

Marlborough Sounds Blue Cod Technical Group

Advice on potential measures to reduce fishing pressure and rebuild blue cod populations in the Marlborough Sounds

Disclaimer

Fisheries New Zealand assisted the Marlborough Sounds Blue Cod Technical Group in drafting this report, based on information presented and minutes from Group meetings. All views are those of the Group and not FNZ, unless otherwise specified.

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Executive summary

The Marlborough Sounds Blue Cod Technical Group (**the Group**) consists of local fishery experts, tasked with identifying and developing advice on potential measures to reduce fishing pressure and increase the population of blue cod in the Sounds. This report outlines the Group's discussions and is to be provided to the Minister for Oceans and Fisheries (**the Minister**) alongside Fisheries New Zealand (**FNZ**) advice, as a resource to inform decisions on options for public consultation. It is not intended to provide recommendations, but rather provide an overview of available measures. It is also aligned with the National Blue Cod Strategy to provide additional context specific to BCO7.

Overall, the Group are in consensus that available information shows a persistent sustainability concern for the fishery, with generally poor abundance (particularly in the inner sounds), high fishing pressure and related mortality, in the face of various cumulative stressors. To address these issues, members tabled a range of potential measures for consideration, including:

Regulatory measures	Voluntary measures and restoration projects
<ul style="list-style-type: none">▪ Extension of the blue cod seasonal closure▪ Temporary Sounds blue cod closure▪ Discrete spawning areas closed to fishing▪ Reduction of the combined daily bag limit▪ Recreational catch reporting	<ul style="list-style-type: none">▪ An educational/ communications strategy to reduce release mortality and shift attitudes▪ Restocking and translocation of fish▪ Supporting habitat restoration projects▪

Key themes which consistently arose included:

- A need to rebuild the blue cod population and associated habitats of significance over a sustained period.
- A need to shift perception of the state of the blue cod population and attitudes towards fishing in the area through communications and appropriate regulatory settings.
- Any regulatory measures, new or existing, should consider consistency across this and surrounding areas and ease of interpretation.
- Future actions should seek to acknowledge and address the wide range of cumulative stressors on the population, as part of an integrated management approach.

While no official recommendations in terms of support for specific measures are made in this document, the Group largely agreed that triage action is needed alongside a structured, long-term management approach to ensure the sustainability of the fishery into the future. Fisheries issues, identified measures and benefits, concerns, and disagreements associated with them are noted accordingly for consideration by the Minister.

Introduction

BCO 7 (Blue Cod – West Coast and top of the South Island) is a highly important shared fishery, concentrated in the Marlborough Sounds. It supports the third largest recreational blue cod fishery nationally, customary fishing for a taonga species, and a valuable commercial target fishery. Since the mid-1990s, the stock has faced ongoing sustainability concerns due to high fishing pressure and habitat degradation by sedimentation from land-based activities, with a wide range of measures implemented in response. Multi-sector groups have regularly provided advice on these measures and any broader effects they may have.

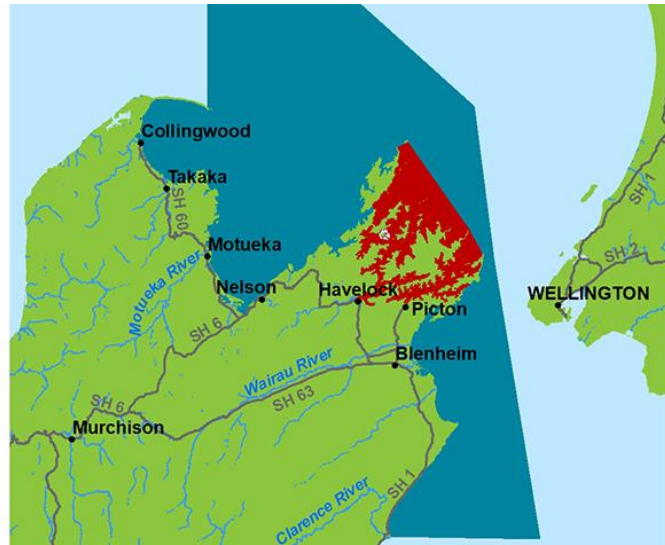


Figure 1: Map of the Marlborough Sounds Area (red), within the Challenger East Area (blue).

Management background

In 2008, following potting surveys indicating a significant decline in abundance and high fishing mortality, an area of the internal Sounds was closed to recreational blue cod take for a planned period of four years. After significant pressure for an early re-opening, a Blue Cod Management Group (BCMG) was then formed to develop measures to accompany reopening in 2011. Upon this advice, reduced bag and accumulation limits, a slot size limit, transit rule, seasonal closure, and hook limit were introduced in the Marlborough Sounds Area (MSA) alongside a recreational no-take zone around Maud Island. The 28-month closure led to a significant increase in abundance and mean size, however, upon reopening these gains were lost as fishing pressure resumed.

The BCMG was re-established in 2015 in order to re-examine these measures, after potting surveys suggested abundance had again declined to pre-closure levels with high fishing pressure, a male dominated population and diminished egg production potential. The subsequent review informed removal of the slot limit and transit rule, aligning of bag and accumulation limits across the wider Challenger East Area, and extension of the seasonal closure and Maud Island no-take area to commercial fishing.

Most recently, the 2018 National Blue Cod Strategy was developed to progress an integrated management approach for blue cod fisheries across NZ, based on broad engagement through online surveys and drop-in sessions to identify top issues for each fishery. Management objectives were identified to build information, improve decision-making, manage to appropriate targets, ensure consistent and effective rules through a traffic light system, and build public buy-in.

Sustainability measures for BCO 7 were reviewed in 2022, to introduce a Total Allowable Catch and allowances for BCO 7 as proposed in the Strategy. As part of this, the then Minister reduced the Total Allowable Commercial Catch by 17% from 70 to 58 tonnes and set an equal recreational allowance. The Minister also requested an advisory group be formed to provide further advice, and accordingly the Marlborough Sounds Blue Cod Technical Group was established in March 2023.

Membership

Carol Scott: Expertise in commercial fisheries operations and management.
Craig Perano: Commercial fisher and long-time resident.
Daryl Crimp: Editor of the Hunting and Fishing Paper and recreational fisher.
Eric Jorgensen: Long-time resident and member of previous advisory groups, with local fishing and community representation expertise.
Tim Healey: Long-time resident with local area and community representation expertise.
George Elkington: Te Tau Ihu Forum member, with mātauranga Māori and charter fishing expertise.
Lindsay Elkington: D’Urville Island resident with commercial line fishery and local area expertise.
Mark Connor: Local recreational fishing expertise.
Reid Forrest: Marine ecologist with local area expertise.
Fisheries New Zealand Support: Anthony Brett and Alex Kroch (Fisheries Management), Marc Griffiths (Fisheries Science), and Chris Beal (Fisheries Compliance).

Purpose, function and vision

The Minister’s brief for the Group was to advise on measures to reduce recreational and commercial blue cod fishing pressure in the Sounds, under the auspices of the National Blue Cod Strategy. The Group noted that the local blue cod population also faces a range of other cumulative stressors, such as sedimentation, environmental degradation and long-term fluctuations, and spatial exclusion from management and use of the marine space causing shift in effort. To interpret the Minister’s brief and acknowledge all cumulative stressors must be considered, the Group agreed the following purpose, definitions, and approach for addressing non-fishing issues in the Terms of Reference:

Purpose: *To support MPI in developing advice on measures to reduce fishing pressure and rebuild populations of blue cod in the Marlborough Sounds region.*

Definition of reducing fishing pressure: *Reducing catch, effort or fishing-related mortality, or addressing the depletion of spawning biomass.*

Definition of rebuilding blue cod population: *Increasing egg production and/or introducing habitat protections.*

Approach: *Measures should be deliverable under fisheries legislation. Measures that contribute to the Group’s purpose but are outside of this legislation can be identified for the Minister’s information.*

Members were also asked to share their vision for future management of the Marlborough Sounds blue cod fishery. From this, a shared vision has been developed:

Collaboration to deliver a healthy and sustainable blue cod population for current and future generations, using the best available information.

Meetings

The Group met on five occasions between March and end of July 2023, with the following topics discussed. Subsequent meetings were held to discuss the wording and content of this document:

14 March	<ul style="list-style-type: none"> ▪ Establishing the purpose, vision and Terms of Reference for the Group. ▪ Background on previous management actions and advisory groups, including connection to the National Blue Cod Strategy and Inshore Finfish Plan. ▪ NIWA presentation on potting survey results, which inform assessments. ▪ Overview of other relevant research on behavioural and biological characteristics. ▪ FNZ insights on commercial and recreational catch trends.
3 May	<ul style="list-style-type: none"> ▪ Review of potting survey methodology and members' concerns. ▪ Available information on recreational catch and release mortality. ▪ NIWA presentation on juvenile distribution and habitat identification. ▪ MDC presentation on monitoring, protection and mapping of seafloor habitats. ▪ Identification of fishery and population issues based on research presented. ▪ Initial brainstorm of available measures and criteria for future discussions.
7 June	<ul style="list-style-type: none"> ▪ Dr Steve Wing (Otago University) presentation on research of effects of sedimentation, Marlborough Sounds and Fiordland populations structures, and movement of blue cod. ▪ Assessment of tabled measures against initial criteria, to identify those for further discussion.
28 June	<ul style="list-style-type: none"> ▪ FNZ overview of current work to implement an EBFM approach and collaborate across agencies to address non-fishing related stressors. ▪ Evaluation of measures against fishery issues, sustainability and utilisation outcomes and implementation. ▪ Identification of research needs where immediate measures to address population issues not available.
19 July	<ul style="list-style-type: none"> ▪ Establishing final advice on potential measures, including: <ul style="list-style-type: none"> ○ alignment with other measures and overall messaging; ○ impacts on fishery users and wider community; and ○ potential specifics of implementation.

