Evaluating the Demographic Factors that Affect the Success of Reintroducing Fishers *(Martes pennanti)* and the Effect of Removals on a Source Population

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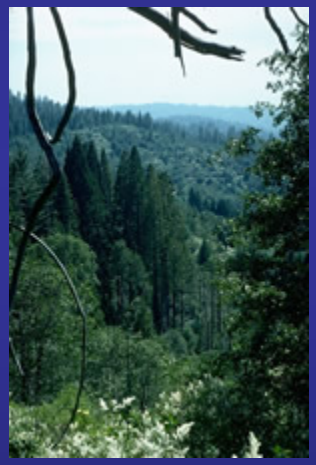

and

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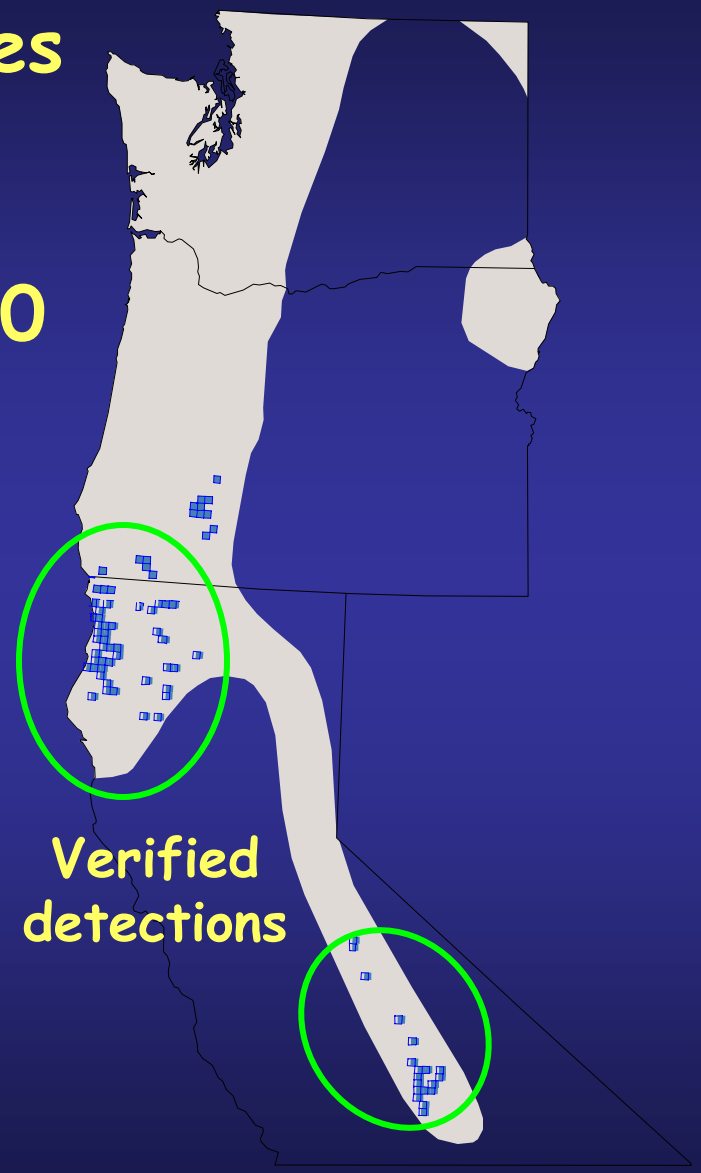
Fishers in the Pacific States

Surveys: 1986 - 2000



Aubry and Lewis (2003)

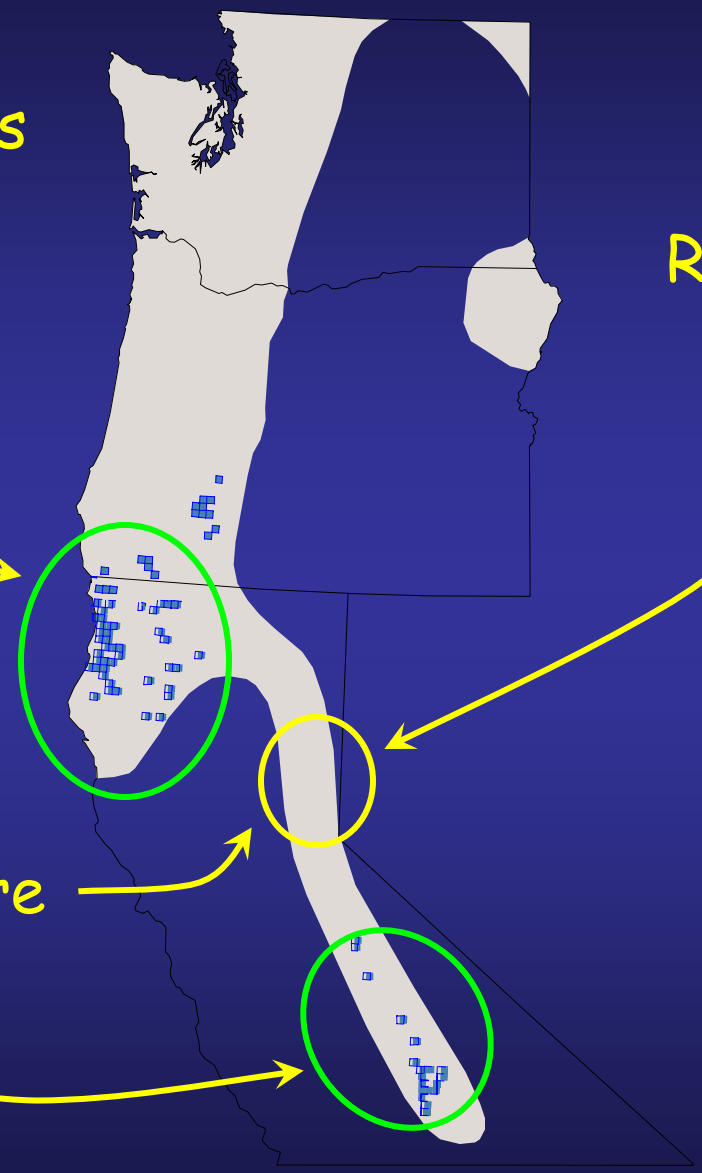
OBJECTIVES

Proposing to re-establish fishers in the northern Sierra Nevada Mountains raises 3 questions:

1) Is re-establishing a fisher population in the northern Sierra Nevada Mountains feasible?
2) Can the fisher population in northwestern California remain viable if fishers are removed for release elsewhere?
3) Might fishers dispersing from a re-established population in the northern Sierra Nevada reach the presently-isolated population in the southern Sierra Nevada and, if so, would such dispersers benefit the southern population?

Here are the questions:

If we live-trap fishers here to be released elsewhere, will the population here be threatened?



Can we Re-establish a population here?

Could having fishers here help the fisher population here?

Modeling approaches considered

Removing fishers for release may mimic harvest for fur

Methods used by management agencies:

- Ratio of juveniles to adults in the annual harvest
- Population estimates before and after harvest
- Population matrices and demographic data

Population matrices most applicable:

- Age ratios require extensive empirical data not available
- Harvest data do not exist because no harvest
- Sufficient information exists to estimate demographic variables needed for population matrix models.

