Why SAU's Reconstruction of New Zealand Deep Water Catches is Unreliable

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Executive Summary

A recent report published by the Sea Around Us (SAU) project, being undertaken by the University of British Columbia, compares their reconstructed catch estimates from New Zealand fisheries for the period 1950 to 2013 against landings in the FAO dataset (Simmons *et al*. 2016). The authors claim that catches between 1986 and 2013 (i.e. since the Quota Management System, QMS, was introduced) were 2.1 times (i.e. 110%) greater than the landings reported to FAO.

Based on the catches they have reconstructed, the authors erroneously conclude that "*the lack of comprehensive and transparent reporting* [to FAO] *threatens the integrity of the QMS*", and incorrectly infer that their findings are both reflective of the true position and relevant to the management of New Zealand's deep water fisheries and to the management of the fisheries for hake, hoki, ling and southern blue whiting in particular.

This analysis compares the Ministry for Primary Industries' (MPI's) publicly available catch records and reports with the catch reconstructions in SAU's dataset for the main deep water species.

In the SAU dataset v1-44 the reconstructed catch for the main deep water QMS species since 1986 is 1.16 times (i.e. 16%) greater than the catch in MPI's database. This is substantially different from the claims of 2.1 times greater as made by Simmons *et al* 2016 and in subsequent public statements attributed to the authors.

Since 1986, catches and catch reports of QMS species to MPI have become progressively more closely monitored and are held to be substantially and increasingly reliable. MPI observers on board vessels in the deep water fleet independently monitor at-sea activities including catches and their disposition. MPI's robust documentation and audit processes provide confidence that there is no large-scale level of unreported landings from the deep water fisheries. This is understandable given the harsh penalty regime and the low product prices. Put simply, the proposition that large volumes (alleged to be hundreds of thousands of tonnes annually) of unreported catch might exist in the deep water fisheries is untenable.

The best available independent information on the level of catch discarded in New Zealand's deep water fisheries is provided in NIWA's publicly available reports (Anderson 2008, 2009, 2011, 2012, 2013, 2014, Anderson *et al* 2017, Ballara & O'Driscoll 2015, NIWA 2017 a, b & c). These analyses, based on information from MPI's observer programme, estimated the proportion of the catch that was discarded over the period 1990 to 2014 to be 5.5%.

The methods and data used by SAU to create their dataset for New Zealand are unknown. During 2015 and 2016, both industry and MPI asked both the authors and the SAU project managers to provide details of their methods and of the information they relied upon to create their catch reconstructions. To date, this information has not been forthcoming. Without knowledge of the data and methods it is not possible to establish the validity of, or to have any confidence in, the SAU catch reconstruction for New Zealand. The findings in the report by Simmons *et al* 2016 must therefore be considered to be entirely unsubstantiated and unreliable.

Importantly, New Zealand relies upon its own catch records and its own catch history reconstructions (including estimates of legally discarded and non-reported illegal catches) for fisheries management, data that are more comprehensive and transparent than those created by SAU. New Zealand's catch data, supported by information on their provenance, are publicly available from MPI (MPI, 2017).

Sea Around Us Catch Reconstruction for New Zealand

The authors of the SAU state that the landings from New Zealand, as were reported to FAO, are lower than those in their reconstructed catches. As is noted below, this would be expected in any comparison of landings with catches.

The observation that country records may differ from those held by FAO is unsurprising due to knowledge that:

- The FAO's requirement is for landings data and expressly excludes data on non-reported catch. Therefore, the quantities in the FAO landings dataset will be less than the total catches as they do not include catches that may have been reported but not landed (i.e. catch with no commercial value) or non-reported catch from the commercial, recreational and customary sectors.
- It is accepted that there will always be a component of the catch that is not reported. In well-managed fisheries, such as those in New Zealand, this proportion would be expected to be small.
- In New Zealand deep water fisheries the associated uncertainty between reported catches and estimated fishing mortality is accounted for in stock assessments and in the setting of total allowable catches, where this is appropriate (see MPI Plenary and specific supporting Fishery Assessment Reports

Catch reconstructions undertaken by the SAU project for other comparable maritime countries are around 1.3 times greater than FAO's records (ranging from 0.82 to 1.68 times). By comparison, the SAU claim for New Zealand of 2.7 times greater for the period 1952 to 2010 (or 2.1 times greater subsequent to implementation of the QMS) is implausibly large.

Rather than relying upon real-world data, as appears to have been done for SAU reports for other countries, the authors of the New Zealand report appear to have based their reconstructions of unreported catch on anecdotal information obtained from interviews with fishers. This approach would be in contravention of the SAU's own methodology which prescribes *"consultations with local experts"*, rather than with fishers (Pauly & Zeller, 2016). No information has been provided on how the subjective anecdotal information obtained from interviews was quantified or was otherwise used to scale the baseline data (i.e. the FAO landings data and/or MPI catch records).

The fact that almost all of these interviews were with disaffected foreign charter vessel crew, or with other disaffected fishers, is highly likely to have introduced significant bias into this study. Simmons *et al* 2016 do not provide any estimates of uncertainty around their catch reconstructions[1], a critical omission as the reader is left uninformed as to the likely accuracy associated with their reconstructions, or whether the catch quantities they have created are even plausible.

