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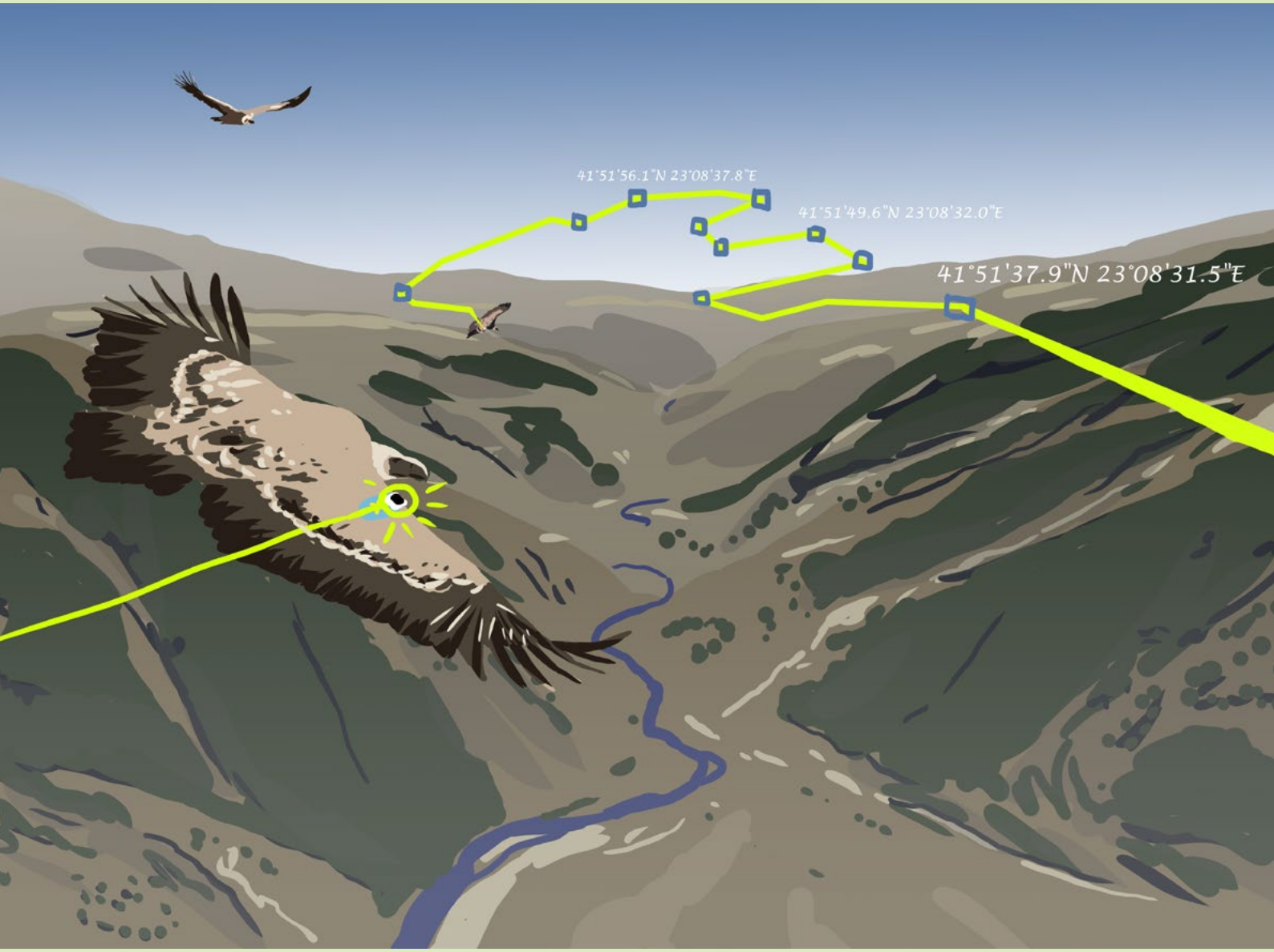

Early warning system for wildlife poisoning, using intensive GPS tracked vultures as detectives

Fund for Wild Flora and Fauna
2018

BRIGHT FUTURE FOR THE BLACK VULTURE
VULTURES BACK TO LIFE LIFE14NT/BG/649

Recommended citation:

Stoynov E., Peshev H., Grozdanov A. 2018. Early warning system for wildlife poisoning, using intensive GPS tracked vultures as detectives. Fund for Wild Flora and Fauna. Blagoevgrad. DOI: 10.13140/RG.2.2.28251.41760

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Acknowledgements

This case study has been carried out as an action Vultures back to LIFE project LIFE14NAT/BG/649.

