Conservation Services Programme
Project MIT2016-01: Final Report

Protected species bycatch media

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ENVIRONMENTAL CONSULTING

Executive summary

The objectives of Conservation Services Programme project MIT2016-01 Protected Species Bycatch Media were:

1. To produce a newsletter to communicate protected species-related information to commercial fishers,
2. To produce media suitable for incorporation into third party publications in order to maximise audience exposure, and,
3. To develop and produce identification tools targeted at commercial fishers to improve their understanding of protected species interacting with their fishing operations.

To address the first objective of this project, eight newsletters were prepared and circulated during the project's two-year project term. Articles covered new, emerging, and best practice bycatch mitigation measures, research underway on mitigation, policy developments, current events, and other protected species information relevant to commercial fishing. Newsletters included key references accessible online to facilitate reader follow-up on items of particular interest.

The newsletter circulation included commercial fishers and others involved in the fishing industry, such as those holding fishing quota and annual catch entitlement, Seafood New Zealand's Sector Representative Entities and Commercial Stakeholder Organisations, seafood company representatives, Ministry for Primary Industries regional office staff, the New Zealand Federation of Commercial Fishermen, and practitioners working on fisheries bycatch issues. Throughout the project, the newsletter was distributed in html form via email, using Twitter and Facebook links, as an A4 2-page pdf file distributed electronically, and as a hard copy newsletter mailed to recipients who did not have an electronic point of contact or had specifically requested a paper copy.

Overall, each issue of the newsletter reached approximately 1,600 recipients directly. The html newsletter was opened by an average of 39 % of recipients through the project term (range: 34.3 – 42.9 % per issue). Most readers were located in New Zealand (83.2 % on average, per issue) and most international readers were based in the USA (14 %), and Australia or the UK (2 % each). Outside these countries, smaller numbers of readers were located in Argentina, Canada, China, France, Greece, Indonesia, Japan and Thailand (< 1 % of the total readership in each country on average, per issue). Twitter was the fastest growing channel for distribution, with an average of 430 views per issue (range: 239 – 762 views per issue).

Addressing the project's second objective was attempted by providing an article with images for publication in *Seafood* magazine. Publication of this was overshadowed by the parliamentary election of 2017 and the content was not picked up again subsequently.

To address the third objective of the project, two seabird identification guides previously produced by the Department of Conservation (the Fisher's Guide to New Zealand Seabirds and the Fisher's Guide to New Zealand Coastal Seabirds) were updated. These were reprinted in hard copy and made available as web-

quality pdfs on the Department of Conservation's website. A new guide to protected fish and reptiles was also produced and made available, in the same A5 and highly pictorial style as the seabird guides.

It is recommended that the newsletter continues to be produced given the sustained levels of readership documented during this project. This regular circulation can usefully be complemented by the development of additional resources that use other formats and media.

Recommendations for future work include:

- Continuing the production and circulation of the *Bycatch Bylines* newsletter at a quarterly frequency,
- Producing a pictorial guide for fishers on handling protected species after capture in fishing operations,
- Continuing the production of fact sheets on key bycatch mitigation measures (e.g. line-weighting), and,
- Developing a series of short (e.g. three to five minute) videos presented as "how-to" guides for fishers, on the basic use of key bycatch mitigation measures such as tori lines, line-weighting and fish waste retention. Videos would highlight fishers demonstrating how these measures can be applied safely and effectively on vessels.

Contents

Introduction

Fishers must maintain and apply their knowledge of bycatch avoidance and reduction measures relevant to their fishing method, to ensure that captures of marine protected species are minimised. Maintaining up-to-date knowledge may be challenging, when the management of marine protected species occurs in a dynamic context that involves ongoing developments in legislation, government policies, science, research, and management approaches. With their activities based from ports around the country, fishers themselves may be somewhat distant from the decisions and processes that affect management of the environment in which they fish. Therefore, the challenge and process of communicating new developments relevant to reducing marine protected species bycatch with fishers is an ongoing one.

To help address that challenge, the objectives of Conservation Services Programme (CSP) project MIT2016-01 were:

1. To produce a newsletter to communicate protected species-related information to commercial fishers,
2. To produce media suitable for incorporation into third party publications in order to maximise audience exposure, and,
3. To develop and produce identification tools targeted at commercial fishers to improve their understanding of protected species interacting with their fishing operations.

