Radio-Telemetry of a Black Vulture Population in the Dadia National Park

Strategy and Methodology

Dadia

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Introduction

The Eurasian Black Vulture *(Aegypius monachus)* is the largest bird of prey in the western Palearctic. In Europe its breeding range is limited to some parts of Spain, France, and southeastern regions (Cramp and Simmons, 1980; Tewes, 1996). The European breeding population has been estimated between 1450 and 1477 pairs, of which 1336 occur in Spain (Tewes et al., in press). Greece is the only southeastern European country holding a breeding population (Handrinos, 1985; Handrinos and Akriotis, 1987). It is considered to be a globally endangered species (Collar ct at., 1994), vulnerable in Europe (Tucker and Evans, 1997) and endangered in Greece (Karandinos and Legakis, 1992).

During the second half of the twentieth century, the species has suffered a severe demographic bottleneck in Greece and was almost extinct during the 1970s. The reasons for its population decline in Greece have been breeding habitat loss, a decrease of food availability paired with changes in livestock-raising practices, and poisoning (Spyropoulou, 1998; Hallmann, 1998). The only breeding place in Greece now exists in the Dadia National Park (DNP), where in 1979 the population was estimated as 26 individuals and 4-5 breeding pairs (Hallmann, 1979). After the establishment of the feeding table in 1987 the population recovered and the breeding population increased steadily from 10 pairs in 1980 to 26 pairs in 2002 (Skartsi and Poirazidis, 2002). The population in Dadia also includes non-breeding birds, while the maximum number of Black Vultures counted in Dadia between 1987 and 2002 was 89 birds in January 2001 (Skartsi, 2001).

The conservation of the population of the Black Vulture is the central subject of interest in the Dadia National Park management. The present situation of the species in the area remains critical as many of the mortality factors (like poison baits) continue to affect negatively the population and the mortality threats are not uniformly distributed (Skartsi and Poirazidis, 2002). Changes in stock-raising practices which have resulted in poor food conditions for carrion feeders force the Black Vulture to travel away through the Evros Prefecture and the adjacent regions in search of food, as animals that feed on sparse, patchily distributed food resources must travel extensively to forage successfully (Meretsky, 1992). For these reasons, an understanding of the active range use and movement patterns that have been developed by this population could be essential for the management and conservation of the species. Such understanding may also be equally useful for the conservation efforts with other large scavengers.

Until now little attention has been paid to the foraging preferences and range use of this species, as well as the kind of dangers that it faced with during its travels. Catering to this need for understanding movement patterns, a pilot telemetry project with the Eurasian Black Vulture has been developed in the Dadia National Park. This project has been implemented since the beginning of 2004, in the framework of the LIFE Nature project “Conservation of Birds of Prey in the Dadia Forest Reserve, Greece”(LIFE02/GR/8497).

The main objectives of the present study lay with the estimation of the home range of the Dadia National Park Black Vultures, and the determination of their movement and activity patterns. The identification of important causes of mortality, are also one of the core aims of this work.

In this first report we describe the strategy of our telemetry project and the methodological framework that has been designed and implemented. In following reports the first analysis from our telemetry data according to the study questions as well as an evaluation of the described methods will be presented.

Why telemetry?

The most useful technique for studying wildlife is radio-tracking, or wildlife telemetry. This technique has most revolutionized wildlife research (Mech, 2002). Radio-tracking brought two new advantages to wildlife research: the ability to identify individual animals and the ability to locate each animal when desired. These advantages have led to the wide application of radio-tracking, for the study of a list of species, wide enough to include raptors, wolves, snakes, crayfish, dolphins, tigers, and elephants and in most major countries the radio-tracking technique is so revolutionary that there is no other wildlife research technique that comes close to approximating its many benefits (Mech, 1983).

Radio-tracking is the technique of assembling information about an animal through the use of radio signals from or to a device carried by the animal. This technique requires the capture of live animals and usually the attachment of a collar or other device to them. It then usually requires for someone to periodically monitor for a signal from the device. The potential for learning new information with this technique is almost unlimited and in many national parks wildlife conservationists have recognized the benefits of this technique for the protection of the endangered species and hosted radio-tracking studies for many years: in some parks, hundreds of animals have been, or are being studied, by radio-tracking (Mech, 2002).