In addition, a range of anomalies exists within the SAU datasets. By way of example, the datasets include:

- An orange roughy catch of some 7,000 tonnes attributed to recreational fishers when there has never been any recreational catch of orange roughy
- An industrial catch of orange roughy of some 112,000 tonnes during the period 1950 to 1978, before there was a known, targeted orange roughy fishery in New Zealand waters
- Orange roughy catches attributed to foreign vessels in years when these vessels were excluded from fishing for orange roughy in New Zealand waters.

[1] The SAU dataset assigns a rudimentary 'uncertainty score' against catch estimates for New Zealand-flagged vessels, but not for foreign-flagged vessels.

During 2015 and 2016, both industry and MPI asked the authors and the SAU project managers to provide details of their methods and of the information they relied upon to create their catch reconstructions. To date, this information has not been forthcoming.

Despite invitations to the authors to do so, the authors have declined to submit their findings for review against MPI's Research and Science Information Standard and they are therefore not of use to inform management decisions.

Without knowledge of the data and methods, it is not possible to have any confidence in the SAU catch reconstruction for New Zealand deep water fisheries.

At this time, the claims in the SAU report can only be considered to be unreliable and to amount to little more than fabrications, made without recourse to factual material, based on arbitrary and anecdotal subjective information without provenance, and without any detailed knowledge of these fisheries.

Analysis of the SAU Dataset

Three SAU datasets of catch reconstructions for New Zealand were accessed from the SAU website (SAU v1-42, v1-43 and v1-44). Each contains different information.

Based on information provided in Simmons *et al* 2016, which references data reconstructions through to 2013, we have assumed their work is reliant upon dataset SAU v1-44. Accordingly, we have based most of this comparative analysis on dataset SAU v1-44.

The SAU catch reconstruction estimates for historical periods prior to 1986 (i.e. before the introduction of the QMS), are both higher and, due to the absence of data, more speculative than those for the post-1986 period. This is especially true for the period from 1950 to 1978 before the declaration of the New Zealand Exclusive Economic Zone (EEZ). The reason for this is that fishing practices were increasingly monitored and more closely controlled following the introduction of the EEZ in 1978 and more so following the introduction of the QMS in 1986. The greater levels of at-sea monitoring, the more rigorous requirements to account for catches against quota and the punitive penalties for failing to do so, all provide confidence that any quantities of non-reported catch, especially for quota species, were much reduced subsequent to 1986 in comarison with the years prior to 1978.

This analysis assesses the SAU v1-44 dataset for the period from 1986 to 2013 in order to understand how the SAU report concludes that "*The total catch since [1986] is conservatively estimated to be 2.1 times greater than that reported to the FAO*", and that five species (namely: hoki, squid, jack mackerels, barracouta and southern blue whiting) were *"some of the most misreported and discarded species over the time period considered"*. We have added three key deep water QMS species (hake, ling and orange roughy) to this analysis for completion. We note that, as the SAU catch reconstruction for squid was provided only at the family level (i.e. Ommastrephidae), we were unable to compare their dataset with MPI's catch record for the two squid species currently managed under the QMS (i.e. *Nototodarus gouldi* and *N. sloanii*).

When the SAU catch reconstruction for New Zealand is broken down by fishery sector for the period 1986 to 2013 it becomes clear that most of the catch by volume (i.e. around 87%) is from the deep water sector and that this sector drives their overall outcome for New Zealand's fisheries in relation to the landings reported to FAO (see Appendix 1).

It is important to recognise and to distinguish the different legal requirements for disposition and reporting of catches of QMS and non-QMS species. Since 1986 the legal requirement is that all catches of QMS species must be reported and landed (with certain specified exceptions). For catches of non-QMS species, the legal requirement is to report estimates of these. Non-QMS catch may be legally returned to the sea (i.e. it is legal to 'discard' portions of the commercial catch).

MPI's catch records show that seven key deep water QMS species together comprise around 82% of the total New Zealand deep water commercial catch (or around 63% of the total QMS species catch in New Zealand) by volume. Comparisons between the SAU v1-44 catch reconstructions and New Zealand's catch record (as are used in stock assessments) for these seven key deep water species for the period 1986 to 2013 are provided in Appendix 2.

The graphs in Appendix 2 illustrate that, since introduction of the QMS in 1986, the trends in the SAU reconstruction and MPIs catch database are very closely aligned for these main deep water species. For these seven species, the SAU catch reconstructions of total catch (both 'reported' and 'unreported') for the period 1986 to 2013 are 1.16 times (i.e. 16%) greater than MPI's catch records (range 1.11 to 1.24).

The claim in the SAU report that catches have been 2.1 times (i.e. 110%) greater than have been reported to the FAO since 1986 clearly does not apply to QMS species in the deep water fisheries. As the deep water catch constitutes around 87% of the total New Zealand QMS catch by volume, this claim can therefore also not apply to QMS catches in the inshore and pelagic fishery sectors.

In summary, based on their own SAU dataset, the claim by Simmons *et al* 2016 that five species were *"some of the most misreported and discarded species over the time period considered"* (i.e. 1950 to 2010) if they were valid at any time certainly cannot not apply for the period when the QMS was in place (i.e. since 1986).

MPI's Catch Record and Stock Assessments in Relation to SAU's 'Reconstructions'

Catch reporting in the years before 1986, and prior to 1978 in particular, is acknowledged to have been incomplete, especially for foreign vessels, which took almost all of the catches of deep water species before the introduction of the New Zealand EEZ in 1978. It is noted that it is usually the Flag State that reports landings to FAO.

