LIFE EURO LARGE CARNIVORES

Favorable Conservation Status of Iberian Lynx

¿Why shoud we estimate FCS?

1) Habitat Directive obligation:

2) European Commission ask for it on the Life Lynx-Connect evaluation

3) We need to define specific objectives and timeframe to maintain conservation efforts

How to aproach FCS/FRP?

1) FCS> species population on 1992

2) FRP>MVP ⟶ Red List UICN,

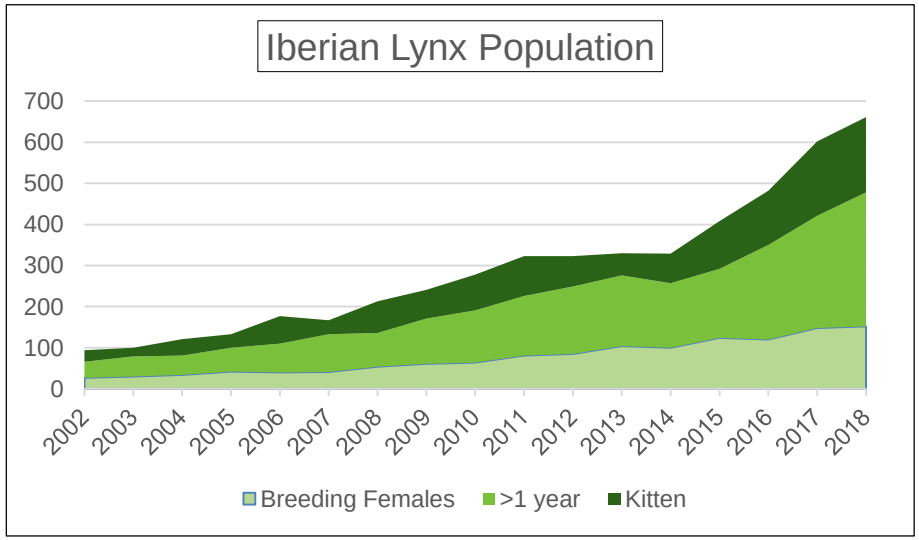
- Criterion E: extinction risk based on quantitative PVA with < 10% extinction risk in 100 years.
- Criterion D: FRP>MVP>1.000 mature individuals

3) FCS ca be said to be reached when population becomes closer to carrying capacity K than extinction. (N> K/2)

- *Guidelines for Population Level Management Plans for Large Carnivores in Europe. Preparde by Large Carnivore Initiative for Europe, July 2008*
- *(Epstein et al 2016)*

How to evaluate population trend?

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Breeding Females	27	30	34	42	40	41	54	61	64	81	85	104	100	124	120	148	152
>1 year	39	49	47	58	70	92	82	110	127	145	164	172	157	168	230	273	326
Kitten	28	21	40	33	67	34	77	70	87	97	74	54	72	116	132	181	183
Total	94	100	121	133	177	167	213	241	278	323	323	330	329	408	482	602	661



Simón 2013

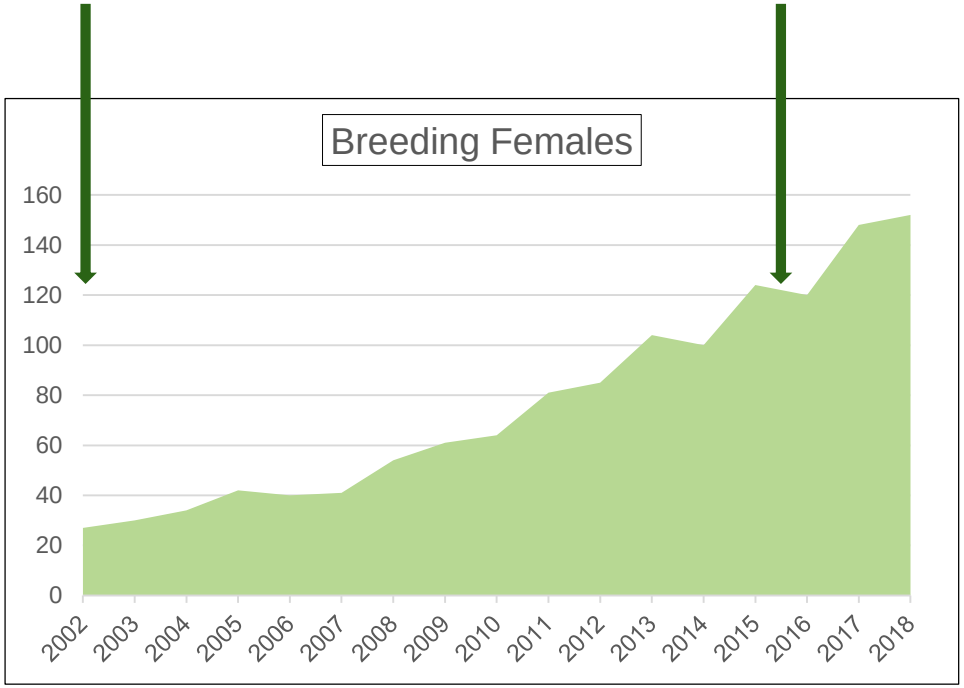
Rodriguez & Calzada 2015,2017)

Iberian Lynx actual status /UICN

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Breeding Females	27	30	34	42	40	41	54	61	64	81	85	104	100	124	120	148	152

