



**Landcare Research**  
Manaaki Whenua

# On learning from surveillance data



Dean Anderson  
Landcare Research



# Surveillance-research questions

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1) Is a species present or absent?

# Surveillance-research questions

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- 1) Is a species present or absent?
  - What is probability of absence given no detection?
  
- 2) What is the absolute abundance?

# Surveillance-research questions

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- 1) Is a species present or absent?
  - What is probability of absence given no detection?
- 2) What is the absolute abundance?
- 3) What is the relative abundance?

# Objective

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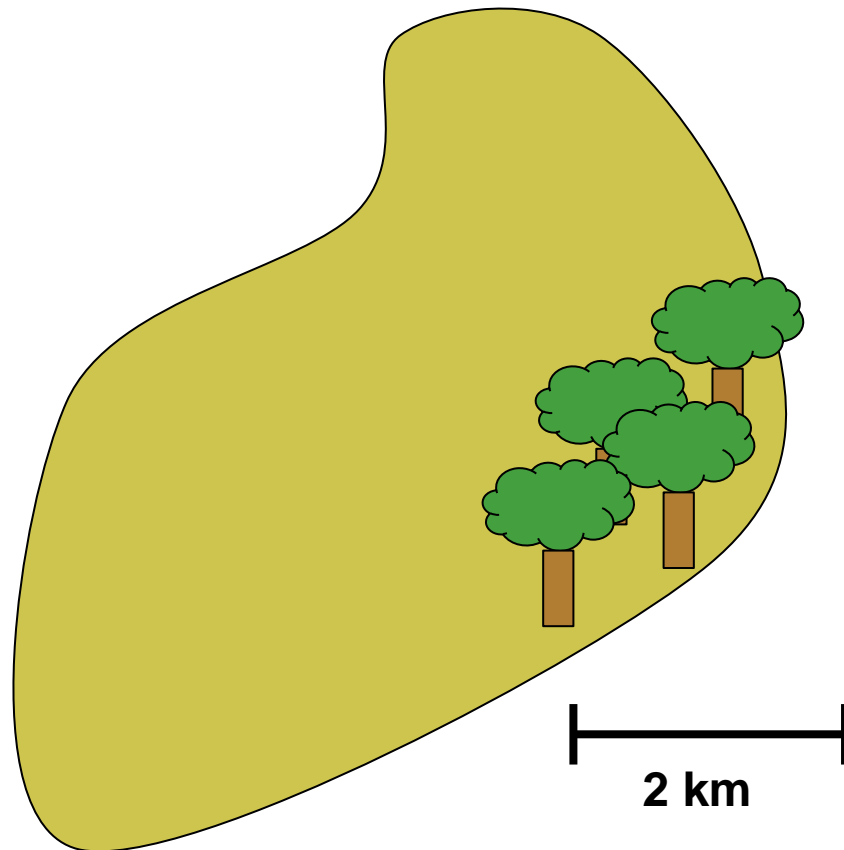
Discuss questions that we must ask ourselves to efficiently deploy and learn from surveillance systems:

- 5 questions related to the detection system

# Detection questions

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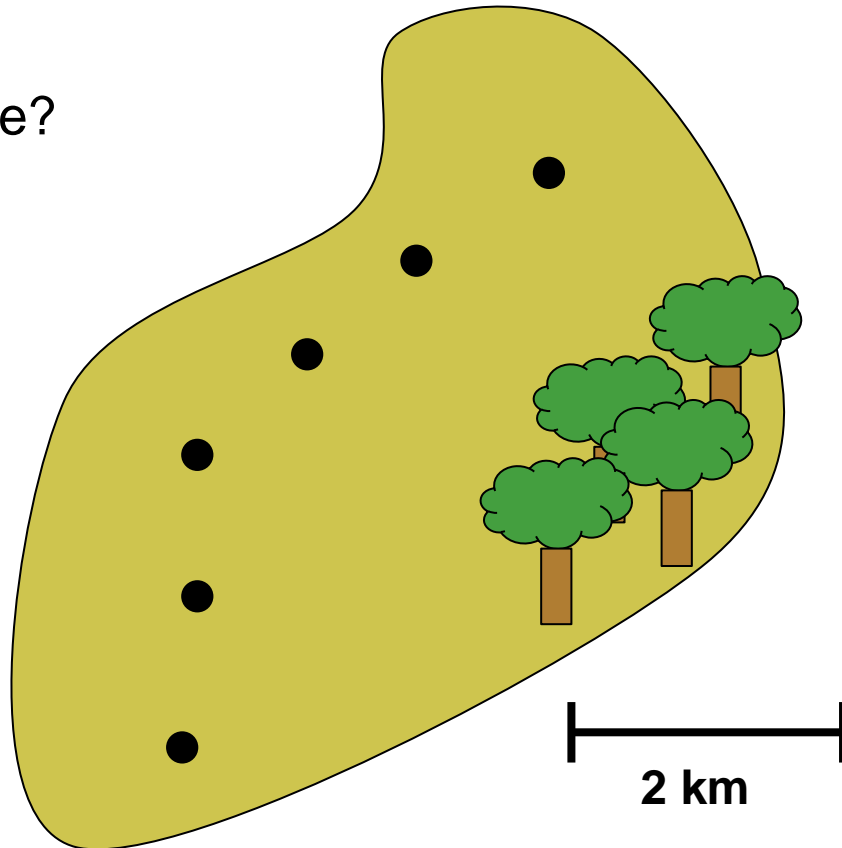
1) What is spatial extent (area) of interest?



