Génétique de la population de Gypaète barbu en Corse

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SWILD

Vulture Conservation Foundation

samples

Samples

- 156 samples collected between 2000 and 2016
- Mainly collected in nests
- 1 sample from a dead bird from 1991
- All have been analysed by 14 microsatellites
- Re-done 32 identified individual with additional 10 microsatellites

Site	**Analysed of samples**
Asco	12
Bavella	4
Bocognano	1
Bonifato	30
Fango	2
Guagno	11
Monte Agutu	1
Popolasca	13
Restonica	22
Scala	9
Tartagine	9
MNHN Paris 1991	1
outside territory	7
Total	**122**

Individuals

- 33 different individuals identified
- Uncertain if different individuals can be distinguished in all cases
- 22 females, 11 males
- Very few parentage assignments possible

genotype	sampleID	sex	territory	sampling year	sample type	assumed age of bird	fledged
GTC001	BVC0002	female	Bonifato	2001	feather		
GTC002	BVC0011	male	Bonifato	2000	feather		
	BVC0004	male	Bonifato	2001	feather		
GTC003	BVC0025	female	Bavella	2001	feather		
	BVC0005	female	Asco	2012	feather		
GTC004	BVC0037	female	Asco	2000	feather	likely adult	
GTC005	BVC0007	female	Bonifato	2008	feather		
	BVC0044	female	Bonifato	2013	feather	adult	
GTC006	BVC0055	male	Guagno	2002	feather		
	BVC0008	male	Popolasca	2007	feather		
GTC007	BVC0009	female	Popolasca	2007	feather		
GTC008	BVC0010	female	Bonifato	2013	feather		
GTC009	BVC0012	female	Tartagine	2002	feather		
GTC010	BVC0065	male	Tartagine	2000	feather	likely adult	
	BVC0013	male	Tartagine	2002	feather		
GTC011	BVC0014	female	Monte Agutu	2002	feather		
	BVC0078	female	Restonica	2012	feather		
	BVC0073	female	Restonica	2013	feather		
GTC012	BVC0017	female	site n°1	NA	feather		
	BVC0019	female	site n°3	NA	feather		
GTC013	BVC0050	female	Guagno	2002	feather		
	BVC0021	female	Popolasca	2013	feather		
	BVC0018	female	site n°2	NA	feather		
GTC014	BVC0060	male	Scala	2000	feather		
	BVC0020	male	site n°4	NA	feather		
GTC015	BVC0027	male	Restonica	2012	egg skin	juvenile	young fledged from nest this year, not clear if two eggs or if GTC015 is from the fledgling
GTC016	BVC0028	female	Restonica	2013	egg skin	juvenile	
GTC017	BVC0034	female	Asco	2012	egg skin	juvenile	
GTC018	BVC0035	male	Asco	2000	feather	likely adult	
	BVC0053	male	Guagno	2002	feather		
GTC019	BVC0056	female	Guagno	2002	feather		
GTC020	BVC0061	female	Scala	2000	feather		
GTC021	BVC0066	female	Tartagine	2000	feather	juvenile	
GTC022	BVC0067	male	Restonica	2013	feather		
GTC023	BVC0080	female	Restonica	2012	feather		
	BVC0072	female	Restonica	2013	feather		
GTC024	BVC0077	male	Restonica	2012	feather		
	BVC0075	male	Restonica	2013	feather		
GTC026	BVC0087	(male)	Bocognano	2011	feather		
GTC027	BVC0088	female	Asco	2000	feather		
GTC028	BVC0089	male	Asco	2000	feather		
GTC030	BVC0105	female	Bonifato	2013	feather		
GTC031	BVC0099	male	Bonifato	2013	feather		
GTC032	BVC0029	female	Tartagine	2000	egg skin	juvenile	
GTC033	BVC0001	NA	Tartagine	2005	egg skin	juvenile	

Individuals by territory

- Turnover of individuals in the territories
- Bonifato:
  - 2000: GTC001 & GTC002
  - 2008: GTC005
  - 2013: GTC030 & GTC031 (juvenile GTC008)
- Very low effective population size

  → Ne = 2.8

Figure 4: Graphic illustration of each genotype found in Corsica. In blue are males, in red females, in light-green female-offspring and dark-green male-offsrpring. Feathers with unknown sampling place or year are not displayed.

Table 3: Summary statistics of genetic variation at 14 microsatellite loci for the Corsican Bearded Vu population per locus. In brackets are the total number of alleles so far observed in all bearded vulture populat Ho = observed heterozygosity, He = expected heterozygosity.

