REPORT OF THE WORKSHOP ON METHODS FOR MONITORING THE STATUS OF EASTERN TROPICAL PACIFIC OCEAN DOLPHIN POPULATIONS

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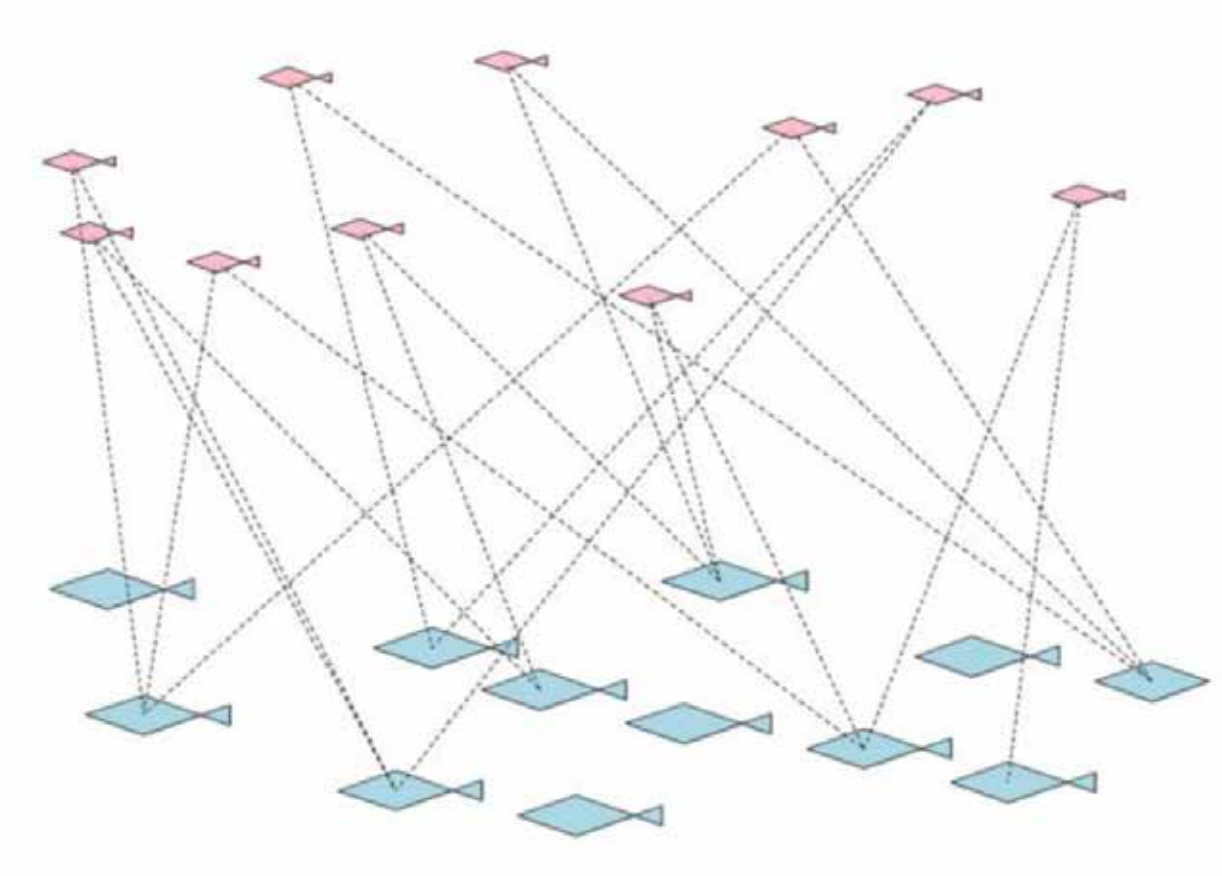
Objectives

- **What data types and methods exist to monitor and assess EPT dolphins?**
- **Specific questions:**
  - What methods can provide estimates of abundance with a CV comparable to that from previous line-transect surveys?
  - Are there new methods that should be used in tandem to provide complementary information?
  - If another fishery-independent, ship-based survey could be conducted, could the methodology be improved without reducing the comparability with past assessments?