Since 1986, catches and landings of QMS species have become progressively more closely monitored and are held to be substantially and increasingly reliable. All catch from deep water fisheries must be landed in New Zealand to a registered Licenced Fish Receiver.

MPI requires catch estimates of all deep water species to be reported on Catch Landing Returns, including catches of non-QMS species, those of species with little commercial value and any permitted discards of QMS species. It is not a legal requirement to retain non-QMS species and unwanted catch may be returned to the sea, although the majority of the catch is now utilised in one form or another.

Simmons *et al* 2016 claim that "*The total catch since [1986] is conservatively estimated to be 2.1 times greater than that reported to the FAO*", and that five species (namely: hoki, squid, jack mackerels, barracouta and southern blue whiting) were *"some of the most misreported and discarded species over the time period considered"*. To put this in a real world context this would mean that annually, with a reported catch of 320,000 t, SAU's claim is that the total annual catch of deep water species would have been 672,000 t and, of this, 352,000 t were not reported. Since 1986 that would equate to 10.6 million tonnes of unreported catch. The sheer volume alone brings into question the credibility of SAU's unsubstantiated claim.

For catches to be unreported they would either have to be landed without record or discarded at sea.

Annual landings of hundreds of thousands of tonnes of unreported catch into New Zealand by deep water vessels would not be possible given the rigorous documentation requirements from the time of catch through onboard porcessing, landing, and export. The QMS documentation and audit processes sit alongside a very harsh penalty regime, which includes automatic forfeiture of vessel and quota upon conviction of certain offences, including misreporting. Simply put, the risk of detection is high, the consequences of prosecution are severe, the value of the catch is low, and the logistics required to conceal very large volumes of deep water species all mitigate against the prospect of wide-scale non-reporting of catches of deep water species on a scale envisaged by SAU

Anyone with knowledge of these systems would know that such large scale movement of landings or product outside of the due processes could not possibly be occuring.

Credible information from observer records indicates there has been minimal discarding from the main deepwater fisheries since 1986. The matter of discarding at sea from the deepwater fleet is closely montored, has been independently analysed in some detail, as is summarised in the next section.

The authors of the SAU report have suggested, based on information gleaned from interviews with fishers, that the behaviours on non-observed vessels may have differed from those on observed vessels. While this may have been the case it would seem highly improbable that the scale of discarding was such that more fish were being returned to the sea than were landed. The authors have provided no detailed explanation on how they converted uncoroborated anecdotal qualitative information into reliable quantitative information.

Independent analyses by NIWA of the amount of catch returned to the sea for the key deep water trawl fisheries in New Zealand over the period 2002 to 2013 estimate 94.5% of the catch was retained on-board. Of the 5.5% returned to the sea, 75% was non-QMS species (NIWA, 2017b). This monitoring work is routine, is on-going and is peer reviewed by MPI's open and transparent Science Working Group processes.

The current reporting requirements for deep water vessels are strictly adhered to, as evidenced through the high levels of MPI monitoring. Currently MPI observers monitor 45% of deep water trawling activities, 100% onboard vessels considered to be of 'high risk', and close to 100% in fisheries where there are management matters that require close operational monitoring.

In 2014-15, 97.5% of the deep water catch was retained on-board (as estimated by MPI from observer records which covered some 45% of the tows in that year).

There is no credible information to support SAU's proposition that since 1986 hundreds of thousands of tonnes of deep water species have been annually caught and either discarded at sea or landed without being reported, as is alleged by Simmons *et al.* 2016. Further, the changes in at-sea monitoring of deep water fishing activities, since 2013 in particular, give confidence that there is currently no large scale levels of non-reported catch in the fisheries for deep water QMS species and for hake, hoki, ling or southern blue whiting in particular.

Simmons *et al* 2016, in accepting their own reconstructions, have erroneously concluded "*the lack of comprehensive and transparent reporting* [to FAO] *threatens the integrity of the QMS*". If one supposes that catches were substantially higher in the early years than have been reported, this would mean that for most species their stock would have had to be more productive than is estimated by the current stock assessments. This is not compatible with what is known about the population dynamics and productivity of these deepwater stocks and is inconsistent with the range of stock asessments for the different stocks. Running sensitivities to stock assessments for these deepwater stocks, using different assumed catch histories in the early years, have usually shown that the current approach to stock assessment is robust to this concern.

As almost all of the assessments for deep water stocks are based on fisheries-independent information (i.e. biomass estimates from research trawl and acoustic surveys, and from biological sampling by scientists and observers), and on commercial catch estimates (which take into account non-reported catches where these are known to occur), the current scientific stock assessments are widely recognised as being robust.

MPI draws from all available sources of information to produce the most accurate catch records for use in assessing fish stocks and managing deep water fisheries, including information from at-sea observers to monitor catches and discards.

Independent Assessment of Discards from Deep Water Fisheries

MPI has contracted NIWA to undertake detailed analyses of bycatch and discards in deep water fisheries based on MPI observer records. These studies have been peer-reviewed and accepted by MPI as meeting their Research Science and Information Standard (Ministry of Fisheries, 2011). A summary of the key results is provided in Table 1.

Table 1: Rates of Observer coverage, target species catches, QMS species catches and discards of fish and invertebrate bycatch in deep water fisheries. Data collated from analyses by NIWA.

