

# Infographic 7 references

## 1. Recirculating aquaculture systems (RAS)

Mt Cook Alpine is looking to build a land-based RAS king salmon (Chinook) farm in Twizel. Mt Cook Alpine Salmon. (n.d.). Mt Cook Alpine Salmon to build innovative land-based salmon farm in Twizel region. Retrieved 12 June 2023 from [www.alpinesalmon.co.nz/2022/10/13/mt-cook-alpine-salmon-to-build-innovative-land-based-salmon-farm-in-twizel-region](http://www.alpinesalmon.co.nz/2022/10/13/mt-cook-alpine-salmon-to-build-innovative-land-based-salmon-farm-in-twizel-region)

'Queenstown-based Mt Cook Alpine Salmon's USD 9.7 million (EUR 9.7 million) recirculating aquaculture system (RAS) project, which has received significant government financial support, aims to create a 1000 metric ton (MT) "hybrid" facility that partially emulates its existing glacial-fed canal system for farming salmon, according to a company press release.' Samoglu, E. (28 October 2022). New Zealand company planning 1,000-MT king salmon RAS. SeafoodSource. Retrieved 12 June 2023 from [www.seafoodsource.com/news/premium/aquaculture/new-zealand-company-planning-1-000-metric-ton-salmon-ras](http://www.seafoodsource.com/news/premium/aquaculture/new-zealand-company-planning-1-000-metric-ton-salmon-ras)

## 2. Flow-through systems (RTS)

### (a). NIWA kingfish example

NIWA has an RTS system for kingfish: 'What we learned was that a land-based system is best at producing superior fish that could be grown sustainably and supplied all year round. Our land-based recirculating aquaculture system works a lot like an aquarium – just bigger. Up to 99 percent of the water can be recirculated and reused after being filtered and treated to eliminate any impurities. As the demand is growing for high-quality and sustainable fish, we are expanding our farm and currently building a recirculating aquaculture system that can produce 600 tonnes of Kingfish a year.' NIWA. (n.d.). Our Facilities. Retrieved 12 June 2023 from [www.niwa.co.nz/aquaculture/our-services/our-facilities](http://www.niwa.co.nz/aquaculture/our-services/our-facilities)

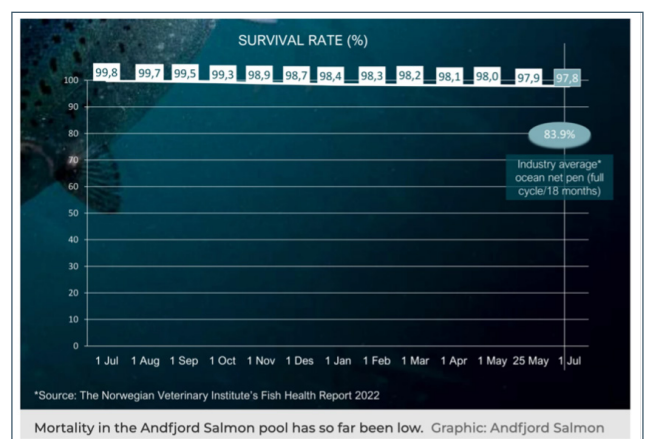
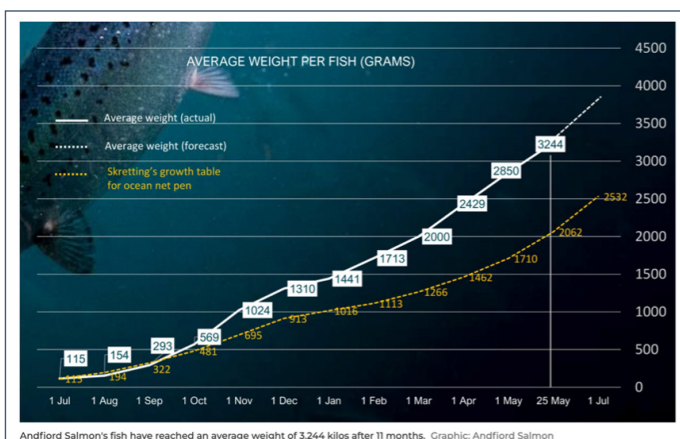
### (b). RTS king salmon in Patagonia

'The first phase of Patagonia King Salmon's recirculating aquaculture system (RAS) facility has a capacity of 100 tonnes per year and will be expanded to produce 500 tonnes annually by 2024.' Fishfarmingexpert. (15 September 2021). Chilean RAS farmer making first king salmon harvest. Retrieved 12 June 2023 from [www.fishfarmingexpert.com/chile-chinook-patagonia-king-salmon/chilean-ras-farmer-making-first-king-salmon-harvest/1178462](http://www.fishfarmingexpert.com/chile-chinook-patagonia-king-salmon/chilean-ras-farmer-making-first-king-salmon-harvest/1178462)

### (c). RTS salmon in Norway

'As of yesterday, 24 May [2023], the average weight of the salmon in the pool at Kvalnes, in the southeast of Andøya, was 3.244 kilos after 11 months of operations. This is 40% ahead of the development stage of salmon farmed in the sea, according to a comparison with feed manufacturer Skretting's growth table for net pens.