Stock status

Over the first two meetings, the Group reviewed information on the Sounds blue cod fishery to build mutual understandings of its current status and issues affecting it. The local population is monitored through independent potting surveys every four years, the latest of which occurred in 2021 and informed a 2022 assessment. In determining stock status, this assessment considered the fishing mortality rate¹ estimated from survey length, age and sex data, as well as catch rates. Various rule changes and a shift in survey design constrain identification of long-term catch rate trends.

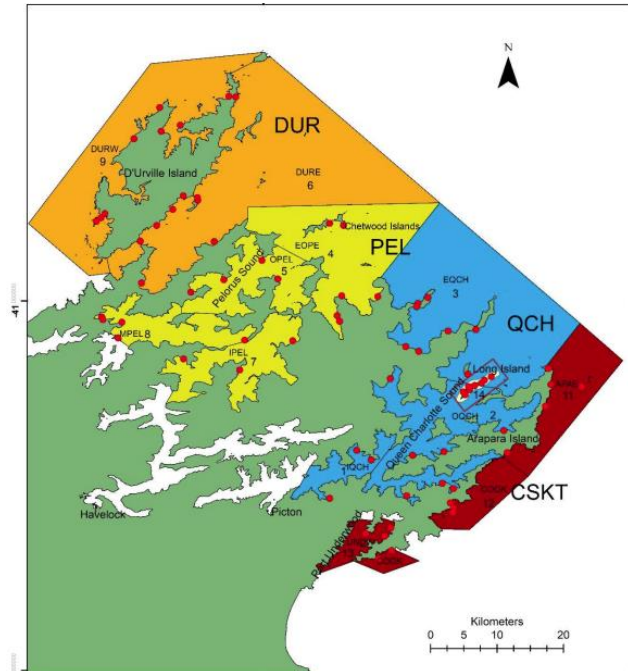


Figure 2: Regions, strata and sites for the 2021 potting survey (Beentjes, Page & Hamill, 2022).

The 2021 potting survey found mortality from fishing was very high, being three times above the level considered to ensure sustainability. Survey catch rates, as an indicator of relative abundance, were declining in the Pelorus Sound/ Te Hoiere (**PEL**) since 2013, stable in Queen Charlotte Sound/ Tōtaranui (**QCH**) since an increase in 2017 and showing no trend in D'Urville Island/ Rangitoto ki te Tonga (**DUR**) and Cook Strait/ Raukawa (**CKST**)². Catch rates are noticeably higher at D'Urville Island and Queen Charlotte Sound than Cook Strait and Pelorus Sound (see Figure 3), and within regions there is a pattern of increasing abundance from the inner to outer Sounds. The Group noted that the population is generally in a stable but concerning state, with considerable variation across areas.

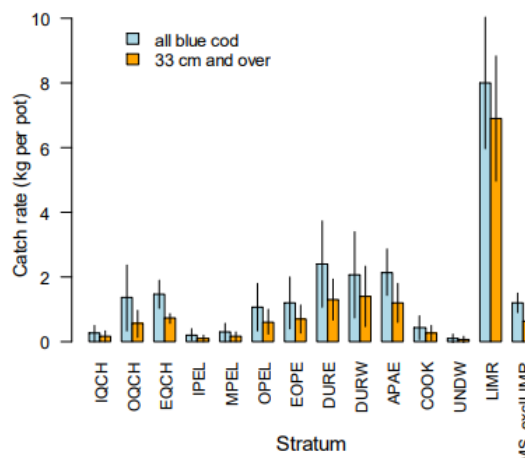


Figure 3: Catch rates by strata and overall (MS_exclLIMR) (Beentjes, Page & Hamill, 2022).

¹ Assessed against a target overfishing threshold of $F = 0.87M$, where F is estimated fishing mortality and M is estimated natural mortality. There is no agreed B_{MSY} (biomass at maximum sustainable yield) reference point for the stock.

² Beentjes, Page & Hamill (2022).

Importantly, other indicators such as population structure (see page 9) and the Long Island Marine Reserve (LIMR) also suggest the population is under very high fishing pressure. Catch rates in the LIMR are over five times those in the surrounding area, indicating fishing effort plays a key role in abundance. Positioning of LIMR in ideal habitat and environmental conditions may contribute; however adjacent areas have much lower catch rates.

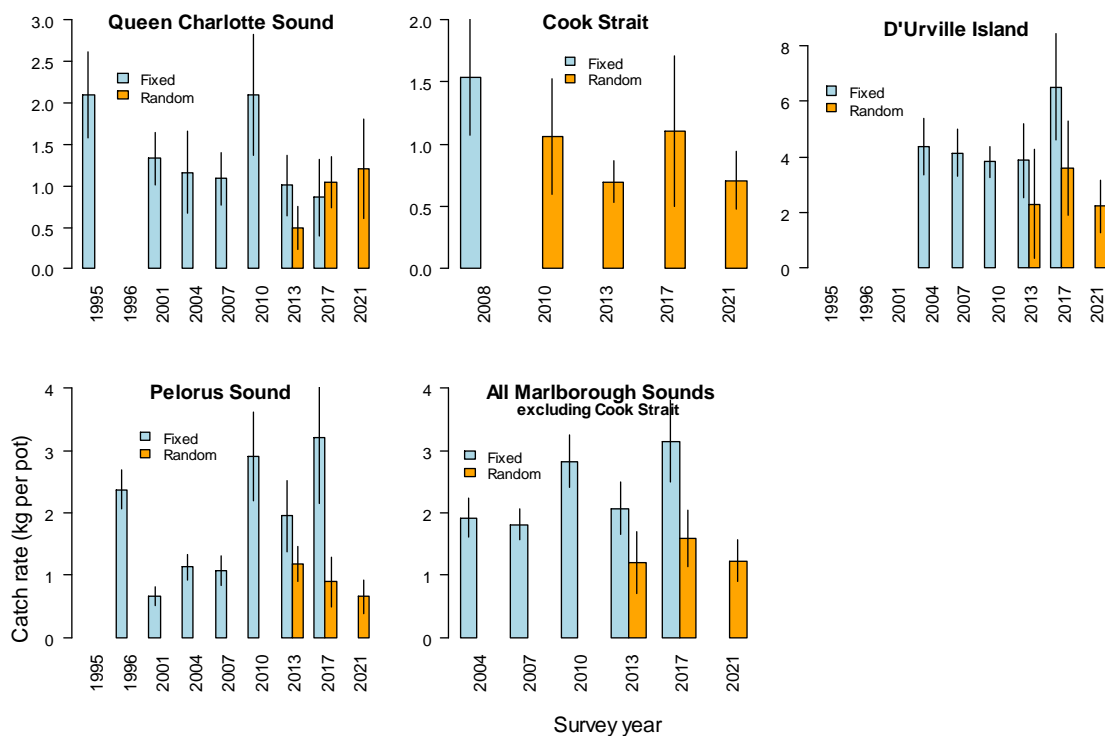


Figure 4: Fixed-site (blue) and random-site (orange) potting survey catch rates with 95% confidence interval error bars. Note differences in catch rate scales. (Beentjes, Page & Hamill, 2022).

The 2008-2011 temporary closure saw abundance and size rebound at a rate beyond local recruitment, suggesting immigration plays a role in local abundance. The Group noted uncertainty around movement of blue cod in the Sounds, and the role of the outer Sounds as a potential source of fish. Members have observed aggregations of distinctive types of fish across the year, tail wear suggesting significant movement, and tagged fish from as far away as Akaroa being landed. An ‘out-to-in’ source-sink dynamic has been observed in Fiordland blue cod through a tagging program and there is some early evidence that a similar movement may occur based on otolith micro-chemistry analysis in the Marlborough Sounds³. However, several members contend that environmental characteristics differ significantly to Fiordland and more extensive local research is needed.

Some members raised concerns about the accuracy of the potting survey’s methodology, noting issues around potting sites located over unsuitable blue cod habitat. NIWA and FNZ Science clarified that the random-site survey design is required to avoid hyperstability, as recommended by international fisheries statistical experts to ensure representative sampling⁴. Commercial fishers and the iwi representative noted that some of the science does not align with what they see on a daily basis, and that researchers should seek to consult with them to consider and incorporate their knowledge.

While concerns remain for some, there is widespread agreement of an evident sustainability issue in the population. All members anecdotally noted a trend of reducing abundance in their lifetime.

