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Inshore Innovation

The case for a new inshore fishing fleet in New Zealand

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Key points

The proposal at a glance

This business case proposes that the Government commit financial support to enable the building of a new fleet of inshore fishing vessels in Northland.

The proposal results in the following:

- immediate carbon emissions reductions, with vessels that are designed to provide a pathway to zero carbon in 15-20 years as the technology matures
- long-term, high-paying jobs and trades training across multiple disciplines
- an achievable avenue for SME owner-operators and iwi to invest in new vessels
- a transformational change to the inshore fishing sector:
  - fewer vessels catching the same volume of fish, creating higher-paying jobs with less reliance on foreign crew
  - increasing the value, export earnings and tax take from the same catch volume
  - reduced benthic impacts of fishing from reduced fleet size
  - reduced protected species impacts from reduced fleet size
  - improved health and safety outcomes
  - built to adopt world-leading innovation and technology
- a transformational change to the capability and capacity in the marine engineering sector that links well with other marine-based initiatives and opens the opportunity to undertake extensive non-fishing related contracts which are currently going offshore and for fishing-related builds outside the target size range of this initiative.

The proposal has a strong regional development focus while meeting the social, cultural, and environmental objectives. It is consistent with the WTO agreements and New Zealand's position on subsidies in the fishing industry.

The project will be delivered by "BuildCo" from a purpose-built facility in Whangarei. Three existing well-established Northland engineering businesses will be the driving force behind the facility.

Buyers will order their new vessels from a catalogue of pre-approved designs and fit-out options, selecting; length, fishing configuration, horsepower, electronic packages, etc. This standardisation will allow BuildCo to achieve production efficiencies, procurement benefits and through life service agreements.

Background

New Zealand's inshore coastal waters provide a sustainable, healthy food supply for the domestic market, high-quality seafood for export and employment for New Zealand's rural, provincial and coastal communities.

The current inshore commercial fishing fleet is old, with many vessels operating on grandfathered approvals because they do not meet current regulatory standards. Most are unregulated polluters with high carbon footprints, poor seakeeping capabilities, and crew live and work in uncomfortable environments.

Because the overall production and associated productivity of the inshore fishery is constrained by fisheries regulation and biological factors, a pathway to increased economic returns from inshore fishing therefore requires the adoption of modern, efficient, environmentally sustainable fishing practices, which in turn require modern vessels to achieve more fishing days per year or catch and store more fish per trip.

Many vessels in the fleet are owned by single-ship operators with limited financial and business capacity to replace their vessels with a modern equivalent.

Without government intervention, fewer vessels catching the same number of fish means that the fleet will probably be concentrated in a few centres and become more corporatised, as opposed to the currently strong SME and regional presence.

The government's industry development, regional development and food and fibre strategies all seek to ensure that the benefits of economic and social growth are spread across the country. The Government is also committed to supporting a just transition to a low-carbon, sustainable future.

While New Zealand does have the technical capacity to build new, high-quality fishing vessels, current practice is for owners to commission one-off, bespoke designs that are expensive by international standards to implement in New Zealand. Therefore, this business opportunity is lost to offshore markets, along with any potential socioeconomic benefit.

The decision for the government is whether allowing market forces to drive a slow and disruptive transition to a smaller fleet, comprised of more efficient and overseas-built vessels, fishing out of main centres is in accord with all of its relevant policies or whether those policies require an intervention that is supported by industry, the regions and local and central government.

Conditions needed for a viable local ship-building operation

Building a fleet of replacement inshore fishing vessels is viable in New Zealand provided that:

- The industry agrees to operate a 'sister ship' fleet with a limited number of highly flexible vessels being constructed, which would allow the production facility to benefit from economies of scale.
- A vessel-retirement scheme is established to support a just transition away from the existing ageing fleet to a smaller, more modern fleet
- There is a targeted approach toward the workforce development programmes that are best placed to support the wider industry opportunity.

Northland Inc has identified a group of business interests in Northland who are prepared to invest in a facility and has confirmed there is support from the wider seafood sector. This group would form a new entity (BuildCo) to further their participation in the project.

The Crown's commitment

This business case outlines the high-level elements of the case for the Crown to support the seafood sector to have a new inshore fishing fleet built in New Zealand. The proposal is a viable way of implementing existing government, regional, industry, just transition and food and fibre policies.

Work to date suggests that about $Commercial would be required to build the facility. Ideally, this would come from private investors, but Crown support may be required during the start-up phase. Crown funding of about $46m over ten years would support aspects of the project that do not have purely financial objectives (like a just transition to a low carbon economy and regional economic and skills development).

The way forward

The next steps are:

- The government guarantees to purchase the first three vessels off the production line to give the facility the confidence to invest in the required plant, equipment, and skilled staff **and** to provide the industry with the confidence that the facility can produce high-quality vessels on time and to budget
- The government supports a just transition away from the existing ageing fleet to a smaller, more modern fleet, which would likely involve a vessel-retirement scheme
- The government provides funding from existing or new workforce development programmes to flow in appropriate amounts to the facility or an organisation that is best placed to support the wider industry opportunity.

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1 Introduction

Inshore Innovation is a project championed by Northland Inc, the regional economic development agency for Northland, supported by Provincial Growth Funding (PGF). Funding from Kānoa, through the PGF, was advanced to allow the development of a business case to explore solutions for the New Zealand inshore fishing sector to embark on a New Zealand built vessel replacement scheme, with a focus on Whangārei as the rebuild location.

This strategic business case builds upon this opportunity and identifies the scope of the venture and what actions and next steps are needed to bring it to fruition. The context of the case is a range of intended overall sustainable development aspirations and the related stated Government policies that envisage the Crown providing financial and other support for the development of regional economic activity that might not occur, at least not at the same scale and timeliness, without direct and indirect Government support.

Before the development of this business case, there was a series of studies and engagements with both the public and private sectors that have focused on assessing the viability of a competitive New Zealand-based fishing vessel-building industry and the sector's support for a production run of 'sister ship' vessels. The focus of this project has been on a subset of the inshore wild-capture fishing fleet in New Zealand, primarily consisting of vessels 16m to 24m in length.

A study of the marine engineering sectors' current capability and capacity identified Whangārei as the most appropriate location, where water side vacant land was available to develop a purpose-built greenfield facility close to existing support industries. While Northland-based, manufacturers of components and suppliers could be located throughout New Zealand, thus bringing benefits to the entire country across all aspects of the Government's well-being framework.

As well as studying the specific requirements of a new fleet and the facility required to build it, Inshore Innovation has also identified a group of business interests in Northland who are prepared to invest in a facility, provided there is sufficient support from the wider seafood sector and the Government. Collectively these interventions will sustain and improve outcomes for two key predominantly regional-based sectors.

Without Government participation, this initiative, for a variety of reasons, is likely to be challenged in moving forward and inevitably, a smaller number of new vessels will be built overseas with no benefit captured on New Zealand shores. Ultimately, the question for the Crown is whether it wishes to create an enabling environment for a commercial fishing vessel construction facility in Northland that will facilitate rebuilding the current ageing inshore fishing fleet.

While knowing exactly what would happen without Government intervention is uncertain, we envisage that the transition to a smaller, foreign-built fleet will be disruptive. This is especially the case in small communities. The inshore fishing industry will continue, but it will probably be concentrated in main centres, with more corporate ownership. The opportunity for smaller iwi to participate in the industry directly may be lost.

Initial indications are that private sector investment of about $Commercia would be required to build the facility, with Crown funding a variety of enabling factors with a value of about $46m over ten years to support different aspects of the project.

Table 1 Required investment and interventions

Investor	Focus area	Amount[1]
Private owner	Infrastructure for a new facility	$c
Central Government	Purchase of first three vessels for use by Government programs	Up to $18m
Central Government Core Programs	Training facility Support for skills training As part of current workforce development programs	$3m set-up $7.65m (over ten years)
Central Government	Support through a Vessel retirement scheme	$17.5m (over ten years, $500,000 per vessel)

Source: Inshore Innovation

If Ministers accept this strategic case, then the group of potential investors in the facility will proceed, with officials from relevant agencies, in collaboration with the New Zealand seafood industry, to progress the case for establishing a New Zealand-based capability to construct inshore fishing vessels in Northland for the benefit of the entire sector and NZ Inc.

2 Background

2.1 Project background

The Inshore Innovation project is the development of a business case funded by Kānoa-RDU and Northland Inc. The business case was broken down into a series of studies and engagements with both the public and private sectors, which focused on assessing/determining the viability of a competitive New Zealand-based fishing vessel-building industry and the sectors' support for a production run of "sister ship" vessels.

Importantly, the business case embraces key contributions across all aspects of the domains of well-being. Social aspects cover incomes and employment, economic includes sustainable increases in GDP at a sectoral and regional level, and there are very specific and relevant environmental attractions, with particular relevance to equality and ongoing support for diversity.

Studies indicate that the 169 fishing vessels in this fleet (16-24m) have an average vessel age of 39 years. These aged fishing vessels face increasing pressure from high operating costs, low serviceability, outdated emission standards and wide-ranging obsolescence.

Modelling by specialist marine consultants Bureau Veritas shows 68 new vessels, built to modern standards, could replace 169 aged vessels in this subset of the current inshore

[1] All these figures are indicative and subject to confirmation through the proposed engagement process.

fleet. This reduced fleet size and deployment of the latest technologies bring many advantages to meeting the Government’s de-carbonisation, environmental, safety and sustainable oceans agenda. Post-establishment, it will also provide regional centres with significant wide-ranging benefits linked to a new self-sustaining industry in shipbuilding and a more profitable inshore fishing sector.

If the obsolescence of the inshore fleet is not addressed, over the next decade, the New Zealand inshore fishing fleet will continually shrink, jeopardising the whole inshore seafood sector and undermining the value of the Treaty Settlement fisheries assets.

Kānoa–RDU’s interests are in “on shore” regional growth and employment via the Regional Strategic Provincial Fund. It is strongly positioned to support the provision of a shipyard that could build the vessels, but also with national and regional specialists contributing.

The project has a range of benefits that align with the Government’s policy imperatives and different agencies agendas and procurement needs (including the Ministry of Business, Innovation and Employment in respect of national and regional economic development and the just transition to a low-carbon future and the Ministry for Primary Industries in respect of food and fibre policy, including the development of fisheries strategy).

2.2 Inshore fishing sector

New Zealand’s inshore coastal waters provide a sustainable, healthy food supply for the domestic market, high-quality seafood for export and employment at sea and on shore for a range of New Zealand’s rural and coastal communities with limited job prospects.

Inshore fishing is mostly carried out in New Zealand’s territorial sea, which extends 12 nautical miles (about 22 kilometres) from the coast of New Zealand. Species covered by these fisheries include snapper, blue cod, flatfish, gurnard, tarakihi, and trevally. Inshore fish species are consumed locally and earn export receipts of around $500m annually.

The sector's contribution to the country and those communities encompasses all of what is regarded as well-being aspirations, including social, economic, environmental and cultural objectives. Figure 1 shows the location of commercial fishing operations around New Zealand, and it highlights that this industry is particularly important to regional New Zealand, where the seafood sector is an important source of employment and community revenue.

The sector is currently challenged by an ageing fleet that is not fit for purpose and is largely non-compliant with more recent industry regulation and not reflective of best practice standards. Ultimately, from an economic benefit perspective, it would be ideal to rebuild the existing fleet in New Zealand and capture the benefits regionally as opposed to any rebuild activity being sent offshore.

Figure 1 Location of commercial fishing around the coast

Source: Adapted from Ministry of Primary Industries

2.3 Northland manufacturing sector opportunity

With its extensive coastline and rich maritime past, Northland is nationally and internationally regarded as a marine hub for its world-class super yacht building and commercial vessel repair capabilities. In recent years, the manufacturing and construction sectors have also become important contributors to the Northland economy, playing a critical role in the structure, diversity and resilience of both the Northland and Whangārei economies.

In Northland, manufacturing contributes almost 20% to its GDP, with a large proportion of this (6%-7%) historically being produced by Refining NZ. Refining NZ was also one of the biggest employers offering higher-than-average salaries for all staff. With its transition to becoming an import terminal, 240 highly skilled jobs and up to a further 564 related manufacturing jobs[2] were lost. A proportion of these positions have transferable skillsets that complement the marine manufacturing sector. Overall, this scale back heightens Northland's underutilised workforce and low availability of productive and highly paid and skilled jobs.

2 Polis Consulting Group. (2022). *Socioeconomic Impacts of Northport.*

Inshore Innovation provides an opportunity to expand the contribution that marine manufacturing makes, while creating new business, employment and export opportunities for the region and thus further developing Northland's capability in the sector.

This is especially relevant given that Northland has a comparative advantage in activities related to this sector. There is also further investment forecasted to occur in the coming years in other key complementary projects that will help to drive growth and sustain employment in the sector. In particular, Northport's drydock/shipyard, which will be a floating drydock capable of servicing 200m long ships. This opportunity is currently being investigated further by the Ministry of Transport and the development of a business case.

3 The Strategic Case for a New Zealand-built inshore fishing fleet

3.1 Key factors for intervention

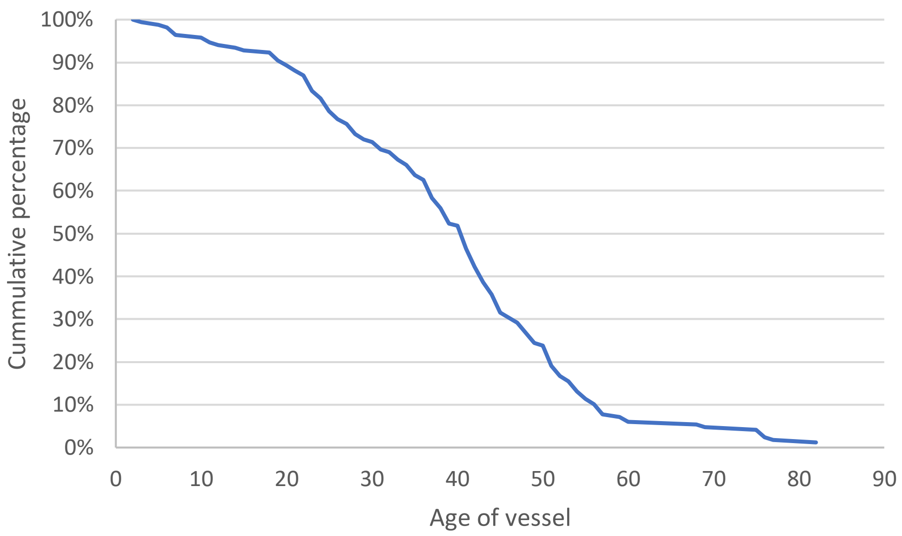
The opportunity exists to underpin and extend the sustainable potential of the inshore fisheries sector, supporting its broad contribution across a range of communities within New Zealand while bolstering and fully utilising the skills, capacity and ability from a Northland-based initiative, significantly supporting that local economy.

3.1.1 An ageing fleet

In terms of the fishing vessels that service the inshore fishery, a report undertaken by Bureau Veritas[3] found that 82 percent of the inshore fishing fleet was built between 1940 and 2000 (as shown in Figure 2) and are largely non-compliant with more recent industry regulation and not reflective of best practice standards. The review assessed information about currently registered vessels and input from the New Zealand fishing industry and was compared to guidance from the New Zealand Ministry for the Environment, the US Environmental Protection Agency, the International Maritime Organization and United Nations environmental panels. Due to their age, these fishing vessels employ outdated and, in some cases, vintage technology. The result is that safety, seakeeping attributes, fishing capability, habitability, and pollution standards are all far below what is acceptable in 2022. Many vessels operate on grandfathered regulatory approvals, meaning they do not comply with current requirements.

[3] A copy of the report is in Appendix A.

Figure 2 The existing fleet is ageing



Source: Fishserve data

Inevitably, the oldest and most out-of-date vessels will be retired, and the timing of this depends on many factors, but the possible tightening of standards or removal of grandfathering and the availability, suitability and cost of any replacement vessels will be important drivers.

If these vessels are proactively replaced with new builds which meet current regulatory and environmental requirements, they will also be more efficient (higher catch per vessel and thus earnings per crew member[4]), have lower whole-of-life operating costs and have a smaller environmental footprint. Compared to an existing vessel of the same length, a modern vessel:

- has 40 percent more fish hold capacity
- uses 24 percent less fuel per kilometre
- has much improved work-station ergonomics
- is safer and more habitable, providing a physically and mentally healthier working environment for the crew
- designed with the built-in capability to be upgraded to produce zero emissions at the 15 to 20yr refit, as battery technology matures.

On a pure equivalent catch basis, 169 aged vessels could be replaced with as few as 69 new vessels. Operational and geographical considerations mean, however, that a new fleet would probably be closer to 100 vessels.

3.1.2 New Zealand-built vessel price comparison

Discussions and industry surveys undertaken with local vessel operators thinking of replacing vessels have confirmed that while they would see advantages in buying a vessel

[4] Nearly all pay in inshore fisheries is based on catch-share agreements, which means a fisher's income is dependent on their position on the vessel, experience and the volume, quality and ultimate selling price of the catch.

built in New Zealand (New Zealand regulatory approvals are already in place, high quality product, easier access to the facility during the design, commissioning and build phases, lower through-life cost of maintenance), sourcing new vessels from Asian shipyards is the lowest purchase price option. European-backed Asian shipyards, the current most viable alternative, are the least risky option for the New Zealand fishing sector when considering replacement options. Given the current financial restraints faced by many in the industry, replacement decisions are primarily driven by the upfront cost of replacement, as opposed to the longer-term return.

Analysis by PwC has confirmed this view, as set out in Table 3.

Their methodology involved desk-based analysis of the whole-of-life revenue and capital and operating expenditure of various options.

The four options were:

- a one-off build at a New Zealand yard
- construction of a European-designed vessel in a high-quality European-backed Asian shipyard (e.g. Vietnam)
- a vessel designed and built in a low-cost Asian shipyard
- purchase of a second-hand vessel from Europe.

The vessels built in New Zealand or a European-backed Asian shipyard are of similar quality and, thus, over their life, produce a greater yield at a lower cost per day at sea. Table 2 provides some examples of the differences.

Table 2 Input assumptions

Assumption	One-off build in NZ	European-backed Asia yard	Asian yard	2nd hand European vessel
Days at sea	250	240	230	220
Gross revenue per sea day	16,000	16,000	15,000	13,000
Crew cost as a percentage of catch	17%	17%	17%	19%
Fuel per day at sea (tonnes)	1.2	1.2	1.2	1.5
Catch quality compared to existing vessels	110%	110%	105%	103%
Gross revenue	4,400,000	4,224,000	3,622,500	2,945,800

Source: PwC

Table 3 PwC's cost analysis

NZ Dollars

Cost	One-off build in NZ	European-backed Asia yard	Asian yard	2nd hand European vessel
Initial capital cost	6,161,616	5,496,809	4,546,932	2,911,345
Total through-life capital costs	1,500,000	1,500,000	3,470,000	3,630,000
Time until vessel operational (years)	1.7	2.3	2.7	2.0
Gross annual revenue	4,669,315	4,572,193	3,921,110	2,670,848
Through-life R&M costs	(5,970,313)	(6,004,167)	(7,491,667)	(9,187,500)
Through-life net cash flow (undiscounted)	148,612,758	144,803,539	120,762,073	87,302,859
Through-life net cash flow, discounted at 10 percent	$21,062,306	$19,329,970	$15,458,358	$11,837,974

Notes

1 Initial capital cost is the purchase costs plus all other costs up to delivery to the owner **in New Zealand**.

2 Total through-life capital costs are the sum of equipment and structural modifications undertaken through the life of the vessel.

3 Gross annual revenue is calculated on a combination of the efficiency of the vessel and the days at sea, which is in turn, a product of reliability of the vessel.

4 Through-life R&M costs represent the total of expenditure on maintenance.

5 Through-life cash flow is the summation of all the cost and revenues. For this presentation, we show undiscounted and discounted amounts using a 10 percent rate.

Source: PwC 2020

A one-off local build is the highest purchase outlay of the options in terms of up-front costs. This is partly due to the current lack of economies of scale at local shipyards. From an economic sense, the price gap between a New Zealand build and a European-backed Asian yard is about 12%, at the point of delivery to the owner in New Zealand. From a pure price at contract signing perspective, the New Zealand one-off is 20% more expensive than the European-backed Asian yard. While for the cheapest Asian yard, it is about 35% cheaper.

Recognising the quality of initial design and build, vessels constructed in New Zealand and in a European-backed Asian yard have similar through-life capital costs. R&M costs for New Zealand builds and European-backed vessels are also similar. Vessels built in the cheapest Asian yards and second-hand vessels require more maintenance throughout their lives.

New Zealand-built vessels have a range of benefits, including:

- A time-to-build advantage, which is due to the closer location: it is easier and cheaper for the owner to visit the yard and make required decisions.
- Potential to earn more gross revenue due to achieving more sea days through greater local support from the builder and equipment suppliers.

- Increased fit-for-purpose offering that takes into account both the regulatory and legislative environment in New Zealand and other factors required for industry compliance

Putting the components of the analysis together, one-off New Zealand-built vessels have some higher outlay initially, but on a whole-of-life basis, have a slight commercial advantage over a European-designed vessel built in Asia, due to being more reliable and productive. Vessels built in the cheapest Asia yards will always be less expensive but will also produce lower lifetime revenues. Second-hand vessels have a lower upfront cost, but because they are essentially using old technology, they do not have the efficiency gains of newly built vessels.

In terms of whole-of-life costs and revenue-earning capacity, New Zealand-built vessels do have a slight commercial advantage, but it remains challenging for the industry to pursue this option due to the higher up-front cost and lengthy payback period, which is further challenged by perceived uncertainty in the wider operating environment of the seafood sector.

Because the options have very different capital outlays and revenue patterns, another way to compare the alternatives is to use the Internal Rate of Return (IRR) method.[5] The results of the calculations for the four options are in Table 4. It shows the slight commercial advantage of a locally built vessel.

Table 4 Internal rates of return

	One-off build in NZ	European-backed Asia yard	Asian yard	2nd hand European vessel
IRR	47%	41%	38%	46%

Source: NZIER

3.1.3 The capability exists in New Zealand

Current New Zealand shipyards have the technical capacity to build modern vessels of a size suitable for inshore fishing in New Zealand waters. A study by Bureau Veritas across 13 New Zealand shipyards revealed that currently, 21 vessels have either been built or upgraded to international standards over the last ten years. The same survey found that New Zealand shipyards, especially those based in Northland, have the technical capacity to maintain and support a fleet of modern inshore fishing vessels to the required international standards.

Details of the study are in Appendix B.

What is currently required is a single facility with the capacity to build a fleet of new vessels over a short period at internationally competitive prices (either initially or through-life costs). Building 100 new vessels over 15–20 years would still be a modest operation by world standards. To be viable, the facility needs to take advantage of economies of scale. It

5 The Internal Rate of Return or IRR method is a way of comparing proposals with different cash flows. It calculates the interest rate required for a project to just break even over its lifetime (that is, have a zero net present value, where discounted expenditure equals discount revenue). The general investment rule is the higher the IRR, the more attractive a proposal.

would need to concentrate on building a limited number of vessel designs that can be configured using modular, interchangeable fishing methods.

Several models of multiple-purpose vessels with modular capabilities could undertake 95 percent of all current fishing activities. The industry also recognises and accepts the benefits that flow from the ownership of sister vessels.

Locating the facility in regional New Zealand, as opposed to a main centre like Auckland or Lyttleton would be consistent with the Government's economic development strategy, which seeks to see the benefits of economic growth distributed widely across New Zealand, with high-paying, sustainable employment opportunities being available to people regardless of where they live. The Government has demonstrated a willingness to provide financial assistance to regional businesses that would otherwise not be able to expand beyond niche operations.