Black Vultures are large scavenger birds, which depend upon a food supply that is scarce and unpredictable in space and time. This dependency has led to a foraging strategy based on minimizing the energy cost of searching while maximizing the range of foraging flights (Hiraldo and Donazar, 1990). The large wing surface of this species (as well as the other vulture species) allows traveling quickly and covering very large distances (from 50-200 km according to the species) (Terrasse and Bagnolini *in* Tewes et al. 1998; Maretsky and Snyder, 1992; Rouxton and Houston, 2002). Additionally, these birds use large remote areas where monitoring their movements is difficult if done by traditional ways. Black Vultures are secretive in behaviour and are not easy to detect on dark background, as they are also able to forage at low altitude following the relief over wooded areas (Terrasse and Bagnolini *in* Tewes et al., 1998).

Some of these difficulties can be overcome by the use of radio-telemetry. With radio telemetry we are able to locate an animal with minimal disturbance and relative accuracy from far away or to follow it during its movements. It has also been considered that radio tracking would be a suitable technique for investigating certain aspects of the biology and ecology of vultures (Boshoff et al., 1984). Additionally, this telemetry project could give useful information relevant to the risk of collision of the vultures to the newly established windmills, in one part of the potential foraging areas.

Study area

The study area is located in the central part of Evros Prefecture (Figure 1), North-eastern Greece, including the Dadia-Lefkimi-Soufli National Park and covers the main foraging area of the Black Vulture in Greece, and up to the Bulgarian border helped as to cover also part of the potential foraging areas in the neighbouring country. The elevation ranges from 20 to 1200 m above sea level and the area is relatively sparsely populated. The local economy is based mainly on traditional extensive farming practices and forestry, although ecotourism has increased in influence during the recent years (especially in the National Park). The study area is characterized by steep valleys covered at the lower altitudes by extensive oak *(Quercus frainetto, Q. cerris, Q. pubcscens,)*, and pine *(Pinus butia, P. nigra)* forests, and at the highest altitudes by beech (*Fagus orientalis*) and oak (Q. *dalechampii*) forests. Many other habitat are found in the area such as cultivations, fields, pastures, torrents and rocky slopes, are also included in the area. Extensive pastures and intensive grazing characterize one big area of the North-western part.

