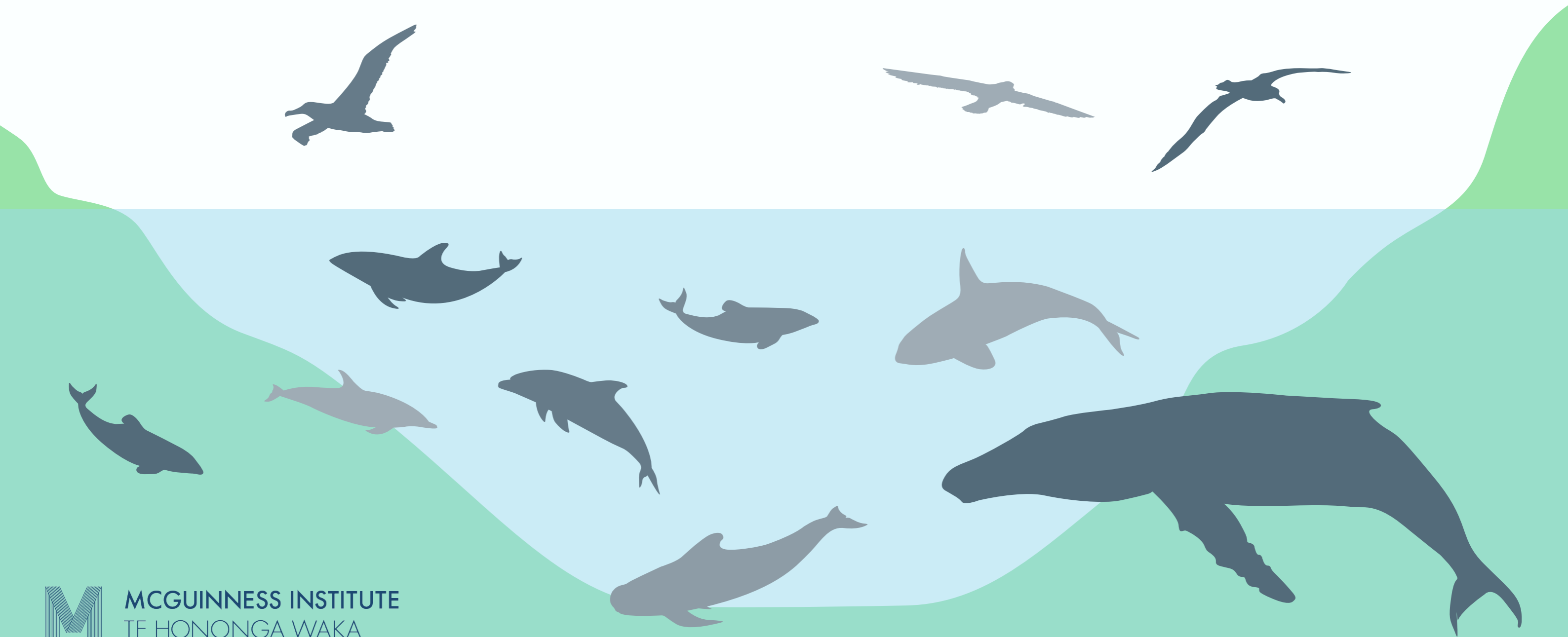


# Exploring the role of aquaculture in our marine space

Infographics relating to McGuinness Institute's OneOceanNZ project as at 1 September 2023



# Preface

The McGuinness Institute continues to explore ocean management under our OneOceanNZ project. Given the size and variety of New Zealand’s ocean territory, we decided early in the project to focus on the Marlborough Sounds, with a particular emphasis on the impacts of salmon feed (and the resulting faeces) on the environment. The only company that undertakes salmon farming in the Marlborough Sounds is New Zealand King Salmon (NZKS).

## NZKS – the case study

A recent application by New Zealand King Salmon (NZKS), the Blue Endeavour (open ocean) farm application, received a consent to operate in the external waters of Cook Strait (beyond the internal waters of the Marlborough Sounds). That decision has since been appealed by the Department of Conservation (DOC) and the Institute (it is currently subject to resolution of consent appeal).

The Institute is a research institute focusing on New Zealand’s long term future. To this end we have prepared seven infographics to illustrate the current state of our ocean management in the Marlborough Sounds and Cook Strait. When we initially heard of the Blue Endeavour application, we hoped this would mean the internal marine farms in the Sounds would move to Cook Strait. However, this has proved not to be the case. In practice, the internal farms will be used more, in order to support the Cook Strait farms.

Further, our assumption that the internal waters were more important to protect than Cook Strait may not be correct, as many megafauna are unique to Cook Strait. As you will learn in the infographics, Cook Strait is not only considered the seabird capital of the world, but the marine mammal capital of the world. Recent research indicates the importance of Cook Strait as a passage way for megafauna, such as whales and sharks, and smaller marine mammals, such as dolphins. At least one international map identifies Cook Strait as an ecological hotspot lacking the appropriate marine protection.<sup>1</sup>

What has been surprising is the lack of scientific research into ocean flora and fauna. ‘You cannot manage what you do not measure’ illustrates the challenges we face. There is no adequate baseline data for the Marlborough Sounds or Cook Strait and no defined boundary for internal waters versus external waters (although LINZ is hoping to provide this in 2024).<sup>2</sup>

The Institute has observed that the ocean management process tends to split into two – policy to protect the ocean and policy to utilise the ocean for commercial benefit. The objective of each ‘prong’ undermines the other, resulting in a question of which one should trump the other. Given the existing failure to collect and report baseline information on marine flora and fauna, policy to utilise the ocean for commercial benefit will continue to trump policy to protect. In particular, it is difficult to find examples that show the precautionary approach in operation in the marine space. In other words, a lack of evidence of flora or fauna benefits commercial interests.

What makes this so concerning is that New Zealand has the world’s fifth-largest territorial waters to protect, and is responsible for global ecological hotspots, such as the Marlborough Sounds and Cook Strait. New Zealand is a signatory to the Convention on Biological Diversity, which commits us to protecting 30% of our land, our internal waters and territorial sea by 2030.

Although there are some concerns that this could result in policy that focuses on the percentage,<sup>3</sup> rather than ecological hotspots, it at least starts a conversation. The goal must be to bring about change. The next step is to agree characteristics of ecological hotspots, identify and agree on these hotspots and then determine the required level of protection. If this had happened before the NZKS application was heard, we believe based on the evidence in this paper that the Blue Endeavour (open ocean) farm application would have been turned down and the Proposed Marlborough Environment Plan (PMEP) (discussed overleaf) would have identified the Queen Charlotte and Pelorus Sounds as ‘inappropriate areas’ for finfish farming. Commercial interests trumped because the information was not sought or unavailable. We need to ensure this does not happen again.

As we venture further into using our ocean, we need to ensure our public policy and compliance is fit for purpose. In this discussion paper we draw strongly on insights from New Zealand King Salmon’s use of water space in order to improve governance systems and decision-making for New Zealand’s long term.

Each infographic aims to form part of the wider picture of New Zealand’s management of the ocean, to help conceptualise the scale and significance of aquaculture management. See brief description of infographics in blue.

## Observations from following NZKS applications

- Many of the original consents are old, outdated and complex, and do not align with best practice. If a coastal permit has not been surrendered, expired or cancelled, it remains active.
- As impacts on the natural environment from salmon farming are complex and often difficult to define, commercial benefits often receive a higher weighting. This is particularly heightened as economic benefits are likely to occur in the short term whereas environmental impacts are long-term.
- NZKS has noted in its 2023 annual report (p. 19) that ‘preparations have also commenced on renewal applications for sea farm consents due to expire in 2024. This work will continue into FY24 and beyond.’ Six of the 12 NZKS sites expire in 2024. This includes the only two sites in Queen Charlotte Sound: Otanerau (site 8396) and Ruakaka (site 8274), and three in Pelorus Sound: Crail Bay (sites 8513, and 8515, currently followed), Forsyth Bay (site 8110, currently followed) and Waihinou Bay (site 8085, currently followed).
- NZKS farms are permitted to discharge 60,710 tonnes of feed; about 20% of the dry matter consumed is excreted as faeces, see Infographic 6 (Graph 1). This means about 13,500 tonnes of faeces is permitted to be released into the Marlborough Sounds and, if Blue Endeavour proceeds, an additional 4000 tonnes of faeces is permitted to be released into Cook Strait.

- There are serious concerns about the poor quality of baseline data and NZKS is not responsible for collecting baseline data in the Marlborough Sounds or Cook Strait. A lack of data collection means farms are more likely to be approved.
- Cooler temperatures are critical for salmon farming. But other species have not been researched. Other marine life is also challenged by small changes in temperature. At the same time, the extent of salmon mortality is increasing, arguably making ocean farming unethical as well as inefficient. 2000 tonnes of dead salmon were dumped at the Blenheim landfill in the 2022 calendar year, see Graph 6. There is a point at which this should be stopped.
- Salmon farming is carbon-intensive. All feed is imported and 59% of salmon is exported (FY2023, p. 11). See Infographic 5.
- The current legal system is failing to take account of climate and biodiversity when making decisions. It is not actively seeking or ranking the importance of climate or biodiversity. The precautionary principle is easily ignored and there is a failure to seek out effective baseline and ongoing reporting.
- Open ocean farming is expensive (i.e. \$150m for 10,000 tonnes p.a.). Land-based salmon farming is increasingly a viable option globally and other players are looking to build land-based farms, using a circular economy model (see for example the Mt Cook Alpine Salmon proposal). See Infographic 7.
- Environmental impacts are becoming more apparent. For example, an independent panel declined the resource consent application from Ngāi Tahu Seafood to construct and operate an open ocean salmon farm off the north-eastern coast of Stewart Island/Rakiura. The decision, dated 1 August 2023, states the marine area was important for a number of threatened and at risk indigenous fauna such as marine mammals and seabirds.<sup>4</sup>

## Current legislative framework

The Resource Management (National Environmental Standards for Marine Aquaculture) Regulations 2020 (NESMA) set the current national regulatory framework and put in place a minimum set of protections. Councils are able to set tighter local protections provided they identify ‘inappropriate areas’ in their plans. However, inappropriate areas have to be identified under Clause 6.<sup>5</sup> If a council does not specify an inappropriate area in a plan, then NESMA protections become the default. Unfortunately the default has a built-in bias towards extending existing finfish farms without public notification.

