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AUSTRALASIAN NET SOLUTIONS WORKSHOP

Summary:

This document contains the report of a workshop held in October 2013 on operational and technical measures for reducing the risk to seabirds from gill and trawl nets.

The workshop was co-funded by CMS through a voluntary contribution from Australia.

Southern Seabird Solutions

Australasian Net Solutions Workshop

Report Prepared for the Convention on Migratory Species of the United Nations Environment Programme (UNEP/CMS), December 2013

Small scale funding agreement - SSFA/2013/SSST

Report on Australasian Net Solutions Workshop

Christchurch, New Zealand

30th and 31st October 2013

Executive Summary

The Southern Seabird Solutions Trust hosted a two-day technical brainstorming workshop to identify new operational or technical measures for reducing the risk to seabirds from gill and trawl nets.

The eighteen people that participated in the technical workshop in Christchurch included individuals from gillnet and trawl fishing companies, skippers, fisheries consultants, seabird scientists, New Zealand and Australian government officials, research companies, conservation NGOs and a fishing net manufacturer.

Participants came up with a wide range of ideas, and these were prioritised against a set of criteria. The eight ideas that participants felt held the most promise were:

For trawl:

- Restricting the mouth of the net when it nears the surface using a noose that can be winched tight
- Laser beams pointing towards the mouth of the trawl net
- Mesh colour that is more visible to seabirds
- Drones that fly over the mouth of the net

For gillnets:

- Using a gillnet roller that shortens the time the gillnet is on the surface or in the air
- Mesh size and net height
- Acoustic pingers to alert seabirds of the presence of the net
- Mesh colour that is more visible to seabirds

Workshop participants identified the first steps that would need to be taken to explore the potential of each of these ideas.

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1.0 Introduction

Gillnets are widely used in commercial, recreational and artisanal fisheries in all oceans of the world. A range of diving seabirds are susceptable to capture in this type of fishing method when it overlaps with their feeding grounds, or their transiting routes to feeding grounds. The most commonly caught types of seabirds are penguins, albatrosses, shearwaters, petrels, gannets, auks, pelicans, and cormorants. Seabird entanglements have also been reported in some deep water and near shore trawl net fisheries, with similar types of diving seabirds being susceptable.

Fishers involved in either type of fishing method have few practical or technical options available for preventing seabird mortalities. Current measures that are practiced in some gillnet fisheries include holding offal on board when nets are being shot away or hauled, staying with the net to remove any seabirds that are caught, minimising soak time of the net, and only using nets in low seabird risk areas or at low risk times. Measures used in some trawl fisheries include limiting or stopping offal discharge when shooting or hauling the net, removing "stickers" (fish caught in the mesh), and binding the net while it is being released.

None of these measures is wholly effective in all circumstances. Practical, cost effective solutions still need to be found. In recognition of this, the Southern Seabird Solutions Trust hosted a two-day technical brainstorming workshop to identify new mitigation ideas suitable for development and testing.

The workshop was held on the 30th and 31st October 2013 in Christchurch, New Zealand. Individuals from Australia and New Zealand with expertise in various net fishing methods, net manufacture, and seabird behaviour attended.

1.1 Objectives

The workshop had the following objectives:

1. Review knowledge on how seabirds become entangled in gill and trawl nets
2. Review existing solutions for each net type,
3. Identify potential solutions (technologies, or fishing practices)
4. Begin the process of planning the development and testing of highest priority solutions.

1.2 Participants

Eighteen people participated in the workshop. Those represented included gillnet and trawl fishing companies, skippers, fisheries consultants, seabird scientists, New Zealand and Australian government officials, research companies, conservation NGOs, and a fishing net manufacturer. A list of participants and their affiliations is

provided in Appendix 1. Apologies were received from three people, and they are also listed in the Appendix.

1.3 Format of Workshop

The workshop began with a series of presentations summarising the nature of seabird interactions with gill and trawl nets, and a review of past and present mitigation practices. The remainder of the workshop was dedicated to brainstorming sessions followed by critiquing, prioritising and planning. Participants were encouraged to put forward all of their ideas, however 'left-field'. At various points throughout the workshop participants studied samples of fishing gear and watched videos of net fishing to stimulate discussion and re-invigorate brainstorming sessions.

Photo: Brainstorming Session

2.0 How Net Entanglement Occurs

2.1 Trawl Net

Seabirds can become entangled in trawl nets in three ways:

1. By diving and swimming in the path of the net and becoming accidentally swept into it or by deliberately swimming into the mouth of the net to take food items
2. By becoming caught by the scissor movement of the net meshes
3. By becoming caught or entangled in the wings of the net when it is being hauled.

The main factors influencing seabird captures are:

- The presence of offal in the water during shooting and hauling
- Weather and sea conditions – rough seas create more of a risk
- Size of the net and distance between the vessel and the net (i.e. the larger the net and the greater the distance between the net and the vessel once it surfaces, the greater the risk)
- Quantity of offal that needs to be disposed of
- Diurnal and spatial effects (i.e. the presence of different seabird species and their level of feeding activity)

A significant proportion of seabirds caught in nets are alive when the net is brought on board; for instance in New Zealand, depending on the fishery, up to 30 - 50% of seabirds are alive.

2.2 Gillnets

Seabirds can become caught in gillnets when their wings, beaks or feet become entangled in the monofilament meshes. It is not clear whether seabirds are attracted to nets by fish that have been caught, or are simply unable to detect the net and accidentally swim into them.

