Using Panther Road Mortalities to Determine a Population Size Estimate of Florida Panthers

Dave Onorato
Fish and Wildlife Research Institute
Florida Fish and Wildlife Conservation Commission

Counting Pumas

- Why?
  - Management
  - Conservation
- How?

"This is how we do it out West"

- **Hunter take**
- **Not estimated at all (trend data)**
- **Educated guesses**
- **Cross-state comparisons invalid**

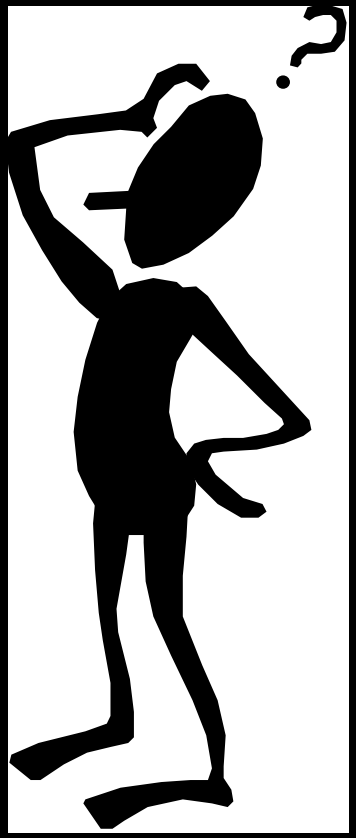
State/Province	Population size/trend†	Legal status
Alberta	800-1200 / increasing	Big game
California	4000-6000 / stable	Protected
Texas	Unknown / stable	Non-game
Idaho	2000 / declining	Big game
South Dakota	200-225 / increasing	Big game

† Population size and trend based on subjective info such as harvest data, sightings, nuisance incidents, extrapolation of localized field research, and/or literature-based density estimates extrapolated to suitable cougar habitat (from Hornocker and Negri 2010).

“How many panthers are there?”

