Agreement on the Conservation of Albatrosses and Petrels

Eighth Meeting of the Seabird Bycatch Working Group

Wellington, New Zealand, 4 – 6 September 2017

ACAP seabird bycatch performance indicators and reporting framework

Igor Debski, Wiesława Misiak, Nathan Walker, Anton Wolfaardt

SUMMARY

The ACAP Action Plan calls on the Advisory Committee to routinely review and update data on the mortality of albatrosses and petrels in commercial and other relevant fisheries.It has been agreed previously that the Status-Pressure-Response framework will be used by ACAP to measure performance, and that the main Pressure Indicator for bycatch P1 should be: total number of birds killed per year of ACAP species (by species where possible), and their bycatch rate, across each of the fisheries of member Parties.

Here we report on intersessional progress on the approach agreed at SBWG7. A reporting template was developed and trialled alongside the national reporting ahead of AC10. Data was received through this new reporting format from only one Party (New Zealand). We used this bycatch datato illustrate a number of different ways in which we can report against ACAP indicators.

Based on this trial reporting we make a number of suggestions to further refine the reporting template so that it can be suitable for implementation as part of future standard national reporting requirements.In particular, developing a decision tree approach to guide reporting and allow for the recording of fisheries where no or little data is available is important to ensure gaps in our knowledge of bycatch can be identified. We also recognise synergies with other processes, in particular the seabird bycatch assessment component of the Common Oceans (ABNJ) Tuna Project.

We identified possible metrics that could be used to report against ACAP's bycatch indicators, and conclude that metrics at a scale of national fisheries by fishing method may be most appropriate as a high level indicator. Such indicators would act to prompt more detailed investigation of fisheries where bycatch concerns are identified, recognising the approach to detailed investigation will vary on a case by case basis a prescriptive approach may not be suitable.

RECOMMENDATIONS

We recommend that the Working Group:

1. Review the trial reporting format used and agree on which further refinements are necessary in order to collect robust data to report on ACAP's bycatch indicator.
2. Recommend to the Advisory Committee that the reporting format developed should be used for future data reporting as part of the national reporting mechanism.
3. Review the outputs from the trial reporting and recommend to the Advisory Committee a format for reporting against ACAP's bycatch indicator.
4. Review and revise the guidance for estimating seabird bycatch in light of the outputs from the trial reporting period and other relevant processes.
5. Request that the Advisory Committee encourage Parties and Range States to report bycatch estimates using appropriate statistical methods, or where this is not available report observed bycatch data using relevant strata, as part of their national reporting.

Indicadores de desempeño del ACAP para la captura secundaria de aves marinas y marco para la presentación de informes

RESUMEN

El Plan de Acción del ACAP solicita al ComitéAsesor que revise y actualiceen forma periódica los datos sobre mortalidad de albatros y petreles en pesquerías comerciales y demás pesquerías pertinentes. Con anterioridad, se ha acordado que el ACAP utilizaría el marco de Estado-Presión-Respuesta para la medición del desempeño y que el principal indicador de Presión (P1) para la captura secundaria debería ser la cantidad total de aves muertas por año que forman parte de las especies amparadas por el ACAP (en lo posible, según la especie) y la tasa de captura secundaria de estas últimas en cada una de las pesquerías pertenecientes a las Partes.

En este documento, se informa sobre los progresos logrados durante el periodo intersesional con respecto a la metodología acordada en la GdTCS7. Se desarrolló una plantilla para la presentación de informes, que se puso a prueba junto con el mecanismo de notificación a nivel nacional antes de la CA10. Solo se recibieron datos de unaúnica Parte (Nueva Zelandia) a través de este nuevo formato de presentación de informes. Utilizamos dichos datos sobre captura secundaria para ilustrar una serie de formas diferentes en las que se pueden presentar informes basándose en los indicadores del ACAP.

Basándonos en esta prueba de presentación de informes, formulamos una serie de recomendaciones con objeto de seguir perfeccionando la plantilla de informes a fin de adecuarla a su implementación comoparte de los futuros requisitos normalizados sobre presentación de informes a nivelnacional. El desarrollo de una metodología de árbol de decisiones para orientar la presentación de informes y permitir el registro de las pesquerías para las cuales no existendatos, o hay datos insuficientes, es particularmente importante para garantizar la identificación de lagunas en nuestros conocimientos sobre la captura secundaria. Además, reconocemos las sinergias con otros procesos, en particular con el componente relativo a la evaluación de la captura secundaria de aves marinas del Proyecto Atún del Programa Common Oceans (ABNJ).

Identificamos métricas posibles que podrían utilizarse para presentar informes basándose en los indicadores de captura secundaria del ACAP, y llegamos a la conclusión de que las métricas a escala de pesquerías nacionales según el método de pesca podrían ser el indicador de alto nivel más adecuado. Dichos indicadores impulsarían una investigación más detenida de las pesquerías en las que se han identificado inquietudes relacionadas con la captura secundaria, y se reconoce que el enfoque hacia una investigación minuciosa variará en función del caso y que una metodología basada en normativas podría no resultar adecuada.

RECOMENDACIONES

Se recomienda al Grupo de Trabajo realizar las siguientes acciones:

1. Revisar el formato para la presentación de informes sometido a prueba que se utilizó, y alcanzar un acuerdo con respecto a los ajustes adicionales que son necesarios a fin de recabar datos contundentes para informar sobre la base del indicador de captura secundaria del ACAP.
2. Recomendar al Comité Asesor que, comoparte del mecanismo de notificación a nivel nacional, se utilice el formato que se desarrolló para la futura presentación de informes.
3. Revisar los resultados de la presentación de informes sometida a prueba y recomendar al Comité Asesor un formato para presentar informes basándose en los indicadores de captura secundaria del ACAP.
4. Revisar y modificar las orientaciones para el cálculo de la captura secundaria de aves marinas a la luz de los resultados del período de prueba de presentación de informes y demás procesos pertinentes.
5. Solicitar al Comité Asesor que aliente a las Partes y a los Estados del Área de Distribución a que informen sobre sus cálculos de captura secundaria utilizando los métodos estadísticos que correspondan, y que, encaso de que no estén disponibles, informen sobre los datos de captura secundaria observada utilizando los estratos adecuados comoparte de su documentación de datos a nivel nacional.