'In its report for the first quarter of 2023, Andfjord Salmon said the growth has been achieved with an accumulated feed conversion ratio of 0.95, which means that each fish requires 0.95 kilos of feed to grow 1 kilo.



### 'Monthly mortality of 0.1%

'As of yesterday, the accumulated survival rate stood at 97.9%, showing a stable average mortality rate of approximately 0.1% per month. The company expects to conduct its first harvest at the turn of June/July 2023. Andfjord Salmon is in the middle of its first production cycle, which means that the company does not yet have income.

'The company made an operating loss of NOK 13.9 million (£1.02m) in Q1 2023, compared to a loss of NOK 9.9m in the same quarter last year. ... The company has the capacity to produce 1,000 gutted weight tonnes of salmon annually in the pool it currently operates and intends to excavate more pools to increase capacity to 19,000 gwt.' Fishfarmingexpert. (25 May 2023). Land-based farmer's salmon 'are 40% ahead of net pen fish'. Retrieved 12 June 2023 from [www.fishfarmingexpert.com/andfjord-salmon-feed-conversion-ratio-q1-2023/land-based-farmers-salmon-are-40-ahead-of-net-pen-fish/1525433](http://www.fishfarmingexpert.com/andfjord-salmon-feed-conversion-ratio-q1-2023/land-based-farmers-salmon-are-40-ahead-of-net-pen-fish/1525433)

3. **Higher sea surface temperatures and concerns over biodiversity. This is likely to mean that companies will need to revisit their social licence to operate**

(a). NZKS observations on impacts and changes in sea surface temperature over time

NZKS advised in 2016 that '[t]he optimum water temperature range for King salmon is 6-17°C, with maximum growth achieved in temperatures between 12-17°C. Rapid changes in temperature within this range can cause death, and most fish adapt to a narrow temperature and salinity range.' New Zealand King Salmon. (2016). *New Zealand King Salmon Operations Report*, p. 13. Retrieved 12 June 2023 from [www.mpi.govt.nz/dmsdocument/16102-New-Zealand-King-Salmon-Operations-report](http://www.mpi.govt.nz/dmsdocument/16102-New-Zealand-King-Salmon-Operations-report)

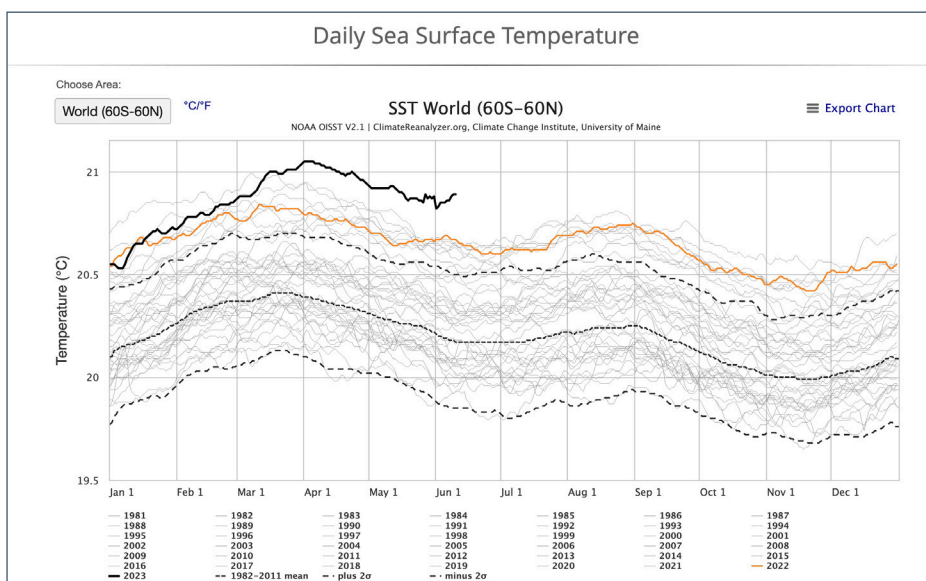
NZKS has recorded historic water temperatures which have been collated in the table below by the Institute. For the table and references see McGuinness Institute. (2022). *Discussion Paper 2022/02 – New Zealand King Salmon Case Study: A financial reporting perspective*, p. 25. Retrieved 13 June 2023 from [www.mcguinnessinstitute.org/wp-content/uploads/2023/03/20230321-DP-2022-02-NZKS.pdf](http://www.mcguinnessinstitute.org/wp-content/uploads/2023/03/20230321-DP-2022-02-NZKS.pdf)

