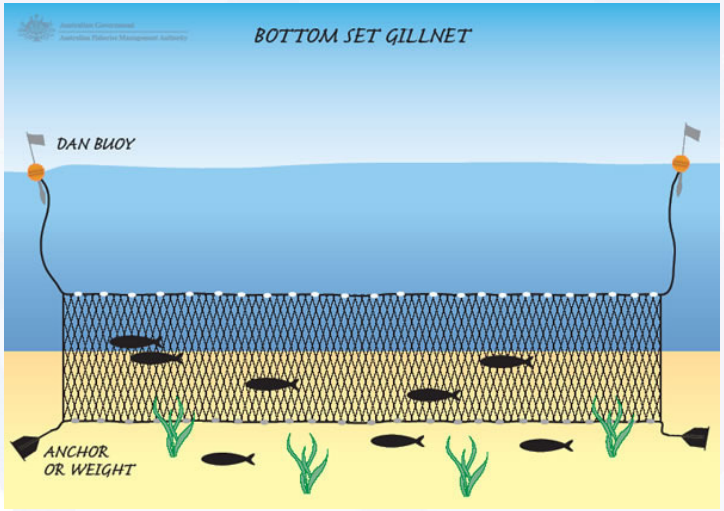
Preliminary Results for the Review of Mitigation Methods in Setnet Fisheries CSP Project 4438

Simon Childerhouse and Verity Steptoe

www.blueplanetmarine.com

1.0 Introduction

- Presentation of preliminary results for the Review of Mitigation Methods in Setnet Fisheries, CSP Project 4438
- To identify and assess the current mitigation techniques for both marine mammal and seabird capture employed in setnet fisheries both domestically and internationally and make recommendations as to their applicability to the New Zealand situation



1.1 Project requirements

- Review current and historic research; including, but not limited to, international scientific literature, government agency commissioned reports, conference proceedings, commercial research and industry trials
- Identify mitigation methods and analyse each in terms of the scientific rigor of any reported trials, the level of proven efficacy in any reported trials, and their relevance to the New Zealand situation
- Describe in detail these methods and outline and compare costs and benefits of each mitigation technique, highlighting uncertainties and caveats of reported trials, and making recommendations for areas of future research

1.2 Project outputs

- Written report detailing the mitigation techniques available to setnet fisheries in New Zealand and assessment of the costs and benefits associated with these techniques highlighting uncertainties and caveats of reported trials, particularly in respect to the protected species assemblages likely to be effected in New Zealand
- A set of recommendations for areas of future research

2.0 Methods

- This review will build on the previous DOC-funded reviews by Bull (2007[1]) and Rowe (2007[2]), as well as the recent global review by Waugh et al. (2011[3])
- Comprehensive literature review of international scientific literature, government agency-commissioned reports, conference proceedings, commercial research, results from industry and scientific trials, and grey literature

[1] Bull, L.S. 2007: A review of methodologies for mitigating incidental catch of seabirds in New Zealand Fisheries. DOC Research & Development Series 263. Department of Conservation, Wellington. 57p. [2] Rowe, S.J. 2007: A review of methodologies for mitigating incidental catch of protected marine mammals. DOC Research & Development Series 283. Department of Conservation, Wellington. 47 p.
[3] Waugh, S.M., Filippi, D.P., Blyth, R. & Filippi, P.F. 2011. Report to the Convention on Migratory Species Assessment of Bycatch in Gill Net Fisheries 30 September 2011. Wellington: Sextant Technology. 146 pp. UNEP/CMS/Inf.10.30.

3.1 Previous reviews - methods

- Previous reviews of Rowe (2007), Bull (2007) and Waugh et al. (2011) identified the following mitigation types:

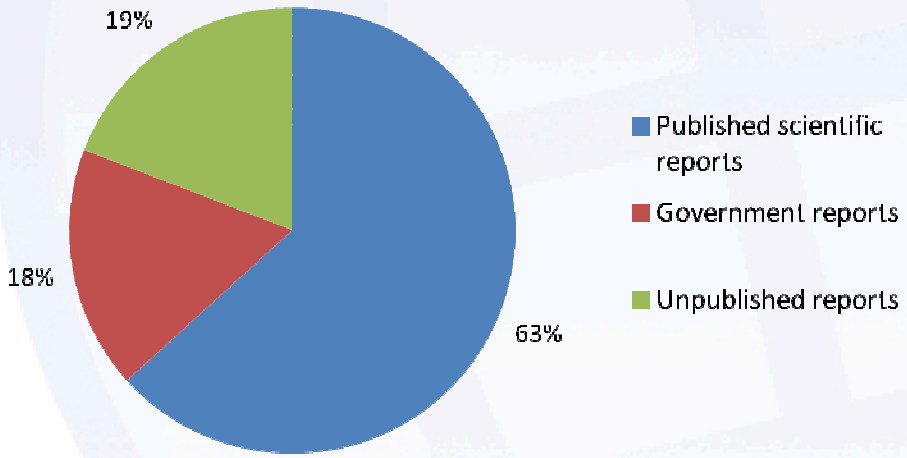
	Bull (2007) Sea birds	Row (2007) Marine mammals	Waugh et al (2011) Various species
Net modifications		*	*
Passive reflectors		*	*
Pingers	*	*	*
Sub-surface setting	*		*
Time of setting	*	*	*
Time/area closures	*	*	*
Visual alert nets	*		*

3.2 Previous reviews - conclusions

- No single method will work in all fisheries, for all areas, all species and all times. Therefore species- and fishery-specific solutions need to be explored
- Many mitigation methods showed little evidence of mitigating bycatch, and where there was evidence, it often corresponded to a reductions in target catch rates as well
- Seasonal and area closures are most effective at mitigating bycatch but obviously exclude fishing and are unlikely to be considered a feasible option in all fisheries
- More research is needed including proper experimental trials
- Increased observer coverage to understand interaction

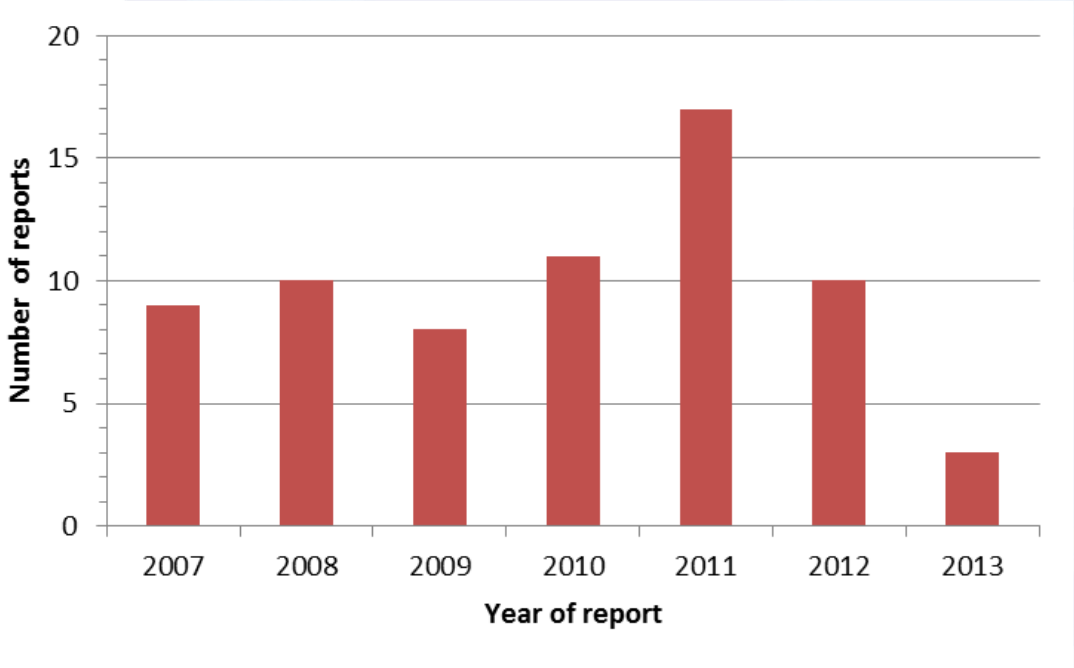
4.0 Results – reports reviewed

- Searched and reviewed 68 published and unpublished reports with relevance to setnetting and mitigation methods
- Mostly (63%) published scientific reports but unpublished reports (19%) and Government (18%) reports also reviewed
- Mostly about mitigation but some reports describing fisheries and interactions