Indicateurs de performance relatifs à la capture accessoire d'oiseaux de mer et format de collecte des données

RÉSUMÉ

Le Plan d'action de l'ACAPprévoit que le Comité consultatif passe en revue et actualise régulièrement les données relatives au niveau de mortalité des albatros et des pétrels en registrésdans les activités de pêche commerciale et autre pêche concernée. Il a été convenu précédemment que l'ACAP utiliserait le format état-pression-réponse pour mesurer la performance, et que le principal indicateur de pression pour la capture accessoire P1 devrait être calculé comme le nombre total d'oiseaux répertoriés par l'ACAP tués par an (par espèce, dans la mesure du possible), et le taux de capture accessoire dans les pêches de toutes les Parties à l'Accord.

Le document présente un rapport sur les avancées accomplies selon la démarche convenue à la réunion du GTCA7 ; Un modèle de rapport a été créé et testé parallèlement aux rapports nationaux, en amont du CC10. Des donnée sont été collectées par le biais de ce nouveau format en provenance d'une seule Partie (la Nouvelle-Zélande). Ces informations sur la capture accessoire nous ont permis de montrer différentes manières de présenter les données en regard les indicateurs de l'ACAP.

À la lumière de ces essais, nous formulons plusieurs suggestions d'amélioration du modèle de présentation des données afin qu'il puisse être utilisé dans les futures normes nationales en matière de collecte de données. Il est particulièrement important de pouvoir améliorer nos connaissances et d'identifier nos lacunes par le biais d'un arbre décisionnel pour guider la collecte de données et permettre l'enregistrement de pêches pour lesquelles nous ne disposons que de trèspeuou pas de données. Nous reconnaissons également les synergies avec d'autres procédures, notamment la composante d'évaluation de la capture accessoire du projet de gestion des pêches de thon (ABNJ) « Common Oceans Tuna ».

Nous avons identifié des paramètres qui pourraient servir pour collecter des données en regard des indicateurs de capture accessoire définis pas l'ACAP, et avons conclu que ces paramètres appliqués à l'échelle des pêches nationales, par méthode de pêche, seraient plus les appropriés en tant qu'indicateur de haut niveau. De tels indicateurs signaleraient la nécessité d'approfondir les recherches dans les pêches identifiées comme présentant un niveau de capture accessoire préoccupant. La démarche choisie pour menerces investigations variera toutefois au cas par cas, car une approche unique n'est probablement pas souhaitable.

RECOMMANDATIONS

Nous recommandons que le Groupe de travail :

1. Examine le format de collecte de données qui été testé et convienne des améliorations à y apporter afin que l'on puisse réunir des données solides en regard de l'indicateur de capture accessoire de l'ACAP.

2. Recommande au Comité consultatif que le format de collecte de données créé soit utilisé à l'avenir dans le cadre des dispositifs nationaux de collecte de données.
3. Examine les résultats de l'essai de collecte de données et recommande au Comité consultatif un format de collecte de données en regard de l'indicateur de capture accessoire de l'ACAP.
4. Examine et révise les lignes directrices relative à l'estimation de la capture accessoire d'oiseaux de mer à la lumière des résultats de la période d'essai de collecte de données et d'autres procédures pertinentes.
5. Prie le Comité consultatif d'encourager les Parties et les États de l'aire de répartition à collecter les estimations de capture accessoire à l'aide de méthodes statistiques ou, si cen'est pas possible, les données relatives à la capture accessoire observée à l'aide des strates pertinentes, dans le cadre de la collecte de données nationale.

1. INTRODUCTION

The ACAP Action Plan calls on Parties '*to collect reliable, and where possible, verifiable data to enable accurate estimation of the nature and extent of albatross and petrel interactions with fisheries*' (Action 4.2). The Action Plan also expects the Advisory Committee regularly to review and update data on the mortality of albatrosses and petrels in fisheries (5.1f) as well as data on the distribution and seasonality of fishing effort for those fisheries that overlap with species listed in Annex 1 of the Agreement (5.1g). In order to achieve this objective, a web-based reporting system was developed to capture and use fisheries and bycatch data submitted by Parties and collaborating Range States (see AC6 Doc 16 and SBWG4 Doc 25 Rev 3). Previous reviews of the aggregated data submitted by Parties highlighted that the temporal and spatial resolution are generally too coarse to enable useful assessments of the levels of trends of seabird bycatch associated with these fisheries (see SBWG5 Doc 16 and SBWG6 Doc 09).

At SBWG6, there was discussion about whether Parties should analyse their own bycatch data and routinely submit the results to ACAP, or whether the raw or aggregated data should be sent to ACAP for collation and analyses, with general support for the former approach. It has been agreed previously that the objective of the bycatch data reporting process is to routinely review and update information on the current levels and trends of incidental mortality of ACAP-listed species in relevant fisheries and to assess the implementation and effectiveness of bycatch mitigation measures in those fisheries. In addition, it has been agreed that the Status-Pressure-Response framework will be used by ACAP to measure performance (see Section 2).

SBWG7 DOC 05 reported intersessional progress made towards the further development of ACAP seabird bycatch indicators, data needs, methodological approaches and reporting guidelines. These guidelines reflected the recommendation made at SBWG6 that instead of

providing raw or aggregated data, Parties could provide estimates that they themselves have derived. The basis for a reporting framework was outlined in **SBWG7 Doc 05**, and based on discussions at the meetings,SBWG7 and AC9 recommended: i) further development of the seabird bycatch reporting framework as part of the national reporting mechanism to facilitate reporting against the indicators developed, and ii) that some Parties trial the reporting system and report back to SBWG8 and AC10 so that a firm recommendation on the bycatch reporting framework can be provided to MoP6.

In this paper we present the trial reporting template developed following SBWG7, and on the basis of the information received, illustrate the options for reporting against the ACAP bycatch indicators. We provide suggestions for the further refinement and implementation of the bycatch indicator reporting system to help facilitate discussions at SBWG8 on how best to proceed.

2. ACAP INDICATORS

The purpose of the indicator-based reporting system is to provide an assessment of the performance of ACAP in reaching its objectivesby synthesising multiple and complex information into a succinct form that can be efficiently communicated to Parties and the Agreement. ACAP indicators have already been developed, and reported against, for breeding site condition, population information and the availability of tracking data. The ACAP bycatch indicators form part of this overall suite of indicators. The indicator-reporting system is intended to form part of a dynamic-feedback system, which not only monitors performance, but importantly also identifies issues that need to be addressed. In relation to bycatch this could, for example, include an early indication of changes in bycatch levels (and factors contributing to these changes), important data gaps that need to be filled, or capacity needs of Parties.