Table 5: Farm site temperatures (2016 or earlier)<sup>53</sup>

Farm site name	Excerpt on water temperature range
Waihinau Farm (Pelorus Sound)	'Over an annual period, water temperature generally ranges from ~12–17.5°C (but can exceed 18°C for an extended period).'
Forsyth Bay Farm (Pelorus Sound)	'Average water temperatures range from ~12–17.5°C (but can exceed 18°C for an extended period).'
Waitata Farm (Pelorus Sound, new 2013 BOI Decision)	'Water temperatures range between ~12–18.0°C.'
Kopāua Farm (Pelorus Sound, new 2013 BOI Decision)	'Water temperatures range between ~12–18.0°C.'
Ruakaka Farm (Queen Charlotte Sound)	'Water temperatures at this site generally range from ~11–18°C (however can peak at up to 20°C).'
Otanerau Farm (Queen Charlotte Sound)	'Water temperature generally ranges from ~11.5–18°C (but can exceed 18°C for an extended period), but due to the consistently higher warmer temperatures in summer at this site, salmon are only grown here for nine months of the year (April to January).'
Te Pangu Farm (Tory Channel)	'Water temperatures generally range from ~11.5–16.5 °C.'
Clay Point Farm (Tory Channel)	'It has cooler water temperatures (~10.5–16.5°C) compared to farms in Pelorus and Queen Charlotte Sounds, making this site ideal for growing salmon.'
Ngamahau Farm (Tory Channel, new 2013 BOI Decision)	'Water temperatures range between 10.5–16.5°C.'

(b). International observations on changes in sea surface temperature over time

Birkel, S. D. (2023). Daily Sea Surface Temperature. Climate Reanalyzer. Retrieved 12 June 2023 from [www.climateanalyzer.org/clim/sst\\_daily/](http://www.climateanalyzer.org/clim/sst_daily/)



#### 4. More applications for ocean farming, and land-based farming using water from the ocean

NZKS is looking to expand fish farming further along the coast from North Marlborough to Stewart Island.

2012: Brief of evidence of Mark John Gillard in relation to site selection and consultation for the New Zealand King Salmon Co. Limited, June 2012, pp. 10–11. Retrieved 17 April 2023 from [www.epa.govt.nz/assets/FileAPI/proposal/NSP000002/Evidence-Applicants-evidence/5545dd4011/2-Mark-Gillard-Site-Selection-and-Consultation-v1.pdf](http://www.epa.govt.nz/assets/FileAPI/proposal/NSP000002/Evidence-Applicants-evidence/5545dd4011/2-Mark-Gillard-Site-Selection-and-Consultation-v1.pdf)

##### Key matters for consideration in selecting possible salmon farm sites

20. Based on my experience, there are two overarching critical matters to consider in determining whether it is *feasible* to farm salmon productively:

- a. The **first critical matters** are the key appraisals of the physical characteristic required for salmon to successfully grow (rather than perform poorly or possibly die). These are primarily:
  - i. Water **temperature** - salmon prefer cooler waters and usually grow best in water temperatures between approximately 12 to 17°C;
  - ii. Water depth - which preferably should be at least 30 metres and ideally 40 metres or more;
  - iii. High current - it is generally preferable to grow salmon in areas of high current.

Water depth and current can impact on temperature, but are also important in terms of "flushing" by-products from the farm area. It is not an exact science. For example, some warm sites that are at the marginal temperature of 17°C (or even just over in the summer), can be managed if they are for example stocked at times to avoid warm temperatures especially with smolt during their first year in seawater. Our existing site at Waihinou Bay falls into this category, although we have farmed this site for over 20 years

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we do still experience difficulties with our autumn mortality event. Mr Mark Preece in his evidence explains the difficulties we experience on that site.

- b. The **second critical matter** is that farms cannot be exposed to open water wave conditions - they will fail. The technology, in terms of anchoring, ability to withstand open ocean swells, storms, and to reliably service farms means they cannot be too exposed. In the future this might be technically possible and there are efforts world wide to try and develop this technology. However, it will be years away and would probably also be prohibitively expensive.

