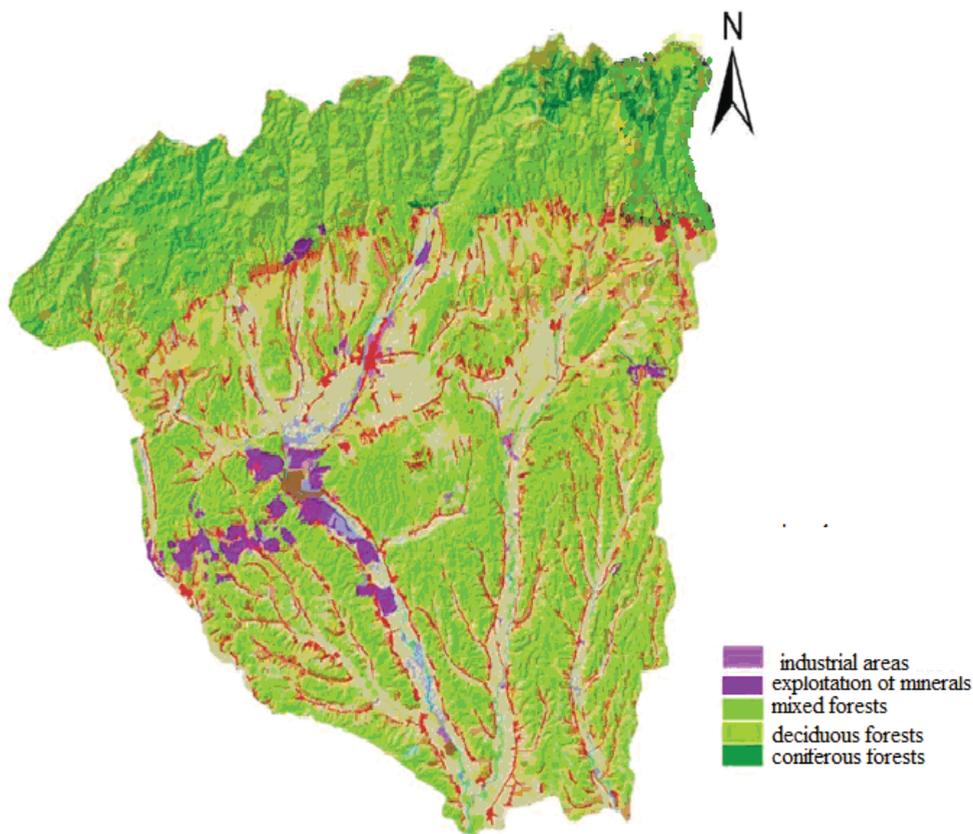


Figure 2. The location of the Protected Natural Area the North of Western Gorj in the Gorj County, with references of the using way of the land

MATERIALS AND METHODS

The wolf (*Canis lupus* L.), together with the brown bear (*Ursus arctos* L.) and the lynx (*Lynx lynx* L.), is a priority species of European interest whose conservation requires the designation of the special conservation areas.

The increasing of the accuracy of estimating populations of the wolves is a fundamental requirement for an efficient management of the wild mammals populations according to the sustainable management principles of the natural patrimony and it is an European Union requirement.

To assess the presence of this species and to count his number within the project area, within the adjacent areas, too, it uses various methods, for some periods of time, opting for concurrent application of two or more

evaluation techniques, to gather a larger quantity of data.

To monitor the wolf populations (*Canis lupus* L.), it used both passive and active methods of study in the field (Linnell, J. and al. 1998).

The monitoring period was between May 2014 and June 2015.

• Passive study methods in the field - The evaluation of the species presence by continuous monitoring method

The continuous monitoring method of some interest locations using photo cameras/cameras with infrared motion sensor implied the placing of 20 photo- and cameras equipped with motion sensors.

To offer an increased visibility, the cameras were placed at 3-5m on the tree trunks, being oriented with IR sensor downward. One

exception has been made in the case of CAM 5 from area 1, which it was placed at the base of a tree, at the height of 0.5 m, being later camouflaged with branches and dried leaves. It opted for this decision to increase the sensibility of the sensor by reducing the distance from the subject. (Figure 3).