Fishery	Data Period[1]	Average Annual Observer Coverage[2]	Target Species as Percentage of Total Catch[3]	QMS Species as Percentage of Total Catch[3]	Percentage of total catch discarded[4]
SBW	2002-03 to 2006-07	40%	99%	99%	0.6%
HOK, LIN, HAK trawl	1990-91 to 2012-13	17%	91%	93%	5.1%
LIN longline	1992-93 to 2011-12	13%	68%	93%	19.2%
ORH	1990-91 to 2008-09	20%	84%	95%	6.0%
OEO	1990-91 to 2008-09	18%	92%	96%	2.4%
JMA	2002-03 to 2013-14	42%	75%	97%	0.5%
SQU	1990-91 to 2010-11	22%	80%	94%	4.4%
SCI	1990-91 to 2009-10	11%	17%	53%	48.9%
All Tier 1 Deepwater Fisheries		23%	76%	90%	5.5%

Notes:

1. Note different time periods for data. Start years differ due to variation in dates of initial observer coverage for longline fisheries and due to specific requirements of individual assessments. End years depend on dates specified in individual research contracts.
2. Calculated as the weight of target species catch in all fishing events recorded by MPI observers divided by the total estimated weight of the target species recorded on catch-effort forms.
3. Based on the fishing events recorded by MPI observers (i.e., not based on scaled-up estimates of catches for the whole target fishery). Relevant for the stated time periods.
4. Based on total estimated bycatch and discards for the whole target fishery and the total estimated target species catch from catch effort forms, over the entire stated period.

The key findings in NIWA's analyses are:

- During the period 1990-91 to 2013-14 annual observer coverage across the main deep water fisheries has been around 23%, increasing in latter years, especially since 2013, to around 45%
- Since 1990-91 the level of non-retained catch (i.e. discarded catch) across the main deep water fisheries has been very low - around 5.5% of the total catch overall.
- Most of the discarded catch comprised non-QMS species, which is legal and for which reports of estimated catch are required by law

- For the mixed-species hake, hoki and ling trawl fisheries during the period 1990-91 to 2012-13 the average annual observer coverage was 17%, 91% of the catch was the three target species, 93% of the catch was QMS species and an estimated 5.1% of the catch was not retained
- For the ling longline fisheries during the period 1992-93 to 2011-12 the average annual observer coverage was 13%, 68% of the catch was ling, 93% of the catch was QMS species and an estimated 19% of the catch was not retained
- For the southern blue whiting trawl fisheries during the period 2002-03 to 2006-07 the average annual observer coverage was 40%, 99% of the catch was southern blue whiting, 99% of the catch was QMS species and an estimated 0.6% of the catch was not retained.

Current Fishing Performance by the Deep Water Trawl Fleet

The matters of relevance under the MSC Fisheries Certification Requirements concern the current performance of the fisheries under assessment, not historical aspects of the fisheries, especialy where these have no bearing on the current situation.

For the hake, hoki, ling and southern blue whiting assessments the catches prior to and during the during the early period of the QMS will have little weight in the current stock assessments. In these fisheries, since 2013 the level of observer coverage has been increased, focussed on Foreign Charter Vessels, whom it has been alleged, posed the most risk of non-legal activities, including non-reporting of catches. Since 1 June 2016, by law no Foreign Charter Vessels are permitted to operate within the New Zealand EEZ. All vessels are now New Zealand flagged.

Deep water fishing activities by trawlers over 28 m in length (i.e. larger vessels most of which fish in the deep water fisheries) are closely monitored by MPI observers, catches are stable, fishing effort has been reduced (increasing economic efficiencies and decreasing environmental impacts) and the current proportion of non-retained catch is minor (assessed to be ~4% of the total catch).

During the past decade, the annual volume of deep water QMS catch has remained at around the same level (between 290,000 t and 320,000 t) while there has been:

- A 40% reduction in the number of trawlers >28 m (52 vessels in 2005-06, 31 vessels in 2015-16)
- A 55% reduction in fishing effort by trawlers >28 m (~55,000 tows/yr in 2002-03, ~25,000 tows/yr during 2013-14 (Fig. 1)
- An increase in MPI observer coverage to around 45% of tows in 2013-14 (Figure 1).
- Elevated MPI observer coverage of fishing activities considered to be of 'high risk', including all foreign-owned vessels (which have had at least two MPI observers on board since 2013) and where there is a high level of interactions with marine mammals (e.g. in the squid, jack mackerel, and southern blue whiting fisheries)
- An increase in at-sea fishmeal capacity from 30% to 66% of factory trawlers (reducing the amount of non-utilised catch).

During the Marine Stewardship Council (MSC) surveillance audits for hake, hoki, ling and southern blue whiting fisheries in November 2016, MPI Compliance advised the CAB that oversight and compliance is now sufficient to assert that there is *"no unacceptable scale of illegal discarding"* occurring in these fisheries.

