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Updating New Zealand's bycatch extrapolation and risk assessment

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Agreement on the Conservation
of Albatrosses and Petrels

SUMMARY

This paper summarises the updates to the time series of New Zealand's estimates of total seabird bycatch and recent modifications of the extrapolations method used. The paper also summarises changes to the quantitative risk assessment and its underlying methods.

Bycatch extrapolations have been continued and now extend to include the 2013/14 fishing year. Up until 2014, New Zealand's extrapolation of seabird bycatch was increasingly complex with up to 35 different statistical models being used in order to maximise the accuracy of the results. However the increased complexity meant that the resulting modelled uncertainties were not directly comparable.

The most recent set of extrapolations have utilised a simplified extrapolation (strata-based ratio) method that is consistent across all seabird species. This approach is stratified by areas and allows for a random year effect for larger vessels (as these have been observed at a higher rate). These in general compared reasonably well with previous estimates and the quantitative seabird risk assessment.

New Zealand's quantitative risk assessment which underpins New Zealand's NPOA-Seabirds was rerun in 2015. Currently some aspects of the methods are being reconsidered; such as whether population trend can be included, and then the risk assessment will be rerun in 2016.

New Zealand is looking to conduct a quantitative seabird risk assessment, including all relevant ACAP species, across the southern hemisphere building on the approach taken for the New Zealand's commercial fishing. The current proposal is to iteratively repeat and improve the risk assessment as further data becomes available. The first iteration will be based on coarse observer and fishery effort data that is publically available.

Actualización de la evaluación de riesgos y la extrapolación respecto de la captura secundaria de Nueva Zelanda

RESUMEN

Este documento resume las actualizaciones de las series temporales correspondientes a las estimaciones de captura secundaria total de aves marinas de Nueva Zelanda y las modificaciones recientes realizadas en el método de extrapolación utilizado. A su vez, resume los cambios realizados en la evaluación cuantitativa de riesgos y sus métodos subyacentes.

Las extrapolaciones respecto de la captura secundaria se han continuado y, hoy en día, incluyen la temporada de pesca 2013/14. Hasta 2014, la extrapolación de la captura secundaria de aves marinas de Nueva Zelanda era cada vez más compleja: se llegaron a utilizar 35 modelos estadísticos distintos con el fin de maximizar la precisión de los resultados. Sin embargo, la creciente complejidad hizo que los modelos de incertidumbre resultantes no fueran directamente comparables.

El conjunto más reciente de extrapolaciones ha utilizado un método de extrapolación simplificado (proporción basada en estratos) que se repite en todas las especies de aves marinas. Este enfoque está estratificado por áreas y permite obtener un efecto anual aleatorio para los barcos más grandes (dado que se los ha observado con mayor frecuencia). En general, dichas estimaciones fueron razonablemente buenas en comparación con estimaciones anteriores y con la evaluación cuantitativa de riesgos para las aves marinas.

En 2015, Nueva Zelanda repitió su evaluación cuantitativa de riesgos, que respalda el PAN-Aves de dicho país. Actualmente, se están reconsiderando algunos aspectos de los métodos, como la posible inclusión de la tendencia poblacional, tras lo cual se repetirá la evaluación de riesgos en 2016.

Nueva Zelanda tiene interés en realizar una evaluación cuantitativa de riesgos para las aves marinas que incluya todas las especies pertinentes amparadas por el ACAP y que abarque todo el hemisferio sur, basándose en la estrategia adoptada para las pesquerías comerciales neozelandesas. El fin de la presente propuesta es que se repita de forma reiterativa y se mejore la evaluación de riesgos a medida que haya más información disponible. La primera iteración estará basada en datos crudos de esfuerzo pesquero y de observación que se encuentran a disposición del público.

Mise à jour de l'évaluation des risques et de l'extrapolation des données sur les captures accessoires et en Nouvelle-Zélande

RÉSUMÉ

Ce document résume les mises à jour des séries chronologiques des estimations du nombre total de captures accessoires en Nouvelle-Zélande et les modifications récentes des méthodes d'extrapolation utilisées. Il résume également les changements apportés à l'évaluation quantitative des risques et ses méthodes sous-jacentes.