2002 Critical Endangered.

2015 Endangered.

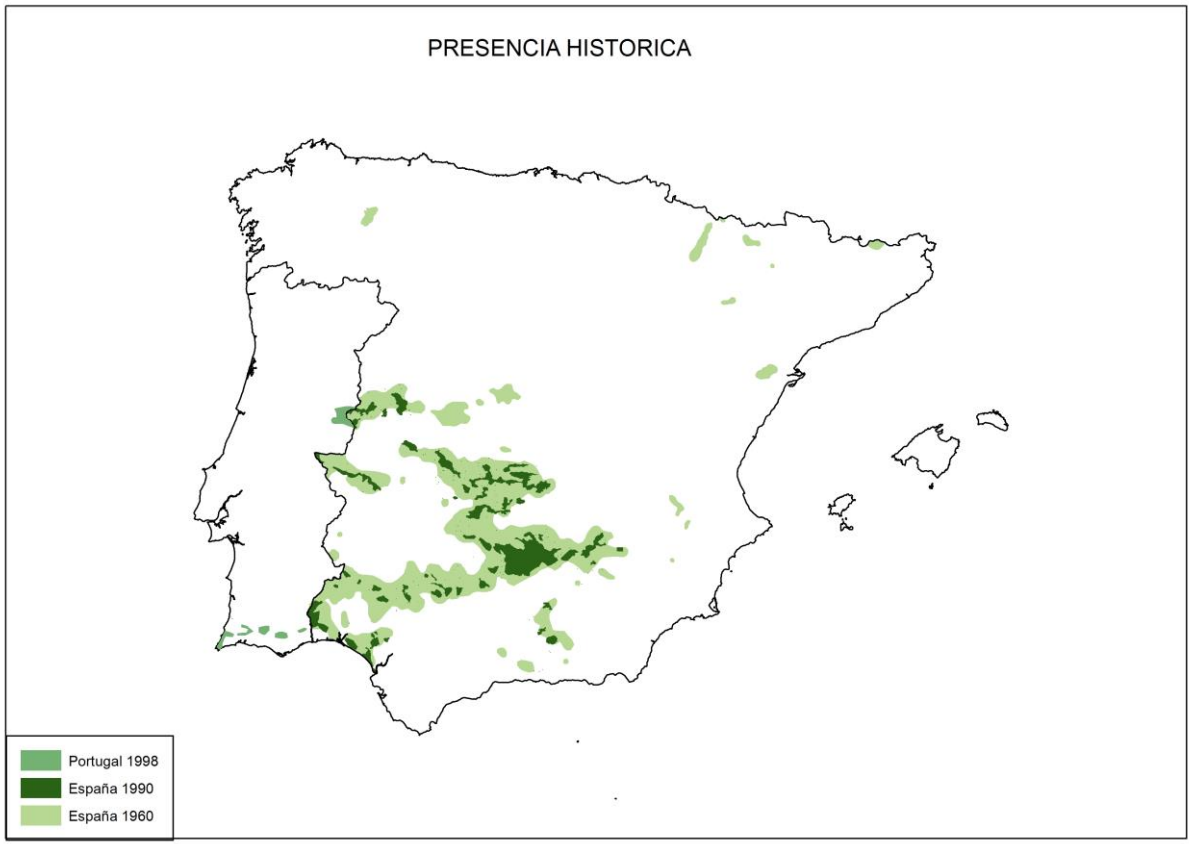


Simón 2013

Rodriguez & Calzada 2015,2017)

FCS Minimum values

1) FCS> species population on 1992: **Iberian Lynx status in 1992**



FCS Minimum values

1) FCS> species population on 1992: **Iberian Lynx status in 1992**

1992	Spain (1)	Portugal (2)	Total
>1 year	1136 (880-1150)	43 (40-53)	1179 (920-1203)
Breeding Females (3)	350 (330-432)	17 (15-20)	367 (345-452)
Surface (Km2)	14569	2400	16969

(1) Rodriguez, A. y Delibes, M. El lince ibérico (*Lynx pardina*) en España. Distribución y problemas de conservación. Colección Técnica, ICONA, Madrid; 1990.

(2) Ceia, H. et al. (1998). Lince-ibérico em Portugal. Bases para a sua conservação. Relatório final do Projeto "conservação do lince-ibérico" ICNF/LIFE programme. Unpublished internal report.

(3) Breeding females: in Spain we used the estimate given by Delibes, other number are calculated by Nº individuals >1 years/ per territory (calculate with Iberian lynx monitoring data 2002-2018)

FCS Minimum values

2) FCS>MVP Red List UICN,

- Criterion E: extinction risk based on quantitative PVA with < 10%

There is some PVA done, but MVP is not calculated.

Different data-models = different results.

We have very good data on population parameters, including genetics.