## List of infographics

### Infographic 1: Conservation status of selected seabirds, marine mammals and sharks that inhabit Cook Strait and the Marlborough Sounds

This infographic shows a range of seabirds, marine mammals and sharks that may be found in Cook Strait and their conservation status. All species listed are protected under either the Mammals Protection Act 1978 (dolphins and whales) or the Wildlife Act 1953 (seabirds and some species of shark).

### Infographic 2: Marine space and protected areas

This infographic provides an overview of our ocean space, highlighting coastal regions and the marine protection zones.

### Infographic 3: Marine aquaculture legislative history

This infographic provides a timeline of marine aquaculture policy in New Zealand, with a focus on salmon. It shows how salmon farming in New Zealand is relatively recent (from the 1980s) and how environmental protection policy has responded to salmon farming, rather than preceded it.

### Infographic 4: NZKS salmon farms

This infographic is a timeline of the lifetimes of each of NZKS’s farms, showing the significant time period permits were granted for. Table 4.1: NZKS salmon farms – By the numbers provides more detail on each farm (see the second page of this infographic).

### Infographic 5: A carbon assessment and life-cycle analysis of NZKS’s business model

Increasingly businesses need to think about their impact on carbon, both from the perspective of how the climate impacts their business and how their business impacts the climate.

### Infographic 6: An overview of NZKS’s operations – By the numbers

An increase in water temperature has significantly impacted NZKS’s profitability and led to high levels of mortality (i.e. salmon become stressed when water temperatures rise above 21°C, see Infographic 7). The graphs illustrate the impact of climate change on NZKS’s business model.

### Infographic 7: Future of salmon farming – strategic options

This infographic illustrates the strategic options for salmon farming in the foreseeable future.

## Background – the NZKS legal strategy

The journey towards the lack of planning for finfish farming in the Marlborough Sounds starts in 2020. Aquaculture farmers asked for marine farming to be considered separately from the Proposed Marlborough Environment Plan (PMEP). The Institute opposed this approach on the basis that finfish farms could not in practice be separated from the wider council plan (e.g. dead fish being disposed of in the Blenheim landfill). However the Marlborough District Council (MDC) approved the siloed approach and on 2 December 2020, publicly notified Variation 1 (applying to marine farming other than finfish) and Variation 1A (to finfish farming only). Hearings on both variations were held in November 2021.<sup>6</sup> In total, 115 submissions were received.

Fast forward to 2023; the Aquaculture Hearing Panel provided its recommendations to MDC on 28 April. The independent panel recommended the withdrawal of Variation 1A. The panel recorded: ‘Submissions highlighted inadequate consultation with the provisions of Variation 1A not adequately providing for current and future technological changes. Environmental changes including rising sea temperatures were cited as creating challenges for finfish farming in the Sounds.’<sup>7</sup>

The recommendations of the Panel regarding Variation 1A were adopted at a full council meeting on 18 May 2023.

On 23 May 2023, MDC notified the public of their decision to remove Variation 1A from the PMP. Due to the withdrawal by MDC of Variation 1A to the PMP, and the statements within Variation 1 explicitly excluding finfish farming, there is no mapping of either appropriate or inappropriate areas for finfish farming (it is back to the drawing board as if Variation 1A never existed).<sup>8</sup>

Although Variation 1A is no more, the lack of any planning for finfish has been sent by Council back to the MDC Environment and Planning committee, which has been asked to reconsider what actions should be taken. To date they have only had one meeting with iwi, and any progress is likely to be next year or beyond.<sup>9</sup> The Council has required that the committee not consult with the public, only specific stakeholders – once again preventing public involvement. The 23 May 2023 media statement said: ‘The hearings panel said provisions for managing finfish farming in Marlborough’s coastal marine area were still needed and recommended a further process to enable the development of these involving the use of a working group consisting of Marlborough’s Tangata Whenua Iwi and key stakeholders.’<sup>10</sup> However, before any replacement for Variation 1A is developed, NZKS will be due to apply for any renewals for the six existing resource consents due to expire in 2024, setting in motion a series of events that are counter to the findings of the independent panel – that more public consultation was required, not less.

This means that although Queen Charlotte Sound was intended to be free of finfish farms (as per previous discussions<sup>11</sup>), it will not be unless MDC act fast and put in a plan that identifies ‘inappropriate areas’ in the Sounds for finfish farming.

The continued absence of plan provisions to address finfish farming leaves a regulatory gap, which means NESMA applies on its own. This is a potential win for NZKS and a potential loss for public consultation. NESMA relies on local plans to identify areas that are inappropriate for finfish farming. In the absence of local planning, NESMA applies default provisions that limit opportunities for public consultation and controls. In the Institute’s opinion, this leads towards the unintended outcome that no local controls will be placed on what is known to be an ecological hotspot. Salmon farming in the inner Sounds has always been contentious, and is well known to have negative ecological impacts.

This win by NZKS (whether intentional or not) relates to six farms, all of which are due to expire in 2024 under the Aquaculture Reform Act 2004 (ARA). Those 2004 reforms generously allowed the farms to continue for 20 years more without public consultation. Twenty years on, the same may happen again.

At the NZKS AGM, the NZKS board advised that they will reapply to extend the existing six marine farms in the inner Sounds. This includes two Queen Charlotte Sound farms and four Pelorus Sound farms.<sup>12</sup> Under NESMA this means no public consultation unless either NZKS specifically requests it, or MDC decides there are special circumstances warranting notification.

Even with consultation, MDC has minimal rights under NESMA to control the activity pending the development of local planning provisions for finfish farming.

### Recommendations

#### Marlborough District Council (MDC)

1. Revive Variation 1A (or something similar) that specifies that Queen Charlotte Sound and areas in Pelorus Sound are inappropriate for existing aquaculture activities. This would mean MDC could decline an application by NZKS or put in place more stringent conditions (in line with more recent decisions). We understand that this would also enable MDC to invite public consultation on each application.
2. Given recommendation 1 is progressed, require all grandfathered marine farms that are active solely due to s10 of the Aquaculture Reform (Repeals and Transitional Provisions) Act 2004 (ARA) and expire in 2024 to be reapplied for, not extended, and invite public consultation. This is so the sites can revert to a clean and natural environment, with remediation where necessary. Notably, the more recent resource consents are over 100 pages whereas the older expiring consents are between 13 and 51 pages, indicating the older consents (including considerations and conditions) are very basic. It seems timely to let all the old consents expire and start afresh. See Table 4.1.
3. Review existing, aged controls on farms to reassess their fitness for purpose based on more modern understandings of the marine environment, as older farms tend to have lower compliance. Build compliance capability and train marine compliance officers specialised in marine management.
4. Lead a citizen-scientist reporting mechanism with DOC and NGOs, where the community shares sightings of nationally critical, nationally endangered and nationally vulnerable seabirds, marine mammals and sharks.

#### Ministry for Primary Industries

5. Help develop a salmon feed industry in New Zealand (so that feed is no longer imported; the quantity required has a significant carbon cost in transportation).
6. Invest in and support land-based farming in preference to ocean farming where possible. In all cases, independently assess environmental risks, costs and benefits.

#### Minister for Oceans and Fisheries

7. Introduce a Marlborough Sounds Marine Protection Bill (along the lines of the proposed Hauraki Gulf/Tikapa Moana Marine Protection Bill. The Hauraki Bill will increase the total area under protection in the Hauraki Gulf Marine Park from just over 6% to about 18% and creates 12 new high protection areas to protect and restore marine ecosystems (restricting commercial or recreational fishing but allowing for customary practices of tangata whenua).<sup>13</sup>

8. Change NESMA so that all grandfathered marine farms throughout New Zealand that are active solely due to s10 of the Aquaculture Reform (Repeals and Transitional Provisions) Act 2004 (ARA) have to be reapplied for, not extended. There has already been a honeymoon period of 20 years without a full review or public consultation, and NESMA has the ability to extend this another 20 years without public consultation on an activity that pays no public rent for use of water space but creates pollution, both physical and visual.
9. Make Queen Charlotte Sound a marine mammal sanctuary (Type 3 of the Marine Protection Area network) in 2024 (when NZKS farm consents expire, see Infographic 4). Internal waterways are important due to their role in breeding and feeding fish, marine mammals and seabirds – they are the kindergarten of the sea. There is at least one pod of Hector’s dolphins that live in Queen Charlotte Sound, and provided commercial and recreational set net fishing is prohibited, marine mammals gain some form of protection.
10. Develop a coastal occupancy charge or resource rent tax regime (as in Norway) for all marine farmers. See Infographic 7.
11. Review the success of the 2008 *Marine Protected Areas: Classification, Protection Standard and Implementation Guidelines*. How could they be improved? See Infographic 3.
12. Revisit the Marine Reserves Bill. Progress has stalled. See Infographic 7.
13. Develop a strategy for meeting the Convention on Biological Diversity requirements – protection of 30% of internal waters and 30% of our territorial sea by 2030 (less than seven years away). See Infographic 2.