Basic approaches for abundance estimation

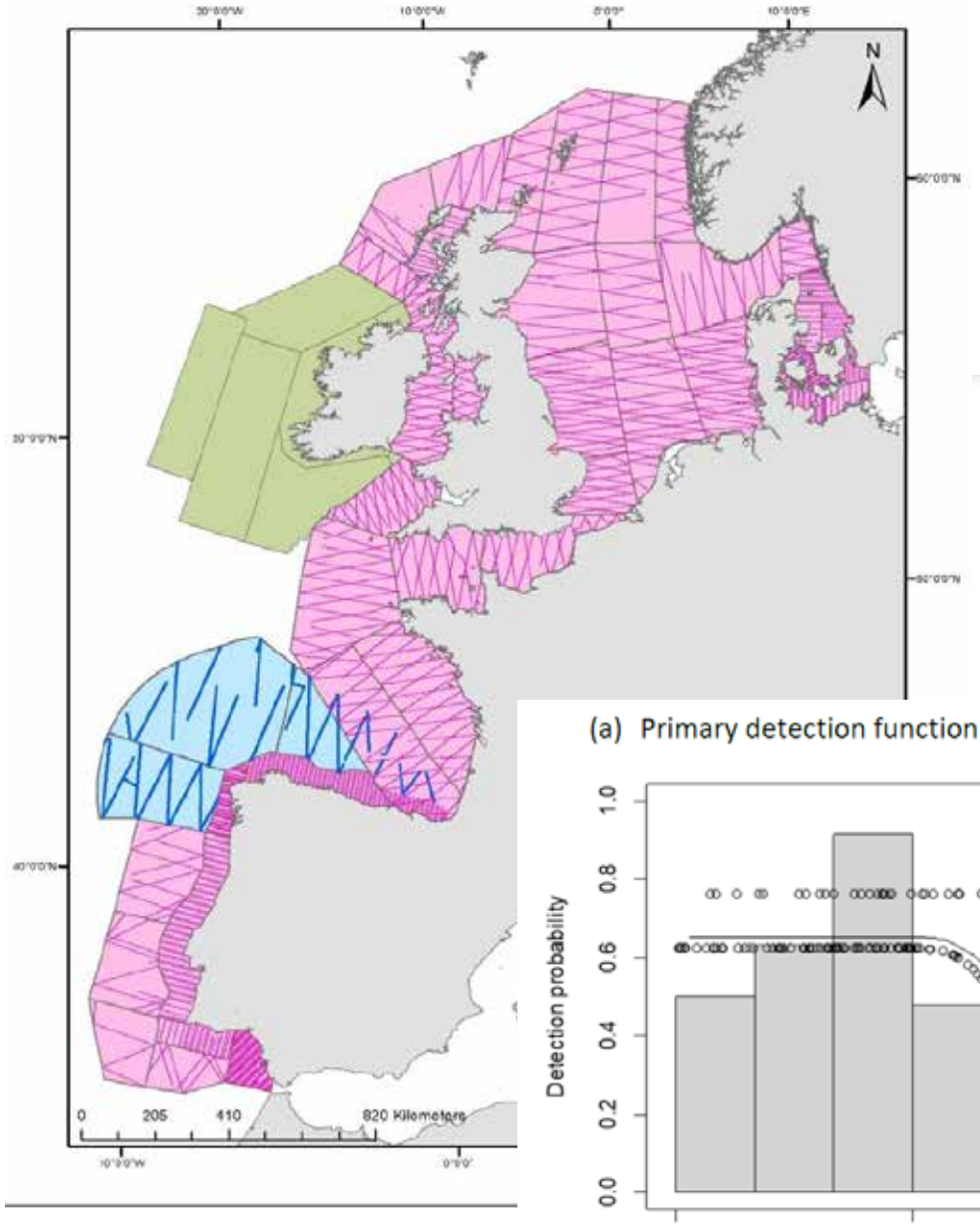
- Close-kin mark-recapture
  - New method, but has the potential to estimate: (a) absolute abundance, (b) relative fecundity, and (c) natural mortality.
  - Can in principle assess movement (or at least spatial structure)
  - Can be integrated into a “standard” stock assessment so as to utilize other data sources (such as length and age data).
  - Gets complicated if age assignment is problematic.

