

Progetto LIFE Perdix

2° Webinar 30 Aprile 2021: La Genetica per la
Conservazione e il Monitoraggio Sanitario



ISPRA



SAPIENZA
UNIVERSITÀ DI ROMA

ALTRE ESPERIENZE DI SELEZIONE GENETICA: il LIFE M.I.R.CO-lupo

Relatore: Romolo Caniglia



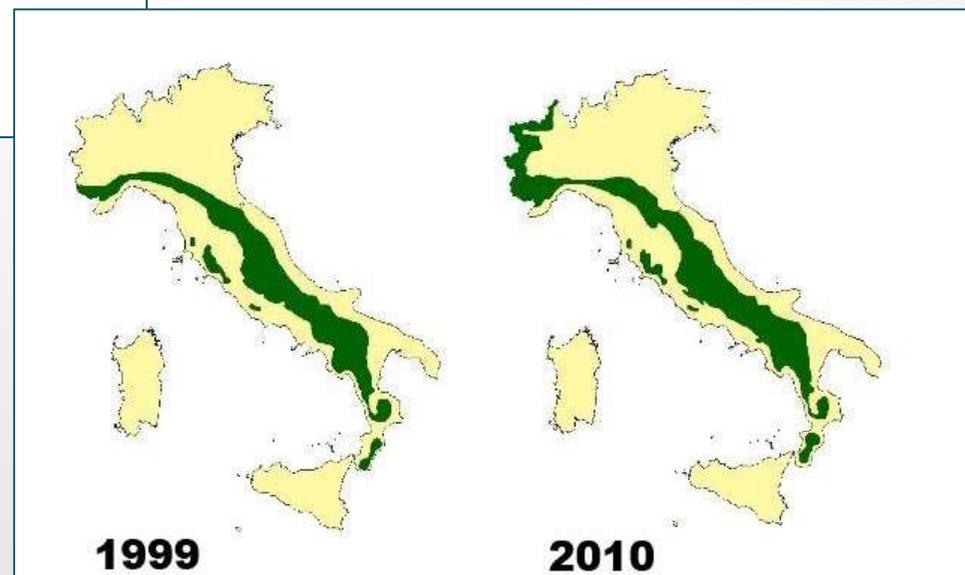
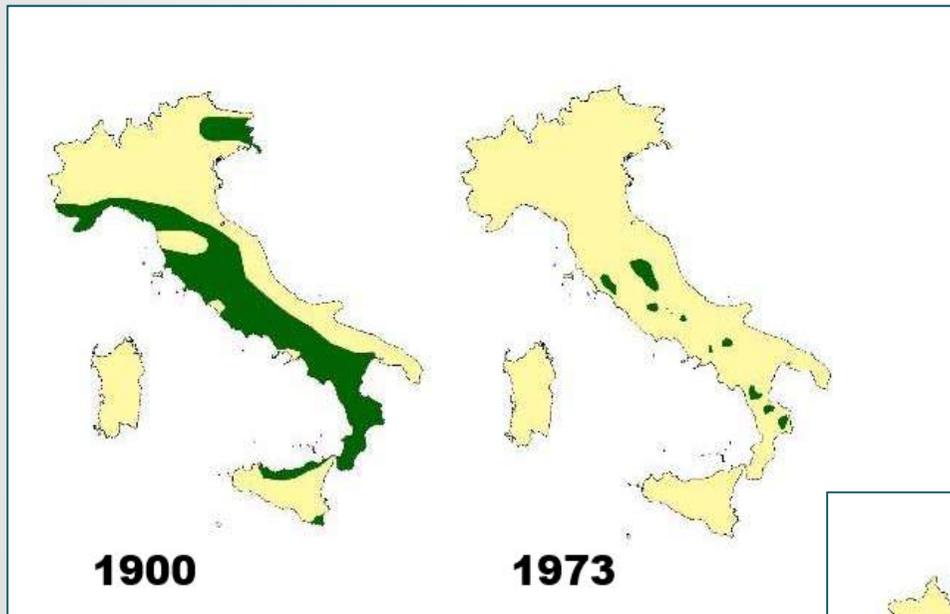
Caniglia Romolo,
Fabbri Elena,
Velli Edoardo,
Mattucci Federica,
Willy Reggioni,
Molinari Luigi,
Striglioni Federco,
Di Nicola Umberto,
Ciucci Paolo,
Mucci Nadia



Area per la Genetica della Conservazione BIO-CGE, ISPRA,
Ozzano dell'Emilia, Bologna, Italy