The type of the camera chosen for this study took into account of these aspects, linked to the parameters of the study and of the land from the interest location. All the 20 cameras equipped with shutter system with IR sensor.

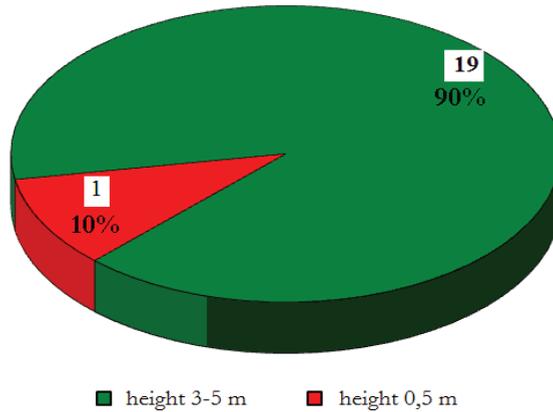


Figure 3. The placing of cameras depending on the height location



Figure 4. The location of the cameras with automatic shutter systems with IR sensor



Figure 5. Camera PNI type Hunting Camo 2.6 C with IR sensor and automatic shutter

It opted for shutter system cameras (with IR sensor) because the only impediment raised by this type of cameras is the false shooting (determination of objects which, from various reasons or actions, cross the shutter ray and initiate the photo recording), but this aspect can be surpassed equipping the monitoring cameras with high capacity data storage medium and ensuring the frequency of the

maintenance visits thus the time between two such consecutive visits is no more than half of life span of the batteries (for a charging cycle) and than the necessary time to charge with records of maximum half of storage medium. In this respect, at the initial placing of the cameras did higher frequency maintenance visits to observe the records accumulation rate and the energy consumption rate of the

batteries, the final decision being to set time between two consecutive visits at maximum 3 weeks.

The monitoring cameras with IR active sensor shutter set to record data and time of each photo and, at the same time, opted to achieve three successive shots, at 1 second time one from each other, to ensure the data redundancy and to not leave out important elements to be catalogued.

The collected imagines were grouped in files pointing the location area and the record period (from the last maintenance visit to that were downloaded those images) to allow the evaluation of the time parameter of the records.

The aim of cameras mounting was represented by the evaluation of the interest species occurrence in the field, and of the wild prey species, too.

Initially there were selected 6 monitoring areas, chosen according to the preliminary map of the species occurrence in the interest

area, made based on the data analyse offered by the Hunting Funds, to identify the frequented areas by the wolf, bear and linx within the Protected Natural Area the North of Western Gorj perimeter.

Intercurrent, the 6 monitoring areas were kept, but the monitoring cameras were relocated in other locations from these areas. (Figure 6.)

According as the land structure (relief and vegetation) allowed, the monitoring areas were placed at relatively equal distances from each other.

Covering the period dedicated to continuous monitoring, the cameras were installed in the interests locations.

In table 2 are shown the data regarding the number of camera placed in each location, the data regarding the type and the definition, and the data regarding the lifetime for each of them.