Seabird interactions with gillnets fall broadly into two categories:

1. During the period the net is fishing and seabirds become caught underwater. Unless the net is being watched and the seabird is immediately released, this type of capture event usually results in mortality
2. During the haul, when seabirds are caught at or just below the surface or once the net is in the air. Seabirds are brought on board alive in these circumstances.

The main factors influencing seabird captures are:

- Offal being disposed of during shooting and hauling, or offal floating in the vicinity of a net in the water
- The aerial extent of the net during deployment and hauling
- Net cleanliness
- Net material (which affects visibility)
- Weather conditions (rough seas create more of a risk)
- Diurnal and spatial effects (which affects the presence of different seabird species and their level of activity).

3.0 Existing Measures

3.1 Gillnets

Some gillnetters use the following operational measures:

- Reducing net 'bellying' so there is less net drifting in the water column to entangle seabirds
- Using nets at night outside the peak feeding times for many seabirds
- Limiting soak time to reduce the period of risk and to allow fishing to be conducted outside of key seabird feeding times
- Managing offal and keeping nets clean to reduce the attractiveness of nets to seabirds
- Setting with the tide to increase sink rates of nets
- Preventing net loss through adequate weighting, avoiding periods or areas of strong tides or weather
- Staying with the net

A range of mitigation techniques have been trialled including:

- Acoustic devices – early generation pingers have been shown to reduce bycatch of some seabird species but further work is required. This includes testing pingers using the acoustic frequency range of seabirds, and investigating the responses of different species of seabird to pingers
- Visual deterrents – exchanging upper monofilament segments meshes with multi-filament mesh to increase visibility has been shown to decrease seabird bycatch, but this has had mixed success with different species and can result in reduced target catch
- Operational – mesh size has been shown to be significant factor in seabird bycatch levels, but further work is required to understand this relationship and its impact on target catch and size class of the catch. The target depth of the nets is also an important variable that affects catch rate of seabird and target species. A shift in effort away from shallower waters has been shown

to significantly reduce bycatch. The inclusion of Barium sulphate (BaSO4) to deter marine mammals has also shown some interesting, if not conclusive, results for reducing seabird bycatch.

3.2 Trawl nets

The focus of seabird mitigation to date has been:

- Holding all offal on board
- Where this is not possible because of offal quantity, no fish meal plant on board, or lack of storage space, dumping offal in batches, and not discharging whilst the trawl net is near the surface
- Limiting the time the trawl net is on the surface especially when there are problems during the haul
- Binding mid water trawl nets prior to shooting the net (note: shooting is not the time of highest risk for seabirds)
- Removing “stickers” (meshed fish)
- Fitting net “restrictors” in the scampi fishery – although there are no scientific results as yet on the efficacy of this measure, anecdotal reports suggest the risk to seabirds is reduced when the mouth of the middle net of the three trawl nets used in scampi fishing is restricted.
- Closing off mid water trawl meshes by turning the vessel during the haul.

4.0 Mitigation Ideas from Workshop Participants

Participants generated the ideas described in the following sections during brainstorming sessions. During the critiquing sessions that followed, not all of the ideas were supported by all participants, and it should be noted that none of the ideas have been thoroughly tested. Many of the ideas are based on assumptions about fish and seabird visual and auditory acuity and on the likely responses of seabirds to novel situations.

4.1 Trawl Nets

The majority of seabird deaths in trawl nets occur when seabirds swim inside the net and drown. Most ideas that were generated addressed this issue.

Deterrents
Numerous ways to deter seabirds from entering the net were discussed. These included spraying water over the mouth of the net, releasing smoke or foam behind the vessel in combination with upwind hauling, underwater strobes, spotlights or laser beams incorporated into the headline floats, a laser barrier above the water, kites, drones or a sail deployed from the stern, and acoustic deterrents.

Closing the Mouth of the Net
A range of ways to close the mouth of the net during hauling were discussed. The ideas involved blocking the net mouth, covering it or restricting it.

Mesh Design
Several ideas were proposed that would either make the mesh more visible and deter birds from entering the net, or allow seabirds to escape once they were in the net. Ideas proposed included reflective materials incorporated into the mesh, multi-coloured mesh, tell tails on the mesh to act like a tori line, different mesh orientation such as square mesh, and for bottom trawling, a large mesh panel.

Operational Changes
Ideas in this category included vacuuming fish directly from the net below seabird diving range, breakaway binding on the net wings, and a 'stern dampener' that reduces the net height above the waterline during shooting and hauling.

4.2 Gillnets

Deterrents
A range of ideas that would make nets more visible to seabirds (but hopefully not to fish) were put forward. These included glow ropes, glow sticks, reflectors, or flashing lights in the net, different float colours, lasers, pingers and other acoustic deterrents, kites or other aerial scarers, and modified tori lines or bafflers.

Mesh and Net Design
As with trawling, a number of ideas were proposed that would make the mesh more visible to seabirds. Mesh design ideas included hollow-core mesh, coloured mesh, or broken coloured mesh, and mesh size. In terms of net design, the idea of shortening the net height and increasing net length was suggested, particularly when targeting bottom dwelling fish.

Operational Changes
Several operational changes were suggested that would reduce the time the net is at or near the surface during setting and hauling. These included reducing the aerial height of the net leaving the vessel using a roller or a shooting tube, or changing the position of the net drum so it was closer to the waterline.