Figure 1. *Griffon vultures with GPS/GPRS transmitters - different type of attachments - harness (perched bird to the right) and patagial (perched bird to the left and the flying birds).*

Poison is the single most important threat to vultures worldwide and has contributed to the regional extinction or severe depletion of the entire species (Botha et al. 2017).

During the 50s and 60s, and in some countries until the 90s, poisoning was a legal practice sponsored and carried out by governmental authorities in order to control populations of wild predators. These were dark decades for wildlife and especially for vulture species, not only in the Balkans but also across the Mediterranean. The use of poison against wildlife became illegal by the end of the 80s or the beginning of the 90s (depending on the individual country) after the ratification of the Bern Convention, which banned this practice.

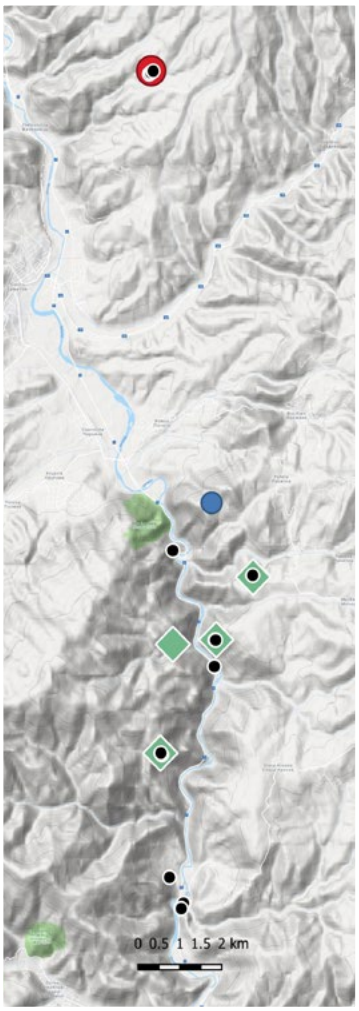
At present, the use of poison baits to control predators is illegal in Europe, including on the Balkans, but it is still in use by local people as a quick and affordable "solution" for resolving the conflicts with carnivores and other wildlife. The main driver for poison use is the conflict between livestock breeders and mammalian predators (Andevski 2013), mainly wolves (Canis lupus) (Parvanov et al. 2018). In all likelihood, the wider distribution and higher numbers of wolves in the Balkans and the permanent conflict with livestock breeders is the underlying cause behind the great difference in numbers and distributions of the vultures in this region compared to Iberian Peninsula (Stoynov et al. 2018).

Many different approaches and activities were implemented in the last two decades to combat poisoning in Balkans, e.g. the promotion and provision of guarding dogs, compensation and prevention programmes for livestock to lower the man/predators conflict and thus poison use (Andevski 2013, Stoynov et al. 2014), public awareness campaigns and most recently the forming of Canine Teams also known as Anti-poison dog units (Pantović & Andevski 2018). Apart from being a preventive means, the Canine Teams contribute to the dissemination and increase of awareness regarding this conservation problem and they also assist the competent authorities in their pre-trial work, collecting findings that can be used as evidence during the investigation and the judicial procedure. However, these teams are unable to cover large areas and their effectiveness relies largely on a priori received information of dead animals or poison baits.

Figure 2. *A dead griffon vulture in the field.*

Despite the species and habitat protection by governments and the long-term engagement of NGOs in the Balkan region, the threat of poisoning is hardly controlled yet and so far remains misunderstood and underrated among specialized institutions and authorities. This is largely because the practice is illegal, temporally and spatially dynamic and in most cases remains hidden. It is noticed here and there when some animals are found dead – dogs, cats, wild carnivores, as well as scavengers such as vultures and eagles. However, one could hardly relate existence of poisoned vulture found dead in its nest or anywhere in the field to a specific site where it got it. In some cases, the birds or any other dead animals could be found next to the bait, but in the case of the vultures, they could move to some or even tens of kilometres from the place where they consumed the poisoned meat prior to their death. This was the case, for instance, in the Kresna gorge in Bulgaria from March 2017 (Peshev et al. 2018). In that case, in two weeks more than thirty griffon vultures (Gyps fulvus) were poisoned in a single poisoning incident. About half of them could have been saved if the bait had been discovered in time and destroyed. This case showed that the vultures may feed on poisoned carcass, move in large numbers and die up to 20 km away (Fig. 3), some even 60 km away. This makes the investigation of the crime almost impossible with conventional methods, regardless the will of the authorities to cope with the problem.