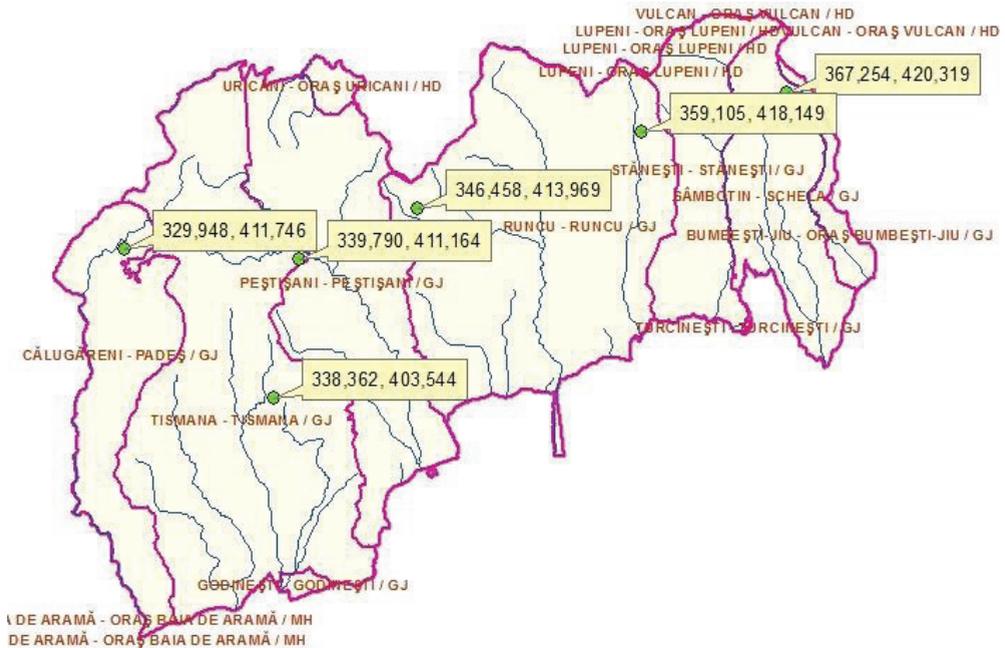


Figure 6. The preliminary map of the interest area with placing of the continuous monitoring areas

Table 1. The camera locations, their type and the lifetime

Camera detection	Exemplary chamber	Resolution (megapixel)	Location(area)	Surveillance time(interval)	Monitoring time(interval)
CAM 1, 2, 4	PNI Hunting Camo 2.6 C	12	1. Pades (Alunu)	20.06.2014-30.06.2015	405
CAM 13, 14, 15	PNI Hunting Camo 2.6 C	12	2. Tismana (Silea and Pietricica)	20.06.2014-30.06.2015	405
CAM 10, 11, 12	PNI Hunting Camo 2.6 C	12	3. Bistrita (Leordile)	20.06.2014-30.06.2015	405
CAM 7, 8, 9, 20	PNI Hunting Camo 2.6 C	12	4. Runcu (Gropu Sec)	20.06.2014-30.06.2015	405
CAM 3, 5,6	PNI Hunting Camo 2.6 C	12	5. Susita (Valea Rea)	20.06.2014-30.06.2015	405
CAM 16, 17,18, 19	PNI Hunting Camo 2.6 C	12	6. Schela (Valea Porcului, Haraboru andComanda)	20.06.2014-30.06.2015	405
Cumulative time monitoring (all camera, all locations)					2430

• **Active study methods in the field**

Specific density evaluation method based on collection and interpretation of „transect” data type, consisting of counting the traces of path and pattern types which cross a preset study route, eventually a study route periodically verified and with historical (annual) reply. The technique consists in the counting by an observer of the incidence of the path type traces with a longitudinal transect parallel with the longest side of the interest perimeter for the study.

For a better space correlation of data, it makes a variable number of such parallel transects, with various distances between them, at random chosen and depending on the structure of the land (relief, accessibility level in the cold season, etc.).

For each location (representing the intercross of a path trace, that means of a pattern type trace row, with the study transect) it is noted the GPS position and the sample size (the specimen number, the number of the parallel paths which cross the transect in that location).

The Wolf Abundance Index interprets this data reporting the number of the individual records (the sample size) to a meter variable, generally represented by the length of the transect made by the observator and conventionally expressed in kilometers. Though the dimension of the interest area of the project is reduced, suggesting in this respect the use of a low measure scale for the metric variable (in meters), we preferred the conventional use (in kilometers), though this aspect offered sub-unitary values for this

variable. It opted for this pattern because we aimed to obtain some values conventionally expressed, to allow the comparison with the values of the Wolf Abundance Index resulted of other similar studies, in other locations. (Crete, M., and F. Messier, 1987).

The formula for Wolf Abu used in this study, according to Stolyarov, V.P, Vorobei, N.N., Ivanova, N.V., Jedrzejewska, B., Litter size, sex ratio and age structure of gray wolf, *Canis lupus*, *Ursus arctos*, *Lynx lynx* in relation to population fluctuations in northern Belarus is the following:

$$WAI = \frac{n}{L * z}$$

Where:

- WAI= Wolf Abundance Index;
- n= the number of individual traces of path type which cross the transect;
- L= the transect length made by the observer
- z= the correction factor of trace time accumulation, representing the number of days from the last snowfall, which could covered the last traces.