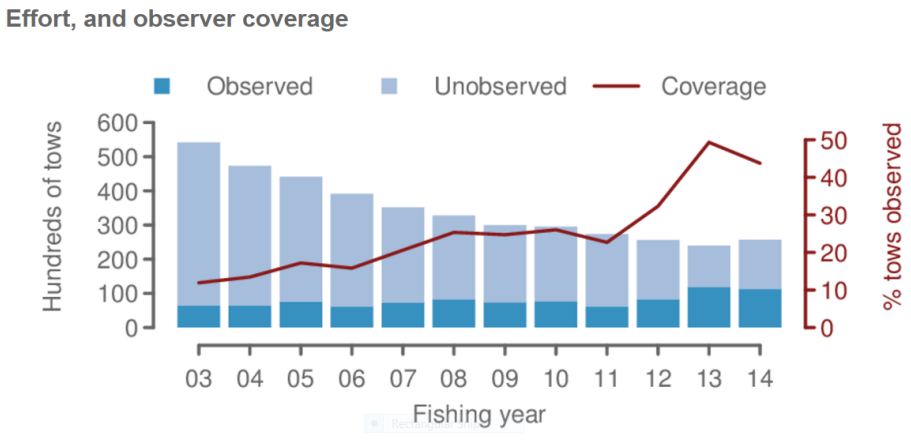

Figure 1: Effort by trawlers >28 m LOA and observer coverage to 2013-14 (Source: MPI and Dragonfly 2016)

Conclusion

This analysis has exposed a lack of data, a lack of rigour, and a lack of fisheries knowledge behind the sweeping assertions in SAU's report in their reconstruction of historic catches from New Zealand's fisheries.

Neither the offical catch and landings data for New Zealand deep water fisheries, nor the SAU's own dataset support the contentions by Simmons *et al* 2016 that:

- *"the lack of comprehensive and transparent reporting threatens the integrity of the QMS";*
- *"The total catch since [1986] is conservatively estimated to be 2.1 times greater than that reported to the FAO";*
- nor that five named deep water species (i.e. hoki, squid, jack mackerels, barracouta and southern blue whiting) were *"some of the most misreported and discarded species over the time period considered"*, at least during the period since 1986.

Overall, the claimed catch reconstructions by SAU for each of the main deep water QMS species for the period 1986 to 2013 are closely aligned with New Zealand's official catch records.

Without SAU disclosing their methods, it appears that they have simply applied an unknown scaling factor, which on average amounts to 1.16 (i.e. +16%), to the publicly available data in MPI's Plenary documents for deep water QMS species, to account for their 'imagined' levels of unreported catch since 1986. This apparent scaling factor applied by SAU is some three times higher than the estimate by NIWA of 5.5% discarded catches in deep water fisheries for the period 2002 to 2013.

It is clear from a detailed knowledge of New Zealand's fisheries, an analysis of SAU's publically available data from SAU, consideration of MPI's catch and landings records, and independent information on bycatch and discard rates, that catches of QMS species from New Zealand's deep water fisheries have not been under-reported since 1986 to the level claimed by Simmons *et al* 2016 and that the integrity of the Quota Management System is intact.

While it is likely that the level of discarded catch in early years may have been higher than it is at present, the best available, credible, valid and transparent information estimates the current level of discarded catch in the deep water fisheries to be in the order of 4%.

It is evident that the findngs in Simmons *et al* 2016 have no bearing on the current performance of the fisheries for hake, hoki, ling and southern blue whiting in their re-assessment under the MSC FCR.

In essence, the SAU work with respect to New Zealand deep water fisheries catches has no credibility.

It remains for this finding to be brought to the attention of stakeholders at large to provide the assurance that New Zealand's deep water QMS fish stocks are being well monitored and well managed, as has been consistently reported by international fishery scientists over recent years (Melnychuck *et al*., 2016; Alder *et al*., 2010; Worm *et al*. 2009).

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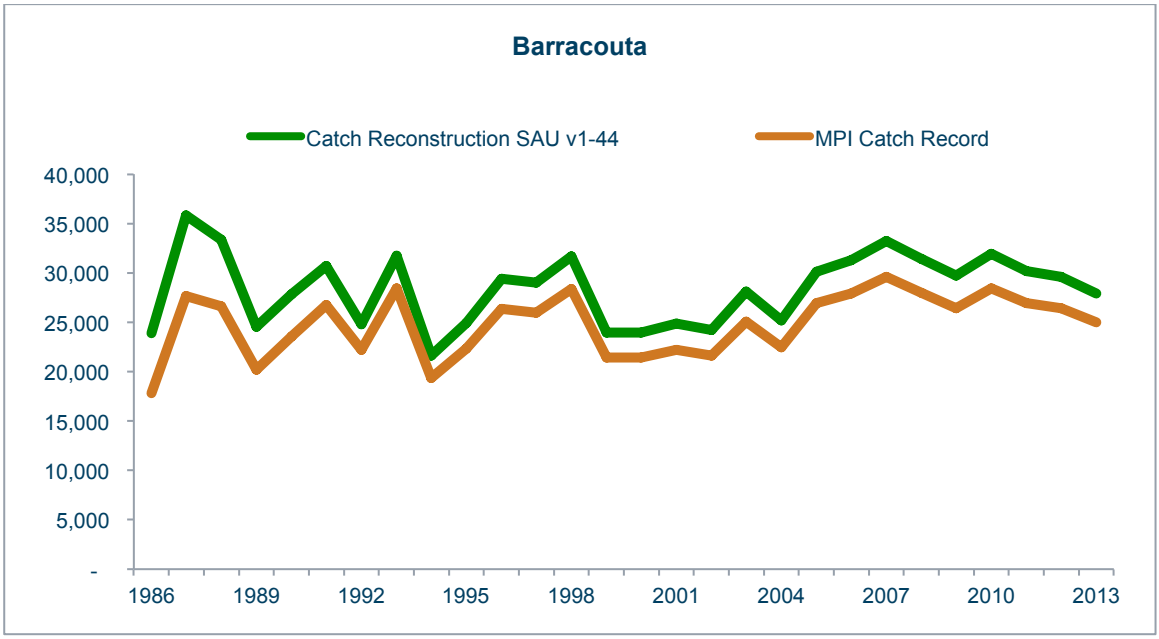
Appendix 1: Analysis of the SAU dataset (SAU v1-44) by fishery sector

