Key Issues in Determining Electronic Monitoring Coverage and Review Rates: Implications for data collection

How should we set review rates?
Como debemos determinar la tasa de revisión?

Electronic monitoring as the potential to

- Expand coverage
- Reduce costs
- Generate massive amounts of data…

Raises two important questions

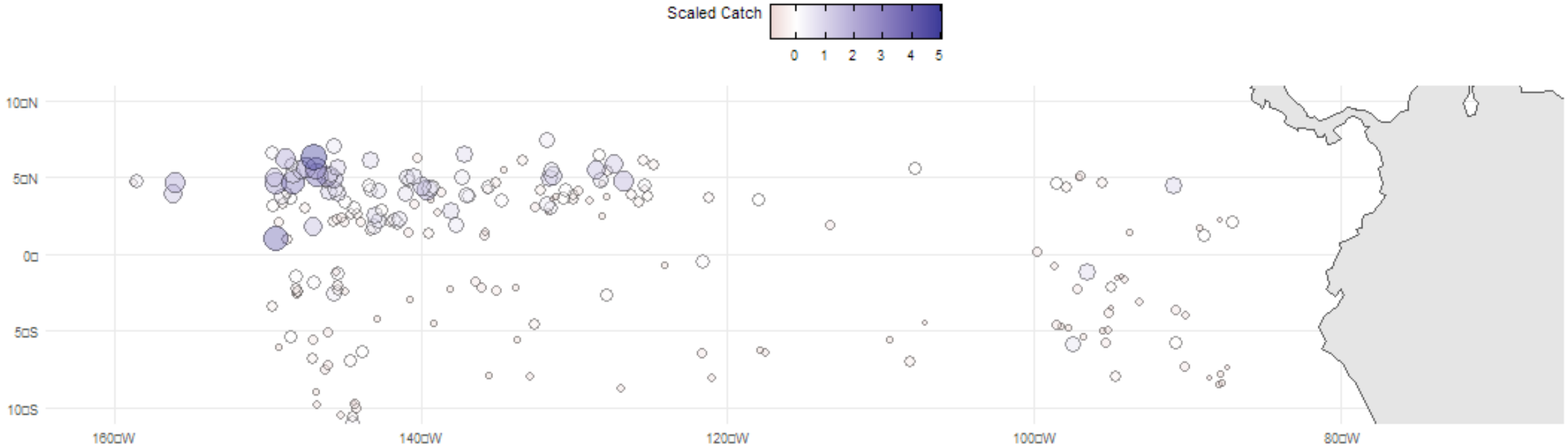
1. What coverage rate?
2. What review rate?