Vortex

Baseline Model

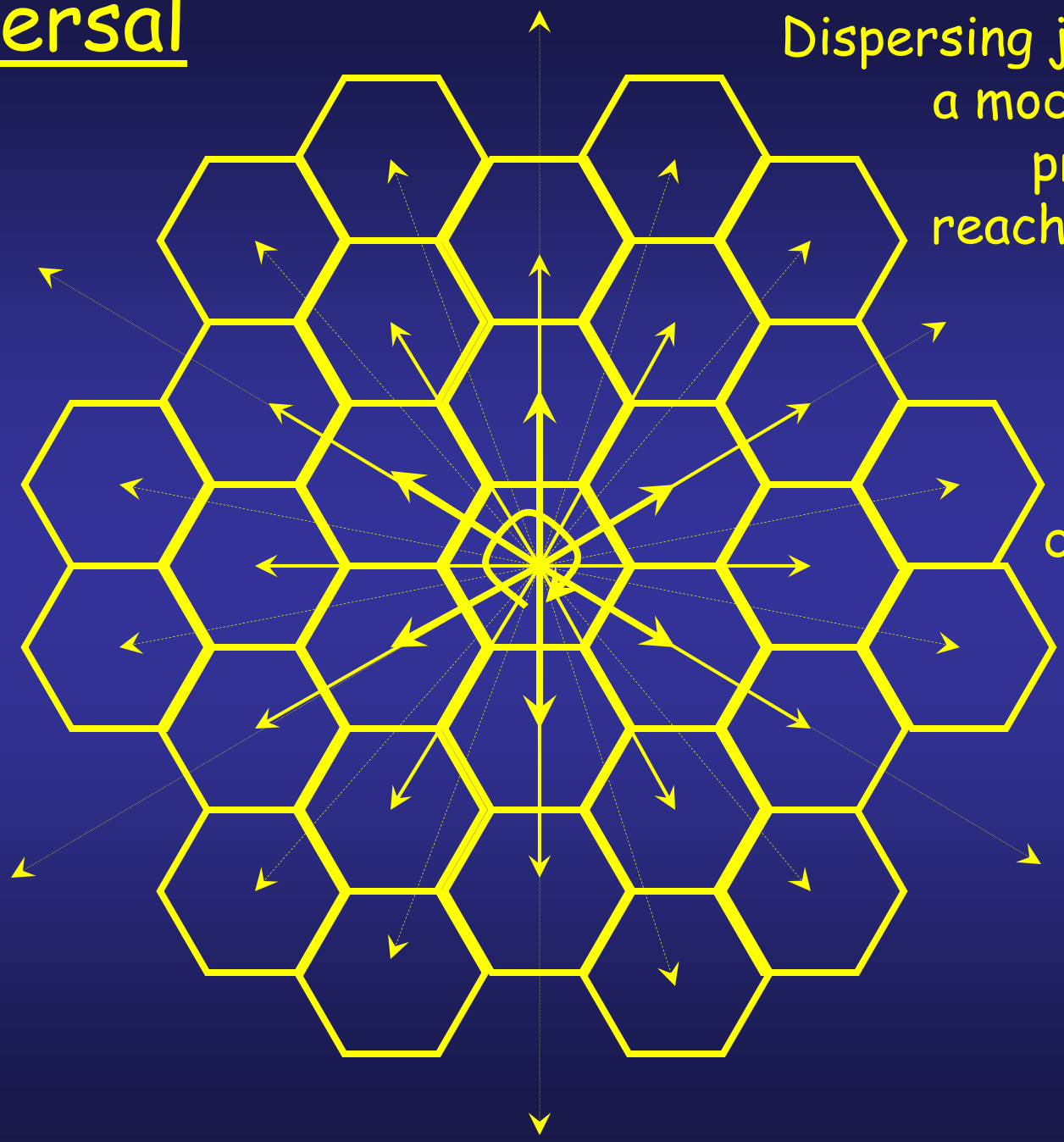
50 study sub-sites
- 25 private land, 2 timber harvests/100 yr
- 18 public land multiple use, 1 timber harvest/100 yr
- 7 public land wilderness, 0 timber harvest

Timber harvest removes critical habitat
- complex canopy structure
- complex structure on the ground
- full canopy

VORTEX allows only 1-year changes. To gain a long-term effect, we exaggerated the reduction of reproduction and survival in the year following harvest.

Fishers are protected from trapping so we assumed that trap mortality was zero.

Dispersal



Dispersing juveniles had a modestly higher probability of reaching adjacent areas (5%) than of reaching more distant areas (3%, 1%).