Les extrapolations sur les captures accessoires ont été poursuivies et comprennent maintenant l'année de pêche 2013/2014. Jusqu'en 2014, l'extrapolation sur les captures accessoires en Nouvelle-Zélande était de plus en plus complexe et utilisait jusqu'à 35 modèles statistiques différents afin que les résultats soient le plus précis possible. Cependant, la complexité croissante de la méthode impliquait que les incertitudes modélisées ne pouvaient être comparées directement.

La série d'extrapolations la plus récente a employé une méthode d'extrapolation simplifiée (taux basé sur les strates) qui fonctionne avec toutes les espèces d'oiseaux marins. Cette approche est stratifiée par zones et permet aux navires de plus grande taille de bénéficier d'un effet annuel aléatoire (puisqu'ils ont été plus fréquemment observés). Les résultats supportent relativement bien la comparaison avec les estimations précédentes et l'évaluation quantitative des risques pour les oiseaux marins.

L'évaluation quantitative des risques de Nouvelle-Zélande, qui vient renforcer son PAN-Oiseaux de mer, a été conduite à nouveau en 2015. Certains aspects des méthodes sont en cours de remise en question, notamment l'inclusion on non de la tendance de population.L'évaluation des risques sera ensuite reconduite en 2016.

La Nouvelle-Zélande souhaite mener une évaluation quantitative des risques pour les oiseaux marins dans tout l'hémisphère sud, incluant toutes les espèces pertinentes inscrites à l'ACAP, en s'appuyant sur l'approche adoptée pour la pêche commerciale de Nouvelle-Zélande. La proposition actuelle est la répétition et l'amélioration itérative de l'évaluation des risques dès lors que de nouvelles données sont disponibles. La première itération se basera sur les données brutes des observateurs et de l'effort de pêche accessibles au public.

1. NEW ZEALAND'S TOTAL SEABIRD BYCATCH

1.1. Updates to time series

Total seabird bycatch estimations have been continued to include data from the 2013/14 fishing year. These estimations are available in more detail on the publically available website https://data.dragonfly.co.nz/psc/ , this website allows users to investigate trends in seabird bycatch in various target fisheries and by area.

1.1.1. Trawl fisheries

In general, trawl fisheries are showing a decline in total estimated captures however this tracks with declining levels of fishing effort (Figure 1). Over the period 2002-03 to 2013/14 there has been increasing levels of observer coverage, largely on the large offshore vessels.

In 2012/13 and 2013/14 there were increased percentages of seabirds released alive (light blue portions of the top graph in Figure 1). Further differences and trends are more apparent when examining specific areas and fisheries, which can be done through https://data.dragonfly.co.nz/psc/
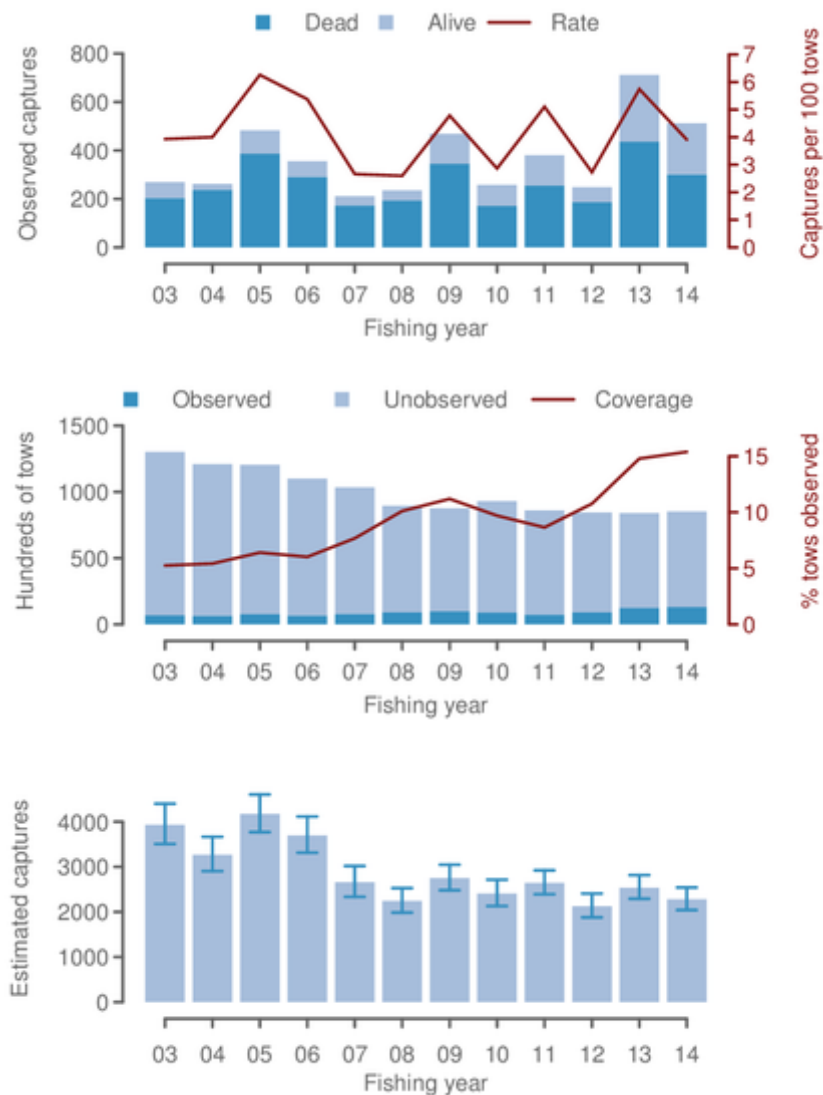