Northland has a particular advantage in ship building, given its track record of delivering high-end vessels to a range of end-users in the commercial, government and defence sectors. The largest vessels built in New Zealand have mostly been built in Northland. There is also a real opportunity to capitalise on this and further deepen the capability of the sector in Northland by pursuing larger, higher-value projects.

3.2 The project's vision

The project will be delivered by BuildCo from a purpose-built facility in Whangārei. Three existing well-established Northland businesses have developed a Memorandum of Understanding (MOU) and will be the driving force behind BuildCo. Appendix C contains a copy of the MOU and associated documents, which outline their intent and provides an overview of their current operations and capability.

Buyers will order their new vessels from a catalogue of pre-approved designs and fit-out options, selecting; length, fishing configuration, horsepower, electronic packages, etc. This standardisation will allow BuildCo the achieve production efficiencies, procurement benefits and through life service agreements. Customisation will come at a cost.

3.2.1 Conditions for project success

We have identified the following conditions that would need to be present for the fleet to be built in regional New Zealand:

- The industry would need to agree to operate a 'sister ship' fleet with a limited range of highly flexible vessels being constructed, allowing the facility to benefit from economies of scale in the build and procurement.
- The Government would need to facilitate the purchase of the first three vessels off the production line for use in existing (e.g. Pacific Aid and Training) programs to give the facility the confidence to invest in the required plant, equipment, and skilled staff **and** to give industry the confidence that the facility can produce high-quality vessels on time and to budget.[6]

[6] Potential uses of these vessels include: a dedicated Seafood training vessel; donation, as part of development assistance, to a Pacific Island state; an inshore research vessel.

- The Government would need to support a just transition away from the existing ageing fleet to a smaller, more modern and efficient fleet, including operating a vessel-retirement scheme.
- The Government may need to financially underwrite the facility's operations until it becomes viable.
- The Government would need to provide workforce development programmes or initiatives that support the marine manufacturing sector and are appropriately resourced within the region. This could be done with funding from existing or new workforce development programmes.

Initial work by the Inshore Innovation project has identified the high-level parameters for a successful regional fishing fleet facility. The next step is for the Crown to signal its in-principle agreement to the commercial parties interested in building the facility.

3.3 Contribution to existing strategies

There are four inter-connected objectives of this proposal to sustain and increase the contribution to New Zealand from a critically important sub-sector:

- Reinvigorating the inshore fishing fleet by encouraging the retirement of old vessels that do not align with current industry standards
- A just transition to a smaller fleet of modern inshore fishing vessels[7]
- Building that fleet in New Zealand
- Building that fleet in regional New Zealand.

Each of these objectives is consistent with various existing Government and regional policies. Specific policies and programmes that support the development of this project are set out in

7 The government is committed to a programme of just transitions to low carbon future. The Ministry of Business, Innovation and Employment describes a just transition in New Zealand has: ‘A key focus of a Just Transition in New Zealand is to ensure that regions are activated and supported to plan and manage the social, economic, and environmental impacts of a transition. A successful transition is where regions can identify and then act upon new opportunities and manage the impacts in a way that is fair and just’. For more details, see https://www.mbie.govt.nz/business-and-employment/economic-development/just-transition/.

Table 5.

Table 5 Existing policies and plans

Policy	Objective	Relevance to Inshore Innovation
Regional development policy	The Government wants to make regions' economies stronger and more resilient to improve the economic prospects, wellbeing and living standards of all New Zealanders. It is investing in a range of programmes to achieve these objectives.	Inshore fishing is largely based in the regions and while the proposal is to concentrate building a new fleet in Northland, the benefits from building and operating these new vessels will be spread throughout regional New Zealand.
Tai Tokerau Northland Economic Action Plan	This plan was developed by the region in conjunction with the Ministry for Primary Industries and the Ministry for Business, Innovation and Employment. The plan, which was originally released in 2016 and is in the process of being delivered, identified key opportunities and projects that, if implemented/bought to fruition, would have a transformational impact on economic growth in Northland.	One of the workstreams of the plan is "High Value Manufacturing" and the projects within this workstream, of which Inshore Innovation fits within one of the projects, aims to enhance marine manufacturing and refit capacity in the region and support the marine sector in pursuing growth opportunities.
Economic Plan	The priorities of the Economic Plan are: • growing and sharing New Zealand's prosperity • supporting thriving and sustainable regions • transitioning to a clean, green and carbon-neutral New Zealand • delivering responsible governance with a broader measure of success	All of these priorities will be achieved by the proposal.
Industry policy – refined approach	Transforming industries to lift aggregate productivity and enable the scaling up of highly productive and internationally competitive clusters in areas where we have a comparative advantage.	New Zealand has the technical **capability** to build high-quality fishing vessels but lacks the **capacity** to build at scale. The Northland marine sector has a comparative advantage. It is well established and has strong foundations to enable it to capitalise on growth opportunities.
Just transitions	A Just Transition in New Zealand is a strategy to move a region toward a low-carbon future. It is about a region leading their own transition to ensure that the impacts and opportunities that may arise from the transition are more evenly distributed. The Just Transitions Partnership Team has recently started engaging with the region due to the closure of the Refinery, which has consistently	The inshore fishing fleet is current made up of old, high-carbon footprint vessels. While bringing benefits in terms of supporting more sustainable fishing techniques at the national level, the impact of retiring those vessels will fall on small fishing communities and single-vessel fishers who do not have the

Policy	Objective	Relevance to Inshore Innovation
	contributed about 7% annually to Northland's GDP and was a large employer of highly skilled people.	financial capacity to purchase a new modern craft. In Northland, Manufacturing plays a critical role in the structure, diversity and resiliency of the economy, especially in the Whangarei District. With the recent shift in the Refinery's activities to a storage-only facility, a large amount of highly skilled, highly paid jobs have been lost, as well as a key GDP stream. The marine sector could be well placed through the Inshore Innovation project to minimise any negative impacts and turn this challenge into an opportunity.
Fit for a Better World (2020)	10-year targets for the food and fibre sector to pave the way for New Zealand's economic recovery. Largely focused on three key themes of: 1. Productivity 2. Sustainability 3. Inclusivity	A reinvigorated inshore fishing fleet will help the sector increase the value of fishing and directly addresses the key themes that underpin the roadmap.
Advanced Manufacturing Industry Transformation Plan	The advanced manufacturing sector's long-term vision is: A thriving Aotearoa New Zealand advanced manufacturing sector of world-class creators, innovators and makers delivering quality products, sustainable solutions and intergenerational wellbeing.	Building modern inshore fishing vessels is quintessentially advanced manufacturing.
Seafood Industry Transformation Plan	The concept of an Industry Transformation Plan seeks to acknowledge the full scope of sector contribution across the whole of community wellbeing, including reducing the environmental impacts of fishing and increasing the value received from fisheries.	The project contributes to all of the sector's potential and aspirations with modern vessels, including having a lower environmental footprint, reducing reliance on migrant labour, improving health and safety outcomes, incorporating world-leading technology and innovation, supporting SMEs and delivering higher-quality catch through, for example, using modern fishing techniques.

Source: NZIER

3.4 Investment objective one: a reinvigorated fleet

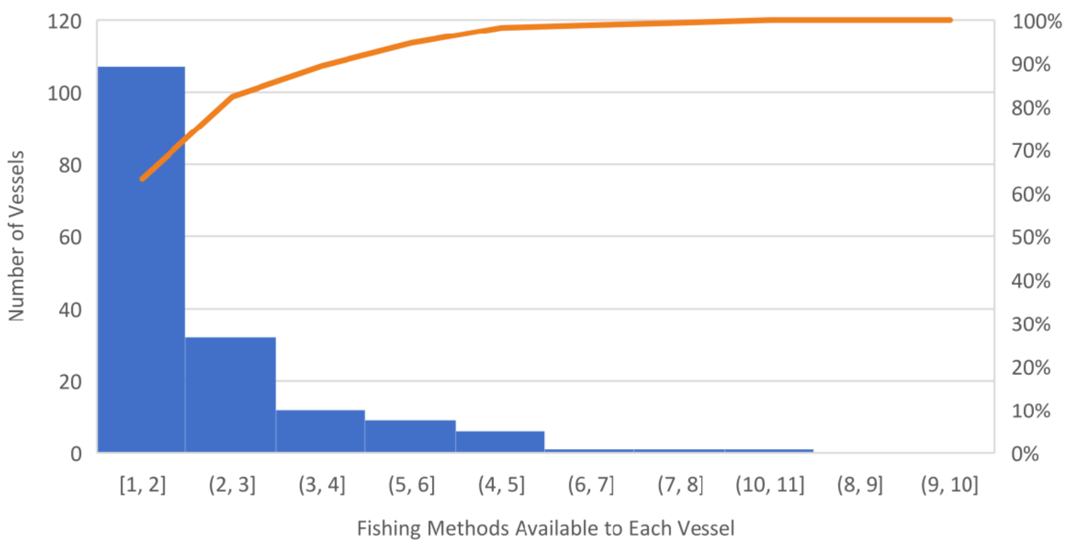
About three-quarters of the current target fleet can be regarded as obsolete, based upon a comparative analysis undertaken by Bureau Veritas (Appendix A).

Bureau Veritas found that only 18 percent of the New Zealand inshore fishing fleet can be considered modern, with 38 percent of the fleet being built between 1940 and 1980. These 'vintage' design vessels exhibit deficiencies across all aspects of seakeeping, including fishing capability and productivity, crew wellbeing and safety, and pollution standards. A further 44 percent of the fleet is 'outdated', having been built 20 to 40 years ago, and almost 90 percent of the main auxiliary engines pre-date mandatory Green House Gas (GHG) targets and are, therefore, unregulated polluters.

Compared to more modern vessel designs, the existing fleet has smaller fishhold capacity (meaning they have to undertake more trips to harvest the same number of fish that can be stowed on a modern vessel), are less fuel efficient and have higher carbon footprints.

The vessels in the current fleet are mostly designed to use only one or two fishing techniques and are not easily adaptable. Modern vessels will be built to a multirole design, meaning they can change methods and target species during the fishing year and/or throughout their economic life. This leads to greater flexibility, improved productivity and higher resale values.

Figure 3 Fishing methods on each vessel



Source: Bureau Veritas

Because the number of fish caught in New Zealand waters is constrained by the Quota Management System, which in turn is driven by biological factors, the sector cannot increase returns by increasing overall production. Nor is product differentiation between fishers possible (a snapper is a snapper). It is possible, however, to differentiate a **New Zealand caught** snapper from one harvested elsewhere. Quality can be improved through innovative fishing techniques and improved onboard handling and storage.

The pathway to increased economic return from inshore fishing is not volume; therefore, it will require adopting modern, efficient, environmentally sustainable fishing practices that require modern vessels.

The sector currently relies on the Government, through Maritime New Zealand, the regulator of vessels plying New Zealand seas, to maintain the grandfathering provisions. At any time, domestic or international policy changes could significantly impact the speed at which vintage and outdated vessels are forced to retire. Being pro-active provides the opportunity to influence what the new fleet looks like.

3.5 Investment objective two: a just transition to a smaller fleet

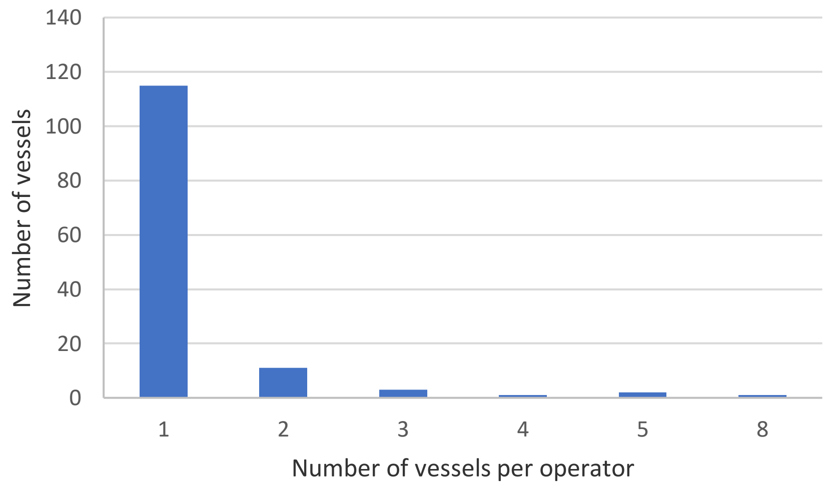
Because modern vessels have a larger capacity and are more efficient than vintage and outdated vessels, a reinvigorated fleet will be smaller than the current one.

Based upon an equivalent catch-ratio basis, it was determined that the 169 vessels in the current target fleet could be replaced with as few as 69 new vessels and still harvest the same volume of fish, whilst improving utilisation rates[8].

However, due to the geographic spread of catching and seasonality requirements of different inshore species, it is likely that the long-term number of vessels would be closer to 100.

Most of the current fleet is owned by single-vessel operators. Figure 4 shows that 115 vessels (68 per cent) are owned by single vessel operators. At the other end of the spectrum, one operator has eight vessels and two have five vessels.

Figure 4 Most vessels are owned by single-ship operators

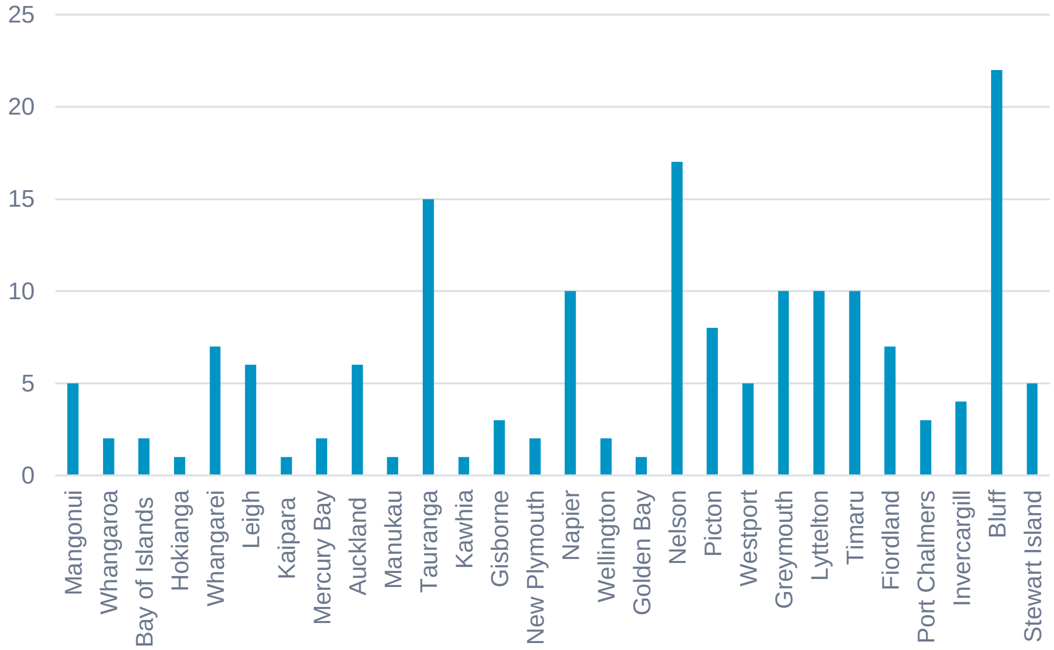


Source: Fishserve data

Many of these owners fish out of regional centres, where fishing is often a mainstay of their small communities. Figure 5 shows the number of vessels by the base port in each region. Just over 100 vessels are based in the South Island and Stewart Island, with the remaining 60 in the north.

8 Bureau Veritas. (2021). *Technical Report- Aged Fleet Analysis.*

Figure 5 The current fleet is mostly regionally-based



Source: Fishserve data

A few larger vessel owners fish their own quota, meaning they have an ongoing right to fish (subject to the commercial catch limits specified by the Minister), while many smaller owners pay a quota owner for an Annual Catch Entitlement (ACE)[9], often through an agent or a Licensed Receiver of Fish[10]. There are also large quota owners and most iwi that rely completely on ACE fishers to catch their fish. The livelihood of these ACE fishers depends on their ability to secure ACE at an economically viable price. The livelihood of many quota owners relies on there being ACE fishers available to lease their ACE and/or catch their fish.

Due to demand for ACE exceeding supply, quota owners have traditionally been able to enter into favourable contracts that allowed them to meet the return expectations on the quota value. This has resulted in a high ACE fisher cost structure and low profitability that was insufficient to support reinvestment in capital equipment upgrades. This situation has become progressively worse over the last decade or more as compliance costs increased, and vessels aged, becoming more expensive to maintain and less reliable.

An efficient, modern fleet will be smaller than the current fleet and require a level of consolidation within the industry. This will affect the balance of supply and demand between ACE fishers and quota owners, depending on the degree of consolidation and the improved profitability expected from new vessels.

This consolidation will bring benefits to the sector, including:

- better catch plans for the remaining vessels
- higher earnings for crew

9 A quota is an enduring right to fish a percentage share of the Total Allowable Commercial Catch of a species in a specified area. ACE is an annual entitlement to fish a volume of fish. Each year Fisheries New Zealand issues an ACE to each quota owner, which is the amount they can fish in the fishing year. Quota owners can either fish their ACE themselves or sell or transfer it to someone else.

10 These are know as ‘ACE Fishers’.

- less reliance on migrant labour due to a lower total crew requirement[11]
- reduced environmental impact
- improved habitability for crew.

Large quota owners who own multiple vessels will be able to reduce the size of their fleets and continue to fish their quota. The timing of this consolidation will be a commercial one, based on the cost of replacement vessels and the owner's financial strength.

It is highly unlikely that the owners of outdated and vintage vessels who do not own quota will have the financial wherewithal and business acumen to purchase new vessels without the support of quota owners and/or the government. A just transition is possible for these fishers, which would allow them to either consolidate with others or exit the industry. They will exit the industry when their vessels finally become obsolete (which may occur as a result of the tightening of regulatory requirements).

The decision for the Government, therefore, is whether allowing market forces to drive a slow and disruptive transition to a smaller fleet, comprised of more efficient and overseas-built vessels, fishing out of main centres is in accord with all of its relevant policy or whether those policies require an intervention that is supported by industry, the regions and local and central government.

3.6 Investment objective three: building that fleet in New Zealand

New Zealand already has a vibrant commercial white boat (commercial non-military) ship-building sector. That sector has the technical capacity to build international-class vessels that reach the global productivity frontier.

Building a fleet of new fishing vessels will bring economic advantages to New Zealand, especially compared with the alternative of ships being built overseas. Not only will the inshore fishing fleet be built here, the capacity to build high-quality work boats at competitive prices will also be developed. While it is unlikely that a New Zealand facility would ever be able to compete on ex-yard build price alone with Asian shipyards, it provides multiple other benefits and may be able to supply other markets.

Most existing builds in New Zealand are one-off, bespoke designs. New Zealand shipyards are certainly capable of building modern commercial fishing vessels. But what New Zealand lacks is the capacity to build a **fleet** of new vessels over short time frame. Current yards simply do not have the capacity to build multiple vessels at once.

There are economies of scale in ship building, in terms of physical capacity (shipyards), but also design capacity, procurement and skills. Building more of the same type of ship year on year reduces the average build cost.

One significant source of economies of scale for any local rebuilding project is the concept of a fleet of ‘sister ships’. Rather than use the current approach of individual owners commissioning a bespoke vessel, a sister ship fleet would involve a shipyard offering a limited number of designs, albeit of a multirole variety that could be adapted to many different fishing techniques.

11 The recent Ministerial Inquiry into the use and allocation of migrant labour in the seafood sector noted a trend towards inshore fishers hiring migrant labour (Wilson, Fry, and Johansson 2021, 13).

To be viable, a sister ship fleet would need the buy-in of the potential owners that they are prepared to own vessels of a common design.

This will come about from the shipyard being able to convince its potential customers that it is a cost-effective, viable long-term proposition, that it can deliver a quality product for a value-for-money price and that agreeing to use sister ships is in their commercial interests.

3.7 Investment objective four: Building that fleet in Northland

The government's regional development and just transitions policies recognise that there are wider national advantages to having thriving regions.

Very limited scale shipbuilding (in terms of the number of vessels and the size of those vessels) is a feature of many regional centres in New Zealand, and that would likely continue even if this scheme went ahead.

While not committed to regional development at any cost, the Government has in place several initiatives that involve providing financial and other assistance for regions to reach their full potential.

Building a single facility (to capture the full economies of scale on offer) in a regional centre would be consistent with the government's policy objectives, provided it is supported by a full range of policy objectives and the domains of the Living Standards Framework.

Northland is an established ship-building centre that has delivered high-end vessels to a range of end-users in the commercial, government and defence sectors. Joint work programmes with Central Government, such as the Tai Tokerau Northland Economic Growth Study, which preceded the Action Plan, have shown that the region has a strong comparative advantage in marine manufacturing, with a very high concentration of employment relative to New Zealand as a whole in shipbuilding and repair and boat-building and repair services. There are opportunities to build on this existing advantage.

The region through initiatives such as the Tai Tokerau Northland Economic Action Plan and pursuing the development of the drydock is also invested in growing the marine manufacturing sector as it has the potential to provide more productive and highly paid/ skilled jobs. As identified earlier, manufacturing plays a critical role in the structure, diversity and resilience of both the Northland and Whangārei economies.

If this facility is successful, it is unlikely to meet total maritime demand, and there could be justification for a second facility to be built elsewhere in New Zealand.

3.8 Existing arrangements & business needs

The transition to a smaller, more efficient fleet is inevitable: eventually, the current vessels will become either uneconomic, unseaworthy or will have grandfathered regulatory approvals removed.

What is not inevitable is the pace of that transition and its effects on vessel owners, crew, the communities from which they fish and the country as a whole.

The government, as regulator and as developer of industry, regional economic development, environmental and workplace health and safety policies, has a key role to play in the timing and type of transition. Inshore Innovation provides an opportunity to carefully manage and minimise any adverse effects of an uncontrolled transition, while maximising the benefits to two key regional sectors.

Table 6 Investment objectives and existing arrangements

Investment Objective One	**A reinvigorated fleet**
Existing arrangements	For vessel owners with sufficient capital, commissioning a new vessel from a European-backed Asian shipyard would be in their short-term financial interests. Whole-of-life costs would, however, include either returning the vessel to that yard for maintenance or using local providers who would not have economies of scale or great familiarity with the vessel. There would be no commonality of spares and institutional knowledge readily available in New Zealand. Small-scale operators with the oldest vessels will continue to operate until either the vessels become completely obsolete or regulatory approval is withdrawn. The deteriorating financial performance during this period could lead to less than desirable behaviours as they struggle to survive. Health and safety and environmental risks (including carbon footprints) would continue to mount with age and financial pressure. New Zealand's image as a world leader of sustainably sourced high-quality seafood would be undermined.
Business Needs	A programme for the timely retirement and scrapping of vessels that no longer meet modern standards across economic, sustainability, and safety dimensions.
Investment Objective Two	**A just transition to a smaller fleet**
Existing Arrangements	Most of the current fleet, especially the outdated and vintage vessels, will not be replaced if Investment Objective 1 is not achieved. These vessels tend to be operated by sole-traders and ply out of small regional ports.
Business Needs	A just transition that both allows the least viable operators to exit ownership (some of whom may gain employment on new vessels, but maybe as co-owners) and retains new vessels in smaller regional centres.
Investment Objective Three	**Building that fleet in New Zealand**
Existing Arrangements	Some current shipyards have the capacity to build modern fishing vessels, but lack economies of scale to be price competitive, even on a whole-of-life basis, where the vessels return to the shipyard at which it was built for routine maintenance and major refits.
Business Needs	A commitment by vessel owners to operate a fleet of sister ships, that can be built in New Zealand over a short period of time. This would allow one initial facility to be commissioned that could concentrate on building and supporting a limited range of vessel types that would enable the New Zealand fishing fleet to be competitive and sustainable.

