

Individual identification of free-living bearded vultures (*Gypaetus barbatus*) based on feather samples collected in 2009

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Material and Methods

Feather samples

In 2009, 34 feather samples were collected in the field and sent to ecogenics, all of which were subject to DNA extraction using the protocol described in Gautschi et al. (2003). To test for successful DNA extraction, the samples were used in a P2/P3 sexing PCR (Griffiths et al. 1996). The PCR products were digested with the restriction enzyme *HaeIII* and the sex of the sample was determined by agarose gel electrophoreses as described in Griffiths et al. (1996). Twenty-eight samples were further analysed with 14 microsatellite DNA markers (Gautschi et al. 2000).

Genotyping (= generating a genetic fingerprint)

Because of low DNA quantity and quality resulting from extractions of moulted feather samples, each sample was genotyped 3 to 9 (i.e. multiple tube approach). That way the two most frequent genotyping errors (i.e. false alleles, and allelic-drop out (Taberlet et al. 1999) can be minimised.

Computer simulations

Paternity simulations were performed using the computer program CERVUS 2.0 (Marshall et al. 1998) as described in the final report 2003.

Results

Individual genotypes found in the database

Fifteen of the 17 genotypes detected in the feather samples could be found in the database.

Feathers from birds released since 1996

One feather of **BG348 (Sereno)** was found below the nest Haute-Ubaye on 9.7.2009.

A feather of **BG370 (Roure)** was collected below the post on the summit du Pelvat in the territory of the pair Haute-Ubaye on 9.7.2009.

One feather each of **BG299 (Gildo)** was collected on the Dent de Morcles on 15.6.2009 and Derborence on 3.8.2009.

Below the eyrie of the Albula pair, two feathers of **BG364 (Louis)** were collected on 15.8.2009.

Of **BG357 (Rätia)** one feather each was found below the eyrie of the pair Serraglio on 31.7.2009 and on 30.8.2009.

In the Engadine, "Muotta Plaun da Lej" a feather of **BG463 (Folio)** was collected on 5.5.2009.

In the Val Tantermozza, below the new eyrie 2009 a feather of **BG395 (Martell)** was found on 11.10.2009.

In the National Park Hohe Tauern one feather each of **BG392 (Ambo)** was collected in autumn 2008 and spring 2009.

Three feathers of **BG375 (Felice)** were collected in Stelvio, one in Solaz in March 2009 and two in the active nest of the Zebbru pair on 27.10.2009.

In October 2009 a feather of **BG433 (Blangiar)** was collected in the Alpi Marittime.

Feathers from wild-born birds, and birds released before 1996

Several genotypes could not be directly matched to an individual studbook number. However, they have been identified in feather samples from previous years.

Below the nest of the pair Bargy, a feather of **GT016** (male of Bargy pair) was collected on 25.11.2009.

Below the eyrie of the Pair Albula, two feathers of **GT004** (female offspring of GT002 and GT003) were collected on 15.8.2009.

One feather of **GT023** (a male offspring of the Livigno pair GT005 and GT006) was found below the eyrie of the Serraglio pair on 30.8.2009.

In Tantermozza, below the new eyrie 2009, a feather of **GT026** (male offspring of the Zebru pair GT001 and BG264) was collected on 11.10.2009.

In Valfurva, Monte Confinale, a feather from **GT001** (female of Zebru pair) was found in July 2009.

Individual genotypes not found in the database

GT037 is the genotype of „Susanna“, the juvenile 2009 of the Aravis pair (GT0285 and BG288) caught in July 2009 because of problems with the plumage.

A feather collected in the Lechtal, Austria, revealed the genotype **GT038**. This bird is related to BG422 (Kasati) and GT031 (a female offspring of the Livigno pair). While Kasati has a high probability of being the father of GT038, GT031 is unlikely to be the mother because of a mismatch at one microsatellite locus. However, the results suggest that the mother of GT038 may be a sister of GT031.

