

**Population Viability Analysis of some
key Egyptian Vulture populations -
what are they telling us?
Review of the knowledge**

Metodija Veleviski

Macedonian Museum of Natural History/Macedonian Ecological Society

Introduction to Population Viability Analyses

- PVA = estimation of probability of survival of the population for a certain time period
- PVA task = assess the probable future status of a population or group of population that requires conservation
- PVA = useful technique to identify the most important demographic parameters of a population
- Very useful in comparing different management scenarios
- Requires lots of data – usually done when species becomes rare – data are difficult to gather!
- Stochastic – deals with probabilities of survival, sex at birth, productivity rates and effect of catastrophes on virtual individuals

The species life history

- Long-lived
- territorial
- strong natal philopatry
- long-distance migrant
- slowly reproducing
- opportunistic in diet

Studies

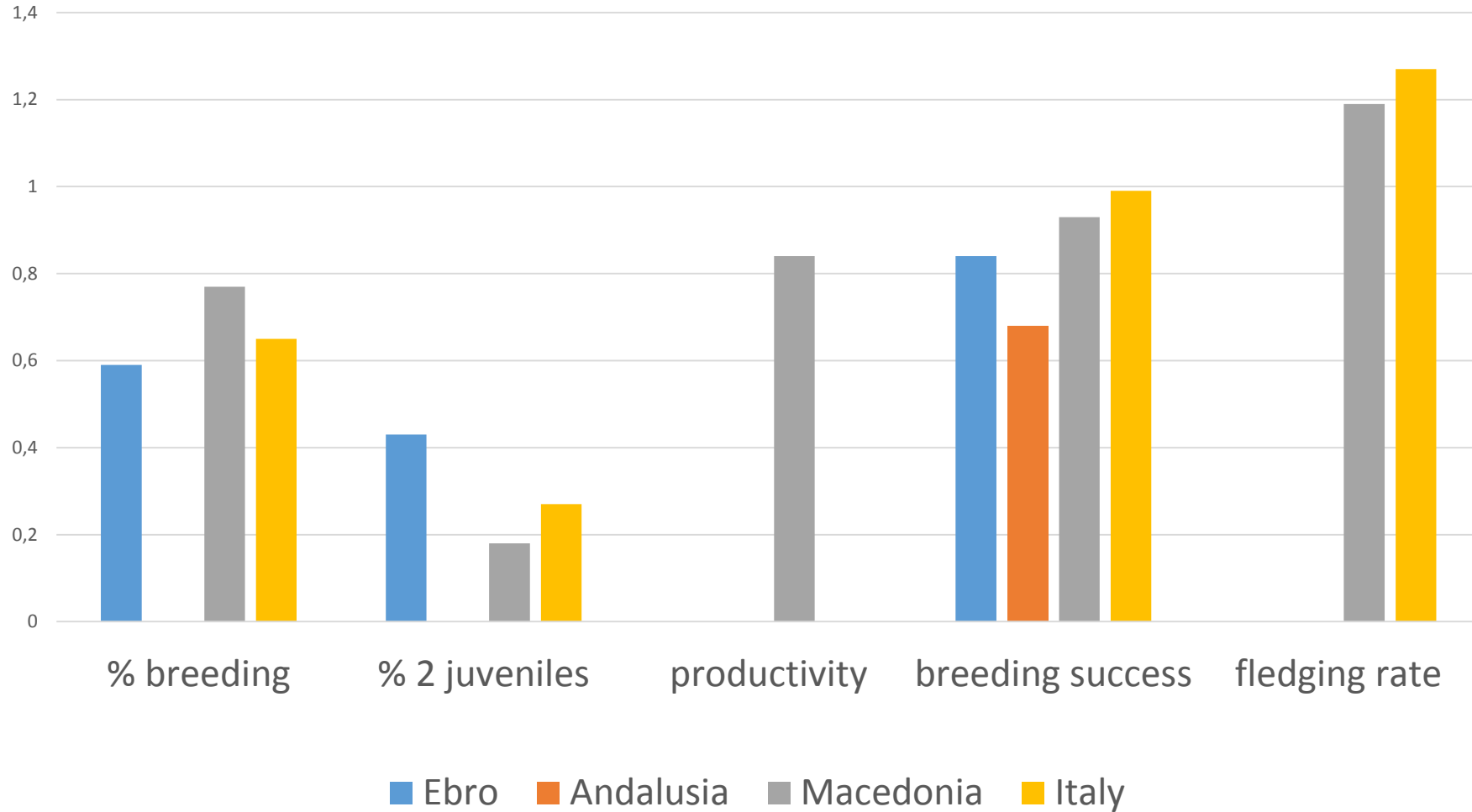
- Ebro Valley, Spain (Grande, 2006) – Vortex
- Italy (Andreotti & Leonardi, 2009) – Vortex
- The Strait of Gibraltar, Spain (Carrete et al. 2009) – Vortex
- Spain, 5 subpopulations (García-Ripollès & López-López 2011) - Vortex
- Macedonia (Velevski et al. 2014) – Vortex
- Andalusia, Spain (Sanz Aguilar et al. 2015) – custom-built model

Data input & knowledge

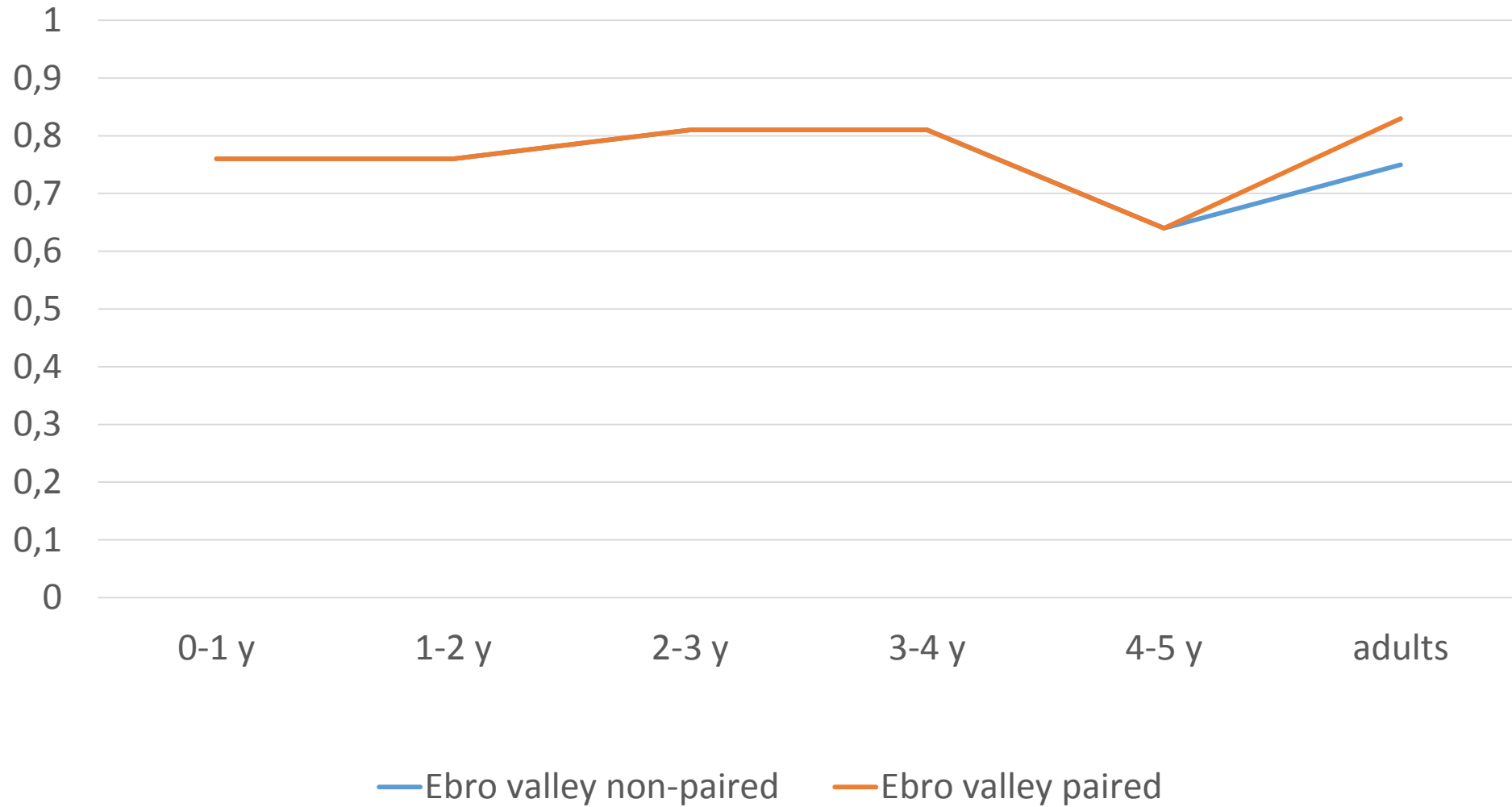
- Long-lived (25 y)
- breeding age 6 y (10 y!)
- monogamous
- sex ratio at birth 1:1
- maximum progeny = 2
- Stable age distribution
- No genetic management, harvest, etc...