Investment Objective One	A reinvigorated fleet
Investment Objective Four	**Building that fleet in regional New Zealand**
Existing Arrangements	Regional operations are a part of the New Zealand shipbuilding sector, with viable shipyards in places like Whangarei, Nelson, Lyttleton and Bluff. While some of these yards have the technical capability to build modern inshore fishing vessels, none currently has the capacity to do so at fleet scale.
Business Needs	The construction of a new, fleet scale shipyard in a regional centre that can build on the existing support services and be supported to overcome short term constraints, e.g. workforce availability.

Source: NZIER

4 Potential business scope and key service requirements

The potential business scope and key service requirements were identified and assessed by stakeholders over several meetings conducted by Inshore Innovation.

Table 7 Scope of the proposal

Service requirements	Scope			
	Minimum Scope	Intermediate Scope	Maximum Scope	Out of Scope
A reinvigorated fleet	Government lets regulatory standards and commercial considerations drive replacement.	Government takes a pro-active approach to accelerate retirement for oldest vessels.	Government buys-out owners of unprofitable vessels.	Government owns and operates commercial vessels.
Just transition	Existing policies (seafood sector transition plan). No specific programme for the inshore fishing sector.	Specific, funded, programme to underwrite transition to a new fleet, financed from within existing allocations.	New funding for inshore fishing fleet replacement.	Government owns and operates commercial vessels.
Ship building facility	Crown support an existing facility currently in operation in Northland.	Government commits to purchase the first three vessels from a new facility.	Crown establishes a new venture and seeks partners to reinvigorate fleet.	100 percent Crown ownership and operation of the facility.
Sister ship fleet	Shipyard leads commercial negotiations to secure agreement for building a fleet of sister ships	Government commitment to whole package contingent on industry agreeing to sister ship concept.	Transitional and other assistance limited to vessel owners who agree to purchase a sister ship.	Government regulatory mandate to limited number of vessel types via regulation.

Source: NZIER

5 Main benefits

Stakeholders identified the following benefits over several meetings conducted by Inshore Innovation.

5.1 Benefits to consumers

Consumers of food are increasingly looking beyond price and product quality when choosing what to buy. They are also concerned with the methods used to produce what they are eating and want information about the supply chain. They are particularly concerned about the environmental footprint of food production.

Existing and proposed regulation of the seafood sector in New Zealand addresses many of consumers' concerns when it comes to the sustainability of the catch and the impact on other parts of the marine environment, like mammals and marine birds.

The actual vessels used to harvest fish are an important part of the supply chain. Being able to demonstrate that New Zealand fish are caught from modern, safe, low carbon footprint vessels using precision harvesting techniques will enhance their reputation in global markets and allow for more value to be captured for the products.

5.2 Benefits to the seafood sector

The conversion of the inshore fishing fleet to modern New Zealand-built vessels strongly aligns with enabling the sustainability of natural resources and contributes to carbon reduction goals.

Modernisation of the fleet supports a shift from volume to value and aligns with the Minister for Oceans and Fisheries' initiation of an Industry Transformation Plan, which envisages outlining actions to achieve key aspects of the reform agenda, with a focus on reducing the environmental impacts of fishing and increasing the value received from fisheries.

Because the quantity of fish that can be harvested is limited by biology and regulation, extracting greater value means improving the efficiency of fishing, which in turn is about improving the quality of fish taken.

A modern fleet will significantly improve working conditions and safety, enhancing attractiveness, career development and training opportunities in the fishing industries. This supports the findings of the recent Ministerial inquiry into the use and allocation of migrant labour in the seafood sector, which made a number of recommendations along these lines aimed at encouraging more New Zealanders to take up sea-going roles (Wilson, Fry, and Johansson 2021).

MPI intends to spend $68 million on cameras and tracing of 300 inshore boats by 2024. The new vessels proposed to be built at the new facility could be built with all necessary camera and trace technologies, allowing the timing of MPI spend to be co-ordinated to potentially allow reprioritisation.

MPI and the Industry have invested $41M in developing the world-leading precision seafood harvesting nets. New inshore boats (regardless of origin) would be capable of utilising this value-add innovative precision catch system. If vessels were New Zealand-sourced, it would likely enable better and faster industry and value chain innovation and the commercialisation of benefits.

5.3 Benefits to Northland

The proposed facility will build on the expertise and experience that currently exists in the Northland shipbuilding community rather than starting from scratch. When completed and running, the new facility will provide good jobs in a regional centre. In the initial stages of development, it will need to recruit trained staff across a range of roles, including design, customer relations, machining, fabrication assembly of vessels and post-launch maintenance. Significant numbers of trades are required for a shipyard and numerous apprenticeships will be available on an annual basis, leading to long-term careers in disciplines New Zealand is critically short of.

BERL has undertaken an economic impact assessment of the proposal and has estimated that a ship building facility building 70 vessels over twenty years would:

- Create 1,345 full-time equivalent jobs
- Involve total expenditure of $284 million
- Contribute $122.5 million to the Northland economy
- Increase government revenues by $79.9 million.[12]

A copy of their report is in Appendix D.

This analysis was limited to the impact of the ongoing operations of the facility and did not include any assessment of the effects of more efficient fishing vessels or the short-term impacts of building the facility. It also ignores the benefits flowing from work outside of the target fleet of 16m to 24m fishing vessels.

Further analysis, using techniques that assess the full impact of the facility and the flow-on impacts to the seafood sector, including the impact of the transfer of resources away from other parts of the local and national economy, could be undertaken to confirm the full economic benefits.[13]

It is also important to note that this project, through improving the capability of the sector, also helps to overcome some of the operating constraints of the Dry Dock opportunity[14], especially those relating to the workforce.

5.4 Other wider benefits

This project also has a wider range of sustainable benefits that closely align with key pillars of the Treasury's Living Standards Framework. The major benefits, quantified where possible, are set out in Table 8.

[12] We note that BERL used a 'multiplier' based methodology which probably over-states the impact of the new facility, because this technique assumes that all the inputs needed are available and have no opportunity cost. This technique does, however, provide an initial indication of the scale of the likely benefits.

[13] This would likely require undertaking analysis using techniques like Computable General Equilibrium (CGE) modelling.

[14] Polis Consulting Group. (2022). *Socioeconomic Impacts of Northport.*

Table 8 Wider benefits of the proposal

Features	Benefits
Social & Cultural	
Essential quality food source	Key natural, high-nutritional, highly-regarded product
Disposable incomes for smaller communities	Sustained and increased remuneration levels
Productive employment	Creation of ~1345 FTE's local, sub sector ~4282 FTE's
Health, safety and working conditions	Significant increase in safety levels on board vessels, e.g. improved ergonomics, etc.
Supporting ongoing diversity	
Specific contribution to Māori	Benefits relating to historic fishery settlements/quota are maximised. Viable pathway for Iwi to enter vessel ownership
Environmental	
Emissions Reduction	Investment in Inshore Innovation supports an immediate reduction in Co2 with a view to zero emissions through refitting vessels with electric motors at 15-20 years
Less benthic and protected species impacts	Significant improvement through new modern techniques, resulting in minimisation of by-catch, etc.
Operating efficiencies	24% less fuel used by vessels per km with 140% higher hold capacities and a lower number of vessels operating
More relevant fishing techniques	Full scope adoption of most modern techniques
Reduced waste	Significant waste reduction high tech catching and handling systems
Investment Structure & Metrics	
Commercially viable	Outlays covered by vessel value and output
Investments coverage	Investment covered by assets created
Higher Return on Investment for Sectors	Sound ROI's that are commercially attractive
Benefits in New Zealand construction	Comparative construction costs to alternative, with other key benefits
Positive relative metrics	New Zealand build rates higher in all related metrics comparison
Other benefits	Range of other direct and flow-on benefits in NZ build

Source: Inshore Innovation

6 Risk identification and mitigation

The main risks to the project are set out in Table 9.

Table 9 Main risks

Main risk	Comments & Risk Management Strategies (Mitigations)
If the sector does not agree to a sister ship fleet, building in New Zealand could be uneconomic.	The sister ship fleet is a key means by which building vessels in New Zealand can achieve economies of scale, which will to some extent improve the attractiveness of a local shipyard. The sector has real life experience of the benefits that flow from operating sister ships. Their involvement in the standardised design will be important step for BuildCo. The government could mitigate this risk by:

Main risk	Comments & Risk Management Strategies (Mitigations)
	• making agreement more attractive (for example by increasing any transition assistance to fishers who agree to retire their vessels and buy a sister ship) • signalling to the sector that domestic and international standards are changing and that increased regulation of existing vessels is likely within a certain timeframe • by making the sister ship concept a stronger condition of other aspects of the package and the entire Seafood Sector Transition Plan.
If the government does not agree to support the application of a just transition, then obsolete vessels will remain in use, posing health and safety and environmental risks) and the viability of some regional fishing centres will be in jeopardy. Vintage vessels end up moving up to the Pacific Islands or slowly rot away in our harbours.	Government assistance to retire and scrap obsolete vessels is a key element of the plan. It will create demand for new vessels and accelerate investment into replacement ones as it removes an existing barrier/cost for business owners. Without it, vessels will be likely be operated until they are no longer seaworthy and/or regulatory approval is removed. As the owners of these vessels are generally on the cusp of financial viability, results from the industry survey suggested that they need extra support to enable them to reinvest into upgraded vessels.
If the government does not commit to buying the first three vessels, then the commercial viability of the shipyard would not be validated.	Proving to the sector that a new facility can deliver quality products, on time and to budget, is one of the key risks of the project. The government purchase of the first three vessels is one way of mitigating that risk. If direct purchase is viewed as being inconsistent with procurement policy or trade agreements, but the government is still wishing to support the facility, it could provide financial assistance that would finance the facility during its early years of operation. This assistance could be made conditional on the ultimate success of the yard, thus providing incentives to the owners of the facility to perform (for example, if the assistance were by way of a loan, repayment could be deferred until the facility had produced and sold a set number of vessels).
The facility cannot secure orders for any other type of vessel, meaning it becomes a stranded asset.	By requiring the private partner to supply the capital needed to build the facility, they will have every incentive to expand their offerings beyond building a new sister ship fishing fleet. Any Crown financial guarantees should be strictly time limited, to again increase the incentives on the private partner.
The sector cannot secure required staff with appropriate skills at the pace required to keep up with demand for vessels	Some of the private businesses involved have dedicated training/apprenticeship programs for their staff but a significant and ongoing lift in numbers would be required to staff the facility, across multiple disciplines. Intervention by Central Government includes funding and supporting a dedicated training facility that would be focused on supporting the wider sector. This work needs to commence immediately, well ahead of the facility build.

Source: NZIER

7 Matching demand with supply

There are two separate but related aspects to this project, each with its own critical success factors:

- Creating the demand for new vessels
- Meeting that demand by **building vessels** in New Zealand.

Combined, the aim of the project is for the Crown to commit to achieving:

- The replacement of the existing fleet with a smaller fleet of modern vessels
- Building the replacement fleet in regional New Zealand.

Inshore Innovation surveyed the owners of the target fleet to understand their anticipated vessel replacement needs. Responses were received from 40 operators who collectively relied on 84 vessels to catch their fish. These operators are expected to replace 25 vessels over the next five years and 82 over the next 20 years.

The key learning from the survey was that owners' preferences were building new in New Zealand, with purchase second hand in New Zealand being the second choice. Building offshore was the lowest preference.

Main reasons given for this preference:

- Proximity for supervision during construction
- Vessels would be built to New Zealand standards
- A desire to support Local industry.

The main concerns expressed were:

- Price compared to overseas alternatives
- Industry expertise
- Financing
- Time to build.

When asked what would incentivise them to purchase a vessel built new in New Zealand, participants nominated:

- Financial assistance from Government, e.g. grants, low interest loans etc.
- Increased affordability, meaning a lower price of build
- Improved profitability and confidence within the industry
- Demonstrating the capacity and capability of the boat building industry to build a high quality fleet.

Many of the owners of existing vessels, especially the oldest craft in the fleet, do not have the financial or business capacity to purchase a modern vessel. This is especially the case of fishers that do not own their own fishing quota.

Without this project or some other intervention, the size of the inshore fishing fleet will slowly diminish. While some new vessels will be purchased by existing larger operators and some new entrants, especially Māori seeking to reconnect to the sea, may come into the sector, the most likely scenario is that the output of the sector will also decline.

On the **demand** side, the proposal is to accelerate the retirement of existing outdated vessels in a way that also creates the conditions for fishers to want to acquire modern, New Zealand-built vessels.

On the **supply** side, the proposal is to reduce the costs of building vessels in New Zealand so that purchasing such vessels is an economic proposition and the opportunity and associated benefits is not lost to overseas markets.

Bureau Veritas undertook a Territory Review & Gap Analysis by completing site and desktop audits, to gain knowledge of the national shipbuilding capability within New Zealand. A copy is attached as Appendix B.

The principal conclusions of the study were:

- Local Industry is well placed for the fabrication of small to medium sized vessels using conventional materials for the main structures,
- Vessel systems (stability and control, engineering, fire safety, communications, navigation and habitability) can be supported locally, if conventional technologies are employed
- Specific builders have advanced capability, such as integrating zero and low emissions control and propulsion systems, as well as advanced materials for main structures, however these companies have not previously undertaken fleet-scale projects
- Additional investment to industry will be needed if advanced capabilities are sought at a fleet-production level
- Additional support is needed to co-ordinate, quality-control and integrate, the final product, especially if advanced capabilities are sought in the delivered vessels, as this will be a multi-company, and possibly also multi-regional solution.
- During this past 6 months, multiple projects have emerged for small to medium sized new vessel construction, across a variety of New Zealand sectors. However, because of the one-off project nature, or lack of awareness within country, these either move offshore or are completed without leveraging the benefits of other complementary projects.

7.1 Critical success factors (CSFs)

The following critical success factors were identified by stakeholders during the Inshore Innovation project.

Table 10 Critical success factors

Key critical success factors	Description
Supplier capacity and capability	All of the core skills needed for programme success currently existing in New Zealand (shipbuilding, design, project management, management of viable businesses, governance of Crown-backed enterprises). While existing ship builders in New Zealand have the technical capacity to build medium sized vessels to international standards, none has experience in a fleet-sized build over an extended time frame. The investment will need to be structured in a way that incentivizes the Crown's partners to make the contribution necessary to deliver a sustainable business.
Fisher buy-in to a fleet of sister ships	Achieving economies of scale at the facility will be necessary to deliver vessels at a price-point that is competitive with overseas yards. Given the size of reinvigorated fleet (about 70-100 vessels built over twenty years), those economies will only be achievable if the range of vessels is limited. Fishers will, therefore, need to buy-in to the idea that owning sister ships is in their commercial interests.
Acceleration of retirement	Enough existing fishers will need to agree to retire their vessels to create the demand needed to support a viable facility. Given the higher efficiency of modern vessels, about 70 vessels will be retired and not replaced. The owners of these vessels will need to be incentivised to either join with other similar owners to form joint ventures owning and operating a new vessel or exit the industry.
Policy consistency and value for money	The Crown supporting the project must be consistent with relevant policies across several portfolios. The financial commitment must represent value-for-money to taxpayers.

Source: NZIER

8 Long-list options and initial options assessment

There are many ways in which the investment objectives of this project could be met, however we have identified a preferred option, that offers an effective and fit for purpose solution which enables the creation of capability to capture a wide range of cross-sector benefits in the regions- which currently does not exist.

This section outlines the dimensions of the project, the options available to meet those dimensions and our initial assessment of the options.

8.1 Dimensions of the project

The principal dimensions of the project are:

- Scale, scope and location
- Service solution

- Service delivery
- Implementation
- Funding

These are described in more detail in Table 11. Further analysis follows the table.

Table 11 Dimensions and options

Dimension	Description	Options within each Dimension
Scale, scope and location	In relation to the proposal, **what** levels of coverage are possible?	Multiple shipyards built or upgraded across the country, each with the capacity to build new inshore vessels to the agreed sister ship specifications. One shipyard is built or upgraded in a main centre. One shipyard is built or upgraded in a regional centre.
Service solution	**How** could services be provided?	Stand-alone, start-to-finish design-to-build-to-maintain facility in New Zealand. Partner with established overseas firm to develop a standalone facility in New Zealand, Incorporate a New Zealand shipyard into the production process of an overseas firm.
Service delivery	**Who** could deliver the services?	An existing New Zealand shipbuilder, with financial support from the Crown. A new Crown-owned enterprise. A new Crown consortium, with either local or overseas partners or both. A new private firm, either with only New Zealand ownership, or with international investors, with Crown backing. An international firm with Crown backing.
Implementation	**When** could services be delivered?	Projected front-ended to deliver swift reinvigoration of the fleet, with incentives to accelerate retirement of most obsolete vessels. Delivery dictated by commercial decisions of existing and potential vessel owners (no accelerated retirement).
Funding	How could it be funded?	Crown provides Budget-funding for all capital for new venture and the

Dimension	Description	Options within each Dimension
		transition programme to accelerate retirement of vessels.
		Crown seeks commercial partners for new facility, but funds transition plan.
		Commercial entity provides capital, with loans/grants from the Crown to provide support during initial development phase. Transition funded separately.
		Commercial entity provides capital, with loans/grants from the Crown to provide support during initial development phase and commits to purchase, on commercial terms, first vessels from new facility Transition funded separately.
		Crown contribution limited to commitment to purchase, on commercial terms, first vessels from new facility. Transition funded separately.
		New facility and transition funded via industry levy.
		Crown funding limited to just transition retirement of vessels.

8.2 Scale, scope and location

The options here are between:

- Multiple smaller shipyards across the country
- A single, large yard in a main centre
- Or a single large yard in a regional centre.

Multiple yards competing against each other will provide competitive pressures. But at the same time, the yards will also be competing against large yards in Asia and Australia. They will also not be able to achieve economies of scale.

A single yard anywhere in New Zealand will have the benefit of economies of scale.

8.3 Service solution

The service solution dimension is a range and we have identified some discrete points to examine.

At one end of the range, a yard in New Zealand would operate on a standalone basis, undertaking all activities from design to build to maintenance through the life of the vessel.

In the middle, a New Zealand facility would partner with an overseas shipbuilder to use some of their intellectual property to build ships in New Zealand.

And at the other end of the spectrum, an overseas firm would be invited to establish a facility in New Zealand.

8.4 Service delivery

The service delivery option is also a spectrum, from full Crown ownership of a new facility to new entrants (either local or overseas) building a facility to a current operator scaling-up an existing facility.

8.5 Implementation

The main driver under this dimension is the speed at which existing vessels are retired. This will be a combination of the nature and extent of government transition support, the financial resources of fishers and regulatory decisions (will grandfathering be continued).

8.6 Funding

In this dimension, the issues are both the quantity of Government investment, across a range of areas (direct financial support for the facility, support for training of staff, purchase of vessels, transition) and the form (equity funding, conditional loans, grants, direct budget funding of transitions, etc).

8.7 The long list of options

Table 14 in Appendix E sets out our initial assessment of the long list of potential options that we have identified. While there are more possible combinations of the dimensions listed in Table 11, we have limited our analysis to those options that meet a threshold test of viability and consistency with Government policy. The options are:

1. Multiple stand-alone shipyards in New Zealand owned by existing operators, with Government assistance limited to vessel retirement
2. Multiple stand-alone shipyards in New Zealand owned by existing operators, with Government loans or grants from the Government in the initial development phase and transition support for vessel retirement
3. One shipyard in a main centre, partnering with an overseas builder, with Crown contribution limited to purchasing vessels and transition support for vessel retirement
4. One shipyard in Northland owned by existing operators, with Government loans or grants from the Government in the initial development phase and transition support for vessel retirement
5. Multiple shipyards incorporated into the operations of overseas builders, with the facility and retirement of vessels funded via an industry levy.

9 The preferred option

Of these options, Option 4 is the preferred approach.

The high-level details of the proposal, and its rationale, is set out in Table 12. More details are set out below.

9.1 The preferred option

A high-level description of the proposal, and its rational, is in Table 12. More details are provided below.

Table 12 One yard in Northland should be the option

Feature	Description	Rationale
One yard in a regional centre.	The new build program would be undertaken in a new single purpose built facility in Northland, where suitable land with ocean access and complementary industries exist.	This would allow economies of scale and assist in creating a high-tech manufacturing and assembly facility in regional New Zealand. Manufacturers of components and suppliers could be located throughout New Zealand.
Stand-alone, start-to-finish in New Zealand	The facility would be a standalone New Zealand enterprise, as opposed to be a local operation of a foreign shipbuilder.	The benefits of the facility would be retained in New Zealand. New Zealand can operate ship-building, at scale, to international standards.
Existing New Zealand companies.	The core owners of the facility would be existing New Zealand shipbuilders and engineering companies.	Rather than start from scratch, the project would involve scaling-up existing expertise.
Project front-ended.	The rebuilding project would be designed to quickly reinvigorate the local fleet.	Much of the current fleet is already obsolete and it is desirable to move as quickly as possible towards a new, modern, efficient and low-carbon fleet.
Commercial entity provides capital, with loans/grants from the Crown to provide support during initial development phase and Crown commits to purchase first three vessels from new facility.	A single New Zealand commercial entity would be the core of the proposal. It would raise capital, on commercial terms, to finance its operations. The Crown would not provide equity to the entity. The Crown's contribution would involve: • Conditional loans or grants to support the initial development of the fleet-building operations • Commit to procure the first vessels build by the facility.	The proposal is essentially commercial in nature. Decisions around the design, marketing, and construction of the vessels would be made by a private-sector entity, with its own capital at risk. The Crown would provide financial and other guarantees during the initial stages of the project where commercial finance not available.
Assistance to retire obsolete vessels	The Crown would operate a program to accelerate the retirement of obsolete vessels. This would include facilitating partnerships between existing owners of several vessels to become joint owners of a new vessel.	Many owners of existing vessels with no quota have little alternative but to fish with their vessel until it becomes completely unseaworthy, or if regulatory approval is removed. Assisting some of these owners to but new vessels would contribute to te equity goals of the government regional development and just transitions policies. Absent any support from government, the demand for new vessels will not be sufficient to support the scale of operation required.

Source: NZIER

9.1.1 One yard in a regional centre.

The preferred option is for a single shipyard to operate in Northland which would design and construct the full fleet.

There are economies of scale in shipbuilding and thus having a single facility would allow those benefits to be captured to the greatest extent possible in New Zealand.

A single facility would create a high-tech manufacturing centre in regional New Zealand.

9.1.2 Stand-alone, start-to-finish in New Zealand

The facility would be a standalone New Zealand enterprise, as opposed to be a local operation of a foreign shipbuilder. Experience shows that New Zealand can operate shipbuilding to international standards. All the capability already exists in New Zealand to build a fleet of sister ships.

9.1.3 Existing New Zealand shipbuilders.

Rather than start from scratch, the project will allow existing expertise to be brought to bear. This will reduce costs, shorten the timeframe for finalising the development of the facility and reduce project risk.

9.1.4 Project front-ended.

Much of the existing fleet is already obsolete and should be retired. Creating a new inshore fishing fleet, using modern, safe, low-environmental footprint vessels will bring a range of benefits to New Zealand. Building a facility with the scale to build the fleet quickly will allow those benefits to be secured early.

9.1.5 Commercial entity provides capital, with loans/grants from the Crown

The preferred option is for a commercial entity to raise the equity needed to build and staff the facility and commence design work on the range of vessels to be offered.

At a minimum, the Crown’s financial contribution would be:

- Procuring the first three vessels from the facility at commercial rates (these vessels would demonstrate that the facility is capable of building international standard vessels)
- Grants or conditional loans to support initial development of the fleet-building operations,
- Workforce training.