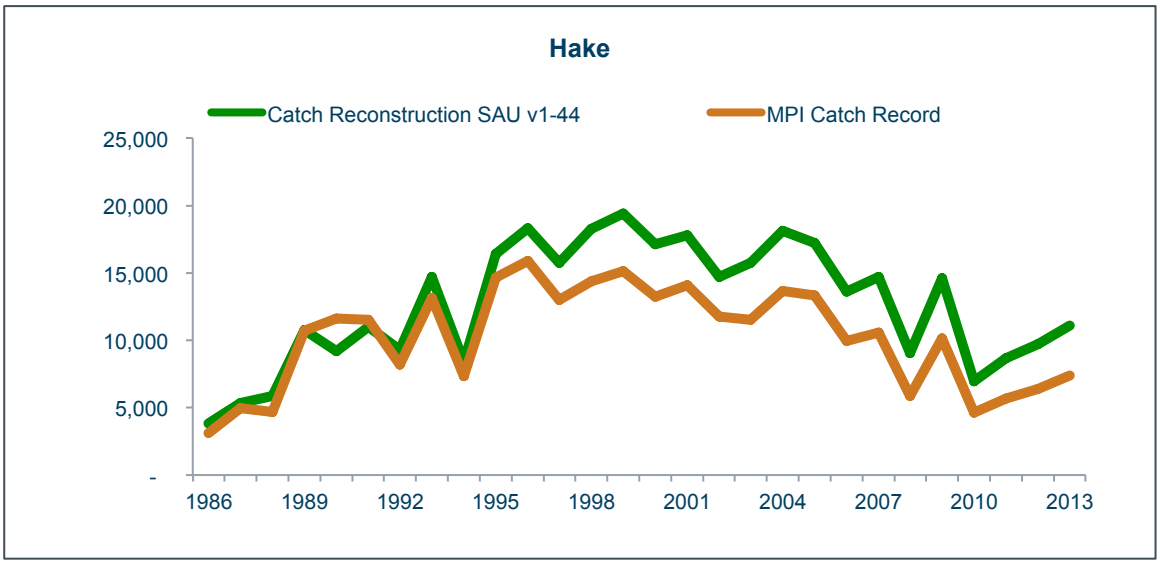
Breakdown of the SAU dataset by fishery sector, illustrating catches are predominantly from the deep water fishery.

Fishery Sector	Proportion of SAU Catch Reconstruction	SAU Catch Reconstruction Compared to 'Reported Landings'
Deep water	86.8%	2.0 times greater
Inshore	8.6%	1.8 times greater
Pelagic	4.6%	3.7 times greater

Appendix 2: SAU v1-44 Catch Reconstructions Compared with New Zealand's Catch

Records for Seven Key Deep Water Fisheries. Catches in tonnes.