ACAP has previously agreed that the primary Pressure Indicator for Bycatch (P1) should comprise two linked components: i) bycatch rates of seabirds (by species, where possible) across each of the fisheries of member Parties and ii) the total number of birds killed (bycaught) per year of ACAP species (again, preferably by species).

It is acknowledged that there is a range of methods that may be used to estimate and monitor these metrics of seabird bycatch in fisheries. Inevitably, the assessment methods are dependent on the quantity and quality of data available, as well as the specific objectives of the exercise. There are a number of issues that need to be accounted for when estimating and interpreting these two indicators. Section 2 of **SBWG7 Doc 05** highlighted the main issues that need to be considered and provided broad guidelines on how best to account for them. These issues include dealing with undetected mortality, uncertainty in estimation (including the representativeness of observer coverage) and uncertainty in species identification. The ACAP seabird bycatch reporting template proposed in **SBWG7 Doc 05**, and subsequently developed intersessionally (see section 3 below), solicits bycatch and associated information from Parties in a manner that is intended to facilitate an understanding of the bycatch rates and estimates reported.

3. DEVELOPMENT OF THE BYCATCH REPORTING PORTAL

Given the range of different approaches used by Parties to collect, analyse and report bycatch data, it is challenging to develop a reporting portal that optimally captures all of the information available. Using Annex 2 of **SBWG7 Doc 05** (Proposed information to be included in routine reporting by Parties and Range States) as a guide, we developed a revised template for reporting fisheries and bycatch data, and added this to the web portal.We requested those Parties who had expressed an interest in participating in the trial reporting process to use the revised template to provide information on seabird bycatch rates and estimates of total numbers of birds bycaught, together with a range of metadata required to interpret these metrics. All other Parties and Range States were also encouraged to take part in the trial.

The reporting template was set up so that the inputs could be stratified by year, season, area, or vessel type (see **ANNEX 1**). In relation to bycatch rates and the estimatesof total numbers of seabirds killed (the two main components of the ACAP bycatch indicator)the forms allow one to selectively include a number of bird status categories: birds landed on vessel that are dead, live birds landed on board that are injured, birds killed or injured by direct interaction with fishing gearbut not landed on the vessel, and undetected mortality. The source of the data (observer programme, fishery logbooks, other) and proportion of fishing effort observed for bycatch were also requested for both these metrics. Tables soliciting information onthe estimated total seabird mortality allowed for the method of estimation to be reported as: simple ratio estimate, stratified ratio estimate, model based extrapolation, and quantitative risk assessment. Estimated numbers and a measure of uncertainty associated with the estimates were able to be reported for all ACAP taxa, plus other species and groupings, including ‘all albatrosses’ and ‘all seabirds’. The uncertainly fields could also be amended to provide a number of options to choose from to further simplify data entry.

We encourage further feedback from data custodians on the ease of use of the template, and suggestions for additional field/options to allow for reporting of data from their jurisdiction.

4. RESULTS FROM TRIAL REPORTING

Only one Party, New Zealand (NZ) adequately reportedbycatch rates and estimates using the revised reporting template. Limited reporting was provided by some other Parties/Range States,which may not necessarily be a reflection of data availability across Parties, but rather a lack of familiarity with the new reporting format.

Therefore, our illustration of different options for presenting reporting metrics is based largely on the NZ data, which we acknowledge is not representative of all fisheries. However, the NZ data did cover both relatively well observed and relatively poorly observed fishery strata, so we have been able to illustrate comparative outputs from fisheries of varying data availability.

4.1. Example result metrics: albatross bycatch in New Zealand fisheries

New Zealand provided data primarily at the national and fishing method wide scale (i.e. EEZ wide trawl/pelagic longline/demersal longline etc) over the period since ACAP came into force in 2004. Each of these broad fisheries can be broken down into a large number of

strata across regions, time of year, vessel class, target fish species etc. Estimates were model-based, which allowed extrapolation across all these strata within a fishing method, even if some strata were data poor. However, model based estimates could only be made for species groups (e.g. all albatross) and the more frequently caught species (e.g. Salvin's albatross). For many ACAP species, data was not sufficient to extrapolate across all strata, and therefore NZ reported observed captures and capture rates for these species where model based estimates were not available.Details of the models can be found in Abraham et al (2016), and more detailed bycatch data can be found on New Zealand's own web-based reporting portal (https://psc.dragonfly.co.nz/).

Estimates of total annual seabird bycatch and 95% confidence intervals were reported; observed bycatch rate, and observer coverage were also entered as requested in the reporting template. Data were entered both for individual species, and for groupings of birds (e.g. 'total albatross', 'all seabirds'). This allows for simple presentation of the key results (**Figure 1**), which shows the capture estimates for the *Total Albatross* group(and 95% Confidence Intervals) across each of the three main fishing methods at a national level. The *large vessel* component of trawl fisheries has had relatively high and increasing levels of observer coverage over the period, leading to relatively precise seabird bycatch estimatesassociated with this component of the trawl fishery and the inclusion of a year effect for large vessels allowed the identification of annual trends. In this example,the reduction in bycatch rate and total bycatch from 2004/2005 to 2006/2007 corresponds to the introduction of mandatory mitigation requirements in the *large vessel* component of this fishery. Estimates become less certain in pelagic and demersal longline fisheries due to lower and less consistent levels of observer coverage and the highly variable nature of bycatch - as reflected by the large spikes in observed capture rate in some years. Patterns or trends in bycatch become more difficult to distinguish in such cases.

Figure 2 shows example results for two species of albatrossacross all New Zealand trawl fleets; Salvin's albatross, one of the more frequently bycaught albatross species and identified as being particularly at risk from trawl fisheries, and Chatham albatross, a relatively infrequently caught species with more limited spatial overlap with trawl fisheries. This example demonstrates that as the data set becomes smaller (i.e. there is less data for a single species of albatross than for all albatross combined) the estimates become less precise. For Salvin's albatross, the apparent trend in estimated captures is masked by the relatively high degree of uncertainty (illustrated by wider confidence intervals) and fluctuating bycatch rates observed from year to year. For Chatham albatross there was insufficient data to estimate total bycatch across trawl fleets. Consequently only numbers of observed captures and capture rate were reported. **Figure 2** also provides maps illustrating the distribution of total fishing effort, observed fishing effort and observed bycatch.

Figure 1. Example indicator plots for albatross bycatch across the major NZ fisheries; trawl, pelagic (surface) longline and demersal (bottom) longline. Left panel plots show error-bound total bycatch estimates and observed bycatch rate, and right panels show associated fishing effort and observer coverage.