# Detection questions

## 1) What is spatial extent (area) of interest?

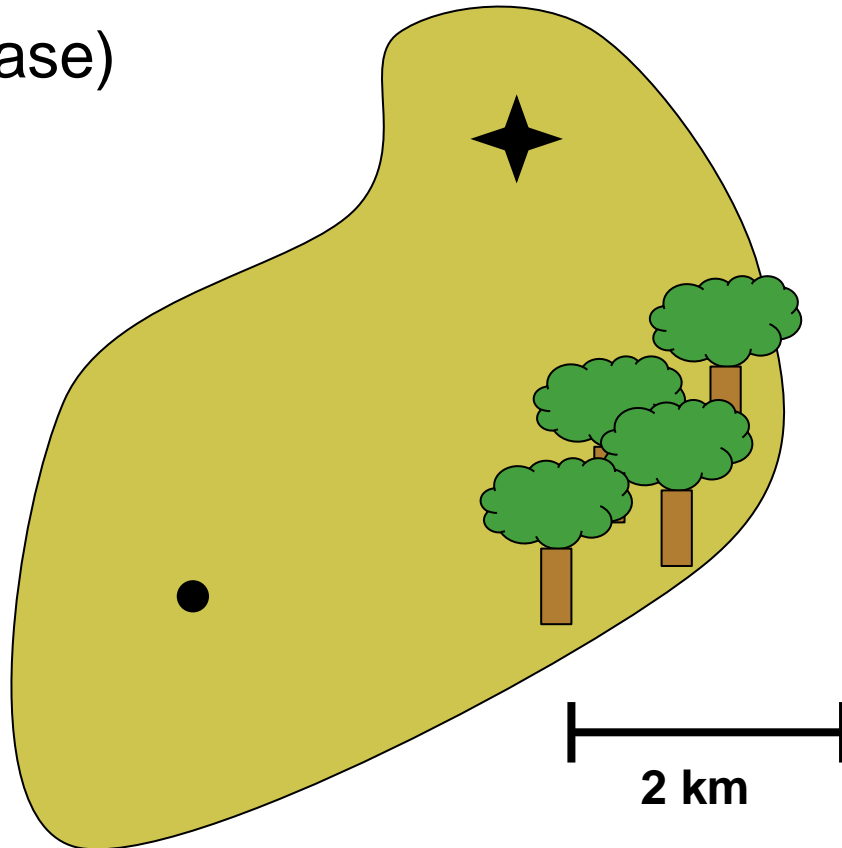
- Presence/absence?
- Abundance?
- Relative abundance?



# Detection questions

## 2) What is resolution of detection method?

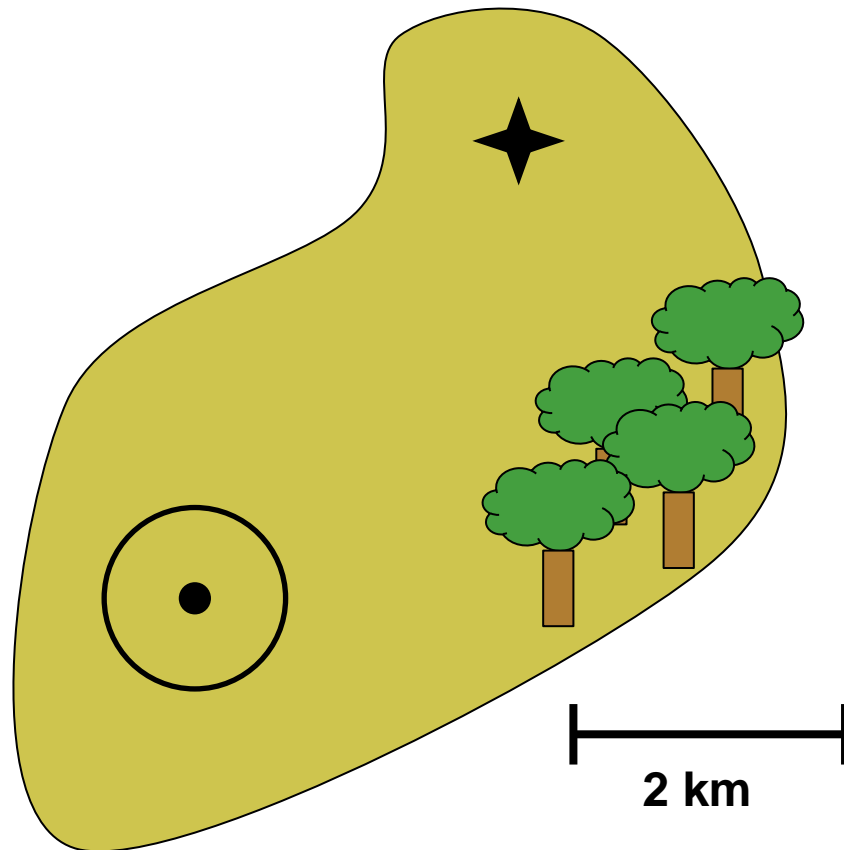
- what is smallest unit searched?
  - Animal (disease)
  - Spatial unit





