



The Status of New Zealand's Fisheries 2021

February 2022

Introduction

This report summarises the status of New Zealand's fish stocks relative to the requirements of the Harvest Strategy Standard for New Zealand Fisheries.¹

Summary

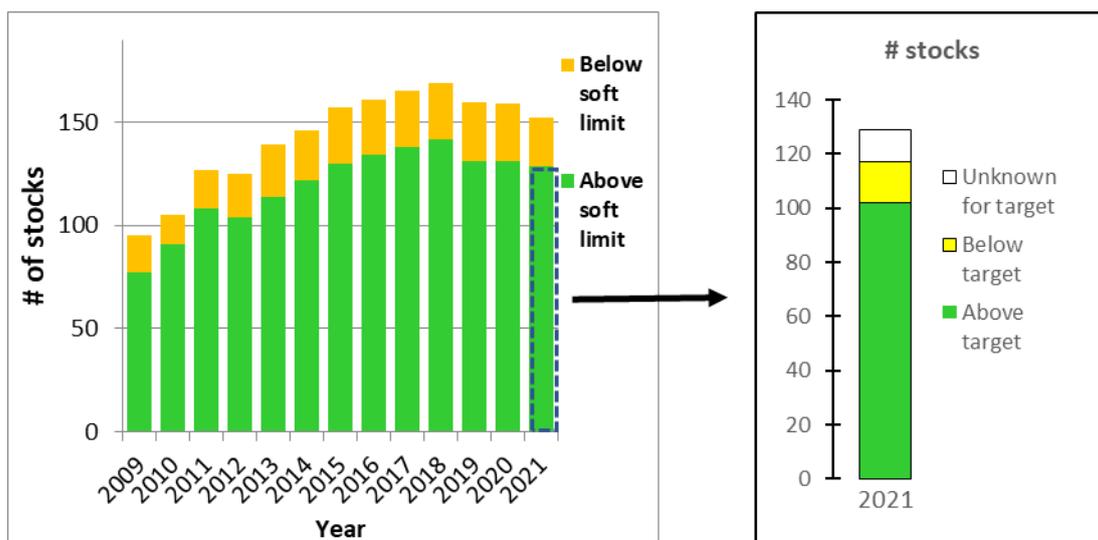
By far the majority of New Zealand's fish stocks are performing well

As of December 2021:

- 95.2% of **assessed stocks** were above the *hard limit*,
 - 84.9% were above the *soft limit*,
 - 74.3% were above their *management targets*, and
 - 88.6% were at or below the *overfishing threshold*. *
- 99.8% of the **assessed landings** were made up of stocks above the *hard limit*,
 - 94.3% were made up of stocks above the *soft limit*,
 - 68.1% were made up of stocks above their *management targets*, and
 - 97.7% were made up of stocks at or below the *overfishing threshold*. *

*This determination has been modified for 2021; see section on '2021 status evaluations'

Most stocks that were above the *soft limit* were also above the *management target*.



¹ <https://www.mpi.govt.nz/dmsdocument/19334-Harvest-Strategy-Standard-for-New-Zealand-Fisheries>

Background

Managed fish stocks

The Fisheries Act 1996, the Harvest Strategy Standard (HSS) for New Zealand Fisheries, which aligns with the Fisheries Act, and various Fisheries Plans guide the management of our fish stocks.

Fisheries New Zealand evaluates 399 stocks, sub-stocks, species, or species complexes, that are mostly in the Quota Management System (QMS). There are currently 642 fish stocks representing 98 species or species complexes in the QMS. Of these, 290 stocks are considered to be *nominal* stocks (down from 297 in 2019), which are species-area combinations that do not have a demonstrated significant commercial or non-commercial potential.

For stock assessment purposes and this evaluation, 26 of the remaining 352 QMS stocks are further sub-divided and split into components. This can either be by geographical area (e.g., eels are assessed by individual catchment areas), or when these are part of a complex (e.g., the flatfish complex includes eight different species and some flatfish QMAs are split into as many as four individual species for assessment purposes).

An additional five non-QMS Antarctic toothfish stocks and Highly Migratory Species (HMS), which are managed via international regional fisheries management organisations, are also included. This brings the total number of assessment units to 399.