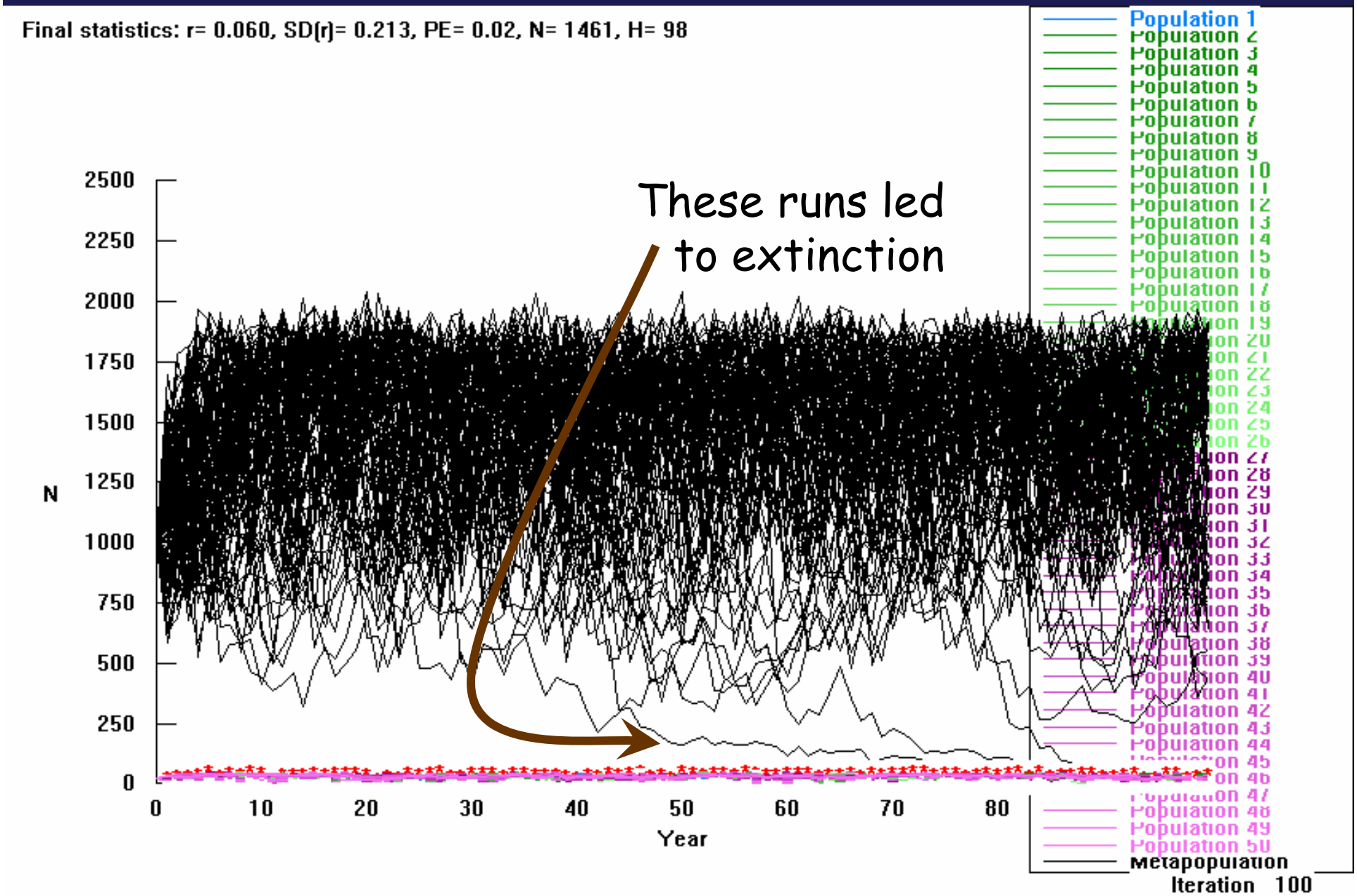
Mortality rates

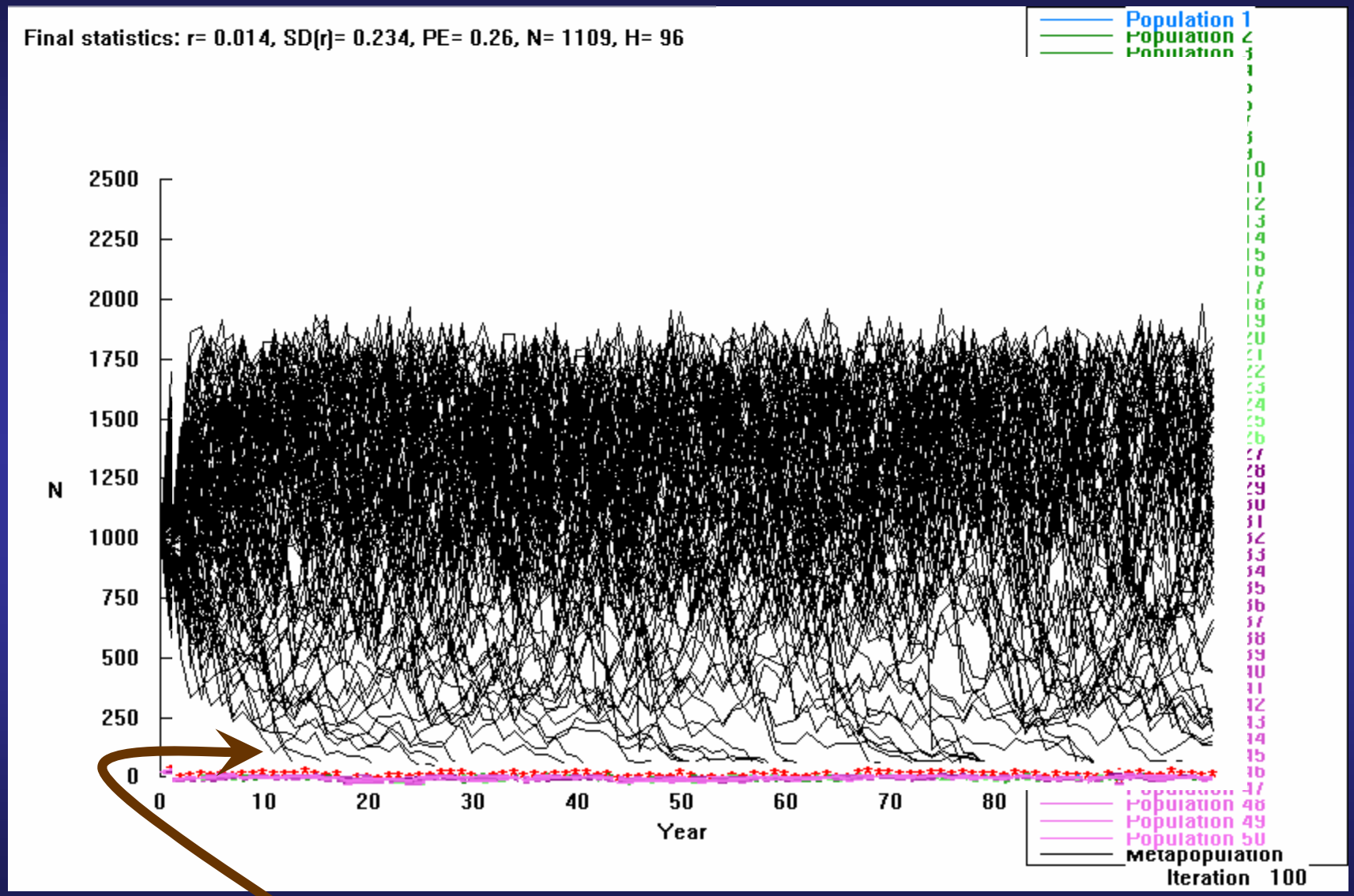
Juveniles	(age 0-1)	65 ± 25 %
Yearlings	(age 1-2)	25 ± 20%
Adults	(age ≥ 2)	12 ± 20%

A note about Vortex:

Because we estimated many variables, we use probability of extinction calculated by *Vortex* as an *Index* of extinction and of successful reintroduction and not as an accurate estimate of extinction or successful reintroduction.