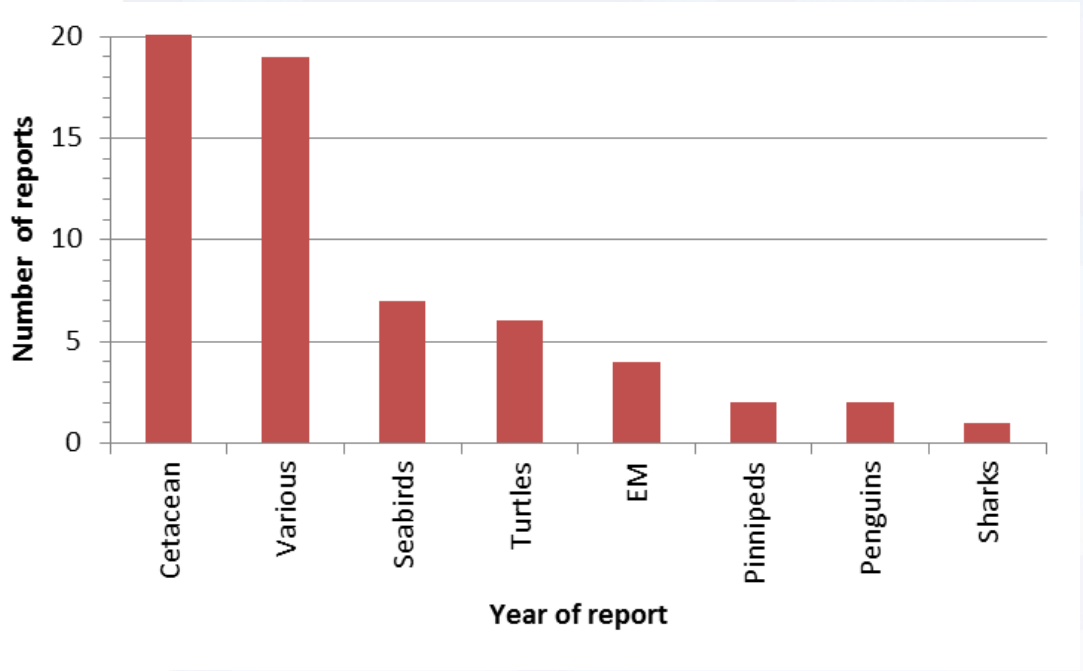
4.1 Year

- Focus on reports from 2007 onwards
- Following previous reviews of Bull (2007), Rowe (2007), and Waugh et al. (2011)



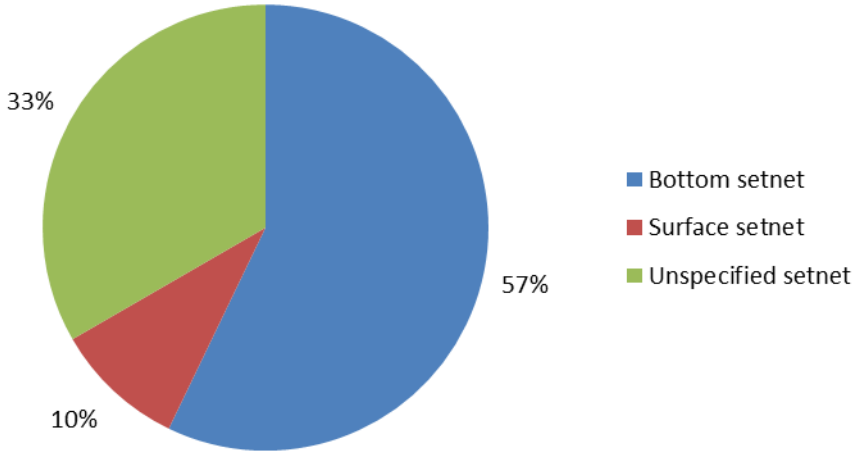
4.2 Group

- Focus of report by group:
  - Cetaceans (whales, dolphins and porpoises)
  - Various (e.g. covers more than one group)
  - EM (electronic monitoring)