WAI does not represent a dimension of the numerical herds, but rather an image of the intensity of the interest species activity within an area or a measure of the abundance index in that location.

The criteria used in the recognition of the wolf traces summarize various aspects related to the geometry and the size of the traces, but various particular aspects which can indicate the membership of the paw print:

- the presence of all 4 claw print or of their traces in the snow/humid soil (always);
- the positioning of fingers 2 and 5 behind the fingers 3 and 4 (the line which unifies the fingertips 2 and 5 crosses the print of the fingers 3 and 4 below of their half);
- the traces of the finger claws 3 and 4 converge, different of dog traces which are divergent
- the angle previously created by the back „pad” is sharp for the wolf trace, compared to the dog;
- the aspect of path type trace is rectilinear (wolf), not meander (dog).



Figure 7. Trace of pattern type from one lone adult wolf (*Canis lupus*)



Figure 8. The measuring of a path type trace

RESULTS AND DISCUSSIONS

Because the *Canis lupus* species (the wolf) is particularly elusive, avoiding mainly the contact with the man or the proximity to the human settlements (with the exception of the moments in which they attack the domestic animal stocks, in the years with diminished food resources), presented low densities compared to other species, on the hand, due to

the fact that the average of the territory dimension for this species is very big (the central area of the pack covers, average, 35 km², average for the populations in the whole world, for Romania, this value being bigger, between 50 km²- 150 km²) – the pack spends in this area over 50% of time), but the territorial shifting phenomenon is frequently in the cases when the prey species (domestic or wild) do seasonal migrations, it resorted to the inventory of the wolf population in the adjacent areas of the perimeter, in the cases when it was found the presence of the species in these locations.

The wolf species distribution (*Canis lupus* L.) within the Protected Natural Area the North of the Western Gorj (ROSCI 0129) was evaluated by addition of the used methods. (Figure 9).

During the researches done in the field, the *Canis lupus* species was identified within the ROSCI0129 site the North of the Western Gorj in the following areas:

- Bumbesti –Jiu area, forest habitat 1100 m altitude;
- Runcu area, forest habitat 1120 m altitude,
- Pestisani area, forest habitat 1633 m altitude,
- Tismana area, forest habitat 1140 m, altitude,
- Motru area, forest habitat 1130 m altitude,
- Stanesti area 1280m altitude.

The habitat area of *Canis lupus* was evaluated according to the field analyses at 40039.73 ha, related to the ROSCI0129 Site the North of the Western Gorj. The repartition area is stable, with a habitat enough extended to ensure the long-term surviving of the species.

After the analyse of the gathered datas, it is considered that the increase of the wolf herd whose territory overlaps with the study area is of 75 specimens (13 specimens at Bumbesti, at Pestisani 14 specimens, at Tismana 14 specimens, at Runcu 10 specimens, at Motru 10, and at Stanesti 14 specimens (two packs). (Figure 10)

It is possible that, some specimens belonging to the same group, to dwell in various areas of the Hunting Funds which do not cover the interest area (the perimeter of the Natural

Area from North-Western Gorj County) or some specimens belonging to other packs to adventure occasionally searching for food within the dwelling pack territory, though the probability of that fact is quite low, because to the aggressive character shown by the species to defend the territory borders. If this fact is possible, then the occurrence areas of the intruders must be found, most probably, in the minimum occurrence area of the dwelling herd).

From the point of view of the time presence of the species within area, it is noted that the

species occurrence within the interest area covers only the cold season (all the pack specimens) and it is extended (for the male – datas obtained using the continuous monitoring method by photo cameras with IR) and in the spring period (in may), when probably, this frequens this area searching for food, because of the increased needed of the pack and of the lower available pack members for the hunting (only the male and eventually the last year sub-adults can hunt, the female being occupied with the pups care) (Table 2).

