# Assessment of cryptic seabird mortality due to trawl warps and longlines

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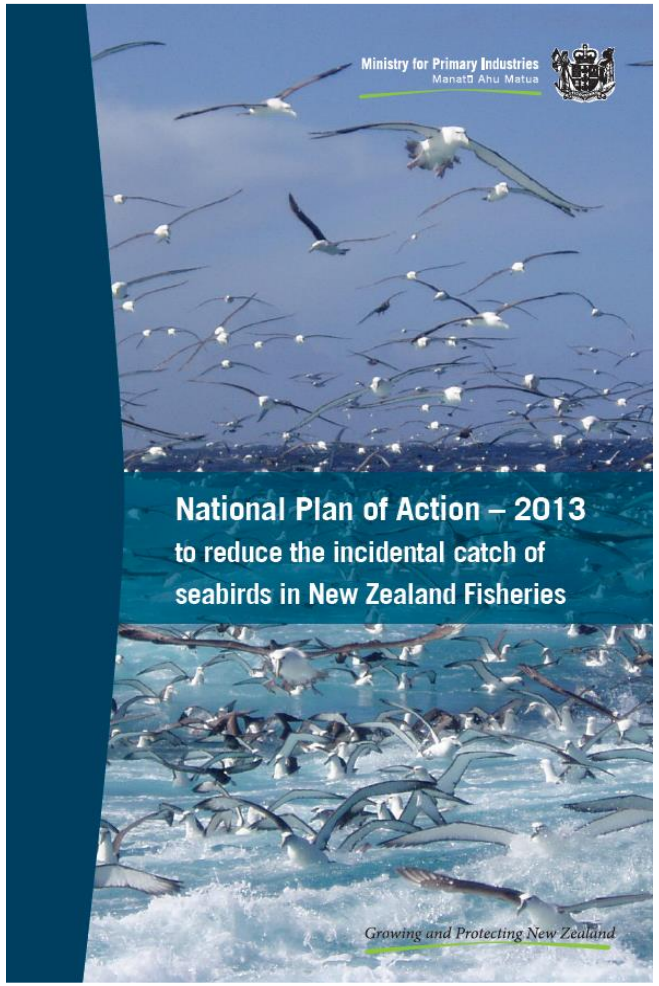
Johanna Pierre

Yvan Richard

Edward Abraham

# Introduction

- Understanding the extent of bycatch important for managing the impacts of fisheries
- NZ fisheries management frameworks incorporate cryptic mortality (CM): NPOA - Seabirds
- NZ: CM = Unobserved or unobservable mortalities
- Richard & Abraham (2013) risk assessment
  - Risk = ratio of estimated annual # of potential bycatch fatalities to the estimated # of seabirds that may be killed taking the PBR approach
  - R&A used multiplier approach to incorporate CM



# Objectives

## Overall objective:

- To estimate appropriate fishery- and species-group specific scalars to allow the robust quantification of total mortality from observed levels of seabird captures, in longline fisheries and on trawl warps

## Specific objectives:

- Review available information from international literature and unpublished sources to characterise and inform estimation of CM and live releases for at-risk seabirds in New Zealand trawl and longline fisheries
- Identify those species and/or fishery groups for which current uncertainty regarding CM contributes most strongly to high risk scores for at-risk seabird species
- Recommend options to improve estimation of CM for those species/fishery group combinations

