

New Zealand and Kermadec Islands: updated marine fisheries catches to 2018*

Rachel White, Gabriel Vianna and Dirk Zeller

Sea Around Us - Indian Ocean, School of Biological Sciences, University of Western Australia, 35 Stirling Hwy, Crawley 6009, WA, Australia

Abstract

The marine fisheries catches for New Zealand and the Kermadec Islands were originally reconstructed from 1950 to 2010, and have since been updated to 2018. National data were utilized as the reported catch data baseline, and this baseline was complemented with estimates of unreported landings and discards. The artisanal sector was the main contributor to unreported catches until 1968, after which the industrial sector started contributing more to the unreported catches from both landings and discards.

Introduction

An initial, preliminary reconstruction of fisheries catches within the EEZ of New Zealand was completed to 2010 by Simmons *et al.* (2015); see also Simmons *et al.* (2016). Tilney *et al.* (2017) raised concerns about this preliminary reconstruction, and we investigate these concerns in the present update to 2018.

The New Zealand Ministry of Primary Industries (MPI) established a Quota Management System (QMS) in 1986, with a stated aim to better manage and report on fisheries, especially common target and bycatch species within New Zealand's EEZ. Legally, fishers must report all catches (landed or discarded) of QMS species and estimate the discarded amount of non-QMS species.

Monitoring of fishing vessels occurs via a subset of in-person on-board observers and cameras. Due to these legal requirements, Tilney *et al.* (2017) assumed that the reports produced by MPI are accurate. However, we emphasize that the anonymous informants who provided personal communications to the investigations undertaken by Simmons *et al.* (2015) provided strong evidence for estimates of catches that were hidden from monitoring, including high grading, and extensive discarding that was never reported, and thus would be considered illegal.

Due to the sensitivity surrounding hidden catch, under-reporting, and high grading, Simmons *et al.* (2015) followed the internationally well-established journalistic protocol to protect the identity of these sources, all of whom were directly and intimately familiar with the issues they provided information on. In these cases, this was viewed as potential "whistle-blower" situations. Similar confidentiality measures also had to be taken in the case of Baltic Sea fisheries (Rossing *et al.* 2010; Zeller *et al.* 2011). Thus, although Simmons *et al.* (2015) cannot publicly identify these sources, the consistency of the information provided by several independent sources is extremely valuable and should be viewed as credible. This does not negate the existence of uncertainty in associated estimates.

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Methods

New Zealand main islands

With national data available to the first quarter of 2019, we updated the reconstruction of New Zealand's catches to the end of calendar year 2018. As New Zealand reports fisheries data by financial year (1-October to 30-September), we applied an adjustment factor to adjust the catch amounts to calendar year. As monthly catch amounts were not available to us, we assumed equal catch spread per calendar quarter, and thus adjusted catch per annum by 25% of the previous year's catch and 75% of the listed year. This assumption does not consider seasonality of fishing, but can be corrected in the future with public release of monthly data or a clear summary of monthly or quarterly percentage catches by MPI.

We cross-checked the taxonomic names previously utilized in the reconstruction and aligned the new dataset. The adjusted national data were compared to the reported FAO data, and for years where the FAO data were higher, we added a reported invisible ratio as per Simmons *et al.* (2015) original methods. These invisible reported landing ratios were 1.3% in 2016 and 1.7% in 2017.

As per Simmons *et al.* (2015), we assumed that 70% of large tunas and billfishes (albacore, bigeye, Pacific bluefin, Southern bluefin, skipjack, yellowfin tunas, and swordfish) were caught by industrial large pelagic fisheries. These data were excluded here, as all industrial catches for large pelagic taxa are addressed separately in Coulter *et al.* (2020). The remaining 30% of large pelagic taxa were assumed to be taken by domestic small-scale fisheries, and retained in the present data.

Since 2016, due largely to Simmons and Stringer (2014) and Stringer *et al.* (2014; 2016a; 2016b) and the associated public response, to fish legally in New Zealand waters, vessels must be New Zealand flagged, registered in the New Zealand Fishing Vessel Register and follow New Zealand rules and laws⁵¹. However, we considered some leniency in the implementation, and estimated some continued foreign catch from foreign charter vessels during this time. We interpolated between the 2013 values for foreign fishing with a 90% reduction by 2016. We further reduced foreign catch to 5% of 2013 values for 2018. From 2016, we treated all foreign catch as unreported catch within New Zealand's EEZ. Future investigations should review and reconsider this assumption.