An option suggested to reduce the risk of seabirds becoming entangled once the net was set was using a lower hanging ratio so the net is taut; this in combination with a larger mesh may increase the changes of a seabird untangling itself.

Other operational ideas already practiced include avoiding fishing in areas near rookeries, staying with the net, not setting in rough weather, minimising soak times, not dumping offal at critical times or on fishing grounds, and setting perpendicular to the coast or at a different angle to the foraging paths of penguins and other seabirds. Landing green fish was proposed as a way to minimise offal production.

4.3 Most Promising Ideas

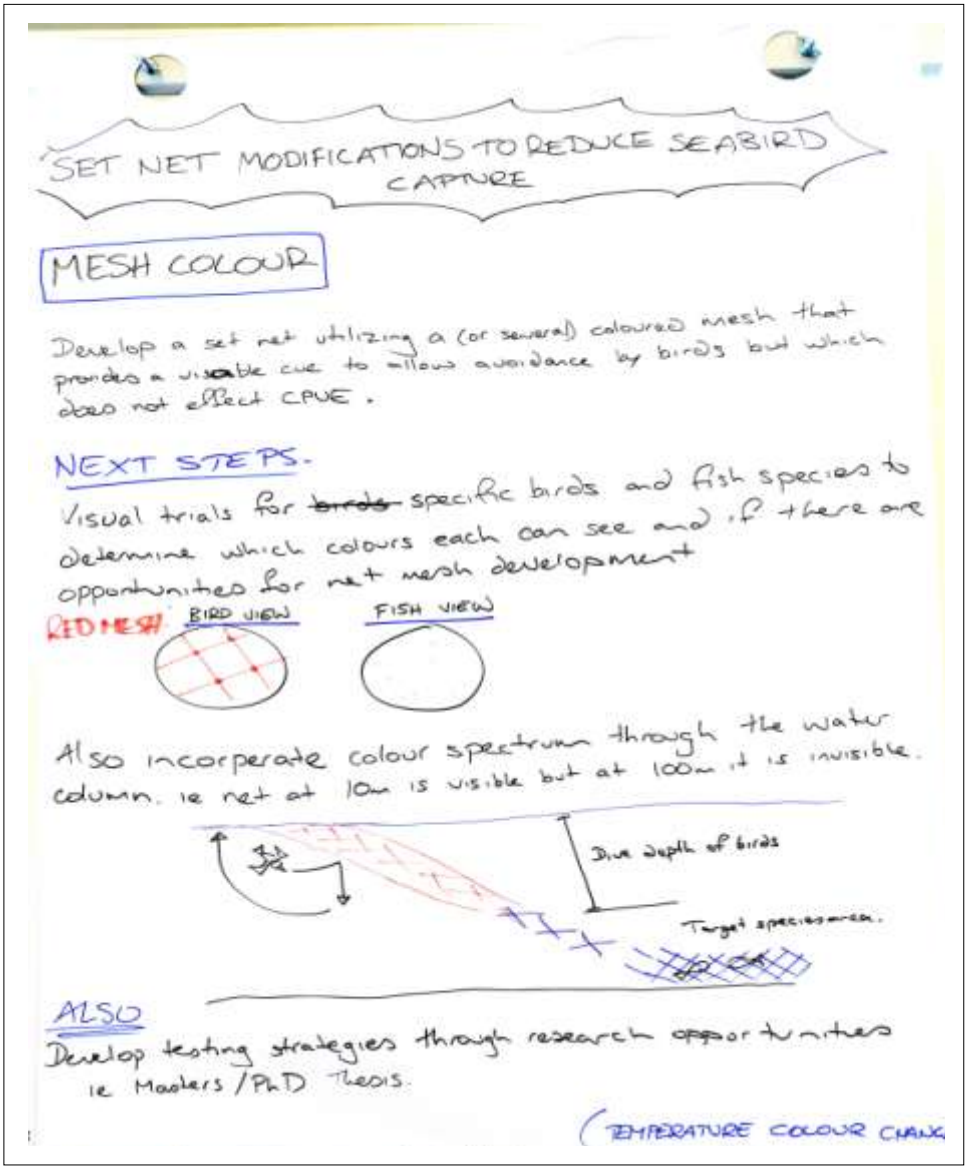
Workshop participants ranked all of the ideas according to their potential and came up with the following short list. Individuals were identified to scope out the next steps on each idea and report back by 20th December 2013.

