

# Wild Pig Management at the Jack and Laura Dangermond Preserve

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## Background

### The Invasive Wild Pig Threat

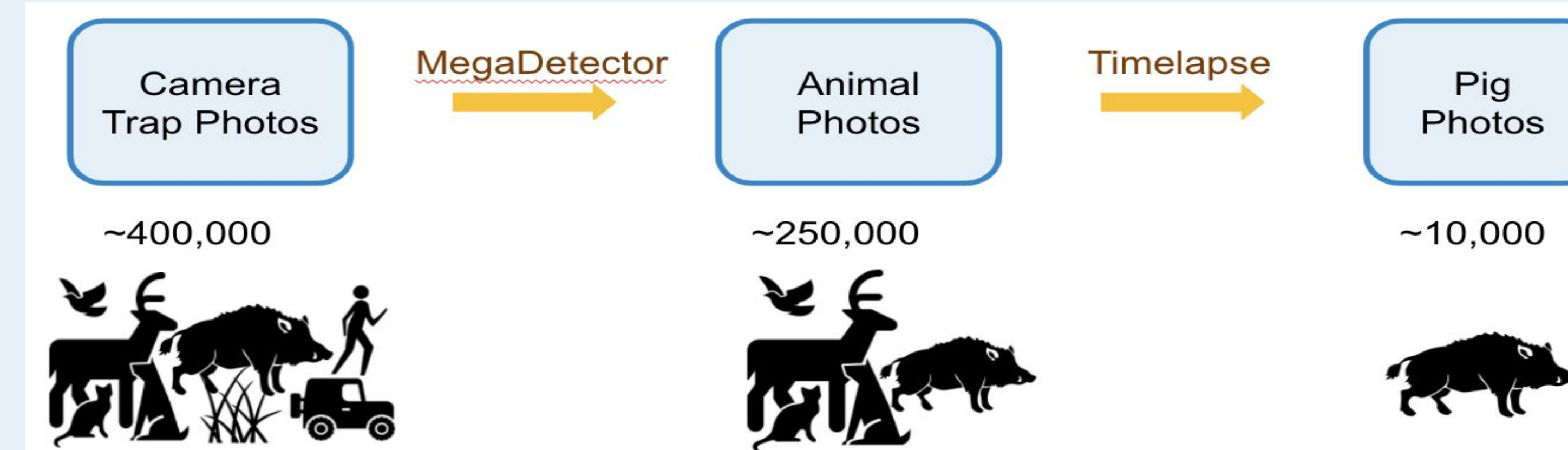
The rapid expansion of wild pig populations into nearly every region in California over the past twenty years has set alarm bells ringing for land managers. *Sus scrofa* are a wildly successful invasive mammal whose roto-tilling foraging behavior has led to their being called America's most destructive species. Wild pigs are opportunistic generalists who can survive off nearly any food source and cause an estimated \$1.5 billion in damages each year in the U.S.



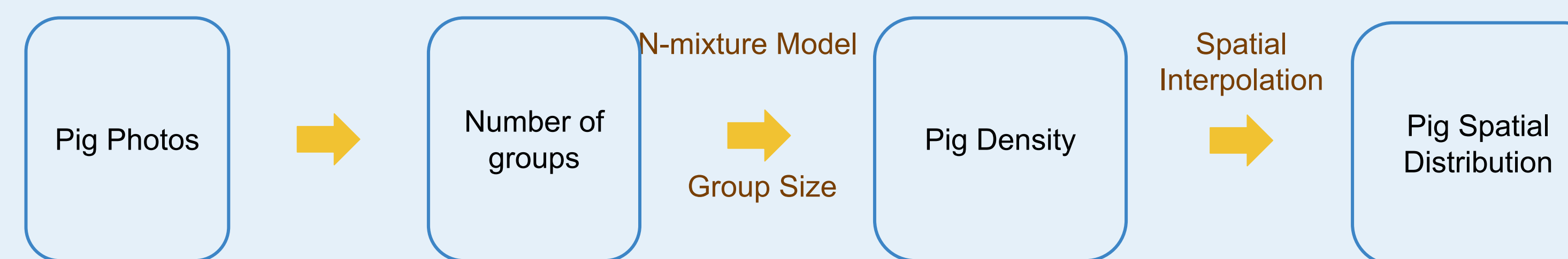
**Problem:** Important ecological resources at the Jack and Laura Dangermond Preserve are being damaged by wild pigs.