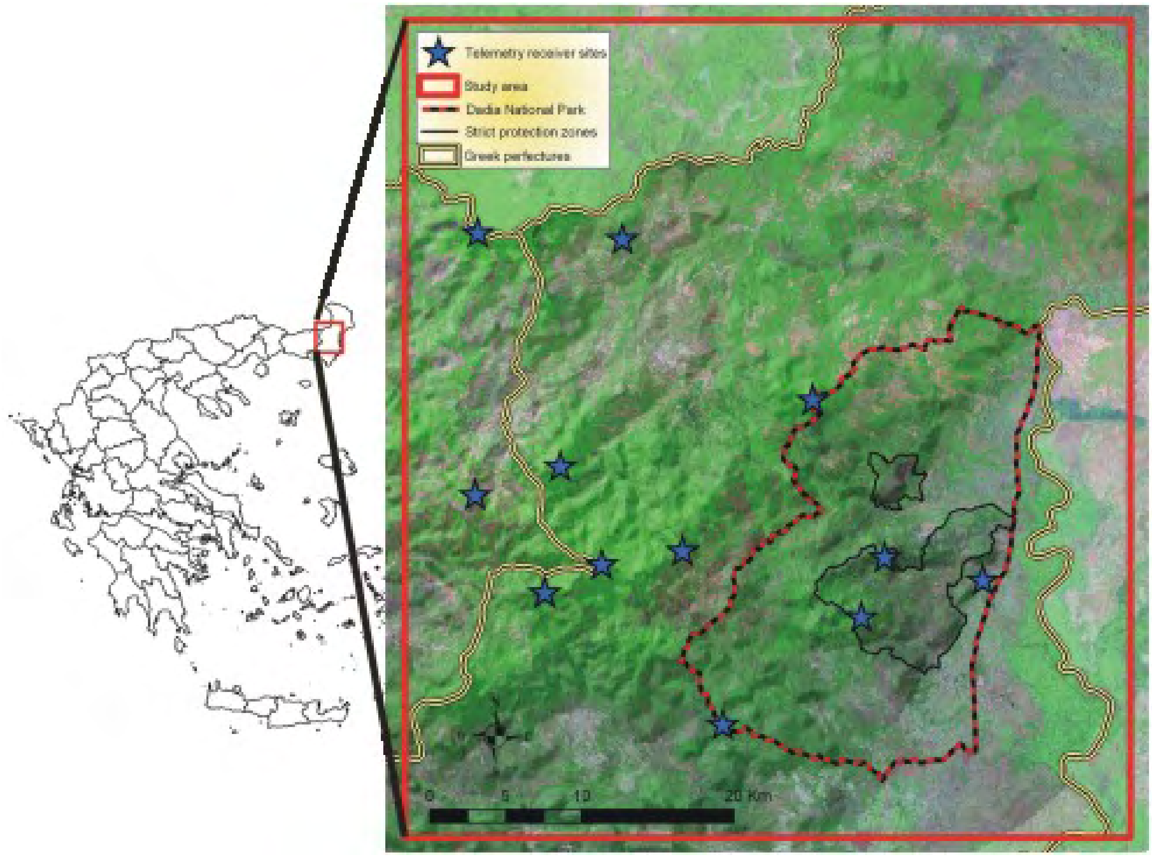

Figure1. Study area of the telemetry project.

Methods

Selection, capture and marking of vultures

The total population of Black Vultures in Evros is estimated at approximately 80-100 individuals (Skartsi, 2001). For the needs of this study a representative sample for each age class of the vultures were radio-tagged. It was impossible to determine the sex of the vultures during the trapping due to lack of phylogenetic dimorphism. Vultures were trapped outside the breeding season (between the end of October and the beginning of November) except from one juvenile that was re-trapped in May in order to replace the transmitter that had failed (Table1).

In order to trap the vultures a walk-in cage was used. The trapping cage was an assembled structure so that it could be easily moved in the forest. Taking into consideration the bibliography and the particular conditions of the region, a square shape of dimensions 6X6X2 m was chosen (Charalambous, 2003; Savas Iezekiel - pers. com., Ohad Hatzofe pers. com.). A metal net covered by plastic material (mesh size 5X5 cm) covers the sides and the top of cage. The whole construction is dyed green in order to blend to the environment. One live decoy-vulture (coming from the rehabilitation center) was staying in an isolated 2.5 m^2 department until the moment free-living vultures entered the cage and the door closed (for detailed description see Skartsi, 2003; Eloriaga, *in press*).

When the vultures were trapped they were immediately hooded and they were placed separately into cardboard boxes properly aerated. Radio-transmitters were attached as backpacks using a Teflon® ribbon harness (Buehler et al., 1995). Specific information about harness structure and fitting are found in Vekasy et al., (1996). Each vulture was also weighed, measured and banded (Table 1). The vultures were monitored after release to determine if the transmitter package and/or handling affected adversely the bird's flight or behavior. Each vulture was monitored again (in most cases on the next day) to ensure that the transmitter was still on and that the bird's behavior was normal.

In October 2003, 7 radio transmitters[1] were fitted in 4 adults, 2 immatures and 1 juvenile Black Vultures. The transmitter fixed on the juvenile stopped working. In May 2004, this vulture was re-trapped and a one-satellite transmitter PTTs[2] (80 gram Birdborne North Star) as well as a radio transmitter (24 gram provided by Birdborne North Star) were fitted on the bird.

Table1. Vultures' age, body weight and backpack percentage of body weight

Date of trapping	Age	Calendar year	Color RingCode	Wing Tag Code	Vultures Name	Vultures Weight in gr	Transmitter and harness weight in gr	% Body weight of vultures
22/10/2003	Adult	>5	H06	01	Javier	8425	155	1,84
22/10/2003	Adult	>=5	H09	09	Stefan	9200	155	1,68
7/5/2004	Immature	2	H34	27	Petros	6800	184	2,70*
23/10/2003	Immature	3	H10	02	Gianna	9400	155	1,65
21/11/2003	Adult	>5	H33	-	Takis	9100	95	1,04
27/11/2003	Adult	>=5	H35	29	Poira	9100	95	1,04
27/11/2003	Juvenile	1	H34	27	Petros	7650	95	1,24
29/10/2003	Immature	3	H15	12	Chiara	8600	155	1,80

**satellite transmitter*

[1] 75gr TW3 form Biotrack, activity and mortality sensing
[2] 80 gram Birdborne North Star