The case in Kresna gorge let us introduce a new approach to track the vultures' whereabouts and to employ the tracked individuals as "poison detectives" in the field which we call "poison aerial control". The rapidly developing technologies of GPS bird tracking (light weight, solar powered, 3D printing of any type and shape of housings, permanent settings control by the customer etc.) and the frequently affordable prices of data load possibility by GPRS network gave us a powerful tool to track vultures in real time in the internet and follow them in the field if we made any suspicious observations on their behaviour.



We introduced patagial transmitter OT-P33 developed by Ornitela UAB, which in the case of the griffon vulture, being more exposed to the sun, provides for better load of the batteries through the solar panel (Fig. 4), and thus the possibility for frequent and abundant data load. A GPS fix may be obtained as frequently as every minute and data load as frequently as every 10 minutes. This frequency of GPS fix and data load is probably not necessary for establishing the home-range of the species or to follow its migration - what the GPS tracking studies are usually aiming, but in the case of poison "poison aerial control" this is an essential advantage, or even a breakthrough in the struggle against poisoning of wildlife.

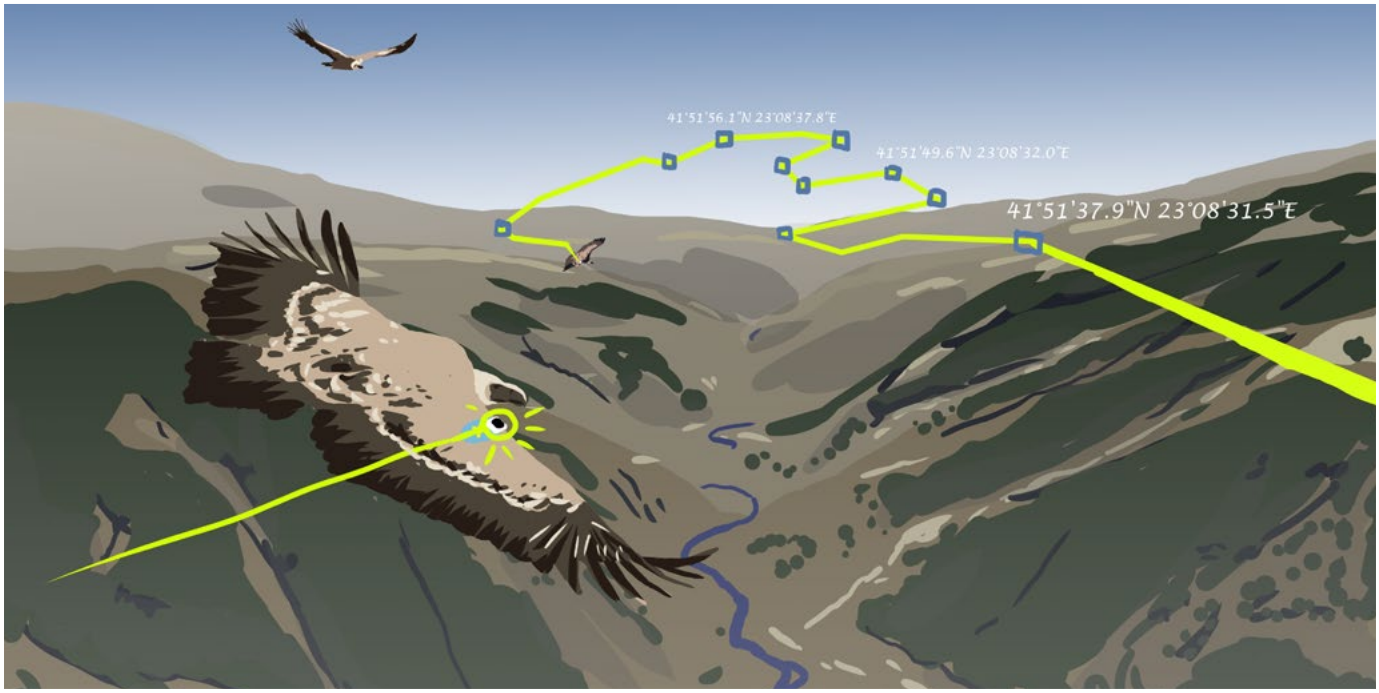
Figure 3. *Map of the Kresna Gorge poisoning incident in March 2017. The black circles indicate dead vultures; the green diamonds indicate the traditional roosting sites; the blue circle indicates the project vultures' feeding site; the red circle indicates the poison bait location.*

Figure 4. *Patagial GPS/GPRS transmitter OT-P33 mounted in griffon vulture – left- in flight; right – landed.*

How it works?