Marker	number of Alleles	Ho	He
BV1	1 (3)	0.000	0.000
BV2	3 (4)	0.800	0.638
BV5	2 (6)	0.400	0.420
BV6	1 (7)	0.000	0.000
BV7	2 (5)	0.633	0.499
BV8	1 (2)	0.000	0.000
BV9	1 (2)	0.000	0.000
BV11	1 (11)	0.000	0.000
BV12	3 (11)	0.667	0.545
BV13	4 (10)	0.767	0.639
BV14	2 (6)	0.533	0.444
BV16	2 (13)	0.138	0.128
BV17	1 (2)	0.000	0.000
BV20	2 (3)	0.133	0.278

- 6 out of 14 microsatellites fixed for one allele
- All microsatellites show a reduced number of alleles compared to the rest of the populations
- High homozygosity

Comparison with other populations

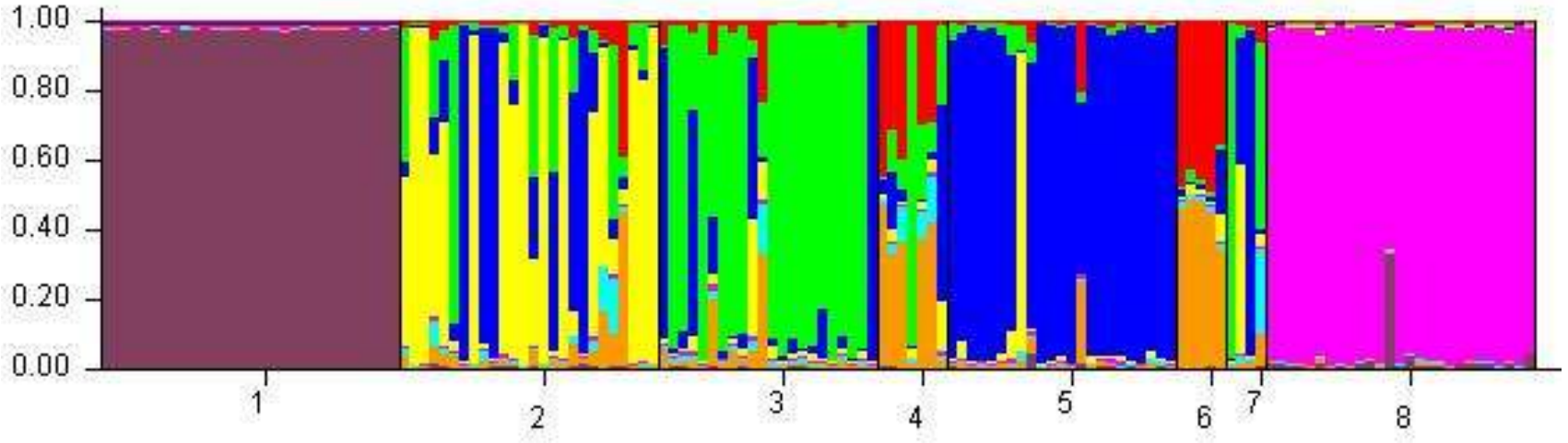
Table 5: Summary statistics and comparison of genetic variation at eight microsatellite loci of the different bearded vulture populations in Europe. Not all microsatellites were used, as results were available for only eight microsatellites (BV02, BV05, BV06, BV11, BV12, BV13, BV14, BV20) for all populations. The data for the captive, the Pyrenees, Sardinia and the Alps were extracted from (Gautschi 2001).

population	mean sample size	mean Nr. of alleles per locus	percentage of polymorphic loci	observed heterozygosity (Ho)	expected heterozygosity (He)
Corsica	30.0 (±0.0)	1.8 (±0.2)	75	0.413 (±0.118)	0.370 (±0.091)
Captive [1]	147.8 (±0.9)	8.5 (±1.5)	100	0.675 (±0.080)	0.680 (±0.078)
Pyrenees [1]	26.9 (±0.1)	4.3 (±0.6)	87.5	0.520 (±0.095)	0.536 (±0.089)
Sardinia [1]	22.5 (±0.5)	4.8 (±0.5)	100	0.555 (±0.082)	0.598 (±0.081)
Alps [1]	25.4 (±0.5)	6.0 (±0.7)	100	0.604 (±0.082)	0.675 (±0.088)

[1] data from Dr. Barbara Hefti-Gautschi (Gautschi 2001)

Structure

Based on microsatellite data, each individual is assigned to a population (each one represented by a different colour)



1 = recent Corsica
2 = historic Alps
3 = historic Spain
4 = historic Greece
5 = historic Sardinia
6 = historic Caucasus
7 = historic France
8 = recent Pyrenees

Conclusion

- Clear separation of the Corsican Bearded Vulture from the rest of the populations
- Mainly due to the isolation of the population and reduction population size
- Very low genetic diversity in the Corsican population
- High inbreeding level and low effective population size
- Effects of the genetic composition not possible to be investigated

Outlook

- Analysis samples collected from 2017 onwards
- Investigate the full genome (genomics)

Merci pour votre attention!

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