Radiotelemetry

General principles of radio-tracking - equipment

In the study area six different zones were distinguished, each one of them in fact consisting of an entire a valley. This area covered the main potential foraging areas of the species but also the active breeding sites of the Dadia National Park colony (Figure1). Vultures were radio-tracked from fixed stations. In our study area 12 telemetry points (fixed receiver sites) were established on the top of the highest hills overlooking the valleys. When observation points were established at high altitudes with unobstructed view, extensive areas could be covered with few observation points, thanks to the high range of the transmitters (30–60km), (White and Garrott, 1990, Marzuff et al., 1997, Kenward, 2001). This area was chosen in order to maximise the part of the area that according to existing information is used by the Black Vulture for foraging, as well as in order to facilitate the regular application of the telemetry monitoring system.

The altitude of the telemetry points varies from 200 to 1100 m. Each valley was controlled by at least three receiving stations. The receiver stations in a valley, in most of the cases, allow the reception of the signal also from vultures that were flying in adjacent valleys, due to the topography and the high range of transmission from the transmitters. When the 'Line-of-site' is unobstructed, transmitters could be detected at distances of 30-60 km (Biotrack, UK).

Vultures were radio-tracked by teams of three persons in each valley. Each valley was sampled in a systematic order every 10-12 days, with the constraint that each be sampled once in the morning (30 min before the sunrise until 13:30) and once in the afternoon (13:30 until approximately sunset). When one valley was sampled in the morning the adjacent valley was sampled in the afternoon in order to satisfy that all radio-tagged vultures should be tracked evenly throughout the season and the daylight hours. Tracking sessions were suspended when lightning, heavy rain and strong wind threatened personnel and receiving equipment.

Radio-tracking teams used 4-element, Yagi (Televilt) antennas and programmable scanning radio frequencies receivers (one Icom R-10 and two R-1000) to sample sequentially the vultures with radio-transmitters. The antennas were placed on 2.5 m sticks to help the personnel during the process.

In the initial phase of the telemetry project bearings were obtained by sighting hand-held compasses toward signals. Afterwards a compass rosette was used from each receiving station, which enabled us to eliminate the use of hand-held compasses, increase the consistency of orientation from each site, increased the accuracy and decreased the time that was needed for each triangulation (Photo 2 & 3). In most cases the strongest signal method was used, as the null average method didn't increase bearing accuracy; both methods were evaluated in the initial phase of this project. This practice is also in line with relevant bibliography (Springer, 1979; Zimmermann and Powell, 1995; Marzuff et al., 1997).

Trackers used 2-way radios to alert the other team members of the presence or absence of a signal. We took care to track all individuals in alphabetic order. When finished with all the birds, the process was repeated with the same order as in the first time. In each round every vulture was checked to detect his signal from all the trackers. When the signal from one vulture was not possible from all trackers, its absence was recorded and they continued with the next bird. When only one tracker had signal from one individual he took a bearing and the other two just recorded absence of signal. When only two trackers received signal from the same individual bearings were taken by them, and absence of signal was recorded by the third tracker. In cases like this, the two trackers after the first successful recording of the bearings tried immediately to relocate the same individual. When all trackers had signal from the same individual, bearings were taken by all. Each tracker was taking notes of the activity of the vulture from signal intensity and the time.

We allowed at least 30 min between successive location estimates on the same bird to reduce dependency among estimates. Although multiple estimates of the same bird's locations are not truly independent, location estimates 30 min apart can be considered as representative of a Vulture's use of the study area (White and Garrott, 1990). Furthermore, the even distribution of research effort throughout the study period meant that the established locations did not include a daily or seasonal bias in the home range estimation (Andersen and Rongstad, 1989).

The only aspect of the project design that could introduce a bias in the home range estimations, regards the delimitation of the research zones, is when the vultures were on the nest or perched at the bottom of a valley or when foraging in other valleys and in these cases the birds can ‘t be tracked. However the implementation of the radio-tracking process twice every two weeks in each zone (once in the morning and once in the afternoon), minimized this potential bias.

Guidelines for the application in the field

In order to standardize the methodology and to increase the efficiency of the telemetry project, special guidelines were drafted and distributed to the involved personnel. Analytically:

1. Essential Equipment for Radiotelemetry in the Field

The typical costs associated with radio-telemetry projects are enormous. Each day in the field has a big cost related to salaries and expenses for field personnel and transportation (vehicles, gasoline,etc). The researchers carry along expensive and valuable infrastructure, and thus excessive care should be taken with their use and handling.