Griffon vultures are fitted with GPS/GPRS transmitters and their whereabouts are tracked on an internet platform from a project staff called “Poison alarmist” (hereafter the Alarmist). The bigger the number of the vultures tracked, the better, as this allows the “poison detectives” to cover more colonies and feeding events over a larger range. The most useful and optimal power use settings of the transmitters are to get a GPS fix every 10 minutes and to load the data every 4 hours. In case of emergency – if there is information of potential poisoning incidents in the area, or of some specific behaviour of the tracked vulture i.e. getting in an unusual site or position, or stays with no reason longer on the ground or perched somewhere etc., the frequency of the GPS fix could be set up on 1-5 min and the data load as necessary: 10 min, 15 min… 1 hour

Figure 5. *With the high resolution GPS/GPRS transmitters we may know the location of the griffon vulture every ten minutes and follow it in the field in real time. The tracked vultures we call "poison detectives".*



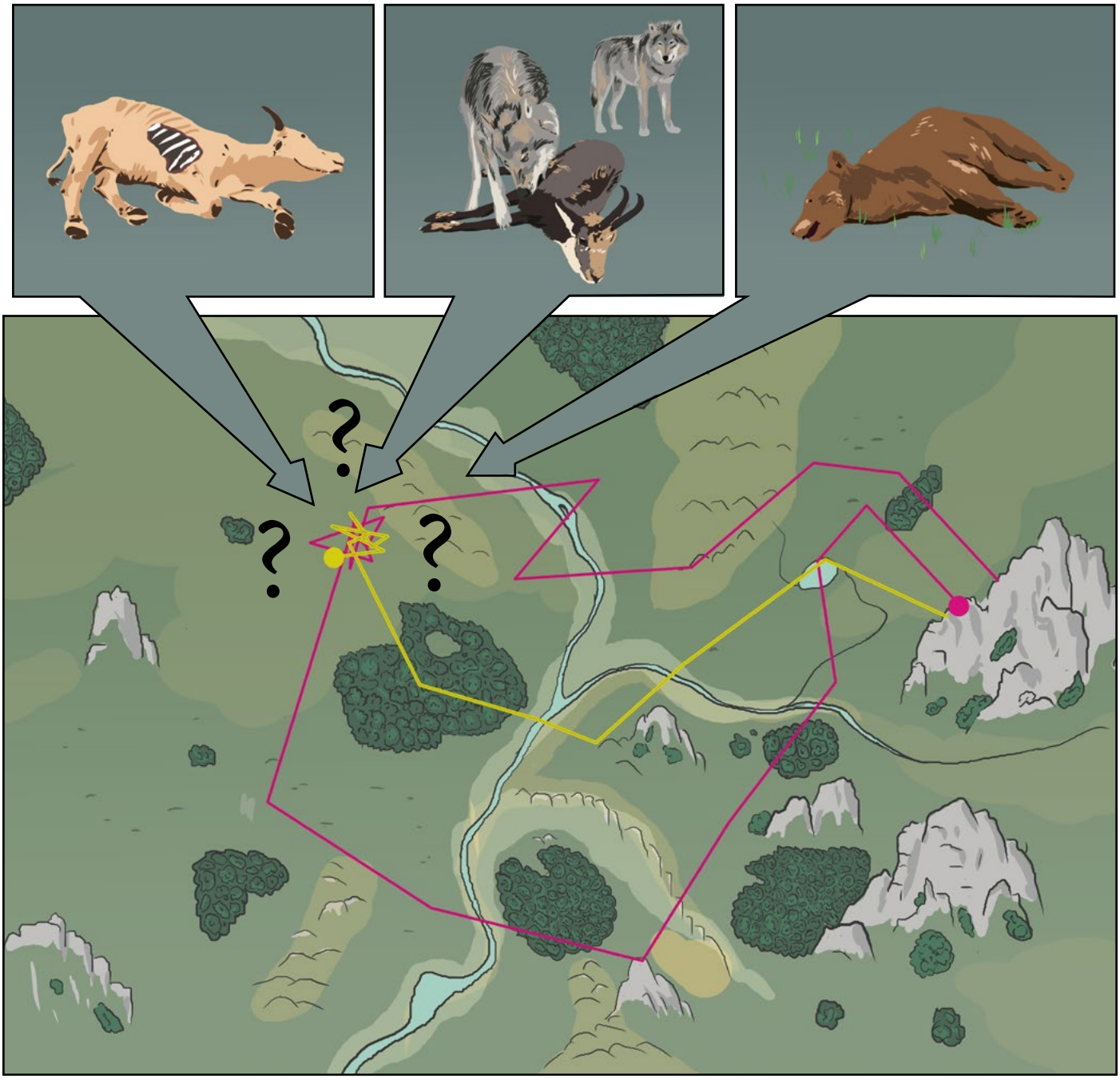


Figure 6. *The reason the griffon vultures to be attracted somewhere could be dead anaimal due to disease or depredation, or poached animals and or poison incident or a bait. All cases deserve attention from local conservation managers.*