FCS Minimum values

2) FCS>MVP Red List UICN,

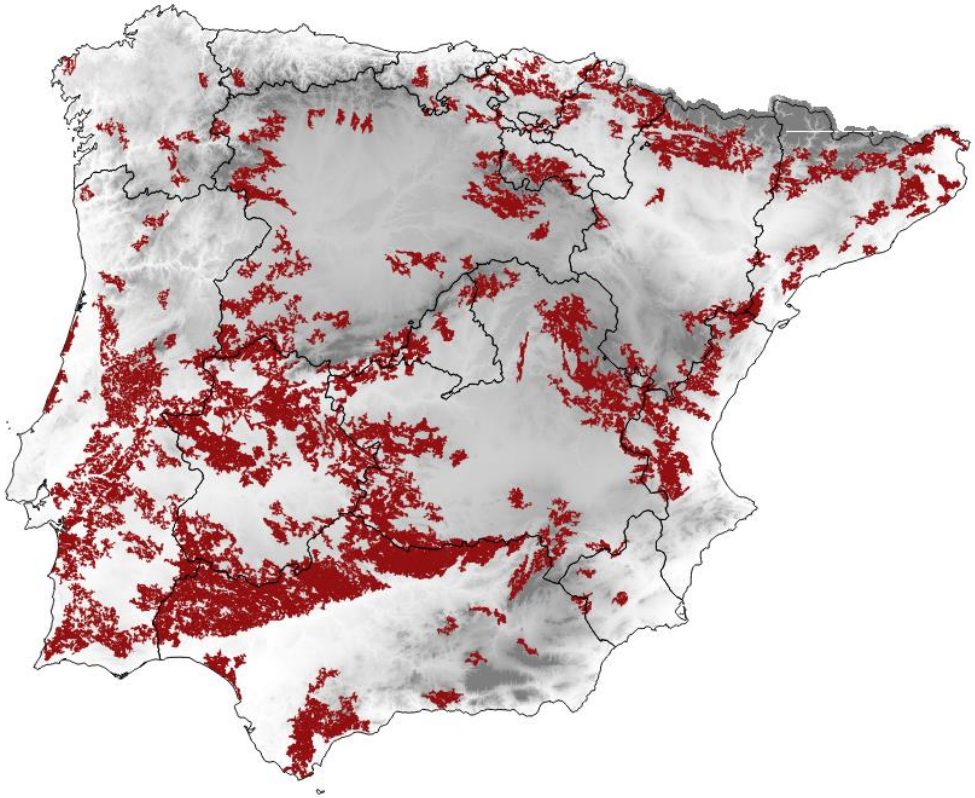
- Criterion D: FCS>MVP>1.000 mature individuals
- 500 breeding females
- How much is “distance from some favourable state”?

- **750 Breeding females???**

Iberian Lynx FCS; hier values?

3) FCS = (N> K/2)

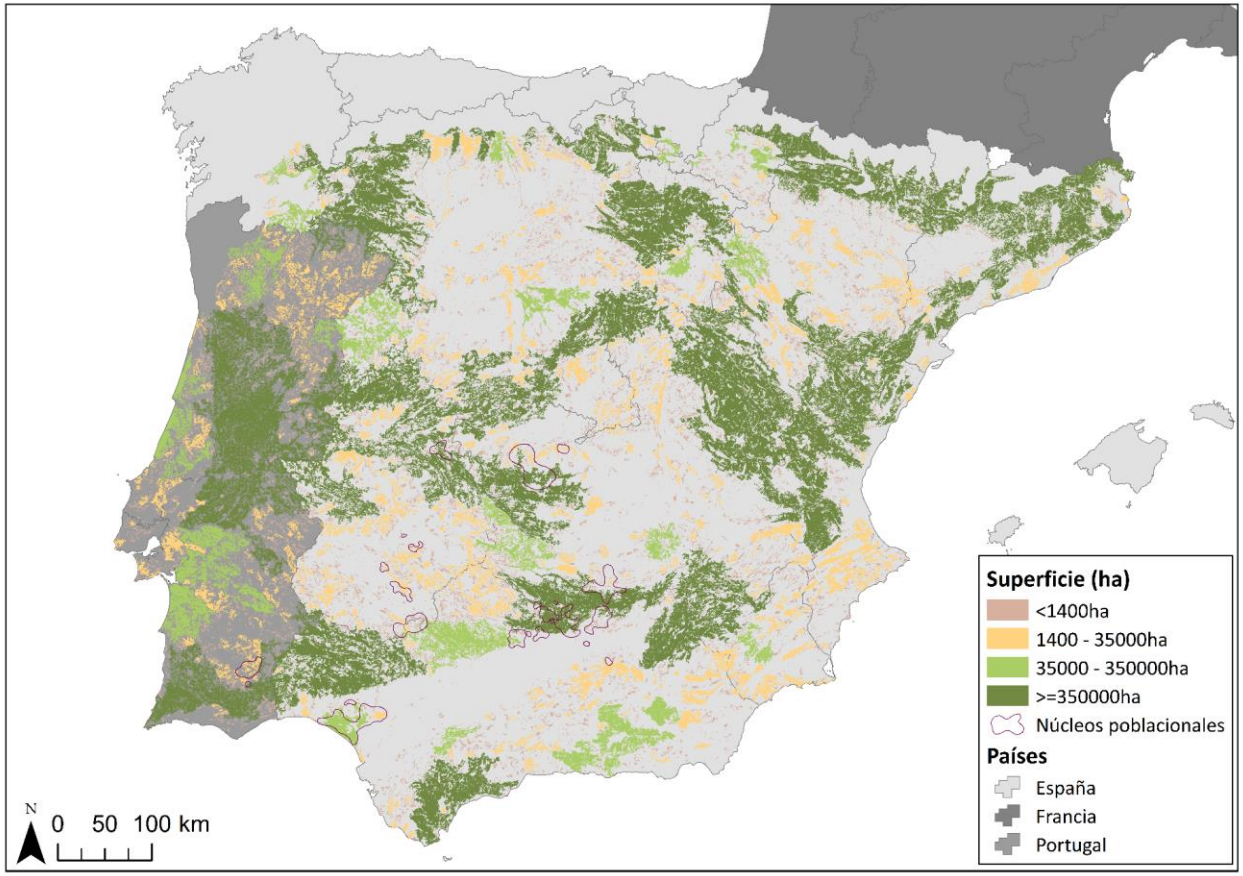
Suitable habitat in big patches 10.786.100 Ha



Iberian Lynx FRP; hier values?

