Department of Conservation
Te Papa Atawhai

Meeting:	Conservation Services Programme Technical Working Group
Date:	12 December 2025
Time:	9:00 am – 14.30 pm
Place:	Microsoft Teams Meeting
Chair:	Kris Ramm (Marine Bycatch and Threats Manager)

Attendees: Kris Ramm, Hollie McGovern, Erin Hewetson, Mel Young, Hannah Hendriks, Hendrik Schultz, Don Neale, Sarah Dwyer, Karen Middlemiss, Katie Clemens-Seeley, Sarah Lyn-Wilson, Kat Manno (DOC), Dave Goad (SNZ), Christine Rose (Māui & Hector's Dolphin Defenders), Mel Underwood, Jason Hamill, Richard O'Driscoll (Earth Sciences NZ), Liz Slooten, Steve Dawson (University of Otago), Campbell Murray, Olivia Hamilton, Greg Lydon, Heather Benko, Celina Garcia, William Gibson (FNZ), Denham Cook (Pelco NZ), Dylan van Winkel (Bioresearches), Warrick Lyon (Lyon Marine Research), Simon Childerhouse (Blue Planet Marine), Chris Gaskin (The Seabird Trust), Leena Riekkola (University of Auckland), Rochelle Constantine (University of Auckland Waipapa Taumata Rau), Chelsea McGaw (Forest & Bird), Karin Forney, Scott Benson (U.S. NOAA Southwest Fisheries Science Center), Karen Baird (Secretariat for the Pacific Regional Environment Programme), Kristin Reed, George L. Shillinger, Sierra Fullmer (Upwell Turtles), David Middleton (Pisces Research), Kane O'Donnell (MAUI63), Jacquetta Udy (Private Consultant), Barry Weeber (ECO)

Apologies: Peter Frost

Presentations:

9:05 am	POP2023-01 Aerial survey of leatherback turtles off Northeast North Island	Upwell Turtles
9:50 am	MIT2024-05 Testing the utility of visual deterrent options to mitigate incidental bycatch of protected species in set nets	Earth Sciences NZ
10:45 am	INT2023-02 Species identification of camera-detected protected species captures in New Zealand fisheries	FNZ
11:30 am	POP2023-03 Updated population estimate and marine habitat utilisation of yellow-eyed penguins/hoiho breeding on Campbell Island	DOC

1:00 pm	Monitoring Marine Megafauna with Satellites: International use and feasibility in New Zealand	Jacquetta Udy
1:45 pm	INT2024-08 Westland petrel overlap with commercial fishing effort	DOC

1. POP2023-01 Aerial survey of leatherback turtles off Northeast North Island

George Shillinger and Sierra Fullmer (Upwell Turtles) presented the results of the leatherback turtle aerial survey.

Discussion:

KB Is there any information available on how much time leatherbacks spend on the surface, we know that they deep dive to forage - whether this would have an impact on observability?

> **GS** They spend a considerable amount of time diving and transit slightly below the surface where they would be quite visible. Turbid waters affect visibility.
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> **SB** In California waters we've estimated a 64% probability of finding turtles at the surface when the plane goes over the animal. Data received from applying suction tags to turtles and a large sample size – would need to do the same thing in NZ as this is likely to be variable by location. Animals may spend more time underwater in different locations depending on behaviour of their pray.
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> **KF** Depends on foraging behaviour and environment, would expect that in other areas where diving deeper to access prey they may spend a smaller amount of time at the surface. If this was of interest we would need to estimate in this study area.

SD It would be helpful to know the total cost of the completed survey, as there is an RFP for a Hector's dolphin survey on the South Island east coast. Imagine the plane costs are quite significant. We don't have a lot of choices for planes or windows.

> **GS** Estimate of about $125,000, not including staff time which wasn't charged for
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> **GS** Also had others outside of upwell that donated their time, tight budget.
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> **SD** Could you talk more about aircraft availability?
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> **GS** This was a complicated process, can share insights with you.
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> **SF** Did detailed searching before the survey and then narrowed down to three aircraft. Windows had to be considered.
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> **KR** Invite you to have an offline conversation about applicability of methods.

LS Does the increase in reported bycatch in WCNI you mentioned coincide with cameras being put on those vessels?

