Eradicating stoats from *Resolution Island, Fiordland: progress made and what to do next*

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Landcare Research
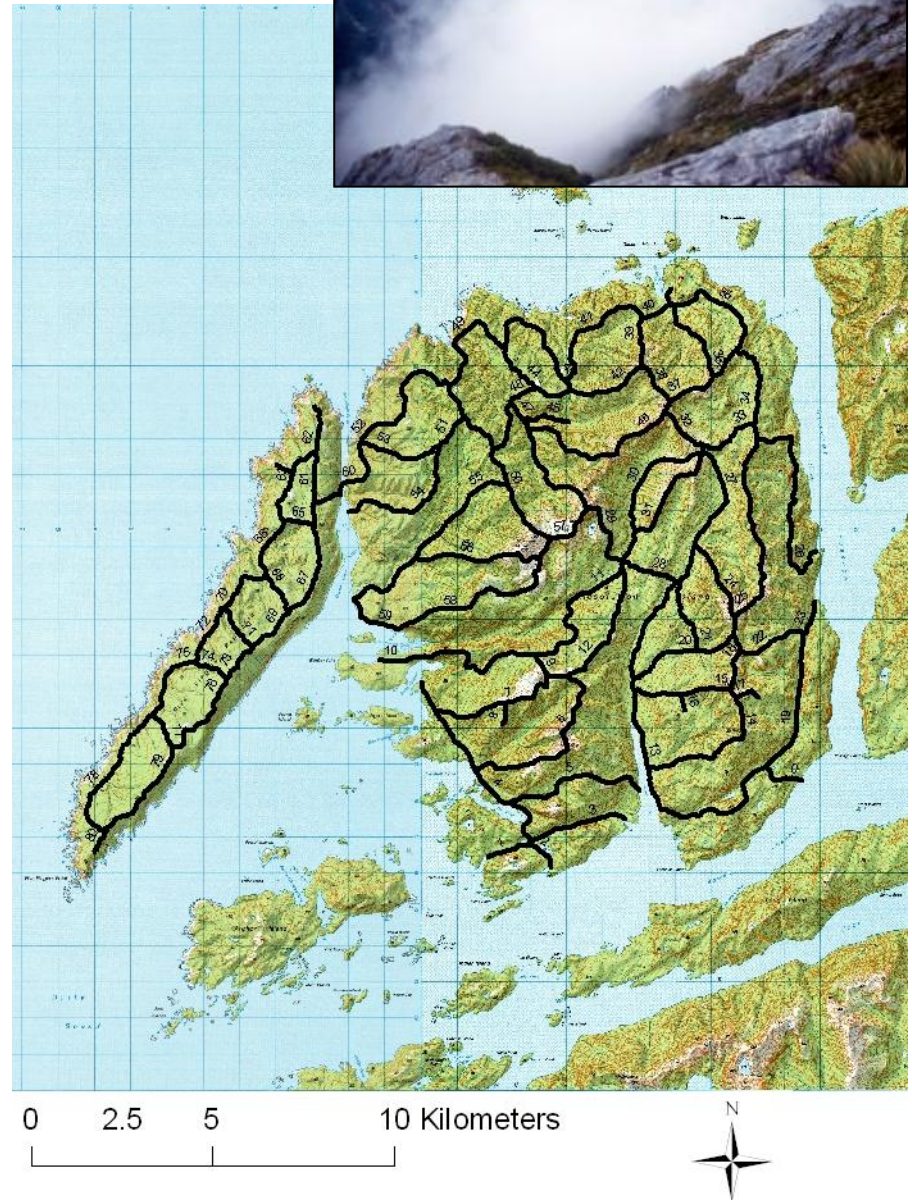*Department of Conservation*

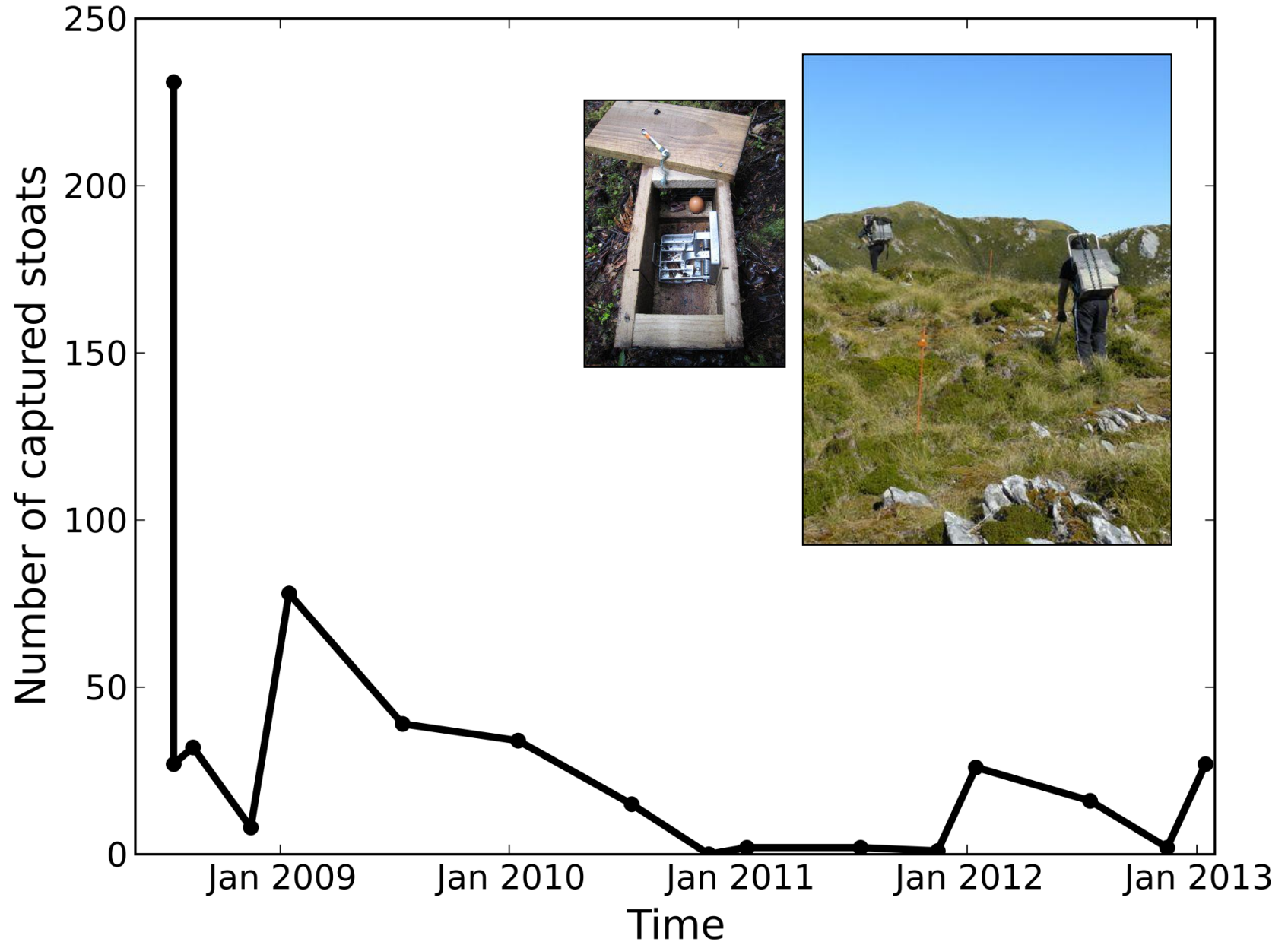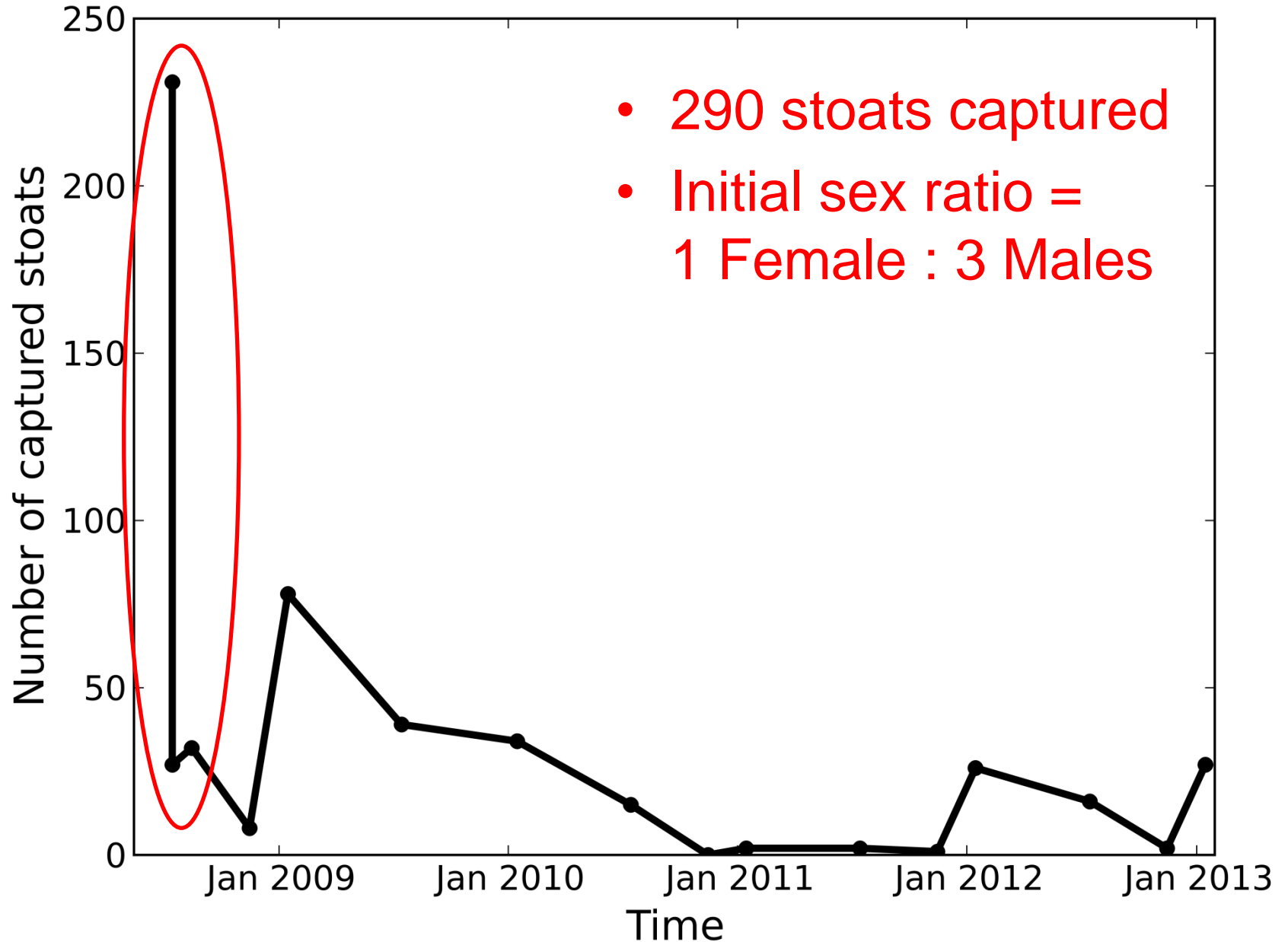# Resolution Island

21,000 ha

Stoat eradication

- 2500 traps spaced 105 m apart
- Traps reset Jan, July and Nov.