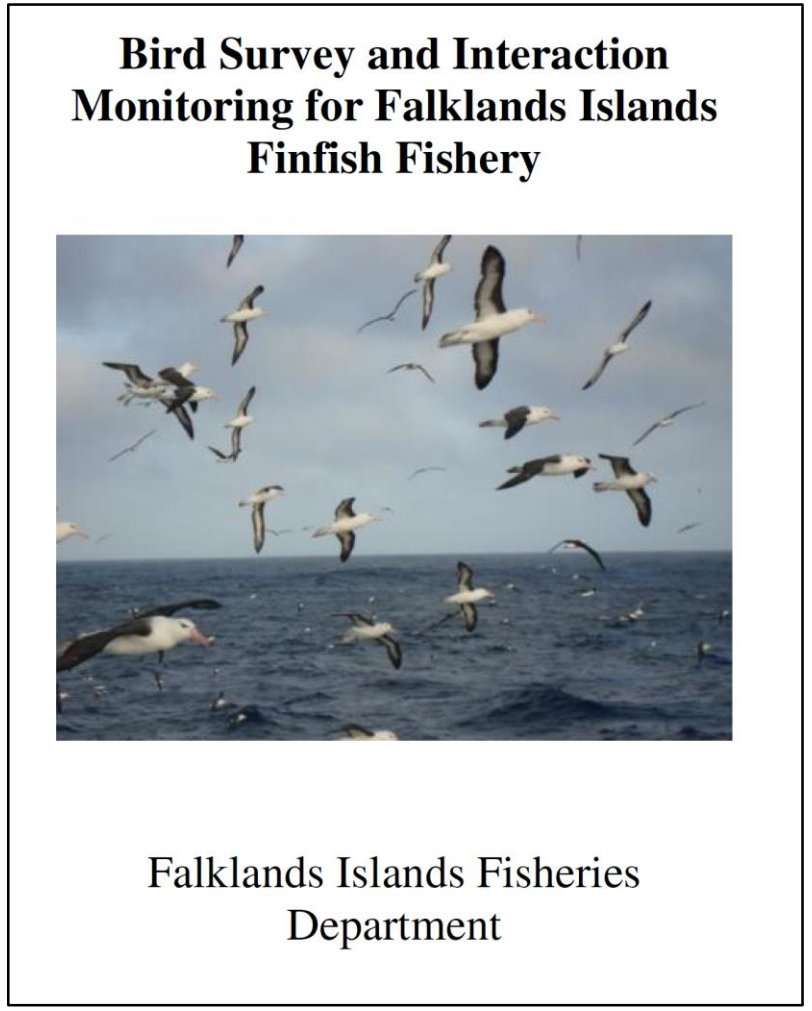
# Methods: Priority fisheries/species

- R&A risk assessment
- Mean difference in risk ratios including and excluding CM
  - Larger mean differences -> CM more important contributor to estimated overall risk
  - Smaller mean differences -> CM less important
- Priority fisheries/species identified
- Then considered assumptions and uncertainties


Photo: J. Pierre

# Methods: Information review

- New published and grey literature
- Expert input
  - Factors affecting CM
- Existing information sources, including databases, not currently publically available in usable form



**Bird Survey and Interaction Monitoring for Falklands Islands Finfish Fishery**



Falklands Islands Fisheries Department

# Methods: How to improve CM estimates

- Use of new and existing information
- Data collection
  - Use of existing government fisheries observer deployments
  - Experimental approaches

Photo: DOC/MPI

# Results: Priority fisheries/species

- Mean differences in risk ratios incl. and excl. CM: 0 – 2.65
- Top fishery/species groups (0.5 – 2.65):
  - Black petrel – bluenose, snapper, small vessel BLL
  - Salvin's albatross – inshore trawl
  - Southern Buller's albatross – large meal trawl
  - White-capped albatross – small inshore trawl
  - Black petrel – small vessel tuna SLL

Photo: DOC/MPI

# Results: Factors affecting CM

- All factors affecting bycatch affect CM
- A subset determines the proportion of captures that are cryptic
- Longline fisheries:
  - Time of line setting: scavenger access to carcasses
  - Gear configuration: escape opportunity, soak depth
    - Weighting
    - Hook type
    - Snood length
  - Where on body birds hooked/tangled
  - Gear remaining in/on captured birds released alive

# Results: Factors affecting CM

- Trawl fisheries:
  - Mid-tow turns: carcass retention on sweeps, bridles, doors
  - Length of exposed warp: extent of warp strikes
  - Presence of warp sprags, grease: carcass retention
  - Tow depth: scavenger assemblage
  - Tow speed: carcass retention in net
  - Net mesh size: carcass retention

Photo: DOC/MPI

# Results: Assumptions

- CM multiplier derived from overseas SLL fisheries
- Large and smaller vessels
- Four geographic regions, 15 years
- Applied to all NZ longline fisheries

- Assuming:
  - Findings from overseas appropriate to NZ
  - Extent of CM identical across all LL fisheries