How we assess stock status

Each year, Fisheries New Zealand convenes a series of Fisheries Assessment Working Group meetings to produce or update assessments of the status of New Zealand's fish stocks. The Working Groups, led by highly qualified Fisheries New Zealand scientists, evaluate research undertaken by contracted expert research providers. These providers combine the results of scientific research vessel surveys and other fisheries-independent information with catch and effort reports from commercial fisheries, data from the Fisheries New Zealand on-board observer programme, and other relevant information.

These integrated analyses are summarised in two annual Fisheries Assessment Plenary Reports, currently published in a 2,400+ page document comprising four volumes, available on-line. Fisheries managers subsequently respond to these assessments with Total Allowable Catch (TAC) and Total Allowable Commercial Catch (TACC) changes or other management measures, to ensure that both sustainability and utilisation objectives are met.

Performance measures

The HSS specifies four performance measures that are used to evaluate the status of New Zealand's fish stocks and fisheries.

- the *hard limit* – a biomass level below which a stock is deemed to be “collapsed”, and fishery closures should be considered to rebuild the stock at the fastest possible rate
- the *soft limit* – a biomass level below which a stock is deemed to be “overfished” or depleted and needs to be actively rebuilt using a formal, time constrained rebuilding plan
- the *management target* – usually a biomass level, but sometimes a fishing mortality rate,² that stocks are expected to fluctuate around, with at least a 50% probability of achieving the target, and

² A fishing mortality target is usually the fishing mortality (rate of extraction) associated with maximum sustainable yield (F_{MSY}) or a related reference point.

- the *overfishing threshold* – a rate of extraction (percentage of a stock removed each year) that should not be exceeded, as it will ultimately lead to stock biomass declining below *management targets* and/or biomass limits, if this hasn't already happened.

The *soft* and *hard limits* should be avoided with high probability; fish stocks should have at least a 90% probability of staying above biomass limits. Fish stocks are managed so that they avoid the biomass limits and fluctuate around *management targets*, achieving the biomass target on average.

The number of assessed stocks, relative to the four harvest strategy standard performance measures, varies as this depends on the methods used to conduct each stock assessment. For example, while it may not be possible to determine whether a stock is somewhat above or below its management target, it may be clear that it is above the hard limit.

Overfished and *overfishing* are two different but related concepts, where *overfished* is a state (the stock is below the *soft limit*; i.e., depleted), and *overfishing* is a rate (fishers take a higher than optimal proportion of the stock each year).

Figure 1 below shows the relationship between the *management target* and the biomass limits (i.e., *soft* and *hard limits*) for a stock that is fished at an optimal constant rate that tracks fluctuations in stock size (i.e. no *overfishing* occurring). Fish stocks are expected to fluctuate around their targets with at least a 50% probability of achieving the target. This means that for well-managed fisheries, at any given point in time, approximately 50% of stocks should be above their management targets and 50% below.

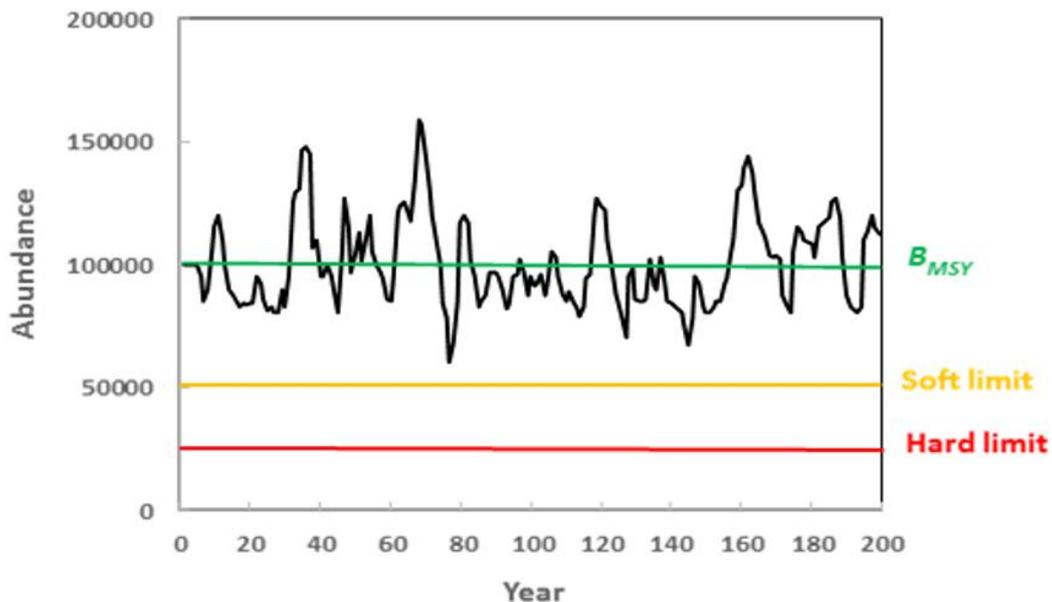


Figure 1. The relationship between the *management target* and the *soft* and *hard limits* for a stock that is fished at an optimal constant rate that tracks fluctuations in stock size.