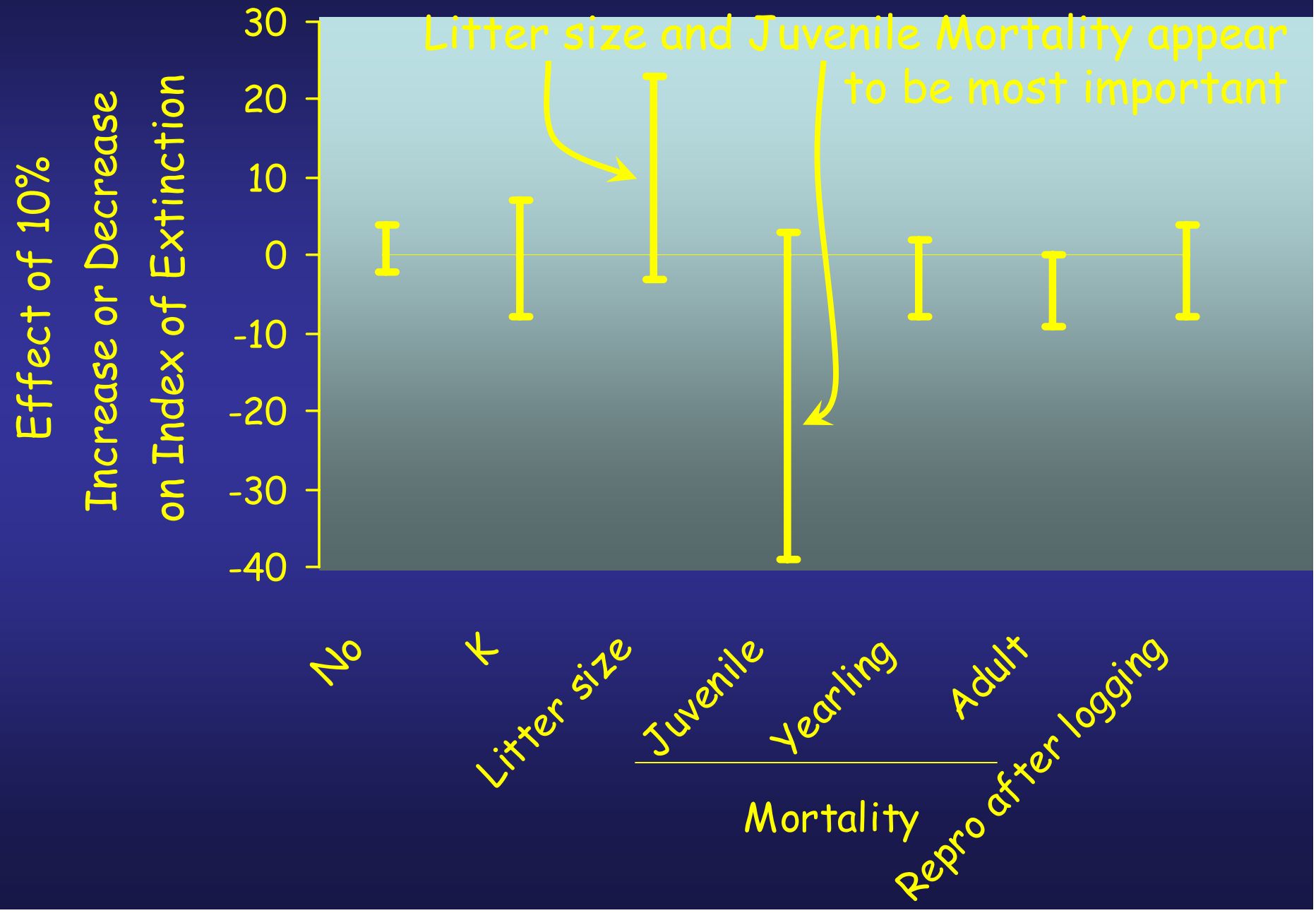
Typical *Vortex* run

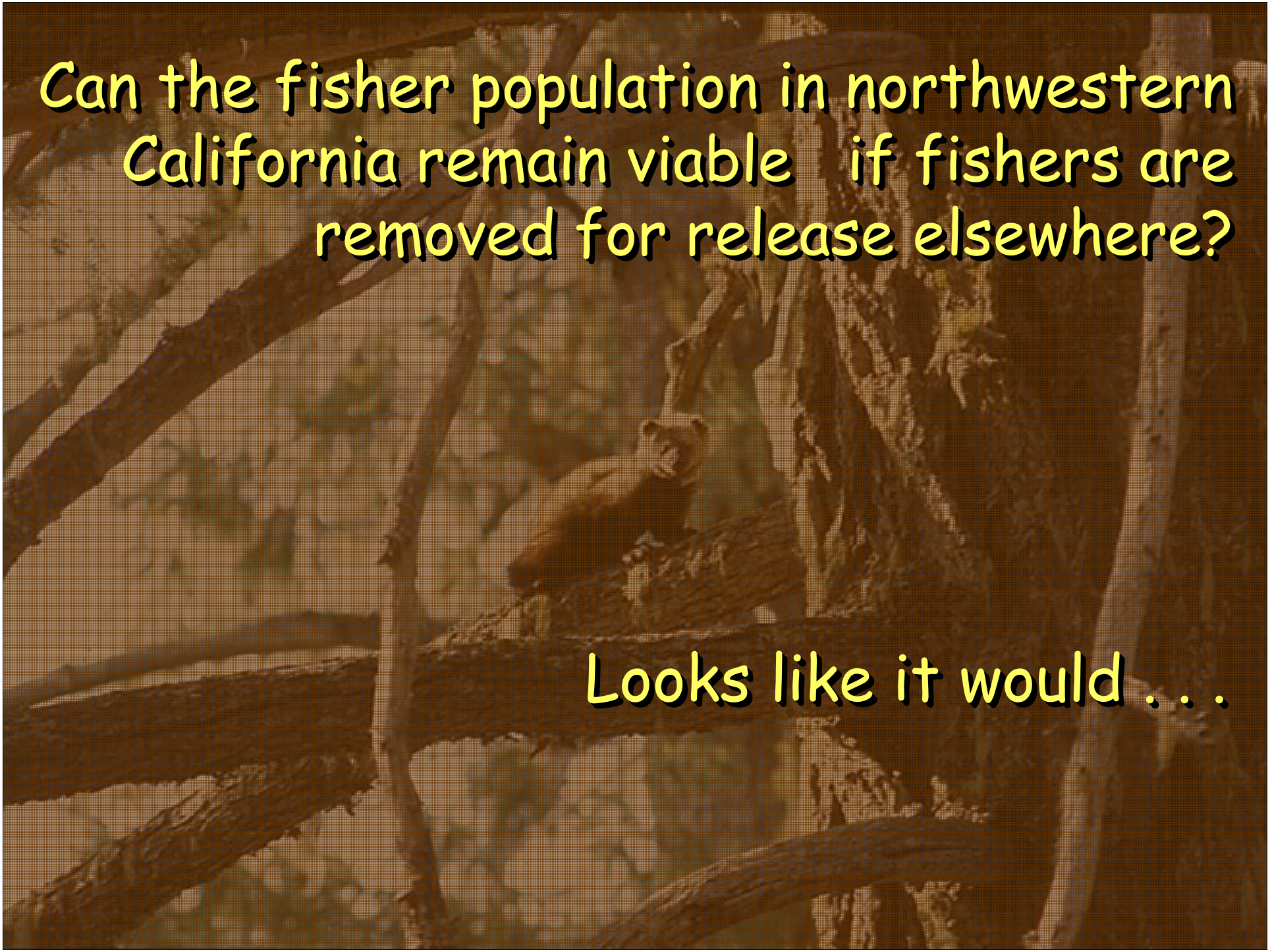




More extinctions this time

Key Life History Variables:





Can the fisher population in northwestern California remain viable if fishers are removed for release elsewhere?

Looks like it would . . .

