The project «Bearded Vulture on the Move»: First results of a satellite tracking study

by Daniel Hegglin & Adrian Aebischer ***

Introduction

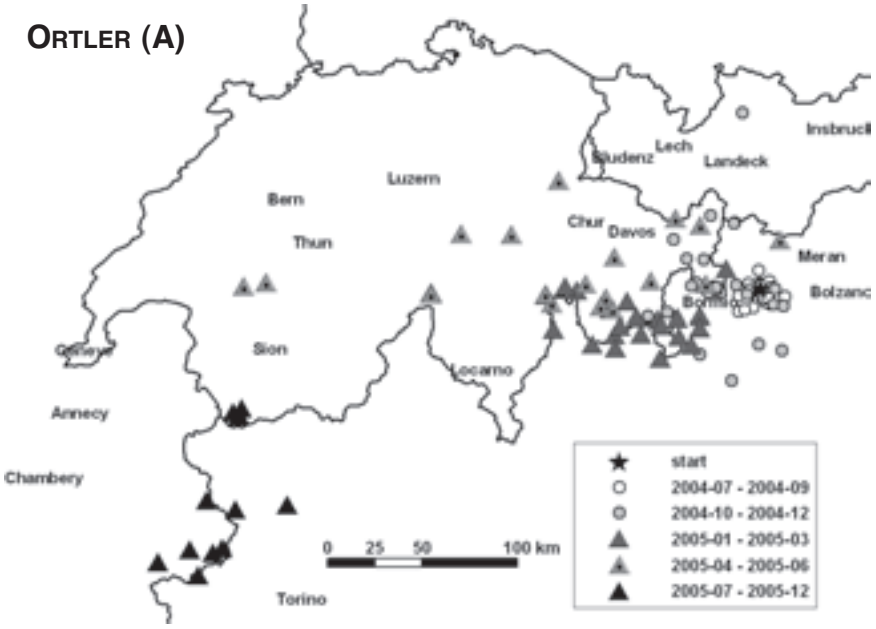
In summer 2004 started the project «Bearded Vulture on the Move». In this project single released young Bearded Vultures get marked with satellite transmitters. This technology allows to follow continuously the marked birds and thus provides basic data to study the spatial behaviour of immature Bearded Vultures. Furthermore this method can supplement the monitoring network, and it gives the opportunity to a broad public to continuously follow the peregrinations of each single bird on the internet. This attractive information helps to fascinate people for the Bearded Vulture and its alpine habitat.

Up to know two Bearded Vultures are marked with a satellite tag: *Ortler* (**BG 439**), which was released at the release site in Martell in summer 2004, and *Natura* (**BG 464**) that was marked in the Swiss National Park in summer 2005. Another two Bearded Vultures, *Culan* (**BG 438**, 2004) and *Folio* (**BG 463**, 2005), lost the satellite transmitter before they dispersed from the release site (for details see www.bartgeier.ch/unterwegs).

Preliminary results of Ortler

The young female *Ortler* was marked with a satellite transmitter that was fixed on the base of a tail feather (Hegglin et al. 2002). Because the tail feathers are not fully developed at the age of fledging, *Ortler* had to be re-trapped one month after fledging. At this age it is possible to properly mount the transmitter.

The satellite-transmitter weighted 35 gram and was programmed to send in a first phase continuously signals during a period of 6 hours with a subsequent OFF-period of 57 hours. To save power and extend the lifetime of the transmitter, during a second phase the six hour ON-periods started every 139 hours (15th of March - 31st of July 2005) and during a third phase every 188 hours (1st of September 2005 onwards). In total we received 126 locations with a monthly mean of 10.9 locations during the first phase, 5.8 locations during the second phase and 0.8 locations during the third phase.