- TNC recently acquired the 25,000 acre coastal property and are establishing conservation plans for its diverse resources
- Intense herbivory of acorns threatens oak regeneration
- Foraging activities degrade natural ecosystems and invite invasion by exotic plant species
- Pigs observed throughout coastal habitat where the Preserve's threatened and endangered species are concentrated

## Methods: Population Estimation



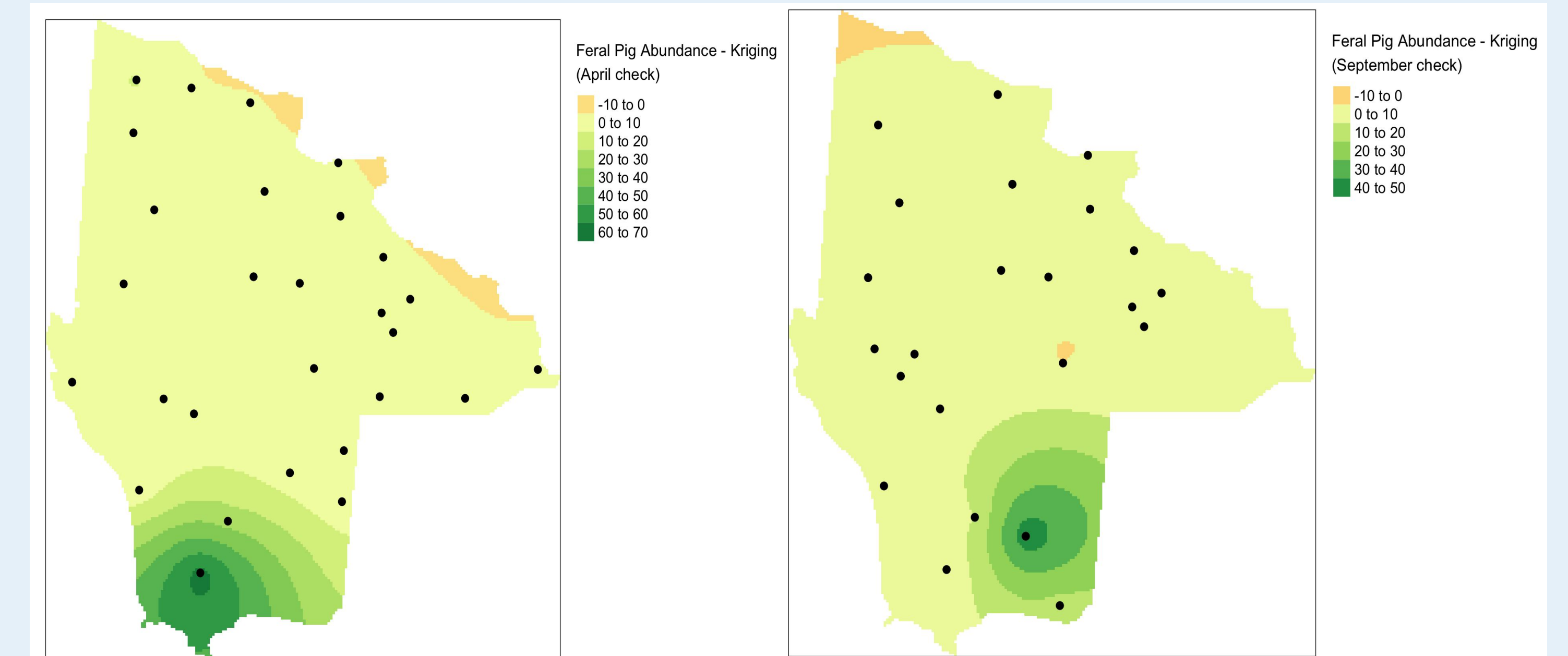
The data used to calculate the density of wild pigs at the Preserve were from a camera trapping survey conducted on the property between 2013 and 2014. 400,000 total photos were taken and available for us. Our team used Microsoft's MegaDetector machine learning model to filter out all images that did not contain animals. We then used Timelapse to quickly sift through and filter out all photos that did not contain pigs. We were left with just under 10,000 images of wild pigs. N mixture analysis with a weighted average group size allowed us to calculate total pig density and conduct spatial interpolation across the preserve.