Gillnets

Mesh Colour

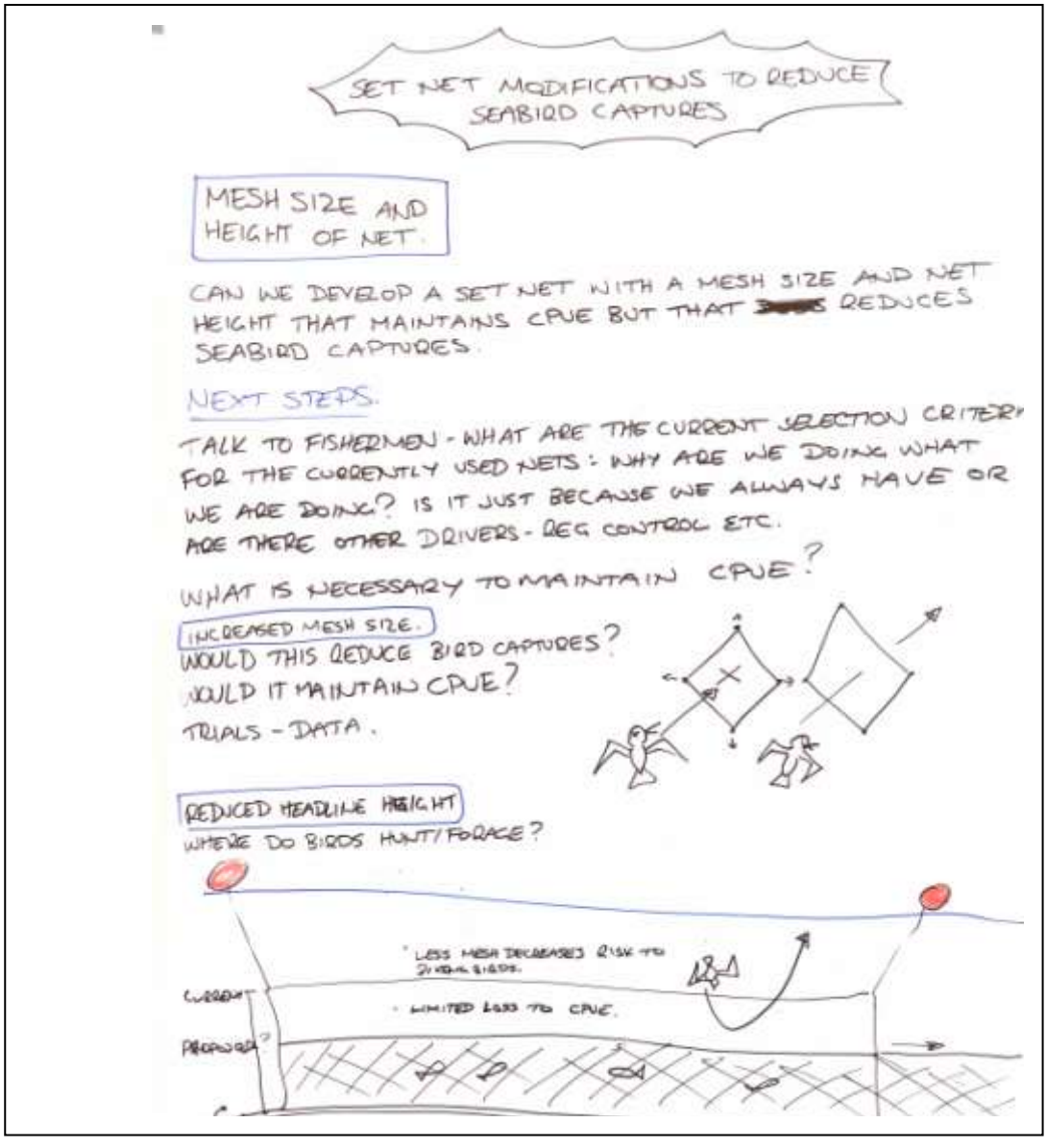
This idea depends on two things: differences in the ability of fish and seabirds to discern different colours, and the effect of increasing water depth on the colour spectrum. Gillnets are already manufactured in a range of colours and there may be colours that are more visible to seabirds than fish.

Red mesh was considered a priority for testing, because red is the first colour to disappear in the water column. This would mean the nets would probably be visible to seabirds near the surface but invisible to fish such as mullet or rig at fishing depth.



Mesh Size and Net Height

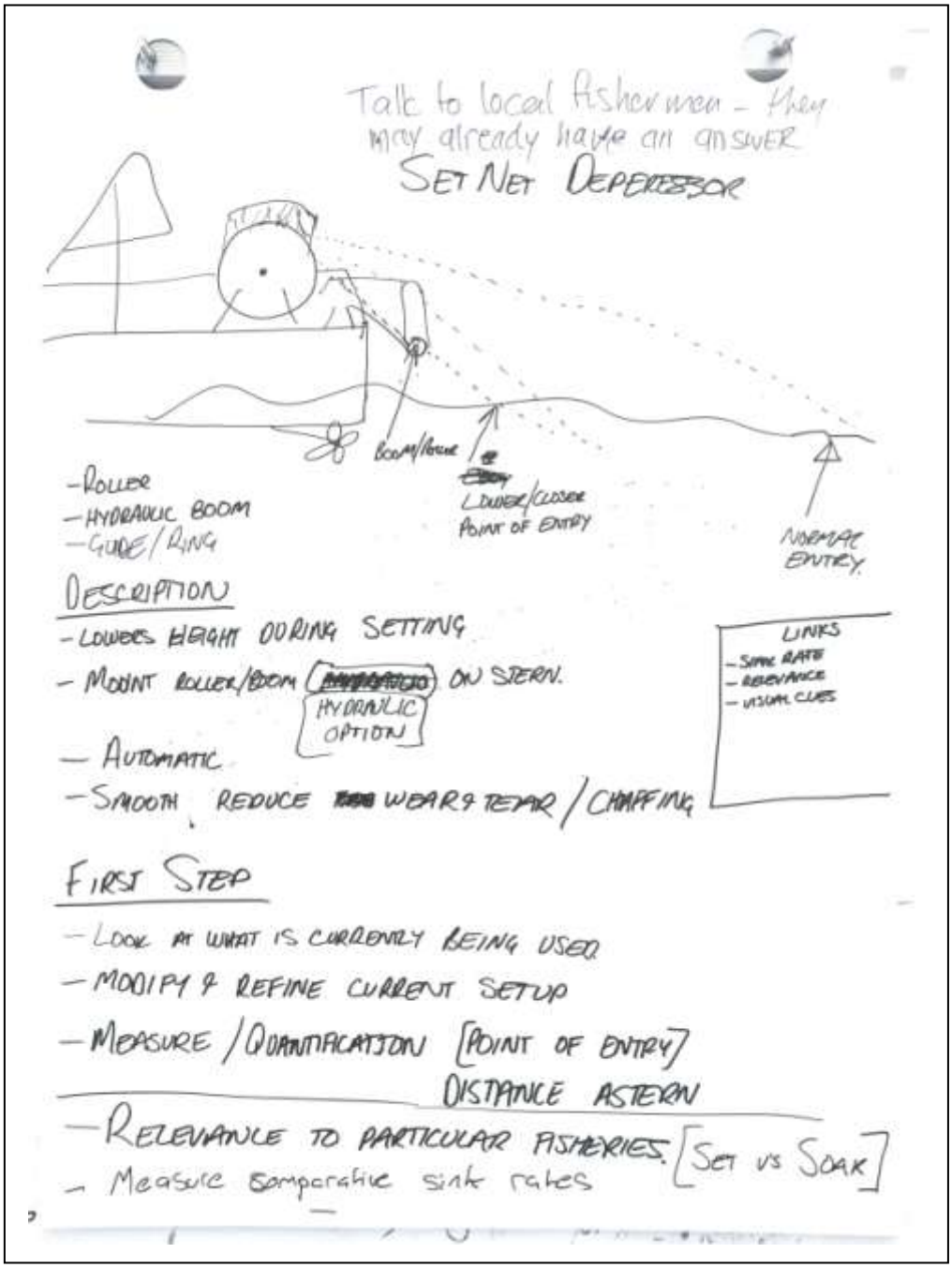
Some fish that are targeted with gillnets are bottom dwelling, so it may be possible to have a lower head height for nets without affecting fish catch. Presumably this would mean that seabirds would be less likely to get caught. Mesh size (both diameter of the mesh and size of the mesh holes) may also have a bearing on the likelihood of seabirds getting entangled.