This report summarises activities undertaken, and outputs produced, to meet the above objectives. It also provides recommendations for further work to address the ongoing challenge of communicating with fishers on protected species bycatch issues.

Newsletter

Scope

During the project, eight issues of the *Bycatch Bylines* newsletter were prepared and disseminated (Appendix 1). Articles covered legislative and government policy developments relevant to protected species, best practice mitigation methods, new and emerging mitigation measures, work underway to develop bycatch reduction approaches, current events of relevance to fishers, and other protected species information relevant to commercial fishing.

The newsletter was equivalent in length to two sides of A4. It comprised the following sections:

Headline: This section comprised half to two-thirds of the front page of the newsletter, and was the lead article of each issue. A relevant image was included alongside the text. The Headline section addressed any aspect of the newsletter's scope.

What's Up?: This section featured bullet points on current issues and news relating to protected species and commercial fishing, new ideas for mitigation measures, work done by fishers to address bycatch issues, meetings and forums. Weblinks were often included to provide access to further information. A relevant image featured alongside the text.

Best Practice Baselines: This section featured in the lower half of the front side of the A4 newsletter. It highlighted mitigation measures applicable to New Zealand commercial fishing methods. Material was presented in bullet point form with an image illustrating a measure discussed. As well as being provided for general information, content in this section could be targeted to recent or current bycatch issues (e.g. as a reminder to fishers to keep on top of their mitigation, given recent capture events in a fishery).

The Big Picture: This section highlighted the broader context of New Zealand protected species and bycatch mitigation issues, for example, government policy developments (e.g., the Ministry for Primary Industries' Future of Our Fisheries programme), technical and quantitative work influencing or underpinning policy (e.g. the efficacy of mitigation measures, the marine mammal risk assessment), and broader protected species management initiatives (e.g. seabird translocations).

World watch: This section covered international developments relating to New Zealand protected species. Topics included bycatch management, mitigation, monitoring approaches, population information, and research. The section illustrated the global nature of bycatch issues, and showed how activities in New Zealand relate to the international context and/or can be progressed by drawing on international experience and expertise. In the second year of the project, a "snapshot" approach was introduced for this section, with several items covered in short and succinct paragraphs. The change in approach was made to enable the inclusion more items of potential interest to the newsletter's readership.

What the FAQ?: This section provided quick facts in bullet-point form, on unique or quirky characteristics of a protected species or species group, and a relevant image. The section highlighted the diversity amongst New Zealand protected species and was intended to promote increased knowledge and appreciation of these species. Protected species profiled in this section included seabirds, marine mammals, reptiles, and fish.

Want to Know More?: This section provided links that readers could use to access key sources of additional information relevant to the articles in the newsletter.

Circulation

The target audience for the newsletter was fishers and others involved in the fishing industry. Fishers were identified in two ways. First, the contact details of quota holders undertaking more than one trip per year and landing > 1,000 kg of catch were requested from the Ministry for Primary Industries (MPI) for the two most recent fishing years for which data are available. Those using the trawl, longline, setnet, purse seine, troll, trotline, pot and trap, and minor net (inshore drift net, Danish seine, beach seine, ring net) methods were included in this request. Second, the contact details of all holders of Annual Catch Entitlement (ACE) in all Quota Management Areas (QMAs) (i.e., for all fishstocks) were requested from MPI. These two information sources were then collated and duplicate records removed.

Others included in the distribution list were seafood company representatives, Seafood New Zealand's Sector Representative Entities, Commercial Stakeholder Organisations representing members using the above fishing methods, MPI regional offices, the New Zealand Federation of Commercial Fishermen, and individuals or groups working in the fishing industry or on fisheries bycatch issues. Recipients were also added to the list on request on an ongoing basis throughout the project term.

To broaden circulation beyond this core list, the newsletter was posted on Twitter and Facebook. Various hashtags were used with the Twitter post depending on the content (e.g. #seabird, #turtle, and #EM4Fish), with #bycatch used for every issue.