100-180

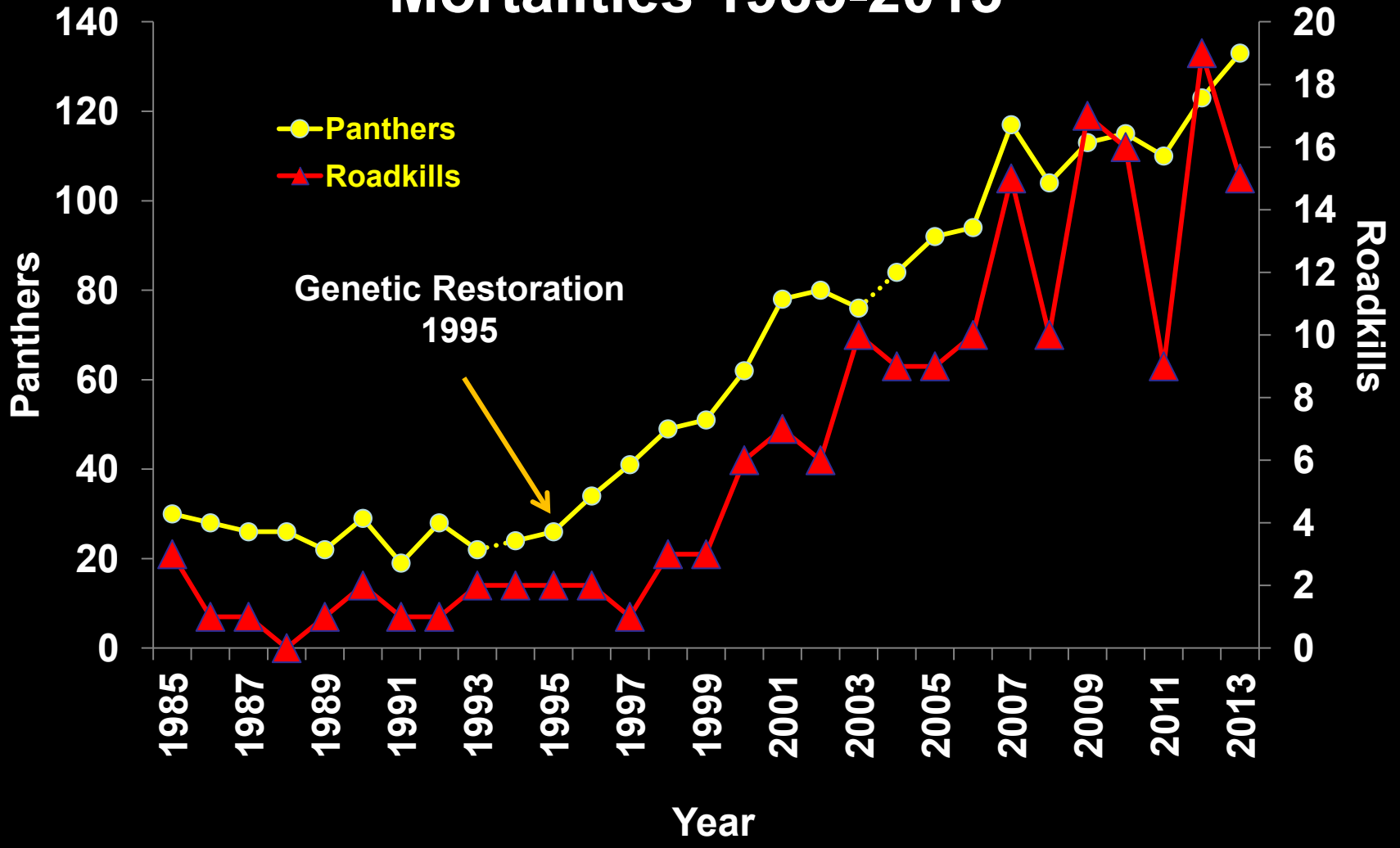
20-30



100-160

50-70

Panther Minimum Count and Road Mortalities 1985-2013



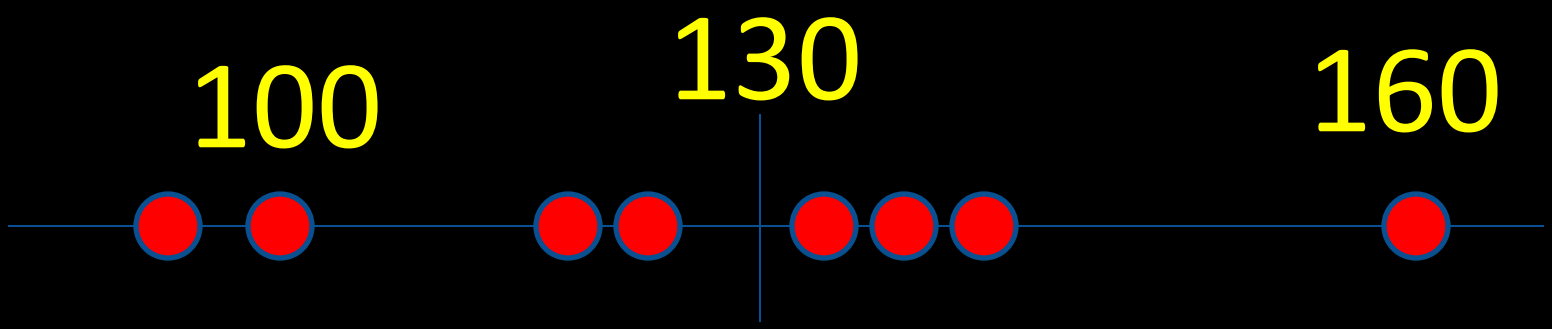
McBride et al. (2008); R. McBride pers. comm.