#### Department of Conservation/Ministry for the Environment

14. Research into marine baseline data of flora and fauna is beyond the current funding model of councils (e.g. MDC and Cook Strait). This could be funded from a national coastal charge or resource rent tax regime, providing funds either directly for councils or to DOC/MfE to undertake research, see 7 above). Species need to be understood in terms of their temperature limits, and how the loss of some species might impact the wider ecosystem. Megafauna and seabirds are critically important, particularly given our global responsibility as one of the seabird and marine mammal capitals of the world. Cook Strait is much more special and unique than the Institute originally thought.
15. Require MDC to send compliance reports on ocean and internal salmon farming to DOC as well as MPI.

Revisit the Memorandum of Understanding signed in 1998 between DOC and NZKS. DOC and NZKS signed a Memorandum of Understanding in 1998 regarding the Ruakaka farm, as part of negotiations to resolve references (appeals) on the proposed Marlborough Sounds Resource Management Plan. We understand this was to ensure that NZKS would not continue to farm in that location past the expiry date. See OIA 2023/14.

#### Land Information New Zealand/Ministry of Foreign Affairs and Trade

16. Provide public access to a detailed map that clearly delineates internal waters from territorial waters, identifying both boundaries and spatial areas. See Infographic 2.

Over time, the combination of climate change and global tensions will put pressure on companies to move from a global efficiency business model to a national self-sufficient business model. For the salmon industry, that is likely to mean land-based farms located close to water, either using saltwater or freshwater.

Open ocean farming is very expensive and risky. Risks include impacts of rogue waves and storms on infrastructure, impacts on wildlife (such as entangled marine mammals) and the potential negative impact of ocean farming on a company’s social licence to operate.

Government and regulators, such as MPI and MDC, should be working with companies to shape long-term outcomes. They should not, as illustrated in the case of NZKS, create a system which results in the legal system being used to protect the interests of business above the interests of the community, or the wider ecosystem in which we all live. Other options exist for NZKS, such as land-based farms close to outlets that ideally recycle waste as fertiliser or expel pollution directly out to sea (on outgoing tides into the wider ocean). It is simply bad business to pollute one’s own back yard.

The Institute hopes this discussion paper contributes towards MDC, MPI, NZKS and others thinking more seriously about the wider environment in which they operate, and the need for business to acknowledge that they should work hard to maintain a social licence to operate.



Wendy McGuinness  
Chief Executive

1 September 2023

# Infographic 1: Conservation status of selected seabirds, marine mammals and sharks that inhabit Cook Strait and the Marlborough Sounds

This infographic forms part of the McGuinness Institute's OneOceanNZ project. For references see [www.mcguinnessinstitute.org/publications/infographics](http://www.mcguinnessinstitute.org/publications/infographics)

**Key**

**Conservation status<sup>1</sup>**

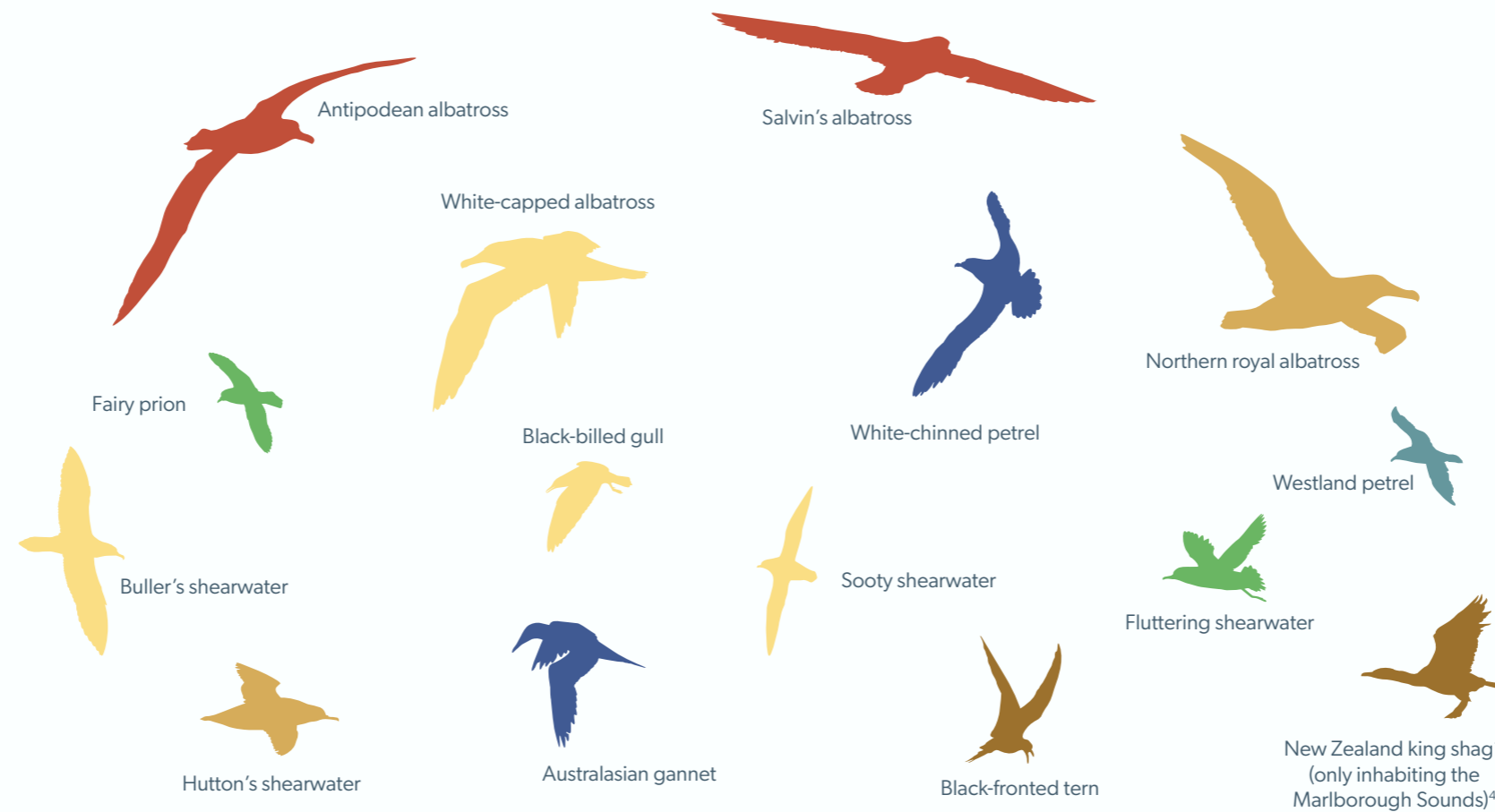
- Nationally critical
- Nationally endangered
- Nationally vulnerable
- Nationally increasing
- Declining
- Recovering
- Relict (small population stabilised after declining)
- Naturally uncommon
- Not threatened
- Data deficient
- Migrant (non-resident native)

**Threatened**

**At risk**

Notes:

- Sizes are not accurate and are for illustrative purposes only.
- There are many other endangered fauna that inhabit Cook Strait and the Marlborough Sounds. For example, see other seabirds in Table 5. There are also no fish in this infographic other than the great white and basking sharks, which have been included because they are likely to interact with the Blue Endeavour farms.



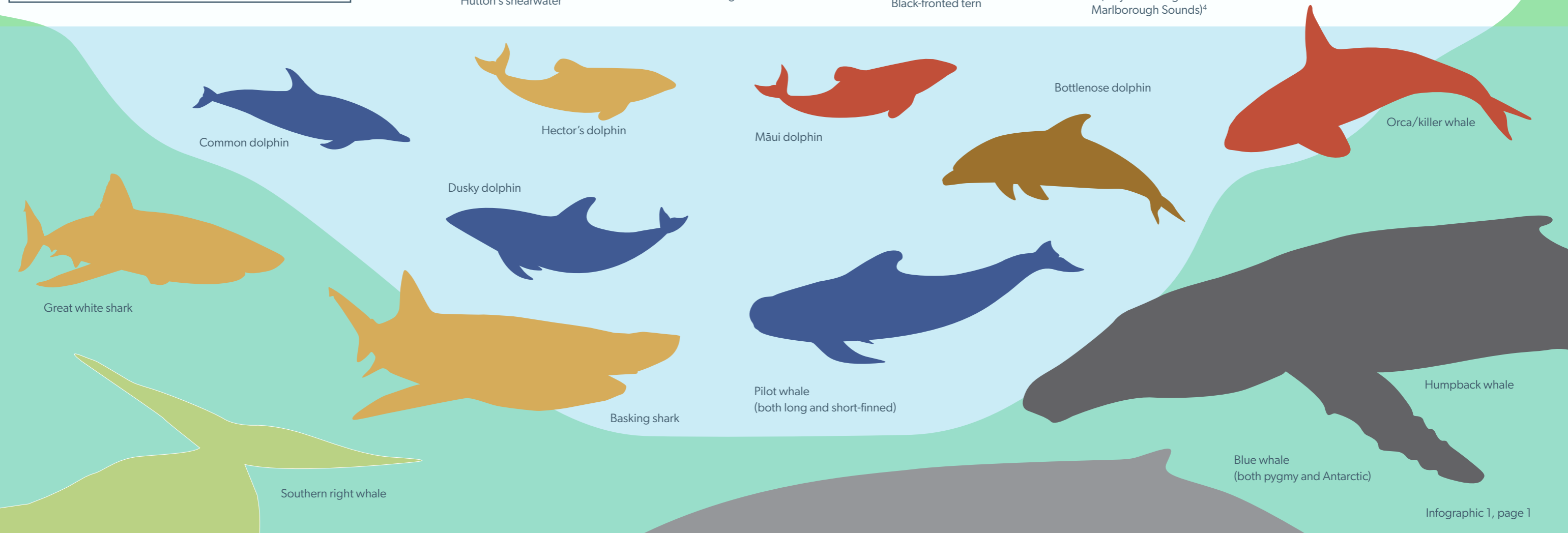
'New Zealand is a very special place for seabirds. Nearly one-quarter of the world's seabird species breed in New Zealand – more than anywhere else on earth.'<sup>2</sup>

**Marine Important Bird Areas**  
 Important Bird Areas (IBAs) are sites that are recognised as internationally important for bird conservation and known to support key bird species and other biodiversity.