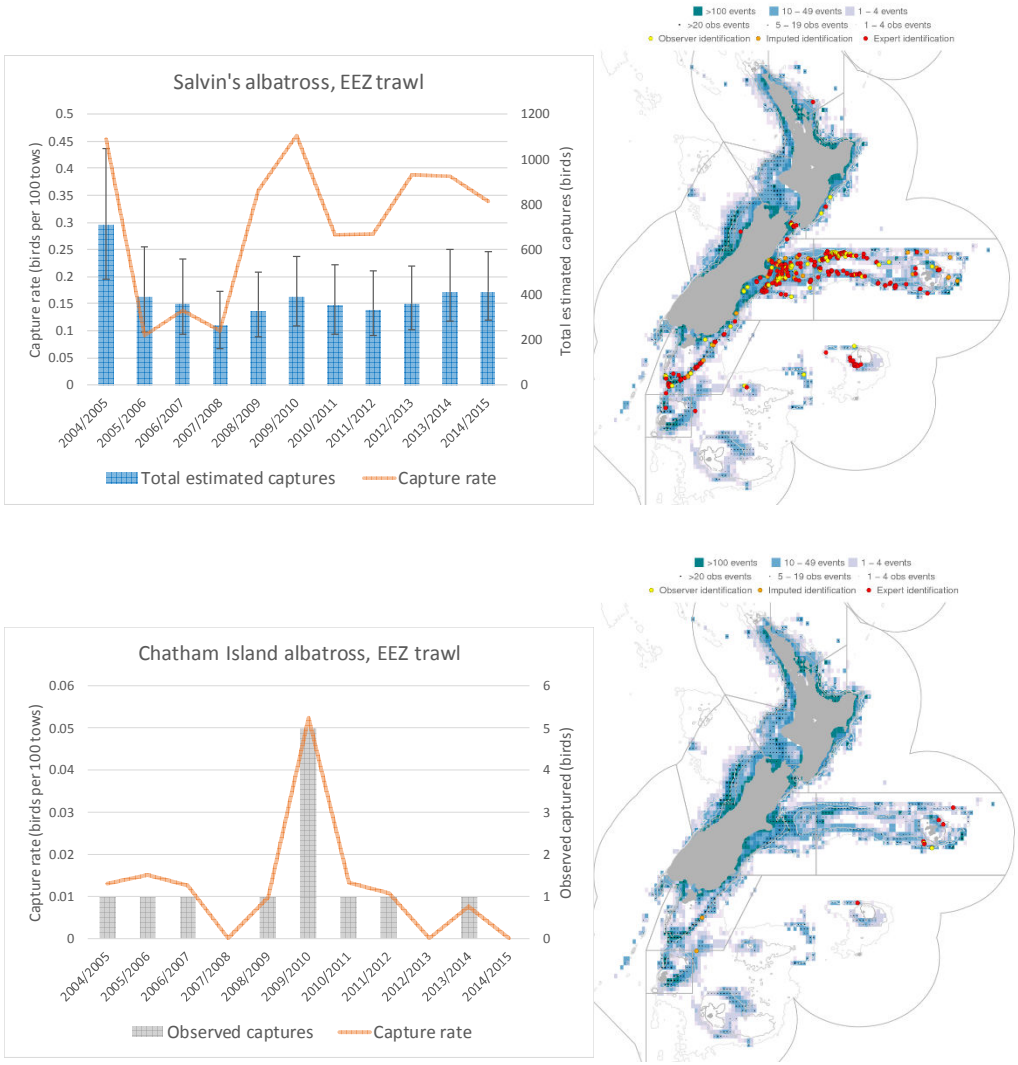

Figure 2. Example indicator plots for two species of albatross; Salvin's albatross above, for which sufficient data was available to estimate total bycatch, and Chatham Island albatross, below, which is rarely observed bycaught and for whichtotal bycatch estimates were not made; in this case information on the number of observed captures is presented. Maps showing the distribution oftrawl fishing effort, observer coverage and observed bycatch for each species arealso provided

Figure 3 provides an illustration of total albatross bycatch in two regional trawl fisheries. The Auckland Islands trawl fishery consists mainly of relatively well observed large vessels which have allowed reasonably precise estimates of bycatch and which shows a strong trend of reduced bycatch following implementation of mandatory mitigation measures. In contrast, the small vessel East Coast South Island trawl fishery has had lower levels of observer coverage, and mandatory mitigation measures do not apply. In this stratumthe estimates were less precise (with wide error bounds) and in some years no capture rate is reportable as there was no observer coverage. However, the application of the modelling approach to bycatch estimation did allow total bycatch to be estimated based on fishing effort information even in the years when there was no observer coverage, as bycatch information from other strata (other years, other areas, etc) could still be used. This illustrates one of the key benefits of advancing to a model based estimation methodology. However due to low levels

of observer coverage on these small vessels the year effect was not included, which results in a constant catch rate applied across all years with estimated total seabird captures varying with the total effort.