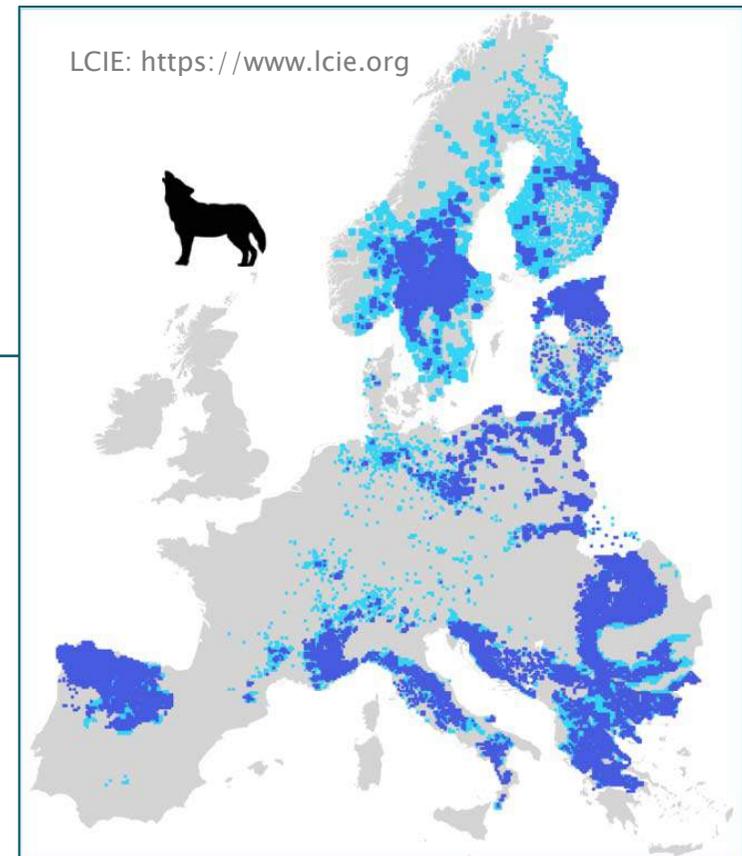
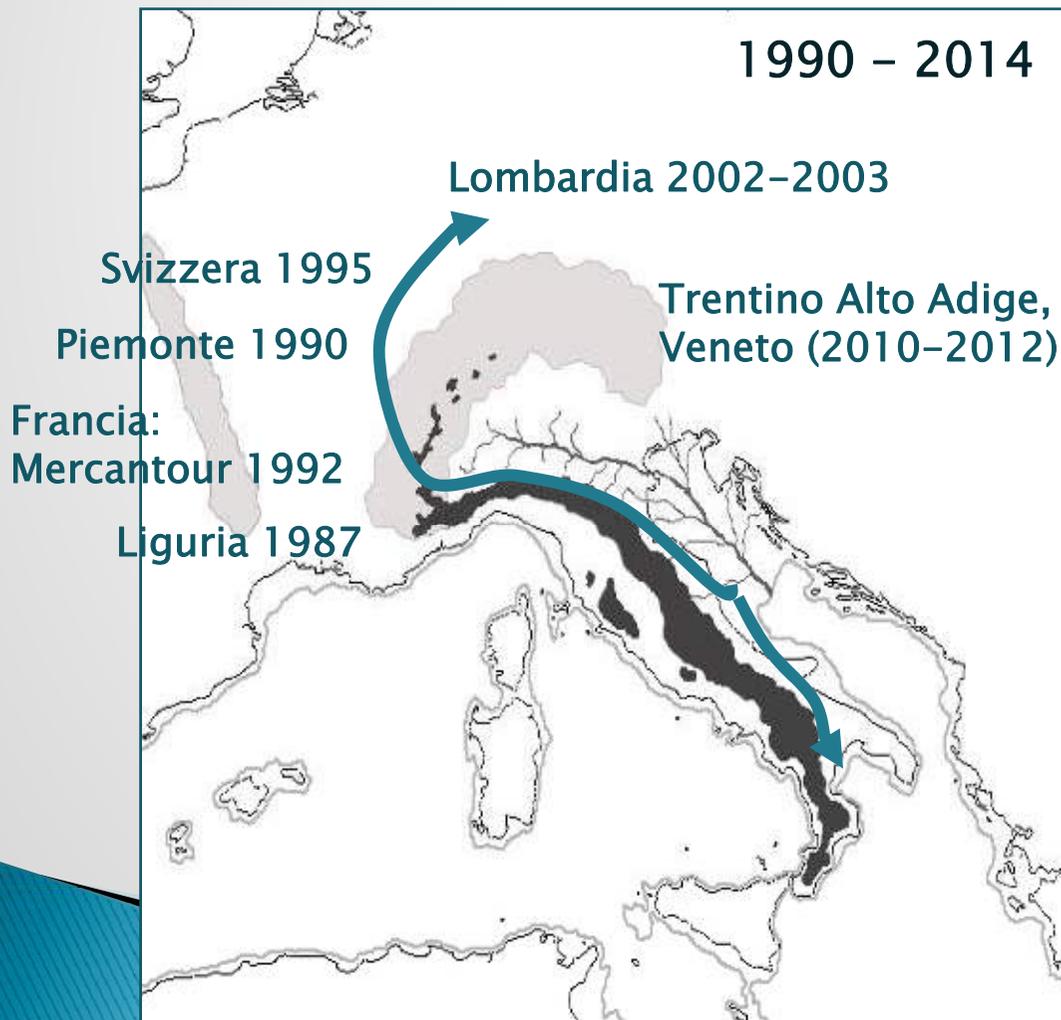
INTRODUZIONE

- ▶ Il lupo in Italia: trend storico e attuale



INTRODUZIONE

► Il lupo in Italia



- Protezione
- Ritorno delle prede
- Riqualificazione ecologica

INTRODUZIONE

- ▶ Il lupo in Italia: problematiche
- ▶ Conflitti con le attività antropiche
- ▶ Bracconaggio
- ▶ Alta mortalità
- ▶ Ibridazione con il cane



IBRIDAZIONE



IBRIDAZIONE: STUDI

Mitochondrial DNA Variability in Italian and East European Wolves: Detecting the Consequences of Small Population Size and Hybridization

ETTORE RANDI,^{*,||} VITTORIO LUCCHINI,^{*} MADS EJELDSØ CHRISTENSEN,^{*} NADIA MUCCI,^{*} STEPHAN M. FUNK,[†] GAUDENZ DOLF,[‡] AND VOLKER LOESCHCKES

Detecting rare introgression of domestic dog genes into wild wolf (*Canis lupus*) populations by Bayesian admixture analyses of microsatellite variation

Ettore Randi
Istituto Nazionale

Detecting introgressive hybridization between free-ranging domestic dogs and wild wolves (*Canis lupus*) by admixture linkage disequilibrium analysis

POLICY PERSPECTIVE

Redefining the Role of Admixture and Genomics in Species Conservation

Bridgett M. vonHoldt¹, Kristin E. Brzeski¹, David S. Wilcove^{1,2}, & Linda Y. R.

¹Ecology & Evolutionary Biology, Princeton University, Princeton, NJ 08544

²Woodrow Wilson School of Public and International Affairs, Princeton University, Princeton, NJ 08544

SCIENTIFIC
REPORTS
nature research

A standardized approach to empirically define reliable assignment thresholds and appropriate management categories in deeply introgressed populations

Romolo Caniglia^{1,2}, Marco Galaverni¹, Edoardo Velli¹, Federica Mattucci¹, Antonio Canu¹, Marco Apollonio¹, Nadia Mucci¹, Massimo Scandura¹ & Elena Fabbri¹

Spatial assessment of wolf-dog hybridization in a single breeding period

C. Pacheco^{1,2}, J. V. López-Bao³, E. J. García⁴, F. J. Lema⁵, L. Llana⁴, V. Palacios⁴ & R. Godinho^{1,2}

Black coats in an admixed wolf × dog pack is melanism an indicator of hybridization in wolves?

Elena Fabbri · Claudia Greco · Lorenzo Manghi · Luigi Boitani ·

Noninvasive sampling and genetic variability, pack structure, and dynamics in an expanding wolf population

ROMOLO CANIGLIA,^{*} ELENA FABBRI, MARCO GALAVERNI, PIETRO MILANESI, AND ETTORE RANDI

Multilocus Detection of Wolf x Dog Hybridization in Italy, and Guidelines for Marker Selection

Ettore Randi^{1,2}, Pavel Hulva^{3,4}, Elena Fabbri¹, Marco Galaverni¹, Ana Galov⁵, Josin Kusak⁶, Daniele Bion⁷