Summaries

Tables 4 and 5 present summaries of the identification of birds hatched in the wild and the composition of breeding pairs.

References

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- Marshall TC, Slate J, Kruuk L and Pemberton JM. 1998. Statistical confidence for likelihood-based paternity inferences in natural populations. *Molecular Ecology*, 7, pp. 639-655.
- Taberlet P, Waits LP, Luikart G. 1999. Noninvasive genetic sampling: look before you leap. *Trends in Ecology and Evolution*, 14, pp 323-327.

Table 1. Feather samples received and analysed in 2009. Listed are the sampling areas and locations, the date of sampling, the person in charge, the sample name given in the laboratory, the sex, the ID of related individuals (P = most likely parents and R = related birds, but not necessarily the parents), and individual ID (BG = studbook number, GT = genotype number). Samples revealing the same genotype are given the same genotype identity.

Sampling area	Sampling location	Date of sampling	Collector	Sample Name	Sex	Related Individuals	Individual ID
France							
Aravis Haute-Ubaye	Caught juvenile	28.7.2009	Etienne Marlé	FR0009	M	GT028/BG288 ^P	GT037, "Susanna"
	Below nest Haute-Ubaye	9.7.2009	F.Breton	FR0010	M	BG011/BG054 ^P	BG348, Sereno
	Post on summit du Pelvat	9.7.2009	F.Breton	FR0011	F	BG086/BG104 ^P	BG370, Roure
	Post on summit du Pelvat	9.7.2009	F.Breton	FR0012	-	No results	-
Bargy	Below nest	25.11.2009	Etienne Marlé	FR0013	M	BG070,BG022 ^R	GT016
Switzerland							
Derborence	?	3.8.2009	Serge Denis	CH0019	-	No results	-
	?	3.8.2009	Serge Denis	CH0020	F	BG034/BG130 ^P	BG299, Gildo
Pair Albula	Dent de Morcles	15.6.2009	Serge Denis	CH0021	F	BG034/BG130 ^P	BG299, Gildo
	Below eyrie	15.8.2009	David Jenny	CH0022	-	No results	-
	Below eyrie	15.8.2009	David Jenny	CH0023	F	GT002/GT003 ^P	GT004
	Below eyrie	15.8.2009	David Jenny	CH0024	M	BG019/BG021 ^P	BG364, Louis
	Below eyrie	15.8.2009	David Jenny	CH0025	M	BG019/BG021 ^P	BG364, Louis
	Below eyrie	15.8.2009	David Jenny	CH0026	F	GT002/GT003 ^P	GT004
	Below eyrie	15.8.2009	David Jenny	CH0027	-	Not analyzed	-
Pair Serraglio	Below eyrie	15.8.2009	David Jenny	CH0028	M	Not analyzed	-
	Below eyrie	31.7.2009	David Jenny	CH0029	-	No results	-
	Below eyrie	31.7.2009	David Jenny	CH0030	F	BG086/BG104 ^P	BG357, Rätia
	Below eyrie	30.8.2009	Lucas Pitsch	CH0031	M	GT005/GT006 ^P	GT023
	Below eyrie	30.8.2009	Lucas Pitsch	CH0032	F	BG086/BG104 ^P	BG357, Rätia
Engadine Tantermozza	Muotta Plaun da Lej	5.5.2009	Dario de Tann	CH0033	F	BG174/BG118 ^P	BG463, Folio
	Below new eyrie 2009	11.10.2009	David Jenny	CH0034	-	Not analyzed	-
	Below new eyrie 2009	11.10.2009	David Jenny	CH0035	M	GT001/BG264 ^P	GT026
	Below new eyrie 2009	11.10.2009	David Jenny	CH0036	F	BG122/BG118 ^P	BG395, Martell
	egg shell, below eyrie	4.7.2008	David Jenny	CH0037	-	Not analyzed	-
	Egg shell, below eyrie	11.10.2009	David Jenny	CH0038	-	Not analyzed	-
Austria							
Lechtal NP Hohe Tauern	Bach		? M. Sprenger	AU0003	F	BG422,GT031 ^R	GT038
	Pair Kotschberg	autumn 2008	Reiner Franz	AU0004	F	BG017/BG070 ^P	BG392, Ambo
		Spring 2009	Reiner Franz	AU0005	F	BG017/BG070 ^P	BG392, Ambo
Italy							
Stelvio	Valfurva, Monte Confinale	July 2009	M.Confortola	IT0063	F	BG034,BG054 ^R	GT001
	Valfurva, Loc. Solaz	March 2009	Giacomo Albo	IT0064	F	BG199/BG107 ^P	BG375, Felice
Zebro	Above active nest	27.10.2009	Enrico Bassi	IT0065	F	BG199/BG107 ^P	BG375, Felice
	In active nest	27.10.2009	Andrea Zanoli	IT0066	F	BG199/BG107 ^P	BG375, Felice
Alpi Marittime	Above active nest	26.10.2009	Enrico Bassi	IT0067	-	Not analyzed	-
	?	October 2009	L. Martinelli	IT0068	M	BG108/BG175 ^P	BG433, Blangiar