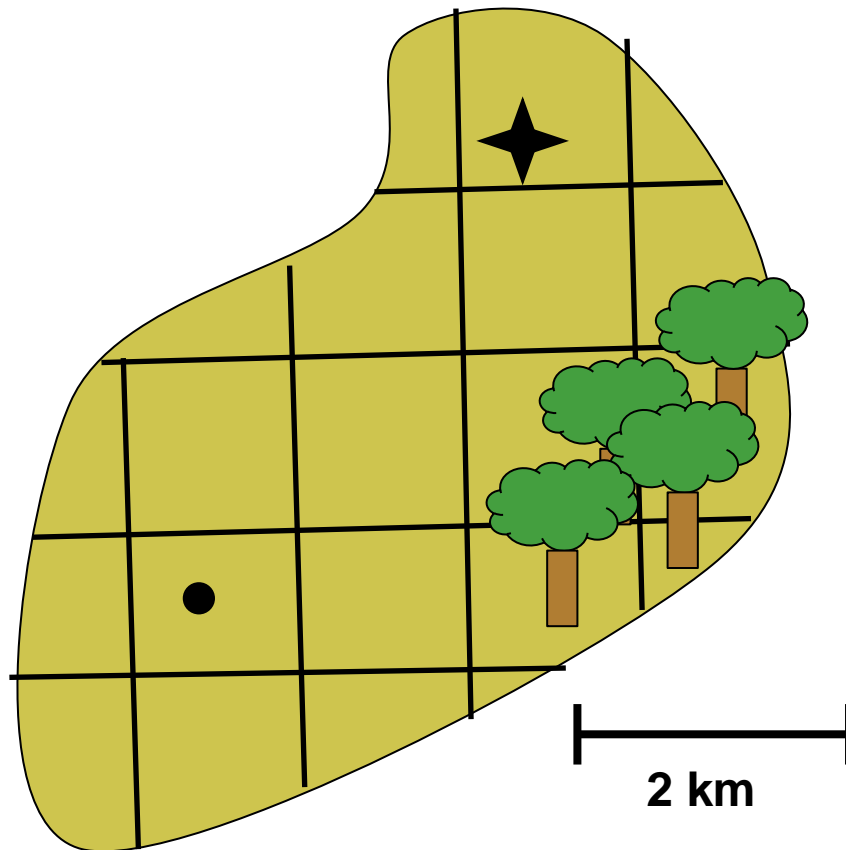
# Detection questions

2) What is resolution of detection method?



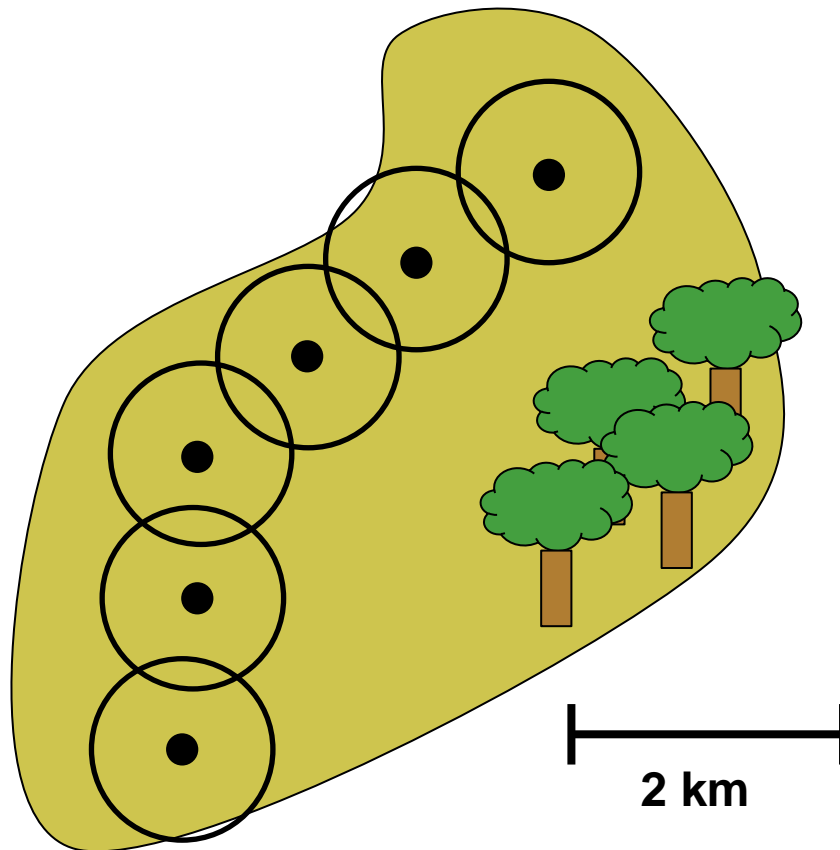
# Detection questions

2) What is resolution of detection method?



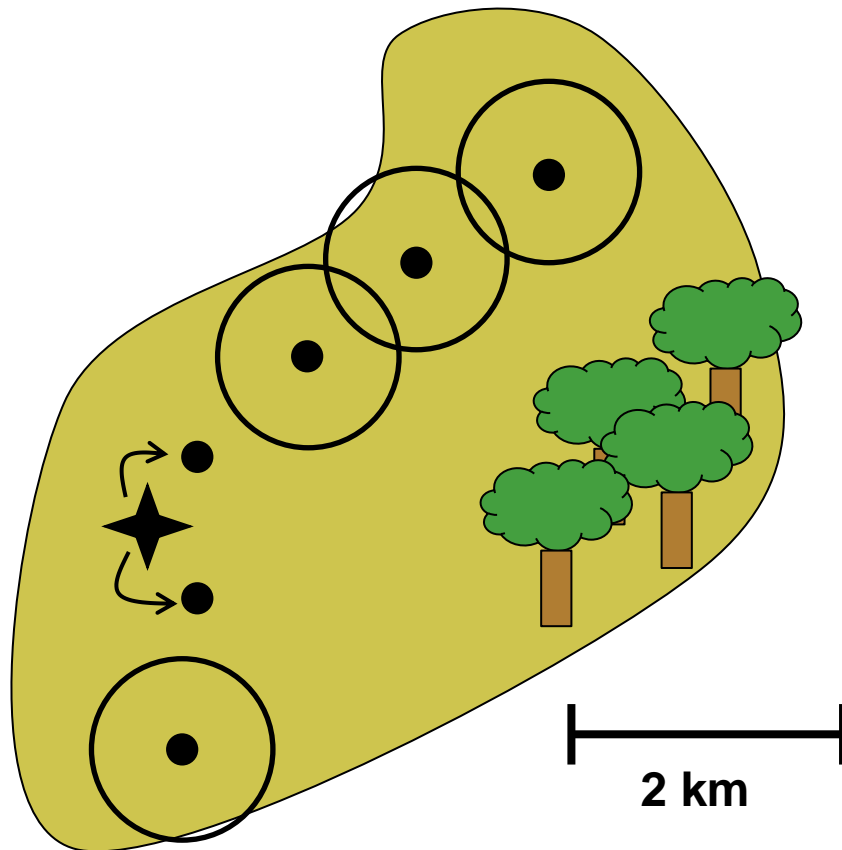
# Detection questions

3) Are devices independent?