Readership

Circulation of the newsletter reached around 1,600 recipients directly. The newsletter was distributed to the majority of recipients by email using an html-format or in hard copy. The html newsletter was opened by an average of 39 % of recipients through the project term (range: 34.3 – 42.9 % per issue). This is very similar to readership in previous years. For example, in the previous two years of the project (MIT2014-01, conducted mid-2014 through mid-2016), the html newsletter was opened by 33 – 43.3% of the emailed recipients, and average readership was identical at 39 % (Pierre 2016).

The majority of readers (87 – 98%) of the html newsletter were New Zealand-based. This reflects a larger core readership based in New Zealand than previously (i.e. compared to 83 – 94 % for 2014 – 2016 (Pierre 2016)). Outside New Zealand, international readers were based in eleven countries during this project term: the USA (14 %), Australia and the UK (2 % each), and Argentina, Canada, China, France, Greece, Indonesia, Japan and Thailand (< 1 % of the total readership in each country on average, per issue). Of these countries, five were additional to those recorded in previous years (Argentina, China, France, Greece, Indonesia).

There was significant growth in the newsletter's Twitter readership during this project term, with an average of 430 views per issue (range: 239 – 762 views per issue). In contrast, Twitter posts of the newsletter attracted 57 views on average for each edition in 2014 – 2016 (range: 22 – 103 per issue) (Pierre 2016).

Third-party publications

A full-length article with images was prepared and submitted to *Seafood* magazine during this project (Appendix 2). This was provided for publication in the last quarter of 2017. Ultimately this was not published, with the focus of the target issue shifting due to the 2017 election.

The goal of preparing information for third party publications was to broaden audience reach. This goal remains, however, the priorities of such publications can change rapidly, leading to an uncertain return on investment for this approach.

Identification guides

Protected species can be difficult to identify, especially when seen infrequently or only in brief glimpses at sea. To increase fisher awareness of protected species and facilitate their attempts to identify them, two seabird guides were revised during this project. Updates to earlier versions of these guides included text information, MPI reporting codes, images, and amendments that had arisen due to taxonomic changes since the original guides were published in the early 2000s. Guides were published as 2017 versions of the Fisher's Guide to New Zealand Coastal Seabirds (Figure 1), and the Fisher's Guide to New Zealand Seabirds (Figure 2).

A new guide to protected fish and reptile species was also created, in the same A5, waterproof and highly pictorial format as the seabird guides (Figure 3).

As well as being made available on the Department of Conservation website, these guides were printed in hard copy as part of the project, and made available for distribution amongst fishers. Protected species liaison officers (delivering on CSP project MIT2017-01) also distributed the guides to fishers during their work.

NZ Conservation Status: Not Threatened

MPI Species Code: XGT
MPI Group Code: XSU

Species group: Gannets

Australasian gannet

Morus serrator

Distinguishing characteristics

- large seabird (84–91 cm in length)
- white body with dusty yellow colouring on top of head
- white wings with dark flight feathers
- wingspan approximately 1.7 to 2 metres
- long, bill that is pale grey
- short, thick black legs

Juvenile features

- mottled grey-brown plumage that lightens each year until they reach maturity

Feeding and range

Eats: Fish and squid.

Range: When not breeding, gannets disperse widely over the continental shelf, including harbours, estuaries, bays, and fiords. Juvenile gannets migrate to Australia and are common off eastern and southern Australia ranging as far west as the Indian Ocean.

Interesting facts

Gannets plunge dive from great heights in pursuit of their prey. When diving they can reach speeds up to 145 km an hour and dive to depths of more than 15 metres.

Gannets are specially adapted for plunge diving, for example they have air sacs in their lower neck to help cushion the impact when they hit the water.

Breeding

Breeding sites: Numerous small islands, as well as the mainland in New Zealand. Colonies are found at the Three Kings Islands, Poor Knights, Mokohinau Islands, islands off Great Barrier Island, the Coromandel Peninsula, White Island, west coast of the North Island, Tolaga Bay, Cape Kidnappers and Black Rocks. South Island breeding sites are at Farewell Spit, Marlborough Sounds and Little Solander Island.

The species also breeds in Australia.

Breeding period: Gannets return to their breeding colonies around June or July each year. Both parents take turns protecting first the egg and then the chick.

Frequency of breeding: Annual.

Number of eggs: One egg, but can replace it if the egg is lost.

Nesting: Gannets usually breed in large colonies.