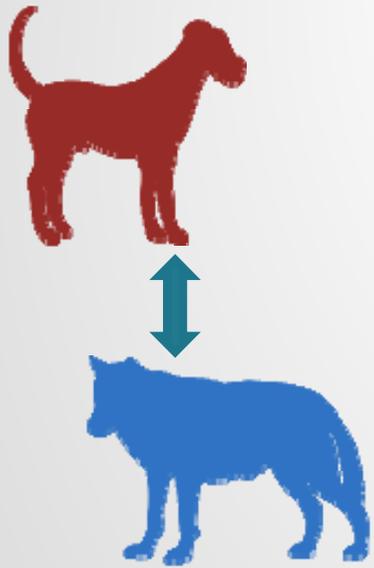
Disentangling Timing of Admixture, Patterns of Introgression, and Phenotypic Indicators in a Hybridizing Wolf Population

Marco Galaverni,^{*,1,2} Romolo Caniglia,¹ Luca Pagani,^{3,4} Elena Fabbri,¹ Alessio Boattini,⁵ and Ettore Randi^{1,6}

¹Area per la Genetica della Conservazione, ISPRA, Ozzano dell'Emilia Bologna, Italy

IBRIDAZIONE: DEFINIZIONI

0.1% di differenza

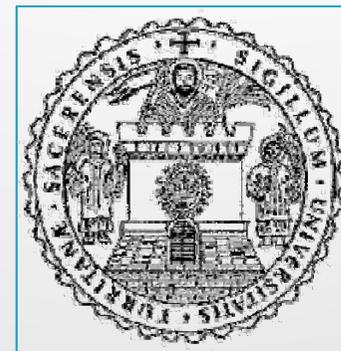
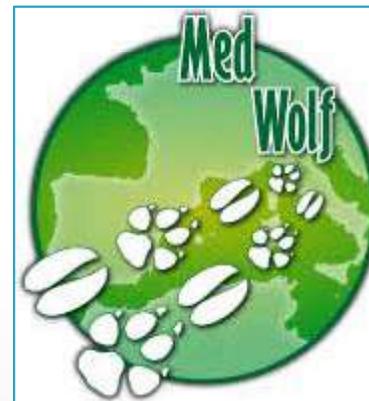
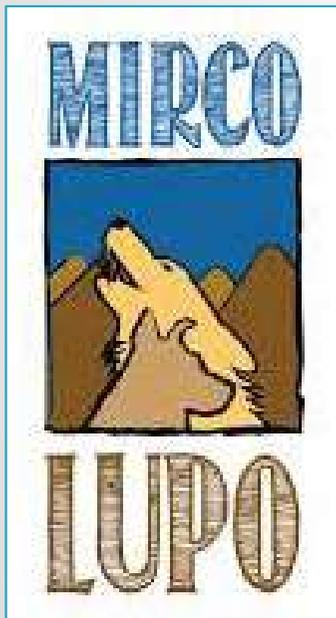


F1		50% lupo- 50% cane
BC1		75% lupo- 25% cane
BC2		87,5% lupo- 12,5% cane
BC3		93,7% lupo- 6,2% cane
BC4		96,6% lupo- 3,1% cane

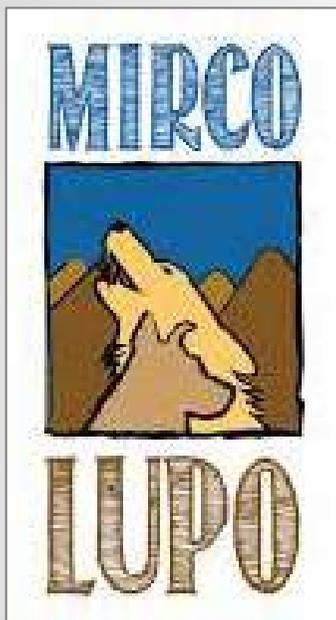
Reincroci
con il lupo

IBRIDAZIONE: PROGETTI

- ▶ LIFE e progetti di monitoraggio



M.I.R.CO-lupo



- ▶ Progetto LIFE LIFE13 NAT/IT/000728

Minimizzare l'Impatto del Randagismo canino sulla
Conservazione del lupo in Italia
2015-2020



METODI: CAMPIONI

▶ INVASIVI

- Pochi campioni
- Dati morfologici
- DNA di buona qualità
- Più marcatori molecolari
- Buon potere diagnostico



▶ NON-INVASIVI

- Tanti campioni
- No disturbo per l'animale
- DNA di scarsa qualità
- Pochi marcatori molecolari
- Minor potere diagnostico



METODI

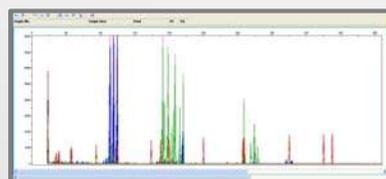
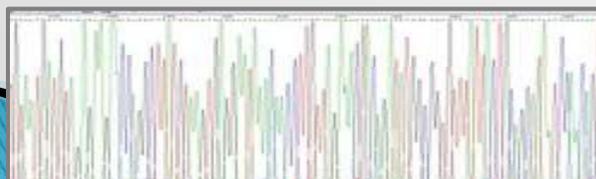
RACCOLTA, CONSERVAZIONE, DATABASE