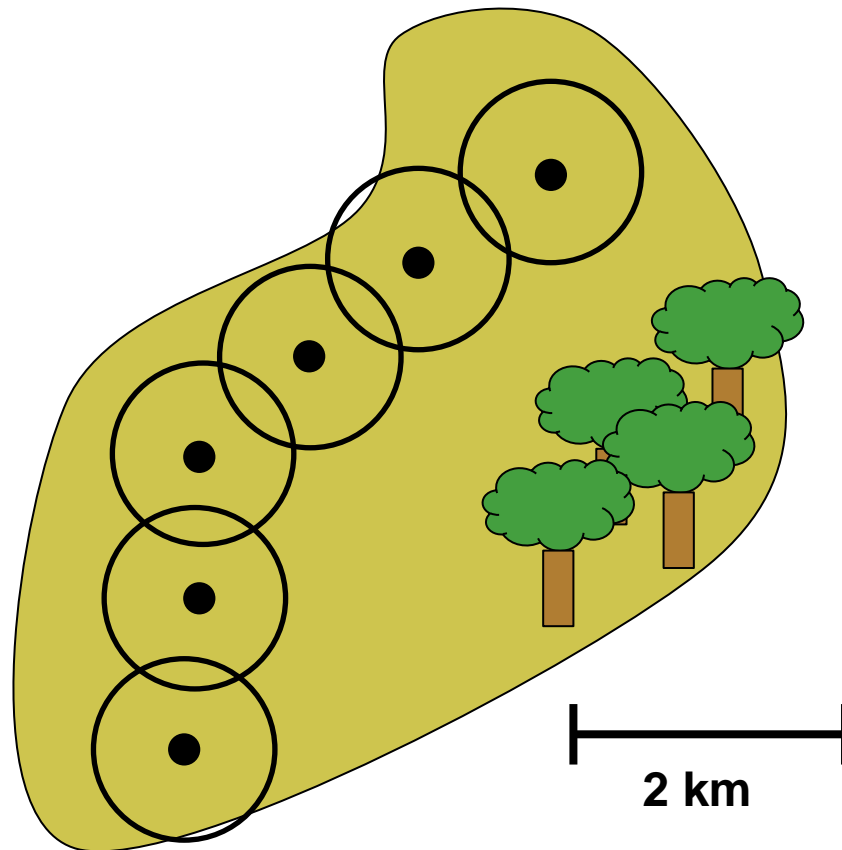
# Detection questions

3) Are devices independent?



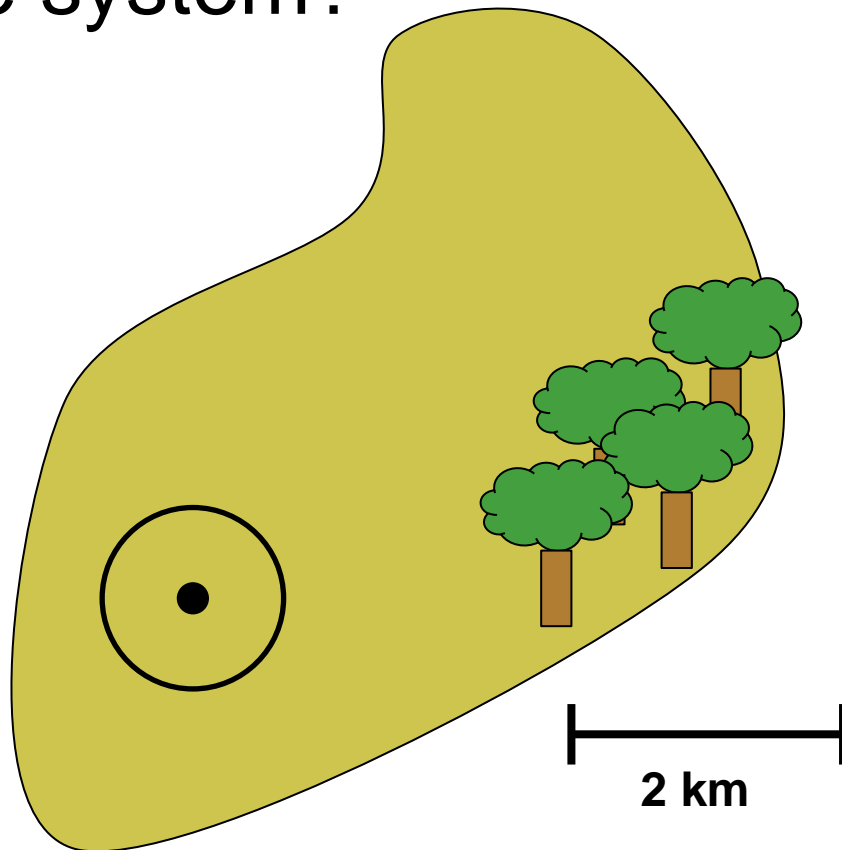
# Detection questions

4) What proportion of extent is searched?