³ Carbines & McKenzie (2004) and Kolodzey (2021)

⁴ Stephenson, Sedberry & Haist (2009)

Identified population issues

The Group identified the following issues as contributing to the blue cod population's poor state:

- High fishing effort and associated mortality – especially recreationally over the summer period;
- imbalanced population structure;
- unintended release mortality;
- poor larval/egg production and distribution;
- habitat degradation;
- shift of effort and localised depletion;
- inconsistency of uptake of previous management advice;
- lack of information on scale and spatial distribution of recreational harvest; and
- issues not addressable under Fisheries legislation but requiring investigation.

High fishing effort and associated mortality

Potting survey results clearly show fishing mortality in the Marlborough Sounds exceeds sustainable levels, at over three times the target (which is 87% of natural mortality). The most recent stock assessment found overfishing as very likely (>90%) to be occurring, with biomass expected to decrease without intervention and current catch levels very likely (>90%) to continue overfishing⁵. It is acknowledged that many species in the area are under pressure, beyond blue cod alone.

Recreational effort

High levels of effort and catch have consistently been identified as a key issue, especially through recreational fishing⁶. The 2017/18 National Panel Survey of Recreational Fishers⁷ (NPS) estimated that 63 tonnes of recreational catch is taken annually from the wider BCO 7, with 35 tonnes (or around 56%) coming from the Marlborough Sounds, which equates to around 70,000 fish or 35,000 daily bag limits. The NPS estimates were considered by some to under-estimate recreational catch.

Introduction of the closed season in 2011 (1 September to 19 December inclusive) to protect blue cod during spawning is likely ameliorating this issue to a degree, however, intense seasonal effort for blue cod remains, as noted in the National Blue Cod Strategy. NPS data shows approximately 60% of recreational catch in the Marlborough Sounds is taken between 20 December and 31 January annually, meaning an average of almost 500 blue cod bag limits every day on average during this peak fishing intensity period. For reference, outside of this period the average number of daily bag limits taken each day would fall to around 43.

The Group has identified that high fishing effort is also likely driving other issues such as an imbalanced population structure and substantial release mortality, which are discussed further below. Members note that information on recreational catch continues to be sparse, and in some cases subject to considerable uncertainty, which constrains effective ongoing management of effort. There is a high level of reporting and positional data available for commercial fishing.

Commercial effort

Catch reporting data shows that targeted commercial fishing is taken by a small number of operators in a band of potting and lining effort across the outer Sounds, with 90% of BCO 7 catch coming from this area⁸. There is currently no commercial catch within the internal waters of the Sounds, apart from very small amounts of crayfish potting bycatch. A small yet notable amount is also taken as trawl bycatch in Tasman Bay, with a decreasing trend in recent years. Trawling is prohibited in the

⁵ FNZ Plenary (2023)

⁶ See MFish (2008) and BCMG & MPI (2015)

⁷ Wynne-Jones et al. (2019)

⁸ Langley (2023)

Queen Charlotte and inner Pelorus Sounds and is seasonally restricted in the outer Pelorus to between 1 April and 31 August. However, this trawling does not target preferred blue cod habitat.

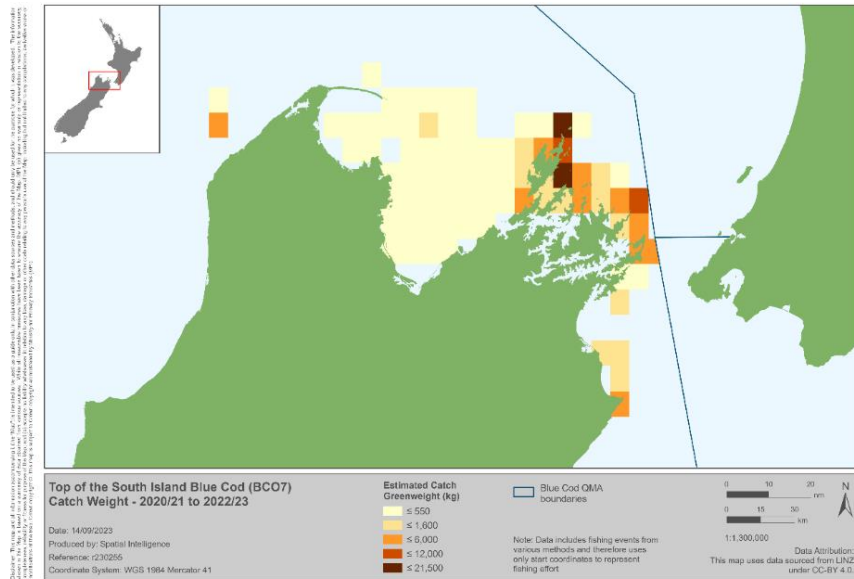


Figure 5: Commercial fishing estimated blue cod catch (kg) for 2020/21 to 2022/23 fishing years.

Public surveys as part of the National Blue Cod Strategy identified the BCO 7 TACC setting of 70 tonnes at the time as a key issue. Following review in 2022 it was reduced to 58 tonnes, reflecting potting survey results, declining commercial catches and the need to reduce fishing pressure. The Group agreed that commercial effort is more actively managed than recreational fishing through electronic reporting, catch limits and monthly harvest returns.

Imbalanced population structure

High levels of effort have led to a visibly skewed structure within the MSA population, with 2021 potting survey data showing a worrying lack of older and larger fish. There are very few fish over 10 years old, whereas in an unfished population blue cod reach a maximum age of 30+ years. The fishery is based on 6–7-year-old fish. Female cod only make up around 30% of the population, with only 18% of these being larger than the MLS of 33 cm and only 5-6% of legal sized fish are female. This has serious implications for egg production and hence locally sourced recruitment. While blue cod in the Marlborough Sounds are understood to reach sexual maturity at 21-26 cm or 3-6 years⁹, cod this size contribute little to egg production.

⁹ FNZ Plenary (2023)

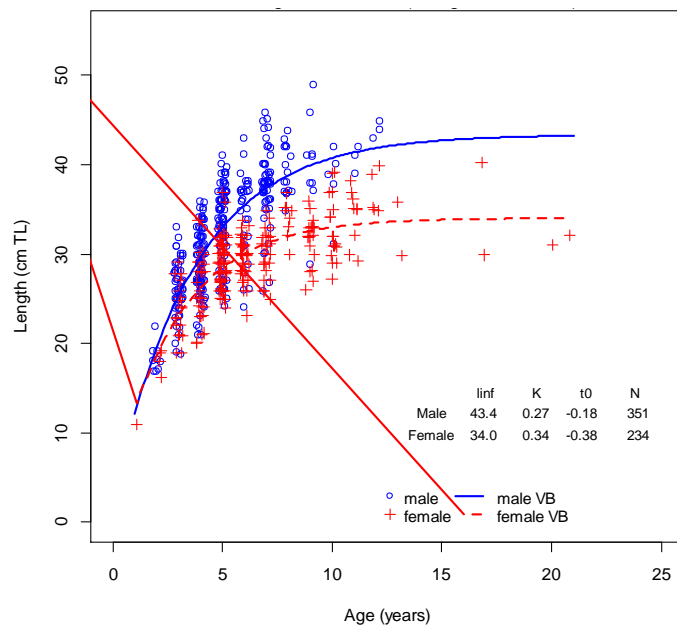


Figure 6: Observed age and length data by sex for blue cod from the 2021 potting survey, for all regions combined. Lines are fitted von Bertalanffy growth models. (Beentjes, Page & Hamill, 2022).

Blue cod are known to change sex from female to male, with evidence showing male-dominated sex ratios often occur in heavily fished areas¹⁰. This is thought to be due to sex change prompted by removal of large males by fishing. Potting survey sex ratios show a heavily male dominated population, especially in Pelorus Sounds (82%), Cook Strait (80%) and to a lesser extent in Queen Charlotte Sound (74%) and D’Urville Island (63%)¹⁵. The Group debated the degree to which these imbalances are caused by fishing but recognise that other South Island potting surveys show a clear link between fishing mortality and a male dominated sex ratio. Collecting sex ratio data in closed areas could further test this.

The lack of larger and older blue cod, especially females, makes the population increasingly vulnerable in the face of a range of other cumulative stressors through reduced reproductive potential. The Group seeks to emphasise the considerable variation in age, length and sex ratio characteristics across different areas, for consideration when implementing management actions. However, there are population structure issues across the entire fishery which need to be addressed.

Unintended release mortality

As a result of high fishing effort and truncated length frequencies for blue cod (see Figure 6), there are significant concerns around the level of recreational release mortality occurring. This has been emphasised by local communities for some time, being identified as the highest priority issue for BCO 7 in the National Blue Cod Strategy. This issue can be categorised into mortality arising from two sources; poor handling and gear use, and predation of released fish, particularly by shags and barracouta. Commercial potting release mortality is not a significant issue due to selectivity from pot design and therefore reduced handling.