The conditions on the loans could include, for example:

- Repayments being deferred until a certain number of orders have been secured
- Repayments starting once the entity starts to achieve pre-specified financial metrics, e.g., revenue, EBIT, NPAT.

The final composition of the Crown’s financial assistance would be determined through conversations and later engagement.

9.1.6 Assistance to retire obsolete vessels

The demand side of the preferred option is for the Crown to accelerate the retirement of obsolete vessels. This could take a variety of forms, including:

- Crown grants or concessional loans to existing vessel owners who commit to retiring their vessels and buying a new vessel from the facility, possibly as a joint venture with other fishers
- The Crown purchasing and then paying to scrap existing vessels.

9.2 Funding requirement

Initial work by Inshore Innovation suggests that building a new ship-building facility will cost approximately $Commercial Information. Ideally, all of this funding would come from private-sector investors.

This will be confirmed by the private investors once the support being requested is committed by the various central government agencies.

Additional support into a range of enabling factors is required to allow the project to meet the wider, largely non-commercial objectives of the whole programme and ensure that industry and the region is supported to address limitations. These enabling factors have been identified in section 8 above.

This business case asks that Central Government consider three facets, specifically:

- The Government purchasing the first three vessels built for use as part of other programs
- The Crown establishing and financing a specialised training programme and facility in Northland, with the ongoing support of apprentices as part of its Workforce Development priority
- A vessel retirement scheme.

Initial costs of these options are set out in Table 13 .

Table 13 Required Central Government investment

Option	Indicative cost	Comment
Purchase the first three vessels.	Up to $18m	Based on PwC's estimate of a $6 million delivery price per vessel.
Support for skills training	$3m set-up $7.65m (over ten years)	The set-up costs are an estimate. Ongoing support is based on the current average funding rate to support people in work-based training ($7,300)[15] for 100 places over ten years.
Vessel retirement scheme	$17.5m (over ten years)	Based on an assumption of a Crown payment of up to $500,000 per vessel to retire the 35 least viable vessels.

Source: Inshore Innovation

15 See: https://www.tec.govt.nz/rove/rove-news/budget-2022-special-edition/.

10 The way forward

While undertaking its assessment of the viability of this project, Inshore Innovation has identified a group of commercial interests in Northland who are willing to invest in the facility and ongoing operations if there is sufficient interest from Government. They have agreed an MOU between them which outlines their intention to form a company (BuildCo) to facilitate further analysis of the proposal.

The preferred process for making the proposal a reality is:

- Confirmation by Ministers that the proposal is a viable way of implementing existing government regional, industry, just transition and food and fibre policies.
- BuildCo, working with the inshore fishing sector, officials and regional development partners would develop a proposal for consideration by government of the required Crown investment into the facility.
- Assessment of the BuildCo proposal, which would be led by Treasury.

10.1 Officials' policy work

This work would focus on confirming that government policy is supportive of the building of a reinvigorated fleet of inshore vessels in New Zealand.

In practical terms, the work would involve:

- Alignment of the options in Section 8 against existing Government policies, to confirm that Option 4 is preferred
- Design work on a scheme to support retirement of existing obsolete vessels
- Confirming that the likely Crown contribution (currently estimated to be about $46 million over ten years, but this will be refined as part of the next stages) is consistent with the government budget priorities

10.2 The BuildCo work programme

Upon receiving the outputs set out in Section 10.1 above, BuildCo would be invited by ministers to prepare and present a more detailed proposal for the supply side of the project.

This would include:

- More detailed specification on the range of vessels to be offered (in consultation with the seafood sector)
- Establishing the type and cost of facility needed to build a fleet of sister vessels over the next 15–20 years
- Assessment of the indicative price points for various vessels designs
- Details of the total investment required to implement the proposal and the relative contributions from the owners of BuildCo and the Crown.

10.3 Coordination

Northland Inc would continue to facilitate the investigation of the project, working closely with officials, the seafood sector, BuildCo and other stakeholders.

They would be responsible for combining the envisaged inputs into a final specification of the overall project, if required.

10.4 Next steps

If Ministers agree to proceed in principle, commercial negotiations between the Crown and BuildCo would proceed to finalise the details of the commercial arrangement between the Crown and the entity. Simultaneously, the Government would develop details of the support package for a just transition to a smaller fleet and confirm details of related programs.

References

Wilson, Peter, Julie Fry, and Greg Johansson. 2021. 'Te Whakatipu I Ngā Tāngata o Tangaroa -- Growing Ocean People: Report of the Ministerial Inquiry into the Use and Allocation of Migrant Labour in the Seafood Sector.' Government of New Zealand.

Appendix A Aged fleet analysis

Technical Report – Aged Fleet Analysis

Project Name:	Inshore Fishing Fleet Replacement Project: Inshore Innovation
Dated:	23 March 2021
Author:	Dwayne Boyes, BV M&O Principal Advisor – New Zealand & South Pacific
Document Authority	Greg Johansson, Managing Director – Johansson Seafood Consultancy
References:	1. Ocean Engineering 110(2015) 39-48, *Integrated Approach to Vessel Energy Efficiency*, of Nov 2015 2. IRCLASS 1933, *Energy Efficiency Design Index – online resource*, of March 2021 3. Precedia Engineering 134 (2016) 157-164, *Comparative Overview of Marine Fuel Quality on Diesel Engine Operation,* of Jan 2017 4. Swedish Methodology for environmental Data NR4 2004, *Methodology for Calculating Emissions from Ships: 1 Update of Emission Factors,* of Feb 2004 5. United Nations Economic Commission for Europe – Air Convention, *Emissions Estimate Methodology for Maritime Navigation,* of Sep 2010 6. USA EPA Research Paper, *Current Methodologies and Best Practise for Preparing Port Emission Inventories,* of Oct 2016 7. Email NZ Ministry for the Environment - S. Gulliver and D. Boyes, *Request for Dataset Regarding Greenhouse Gas Emissions (CO2, S2O and NXO),* of Mar 2021 8. New Zealand Ministry for the Environment Workbook, *NZ Ministry for the Environment Measuring Emissions Interactive Workbook 2020 – online resource,* of Mar 21 9. PMID 25946194, *The Fishery Performance Indicators – A Management Tool for Triple Bottom Line Outcomes*, of Feb 2015 10. GHGProtocol.org, *GHG Protocol – emissions Factors From Cross Section Market Tools – March 2017 – online resource,* of Mar 2021 11. GHGProtool.org, *Global Warming Potential Values,* of Feb 2016 12. Bureau Veritas NI577, *Habitability Design and Construction of Crew Accommodation in respect of Title 3 Maritime Labour Convention 2006*, of Jan 2017
Enclosures:	A. Excel File, *Vessel Details for 16-26m Vessels*, of 3 Mar 2021 B. Bureau Veritas NR467 – *Rules for Steel Structure Ship – Fishing Vessels*, of Jul 2020 C. 210323, *New Fleet and Summary Tab*, of 26 Mar 2021 D. 210323, *Working Copy – Vessel Details for 16-26m vessels,* of 26 Mar 2021

Executive Summary

The Inshore Innovation project undertook a detailed review of the 169 vessels that comprise the New Zealand inshore fishing fleet. This review assessed the registered details of the vessels and input from the New Zealand fishery industry. This information was compared to guidance from the New Zealand Ministry for the Environment, The US Environmental Protection Agency, the International Maritime Organisation and United Nations environmental panels. This allowed for comparative analysis of New Zealand's inshore fishing fleet and detailed modelling to supplement that analysis.

As a base level review, the fleet data showed significant age-related trends. Specifically, 82% of the inshore fishing fleet was built between 1940 and 2000; meaning those vessels employ out-dated, and in many cases, vintage design and technology. The safety, seakeeping attributes, fishing capability, habitability, and pollution standards, are far below what is acceptable in 2021. Further, noting that mandatory Green House Gas (GHG) targets were phased in with engine manufacturers from 1990 to 2005; 87% (by kW/h) of the main and auxiliary engines of the New Zealand Inshore fishing fleet, pre-date these requirements and are therefore unregulated polluters which emit GHG at the highest measured levels within the maritime environment.

Reviewing the fishing capability; the entire fleet comprised 12 fishing vessel configurations, being Dredge, Trawl, Potting, Liner, Set Nets, Seine, Troller, Hand-gather, Jigger, Mechanical, Carrier or other. Noting that modern fishing vessel design allows for flat-deck, electric drive multi-role capability; a modern single fishing vessel can be specified with multiple fishing gear fitouts, which allow rapid conversion from Liner to Trawler to Dredger, etc, all as the client's fishing operations require. Employing this design would allow for significant savings during the construction stage, maximum utilisation and profits during the fishing season, whilst also increasing resale value of the asset.

When assessing future options, two key findings emerged. Firstly, on an equivalent catch volume and fishing capability basis; the 169 aged vessels can be replaced by as few as 69 modern vessels. These will be able to catch the equivalent of the entire aged fleet, however, will emit 10,817 tonnes less of $CO_{2\text{-}e}$ pollution per year and save over 330 thousand litres of fuel each year. The second finding is that industry technology is within an estimated 10-year window to provide zero-carbon powerplants. The dominant trend being compact electric motors coupled with solid-state battery storage. Accordingly, if the vessels are designed with accessibility and battery distribution considerations, then the replacement fishing fleet could be readily converted to zero-carbon operation at the mid-life refit, around the 15 to 20yr service life, whilst also maintaining the necessary seakeeping attributes.

Bringing all these aspects together: the potential exists for the New Zealand Fishing industry to adopt world leading innovation. This is a world first, creating a multi-role fishing fleet, upgradable to zero-carbon operation. The benefits, not only to the operators and customers, but also to the environment and to New Zealand industry, would be significant and long lasting.

Background

The aged fleet analysis is a multi-aspect review of 169 vessels that comprise the current New Zealand inshore fishing fleet[1]. The purpose of this review is to understand what capabilities exist within the current fleet, such that an informed assessment can be made when sizing and specifying any future replacement capability.

The undertaken assessment is detailed within this document and includes all models, assumptions and estimates used.

Assessment Process

The Inshore Innovation project registered an Official Information Act (OIA) request with the Commercial Fisheries Services agency, Fish Serve. This information request secured high level information, mandatory for registration through Maritime New Zealand (MNZ). The un-edited copy of that data is included within Enclosure 1.

Within Enclosure 1, the Inshore Innovation project received the key information for all registered fishing vessels between 16 to 26m, whilst also detailing year of manufacture, registered length, gross tonnage, engine Maximum Continuous Rating (MCR), Hull Material, Duration at Sea, Fish Hold Capacity, Crew Compliment, Available Fishing Methods and Overall Vessel Type.

For the first pass review, the following assumptions were applied:

- For the proportional majority of the aged fleet, the main and auxiliary engines are assumed to perform the same as a fully maintained and serviceable engine, of the same year as the date of vessel manufacture.
- Hydrodynamics, fit and finish, Noise & Vibration, HVAC, quarters and stations, are assumed to have been maintained, and not appreciably modified above standards present at the date of original manufacture.
- Fuel Supply is assumed to be consistent across the aged fleet, and consistent with current (2021) best practise, being Medium Diesel Oil (MDO) at 0.1% sulphur content.
- Repeatability of design is assumed between aged fleet and new fleet vessels, i.e. if an aged fleet vessel is multirole capable for Dredge, Trawler and Potting operation, then a new design vessel is expected to be able to be specified for the same.

[1] The original Assessment of BERL, assessed 173 vessels within the inshore fishing fleet. By March 2021, that number has decreased to 169. Due to the small change of 2%, the Inshore Innovation project has not adjusted founding estimates, as this level of error is within acceptable tolerance. Additionally, no reason was available as to why 4 vessels are no longer registered. It is assumed these have been decommissioned without replacement.

Results

Table 1 shows a summary of the data received, outlining the makeup of the aged fleet.

Aged Fleet - Summary Data							
Average Build Year	Average Length (m)	Average Gross Tonnage (t)	Power (MSD and HSD)	Typical Hull Material	Crew	Average Fish Hold - m^3	Available Fishing Methods
1984	19	75	386	Steel	4	35	2

Table 1 – Aged Fleet Summary Data

The following scatter plot (figure 1) shows key relationships across the aged fleet.

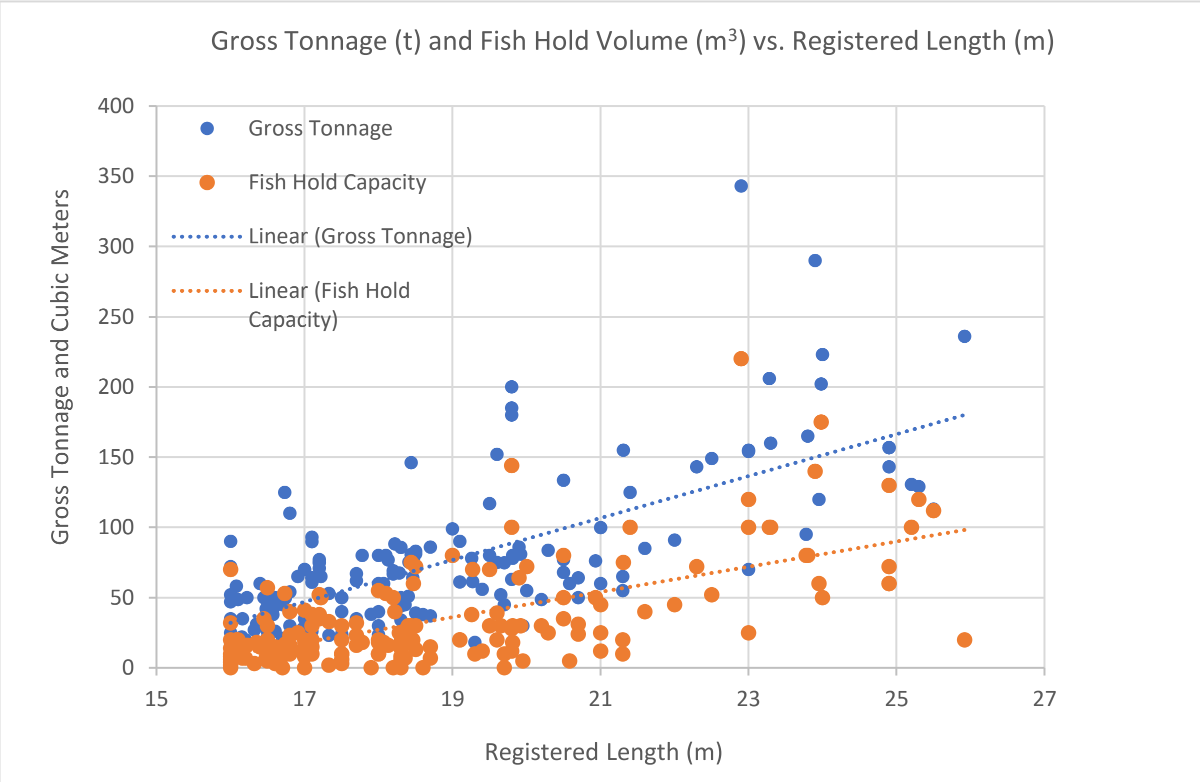


Figure 1 – Comparison of Size and Capability

From the data set and the relationships of figure 1, it was determined that, of the 169 vessels, the average catch capacity is only 35m^3. Compared to modern fishing vessels of equivalent size (length and gross tonnage), catch capacity ranges from[2] 70 to 120m^3. Scaling this capacity, would allow 69 new vessels to catch the equivalent quota of 169 aged vessels. This would also increase profitability per voyage and crew pay rates, whilst slashing pollution levels by more than halving the fleet size.

[2] https://products.damen.com/en/ranges/sea-fisher/sea-fisher-2007-purse-seiner

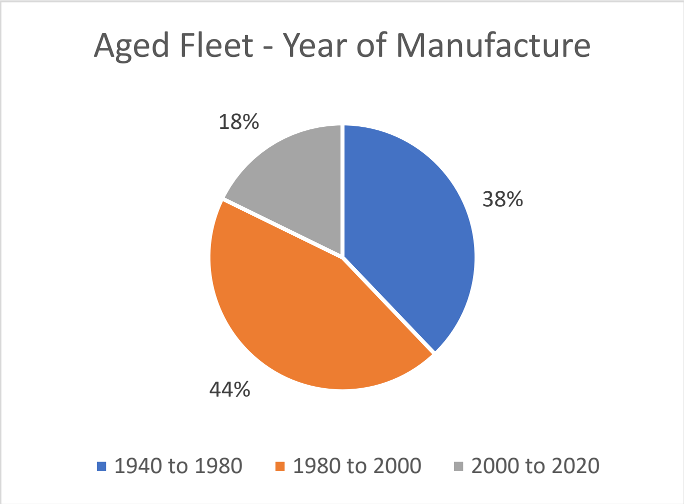


Figure 2 – Aged Fleet – Year of Manufacture

Referring to figure 2, 38% of the vessels are built between 1940 and 1980. These "vintage" design vessels exhibit significant deficiencies for all aspects of seakeeping: pitch and roll characteristics (seasickness and stability at workstations), crew station and quarters ergonomics, habitability, as well as safety systems. Of the entire fleet, 44% would be considered outdated (20 to 40 years old) and only 18% would classify as modern vessels.

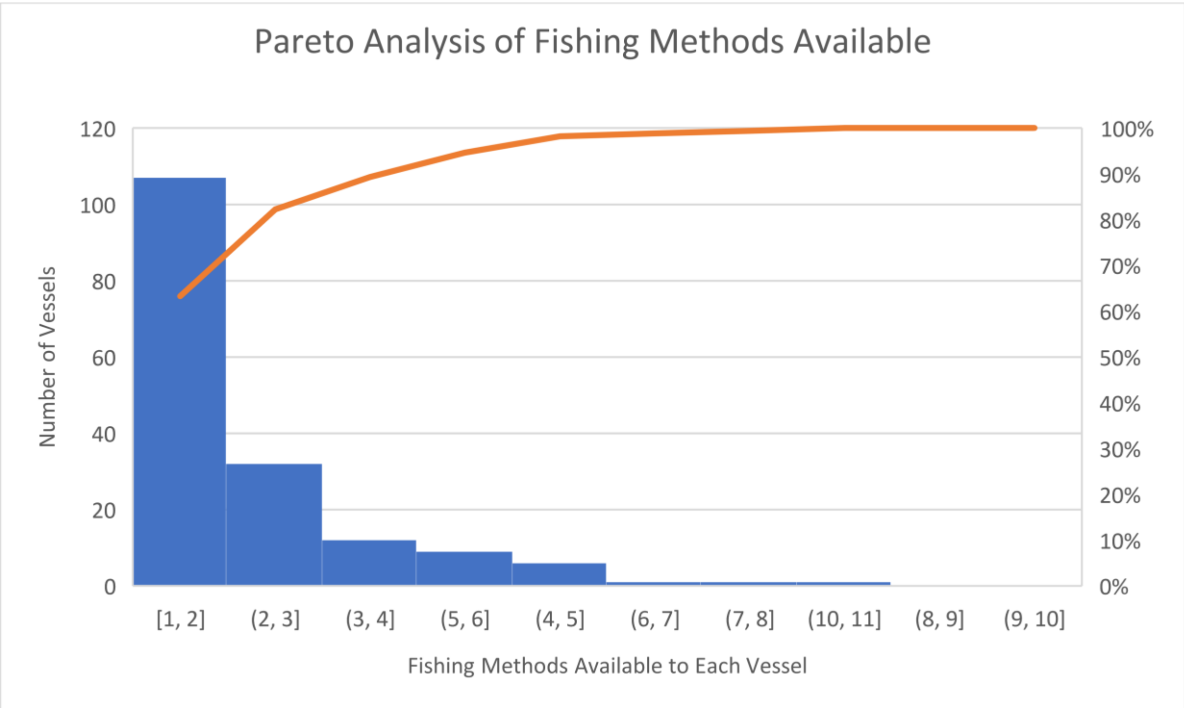


Figure 3 Pareto analysis of distribution of fishing methods

Referring to figure 3, a pareto analysis was applied to the different fishing vessel configurations. This analysis is a histogram, adding together the largest contributors to the 80% population value. What this showed, was that despite the aged fleet having multiple arrangements, some spanning up to 12 different fishing roles, over 80% comprised of 1 or 2 methods; most commonly, vessels only had one method, being either Trawler or Liner.

Noting the capability for modern vessels being flat-deck, electric-drive multirole design: one purchased vessel configured with 6 roles, could achieve 98% of the fishing activities currently spread across the entire aged fleet (Trawler, Liner, Dredge, Potting, Set Nets and Seine). This will significantly increase the range of application, increase residual value and provide the greatest economic opportunities to owners, as vessels can be easily reconfigured to seasonal, market and stock availability fluctuations.

Pollution and Efficiency Modelling

A detailed literature review was conducted to determine contemporary methods for estimating multi-aspect pollution, as applied by other government, environmental, research and academic bodies (references 1 through 9). The key findings of which, are detailed as follows:

- The current European and Western practises for modelling pollution, all use a common summative method $\sum_p (P \times LF \times t \times EF_x)$ where P is the Maximum Continuous Rating (MCR) of the main and auxiliary engines, LF load factor is the output for that phase of operation, t is time, and EF_x pertains to the modelled pollution emissions factor. This summation method adds the contribution of each operation phase, commonly modelled as Hotelling, Cruise and Manoeuvre (Refs. 5, 6 and 8).
- Comparing the multiple models and variations, the most accurate and applicable to the Inshore Innovation project is that proposed by the United Nations committee within reference 5. This methodology aligned closely with the other models, however it excelled by also containing the largest dataset (2 years of World Fleet data), included the requirements specified by MARPOL VI, the IMO Marine Environment Protection Committee and European Union Council Directives, and aligned closest to current Maritime and NZ government policy via the Maritime Operator Safety Systems (MOSS). This model is explained below and attached within enclosure A.

$$E_{Trip} = \sum_{p3}^{p1} \left(T_p \sum (P_e \times LF_e \times EF_{e,i,j,m,p})\ 1\right)$$

Where:

E_{Trip} = *emissions over a complete trip*

EF = *emissions factor*

LF = *load factor*

P = *engine power (MCR)*

T = *time (hours)*

E = *engine category (main or auxiliary)*

i = *pollutant type*

j = *engine type (medium or high-speed diesels)*

m = *fuel type (low sulphur MDO)*

p = *phase of the voyage*

For reference, the procedural evaluation and model for the replacement fleet, is included within this document at enclosure C. For the full working file; this is available within Enclosure D, separate to this document.

The key information determined by the analysis is summarised within the section below. When assessing this information however, several factors are relevant regarding the model, as these contribute to the presented results:

- The total vessel number for the replacement fleet is calculated on an equivalent catch-ratio basis. Specifically, modelling the new vessel holds as $85m^3$, would allow the total catch volume of the 169 aged vessels ($5866m^3$) to instead be caught by only 69 new vessels. This number of vessels is then used for the baseline calculation for the emissions and efficiency factors for the replacement fleet.
- This proportionally scales up the utilisation rate by the corresponding proportion, in this way, there time spent catching is modelled as equivalent between the fleets. For instance, a 59% reduction in vessels, equates to 59% more time at sea for the replacement fleet to catch the equivalent volume.
- The reduced fuel consumption of the hull optimisation is only applied during the Cruise phase, as hotelling is often static or at restricted speed and manoeuvring will not benefit from a cruise optimised profile.
- The modern engine SFC improvement is conservatively modelled as 10% - however given the dated technology and variable maintenance state, a realistic figure should likely be closer to 15 to 18%.
- The replacement fleet is conservatively modelled as an equivalent ratio of HSD and MSD powerplants. If more of the replacement fleet were transitioned to HSD engines, then slight improvements in N_xO emissions would also result. Similarly, the use of humid intake or direct H_2O injection would further decrease N_xO. These, however, have conservatively been omitted.