#### 2016: Move to Tory Channel/Kura Te Au

Simpson, H. (10 May 2016). New Zealand King Salmon says failing farms should be moved to Tory Channel. Stuff. Retrieved 17 April 2023 from [www.stuff.co.nz/business/farming/aquaculture/79637662/new-zealand-king-salmon-says-failing-farms-should-be-moved-to-tory-channel](http://www.stuff.co.nz/business/farming/aquaculture/79637662/new-zealand-king-salmon-says-failing-farms-should-be-moved-to-tory-channel)

#### 2019: Move to open waters

It was reported: 'NZ King Salmon has applied for 13 research positions from North Marlborough to Stewart Island to monitor waves and currents in a bid to expand fish farming further into New Zealand's open waters. Testing had been completed on the most northern side of Cook Strait with conditions "more benign" than NZ King Salmon anticipated ... [NZ King Salmon chief executive Grant Rosewarne] said he predicted the technology to open ocean farm at "benign" sites like this one would be available ahead of obtaining the required resource consents. The technology to handle sites further down the coast, and close to Stewart Island, where weather was more challenging, was more like 10 years away, he said. ... Rosewarne said this summer had not been as hot as last, where tonnes of fish died after overheating in warmer than usual Marlborough Sounds farms. But it was still "too warm for our fish", Rosewarne said. Anything above 16 degrees Celsius could be a problem.' Angeloni, A. (8 April 2019). NZKS to test waters down SI's east coast after Cook Strait trial. Stuff. Retrieved 17 April 2023 from [www.stuff.co.nz/business/109625032/nzks-to-test-waters-down-sis-east-coast-after-cook-strait-trial](http://www.stuff.co.nz/business/109625032/nzks-to-test-waters-down-sis-east-coast-after-cook-strait-trial)

Home > Database search > Resource Management Act (RMA) applications

## New Zealand King Salmon offshore monitoring sites - call in request

Proposal overview ×

**Proposal number:** NSP000043

**Proposal name:** New Zealand King Salmon offshore monitoring sites - call in request

**Primary organisation:** New Zealand King Salmon Company

**Proposal type:** Resource consent application

**Proposal state:** Lodgement

**Application decision:** Decision not yet made

**Date decision notified:**

**Proposal description:** New Zealand King Salmon (NZKS) have applied for resource consents for coastal permits, for the monitoring of offshore sites within the Coastal Marine Area (CMA) within Marlborough District Council and Southland Regional Council. Both councils have requested that the Minister of Conservation call in these applications from NZKS as a National Significant Proposal. NZKS lodged similar applications with the Canterbury and Otago Regional Councils.

Latest website update on proposal:

Source: EPA. (nd.). New Zealand King Salmon offshore monitoring sites - call in request. Retrieved 19 June 2023 from [epa.govt.nz/database-search/rma-applications/view/NSP000043](https://www.epa.govt.nz/database-search/rma-applications/view/NSP000043)

## The New Zealand King Salmon (NZKS) salmon farm north of Cape Lambert, Marlborough

Proposal overview ×

**Proposal number:** NSP000044

**Proposal name:** The New Zealand King Salmon (NZKS) salmon farm north of Cape Lambert, Marlborough

**Primary organisation:** New Zealand King Salmon Company

**Proposal type:** Resource consent application

**Proposal state:** Proposal Close-Out

**Application decision:** Decision to be made by Local Authority

**Date decision notified:**

**Proposal description:** The New Zealand King Salmon Co. Limited (NZKS) has lodged a resource consent application with Marlborough District Council (U190438) to establish and operate salmon farms within a 1,792 hectare site (approximately 3.3km wide by 5.4km long) located between 6 km and 12 km due north of Cape Lambert, Marlborough. Two blocks of pens are proposed within the application area. The development of the site will be staged. The Minister of Conservation received correspondence from Friends of Nelson Haven, Kenepuru and Central Sounds Residents Association, Marlborough Environment Centre and Guardians of the Sounds regarding the resource consent application lodged by NZKS (the applicant) to establish and operate a salmon farm north of Cape Lambert, Marlborough, asking the Minister to call in the matter under section 142 of the Resource Management Act 1991 (RMA). The Minister has the power under section 142 of RMA to make a direction to call in the application on the Minister's own initiative or at the request of the applicant or the local authority.

Latest website update on proposal:

Source: EPA. (nd.). The New Zealand King Salmon (NZKS) salmon farm north of Cape Lambert, Marlborough. Retrieved 19 June 2023 from [www.epa.govt.nz/database-search/rma-applications/view/NSP000044](https://www.epa.govt.nz/database-search/rma-applications/view/NSP000044)

### 2023: NZKS 14 June AGM

At the AGM, the acting Chairman, Paul Steere, noted that: 'Blue Endeavour was the largest, most expensive application under the RMA ever in any form of NZ Aquaculture.'