¹⁰ Beentjes, Page & Hamill (2022)

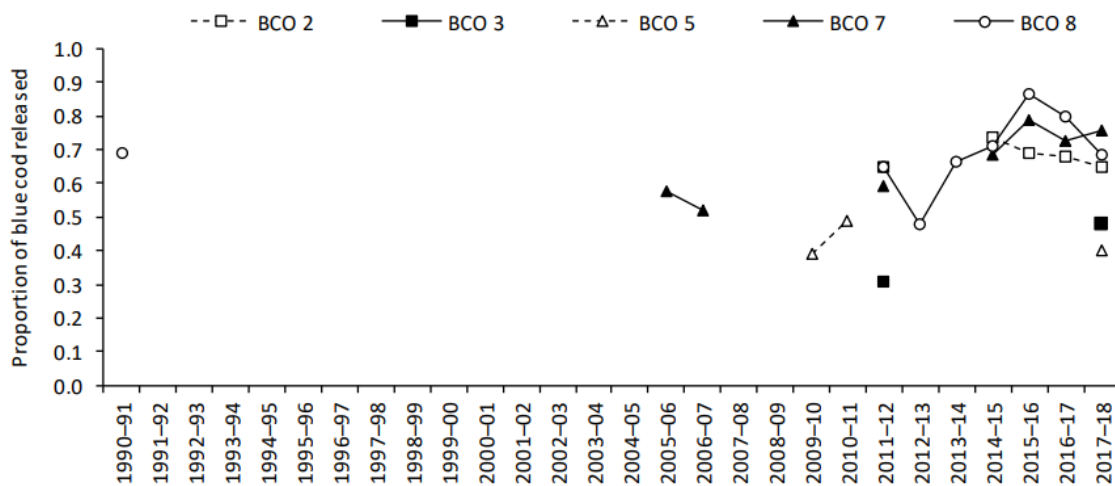


Figure 7: Proportion of reported recreational blue cod catch released by fishers interviewed during ramp surveys, by year and area (Hartill, Holdsworth & Evans, 2020).

Charter vessel reporting and boat ramp surveys suggest that up to 80% of recreationally caught cod (by number) in the Sounds are returned to the water. Previous analysis has used a 25% catch-and-release mortality rate and tested for scenarios of up to 50%¹¹. When considering the most recent NPS estimate of approximately 70,000 blue cod taken by recreational fishers annually, Table 1 gives a sense of the significant amount of cod potentially subject to mortality from poor handling practices, gear choice or predation upon release. It also estimates this in terms of weight if left to grow to the average harvest size (490g). For reference, the estimated retained recreational catch is 35t.

¹¹ Henderson (2009)

Table 1: Estimated potential loss of blue cod to recreational release mortality (assuming 80% release rate, 300g weight per released fish, 35t total catch and 490g average harvest size.

Mortality rate	Number of fish	Pre-recruit weight (t)	Recruited weight (t)
10% (conservative min.)	28,000	8.4	13.7
25% (nominal estimate) ¹³	70,000	21	34.3
40% (anecdotally possible)	112,000	33.6	54.9

While the extent of the predation issue has not been quantified, it is no doubt significant and needs a management response in some form. In doing so, it is important to not focus only on predators as the problem, but also fish handling before return, which also causes mortality. Anecdotal evidence suggests there are issues with poor handling, such as fish left out of the water and on hot decks for extended amounts of time. Research into mortality due to hook damage and handling techniques has found that use of larger, recurve style hooks reduced release mortality¹².

Previous efforts have been made to address release mortality through FNZ publication of fisher guidelines, with advice on hook types, handling methods, and techniques to avoid undersized fish and predation. The Group felt that while education remains an ongoing commitment, these resources have made limited impact in mitigating release mortality for the majority of blue cod fishers. Various release methods have been explored to return fish without predation, yet there is no conclusive evidence on their effectiveness or practicality. Therefore, this issue should currently be managed through minimising catch of undersize blue cod in the first instance.

Poor larval/egg production and distribution

Given the blue cod population is generally male-dominated and based on young fish, the Group recognised that production of eggs and larvae in the area has likely been substantially compromised. Research shows that fecundity (a measure of reproductive ability) differs significantly between the Sounds and Fiordland. While blue cod reach sexual maturity at a smaller size in the Sounds, modelled total fecundity is up to fifteen times higher in Fiordland controlling for population size¹³. This is attributed to a higher average age and greater number of larger females in the Fiordland population.

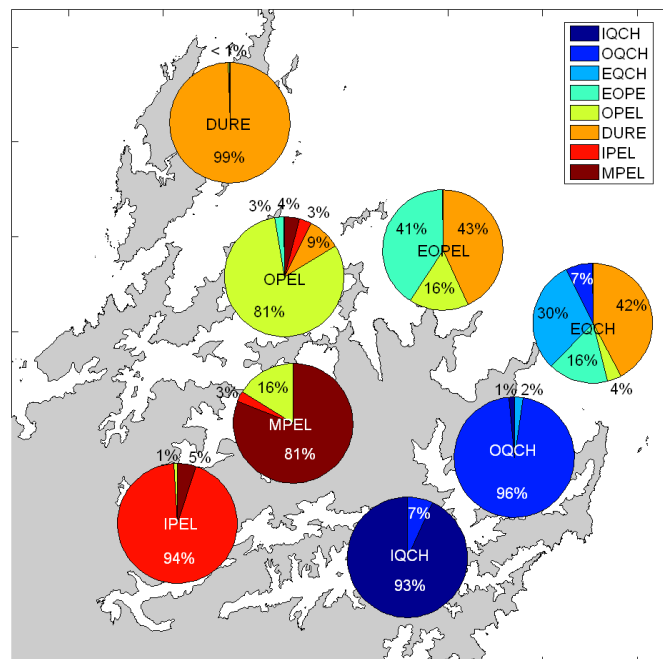


Figure 8: Estimated relative contribution to egg recruitment for each stratum (Knight et al., 2010).

¹² Carbines (1999)

¹³ Kolodzey & Wing (2022)

Modelling undertaken to investigate the possible sources and dispersal of eggs and larvae in the area suggests that the inner Sounds are largely reliant on local egg production, whereas there is some mixing in the extreme outer Sounds¹⁴. It is therefore crucial to have mature fish in the inner Sounds to ensure ongoing egg production and recruitment. The Group noted that available egg distribution modelling is dated and may benefit from updates given recent improvements in hydrological modelling. Information also indicates that the inner Sounds do not currently support substantial numbers of juvenile blue cod, suggesting local egg production is limited. A number of factors alongside egg production may be influencing this.

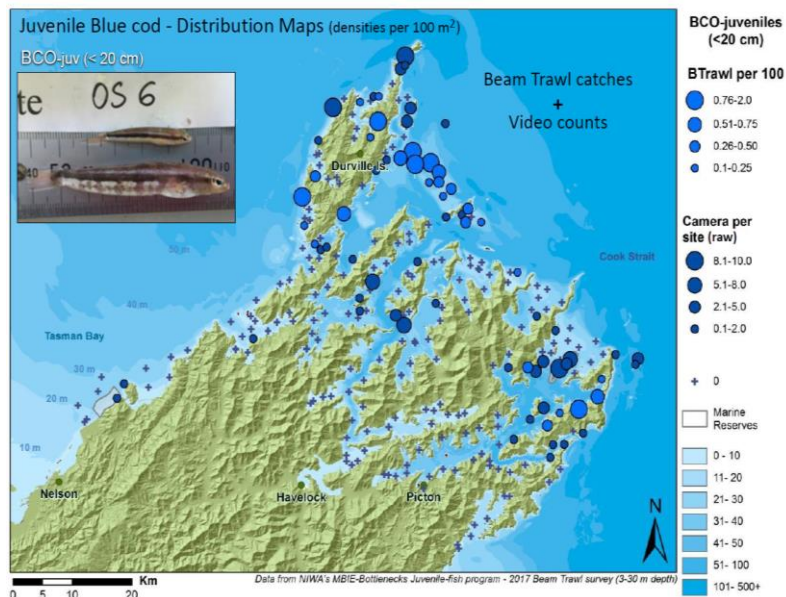


Figure 9: Juvenile blue cod observed in beam trawls and camera tows in the Sounds (NIWA, 2017)

Shift of effort and localised depletion

Low abundance in the inner Sounds and restrictions on fishing may have led to a shift of recreational effort into areas such as D’Urville and Stephens/ Takapourewa islands, or concentration to the limited remaining points within the inner Sounds still supporting blue cod.

Anecdotal evidence from Group members is that recreational fishing activity is highly concentrated in small areas of the inner Sounds, especially over summer. These small areas may be targeted by multiple vessels at a time and visited repeatedly throughout a day by different vessels. When considering the characteristics of blue cod, there is local depletion within a very short time.

Several members also raised concerns around substantial increases in recreational vessel numbers and effort in adjacent areas outside of the seasonal closure, such as Cook Strait/Raukawa, Port Underwood/ Te Whanganui, the Brothers/ Ngāwhatu Kai-ponu, and western D’Urville Island. The male dominated sex ratio and lower catch rates in Cook Strait (especially south of Tory Channel/ Kura te Au) may be partly due to the area currently remaining open during the seasonal closure, noting this area has historically been understood by some to hold fewer blue cod.