Trapping results

Initial knockdown

- 290 stoats captured
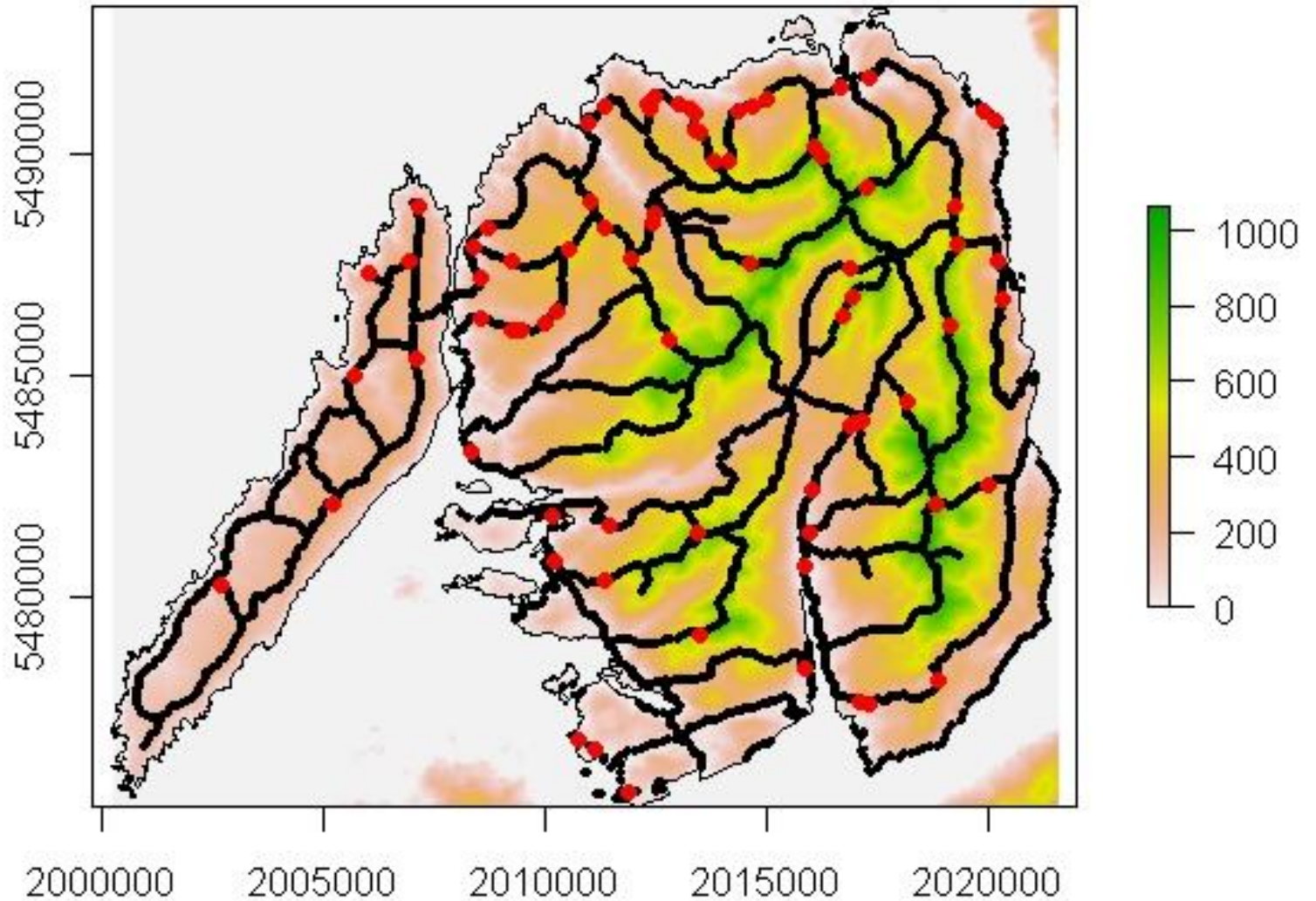- Initial sex ratio =
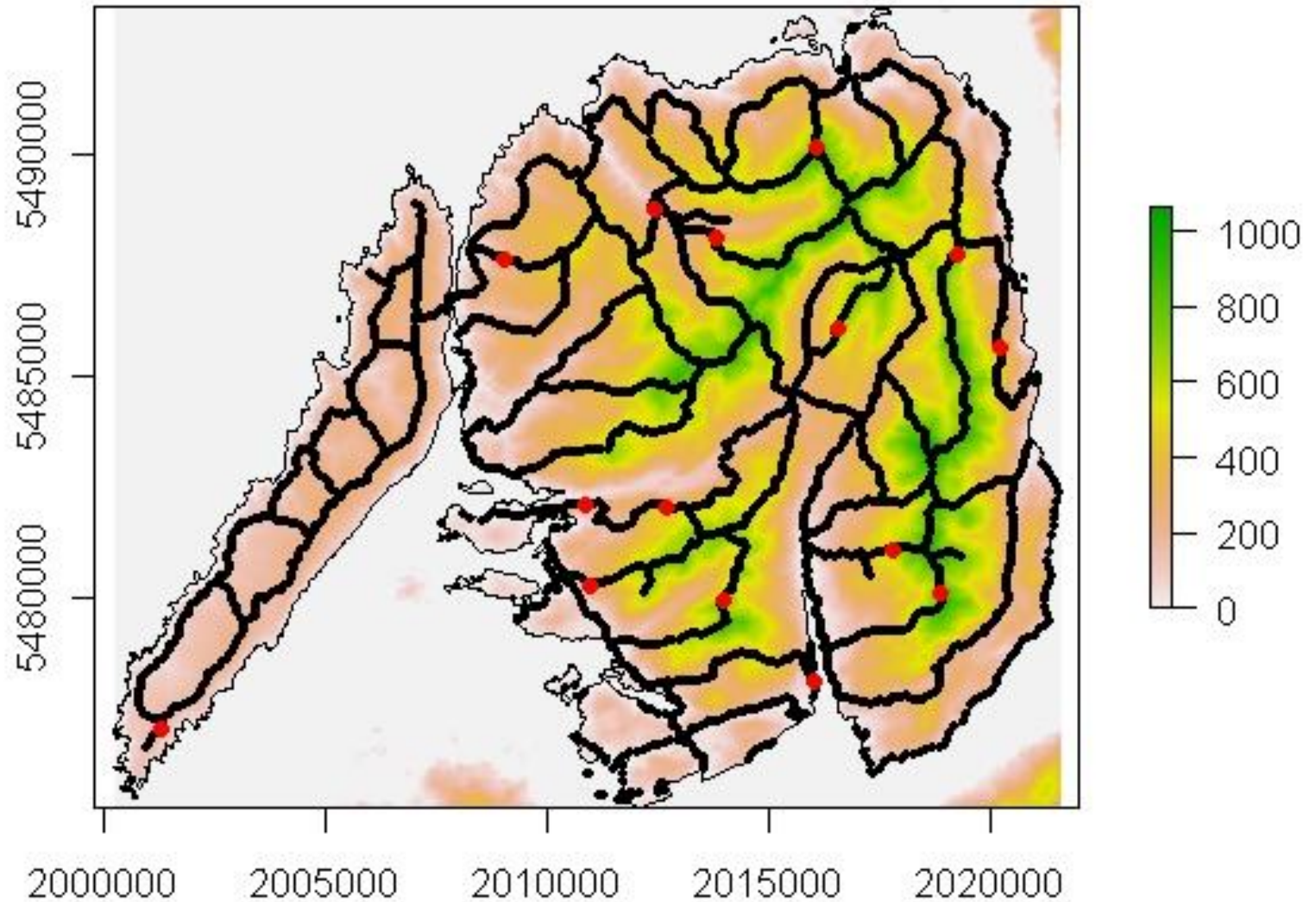 1 Female : 3 Males
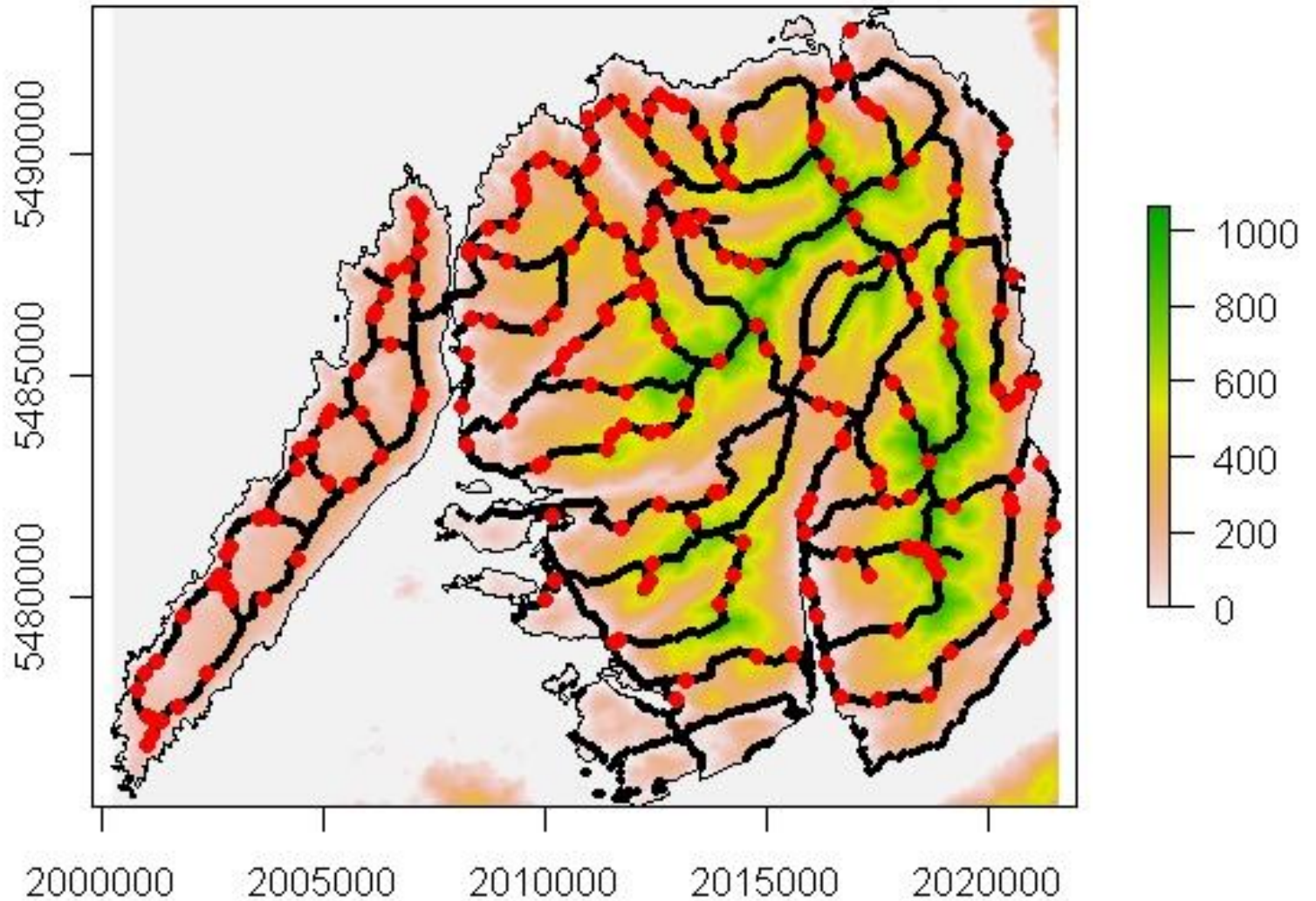
231 captures
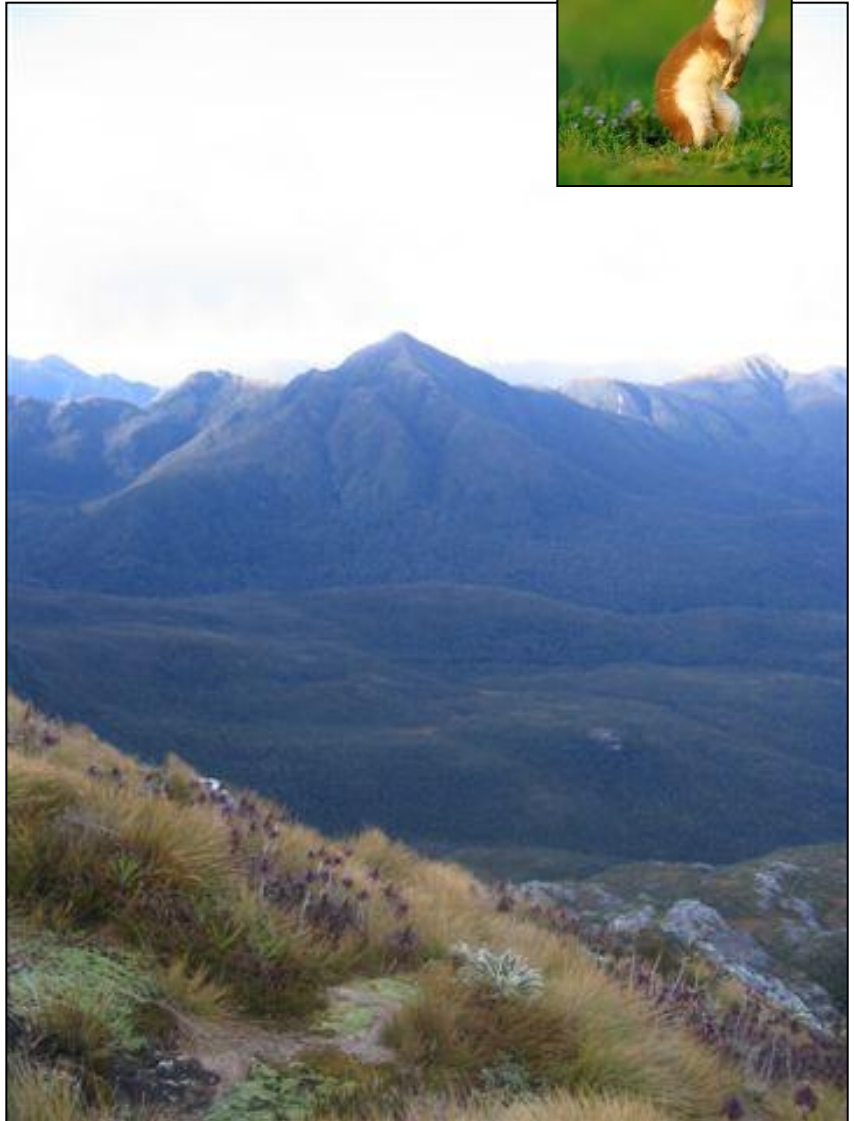
27 captures
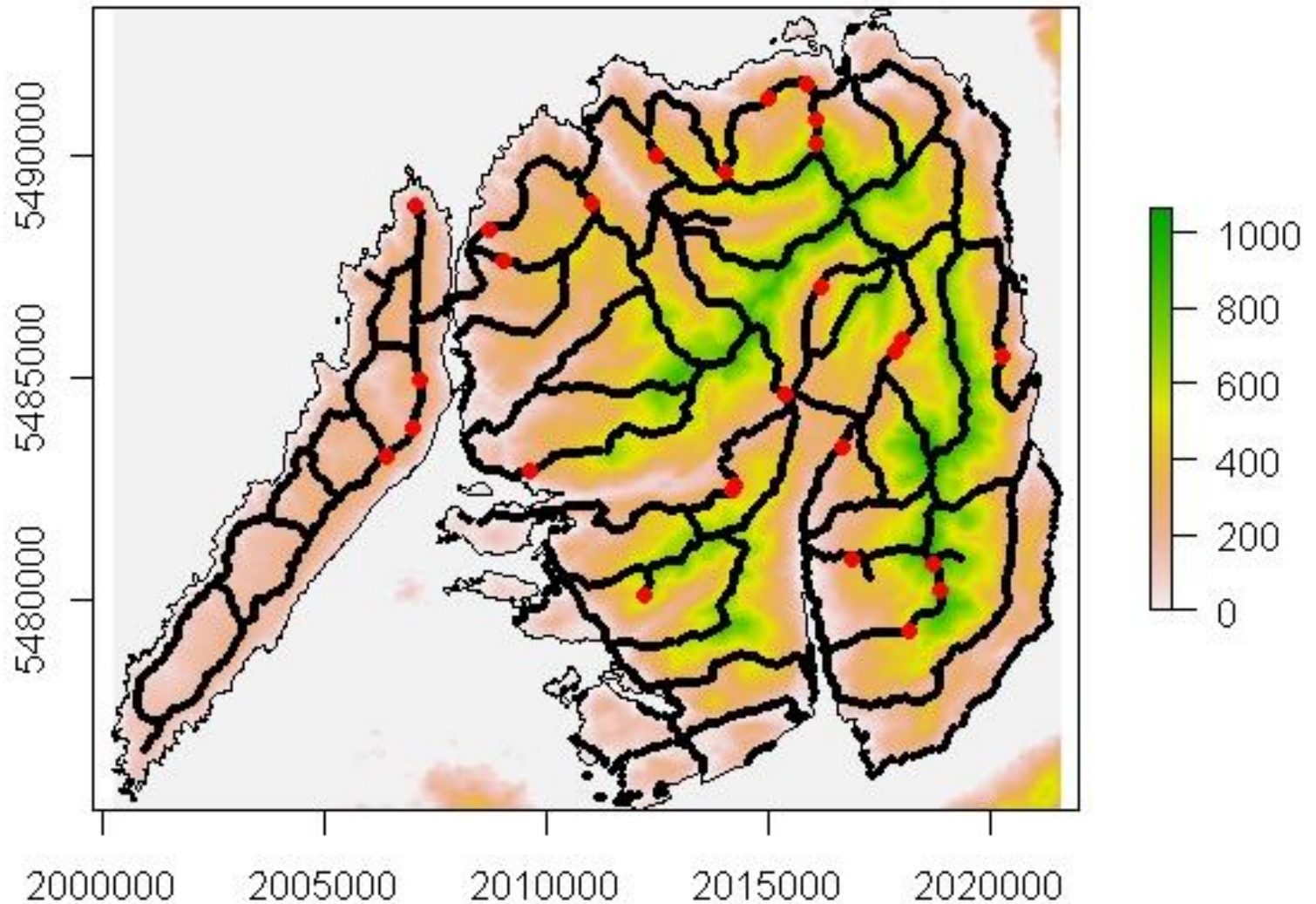
78 captures