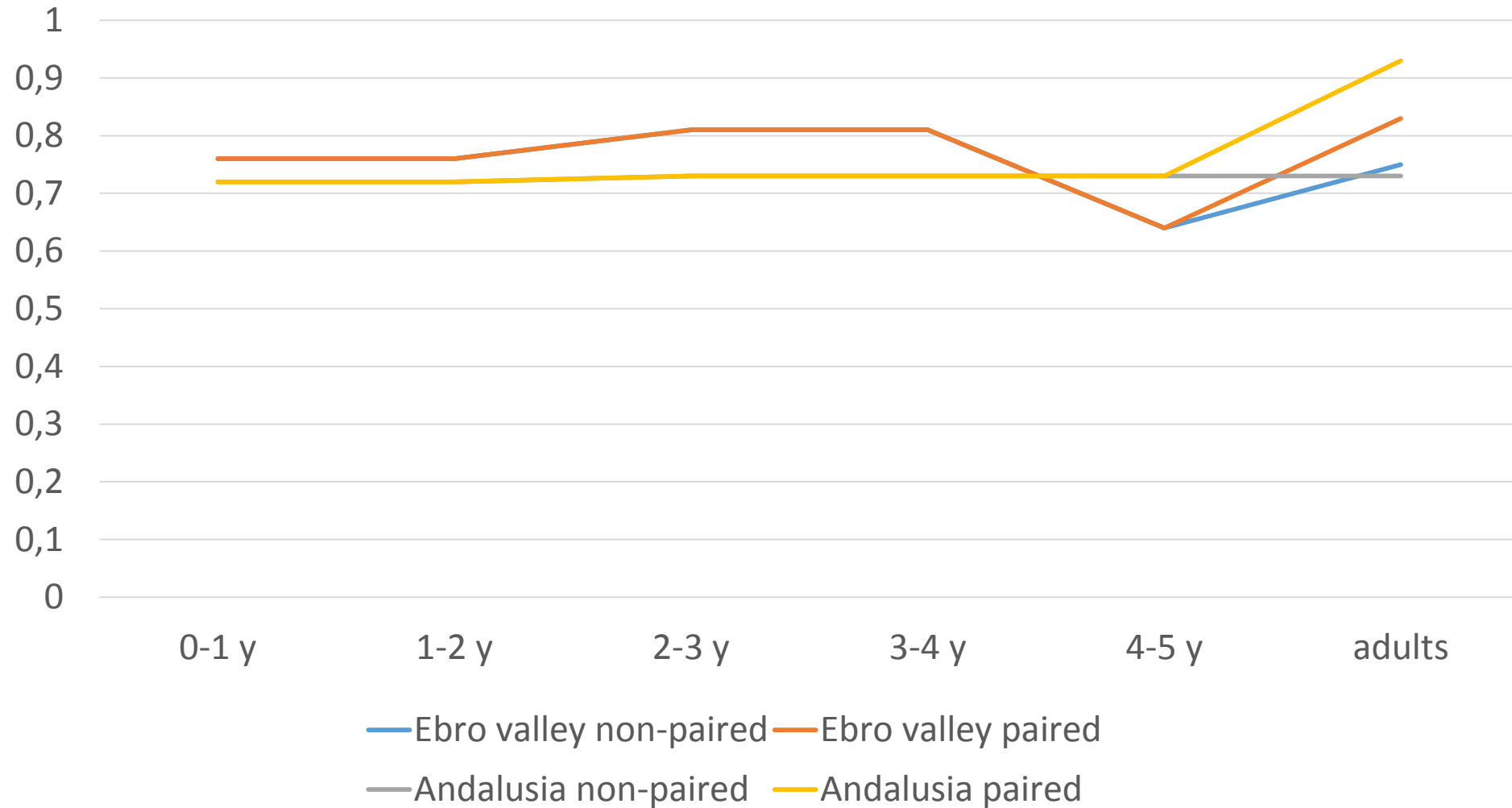
Productivity parameters



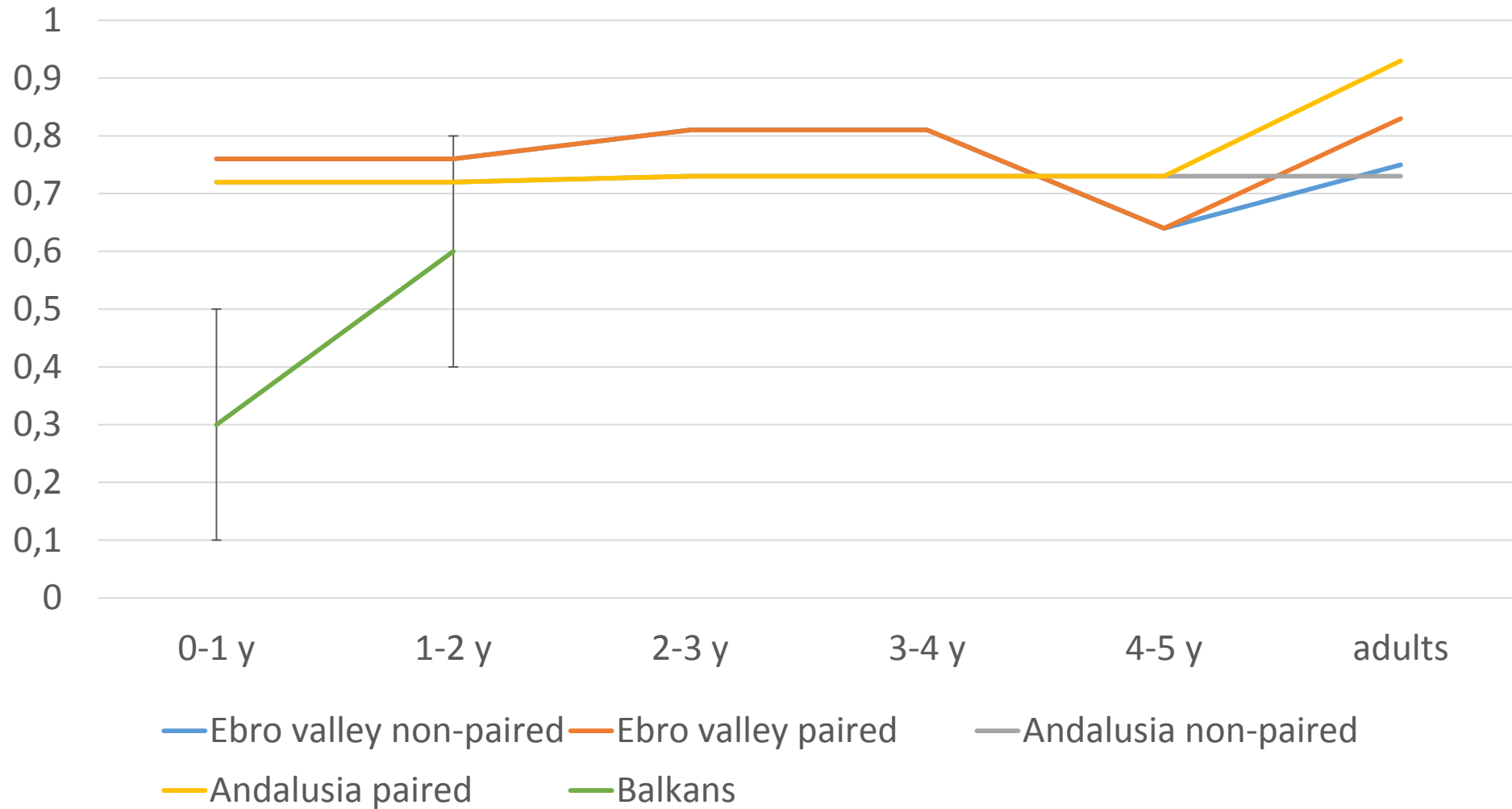
Survival rates



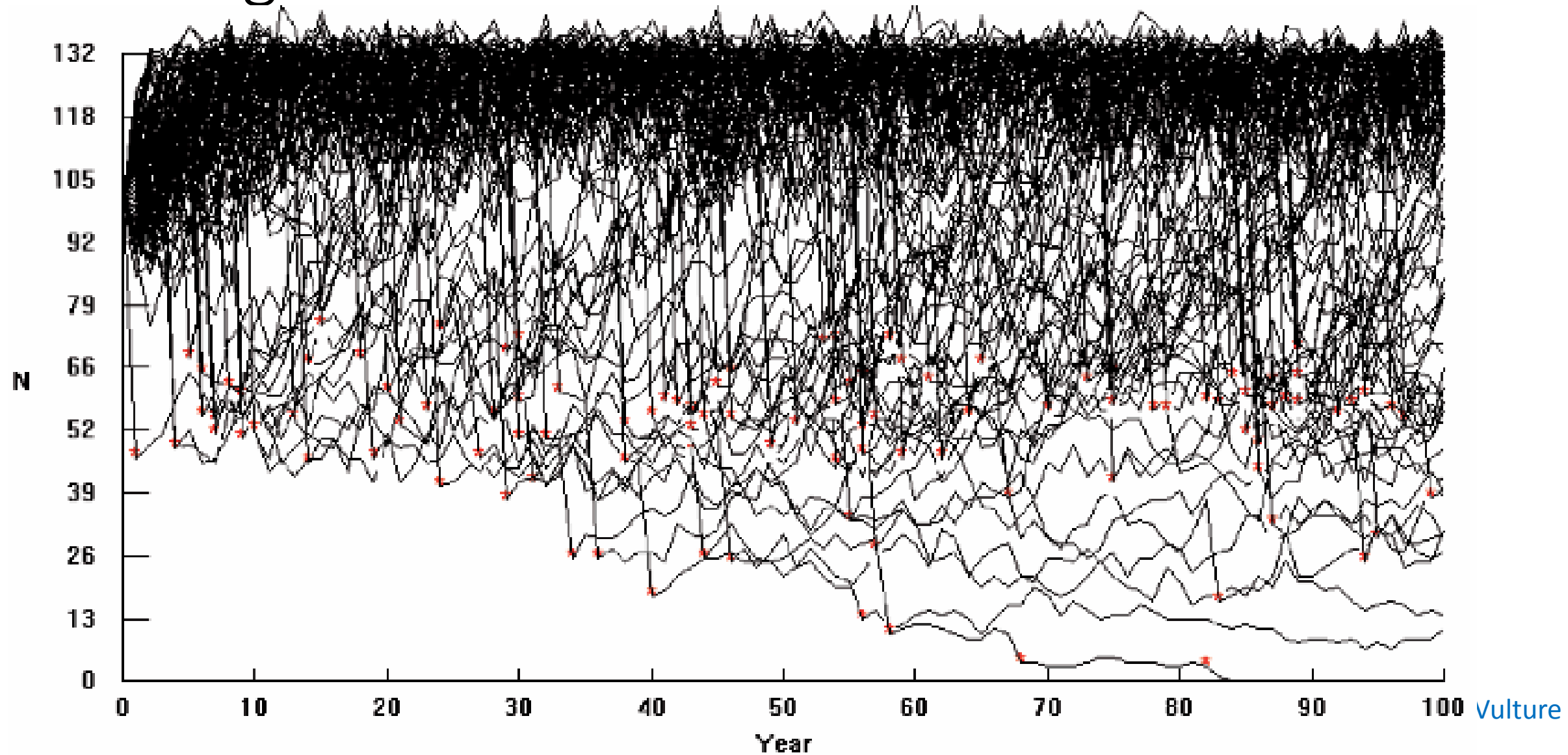
Survival rates