Table 2. Overview of all bearded vulture genotypes sampled from 1998 till 2009. Each genotype was given an individual identification number. Listed are, the laboratory identities of the samples that could be assigned to the genotype, the sampling date, location and area and the number of samples analysed. For each genotype the studbook numbers of the closest relatives are given (P= parents, R=relatives, not necessarily the parents).

Genotype	Relatedness	Sex	Laboratory ID	Sampling date	Sampling location	Sampling area	No of samples
GT001	BG034,BG054 ^R	F	F13.8.3, Bo1, Bo2	13.08.1998	Nest	Bormio	3
			Zeb4, Zeb6	07.08.2002	Below Nest	Zebbru	2
			Zeb25, 26, 27, 29	17.06.2003	Eyrie	Zebbru	7
			Zeb7, 9, 12	07.08.2003	Nest	Zebbru	3
			Zeb35, 36	28.09.2004	Nest	Zebbru	2
			Zeb44, Zeb49, Zeb50	16.10.2007	Below active nest	Zebbru	3
			IT0008,23,39,43	2008	Nest	Zebbru	4
GT002	BG107/BG151 ^R	M	IT0063	July 2009	Monte Confinale	Stelvio	1
			Bo6, Bo7	13.08.1998	Nest Bormio	Bormio	2
			Bo18	03.05.1999	Sleeping Place	Bormio	1
			Bo12	06.08.2001	Sleeping Place	Bormio	1
GT003	BG017/BG070 ^P	F	Sin26, Sin 28	13.10.2004	Sleeping Place	Sinestra	2
			Bo10, Bo11	06.08.2001	Sleeping Place	Bormio	2
			Bo13	28.08.2001	Nest Bormio	Bormio	1
			Bo15, Bo16	06.08.2002	Nest Site	Bormio	2
			Bo28, Bo30, Bo32	12.10.2005	Sleeping Place	Bormio	3
GT004	GT002/GT003 ^P	F	BO35, BO36	26.7.2007	Below eyrie	Bormio	2
			IT0048, 56	2008	Nest	Braulio/Bormio	2
			Bo24	13.08.2000	Below Nest site	Bormio	1
			CHA03, CHA04	16.10.2007	Below eyrie Melna	Pair Albula	2
GT005	BG051/BG049 ^P	M	CH0016,17,18	10.8.2008	Below eyrie Melna	Pair Albula	3
			CH0023, 26	15.8.2009	Below eyrie	Pair Albula	2
			Liv1-Liv5	01.05.1999	Nest	Livigno	5
GT006	BG017/BG070 ^P	F	Liv16	2006	Trepalle/Eira's Pass	Livigno	1
			Punt Ota	25.01.1998	Punt Ota	-	1
GT007	BG034/BG035	F	Liv9	05.08.2002	Nest Livigno	Livigno	1