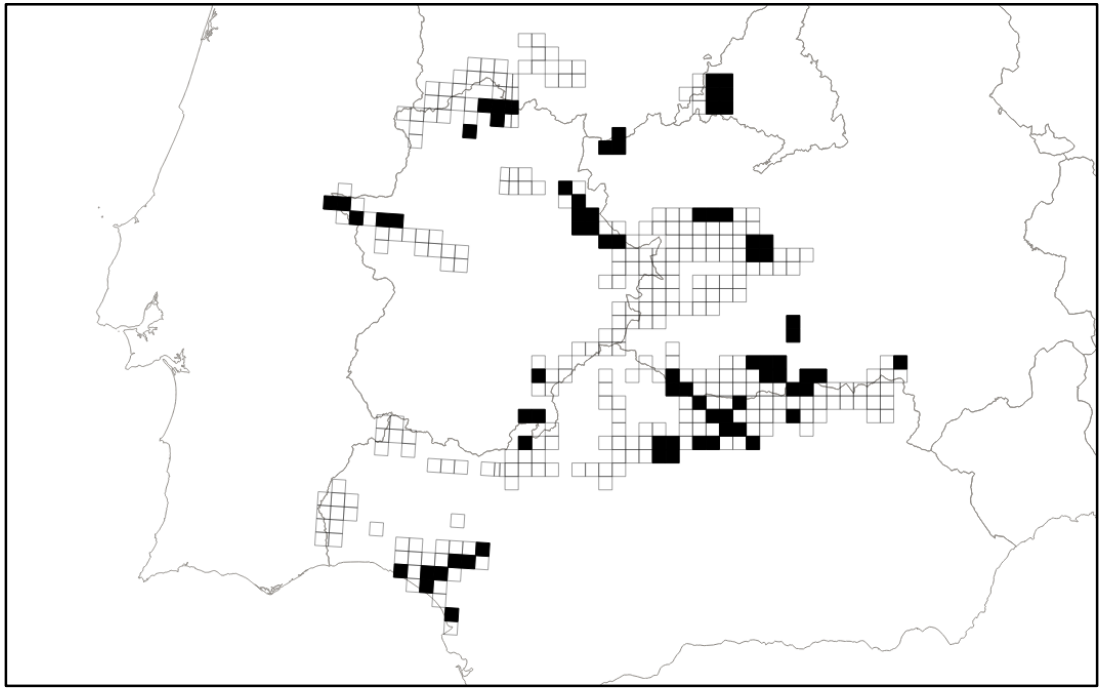
3) FCS = (N> K/2); Different models

Total suitable habitat 19.369.442Ha



How do we stimated cariyin capacty?

Prey density: Lynx is a rabbit predator specialist



Lynx national census 2002; 0,18 Surface of 1992 lynx surface with good rabbit density

Garrote et al. in Press

How do we stimated cariyin capacty?

Prey density: Lynx is a rabbit predator specialist

Breeding female territory size = f(rabbit density)

	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	1796,919	182,180	9,863	< 2e-16
IKA	-28,166	7,767	-3,626	0.000388

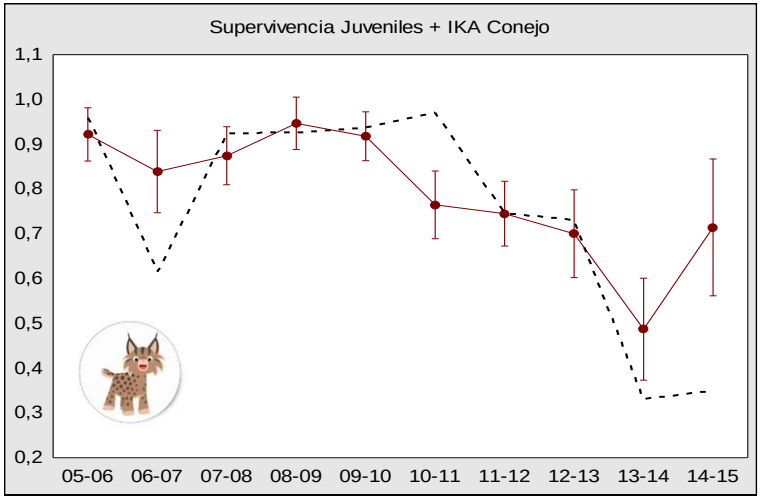
Nº of cubs = f (N-1 rabbit density)

	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	0,119	0,115	1040,000	0,300
IKA N-1	0,013	0,005	2456,000	0,015

Already supported by Monterroso et al. 2016

How do we stimated cariyin capacty?