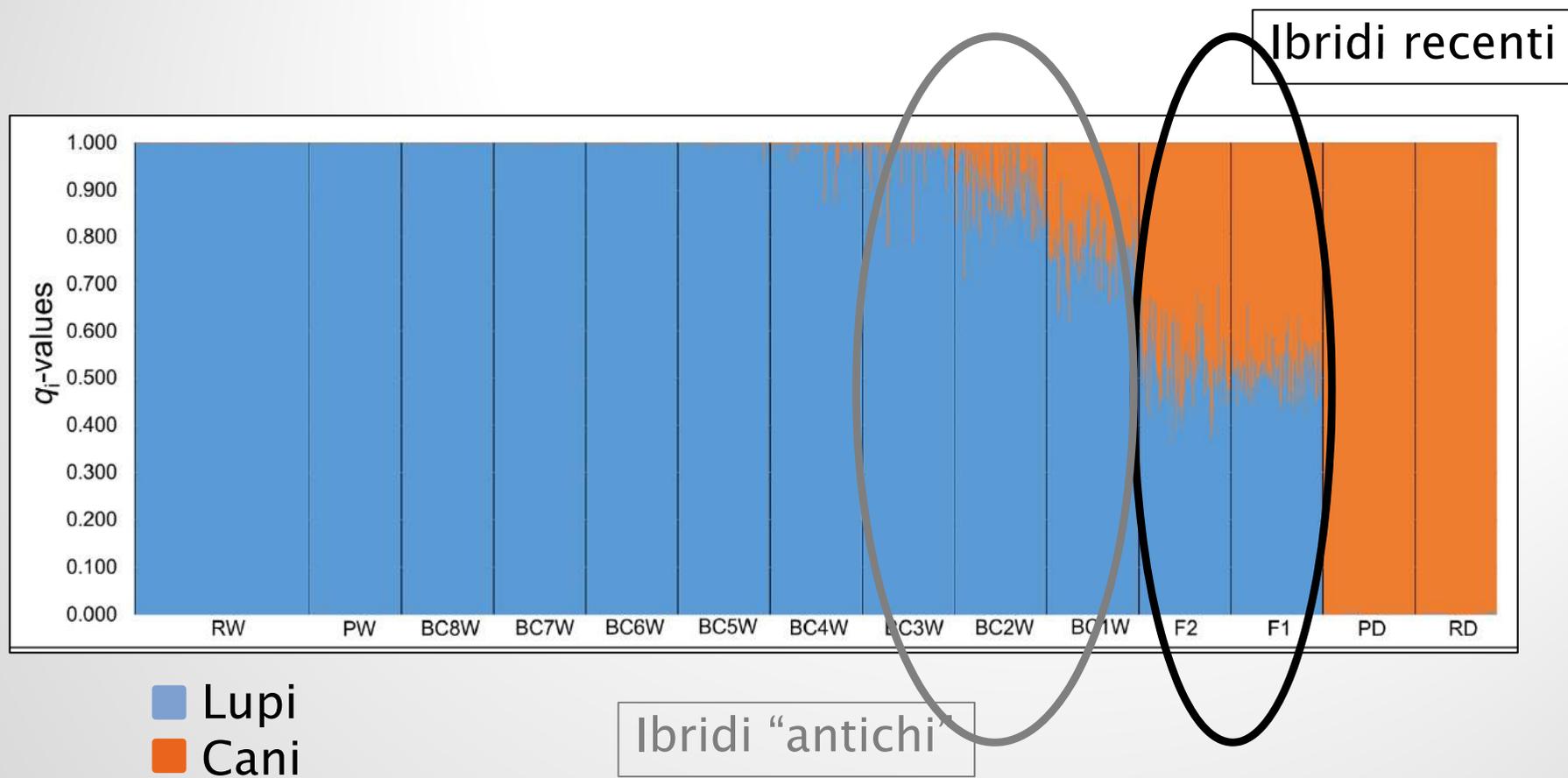
ESTRAZIONE E AMPLIFICAZIONE DEL DNA



ANALISI DEL DATO



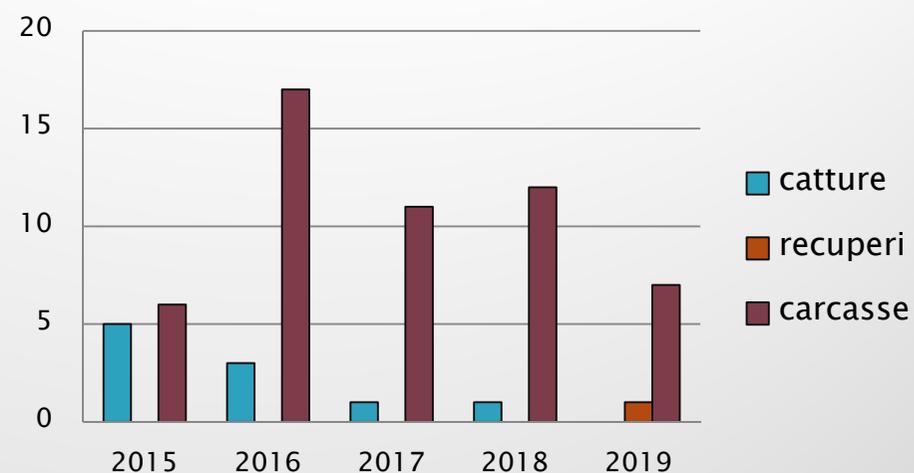
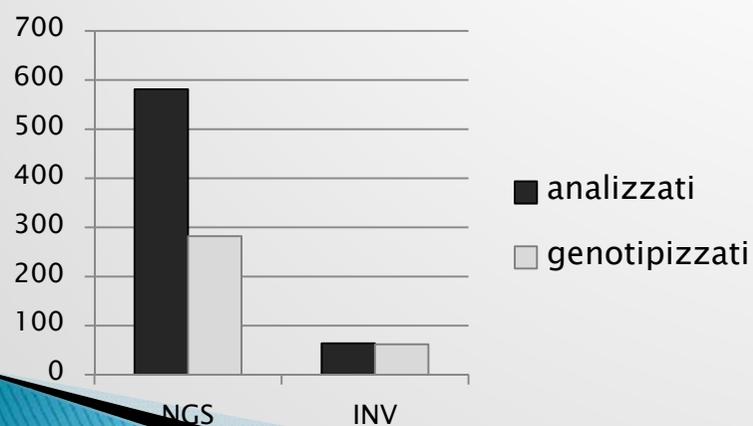
METODI: ASSEGNAZIONE DELLA SPECIE