Noting the above factors, the summary emissions modelled is included as follows.

NEW FLEET - TOTAL EMISSIONS		
Carbon	6454	tons
Methane	0.081	tons
Nitric Oxides	98	tons
Fuel	872	tons

Table 2 – New Fleet Summary

AGED FLEET - TOTAL EMISSIONS		
Carbon	8532	tons
Methane	0.082	tons
Nitric Oxides	127	tons
Fuel	1153	tons

Table 3 – Aged Fleet Summary

Summary Data		
Carbon	2077	tons per year
Methane	0.001	tons per year
Nitric Oxides	29	tons per year
Fuel	281	tons per year, or
	330	thousand litres per year

Table 4 – Comparative Emission Reductions

Percentage Savings	
24.35%	COx
1.13%	CH4
23.03%	NOx
24.35%	Fuel

Table 5 – Percentage Reductions

Greenhouse Gas	CO_2	CH_4	N_2O
Global Warming Potentials	1	25	298
	2077	0	8739
	Total	10817	CO2-e tons

Table 6 – Global Warming Potential Reductions

Referring to the data from tables 2 to 5: the increased fish hold capacity of the new fleet vessels contributes to a 59% reduction in the total number of vessels at sea, giving a new Inshore Fishing Fleet size of 69 vessels. Assuming an equivalent catch total, means an increase from 120 days at sea to 191 days at sea, working 18hr shifts. Despite this significantly increased time at sea, the combination of reduced fleet size and improved efficiency, results in savings of more than 2,000 tons of Carbon and 120 tons of Nitric Oxides, per year. Referring to the GHG Protocol (reference 10) as well as NZ Ministry of Environment Estimates (reference 8) the Global Warming Potential (GWP) reduction is equivalent to 10,817 metric tons of CO_2-e, per year.

For Reference – if an old vessel was directly replaced with a new vessel (noting the new vessel would not be fully utilised to catch capacity), then the incremental savings on a 1 to 1 basis will equate to approximately 13%.

Human Factors and Environmental Impact

Due to the vessel size and the associated cost of maintaining class, it is likely that the majority of owners (if not all) will not maintain classified vessels. However, the benefits of a class design can still be integrated into the vessel arrangement, such that the through life performance is near equivalent to that of a class compliant vessel.

By integrating design for Comfort notations, noise and vibration can be minimised toward industry best practise – examples being crew exposure at workstations, whereby shielding and isolating materials ensure crew are not exposed to fatigue inducing levels of noise and vibration during a work shift. Similarly, by incorporating Habitability design, accommodation, climate, and lighting will also conform to comfortable industry standards, thus promoting rest and reduction of fatigue (reference 12). These benefits will also assist in attracting a younger work force, whom have expectations of higher work comfort than those of workers 10 to 20 years ago.

Regarding the environment: Class compliant design benefits aspects of both vessel use and fishing operation. Regarding vessel use; the adoption of contemporary Fishing Vessel design (enclosure 2) ensures bilge, scuppers, air and ventilation, oil and cooling lines, compressed air, hydraulics, exhaust refrigerant and ballast management, all comply to the latest MOSS, IMO and international best practice and safety guidelines. The result will be improved safety and serviceability whilst at sea and reduced instances of loss of containment and reportable safety events.

Regarding fishing operations, the modular fishing gear designed in consultation with the latest New Zealand sustainable precision seafood harvesting techniques.

Arrangement for Mid-Life Upgrade

By sizing estimated fuel cell, solid state battery and motor dimensions, into the engine bay and hull access arrangements, the Inshore Innovation Project provides an opportunity that has not previously been possible for any other major New Zealand maritime project. That opportunity is to design all new Inshore Fishing Fleet vessels for the readily accessible upgrade, to future propulsion technologies. The result being a zero-emission fleet, within the 15-to-20-year mid-lifecycle upgrade.

Optional Follow Up Assessments

During the scoping of deliverable 1.1, The Aged Fleet Assessment, the customer review was reduced in scope. As a result, no survey has been completed for Catch per Unit Effort, Nominal Fishing Effort or Cost per Fishing Hour. This information can be visited at a later stage within the project if required.

Similarly, the vessel accident, loss of containment and registered fines was omitted from this deliverable.

Enclosure C

10323, New Fleet and Summary Tab, of 26 Mar 2021

$$E_{Trip,i,j,m} = \sum_p \left[T_P \sum_e \left(P_e \times LF_e \times EF_{e,i,j,m,p} \right) \right]$$

where:

E_{Trip} = emission over a complete trip (tonnes),
EF = emission factor (kg/kW),
LF = engine load factor (%),
P = engine nominal power (kW),
T = time (hours),
e = engine category (main, auxiliary),
i = pollutant (NOx, NMVOC, PM),
j = engine type (slow-, medium-, and high-speed diesel, gas turbine and steam turbine).
m = fuel type (bunker fuel oil, marine diesel oil/marine gas oil, gasoline),
p = the different phase of trip (cruise, hotelling, manoeuvring).

Profile Distribution

5%	Hotelling
32%	Cruise
63%	Manoeuvring

69	total vessels
191	days at sea
18	working hours
85	new vessel fish hold volume

	Average duration trip (days)
2	discrete voyages

9%	Hull Efficiency Factor
10%	% Modern Engine SFC Improvement
9%	% Selective Catalytic Reduction (SCR) convertor

MODELLED OPERATIONAL PROFILE

Phase	Time (hrs)	Definition
Hotelling	11863	Time spent at port or at anchorage using auxilary engines, excludes Shore-to-Ship power
Cruise	75923	Time spent at service speed moving to and from the area of operation
Manoeuvring	149473	Time spent fishing within opearating area

Table 4 - Emission factors for NO_x , NMVOC, PM and Specific Fuel Consumption for different engine types/fuel combinations and vessel trip phases (cruising, hotelling, manoeuvring) in g/kWh

Engine	Phase	Engine type	Fuel type	NOx EF 2000 (g/kWh)	NOx EF 2005 (g/kWh)	NMVOC EF (g/kWh)	TSP PM_{10} $PM_{2.5}$ EF (g/kWh)	Specific fuel consumption (g fuel/kWh)
Main	Cruise	Gas turbine	BFO	6.1	5.9	0.1	0.1	305.0
			MDO/MGO	5.7	5.5	0.1	0.0	290.0
		High-speed diesel	BFO	12.7	12.3	0.2	0.8	213.0
			MDO/MGO	12.0	11.6	0.2	0.3	203.0
		Medium-speed diesel	BFO	14.0	13.5	0.5	0.8	213.0
			MDO/MGO	13.2	12.8	0.5	0.3	203.0
		Slow-speed diesel	BFO	18.1	17.5	0.6	1.7	195.0
			MDO/MGO	17.0	16.4	0.6	0.3	185.0
		Steam turbine	BFO	2.1	2.0	0.1	0.8	305.0
			MDO/MGO	2.0	1.9	0.1	0.3	290.0
	Manoeuvring Hotelling	Gas turbine	BFO	3.1	3.0	0.5	1.5	336.0
			MDO/MGO	2.9	2.8	0.5	0.5	319.0
		High-speed diesel	BFO	10.2	9.3	0.6	2.4	234.0
			MDO/MGO	9.6	9.9	0.6	0.9	223.0
		Medium-speed diesel	BFO	11.2	10.8	1.5	2.4	234.0
			MDO/MGO	10.6	10.2	1.5	0.9	223.0
		Slow-speed diesel	BFO	14.5	14.0	1.8	2.4	215.0
			MDO/MGO	13.6	13.1	1.8	0.9	204.0
		Steam turbine	BFO	1.7	1.6	0.3	2.4	336.0
			MDO/MGO	1.6	1.6	0.3	0.9	319.0
Auxiliary	Cruise Manoeuvring Hotelling	High-speed diesel	BFO	11.6	11.2	0.4	0.8	227.0
			MDO/MGO	10.9	10.5	0.4	0.3	217.0
		Medium-speed diesel	BFO	14.7	14.2	0.4	0.8	227.0
			MDO/MGO	13.9	13.5	0.4	0.3	217.0

BFO –Bunker Fuel Oil, MDO –Marine Diesel Oil, MGO –Marine Gas Oil

Source: Entec[6,8], the emission factors for NMVOC was been derived as 98 % of the original HC emission factors value, based on reported CH4 factors from IPCC[9].

Table 5 - Emission factors for pollutants other than NO_x, NMVOC, PM

Pollutant	BFO	MDO/MGO	Unit	Reference
CO	7.4	7.4	kg/tonne fuel	Lloyd's Register[10]
SO_x	20 * S [(1)]	20 * S [(1)]	kg/tonne fuel	Lloyd's Register[10]
Pb	0.18	0.13	g/tonne fuel	Lloyd's Register[10] and Cooper and Gustafsson[11] (average value)
Cd	0.02	0.01	g/tonne fuel	Lloyd's Register[10] and Cooper and Gustafsson[11] (average value)
Hg	0.02	0.03	g/tonne fuel	Lloyd's Register[10] and Cooper and Gustafsson[11] (average value)
As	0.68	0.04	g/tonne fuel	Lloyd's Register[10] and Cooper and Gustafsson[11] (average value)
Cr	0.72	0.05	g/tonne fuel	Lloyd's Register[10] and Cooper and Gustafsson[11] (average value)
Cu	1.25	0.88	g/tonne fuel	Lloyd's Register[10] and Cooper and Gustafsson[11] (average value)
Ni	32	1	g/tonne fuel	Lloyd's Register[10] and Cooper and Gustafsson[11] (average value)
Se	0.21	0.10	g/tonne fuel	Lloyd's Register[10] and Cooper and Gustafsson[11] (average value)
Zn	1.20	1.2	g/tonne fuel	Lloyd's Register[10] and Cooper and Gustafsson[11] (average value)
PCDD/F	0.47	0.13	TEQmg/tonne	Coope[r12]
HCB	0.14	0.08	mg/tonne	Coope[r12]
PCB	0.57	0.38	mg/tonne	Coope[r12]

Notes
1. S = percentage sulphur content in fuel

350	kW	High Speed, 4 stroke Diesel at this value and below
351	kW	Medium Speed 4 stroke Diesel - at this value and above
1	%	Set Value to 1 for CH4 or 0.1% for Sulphur Content

High Speed Diesel - Main Engine Parameters - Marine Diesel Oil Fuel

Cruise	Hotel / Manoeuvre			
0.000012	0.0000096	t/kWh	NOx_ef_2000	Nitric Oxide emissions, pre 2000 build engines
0.00000906	0.0000073	t/kWh	NOx_ef_2005	Nitric Oxide emissions, post IMO Technical Code compliance (2005 onward)
0.3	0.9	PM2.5/10	TSP_pm	Total Suspended Particulate Matter
0.000000004	0.000000012	kg/t	CH4	Methane Content - requires fuel grade to multiple against
7.4	7.4	kg/t	COx	Carbon Emission Factor
0.000166257	0.0002007	t/kWh	SFC	Specific Fuel Consumption (converted to kg/kWh)

Auxiliary Engine - High Speed Diesel - Medium Diesel Oil

0.0000502	0.0000502	t/kWh	NOx_ef_2000	Nitric Oxide emissions, pre 2000 build engines
0.00003671	0.00003671	t/kWh	NOx_ef_2005	Nitric Oxide emissions, post IMO Technical Code compliance (2005 onward)
1.4	1.4	PM2.5/10	TSP_pm	Total Suspended Particulate Matter
0.0001953	0.0001953	t/kWh	SFC	Specific Fuel Consumption (converted to kg/kWh)

Medium Speed Diesel - Main Engine Parameters - Marine Diesel Oil Fuel

0.0000132	0.0000106	t/kWh	NOx_ef_2000	Nitric Oxide emissions, pre 2000 build engines
0.000009668	0.000007704	t/kWh	NOx_ef_2005	Nitric Oxide emissions, post IMO Technical Code compliance (2005 onward)
0.3	0.9	PM2.5/10	TSP_pm	Total Suspended Particulate Matter
0.00000001	0.00000003	kg/t	CH4	Methane Content - requires fuel grade to multiple against
7.4	7.4	kg/t	COx	Carbon Emission Factor
0.000166257	0.0002007	t/kWh	SFC	Specific Fuel Consumption (converted to kg/kWh)

Auxiliary Engine - Medium Speed Diesel - Medium Diesel Oil

0.0000641	0.0000641	t/kWh	NOx_ef_2000	Nitric Oxide emissions, pre 2000 build engines
0.00004683	0.00004683	t/kWh	NOx_ef_2005	Nitric Oxide emissions, post IMO Technical Code compliance (2005 onward)
1.4	1.4	PM2.5/10	TSP_pm	Total Suspended Particulate Matter
0.0001953	0.0001953	t/kWh	SFC	Specific Fuel Consumption (converted to kg/kWh)

Table 11 - Estimated % load of MCR (Maximum Continuous Rating) of Main and Auxiliary Engine for different ship activity

Phase	% load of MCR Main Engine	% time all Main Engine operating	% load of MCR Auxiliary Engine
Cruise	80	100	30
Manoeuvring	20	100	50
Hotelling (except tankers)	20	5	40
Hotelling (tankers)	20	100	60

Source: Entec[8]

Cruise	80%	100%	30%
Manoeuvring	20%	100%	50%
Hotelling	20%	5%	40%

0	kW	Sum of HSD output - Pre 2005
21466	kW	Sum of HSD output - Post 2005

Note - it is estimated that the average output per vessel increases, such that the total fleet power remains constant

0	kW	Sum of MSD Output - Pre 2005
43830	kW	Sum of MSD Output - Post 2005

Table 9 - Estimated average vessel ratio of Auxiliary Engines / Main Engines by ship type

Ship categories	2010 World fleet	Mediterranean Sea fleet (2006)
Liquid bulk ships	0.30	0.35
Dry bulk carriers	0.30	0.39
Container	0.25	0.27
General Cargo	0.23	0.35
Ro Ro Cargo	0.24	0.39
Passenger	0.16	0.27
Fishing	0.39	0.47
Other	0.35	0.18
Tugs	0.10	

Source: Trozzi[13] for 2010 world feet Entec[6] for 2006 Mediterranean Sea fleet

0.39	Ratio of AE to ME Maximum Continuous Rating

EMISSIONS MODELLING								
HSD - Hotelling								
Time	3900	hrs	Main Eng.	4293	kW	Aux Eng.	3349	kW
COx	20117	kg	NOx	131	kg	CH4	0.167	kg
						Fuel	2719	kg

MSD - Hotelling								
Time	7963	hrs	Main Eng.	8766	kW	Aux Eng.	6837	kW
COx	83872	kg	NOx	2550	kg	CH4	1.633	kg
						Fuel	11334	kg

HSD - Manoeuvring								
Time	49139	hrs	Main Eng.	4293	kW	Aux Eng.	4186	kW
COx	610589	kg	NOx	11855	kg	CH4	5.000	kg
						Fuel	82512	kg

MSD - Manoeuvring								
Time	100334	hrs	Main Eng.	8766	kW	Aux Eng.	8547	kW
COx	2545595	kg	NOx	46933	kg	CH4	52.112	kg
						Fuel	343999	kg

HSD - Cruise								
Time	24960	hrs	Main Eng.	17173	kW	Aux Eng.	2512	kW
COx	617936	kg	NOx	7032	kg	CH4	1.965	kg
						Fuel	83505	kg

MSD - Cruise								
Time	50963	hrs	Main Eng.	35064	kW	Aux Eng.	5128	kW
COx	2576228	kg	NOx	29515	kg	CH4	20.483	kg
						Fuel	348139	kg

NEW FLEET - TOTAL EMISSIONS		
Carbon	6454	tons
Methane	0.081	tons
Nitric Oxides	98	tons
Fuel	872	tons

AGED FLEET - TOTAL EMISSIONS		
Carbon	8532	tons
Methane	0.082	tons
Nitric Oxides	127	tons
Fuel	1153	tons

Summary Data		
Carbon	2077	tons per year
Methane	0.001	tons per year
Nitric Oxides	29	tons per year
Fuel	281	tons per year, or
	330	thousand litres per year

Percentage Savings

24.35%	COx
1.13%	CH4
23.03%	NOx
24.35%	Fuel

Greenhouse Gas	CO_2	CH_4	N_2O
Global Warming Potentials	1	25	298
	2077	0	8739
	Total	10817	CO2-e tons

Appendix B Shipbuilding capability assessment

Inshore Innovation Project: Replacing New Zealand’s Ageing Inshore Fishing Fleet

Shipbuilding Capability Assessment

Move Forward with Confidence

Contents

Executive Summary

The New Zealand inshore fishing fleet targeted by the Inshore Innovation Project has an average vessel age of 38 years, which is consistent with the entire fishing fleet in New Zealand. These aged fishing vessels are facing increasing pressure from high operating costs, low serviceability and wide-ranging obsolescence. If not addressed, the New Zealand inshore fishing fleet will continually shrink jeopardising the $4.2 billion seafood sector and undermining the value of the Treaty Settlement fisheries assets.

Conversely, a modern New Zealand built Inshore Fishing Fleet will provide catch flexibility, improved environmental performance and maximise operator and quota owner profit. By building in country, this will create 1345 jobs and return $284 million into the New Zealand regional economy, just from the target fleet replacement activity. The modern technology will save 10,800 tons of CO_{2e} and 330,000 litres of fuel per year, and by designing for future upgrade, these vessels can fit zero-emission systems at mid-life upgrade, eventually removing CO_{2e} pollution completely.

However, a project of this scale has never before been undertaken by the New Zealand maritime industry. Accordingly, the Inshore Innovation Project undertook a Shipbuilding Capability Assessment that was tailored from standard industry process for the assessment of large commercial shipbuilding yards.

This Shipbuilding Capability Assessment evaluated 13 New Zealand shipyards and 2 support businesses. The assessment process combined site audits, remote desktop audits, phone interviews, accreditation review, and website and marketing analyses. The audits covered a varied range of New Zealand maritime projects, spanning 21 vessels that were either constructed or upgraded in accordance with either International Association of Classification Societies, Maritime New Zealand or Royal New Zealand Navy, design requirements. The data from this assessment is Commercial in Confidence, and thus the summary findings are presented anonymously.

The primary finding of the Shipbuilding Capability Assessment, is that despite a lack of large commercial shipbuilding within New Zealand, the maritime industry is nonetheless well positioned to support and maintain vessels up to and including large and complex ships. This capability is evident across a range of commercial, superyacht, military and zero emission vessels. In these projects, the technical and design aspects were demonstrably compliant with international, Maritime New Zealand and military seaworthiness, requirements. This proves that a New Zealand built Inshore Fishing Fleet may also be maintained and supported in accordance with international or Flag Authority rules. This capability however, requires targeted support and investment in order to pivot from primarily repair and upgrade activities to modern fleet-scale new construction. The key areas for support and investment are listed as follows:

- The New Zealand maritime industry is exclusively (except for one) small to medium sized businesses with no history of fleet-scale shipbuilding. Accordingly, only two companies are independently accredited for workplace health and

safety and only 15% comply with externally accredited asset management, quality systems, or environmental and sustainable practises. This is a **critical technical finding** as it highlights several areas of risk across the project design. Specifically, New Zealand shipbuilders must use safety, quality, environmental and through-life support process controls in order to demonstrably comply with the best-practise systems of management. Accordingly it is **recommended** that participating New Zealand maritime companies are supported for accreditation to ISO9001, ISO14001, ISO45001 and ISO55001. It is then **recommended** that a Business Entity is established, that is responsible for management of quality and product delivery, authority for in-service support, including warranty resolution and to be the technical authority for design control and the coordinating authority for regional and community engagement. It is recommended that this entity is a Joint Venture, established between international industry for design and compliance, local industry and representation for Iwi.

- If the current seafood harvest levels are to be maintained, then the required replacement build schedule will far exceed the staff numbers and infrastructure available within country. This is a **critical production finding** and a point for early action. Accordingly it is **recommended** that targeted investment in training and hiring is commenced as an immediate follow-on action from formation of the JV. The focus being to minimise lead time for skilled labour, secure the skill base for lean production management and to include community and Iwi for job opportunities immediately as the shipbuilding capability is increased.

As part of the project review, a significant peripheral finding was made; being that the New Zealand Industry and Government were at various stages of acquiring $1.73 billion of maritime new construction. If the New Zealand maritime industry were already established as recommended within this report, then $232 million of the new construction could have been completed within country, which would have been additional to the already estimated $284 million for the inshore fishing vessels ($516 million total).

In closing, the above actions and recommendations will enable the New Zealand maritime industry to establish a capability equivalent to that of a large well-organised shipbuilder. This will then allow industry to undertake a national shipbuilding program for the construction of a replacement Inshore Fishing Fleet and reinvigoration of the country’s shipbuilding capability. If managed correctly, the estimated New Construction expenditure could readily exceed $284 million through the fishing fleet and through the allocation of future maritime tenders. This will benefit industry, provide food security and create decades-long careers for regional and Maori community.

Introduction

Bureau Veritas Preamble

Bureau Veritas was founded in 1828 with the simple goal of making shipping safer by offering up-to-date tracking information about ships and equipment to voyage underwriters. The company then grew to Vessel Classification, in which Bureau Veritas classed ships by construction and condition. The first such vessel being the Antwerp classed in 1829. Since that time, Bureau Veritas has grown to 80,000 employees across 140 countries. The Marine & Offshore business and Bureau Veritas as a Class society, are now one of the leading international bodies for maritime classification, safety, inspection and compliance. This report has drawn upon this maritime expertise in order to deliver a tailored assessment for the Inshore Innovation Project, supporting the opportunity to replace the ageing inshore fishing fleet.

Background

The Inshore Innovation project assessed all Maritime New Zealand registered fishing vessels of 16m to 26m keel (the Inshore Fishing Fleet). This found that the average time in service was 38 years[1], and that owners are now facing increasing pressure from rising operating costs, reduced serviceability and inefficiency from obsolete equipment. All of which creates a critical situation, whereby owners are increasingly retiring vessels and ceasing operation. If not addressed, the New Zealand Inshore Fishing Fleet will continually shrink, jeopardising the $4.2 billion per annum seafood sector[2] and undermining the value of the Treaty Settlement fisheries assets.

To address this critical situation, Northland Inc. has commissioned the Inshore Innovation Project, supported by the NZ Provincial Growth Fund, Johansson Seafood Consultancy and select commercial and industrial partners. This project has spent the past year investigating the opportunities for the NZ fishing industry, in order to provide practical options to maintain the fishing fleet capability, improve profitability and environmental performance, ensure ongoing food security and grow the value of the seafood sector.

This report summaries the current inshore fishing fleet, it's limitations and risks, particularly to pollution and $CO2_e$ emissions, presents the capabilities of modern fishing vessels and reviews the New Zealand national ship building capability, with a view to building modern fishing vessels within country.

The Current Inshore Fishing Fleet

Details of the Inshore Fishing Fleet were compared to guidance from the New Zealand Ministry for the Environment, the US Environmental Protection Agency, the International Maritime Organisation and the United Nations environmental panel. This allowed for

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[1] #6106 – *Building Local Fishing Vessel Capacity*, of Mar 2020

[2] #5643 – *The Economic Contributions of Commercial Fishing to the New Zealand Economy,* of Aug 2017

comparative analysis of New Zealand's inshore fishing fleet and a detailed model to supplement that analysis[3].

The primary review finding is that significant risk is created by persistent use of obsolete design and technology. Specifically, 82% of the inshore fishing fleet was built between 1940 and 2000. Accordingly, these fishing vessels employ out-dated and in some cases vintage technology. The result is that safety, seakeeping attributes, fishing capability, habitability, and pollution standards, are all far below what is acceptable in 2022. For example, mandatory Green House Gas (GHG) compliance was phased in with engine manufacturers from 1990 to 2005; meaning that 87% (by kW/h) of the New Zealand Inshore fishing fleet pre-date these requirements and are unregulated polluters.

