



Dangerous journeys of Sakers of the Carpathian Basin

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Hungarians' symbolic bird, the Saker Falcon *Falco cherrug* – or "Turul" as it is called in ancient Hungarian legends – is a globally endangered large falcon species. Its original distribution area spreads from China in Asia to the Czech Republic in Central Europe. However, due to negative human impacts on the populations in the last decades, nowadays it can be distinguished two disjunctive areas in the east and in the west. The Asian population is bigger than the western one, however, it is under permanent and heavy pressure by falcon trappers who sell the falcons for Arab falconry. In addition, electrocution, poisoning and shooting contributes to the losses. Altogether the negative impacts cause a continuous decrease in the eastern population.

The European population is much smaller in absolute number, however, it is stable or slightly increasing. The bulk of the western population can be found in the Carpathian Basin (Hungary, Slovakia, Serbia, Austria) with about breeding 300 pairs. In Ukraine there may be another 200-300 pairs, however, unlike the previous estimation, those numbers come from modelling, not from the field.

Number of breeding pairs are slightly increasing in Hungary, Slovakia and Serbia, but it was not always so. In the early 1980's, Hungarian breeding pairs were about 30 and there were only very few pairs, if at all, known in the neighbouring countries. One of the first aims of the Magyar Madártani és Természetvédelmi Egyesület (later becoming BirdLife Hungary) formed in 1974, was to save the Saker.

Nest guarding, insulating pylons of mid-voltage power lines, erecting artificial nests, re-patriation of European Soudjiks *Spermophilus citellus* (main food for Saker), raising public awareness have been going on for almost 30 years now having involved more 1000 volunteers during the years. As a result, there are about 180-200 breeding pairs in Hungary and increasing number of breeding pairs in the neighbouring countries.



Figure 1. Satellite transmitter mounted on a back of adult Saker. Photo M. Prommer

In spite of more than 3500 fledged juveniles from 1980, population is not increasing as fast as it has been expected. Even if we calculate with known mortality factors, more Sakers should be found. There must be, therefore, one or more factors that we do not know yet.

Table 1. Recovery rates of banded raptors in Hungary. Source: Hungarian Bird Ringing Centre

Species	Recoveries [per cent]
<i>Accipiter gentilis</i>	7,6
<i>Accipiter nisus</i>	3,1
<i>Aquila heliaca</i>	9,5
<i>Aquila pomarina</i>	2,0
<i>Buteo buteo</i>	3,4
<i>Buteo lagopus</i>	4,1
<i>Buteo rufinus</i>	8,5
<i>Circus aeruginosus</i>	2,0
<i>Circus cyaneus</i>	1,0
<i>Circaetus gallicus</i>	2,2
<i>Circus pygargus</i>	0,6
<i>Falco cherrug</i>	3,5
<i>Falco columbarius</i>	3,5
<i>Falco peregrinus</i>	6,0
<i>Falco subbuteo</i>	0,6
<i>Falco tinnunculus</i>	1,2
<i>Falco vespertinus</i>	1,3
<i>Haliaeetus albicilla</i>	7,6
<i>Milvus migrans</i>	2,4
<i>Pernis apivorus</i>	3,4

History of Sakers' migration studies

In the early 1840's a female Saker was shot in her nest (at Adony Island, Hungary) that had jesses with „Persic or Arab” text sewn to a silk pad on her jesses (Csörgey 1897). It was the first, though indirect, proof that Hungarian Sakers may fly far away from the Carpathian Basin. Long silence followed and we started to receive data about the movements of Sakers only after 1954 when systematic ringing of Saker chicks had started. Very intensive ringing activity started even later and it can be dated to 1980. Since then more than 1500 Sakers have been banded.

Despite of the large number, however, recoveries are very limited. Only 18 (1,2%) banded Sakers were found abroad and 37 (2,4%) in Hungary showing an average recovery rate among raptors.

Still, analysis of recoveries held some interesting finding for us. Most interestingly, we have found that only Sakers younger than 12 months had been found more than 500 km from their fledging place (Fig. 2). These finding strongly suggests that only 1cy Sakers (or at least some of them) leave Hungary and the Carpathian Basin – once they return they never leave the area again.