The IBA Programme is global in scale and more than 12,000 IBAs have already been identified worldwide, using standard, internationally recognised criteria for selection.<sup>3</sup>

\*The New Zealand king shag is not an IBA trigger species for Cook Strait, but has been included as it is still considered a species of significance within the Marlborough Sounds.

'More than half the world's whale and dolphin species are found in New Zealand waters, yet very little is known about their migration paths, their behaviour and where they go.'<sup>5</sup>

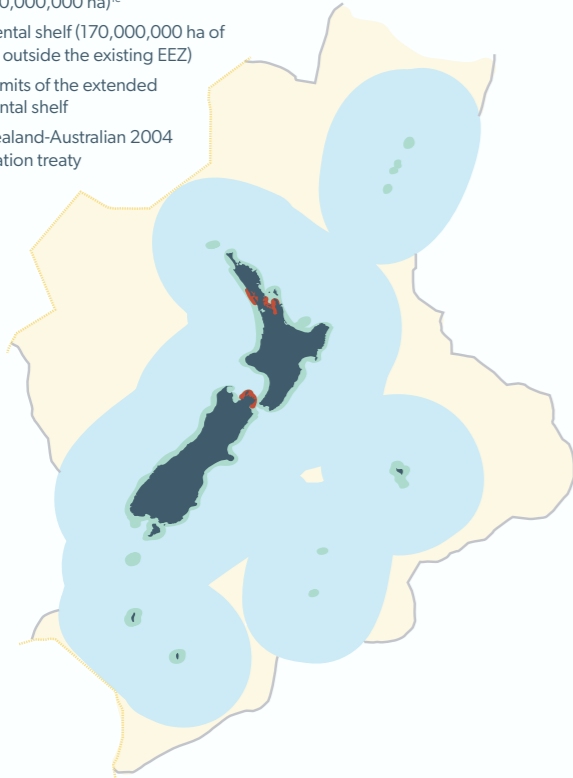


# Infographic 2: Marine space and protected areas

This infographic forms part of the McGuinness Institute's OneOceanNZ project. For references see [www.mcguinnessinstitute.org/publications/infographics](http://www.mcguinnessinstitute.org/publications/infographics)

## I: Marine area<sup>1</sup>

- Internal waters (landward of the territorial sea baseline (TSB). LINZ is hoping to provide more detail in 2024, but the largest internal waterways are likely to be Marlborough Sounds, Kaipara Harbour, Hauraki Gulf and/or Thames Harbour.<sup>1a</sup>
- Territorial sea (12-mile limit) (est. 18,100,000 ha)<sup>1b</sup>
- Exclusive Economic Zone (est. 430,000,000 ha)<sup>1c</sup>
- Continental shelf (170,000,000 ha of seabed outside the existing EEZ)
- Outer limits of the extended continental shelf
- New Zealand-Australian 2004 delimitation treaty



## II: 9 coastal marine biogeographic regions<sup>2</sup>

1. Biogeographic regions are areas constituting a natural ecological community with characteristic flora, fauna, and environmental conditions and bounded by natural rather than artificial borders.<sup>2</sup>
2. Illustration excludes a number of small islands.
3. Size in total is estimated as 18,109,595 ha.<sup>2</sup>



## III: Marine protected areas (MPAs) network<sup>3</sup>

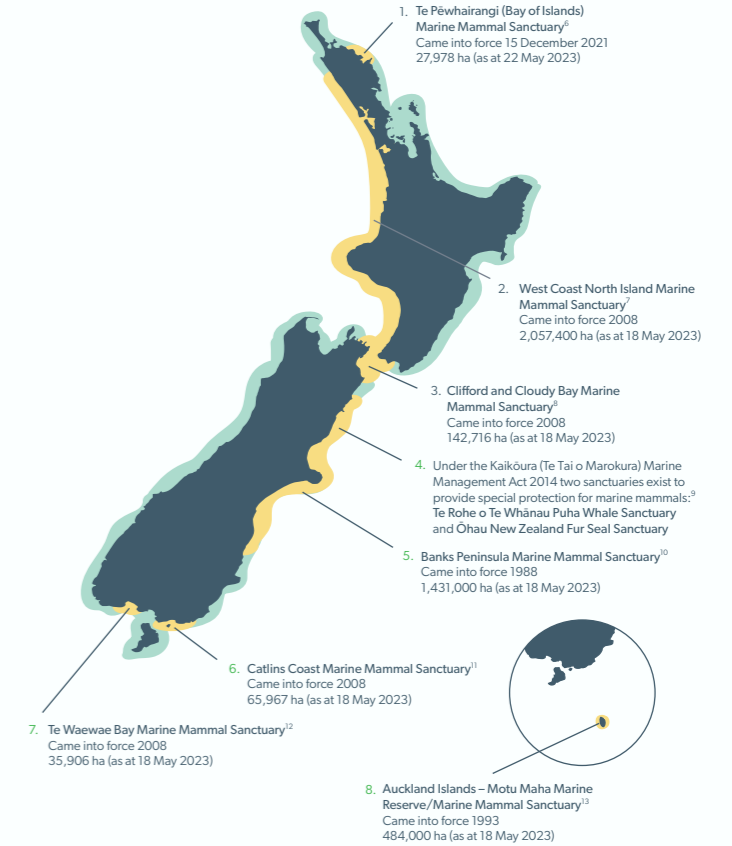
1. A marine protected area (MPA) is protected because it is considered unique or rare and/or a function of how the area serves marine life, and therefore fishing is not allowed.<sup>3a</sup>
2. Illustration excludes a number of small islands.



- 44 marine reserves  
As at 2014 (est. 1,726,007 ha)
  - 2 marine parks  
As at 2014 (est. 1,202,000 ha)<sup>3b, 3c</sup>
  - 3 marine protected areas  
As at 2014
- Fiordland/Te Moana o Atawhenua (not found)  
 – Kaikōura/Te Tai o Marokura (not found)  
 – Ngā Motu/Sugar Loaf Islands (749 ha)

## IV: 8 marine mammal sanctuaries<sup>4, 5</sup>

1. Illustration excludes a number of small islands.
2. Type 3 areas protected include marine mammal sanctuaries which cover a total est. 4,244,967 ha. See description of Type 3 areas below.



1. Te Pēwhairangi (Bay of Islands) Marine Mammal Sanctuary<sup>6</sup>  
Came into force 15 December 2021  
27,978 ha (as at 22 May 2023)
2. West Coast North Island Marine Mammal Sanctuary<sup>7</sup>  
Came into force 2008  
2,057,400 ha (as at 18 May 2023)
3. Clifford and Cloudy Bay Marine Mammal Sanctuary<sup>8</sup>  
Came into force 2008  
142,716 ha (as at 18 May 2023)
4. Under the Kaikōura (Te Tai o Marokura) Marine Management Act 2014 two sanctuaries exist to provide special protection for marine mammals: Te Rohe o Te Whānau Puha Whale Sanctuary and Ohau New Zealand Fur Seal Sanctuary
5. Banks Peninsula Marine Mammal Sanctuary<sup>9</sup>  
Came into force 1988  
1,431,000 ha (as at 18 May 2023)
6. Catlins Coast Marine Mammal Sanctuary<sup>11</sup>  
Came into force 2008  
65,967 ha (as at 18 May 2023)
7. Te Waewae Bay Marine Mammal Sanctuary<sup>12</sup>  
Came into force 2008  
35,906 ha (as at 18 May 2023)
8. Auckland Islands – Motu Maha Marine Reserve/Marine Mammal Sanctuary<sup>13</sup>  
Came into force 1993  
484,000 ha (as at 18 May 2023)

## V: About

'New Zealand has the fifth largest EEZ (roughly 430 million hectares) in the world, about 15 times the size of our land mass', which means '[u]nder international law we have "sovereign rights" over this area'.

'New Zealand's marine ecosystems and species are highly diverse. This is due to a combination of factors, including our geological history and isolation, the range and complexity of habitats, and the influence of major ocean currents. The result is a wide variety, if patchy distribution, of marine plants and animals.'