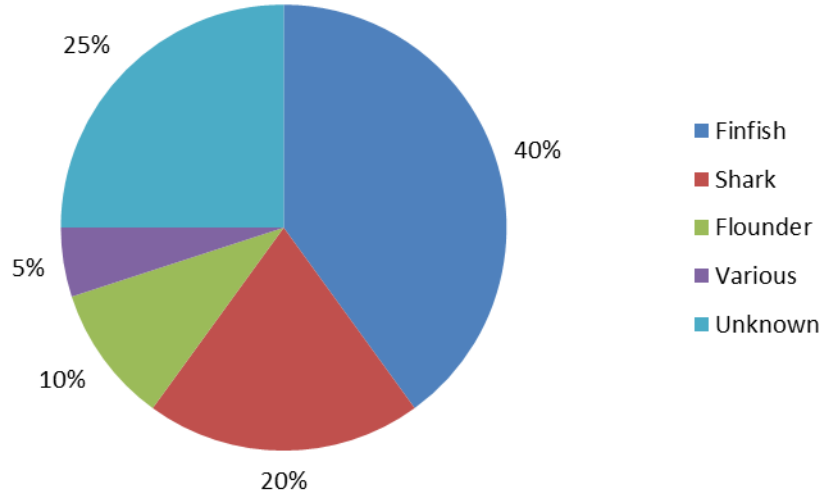


4.3 Fishery and target species

- Fishery type

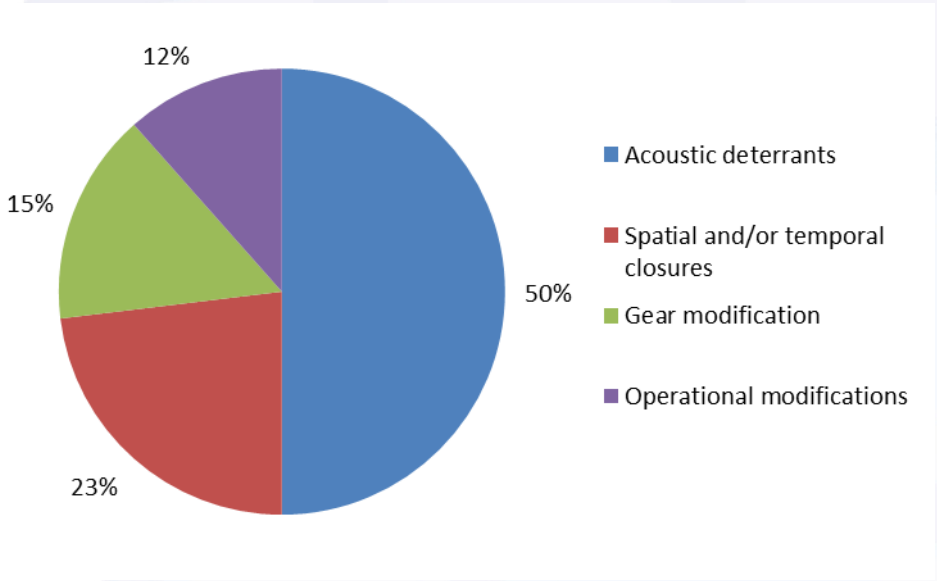


- Target species



4.4 Mitigation type

- Breakdown of papers by mitigation type
  - Acoustic deterrents (mostly pingers)
  - Spatial and temporal closures
  - Gear modification
  - Operational modification



4.5 Acoustic deterrents

- Extensively tested with cetaceans (n=14 publications)
- Results vary across species and areas
  - Most successful for beaked whales (100%), harbour porpoise
  - Less for bottlenose, common, striped, Franciscana dolphins
  - Varied or no response for Hector's, Sousa, Tucuxi
- Pingers are mandatory in
  - Gulf of Maine gillnet fishery
  - California drift net fishery
- Used in NZ under Industry COP
  - effectiveness is unknown but MPI considers the efficacy of these for Maui's dolphins to be unproven

4.6 Acoustic deterrents

- Mechanism for deterrence is unclear
  - Is likely to vary by species
  - Most likely aversion is the driving force
  - Conflicting results across studies

Positive results include:

- Decreased levels of bycatch
- Decreased damage to nets
- Decreased interactions with nets
- Increased target catch rates

Negative results include:

- No change to bycatch levels
- Decreased effectiveness over time
- Decreased target catch
- Reliability problems