The following equipment should always accompany the radio-tracking team:

- The 'Yagi' antenna four elements (**Photo 1**) and its carrying case so as to be protected from crashing.
- The screw (**Photo 1**) that connects the antenna with the stick of the compass rosette and is used for the calibration of the antenna with the rosette's needle (**Photo 2**).
- The stick of the compass rosette (**Photo 1).**
- The screw that connects the stick of the compass rosette with the main body of the rosette (**Photo 2**).
- The main body of the compass rosette (**Photo 2**).
- Tow (2) cables with BNC connectors in both sides to secure the Yagi antenna with the reviser.
- Receiver with fully charged batteries (4 AA rechargeable) and one extra set (4) of fully charged batteries for the receiver (4 AA rechargeable or one-use).
- Earphones.
- VHF with fully charged batteries.
- One extra, fully charged, battery for the VHF.
- Battery case for the VHF (the appropriate for each type of VHF).
- One extra set (4) of full charged batteries for the battery case of the VHF (4 AA rechargeable or one-use) .
- Field protocols.
- Instructions for relocating each telemetry point.
- Wrist watch.

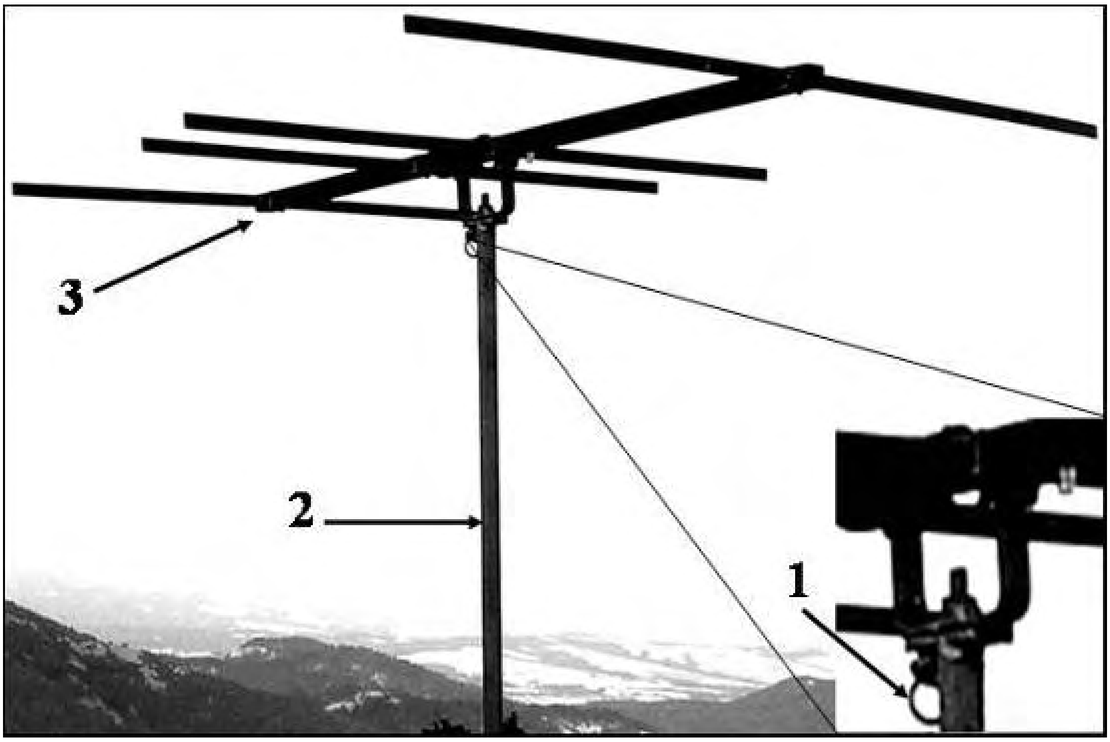

***Photo 1**. The four-element 'Yagi' antenna fixed on the stick of the compass rosette*

1. Screw that connects the antenna with the stick of the rosette. 2. Stick of the rosette. 3. Four-element Yagi antenna.