It was first lodged in July 2019 after some 18 months of preparatory work by your company in scoping the needs, monitoring the proposed and other possible sites for their conditions and suitability, studying the technology already being used in the northern hemisphere and engaging with interested 3rd parties both supportive and some, maybe a little concerned.

The three learned Commissioners appointed by the Marlborough District Council called for public submissions on the 18th October 2019 – 56 were received, of which 39 supported the application, 14 were opposed and 3 neutral.

The commissioners had 5 periods of meetings totalling 11 days – a significant amount of work was done by correspondence between the commission with the parties involved. Some 26 witnesses gave evidence from the company and of the submitters, 26 also gave evidence, as did 9 council officers. We are very grateful to the company team, especially to Grant, Mark Preece, Mark Gillard and Zac Waddington plus the legal team of Gascoigne Wicks led by Quentin Davis, for their combined diligence, application and aptitude in seeing this through to a positive conclusion.

Approval of the application was released by the commissioners on behalf of the Council on the 10th of November 2022 – the decision runs to 199 pages including appendices.

So over 5 years in the making, \$7million in fees and research by your company to say nothing of the distraction from the teams day jobs, and subject to the formal lodgement, we now have the resource consent for two farms under acceptable conditions, within an area of 1,000 hectares just 5km north of point Lambert in the north Marlborough Sounds.'

At the AGM, the acting Chief Executive, Graeme Tregidga, noted that 'Blue Endeavour has the potential to add up to 10,000MT of harvest volume in conjunction with our nursery sites when fully developed' [and] 'Future full capacity of existing sites plus a fully developed Blue Endeavour is ~17,000MT.'

NZKS. (14 June 2023). New Zealand King Salmon Investments Limited Annual Shareholders' Meeting – Chair and CEO's Address. Retrieved 19 June 2023 from [www.nzx.com/announcements/413033](http://www.nzx.com/announcements/413033) See also NZKS. (14 June 2023). New Zealand King Salmon Investments Limited Annual Shareholders' Meeting – Presentation. Retrieved 19 June 2023 from [www.nzx.com/announcements/413033](http://www.nzx.com/announcements/413033)

#### 5. **More compliance costs for marine-based farming**

The MDC can recover direct costs of compliance from marine farms. There are 4.5 FTE compliance officers in the MDC compliance monitoring team. Officers' roles are varied and there is not one dedicated marine compliance officer as workloads change with demand at different times of the year. Compliance officers come from a range of backgrounds with qualifications in a number of different disciplines including legal, enforcement and science. All compliance officers are trained in local government compliance monitoring. When specific science knowledge is required Council calls on marine scientists to provide technical advice to compliance officers. Compliance charges recovered for marine finfish farming are as follows: 1 Jan–31 Dec 2020: \$7422.50; 1 Jan–31 Dec 2021: \$7101.75 and 1 Jan–31 Dec 2022: \$9015.47. Personal communication with Marlborough District Council, 26 May 2023.

#### 6. **Coastal charges/resource rent tax applied uniformly across all marine-based farms**

Currently NZKS, or indeed any other finfish farmers, are not charged by councils for occupying public water space. MDC did attempt to implement a charging system. However, NZKS 'successfully challenged the Marlborough District Council's proposal to charge companies for occupying coastal waters for finfish farming. The Environmental Protection Authority's Board of Inquiry has determined the council cannot introduce new coastal charges on finfish farmers at this point in the process examining King Salmon's application to farm in areas of the Marlborough Sounds where marine farming is prohibited. King Salmon has indicated to the Marlborough Express, however, that it will consider paying charges under certain conditions'. Bell, C. (13 April 2012). EPA knocks back fish farm charge. Stuff. Retrieved 17 April 2023 from [www.stuff.co.nz/marlborough-express/news/salmon-farms/6636530/EPA-knocks-back-fish-farm-charge](http://www.stuff.co.nz/marlborough-express/news/salmon-farms/6636530/EPA-knocks-back-fish-farm-charge)

In 2014 the MDC prepared a report: *Reviewing Marlborough's Regional Policy Statement and Resource Management Plans* (1 July 2014). The level of proposed charges were very low. Of note, the intention was that the actual charges would reside within the Annual Plan rather than in the plan (see p. 6).