# Detection questions

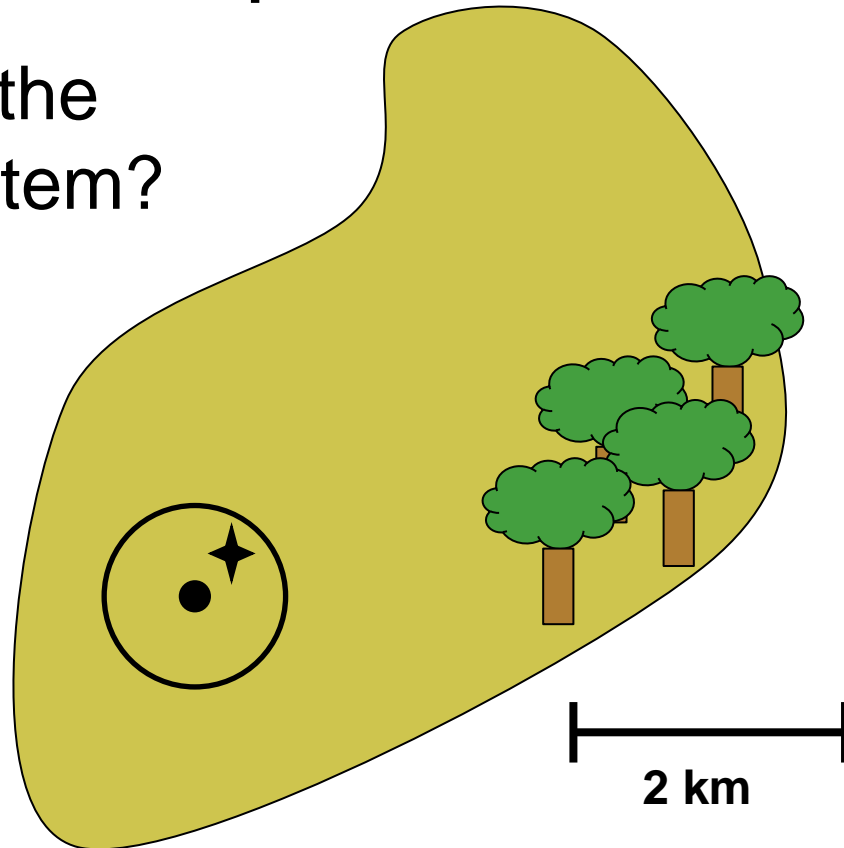
5) What are **sensitivity** and **specificity** of surveillance system?



# Sensitivity

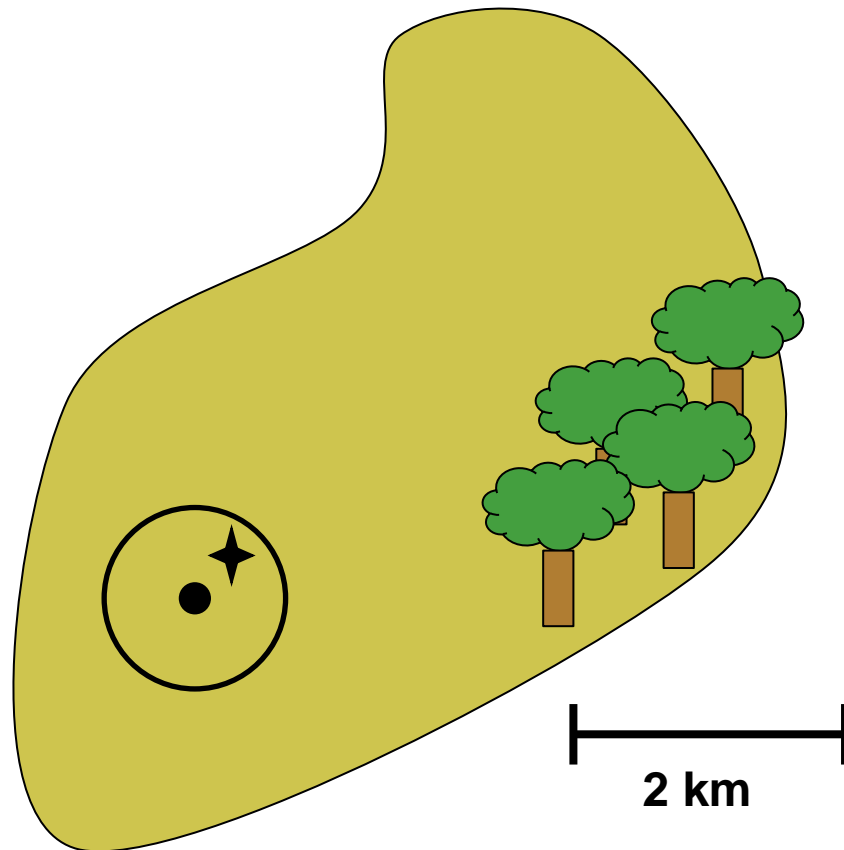
Probability of detection in a specified area given animal is present

- How good is the detection system?



# Sensitivity

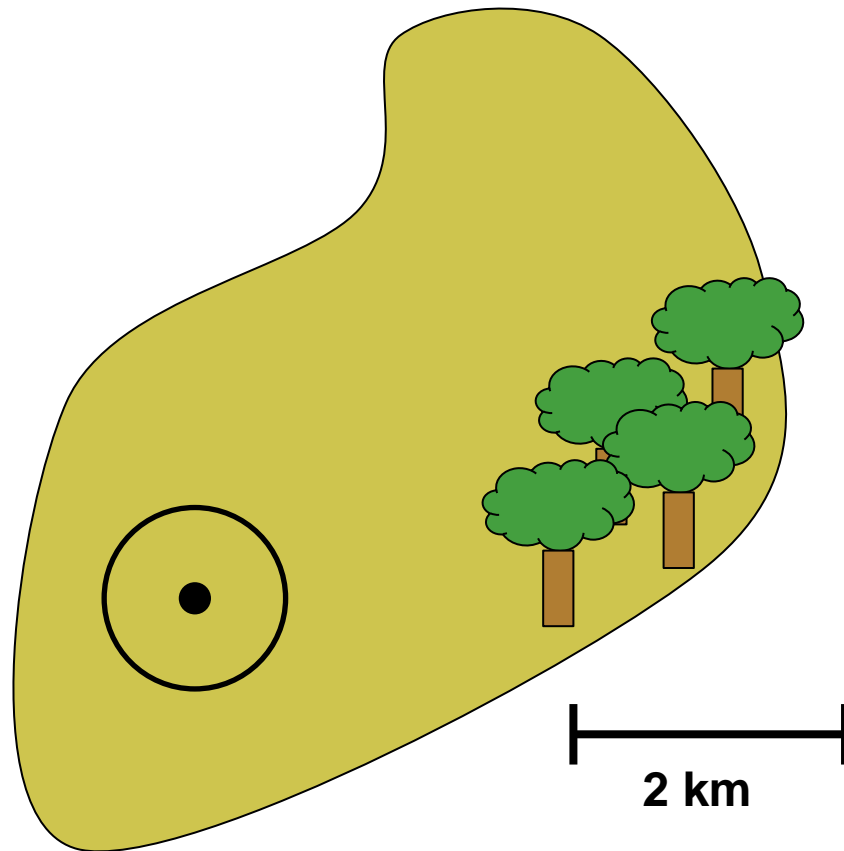
False negative rate =  $1 - \text{Sensitivity}$