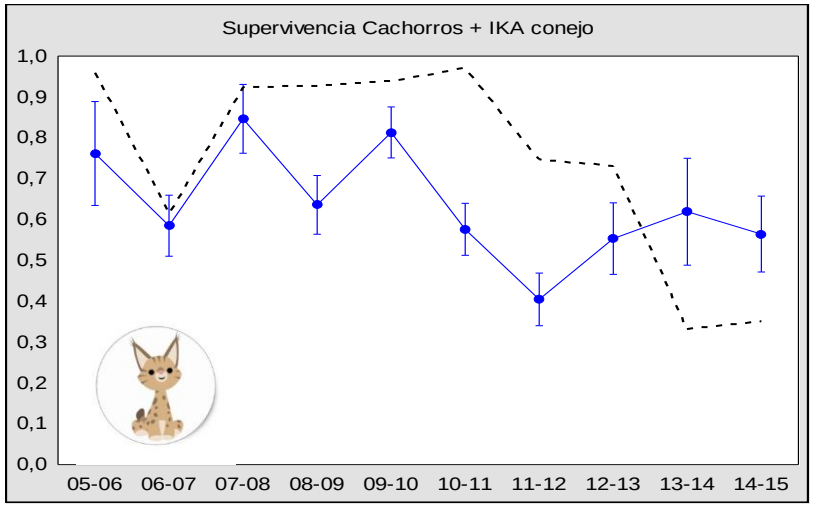
Prey density: Lynx is a rabbit predator specialist



VARIA en el tiempo

Supervivencia Vs Abundancia conejo

y = 0,019x + 0,457 R² = 0,604 P=0,008



VARIA en el tiempo

GLM : Conejo + densidad de cachorros
Conejo (+) (p=0.003)
Densidad cachorros (-) (p=0.005)

How do we stimated cariyin capacty?

- Breeding female medium territory size
- Presence surface of Iberian lynx/ nº of breeding females

Population	Lynx Presence surface/ nº of breeding Females	Breeding Female surface
Andujar	709	1.270
Doñana	2.091	1.267
Guadalmellato	1.174	3.390
Guarrizas	2.087	2.003
Vale do Guadiana	4.747	1.100
Matachel	5.768	1.019
Montes de Toledo	6.006	1.290
SMO	8.338	1.562
Medium	3.865	1.613
Value Used	1.400	1.269

Iberian Lynx FCS; hier values?

With a total suitable habitat of 10.786.100 Ha.

Female territory surface = 500 ha	ECF= 10.786
“With Rabbit”	ECF= 1.941
Female territory surface = 1268 ha	ECF= 4.253
“With Rabbit”	ECF= 766
Presence S/ nº B Females = 1400 ha	ECF= 3.852
“With Rabbit”	ECF= 693

Objectives

SMART: Specific; Measurable; Ambitious/ achievable; Relevant; Tim.

Crema: Con fecha; ***Realista (concreto); Especifico; Medible***; Ambicioso Alcanzable

FCS; LC	>750 breeding females
Near Threatened	>500 breeding females
1992	>367 breeding females
Vulnerable	>125 breeding females