Figure 1. Observed captures, fishing effort, and estimated captures for all trawl fisheries in New Zealand from 2002-03 to 2013-14.

1.1.2. Surface longline fisheries

In general, the total estimates of seabird bycatch from New Zealand surface longline fisheries has remained relatively constant since 2004-05. In the observed high capture rate years (2006-07 and 2009-10) there was also a higher proportion of seabirds released alive (see the light blue portions of the bars in the top graph of Figure 2).
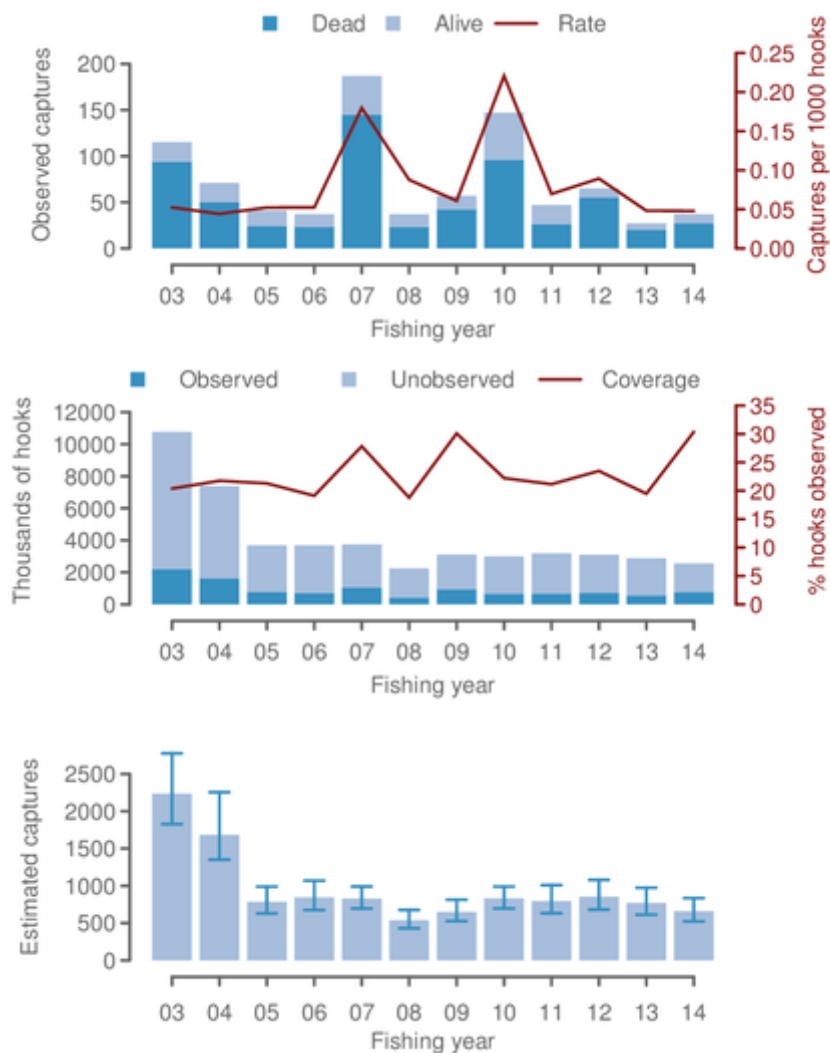