Focusing on the *review rate* question

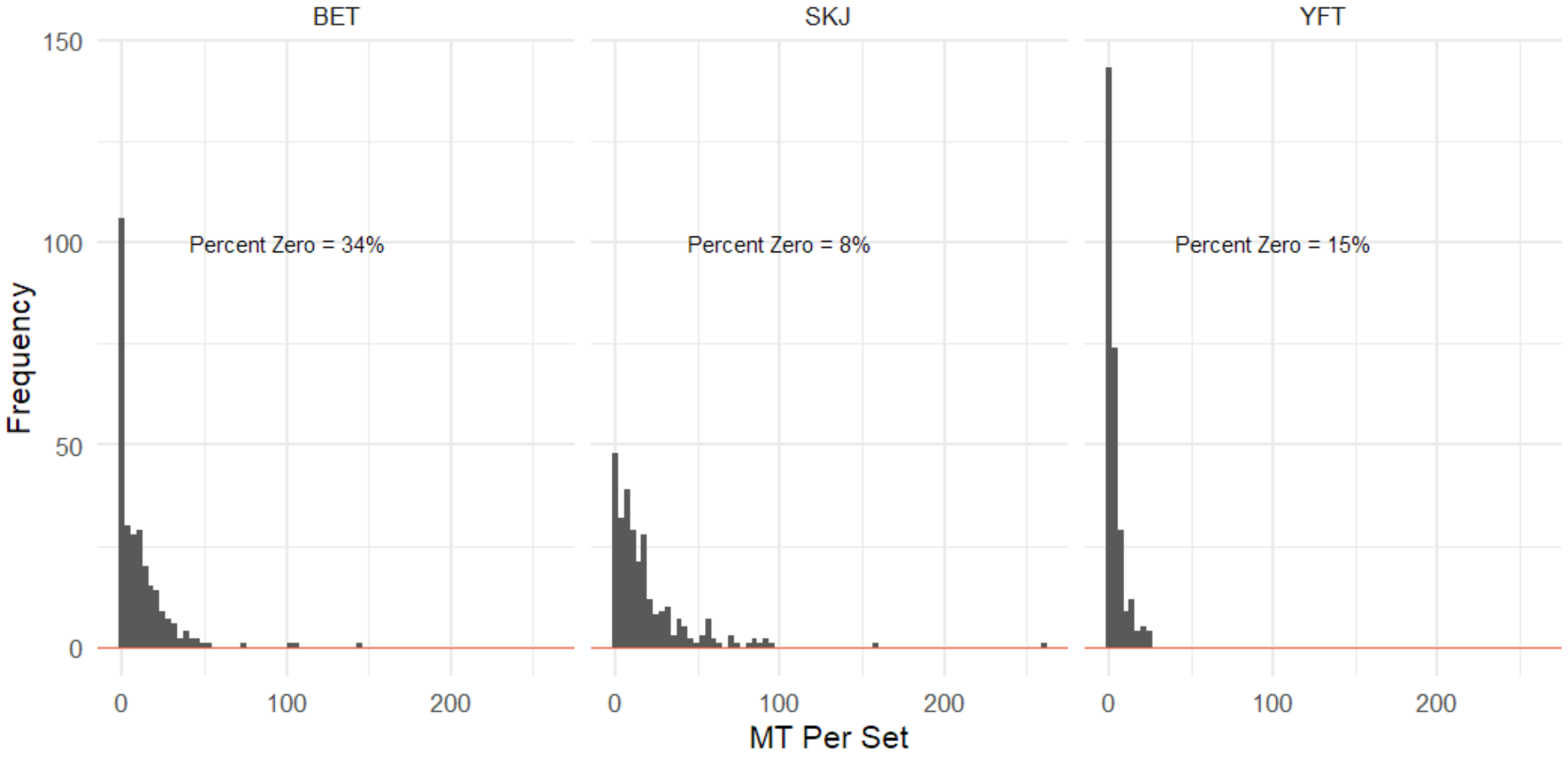
- What proportion of events need to be reviewed?
- How do we select sets that are reviewed?

These decisions need to be made taking into account *Objectives*, *Budget*, *Reality*