GS Increased monitoring may be a factor, probably needs to be considered.

KR This is probably outside the scope of this project.

LS This has certainly been the experience with other species, we can have an offline discussion and will go back to the documents.

DN Were the four observers independent or did they inform others when a turtle/animal was seen to get independent counts? ID confidence of species, especially beaked whales? In what situations was circling back done? Was there potential of double counting between lines and days? Does fisheries encounters mean a death or a sighting?

GS Observers are independent but do inform group and data is recorded immediately. Had pretty high confidence in species ID, circling back did occur usually related to validating an observation of a species of note and fisheries encounters don't necessarily imply a death, this is an interaction, a subject for another discussion as post-release survival is unknown.

SB We had two observers on each side of the plane, not independent but weren't double counting, there is a structure that holds the wheel for landing which is an obstacle for people in the bubble window. Used the flat window observers to overcome this obstruction. Having two each side with different windows meant we were able to cover the track line as well as we could, couldn't get the full view from the bubble window. Not necessarily independent teams, just trying to guarantee full coverage.

KF Team ensured we weren't double counting in real time. Species ID, we have decades of experience and have seen most if not all of the species seen in the study areas. Our methods have us identifying to lowest taxonomic level possible. A few unidentified whales/dolphins if they disappeared too quickly or were unable to circle back. The circling back was done when needed to verify species ID, determine if there was a mixed species school and confirm how many species present and get group size counts if we couldn't count on the fly. Double counting of individuals between days is possible but this isn't a problem if you're just trying to estimate abundance in areas, would only create bias if it was a systematic directional migration.

KO Just doing some aerial surveys in the Hauraki, looking at using cameras and AI – do you have any imagery of leatherbacks as this is something we could add to our modes and whether you had cameras attached to the windows.

KF In the past camera technology was not sufficiently good and loss of 3-dimensionality reduced the ability to identify small things from altitude. Generally not proven to be very successful however newer technology may allow for this. Leatherbacks do look similar to ocean sunfish and other species, and are

a little bit deeper than other species. Always worth trying again. We do have some aerial photographs but not many.

SB Have been trying to do this work with drones but results have been poor. Area of view is really low, have been able to put a drone on a turtle found. Could improve over time but not ready yet.

GS There are some drone photographers out of Australia taking great footage from near shore (outside surf zone), these could potentially be used.

DG How much of this work would you need to do to come up with some kind of abundance/distribution estimate? Need to account for blue water and other environmental variables and how well you can see.

KR This is almost a separate workshop in itself.

GS Certainly need to sustain the work for a longer time and integrate it with fisheries observer data to make the sample size more robust.

SC How many years or hours might be needed to grow this model robustly, is this really a viable method to go forward with?

SB This was a snapshot in time, to improve this you would want to be doing surveys through a period of 2-3 months when turtles are present. Takes some time to amass a sample size to estimate density and abundance and would be high cost.

KF Would require some further analyses of encounter rates and variation, ideally with more data. We have been able to detect trends and spatial patterns in California with about 30-50 flight hours per year within a similar-sized study area. Know where leatherback habitat is off California but in NZ they may be in different areas in different times – need to narrow down seasonality to learn about how they use certain areas and then lower maintenance of surveys, require more rigorous design and analysis.

SF Flexibility is required, using local capacity is needed – using observers that are local mean you can call on them when the weather is good. Part of this project was to build local capacity so they could pick days throughout season to capture data. Quality of data can be improved with increased flexibility.

DG In California, do you get the season variability? From fisheries bycatch records there seems to be odd peaks – is this expected?

GS We see high variability when surveying in California, has been difficult lately to see animals. Unknown if this is a decline in population or a change in environment but leatherbacks don't reproduce every year, different cohorts reproduce every 3-5 years which affects year to year counts and this might be because fewer animals are available to be counted as they are on nesting beaches

so some aspect of biology of the animals that makes it difficult to estimate abundance so use trends over time that smooth out variability.

KF Leatherback foraging habitat is generally in low energy areas where their prey aggregates, in the BOP this likely is strongly affected by currents and eddies, this can change where leatherbacks might be, so habitat characteristics are an influence. A bit more anchored in California than in BOP.