Evaluations relative to the *soft limit*, the *hard limit* and the *overfishing threshold* have been undertaken since 2009, while those relative to the *management target* have been conducted since 2008.

Soft limit is the key performance measure

All performance measures are important, but the key performance measure for determining the status of fish stocks is the *soft limit*, in line with international best practice. As long as fish stocks are sufficiently above the soft limit, we conclude that no sustainability risks to the stock are evident.

Management target is the goal

However, the emphasis on the soft limit does not mean that no management action is needed if stocks are simply above the *soft limit*. The HSS describes the use of a *soft limit* as a biological reference point that triggers a requirement for a formal, time-constrained rebuilding plan and does not imply that no action needs to be taken to rebuild stocks that have fallen below targets but have not yet declined to the level of the *soft limit*. The HSS further explains that management action needs to be continually applied to ensure that fisheries and stocks fluctuate around target levels, particularly when they start to fall below those targets. Management action is likely to involve reductions in fishing mortality rates and TACs, and/or implementation or modification of input controls such as gear restrictions and seasonal or area closures. The role of the *soft limit* is to ensure that subsequent management action is sufficiently strengthened if previous action has not been adequate to prevent the stock declining to or below the *soft limit*.³

Being above the soft limit is key, but the aim is to ensure that fish stocks fluctuate around their fisheries management targets. Most stocks that were above the soft limit in 2021 were also at or above their management targets.

Management targets provide guidance on how well stocks are being managed. Fish stocks are expected to fluctuate around their *management targets* with at least a 50% probability of achieving the *target*. However, stocks that are below *management targets* should not be near or below biomass limits.

Most stocks that are above the soft limit are also above the target

Of the 129 fish stocks that were above the soft limit in 2021, 102 (79.1%) were also above their targets. For those 129 stocks, 68.5% of their landings and 82.9% of their value were also above their management targets. This is shown in Figure 2.

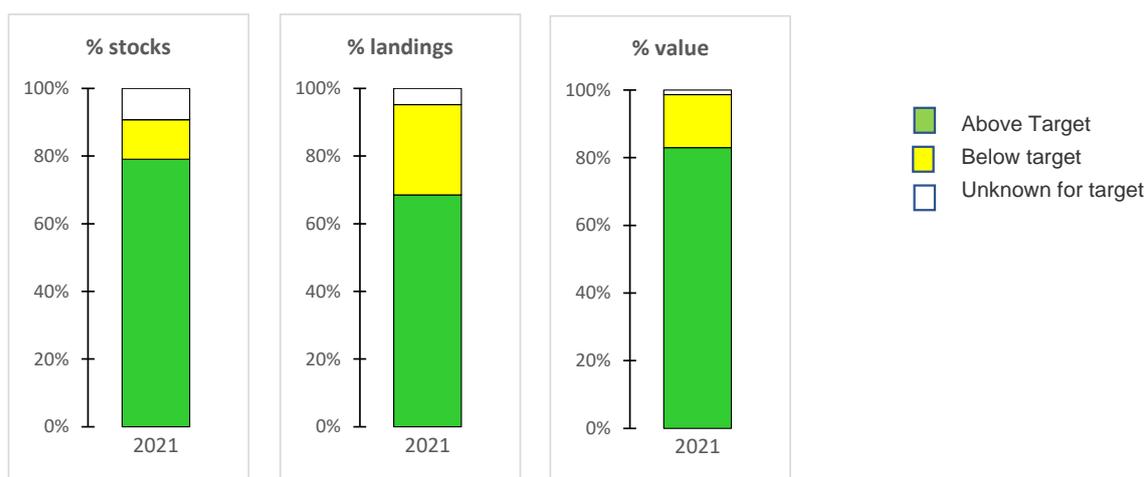


Figure 2. The percentage of stocks in 2021 that were above their *soft limit* and also either above, below, or unknown with respect to their *management targets*.