BRIGHT FUTURE FOR THE BLACK VULTURE
VULTURES BACK TO LIFE LIFE14NT/BG/649

Figure 7. *The vulture expert following the birds through on-line platform turns into Alarmist, whenever he finds something in the behaviour of the "poison detectives" that should be checked in the field. He then calls the field team members or Canine Team and provides them the coordinates.*

or whatever is necessary. In such cases also a team visit on the ground is required. If the Alarmist sees that more than one of the tracked vultures go to the same place, it is more likely that there is food (in some cases it could be a watering place, but these are more traditional sites and thus usually known to the Alarmist). Otherwise, it could be a poached wild animal, poison bait or depredated livestock – all cases representing important topics to be closely monitored in conservation practice. Thus it is good for field team member(s) to check the feeding event. In areas where a Canine Team is established and operational, it is worth sending it on site so as to find the carcass (food) and any other corpses (if poisoning or poaching is behind the case) sooner. The Alarmist (if not going on its own) sends the GPS coordinates to any other project team member or ranger from local NGO/authority who is able to go in the field and check the place (together or instead of Canine Team, if not available). Despite the field check and establishing the case (protocol, monitoring), the presence of the team member at the point where the vultures were/are sets a good example for the local farmers (to whom the dead livestock usually belongs), letting them know that someone is following the vultures in time and space and may notice if they are killed, poisoned etc. In such cases, the witnesses of such interesting phenomena may spread the word in local communities, which raises public awareness on the subject and eventually helps prevent criminal attempts.

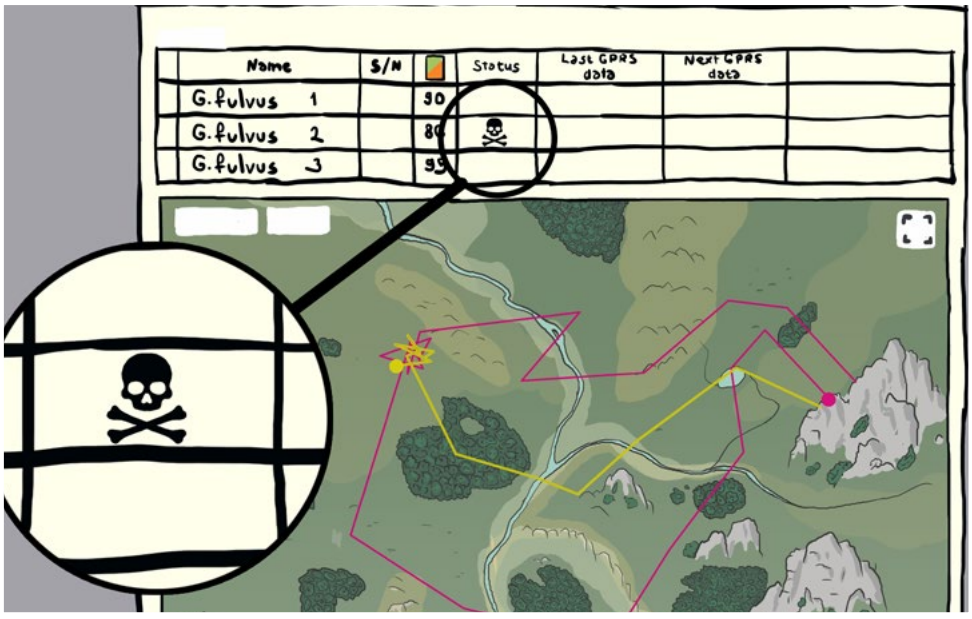


Figure 8. *When the mortality icon appears in transmitters' on-line platform this is a sign for very urgent reaction for a field check and Alarmist should inform all field teams and authorities related to the toppic. The Canine Team should visit the place with priority.*