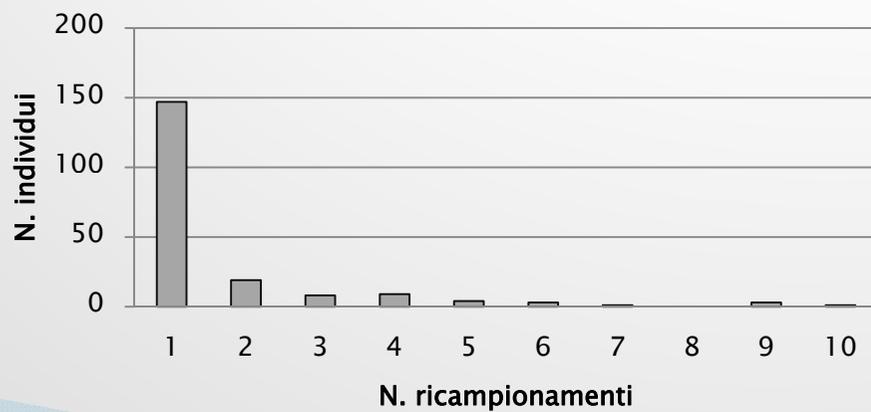
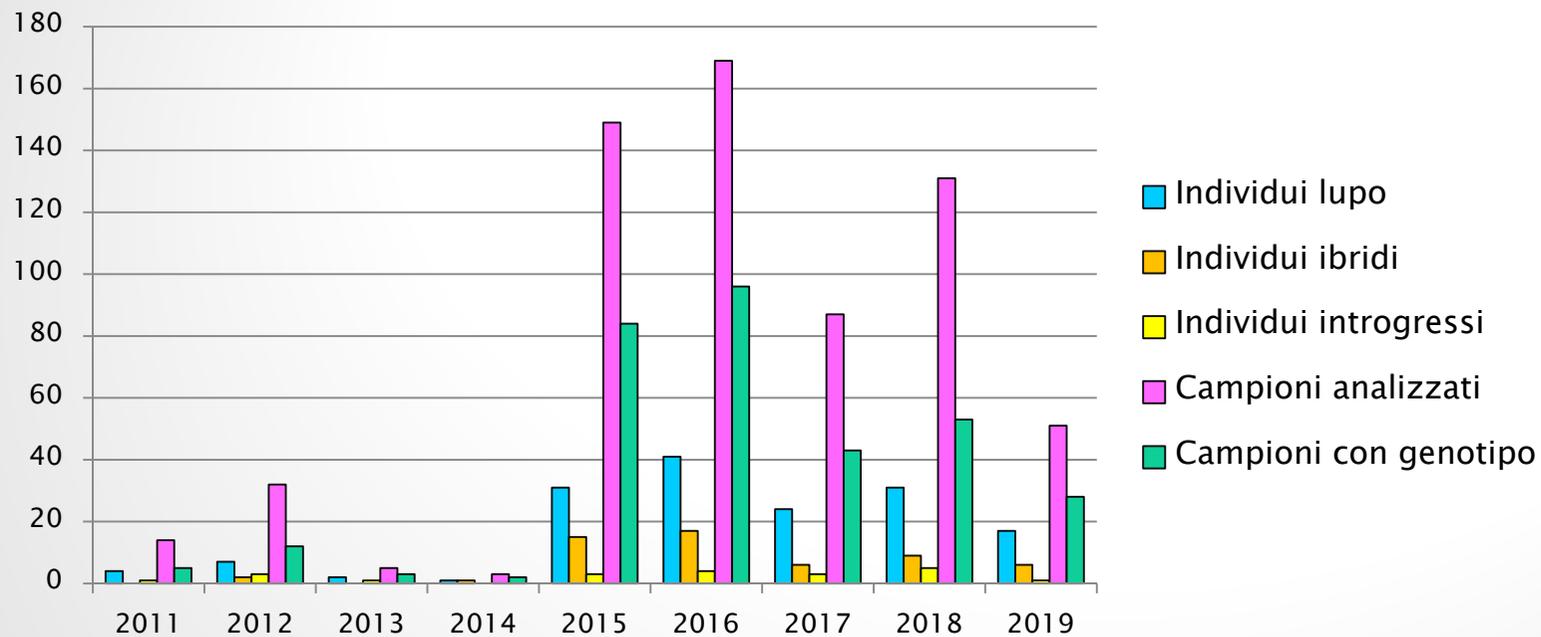
RISULTATI: PNATE



PNATE	TOTALE		NGS		INV	
	Campioni	Individui	Campioni	Individui	Campioni	Individui
Campioni analizzati	645		581		64	
Campioni NR	275 (42.6%)		275		0	
Campioni genotipo NR	25 (3.9%)		24		1	
Cane	18 (2,8%)	12	17	11	1	1
Lupo	213 (33%)	135	169	91	44	44
Ibridi	90 (13.9%)	45	83	38	7	7
Introggressi genetica	23 (3.5%)	18	13	9	10	9
Introggressi solo fenotipo	1 (0.1%)	1	0	0	1	1



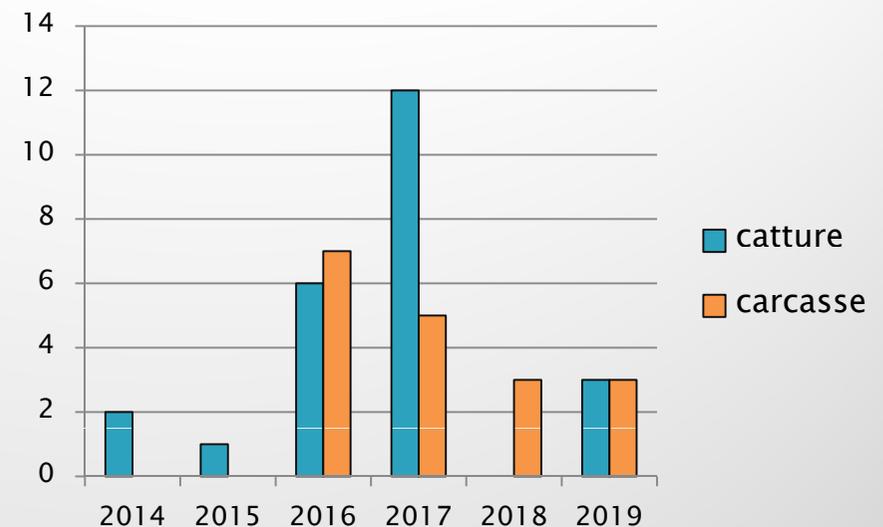
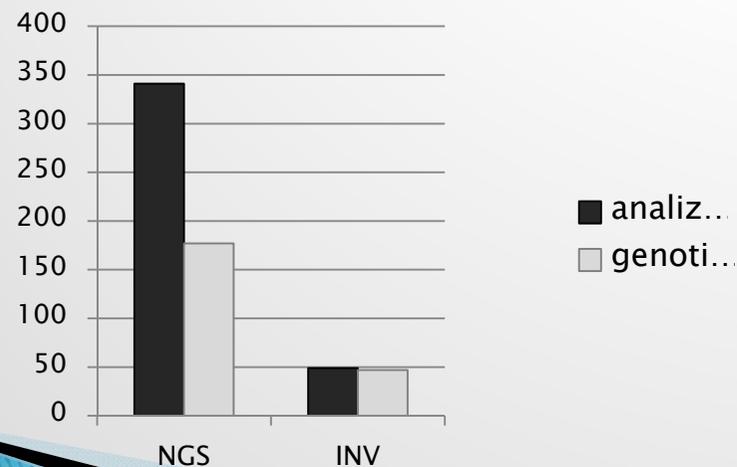
RISULTATI: PNATE