In 2021:

The potential delivery of government intervention in the aquaculture space is discussed in para. 221 of the MPI report *Open Ocean Salmon Farming in New Zealand* (October 2021). Retrieved 30 June 2023 from [www.mpi.govt.nz/dmsdocument/50131-Open-Ocean-Salmon-Farming-in-New-Zealand-Aquaculture-Strategy](http://www.mpi.govt.nz/dmsdocument/50131-Open-Ocean-Salmon-Farming-in-New-Zealand-Aquaculture-Strategy)

The report notes on p. 56:

Para. 221: Any changes from the RMA reform and/or the work being undertaken by the Ministry on resource consenting that might impact on the interface between government, in its widest sense and participants is unlikely to warrant the establishment of new entity. However, there are some options for changes that will involve new activities. For example, there are options for how consented water space might be allocated to participants and charges levied for access to water space.

In June 2023:

MDC has sought to impose coastal occupation charges through the Proposed Marlborough Environment Plan (PMEP). The PMEP is in progress, see in particular policies 13.20.4–13.20.8 and methods 13.M.33 and 13.M.34 in the Coastal Environment chapter. Retrieved 30 June 2023 from [www.marlborough.govt.nz](http://www.marlborough.govt.nz)

Personal communication with Marlborough District Council, 27 June 2023.

#### **Resource rent tax on aquaculture (Norway)**

The production/use of natural resources can sometimes generate a high return through using a public area. This is often referred to as resource rent. A resource rent tax on aquaculture recognises that the public are disadvantaged through the exploitation of water spaces (through, for instance, visual or environmental pollution). By introducing a resource rent tax, a government can return the benefit to the public, often through distributing a share of the tax take to both the state and the local community.

'The rationale behind the new tax is based on the sector's use of public resources, and already applies to sectors such as hydroelectric power stations that profit from state assets. Previously proposed in 2019, it is back on the agenda following the rise in the costs of the provision of public services that is affecting all of Europe as a result of the Russia-Ukraine war.

'Municipalities close to the farms are likely to benefit the most, as Norway's Finance Ministry explained in a statement. "A key element of the proposal is that the local communities which make natural resources available should be guaranteed a share of the resource rent. The tax revenues are estimated to be between NOK 3.65 and 3.8 billion [\$347 million to 361 million] and the government is planning for half of this to go to the municipal sector."

'The government said those farms operating under the development licence initiative, which are testing new technology, will be immune from the new resource rent tax.'

TheFishSite. (28 September 2022). Norway moots 40 percent tax for the country's largest trout and salmon farms. Retrieved 14 June 2023 from [www.thefishsite.com/articles/norway-moots-40-percent-tax-for-the-countrys-largest-trout-and-salmon-farms](http://www.thefishsite.com/articles/norway-moots-40-percent-tax-for-the-countrys-largest-trout-and-salmon-farms)

'The Norwegian Parliament has passed an additional resource rent tax on aquaculture in Norway, with a tax rate of 25%. This is in addition to the regular corporate tax and means that the marginal tax rate on aquaculture will increase by over 100%, from 22% to 47%. The new tax will apply retroactively from January 1, 2023, and is being implemented without the involvement of stakeholders and broad political consensus that traditionally characterize major changes in the tax system and framework for Norwegian businesses.' SalMar. (31 May 2023). SalMar – Resource rent tax on aquaculture in Norway. Retrieved 14 June 2023 from [www.globenewswire.com/news-release/2023/05/31/2679636/0/en/SalMar-Resource-rent-tax-on-aquaculture-in-Norway.html](http://www.globenewswire.com/news-release/2023/05/31/2679636/0/en/SalMar-Resource-rent-tax-on-aquaculture-in-Norway.html)

**7. Feed costs and supply issues increase, solution is to produce feed in New Zealand**

2012: Statement of Evidence of Ben Armour Wybourne in relation to feed discharge for the New Zealand King Salmon Co. Limited, June 2012, pp. 12–13. Retrieved 2 June 2023 from [www.epa.govt.nz/assets/FileAPI/proposal/NSP000002/Evidence-Applicants-evidence/7256335586/15-Ben-Wybourne-Salmon-Feed-v1.pdf](http://www.epa.govt.nz/assets/FileAPI/proposal/NSP000002/Evidence-Applicants-evidence/7256335586/15-Ben-Wybourne-Salmon-Feed-v1.pdf)