Inconsistency of uptake of previous management advice

Upon reviewing previous management actions, the Group has identified concerns around how advice on measures was factored into implementation in the past. Members felt that the early reopening of the fishery in 2011 did not allow for sufficient time to develop supporting measures to maintain the benefits associated with the closure. Further, some argued that advice from the BCMG on specific settings of the slot limit was not followed, rendering the slot limit ineffective in protecting spawning biomass and inadvertently exacerbating issues around release mortality and high grading.

¹⁴ Knight et al. (2010)

Most clearly, the BCMG's recommendation to introduce a seasonal closure from 1 September – 1 February annually was modified upon implementation, to allow for some blue cod fishing during the summer holiday period. Therefore, it is imperative moving forward to consider the advice of the Group as a whole, including the relationship of potential measures in regard to each other.

Lack of information on scale and spatial distribution of recreational harvest

Current recreational catch and effort information is collected through the NPS every four to five years and annual Waikawa and Nelson ramp surveys. NPS estimates are derived from surveys of randomly selected fishers and scaled to an average fish weight. Ramp surveys provide indices to describe relative trends of vessels numbers, proportion of boats used for fishing and harvest rates by species. The Group raised the following concerns:

- Ramp surveys don't capture non-trailer vessels, catch eaten at sea or baches, nor other ramps in the Sounds and lower North Island. FNZ noted that despite this, indices reflect wider trends.
- Information cannot capture shifts in effort or the risk of localised depletion. The NPS provides the finest scale data, with information available at a Pelorus, Queen Charlotte and Cook Strait level.
- Recent ramp survey results suggesting a decrease in number of vessels fishing don't align with members' observations in the outer Sounds and D'Urville Island, plus recent expansion of many boat ramp facilities.

Many members consider that these factors hinder the effective and proactive management of recreational catch, as well as sufficient accommodation in setting catch limits and allowances.

Habitat degradation from fishing

Degradation of blue cod habitat presents a major issue for the Sounds population, as identified in the National Blue Cod Strategy. The Group considered that non-fishing stressors, such as sedimentation from land-based activities, play a significant role in this currently (discussed in following section). There are also some concerns about impacts of current and potential biosecurity threats.

Within the scope of fisheries legislation, there was general consensus that while dredging and trawling had previously impacted on some biogenic habitats and resuspended sediment, these activities are now largely absent within the internal waters of the Marlborough Sounds. Research presented to the Group indicates that patches of biogenic habitat and shell hash still show signs of disturbance from historical recreational and commercial dredging and trawling in some areas¹⁵.

Some members raised concerns around the lack of a total trawling prohibition, the contribution of such a technique on further degradation of habitat within the sounds, as well as impacts of outer Sounds effort for immigration of fish into the Sounds. Several members noted that trawling does not occur regularly in the outer Pelorus Sound and is generally focused away from key blue cod habitat areas. Marlborough District Council's *Ecologically Significant Marine Sites* programme monitors several potential blue cod habitats, and the proposed Marlborough Environment Plan Variation 2 (if given effect as proposed) would see trawling and dredging prohibited in category A and B sites, including adjacent areas of various offshore islands and other blue cod habitats across the Sounds.

Issues not addressable under Fisheries legislation

Sedimentation from land-based activities

Sedimentation arising from land-based activities has previously been described as one of the top threats to New Zealand's marine habitats¹⁶ and noted by previous local advisory groups as a priority issue. In Pelorus Sound, recent work for MDC¹⁷ has found that sediment accumulation rates have increased tenfold over the past 100 or so years, reflecting significant changes in land cover and activity changes. Satellite imagery after significant rain events clearly illustrates the extent of this

¹⁵ Morrison, 2017

¹⁶ MacDiarmid et al. (2012)

¹⁷ NIWA (2021)

issue, with large plumes visible especially in the Pelorus Sound. Fine sediment is likely degrading key blue cod habitat, the wider productivity of the inner Sounds ecosystem and continually being resuspended by water movement. Anecdotal evidence indicated that fine sediment seabed environments (muds) are continuing to become increasingly prevalent in the MSA at the detriment of coarser sand, shell hash, cobble and reef environments. The current management, policy and legislative frameworks limit coordinated action to mitigate external stressors on the marine environment.



Figure 10: Sediment plume in Pelorus Sound following a rain event (Cawthron Eye, 10 July 2018).

Public perception of the Marlborough Sounds fishery

Given the historic high abundance of blue cod and other species, and tradition of summer holidaying and boating, a widespread public perception has developed of the Marlborough Sounds as a prime, inexhaustible and abundant fishing destination. This has been somewhat promoted in the past through tourism messaging and word of mouth, however the Group considered it no longer reflects the true state of the population and is likely compounding heavy fishing effort. Within the scope of fisheries legislation, regulations need to reflect values and attitudes that contribute to sustainable fishing and management.

Acknowledging the role that tourism and summer holidaying plays in the local economy, efforts need to be made to encourage visitors to engage in a wider range of non-fishing activities and better communicate the true state of the regions fisheries, such as blue cod. If visitors are more aware of the issues identified, and the evidence behind them, buy-in to more responsible and sustainable fishing practices will likely have benefits for the fishery.

Potential measures tabled for discussion

Following identification of fishery issues, members tabled any measures that they felt may address these for consideration. These were then circulated for individual comments and Group discussion against the following criteria; link to fishery issue(s), ability to implement, information and research requirements, impacts on fishery users, policy/strategic alignment and overall pros and cons. From this, nine measures were identified for further discussion and four referred to FNZ for follow-up action. An overview of the Group's comments for each measure is provided in Table 2.

Table 2: All measures tabled by the Group (specific to blue cod in the Marlborough Sounds Area unless otherwise stated). Those discussed in detail are highlighted blue, or grey for FNZ action.

Type	Measure	Comments
Gear	Educational campaign around best practice hook types and return methods.	Limited previous impacts but an ongoing commitment with potential incremental improvements, especially shifting MSA marketing from an abundant fishery to a holiday destination.
	Review harvest method regulations	Impacts of recreational and commercial set-netting, long-lining as well as trawling in the outer Pelorus discussed.
	Minimum recreational hook size/shape/barb standards for all fishing.	Previously discussed in other advisory groups, with issues around a lack of industry standard in hook sizes and shapes meaning it is not feasible to regulate this.
	Transition to recreational potting fishery.	Not considered viable given low bag limit and ongoing release mortality when rod fishing for other species.
	Use/possession of return devices required for all recreational vessel fishing.	Not feasible until return devices are identified and proven to be effective. Research required to better understand the magnitude of the release mortality issue .
Info and access	Recreational catch reporting.	Seen as necessary, would need to be mandatory to provide best information for management purposes.
	Ballot system or licensing.	Supported by some members but acknowledged as unlikely without broad political support.
Catch and size limits	Extension to the blue cod seasonal closure.	Potential to significantly reduce fishing effort, with support of local communities.
	Reduced combined daily bag limit from 20 fish.	Impact dependent on limit. May reduce overall effort and blue cod release mortality, while encouraging more sustainable practices. However, some concerned about setting a limit based on opinion rather than evidence of benefit for blue cod.
	Revised slot rule.	BCMG 2009 proposal (33-45cm) or one >50cm fish discussed. Consensus of poor past results and release mortality concerns.
	Vessel limit for blue cod.	Individual bag limit of two considered sufficient at vessel level.
	'Keep what you catch' requirement for blue cod.	Would not address release mortality unless accompanied by an enforceable stop-fishing rule.
Closures and spatial measures	Discrete spawning recovery areas closed to all fishing.	Would increase egg production in the Sounds and potentially avoid broader closures.
	Temporary total closure of blue cod take.	Potential high impact triage measure but many members considered not necessary at this stage given other measures.
	Extension of red traffic light setting to the Brothers (areas of BCO 2 & 8).	FNZ to investigate potential approaches to improve consistency in this area. Currently incentivises localised depletion with three different bag limits.
	Seasonal closure for all fishing.	Most effective, however longer immediate economic impacts than blue cod seasonal closure.
	Extension of seasonal closure to west D'Urville.	Would lead to ongoing extensions, as fishers simply move to new boundary.
	Mātaitai, taiāpure or s.186B temporary closures	To be explored and advanced by local iwi.
Restoration	Habitat restoration	Potential to accompany other measures. Requires action on underlying causes of degradation, some of which can be managed under the Fisheries Act.
	Restocking or transferral of blue cod	Potential to accompany other measures. Requires action to address high fishing pressure.
	Improved land-based activity management	Better understanding of current work needed. Needs to be part of integrated approach to managing the fishery.
Compliance	High-grading offences	Already illegal and faces enforcement constraints.
Other	Prohibit blue cod fishing competitions.	Engage with organisers and encourage removal of blue cod categories, or a move to average or randomly drawn size as winning criteria.
	Address inconsistencies with BCO 2/7/8 bag limits.	FNZ to explore this issue, with various bag limits potentially presenting risk of localised depletion around offshore islands.