Timeframes

Vulnerable >125 breeding females 2022

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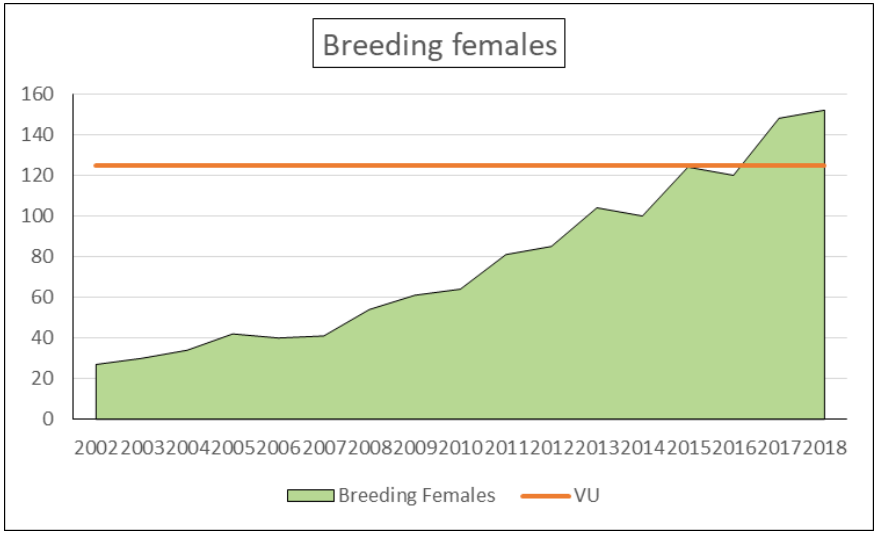
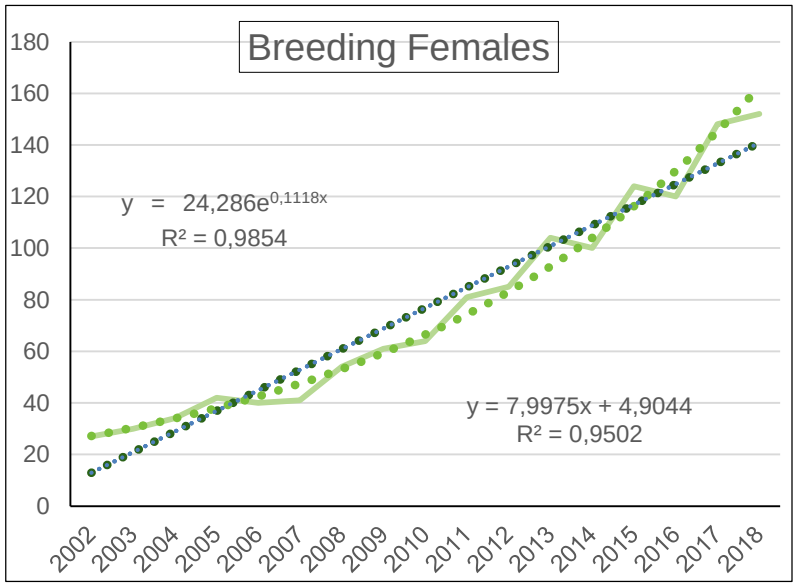
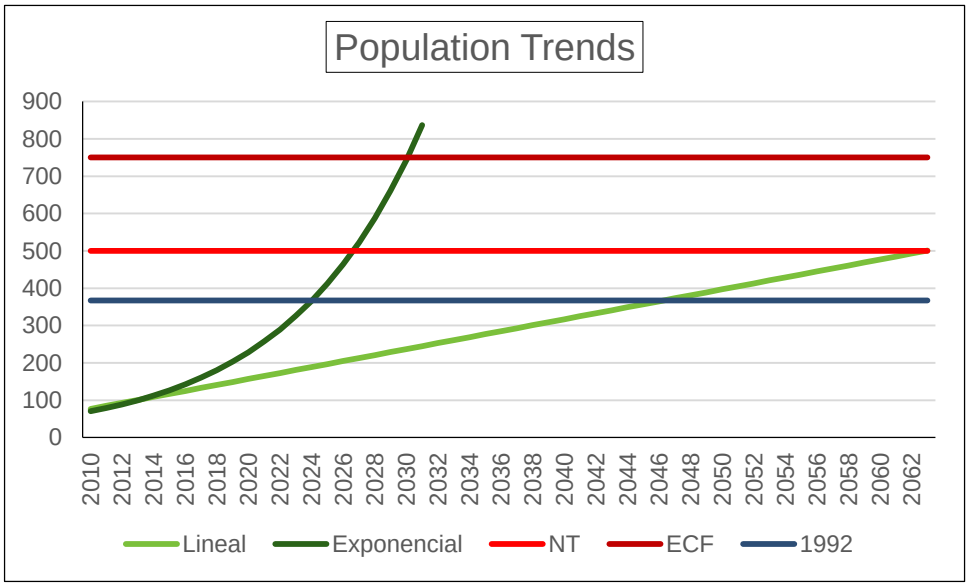


Timeframes

Total Populations Trend

1992	>367 breeding females	2025/2047
Near Threatened	>500 breeding females	2027/2063
FSC; LC	>750 breeding females	2031/2094

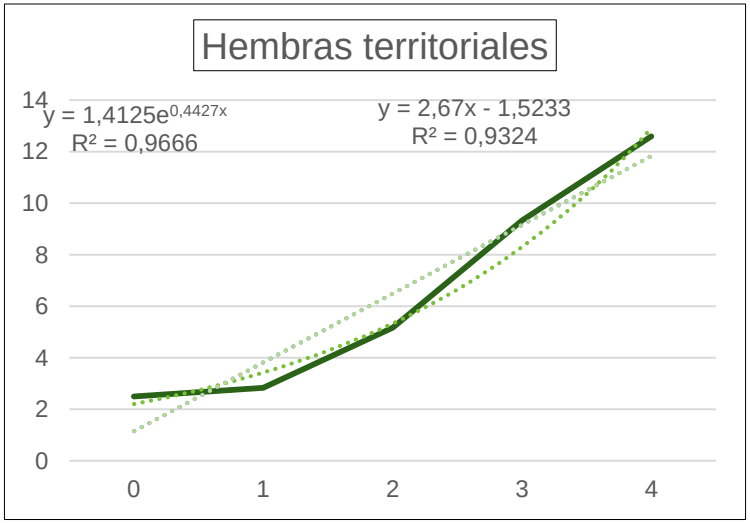




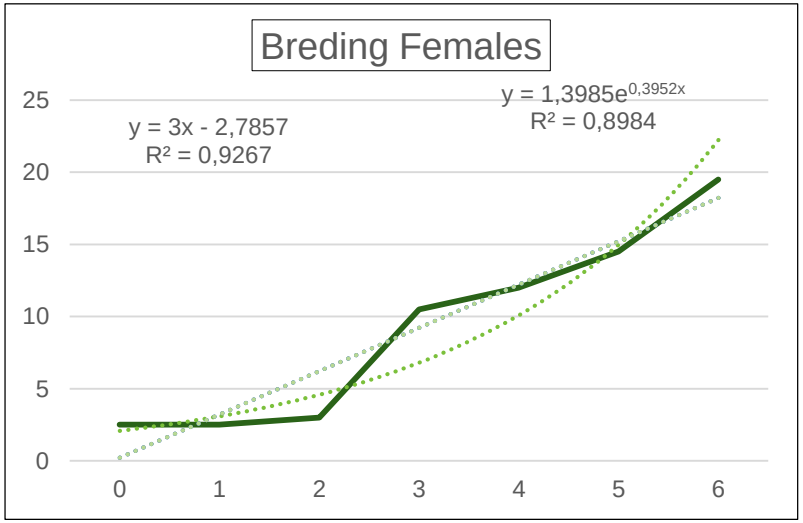
Timeframes

Evolution per population

Doñana and Andujar- Cardeña have reached their carrying capacity (25 and 50 breeding females)