New Zealand's Opportunity

The current Inshore Fishing Fleet comprises 12 fishing configurations across 169 registered vessels: Dredge, Trawl, Potting, Liner, Set Nets, Seine, Troller, Hand-gather, Jigger, Mechanical, and Carrier or other. Modern designs however, allow for electric drive multi-configuration fishing vessels. Meaning that a single modern vessel could potentially replace 4 or 5 traditionally designed vessels. This allows rapid conversion from Liner to Trawler to Potting, all as fishing operations require. This designed flexibility allows for significant savings during construction, maximum profit, and significantly increased resale value. Additionally, the design, build and maintenance process will create 1345 jobs over a 20 year period and an estimated $284 million of expenditure within New Zealand[4].

Using modern diesel engines will save 10,817 tons of CO_{2e} and 330,000 litres of fuel each year[5]. However, by designing for future upgrade, these vessels can also convert to zero-emission systems at the 10 to 15yr refit, as battery technology matures.

Accordingly, the potential exists for the New Zealand fishing industry to adopt world leading innovation; by building a multi-role fishing fleet, upgradable to zero-emissions, whilst also significantly benefitting operators, NZ industry, regional workforce and the environment.

Understanding New Zealand's Shipbuilding Capability

A modern Inshore Fishing Fleet will significantly benefit New Zealand; however legitimate questions arise regarding whether this is achievable from in-country shipbuilders or through overseas purchase? To help inform that decision, the Inshore Innovation Project launched this review to assess New Zealand shipbuilding capability, relevant to the construction and through life support of inshore fishing vessels of 16 to

[3] 210323_1 – *Aged Fleet Analysis – Technical Report 1_1,* of 23 Mar 2021
[4] #6106 – *Building Local Fishing Vessel Capacity,* of Mar 2020
[5] 210323_1 – *Aged Fleet Analysis – Technical Report 1_1,* of 23 Mar 2021

26m keel. This review was based upon industry assessment standards[6] [7] [8] and is presented further in the following sections.

Commercial in Confidence Aspects

All assessments have been made anonymously to protect Commercial in Confidence information and to comply with participant non-disclosure agreements. This allows findings to be shared openly to capture the lessons learned but not to compromise or share sensitive information from the companies involved. Summarising the key aspects of the review group:

- 13 individual shipyards,
- 2 support businesses,
- These 15 businesses are collectively referred to as The Sample Group.
- The Sample Group was assessed by a combination of phone interview, desktop audit, site audit, review of registered accreditations, website and marketing review.
- The depth of review was dependent upon each company's agreed level of participation.

[6] NR320 DT R04 E – *Certification Scheme of Materials and Equipment for the Classification of Marine Units,* of Jul 2018

[7] NR467 Part D – *Rules for Steel Ships, Part D, Chapter 15 – Fishing Vessels*, of Jul 2021

[8] URZ047 – *No. 47 Shipbuilding and Repair Quality Standard, Rev 5,* of Oct 2010

Assessment Process

The assessment process was adopted from a materials and equipment certification process[9] as shown below at figure 1.

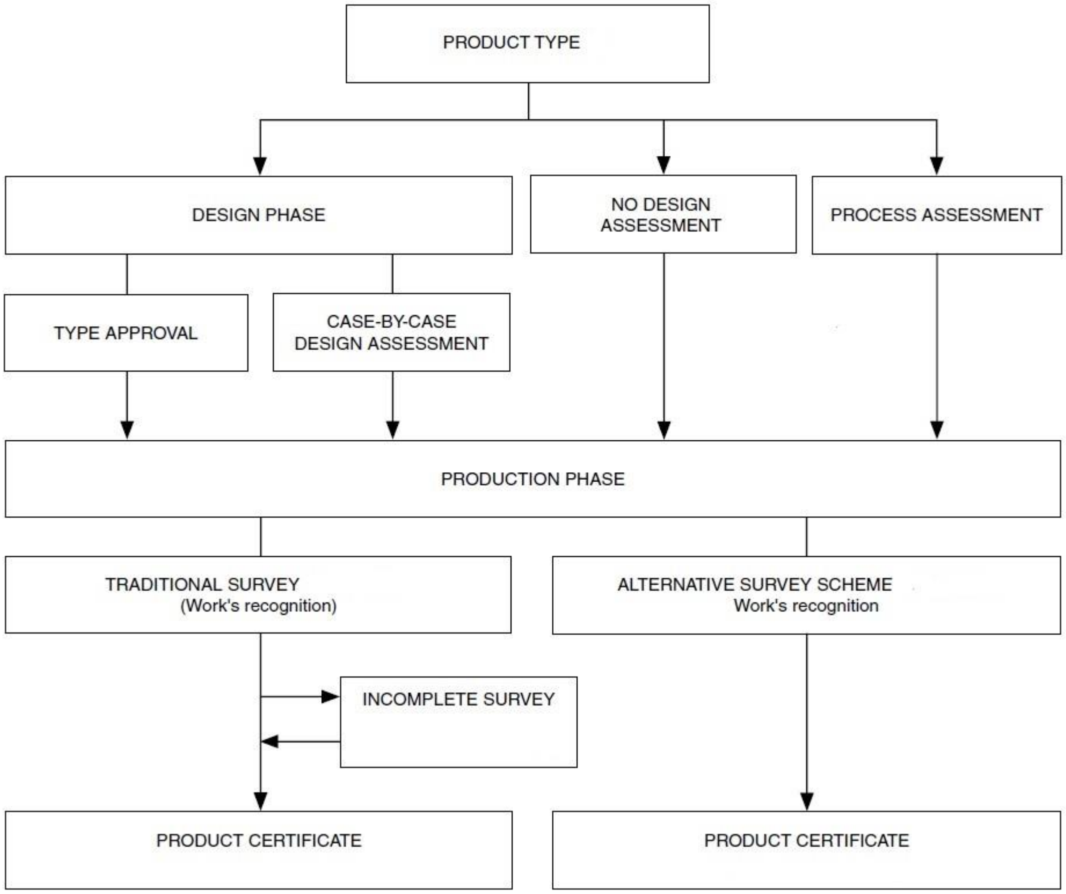

Figure 1. General Assessment Procedure

A material and equipment certification process was adopted over a vessel Class construction process, as Class compliance is pass or fail and the criteria vary significantly between applications. Instead the Inshore Innovation Project applied a material and equipment process where aspects of shipbuilding were individually assessed as “Product Types”. This allowed for compliance assessment to be defined on a case by case basis as relevant to the particular product type. An example of this is shown below within Figure 2.

[9] NR320 DT R04 E – *Certification Scheme of Materials and Equipment for the Classification of Marine Units,* of Jul 2018

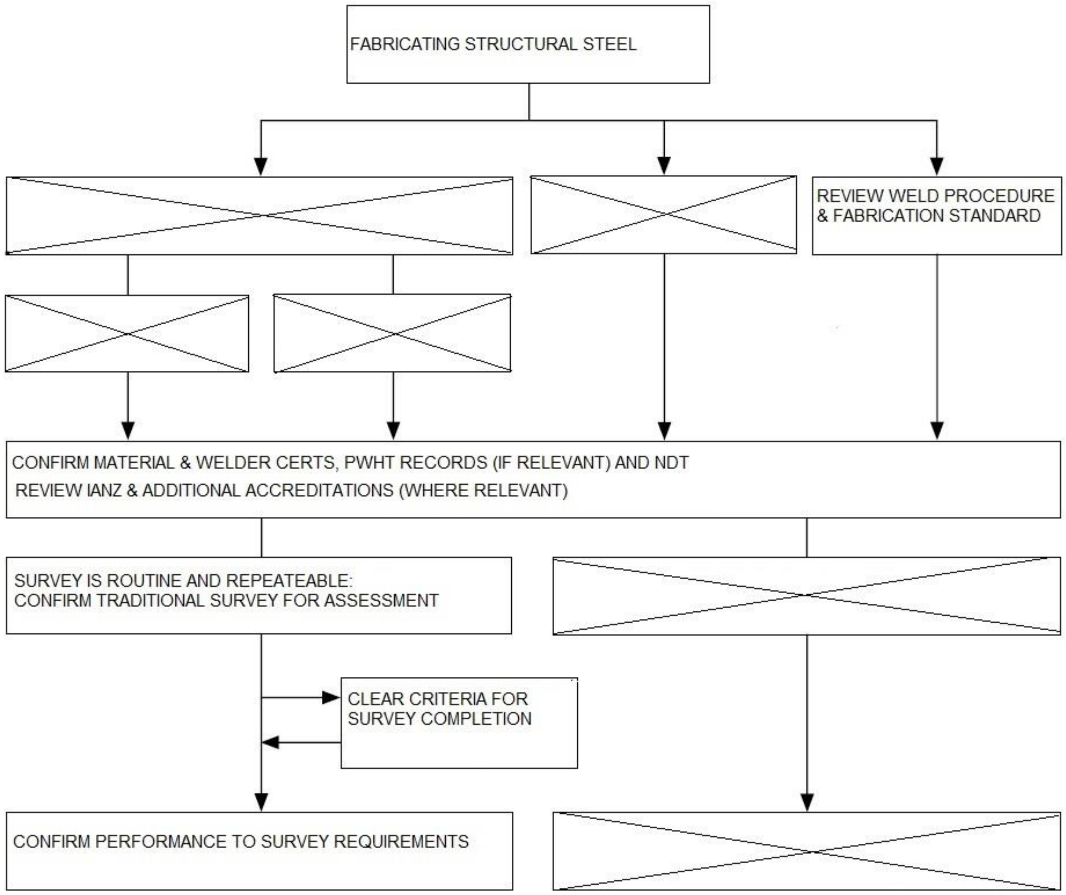

Figure 2. Assessment Example for Service Aspects

These assessment steps were then combined with the general requirements for New Construction and Repair as detailed by IACS guidance[10]. This detailed the overarching requirements that were applied to the Inshore Innovation Project assessments:

- **Design** assessed whether New Construction or Repair design demonstrably complies with a defined shipbuilding ruleset or appropriate statutory requirement.
- **Shipbuilding** assessed whether shipbuilding work is demonstrably compliant with the above design requirements. Additional to the IACS guidance, this assessment also reviewed critical trade and skill shortages, as a general informing factor toward NZ shipbuilding capability.
- **Facilities** assessed Working Conditions and Facilities for Health & Safety at Work Act (HSWA 2015) compliant accessibility, staging, lighting and ventilation, as compared to individual business QMS requirements.

[10] URZ047 – *No. 47 Shipbuilding and Repair Quality Standard, Rev 5,* of Oct 2010

The data from these assessments is Commercial in Confidence and is retained by the Project Authority, JSC Ltd.

Industry Observations

The Shipbuilding Capability Assessment covered a varied range of new construction and upgrade projects. These included two IACS Class passenger ferries, two deep sea fishing vessels, an ocean tug, two superyachts, two specialist research vessels, two hybrid vessels and an electric vessel. A MOSS compliant skiff, two tugs, two barges and a utility vessel. Also, two ANZAC Frigates and an Offshore Patrol Vessel. Please note: the military vessel review pertained only to unclassified construction aspects and was not privy to systems or capability related functions.

Design

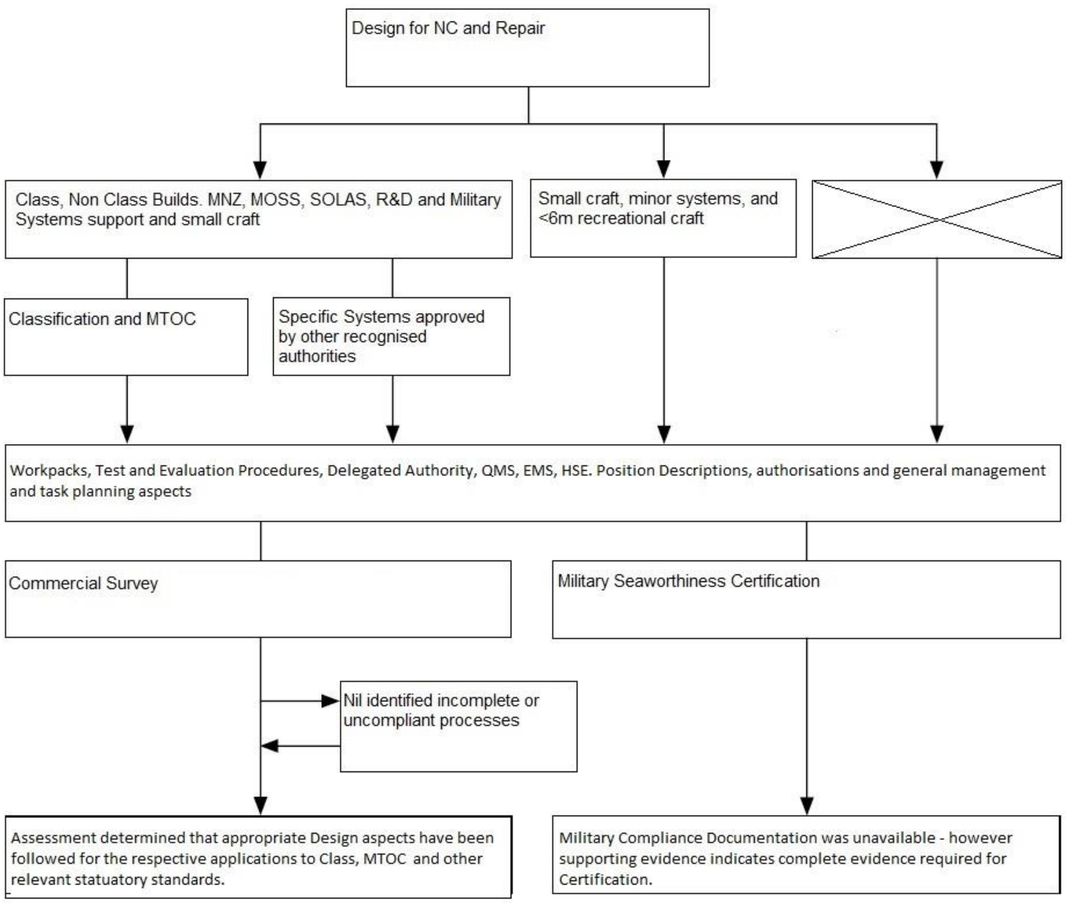

Figure 3. Design Compliance Evidence.

Design compliance occurs at three stages through the ship build and repair process; prior to build or fabrication, confirmation of adherence during build or fabrication, and final compliance at commission or return to service. A review of those aspects is presented at Figure 3 and the key findings are noted as follows:

- The design of the assessed vessels fell in to one of two types: Large, complex vessels of international design, and small vessels that are a mix of New Zealand and international design.
- Across all builds: the design aspects were found to conform to a high level, within the requirements of the compliance standard – e.g. drawings and plans for Class vessels were approved by Class Societies prior to commencement of work. The survey aspects were met and the evidence of Welder Qualification, Material Certs and NDT and DT were readily available where required. Because this work was a repeated and well understood process, the systems of management were also well established and applied uniformly.
- Design procedures, technical controls and authorised personnel were appropriate, with minor discrepancies only found around QMS implementation.
- Conversely – when Design aspects were not explicitly covered by the compliance standard: performance was found to be poor or non-verifiable. One example was that multiple work packs were found to omit overhead lift and work positioning requirements, particularly for test fit or rework. In the instances where the overhead lift is mentioned, it was often a one line instruction only: “rig and remove from vessel to workshop”, with no overhead lift or work positioning procedures referenced. When reviewed separately, the procedures were either incomplete or did not exist. The roles and responsibilities were not defined and authorities were not allocated within Position Descriptions or as standalone authorisations. Instead the JSA process was relied upon, which is HSWA compliant, however is insufficient for planning, control and authorisation for this type of task.
- As a counter finding however; the commissioned vessels were typically high quality, fully compliant and fit for purpose. From review of customer feedback, dispute and claim resolution and open source media; the final products were largely reliable and of a high quality.

Following on from the points above; a secondary review was then completed assessing JASANZ accreditations, with a particular focus on Quality Management, Occupational Health and Safety, Environmental Management, Asset Management and shipbuilding and Marine and Offshore accreditations. This review is summarised as follows at table 1.

Company Name	ISO9001 Quality Management Accreditation	ISO14001 Environmental Management Accreditation	ISO 55001 Asset Management Accreditation	ISO 45001 Health & Safety Accreditation
A				
B	✓	✓	✓	+ additional accreditations
C				
D				
E				
F				
G				
H				
I				
J				
K				
L				
M				
N	✓	✓		✓
O	✓			✓

Table 1. Review of NZ Shipbuilder Sample Group Accreditations

Referring to table 1, of the 15 businesses sampled, only two held ISO accreditation for workplace health and safety. When referring to the total accreditations which support international best practise for shipbuilding, there is only a 15% uptake within New Zealand, as compared to 100% for large international shipbuilders. This shows that industry best practise for environment, asset management or quality management, is not implemented across equivalent New Zealand shipyards. The management of accreditation and conformance to best practise is a key requirement if an internationally competitive shipbuilding capability is to be fostered within New Zealand. It is proposed that a Joint Venture (JV) is established, to manage this and other relevant outcomes. This JV is detailed later within this report.

Shipbuilding

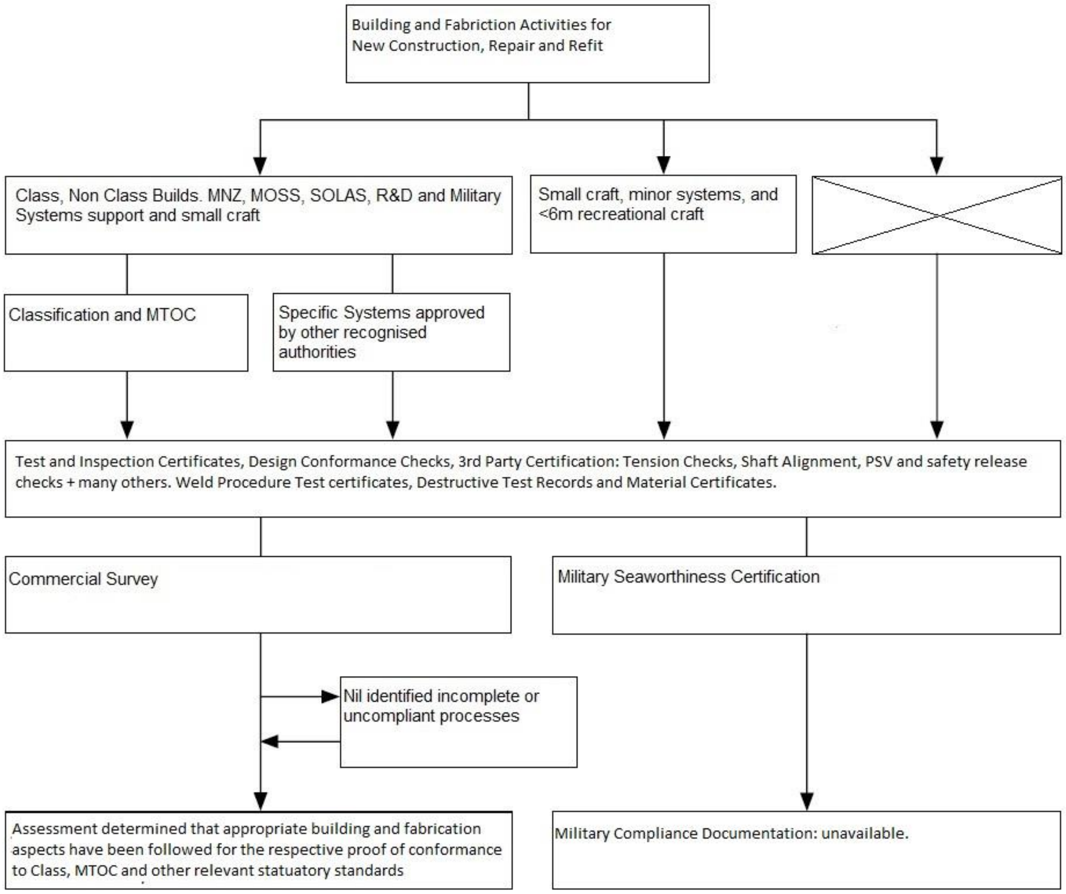

Figure 4. Shipbuilding Compliance Evidence

Shipbuilding compliance is achieved at multiple stages during the construction, repair and upgrade process. Compliance is determined by a mix of authorised surveys, training, qualification of workers and service providers and 3rd party verification. A review of those aspects is presented at Figure 4 and the key findings are noted as follows:

- As was found within the design review; the assessed compliance to shipbuilding standards were also well understood and applied effectively. This was apparent from the initial reviews of documentation, compliance evidence and from site and phone interview.
- The third party and independent audit evidence was readily available, was appropriately qualified (for instance IANZ accredited providers) and there were no adverse findings or notable observations regarding compliance evidence within this area.

Fleet-Scale Shipbuilding Observations
Construction, repair and upgrade activities were all found compliant to the respective industry standards. However, there are several additional observations specific to capability and scale that are relevant to a possible Fleet-scale New Construction project. These observations are grouped by functional stage:

- **Design and Lofting** although the skills and tools are present within country, the New Zealand maritime industry does not have a proven design and loft capability for the construction of modern inshore fishing vessels.
- **Large Form Fabrication** the New Zealand maritime industry contains multiple medium shipyards, none of which are currently engaged in long-running production build. This creates both a challenge and an opportunity. The challenge is that no NZ business has a proven record of leveraging economies-of-scale during a long running New Construction project, nor has any NZ business demonstrated experience in lean optimisation over fleet scale vessel builds.
- Conversely, by partnering with industry and potentially offshore expertise, the Inshore Fishing Fleet new build project may be designed from the outset with lean and optimised production as a core requirement. This would combine well with the multiple Greenfield expansion opportunities, present across multiple NZ shipbuilding yards that are ideally placed at main waterways and harbours with large areas for expansion (this aspect is discussed further within the facilities section).
- **Personnel and Trade Observations** There were no identified skill nor capability shortages for the current workload. However, the addition of new construction for an inshore fishing fleet will completely exceed the current staff and skill base within industry. This is a key point for early action, noting that staff and skill shortages have only been further compounded by the closed borders and reduced travel due to COVID. Accordingly, investment in Personnel and Trade training facilities and skilled hiring is highlighted as a high priority. This is another function that is recommended to be negotiated and managed with industry through the central JV body.
- **National Shipbuilding Capability** Currently, New Zealand Industry and the Government are at various stages of commitment for New Construction inshore ferries, large ROPAX ferries, patrol vessels, ICE and electric tugs, barges, offshore fish farms, and multiple small and specialist boats. The value of these

projects totals approximately $1.73 billion[11] [12] [13] [14] [15] [16] [17]. All but one of these projects (Auckland Ferries) are confirmed for overseas build. Conversely, if the New Zealand maritime industry had an agile, modern and coordinated national shipbuilding capability, it is estimated that all of the small and a portion of the medium sized (<1000GT) vessels, may instead be built within country. From estimated direct acquisition costs (excluding additional TLS and maintenance revenue) it is estimated that these new builds would have contributed to nearly $232 million to the New Zealand economy, which would be additional to the $284M already estimated for the Inshore Fishing Fleet. By having an established JV, which is known both to industry and government, this entity will act as a first-pass advisor, guiding new acquisitions to NZ industry and preventing future offshore purchase when NZ capability exists.

ESG Goals: Regional and Maori Engagement

Of the companies that shared workforce information: all were regional and all employed a skilled regional workforce. Although no specific schemes for regional skills or Iwi engagement were demonstrated, this is nonetheless a significant opportunity. The proposed JV will equitably plan the placement of the estimated 1345 new jobs. Which, with the right community engagement, will significantly strengthen regional economies and create recurring high income jobs, through the new construction roles and the through life support of fishing and other NZ built vessels.