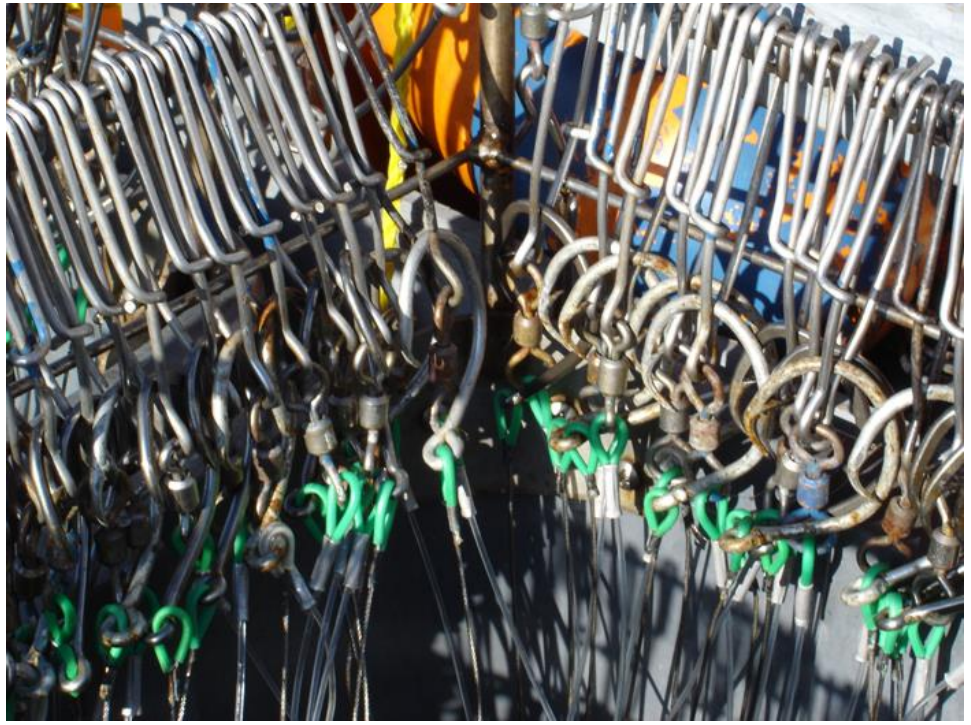


Photo: www.smithsonianmag.com

# Results: Assumptions

- CM multiplier based on NZ and South African information
- Mostly from large demersal trawlers
- Applied to all NZ trawl fisheries
- Assuming:
  - South African information appropriate to NZ
  - Extent of CM identical across trawl fisheries
  - Net-capture CM multipliers assumption-based
  - Aerial warp strikes assumed entirely cryptic
    - Species-based fatality rates assumed


Photo: J. Pierre

# Results: Additional Information

- Broader definition of cryptic mortality (Gilman et al. 2013)
  - Pre-catch losses
  - Ghost-fishing
  - “collateral” mortalities
  - Post-release mortality
  - Cumulative effects of the fishing operation
- Some information available for NZ seabirds
  - Banding records
  - Colony-based records
  - Necropsy data from bycaught birds

Photo: DOC/MPI

# Results: Additional Information

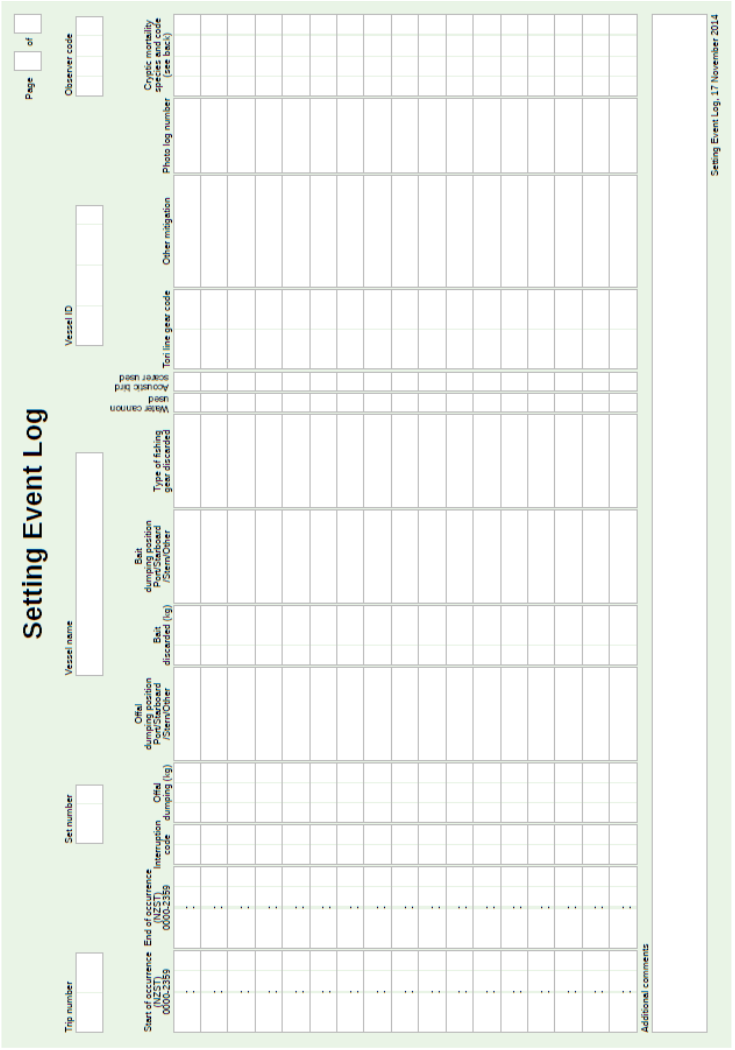
- New information on the outcomes of trawl warp strikes
  - Demersal fisheries
  - Uruguay: larger vessels
  - Australia: smaller vessels
- One field study on cryptic mortality
  - Falkland Islands fishery
  - Demersal trawl vessel
- Existing, but not currently available, information
  - CCAMLR observer data