## Results/Conclusions

### Population Estimation:

- The density of wild pigs across the Preserve is about **2 pigs/km<sup>2</sup>** (~200 total)
- Wild pigs at the Preserve tend to be clustered towards the southern coast



### Management Scenario Cost Analysis:

- Protecting large continuous zones with exclusion fencing is the most cost effective management strategy for areas with low wild pig density.
- Pig removal costs scale with density and must be around 70% annually to prevent further population growth.
- Total eradication is a costly measure with a host of unfavorable environmental outcomes and is uncertain to succeed.

## Our Approach

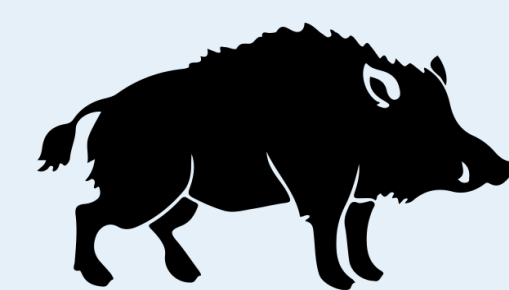
### Protecting the future of the Preserve

In order to safeguard the natural resources of the Jack and Laura Dangermond Preserve in perpetuity, a wild pig management plan has been deemed necessary. To guide this plan, our team sought to answer two important questions:

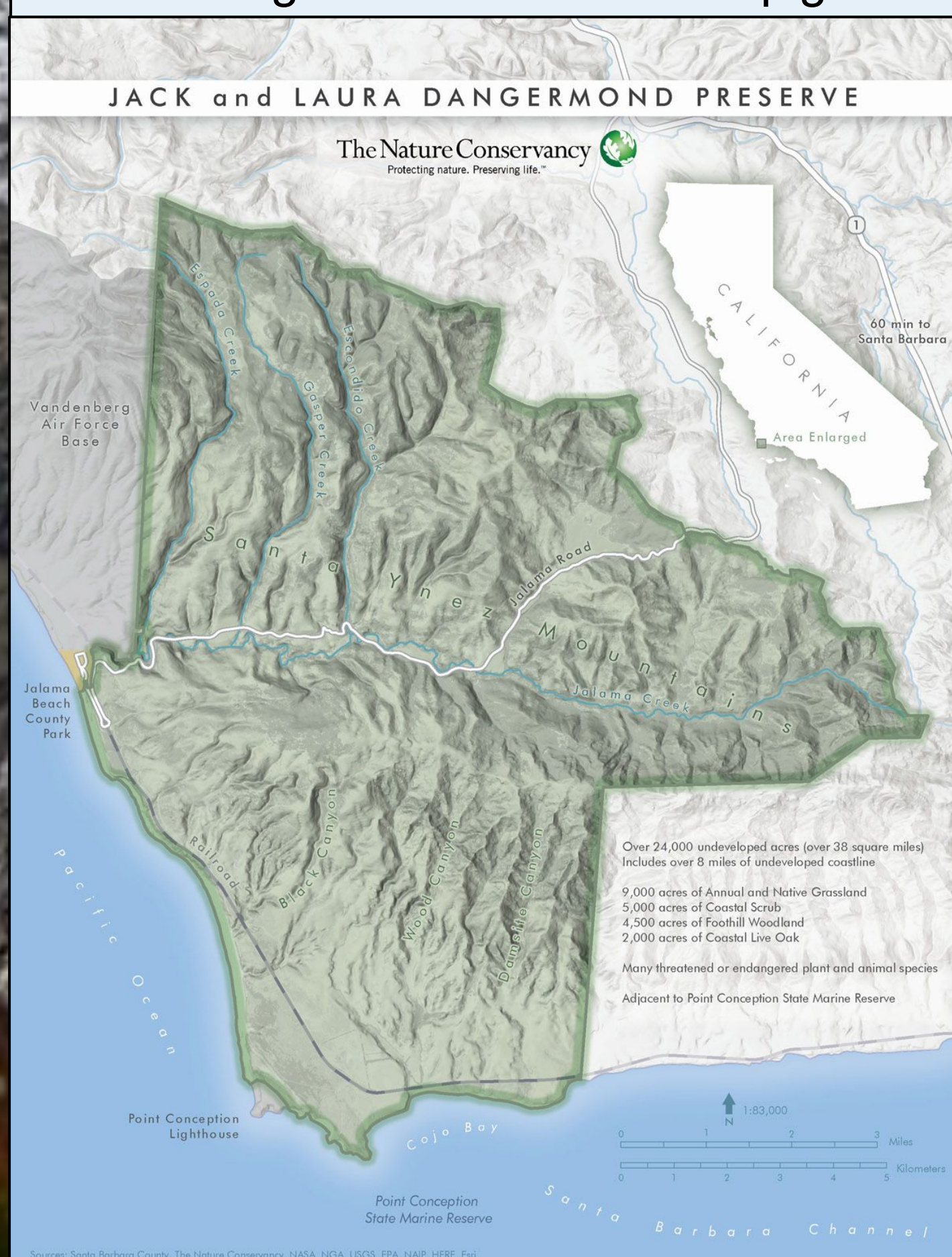
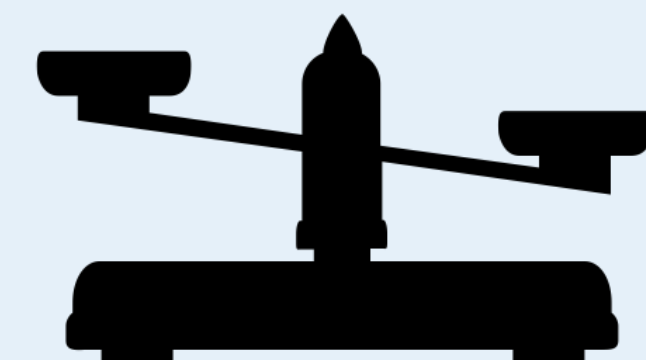
1. What is the population abundance of wild pigs at the preserve?
2. How can TNC most efficiently use their resources to protect their ecological assets from wild pig damages?

### Research Objectives

1. Estimate abundance of wild pigs using existing camera trap data



2. Create a cost analysis of three different wild pig management scenarios.



## Methods: Management Scenario Cost Analysis

Through a combination of expert interviews, literature review (including eight prior case studies in wild pig management), internal TNC data on oak regeneration and fencing costs, and consultation of the Dangermond Integrated Research Management Plan, we were able to provide cost estimates of the following wild pig management scenarios while outlining the likely benefits from each scenario:

1. Reduction of damage by fencing of high priority areas
2. Management of wild pig population through targeted removal and monitoring
3. Total eradication of wild pigs at the Dangermond Preserve