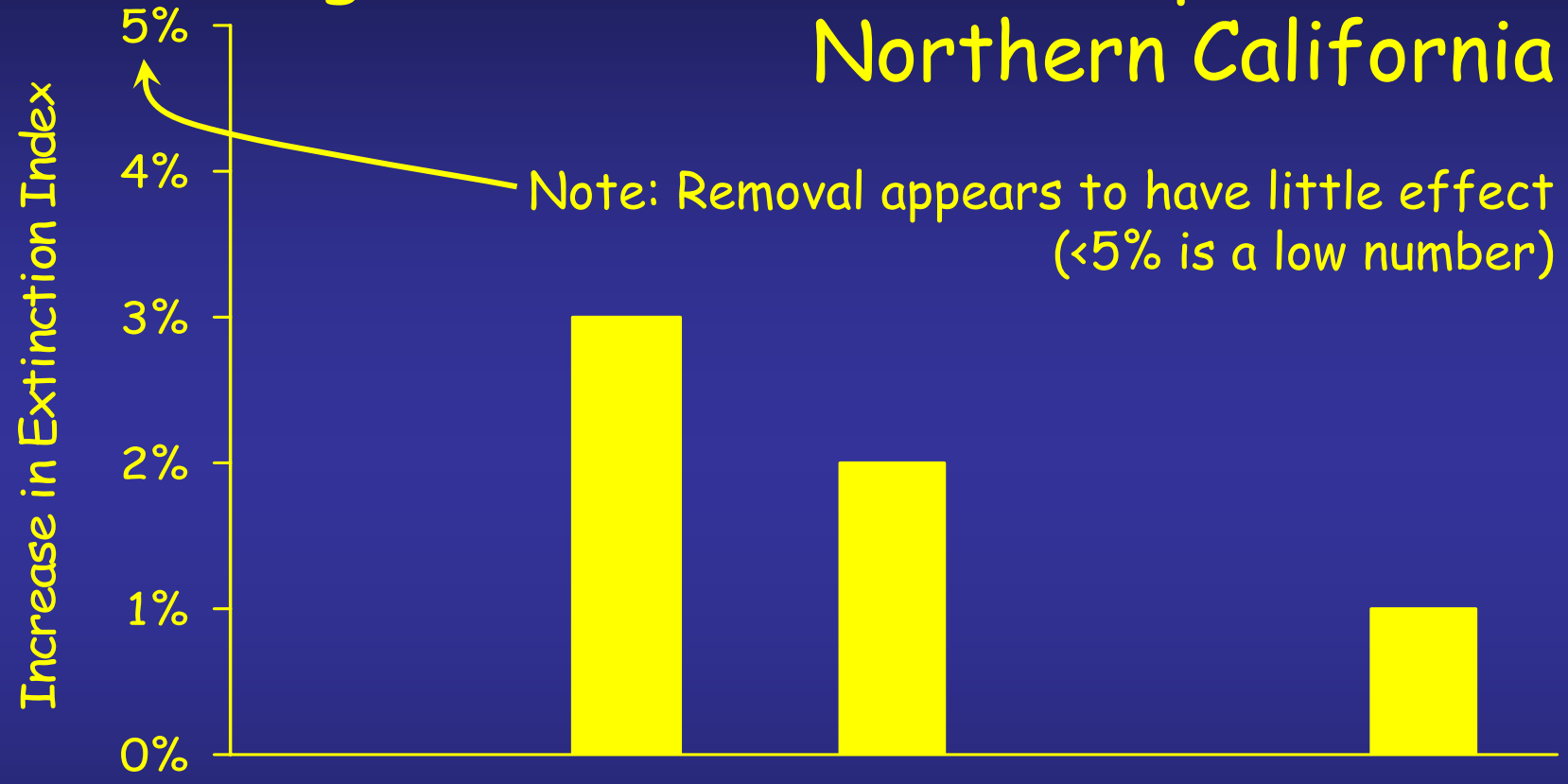
From the model population:

We removed 20 fishers for 2, 3, 5 or 8 years

- 5 fishers from each of 4 different areas/yr
- 1 fisher from each of 20 areas/yr
- Sex ratio 3 adult females : 2 adult males

We evaluated the potential effect on the northwestern California population through changes in the probability of extinction.

Predicted Effects of Different Removal Regimes on the Fisher Population in Northern California



Number Removed	1	1	5	5	5
Number Areas	20	20	4	4	4
Number Years	3	5	3	5	8

Is re-establishing a fisher population in the northern Sierra Nevada Mountains feasible?

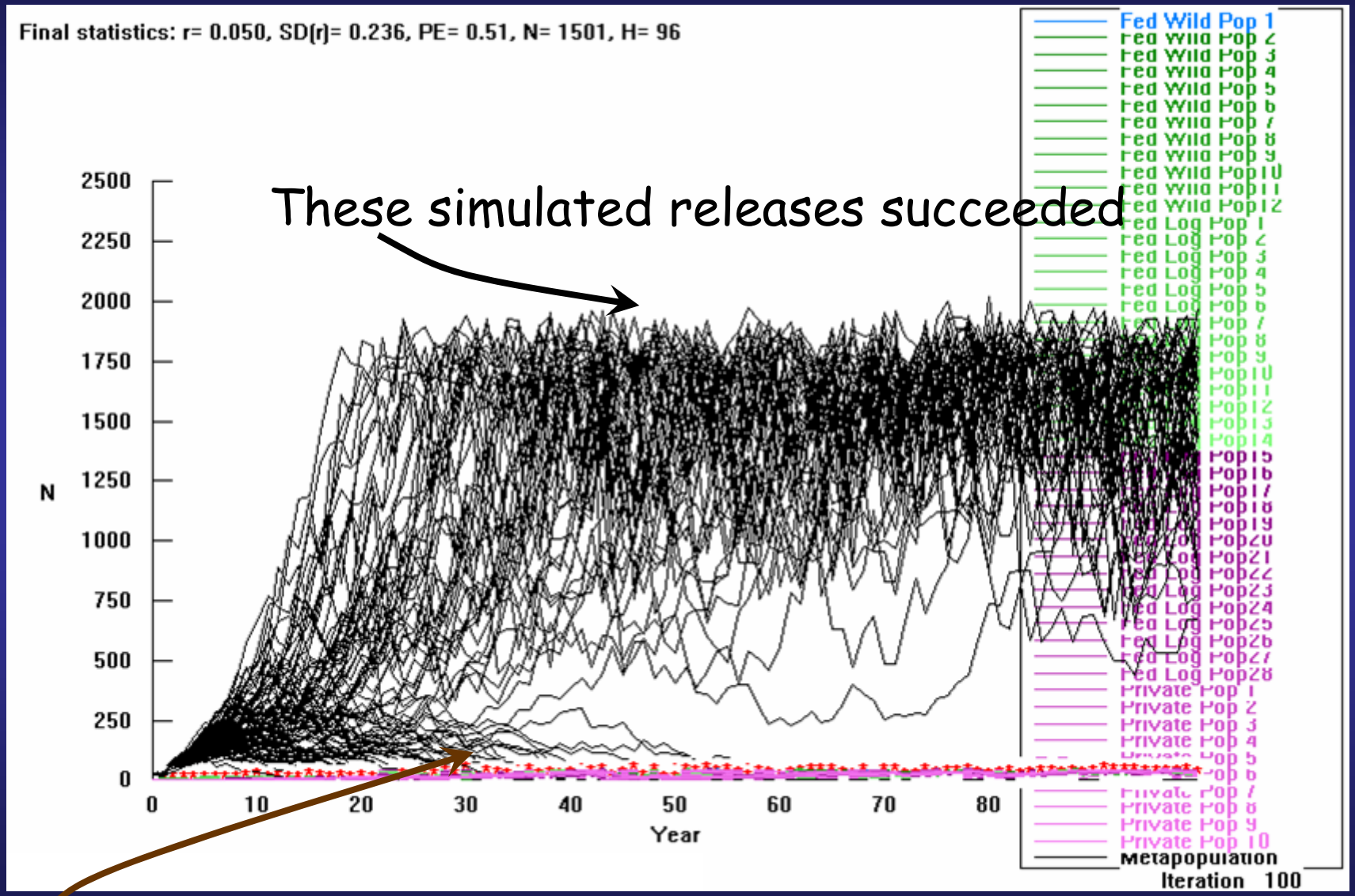
Let's rephrase that question, since our approach cannot really evaluate feasibility:

Assuming that suitable habitat exists in the northern Sierra Nevada Mountains, what release protocol might maximize our chances of re-establishing a fisher population?