Figure 2. Observed captures, fishing effort, and estimated captures for all surface longline fisheries in New Zealand from 2002-03 to 2013-14.

1.1.3. Bottom longline fisheries

New Zealand bottom longline fisheries are typically observed at lower rates, leading to less precise total estimates (see the wide uncertainties associated with estimates in the lower graph of Figure 3). In these fisheries, the proportion of seabirds released alive can be high as well (see the light blue portions of the bars in the top graph of Figure 3).
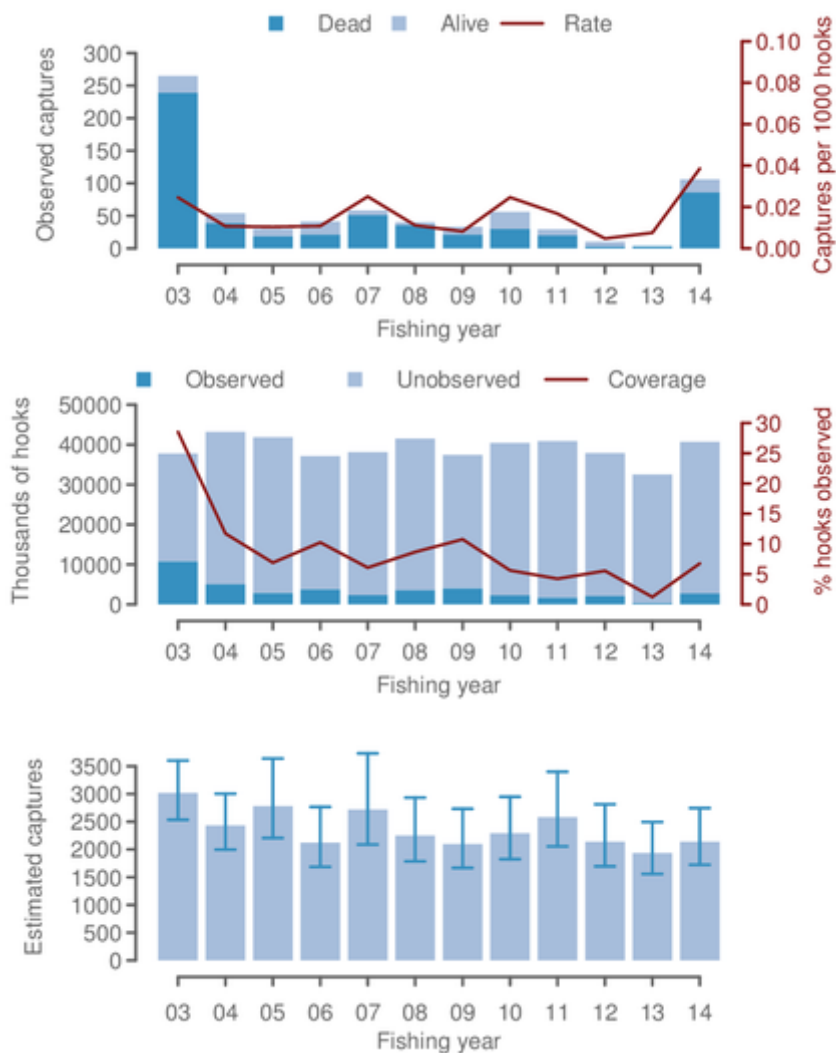

Figure 3. Observed captures, fishing effort, and estimated captures for all surface longline fisheries in New Zealand from 2002-03 to 2013-14.