'Marine scientists estimate that perhaps as much as 80% of New Zealand's indigenous biodiversity is found in the sea. While many of our marine fish also occur in other countries' seas, many of our benthic (bottom-dwelling) marine species are found only in New Zealand waters. Evaluating the state of New Zealand's marine biodiversity is difficult due to the very limited information we have about deep-sea species.'<sup>14</sup>

### Convention on Biological Diversity

'Ensure and enable that by 2030 at least 30 per cent of ... inland water, and coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems ...'<sup>15</sup>

'On March 4, 2023, and after nearly two decades of negotiations, UN member states, including Aotearoa New Zealand, reached the successful conclusion of negotiations for a new global treaty on conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, commonly known as the high seas ... Nearly two-thirds of the ocean lies outside any country's national jurisdiction or control. These areas include the sea column beyond countries' EEZs and the seabed beyond countries' continental shelves ... The new agreement will help to protect biodiversity in these areas in two main ways: by enabling the international community to establish marine protected areas, and by setting clear procedures and requirements for assessing the environmental impacts of activities.'<sup>16</sup>

There is a variety of legislation and protections which cover the classification and management of marine protected areas in New Zealand.<sup>18</sup>

### By the numbers

**5th**

New Zealand has the fifth-largest EEZ in the world (roughly 430 million hectares)<sup>14</sup>

**80%**

80% of New Zealand's indigenous biodiversity is in the sea<sup>14</sup>

### Where we are now in 2023

**9.5%**

New Zealand has protected about 9.5% of its territorial sea<sup>17</sup>

### Where we need to be by 2030

**30%**

New Zealand has agreed to conserve and manage 30% of inland water and coastal and marine areas by 2030<sup>15</sup>

### MPAs network levels of protection

- **Type 1 (high-level protection for flora and fauna)**  
Type 1 areas protected est. 1,726,007 ha<sup>19</sup>
- **Type 2 (low-level protection from fishing)**  
Type 2 areas protected at least 1,202,749 ha

To date this type of protection covers the 44 marine reserves established under the Marine Reserves Act 1971. DOC is responsible for the implementation, management and monitoring of marine reserves.<sup>20</sup>

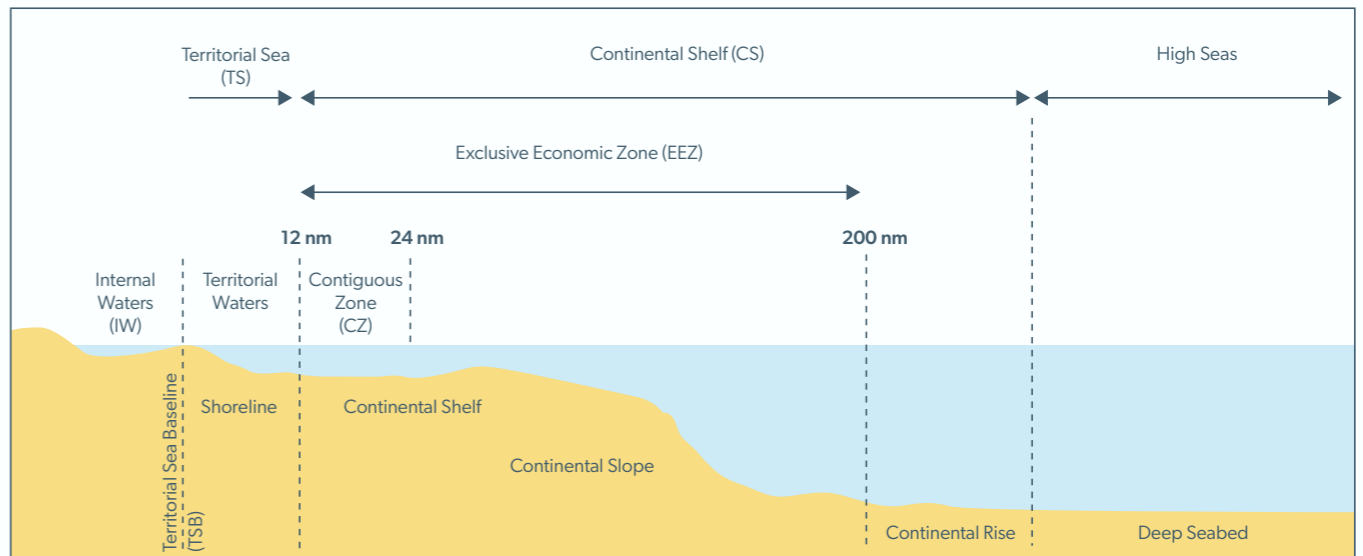
- **Type 3 (anything else)**  
Type 3 areas protected at least 4,244,967 ha

Includes 2 marine parks, 3 marine protected areas and a range of other small areas (such as submarine cable and pipeline protection zones). These areas have been established outside of the Marine Reserves Act 1971 and put in place protections against the adverse effects of fishing under the *Marine Protected Areas: Classification, Protection standard and implementation guidelines* (2008).<sup>21</sup>

### Protections outside the MPAs network

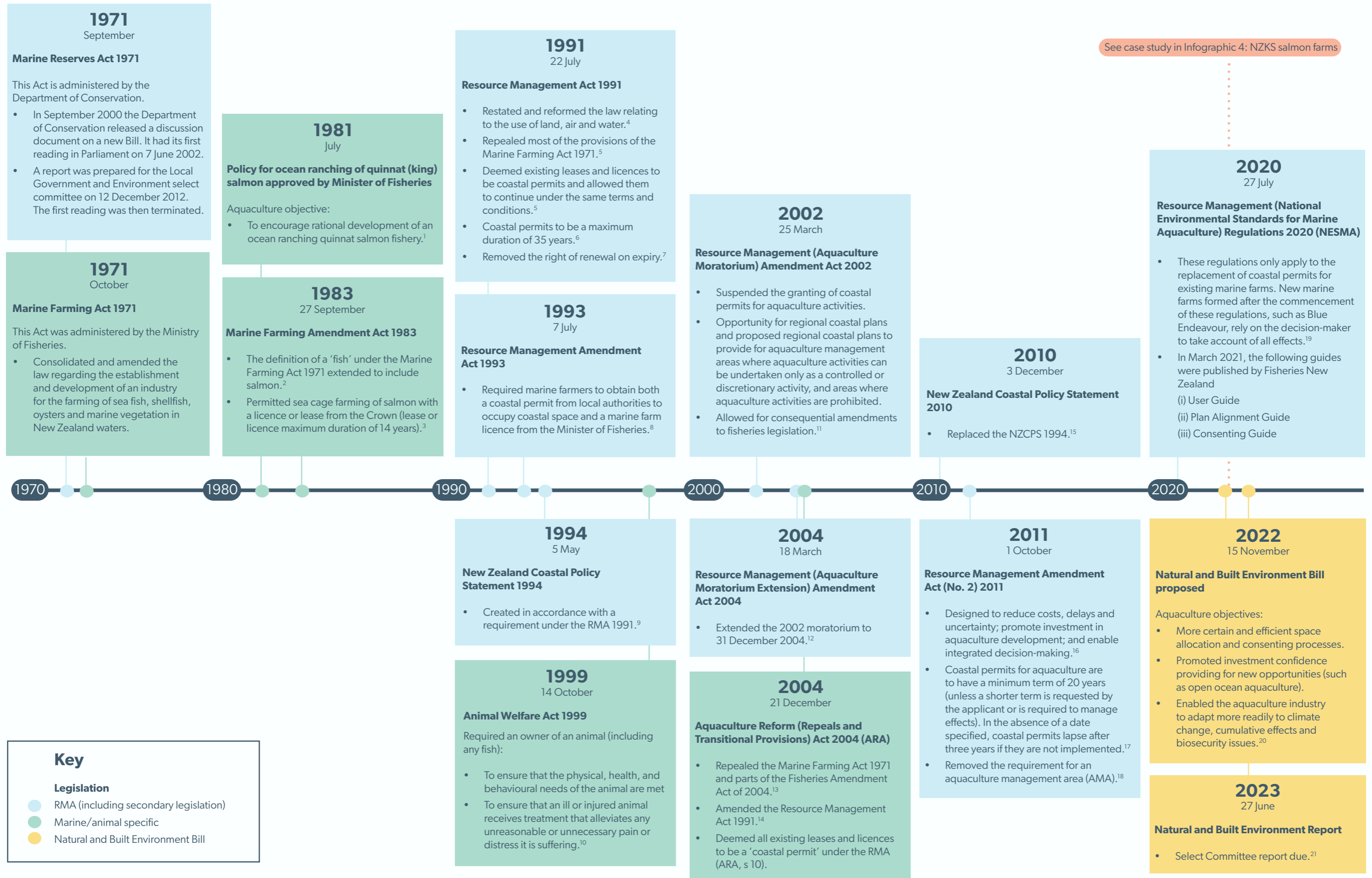
**Type 3 (anything else)**  
Includes the 8 marine mammal sanctuaries (see IV above) and any other form of protection that might exist in the network that does not need to meet the biodiversity requirements set out in the 2008 protection standard (mentioned under Type 2).<sup>22</sup>  
Note: The Fisheries Act 1996 provides for customary fisheries (e.g. māitaitai reserves).