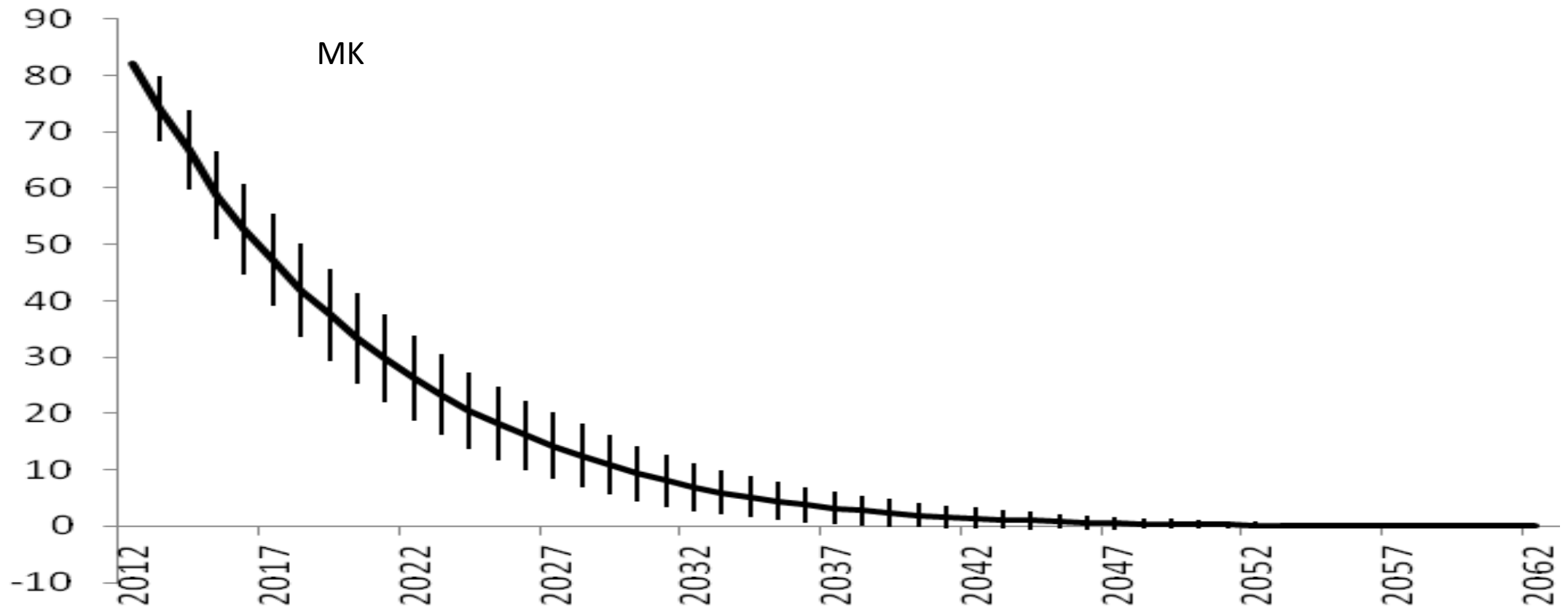
Survival rates



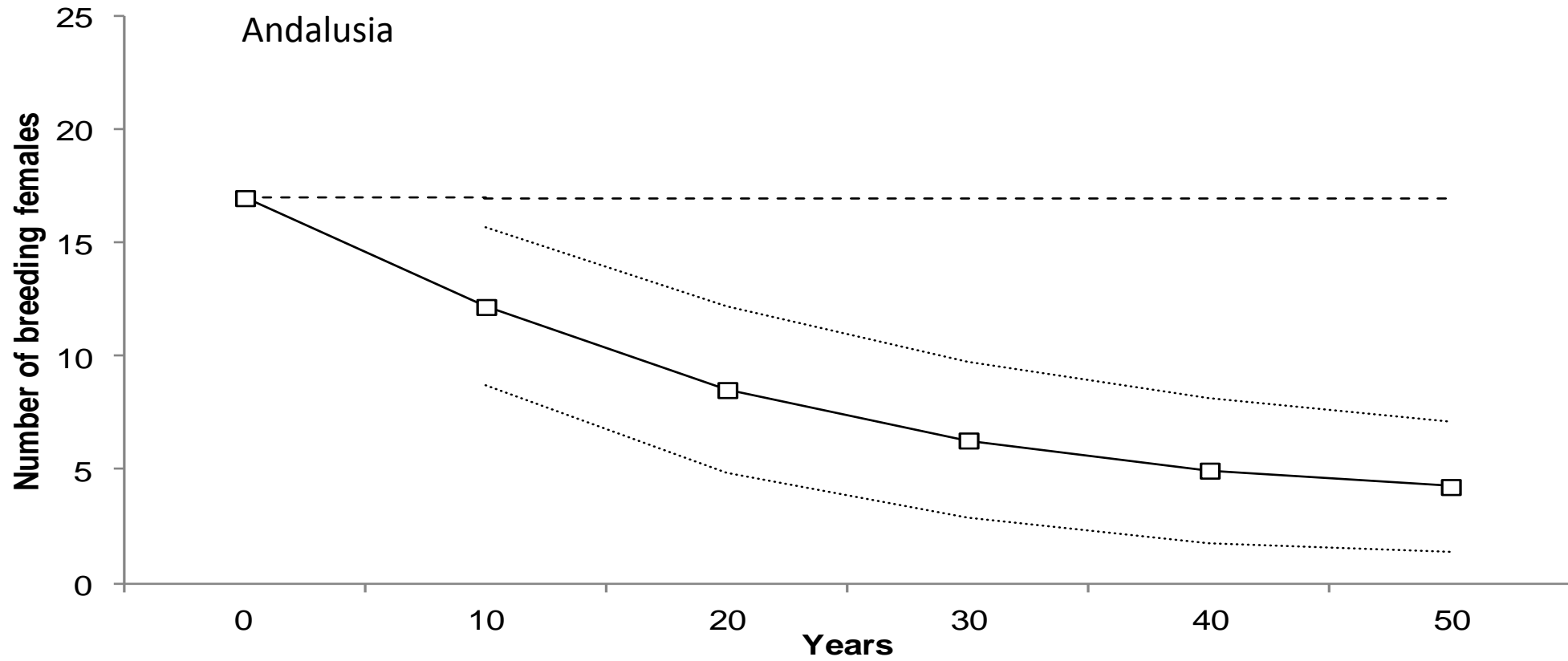
Findings



Baseline scenarios



Baseline scenarios

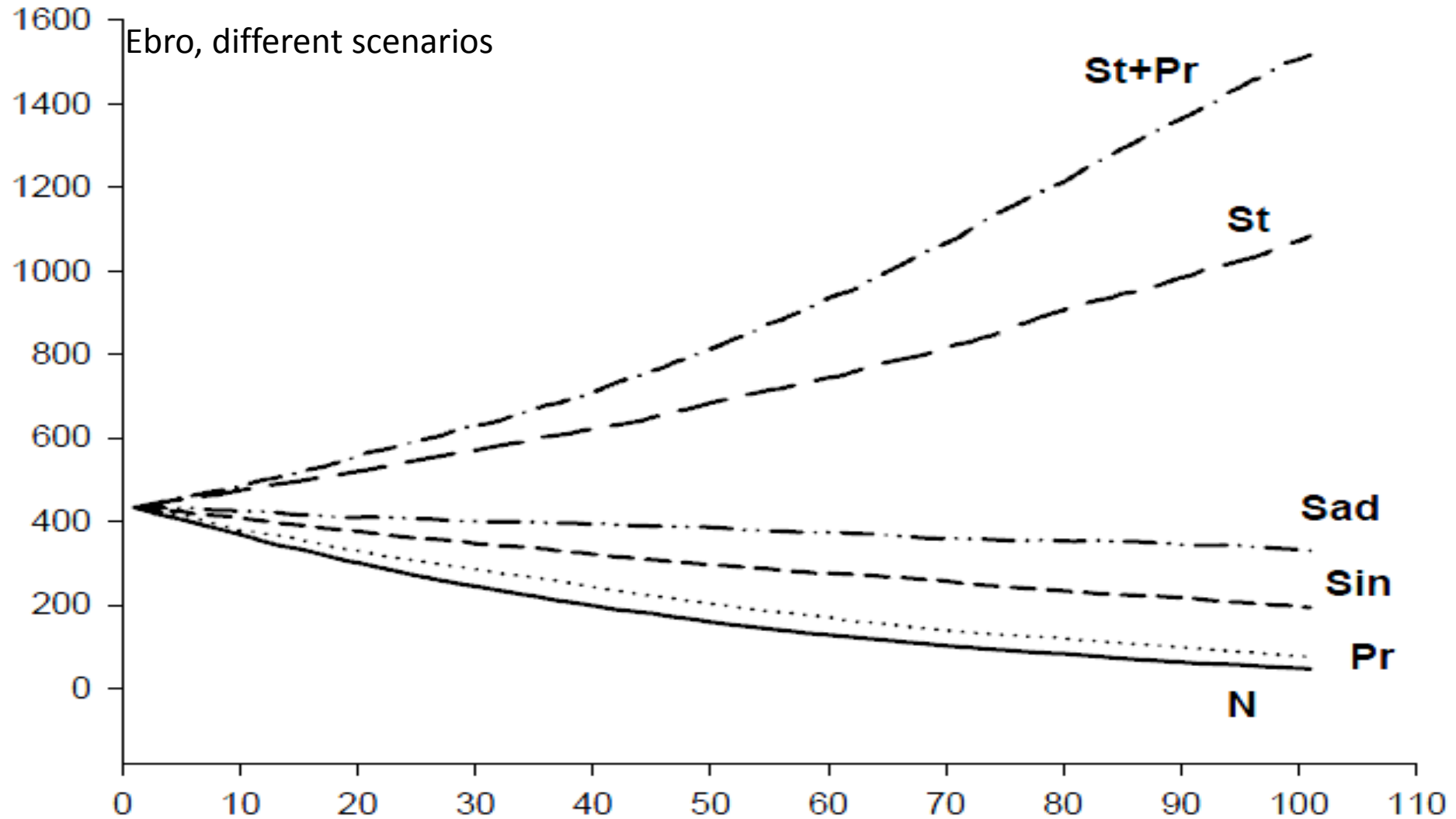