GS With Eastern Pacific leatherbacks, similar variation associated with prey aggregation. Starting to consider collaborating with teams at nesting beaches to give us a better sense of whether shifts have occurred in abundance and where they are moving to. Hoping to resume tagging efforts in nesting beach areas. From NZ perspective there is opportunity to collaborate with Australian teams and others to tag turtles that use NZ waters.

2. MIT2024-05 Testing the utility of visual deterrent options to mitigate incidental bycatch of protected species in set nets

Mel Underwood (Earth Sciences NZ) presented the results from the trial for testing the utility of visual deterrent options in set nets.

Discussion:

WG FNZ are not so much assessing penguin interactions, more of a longer term goal but looking at effective on target catch because there's not much point in a mitigation method if it scares away fish.

ES In regards to the possibility of future trials with hoiho, would you still need a sample size of 180?

MU Yes, would need a large enough sample size. 180 was noted at the time we had (30 individuals over 6 nights) gives us a sample size that would give some indication. Lower numbers of hoiho were one of the rational for not using that species in this study.

KR Points to the urgency of this project, with few animals and industry looking for solutions.

ES Then in that case you need to abandon this as an option and go back to spatial mitigation.

KR The key point of this study was ensuring we're not going to make anything worse. Your point about spatial measures is pertinent but outside of scope here.

SD I have several concerns. Firstly, you have a very low sample size and the penguins don't seem to avoid by much. If only swimming 5 metres away or so, then you need a lot of green lights on any gill net to produce some kind of effect. We addressed this problem in a paper, the encounter rates with this species is rare so detecting a difference robustly with a technology like this is going to take a long time and a lot of penguins will be killed in nets in the process of those trials. There is an ethical question about whether this is something to pursue. Gill netting in NZ is economically insignificant and appears to be declining – why not just put a stop to it completely?

> **KR** This is a discussion for a different group. Our main concern is that we do not harm penguins.
>
> **MU** Due to visibility in the harbour (~0.5-1m) this may have affected the interaction distance whereas in the open water you would have higher visibility which may improve detection timing.

BW Not convinced the results were very useful – why green lights, and what about different diving depths of other penguin species? Clearly red light doesn't make a difference but you're talking about the surface where gill nets are normally deeper.

> **MU** Green LED lights were chosen prior to the project, due to overseas studies. The change in colour could affect the behaviour and we are looking at doing other studies with interactions with other species and different colours.
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> **WG** We have done power analysis to detect power of sample size, even in large fisheries it is difficult to detect a change with this sample size, but this is why we have taken the staged approach. First looking at non-fishery interaction to make sure it is not an attraction and used green because of overseas studies.

TH As a fisher, we use green LEDs to attract fish, and while you might see avoidance from a penguin in travel mode when it is in target acquisition mode you're likely to see different behaviours. Would like to see this trialled in amongst a bait ball. Most of the set net fishery in NZ is in relatively shallow water and water clarity can vary so significantly so probability of getting a consistent result is quite low.

ES Research with pingers shows that depending on spacing of pingers and nets can increase bycatch of for example harbour porpoise, which would be hard to get data on. This is an attempt at a mitigation method for one or a small range of species, these nets are impacting on a number of protected species and you want a spatial or similar solution that is highly effective and works for several species at once. Particularly for hoiho don't have enough penguins to do this kind of work.

> **WG** We can make a meta-analysis available that shows justification based on international studies.

3. INT2023-02 Species identification of camera-detected protected species captures in New Zealand fisheries

William Gibson (FNZ) presented on the seabird expert identification from camera footage project.

Discussion:

BW You've just looked at seabirds, what about other protected species bycatch and what are you doing in terms of reviewing that information given these cameras are replacing observers to a certain degree? Interested in if there is a report with this. If there is a disagreement between ID there would be good to see some examples of this.

> **WG** There are tables and data in the report. Marine mammal/shark/coral captures are referred to DOC as the volume is much less than seabirds.

DG Interested in the differences in opinion on ID, amazed at how well it all came out. Going forward, how will you undertake blind reviewing, perhaps re-reviewing ones that have been piled into generic codes. Can see how location might be useful but doing blind review without it might ensure some consistency. Information will be useful to feed into risk assessment. DOC has a project for fishers to retain protected seabirds, this project will be useful to feed into that.