## VI: Maritime boundary definitions<sup>23, 24, 25, 26</sup>



# Infographic 3: Marine aquaculture legislative history

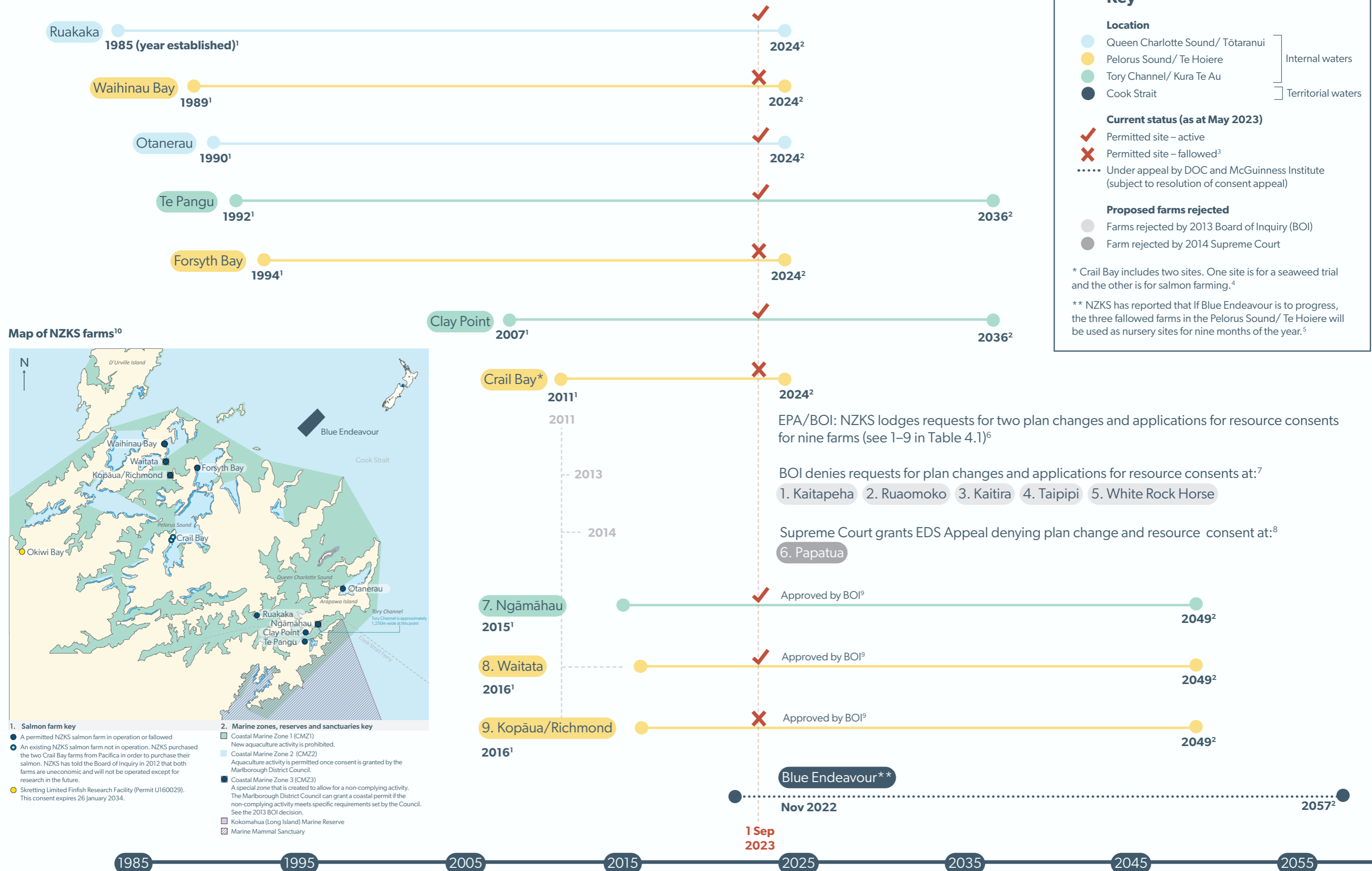
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# Infographic 4: NZKS salmon farms

See Table 4.1: NZKS salmon farms – By the numbers for more detail on each farm.

This infographic forms part of the McGuinness Institute's OneOceanNZ project. For references see [www.mcguinnessinstitute.org/publications/infographics](http://www.mcguinnessinstitute.org/publications/infographics)



# Table 4.1: NZKS salmon farms – By the numbers

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**Bold italics:** Highlight key data relied upon in order for the site to operate as it does today.

**Abbreviations:**

ARA: Aquaculture Reform (Repeals and Transitional Provisions) Act 2004	MFL: Marine farming licence	NF: Not found in resource consent
App.: Appendix	MI: McGuinness Institute Office	PC: Personal correspondence
MDC: Marlborough District Council	MOF: (previous) Ministry of Fisheries	PR: Planners Report
	MPE: Marine farming permit	RCNF: Resource consent not found by MDC or MPI
		U#: A resource consent application made to MDC

**Note:**

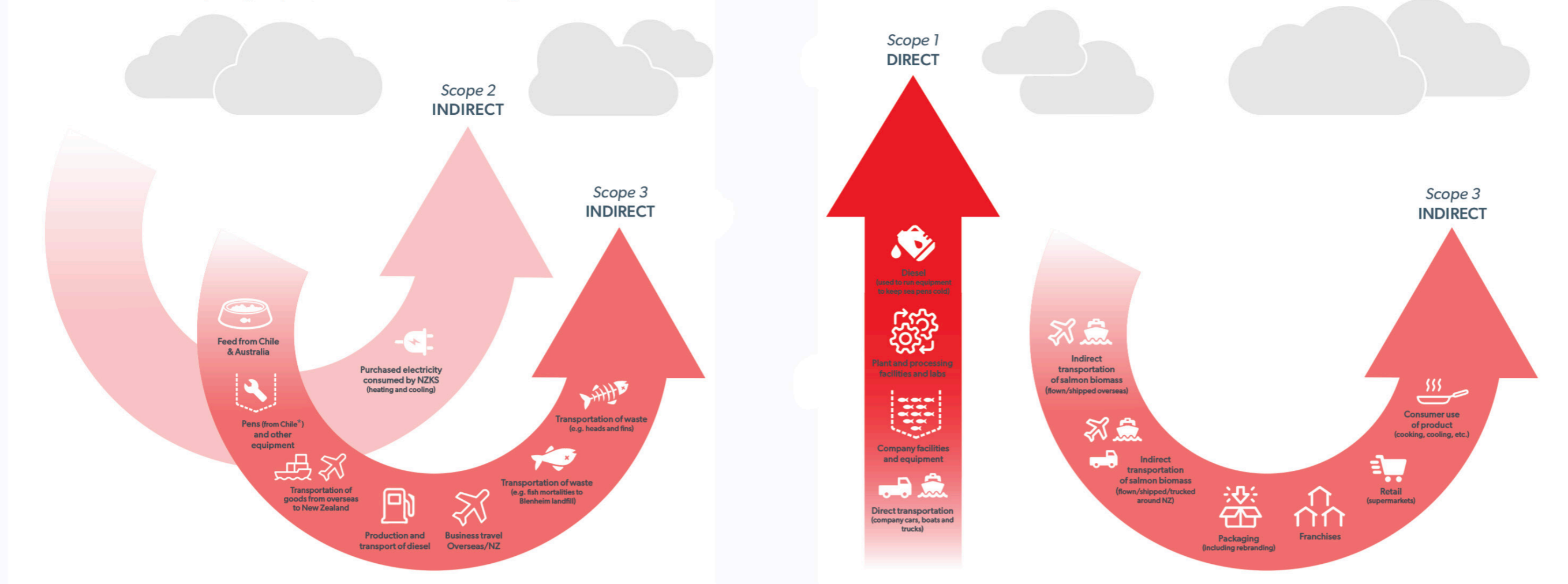
There are errors in the MDC Smart Map marine farms website summary.<sup>9</sup> These are likely to be corrected by MDC. Given this, the Institute has sought the actual active resource consents, and relied solely on those documents. If using the Smart Map marine farms website summary, please note the application number is also the resource consent number (also known as a coastal permit). MDC has been able to supply all of these except MPE763. MPE763 is an historical but active resource consent that neither MDC or MPI have been able to find.<sup>10</sup> The Institute has uploaded all other resource consents to our website. The page number where the data has been collected can be found in the table below. Interestingly, six farms are permitted to farm only king salmon, whereas six can farm other fish (such as snapper) or marine flora (such as seaweed).