[11] Open Source Media – Kiwirail Inter Islander Ferry Replacement https://www.stuff.co.nz/travel/news/125620974/halfbilliondollar-contract-to-build-two-new-interislander-ferries-signed#:~:text=KiwiRail%20has%20signed%20a%20%24551,Zealand%20in%202025%20and%202026.

[12] GETS Tender System – ID24293212, RFI for Design and Build of a Southern Ocean Patrol Vessel

[13] GETS Tender System – ID 25427501 Auckland Public Transport Ferry Services

[14] Open Source Media – GETS Tender 24333045 https://www.australiandefence.com.au/defence/sea/tassie-boat-builder-wins-nz-defence-contract

[15] #6106 – *Building Local Fishing Vessel Capacity*, of Mar 2020

[16] Open Source Media - NZKS – Project Blue Endeavour Salmon Aquaculture Fish Farm https://www.seafoodsource.com/news/aquaculture/new-zealand-king-salmon-shifting-to-open-ocean-farming

[17] Open Source Media - Project Hananui Fish Farm

Facilities

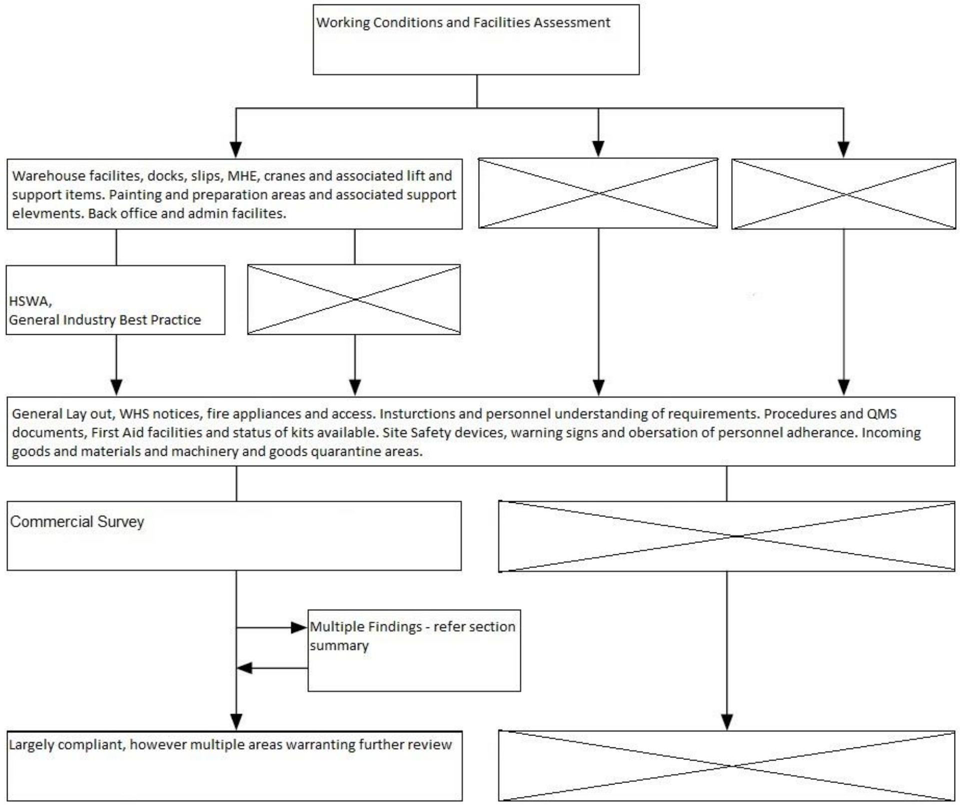

Figure 5. Facilities Compliance Evidence

NOTE: Due to COVID restrictions and Commercial in Confidence sensitivities; the majority of shipbuilders chose to not participate in the site assessment. Accordingly, this information is based upon limited site data and supported by desktop audit and multiple in-person and over-phone interviews.

The key findings of the Facilities assessment are presented at Figure 5 and are noted as follows:

- The New Zealand Shipbuilding industry comprises a large, national capability for service and repair. Multiple companies can service vessels far larger than typical inshore fishing vessels, and can service multiple vessels at a time providing a range of advanced service and refit options.
- When reviewing the certification, equipment control, test inspection and serviceability records, there were no major deficiencies and compliance was generally achieved to a high standard.
- Referring to the accreditation review at Table 1; Quality Management, Asset Management, and general Shipbuilding accreditations are absent from the majority of companies. This is consistent with the New Zealand output which comprises mainly of service and refit, or single and small production run New Construction vessels.

- The above findings are also consistent with the small size of the majority of the NZ shipbuilding companies. This is not in terms of physical facilities, or output potential, but rather in terms of commercial, technical and financial size of the businesses.
- As a counterpoint; the location of the current New Zealand shipyards and the available commercial land for Greenfield opportunities, would readily allow for multiple options to invest and scale capability. Unlike many developed shipbuilding nations, New Zealand has an abundance of dock facilities close to industrial hubs and all are serviced by reliable logistics and transport infrastructure. Accordingly, the fundamentals of the New Zealand maritime industry are actually very well placed to underpin a larger scale of service and New Construction capability, if supported by government and industry.
- Regarding New Construction however, there is currently no large design capability within country (excluding services to Navy) and none of the shipyards are currently engaged in fleet-scale production of commercial vessels or aquaculture facilities. This is reflected by recent acquisitions whereby some $1.73 billion worth of new construction is currently being built or tendered for build outside of New Zealand.

From the balance of the above points, it is evident that the New Zealand maritime industry is sized to meet only the current workload. There is no latent capacity, particularly in terms of design, compliance and systems of management – to allow for the introduction of a fleet-scale New Construction project. Despite this however, the fundamental service aspects are present, particularly with regards to Greenfields development and enabling infrastructure. Accordingly, the Inshore Fishing Fleet as well as a portion of the $1.73 billion NZ new construction and tenders, could readily be built within country if the appropriate steps are taken to expand from the current service model to instead become a compliance based service, refit and fleet-scale New Construction provider.

To enable this outcome, the industry requires a managing business entity that undertakes the central management function which would normally be present within a large shipbuilding yard. This entity would be responsible for accreditation and compliance of all products and services. They would coordinate between sales, customer orders and design control. Additionally co-ordinating between the respective NZ shipyards, ensuring delivery to specification whilst also holding responsibility for after-sale support and Through Life Support to the fleet.

Noting the complex coordination between multiple NZ businesses, and the need for equitable achievement of project and ESG outcomes, it is recommended that the business entity be a collaboration between international expertise, New Zealand business and community representation. This is recommended as a commercial Joint Venture.

Conclusions

This Shipbuilding Capability Assessment evaluated 13 New Zealand shipyards and 2 support businesses. The assessment process combined detailed site audits, remote desktop audits, phone interviews, registered accreditation review, and a website and marketing analysis. The audits covered a varied range of New Zealand projects, spanning 21 vessels that were either constructed or upgraded in accordance with IACS, MNZ or RNZN design requirements. The raw data from these assessments are Commercial in Confidence, and thus the summary findings are presented anonymously.

Technical and Design Aspects

Internationally designed vessels account for 2/3 of the sample group and amount to over 90% of total Gross Tonnage (GT). Of the remaining NZ designed vessels, all were small (<25m keel) of conventional design and were inshore vessels. Regarding repair and upgrade however, the opposite was found, as 100% of the design and fabrication work was completed by NZ maritime businesses. This is an important finding, as it shows that the NZ maritime industry is appropriately equipped to technically support and maintain large and complex ships, despite not building those ships within country.

This technical support and maintenance capability was proven across a range from commercial to luxury to zero emission vessels, with technical and design aspects demonstrably compliant with IACS, MNZ and military seaworthiness requirements. This showed that any coordinated New Zealand built Inshore Fishing Fleet can readily be maintained and supported in accordance with either IACS or Flag Authority requirements.

This capability however, comes with a significant requirement for support. The NZ Shipbuilding industry is distributed across the country and all except for one, are small to medium businesses. This causes a central limitation that creates a cascading set of risks.

Key Finding. Of the 15 businesses sampled, only two hold accreditation for workplace health and safety. Then looking at the wider range of accreditations typical for large shipbuilders (asset management, quality systems, environmental and sustainable practises) only 15% of NZ shipbuilding businesses are accredited. This is an important finding as it highlights a significant yet readily-addressable area for improvement. Specifically, that if the Inshore Fishing Fleet is to be built within country, then shipbuilders must demonstrably comply to safety, quality and through life sustainment process controls. This must be a first step, which in turn will allow for the systems of management that will support controlled design, fabrication, construction, and maintenance processes across the multiple NZ shipbuilding companies. Additionally, it is recommended that a Business Entity be established, to oversee the shipbuilding process. This will allow uniform management of quality and product delivery, act as POC for in-service support, including warranty resolution and assume technical authority for design control. These functions would align well with a JV, as described earlier within this report.

Shipbuilding and Facilities

3rd party and internal audit evidence of build, repair and fabrication activities have shown that the New Zealand maritime industry demonstrably comply with survey, test and regulatory inspection, as specified by IACS and MNZ rules. Accordingly, the facilities and skills, regulatory compliance and process understanding required for New Construction are all present within local industry. This is an important finding, as despite there never being a fleet-scale New Construction project prior, the New Zealand maritime industry nonetheless possesses the base capability to support one. However, a significant gap must also be addressed. In order to meet the timeframes for fishing vessel replacement, the industry requires significant support for the additional personnel, design and implementation of lean production systems and the expansion of facilities and infrastructure to commence new construction additional to extant workload. It is recommended that this support is provided from Government, in consultation with industry.

ESG and National Opportunity

The Inshore Innovation Project is uniquely placed to merge significant economic benefits with regional and Maori focused outcomes. Specifically, the replacement of the Inshore Fishing Fleet will create some 1345 new jobs. With the right community engagement, these jobs will bolster regional economies and create decades-long, skilled employment. Moreover, by combining the fishing fleet opportunity with a reinvigorated New Zealand shipbuilding sector; the expenditure for regional maritime projects could have exceeded $516 million for New Construction alone. This estimate is based upon historical tenders and the Inshore Fishing Fleet scope; accordingly, this value may yet be realised in the future if other opportunities for barges, tugs, ferries or small craft, are coordinated and directed to New Zealand Shipbuilders as a first priority. Combining this economic potential with careful project, regulatory, community and industry planning, will allow for a fair and equitable allocation of trade training, engagement with community and benefits to local Iwi; whilst greatly expanding New Zealand sovereign shipbuilding capacity. And with the right JV established to plan and deliver these outcomes, the New Zealand industry, community and economy will significantly benefit for years to come.

Summary Statement

In undertaking the above actions; the New Zealand maritime industry will have established a functional capability akin to that of a large well organised shipbuilder. This will allow the industry to support a national program for the construction of a replacement Inshore Fishing Fleet and reinvigoration of the national shipbuilding capability. This high value opportunity will benefit the regional and Maori workforce through long-term skilled employment and partnerships with local Iwi and regional councils. This would also protect and grow the $4.2 billion seafood sector and provide food security to New Zealanders and our trade partners.

If there are any questions regarding this report, please do not hesitate to contact the undersigned.

Dwayne BOYES

Strategic Development Manager, New Zealand and South Pacific

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ENCLOSURES:

A. List of Terms and Definitions

ENCLOSURE A to NZ Shipbuilding Capability Assessment

of 02 MAY 2022

Classification – Marine and Offshore vessels, units and structures are classified in accordance with Class Society rules and guidelines. Classification societies certify that the relevant aspects of the rules and guidelines are met and in turn the vessel, unit or structure is issue with a Certificate of Class.

Class Society – A ship classification society or ship classification organisation. Only Class Societies are authorised to issue Class Certificates for vessels, units and structures.

ESG – Environmental, Societal and Corporate Governance, are the factors applicable to companies and state authorities in order to determine the non-financial factors related to ethical business and outcomes.

Flag Authority – is the maritime authority for the Port of Registry of vessels.

Gross Tonnage – this is the size or carrying capacity of a vessel.

IACS – International Association of Classification Societies.

IANZ – International Accreditation New Zealand, the Crown entity established for testing and verification within New Zealand.

ICE – Internal Combustion Engine.

JSA – Job Safety Analysis, is a safety procedure applied at hazardous worksites.

Keel – The lengthwise timber or steel structure at the base of a vessel

MOSS – Maritime Operators Safety System, which is the Maritime New Zealand system for safety management at sea.

MNZ – Maritime New Zealand, is the Flag Authority for New Zealand.

NDT / DT – are Non Destructive Testing and Destructive Testing, which are the means for assessing material properties.

ROPAX – Roll on / Roll off, Passenger Ferry.

Statutory – These are the maritime rules specified by a governing body or flag authority.

Appendix C BuildCo

Withheld in full - commercial information

Appendix D BERL report

Building local fishing vessel capacity

Pautū-te-rangi
(March) 2020

www.berl.co.nz

Author: Konrad Hurren and Hillmare Schulze

Reference No: #6106

Pautū-te-rangi 2019

Making sense of the numbers

Total vessels constructed and sold
70 vessels

Total full time equivalent employment over twenty years
1,345 employees

Total expenditure over twenty years
$284 million

Total contribution to Northland GDP
$122.5 million

Present value of tax take over twenty years
$79.9 million

BERL has not attempted to model the impact on the fishing industry as a whole or quantified the impact on the economy of the fishing industry using modern vessels. The analysis does not include any economic impact arising from constructing the vessel building facilities. Nor do we attempt to model the economic benefit that will flow from non-fishing vessel building activity which will occur during the 20 year period or beyond.

Wider economic, social, cultural, and environmental impact

Cultural and economic impact

Long term sustainable sector:
Long term sustainability is improved by an improved profitability of each catch

Improved fish handling improves the value of the catch:
On-board handling technologies are improved which will lead to greater profitability for the sector and more income for fishers

Diversification of the economy:
Building vessel construction capacity locally will create a more highly diversified economy into high value manufacturing

Catalyst for the grey and black water industries:
This project will act as a catalyst for New Zealand becoming a regional leader in grey and black water vessel construction

Build technical capacity in Northland:
Northland is an area with high unemployment and a high proportion of Māori. Building industrial capacity in this region is of top policy priority in order to ensure a fair, inclusive economy

Social impact

Workers are protected:
New vessels will be designed with modern technology to optimise for health and safety

Sustaining jobs:
Developing local capacity to replace the inshore fishing fleet in New Zealand will bring new jobs and opportunities to the region

Environmental impact

Reduced benthic impact:
New fishing gear technology will reduce impact on seafloor ecosystems

Reduced carbon emissions:
Vessels can be designed with fuel efficient engines and the ability to retrofit future engine improvements

Reduced impact on protected species:
Seabirds can become trapped in fishing lines. New vessels will be designed to minimize this risk

Contents

Tables

Figures

1 Introduction

Business and Economic Research Limited (BERL) has been tasked by Northland Inc. to prepare an economic impact assessment for a proposed project to develop a hub for inshore fishing vessel construction in Northland.

In this report we begin by outlining the proposed hub. Followed by an analysis of the wider economic benefits and the results of the economic impact model. We briefly describe the methodology including the premise behind it and the necessary assumptions. Finally, we conclude by summarising our analysis and our recommendations.

1.1 The opportunity: A hub for inshore fishing vessel construction in Northland

The New Zealand inshore fishing fleet is ageing and requires replacement over the next 15 to 20 years.

There are currently 173 inshore fishing vessels (between 16m to 26m) registered with Maritime New Zealand with an average age of 37 years. Most of the fleet is well past their expected economic life span. Due to the age of the fleet there are inefficiencies related to fuel, mechanical reliability and operating costs. The inshore fishing fleet industry has indicated a need for at least 70 vessels to be built or imported within the next 15 to 20 years.

To enable the building of these vessels in New Zealand, rather than importing the vessels, the marine engineering sector will be required to invest in establishing an appropriate facility/facilities. This could be a feasible option through a coordinated effort of public and private sector investment.

The fishing vessel hub building project will create a sustainable work-boat building maritime industry for New Zealand. This could include barges, ferries, tugs, aquaculture platforms. Similarly to the super yacht and pleasure boat industries that was developed off the back of our Americas Cup success.

The current proposed project is focussed on centring this production in Northland which currently has a number of vessel building companies which can expand and produce the new vessels.

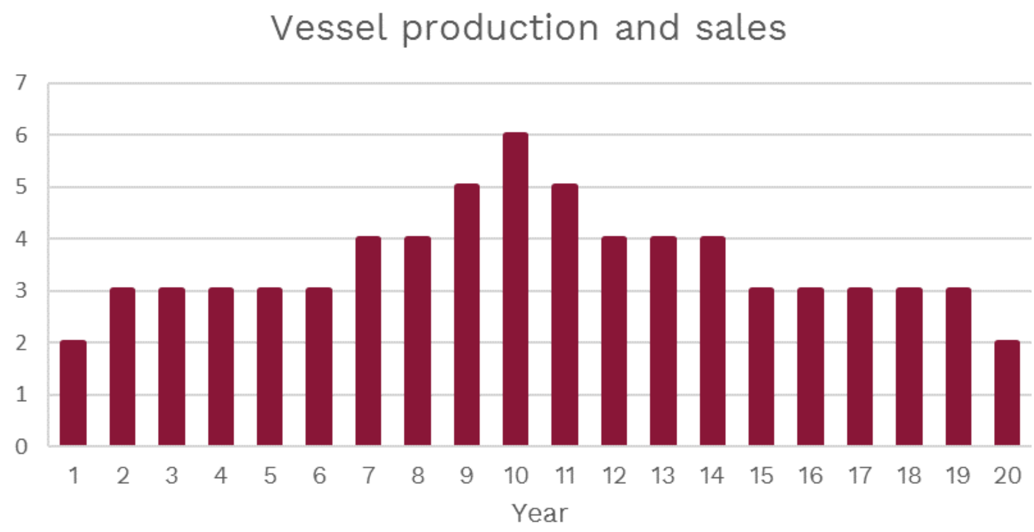
1.2 Scope

The BERL analysis was restricted to considering the effect on the economy from the production and sale of 70 new fishing vessels over the next twenty years. BERL has not attempted to model the impact on the fishing industry as a whole or quantified the impact on the economy of the fishing industry using modern vessels.

The analysis does not include any economic impact arising from constructing the vessel building facilities. Nor do we attempt to model the economic benefit that will flow from non-fishing vessel building activity which will occur during the 20 year period and beyond.

To capture some of the effect of the "ramping up" and "cooling down" over time of producing fishing vessels we model production starting at two vessels in the first year. This builds to four vessels at year seven and six vessels in year ten which represents the peak. After year ten we assume the fishing industry has absorbed most of the required boats and the late adopters slowly purchase the rest. Until year twenty when the final two vessels are produced and sold. Based on consultation with industry experts we determined that a twenty year time frame was appropriate but in reality, fishing vessel construction will continue forever.

Figure 1.1 Number of fishing vessels produced and sold, years 1 - 20



1.2.1 Two scenarios

The main difficulty in estimating the economic impact for this type of project is deciding how much of the expenditure should be attributed to imports. Building fishing vessels uses materials and parts that are not all locally available in sufficient quality or quantity.

We are uncertain about the precise proportion of spending that will be on imported material and components.

In discussions with stakeholders BERL decided to create two scenarios to reflect this uncertainty: the first is that 60 percent of the vessel sale price (before GST) is imported. The second is that 40 percent of the vessel sale price (before GST) is imported.

In the first part of our results section BERL present the results of the analysis assuming 60 percent of components are imported. We then present the estimate with an assumed 40 percent of components imported in a following section.

2 Wider economic benefits

This section describes and explores some of the wider economic benefits of developing local capacity to replace the inshore fishing fleet in New Zealand.

Marine fisheries play an important part in the social, cultural, ecological and economic quality of life for many New Zealanders. Māori have strong cultural and economic links with the marine environment and fisheries. This is recognised in the Treaty of Waitangi and supported through common law and legislation and their special relationship with the Government. Iwi asset holding companies are particularly exposed to this aging fleet as they control more than 40 percent of the quota rights in New Zealand but own almost no inshore catching capacity.

These wider economic impacts are organised into four areas: environmental, social, cultural, and economic. This aligns with the wellbeing framework of the Local Government Act which requires city, district and regional councils to take into account environmental, social, cultural, and economic wellbeing when making plans.

2.1 Environmental

Environmental wellbeing is defined as the capacity of the natural environment to support, in a sustainable way, the activities of people and communities.

Fishing is an extractive process. While there is nothing inherently negative about this, it implies careful consideration for the sustainability of harvesting. New Zealand's fishing quota management system is world class and protects species from overfishing but there are other benefits to consider.

Benthic impact – less damage to ecosystems

The current fishing fleet is relatively old and inefficient. The average age of vessels is 37 years. Over the past 37 years technology has improved dramatically. While some of this technology can be retrofitted to older vessels, other technologies cannot. Thus, the new vessels can be built with new technology to reduce the impact on the marine environment.

Additionally, the proposed project to develop capacity for replacing the inshore fishing fleet in New Zealand will result in only 70 to 100 vessels being needed to replace 173. Meaning that less vessels will be fishing, having a significantly reduced impact on the marine environment, protected species and to produce less carbon omissions.

Reduced emissions

The age of the current fishing fleet also implies the use of older, less efficient engines. Again, some vessels might be able to be retrofitted with new model engines, but not all the vessels are suitable for retrofitting or it may be cost prohibitive. Replacing the 173 vessel fleet will result in a significant decrease in emissions because of a reduced fleet and all 70 of the new vessels will be fitted with modern, fuel efficient engines and modern hull designs to reduce resistance through the water.

There is also potential to decrease emissions further by designing the vessels so that replacing their engines with hydrogen or electric engines in future is possible at a reasonable cost.

In a study on the carbon emissions of inshore fishing vessels Zainol et al concluded:

"The results show that CO value increase proportionally to the engine capacity as more fuel was burnt for larger engines power. The power requirement for one particular engine may vary depending on various condition such as hoteling, cruise and fishing operation mode. In addition, the quantity of emission produced are much influenced by combustion efficiency, engine condition and engine lifetime. New purchased engine is mostly to give better emission reading than older engine."[1]

The fish hold chilling systems will also be constructed to worlds best practice using environmentally friendly gases, which if accidentally lost will have minimal environmental impact.

Reduced impact on protected species

In New Zealand fishing equipment is regulated to reduce the impact on seabirds and marine mammals (protected species) which can be attracted to the catch/bait and become entangled or injured by fishing gear. The 70 new vessels will be built with equipment designed to reduce the risk of harming protected species. This will reduce the number killed or injured each year.

2.2 Social

Social wellbeing is defined as the capacity of individuals, their families, whānau, iwi, hapū and a range of communities to be connected, safe and healthy.

Health and safety – workers are protected

The current, older vessels in the fishing fleet were built in an era where ergonomics were not considered in fishing vessel design. Working and living conditions are generally cramped, damp and well below current social expectations. Working decks are often very exposed to the elements compared to modern hull and super structure designs. The current fleet are fitted with health and safety equipment but aspects of these vessels are accepted (grandfathered) due to their age. These vessels are up to standard, however significant improvements would be made in a new build.

The 70 new vessels will be designed with New Zealand health and safety standards in mind to protect workers. They will have equipment on board to pass current standards and will be easier to retrofit with new technologies as technology and standards change in future.

The improved living and working conditions will make fishing a more attractive career choice for young people.

Sustaining jobs for the community

Developing local capacity to replace the inshore fishing fleet in New Zealand will bring new jobs and opportunities to the region. This will be direct jobs at the vessel building hub and other employment opportunities in industries that will support the hub. Also, ensuring a viable long term fleet will provide sustainable employment opportunities in the industry over time. The profile of a secure fishery and higher earnings from fleet consolidation will enable the industry to attract and retain workers.