We maintained the taxonomic composition of unreported landings from Simmons *et al.* (2015) for commercial sectors (artisanal, industrial); however, we reduced the ratio of unreported landings since 2016 under the assumptions that the reduction in foreign vessels due to the ban may have reduced the under- or non-reporting rate identified by Simmons *et al.* (2015), and that there were additional resources applied to monitoring domestic vessels. We calculated discards on the total landed catch (reported plus unreported) for both the domestic and the substantially reduced foreign commercial fisheries. We maintained the Simmons *et al.* (2015) discard rates as 46% for foreign industrial fisheries, 20% for domestic industrial fisheries and 5% for artisanal fisheries. Note the discard rate is higher than that reported by the MPI, as it includes estimates of illegal and unreported discards not captured by the MPI monitoring system.

Simmons *et al.* (2015) estimated recreational catch as a ratio of the commercial snapper and kahawai (Australian salmon, *Arripis trutta*) catch in Quota Management Area 1 (QMA1). We interpolated between the 2012 anchor point value in Simmons *et al.* (2015) to the same ratio of reported commercial snapper and kahawai catch in QMA1 for 2018.

⁵¹ <https://www.mpi.govt.nz/growing-and-harvesting/fisheries/operating-as-a-fisher/vessel-registration/>

We maintained the assumptions in Simmons *et al.* (2015) that the subsistence catch was equivalent to 4% of the estimated recreational catch for Māori customary fishers, plus a small amount (1% of the estimated recreational catch) for take-home or amateur catch. These fisheries we maintained as fully unreported. We continued the existing taxonomic breakdown from Simmons *et al.* (2015), but with the exclusion of orange roughy (*Hoplostethus atlanticus*) as suggested by Tilney *et al.* (2017).

Retroactive corrections

In this update, we adjusted the New Zealand unreported commercial catch for 1972-1982, where a large spike was present in the original reconstruction and unreported landings reached up to 84% of reported New Zealand catches. Because Simmons *et al.* (2015) did not specifically address this, we linearly interpolated the unreported ratio for both New Zealand commercial sectors (artisanal and industrial) between 1971 and 1983 to eliminate this likely artificial data spike. We also adjusted the discards accordingly.

Furthermore, we found evidence that three species occurred in catches earlier than the existing reconstruction suggested. Catches have been reported for ribaldo (*Mora moro*) since 1975, rather than the reconstructed start in 1983; cosmopolitan rubyfish (*Plagiogeneion rubiginosum*) since 1983, rather than 1991; and white warehou (*Seriolella caerulea*) since 1970, rather than 1979 (MPI 2006a, 2006b, 2008). We interpolated these catches from zero in their respective new 'start' year (1975, 1983, 1970) to the existing reconstructed catches in 1983 for ribaldo, 1991 for cosmopolitan rubyfish, and 1979 for white warehou, respectively. Since bycatch species were unlikely to drop to zero within a catch time series, we interpolated the gaps for these. Gap interpolations were estimated for southern hake (*Merluccius australis*) from 1955-1958 and 1967-1972 and for white warehou in 1981.

Marine biodiversity protection

New Zealand has agreed to protect its biodiversity through the international agreements of the Convention on Biological Diversity (Aichi), the United Nations Convention on the Law of the Sea, the Ramsar Convention on Wetlands of International Importance and the World Heritage Convention. New Zealand is a signatory to regional treaties and agreements such as the Regional Seas Convention and Natura 2000 (Marine Conservation Institute 2020).

New Zealand has 541 MPAs and 50 marine managed areas, which jointly cover 17,622 km² (Marine Conservation Institute 2020), i.e. 0.5% of the EEZ of 3,479,752 km² (Simmons *et al.* 2016).

There are four types of MPAs in New Zealand and territories: type 1, which are no-take areas; type 2, which offer benthic protection restricting all commercial and recreational fishing activities that potentially impact benthic habitats; special Management Areas (SMA), where no commercial fishing but certain recreational fishing is allowed); and community co-management areas like the Ahu Moana or Mana Whenua (Marine Conservation Institute 2020). Moreover, there are also tools traditionally used in New Zealand to conserve and manage marine resources such as Taiāpure-local fisheries (area of special significance to an iwi or hapū because of source of food or for spiritual or cultural reasons), Mātaitai (where commercial fishing is prohibited) and rāhui (a temporary closure of an area) (Marine Conservation Institute 2020). "Māori play an important role in the establishment and management of many of these areas. However, in general the legislation that addresses marine protection is disjointed and there are important gaps in coverage. Attempts to reform the legislation have not yet succeeded" (Mossop 2020).