Net Roller

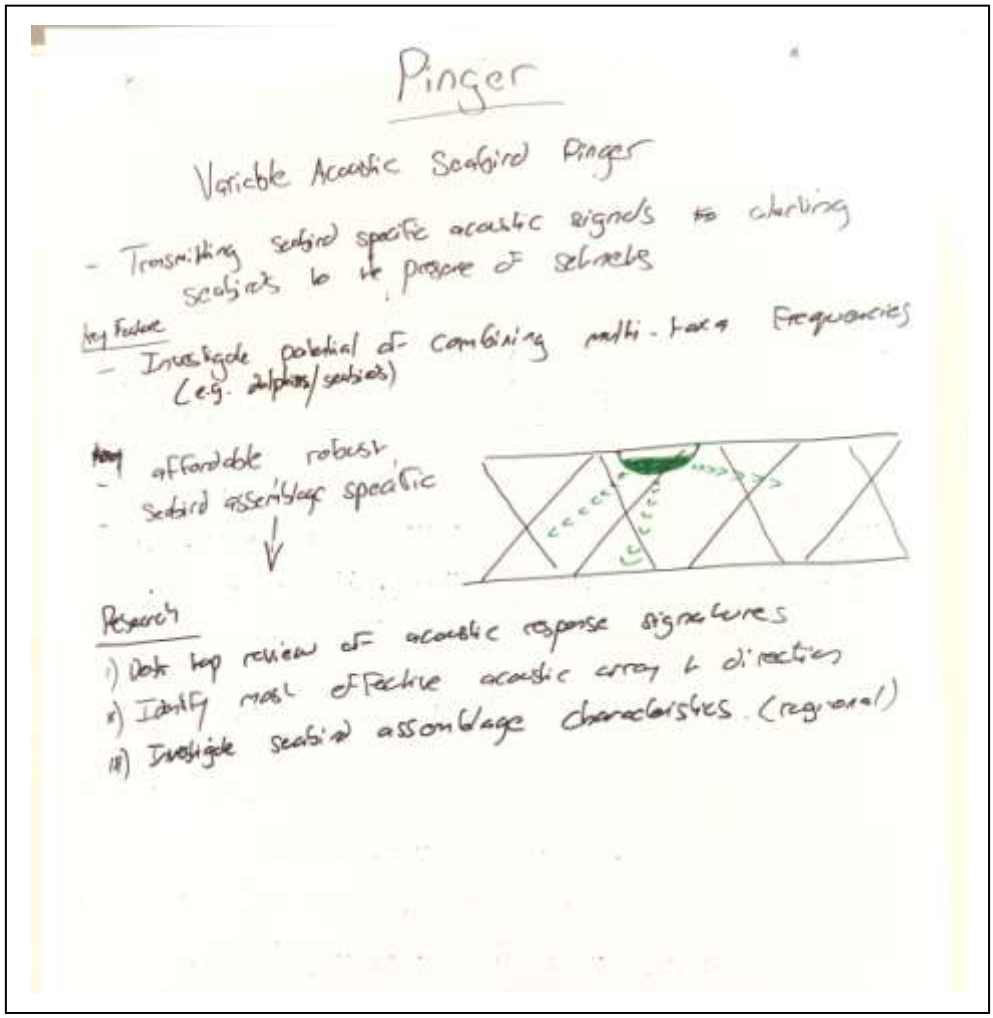
Net rollers (and net tubes) are already used in some net fishing operations (e.g. North American salmon fishery).