Threats

At sea

A few gannets are caught in the trawl fisheries and by line-fishing techniques such as trolling for kahawai.

Gannets have been found dead on beaches after swallowing fish hooks or becoming entangled in fishing line.

Gannets tend to take non-commercial fish such as pilchards or small size classes of commercial fish stocks. Periodic die-offs of pilchards and other fish appear to increase gannet mortality rates. The largest recorded wreck of gannets on New Zealand beaches occurred in 1995 when 283 gannets died of starvation due to a pilchard die-off event.

On land

The main threat to mainland gannet colonies is disturbance by dogs and humans.

Gannets at mainland colonies can, however, become tolerant of people as long as they keep their distance from the colony itself.

The colony on White Island has to survive periodic volcanic eruptions, and some eggs and chicks are lost in thermal areas.

Figure 1. Example pages from the updated Fisher's Guide to Coastal Seabirds.

NZ Conservation Status: Nationally Critical

MPI Species Code: XSA
MPI Group Code: XAL

Salvin's albatross

Thalassarche salvini

Head: Light grey to brown with a white cap.

Body: Medium-sized albatross with a mostly white body.

Wings: Dark upperwings with some mottled white near neck. Underwings are mainly white with a narrow outline of black.

Bill: Dusky grey or pale brown, with yellow patches at the base, tip and sides.

Feeding and range

Eats: Squid and fish.

Range: Distributed widely over the Southern Ocean. They can be found in the South Pacific and Indian oceans. They often forage over shelves and seamounts.

Interesting facts

95% of the world population of Salvin's albatross breeds on the tiny, barren islets of the Bounty Islands.

Breeding

Breeding sites: In New Zealand, Salvin's albatrosses breed annually at the Bounty Islands, the Snares and possibly The Pyramid and the Forty-Fours at the Chatham Islands. The species also breeds at the Crozet Islands in the Indian Ocean.

Breeding period: Begins in October and ends the following April.

Frequency of breeding: Annual.

Number of eggs: One.

Type of nests: Nest on barren islands and rock stacks.

Threats

At sea

- Commonly seen attending fishing vessels.
- Salvin's albatross have been reported caught from longline and trawl fisheries in New Zealand.
- Almost all of these captures have been reported from the east and south of New Zealand.
- Outside New Zealand waters, Salvin's albatross are reported caught in longline fisheries off Chile.

On land

- There are very few land-based threats to Salvin's albatrosses.

Figure 2. Example pages from the updated Fisher's Guide to Seabirds.

IUCN Red List: Near threatened

MPI Species Code: MJA

Species group: Rays

Spinetail devil ray

Mobula japanica

Distinguishing characteristics

- This ray is deep blue to purplish black in colour, and iridescent when living. Juveniles have two white crescent-shaped markings on their shoulders.
- It has a wide black band that stretches from eye to eye.
- The underside is white and may have dark patches.
- Wingtips are pointed. The wingspan is greater than the body length (to the base of the tail). The tail is thin.
- The tip of the pectoral fin is white.
- The head has fleshy extensions that are white on the outside.
- In New Zealand waters, this ray's wingspan is about 90 cm at birth and reaches at least 3.1 m.

Feeding and range

The spinetail devil ray is distributed worldwide, in tropical, subtropical, and warm temperate waters. Its distribution appears to be fragmented.

In New Zealand, devil rays appear to favour an area near the shelf edge off the northeast coast of the North Island. However, they can occur as far south as East Cape and Cape Egmont.

These rays eat plankton.

Interesting facts

When rays are caught in purse seine gear targeting skipjack, they can be separated from catch using a cargo net over the hopper before the brail is emptied. Catch passes through the net and rays stay behind and can then be released.

These rays travel at speeds of up to 8.3 km/h.

Breeding and ecology

The spinetail devil ray is a filter feeder.

It appears to spend most of its time at depths of less than 50 m, but can also dive deeply. In New Zealand waters, the deepest known dive is 649 m. This ray follows the vertical movements of its planktonic prey.

Spinetail devil rays give birth in New Zealand waters. They generally produce one pup per litter. It is estimated that they mature at around 5 – 6 years. At maturity, wingspans are around 2 m for males and at least 2.4 m for females. Lifespan is unknown, but is estimated at longer than 14 years.