15 captures

Management questions:

1. What is the on-going objective: eradication or suppression?

2. Where do we put control effort?

3. When and how frequently do we reset traps?

** Budget constraints
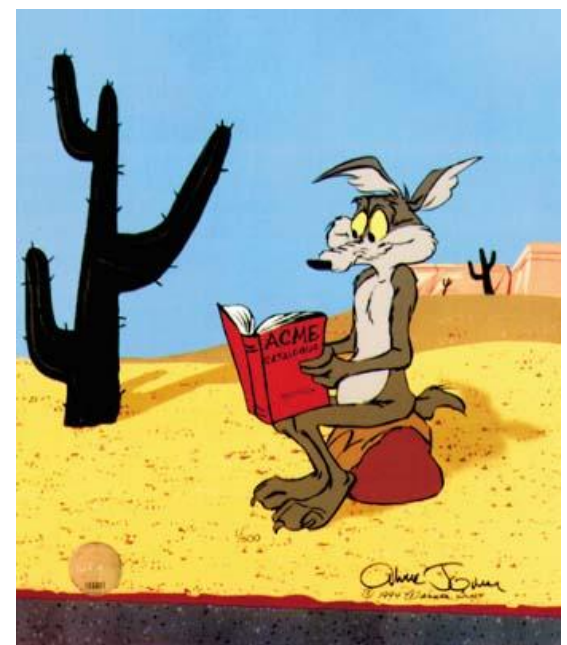
What can modelling contribute?

Two-stage process

1) Analyse data:
   a) Trapping dynamics
   b) Stoat population dynamics

2) Simulate management scenarios
   a) Predict resulting stoat population responses

Data analysis to estimate:

1) Probability of capture
2) Home-range size
3) Population size over time
4) Immigration rate
5) Population growth rate
6) Preferred habitat features

Simulation questions

Given different management scenarios:

1) What is the probability of sustained eradication?

2) What is the probability of sustained population suppression below a set threshold?
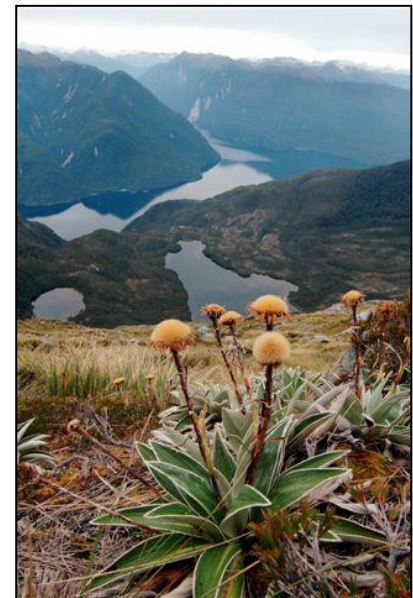
- Kokako?
- Saddleback?
- Kakapo?
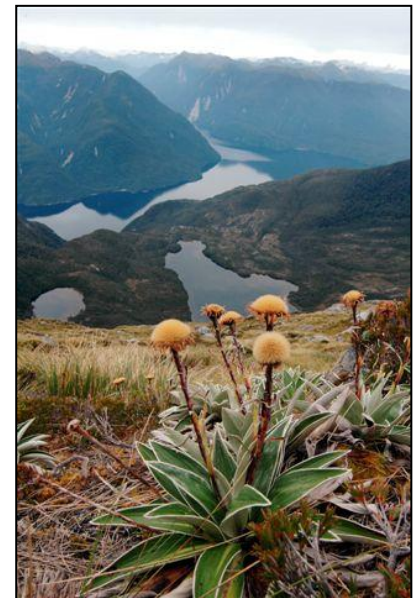
Simulation questions

Given different management scenarios:

1) What is the probability of sustained eradication?