Advice on regulatory measures

A range of regulatory, voluntary and project-based measures were identified for further discussion. Issues were discussed in detail. Members noted that regulatory measures with immediate impacts are needed, as part of a broader package of longer-term or ‘horizontal’ rule changes and non-regulatory actions. Overall, three broad themes consistently arose:

- The Marlborough Sounds is a finite environment not capable of sustaining current high fishing pressure on blue cod and some other species. Given concerns around portrayal as an iconic fishing destination, communications and appropriate regulatory settings should promote a shift in attitudes and perceptions of the fishery.
- Action is needed to acknowledge environmental stressors and progress an integrated management approach, especially in regard to sedimentation, bottom-contacting fishing activities and the effects on habitat. Members felt that actions to improve blue cod abundance might be stymied by ongoing cumulative stressors.
- Any new regulatory measures need to be consistent with existing rules, maximise compliance, avoid confusion and remove loopholes which enable localised depletion. This includes ensuring that adjacent areas, particularly western D’Urville Island, the open coast south of Tory Channel, and Port Underwood are not adversely impacted through transfer of effort.

Extension of the blue cod seasonal closure in the MSA

The Group broadly agreed that while for the purpose of protecting cod during the spawning period, the seasonal closure has effectively reduced fishing pressure, with clear potential to further support sustainability through an extension. The closure was introduced in 2011, limited to recreational fishers between 1 September and 19 December. BCMG advice and the option consulted on was for closure until 31 January, to both provide protection to spawning fish and to reduce fishing pressure (given most recreational effort occurs in January)¹⁸. However, this did not proceed after opposition during consultation and the fishery was only closed during the height of spawning. The closure was extended to commercial fishing in 2015 but dates remained the same. Extension of the closed season would reduce recreational effort and associated mortality, noting it would require other actions focused on issues beyond effort. A range of possible dates could be canvassed during consultation.

Provision for self-generating sustainability - link to fishery issues

If extended, this would significantly reduce fishing effort which is causing mortality to exceed a sustainable level. Current information¹⁹ shows around 25% of total annual blue cod catch in the Sounds occurs in the last weeks of December upon reopening, and a further 35% during the month of January. Intense seasonal effort may occur regardless of opening date, with members observing a “reopening goldrush” mentality, however this could be substantially reduced by moving reopening later in relation to the peak holiday period. By reducing harvest of legal-size blue cod, this may also improve population structure and egg production.

Some members were concerned that an extension may exacerbate release mortality, given fishers would still be in the area and potentially catching cod when targeting other species. Existing issues around effort shift to surrounding areas during the closure may also be exacerbated to some degree. However, the Group considered benefits outweigh these concerns, given the 2008-2011 closure faced similar concerns yet still significantly increased abundance.

Provision for utilisation – potential impacts and benefits

Noting that commercial catch is primarily managed through catch limits and should continue to be, the Group agreed any closure extension could reduce recreational effort while seeking to avoid reducing commercial access during key periods. In saying this, members acknowledged that an extension for both sectors would maximise public buy in and ease the implementation process.

¹⁸ Batstone et al. (2009).

¹⁹ Wynne Jones et al. (2019)

Those with industry expertise suggested that extension to 31 December or 5 January would have minor effects, after which closure would limit ability to meet market demand. Some felt that a closure until the end of January was necessary, however there was disagreement on whether this could apply to both sectors given the points above.

Alignment as part of a long-term management approach

This could serve as a short to medium term measure with immediate triage benefits in addressing high fishing effort. Some members felt that an extended closure should be implemented preceding other more permanent measures, as a triage tool and to enable review in the medium-term and potential removal if other measures prove effective. Importantly, it would align well with an overarching communications strategy to drive more sustainable attitudes for interacting with fishing.

Practicality of implementation and enforcement

Previous opposition to a seasonal closure into January has to be acknowledged, especially among bach owners, holiday makers and those seeking access during the holiday period. However, the Group considered this measure would receive greater support during consultation with better communication of the scale of fishery issues. It was also noted that alternative fisheries are more readily accessible now than previously with increasing abundance of snapper, gurnard and kingfish.

Local residents, recreational and commercial fishers would likely support this measure, subject to dates and accompanying proposals. The existing closure already sees high compliance. While changes would have to be well communicated, no obvious compliance issues would be created.

Temporary total closure of blue cod take in the Marlborough Sounds

Given the poor current state of the population and the proven impact of this measure in the past, the Group considered the appropriateness of another temporary closure. Historical potting survey results demonstrate that the 2008-2011 closure of the Sounds (see figure 11) to blue cod take was highly effective, despite ongoing fishing effort targeting other species. However, the majority of members considered a further closure unnecessary if other measures can be progressed while a few deemed it appropriate to address the poor state of the internal Sounds.

Provision for self-generating sustainability - link to fishery issues

This measure would significantly, albeit temporarily, reduce fishing effort and associated mortality in the area concerned. Those who supported this measure felt it delivers the greatest degree of certainty in avoiding a further decline in abundance, given its past success. It could enable rapid recovery of a healthy population structure, spawning biomass and egg production in the Sounds however past experience shows that any enduring benefits would rely entirely on accompanying and subsequent measures. There are also concerns that total closure of a defined area could exacerbate effort shift and localised depletion where the boundary was within reach of day-trip vessels.

Provision for utilisation – potential impacts and benefits

This measure would have the greatest immediate negative impact on utilisation opportunities of all discussed. The existing seasonal closure applies for 3.5 months annually, meaning a total closure would equate to an 8.5-month extension. As a consequence, immediate impacts on the local economy and fishing-related business could be significant. However, it could also lead to improved utilisation opportunities in the long-term if accompanied by other appropriate ongoing measures.

Alignment as part of a long-term management approach

There was robust discussion around whether such a drastic triage measure is required, if other measures such as an extended seasonal closure, discrete (spawning recovery) area closures, or reduced combined bag limit could be introduced swiftly. Most in the Group felt that if a total closure could be avoided through these other measures, this would be more effective and preferable, potentially receiving far greater public buy-in. However, a few members felt strongly that a closure is needed as a significant triage action.

Practicality of implementation and enforcement

The Group noted that this measure may receive significant pushback from recreational fishers during consultation or threaten public support for other promising measures which may affect recreational access, such as discrete closed spawning recovery areas. This is important as any long-term benefits would depend on additional measures being introduced.

The previous closure applied to an area roughly capturing the internal waters of Pelorus and Queen Charlotte Sounds (see Figure 11). The Group debated whether a closure to this area could be justified again, or potentially be applied to a smaller area of the inner Sounds. Some considered a closure at the 2008 scale unwarranted, while others felt that a smaller closure area in the inner Sounds would increase the risk of a shift in effort and localised depletion outside of the boundary. The Group did agree that if pursued, this measure would demand transparent closure objectives, monitoring and reopening criteria, and a formal commitment to accompanying measures to realise long term benefits. Previous experience from the 2008-2011 and seasonal closures suggest that enforcement of a total closure would not present significant new challenges.



Figure 11: Area subject to the 2008 – 2011 blue cod fishing closure (blue no-take area).

Discrete areas closed to all fishing (spawning recovery areas)

The Group generally considered that local area closures in areas of suitable habitat (especially in the internal Sounds) will serve as an effective targeted measure to address population issues, while minimising wider impacts associated with more blunt closures. There are two existing finfish closed areas in the Sounds under fisheries legislation (see Figure 12). While impacts of the Maud Island closure have not been monitored, Long Island Marine Reserve potting survey results show a significantly higher abundance, more balanced population structure, and greater proportion of large fish. Over time, closed areas would result in discrete populations with normal age structure and sex ratio, including a large number of large adult females, which may seed adjacent areas with eggs and larvae. Many in the Group prefer this measure over a temporary total closure of the internal Sounds.

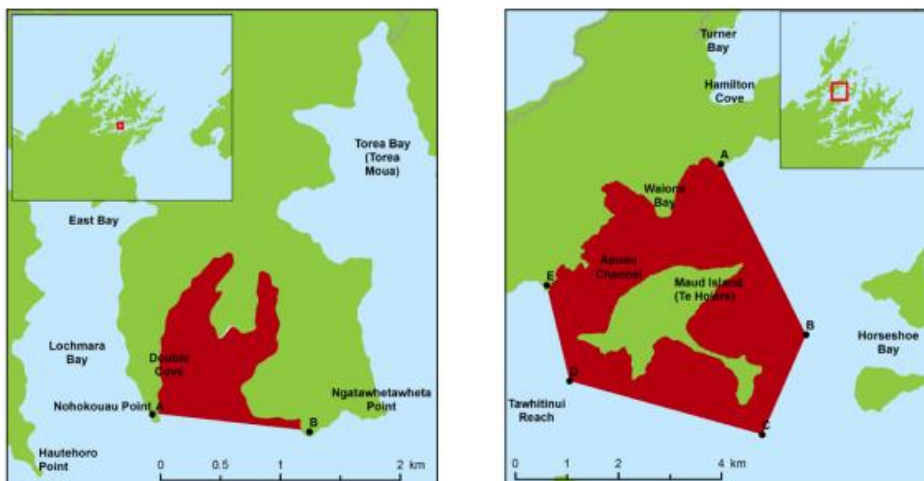


Figure 12: Double Cove (left) and Maud Island (right) Finfish Closed Areas.