Summary of Ingredients Used in NZ King Salmon Diets	
<i>Protein Sources</i>	
38.	The proteins contained in fish food are a mixture of fishmeal, land animal proteins and vegetable proteins.
39.	Fish require an appropriate mix of digestible amino acids (the building blocks of protein) as opposed to raw protein material (such as fishmeal) <i>per se</i> . The same necessary mix of amino acids can derive from various combinations of different raw materials. Understanding the amino acid availability from specific raw materials is an important topic of research at fish feed companies.
40.	The choice of protein source varies with cost and availability, and within Skretting this varies around the world according to local conditions. Protein in New Zealand diets supplied from Skretting Australia typically derives from: <ol style="list-style-type: none"> <li>Fishmeal; primarily Peruvian anchovy</li> <li>Poultry meals (bloodmeal, meatmeal, feathermeal); these rendered products are a by-product of poultry slaughtered for human consumption in Australia. These products are excellent nutritional materials for carnivorous fish.</li> <li>Mammalian meals; these rendered products are a by-product of cattle, sheep and pigs slaughtered for human consumption in Australia. Currently only mammalian bloodmeal (and not mammalian meatmeal) is included in New Zealand diets due to New Zealand import restrictions.</li> <li>Plant protein meals; Faba bean meal, lupin meal, corn gluten, wheat gluten and soya protein concentrate</li> </ol>
41.	Concerns around the presence of antibiotics and banned substances (e.g. growth hormones) in poultry products included in salmon diets have been raised.
	<ol style="list-style-type: none"> <li>Poultry by-products used in NZ King Salmon diets derive from poultry slaughtered for human consumption in Australia. As such they are subject to strict controls on residues and a comprehensive residue monitoring program.</li> <li>For example, the Australian Government's National Residue Survey (NRS) for 2009-10 tested 330 commercial poultry samples (9570 analyses) and found no residues (including antibiotics) or environmental contaminants above the Limits of Reporting for products for human consumption.</li> </ol>
<i>Oils</i>	
42.	It was traditionally thought that fish required fish oil. We now understand that fish have a digestible fatty acid requirement that can be met from a variety of oil sources. Fish oil is still used extensively in salmon diets, but primarily to introduce long chain omega-3 fatty acids (mostly EPA and DHA) into the salmon fillet. The fatty acid composition of a salmon fillet is strongly influenced (and to an extent mirrors) the fatty acid composition of the diet. At present fish oil is the only practical source of EPA and DHA.
43.	Fish oil is a by-product of fishmeal production, although now is considered a valuable commodity in its own right
44.	Poultry oil, a by-product of poultry slaughtered for human consumption, is used to replace fish oil in New Zealand salmon diets. This poultry oil is sourced from Australian poultry. Poultry oil acts as an energy source for the fish and has the same saturated fat content as fish oil.
45.	The principal reason poultry oil is used in New Zealand is because of price and quality. In both Australasia and North America poultry oil is less expensive than the available vegetable oils. In some parts of the

2023: 'Significant increases in feed prices throughout FY23 due to raw materials constraints (impact of global pandemic and Russian/Ukraine war)'. NZKS. (n.d.). *New Zealand King Salmon Annual Report FY23*, p. 10. Retrieved 17 April 2023 from [www.kingsalmon.co.nz/wp-content/uploads/2023/03/NZKS-Annual-Report-FY2023.pdf](http://www.kingsalmon.co.nz/wp-content/uploads/2023/03/NZKS-Annual-Report-FY2023.pdf)

**8. Cost of salmon farming infrastructure increase**

The October 2021 report *Open Ocean Salmon Farming in New Zealand* begins by quoting the *Salmon Farming Industry Handbook 2021*: 'The salmon farming industry is capital-intensive and volatile. This is a result of a long production cycle, a fragmented industry, market conditions and a biological production process which is affected by many external factors.'

The report notes on p. 31:

Para 195: The cost of establishing an entire value chain for an open ocean salmon farm will be considerable. Preliminary analysis prepared by MPI suggests that the cost of consenting, onshore facilities and plant (hatchery and processing plant) and offshore infrastructure (pens) and supporting assets (vessels etc.) for an operation that can produce 10,000 tonnes of salmon per annum could be \$150 million or more. In addition, there will be operating losses that will need to be financed in the initial years as production increases. Smolt will need to be produced, salmon grown to market weight and marketing and market development undertaken before there is revenue of any substance.

Para 203: Findings from the analysis include:

The total capital required to finance the purchase/construction of assets and to finance initial operating losses could be in the region of \$250 million.

It could be seven years from the start of the consenting process to the first year of positive operating cash flow. The projected price per kilogram received from export sales is derived by escalating the current average export revenue per kilogram of \$21.50. The projections are sensitive to the assumed escalation rate.

Revenue in the first year that full production (10,000 tonnes) is available for sale is approximately \$285 million. Another four to five farms of the same size (five to six in total) and developed at the same time will be required to achieve industry sales revenue of \$1.5 billion by 2030.