			Liv11	05.08.2003	Horst	Livigno	1
			LIV18, LIV19	31.10.2007	Below active nest	Livigno	2
GT008	GT007/GT016 ^P	M	Bargy	April 2000	-	Bargy	1
			Bag5-Bag7	22.04.2003	Nest	Bargy	3
GT009	BG009/BG041 ^P	M	Bag1, Bag2	03.07.2001	Colouring zone	Bargy	2
			Nan 1	No date	Peisey-Nancroix	Vanoise NP	1
			Nan 05	30.9.2006	Rocher de Sétives	Peisey-Nancroix	1
			Nan06	31.9.2007	Foot of the nest	Peisey-Nancroix	1
GT010	BG19/BG021 ^P	F	Val1	27.06.2001	-	Val d'Isère	1
			Val8	No date	-	Val d'Isère	1
			Val11	2005	Below nest site	Val d'Isère	1
GT011	BG011/BG054 ^P	F	Val2	27.06.2001	-	Val d'Isère	1
			Val6	No date	-	Val d'Isère	1
GT012	BG019/BG021 ^P	F	Val8.1	2005	Below nest site	Val d'Isère	1
			Val3	27.06.2001	-	Val d'Isère	1
GT013	BG034/BG065 ^R	F	HB1 (HB8)	-	-	Heiligenblut	1-2
			HB2	2001	Horst	Heiligenblut	1
GT014	BG009/BG041 ^P	M	HB3, 4, 7, 9	Aug. 2002	-	Heiligenblut	4
			Gro01	July 2005	Near releasing site	Grossglockner	1
			Fus03	28.7.2005	-	Fuscherlacke	1
			Glo07	9.8.2006	Hochtor/Glocknerstr.	Hohe Tauern	1
			AU0001	May 2008	Gschlöss	Hohe Tauern	1
			Lechtal	Wi 98/99	-	Lechtal	1
			Bag8	2003	Nest	Gastein	5
GT015	BG019/BG021 ^P	F	Köt1, Köt2	?	Sleeping place	Kötschachtal	2
			FR0013	27.09.2004	Near nest site	Bargy	1
GT016	BG070/BG022 ^R	M	Pont1	25.11.2009	Under nest	Bargy	1
			Pont8	Aug. 2003	Nest	Ponte Bernardo	1
GT017	BG131/BG132 ^P	F	Pont8	Aug. 2004	Nest	Ponte Bernardo	1
			Van2, 4, 8	No date	-	Termignon	3
GT018	GT001/GT002 ^P	M	Embryo free	01.05.1999	Nest Livigno	Livigno	1
GT019 †	GT005/GT006 ^P	F	Köt1	?	Nest	Kötschachtal	Egg skin
GT020 †	Köt1	M	Köt3	?	Nest	Kötschachtal	Egg skin
			Pasc07	07.07.2004	Known colouring zone	Passy	1
GT021	GT007/GT016	M	Pasn01,Pasn08	07.07.2004	New colouring zone	Passy	2
			NAN15	5.8.2008	Pied des falaises	Peisey	1
			SNP01, SNP05, SNP06	20.06.2005	Val Stabelchod	CH	3
GT022	GT005/GT006	F			Val Stabelchod	Nationalpark	