Florida panther population estimate

GOAL

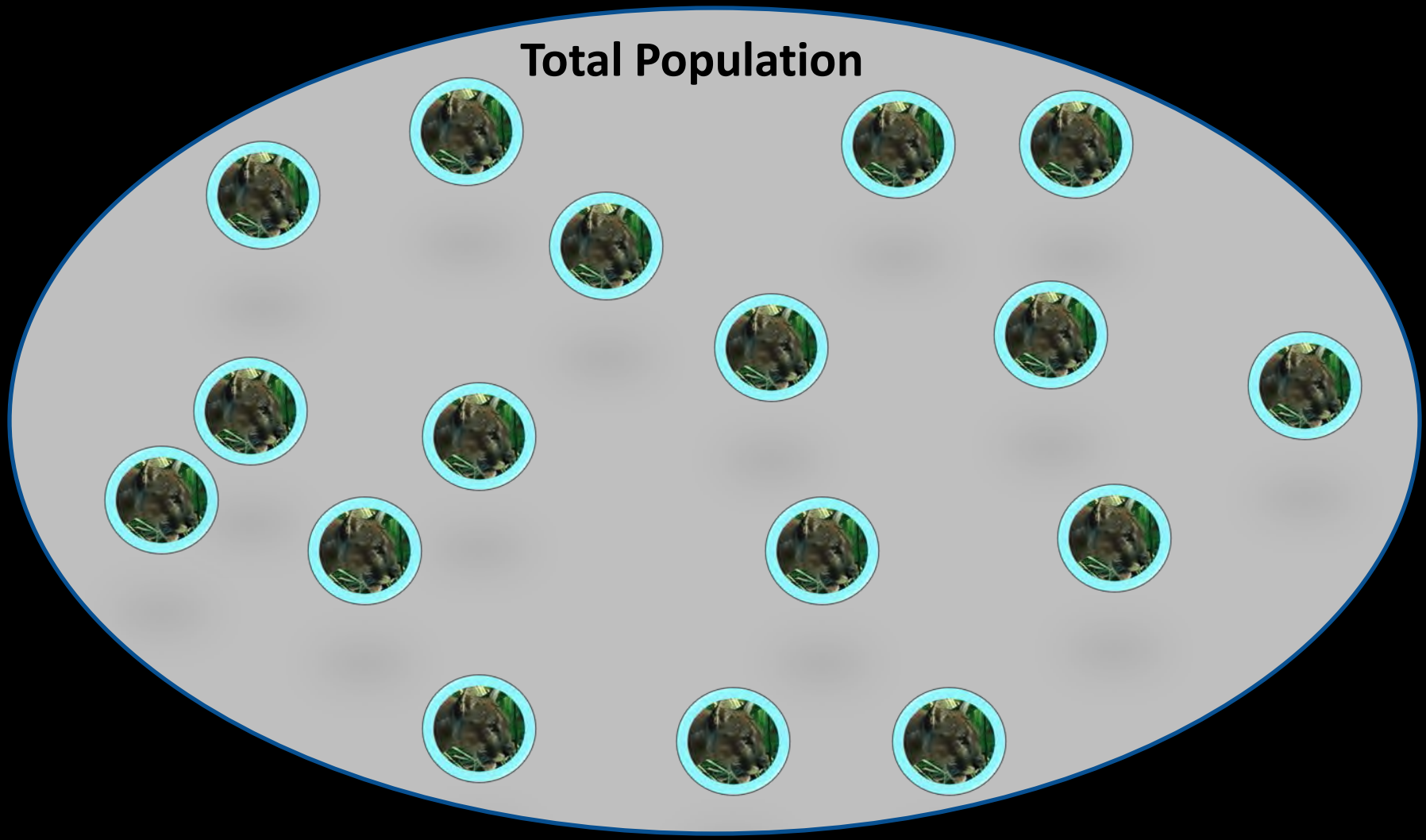
"To calculate a population estimate with associated measures of variance via a methodology that is repeatable on a periodic basis."