> **WG** This will be a continually refined process and one of the key benefits will be getting a DOC expert along with WMIL. Agree will be an informative dataset for the retention of protected seabirds project. If we do get a generic code it doesn't mean that its lost or excluded from risk assessment work.
>
> **DG** Consider feedback to the EM reviewers as well, not expected to get everything right but would be beneficial.

TH: Was any data captured on light-based interactions? Interest in the Hutton's shearwater, anecdotally they don't interact with gear but in overcast situations may get birds on the deck because of light.

> **WG** If there is a deck strike during a fishing event then it is recorded but don't estimate risk from deck strikes in risk assessments. Data is available, would be possible to reanalyse it. Lighting often falls under Maritime NZ.

4. POP2023-03 Updated population estimate and marine habitat utilisation of yellow-eyed penguins/hoiho breeding on Campbell Island

Mel Young (DOC) presented the results of year 2 of the Campbell Island hoiho monitoring.

Discussion:

TH Amazed at the depths they are working to. Impossible to limit human hoiho interactions when they have the range and depth that they have.

> **MY** The only previous tracking work was in 1995, Peter Moore put two TDRs on Campbell Island hoiho and recorded one of them diving to 160m. Deepest dive recorded for mainland hoiho is 156m. 164m is edging on physiological capability.
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> **KR** Important data to help close the loop on this big knowledge gap and how we manage it, both around what is happening in the subantarctics but also understanding more about their behaviour.

BW Seems like we need to get more long-range tracking or out of season tracking would be useful to see where there is overlap, to know whether it's having an ecosystem or bycatch impact. What proportion of the numbers on the island are you monitoring, is there any way of assessing that, and is it possible to get some trend over time information.

> **MY** Te Mahere Rima Tau 5-year action plan, indicates development of a southern hoiho monitoring programme, so are testing a range of methods as we can't apply the same methods we have for the mainland population, which are focused on finding nests, compared to sparsely populated places like Campbell Island, testing methods on Enderby and Campbell. Huge amount of work hasn't happened between 1993 and now, and we have very good information from 80s and 90s about survival and breeding success over those years where there was year round study, but we can't do that at the moment with the state of our infrastructure. Outside of scope of this project was monitoring productivity, that is something that needs to be considered.
>
> **KR** Takes a lot to set this work up but committed to continuing it.

DG Amazing effort. Have you looked at foraging and whether Campbell hoiho are finding it easier to find food?

> **MY** Have looked at the U-shape benthic dives and how much time available to the birds on dives. Once the birds diving to +100m they have 20 seconds of bottom time. The cameras tell us a lot. In previous season, when tracking the birds during the guard stage, they had 96% success on those dives at catching prey items, and usually catching 3-4 prey items per dive. Prey encounter rates this season were a lot lower, catching 0.8 per dive, result of only putting 6 cameras out, mostly on males and most were doing deep benthic dives. Need to look at putting cameras on females. Females are anecdotally a lot leaner on Campbell, than on Auckland Islands, so limitations there with camera and GPS co-deployments, due to the weight of those. Smaller cameras would be great.

WG Great to see more tracking data. Please reach out to FNZ about getting access to data to support the upcoming overlap project. Would be good to chat about some of the interesting characteristics of the fisheries, e.g. SBW distributed between 250 and 600m

in depth, so even though there may be some spatial overlap, everything is a lot deeper than you'd expect to see interactions occurring.

WL Any challenges you faced with tagging?

> **MY** In previous years we've used a combination of satellite tags. Penguins go through a catastrophic moult, so only able to keep devices on for short amount of time. More archival devices that give more fine scale data, work really well. Intermittently have problems with their sensors so eventually the batteries warp on them and start having problems with the depth sensors. Limited shelf life. Keen on any other tech people may know of. We are using the Pengucam developed by Thomas Mattern, have four of those cameras. Looking at different types of satellite tags and whether we can combine tags with high-res tags in the future to get more fine scale info over winter.
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> **KR** We have hugely expanded our tracking programme for a range of taxa over the last few years due to options of funding streams, as well as improvements in technology and cost. Feels like we could set up an independent support and information sharing group, because there are a lot of opportunities.
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> **MY** Would love some way of knowing if a bird is going to be coming home or not, improvements to be made for the welfare of the field team.
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> **WL** How well do the penguins come back to the same spots?
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> **ML** They have a very high site fidelity, but doesn't necessarily mean they will use exact same landing point within that area.