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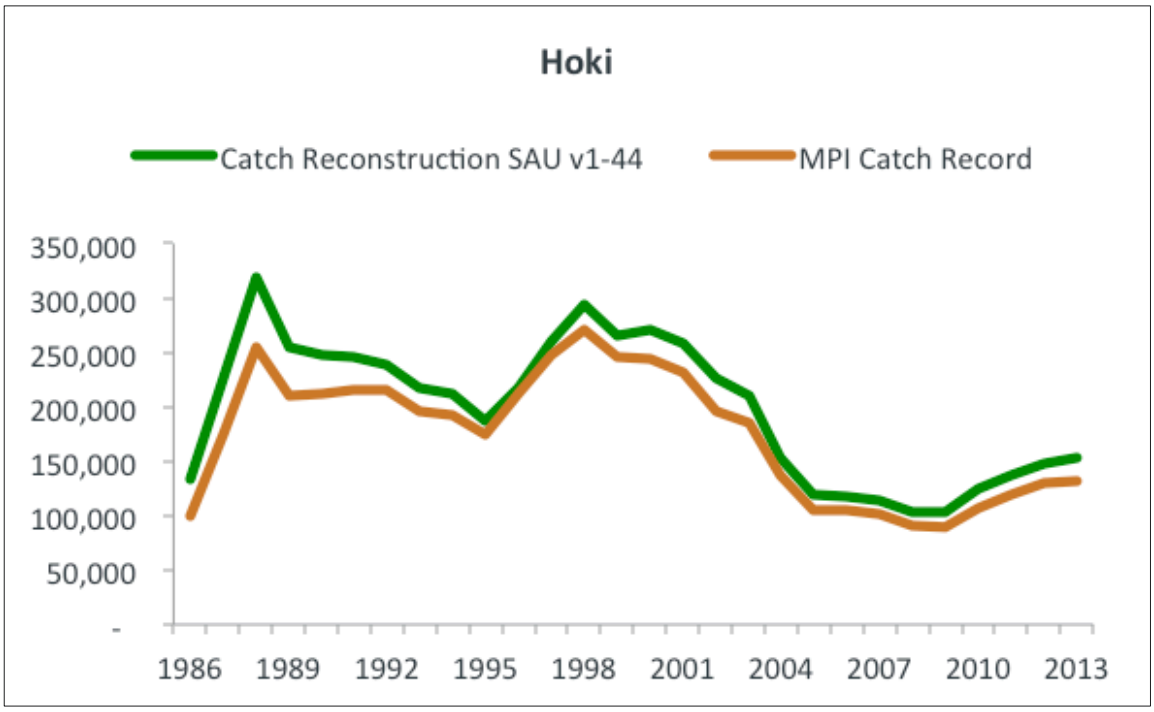
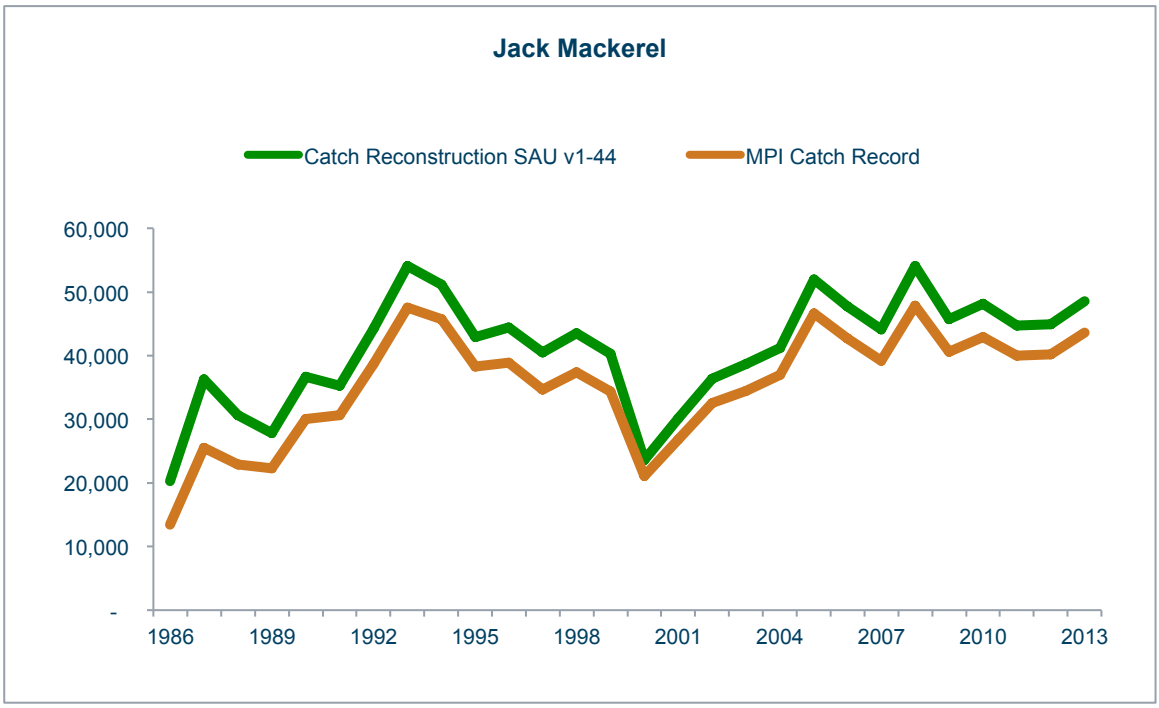
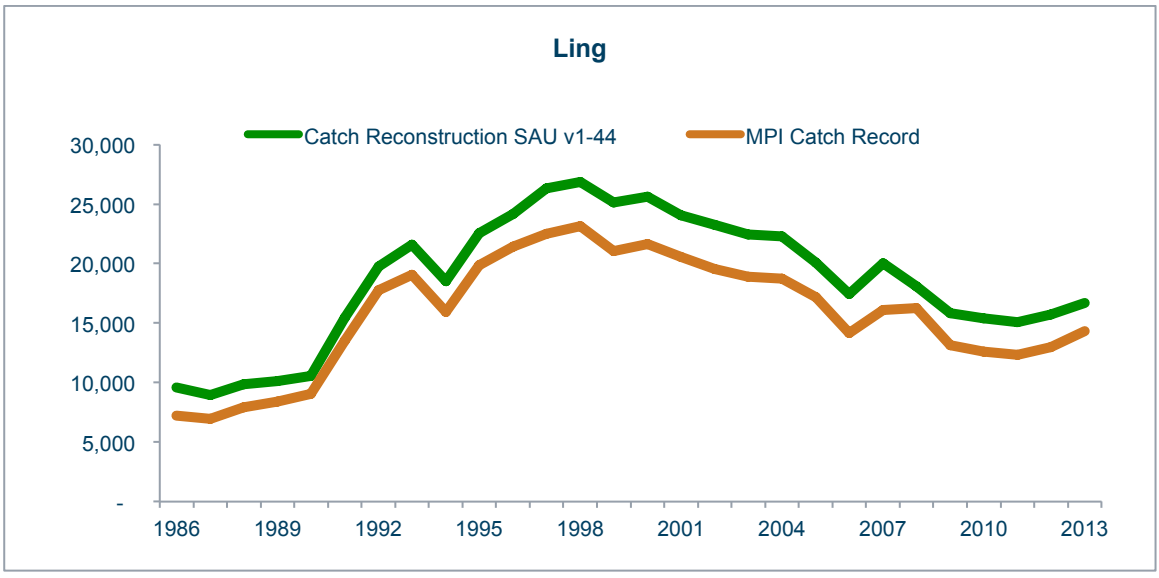
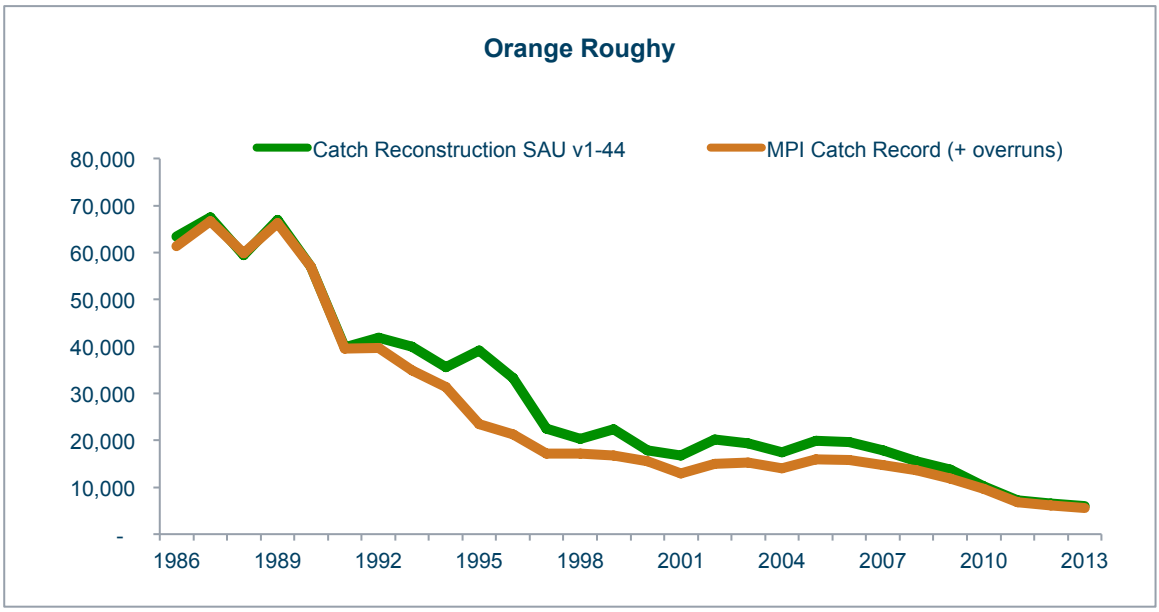
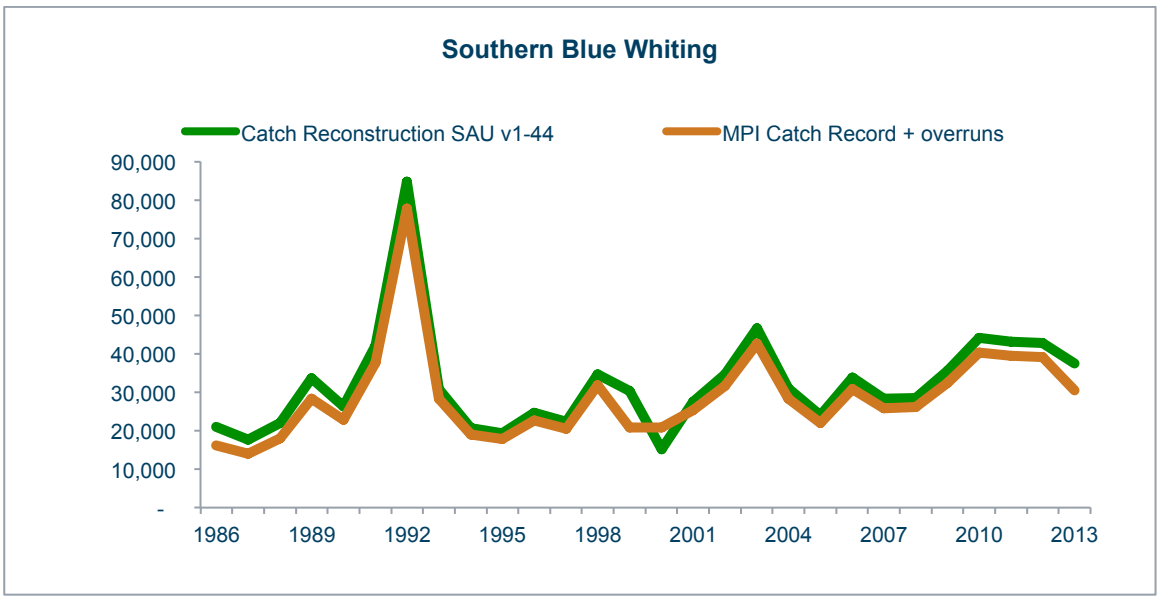
2010
2013


Hoki
Catch Reconstruction SAU v1-44
MPI Catch Record
350,000
300,000
250,000
200,000
150,000
100,000
50,000
-
1986
1989
1992
1995
1998
2001
2004
2007
2010
2013


Jack Mackerel
Catch Reconstruction SAU v1-44
MPI Catch Record
60,000
50,000
40,000
30,000
20,000
10,000
-
1986
1989
1992
1995
1998
2001
2004
2007
2010
2013


Ling
Catch Reconstruction SAU v1-44
MPI Catch Record
30,000
25,000
20,000
15,000
10,000
5,000
-
1986
1989
1992
1995
1998
2001
2004
2007
2010
2013


Orange Roughy
Catch Reconstruction SAU v1-44
MPI Catch Record (+ overruns)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
1986
1989
1992
1995
1998
2001
2004
2007
2010
2013


Southern Blue Whiting
Catch Reconstruction SAU v1-44
MPI Catch Record + overruns
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
1986
1989
1992
1995
1998
2001
2004
2007
2010
2013