Increase in productivity

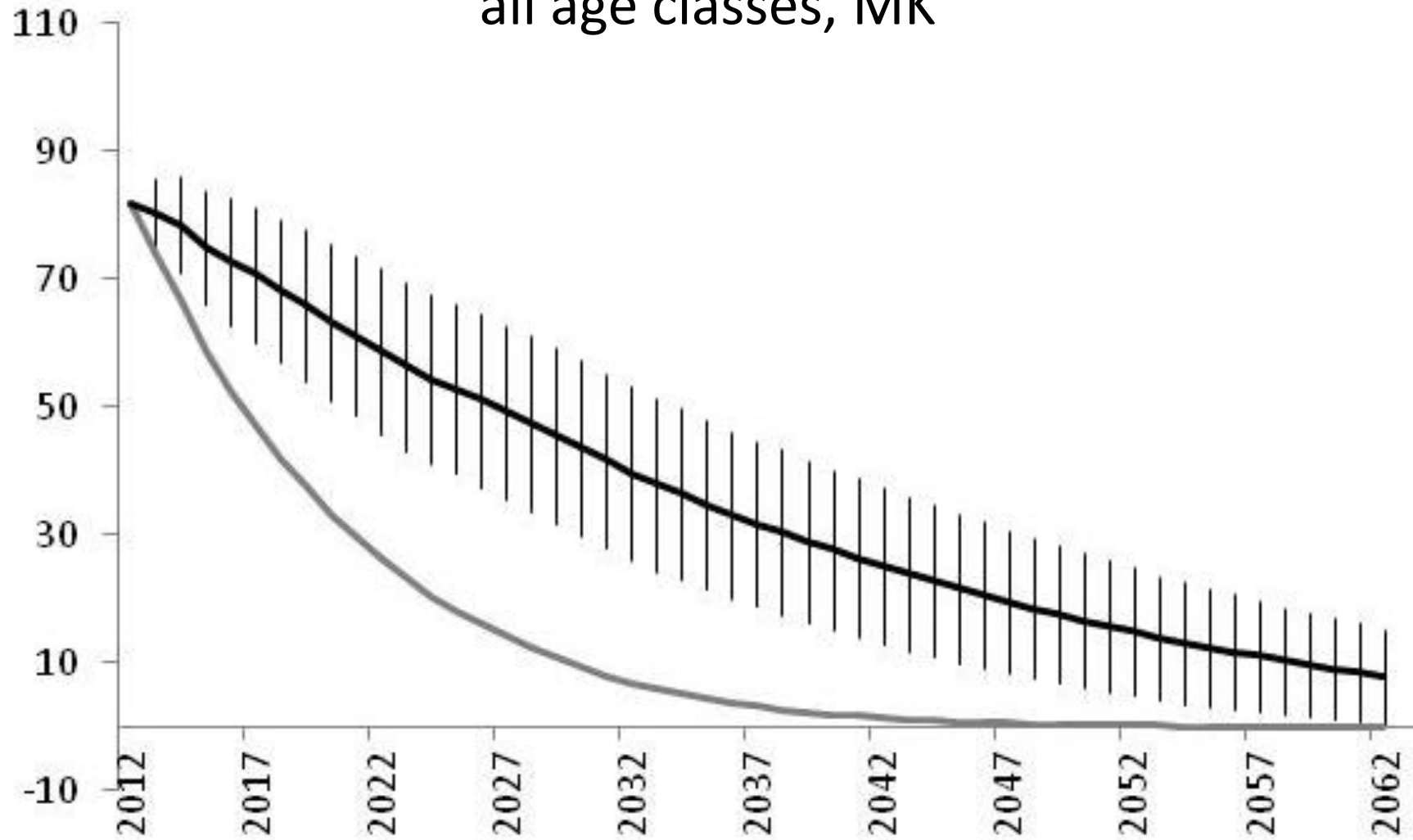
- **very little effect (sorry, guys, nest guarding won't do it!)**
- **BUT might have its share later on the road!**