This method could reduce the risk to seabirds during setting and shooting and also reduces the risk of fish falling out of the net on hauling.



Pingers

Pingers were proposed as a means of alerting seabirds to the presence of a net (rather than as a deterrent).

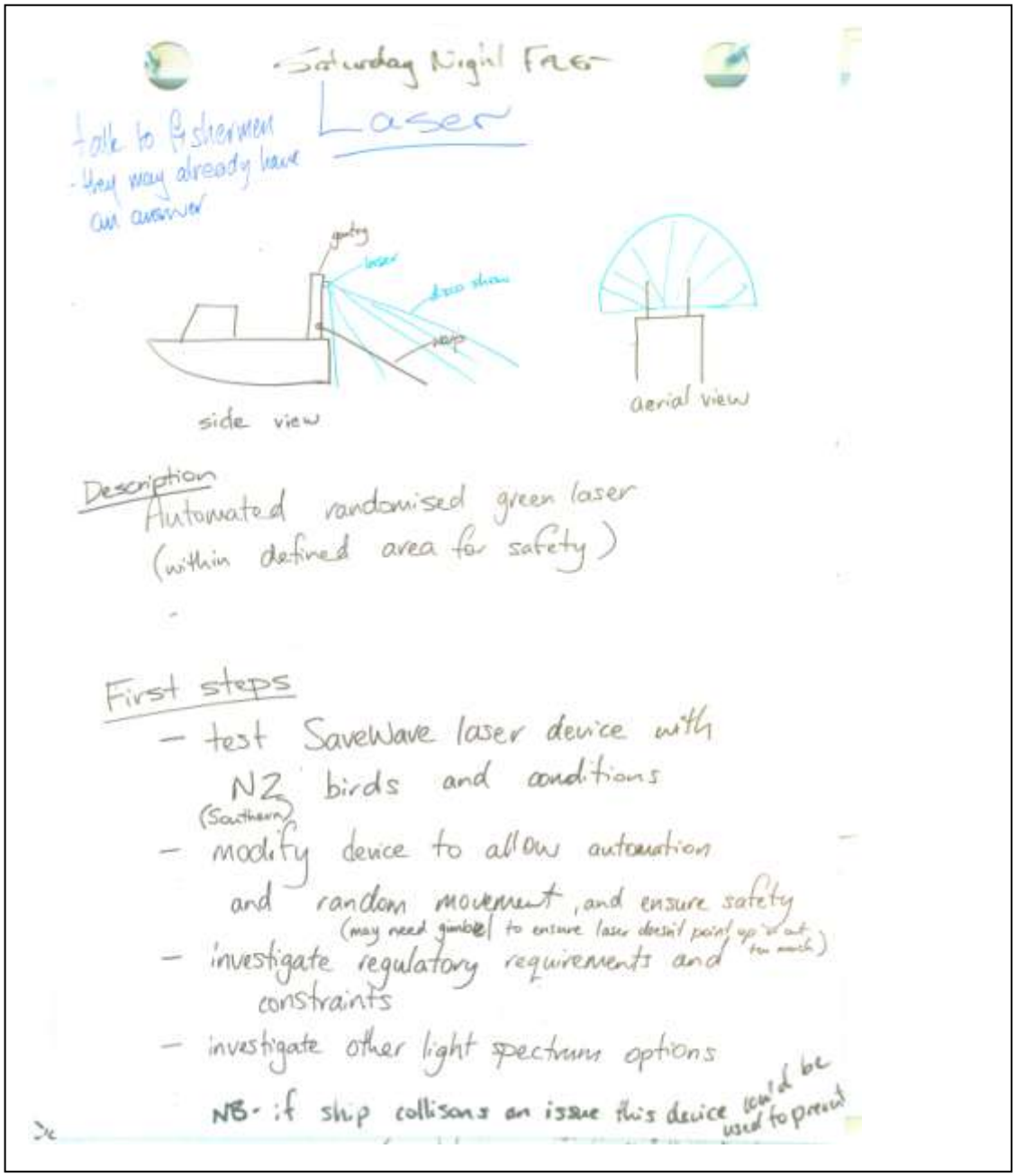


Trawl

Above-water laser

This idea involves one or more lasers mounted high on the stern and pointing in a down-wards direction towards the mouth of the net. Participants presumed that lasers are more likely to be effective during night time.

SaveWave and Mustad Longline have recently developed a new laser and acoustic system using a high-energy sound source and new-patented laser technology, and participants felt this technology was worth testing. Safety and animal welfare issues would need to be carefully worked through.