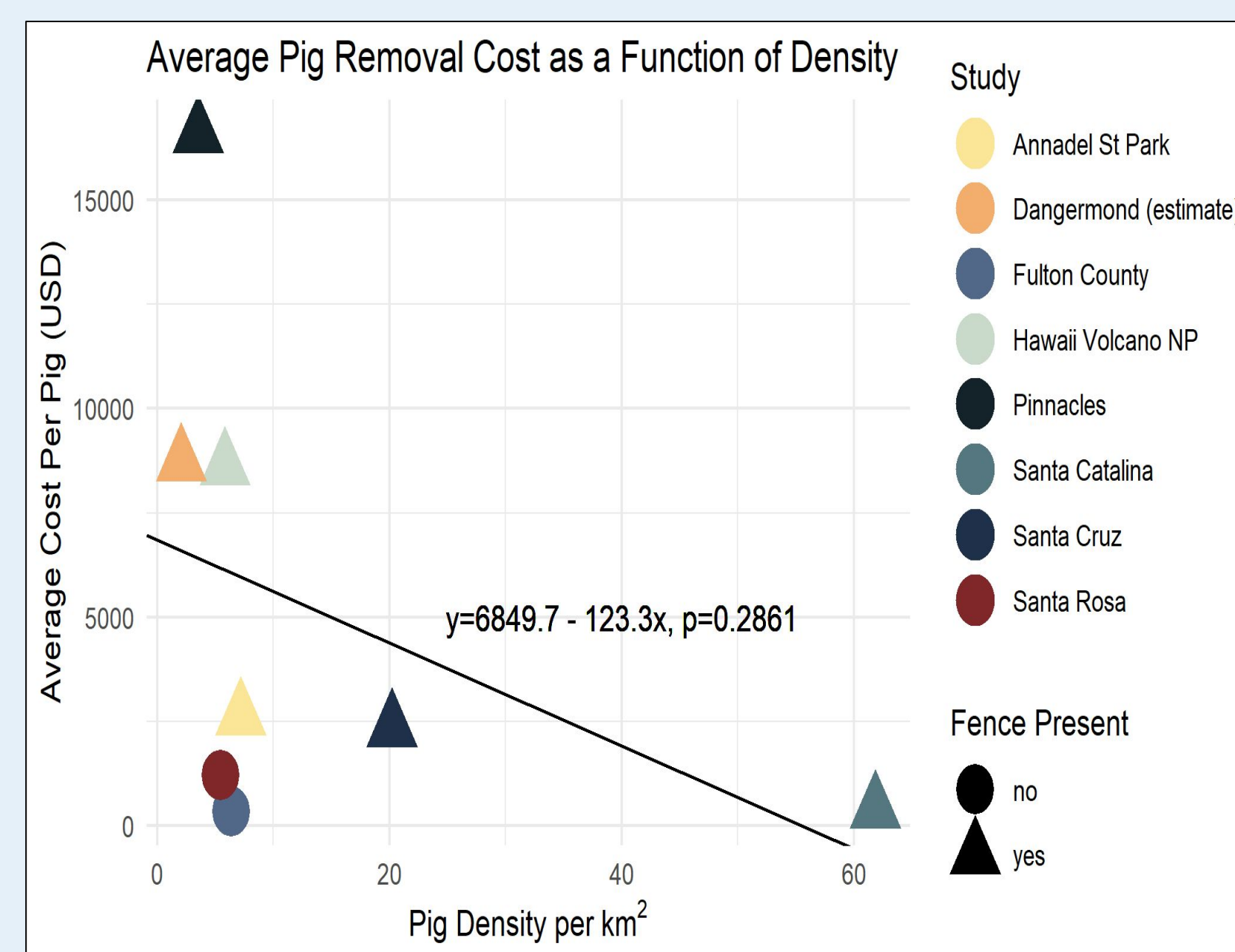


Figure #. Costs of pig removal as a function of density for eight case studies

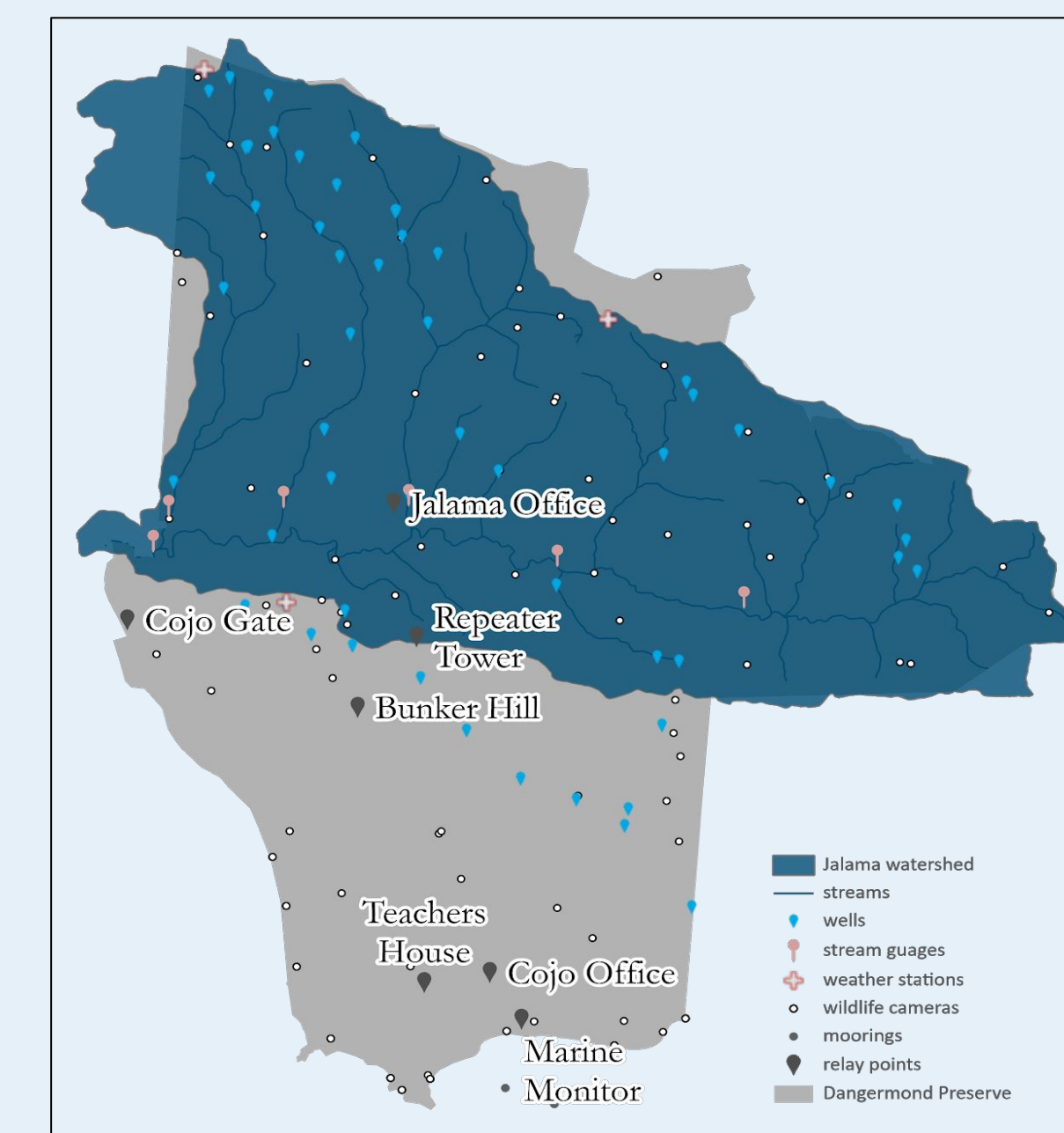


Figure #. Proposed wildlife camera trap network. Source: TNC

## Management Recommendations

1. Install pig exclusion fencing around sensitive oak woodland and coastal dune habitats



2. Increase monitoring capacity with installation of ~30 camera network



3. Collaborate with neighboring stakeholders and refine management through information sharing



## Acknowledgements

Thank you to our faculty advisor Dr. Kelly Caylor, our client TNC, and our many external advisors.