So, let's look at protocols . . .

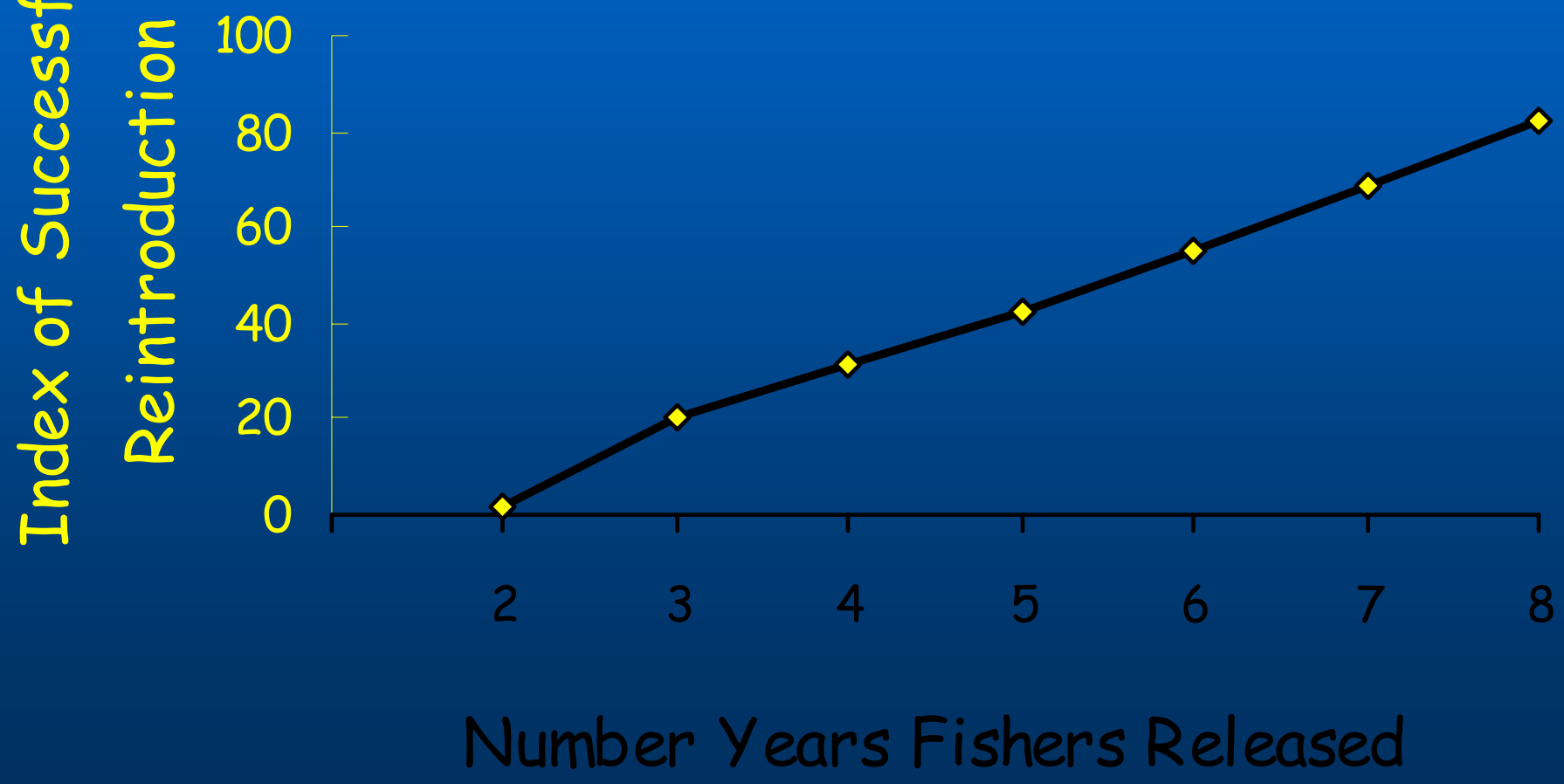
Potential Release Regimes:

- Release 20 fishers/yr
- Release fishers for 2 yrs, 3 yrs, up to 8 yrs
- Use sex ratios of 1:4 to 4:1
- Try variable age ratios