Estimates and measures of variance

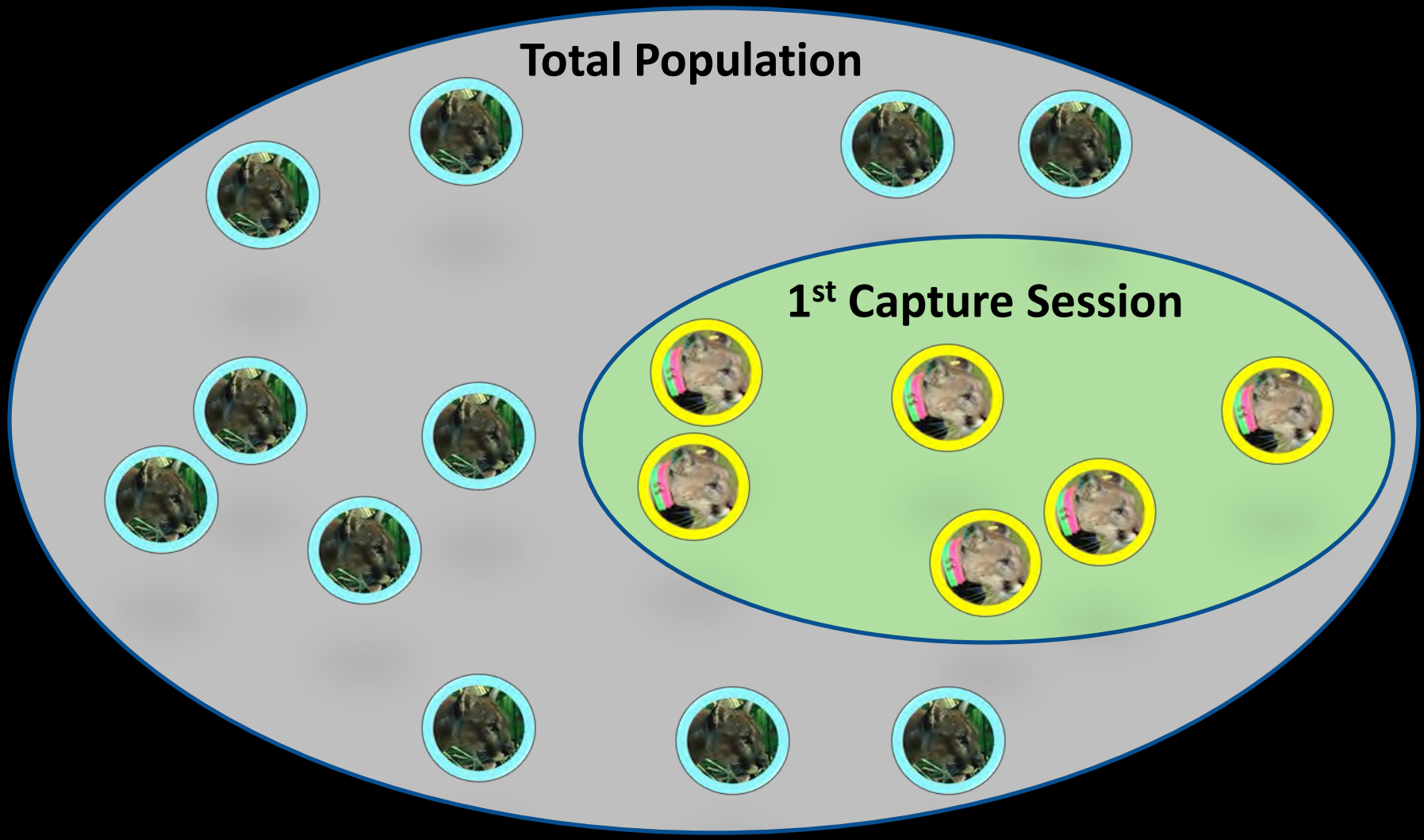


- Variance = measure of dispersion of values around the mean
- Confidence Interval = range of values set to include the parameter being investigated a given percentage of the time (e.g., 95% CI = 130 ± 30)