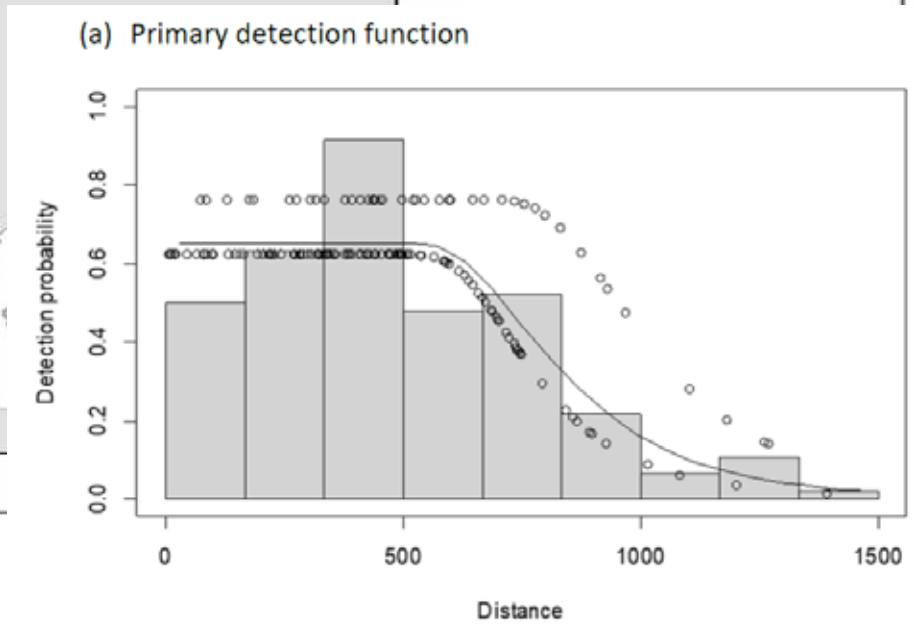


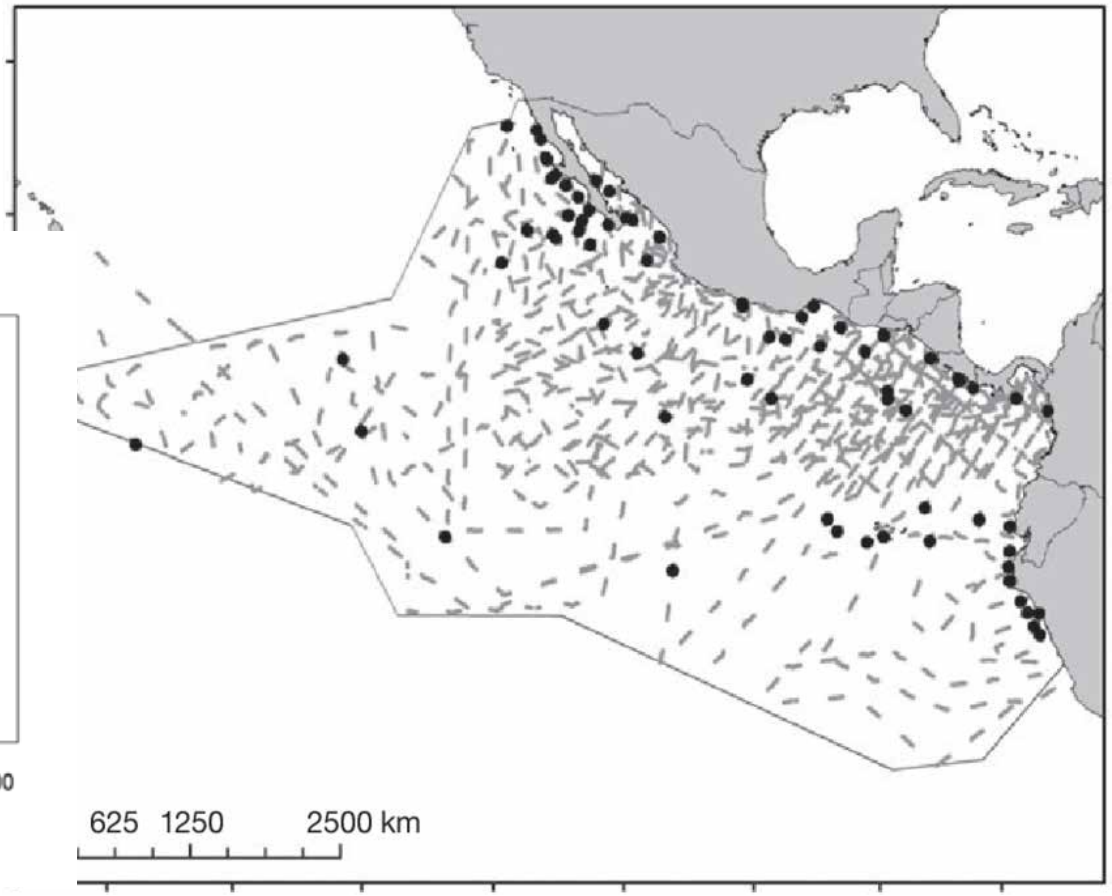
Other Tag-based methods

- Conventional mark-recapture
  - Established method but subject to issues of samples and recapture heterogeneity.
- Conventional tag (fishery interactions)
  - The usual challenges associated with tagging data
- Telemetry / radio tag (fishery interactions, dive time, behavior, habitat association)
  - High cost, tag-type issues, etc.
- Acoustic / PIT tags (fishery interactions, habitat association)
  - Limited tag-detection range, tag-type issues.
- Genetic mark-recapture methods
  - Fewer applications to date (but not subject to many tag-related concerns).

Line-transect type







Line transect approaches for abundance estimation-I

- Line transect surveys
  - Ship-based surveys – depends on estimating g(0)
  - Animals may respond to the vessel.
- Acoustics
  - Can be used to estimate abundance and (potentially) g(0).
- Drifting buoys
  - Limited discussion on how these could be used to estimate abundance
- Aerial photography (fewer effects of issues such as vessel attraction)
  - Perception and availability bias need to be estimated, g(0) is likely to be lower for aerial surveys than for ship-based survey.

Line transect approaches for abundance estimation-I