³ Harvest Strategy Standard for New Zealand Fisheries, p. 8.

2021 status evaluations

Analysis

New results for 2021 and recent trends for each of the four individual performance measures were compiled in terms of six variables:

- i) the number of fish stocks falling above and below each of the four performance measures, in terms of raw numbers
- ii) the number of fish stocks falling above and below each of the four performance measures, as a percentage of the total number of assessed fish stocks
- iii) the weight of landings of the fish stocks falling above and below each of the four performance measures, in terms of total tonnes
- iv) the weight of landings of the fish stocks falling above and below each of the four performance measures, as a percentage of the total tonnes of assessed stocks
- v) the value of landings (port price in dollars per kilogram multiplied by total kilogram caught) of the fish stocks falling above and below each of the four performance measures in terms of total dollars, and
- vi) the value of landings (port price in dollars per kilogram, multiplied by total kilogram caught) of the fish stocks falling above and below each of the four performance measures, as a percentage of the total dollar value of assessed stocks.

Figures 3 and **4** show the results of evaluating fish stocks against each of the performance measures, colour coded according to their stock status.

In 2021, a change has been made to the way the status of stocks has been evaluated relative to the *overfishing* threshold performance measure. The About as Likely as Not (AaLaN) to be *overfishing* category has been separated out from the other *overfishing* categories to denote that this does not require corrective management action but neither does it enable further utilisation opportunities. It is therefore now grouped with the not *overfishing* category. This conclusion is based on a review of international best practice.

When summarising overall stock status in terms of the actual numbers (or percentages) of stocks, a large number of small fish stocks are expected to have a disproportionate influence on the overall result. For this reason, it is helpful to consider stock status in terms of the contribution to the landings (or value of the landings). However, in the latter instances, a single stock with very high landings (or value) can be highly influential. For example, the large increase from 2020 to 2021 in the percentage of landings made up of stocks below the *management target* is the result of the abundance of the western hoki stock decreasing from above to below the *management target* (Figure 4, top right).

Results

The number of assessed stocks relative to the four performance measures varies because, for example, while it may not be possible to determine where a stock is relative to its *management target*, it may be clear that it is above the *hard limit*. In 2021, relative to the *soft limit*, assessed stocks

accounted for 66.8% of the total landings by volume and 85.2% of the total landings by dollar value,⁴ representing most of the main commercial fish species.

Overall, the 2021 evaluation indicates that by far the majority of New Zealand's fisheries are performing well. The majority of New Zealand's fish stocks are meeting or exceeding their performance measures, with relatively few stocks failing to do so (Figures 3 and 4).

Corrective management actions have a notable effect on mitigating sustainability risks for fish stocks that are not meeting their performance measures. In 2021, there was a low percentage of landings for fish stocks below the *hard limit*, as most of fisheries on these fish stocks were closed or had previously had their TACs reduced considerably (Figure 4, top row).

Our knowledge of New Zealand's fish stocks is growing as more research is completed. Following early increases in the number of assessed fish stocks, numbers appear to be plateauing for most performance measures in recent years.

For further details see the Status of Stocks page at <https://www.fisheries.govt.nz/protection-and-response/sustainable-fisheries/the-health-of-new-zealands-fisheries/fish-stock-status/>

Highlights from recent stock assessments

The following examples represent some of the success stories in terms of stock assessments and/or improved status due to corrective management actions.

Deepwater stocks

Two **hake** stocks were assessed in 2020 and 2021 and were shown to continue to have excellent status relative to all performance measures.

Both the eastern and western stocks of **hoki** have recently been re-assessed after a two-year project to overhaul the assessment model. The eastern stock continues to exceed performance measures, but the western stock was assessed as unlikely to be at or above the *management target*. In response, the western hoki TACC was reduced in 2019 and 2021. In addition, voluntary hoki operational procedures are in place. These include closures of the main hoki spawning areas (all vessels) and areas with a relatively high abundance of small hoki (vessels larger than 28 m).

One **jack mackerel** stock was unable to be fully assessed in 2020 due to the lack of separate reporting of the three species in the fishery, but a combined index indicated a substantial increase in biomass in recent years. Five **ling** stocks have been re-assessed over the period 2019–21 and were shown to continue to have excellent status relative to all performance measures.

Two **Chatham Rise orange roughy** sub-stocks were re-assessed in 2018 – with one also being reassessed in 2020 – and found to be performing well relative to all performance measures. The **Challenger orange roughy** stock was also shown to be performing well when it was re-assessed in 2019.