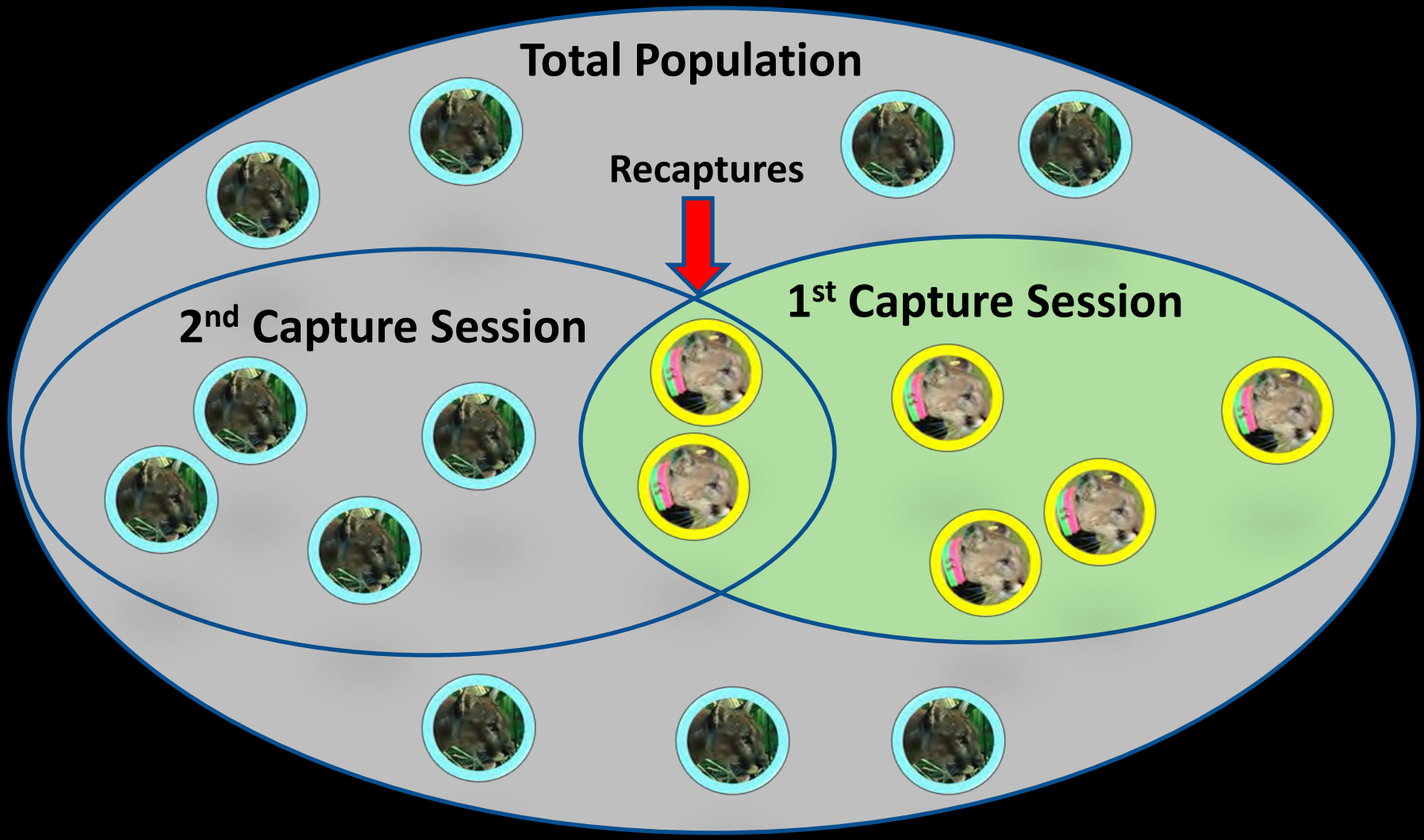
Mark-Recapture (MR) Framework



Mark-Recapture (MR) Framework

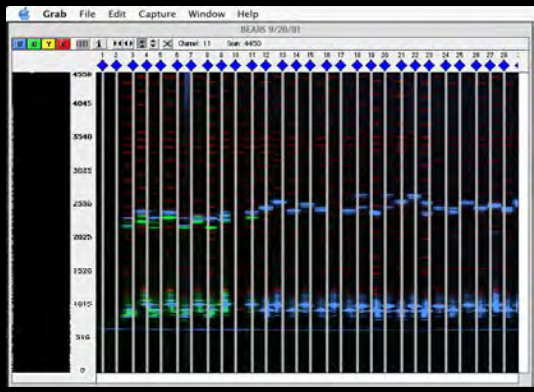


Mark-Recapture (MR) Framework



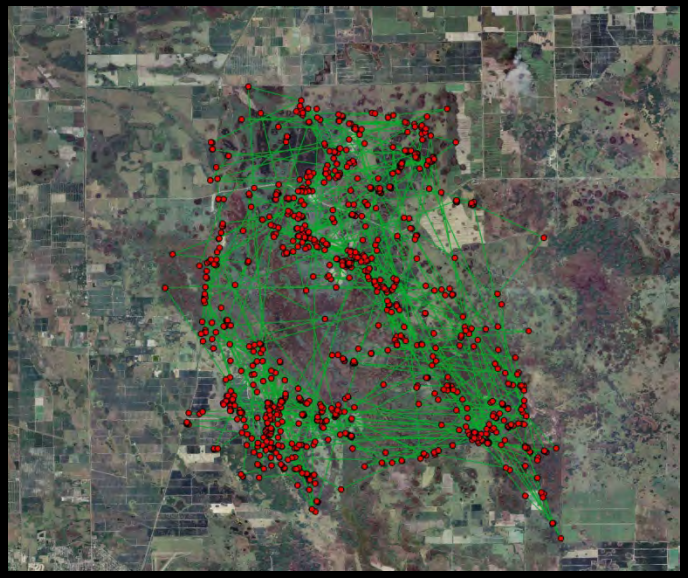
Mark-Recapture Framework

- **Biopsy dart MR method**
- **Camera Trap MR method**
- **Motor Vehicle Mortalities (MVM) MR method**



MVM Method

- Why use MVM data?
  - Data already being collected
  - Provides an estimate with associated measures of variance across the entire breeding range
  - Allows retrospective look at panther population