4.7 Spatial & temporal closures

- Most effective mitigation measures but effectively removes fishing from the area
- Can be an effective solution in areas and/or times when protected species only occur in small part of fishery
  - localised closures
- Best explored through the use of spatial and temporal modelling scenarios for protected species and fisheries
  - However, sufficient data generally lacking
  - Requires clear management goals for both protected species and fisheries
- Widely used: New Zealand, Australia, USA, EU, Mexico
- Financial compensation has been used to offset the losses to fishers from closing areas

4.8 Gear modification

- Surprisingly small area in literature
- Acoustic detectability
  - Making nets easier to detect with sonar (e.g. odontocetes)
  - Adding chemicals to nets (e.g. barium sulphate, iron oxide)
  - Conflicting results but where bycatch was reduced so was target species catch rate
- Visual detectability
  - Making nets easier to detect visually (e.g. turtles)
  - Adding materials to nets (e.g. LED lights, light sticks, shark shapes)
  - Good results for turtles at night (e.g. reduced bycatch, no reduction in target species)

4.9 Operational modifications

- Surprisingly small area in literature
- Mostly about modifying the way the net hangs in the water including:
  - Hanging ratio (i.e. length to height ratio of the net)
  - Increasing net tension
  - Tie downs
- Some evidence of reduction in bycatch in some cases, but normally associated with a reduction in target species
- However, sample sizes are all small and with low statistical power to draw conclusions

4.10 Operational modifications

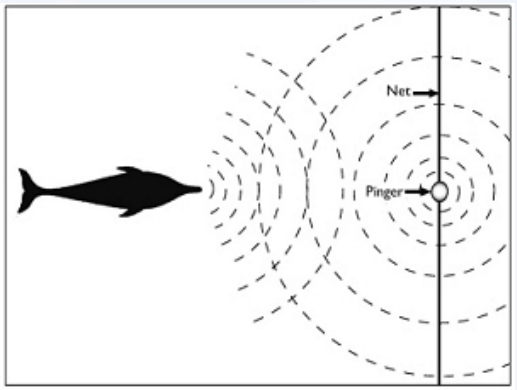
- Code of Practices (COPs) have been voluntarily implemented by some fisheries for bycatch reduction
  - NZ SEFMC developed one in 1999
  - NZ CFMC developed one in 2002
- While there are some anecdotal reports of the effectiveness of these, in general, there are no statistical analyses to support these

5.0 Conclusions

- Perhaps unsurprisingly, conclusions are similar to previous reviews
- There is no silver bullet
- No single method will work in all fisheries, for all areas, all species and at all times. Therefore species- and fishery-specific solutions need to be explored
- To understand what mitigation is likely to be effective we must:
  - understand both the fishery and the protected species, and
  - have clear management goals for both protected species (including which species) and fisheries

5.1 Conclusions

- Globally, mitigation research has focused on:
  - Acoustic deterrents
  - Spatial and temporal closures
  - Gear modifications
  - Operational modifications
- Most promising areas for mitigation research for New Zealand set net fisheries are:
  - Spatial and temporal closures
  - Acoustic deterrents



5.2 Conclusions

Spatial and temporal closures

- MPI and DOC have been implementing these already for mitigating bycatch of Hector's and Maui's dolphins
- Excellent evidence of effectiveness in reducing bycatch levels for all protected species
- Trade off is that fishing is prohibited but this may be partly addressed by financial compensation to fishers in appropriate circumstances
- Must be driven by clear management goals for both protected species and fisheries and thoroughly evaluated against them

5.3 Conclusions

Acoustic deterrents - pingers

- While achieving variable success rates, there have been some significant examples of large reductions in dolphin bycatch
- There have been some pinger trials with Hector's or Maui's dolphins but no statistically robust experiments
- However, Hector's and Maui's dolphins may not be good candidates for pingers to be effective
- Prior to experiments, the effectiveness of pingers must be evaluated against what reductions may be achievable, and if these are going to be sufficient to meet management goals
- If pingers are implemented, dedicated enforcement and compliance regimes will be required

6.0 Feedback and thanks

- Simon Childerhouse
  - Mob. +61-409-982-658
  - Email: simon@blueplanetmarine.com
- Thanks to:
  - Kris Ramm (DOC) and many others who have provided information