"In 2011, an assessment was made of the areas managed by all tools in New Zealand's Territorial Sea, to inventory the existing marine reserves (Type 1 MPAs) and also determine which other tools met the MPA

protection standard and could be considered to be Type 2 MPAs (Department of Conservation and Ministry of Fisheries 2011)” (Department of Conservation. 2012).

“Aotearoa NZ’s first no-take marine reserve was established in 1975 at a site adjacent to the University of Auckland’s Leigh Marine Laboratory. The reserve was established under the Marine Reserves Act 1971 to preserve marine life for scientific study. The decision to establish a marine reserve under the Marine Reserves Act 1971 is made by the Minister of Conservation with concurrence from Ministers of Transport and Primary Industries. Historically, many of New Zealand’s marine reserves resulted from single applications, with little consideration of alternative sites or management measures to provide for marine biodiversity protection or tangata whenua and/or community aspirations for marine protection. Although the Marine Reserves Act has remained largely unchanged since 1971, the purpose of marine reserves and other MPAs has evolved both socially and politically since that time” (Davies *et al.* 2018). An example of this type of planning is the Aotearoa marine reserve, which has developed into a more collaborative MPA implementation, partly due to the instrumental support provided by the MPA Policy in 2005 and the associated implementation guidelines in 2008 (Davies *et al.* 2018).

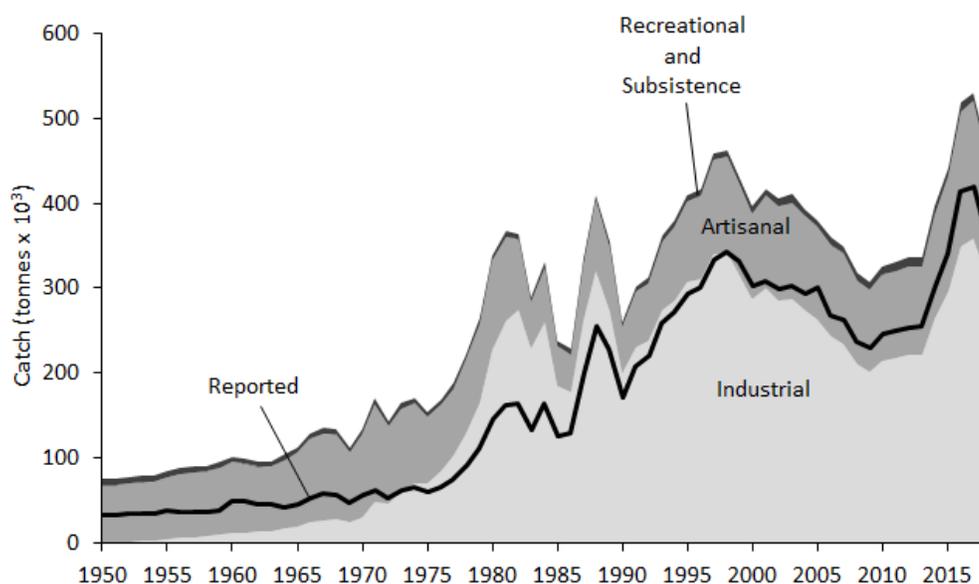


Figure 1. The marine fisheries catches of the New Zealand main islands for 1950-2018, by fishing sector, with discarded catches by all sectors presented separately. Discards occur in both artisanal and industrial sectors, while no discards were estimated here for the non-commercial sectors. The non-commercial sectors consist of both recreational and subsistence catches, but were too small to show separately. The overlaid black line refers to the officially reported data.

Kermadec Islands

The uninhabited Kermadec Islands are located 800 km north of New Zealand’s North Island. There is relatively little fishing in the waters around the Kermadec Islands, as documented in a catch reconstruction which covered 1950 to 2010 (Zylich *et al.* 2012, 2016). This documents how the domestic catch data were updated to 2019 (Figure 2).

Baseline data

Domestic reported catch data were obtained from the New Zealand Ministry of Fisheries website for fishing operations within the Kermadec Islands fisheries management area (FMA10) for fiscal years 2011-2012 and 2015-2019. Fiscal years in New Zealand run from October 1st to September 30th. Thus, fiscal year catch data

were converted into calendar year by combining 75% of the listed year and 25% of the following year for each reported taxon. This assumption does not consider seasonality of fishing, but can be corrected in the future with release of monthly data or a clear summary of monthly or quarterly percentage catches by MPI.