Table 2. Continued

Genotype	Relatedness	Sex	Laboratory ID	Sampling date	Sampling location	Sampling area	No of samples
GT023	GT005/GT006	M	For01, For03	12.10.2005	Sleeping place	Foraz	2
			Ser01, Ser02	20.7.2006	Under sleeping place	Serraglio	2
			SER06, SER07	15.8.2007	Below eyrie	Serraglio	2
			CH0031	30.8.2009	Below eyrie	Serraglio	1
GT024	GT005/GT006	F	For02	12.10.2005	Sleeping place	Foraz	1
GT025	BG019/BG021 ^P	M	Gast19, Gast20	2.8.2006	Nest	Heitzing	2
GT026	GT001/BG264 ^P	M	Sch01	28.5.2006	Murtiröt	S-chanf	1
			Cim01	17.7.2006	Cima dei Buoi	CH Nationpark	1
GT027	BG019/BG021 ^P	F	Tan01, Tan02	29.10.2006	Below eyrie	Val Tantermozza	2
			TAN08, TAN10, 11	9.10.2007	Below eyrie	Val Tantermozza	3
			CH0014	4.7.2008	Below eyrie	Val Tantermozza	1
			CH0035	11.10.2009	Below new eyrie	Val Tantermozza	1
			Nan02	19.9.2004	Under unoccupied nest	Mont Blanc de Peisey	1
GT028	GT007/GT016 ^P	M	Nan03, Nan04	28.4.2006	Rocher de Séteives	Peisey-Nancroix	2
			NAN14	25.4.2008	Vallée de Roauel	Peisey-Nancroix	1
			Lan01		Lancheron à Mayères	Aravis Nord 74	1
			Ara01	1.9.2007	Passage du Saix	Aravis	1
GT029	GT001/GT002 ^P	M	CUL01, 02	13.8.2008	“Aired u Culard”	Magland	2
			MOE04	14.8.2008	Coloring place	Passy	1
			Zeb43	July 2006	Zebbru Valley	Zebbru	1
			Zeb45, Zeb46, Zeb47	16.10.2007	Below active nest	Zebbru	3
GT030	BG051/BG049 ^P	M	IT0005-7, 36,41	2008	Nest	Zebbru	5
			GT031	GT005/GT006 ^P	F	Maira03	12.9.2006
GT032	GT010/GT009 ^P	F	Sin32	31.8.2007	Below sleeping place	Val Sinestra	1
			CH0005	12.10.2008	Below sleeping place	Val Sinestra	1
			CH0009, CH0010	8.7.2008	Below eyrie	Val Fex	2
GT033	BG279/GT018 ^P	F	SAV01	12.8.2007	Val Savarenche	Aosta	1
GT034	BG279/GT018 ^P	F	CH0011	11.8.2008	Below eyrie	Val Mora	1
GT035†	GT001/BG264 ^P	M	LEU01	?	Coordinates 614/138	Leukerbad	1
GT036	BG091, BG006 ^R	F	BGS	28.04.2008	Perfibach Naturns	Schnalstal	4
GT037	BG091, BG006 ^R	F	FR0007	8.9.2008	Nest Haute Ubaye	Mercantour	1
GT038	GT028/BG288 ^P	M	FR0009, Susanna	28.7.2009	Juvenile caught	Aravis	1
GT038	BG422, GT031 ^R	F	AU0003	?	Lechtal	Austria	1

Table 3. Overview of bearded vulture individuals identified through the analysis of feather samples collected from 1998 till 2009. For each individual the studbook number, the name, the laboratory identities, the sampling date, location and area and the number of samples analysed are given.