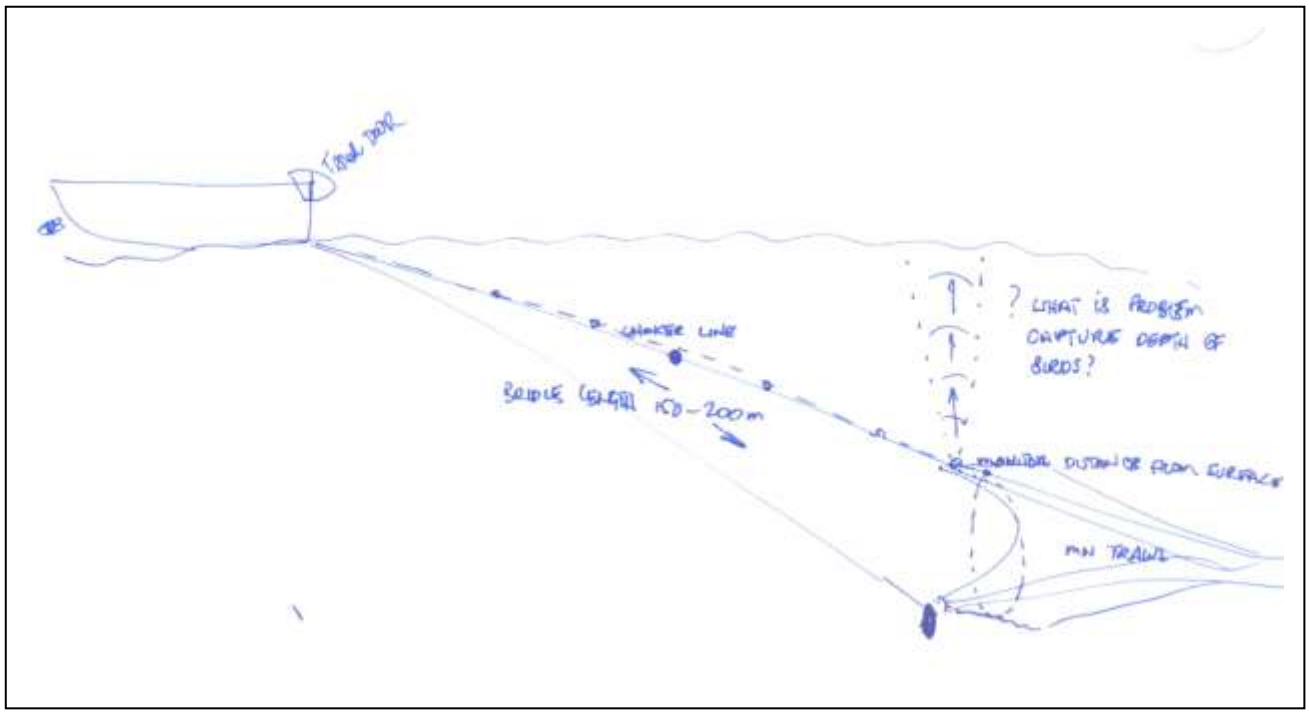


Net Choke

This involves a noose that is threaded around the circumference of the mouth of the net that can be winched tight once the trawl doors come up and prior to hauling the sweeps, bridles and net aboard.

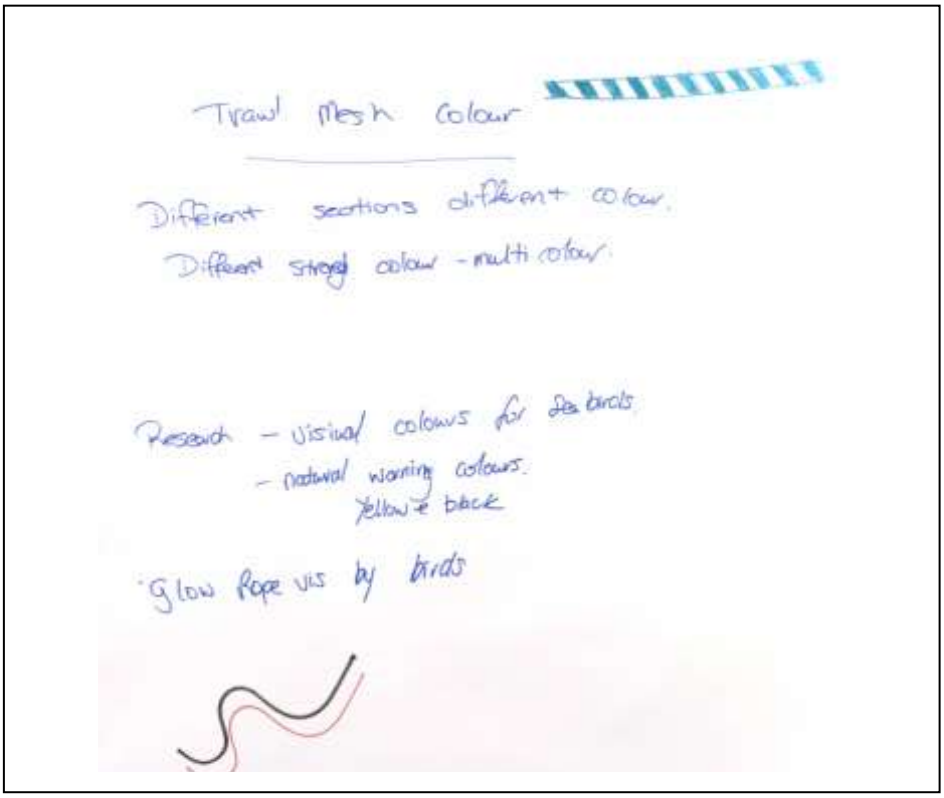
While this system could work on both mid water and bottom trawls, it may be more applicable to mid water trawls. This is because the sweeps and bridles are much shorter on bottom trawls so the net will be much closer to the surface when the trawl doors are up, and seabirds would have had more time and opportunity to swim into the net before it is choked.

Once the net has been 'choked', any seabirds (or marine mammals) would be unable to enter but also any already in there would be unable to escape.