2) What is the probability of sustained population suppression below a set threshold?

- Add traps
- Reduce trapping sessions
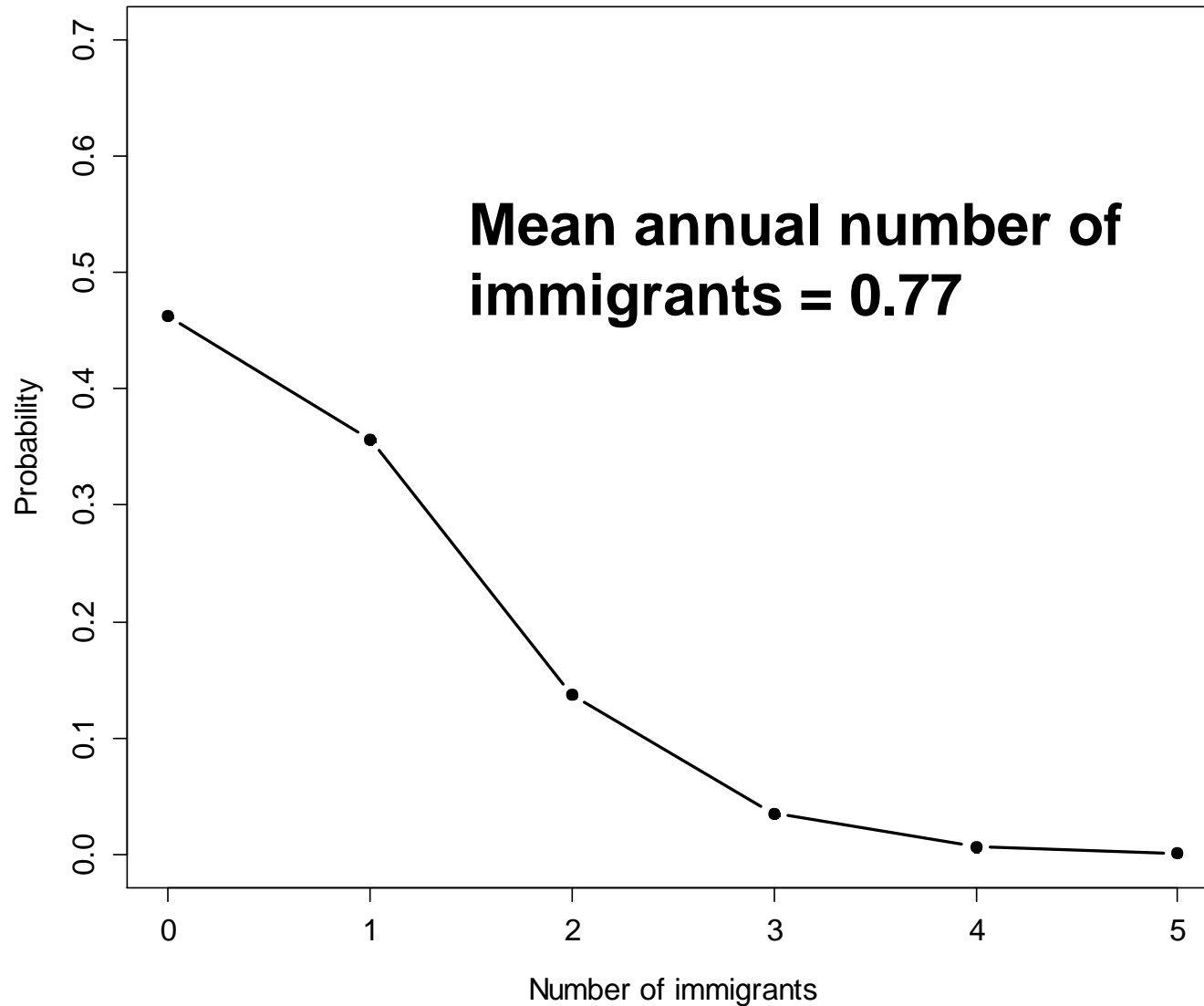- Reduce immigration
- Improve trap attractiveness

Spatial trapping model

1) Data analysis to fit model parameters

2) Simulate population dynamics

Results: Data analysis

Annual immigration rate?

Mean annual number of immigrants = 0.77

Results: Data analysis

Female reproductive rate?

- Literature: per-capita rate = 4.5
  - 9 kits / female

Results: Data analysis

Female reproductive rate?

- Literature: per-capita rate = 4.5
  - 9 kits / female

- Our reproduction parameter estimate:
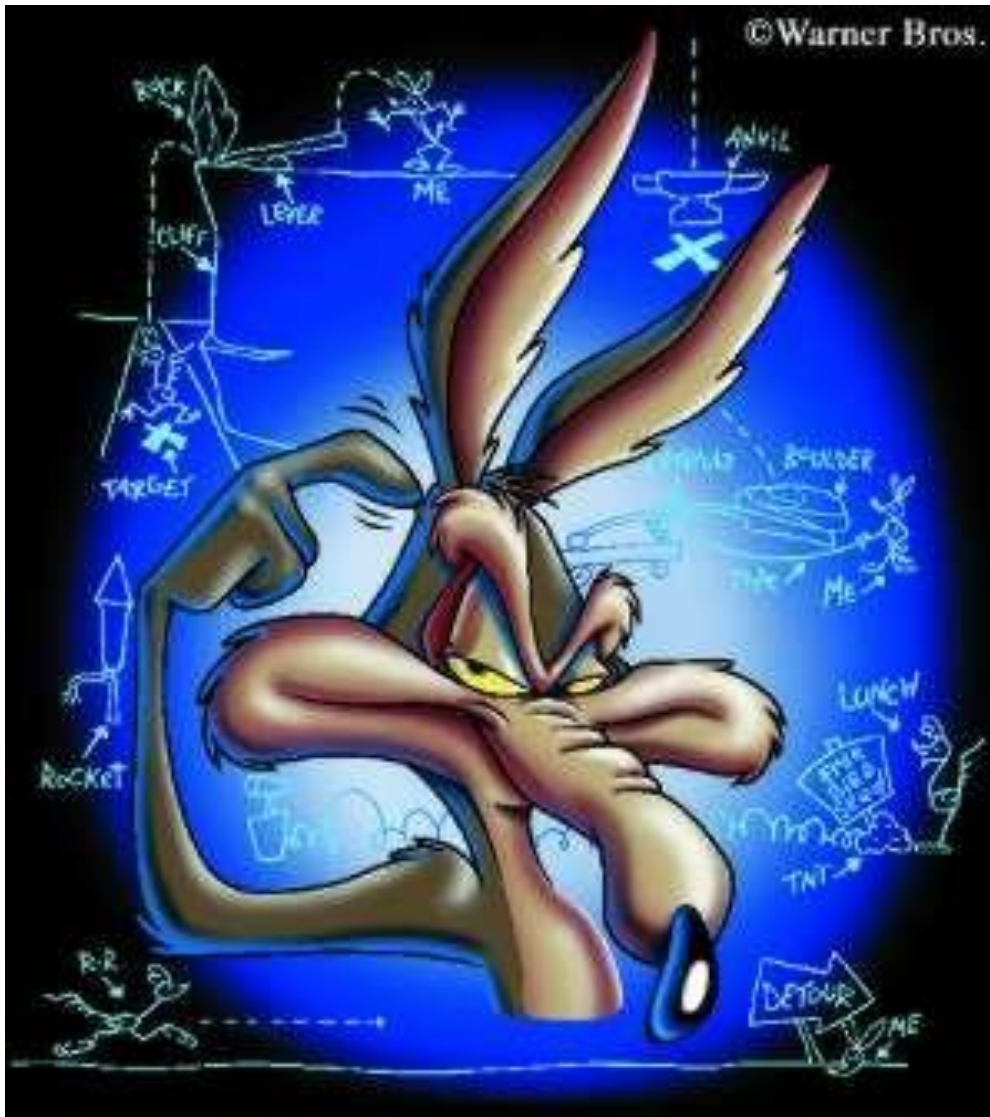 - Per-capita rate = 11.5 **(23 kits / female)**

Results: Data analysis

Female reproductive rate?