Shark CPUE varies in space
CPUE de tiburones varía en espació



Tunas catches also vary
Capturas de atunes también varian



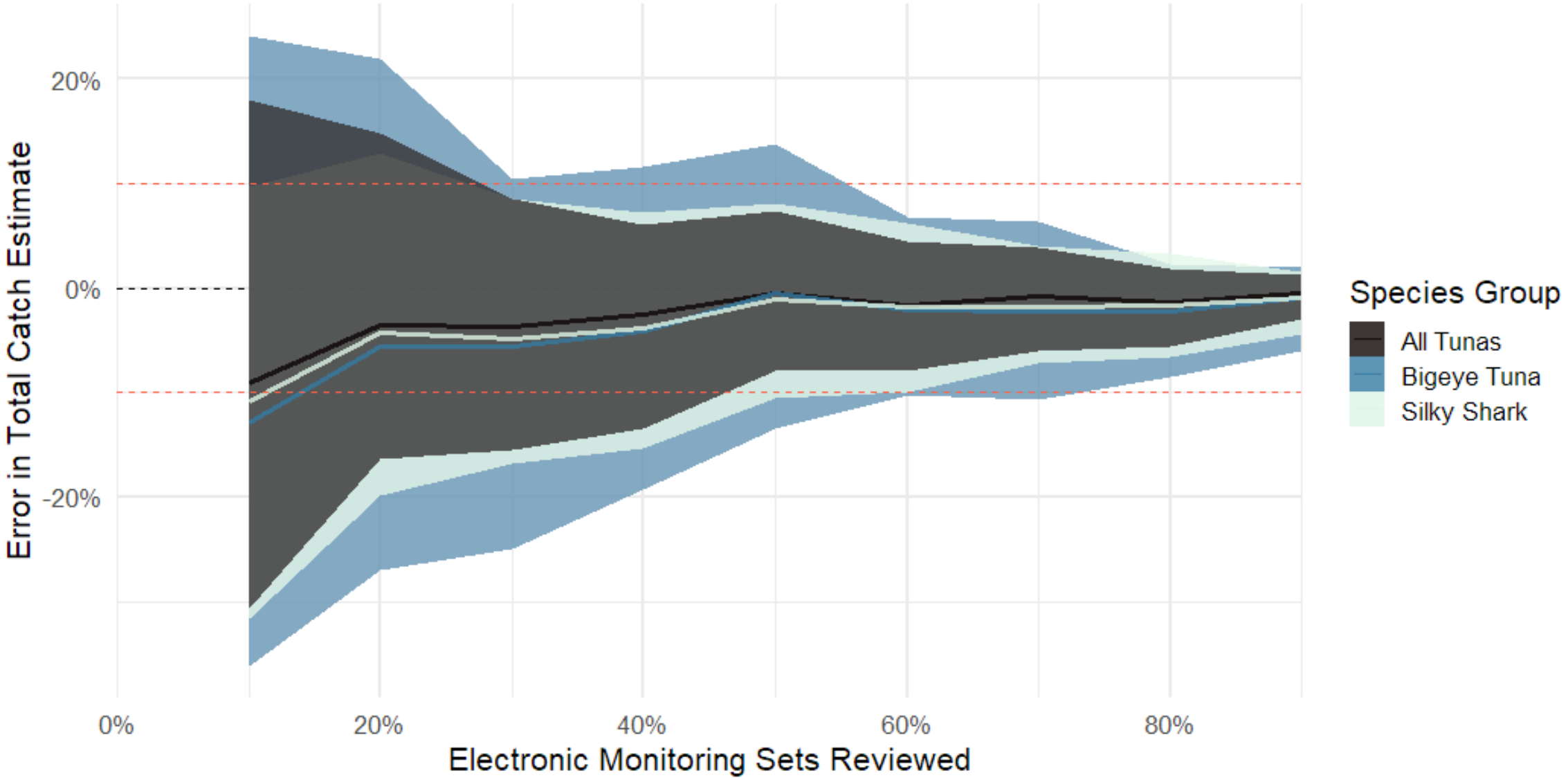
General methods
Métodos generales

Suppose you only review X% of sets…

How do you estimate metric of interest in remaining (100 - X)% of sets?

1. Sample X% of sets for review
2. Train model on reviewed sets
3. Use model to *predict* metric in un-reviewed sets
4. Generate total metric (e.g. catch) as sum of *observed* and *predicted* values
5. Repeat process many times

Example Results
Ejemplo de Resultados



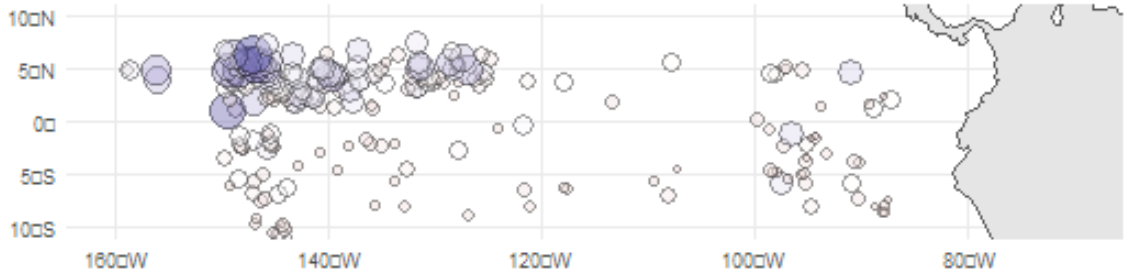
Additional questions
Preguntas adicionales

- How do we mix-and-match observer and electronic monitoring?
- What aspects of EM review can be outsourced to AI?
  - What metadata fields can AI provide for “unreviewed” sets
- How do we extrapolate to unreviewed in cases where coverage isn’t 100%?
  - How do we balance bias from non-random review with potential efficiency /cost savings?
- How should reviews be stratified?
  - Prioritize weakest links?
- Process for “auditing” EM review-rate performance
- What is the selection process for EM participation?