Description (as at 1 September 2023)				Max. area (ha)				Max. feed (t)	
NZKS salmon farms with resource consents	Site number	Resource consent Note: Date granted refers to the original consent date	No of pages <sup>1</sup>	Related resource consents Note: These are surrendered, expired or cancelled	Pen surface area	Pen boundary area	Marine farm boundary area	Overall consent area	Permitted feed discharge pa
<b>Internal waters (in the Marlborough Sounds)</b>									
<b>Queen Charlotte Sound/Tōtaranui</b>									
1. Otanerau (active) (one farm) <sup>2</sup>	8396 (exp. 2024)	MFL446 (granted 11 July 1990, p. 17). Permitted species: a mix, p. 1	37	No copy at MI: 010127, 950653, 981011, 060822, 080726, 160039, 090002.	<b>2.000 (p. 2)</b>	<b>2.000 (p. 2)</b>	<b>3.250 (p. 2)</b>	<b>3.250 (p. 2)</b>	NF
		U040217 (granted 22 April 2005, p. 9). Permitted species: a mix, p. 1	43		2.000 (p. 2)	2.000 (p. 2)	<b>7.550 (p. 1)</b>	<b>7.550 (p. 1)</b>	<b>4000 (p. 34)</b>
		MPE763 (granted 9 January 2006, MOF [MDC PC, 15 June 2023]). Original resource consent not found, but relied upon <b>for activity</b> .	15 (in part)		RCNF	RCNF	RCNF	RCNF	RCNF
2. Ruakaka (active) (one farm) <sup>3</sup>	8274 (exp. 2024)	MFL001 (granted 29 September 1975, p. 23). Permitted species: a mix, p. 5	48	No copy at MI: 980543, 950656, 060822, 080726, 001268, 090002, 021247 (exp. 7 May 2021).	<b>2.000 (p. 6)</b>	<b>2.000 (p. 6)</b>	4.500 (p. 6)	4.500 (p. 6)	<b>2000 (est.)</b> See note on p. 50.
		U200301 (granted 15 October 2020, p. 10). Replaces part of U021247 ( <b>enables subsurface anchoring structures</b> , p. 1)	13		2.000 (see MFL001, p. 6)	NF	<b>11.300 (p. 1)</b>	<b>11.300 (p. 1)</b>	No condition exists, see note on p. 50.
<b>Pelorus Sound/Te Hoiere</b>									
3. Crail Bay (seaweed, NZKS FY23, p. 20) (one farm)	8513 (exp. 2024)	U090660 (granted 9 July 2010, p. 8). Permitted species: <b>king salmon</b> , p. 4 (note this and U090634 below are in the same decision)	40	No related resource consents	<b>0.391 (p. 31)</b>	<b>4.500 (p. 31)</b>	4.500 (p. 14)	4.500 (p. 14)	<b>1770 (p. 4)</b>
		MFL048 (granted 27 June 1978, p. 23). This consent does not allow salmon farming, but is required for U090660 to operate, see pp. 4, 39 of U090660)	34	No related resource consents	NF	NF	<b>4.500 (p. 8)</b>	<b>4.500 (p. 8)</b>	NF
		U130743 (granted 4 April 2014, p. 20) ( <b>enables a feed barge</b> , p. 2)	48	No related resource consents	NF	NF	NF	NF	NF
4. Crail Bay (fallowed) (one farm) <sup>4</sup>	8515 (exp. 2024)	U090634 (NZKS) (granted 9 July 2010, p. 8). Permitted species: <b>king salmon</b> , p. 3. (note this and U090660 above are in the same decision)	40	No related resource consents	<b>0.391 (p. 22)</b>	<b>6.400 (p. 22)</b>	6.400 (pp. 22, 30)	6.400 (pp. 22, 30)	<b>1440 (p. 3)</b>
		MFL032 (Crail Bay Trust) (granted 18 May 1977, p. 24). This consent does not allow salmon farming, but is required for U090634 to operate, see pp. 3, 30 of U090634. Permitted species: a mix, p. 11	44	No related resource consents	NF	NF	<b>6.400 (p. 10)</b>	<b>6.400 (p. 10)</b>	NF
5. Forsyth Bay (fallowed) (one farm) <sup>5</sup>	8110 (exp. 2024)	U040412 (granted 4 May 2005, p. 3). Permitted species: a mix, p. 17	24	No copy at MI: 950523, 980454, 060822, 080726, 130789, 180278, 090002.	<b>2.000 (p. 5)</b>	<b>2.000 (p. 17)</b>	6.000 (p. 6)	6.000 (p. 6)	<b>4000 (p. 5)</b>
		MFL239 (granted 30 June 1982, p. 14). Permitted species: a mix, p. 3	46		2.000 (p. 7)	2.000 (p. 7)	<b>6.000 (p. 7)</b>	<b>6.000 (p. 7)</b>	(repeats 4000 above)
6. Kopāua/Richmond (fallowed) (new, one farm)	8633 (exp. 2049)	U140295 (granted 14 March 2013, p. 68). Permitted species: king salmon, p. 73	105	No copy at MI: 170579.	<b>1.500 (p. 75)</b>	<b>5.000 (p. 3)</b>	<b>16.487 (p. 98)</b>	<b>16.487 (p. 98)</b>	<b>4000 (p. 78)</b>
7. Waihināu Bay (fallowed) (one farm) <sup>6</sup>	8085 (exp. 2024)	MFL456 (granted 24 April 1991, p.20). Permitted species: a mix, p. 3	51	Hard copy at MI: 000956 (exp. 31 Oct 2010) No copy at MI office: 990126, 060822, 080726, 180707, 090002.	<b>2.000 (p. 7)</b>	<b>4.000 (p. 7)</b>	<b>8.000 (p. 6)</b>	<b>8.000 (p. 6)</b>	<b>3000 (est.)</b> See note on p. 52.
8. Waitata (active) (new, one farm)	8632 (exp. 2049)	U140294 (granted 14 March 2013, p. 149). Permitted species: king salmon, p. 155	187	No copy at MI: 170579, 180735, 180778.	<b>1.500 (p. 157)</b>	<b>3.500 (p. 85)</b>	<b>16.500 (p. 83)</b>	<b>16.500 (p. 83)</b>	<b>6000 (p. 160)</b>
<b>Tory Channel/Kura Te Au</b>									
9. Clay Point (active) (one farm)	8407 (exp. 2036)	U160675 (granted 9 November 2016, p. 20). Permitted species: king salmon, p. 17	23	Hard copy at MI: 060926. No copy at MI office: 001268, 950655, 060822, 080726, 090002, 080054.	<b>2.000 (p. 4)</b>	<b>3.150 (p. 4)</b>	<b>19.644 (p. 4)</b>	<b>19.644 (p. 4)</b>	<b>4500 (p. 6)</b>
10. Ngāmāhau (active) (new, one farm)	8634 (exp. 2049)	U140296 (granted 14 March 2013, p. 101). Permitted species: king salmon, p. 107	136	Hard copy at MI: 150355.	<b>1.500 (p. 109)</b>	<b>3.183 (p. 37)</b>	<b>16.500 (p. 37)</b>	<b>16.500 (p. 37)</b>	<b>4000 (p. 112)</b>
11. Te Pangu (active) (one farm) <sup>7</sup>	8408 (exp. 2036)	U150081 (granted 26 January 2016, p. 16). Permitted species: king salmon, p. 1	18	No copy at MI: 950654, 010142, 981072, 040813, 060822, 080726, 090841, 100656, 110410, 120226, 130472, 090002.	<b>1.500 (p. 1)</b>	<b>9.027 (p. 1)</b>	<b>21.092 (p. 1)</b>	<b>21.092 (p. 1)</b>	<b>6000 (p. 1)</b>
Total (11 sites)	—	—	—	—	<b>16.782</b>	<b>44.760</b>	<b>137.226</b>	<b>137.226</b>	<b>40,710</b>
<b>External waters (in Cook Strait)</b>									
12. Blue Endeavour <sup>8</sup> (two farms)	Not yet designated	U190438 (granted 10 November 2022, p. 120). Permitted species: king salmon, p. 1. Subject to resolution of consent appeal	199	No related resource consents	<b>12.000 (p. 123)</b> 2x6 pens (6 ha)	<b>380.000 (p. 6)</b> 2x2 areas (190 ha)	<b>380.000 (p. 6)</b> 2x2 areas (190 ha)	<b>1000.000 (p. 6)</b>	<b>20,000 (p. 8)</b>
Total (12 sites)	—	—	—	—	<b>28.782</b>	<b>424.760</b>	<b>517.236</b>	<b>1137.226</b>	<b>60,710</b>

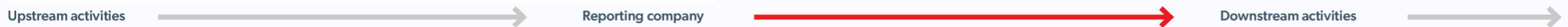
# Infographic 5: A carbon assessment and life-cycle analysis of NZKS's business model

This infographic forms part of the McGuinness Institute's OneOceanNZ project. For references see [www.mcguinnessinstitute.org/publications/infographics](http://www.mcguinnessinstitute.org/publications/infographics)

A: A carbon assessment – Exploring Scope 1, 2 and 3 for New Zealand King Salmon's business model



B: Life-cycle analysis – Exploring New Zealand King Salmon's business model



	<b>THE FISHFOOD</b>				<b>THE MORTALITY</b>	<b>THE POO</b>			
	FISH OIL FISH PROTEIN CEREAL/GRAIN VEGETABLE PROTEIN VEGETABLE/POULTRY OIL LAND-ANIMAL PROTEIN	VITAMINS & MINERALS (INCLUDING ASTAXANTHIN)			SKELETAL ISSUES & DISEASE				
	<b>SALMON FEED</b> FY2019 (p. 42)	<b>IMPORTS</b> Feed largely from Tasmania, Australia. FY2023 (p. 7)	<b>FEED VOLUME</b> <b>18,616 t (est)</b> FY2023 (pp. 10, 85)**	<b>DIESEL UPWELLING SYSTEMS</b> Cool water is pumped up to the surface of farm pens. FY2019 (p. 10)	<b>HARVESTED BIOMASS</b> <b>6834 t</b> (Live weight) FY2023 (p. 85)	<b>MORTALITY</b> <b>4381 t (est)</b> \$25.9 m (cost) FY2023 (p. 85)***	<b>FAECES</b> <b>3723 t (est)</b> (20% of feed)****	<b>SALES VOLUME</b> <b>5837 t</b> FY2023 (p. 9)	<b>OVERSEAS</b> <b>3443 t (59%)</b> Major countries include Australia, Japan and the US. FY2023 (pp. 13, 91)
<b>2023</b>									
<b>2019</b>	FY2019 (p. 42)	Feed from Chile and Australia. Pens from Chile. FY2019 (p. 86)*	19,593 t FY2019 (p. 13, 85)**	Cool water is pumped up to the surface of farm pens. FY2019 (p. 10)	9013 t (Live weight) FY2019 (p. 82)	2954 t (est) \$17.5 m (cost) FY2019 (pp. 13, 82)***	3919 t (est) (20% of feed)****	7520 t FY2019 (p. 12)	4060 t (54%) FY2019 (p. 59)

**Assumptions and estimates**

\* Imports: See FY2019 (p. 86); FY2023 (p. 7). See also Winter, C. (8 January 2015). Chilean firm wins King Salmon contract. Stuff. Retrieved 13 June 2023 from [www.stuff.co.nz/business/farming/aquaculture/64750652/chilean-firm-wins-king-salmon-contract](http://www.stuff.co.nz/business/farming/aquaculture/64750652/chilean-firm-wins-king-salmon-contract)

\*\* Feed volume in tonnes: [Total live weight harvested + mortality (est, see \*\*\*)] x Feed conversion ratio (FCR) (FY2023, pp. 10, 85: [6834 t + 4381 t (see very estimated figure in \*\*\* below)] x 1.66 = 18616 t) (FY2019, p. 13).