Studbook No.	Name	Sex	Laboratory ID	Sampling date	Sampling location	Sampling area	No of samples
BG264	Mauritio	M	Zeb1, 2, 3, 5	07.08.2002	Below Nest site	Zeburu	4
			Zeb28, 31, 32, 34	17.06.2003		Zeburu	4
			Zeb8, 10, 11,	07.08.2003	Horst	Zeburu	3
BG279	Gelas	F	Van1	25.05.2003	-	Termignon	1
			Van3, 5, 6, 9	No date	-	Termignon	4
			Van10-12	24.7.2005	under nest No 3	Termignon	3
			Van14, Van15	21.7.2006	Below nest	Termignon	2
BG283	Tell	M	Sin15	13.10.2002	Sleeping place	Sinestra	1
			Bo29, Bo31	09.08.2005	Sleeping place	Bormio	2
			Bo34	20.6.2006	50m from active nest site	Braulio/Bormio	1
			IT0052,54,55,60	2008	Nest	Braulio/Bormio	4
BG285	Sina	F	Sin9 -Sin14,16	13.10.2002	Sleeping place	Sinestra	7
			Sin21, 24	19.10.2003	Sleeping place	Sinestra	2
BG288	Republic11	F	Ast1	06.03.2003	New colouring place	Aster	1
			Pasc01,03, 04	04.07.2005	Known colouring zone	Passy	3
			Pasn02, Pasn09	04.07.2005	New colouring zone	Passy	2
			CUL03	13.8.2008	Aire du Culard	Magland	1
BG296	Jackpot 3	M	Pöll1	2003	-	Pölltal	1
BG299	Gildo	F	Deb1	Summer 04	Haut de Cry	Derborence	1
			Deb2	?	?	Derborence	1
			Deb06	17.8.2007	Eyrie	Derborence	1
			CH0021	15.6.2009	Dent de Morcles	Derborence	1
			CH0020	3.8.2009	?	Derborence	1
BG304	Aisone	M	Deb3	?	?	Derborence	1
			Deb07, Deb09	17.8.2007	Eyrie	Derborence	2
BG305	Vernante	M	Stura	Summer 01	-	Stura Valley	1
			Bai01	05.06.2005	La bai Graine?	Mercantour	1
BG311	Roubion	M	Maira05	12.9.2006	Maira valley	Alpi-Maritime	1
			FR0001	20.8.2008	Pelvat de Charière	Mercantour	1
BG321	Veronika	F	Clo01	9.6.2006	sixt Fer à Cheval	Clos de Sales	1
			Moe02	26.6.2006	?	Moède-RN Passy	1
			JUM01	13.8.2008	Under "Jumelles"	Passy	1
BG323†	Sempach	F	Bev02, Bev05	29.5./3.6.2006	786.4/158.5	Val Bever	2
BG348	Sereno	M	Pont2	Aug. 2003	Nest	Ponte Bernardo	1
			Pont3, 7	Aug. 2004	Nest	Ponte Bernardo	2
			PAUL1	24.5.2007	Belwo nest site	Saint Paul sur	1
			FR0003,5,6,8	8.9.2008	Nest Haute-Ubaye	Mercantour	4
			FR0010	9.7.2009	Below nest Haute-Ubaye	Mercantour	1
BG357	Rätia	F	Sin17, 18, 20	19.10.2003	Sleeping place	Sinestra	3
			Sin27, 29, 30	13.10.2004	Sleeping site	Sinestra	3
			Ser03, Ser05	20.7.2006	Under sleeping place	Serraglio	2
			CH0012	11.8.2008	Below eyrie	Val Mora/Serraglio	1
			CH0030	31.7.2009	Below eyrie	Serraglio	1
			CH0032	30.8.2009	Below eyrie	Serraglio	1
BG359	Pablo	M	Deb04	23.6.2007	?	Derborence	1
			Deb05, Deb08	17.8.2007	Eyrie	Derborence	2
BG361	Montblanc	M	Moe01, Moe03	26.6.2006	?	Moède-RN Passy	2
BG364	Louis	M	CHA01, CHA02	16.10.2007	Below eyrie Melna	Pair Albula	2
			CH0024, 25	15.8.2009	Below eyrie	Pair Albula	2
BG370	Roure	F	Maira02,04,06,07	12.9.2006	Maira valley	Alpi-Maritime	4
			FR0004	8.9.2008	Below nest Haute-Ubaye	Mercantour	1
			FR0011	9.7.2009	Post on summit du Pelvat	Haute-Ubaye	1
BG375	Felice	F	IT0064	March 2009	Valfurva, Loc. Solaz	Stelvio	1
			IT0065,66	27.10.2009	Active Nest	Zeburu	2
BG392	Ambo	F	AU0004	Autumn 2008	Kotschberg	NP Hohe Tauern	1
			AU0005	Spring 2009	Kotschberg	NP Hohe Tauern	1
BG393	Stift	F	Sin31	31.8.2007	Below sleeping place	Val Sinestra	1
			CH0004,06,08	12.10.2008	Below sleeping place	Val Sinestra	3
BG395	Martell	F	Madu1	09.04.2003	-	Madulain	1
			LaS1	March 04	804.300/175.500	Zernez	1
			TAN03, TAN05, TAN06	9.10.2007	Below eyrie	Val Tantermozza	3
			CH0015	4.7.2008	Below eyrie	Val Tantermozza	1
			CH0036	11.10.2009	Below new eyrie 2009	Val Tantermozza	1
BG413	Jausier	F	Van13	3.5.2006	Vallon final des Ardlets d'en Haut	Termignon	1
BG433	Blangiar	M	IT0068	October 2009	?	Alpi Maritime	1