New Zealand used both industrial longlines and pelagic trawls in Kermadec waters. However, based on Zylich *et al.* (2012), all catches in this update were assumed to be from pelagic trawlers. In the absence of data for 2013 and 2014, these years were assumed to have the same very low catch as the year 2012; however, this needs to be confirmed in future updates. Given the remoteness and uninhabited nature of the Kermadec Islands, undocumented fishing by foreign fleets may be a possibility. Future research should investigate this possibility carefully.

Marine biodiversity protection

In 2015, the Kermadec Islands EEZ was proposed as an ocean sanctuary (MfE 2015) on the basis of biodiversity information to which the *Sea Around Us* contributed (Palomares *et al.* 2012). However, these plans have been delayed.

The Kermadec Islands are part of New Zealand, which has agreed to protect biodiversity through the international agreements of the Convention on Biological Diversity (Aichi), the United Nations Convention on the Law of the Sea, the Ramsar Convention on Wetlands of International Importance and the World Heritage Convention. New Zealand is a signatory to regional treaties and agreements such as the Regional Seas Convention and Natura 2000 (Marine Conservation Institute 2020).

Kermadec has two MPAs: Kermadec Islands Marine Reserve (a no-take area designated in 1990) and the Kermadec Benthic Protection Area (prohibiting trawling of the sea floor, but not offering protection in the water column; this was designated in 2007). These areas jointly cover 476,950 km² (Marine Conservation Institute 2020), contributing to nearly 77% of the EEZ around Kermadec, which covers 621,764 km² (Zylich *et al.* 2016). There is an Ocean Sanctuary proposed in 2016. Approval for the sanctuary awaits a second reading in the N.Z. Parliament. If it were established, it would cover the entire EZZ. “It includes the world’s longest chain of underwater volcanoes and the world’s second deepest ocean trench at over 10 kilometres” (Ministry for the Environment 2019).

The sanctuary will have the same category of protection as the Kermadec Islands Marine Reserve (IUCN Ia). However, the following activities might be allowed (subject to regulation): exchanging ballast and marine discharges from ships, yachts and submarine cables (Ministry for the Environment 2019). “During the select committee process, submissions for and against the creation of the sanctuary came from three main interest groups: conservation groups, iwi and fisheries companies. Among these groups three main issues were identified. These were: whether the proposal extinguished property rights; whether the proposal was a sustainability measure; and the inability to claim compensation. [...] However, there was in fact no consultation with industry stakeholders or iwi on the proposal to establish the sanctuary (Fisheries Inshore New Zealand 2016, p.26). The government only engaged with iwi after Cabinet had made the decision. Te Ohu Kaimoana, who manage Māori fishing quotas, were advised by telephone the evening before the government’s announcement of the intention to establish the sanctuary (Te Ohu Kaimoana Trustee Limited 2016, p. 16). Attempts to engage with government following the announcement were unsuccessful. A letter sent to the prime minister seeking the opportunity to work towards a marine protection initiative that would meet the needs of government, iwi and the seafood industry was declined by the minister for the environment (Fisheries Inshore New Zealand 2016, p. 30)” (Love 2017).