These rays may occur alone or in groups.

Threats

Fishing is the main threat to spinetail devil rays. In some areas, targeted fishing occurs using gillnets and harpoons. Bycatch in gillnet and longline fisheries is also reported.

Spinetail devil rays have been reported caught on surface longlines in New Zealand. They may also be caught on trolled lures.

In New Zealand purse seine fisheries, about 8% of sets are reported to catch these rays. Not setting when rays are seen around tuna schools would reduce captures. In areas frequented by rays, setting at depths of less than 200 m should also reduce captures. Rays should be released from nets while still in the water.

Figure 3. Example pages from the new Fisher's Guide to Protected Fish and Reptiles.

Conclusions and recommendations

Communication with New Zealand's large and spatially disparate fishing industry operators is an ongoing challenge. Multiple tools and resources prepared in a range of media are required to effectively engage this group on protected species bycatch.

During the two year-period in which this project was conducted, readership of the protected species newsletter in its html form has continued at levels documented in previous years. Engagement with the newsletter on Twitter has increased by an order of magnitude since the previous project term, indicating the longer-term potential of this medium (while recognising that readers will not all be from the target audience, i.e. the New Zealand industry).

As next steps from the outputs reported here, there are additional opportunities to improve resources available for fishers to reduce the risks that commercial fishing presents to protected species. Recommendations for future work include:

- Continuing the production and circulation of the *Bycatch Bylines* newsletter at a quarterly frequency,
- Producing a pictorial guide for fishers on handling protected species after capture in fishing operations,
- Continuing the production of fact sheets on key bycatch mitigation measures (e.g. line-weighting), and,
- Developing a series of short (e.g. three to five minute) videos aimed at fishers, on the use of key bycatch mitigation measures such as tori lines, line-weighting and fish waste retention, that feature fishers demonstrating how these measures can be applied safely and effectively on vessels.

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References

Pierre, J. P. 2016. Protected species bycatch newsletter: Final Report on Conservation Services Programme Project MIT2014-01.

Appendix 1: Example issue of the newsletter *Bycatch Bylines*

BYCATCH BYLINES

Issue 32 | June 2018

HEADLINE

Federation mitigation

A programme to boost protected species bycatch reduction was announced at the annual conference of the Federation of Commercial Fishermen. What does this mean for operators?

The Federation's annual conference is always a good place to take the pulse of the industry, and this year was no exception. Fisheries Inshore New Zealand (FINZ) announced its plan for all inshore operators to participate in a programme focused on reducing protected species bycatch risks.

Chief Executive Jeremy Helson likened the programme to what is already happening in deepwater and surface longline fisheries. FINZ will work on the roll-out alongside the Department of Conservation (DOC) and Ministry for Primary Industries (MPI). FINZ's goal is to have all inshore vessels equipped with a vessel-specific plan to reduce risks of bycatch for protected species by 2020. The programme will also include:

- Operational procedures developed for each component of the inshore fleet and prepared by FINZ in consultation with operators and interested parties
- Triggers that result in operators reviewing mitigation practices and notifying a designated contact point on land when a certain number or type of protected species capture events occur
- Monitoring, e.g. by government fisheries observers, to audit on-vessel implementation of practices described in plans, and
- Performance reviews by DOC, MPI and industry representatives.

Ensuring that plans remain current also means operators will need to train new crew on operating procedures over time.

Onshore and at sea, the seafood industry is working to improve performance. *Photo: © M.P. Pierre*

Rolling out the programme across the inshore sector is part of FINZ's recognition of the industry's impacts on protected species, and the need to minimise those impacts and continue improving performance. The programme will also recognise and codify positive actions where they are already in place on inshore vessels.

The inshore programme announcement comes hot on the heels of Seafood New Zealand's work on an industry-wide code of conduct. The Seafood NZ team has been visiting ports to spread the word among industry operators. That code is broader and includes not condoning illegal behaviour, working towards policies that ensure sustainability, minimising environmental impacts, investing in science and innovation to enhance fisheries resources and add value, supporting increased transparency, looking after people, and being accountable.

BEST PRACTICE BASELINES

When it's night and the moon is bright

Full moon is a very high-risk period for seabird captures in surface longline fisheries. When it's night and the moon is bright, what should you do?