Four **scampi** stocks were re-assessed in 2019 and 2020, with three found to be performing near or above the favourable levels indicated at the time of their previous assessments. The status of one

⁴ This excludes squid, which has a life cycle that is not amenable to management relative to the maximum sustainable yield benchmarks in the Fisheries Act 1996.

of the stocks continues to be unknown. Another scampi stock, last assessed in 2018, was also found to be performing exceptionally well against all performance measures.

Highly migratory species

Albacore tuna was re-assessed in 2021, **bigeye tuna** and **yellowfin tuna** in 2020, and **skipjack tuna** in 2019. All stocks were found to be performing extremely well relative to all performance measures.

Swordfish was re-assessed in 2021 and found to have good status relative to all performance measures.

A highlight for 2020 was that the number of stocks below the hard limit decreased from 9 to 8. **Southern bluefin tuna** has been under a rebuilding strategy and stock status has improved considerably from about 5% of the unfished level in 2011 to 20% in 2020.

Inshore finfish stocks

Four **blue cod** stocks were re-assessed over the period 2018-2021. Three stocks were above the *soft limit* and one was found to be above the *management target*, with the status of the fourth stock unknown relative to the soft limit. *Overfishing* was found to be occurring in two of the stocks, about as likely as not in one stock, and unknown in the fourth.

Bluenose stocks were identified as being in need of rebuilding in May 2008, and four TACC reductions were subsequently implemented in 2008, 2011, 2012 and 2016. Stock assessments were undertaken in 2016 and 2021, with the 2021 assessment showing that although the stocks are still below the *management target*, they are now above the *soft limit* with no *overfishing* occurring.

Four **flatfish** stocks were re-assessed in 2020 and a further four were assessed for the first time in 2020. All were above both the *soft* and *hard limits*, although two of the eight stocks were below their *management targets*. *Overfishing* is occurring in one stock and about as likely as not in a further four stocks.

Two **gemfish** stocks were re-assessed in 2021 and found to have good status relative to all performance measures. Both stocks have exhibited substantial increases in recent years.

Two **kingfish** stocks were re-assessed in 2021, and one in 2020. All three stocks were well above biomass limits and at or above *management targets* although it was not known whether *overfishing* was occurring.

Stock assessments for six **red gurnard** stocks from 2015-20 show that they are at or above their *management targets* in virtually all areas where they occur, with *overfishing* about as likely as not to be occurring in two areas.

Three **rig** stocks were successfully assessed in 2019 and all were found to be at or above their *management targets* and well above the *soft* and *hard limits*, although *overfishing* was identified to be about as likely as not in one instance.

Seven **school shark** stocks were re-assessed in 2021. Four stocks were above *management targets*, with no *overfishing* in three of these stocks and *overfishing* about as likely as not in one. For two stocks it was only possible to show that they are above the *hard limit* with the status relative to other performance measures unknown. One stock was found to be below the *soft limit* with *overfishing* taking place.

The **snapper** stock off the northwest coast of the North Island was re-assessed in 2021, and that along the north and west coasts of the South Island in 2020. Both stocks have shown substantial increases in size in recent years and are now well above their biomass limits and at or above their *management targets*.

Three **stargazer** stocks assessed during 2017–20 were found to be above their *management targets*, although *overfishing* was about as likely as not for two of these.

Eels

Nine sub-stocks of North Island **longfin eels** were assessed in 2020 and found to be at or above their *management targets* with no evidence of *overfishing*. Two additional sub-stocks were re-assessed in 2021, with one stock above and one below the *soft limit*.

Seven sub-stocks of North Island **shortfin eels** were assessed in 2020 and while their status relative to performance metrics could not be determined, there is evidence that they are increasing in abundance. An additional four sub-stocks assessed in 2021 were determined to be above the *soft limit*. Performance metrics related to *management targets* and *overfishing* were estimated to be about as likely as not to be in a good status for one of the sub-stocks but could not be estimated for the others.

Rock lobsters

Seven **rock lobster** stocks were re-assessed in 2021 and all were found to be above their *management targets*. *Overfishing* was found to be occurring in two stocks and about as likely as not in one stock. Stock status of rock lobster stocks is monitored actively, and rock lobster catch limits are reviewed annually. Moreover, rock lobster stocks are unique in that, unlike all other fish stocks, the overfishing threshold is only based on a relatively small component of the total population being fished in a particular season. For both stocks in which overfishing was found to be occurring the spawning stock biomass is well above the *management target*.