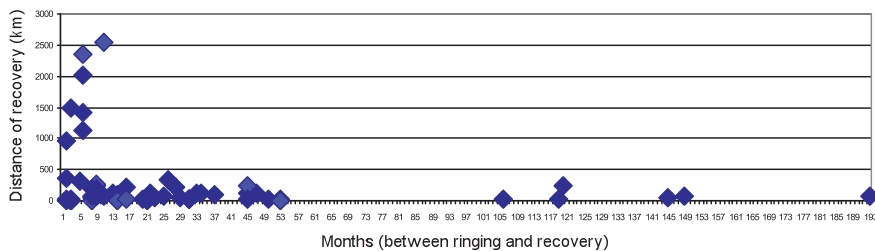


Figure 2. Distance of recoveries of banded Sakers at various months after ringing (Sakers were banded in nests as chicks and months are counted from the date of ringing)

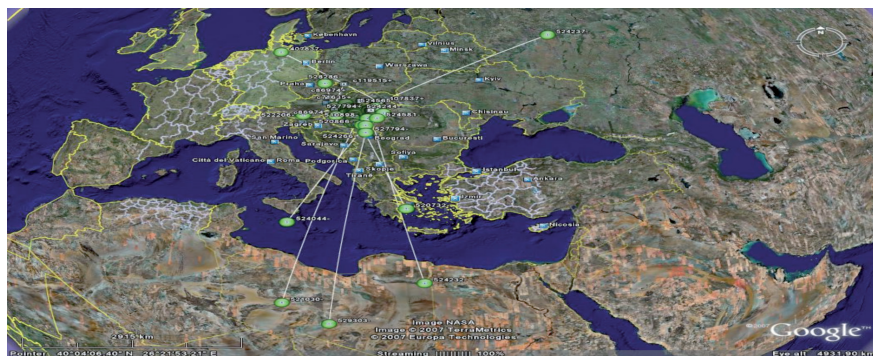


Figure 3. Recoveries of Hungarian Sakers (juveniles) 1954 – 2006

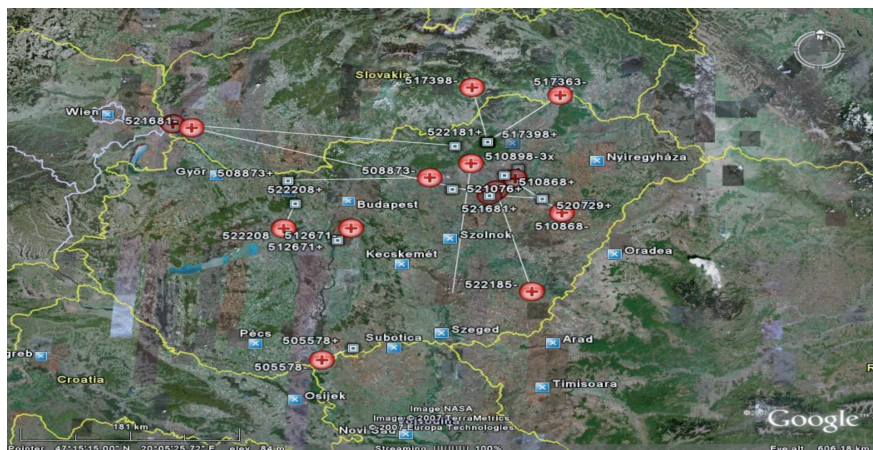


Figure 4. Recoveries of adult Sakers 1954 – 2006



Figure 5. Saker in flight with mounted satellite transmitter. Photo M. Prommer

If we look at the directions where Sakers have flown we can see that the dominant direction is south. Hungarian Sakers have been recovered in Malta (shot), Greece, Libya, and in Hungary south from the nest. There is only one Hungarian Saker and a Slovak Saker recovered near Moscow, Russia, a Hungarian recovered near Hamburg, Germany and we know about one Slovak Saker found in France, near to the Spanish – French border. All of them were 1cy juvenile Sakers.

So far (between 1954 and 2006), adults have been recovered within 500 km from the nest they fledged from.

That was all we knew when we started satellite-tracking of Sakers in June 2007.

Satellite telemetry

In 2006, a huge Hungarian-Slovak Saker conservation project was launched – worth €2 million – supported by EU's LIFE-Nature fund. Beside other conservation activities, satellite telemetry forms part of that huge project and we hope to understand those unknown factors. There will be 46 Sakers equipped with PTTs until 2009 providing vast amount of data about the movements of tagged falcons. We hope to unveil the threatening factors by analysing those data and then to make the appropriate steps to save our birds.