Table 3. continued

Studbook No.	Name	Sex	Laboratory ID	Sampling date	Sampling location	Sampling area	No of samples
BG438†	Culan	M	Gun1, Gun2	April 2005	Matschertal	Souttirol	2
BG446	Hubertus 2	M	POEL02	May2008	Langrand	Pölltal	1
BG462	Escalero	F	Fus04	28.07.2005	Fuscherlacke	NP Hohen Tauern	1
BG463	Folio	F	CH0033	5.5.2009	Muotta Plaun da Lej	Engadine	1
BG464	Natura	F	SNP02, SNP03	20.06.2005	Val Stabelchod	CH Nationalpark	2
			CH0001	25.10.2008	Brünun 820 200/197 900	Unterengadin	1
BG465	Doraja	F	Glo02, 04, 06	20.7.2005	Glockner	Hohe Tauern	3

Table 4. Overview of genotypes from birds hatched in the wild. Given are the ID (i.e. genotype number), the nest site of their parents, the sex and information about the sampling date and location.

Genotype	Offspring of Pair	Sex	Sampling date	Sampling location	Sampling area	No of samples
GT008	Bargy	M	03.07.2001	Colouring zone	Bargy	2
			No date	Peisey-Nancroix	Vanoise NP	1
			30.9.2006	Rocher de Sétives	Peisey-Nancroix	1
			31.9.2007	Foot of the nest	Pesey-Nancoroix	1
GT004	Bormio 2000	F	13.08.2000	Below Nest site	Bormio	1
			16.10.2007	Below eyrie Melna	Val Chamuera	2
GT018	Bormio (before 2000)	M	No date	-	Termignon	3
GT019 †	Livigno	F	01.05.1999	Nest Livigno	Livigno	1
GT020 †	Kötschachtal	M	?	Nest	Kötschachtal	Egg skin
GT021	Bargy	M	07.07.2004	Known colouring zone	Passy	1
			07.07.2004	New colouring zone	Passy	2
GT022	Livigno	F	20.06.2005	Val Stabelchod	CH Nationalpark	3
GT023	Livigno	M	12.10.2005	Sleeping place	Foraz	2
			20.7.2006	Under sleeping place	Serraglio	2
			15.8.2007	Below eyrie	Serraglio	2
GT024	Livigno	F	12.10.2005	Sleeping place	Foraz	1
GT026	Zebbru	M	28.5.2006	Murtiröt	S-chanf	1
			17.7.2006	Cima dei Buoi	CH Nationalpark	1
			29.10.2006	Below eyrie	Val Tantermozza	2
			9.10.2007	Below eyrie	Val Tantermozza	3
GT028	Bargy	M	?	Lancheron à Mayères	Aravis Nord 74	1
			1.9.2007	HS 10 AR 3 passage du Saix	Aravis	1
GT029	Bormio (before 2000)	M	July 2006	Zebbru Valley	Zebbru	1
			16.10.2007	Below active nest	Zebbru	3
GT031	Livigno	F	31.8.2007	Below sleeping place	Val Sinestra	1
GT032	Val d'Isère	F	12.8.2007	Val Savarenche	Aosta	1
GT033	Termignon	F	11.8.2008	Below eyrie	Val Mora	1
GT034	Termignon	F	?	Coordinates 614/138	Leukerbad	1
GT035†	Zebbru	M	28.04.2008	Perfibach Naturns	Schnalstal	4
GT036	Unknown	F	8.9.2008	Nest Haute-Ubaye	Mercantour	1
GT037	Aravis	M	28.7.2009	Susanna	Aravis	1
GT038	Unknown	F	?	?	Lechtal	1

Table 5. Overview of all bearded vulture pairs identified between 1998 and 2009. Given are the nest locations, the individual identity (ID) and/or relatedness, and the years in which samples were collected.