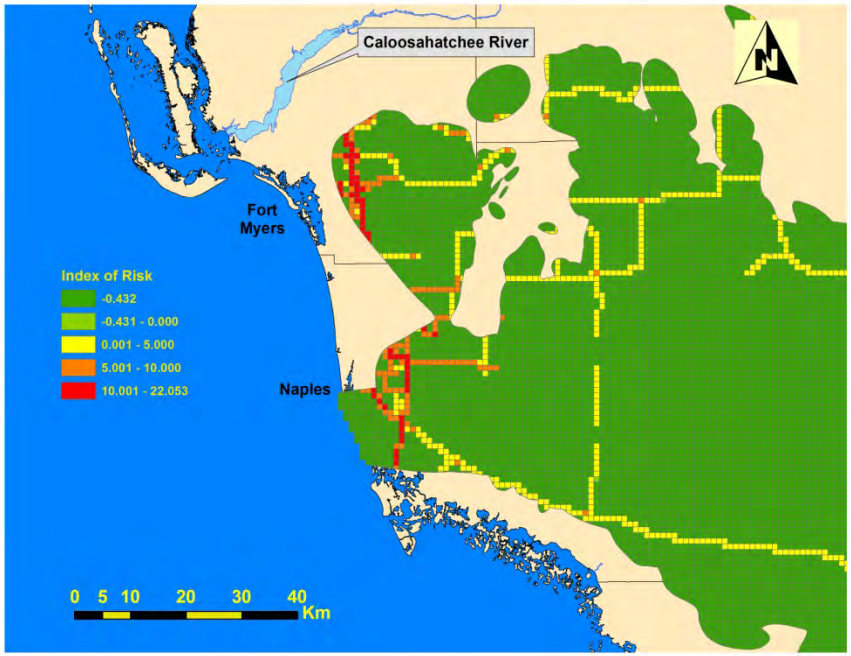


MVM Method

- How it works
  - Similar to traditional MR methods
  - Collared panthers serve as your marked population
  - Recaptures are inclusive of:
    - Marked panthers killed on roadways
    - Unmarked panthers killed on roadways
  - Proportion of marked to unmarked MVM helps calculate a population estimate

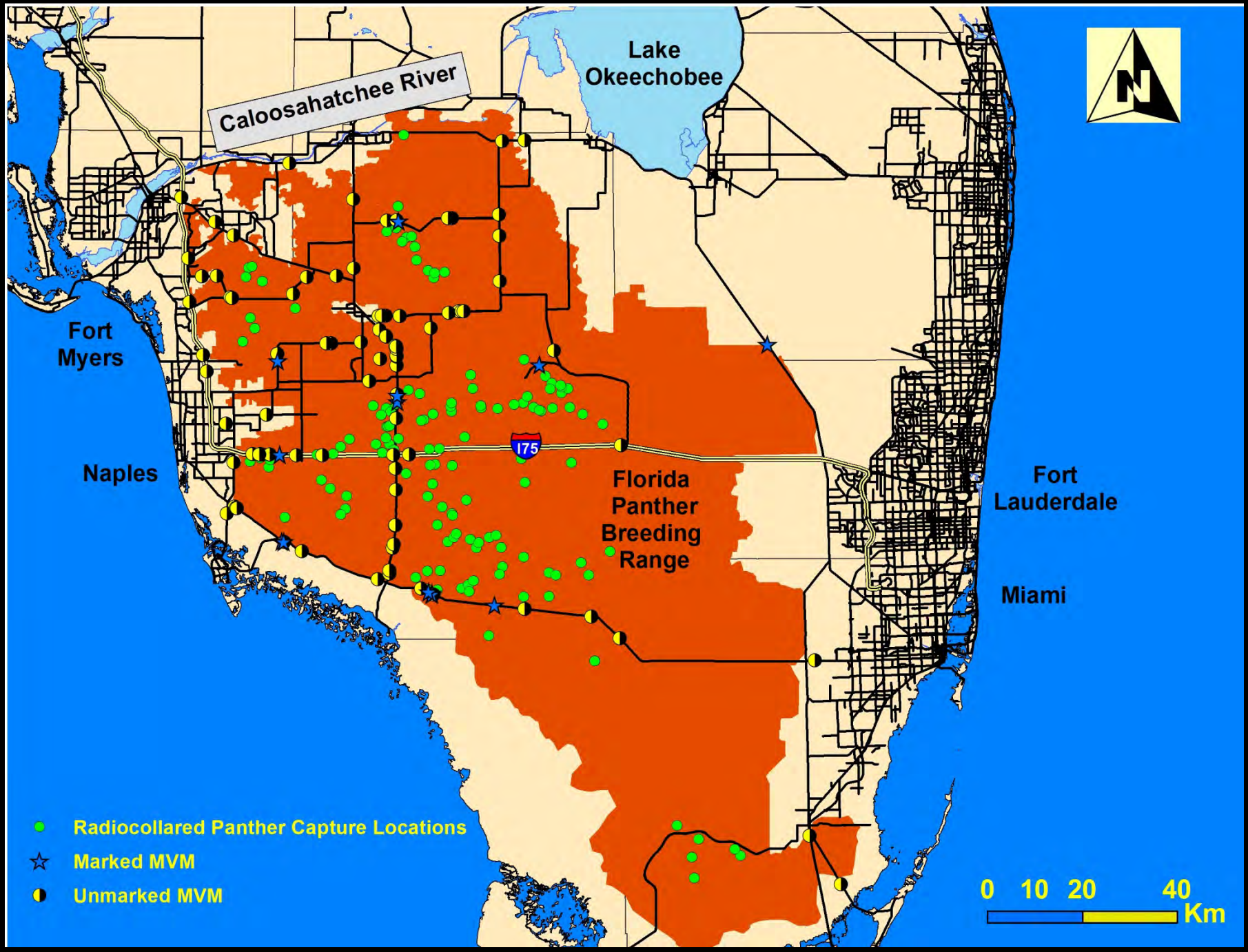
MVM Method

- Model Refinement- Developed a Risk Layer
- Different levels of MVM risk for panthers roaming private vs. public lands
- Assigned a risk value to panthers according to their home range overlap of risk layer values