**Assessing the effectiveness of seabird mitigation devices in the trawl sectors of the Southern and Eastern Scalefish and Shark Fishery in Australia**

J. Pierre[#], M. Gerner[*], L. Penrose[^]
[#]JPEC Ltd [*], AFMA; [^]ABARES

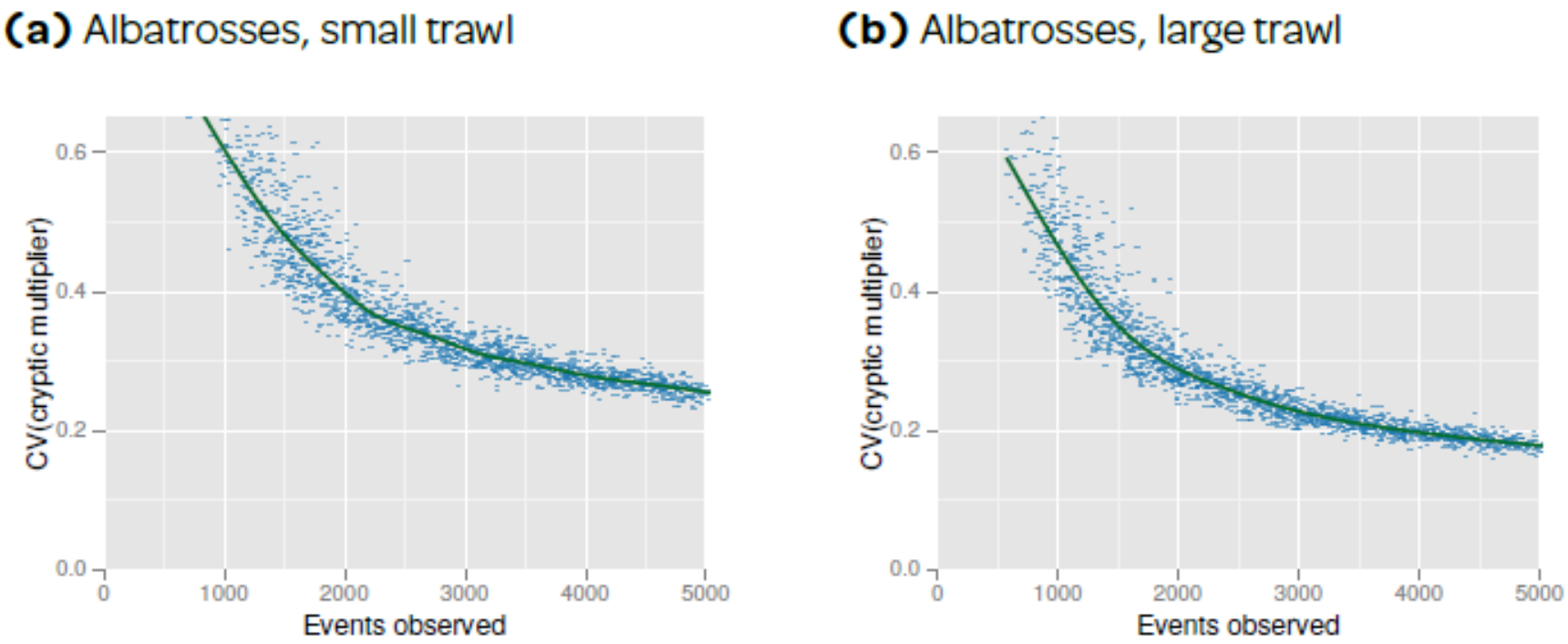
# Conclusions: Improving CM Estimation

- Amend observer protocols to record incidents of cryptic mortality
  - New code on the NFBC
  - Conduct structured observations at the set and haul of longline operations
  - Conduct warp strike observations with an assessment of immediate outcome
- Data collection by observers should be considered a longer-term undertaking