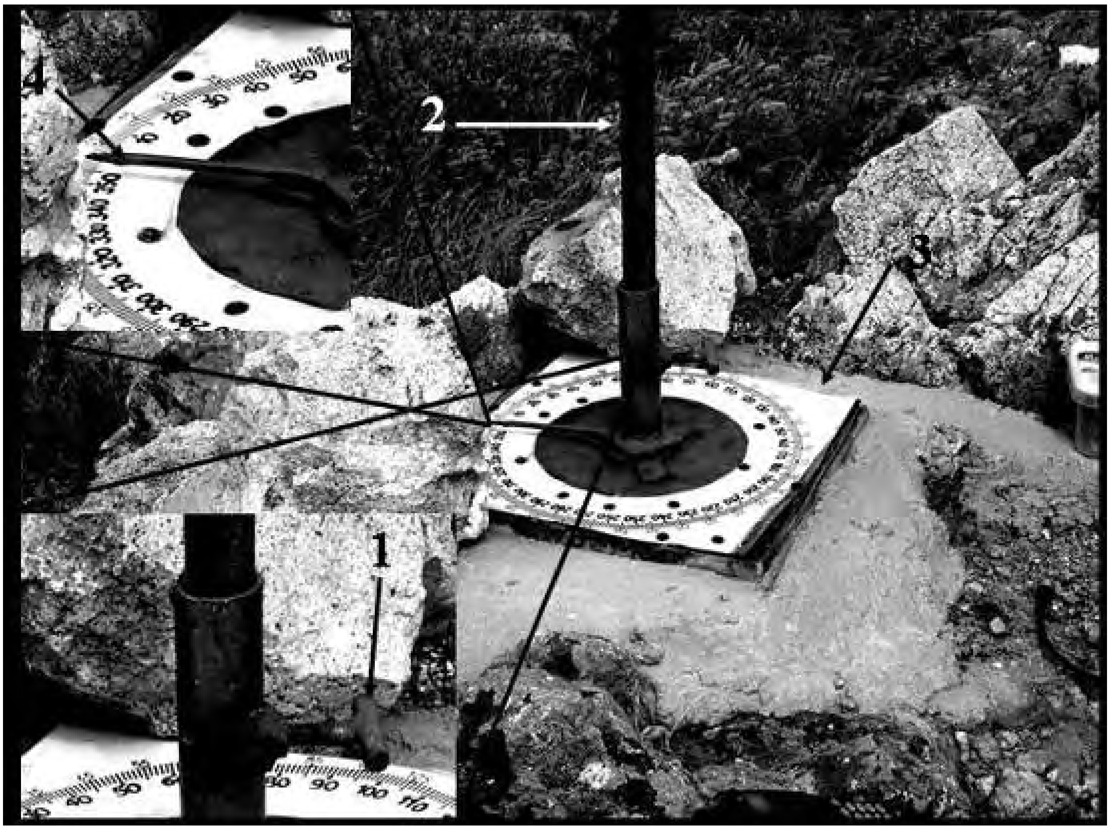

***Photo 2**. The main body of the compass rosette and the stick*

1. Screw that connects the stick with the main body of the rosette, 2. The stick of the rosette, 3. Main body of the rosette, 4. Rosette's needle.

2. How to set the rosette?

On high hills of our study area 12 permanent telemetry points were established. On each one of them one square 30x30 cm made by iron was fixed on the ground with cement. This metallic construction was mounted on the ground in such a way that one of its sides was vertical to the north. To this side a mark "N" was engraved on the cement. Consequently when the observer set the 'zero' of the rosette's compass to this side, the rosette was instantly calibrated with the magnetic north (**Photo 3)**.

Photo 3. *Calibration of the rosette with the magnetic north*

1. Magnetic north (0), 2. Magnetic south (180°), 3. Metallic square, 4. Cement, 5. Rosette's main body.

3. How to take a bearing?

The quality of the signal that an observer may receive is of two general different levels. The first level is when the radio-tagged bird is "in line of site" from the observer. In this case, a distinguishable striking stripe appears on the screen of the receiver, accompanied by a sound. The second level is when the bird is far from the receiver or a surface intercedes between them. In this case only the sound will be received.