All 6 reintroduced populations

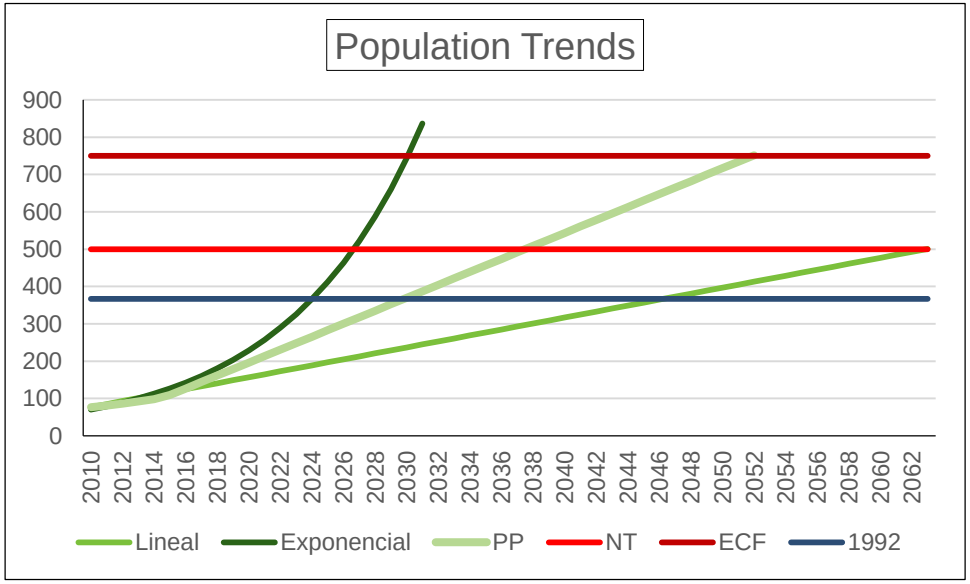


Guarrizas and Guadalmellato

Timeframes

Sum of populations trend without threshold carrying capacity

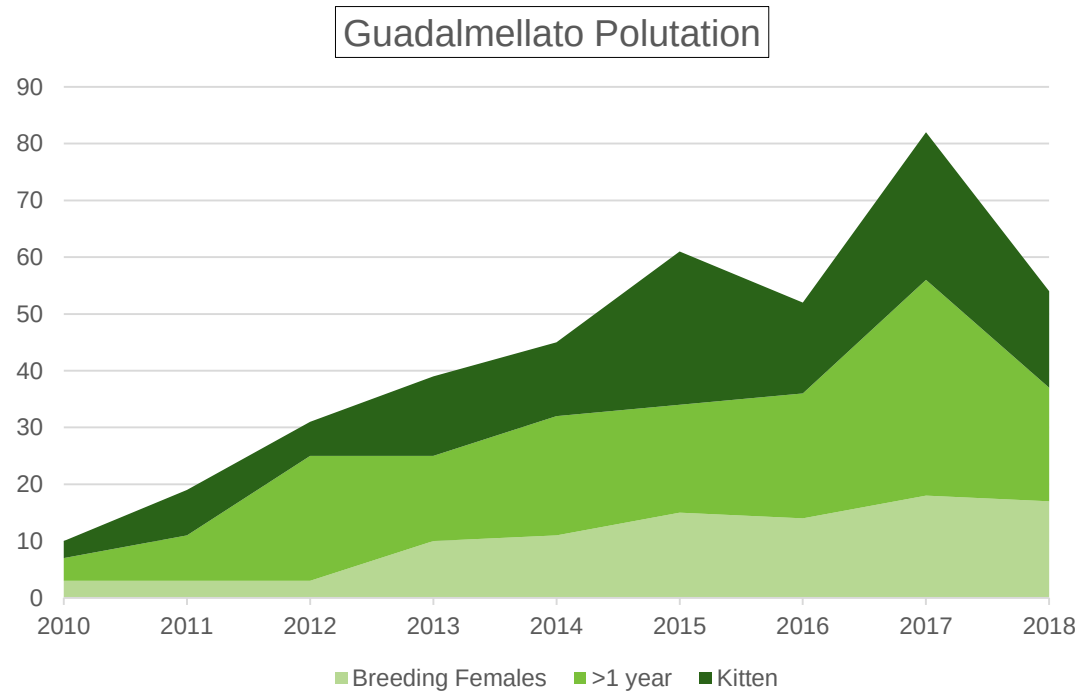
1992	>367 breeding females	2030
Near Threatened	>500 breeding females	2038
FSC; LC	>750 breeding females?	2052