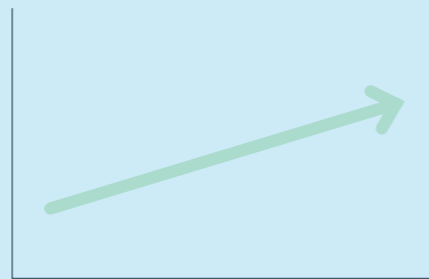
\*\*\* Mortality in cost and tonnes: [Feed volume p.a. divided by FCR] - harvest volume p.a. (FY2019, p. 13: [19593 t / 1.8] - 7931 t = 2954 t). 2023: We have used FY2019 figures to estimate the relationship between cost of mortality and tonnes of mortality. (FY2023: [2019 \$17,465,000 cost / 2954 t = \$5,912 cost of mortality per t, then 2023 \$25,943,000 cost / 2019 \$5,912 cost of mortality per t = 4381 t (a rough estimate)]. Note: We could not find feed volume in either FY2022 or FY2023, and we could not rely on FY2021 (as it was a seven-month financial year) or FY2020 (as the financial results were significantly impacted by COVID-19).

\*\*\*\* Faeces: NZKS BOI June 2012 Wybourne: 'Skretting expects that about 20% of the dry matter consumed is excreted as faeces, for NZ King Salmon current salmon diet range'. Faeces estimate based on 20% of feed volume (FY2023: 18616 (pp. 10, 85) (est, see \*\*) x 0.2 = 3723) (FY2019, p. 13: 19,593 x 0.2 = 3919)

# Infographic 6: An overview of NZKS's operations – By the numbers

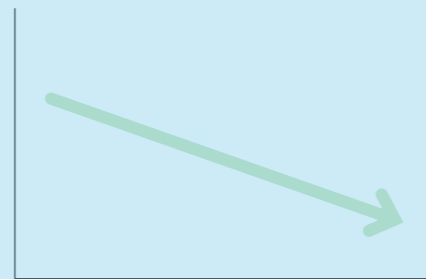
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## What's going up

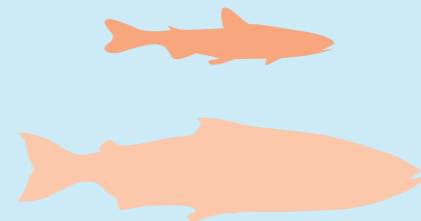


- Cost of mortality over a financial year (see Graph 3)
- Mortality as a percentage of biomass at year end (see Graph 4)
- Tonnes of salmon dumped in Blenheim landfill by calendar year (see Graphs 5 and 6)
- Average revenue per tonne sold (see Graphs 9 and 11)
- Average cost per tonne sold (see Graphs 10 and 11)
- Feed cost (\$/kg of feed) (see Graph 13)
- Freight costs (see Graph 15)
- Auditor fees (see Graph 19)

## What's going down



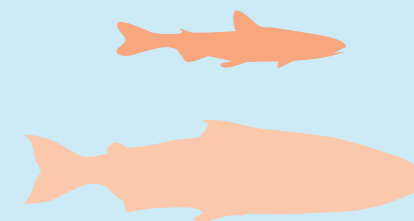
- Feed conversion ratio (see Graph 2)
- Harvest biomass (see Graph 12)
- Average gilled and gutted (G&G) harvest weight (see Graph 13)



## What's staying the same

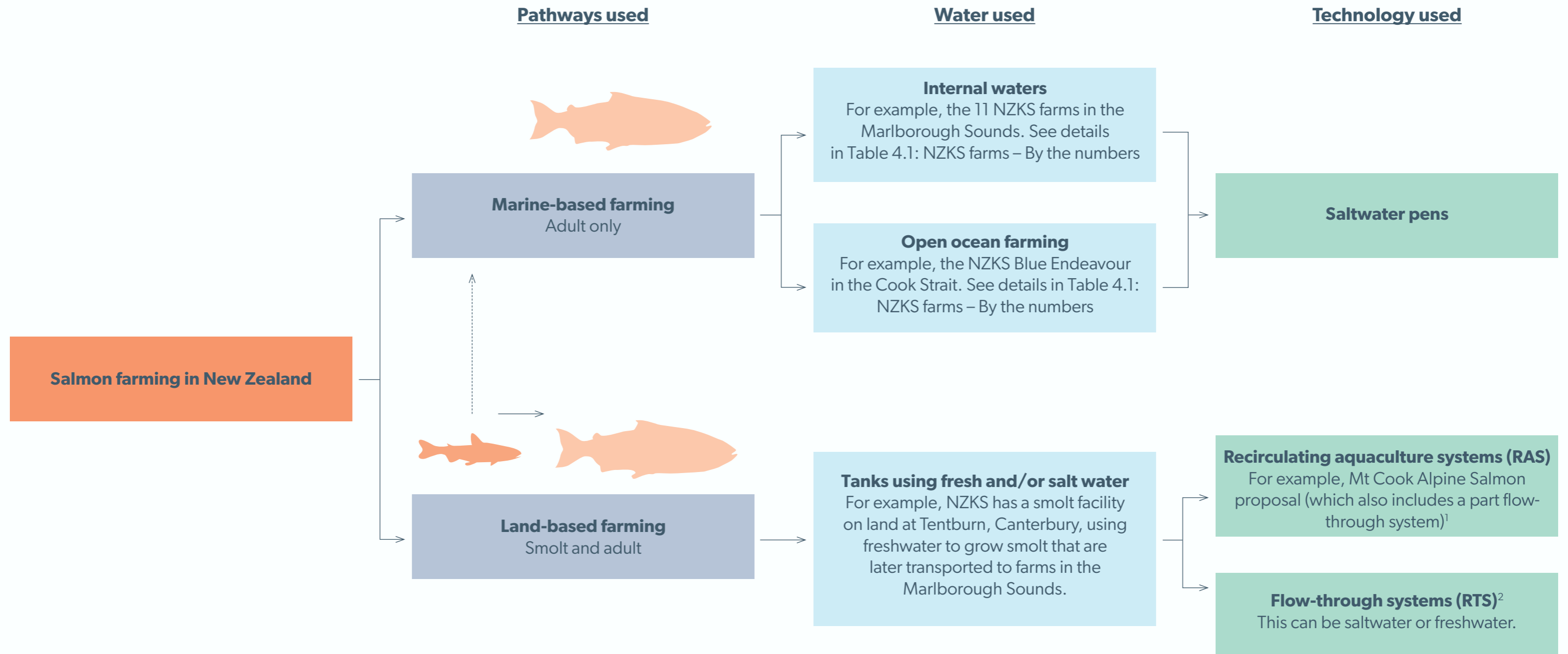


- Inventories, biological and non-current biological assets (approx. from 2017, see Graph 21)



# Infographic 7: Future of salmon farming – strategic options

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## Potential changes that may emerge within the next five years

- Higher sea surface temperatures and concerns over biodiversity. This is likely to mean that companies will need to re-establish their social licence to operate<sup>3</sup>
- More applications for ocean farming, and land-based farming using water from the ocean<sup>4</sup>
- More compliance costs for marine-based farming<sup>5</sup>
- Feed discharge becomes a stronger focus of conditions. This is due to feed being a key determinant of the quantity of faeces (which is a foreign input into the existing environment)
- Faeces being collected rather than discharged into the marine space or at least discharged further out to sea. For example, MDC require all faeces to be collected in the Tory Channel and only discharged on an outgoing tide
- Coastal charges/resource rent tax applied uniformly across all marine-based farms (e.g. Norway has introduced a resource rent tax, meaning that the marginal tax rate on aquaculture will increase from 22% to 47%)<sup>6</sup>
- Feed costs and supply issues increase, solution is to produce feed in New Zealand<sup>7</sup>
- Cost of salmon farming infrastructure increase (e.g. MPI suggests the cost of establishing an entire value chain for an open ocean salmon farm is \$150 million or more for an operation that can produce 10,000 tonnes)<sup>8</sup>
- Increased legislation of marine space and protected areas<sup>9</sup> (e.g. a Marlborough Sounds Marine Protection Bill, along the lines of the proposed Hauraki Gulf/Tikapa Moana Marine Protection Bill)
- New rules across all marine farms under a similar set of national rules
- More government support and incentives for land-based farming