# Conclusions: Improving CM Estimation

- To improve the confidence of CM multipliers, many fishing events must be observed



# Conclusions: Improving CM Estimation

- Role of experimental approaches
  - May be expensive and methodologically challenging, but….
  - High quality data
  - Data collected in a shorter timeframe
- e.g., retention of longline carcasses on hooks, losses from trawl nets, monitoring live releases over time

Photo: © M. P. Pierre

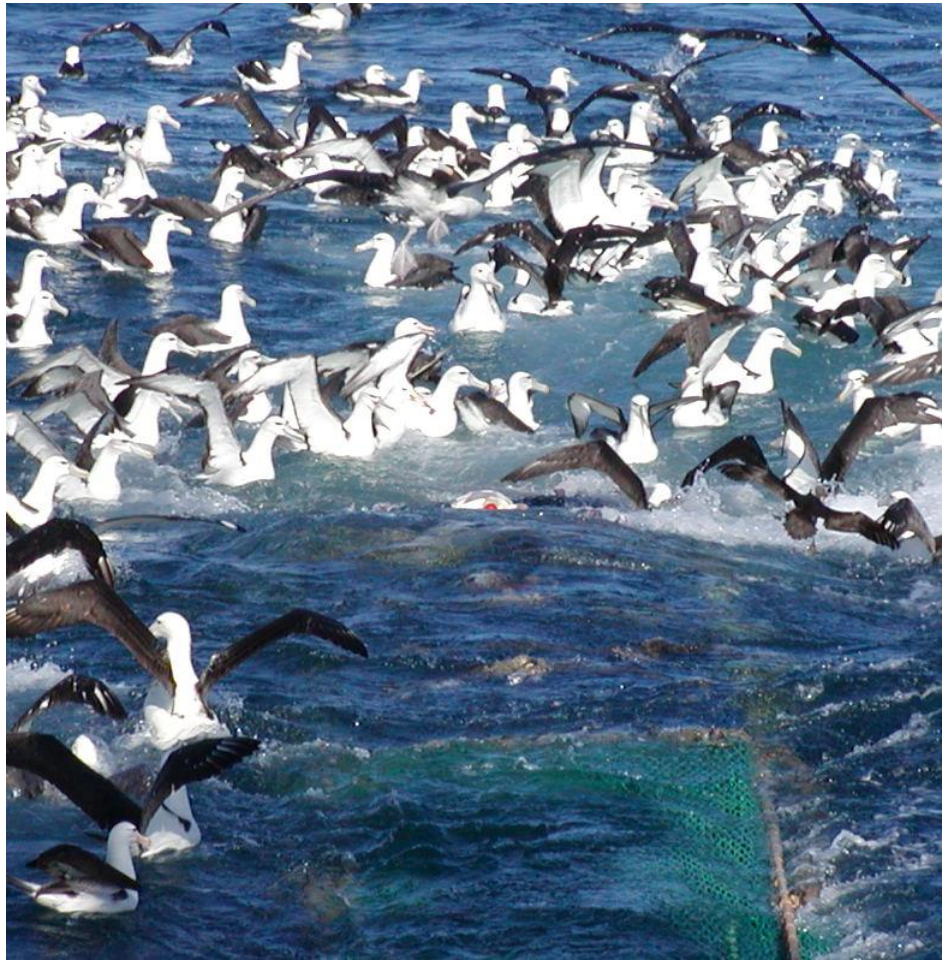
# Recommendations

- Confirm the definition of CM to be used in the NZ fisheries context
- Amend data collection protocols used by government fisheries observers to record potential incidents of CM
- Consider the role of experimental approaches in supporting improved estimates of CM and the development of multipliers

Photo: DOC/MPI

# Recommendations

- Refine estimates of mortalities resulting from aerial warp strikes
- Develop method-specific scalars for bottom longline fisheries, especially vessels < 34 m
- Explore the development of scalars for trawl vessels < 28 m in overall length
- Refine CM scalars applied to small-vessel SLL fisheries



# Acknowledgements

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# Questions?