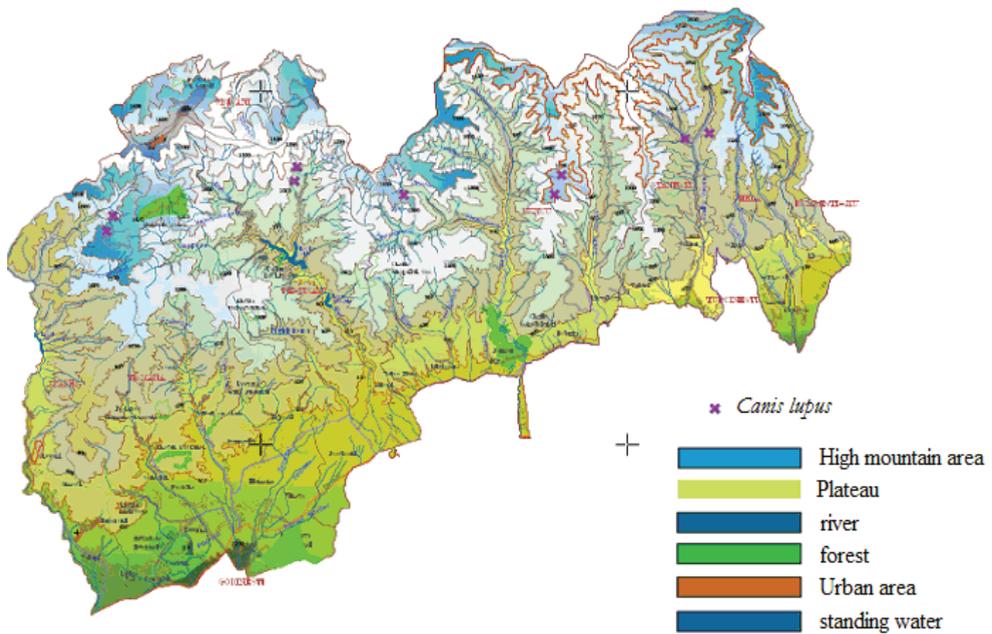


Figure 9. The distribution map of the *Canis lupus* species within the study perimeter



Figure 10. Specimens of wolf surprised by the photo- / cameras with infrared sensor

Table 2. The calendar of the species presence in the natural area

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
The presence of the species												

It is possible that, some specimens belonging to the same group, to dwell in various areas of the Hunting Funds which do not cover the interest area (the perimeter of the Natural Area from the North- Western part of the Gorj County) or some specimens belonging to other packs to adventure occasionally searching for food within the dwelling pack territory, though the probability of that fact is quite low, because to the aggressive character shown by the species to defend the territory borders. If this fact is possible, then the occurrence areas of the intruders must be found, most probably, in the minimum occurrence area of the dwelling herd).

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CONCLUSIONS

To monitor the wolf populations (*Canis lupus* L.), it used both passive and active methods of study in the field.

The monitoring period was between May 2014 and June 2015.

The wolf species distribution (*Canis lupus* L.) within the Protected Natural Area the

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ACKNOWLEDGEMENTS

The datas were collected from the monitoring activity of the large mammals species of wolf, bear, linx, of european interest from the Protected Natural Area the North of the Western Gorj within „The monitoring of the species the Nature 2000 – large carnivors, respectively the creation of a visiting center of the protected natural area ROSCI0129 the North of the Western Gorj” project141076/17.06.2013

REFERENCES

- Cirtina D., Gamaneci Ghe, 2015, Study Regarding the Elaboration of Certain Management Measures of the Protected Area Oltet Gorges, Gorj County – a Premise of the Sustainable Development, Journal

- of Environmental Protection and Ecology, Book 2, Vol.16/2015, pag. 667-675, ISSN 1311-5065.
- Crete, M., and F. Messier, 1987, *Evaluation of indices of gray wolf, Canis Lupus, density in hardwood-conifer forests of southwestern forests of southwestern Quebec*, Canadian Field-Naturalist 101:147-152.
- Linnell, J., J. Swenson, A. Landa, and T. Kvam. 1998. *Methods for monitoring European large carnivores - a worldwide review of relevant experience*. Norwegian Institute for Nature Research, Oppdragsmelding 549, Norway.
<http://www.rezervatiagorjului.ro/web/Arhiva-Stiri-/Situl-de-importanta-comunitara-ROSCI0129-NORDUL-GORJULUI-DE-VEST-419>.