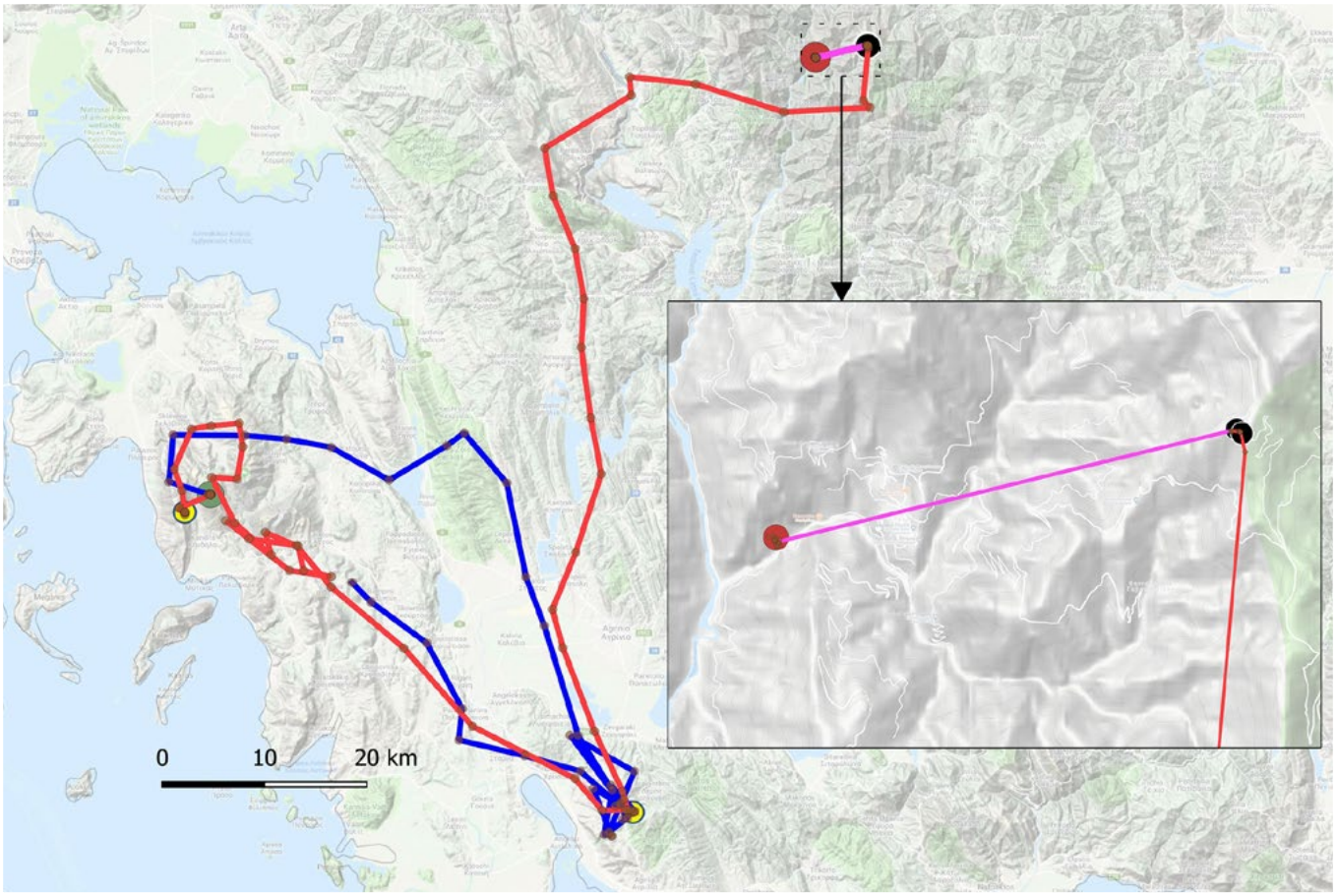


Figure 9. *Map of the case of detected poisoning of griffon vulture in Agrafa Mountain in Greece in May 2018. Yellow and green circles indicate traditional roosting sites of the species in the region; black circles – indicate the poison bait place and two poisoned griffon vultures; the red circle indicates the place where the tracked with GPS/GPRS transmitter griffon vulture was found dead. The lines with different colours indicate the movements of the bird in three consecutive days derived by GPS.*

First success

In May 2018, from its office in Bulgaria, some 350 km away from the Agrafa Mountains in Greece, the Alarmist followed a griffon vulture with a transmitter and found that it had stopped moving and the mortality icon appeared in the internet platform. Getting the kml file and checking online in Google Earth the place where the bird had fallen and its whereabouts prior to its death, revealed that in a place on more than 5 km the bird had been on the ground for some 2 hours, which seemed very much like a feeding event (Fig.9). The coordinates were sent by the Observer to the authorities in Greece and to the Canine Team of Hellenic Ornithological Society (HOS) in the region. The common team visited the site some days later and confirmed the tracked vulture's death, as well as found two more corpses of dead griffon vultures 5 km from it – at the coordinates reported by the Alarmist. A corpse of a calf (used as a bait) and a plastic bottle of pesticide was also found (HOS 2018, VCF 2018). So, although the "poison detective" died 5 km away from the poison bait, it gave the clue to a person placed 350 km away, which allowed the case to be detected, recorded, and reacted to.