- Get your tori line in tip-top shape before full moon and have a spare one handy. That means at least 75 m of aerial extent to help protect baited hooks from hungry seabirds.
- Have line weights on all snoods. Be prepared to move weights closer to the hook to sink gear faster and keep it away from birds.
- Avoid setting gear into a flock of waiting birds.
- Talk to other fishers to find out where birds aren't. If you're having problems, there is probably safer fishing somewhere else.
- Ask your liaison officer. They can help troubleshoot to get you out of sticky seabird situations.

Line weights are a fisher's friend when seabird capture risks are high. *Photo: https://www.fishtekmarine.com*

WHAT THE FAQ?!

A refugee from the GC

The giant grouper is one of New Zealand's protected fish species. It is also called the Queensland grouper and occurs along Australia's Gold Coast. Last month, the Bay of Islands had a GC visitor.

- Giant groupers rarely occur in New Zealand and generally prefer warmer waters. In Australia, they are widely distributed along temperate and tropical coasts.
- All giant groupers are born female. Some will become males if there are few males around where they live.
- Juveniles become adults at around 1.3 m long. Adults may be up to 3 m in length and weigh 400 kg.
- Juvenile giant groupers are yellow and black. They become greenish grey to greyish brown with age.

The Queensland grouper, seen in the Bay of Islands in May. *Photo: Ben Brodie, Paihia Dive*

THE BIG PICTURE

Taranaki's blues

Even though it looks smooth and blue on the surface (sometimes at least!), there's a lot going on in our oceans. Marine animals like whales deal with natural and human impacts throughout their potentially long lives. Harvesting and earthquakes are just two examples for the blue and sperm whales in our waters.

Commercial whaling had severe impacts on blue whales in the past. For example, the Antarctic population of blue whales was reduced by 99%. That sort of impact is hard to bounce back from, and it is still poorly known how most populations of blue whales are doing. With so much unknown, scientists were particularly excited to discover what they thought was a blue whale feeding area off Taranaki in 2014.

Taranaki's blues are pygmy blue whales. While they may be slightly smaller than some other blue whales, they still grow to around 21–23 m in length. Following the 2014 discovery, scientists used several tools to check how many blue whales might be living around the Taranaki Bight, and in New Zealand waters.

Scientists conducted boat-based surveys and used drones, photo identification, underwater sound recordings, and tissue biopsies to help them understand the pygmy blue whale population. They also looked at all records of blue whales collected opportunistically over time, for example, by whale watch vessels and on seismic survey vessels.

After a lot of data digestion and number crunching, the population of pygmy blues in New Zealand waters is estimated at 718 animals. Scientists speculate that these whales are largely resident in New Zealand, not migrants as originally thought. Further, it turns out New Zealand is in their DNA. On a global scale, the whales are uniquely ours, but closest genetically to their Australian cousins.

A sperm whale off the Kaikoura coast with a very different view since November 2016's earthquake. *Photo: Claire Brownlow, CC BY-NC-ND 2.0*

Meanwhile, off the coast of Kaikoura ...

Kaikoura's sperm whales are world-famous. They've also been the focus of more scientific attention than usual since the tragic earthquake of November 2016. This earthquake caused submarine mudslides and sediment flows, resulting in huge changes to the whales' habitat. So how did the whales respond?

In the summer after the earthquake, many whales skipped town. Very few remained off Kaikoura. However, those that remained appeared to be around the same areas as before. They did change behaviour, however, spending 25% more time on the surface. By the winter and second summer after the earthquake, the whales were back in numbers similar to pre-earthquake times. They focused their time in different areas within their range but resumed normal surface intervals within one year.

The long-term impacts of the 2016 shake-up on Kaikoura's whales are unknown. However, so far, they seem to be okay, and the earthquake seems to be just another bump in their long and watery road.

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WORLD WATCH

Snotbots and seabird spies

Technology is a game-changer for science. This month, we look at how snotbots and seabird spies are changing what we know about protected species and fisheries.

Snotbots

In the Taranaki study of pygmy blue whales, scientists collected DNA from samples of whale tissues. This method is great when it works, but for animals that spend a long time underwater and are tricky to track when they surface, it can have a high fail rate. It is also invasive: A tiny chunk of tissue is taken from the whales – not necessarily a big deal, but still better avoided if possible.