Ortler remained the first three months after fledging very close to the release site (Figure 1). The area of the MCP (Minimal Convex Polygon) during this period was 290 km^2 only (s. Table 1). In the following months *Ortler* extended it's range continuously. During the last quarter of 2004 *Ortler* spent a lot of time in the Valley di Braulio and its near surrounding where an adult pair raised successfully a nestling that year. During the first quarter of 2005 *Ortler* shifted the center of activity to the southern border of the canton Grison (s. Figure 1).

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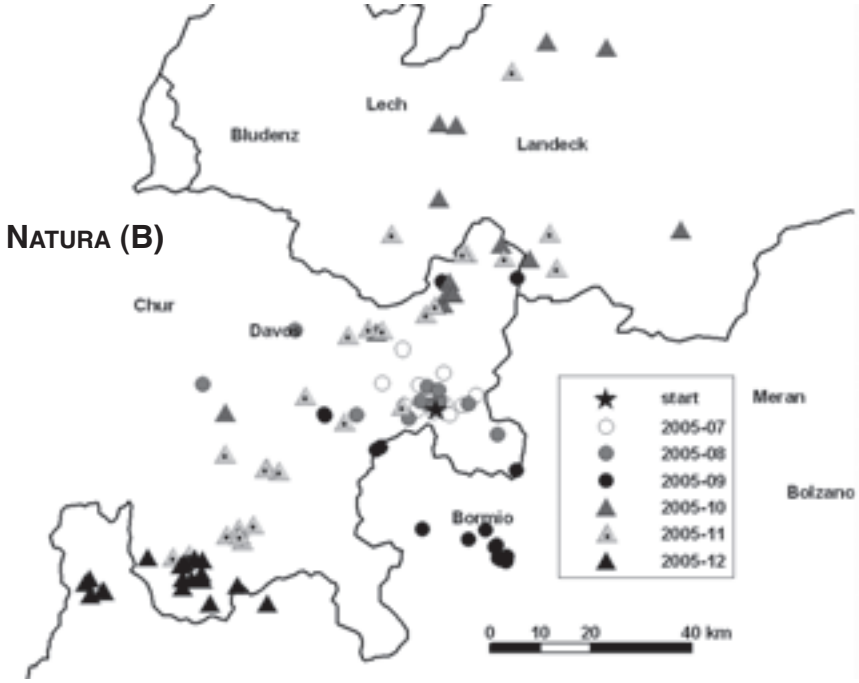

Figure 1: *. Satellite locations of the young Bearded Vultures Ortler (A) and Natura (B).*

During February 2005, when a lot of snow was lying in most parts of the alps, the young female was located mainly in the region of the upper Veltlin and the Puschlav, where it had a relatively thin snow cover. During the second quarter the most locations where much more dispersed than in the previous months. Only few locations were recorded from the third and forth quarter of 2005. All of them originated from the western parts of the alps (s. FIGURE 1). Several locations originated from the Parque Nationale de la Vanoise where up to know three pairs of Bearded Vultures bred successfully. The MCP for all 126 locations measured 42.296 km^2 (s. TABLE 1).

TABLE 1: *. The Minimum Convex Polygons (MCP) of the satellite locations from the two marked juvenile Bearded Vultures Ortler (marked in June 2004) and Natura (marked in June 2005). The MCP's are given for the single periods (MCP period) and for the whole time since marking (MCP total).*

BG	year of life	quarter of year	MCP periods		MCP total	
			N locations	*MCP (km2)*	*N locations*	*MCP (km2)*
Ortler	1st year	3rd quarter	41	290	41	290
		4th quarter	33	5'583	74	5'692
	2nd year	1st quarter	21	2'883	95	10'051
		2nd quarter	19	10'252	114	20'577
		3rd & 4th quarter	12	2'785	126	42'296
Natura	1st year	3rd quarter	43	2'061	43	2'061
		4th quarter	61	9'561	104	10'458

PRELIMINARY RESULTS OF NATURA

The tag on the young female *Natura* was attached on its back by a harness described in HEGGLIN ET AL. (2004). This made it possible to use a more powerful satellite transmitter than for *Ortler.* Furthermore this method had the advantage that we could mount the expandable harness before the young bird fledged and thus re-trapping was not necessary. The satellite-transmitter weighted 95 gram and was programmed to send signals every 55 hours for 8 hours during the first year. After one year (June 2006) the transmitter will send signals every 103 hours.