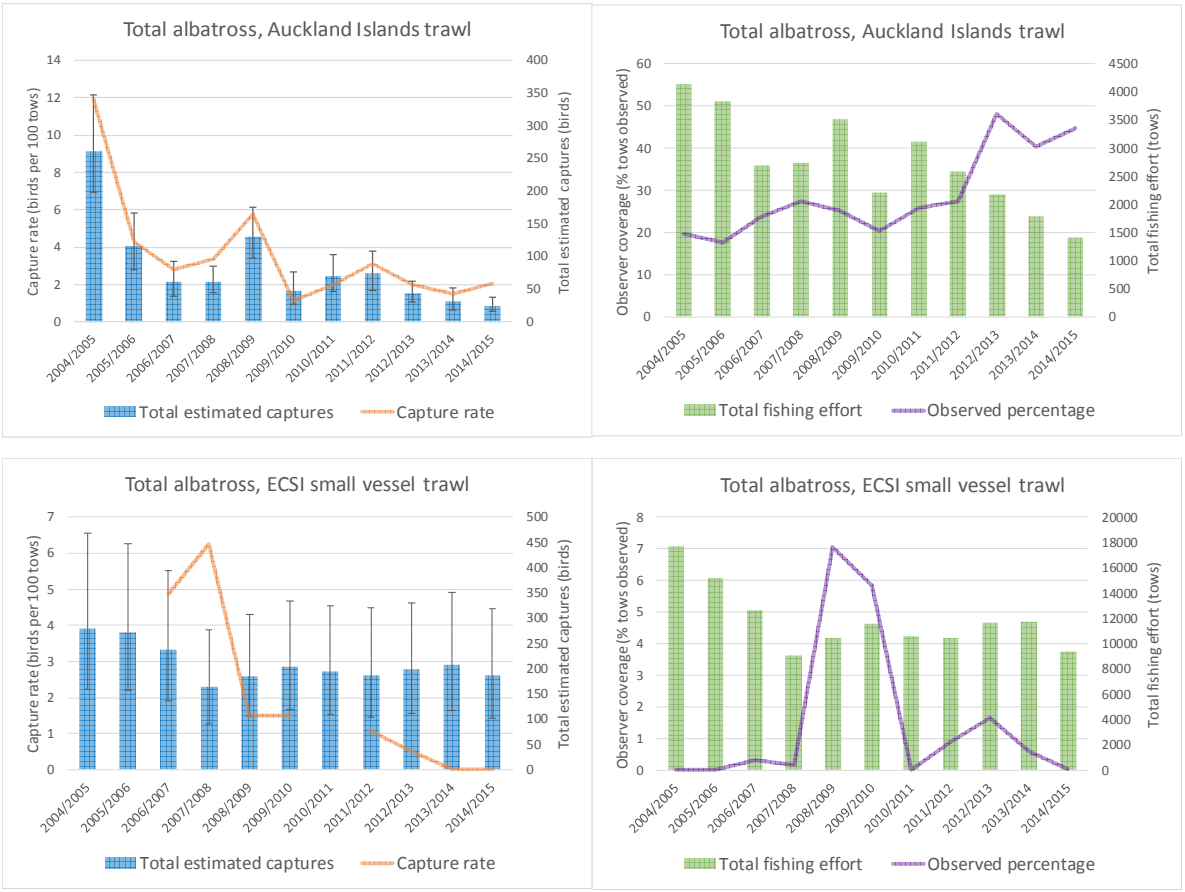

Figure 3. Example indicator plots of albatross bycatch in different spatial/fleet components of the NZ trawl fishery; all vessels in the Auckland Islands area and small vessels in the East Coast South Island (ECSI) area.

Even in relatively well observed fisheries, annual trends in bycatch may be difficult to interpret (**Figure 4**). In this example,the recent year to year fluctuations in capture rates seem unlikely to be related to changes in efficiency in bycatch mitigation but more likely related to changes in fishery timing or the timing of seabird migrations. The reverse trend was seen in New Zealand's bottom longline fisheries. Further analysis may be desirable to better understand such complex bycatch trends.

Figure 4. Estimated captures and observed bycatch rate of white-chinned petrel in New Zealand trawl fisheries.

The setnet fishery is an example of a relatively poorly observed fishery in NZ, and one that has limited bycatch of ACAP species. The information available was insufficient to make any total bycatch estimates for ACAP species.Since 2004 only four birds of two ACAP species were observed captured, three Westland petrels and one white-chinned petrel. **Figure 5** shows the data for Westland petrel. While the limited data hinders a thorough understanding, this level of data reporting can still demonstrate that the absence of further captures since 2007/08 was not related to a reduction inobserver coverage, and suggests the bycatch of this species in this fishery is likely to be rare and sporadic.

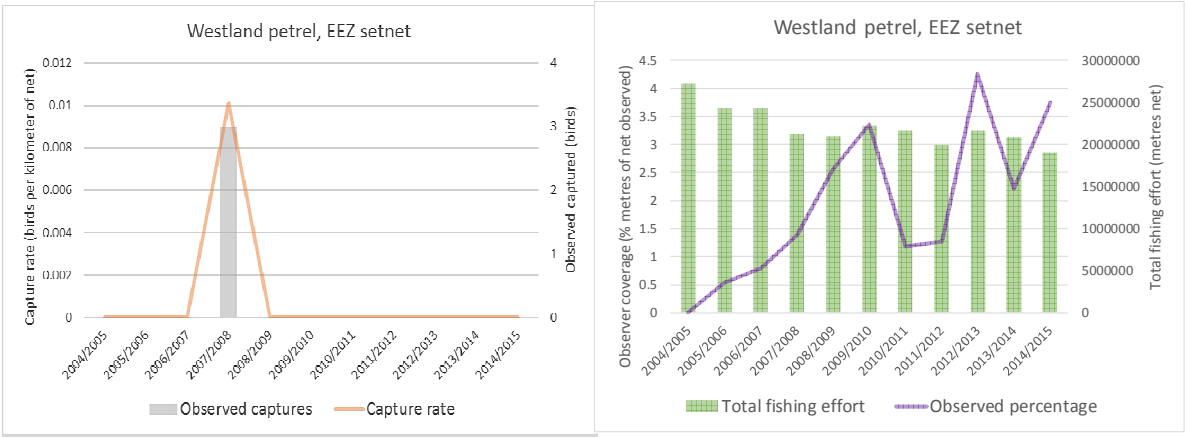

Figure 5. Westland captures in NZ setnet fisheries, and associated fishing effort and observer coverage levels.

So far, we have considered the reporting of raw bycatch data (observed captures), bycatch rates and estimated total bycatch. The estimation methods used did not account for unobserved, or cryptic mortality.However, NZ has developed methods to derive such estimates (Richard & Abraham 2015). In **Figure 6** we provide a comparison of different metrics for Salvin's albatross bycatch in NZ trawl fisheries. This shows the observed captures, the estimated captures (with associated error) and the estimated number of potential fatalities including unobserved mortality (with associated errors). The estimation of potential fatalities

was made as an average over the most recent three years of data, and was why this metric was not chosen by NZ for year to year reporting through the ACAP reporting template. Note that potential fatalities are shown on a different scale, as these fatalities include multipliers used to account for possible unobserved mortalities were particularly high for trawl fisheries given the likelihood of birds striking warp cables and not being recovered to be recorded as (observed) bycatch. Clearly, such methods are very important in understanding the true extent of fisheries impacts on ACAP species, but unless methods to estimate undetected mortality are applied on a year by year basis the estimates may not necessarily be best suited as an indicator to track changes in fisheries management.