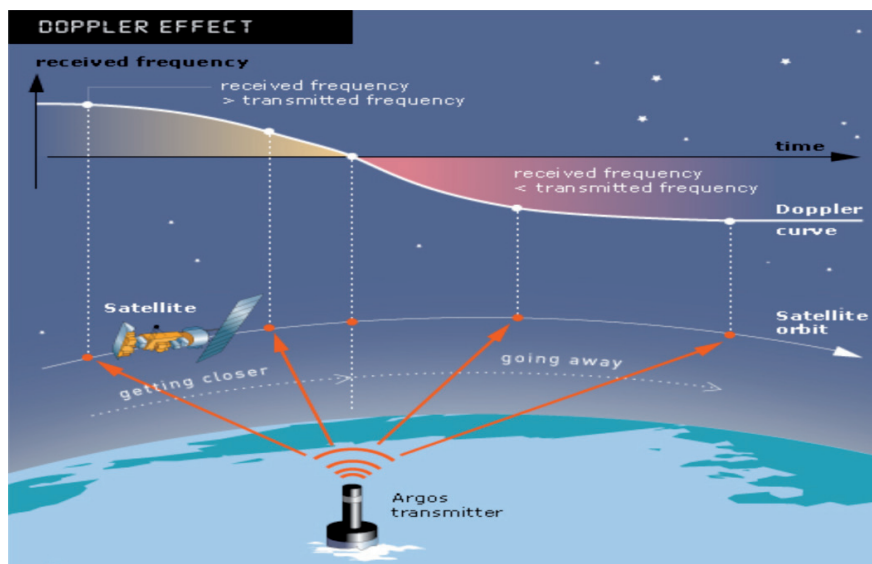


Figure 6. Theory of the Argos-system (Source: www.argos-system.org)



Figure 7. János Bagyura releasing adult male Saker with mounted satellite transmitter.
Photo M. Prommer

The idea of satellite tracking is as follows:

Sakers receive radio transmitters in a form of a small backpack. That radio transmitter or Platform Transmitter Terminal (PTT) transmits on certain frequency and according to a pre-set schedule. Special satellites – the so-called Argos system – receive the signals and locate the PTT (thus the bird) by using the Doppler-effect. Calculated locations are sent to receiver stations on Earth and forwarded to project experts (Fig. 8).

More advanced PTTs have their own inbuilt GPS receivers and calculate their location based on the Global Positioning System. Then they submit their co-ordinates via radio signals to the Argos-satellites. That latter system is way more precise: accuracy of a few meters can be reached.

In 2007 we deployed 10 PTTs on Hungarian Sakers. The first year was to learn thus we used 5 pieces of Microwave's 22g solar GPS/Argos PTT-100 model and 5 pieces of 20g solar Argos PTTs manufactured by NorthStar to compare their performance. We used 6,37 mm wide Teflon ribbon to attach the PTTs to the Sakers. Deployment of PTTs started in June and the last one was attached to a falcon in early July.

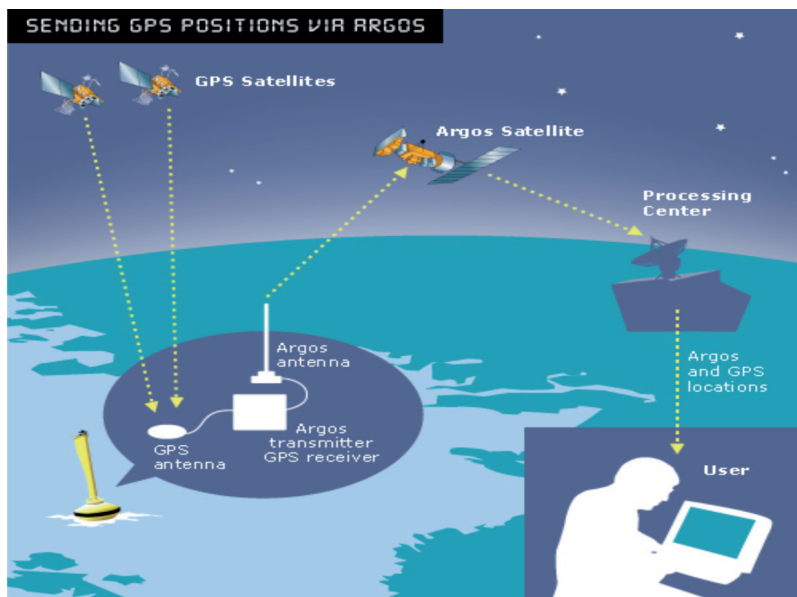


Figure 8. How GPS PTTs work (Source: www.argos-system.org)