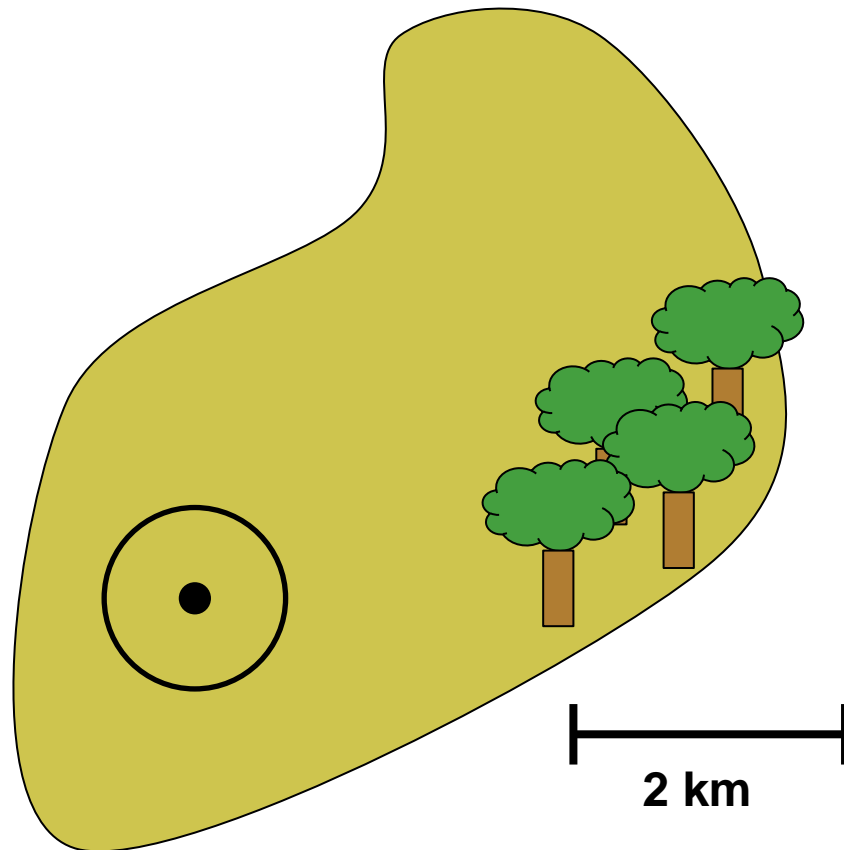
# Specificity

Probability of no detection in a specified area given animal is absent



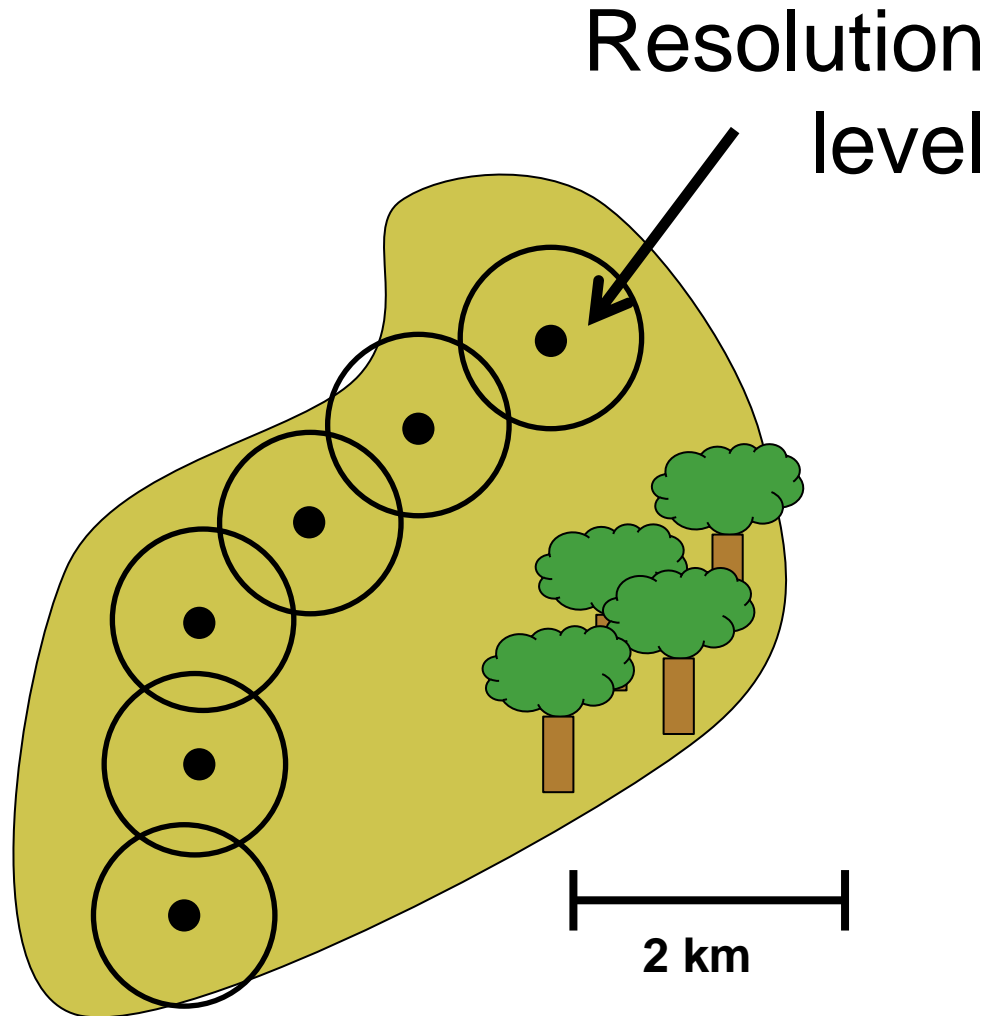
# Specificity

False positive rate =  $1 - \text{Specificity}$



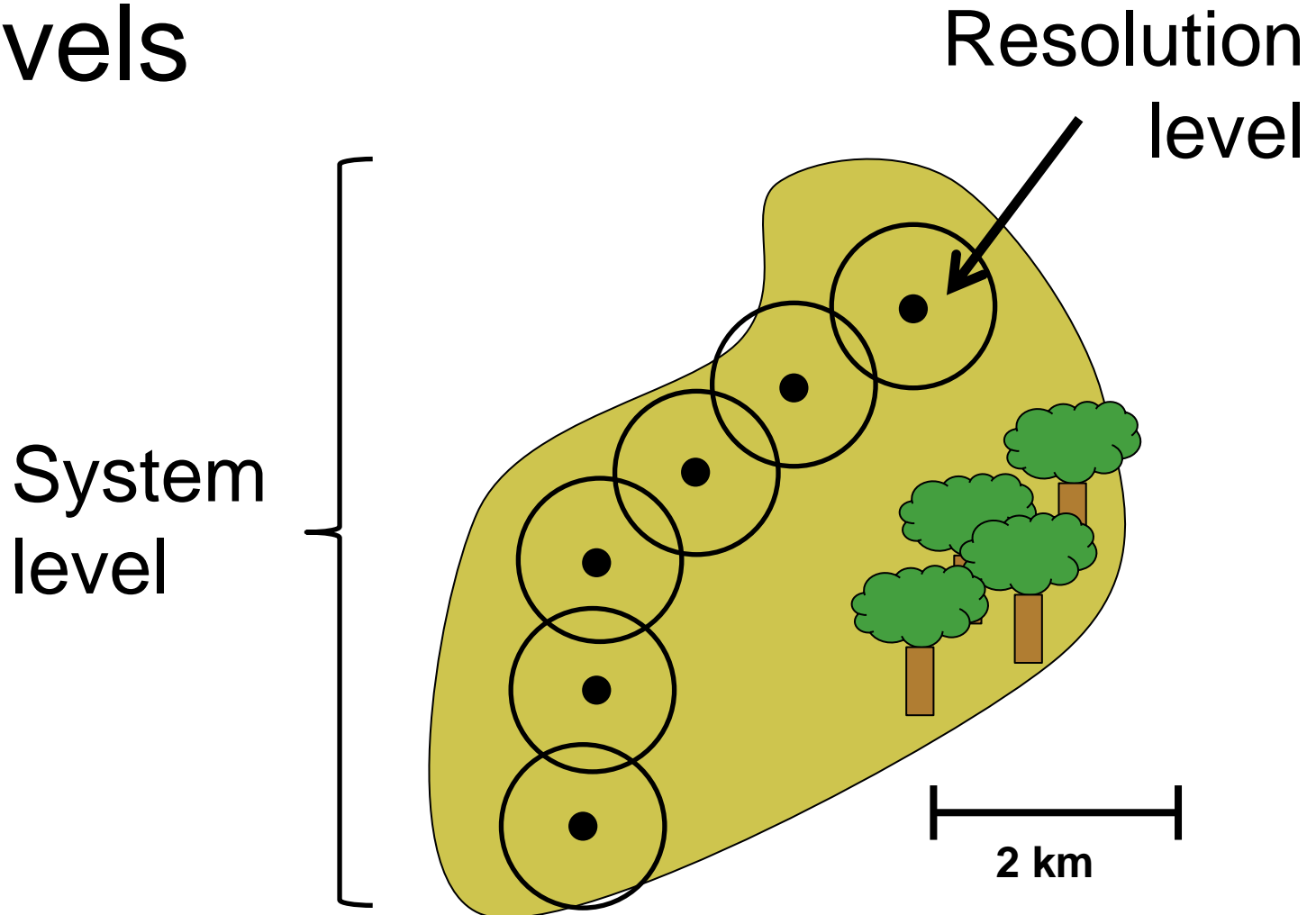