The first ever successful assessment for **packhorse lobster** was completed in 2020 and showed that the stock is above biomass limits and at or above its *management target*.

Shellfish

One **cockle** stock assessed in 2021 was found to be performing well relative to all performance measures, although localised depletion in some bays could not be ruled out.

Four **pāua** stocks assessed in 2018 to 2021 were determined to be well above both the *soft* and *hard limits*, and also above their *management targets*. *Overfishing* is as likely as not for one stock, but no evidence for overfishing was found for the other three stocks.

Overfished stocks and corrective management actions

At the time of their most recent assessment, 23 stocks were considered to be below the *soft limit* (and therefore overfished), out of a total of 152 stocks evaluated relative to the *soft limit* (Figure 3, top row):

- three stocks of black **cardinalfish*****
- two stocks or sub-stocks of **dredge oysters**
- two stocks or sub-stocks of **orange roughy***
- two stocks or sub-stocks of **scallops****

- two stocks or sub-stocks of **snapper**
- three stocks or sub-stocks of **tarakihi**
- one stock or sub-stock each of **hake**, **John dory**, **pāua**, **pipi***, **school shark** and **longfin eel**, and
- **Pacific bluefin tuna***, **southern bluefin tuna** and **striped marlin**, which are highly migratory species that are seasonally present in New Zealand waters and are managed by Regional Fisheries Management Organisations (RFMOs).

Eight of these 28 stocks (those marked *) were also considered to be below the *hard limit* (collapsed).

Overfishing was documented for 16 stocks, with *overfishing* as likely as not to be occurring in a further 21 stocks.

Corrective management actions

Corrective management action has been put in place, or is being considered for stocks that are below their *management targets*, or the *soft* or *hard limit*, or where *overfishing* is occurring. These changes demonstrate the responsiveness of New Zealand's fisheries management system to the intrinsic fluctuating nature of wild fish stocks and the influence of fishing and environmental impacts on stock size, as well as our contributions to the management of international fish stocks.

Three-year staged TACC reductions were implemented for the three overfished **cardinalfish** stocks over the period 2009/10 to 2011/12, with the TACC remaining low since.

The **dredge oyster** stock in Foveaux Strait has had a voluntary commercial catch reduction in place since 2005 and catches of dredge oysters in Nelson / Marlborough have been minimal since 2008.

The fishery on one **orange roughy** sub-stock has been effectively closed, with a TACC of one tonne, to maximise the rate of rebuilding. A TACC reduction was also implemented for the orange roughy sub-stock on the east coasts of the North and South Islands in 2014.

The Tasman Bay **scallop** fishery was voluntarily closed to all commercial fishing in 2006, with the Golden Bay scallop commercial fishery following in 2011. Both of these sub-areas, along with the Marlborough Sounds sub-area have been formally closed to both commercial and recreational fishing since 2017. Biomass surveys are undertaken to assess recovery, with the most recent survey occurring in 2021.

Comprehensive monitoring and management measures for **snapper** in East Northland and the Hauraki Gulf / Bay of Plenty were implemented in 2013, including a reduction in recreational bag limits and increase in minimum legal size. A new stock assessment for snapper in Hauraki Gulf / Bay of Plenty is currently underway.

Three stocks or sub-stocks of **tarakihi** were assessed in 2018 and found to be below the *soft limit*. Initial reductions in TACs and TACCs were implemented in that year, with further management measures implemented in 2019. A new assessment was completed in late 2021 that indicated the stocks or sub-stocks are slowly rebuilding.

TAC or TACC reductions have been implemented in recent years for a number of other stocks including relevant stocks of **hake**, **John dory**, **pāua**, **pipi**, **school shark**, and **eels**.

Fisheries New Zealand is working constructively with the relevant RFMOs to effect appropriate management measures for highly migratory species. In most cases New Zealand only catches a small fraction of the total catch of these species.

While some fish stocks are unable to be assessed relative to any of their performance measures, research surveys and other indicators can sometimes be used to demonstrate that stock size is either substantially increasing or decreasing and this can inform subsequent management actions (e.g., the surveys of scallop beds in Northland and Coromandel areas in 2021 that have led to closures of all beds in Northland and most beds in Coromandel in 2022).