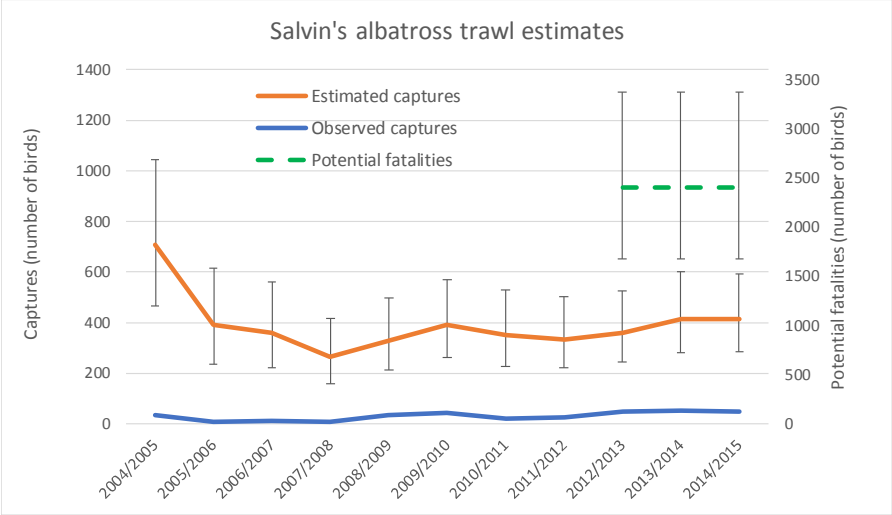

Figure 6. Comparison of the number of observed captures, estimated total captures and potential fatalities (including unobserved or cryptic mortality) for Salvin's albatross across NZ trawl fisheries. Note the different scale for potential fatality estimates due to the particularly high scaling factor used in relation to warp strikes (see Richard & Abraham 2015).

4.2. Options for reporting metrics

The example results provided above illustrate a number of complexities that must be considered in choosing appropriate metrics to use in reporting against ACAP's bycatch indicators.

1. **Estimated vs observed data**. Clearly, total estimated bycatch is preferable, and with appropriate estimation methods this can allow for extrapolation across strata for which observer data may be limited. Where data are insufficient, observed data can still be reported and presented in a similar format, but more careful interpretation is required to assess changes over time.

2. **Temporal scale**. Bycatch rates are likely to vary considerably by season in any particular fishery due to the migratory nature of many ACAP species and variations in fishing activity. However, if bycatch metrics are reported at fine temporal scales (e.g. monthly), it may be less easy to interpret long term trends. Ideally, annual estimation that includes representative seasonal data is preferred as a high level indicator, though we recognise that interpretation of year to year changes may complex.

3. **Spatial/fleet scale**.Given the advantages of the simpler interpretation of metrics provided at a higher (coarser) level, that account for variation within the component strata, it is preferable to report the metric at the approximate scale of national/fishing method. If too many strata are reported, not only will uncertainty increase, but overall trends will be difficult to identify. If coarse level indicators identify bycatch problems, this should then be investigated by a finer scale analysis optimised for the fleet(s) in question.

4. **Inclusion of unobserved (cryptic) mortality.** Clearly it is important to consider the total level of mortality caused by fishing as this may greatly exceed the observed or total estimated bycatch of birds landed on deck. However, it is important that the methods used to derive estimates of total mortality, including the unobserved component, can be reported annually. Including the unobserved, or cryptic, mortality in estimates of total bycatch of seabirds could be useful for improving our understanding of the impacts of changing mitigation practices. For example, the introduction of warp mitigation devices on trawlers will reduce the number of warp captures, but may not influence the rate of net captures. Because of the difference in scalars used to account for unobserved mortality associated with warp captures vs net captures the estimates of total fatalities rather than total observed captures would be more apparent due to the much larger scalar applied to warp captures.

4.3. Additional reporting considerations

In reviewing and analysing the reporting results from NZ it became apparent that there are a number of additional considerations that may need to be incorporated in the data reporting template and the resulting indicator metrics.

1. **Poorly known fisheries**. The data reporting template is suitable for reporting data from fisheries where there is some level of observer coverage and the existence of bycatch of ACAP species is known. However, there are likely to be a number of other fisheries where data are either extremely poor or lacking altogether. In the case of NZ, recreational fisheries provide such an example. Limited data haveshown that bycatch of ACAP-listed species occurs in this fishery, but there are no observer data, and hence reporting was not provided for this fishery. To fully understand the extent of bycatch of ACAP species it is very important that such fisheries are reported. This would allow the identification and prioritisation of gaps in our knowledge, to focus future efforts to better understand, and mitigate, bycatch in all relevant fisheries.

2. **Bird identification**.Bycaught birds are often not identified to species level, and in some cases thisis simply not feasible, at least for observers at sea. Thus, reporting bycatch at the species level, based on identified specimens only, risks under reporting true bycatch levels for any given species. Reporting a combination of species level and species group information may therefore be preferable.

3. **Fisheries management and mitigation measures**. Currently data is collected in the reporting template on mitigation measures in placefor each fishery.

However this information can be difficult to succinctly summarise at broad scales. For example, in the NZ trawl fishery, mandatory mitigation was introduced for large vessels but not small vessels, and different options are available meaning that mitigation approaches used varies from vessel to vessel.

4. **Intermediate meta-data metrics**. Ideally there would be some level of bycatch data reporting for each national scale fishery across all Parties to provide a comprehensive panel of numeric indicators to track the success of ACAP in reducing fisheries bycatch. However, we recognise that there will be instances where such reporting is not currently possible for some fisheries. Therefore, the presentation of meta-data metrics such as the number/proportion of fisheries for which raw bycatch data/estimated bycatch is available may also be an appropriate intermediate measure of progress towards comprehensive bycatch reporting.
5. **Global headline indicators**. Once a range of national scale fishery metrics are reported, it will be beneficial to summarise these in a simple form as headline indicators for a general audience. For example, the metrics could be summarised as the proportions of the total fisheries meeting certain bycatch thresholds (e.g. proportion of pelagic longline fisheries for which bycatch rates are less than 0.05 birds per 1000 hooks, between 0.05-0.1, and greater than 0.1).

Modifying the reporting template to address these, and any other considerations identified by the Working Group, is one of the next steps to achieving consistent and robust bycatch reporting to ACAP.

5. GUIDELINES AND RECOMMENDATIONS ON METHODOLOGICAL APPROACHES FOR ESTIMATING SEABIRD BYCATCH

Section 3 of **SBWG7 Doc 05** provided some broad guidelines and recommendations on methodological approaches and issues to consider when estimating seabird bycatch, which forms an important component of this work. In light of the outputs (all be they limited) from the trial reporting period, it would be useful to reconsider and develop further the guidelines for seabird bycatch estimation. We propose that, in line with the recommended approach for reporting, the advice on seabird bycatch estimation be developed into a decision tree tool to clearly guide Parties on what methods would be most appropriate. This would depend largely on the quantity and quality of data available.