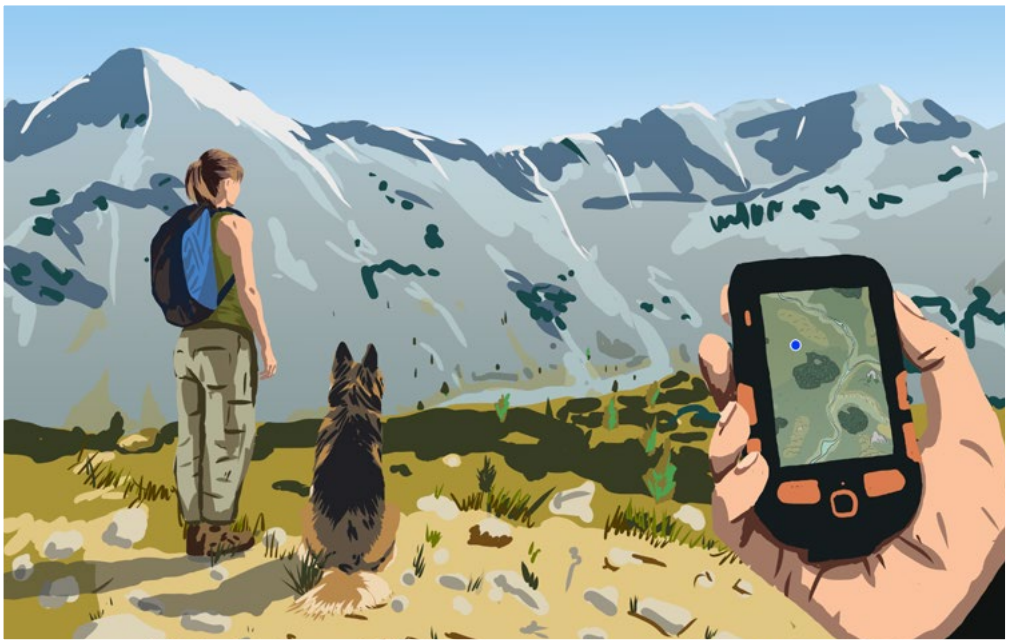


Figure 10. *The Canine Team is visiting the place following the coordinates sent from the Alarmist and makes an intensive search for dead animals and baits. If relevant the Team provides the signal to competent authorities, depending on the find.*

Although only three griffon vultures corpses were found in total, in that case, it is very much likely that in the radius of 5 km or more (as in the Kresna Gorge case) in an extremely rugged terrain quite some more may remain hidden.

For a year and a half now, 14 griffon vultures were and are still tracked in this intensive way in one LIFE project covering almost all of the Balkan vulture ranges (Vultures back to LIFE 2017, 2018). In the Eastern Rhodopes (one of the main vultures ranges in mainland Balkans) other fifteen griffon vultures are now employed as "poison detectives" in another LIFE project (Rewilding Europe 2017). Although more than 50 checks in the field were done and only one case of poisoning was detected so far, the introduction of this method is a breakthrough in the fight against poisoning in the Balkans and should be employed permanently and widely in vultures' conservation practice.

Figure 11. *Deapending from the find and the case, the relative authorities are informed - police in case of a crime or forestry service and/or environemntal inspectors if crime is not suspected.*