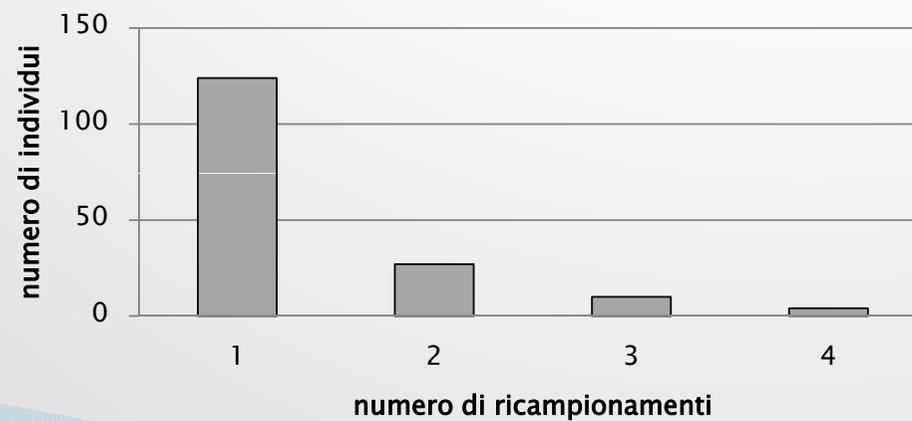
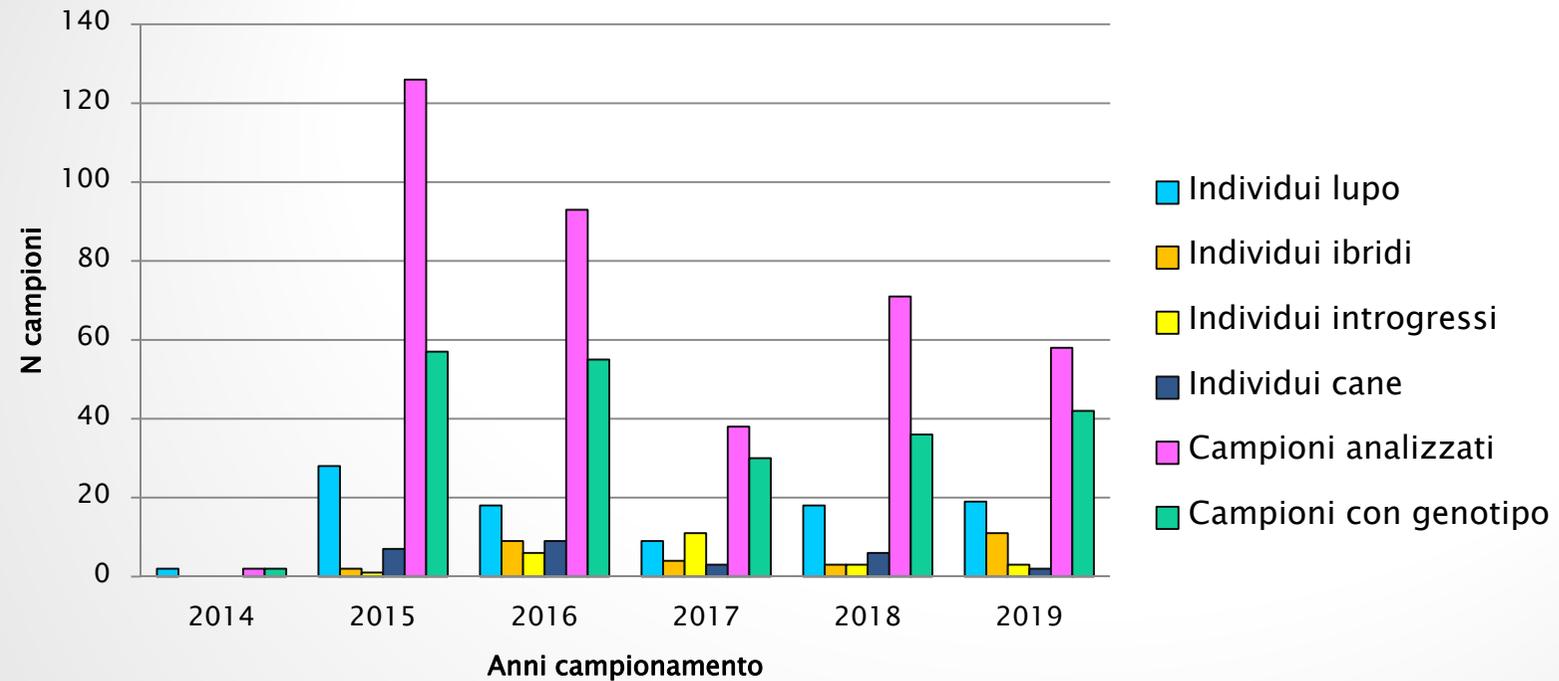
RISULTATI: PNGSL



PNGSL	TOTALE		NGS		INV	
	Campioni	Individui	Campioni	Individui	Campioni	Individui
Campioni analizzati	390		341		49	
Campioni NR	143 (36.6%)		141		2	
Campioni genotipo NR	23 (5.9%)		23		0	
Cane	28 (7.2%)	26	19	17	9	9
Lupo	132 (33.8%)	91	119	78	13	13
Ibridi	38 (9.8%)	29	28	21	10	8
Introggressi x genetica	26 (6.7%)	23	11	8	15	15



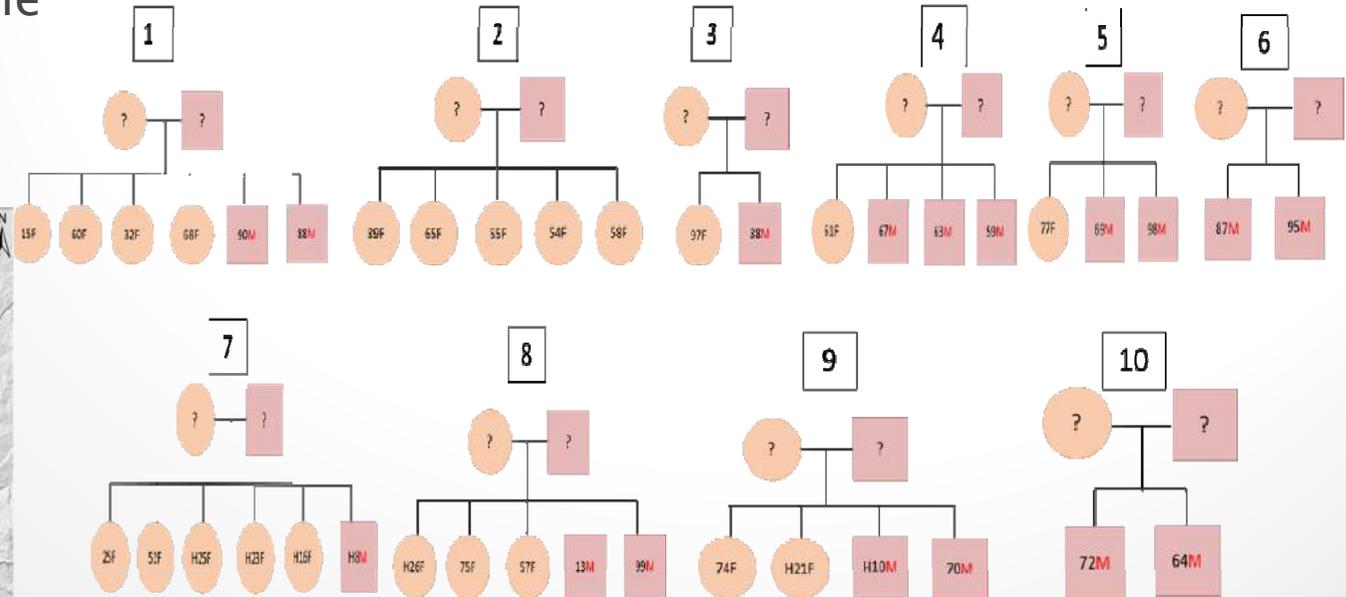
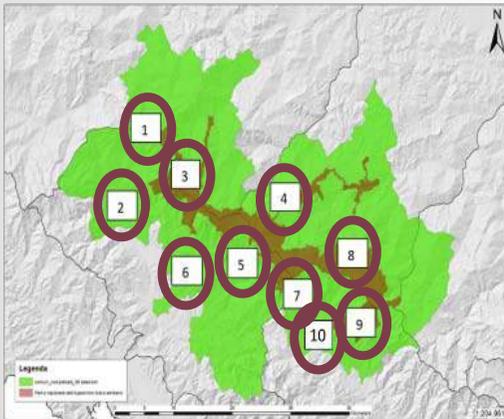
RISULTATI: PNGLS