- Literature: per-capita rate = 4.5
  - 9 kits / female

- Our per-capita rate = 11.5
  - **23 kits / female**

- Recall initial 1 female : 3 male capture ratio

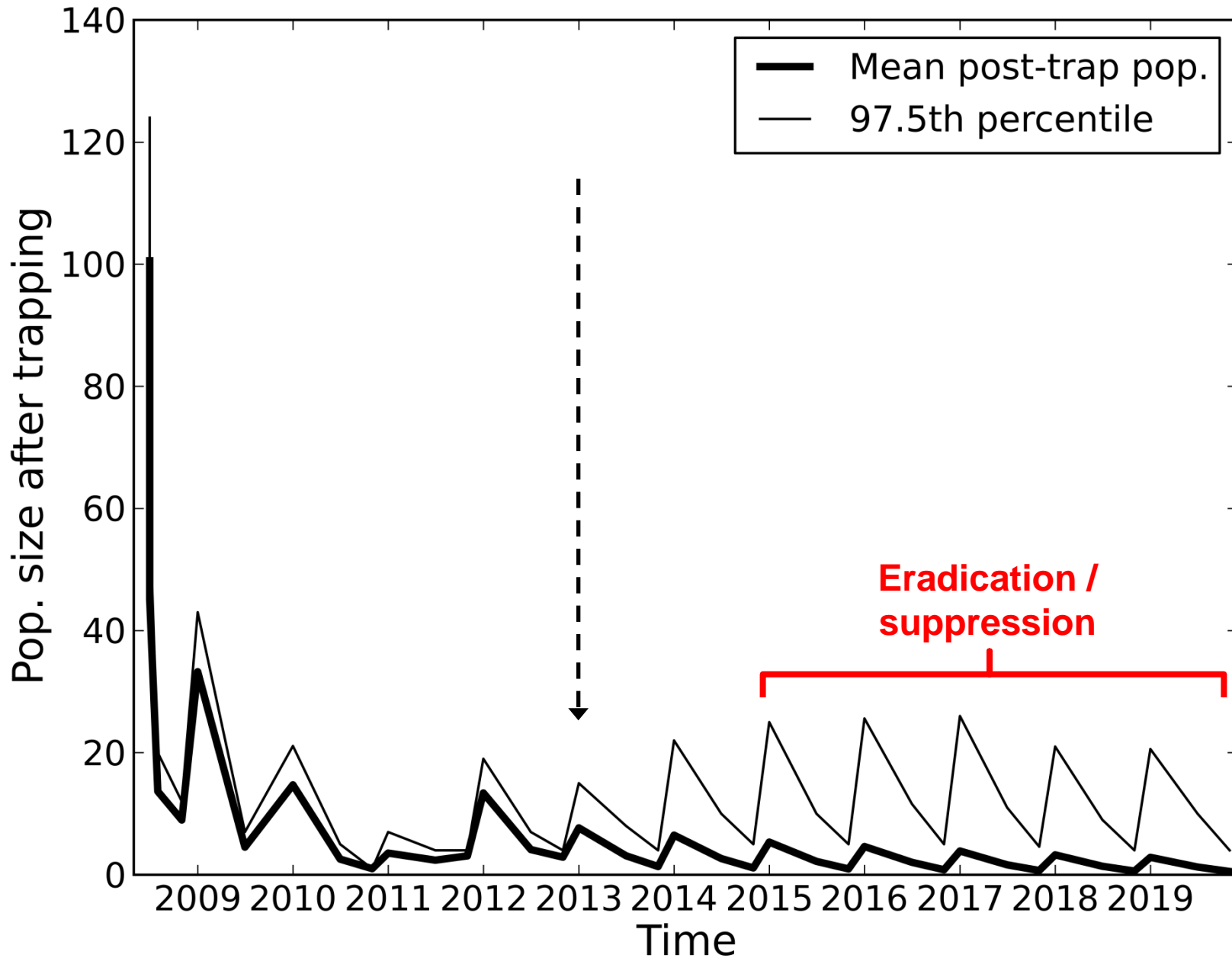- Indicates a present ratio: 2.56 females : 1 male
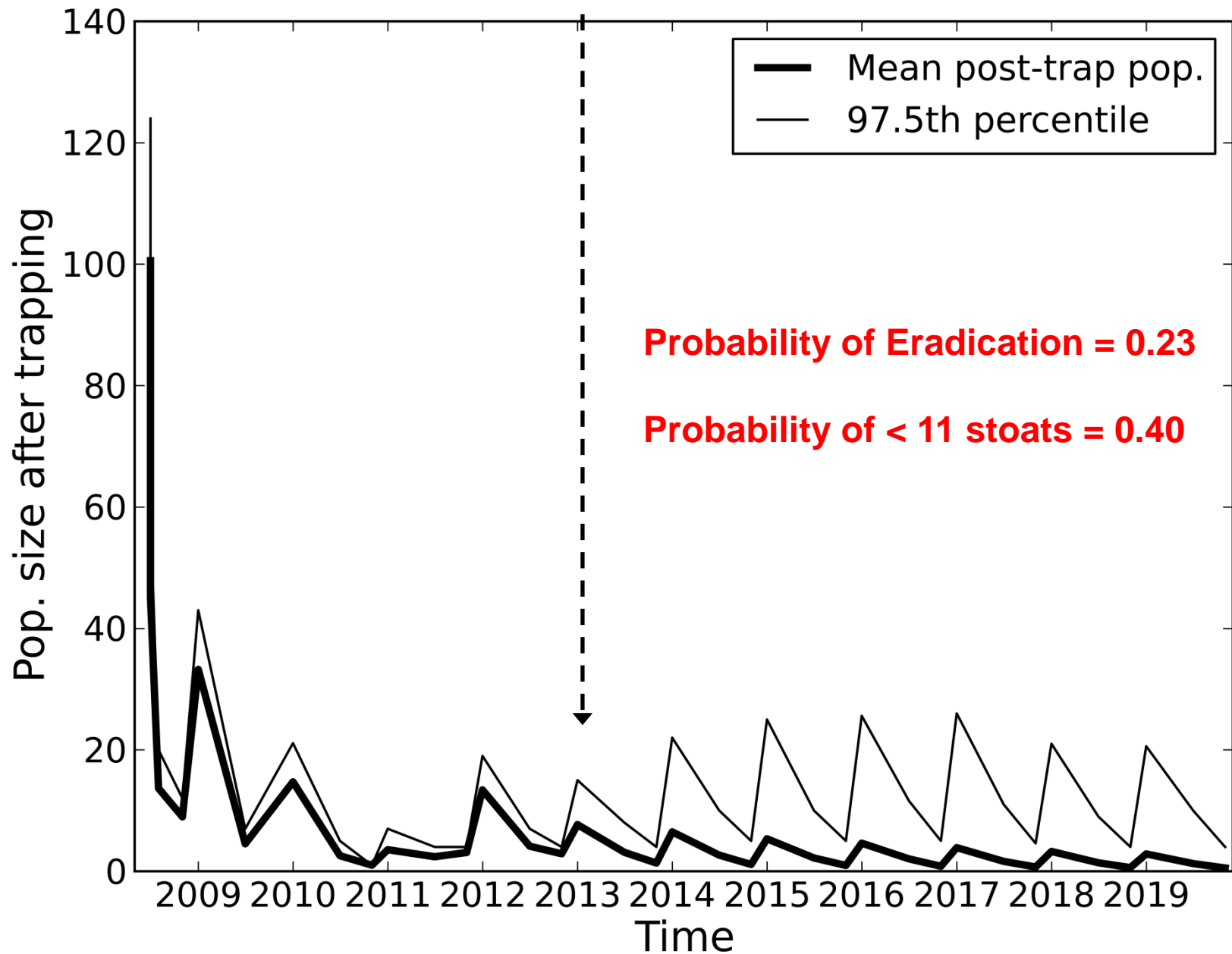
Results: Predictive simulations

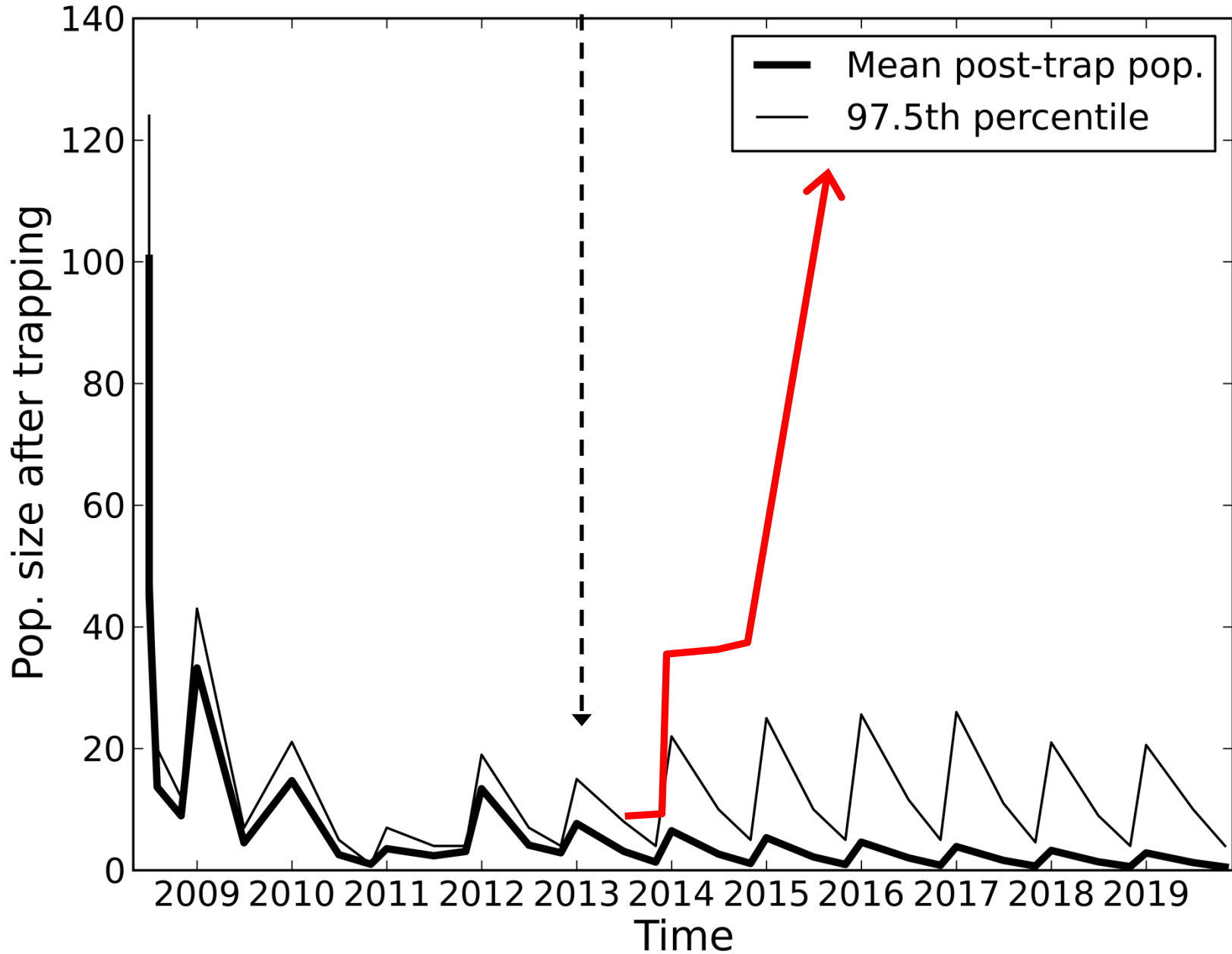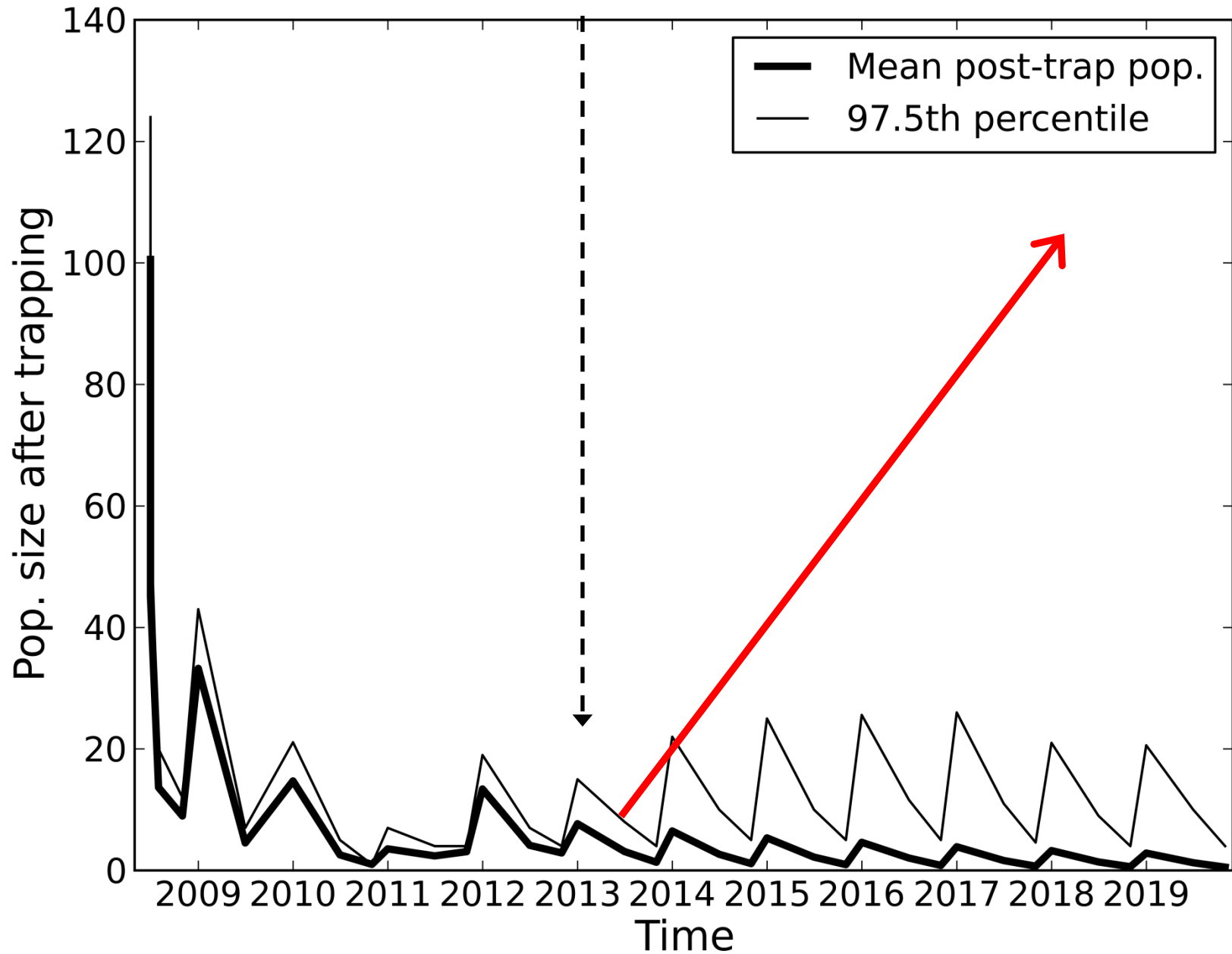**What if …?**