Timeframes

Carriyin capacty per population

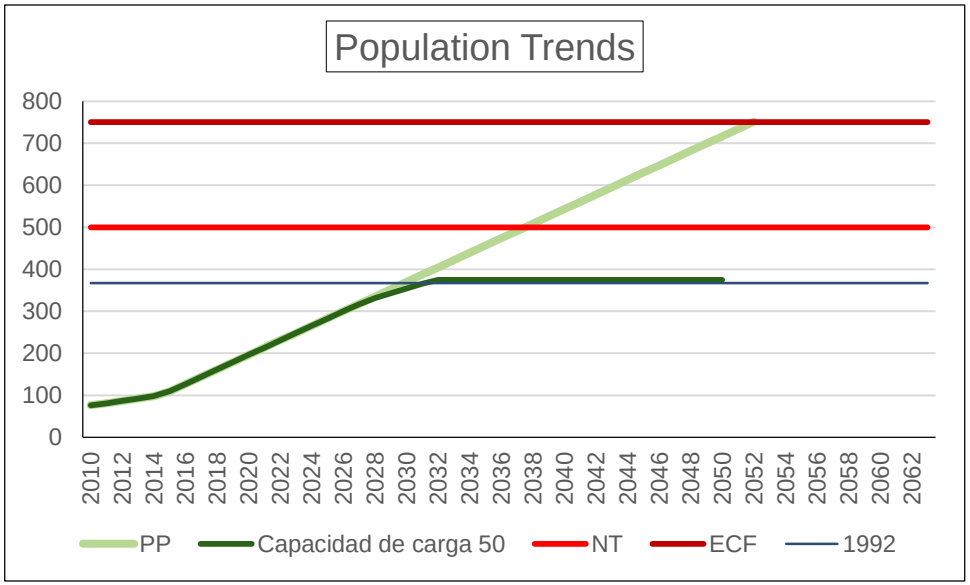
Human carrying capacity



Timeframes

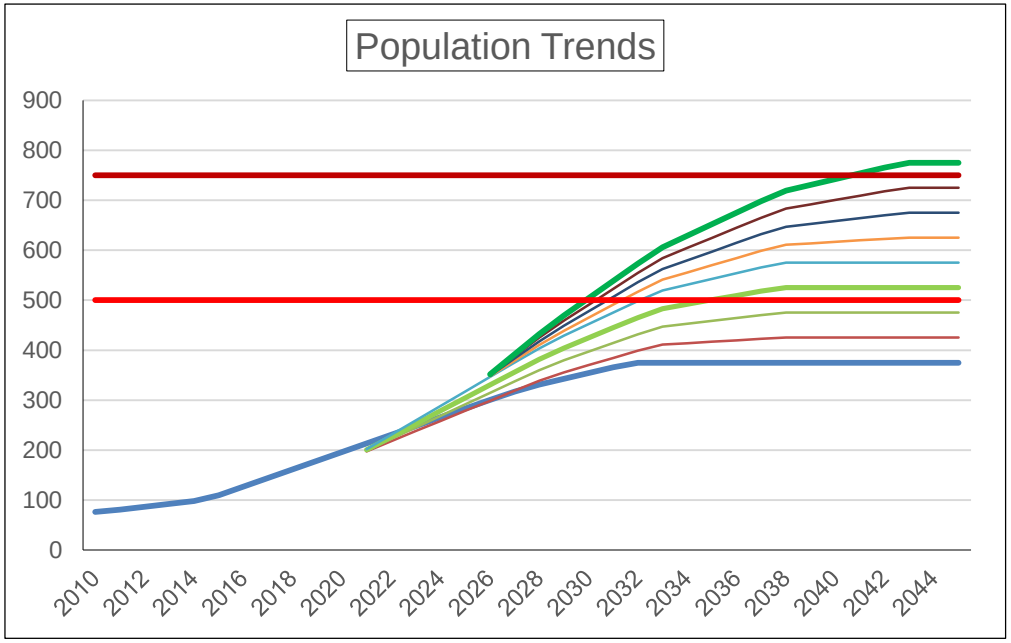
Sum of populations trend without a threshold carrying capacity of 50 breeding females

1992	>367 breeding females	2032
Near Threatened	>500 breeding females	Never
FCS; LC	>750 breeding females?	Never



Timeframes

NT	>500 breeding females	2035; >3 new Populations
FCS	>750 breeding females	2041; >8 new Populations



Some needs

To reach this objective we will need to reintroduce lynxes:

- 4 new populations in 2021 (8 per population - year)
- 4 new populations in 2025 (8 per population- year)
- Genetics reinforcement. (1-2 per population)

A total of:

40 Lynxes from 2020 to 2030
32 Lynxes from 2030 to 2040

Final proposal

By 2040 FCS for Iberian lynx is reach, with at least 750 breeding females living in connected populations.

This will include FCS for both, Spain and Portugal

Milestones:

By 2022 Lynx is down-listed to Vulnerable by the UICN

By 2030 Lynx has reach the population status when the Habitat directives come into force; with at least 367 breeding females

By 2035 Lynx is down-listed to Near threatened by the UICN

Conclusions

- **Iberian Lynx conservation work IS NOT DONE.**
- **Iberian Rabbit census has to be developed.**
  To have better management and to have better models
- **Minimum Viable Population should be calculate.**
  Vortex workshop? Genetics should be included
- **New populations are probably needed.**
  Captivity breending centers should be maintened
  New gobernments should *board the ship*

Thanks

Gracias

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