From July to December 2005, a total of 104 locations were received (17.3 locations per month). The locations where more dispersed during the first six months after fledging than compared to *Ortler* (s. TABLE 1). After dispersing from the release site the centre of activity shifted first to Italy near Bormio (September 2005), to the lower Engadina (October and beginning of November 2005) and thereafter to the upper Engadina and Bregalia (December 2005, s. FIGURE 1). At the end of December the MCP extended over 10'458 km^2. As *Ortler, Natura* has also been located various times in valleys where adult Bearded Vultures have been seen regularly.

Public interest

The releases of the satellite-tagged Bearded Vultures was accompanied by a broad interest of the media in Switzerland. All major journals and TV stations reported about the Bearded Vulture and the reintroduction project. Every two months, we informed on the website WWW.BARTGEIER.CH/UNTERWEGS about the peregrinations of the marked Bearded Vultures. We registered 69'192 visits during 2005. This corresponds to a mean number of 190 visitors per day. Per visit a mean number of 26.5 clicks on single pages and pictures were recorded. The website offers the possibility to subscribe to a newsletter. Subscribers get informed via email each time when news about the project are uploaded to the website. During 2005 the number of subscribers increased from 555 to 2'498. The Internetsite is available in English, French, Italian and German and the subscribers live in 29 different countries. The majority of the subscribers lives in Switzerland (83%), followed by Germany, Italia, France and Austria.

Preliminary conclusions and outlook

Satellite telemetry is rather expensive and is not an alternative to the monitoring based on the international observation network. Both methods have their advantages and disadvantages. For example the observation network can give basic data about the whole population, while results from the satellite tracking are limited to few individuals. Furthermore the former method is very valuable by actively involving a broad public into the reintroduction project. On the other hand satellite telemetry allows to get spatial data gathered continuously in space. By combining the two methods we can gain valuable synergistic effects. Direct observation of the behaviour can give important additional information to the spatial data got by satellite telemetry. Furthermore it helps to better estimate the location accuracy of the locations got by the satellites. On the other hand satellite data can give information about spatial and temporal gaps in the observation network. In addition, the continuous surveillance can help to better estimate the error quote of the received direct observation in future, what is essential to determine the confidence intervals of estimates of the survival rate.

The satellite telemetry enabled us for the first time to get regular location data from released Bearded Vultures independently from time and space. The use of a transmitter that is mounted with a harness allowed us to use in 2005 a more powerful transmitter than in 2004. This gives the chance to get more data for a longer time. Both marked juveniles shifted various times their centre of activity (see animated maps on WWW.BARTGEIER.CH/UNTERWEGS) and visited several times regions where adult Bearded Vultures have been seen regularly. To derive general conclusions about the spatial behaviour of juvenile Bearded Vultures more individuals should be followed with satellite telemetry. Therefore it is planned to mark another two juvenile Bearded Vulture in 2006. Currently the use of satellite transmitters with GPS module is evaluated. This would allow to get more accurate location data in future.

Acknowledgements

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References

Hegglin, D, Aebischer, A, Wehrle, M (2002): Mounting devices for satellite tracking Bearded Vultures (*Gypaetus barbatus*) – preliminary results. Annual Report of the Foundation for the Conservation of the Bearded Vulture. 2002: 82-84.

Hegglin, D, Aebischer, A, Wehrle, M (2004): Satellite tracking of Bearded Vultures - the project «Bearded Vultures on the Move». Annual Report of the Foundation for the Conservation of the Bearded Vulture. 2004: 52-55.