Too many hours spent on the water missing out on tissue samples and being showered with whale blow led scientists working in the Gulf of Mexico to change their approach. With whale blow being so stinky, they thought it may contain something useful, if only they could get a sample of it. Eventually, the SnotBot was born.

Using drones like the SnotBot to grab samples saves huge amounts of money compared to conventional approaches. With samples in hand, the research team found that whale snot contained DNA, amongst other things like microbes and hormones, all of which are interesting and useful. Figuring out just how useful, and how the information gleaned from snot compares to traditional sample sources, are the next steps. If it works well, the dream team of drones and snot could make understanding whale populations so much easier.

A scientist's dream – a cloud of whale snot and the snotbot in action (inside the red circle). *Photo: Cristian Miller*

Seabird spies

French scientists have used location information collected by seabirds to identify potentially illegal fishing activity. Going one-up on the normal approach to tracking seabirds, they have developed a data logger that also records position information transmitted from fishing vessels. The locations of seabirds wearing the loggers, and fishing vessels, are both recorded.

The devices are extremely useful for figuring out how seabirds and fishing operations interact. French scientists also worked with longline vessels in their subantarctic waters to check the accuracy of the information the birds recorded. In the process, they identified signals from one anonymous fishing vessel, which may have been operating illegally. It's early days, but seabird spies may provide the next source of intelligence in the war against illegal fishing.

WANT TO KNOW MORE?

- The Big Picture: Read the full report on our pygmy blue whales. Go to: https://tinyurl.com/Taranaki-blues.

FEEDBACK

To submit feedback or questions, please email: johanna@jpec.co.nz

Banner image: © M. P. Pierre

Appendix 2: Article provided for publication in *Seafood* magazine

Fishing for solutions

New Zealand is often called the seabird capital of the world, because of the 96 types of seabirds that breed here. With such diversity, and a large and active commercial fishing fleet, it is predictable that seabirds and fisheries will interact. Approaches to reducing seabird bycatch include the tried and true, and the bold and new. Johanna Pierre takes a look at progress to date in developing effective seabird bycatch reduction measures, and where there is still work to be done.

Over the years, fishermen have been at the front line of developing ways to avoid seabird bycatch. The tori line is one of the best examples. As the saying goes, it's an oldie but a goodie, pioneered by Japanese fishermen last century.

Reducing seabird bycatch is a continual work in progress, but it's not just about the birds. The best measures should also be clearly definable, straightforward to use, cost-effective, and not have negative impacts on target catch. Everyone loves a good news story, so let's look at some successes to date, where effective methods have been found to reduce seabird captures in fishing gear.

The tried and true

Longline:

For both surface and bottom longline fisheries, the awesome threesome of seabird bycatch reduction includes tori lines, weighted gear, and night-setting. These methods have been proven effective repeatedly, in operational practice and in research settings, in different oceans, fisheries, and decades.

Tori lines are not set-and-forget, which puts some off using them. However, a well-designed tori line is worth its weight in gold for reducing seabird captures. Key components are deployment height (higher is better), bright-coloured streamers that drop to the sea surface, and enough drag to minimise sag in the tori line backbone to maximise the area where hooks are protected. It's a basic recipe, but one that is consistently shown to work. Incorporating a breakaway link and a lazy line can help keep tabs on tori lines when the going gets tough. The tori line may break if it tangles, but it is not lost – helpful for keeping costs down.

Tori lines and weighted gear require careful handling to ensure crew safety. For surface longline operators in particular, using weighted gear can be controversial because of the need to manage safety extremely carefully during the haul. Double-weighting snoods is one approach to mitigating these safety concerns. This method involves attaching two weights per snood, placed some distance apart. Sliding weights (such as lumo leads) are another safer way to add weight to surface longline gear.

Last of the tried and true trifecta for reducing seabird bycatch in longline fisheries, the efficacy of night-setting for reducing seabird captured was first documented in the 1990s. Night-setting has been widely adopted by some surface liners here. However, in New Zealand, swordfish and bigeye tuna fishers like to have gear set by dusk. Interestingly, Portuguese fishers have the opposite approach, preferring to set at night when fishing for swordfish. Night-setting doesn't work as well for reducing seabird bycatch around full moon, when bright conditions help seabirds see.