Decrease of mortality



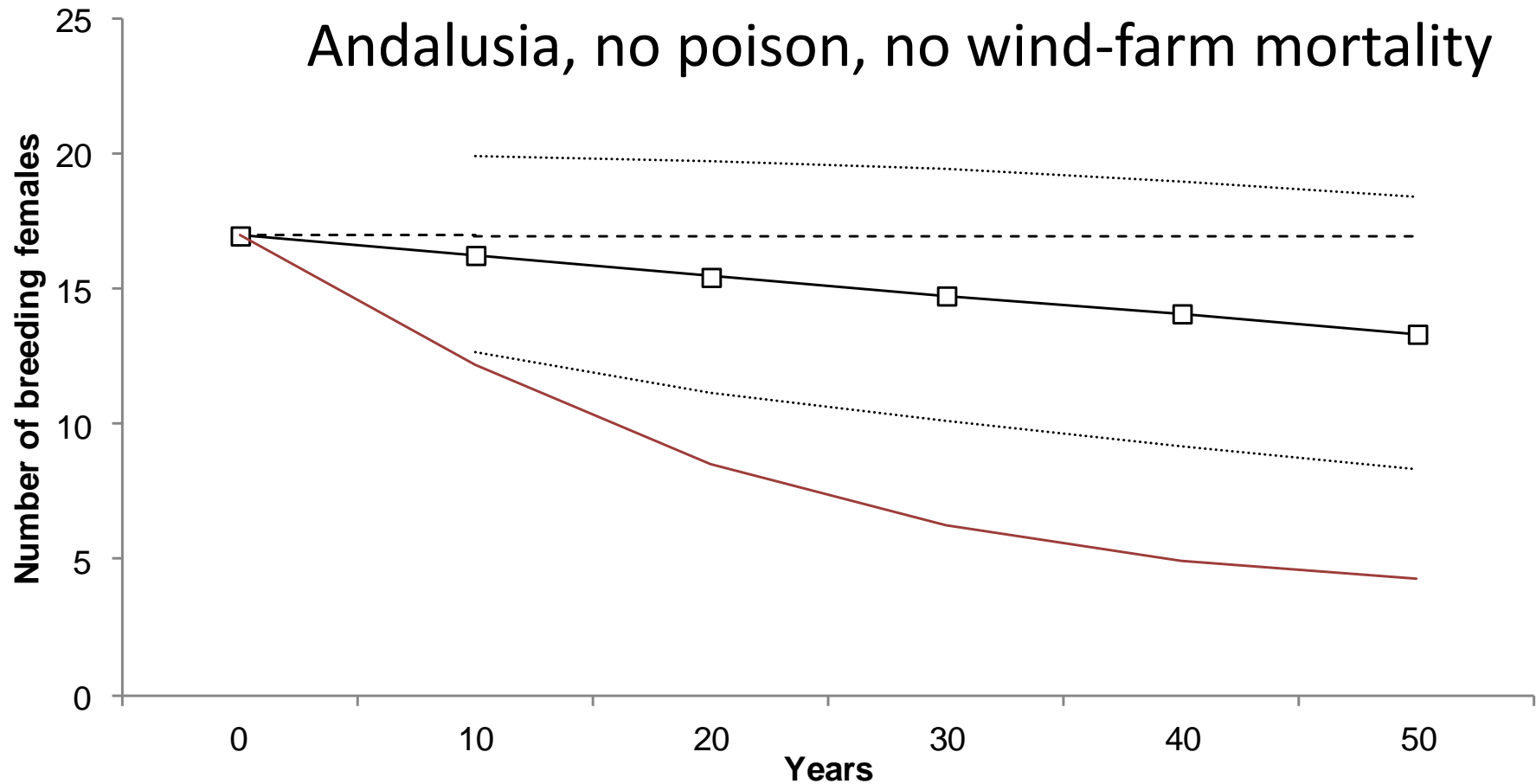
Decrease of mortality

all age classes, MK