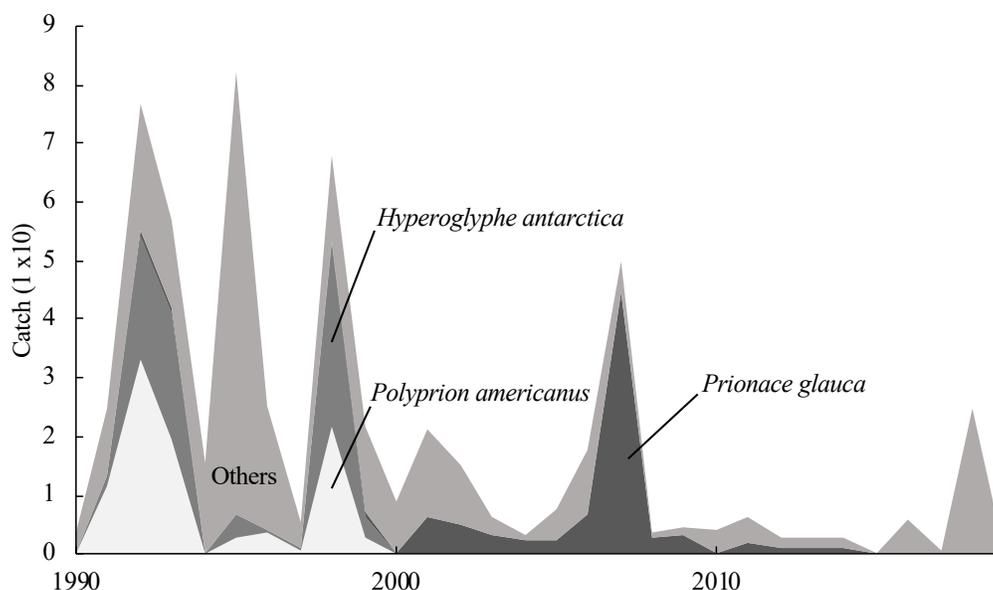


Figure 2. Domestic (New Zealand) fisheries catch in the Kermadec Islands EEZ from 1990 to 2019 by major taxa, with ‘others’ accounting for 84 additional taxa.

Results and Discussion

The reconstruction update of New Zealand’s marine fisheries catches encompassed catch from 1950 to 2018, and also included some modifications and corrections of earlier data. With the availability of new reported data and secondary sources of data, the original reconstruction was corrected back to 1971. Discards peaked in 1990 and seem to have declined considerably since (Figure 1).

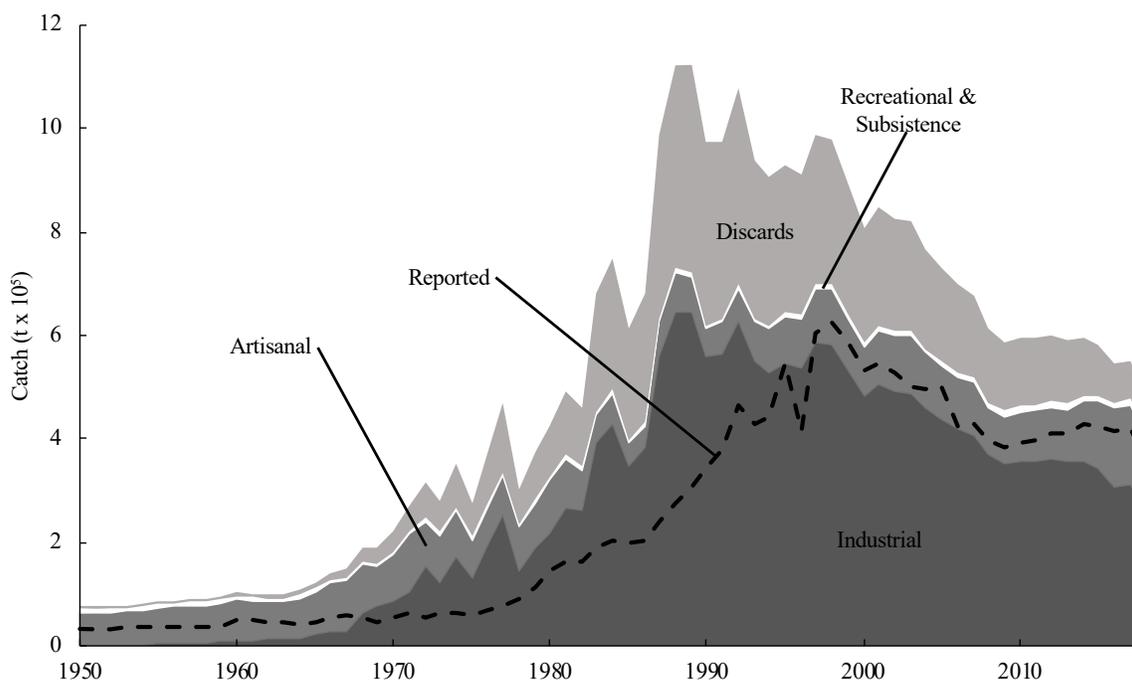


Figure 1. New Zealand’s marine fisheries catches for 1950-2018, by fishing sector landings and sector combined discards.

Discards occur in both artisanal and industrial sectors, while no discards are associated with the non-commercial sector. The non-commercial sector consists of both recreational and subsistence catches, but they were too small to show separately here. The overlaid dashed line refers to the officially reported data.

Landed catches seemed to also have peaked in the 1990s, with industrial catches declining more strongly thereafter, while recreational and subsistence catches were dwarfed by the large artisanal and industrial fisheries (Figure 1).

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