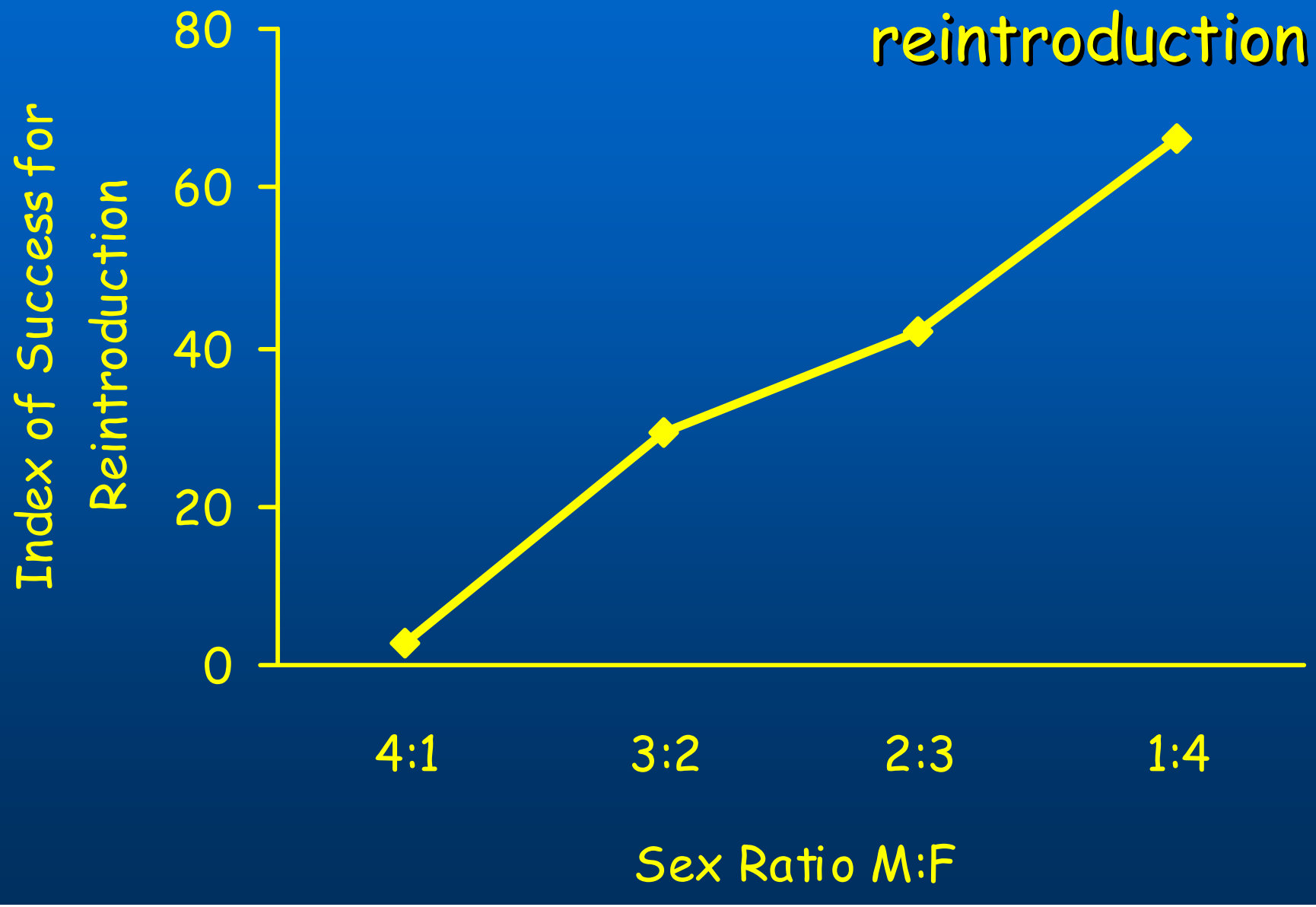


These simulated releases failed

The more years fishers are released, the higher the index of successful re-introduction