Wattie, B. (October 2021). *Open Ocean Salmon Farming in New Zealand*. Retrieved 14 June 2023 from [www.mpi.govt.nz/dmsdocument/50131-Open-Ocean-Salmon-Farming-in-New-Zealand-Aquaculture-Strategy](http://www.mpi.govt.nz/dmsdocument/50131-Open-Ocean-Salmon-Farming-in-New-Zealand-Aquaculture-Strategy)

In 2023, the *Handbook* reaffirms: 'The salmon farming industry is capital-intensive and volatile. This is a result of a long production cycle, a fragmented industry, market conditions and a biological production process which is affected by many external factors. Over time, production costs have been reduced and productivity has increased on the back of new technology and improved techniques. In recent years, costs have trended upwards due to several factors including rising feed costs, biological costs and more stringent regulatory compliance procedures'. Mowi. (2023). *Salmon Farming Industry Handbook 2023*, p. 59. Retrieved 12 June 2023 from [www.ml-eu.globenewswire.com/Resource/Download/c56557de-ebbc-4f78-be7b-b167a0d5a279](http://www.ml-eu.globenewswire.com/Resource/Download/c56557de-ebbc-4f78-be7b-b167a0d5a279)

## 9. Increased legislation of marine space and protected areas

### Background to the Marine Reserves Bill

'In September 2000 the Department of Conservation released a discussion document which reviewed the way in which marine reserves are established and managed ...

A draft new Marine Reserves Bill was introduced to Parliament on Friday 7 June 2002.' Department of Conservation. (May 2001). Review of the Marine Reserves Act 1971. Retrieved 12 June 2023 from [www.doc.govt.nz/about-us/science-publications/conservation-publications/marine-and-coastal/marine-protected-areas/review-of-the-marine-reserves-act-1971](http://www.doc.govt.nz/about-us/science-publications/conservation-publications/marine-and-coastal/marine-protected-areas/review-of-the-marine-reserves-act-1971)

It is noted that the final report was presented on 12 December 2012 and the first reading was terminated.

New Zealand Parliament. (2023). Marine Reserves Bill. Retrieved 12 June 2023 from [www.bills.parliament.nz/v/6/cfa3a510-592b-4866-b30b-cbaa9e9ab94c](http://www.bills.parliament.nz/v/6/cfa3a510-592b-4866-b30b-cbaa9e9ab94c)

The Institute has asked in an OIA for a copy of the 2012 report and any progress on this or similar bills. The 2012 report is no longer available on the Parliamentary website.

'The government would create a huge marine sanctuary in the wild waters of the South Island, protecting 1267sq km of ocean, about the size of Auckland. But after nearly a decade of arguing, millions of dollars, three terms of Parliament and six conservation ministers, the marine mammals, birds, fish and invertebrates that live between Timaru in South Canterbury and Waipapa Point in Southland are still without sanctuary from harmful human behaviour. And with ministers yet to receive advice on the proposal – and no timeline for a decision by the Government – the marine protection network seems unlikely to progress before next year's election.' Vance, A. (29 October 2022). A decade of wrangling, but dolphins and seabirds off the South Island's east coast remains unprotected. Stuff. Retrieved 14 June 2023 from [www.stuff.co.nz/national/politics/130147040/a-decade-of-wrangling-but-dolphins-and-seabirds-off-the-south-islands-east-coast-remain-unprotected](http://www.stuff.co.nz/national/politics/130147040/a-decade-of-wrangling-but-dolphins-and-seabirds-off-the-south-islands-east-coast-remain-unprotected)

'Iwi organisations with interests around the Kermadec Islands have almost unanimously voted to reject the Government's latest proposal for an ocean sanctuary, a decision Environment Minister David Parker says is unexpected and disappointing. It is another major setback in fraught attempts by the government to set up the 620,000sq km Ocean Sanctuary since it was first announced at the UN in New York by former prime minister John Key in 2015.' Trevett, C. (13 June 2023). Major setback for Kermadec Ocean Sanctuary as iwi reject latest Government proposal. *NZ Herald*. Retrieved 14 June 2023 from [www.nzherald.co.nz/nz/politics/major-setback-for-kermadec-ocean-sanctuary-as-iwi-reject-latest-government-proposal/WVFWIFW2ZNCWDBMSI3KYMBUOM/](http://www.nzherald.co.nz/nz/politics/major-setback-for-kermadec-ocean-sanctuary-as-iwi-reject-latest-government-proposal/WVFWIFW2ZNCWDBMSI3KYMBUOM/)

Note: The Chief Executive of the McGuinness Institute owns a small shareholding in NZKS and a property at Umuwheke Bay in Queen Charlotte Sound.