Trawl:

As well as working wonders for seabird bycatch reduction in longline fisheries, tori lines are the most effective device known for reducing seabird strikes on trawl warps. When paired with effective

management of offal and other fish waste, greater reductions are possible. The “ideal world” waste management approach is holding all fish waste until fishing gear is not in the water. Where this is not possible, holding waste for any length of time is likely better than none. Holding waste for 30 minutes can be long enough to reduce seabird abundance astern trawl vessels.

Making the great and the good better

Thinking about the purpose of mitigation measures and how they work is important for optimising their performance. For example, are tori lines long enough to cover hooks that seabirds can reach? A common and practical benchmark is for the mainline to have sunk to at least 10 m depth where the tori line ends. Obviously in this case, deeper is better! How about the longline itself – is it sinking evenly? Placing smaller weights closer together along bottom longlines, rather than larger weights further apart, promotes more even sink rates. This reduces line lofting which can keep hooks at shallower depths for longer, making them more accessible to seabirds. Using sensible smarts to fine-tune even tried and true mitigation approaches can improve outcomes for bycatch reduction.

The Bold and New

The tried and true methods take care of some seabird bycatch issues in trawl and longline fisheries. However, there is always room for new ideas in the bycatch mitigation toolbox. For surface longline fisheries, hook pods have been a focus for development and operational testing in recent years including here in New Zealand. The pods work by covering the hook barb until the pod opens at a pre-set depth. Hook pods can also be made with incorporated LED lights, meaning light sticks are no longer required. Hook pods are not yet in commercial production, but have been tested in a number of surface longline fisheries around the world.

The use of lasers is another recent development intended to reduce seabird bycatch. In this method, a laser beam is aimed at the water where seabirds may be at risk of interacting with fishing gear. Night trials in Alaskan trawl fisheries had some effect in reducing seabird abundance around the test vessel. Trials in bright daylight did not deter birds. The potential for damage to the sight of birds (and people!) has been raised for this measure, and work on that continues.

Another blinged-up approach to bycatch reduction applies to setnet fisheries. Attaching lights to the floatlines of nets was originally tested as a potential method for reducing sea turtle bycatch. However, in dark conditions, using setnets with lights attached has reduced seabird captures significantly in some trials. Work is ongoing in this area, and researchers have also looked at other ways to make set nets more visible. Attaching CDs, streamers, corks, and ribbons to setnets are other examples of their creative thinking. It might seem weird and whacky, but sometimes it’s hard to predict what will work in the world of bycatch reduction.

Where there is still work to be done

Beyond the success stories, there is still work to be done to reduce seabird bycatch. So, where to next? Opportunities to make a difference abound where seabird captures occur in setnet fisheries and trawl nets. Globally, these have both proven tough mitigation nuts to crack. In New Zealand, many more seabirds are now reported caught in trawl nets, than on trawl warps. This highlights a success, in that effective mitigation approaches exist and can be used to reduce trawl warp strikes. It also directs us to a key ongoing challenge that we must address, to further reduce seabird bycatch in trawl fisheries.

Necessity is the mother of invention, so the saying goes. Where seabird captures still occur, ways to reduce or eliminate them are needed. As practical people operating in the seabirds' environment, fishers' contributions to meeting this challenge cannot be underestimated.

The "Stocktake of measures for mitigating the incidental capture of seabirds in New Zealand commercial fisheries" was completed by Graham Parker for Southern Seabird Solutions. Project sponsors were MPI, Sealord Group, Deepwater Group, and WWF NZ.

Photo captions:

Salvin's albatross is one type of albatross caught in our trawl and longline fisheries. © M. P. Pierre

Lumo leads are a safer way to add weight to surface longline gear. The weights are designed to slide along monofilament line under tension. The movement of the weight helps absorb energy that would otherwise result in a fly-back. Photo: Department of Conservation.

Hook pods are a relatively new approach to reducing seabird bycatch on surface longline hooks. The squid bait is on the hook, but the hook's barb is out of harm's way inside the plastic pod. The pod opens to release the bait at a pre-set depth, and it's game-on for fish. Photo: Department of Conservation.