STOCK AND FISHERY STATUS INFORMATION BY NUMBER OF STOCKS: 2008-21

SOFT LIMIT (Below=rebuilding plan needed)
 HARD LIMIT (Below=consider closure)
 OVERFISHING (Above=reduce fishing rate)
 MANAGEMENT TARGET (Below=continue monitoring)

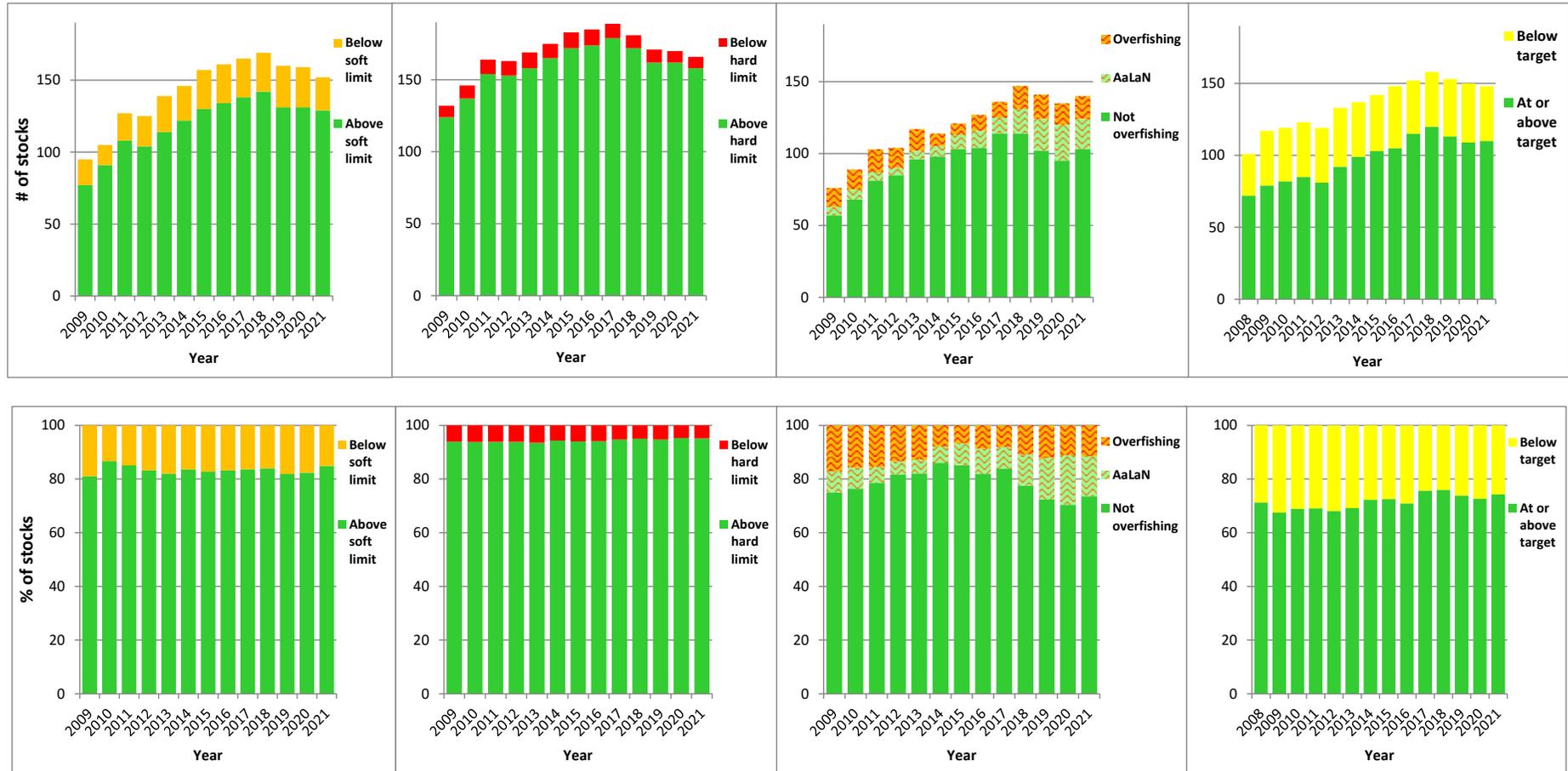


Figure 3. Stock and fishery status by number of stocks and percentage of stocks, 2008-21. AaLaN: About as Likely as Not that overfishing is occurring.