Provision for self-generating sustainability - link to fishery issues

Sites of suitable adult habitat could be identified where larvae from improved egg production would be broadcast to juvenile habitat. Spawning recovery areas in these locations could have adequate term effects in improving egg production and population structure, especially in key areas of concerns such as the inner Sounds. It was seen as the measure most likely to meaningfully address the spawning biomass and egg production problems and ensure a self-sustaining population.

However, the Group considered that the spill over effect of abundance from existing closed areas is unknown but appears limited, likely due to existing recreational fishing pressure. While this measure might not have significant effects across the wider area, it would greatly improve the resiliency of the population to environmental and fishing-related stressors. For this reason, the Group concluded that benefits for egg production would outweigh the potential issue of shifted effort, given closed areas would be relatively small and localised therefore not impacting significantly on fishing activity.

Provision for utilisation – potential impacts and benefits

To ensure that these areas provided tangible medium to long term utilisation opportunities any closure would require a commitment to ongoing monitoring, with the possibility to reopen if positive effects were not seen in the longer term.

While local area closures would have less impacts on access and utilisation across the wider fishery than a temporary total closure, their discrete locations create potential for significant impacts for resident fishers within those areas. Members noted that if pursued, these areas should be placed in less populated areas (such as Blumine Island) and take into account key residential bays and fishing grounds. This would avoid undue impacts on local residents and bach owners. The Group also discussed necessary scale of closures, with FNZ scientists suggesting closure of around 5-10% of the MSA should have a meaningful and visible impact on abundance.

Alignment as part of a long-term management approach

This measure would require analysis to identify suitable potential sites before implementation, data is already available through multiple sources. FNZ advises that this could occur in the upcoming year to see potential closures in place in 2025, if pursued. Many in the Group agreed that spawning recovery areas would be a better fit as part of a package of measures than a temporary total closure, given they would avoid the abundance loss upon reopening of a temporary total closure. However, benefits might not be seen in such a quick timeframe. Some members considered that within time, other measures such as the seasonal closure could be revoked if discrete area closures proved successful. Ultimately, most felt that if this measure was implemented, others would still be required to immediately reduce fishing effort in some form.

Practicality of implementation and enforcement

As noted above, this measure would require research to combine existing habitat, environmental and biological data to identify potentially suitable sites, which could occur within the upcoming year. Following this, FNZ would need to develop a range of possible sites and undertake public and targeted consultation. Resistance from local property owners and affected fishers was raised as a potential barrier, however most members considered that if kept to reasonable locations and scale, support would be widespread upon understanding the need for action and alternative blunt closures. Point-to-point closures are significantly more interpretable for the general public and enforceable for FNZ marked boundary coordinates. There were no concerns about enforceability of area closures.

Reduction of the combined daily bag limit in the MSA

In discussing ways to mitigate release mortality, members noted that hook types, handling and release methods are generally difficult to regulate. Previous efforts around hook sizes/ types faced issues due to variations across manufacturers, and lack of evidence of efficacy and viability of release devices to minimise predation constrains a regulatory approach. Therefore, the Group generally agreed that release mortality is currently best addressed by reducing catch of vulnerable fish.

One approach supported by many members was to reduce the combined daily bag limit, with the intention of reducing overall recreational effort, time spent fishing, and release mortality. They felt it would also contribute to more sustainable and less extractive fishing practices/ attitudes. However, some opposed a reduction. Concerns included a lack of evidence of tangible benefits for blue cod and the risk of making any reduction based on opinions of ‘reasonable take’ in place of this evidence.

Provision for self-generating sustainability - link to fishery issues

This measure was tabled as a tool to reduce release mortality, through driving reduction in total effort. Most members considered the current limit of twenty finfish to be excessive in the context of the Marlborough Sounds and potentially exacerbating blue cod release mortality. Those who supported a reduction felt it would (i) reduce effort and therefore the number of cod being caught and released as bycatch, and (ii) prompt a change in fishing attitudes leading to increased focus on reducing the impacts on blue cod. In order to ensure consistency and avoid significant shifts in effort, some suggested a reduced limit be applied to the wider area, such as the Marlborough Harbour limit.

A few members raised concerns that a reduction had unclear impacts for blue cod and may even incentivise high grading, compromising expected benefits. To address this, a complementary stop-fishing rule²⁰ for blue cod was discussed. Those who opposed a reduction felt the stop-fishing rule in itself would have greater effect. All agreed that better information around recreational fishing and release mortality would aid consideration of a combined bag limit as a potential measure.

Provision for utilisation – potential impacts and benefits

To meaningfully reduce overall effort with the intention of reducing release mortality for blue cod, most felt a reduction to 5-10 finfish would likely be necessary (see Table 3). Available information suggests the current limit of 20 is rarely taken, especially by casual fishers, holiday makers, or those targeting blue cod. For reference, current individual bag limits for key recreational species in the Sounds include; three snapper, two blue cod, two hapuku, three kingfish. Catch of species such as tarakihi and gurnard are constrained by the combined daily bag limit to a maximum of 20.

Those most affected by a combined daily bag limit reduction would likely be recreational fishers in the outer Sounds on multi-day trips or those who fish less regularly. Those who opposed this measure considered that a 50% or more reduction would seriously impact access, especially when, in their view, the benefits were unclear. They noted that some species in the Sounds were doing well (e.g. snapper and gurnard), so instead looking at the bag limits of species under threat or without individual limits may be a more prudent and targeted approach to reduce effort.

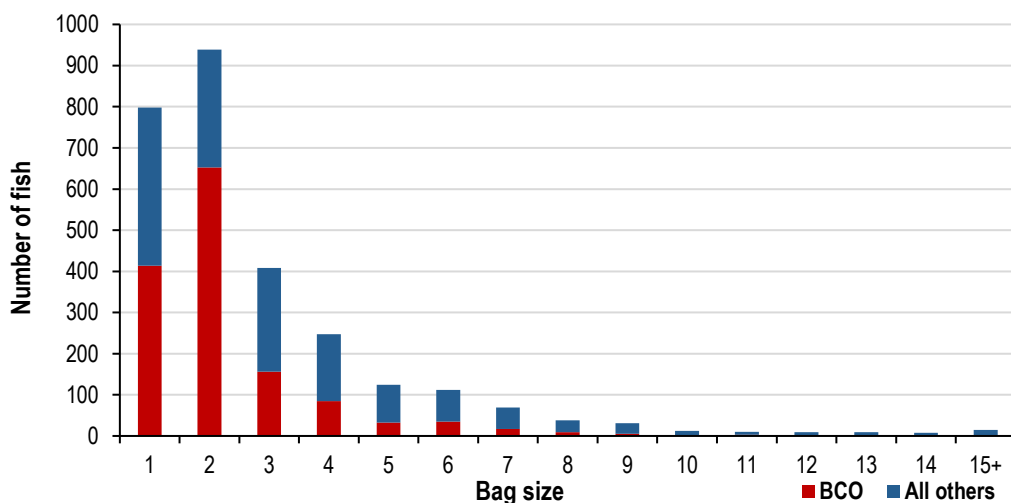


Figure 13: Catch composition by bag size in the Sounds (derived from FNZ-held ramp survey data).

²⁰ When you have caught the daily limit for blue cod, you are required to stop fishing for the day. Intended to encourage targeting of species outside of blue cod preferred habitat, thereby reducing effort and associated mortality for blue cod.

Table 3: Potential reduction in overall catch for all species in the Sounds with a reduced combined daily bag limit (derived from FNZ-held ramp survey data).

Combined daily bag limit	5	6	7	8	9	10	12	14
Potential reduction	11%	7.1%	4.7%	3.2%	2.1%	1.4%	0.5%	0.1%

Alignment as part of a long-term management approach

A reduced combined daily bag limit was seen by many as an effective effort reduction measure with an ongoing longer-term effect, the scale of which would depend on the extent of a reduction from the current limit and any changes in recreational participation. It would align with a communications strategy to shift perceptions of the area away from that of an abundant and inexhaustible fishery.

Practicality of implementation and enforcement

While this measure would require a regulation change, it would pose no obvious compliance issues. There may be consistency issues between the Challenger East and Marlborough Sounds areas.

Recreational catch reporting for all species in the MSA

The Group discussed potential actions to increase the quality of recreational catch data, especially in order to manage at a finer scale and avoid localised depletion. Acknowledging that tools are available for voluntary reporting of blue cod catch in the Marlborough Sounds, the Group had some concerns around poor uptake and quality of information collected. In particular, relying on fishers to report voluntarily creates a self-selected sample and hinders use of data in management decisions. Therefore, most members supported mandatory catch reporting for all species in the Sounds

Provision for self-generating sustainability - link to fishery issues

In the view of those that support this measure, it would likely improve the quality of data on recreational catch, enabling improved management of recreational effort and catch including mitigating shifts in effort and the potential for localised depletion. Several members noted that benefits of mandatory reporting seen in the commercial sector. Others dispute the true level of data quality improvements that could be expected, given uptake would rely on enforcement and reports would be difficult to monitor for accuracy.