# Sensitivity and specificity

2 levels



# Sensitivity and specificity

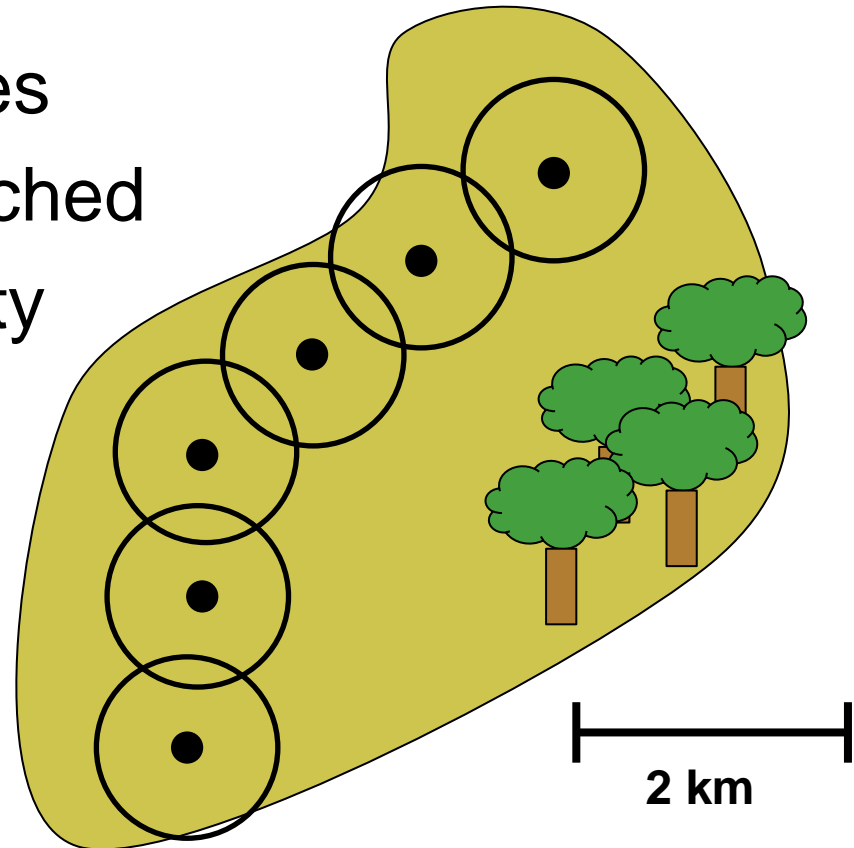
2 levels



# Summary - detection

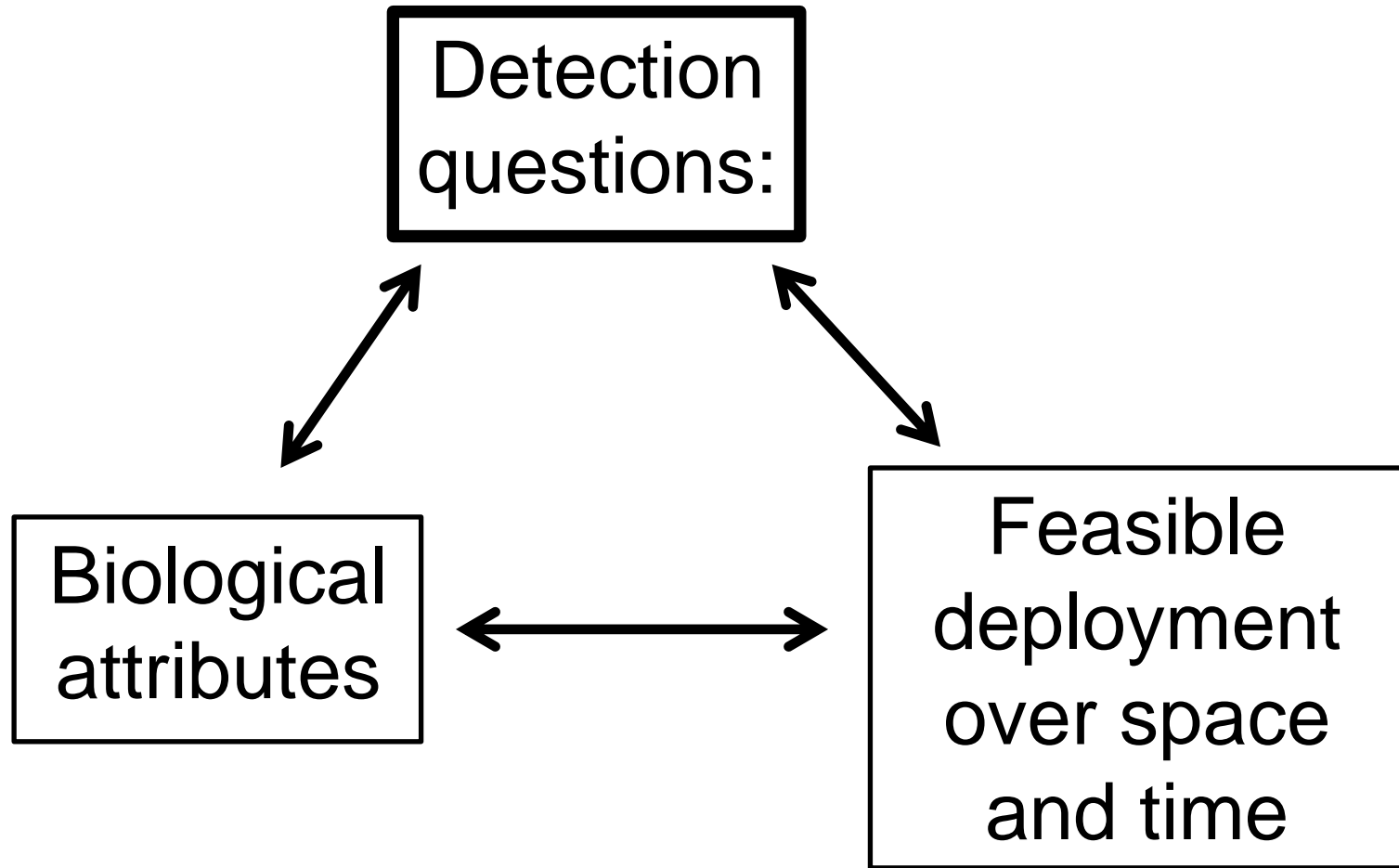
Questions:

- 1) Extent
- 2) Resolution
- 3) Independence of devices
- 4) Proportion of area searched
- 5) Sensitivity and specificity



# Summary

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# Summary

Plan and budget for a team approach from beginning to end:

- 1) Field biologists/managers
- 2) Research technicians
- 3) Ecological modeller



# Thank you