2. REVISED METHOD FOR EXTRAPOLATING SEABIRD BYCATCH

Up until 2014, New Zealand's extrapolation of seabird bycatch was becoming increasingly complex with up to 35 different statistical models being used in order to maximise the accuracy of the results. However the increased complexity meant that the resulting modelled uncertainties were not directly comparable between fisheries.

This increasing complexity prompted consideration of a more unified modelling approach that would provide more consistent uncertainty and allow comparisons across species and

fisheries. Another benefit to the simplified modelling approach, was that it would allow for prompt updating as new data becomes available.

In this refined modelling, a single model was used for each species, including all trawl and longline fisheries; all covariates were based on a set of strata (fishing year, area, fishery, season), so that the data could be aggregated before the modelling; and covariates that reflected the distribution of seabirds (e.g., area and season) were shared across different fisheries. The identical model structure and parameters for each species then allowed direct comparisons.

Consistent with preceding bycatch assessments, total capture estimates were focused on seabird species with the largest number of observed captures. In addition to the five species (New Zealand white-capped albatross (*Thalassarche steadi*), Salvin's albatross (*Thalassarche salvini*), Buller's albatross (*Thalassarche bulleri*, combining both southern *T. b. bulleri* and northern *T. b. platei* subspecies), white-chinned petrel (*Procellaria aequinoctialis*), sooty shearwater (*Puffinus griseus*), and two species groupings (other albatross and other birds) used previously, the updated modelling allowed separate capture estimates for another three seabird species (black petrel (*Procellaria parkinsoni*), grey petrel (*Procellaria cinerea*), flesh-footed shearwater (*Puffinus carneipes*)).

As data were updated and all statistical models were re-developed, previous estimates are superseded, and any comparison across fishing years should be made using the results from this modelling.

The most recent set of extrapolations were undertaken by developing a simplified extrapolation (strata-based ratio) method that is consistent across all seabird species. This approach is stratified by areas and allows for a random year effect for larger vessels (as these have been observed at a higher rate). These in general compared reasonably well with previous estimates and the quantitative seabird risk assessment.

3. SEABIRD RISK ASSESSMENT PLANS AND PROGRESS

3.1. New Zealand's seabird risk assessment

The most recent version of New Zealand's seabird risk assessment was published in 2015 (Richard & Abraham 2015), this iteration incorporated fishing data up to 2012-13. As planned under New Zealand's NPOA –Seabirds, the seabird risk assessment is to continue to be repeated with new data as it becomes available. The next iteration will be completed with 2013-14 data in mid-2016. In advance of this next iteration, MPI has contracted a project to consider some modifications to the methodology of the risk assessment, including reconfiguring the application of the correction factor, incorporating information on population trends in the risk assessment to constrain the modelled calculations of mortality, improving uncertainty distributions around the estimate of N_{min}, and incorporating step changes into the risk assessment.

3.2. Southern hemisphere seabird risk assessment

The long awaited 'global' seabird risk assessment, which will extend the New Zealand seabird risk assessment to consider fisheries and seabird populations further afield than New Zealand, has now been contracted.

This project will seek to gather data on fishing effort, observed fishing effort and subsequent observed captures of

In order for this project to develop in conjunction with the Birdlife capacity building bycatch extrapolation workshops, a coarse low resolution risk assessment will be developed in 2016 using data that is freely available. We will approach Regional Fisheries Management Organisations, and States with request for the necessary data to help refine the seabird risk assessment. The second iteration of the risk assessment should be completed in 2017.

If any State would like to collaborate, and share data, with New Zealand in the development of the Southern Hemisphere Seabird Risk Assessment, please discuss with Nathan Walker or Igor Debski.

References:

Richard, Y.; Abraham, E.R. (2015). Assessment of the risk of commercial fisheries to New Zealand seabirds, 2006–07 to 2012–13. New Zealand Aquatic Environment and Biodiversity Report 162. 85 p. Available at https://www.**mpi**.govt.nz/document-vault/4267