There are two main approaches to taking a bearing.

a. Strongest signal method

In this case the observer turns the antenna to the direction of the best signal reception (striking stripe appears on the screen and sound is heard) and turns down the gain until only one line appears on the screen. At this moment the tracker reads the azimuth on the compass with the help of the needle.

b. Null average method

In this case the tracker turns the antenna to the direction of the best signal reception of signal (sound) and turns down the gain until he can just hear the sound. Then the tracker turns carefully and quickly the antenna to the left till the point that no sound is heard. At this moment the tracker reads the azimuth on the compass with the help of the needle (e.g. 353^{o}). Then the tracker turns carefully and quickly the antenna to the right till the point that no sound is audible. At this moment, once again the tracker reads the azimuth on the compass with the help of the needle (e.g. 45^{o}). Then, in order to find the direction of the vulture he calculates the absolute difference between the previous records.In our example special attention should be paid due to the fact that the two records are the one on the left of 360^{o} that points to the North and the other on the right of the North.

e.g. -(353-360)+45= -(-7)+45=7+45=52.

Consequently the absolute difference should be divided by two e.g. 52/2= 26 and should be added always to the left azimuth.

e.g. -(353-360) +26= 7+26=33.

In our example the radio-tagged vulture was flying on 33^{o} degrees.

4. How to avoid taking a back bearing?

In same cases, when the radio-tagged vulture is flying very close to the tracker or at a very high altitude, the reception of signal (striking stripe on screen and sound) is very good from all directions and especially from the direction of the vulture and the opposite one. In this case the tracker has to be very careful because there is a big possibility to take a wrong bearing (back bearing). The tracker has to turn the down gain less than half and make some full turns of the antenna until he realizes the direction of the best signal reception (Kenward, 2001).

5. Triangulation system

The triangulation system is applied by three observers, who synchronously track the six radio-tagged vultures from three different permanent telemetry points. One of the three observers is the coordinator of the process. Trackers use 2-way radios to communicate between them. They pay attention to track all the individuals in fixed alphabetic order and every vulture should be tracked once every 30-min. When the trackers finish with all the individuals, the process is repeated in the same order as in the first round.

In each round all the trackers check every vulture to detect its signal (record). Every record on the data sheets (Appendix 1) has a unique number (Bearing Number, BN). When there is visual contact with the tagged vulture a different protocol is filled (Appendix 2). The Bearing Number (BN) is set by the coordinator and the rest of the trackers follow this same numbering. After the control for every vulture, the trackers report to the coordinator, if they succeeded in detecting or not the signal and the activity of the specific individuals.

When none of the trackers could detect a signal from a vulture, its absence is recorded (No Bearing, NB). When only one tracker has signal from one of the individuals, he takes a bearing (Single Bearing, SB), while the other two trackers record absence of the signal. When two trackers have signal from the same individual they take the bearings (Biangulation, B), while the third tracker records absence. In this case immediately after the 1st biangulation they repeat another biangulation for the same vulture (Double Biangulation, DB) with the same BN. When all of the trackers have a signal from the same individual they all take the bearings (Triangulation, T). Each tracker takes a note of the activity for each tracked vulture from the beat and the intensity of the signal and the time. In each round all the trackers attempt to detect the signal from every vulture. Every record for each vulture is being written on field data sheets.

The communication with the 2-way radios, and the reports to the coordinator, are inclusive, sentence-word (holophrastic) and short-speech in order to save the battery of the radios, simplifies the process, avoid mistakes and misunderstandings and gain time.

6. How to identify the activity of the bird from the signal?

Transmitters with activity sensing

In this case the transmitters have the ability to transmit different types of beat (sound) according to the activity of the tagged animal (Roosting, Flying, Dead**)**. For example in the case of the transmitters that have been attached on the Black Vulture, the rate of the first type of beat is 50 biiips per min and this signals that the transmitter is not horizontal (the vulture is erect on the nest or on a tree, rock etc). The rate of the second type of beat is 60 biiips per min and this signals that the transmitter is horizontal (the vulture is lying on the nest or a rock, ground and when is flying). The rate of the third type of beat is 80 biiips per min and this signals that the transmitter is on the ground or somewhere immobile for more than 24h (vulture lost the transmitter or dead).

For our needs, a vulture is '**Roosting'** when the rate of the beat is 50 biiips per min and this happens when the transmitter is not horizontal (the vulture is erect on the nest or on a tree, rock, etc). The characteristics of the received signal are slow beat, always same sound level, the sound doesn't appear and disappear, if there are lines on the screen of the receiver they are stable (don's appear and disappear) and their number is always the same. The strongest signal comes steadily from the same direction. As, vultures are not completely immobile when roosting (they may be cleaning their feathers, biting their feet or a carcass or socialize with other vultures). In these cases the tracker focuses for more time on the beat and from its changes realizes the activity. The signal in such cases is slow in general and for some seconds is fast and then slows again.