Mesh Colour

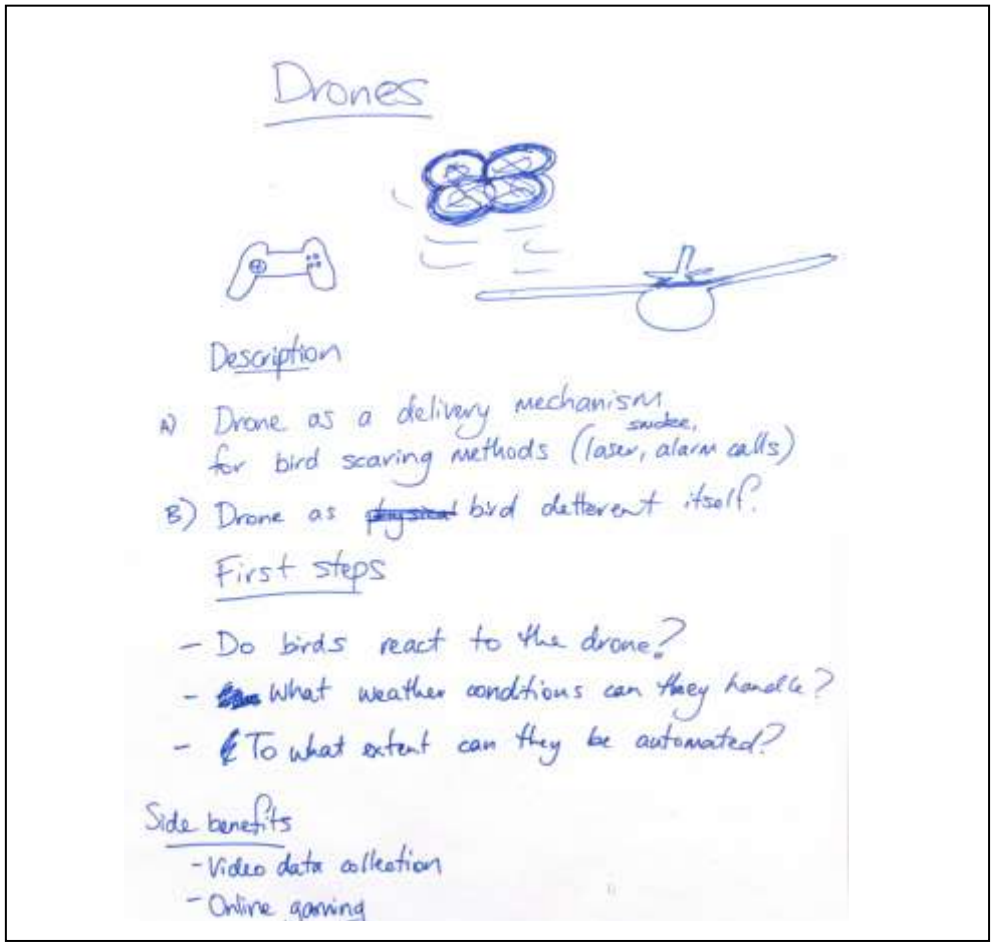
A similar process needs to be followed as with gillnets; that is finding out what colours are visible to seabirds.



Drones

Drone technology is rapidly evolving and drones are already used in a range of industries (including farming and fishing). The concept is to fly one or more drones over the net mouth to scare seabirds away.

At the moment, drones are fairly costly, and may be susceptible to high winds. However, this is likely to be a future mitigation option as technology improves and costs drop.



5.0 Research Needs

Almost all of the most promising ideas rely on seabird's visual, auditory and olfactory abilities. In particular, seabirds':

- ability to see colours
- vision above and below water
- response to alarm calls
- response to different smells and tastes

In addition, information on seabird's diving behaviour and the duration of dives behind vessels or in the vicinity of gillnets could also help shape the ideas.

More specific information on what part of gill nets the different species become caught in would be useful; for instance, an understanding of whether seabirds are caught in the wings of the net, in the net itself, and in the later case, whether it is the lower or upper section of the net. Information on when seabirds are more likely to be caught could also be helpful.

5.1 Next Steps – Timeline

Participants agreed that all of the individuals tasked with carrying out actions would provide an update on progress before 20th December 2013.

5.2 Closing Comments

Participants thanked the presenters and other contributors for their efforts, and noted that the workshop had achieved its objectives, and had helped rejuvenate interest in finding new solutions, and providing a focus for future work.

Acknowledgements

This project was generously sponsored by the Convention on Migratory Species (CMS), the Deepwater Group Ltd and the NZ Ministry for Primary Industries. Many organisations and companies provided in kind support for the workshop by covering the travel and other costs of participants.

The workshop was organised and hosted by the Southern Seabird Solutions Trust, an alliance including representatives from the New Zealand seafood industry and government, WWF and Te Ohu Kaimoana.

Appendix 1: Workshop Participants

Barry Baker	Southern Seabird Solutions Trust/ Latitude42
Jonathon Barrington	Australian Antarctic Division
Chris Carey	Independent Fisheries Ltd
John Cleal	Deep Water Group Ltd
Sharon Ford	Plant and Food Research
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Kris Ramm*	Department of Conservation
Allan Rooney	Independent Fisherman/ NZ Federation of Commercial Fishermen
Ben Sullivan*	BirdLife International
Tony Threadwell	Pegasus Fisheries/ NZ Federation of Commercial Fishermen
Nathan Walker	Mr Fish Consulting
Richard Wells*	Deep Water Group Ltd
Neville Smith	Ministry for Primary Industries / Facilitator
Janice Molloy	Southern Seabird Solutions Trust / Facilitator
Kirsten Crawford	Southern Seabird Solutions Trust

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Apologies

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