Pair	Sex	ID and relatedness	Year(s) of sample collection
Albula	Male	Louis (BG364)	2007, 2009
	Female	GT004 (offspring of GT002/GT003)	2007, 2008, 2009
Aravis	Male	GT028, offspring of GT007/GT016	2007, 2008
	Female	Republic 11 (BG288)	2008
Bargy	Male	GT016, offspring of BG022/BG023	2004, 2009
	Female	GT007, offspring of BG034/BG035	2000, 2003
Bormio (before 2000)	Male	GT002, offspring of BG150/BG151	1998, 1999, 2001
	Female	GT001, related to BG034/BG054	1998
Bormio (from 2002)	Male	Tell (BG283)	2005, 2006, 2008
	Female	GT003, offspring of BG017/BG070	2001, 2002, 2005, 2007, 2008
Dérborence	Female	Gildo (BG299)	2004, 2005(?), 2007, 2009
	Male	Pablo (BG359)	2007
Gastein/Kötschachtal	Male	Aisone (BG304)	2005(?), 2007
	Female	-	-
Haute-Ubaye	Male	GT015, offspring of BG019/BG021	2003
	Female	BG348 (Sereno)	2003, 2004, 2007, 2008, 2009
Heiligenblut	Male	BG370 (Roure)	2008, 2009
	Female	-	-
Heitzing	Male	GT012, offspring of BG019/BG021	No date
	Female	GT013, related to BG034/BG065	2001, 2002, 2005
Kotschberg	Male	GT025, offspring of BG019/BG021	2006
	Female	GT015, offspring of BG019/BG021	2006
Livigno	Male	?	-
	Female	Ambo (BG392)	2008, 2009
Maira Valley (Trio)	Male	GT005, offspring of BG051/BG049	1999, 2006
	Female	GT006, offspring of BG017/BG070	2002, 2003, 2007
Moëde-RN Passy	Male	GT030, offspring of BG051/BG049	2006
	Female	Roubion (BG311)	2006
Ponte Bernardo	Male	Roure (BG370)	2006
	Female	Montblanc (BG361)	2006
Serraglio	Male	Veronika (BG321)	2006
	Female	Sereno (BG348)	2003, 2004
Sinestra (before 2004)	Male	GT017, offspring of BG131/BG132	2003, 2004
	Female	GT023, offspring of pair Livigno	2006, 2007, 2009
Sinestra (from 2004)	Male	Rätia (BG357)	2006, 2009
	Female	Tell (BG283)	2002
Termignon	Male	Sina (BG285)	2002, 2003
	Female	GT002, offspring of BG150/BG151	2004
Val d'Isère	Male	Rätia (BG357)	2003, 2004
	Female	GT018, offspring of GT001/GT002	No date
Val Tantermozza	Male	Gelas (BG279)	2003
	Female	GT009, offspring of BG009/BG041	2001, 2005
Zebbru	Male	GT010, offspring of BG019/BG021	2001, 2005
	Female	GT026, offspring of GT001/BG264	2006, 2007, 2008, 2009
	Male	Martell (BG395)	2007, 2008, 2009
	Female	Mauritio (BG264)	2002, 2003
	Male	GT029, offspring of GT001/GT002	2006, 2007, 2008
	Female	GT001, related to BG034/BG054	2002, 2003, 2004, 2007, 2008
	Female	Felice (BG375)	2009