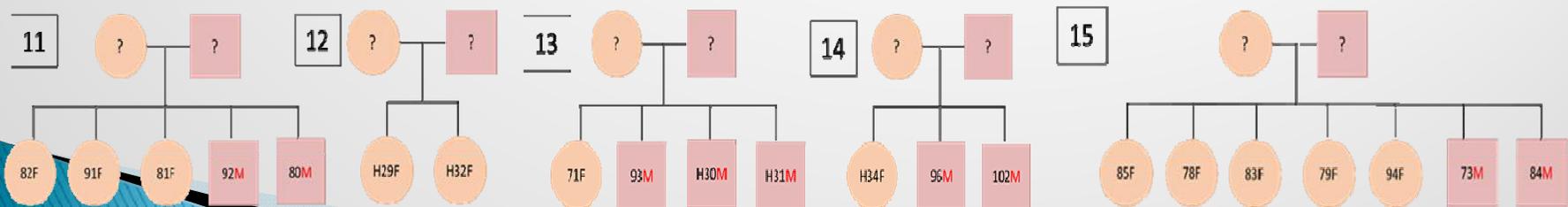
RISULTATI: NUCLEI FAMILIARI

- ▶ Identificati 15-17 possibili gruppi familiari

3 nell'area occidentale
 3 nell'area centrale
 4 nell'area orientale



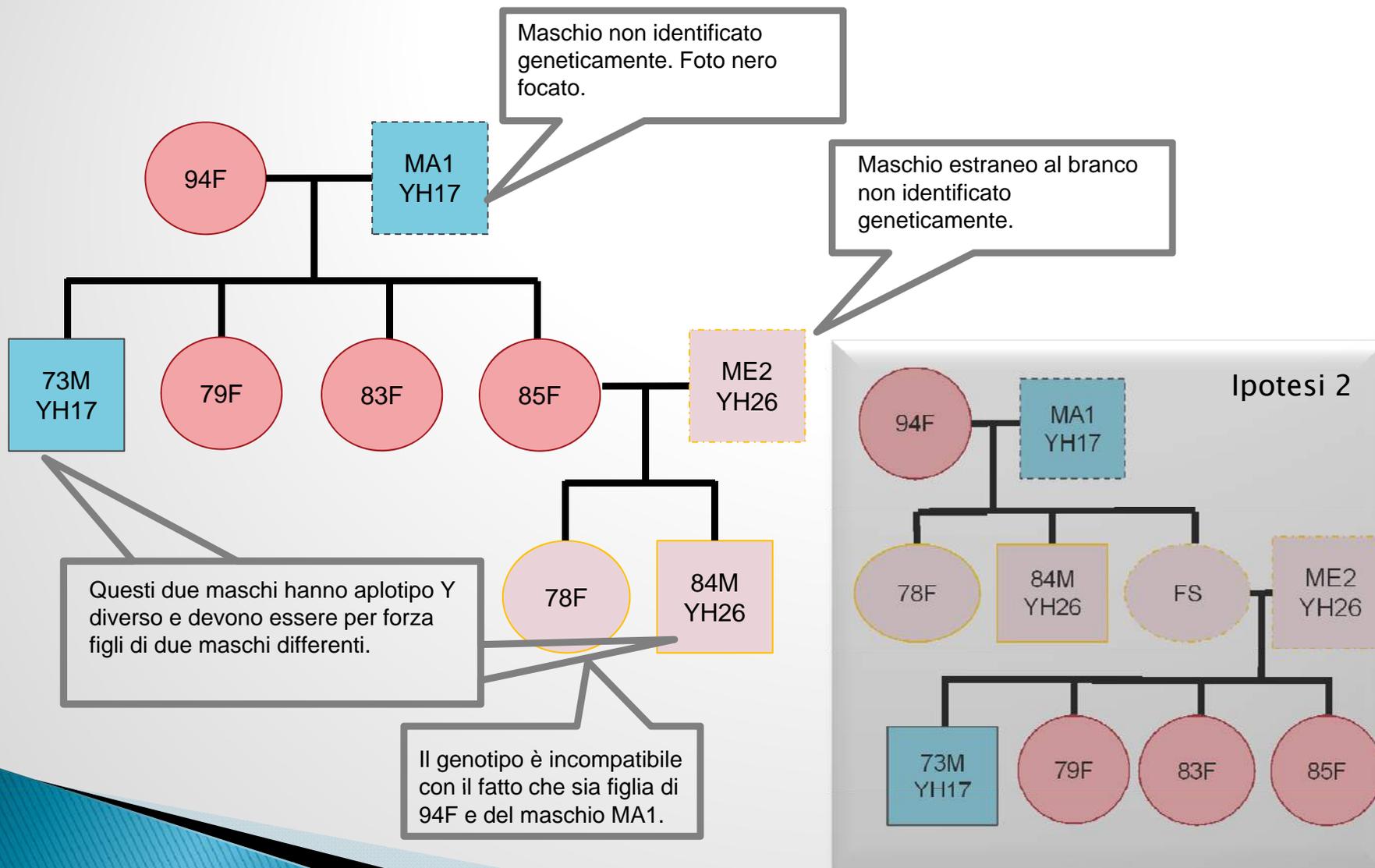
Altri 5 nuclei esterni all'area di studio principale



(Tesi di laurea Nicole Macri – UniBO)