Our first experiences show that only Argos using PTTs provide only few usable locations, probably because of the considerable background noise in

this part of the world. Nevertheless, those PTTs can give a general idea about the location of the bird but they have not been proved to be accurate enough to draw a clear track in case a falcon stays in the same area (within a 15-20 km circle). We do not know yet how those PTTs will perform once the Sakers left the "noisy" Carpathian Basin because our first Saker having been tagged with non-GPS PTT left Europe just a few days ago.

Contrarily, GPS/Argos PTTs give us more locations with more accuracy. Most of the information we have now about juvenile dispersal and migration have come from that type of PTTs.



Figure 9. M. Prommer and J. Bagyura are mounting a juvenile Saker. Photo I. Balázs

Results

We have learnt from the satellite tracking that juvenile Sakers leave the eyrie about one month after fledging. That time they are capable to make long (250-300 km) journeys. Some birds made round-trips and returned to the eyrie, some birds left the eyrie and never came back. It was typical to all juveniles that they set up temporary bases. They made round-trips around the bases (from a few km to more dozens of kilometres) exploring the neighbourhood, and then – probably when the local food source dwindled – they moved on to the next base. Another common feature was that they avoided mountains – they tended to stay in the lowland.

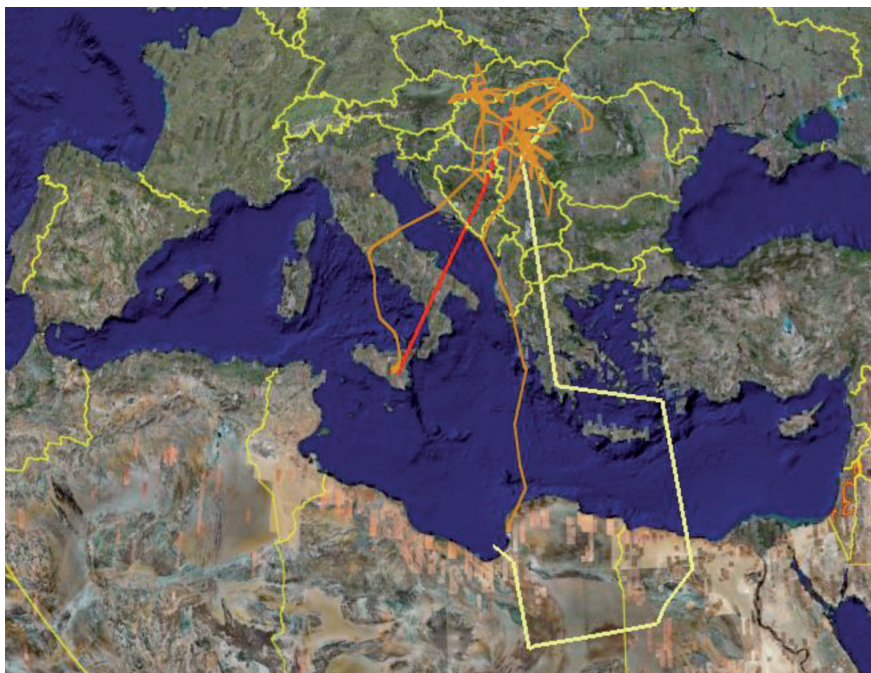


Figure 10. Movements of satellite tagged Sakers between June 2007 and February 2008

Apart from those similarities we found a lot of individual differences. Some falcons have never left Hungary, some visited 7 countries within 3 months. At some point some birds have started to head to South, others stayed in the Carpathian Basin. The three birds that started migration so far, went to three different directions. Apparently, neither weather condition nor food supply triggered migration. All the birds met very similar conditions and some of them were even in the same region, still they acted differently. So far we think that the only explanation is the individual differences among Sakers.