Current regime

Current regime

Probability of Eradication = 0.23

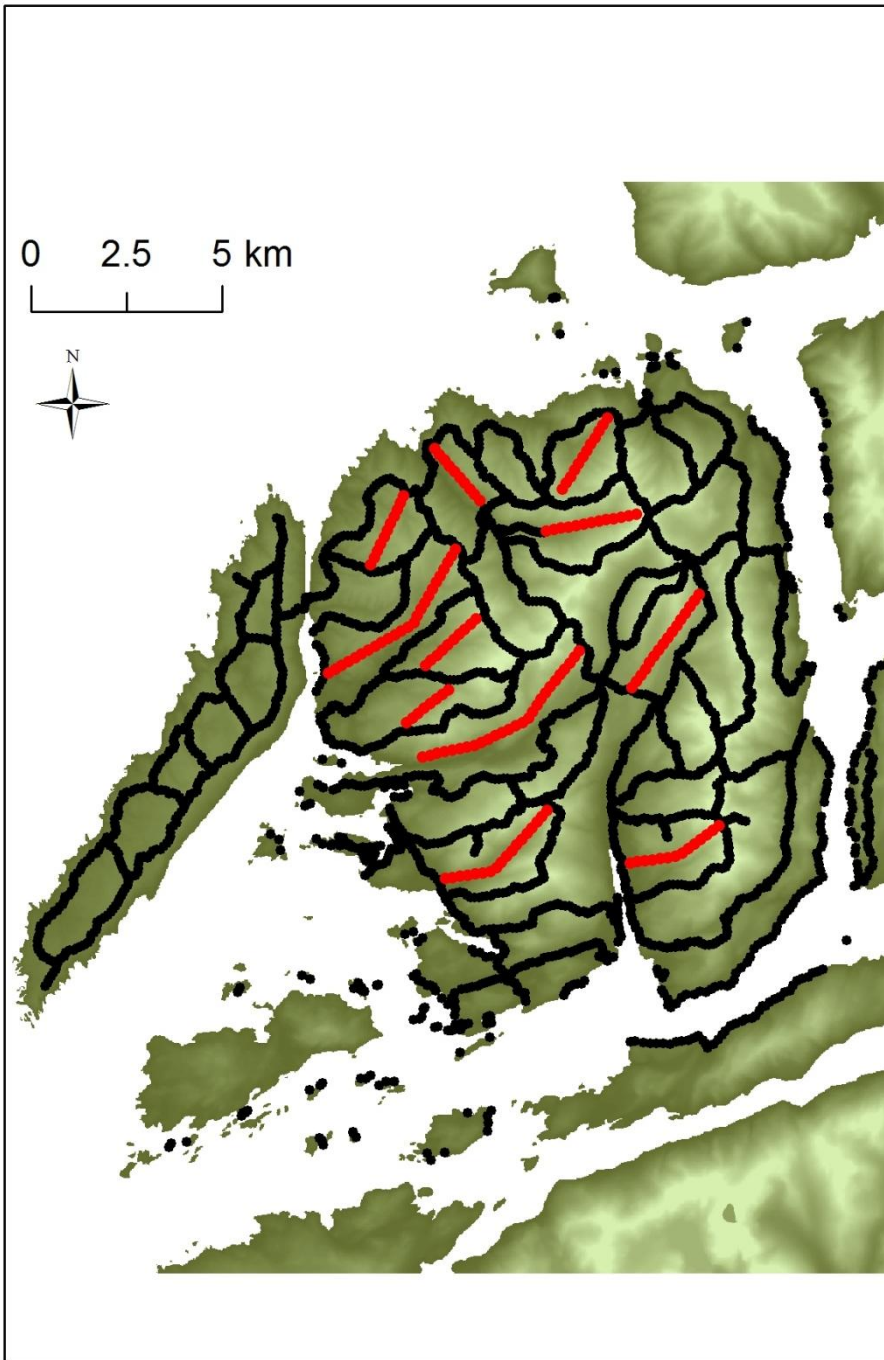Probability of < 11 stoats = 0.40

Stop trapping
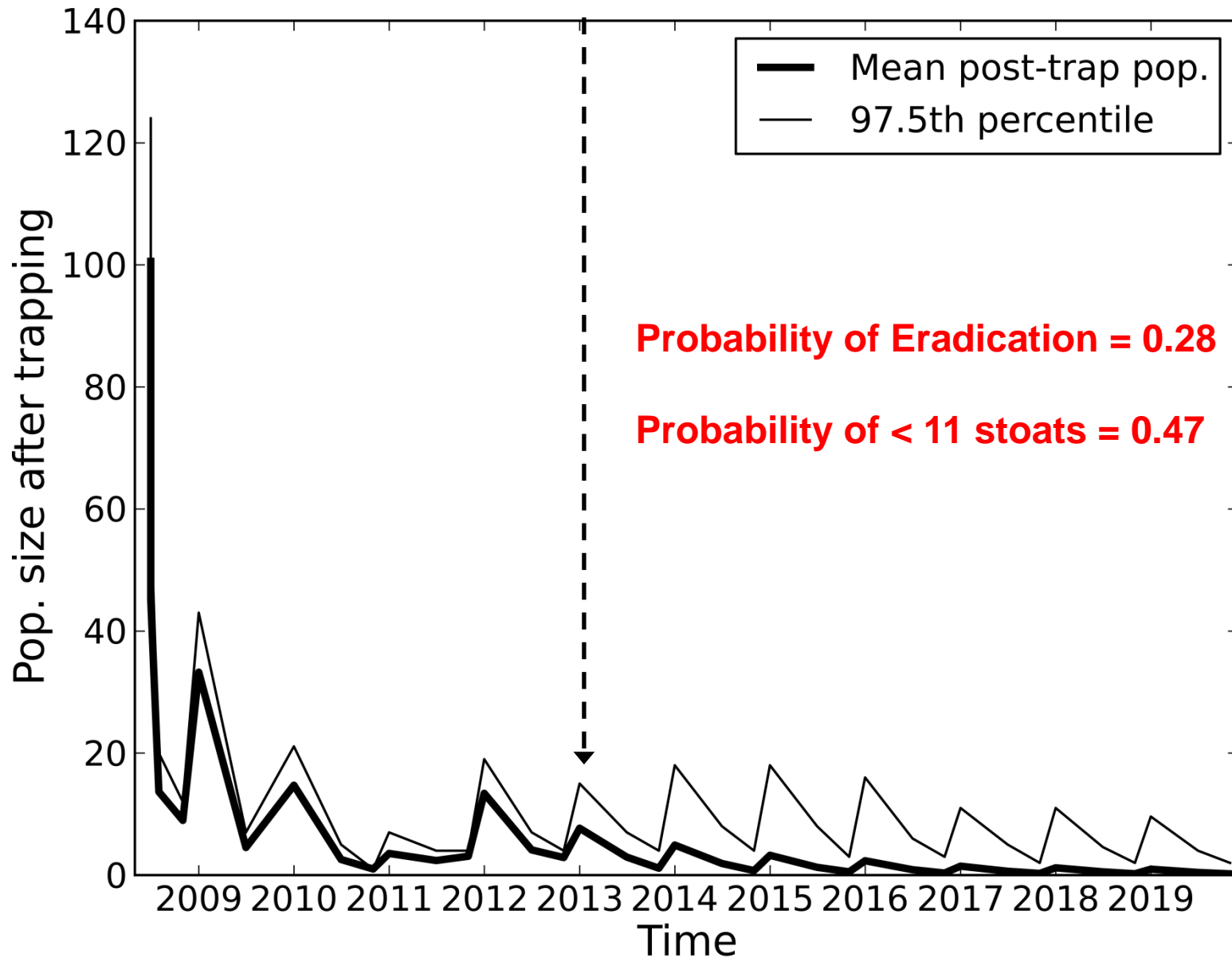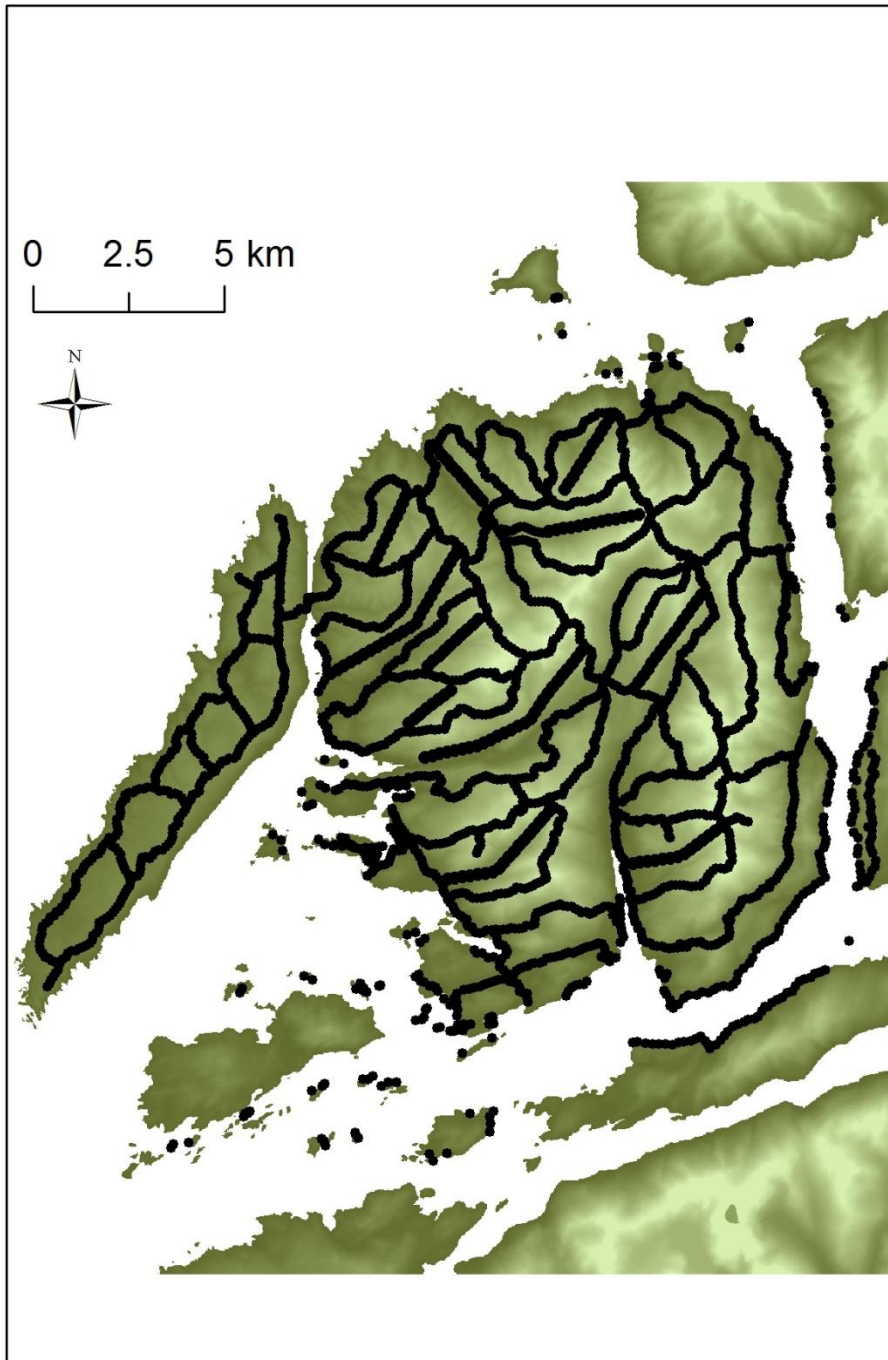
Trap 2 times per year