Provision for utilisation – potential impacts and benefits

This measure would not obviously reduce utilisation opportunities in itself, but members note it may potentially act as a barrier to certain groups of fishers depending on the system chosen (such as a mobile app). Concerns were also raised around the general principle of placing additional conditions on recreational catch, such as taking the spontaneity and the leisure nature out of fishing.

Alignment as part of a long-term management approach

This would be a medium to long-term accompanying measure, with benefits for management not immediately available. Those who support it considered it an effective measure to drive a wider change in attitudes towards fishing in the Marlborough Sounds and encourage individual/collective responsibility for sustainable fishing.

Practicality of implementation and enforcement

The Group acknowledged that if pursued, an extensive feasibility study would be required to identify a model and technologies for reporting. Overseas systems vary widely, with paper reporting, apps, or through a fishing license. If regulated, any system should be proven as reliable and accessible for all.

The Group agreed there would likely be strong public and political opposition initially, as shown by past discussion on the matter. Some felt this could be overcome with extensive socialisation and consultation on the concept to ensure recreational access rights are not impinged, while others are more sceptical. Several members noted that while they do not like the idea of having to report catch, understanding the need for information and personal responsibility motivates participation.

Advice on voluntary measures and restoration projects

Beyond regulatory measures, there are opportunities to address issues through education, voluntary measures and projects to mitigate environmental impacts. These are unlikely to have a substantial impact in themselves but may promote sustainable fishing behaviours or drive longer-term change.

Educational campaign and communications strategy

While previous educational approaches to improve handling, gear use and release practices have had limited impact, there was widespread agreement that education remains an ongoing commitment. Moving forward, ongoing funding is needed for an advertising and education initiative specific to the Marlborough Sounds, including engaging external media and multi-platform marketing expertise.

This could include targeting best practices resources to groups such as holiday makers and youth and emphasising the need for action by more clearly articulating the scales of the fishery issues. Through engaging with local stakeholders, such as MDC, iwi, Destination Marlborough, Port Marlborough, tourism providers and residents' boards, messaging around the Marlborough Sounds as an abundant fishing destination needs to be modified to reflect current sustainability issues and promote a wider range of non-fishing activities.

Provision for self-generating sustainability – link to fishery issues

Whilst this measure would not significantly improve abundance and sustainability in the short-term, it would contribute to a long-term shift in attitudes and interactions with the fishery to minimise impacts of recreational fishing pressure. It is seen as the best available measure to reduce release mortality through gear, handling and release practices, given difficulties associated with introducing regulations. It may also assist in reducing overall recreational fishing effort, to a limited degree.

Provision for utilisation – potential impacts and benefits

This measure would have no immediate impacts on utilisation. If it contributes to reduced release mortality in the medium to long term, it would improve opportunities for utilisation through harvest.

Alignment as part of a long-term management approach

An educational and communications strategy should accompany any package of measures, as an ongoing commitment. The Group felt that certain regulatory measures would give teeth to revised messaging on the state of the population and need for action, which are identified in this report.

Practicality of implementation

Improving public awareness of the true state of the population could start with FNZ developing and promoting accessible resources on the issues identified by the Group during consultation on proposed measures. Existing best practice resources could be amended accordingly, with a distribution strategy to target key groups.

Restocking and translocation of fish

Juvenile snapper have previously been released in the Sounds and the blue cod life cycle has been successfully completed in captivity; however release of hatchery reared fish is expensive and has not been widely successful. Recognising the successful live-market blue cod fishery the Group considered that restocking using translocated fish could be viable to accelerate abundance in spawning recovery areas. Clear and measurable objectives would be required, with particular care needed to ensure no adverse impacts on areas where fish are sourced from.

Provision for self-generating sustainability - link to fishery issues

Restocking in conjunction with local area temporary closures or other measures to reduce fishing effort may speed up recovery of population structure, spawning biomass and egg production.

Provision for utilisation – potential impacts and benefits

This measure would not impact on access but may have long term utilisation benefits if, in conjunction with other measures, it increases egg production and recruitment in the population. In particular, it should not be seen as a tool to enable ongoing unsustainable levels of fishing effort.

Alignment as part of a long-term management approach

Under some management measures, transferral of fish could accelerate recovery rather than being a measure in itself. In particular, restocking through transferral may fit well with “kick starting” spawning recovery areas. Members considered it not worthwhile in unprotected areas or where fishing pressure is left unaddressed, as gains would be quickly lost. Research, such as tagging studies, to quantify numbers of blue cod to achieve recovery objectives would be required.

Practicality of implementation

This process would require a special permit which currently requires a 3 month lead in time.

Supporting habitat restoration projects

Evidence shows degradation of suitable blue cod habitat in parts of the Sounds from sedimentation, aquaculture footprints and historical disturbance from dredging and trawling. Noting that action must be taken to address the underlying causes, there is also potential to progress restoration with catchment initiatives, reduced bottom-contact activity, and active restoration where appropriate.

Relevant projects include Te Hoiere catchment restoration, Sustainable Seas Tōtaranui/ Queen Charlotte shellfish restoration, Marine Farming Association’s mussel bed restoration, and exploration of use of shell hash in the Southern Scallop Strategy. The Group considered that these projects should be supported where aligned with positive outcomes for blue cod but noted that there was little point in attempting to restore habitats or installing artificial ones if those locations were still likely to be subject to elevated sedimentation which could quickly render them unsuitable habitat.

Provision for self-generating sustainability - link to fishery issues

This measure could mitigate impacts of fishing-related habitat degradation and if successful, increase population resiliency by improving egg production and recruitment, especially in the inner Sounds.

Provision for utilisation – potential impacts and benefits

This measure would not reduce utilisation but may potentially improve sustainability of fishing in the internal Sounds. Some raised concerns that, as in other areas where artificial/restored habitats have been created, any restored habitats may become highly targeted fishing spots given poor wider abundance of blue cod.

Alignment as part of a long-term management approach

This is a potential accompanying measure to others which address fishing effort, population structure and spawning issues. It is not a valuable pursuit if action on the underlying stressors causing degradation isn’t taken prior to and in conjunction with the project. It could contribute to an integrated ecosystem-based management approach for the Sounds.

Practicality of implementation and enforcement

The Group considered the best course of action is for FNZ to actively support existing restoration projects with resourcing and information and seek to align objectives with positive outcomes for blue cod where possible.

Additional advice for wider management

Actions for FNZ for follow up or immediate action

Members noted an issue of consistency in bag limit setting for the Brothers in Cook Strait, which sit on the boundary of BCO 7, 2 and 8. This means that varying bag limits of two, ten and twenty apply when fishing on different parts of the coast of these islands, creating an incentive for localised depletion. FNZ has agreed to explore technical regulatory changes that may address this.

The Group also discussed suitability of various harvest methods within the Sounds, including longlines, setnets and trawling. Some considered the current two hook per line regulation conflicted with the legal presence of longlining with twenty or more hooks. Members acknowledged that these methods are not generally used to target blue cod but rather gurnard, snapper or butterfish, often in areas not known for blue cod. FNZ agreed to examine the consistency of current regulations.

Lastly, several members felt that recreational fishing competitions targeting blue cod do not reflect the state of the population and the significant management actions being considered. The Group agreed that FNZ and members should engage with competition organisers to encourage removal of blue cod categories or length-based prize criteria. Providing accessible information on the state of the population and current issues during public consultation on measures may also assist with this.

Addressing issues outside the scope of Fisheries legislation

All members considered there has been increasing stress on the marine environment, particularly in Pelorus Sound. To address stressors contributing to poor blue cod abundance, improved land-based activity management and consideration of impacts on the marine environment in planning is clearly needed. Advisory groups have long been calling for this, with one barrier being a disconnect between key pieces of legislation and the local and national agencies that administer them.

A coordinated and integrated approach is needed in managing the marine/ terrestrial environments. The Group encourages broader action to build collaboration between regulators and account for external effects of land-based activity. Sustainable Seas research on ecosystem-based management and the Te Kotahitanga mō te Taiao project provide examples of how this may be progressed.

Research and investigation needs

The Group also identified the follow research and investigation which would be of value:

- Analysis to identify potential spawning recovery area sites to increase egg production.
- Expansion of the potting survey to include Stephens Island, which is an important commercial fishing area and appears subject to increasing recreational effort.
- Inclusion of Maud Island as separate stratum in the potting survey, to monitor the impacts of the closure on local abundance and population structure, specifically sex ratio.
- Investigating potential methods to quantify the scale of release mortality due to predation.
- Tagging studies to monitor the current state of blue cod movement in the MSA.
- Inclusion of additional locations for recreational ramp surveys and investigation of ways to attain information from non-trailer boat fishers.
- Sampling to detect levels of eggs and larvae in the inner Sounds.
- Implementation of a recreational catch reporting case study in the MSA

FNZ has taken these recommendations into research planning discussions, with some science providers expressing interest in performing these projects. Projects to identify Habitats of Particular Significance for blue cod in the Marlborough Sounds, as well as wider habitat restoration and identification of areas of high biodiversity are also underway externally and internally.

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