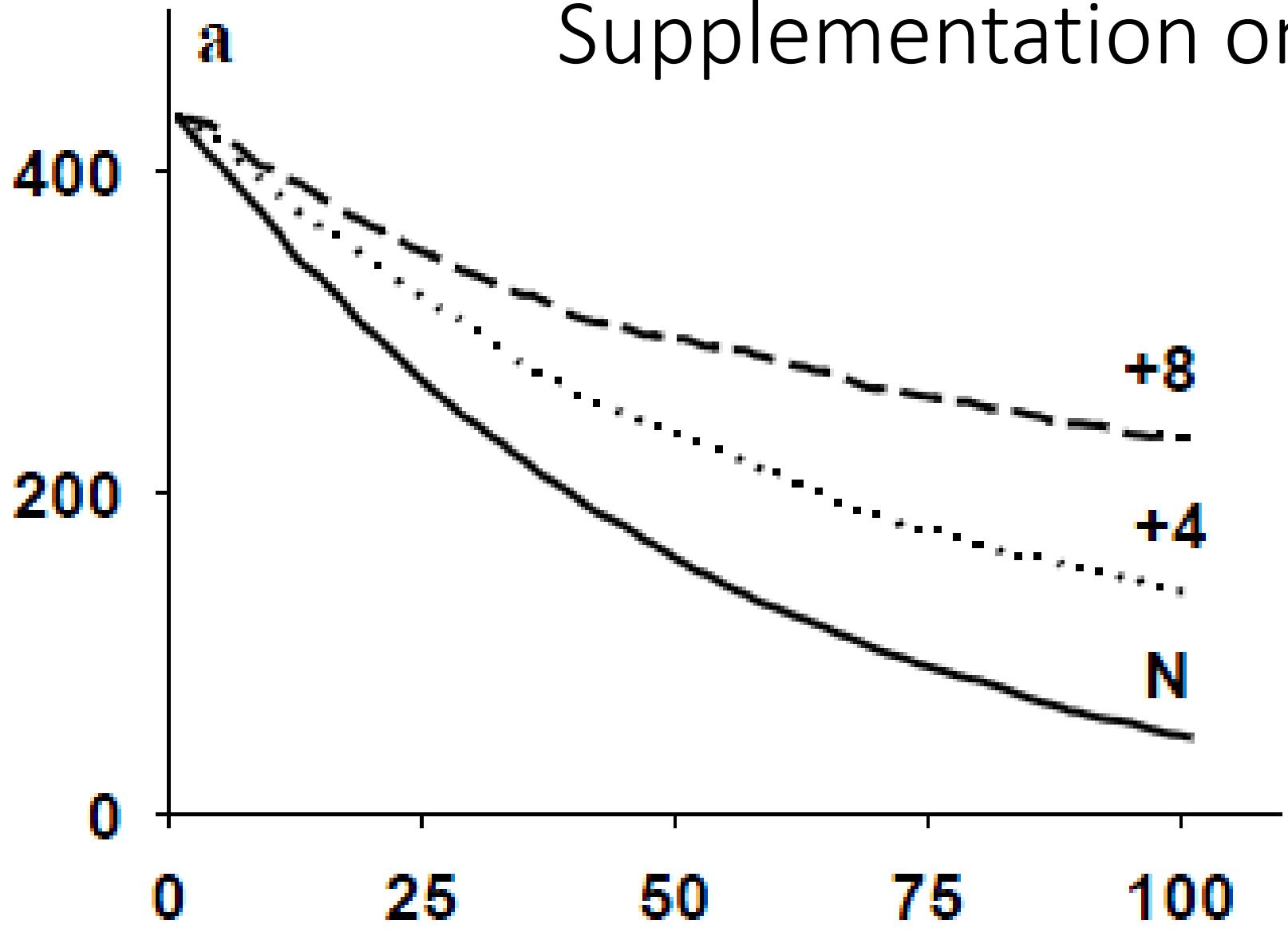


Decrease of mortality

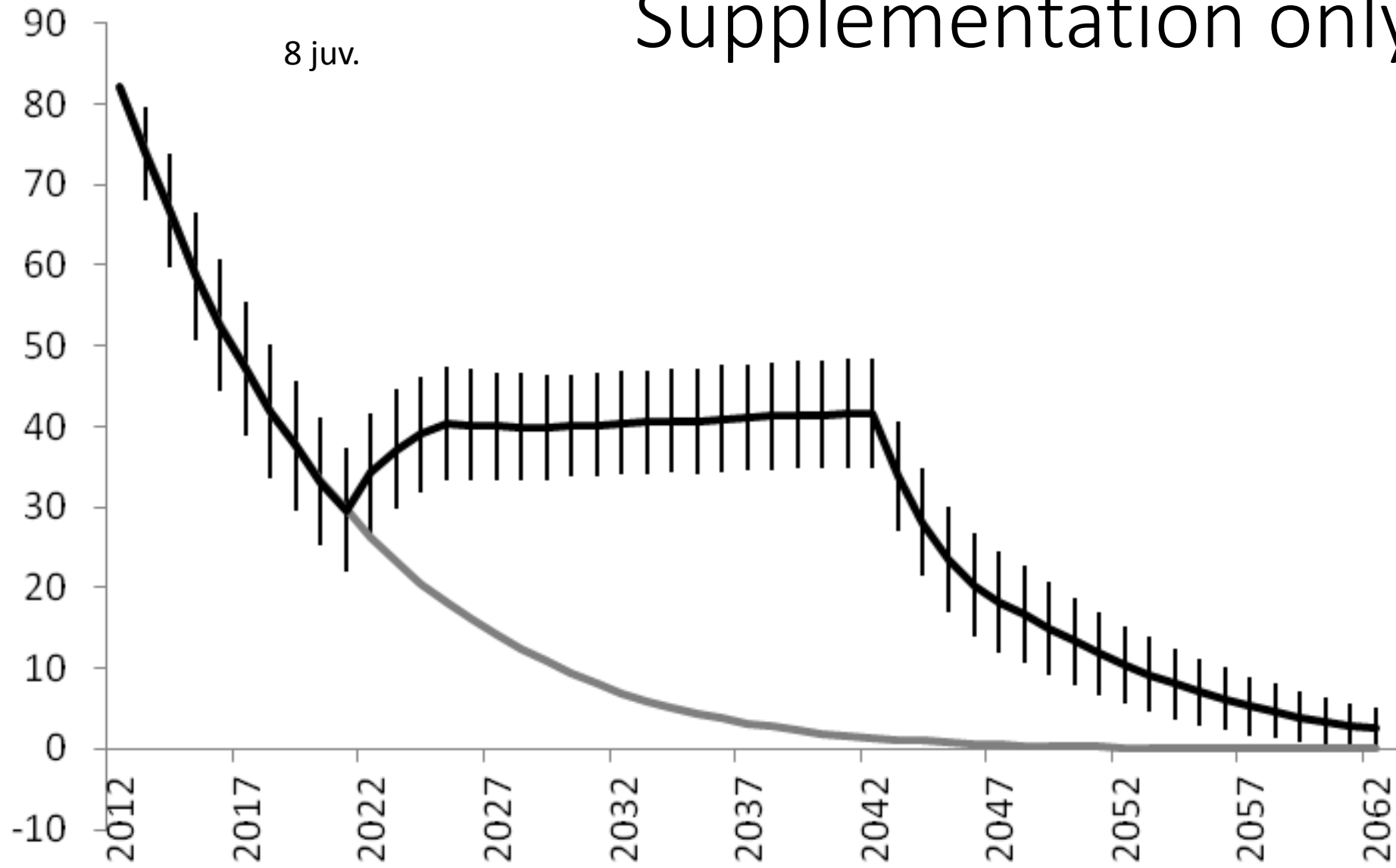
- good effect, but not enough!