Additional traps

- 164 traps
- 200-m spacing
- Difficult to access

Add 164 traps

Probability of Eradication = 0.28

Probability of < 11 stoats = 0.47

Reduce immigration

Reduced probability of immigration

Decrease mean annual rate:

0.77 to 0.38

Decrease immigration by 0.50

Probability of Eradication = 0.46

Probability of < 11 stoats = 0.53

Equal female : male ratio

Probability of Eradication = 0.33

Probability of < 11 stoats = 0.94
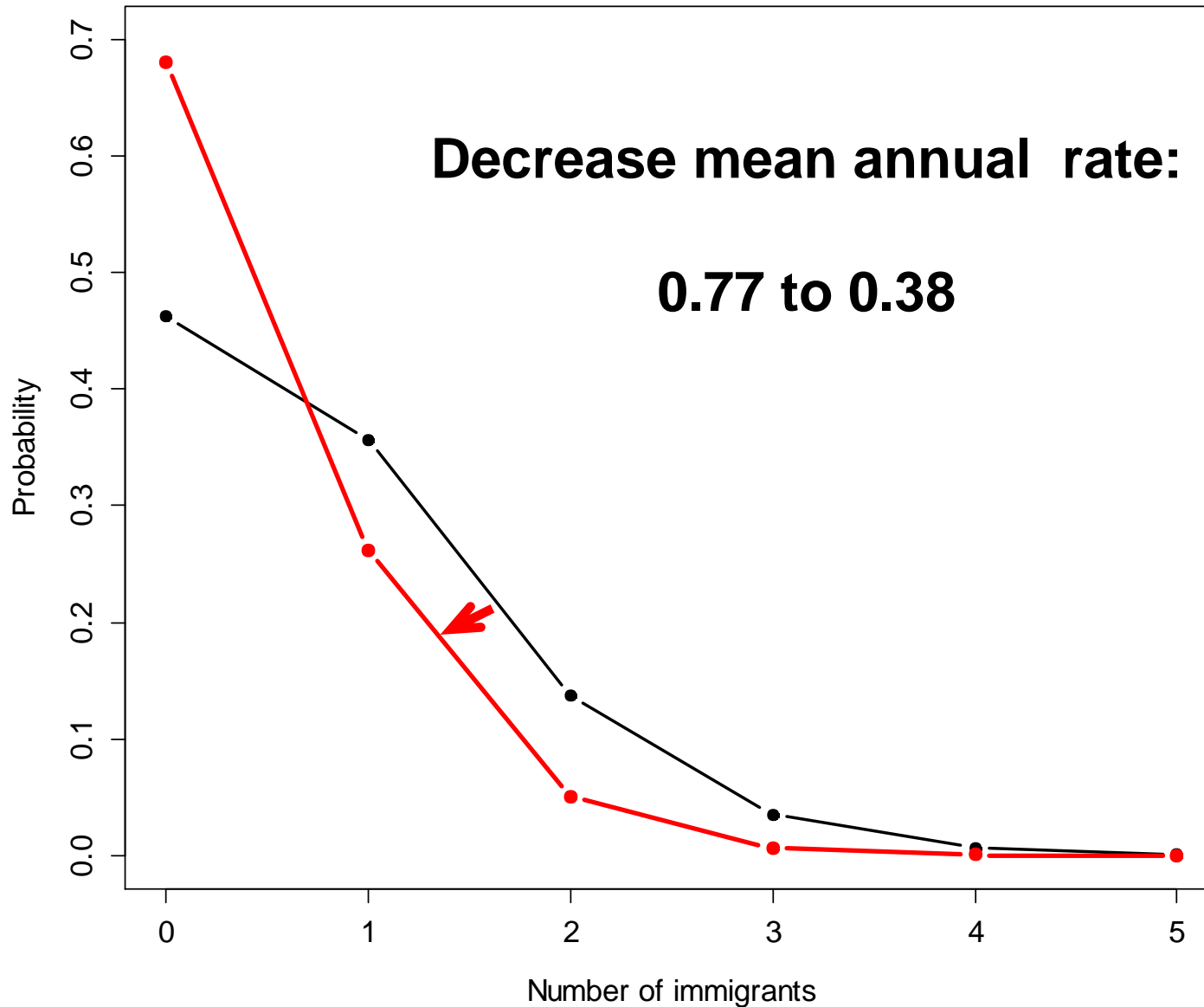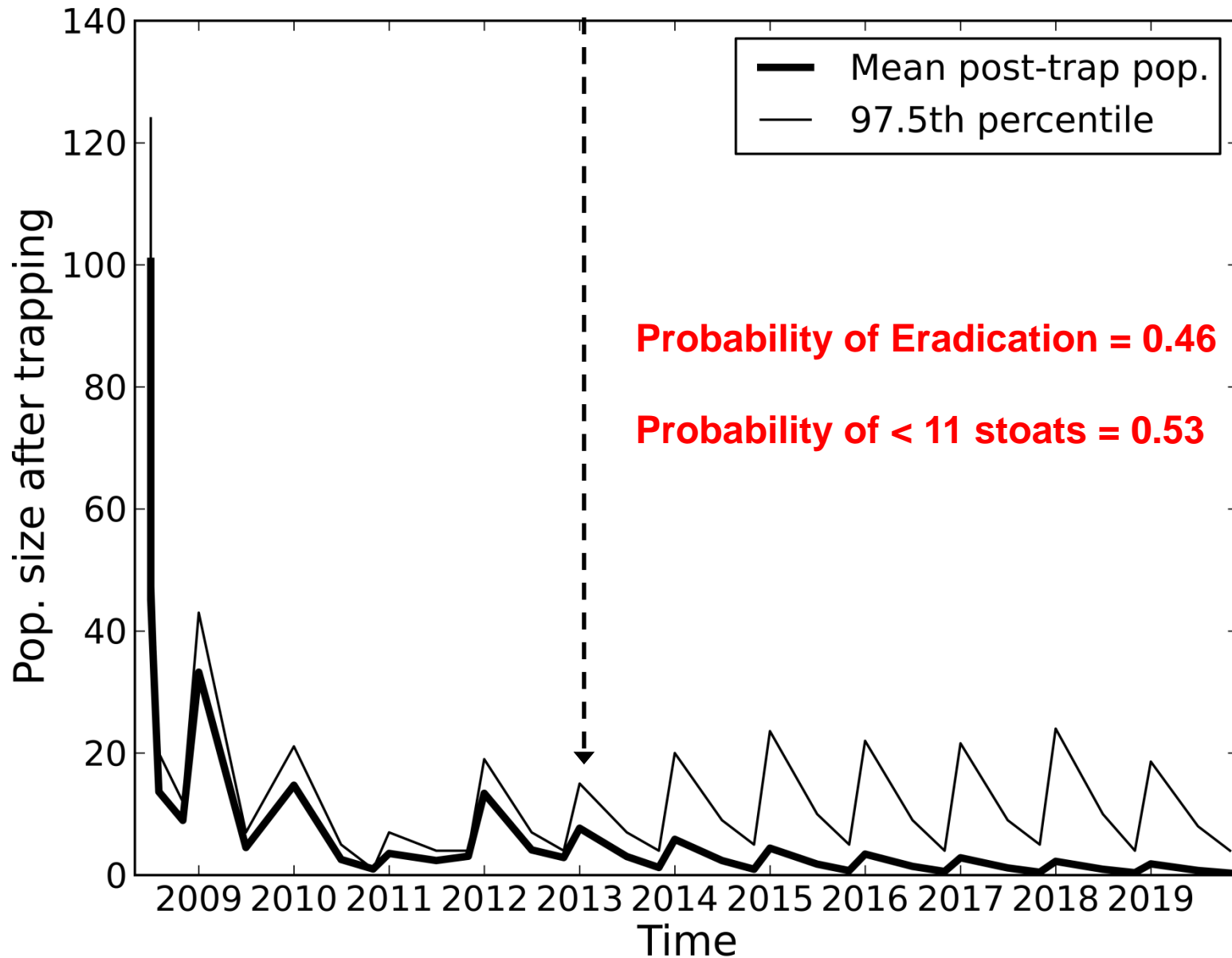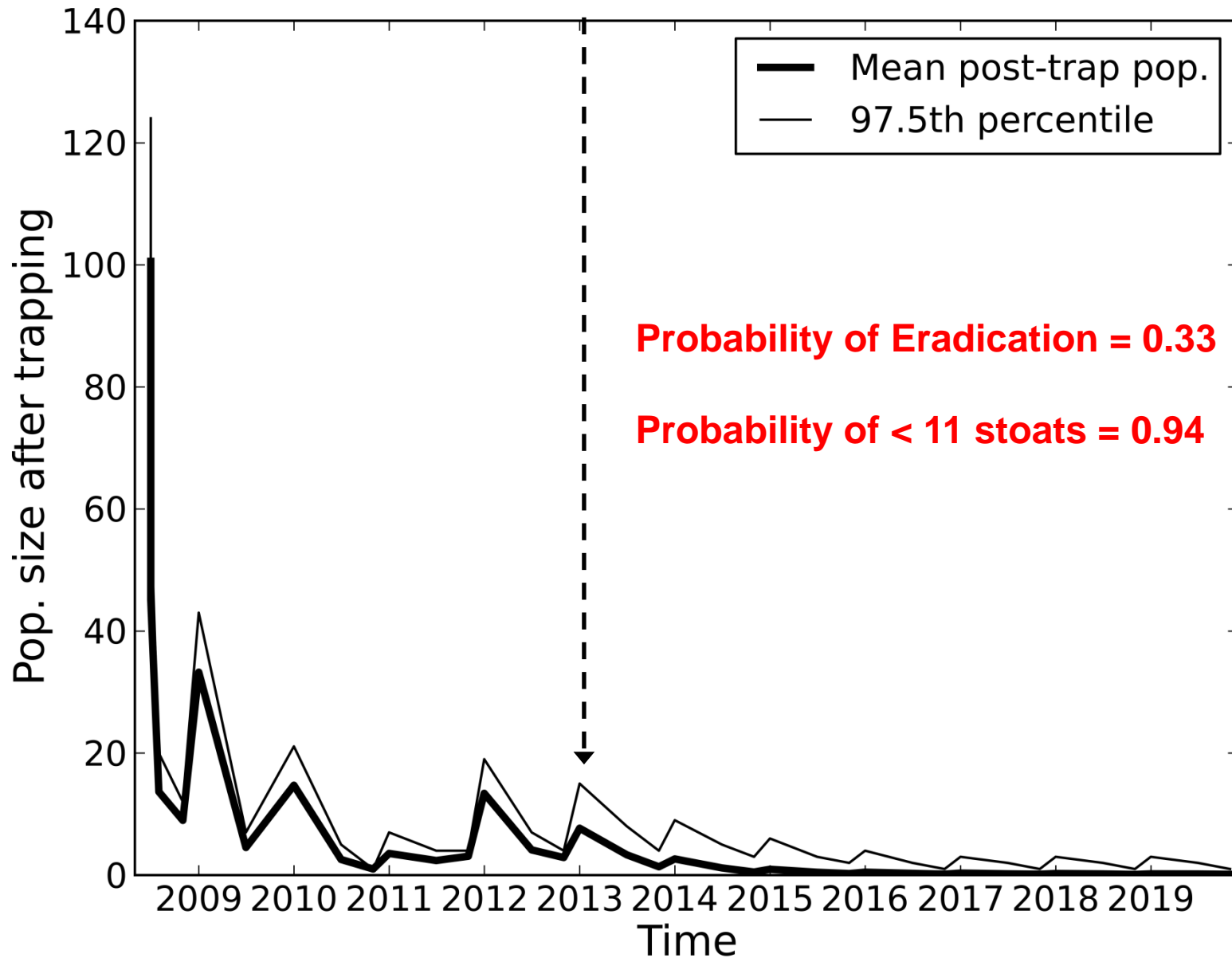
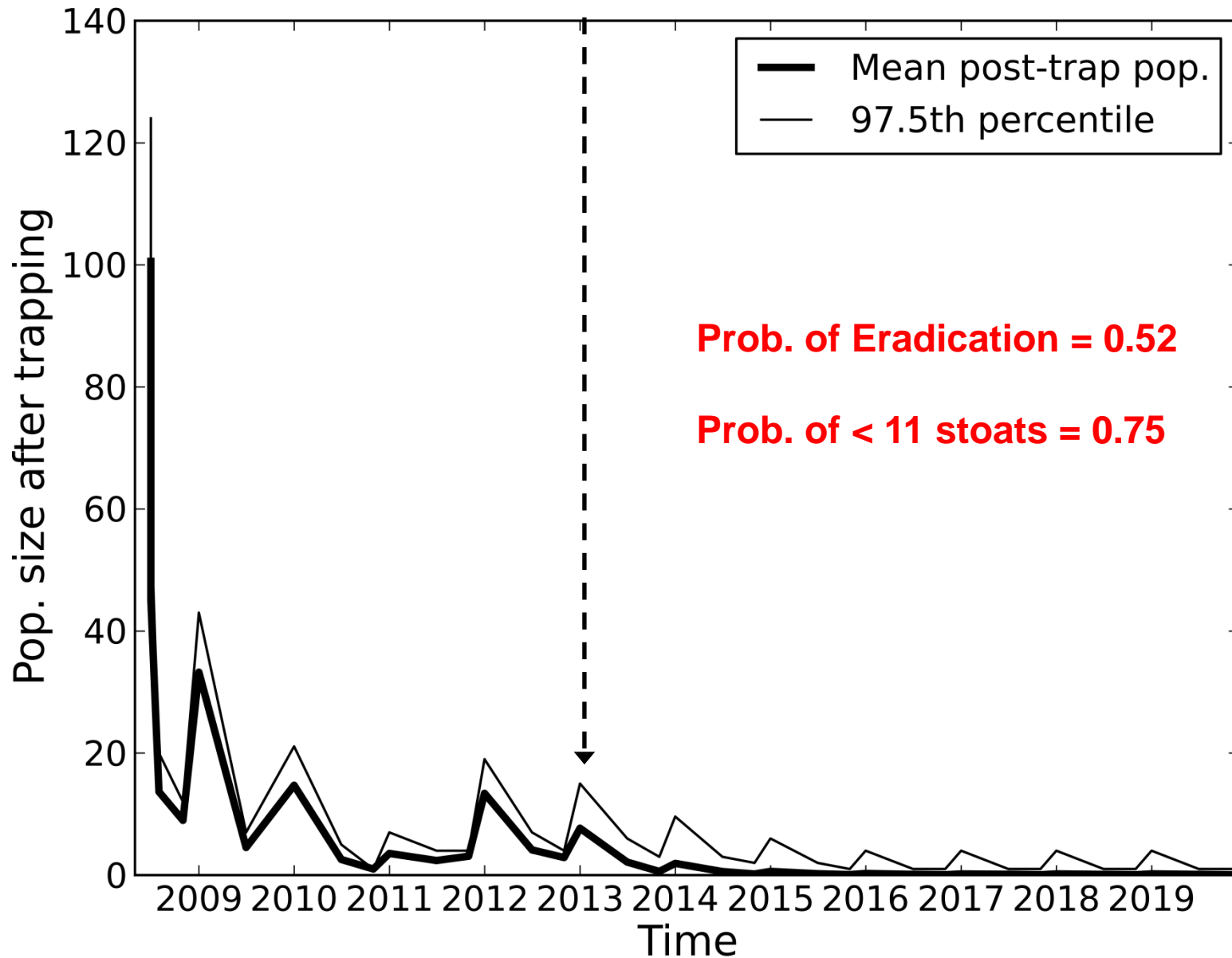# Increase per-night probability of capture if trap is at home range centre