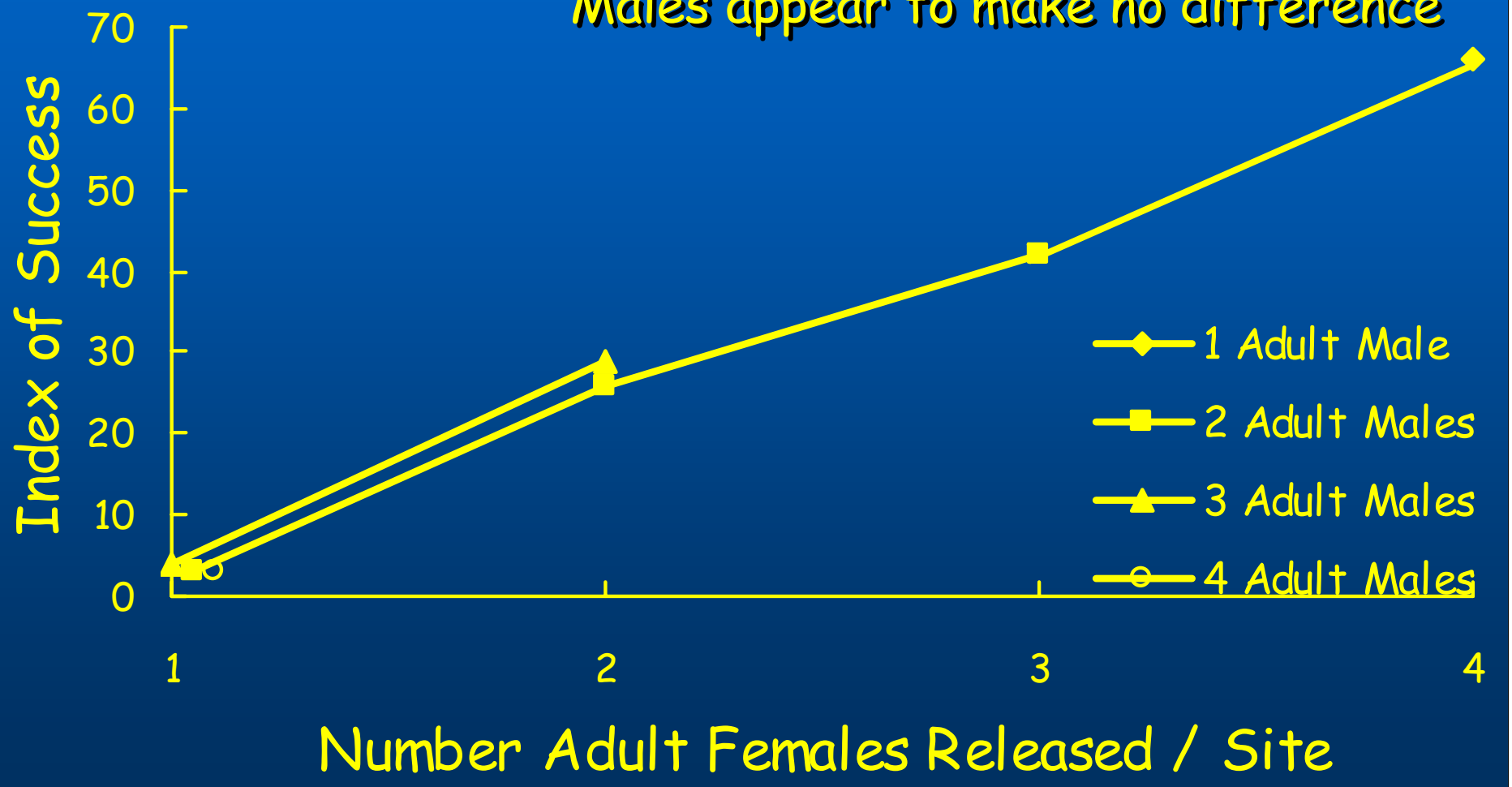


The more females per male, the higher the index of successful reintroduction

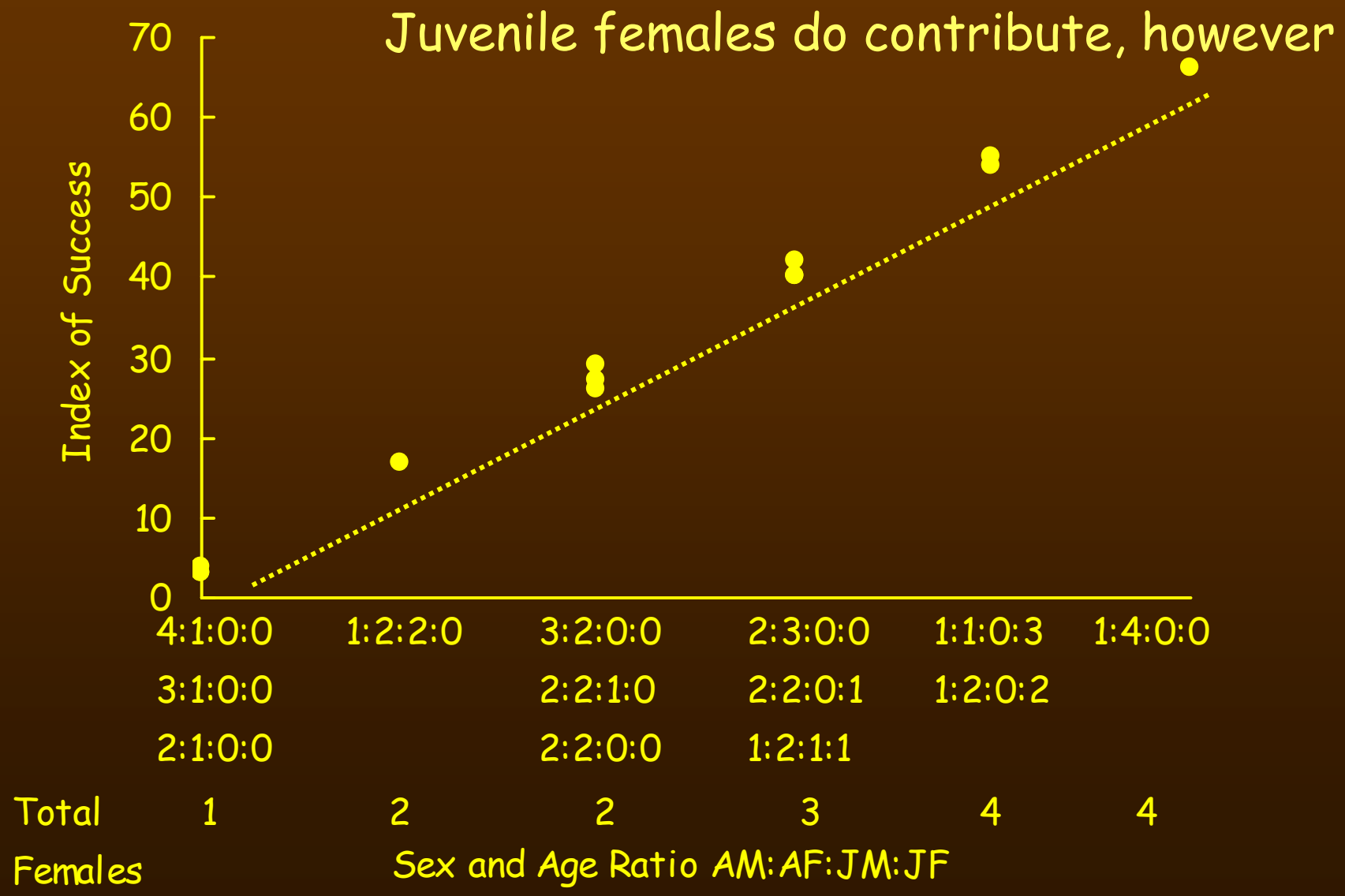


The more females, the higher the index of successful reintroduction

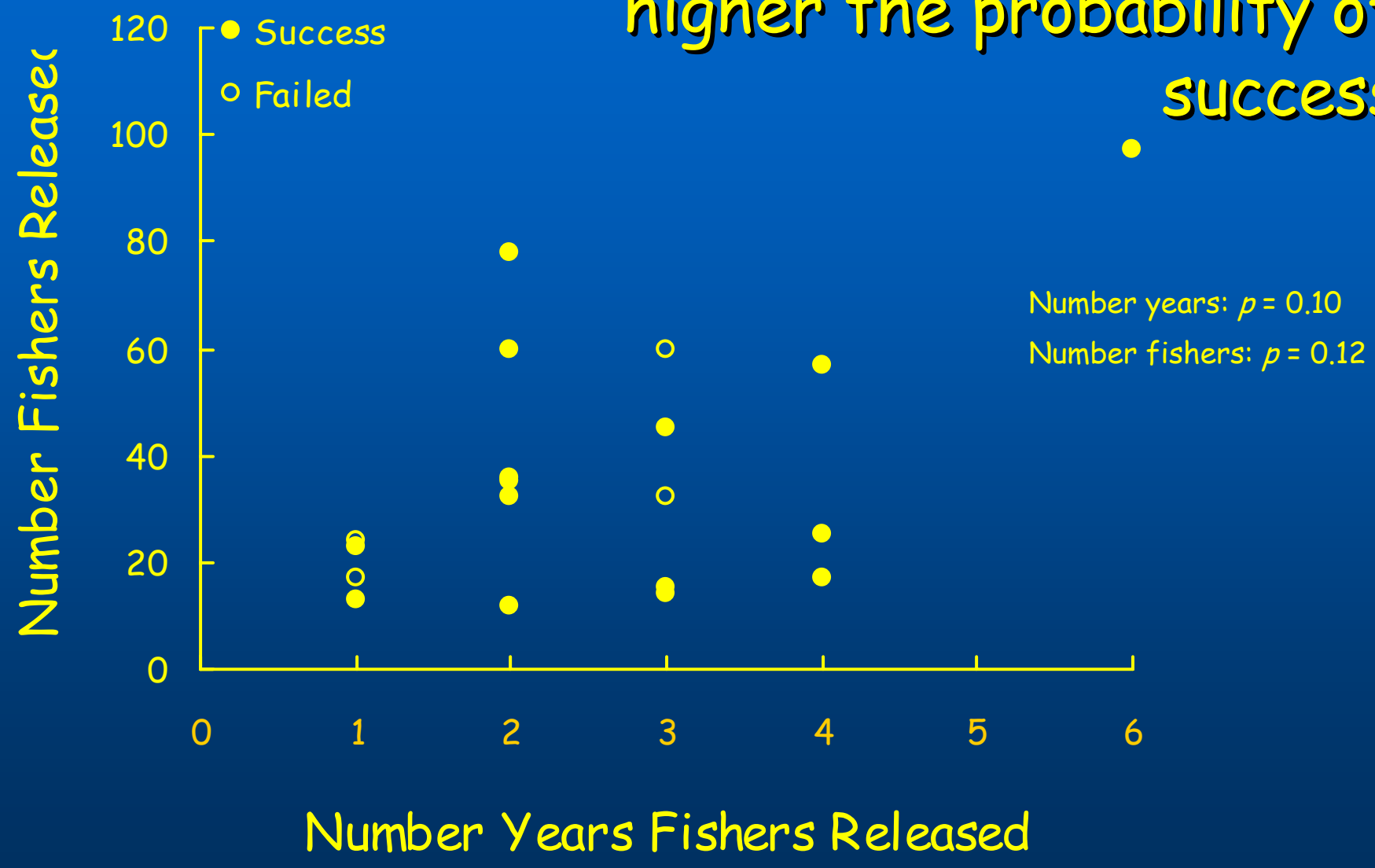
Males appear to make no difference



The more adult females, the higher the index of successful reintroduction



History suggests that the more years fishers are released, and the more fishers, the higher the probability of success



If fishers dispersing from a re-established population in the northern Sierra Nevada reach the presently-isolated population in the southern Sierra Nevada, would such dispersers benefit the southern population?

Looks like they would . . .

Effects of a Stepping Stone Population

We established a model fisher population designated 'Southern Sierra Nevada'

Index of Extinction = 15%

Immigration supplemented the southern Sierra Nevada population and allowed recolonization after extinction

Immigration probability = 1%

Index of Extinction drops to 11%.

Immigration probability = 2%

Index of extinction drops to 2%.

1 immigrating female/5 years

Index of extinction drops to 6%.

Have we shown that re-introducing fishers to the Northern Sierra Nevada Mountains is feasible?

No.

But our results suggest that

1) Removing fishers from the fisher population in northwestern California will probably not have major negative effects on the population
2) The more female fishers released and the more years of releases, the greater chances of a successful re-introduction to the Northern Sierra Nevada Mountains
3) Any immigration into the Southern Sierra Nevada fisher population, the higher its chances of survival

Finally,

If re-introduction of fishers to the Northern Sierra Nevada is to be considered further, the next steps are

(1) Examine the characteristics of the northwestern population critically to validate our modeling assumptions
(2) Investigate the distribution and abundance of habitat and prey in potential reintroduction areas
(3) Evaluate the genetic implications of transplantation

Questions?