- Unpersoned aircraft (may be able to cover more ground and is more rapid)
  - Perception and availability bias need to be estimated.
- Satellite images (could estimate group size)
  - Species identification issues
  - Unlikely to provide estimates of abundance (at present)

Analysis approaches

Most of the analysis methods are based on design-based estimation approaches but increasingly model-based approaches are being applied to cetaceans.

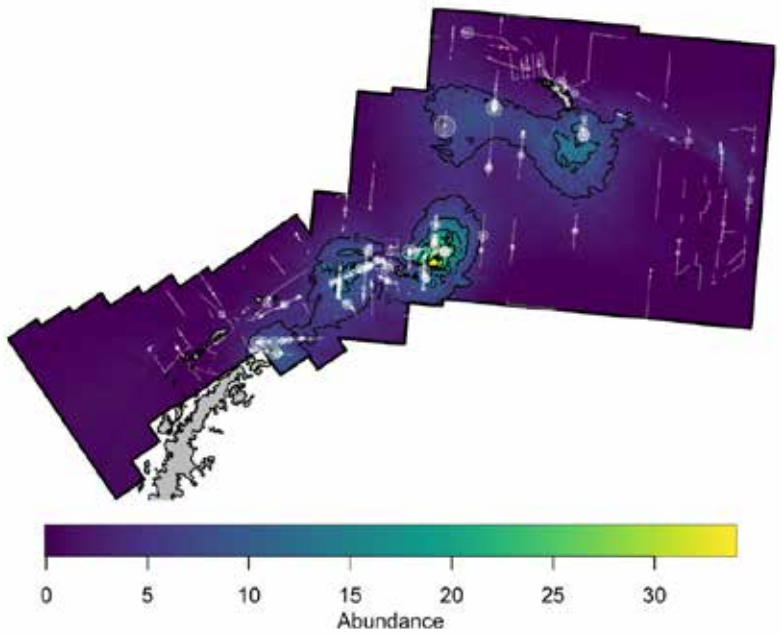


Figure 4. Predicted fin whale abundance across the full survey stratum covered during the 2019 survey from the density surface model. Numbers represent the number of whales per 100 km^2.

Assessment related outcomes

Goal	Minimal model	Data/information	Reliability
Abundance estimates	Exponential regression	Absolute abundance	Moderate
Trends	Exponential regression	Relative abundance	Moderate
Depletion	Requires catch history	Absolute (or relative) abundance	Low
Reference points	Population model	Absolute (or relative) abundance	Low

Potential Research Projects

Projects with funding

- Ship-based line-transect survey (USD $ 9.4 million)
- Close-kin mark-recapture study (USD $ 5 million)
- Drone-base estimation (USG $1.2 million)

Other projects

- Tuna-vessel research surveys
- Satellite imagery
- Estimation of tag-loss
- Regular sampling of life-history data