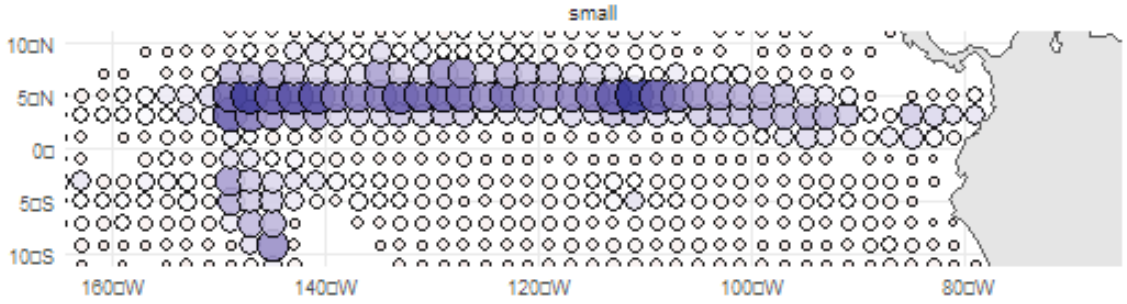
Review rates can be retroactively “corrected”; coverage rates cannot.

Achieving Representative Coverage

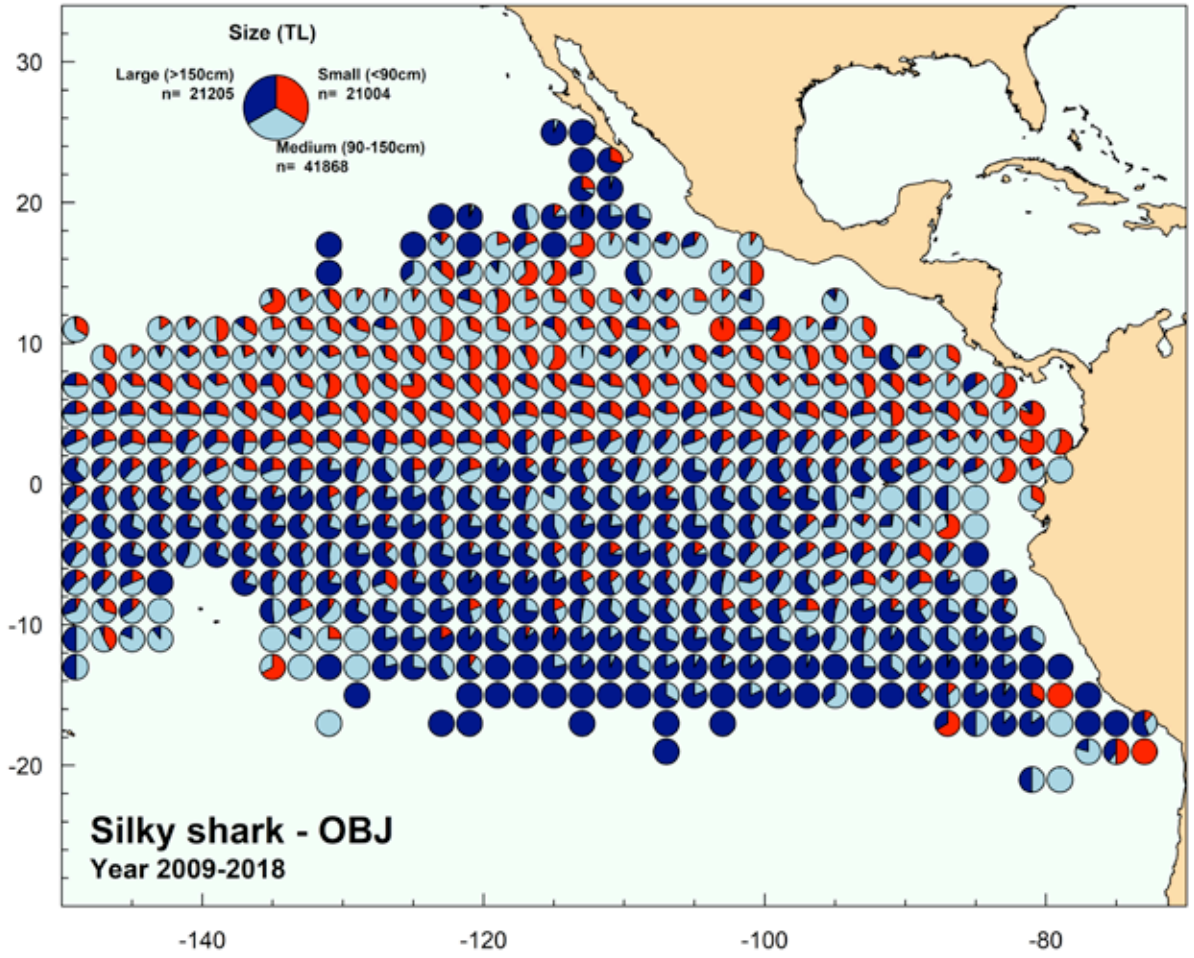
EM Sets



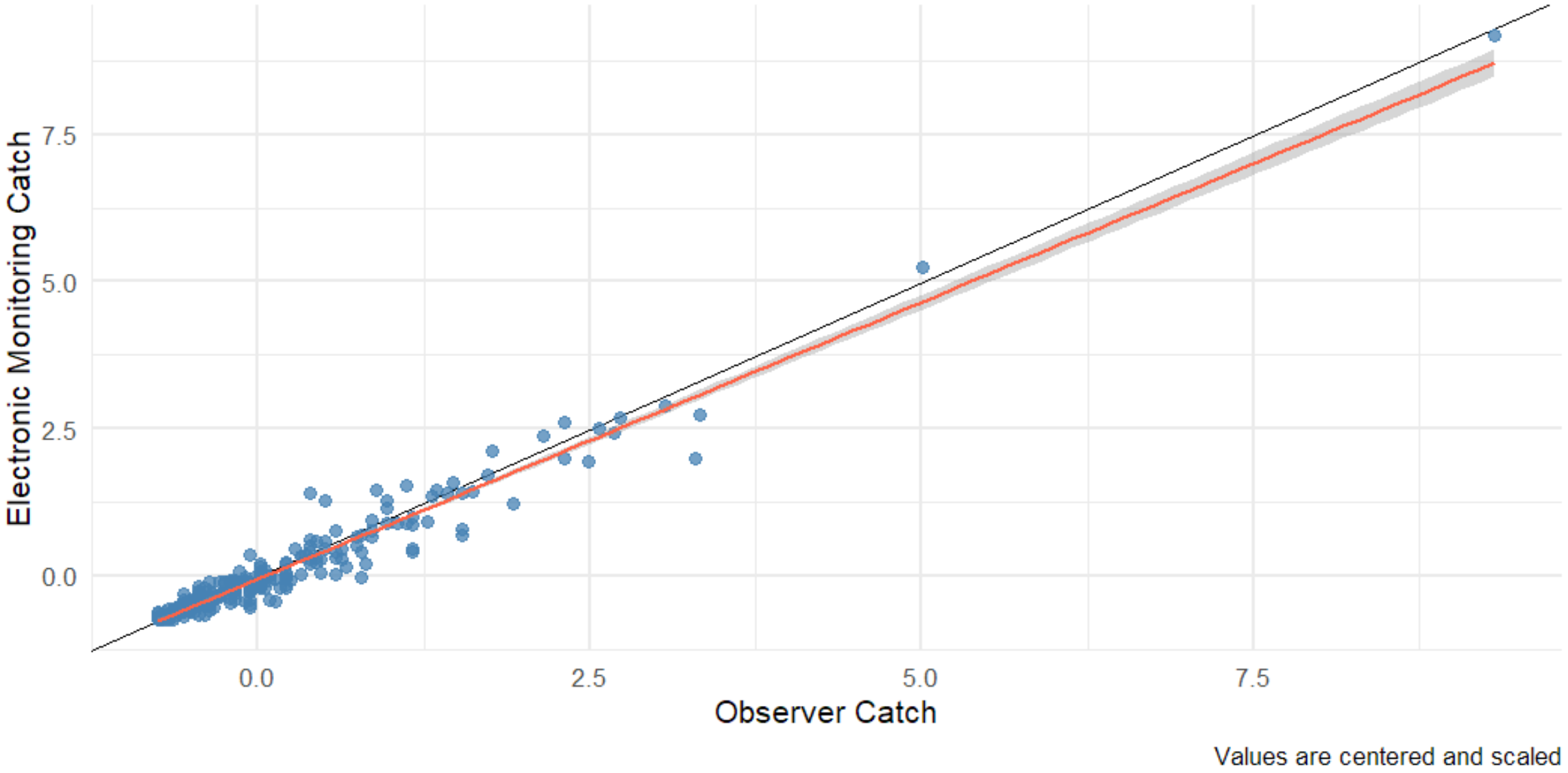
All Associated Sets



Achieving Representative Coverage