As for the three migrating birds, there is one in Sicily (named Barna), one in Egypt (Emese) and one disappeared in Libya (Viki). Barna travelled about 1535 km in total from his base in Ukraine to Sicily. Unfortunately data of 5 days were lost due to low voltage of the PTT just at the start of his migration thus we could track him again once he was already on the Croatian coast. Based on the data from the Croatian coast to Sicily (12 location points, 25/10/2007 – 29/10/2007), Barna made 161 km/day with an average speed of 40-50 km/h above the sea, and 20-30 km/h above mainland. After his arrival, he set his new base in Sicily and he is there since then.



Figure 11. Satellite transmitter on a back of juvenile Saker female named Viki.
Photo M. Prommer

Viki completed about 1670 km from South Hungary to the Libyan coast (between 07/10/2007 – 11/10/2007). Based on the data of 16 locations (not counting the few ones when she stayed within a few km for a couple of hours), she travelled 334 km/day with an average speed of 40-50 km/hour when crossing the Mediterranean Sea. Her speed was less above the mainland. Viki justified again the theory that falcons do not need straits to cross large water bodies. She took off in Greece on the island of Zakynthos and she flew almost straight to North-Africa, taking almost 600 km and spending more than 12 hours in the air non-stop. Unfortunately, her PTT stopped transmitting on 12/10/2007 for an unknown reason. We only suspect that she was trapped to be sold for falconry.

Emese is our only falcon with a non-GPS PTT that started the migration. She made the most impressive move so far. She travelled about 3100 km from South Hungary to Libya across Egypt within 14 days (14/10/2007 – 27/10/2007). That means an average travelling speed of 185 km/day. Similarly to Viki, she also avoided the straits – well-known crossing sites for migrating raptors.

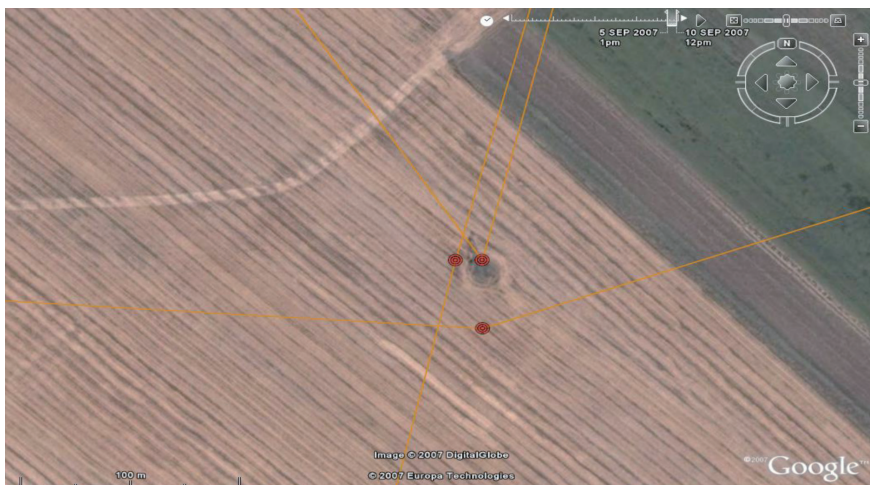


Figure 12. One of the pylons of a high-voltage power lines where Lili used to perch. The picture illustrates the accuracy of the GPS PTT very well

Koppány's and Lili's PTT have stopped transmitting in November. However, there were some observations of tagged Sakers afterwards in the area they had been located last time. We assume that they are still OK it is only the PTT that stopped functioning.

All of above are only a start of a very exciting exploration, but we can already say that we have learnt more in the last 7 months with satellite-tracking about the movements of Sakers than in the previous 50 years with ringing. Detailed analyses of juvenile dispersal and migration will follow as we proceed with the satellite-tracking project. No doubt we are heading to new discoveries.

Should you be more interested in our Saker conservation project, please, visit our website: www.sakerlife.mme.hu where you can also follow our migrating falcons on map.

Hereby I would like to thank the work and help of our colleagues, who give their best to learn more about the movements of our Sakers.



Figure 13. Lehel, one of the tracked juvenile Sakers, wintering at Belgrade, Serbia.
Photo M. Prommer

Acknowledgement

We want to thank the help in both preparation and field work to the following colleagues: Bud Anderson, István Balázs, Iván Demeter, József Fidlóczy, Antal Klébert, András Kleszó, Miklós Lóránt, Mike McGrady, Péter Spakovszky, Tamás Szitta, Gábor Tihanyi, Miklós Váczi, Levente Viszló, Tamás Zalai. It would have been very difficult to carry out such a study without their contribution.

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