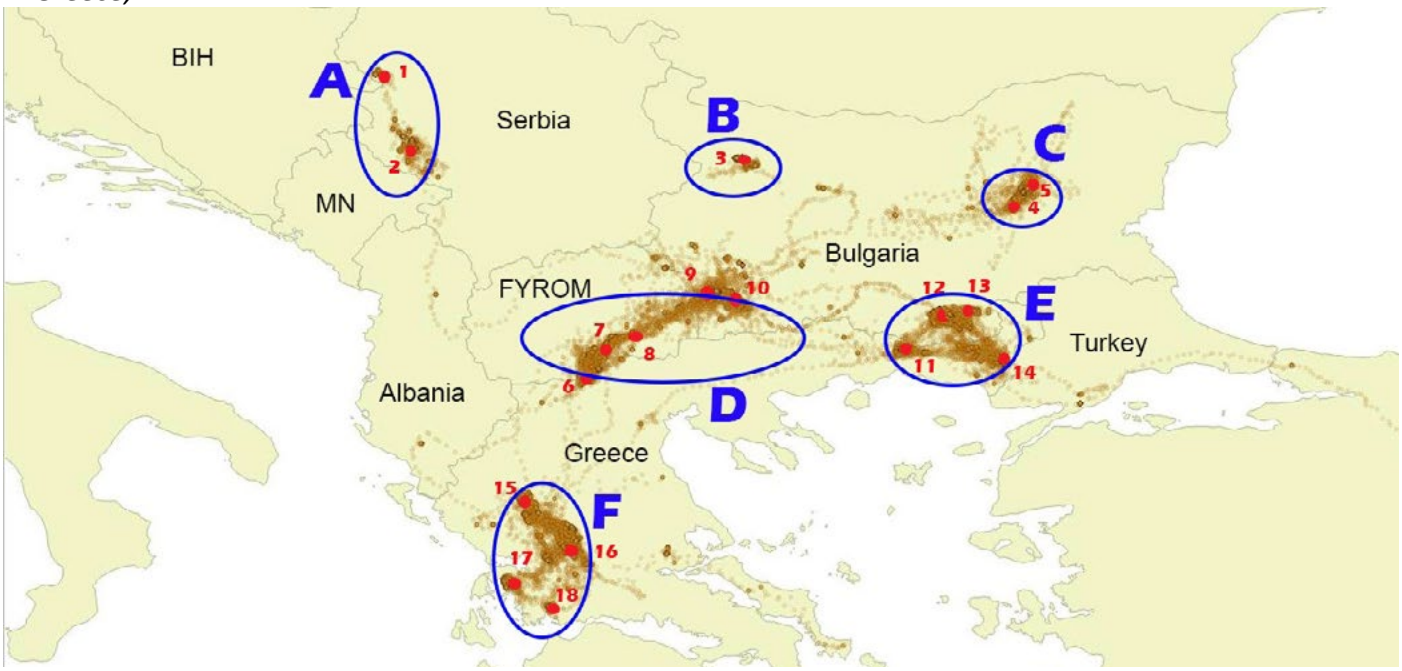
Figure 12. *Depending from the find and species involved, a specific protocol is implemented and all relevant information is collected and set in data base.*

Recommendations

The described above GPS tracking approach should be widely introduced as poison monitoring and prevention measure, especially in marginal vulture populations such as those in the Balkans. A minimum of three adult (more territorial) griffon vultures should be tracked and employed as detectives at a time per colony – so minimum eighteen in all six main vulture refuges in the Balkans (Fig 12.). Another two immature birds (more mobile) per site should be also equipped with transmitters and tracked – thus some twelve more. Where possible it should be combined with the work of a Canine Team on the ground. To be effective, each colony should be monitored by 3-5 "poison detectives" at a time and new one to be employed soon after the stop or loss of any transmitter/"detective". One Alarmist could follow effectively on-line 20-30 poison detectives. This approach should be considered a conservation practice, more so than a scientific one, and should be widely introduced by managers and supported in conservation programmes. Indeed, the large amount of data obtained should then be a topic of scientific studies, but the primary goals should be the timely reaction to prevent losses of threatened species – directly – by rehabilitating poisoned birds that are found still alive, destroying poison baits in-time to minimize losses, and indirectly – by increasing the control on poisoning and poaching. Not least, this same approach could be introduced in poaching and/or depredation monitoring by managers in protected areas or wherever necessary (in any vulture species range).

Figure 12. *Map of vulture areas in Balkans revealed by GPS/GPRS tracking – small brown dots. General vulture sites surrounded by blue line: A. Western Serbia; B. Vrachanski Balkan; C. Eastern Balkan; D. FYROM & SW Bulgaria; E. Eastern Rhodopes; F. SW Greece;*

Particular Vulture areas in Balkans – red circles: A1 – Treshnitsa Gorge in Serbia; A2 – Uvats Gorge (includes also Mileshevka Gorge and Radoyna Gorge) in Serbia; B3- Vrachanski Balkan in Bulgaria; C4 – Sinite Kamani in Bulgaria; C5 – Kotel Mountain in Bulgaria; D6 – Kaymakchalan in Greece and Mariovo in FYROM; D7 – Vitachevo feeding site and Chatino colony in FYROM; D8 – Demir Kapia in FYROM; D9 – Kresna Gorge in Bulgaria; D10 – Pirin National Park in Bulgaria; E11 – Kompsatos Gorge in Greece; E12 – Studen Kladenets in Bulgaria; E13 – Madjarovo in Bulgaria; E14 – Dadia in Greece; F15 – Tzumerka in Greece; F16 – Central Greek Mountains in Greece; F17 – Akarnanika and Boumistos Mts in Greece; F18 – Kleisura & Messolonghi in Greece;



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