IB Relating this talk back to the LED lights and deterrents, could the Campbell hoiho population be used to explore/study potential deterrent strategies which might be used to help the mainland population? And secondly, is there a sex imbalance amongst remaining Hoiho in the mainland population due to fisheries interactions? could the potential resource partitioning between males and females you mentioned lead to a sex imbalance?

> (*Post meeting note)* **MY** Potential to review interactions between LED lights and hoiho could be further explored at Enderby Island, where it would be much easier to service the equipment when installed in the water. There are few places this could be achieved at Campbell where it would be safe enough to set out and retrieve the equipment, and where there would be enough hoiho to test the theory. One site on Enderby which has 50-100 hoiho using it exclusively, and this site also has a vantage point from above, and is <400m from the hut, so it would be far more logistically feasible. However, given that I do not have any oversight of the LED project, I do not know what other parameters need to be considered. In terms of sex imbalance, Richdale (1957) found that by age 10, there are two males for every female hoiho within the mainland population, i.e. from 1936 to 1952. There is a sex imbalance known in the mainland population currently,

however there is limited evidence of any disparity in their foraging or diet throughout time, noting the bias associated with the latter as we can only sample animals that are eating via assessment of faeces from DNA metabarcoding. (i.e. animals that do not eat generally do not provide faecal samples). We do not have enough information at this stage to indicate any demographic information that would suggest a sex skew in the Campbell Island population, and as I indicated in my presentation, we have some work to do to look at what the observations of switching mid-trip from benthic to pelagic diving means for female hoiho at Campbell Island. We have collected faecal samples from all tracked animals, and this can be assessed in due course, in collaboration with the University of Otago.

5. Monitoring Marine Megafauna with Satellites: International use and feasibility in New Zealand

Jacquetta Udy presented a literature review on international use of monitoring marine megafauna with satellites and its feasibility in NZ.

Discussion:

JF Pleased to see this come out so well balanced. Agree with conclusion that these are supplemental tools to those currently in the toolbox. Want to highlight not only the challenge with identifying breeders and loafers, but also birds that may be occupying the nest but not breeding, and therefore not part of that breeding population, so you wouldn't be able to solve that problem with images and would need boots on the ground. Without those corrections, any number derived from satellite imagery would result in a very coarse estimate. Appreciate smaller islands like Western Chain and Bounties are attractive sites for trying these methods, however the Western Chain islands are full of tunnels which the birds go into. Islands that may appear suitable might actually not be. A lot of different things to consider, remain sceptical that this is a replacement for anything we currently do, even though the costs appear so much lower.

BSM Been an interesting project to see evolve over time. Highlights the fact that you can use some of this imagery in places where we aren't necessarily monitoring so much e.g. sea lions on Stewart Island, could be interesting to explore other options for those species where its more reliable to see where we can find those opportunities to inform our species monitoring going forward, not replacing but how we can supplement going forward.

WL Do the companies that offer satellite photography work together so there is more of a chance of getting a cloud free day? Or do they work individually?

> **JU** Seem pretty separate from talking to them, they don't work with the other companies.

KF In case it is of interest, The Nature Conservancy recently launched an open source satellite image processing site Whalesai.org for two whale species off the US.

6. INT2024-08 Westland petrel overlap with commercial fishing effort

Johannes Fischer (DOC) presented the on the Westland petrel overlap work.

Discussion:

DM A lot more tracking data for this species than in the past which is very useful. Did you reanalyse the historical GLS tracks? Interesting to know how much the new methodology makes when applied to GLS data historically.

> **JF** No we haven't, did have a close look, of the 10 one bird made it around to the Patagonia Shelf so keen to confirm if that's something that happens regularly. Not sure how much you would gain from reanalysing those additional tags, because they didn't have the sea surface temperature sensors. Our results mirror those early 10 tags.

DM Suggest a change of terminology, and use the term co-occurrence rather than interaction for birds being in the vicinity of boats.

> **JF** Will double check that in the report.