In reviewing and further developing the guidance for seabird bycatch estimation methods, it would be helpful to have inputs and active participation from a wide range of ACAP Party and Range State national scientists who have direct experience with and knowledge of the relevant data sets. This would help ensure that the guidance developed is broadly applicable, and would help identify more specifically the resources, tools and capacity needs that need to be developed. This could, for example, include the development of an Excel script or Application ‘tool’ that Parties and Range States could use to undertake a simple, standardised estimation of seabird bycatch in the absence of any other analytical protocols.

It would also be useful to link with other initiatives undertaking work in this area. For example, the process underway, as part of the Common Oceans Tuna Project to develop approaches for the analysis of seabird bycatch and conduct an assessment of seabird bycatch in tuna RFMOs (**SBWG8 Inf 03**) is of direct relevance, and provides an opportunity to maximise synergies between these two processes.

6. FUTURE IMPLEMENTATION

During our intersessional work, in particular the development, testing, and reporting of the updated bycatch data portal, we have identified a number recommendations and suggestions for the further development and implementation of the reporting mechanism. We present these below to facilitate focussed discussion of these matters at SBWG8:

1. The reporting template should be structured as a 'decision tree'to very clearly guide the provision of information, and the interpretation of the headline indicator metrics. The 'decision tree' should be structured to identify unambiguously the preferred information being requested, but would also cater for the provision of information from fisheries that are poorly monitored, for which the preferred information is unavailable.
2. Preference should be given, where possible, to reporting total bycatch estimates (and capture rates) at a national fishery scale, using appropriate methods based on the Working Group's guidelines. This represents an appropriate scale to report indicator metrics.
3. When raw bycatch data are submitted (e.g. the number of observed seabird captures from poorly observed fisheries) the metadata should specify the stratum of the fishery concerned, i.e.over which season, area, target etc are these data representative.
4. Because the bycatch data reporting processcan help facilitate an improved approach to data collection, analysis and reporting by all Parties, the reporting process should be used to identify data gaps and problems/issues that need to be addressed. Specifically, the reporting template should include information on poorly known fisheries that may pose a bycatch risk to ACAP species.
5. The information provided for mitigation measures should be the required mitigation measures (i.e. those formally/legally required by the regulator), and not the vessel specific variations that may exist. The template should also clearly identify where ACAP best practice advice is being applied. The latter are best characterised within a finer-scale analysis, and not the coarse indicator level that we envisage ACAP reporting against. However, there will still be some variation in the mitigation requirements across different fleets (including different size classes of vessels and target species), and the information presented should be stratified accordingly.
6. Consideration is required on how we distil a global set of fishery indicator metrics into asimple set of headline indicators. This could, for example, reflect the number/proportion of fisheries that pose a bycatch risk to ACAP species

for which we have/do not have data to estimate bycatch, and for those for which we can estimate bycatch, the number/proportion of fisheries by level of bycatch.

7. The Working Group should investigate possibilities of developing some simple tools to facilitate the development of capacity to analyse and report bycatch estimates. This could include, for example, an Excel App that could be used to estimate seabird bycatch from raw observer data.
8. Further engagement with other relevant processes such as the Common Oceans Tuna Project initiative may identify synergies to improving capacity to report bycatch data to ACAP.
9. ACAP data custodians are encouraged to provide feedback on the ease of use of the reporting template, and suggestions for additional field/options to allow for efficient reporting of data from their jurisdiction.
10. Given the limited nature of bycatch data reporting in the trial leading up to AC10, the Working Group should request to the AC that full reporting be required, using updated templates, as part of reporting in the lead up to AC11.

6. REFERENCES

Abraham, E.R.; Richard, Y.; Berkenbusch, K.; Thompson, F. (2016). Summary of the capture ofseabirds, marine mammals, and turtles in New Zealand commercial fisheries, 2002–03 to 2012–13.*New Zealand Aquatic Environment and Biodiversity Report No. 169*. 205 p.

Richard, Y.; Abraham, E.R. 2015. Assessment of the risk of commercial fisheries to New Zealandseabirds, 2006–07 to 2012–13.*New Zealand Aquatic Environment and Biodiversity Report 162*. 85 p.

ANNEX 1

Table 1. Example of bycatch **rate**data reported by area and vessel type for trawl fishery in NZ

4. Seabird bycatch rate

Click on 'Add records for new stratum table'. Enter Year (starting from 2004) or a range of years (e.g. 2004-2007 or 2005/2006), then fill all stratification options that apply (area e.g. management sector, grid square /season e.g. January-March/ vessel e.g vessels over or under x meters in length, tonnage). If the data applies to the whole fishery, leave the pre-filled option of "all" for area, season, and vessel.

Add records for new stratum table

Year	Season	Area	Vessel	Taxon/Group Records	Link to map	edit strata
2002/2003	Oct-Sep	auckland-islands	large-vessels	7		edit
2002/2003	Oct-Sep	auckland-islands	small-vessels	5		edit
2002/2003	Oct-Sep	bay-of-plenty	small-vessels	5		edit
2002/2003	Oct-Sep	chatham-rise	large-vessels	13		edit
2002/2003	Oct-Sep	chatham-rise	small-vessels	6		edit
2002/2003	Oct-Sep	cook-strait	large-vessels	6		edit
2002/2003	Oct-Sep	cook-strait	small-vessels	3		edit
2002/2003	Oct-Sep	east-coast-north-island	large-vessels	4		edit
2002/2003	Oct-Sep	east-coast-north-island	small-vessels	4		edit
2002/2003	Oct-Sep	east-coast-south-island	large-vessels	11		edit
2002/2003	Oct-Sep	east-coast-south-island	small-vessels	5		edit
2002/2003	Oct-Sep	fiordland	large-vessels	6		edit
2002/2003	Oct-Sep	northland-and-hauraki	small-vessels	4		edit
2002/2003	Oct-Sep	stewart-snares-shelf	large-vessels	10		edit
2002/2003	Oct-Sep	stewart-snares-shelf	small-vessels	4		edit
2002/2003	Oct-Sep	subantarctic	large-vessels	10		edit
2002/2003	Oct-Sep	taranaki	large-vessels	3		edit
2002/2003	Oct-Sep	taranaki	small-vessels	4		edit
2002/2003	Oct-Sep	west-coast-north-island	large-vessels	3		edit
2002/2003	Oct-Sep	west-coast-south-island	large-vessels	7		edit
2002/2003	Oct-Sep	west-coast-south-island	small-vessels	5		edit
2003/2004	Oct-Sep	auckland-islands	large-vessels	7		edit
2003/2004	Oct-Sep	auckland-islands	small-vessels	5		edit
2003/2004	Oct-Sep	bay-of-plenty	small-vessels	5		edit

Table 2. Bycatch **rate**data reported for 2002/2003 fishing year, Auckland Islands, large vessels.