STOCK AND FISHERY STATUS INFORMATION BY VOLUME AND VALUE OF LANDINGS: 2008-21

SOFT LIMIT
(Below=rebuilding plan needed)
HARD LIMIT
(Below=consider closure)
OVERFISHING
(Above=reduce fishing rate)
MANAGEMENT TARGET
(Below=continue monitoring)

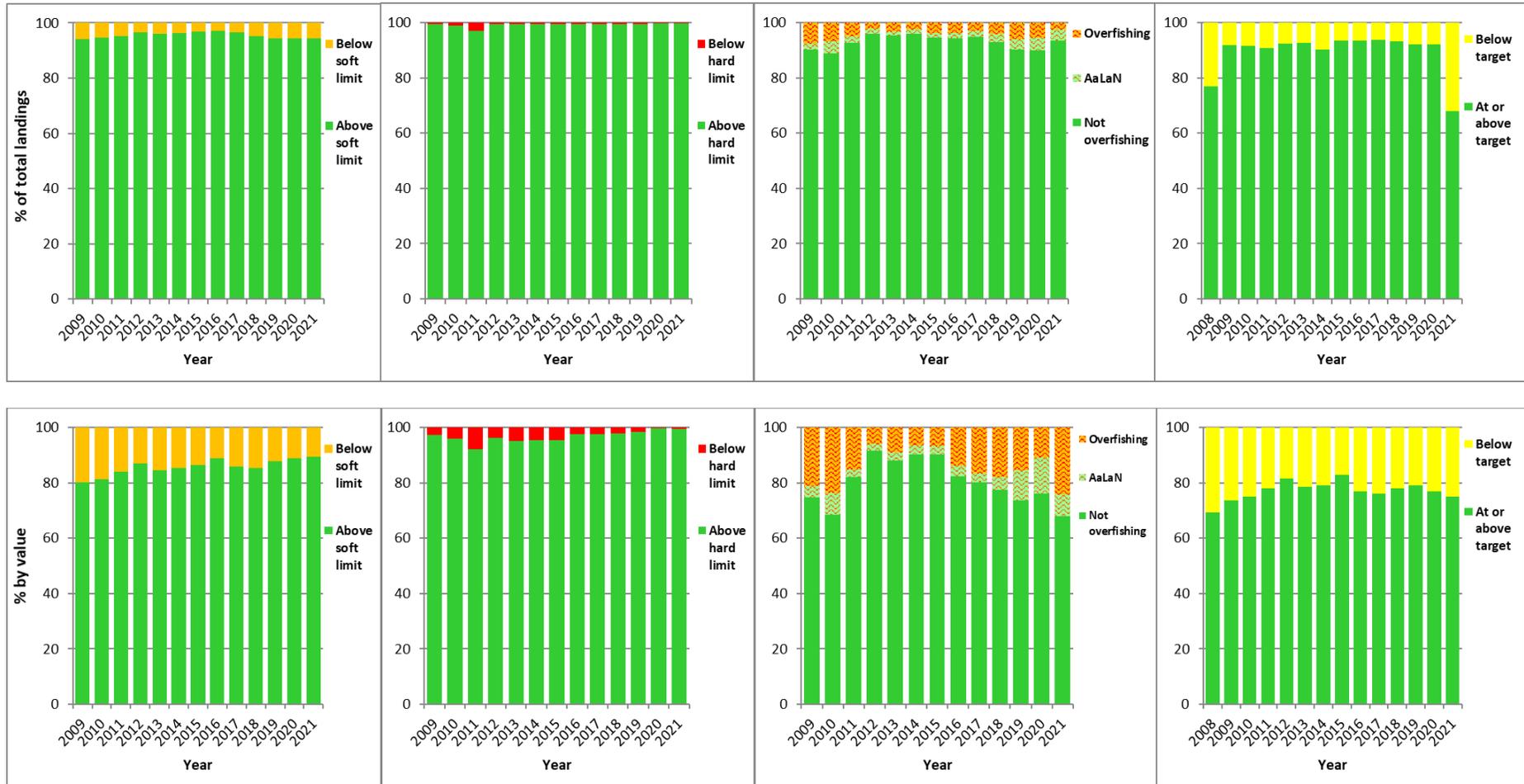


Figure 4. Stock and fishery status by percentage of total volume of landings and percentage of total value of landings, 2008-21. AaLaN: About as Likely as Not that overfishing is occurring.