DM Done some maps of where the birds occur, but you've used a data summary method, and that's a bit different then the methods used for producing the layers for the SEFRA – any comments on whether or not these data would go into the same modelling approaches that have been used for generating SEFRA layers in the past? Or with more extensive datasets there might be an argument for doing something different to provide layers for the SEFRA?

> **JF** I envisioned these data sets are now available free for request through seabird tracking database, and whenever FNZ is going through the next iteration of that spatial modelling exercises these are now available for inclusion.
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> **DM** Did you think about trying to apply the SEFRA layer modelling approaches as part of this project because of time?
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> **JF** Yes due to time and funding.

DM Regarding recommendation of improved monitoring of deepwater trawl, was that because you saw overlap with deepwater trawl, and that the SEFRA doesn't predict any captures, that might be a catchability thing. Are you suggesting observers might be missing captures or interactions? Or that coverage is especially low, because the fact that you have spatial overlap and aren't seeing captures with fleets that are reasonably well observed suggests low catchability. Quite surprising to suggest a focus on a fleet where we might reasonably conclude that catchability is low. And that there are more pressing questions from what you've identified here.

BSM Its 50% observer coverage in Hoki.

JF Conscious that observers, due to various constraints, are not able to access the stern and therefore actual observations of medium sized petrels interacting with warps and/or nets maybe somewhat limited. Further highlighted by that cryptic multiplier of warp strikes. When you look at the estimates, think it would benefit to have some further corroboration to prove that what you are saying is indeed the case. Know some birds spend four hours a day behind deepwater trawl, and based on some of the multipliers and there's no electronic monitoring, and observers can't access the stern, do we really know deepwater doesn't catch these birds.

DM Do you have a way of assessing from these data, whether there's a behavioural change, when the birds are in the vicinity of fishing vessels and can you detect different behavioural changes for different fleet types?

JF We should be able to investigate vessel following or attraction. That would require an additional project and concerted capacity. Think it's possible particularly with the 10-minute resolution tracks.

KR Now that we've got a really good data set building up for a range of species, we can start looking at more of these things and in a cost-effective way i.e. student projects.

BSM Regarding terminology of fleets, how have you chosen to split Inshore and deepwater bottom longline? Deepwater referring to autolining? Ling in our world is a deepwater fishery

JF Will get back to you in writing on that.

BSM We know we have a ling longline out on that coast frequently during the winter months, and that there is a lot of overlap with our ling fleet there but that hasn't shown up at all in this. Need to be careful how we refer to overlap and not equate that with risk. You'll probably find more albatross and petrel species out the back of factory vessels rather than the smaller lining vessels, just because of the nature of the amount of fish they are processing and they have larger noise so naturally attract more birds. But that's not necessarily going to reflect the risk as opposed to longlining. Composition of birds around vessels at that time, often smaller than when just shooting fishing gear as a trawler. Understanding what those overlaps mean in terms of risk, a lot more involved in this than just looking at the overlap. Understanding how this will fold into the risk assessment will be important.

DG How you cut the fleets can depend on how you're analysing the data. If you've got good resolution in the data, then it's worth cutting the fleets more and vice versa. For the liners, are they cutting fish or not because if they're not then you've got nothing going over the side. It will be interesting to see how it pans out in the SEFRA, tracking

data was downgraded quite a lot compared to the observer counts, on the back of this that's going to switch around a lot. Especially given that where we've seen the bird go, probably an argument that there might be a bit of mis-id creeping in, white-chinned petrels especially. At that breeding time, there's potentially higher overlap with fishing vessels because they're more constrained to find a quick feed, wondering if you had looked at that on an individual basis? Are some birds boat followers or some not?

> **JF** In the supplementary material of the report there is an individual level summary for some GPS tracks, with some big differences. They are month long deployments, so not sure how you would disentangle temporal components between early deployment and early retrieval in the same year, and a later deployment and later retrieval. Think you would still need a bigger dataset, or use this one with the previous one from Sue Orr. We know from some earlier research analyses that young chicks have had hoki discards in their diet, so strong indication that these birds go offshore to get a quick feed, particularly from the hoki fleet.

Any additional comments should be provided to csp@doc.govt.nz by 5pm, 9th January 2026. Close of Meeting @ 14:30 pm