Fisheries: Trawl back to edit fishery

4. Seabird bycatch rate

Year: 2002/2003 **Season**: Oct-Sep **Area**: auckland-islands **Vessel**: large-vessels Add records for new Stratum table

There are no maps to link to this strata. Submit a map

Rate includes - tick all that apply: [edit picklist]

- ☐ birds landed on vessel that are dead
- ☐ live birds landed on board that are injured
- ☐ birds killed or injured by direct interaction with fishing gear but not landed on the fishing vessel
- ☐ undetected mortality - if yes describe how this was quantified

Source of data - tick all that apply: [edit picklist]

- ☐ Observer programme
- ☐ Fishery logbooks
- ☐ Other - use text box for details

Percent unit fishing effort observed for bycatch (This should reflect the proportion of actual fishing effort that was directly observed and not a proxy which includes e.g. travel time or other periods when the vessel was not engaged in fishing).

24.6990291262

Taxon/group	Rate	Per unit fishing effort	Entered by
Diomedea amsterdamensis Amsterdam albatross			
Diomedea antipodensis Antipodean albatross			
Diomedea dabbenena Tristan albatross			
Thalassarche impavida Campbell albatross			
Thalassarche melanophris Black-browed albatross	0	100 tows	Igor Debski
Thalassarche salvini Salvin's albatross	0	100 tows	Igor Debski
Thalassarche steadi White-capped albatross	3.14465408805	100 tows	Igor Debski
Petrels			
Shearwaters			
All albatrosses	3.14465408805	100 tows	Igor Debski
Unidentified Larus spp			
Unidentified albatrosses			
Unidentified bird			
Unidentified petrels, prions and shearwaters			
All seabirds	7.07547169811	100 tows	Igor Debski

Table 3. Example of **total** bycatch estimates reported by area and vessel type for trawl fishery in NZ

5. Estimate of total number of bycaught birds

Click on 'Add records for new stratum table'. Enter Year (starting from 2004) or a range of years (e.g. 2004-2007 or 2005/2006), and fill in all stratification options that apply (area e.g. management sector, grid square /season e.g. January-March/ vessel e.g vessels over or under x meters in length, tonnage). If the data applies to the whole fishery, leave the pre-filled option of "all" for area, season, and vessel.

Add records for new stratum table

Year	Season	Area	Vessel	Taxon/Group Records	Link to map	edit strata
2002/2003	Oct-Sep	auckland-islands	large-vessels	7		edit
2002/2003	Oct-Sep	auckland-islands	small-vessels	5		edit
2002/2003	Oct-Sep	bay-of-plenty	small-vessels	5		edit
2002/2003	Oct-Sep	chatham-rise	large-vessels	13		edit
2002/2003	Oct-Sep	chatham-rise	small-vessels	6		edit
2002/2003	Oct-Sep	cook-strait	large-vessels	6		edit
2002/2003	Oct-Sep	cook-strait	small-vessels	3		edit
2002/2003	Oct-Sep	east-coast-north-island	large-vessels	4		edit
2002/2003	Oct-Sep	east-coast-north-island	small-vessels	4		edit
2002/2003	Oct-Sep	east-coast-south-island	large-vessels	11		edit
2002/2003	Oct-Sep	east-coast-south-island	small-vessels	5		edit
2002/2003	Oct-Sep	fiordland	large-vessels	6		edit
2002/2003	Oct-Sep	northland-and-hauraki	small-vessels	4		edit
2002/2003	Oct-Sep	stewart-snares-shelf	large-vessels	10		edit
2002/2003	Oct-Sep	stewart-snares-shelf	small-vessels	4		edit
2002/2003	Oct-Sep	subantarctic	large-vessels	10		edit
2002/2003	Oct-Sep	taranaki	large-vessels	3		edit
2002/2003	Oct-Sep	taranaki	small-vessels	4		edit
2002/2003	Oct-Sep	west-coast-north-island	large-vessels	3		edit
2002/2003	Oct-Sep	west-coast-south-island	large-vessels	7		edit
2002/2003	Oct-Sep	west-coast-south-island	small-vessels	5		edit
2003/2004	Oct-Sep	auckland-islands	large-vessels	7		edit

Table 4.Total bycatch estimates reported for 2002/2003 fishing year, Auckland Islands, large vessels.

5. Estimate of total number of bycaught birds

Year: 2002/2003 **Season**: Oct-Sep **Area**: auckland-islands **Vessel**: large-vessels Add records for new Stratum table

There are no maps to link to this strata. Submit a map

Rate includes - tick all that apply: [edit picklist]

- birds landed on vessel that are dead
- live birds landed on board that are injured
- birds killed or injured by direct interaction with fishing gear but not landed on the fishing vessel
- undetected mortality - if yes describe how this was quantified

Source of data - tick all that apply: [edit picklist]

- Observer programme
- Fishery logbooks
- Other - use text box for details

Method - select one and add method details in the text box: [edit picklist]

Model based extrapolation

Percent unit fishing effort observed for bycatch (This should reflect the proportion of actual fishing effort that was directly observed and not a proxy which includes e.g. travel time or other periods when the vessel was not engaged in fishing).

24.6990291262

Taxon/group	Estimate	uncertainty e.g. 95% CI	Measure of uncertainty type	How was 95% CI or other measure of uncertainty derived?	Entered by
Diomedea amsterdamensis Amsterdam albatross					
Thalassarche impavida Campbell albatross					
Thalassarche melanophris Black-browed albatross		-	95% CI	model	Igor Debski
Thalassarche salvini Salvin's albatross	0	0-2	95% CI	model	Igor Debski
Thalassarche steadi White-capped albatross	84	51-131	95% CI	model	Igor Debski
Petrels					
Shearwaters					
All albatrosses	87	54-135	95% CI	model	Igor Debski
Unidentified Larus spp					
Unidentified albatrosses					
Unidentified bird					
Unidentified petrels, prions and shearwaters					
All seabirds	189	140-253	95% CI	model	Igor Debski