Supplementation only

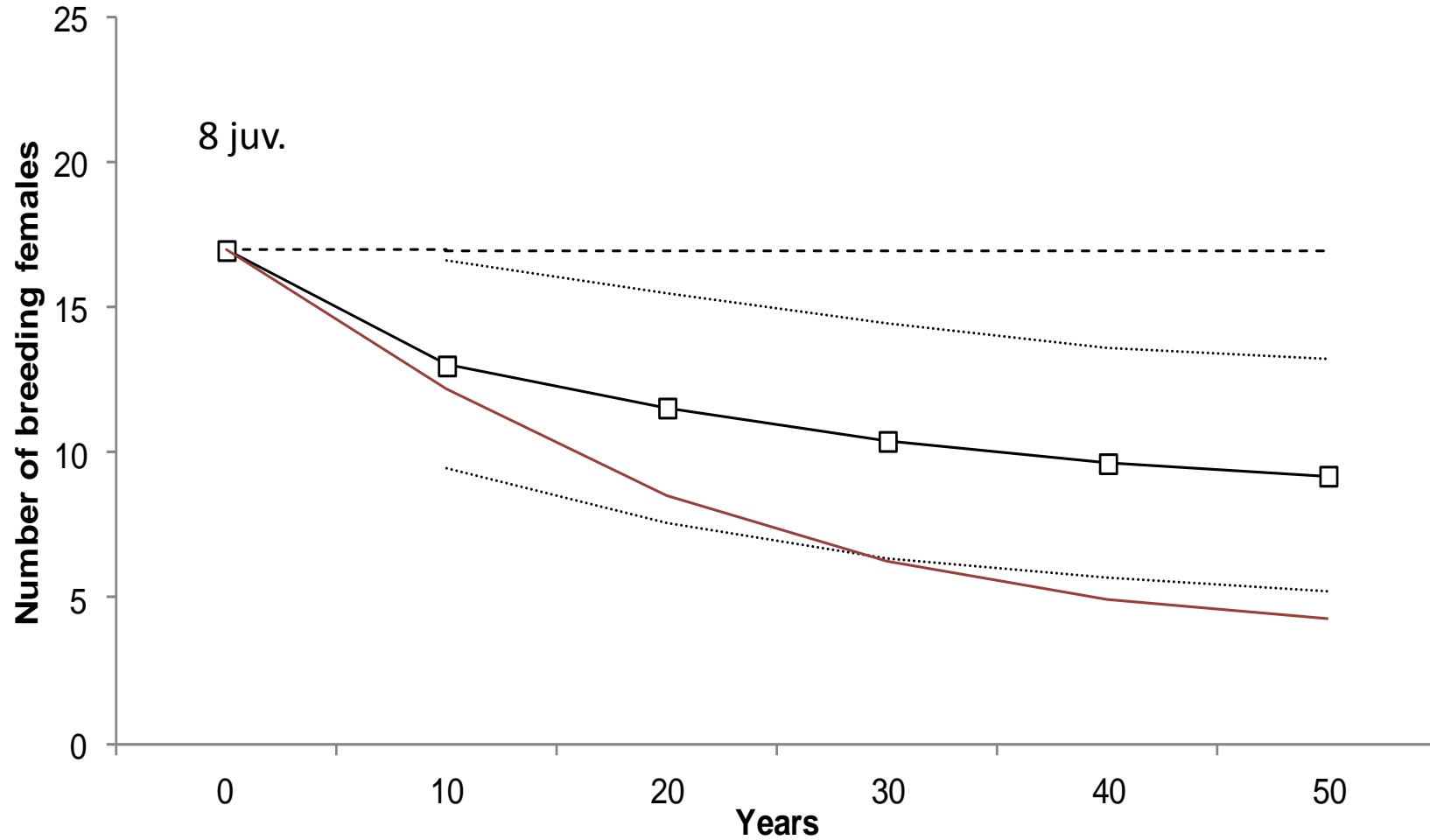


Supplementation only



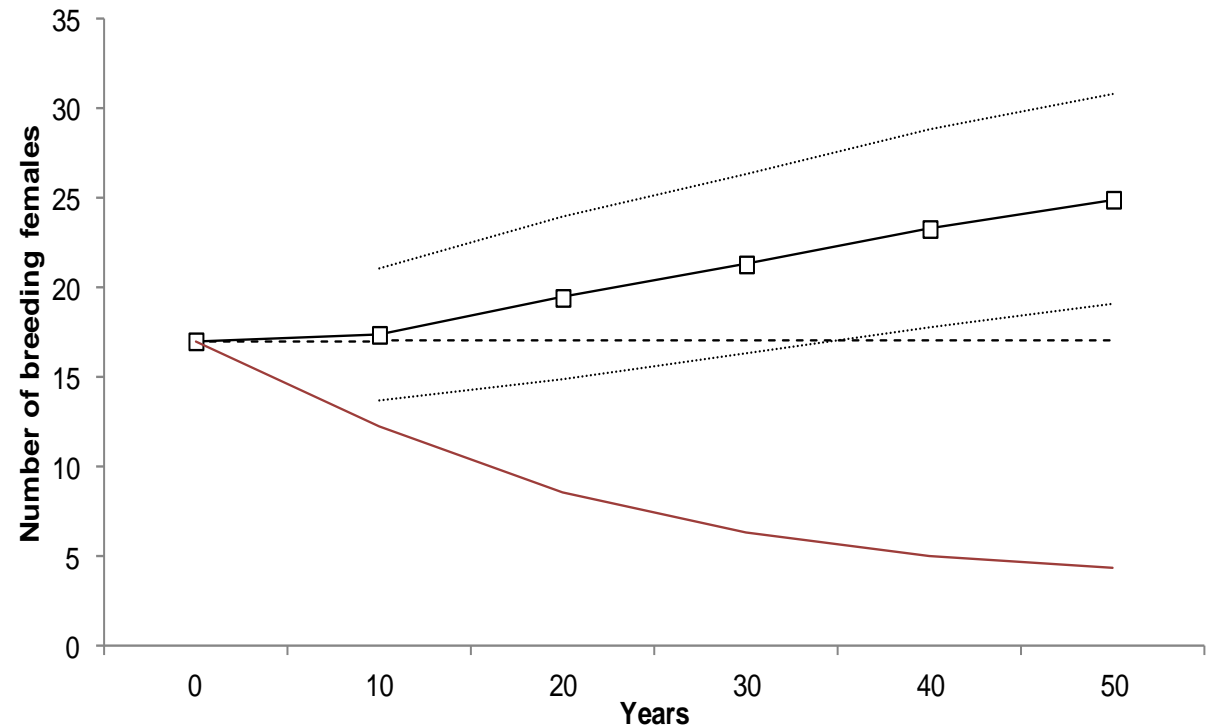
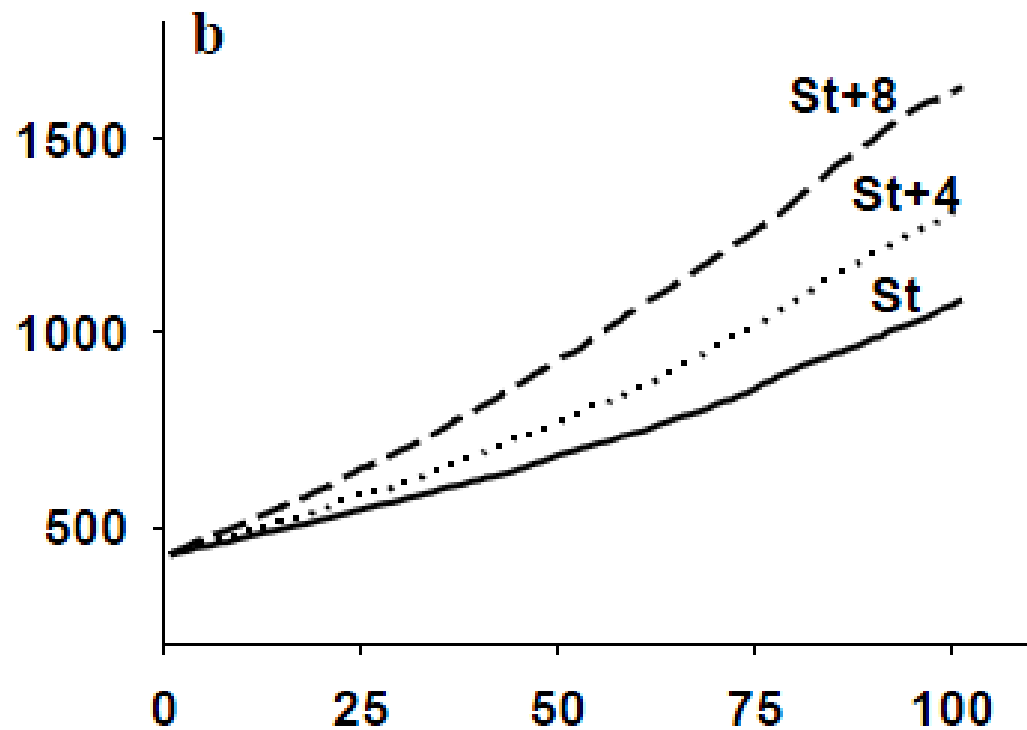
Supplementation only

- not enough, or temporary!



Supplementation and mortality reduction

- now we are talking!



Gaps in knowledge

- How do productivity and survival parameters vary among subpopulations?
- What are the real emigration and immigration rates? Are populations connected?
- Is there any inbreeding depression already? Where?
- Where are the sinks?
- What the future threats are/might be?

(Probable) Conclusions

- Most populations are expected to (continue) to decline.
- Productivity has little effect on probability of survival
- Improving survival of adults & subadults only is not enough
- Improving total survival only is not enough!
- Supplementation only is not enough!
- Supplementation numbers should be high (10-50% of the breeding pairs/females annually!!!)
- Improving survival AND supplementation seems the only way forward.

How to do it?

- Learn more! (underway). Develop improved models!
- Mitigate threats (going hard 😞)
- Have plan B (sedentary populations?)
- Do not give up! (“There are no hopeless cases, only people without hope, and expensive cases” – Soulé 1987)
- Establish captive flock (underway).
- Start (experimental) releases, double focus: knowledge & (some) supplementation
- Secure funding 😞