Equally for the needs of our research, a vulture is '**Flying**' when the rate of the beat is 60 biiips per min, signaling that the transmitter is horizontal (the vulture is flying or laying on the nest or on a rock, etc). The characteristics of the received signal are fast beat, while the sound and, if any, the lines on the screen appear and disappear. The only exception to this general rule, is when the vulture flies very close to the tracker, in which case the lines don't appear and disappear but when a vulture is close to one of the trackers it is far from the other two, who are thus able to distinguish its activity.

When a vulture is flying, it doesn't always stay with his back in horizontal position. According to the activity (e.g. soaring, gliding or displaying) its back is horizontal or vertical or there is an angle between the level of his back and the horizontal level. For this reason the signal from a flying vulture is fast in general and for some seconds is slow and then fast again. As in the previous case, the tracker has to focus for more time on the beat trying to realize the activity from changes in the signal.

Transmitters without activity sensing

These transmitters are not manufactured to have the ability to transmit different type of beat (sound) according to the activity of the tagged animal (Roosting, Flying, Dead**)**. The rate of the beat is always the same.

A vulture is '**Roosting'** when the characteristics of the received signal are the following:

- Always same sound level,
- The sound doesn't appear and disappear,
- If there are lines on the screen of the receiver their number is always the same,
- The lines don't appear and disappear from the screen.
- The strongest signal comes steadily from the same direction.

As in the previous case, the tracker must concentrate on the variations of the signal, in order to establish the kind of activity the birds are engaged in.

A vulture is '**Flying**' when the characteristics of the received signal are:

- The sound appears and disappears,
- If there are lines on the screen, those appear and disappear from the screen.

There is an exception when the vulture is flying very close to the tracker. In this case the sound and the lines don't appear and disappear but when a vulture is close to one of the trackers is far from the other two, which they are able to distinguish its activity.

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Appendix 1: Black Vulture Monitoring 2004

Radiotelemetry Field Protocol

Chiara Gianna Petros Poiras Stefan Takis

Date: / /2004 | Researcher: ________ | Wind Power: ________ | Wind Direction: ________

Start time: ________ | Telemetry Point: ________ Altitude: ________ | Cloud Cover: ________ | Visibility: ________

End time: ________ | Coordinates: N ________ E ________ | Interruption: ________

Bearing Number (A/A)	Time	Radio tag's name	Vultures's activity from signal (F,R,INC,UN)	Strongest Signal Direction in degrees or Absent	Triangulation (T), Biangulation (B), Single Bearing (SB), Not Signal for all (NB)	Visual contact	Signal Quality Sound and lines (L) or only sound (S)	Comments

*The Bearing Number is unique, the telemetry units set it in coordination, and they follow the numbering strictly.
*Before taking the direction of the bearings with the compass, put away walky-talky,mobile phones and headphones.
*We are taking bearing for each individual every 30 minute and we are writing the real time when we have result from the rosette.
*We are using Strongest Bearing (SB) method.
*We are very cearfull with the compass when we are taking the bearings, the landmark shoud be obvious and prominent.

Appendix 2: Black Vulture Monitoring 2004

Radiotelemetry Field Protocol

In Case of Visual Contact

Date: / /2004 **Researcher:** **Telemetry Point:** **Altitude:**

Start time: **End time:** **GPS-Coordinates: N** **E**

Bearing Number (A/A)	Radio tag's name	Activity from visual contact	Visual Habitat	Companioned With				Vultures with Wing Tag	Comments
				Am_Nr	Gf_Nr	Nper_Nr	Other Species_Nr		

*The Bearing Number is unique, the telemetry units set it in coordination, and they follow the numbering strictly.This number connects the data in this protocol with the data in Radiotelemetry Field Protocol.

*Visual Contact:We are interesting for visual contact with the radiotaged Vultures.

*Activity from visual contact: Soaring, Gliding, Flying low, Flying height, Displaying, Mobbing, et cetera.

*Visual Habitat: we describe the relief (crest, fold, palisade, valley) and the type of vegetation (oak, pine, mixed forest, openings, rocks).

*Companioned With: we describe the number of individuals and the species that fly with the radiotag vulture.