Comparing EM and OBS
Comparando EM y OBS



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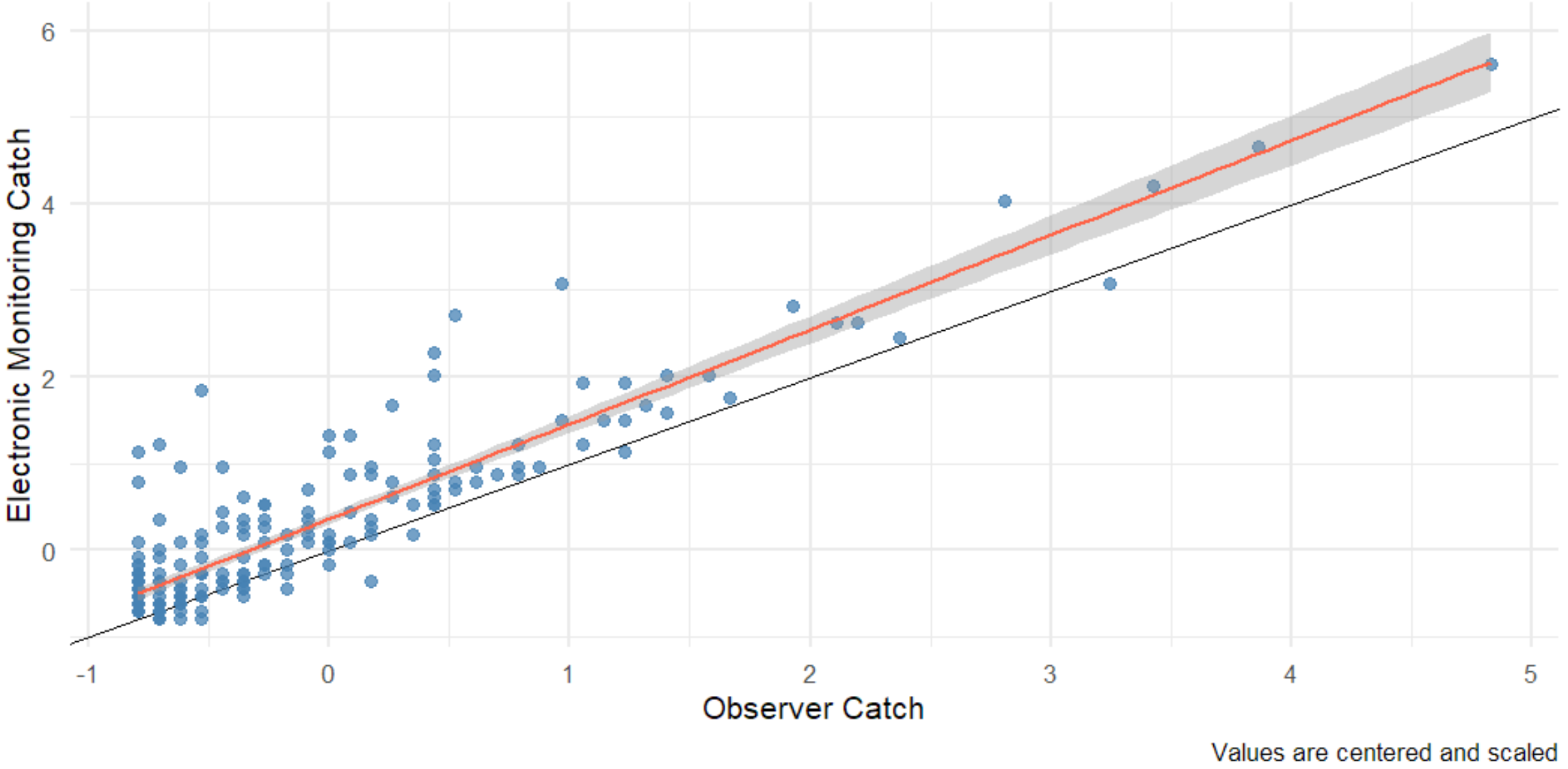