Thank you very much!

Andreotti, A., and G. Leonardi. 2009. Piano d'azione nazionale per il Capovaccaio (*Neophron percnopterus*). Page 121. 30, Quad. Cons. Natura. Min. Ambiente - ISPRA.

Carrete, M., J. A. Sánchez-Zapata, J. R. Benítez, M. Lobón, and J. A. Donazar. 2009. Large scale risk-assessment of wind-farms on population viability of a globally endangered long-lived raptor. *Biological Conservation* **142**:2954–2961.

García-Ripollés, C., and P. López-López. 2011. Integrating effects of supplementary feeding, poisoning, pollutant ingestion and wind farms of two vulture species in Spain using a population viability analysis. *Journal of Ornithology* **152**:879–888.

Grande, J. M. 2006. Factores limitantes antrópicos y naturales de poblaciones de aves carroñeras: el caso del Alimoche (*Neophron percnopterus*) en el Valle del Ebro. Universidad de Sevilla, Sevilla.

Sanz-Aguilar, A., J. A. Sánchez-Zapata, M. Carrete, J. R. Benítez, E. Ávila, R. Arenas, and J. A. Donazar. 2015. Action on multiple fronts, illegal poisoning and wind farm planning, is required to reverse the decline of the Egyptian vulture in southern Spain. *Biological Conservation* **187**:10–18.

Velevski, M., B. Grubač, and L. Tomović. 2014. Population viability analysis of the Egyptian Vulture *Neophron percnopterus* in Macedonia and implications for its conservation. *Acta Zoologica Bulgarica* **66**:43–58.