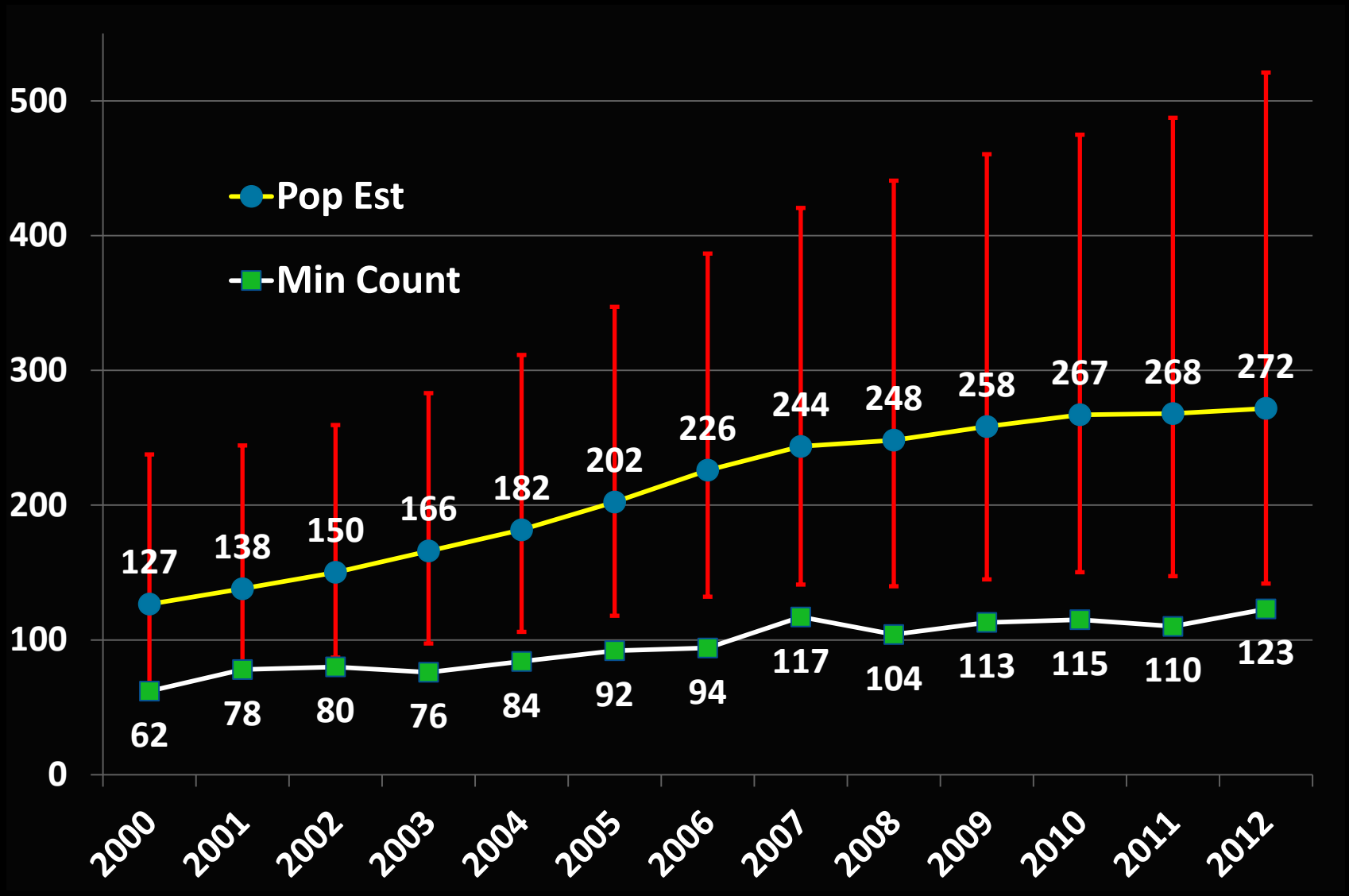


MVM Method

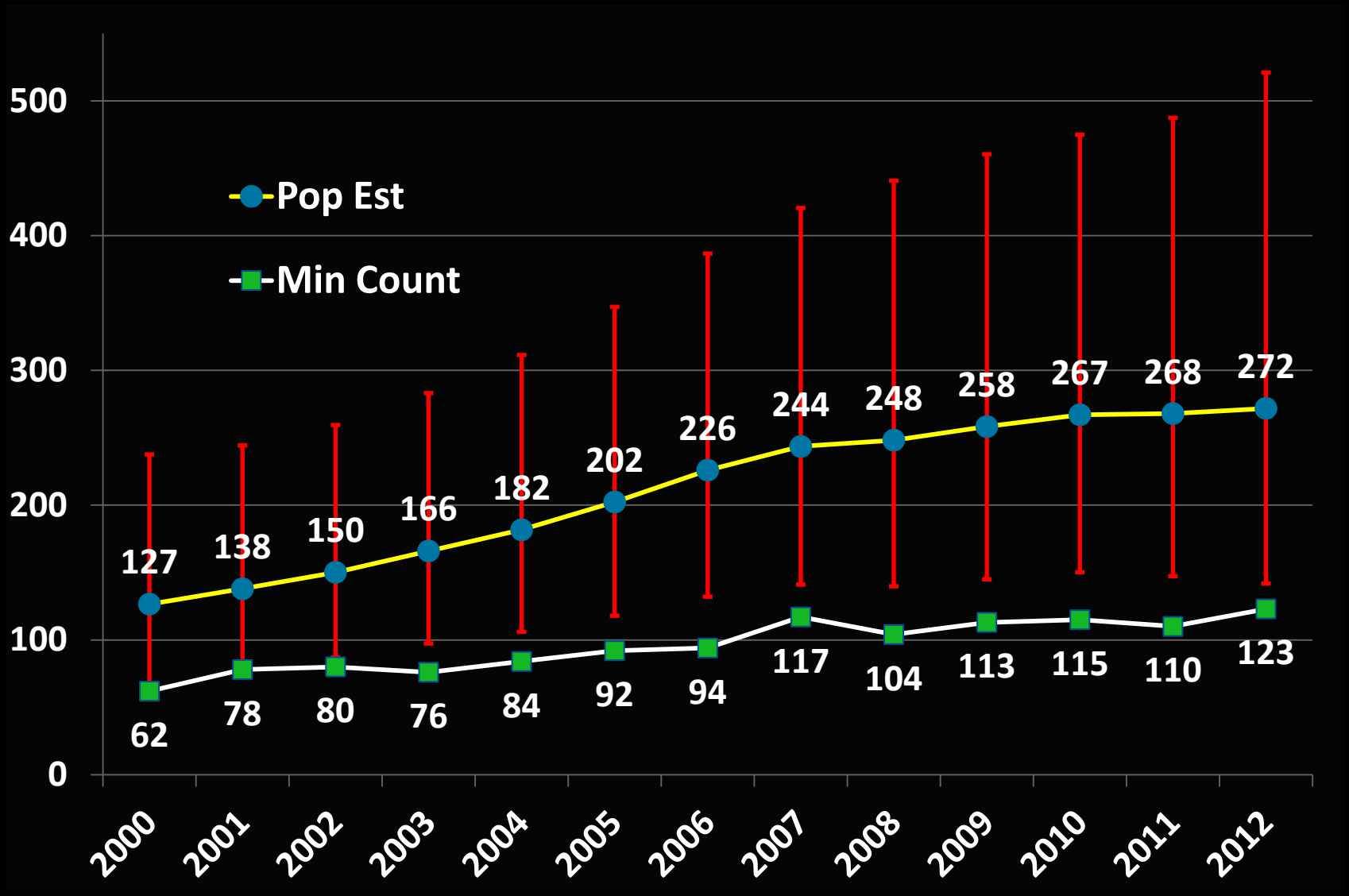
- Assess impact of factors on detection
  - Age
  - Number of telemetry points
  - Sex
- Data used in analysis (2000-2012)
  - Study area = Breeding Range
  - Radiocollared (marked) panthers (♂ =64 ♀ = 76)
  - Aerial telemetry data (>45,000 locations)
  - MVM served as recaptures
    - Marked MVM ♂ = 6 ♀ = 7
    - Unmarked MVM ♂ = 58 ♀ = 36


Caloosahatchee River
Lake Okeechobee
Fort Myers
Naples
I75
Florida Panther Breeding Range
Fort Lauderdale
Miami
Radiocollared Panther Capture Locations
Marked MVM
Unmarked MVM
0 10 20 40
Km

Panther Population Estimate 2000-2012



Panther Population Estimate 2000-2012



Conclusions

- Population estimate
- Population increased then stabilized
- Marked MVM probabilities affected precision
- Lower bounds of estimate track minimum counts
- Recovery should rely on conservative estimates
- Future endeavors to improve precision

Acknowledgements

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