RISULTATI: NUCLEI FAMILIARI

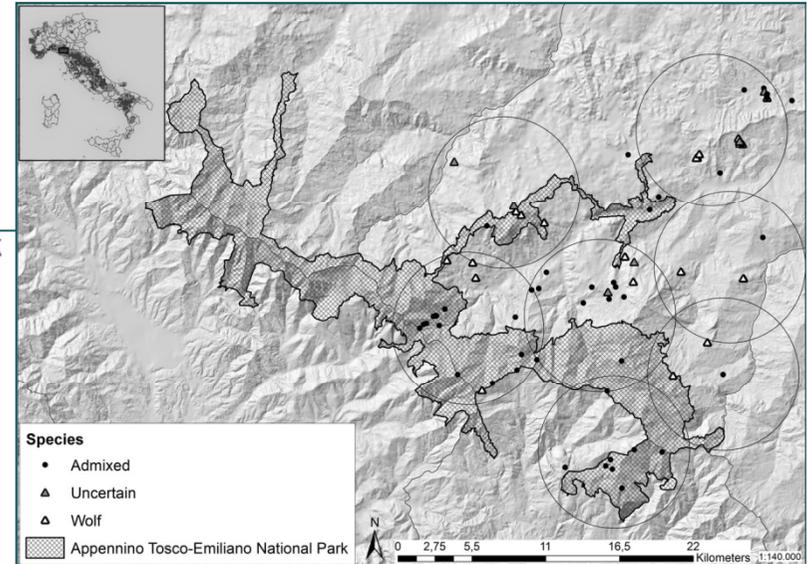
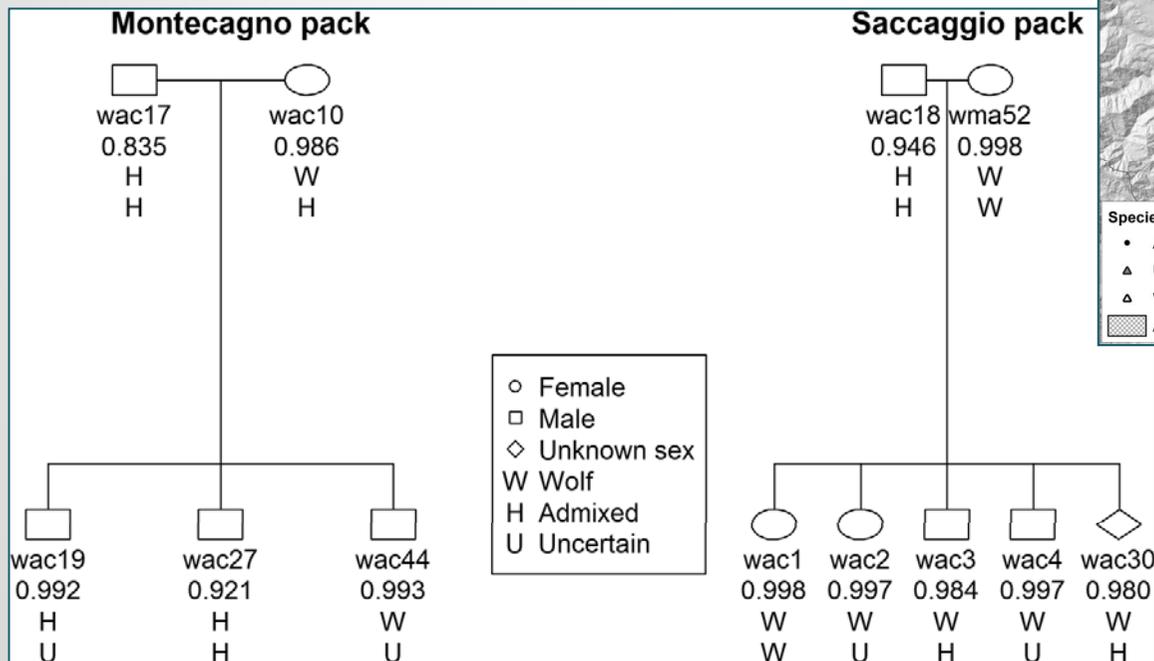
► Identificato caso di multipaternità



(Tesi di laurea Maria Chiara Contini – UniPR)

RISULTATI: NUCLEI FAMILIARI

- ▶ Monitorare ibridazione nei branchi: Santostasi et al. 2021



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UNIVERSITÀ DI ROMA

Collaborazione con Prof. Paolo Ciucci Università La Sapienza Roma

RISULTATI: COLLABORAZIONE SCIENTIFICA



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ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



<http://www.italian-journal-of-mammalogy.it>

doi:10.4404/hystrix-00183-2019

Research Article

Ethanol versus swabs: what is a better tool to preserve faecal samples for non-invasive genetic analyses?

Edoardo VELLI¹, Elena FABBRI¹, Marco GALAVERNI², Federica MATTUCCI¹

Received: 3 September 2018 | Accepted: 5 September 2018

DOI: 10.1002/ece3.4819



ORIGINAL RESEARCH

WILEY Ecology and Evolution

The Journal of Wildlife Management 1–16, 2021; DOI: 10.1002/jwmg.22038

Research Article

Estimating Admixture at the Population Scale: Taking Imperfect Detectability and Uncertainty in Hybrid Classification Seriously

Use of hidden Markov capture–recapture models to estimate abundance in the presence of uncertainty: Application to the estimation of prevalence of hybrids in animal populations

Nina Luisa Santostasi^{1,2} | Paolo Ciucci¹ | Romolo Caniglia³ | Elena Fabbri³ | Luigi Molinari⁴ | Willy Reggioni⁴ | Olivier Gimenez²

NINA L. SANTOSTASI^{1,2} Department of Biology and Biotechnologies "Charles Darwin", University of Rome La Sapienza, OLIVIER GIMENEZ, CEFE, CNRS, University of Montpellier, University Paul Valéry Montpellier 3, EPHE, IRD, Montpellier, France

ROMOLO CANIGLIA, Italian Institute for Environmental Protection and Research (ISPRA), Ozzano dell'Emilia, Italy

ELENA FABBRI, Italian Institute for Environmental Protection and Research (ISPRA), Ozzano dell'Emilia, Italy

LUIGI MOLINARI, Wolf Apennine Center, Appennino Tosco-Emiliano National Park,

WILLY REGGIONI, Wolf Apennine Center, Appennino Tosco-Emiliano National Park,

PAOLO CIUCCI^{1,2} Department of Biology and Biotechnologies "Charles Darwin", Un

Conservation at the individual level: successful rehabilitation and post-release monitoring of an Italian wolf (*Canis lupus italicus*) injured in a car accident

Carmela Musto^{1#}, Romolo Caniglia^{2#}, Elena Fabbri², Marco Galaverni³, Noemi Romagnoli¹, Stefania Pinna¹, Elisa Berti⁴, Marzia Naldi⁴, Emanuela Bologna⁴, Luigi Molinari⁵, Sara Del Magno¹, and Mauro Delogu^{1*}

CONCLUSIONI



- ▶ Multidisciplinarietà

... E PER IL FUTURO

- ▶ Network di laboratori
- ▶ Database nazionale
- ▶ Identificazione caratteri morfologici
- ▶ Nuovi marcatori molecolari



GRAZIE PER
L'ATTENZIONE...

...and back to
Conservation