0.047 to 0.094

Increase trap attraction x2

Prob. of Eradication = 0.52

Prob. of < 11 stoats = 0.75

Attract females, improve traps, reduce immigration

Probability of Eradication = 0.87

Probability of < 11 stoats = 0.99
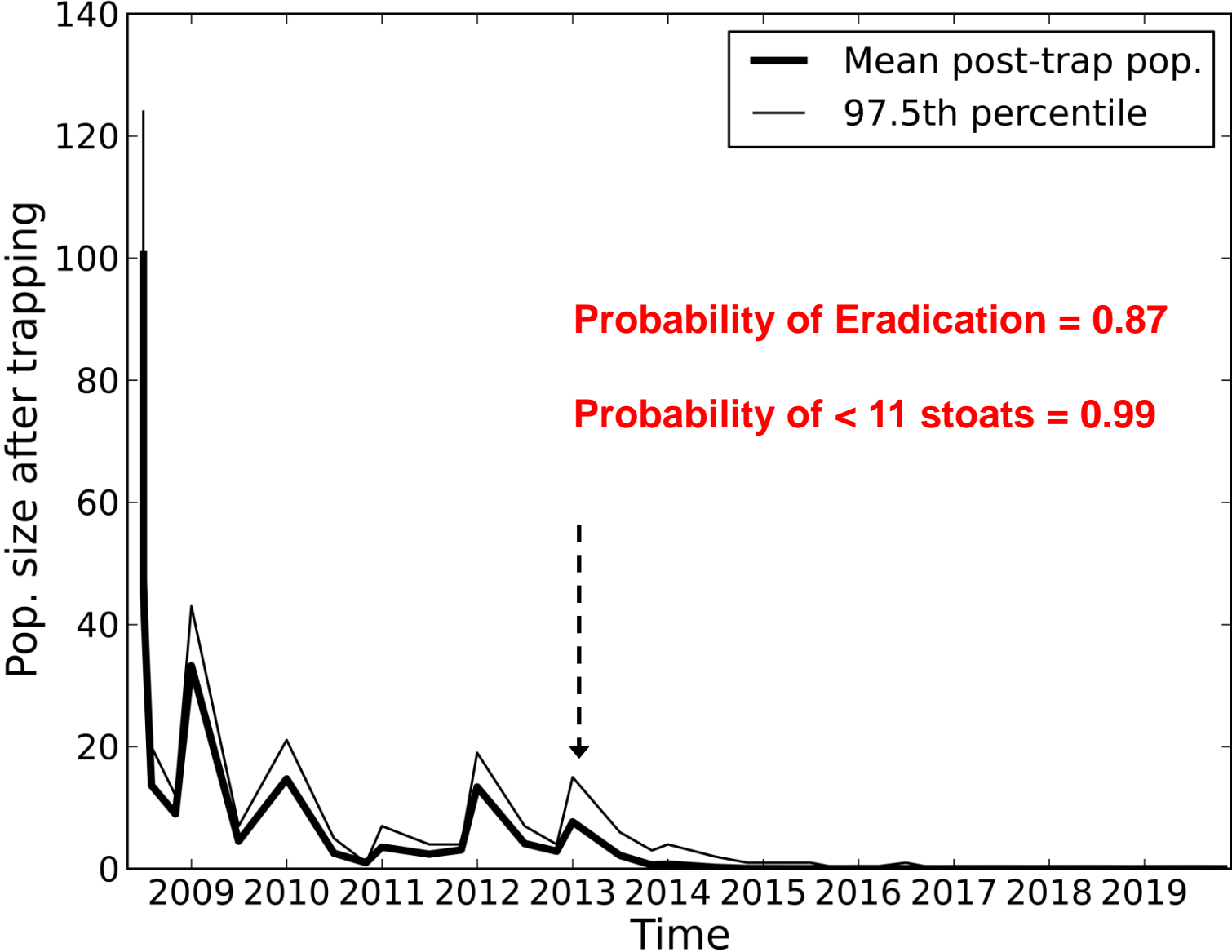
Summary

Suppression or eradication is possible

Three major challenges:

- Increase ability to control females

- Increase overall probability of capture

- Decrease immigration

Summary

Suppression

- Increase capture of females
  - 1 female : 1 male
  - Fertility control
- Probability of suppression = 0.94

Summary

Eradication

- Increase capture of females
  - Or fertility control
- Increase probability of capture
- Decrease immigration
- Probability of eradication = 0.95

Thank you

Sam Gillingham assisted with coding

Funding:

End