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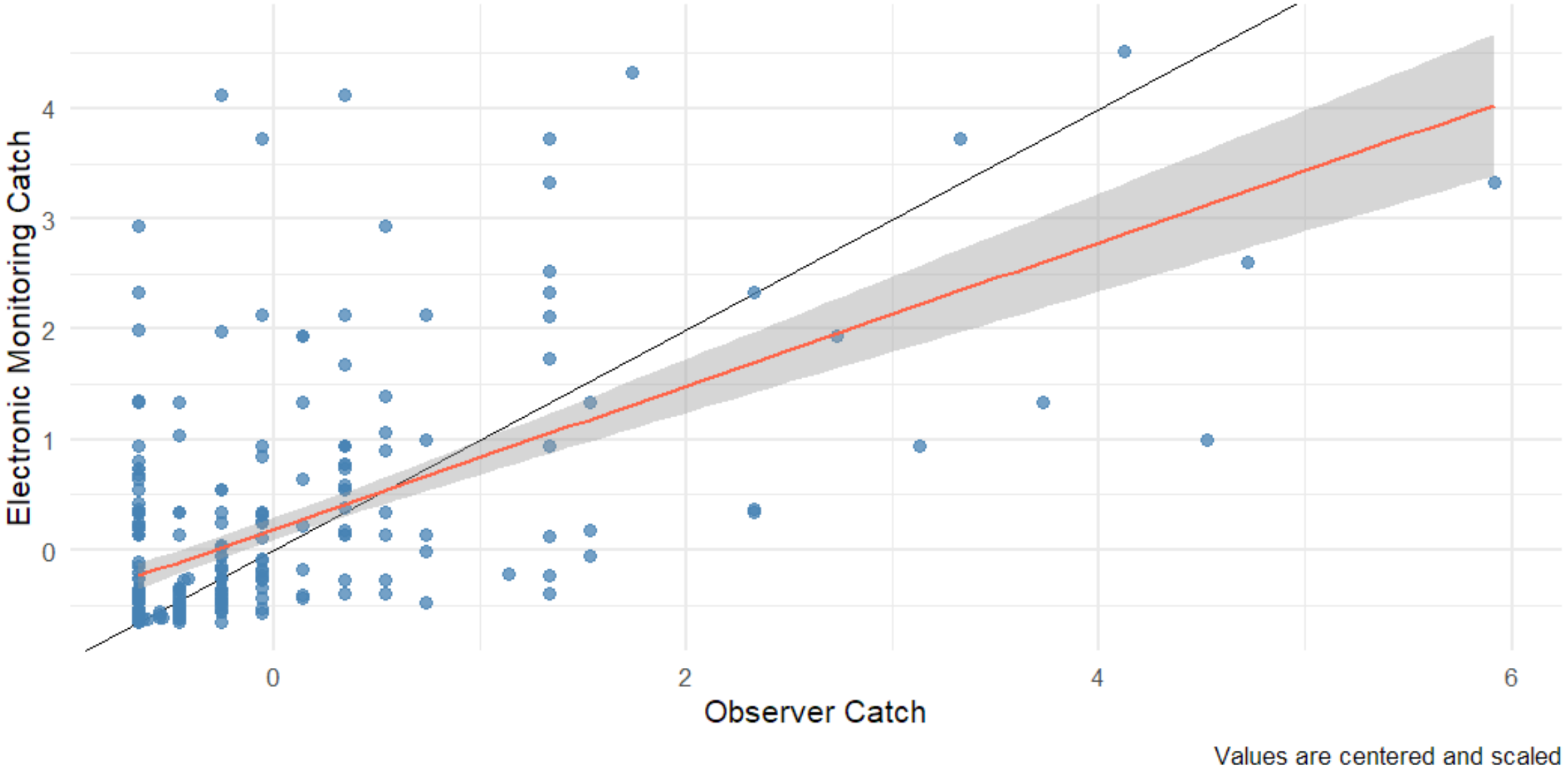

Questions Need To Drive Design

- The review program design may be quite different if the objective is total catch of target tunas vs. not missing threatened species events
- This is particularly true if **coverage** is not 100%
- What is “cost effective” for one species may be insufficient for another and “excessive” for a third
- The more targeted the review rate program, the more care needs to be taken in designing and monitoring the program
- We may need redundancy in programs while we learn

Needs for providing scientific guidance on review rates
Necesidades para recomendaciones cientificos para tasa de revisión

- Review rate needed will depend on
  - Objectives of EM
  - Metrics required
  - Species of interest
  - Accuracy desired
  - Covariates available
  - Budget available
  - Consistency of methods

Given bounds on these questions, we can provide guidance on review rate and coverage strategy