2.3 Cultural and Economic

When considering the development of industrial capacity it is logical to join the economic and cultural impacts as one because the separation of society and economy isn't helpful in this case.

[1] Zainol, Ismail, et al. "Carbon Emissions Measurement Using Portable Emission Device in Coastal Fishing Boats." *Advancement in Emerging Technologies and Engineering Applications*. Springer, Singapore, 2020. 339-349.

Cultural wellbeing is defined as the capacity of communities to retain, interpret and express their shared beliefs, values, customs, behaviours and identities.

Economic wellbeing is defined as the capacity of the city to generate broad-based employment, income and wealth necessary for present and future financial security.

Long term sustainable sector

Commercial fishing plays a significant part in the New Zealand economy, particularly in regional centres. In previous research completed by BERL in 2015, it was estimated that inshore fishing produced a total output value of $1,197 million, total contribution to GDP of $460 million and total employment of 3,861 FTEs.[2]

When equipment, such as the current vessel fleet, reaches a certain point it begins to degrade faster through use. Repairs can be made, but will increasingly use more resources. This lowers profitability and eventually the profitability may fall so low that the consumption of capital is greater than the profit generated. This is not sustainable. Thus, replacing the fishing fleet with new models built for modern standards will improve profitability and improve sustainability of the industry.

Fish handling improves the value of catch – which improves incomes

Fishers are paid according to the volume, quality, and value of the catch. A new build vessel can be designed to accommodate the latest in electronics and innovative fishing technology. For example, new vessels can include Precision Seafood Harvesting, which adds significant value to every kilo caught. Newer vessels which are equipped with modern handling and chilling equipment will be able to process and store more high quality catch increasing returns from the same volume of catch.

The deck layout and fish hold design not only provide a safe and ergonomically designed working environment for the crew but significantly reduce damage to the catch, improving the sales value.

Diversification of economy – high value manufacturing

The manufacturing sector is diverse and dynamic and has undergone a major transition over the last thirty years, moving away from commodities towards more value-added products. In 2017, manufacturing accounted for 12 percent of New Zealand's real GDP ($23 billion) and generated an estimated $36 billion in exports[3].

A large part of manufacturing in New Zealand, as is the case in most developed economies, is focused on the production of low and medium-low technology goods e.g. food and beverage products, metal products, textiles, plastics, paper, lumber and building materials. Adding grey and black vessel building to the New Zealand market will expand high value manufacturing and further diversify our economy as vessels require many components. Some of which can be used in other sectors. Most of these components are produced using complex manufacturing methods that can also produce other, high value products. Building capacity to construct vessels in New Zealand will result in a local manufacturing base that is more highly geared toward high value outputs.

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[2] Report can be retrieved from https://www.seafood.co.nz/fileadmin/Media/BERL_report/BERL_Report_August_2017.pdf

[3] MBIE, retrieved from https://www.mbie.govt.nz/assets/f0f81b6194/new-zealand-manufacturing-sector-report-2018.pdf

Catalyst for the grey and black water industry: aquaculture, tugs, barges, ferries

A key component of this project is to build a hub for fishing vessel construction in Northland. This hub will require a significant amount of capital. Much of this capital will be in the form of machinery that is well suited to building marine vessels.

In addition to constructing and selling 70 fishing vessels this capital will be easily repurposed to producing other types of vessels for the black and grey water industry such as tug boats, barges and ferries.

Of the countries nearest to New Zealand (Australia and the Pacific) there is little in the way of cost effective capacity to produce these vessels. A hub in New Zealand opens up the possibility of a new, high value, export market. And the opportunity to make New Zealand a regional leader.

Builds technical capacity and skills in Northland

The proposed project is to build a hub for fishing vessel construction in Northland. Northland is an area with high unemployment, low access to education, and low access to the internet. It is also an area with a high proportion of Māori households. The project will involve a large influx of capital into the Northland. With this capital will come new opportunities for locals in terms of employment and new business ventures.

Combined with a well-designed training pipeline this represents the opportunity to build capacity and long term employment opportunities for people in Northland, enabling them to stay within the region.

3 Methodology and results

In this section we detail the results and describe the motivation behind our analysis and how it works.

3.1 Economic contribution - the basic premise

We assume economic contribution (as measured by Gross Domestic Product) is driven by the decisions of consumers to spend their money which prompts businesses to produce goods and services.

In its simplest terms, economic contribution from an economic activity is the cost to the nation if the economic activity stops. More precisely, an economic contribution is defined as the gross changes in a nation's existing economy that can be attributed to a given industry. Economic contributions occur from transactions in a market setting. We use multiplier analysis using multipliers derived from inter-industry input-output tables to measure the direct, indirect and induced effects of additional industrial activity or expenditure. There are three different and complementary measures: gross output, GDP; and full-time equivalent (FTE) employment.

3.1.1 From initial spending to impact – interpreting the results

We report four metrics for each of output, GDP and employment. These are the direct, indirect, induced, and total effects.

The direct effect is the effect on output, GDP, or employment that occurs from the spending by consumers at the first stage. In the case of vessel building it is the output GDP and employment generated by the fishing industry purchasing the new vessels.

The indirect effect is the effect on output, GDP, or employment that occurs from the spending by the businesses one stage removed from the consumer. In the case of vessel building it is the spending of the vessel builders on raw materials and components with which to assemble the vessel.

The induced effect is the effect on output, GDP, or employment that occurs from the spending by the workers employed in the vessel building sector on other goods and services. This effect captures the direct and indirect effects of this consumer spending all across the economy.

The total effect is how we reconcile these three effects, it is not the arithmetic sum of the effects because it includes a correction to avoid double counting.

3.1.2 Weighting results to present value

We follow standard practise by weighting all results down to the present value as at the year the multipliers are calculated. For the multipliers employed in this analysis this is 2013.

3.2 The first round, the direct spending

We first consider the direct spending of the fishing vessel builders. This spending represents the materials directly used in producing fishing vessels. In our analysis this spending goes to producers of steel and other textiles to construct the basic shell of a fishing vessel, electronics equipment and other specialised bits of machinery.

Altogether the impact of this spending is $191.2 million. This spending will directly generate $73.8 million in GDP which is sufficient to directly support 927 full time equivalent jobs over the twenty years.

We also calculated an estimate of the additional tax take as a result of building and selling 70 fishing vessels over twenty years. This tax take mostly consists of GST but also includes an estimate of the company tax paid on the profit margin of selling the vessels and an estimate of the income tax paid by the people employed as a result of this project.

Altogether the extra tax generated will be $79.9 million in 2020 present value.

Table 3.1 Direct impact

	Direct
Output $m	191.2
GDP $m	73.8
Employment (FTEs)	927
Tax take (present value) $m	79.9

3.3 The second round, indirect spending

After the suppliers of steel, machinery, and electronics equipment have received payment they will also increase production, and hire workers. We capture this "secondary round" of spending as *indirect impact.*

The economic impact will be felt in industries further removed from vessel building. It is likely to be felt in the steel manufacturing industries, tool suppliers, and even electricity supplier industries.

Our analysis concludes that this secondary round of spending will amount to around $55.1 million. This spending will result in production of around $26.6 million added to Gross Domestic Product (GDP) over the twenty years of this project. This production is sufficient to employ an extra 225 full time equivalent (FTE) workers over the twenty years of the project in industries tangentially connected to vessel building.

Table 3.2 Indirect impact

	Indirect
Output $m	55.1
GDP $m	26.6
Employment (FTEs)	225

There is no indirect or induced tax revenue.

3.4 The third round, induced spending

Finally, we want to consider the impact the spend will have on the rest of the economy. Thinking about the *indirect impact* as being the impact on the industries twice removed from vessel building. That is, it is the impact caused by the workers in vessel building, steel production, electricity supply etc. earning an income and spending their income at the local supermarket, bars, movie theatres, and shopping centres.

We calculated that this *induced effect* totals around $37.8 million. This spend results in around $22.1 million in terms of GDP which is sufficient to support 193 FTE jobs over the whole economy over the twenty year project.

Table 3.3 Induced impact

	Induced
Output $m	37.8
GDP $m	22.1
Employment (FTEs)	193

3.5 Total impact (assuming 60% of building costs were imported, a the conservative position)

We summarise the total impact the proposed vessel building project will have on the economy in the following table and charts.

Table 3.4 summarises the direct, indirect, induced and total economic impact of the production and sale of 70 fishing vessels over twenty years. We estimate that the total spending caused by the production and sale of 70 vessels over twenty years will be $284 million.

This spending is predicted to add $122.5 million in GDP to the New Zealand economy. This GDP is sufficient to support 1,345 FTE workers over the twenty years of the project.

Table 3.4 Economic impact (assuming 60% imported component)

	Direct	Indirect	Induced	Total
Output $m	191.2	55.1	37.8	284.0
GDP $m	73.8	26.6	22.1	122.5
Employment (FTEs)	927	225	193	1,345
Tax take (present value) $m	79.9			

In Figure 3.1, Figure 3.2, Figure 3.3, and Figure 3.4 we display the economic impact at each year of the project. As explained above in the introduction we have added a time component to this analysis to emphasise that the analysis is of a project that will take twenty years to complete.

The particular production and sale schedule we assumed is evident in the shape of the impacts. In years where less vessels are produced and sold the impact is less than in years where more vessels are produced and sold.

Note that the contribution from this investment is expected to continue beyond the 20 years and be greater than shown here due to ongoing fishing vessel builds and other grey and black boat builds not included in our analysis.

Figure 3.1 Estimated size of the spending impact

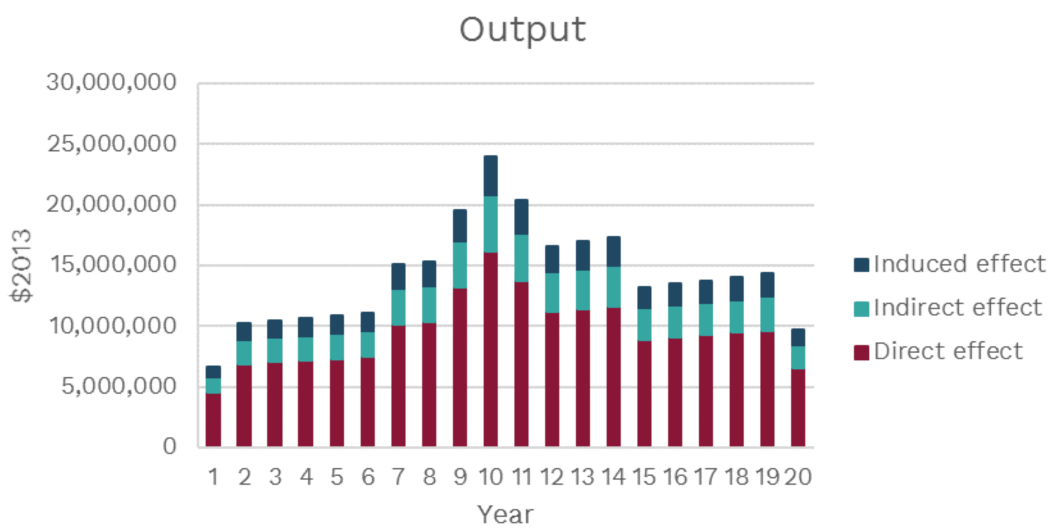


Figure 3.2 Estimated GDP caused by the spend

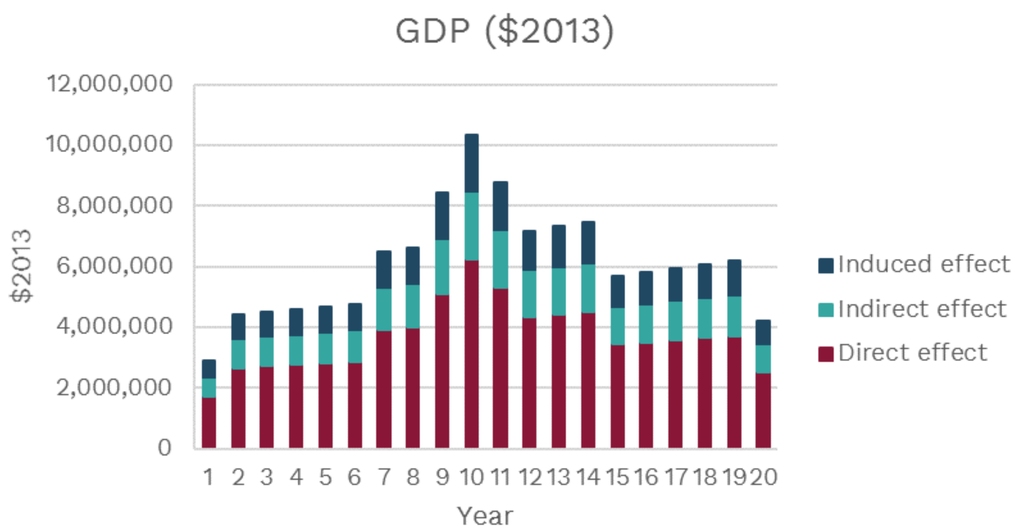


Figure 3.3 Estimated extra employment supported by the GDP

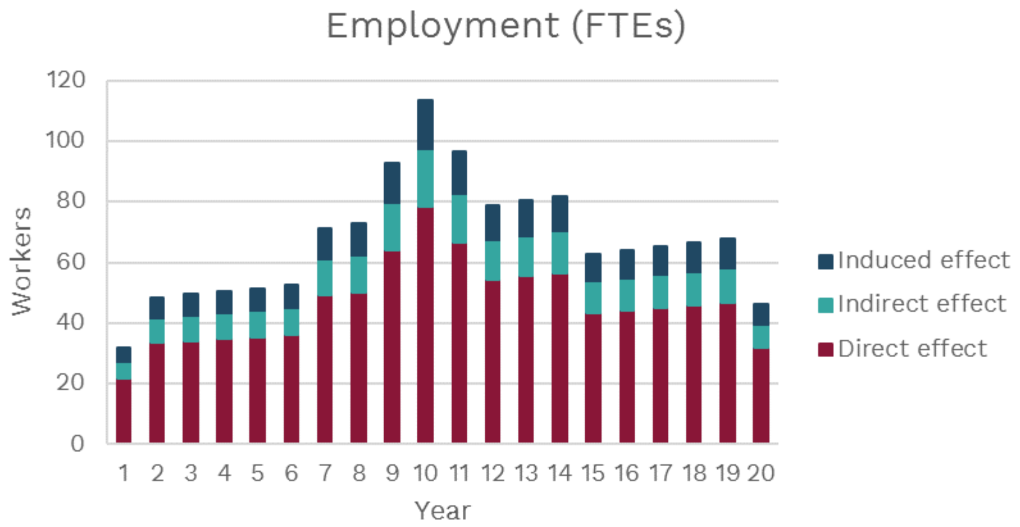
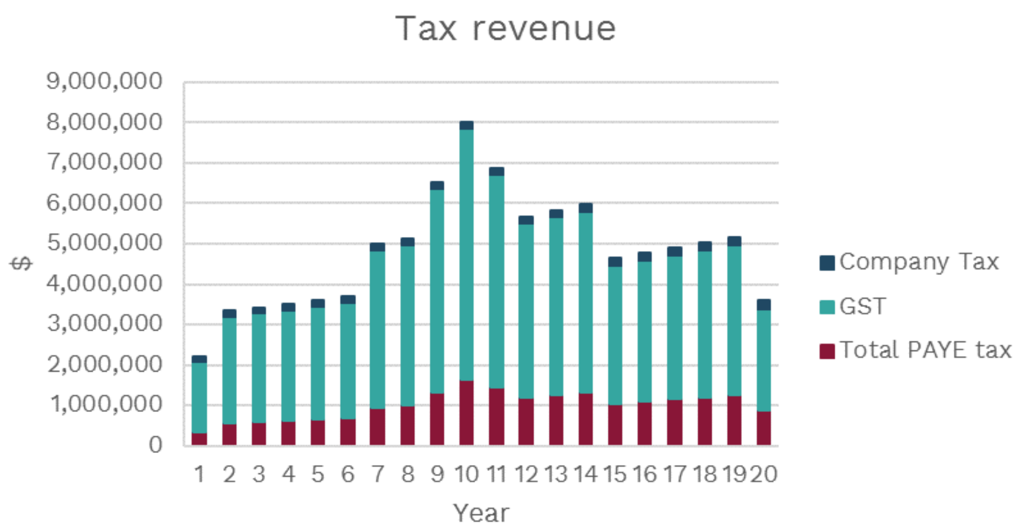


Figure 3.4 Tax revenue generated by the direct spending



3.6 Accounting for the range of estimates

In this section we present a range for our estimate of the economic impact of constructing and selling 70 fishing vessels over the next twenty years in Northland.

As detailed in the assumptions section if a project contains a greater imported component of spending then we need to correct the economic impact to avoid double counting. This makes the economic impact lower.

This requires careful consideration. While a lower impact is reported there is still a positive impact even if 60 percent of components are imported. Additionally, the wider economic benefits will still occur even with a larger imported component.

We estimate that the total impact will be between $395.1 and $284 million in sales impact. This translates to between $170.5 and $122.5 million extra GDP for Northland over the twenty years. The extra GDP is sufficient to support between 1,871 and 1,345 full time equivalent jobs in Northland over the twenty years of the project.

The extra tax take generated by this project has a present value of between $86.2 million and $79.9 million.

Table 3.5 Total economic impact range

	Direct		Indirect		Induced		Total	
% Imported	**60**	**40**	**60**	**40**	**60**	**40**	**60**	**40**
Output $m	191.2	266.0	55.1	76.6	37.8	52.5	284.0	395.1
GDP $m	73.8	102.7	26.6	37.1	22.1	30.7	122.5	170.5
Employment (FTEs)	927	1,290	225	313	193	268	1,345	1,871
Tax take (present value) $m	79.9	86.2						

3.7 Key assumptions

Additionality

Multiplier analysis in general rests on the assumption of additionality. This assumption is that spending involved in the project in question would not have occurred absent the project. I.e. the project must be *additional* to the background economic activity.

In the case of vessel building we assume that absent the proposed project the resources in Northland would not have been employed in producing fishing vessels.

Local production

Spending generates activity in the economy where it occurs. The impact of this spending is estimated from the final consumption data. This final consumption data contains a component of imported production. This imported component needs to be subtracted from the final impact. This is because the calculations already account for them and so if we don't subtract them it will be double counting.

For the current project we assumed two scenarios. In the first 60 percent of the vessel building costs were assumed to be imported. In the second we decreased this to 40 percent.

Adding a time dimension

The proposed project to build the capacity to construct fishing vessels in New Zealand adds an interesting piece of complexity. Namely, that the vessels cannot all be constructed and sold in the same year. Instead, the plan is to build and sell 70 vessels over 20 years.

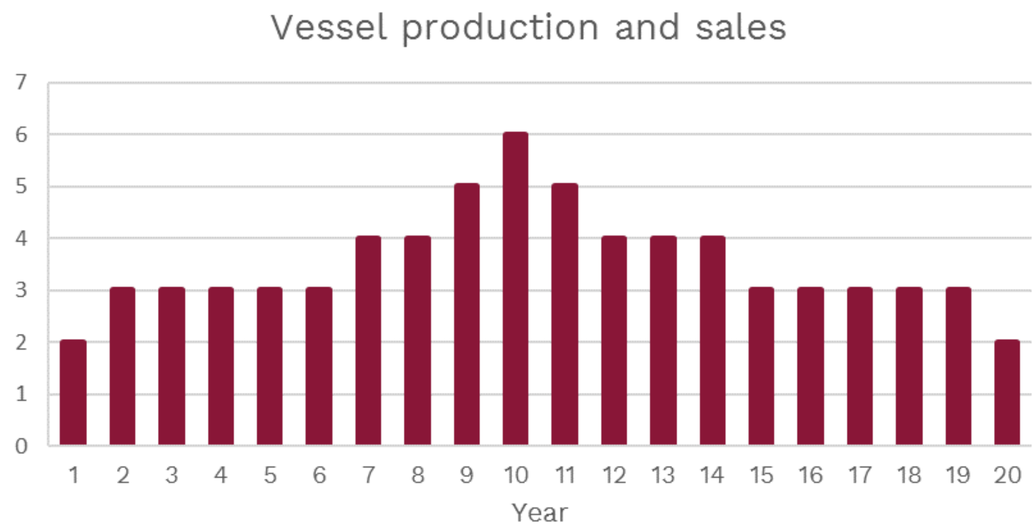
We have calculated an economic impact for each of the 20 years as well as a total economic impact. To do so we made an assumption of how many vessels are produced and sold each year. The assumed number produced and sold is summarised in Figure 3.5.

We assume that in the first six years production and sales amount to at most three vessels. This ramps up to four vessels per year in years seven and eight. By year nine, five vessels are made and sold each year. Production peaks at year ten with six vessels produced and sold. After this point production and sales slowly fall as the fishing industry absorbs all 70 vessels.

The shape of this production schedule affects the annual results. Years where more vessels are produced and sold show a greater impact.

Since the impacts are calculated at 2013 values the shape of the production schedule does not affect the total results. We have included it as a way of highlighting that the economic impact will vary over time.

Figure 3.5 Number of vessels produced and sold, years 1 - 20



Appendix E Longlist of options

This table presents the longlist of options that have been considered.

Table 14 Long list of options

Option	Scale, scope and location	Service solution	Service delivery	Implementation	Funding	Initial assessment
1.	Multiple shipyards	Stand-alone, start-to-finish in New Zealand.	Existing New Zealand shipbuilders.	No accelerated retirement	Crown funding limited to just transition retirement of vessels.	This option would deliver an invigorated fleet over an extended time period. Not all vessels in the fleet would be constructed in New Zealand, as the facility would be unlikely to compete on price with overseas yards.
2.	Multiple shipyards	Stand-alone, start-to-finish in New Zealand.	Existing New Zealand shipbuilders.	Project front-ended.	Commercial entity provides capital, with loans/grants from the Crown to provide support during initial development phase. Transition funded separately.	Crown assistance would be spread across several facilities, and it is unlikely that any would achieve sufficient scale to compete with overseas yards.
3.	One yard in main centre.	Partner with overseas builder.	New entity, with crown backing.	Project front-ended.	Crown contribution limited to purchasing vessels and transition support.	While bringing overseas capital into New Zealand, this option would see the Crown taking a leading role in the establishment of what it essentially a commercial venture in a main centre. It would make minimal, if any, contribution to the government's just transition and regional development policies.
4.	One yard in Northland.	Stand-alone, start-to-finish in New Zealand	Existing New Zealand shipbuilders.	Project front-ended.	Commercial entity provides capital, with loans/grants	This is the preferred option.

Option	Scale, scope and location	Service solution	Service delivery	Implementation	Funding	Initial assessment
					from the Crown to provide support during initial development phase and Crown commits to purchase first vessels from new facility. Transition funded separately.	It would make the greatest contribution to all the investment objectives and meets the full range of critical success factors. A sister ship fleet would be designed and built in Northland, utilising existing experience and capability. The Crown's contribution would be focussed on a just transition to a sustainable fleet (supporting retirement of vessels), proving the viability of the facility (purchase of the first three vessels) and conditional financial assistance at the set-up stages.
5.	Multiple shipyards	Incorporate a New Zealand shipyard into the production process of an overseas firm.	New Crown consortium with expertise acquired from existing operators (local or overseas)	No accelerated retirement	New facility and transition funded via an industry levy.	This option has the industry financing the transition to a new fleet via a levy, which recognises that while they will be beneficiaries of the project, individual fishers have an incentive to free ride on the efforts of others (e.g., only agreeing to opt in after the initial establishment costs have been met by others). The reputational benefits of sustainable fishing practices will also accrue to the whole sector, meaning that they should make at least some contribution to securing those benefits. Having to pay a levy might trip some operators, who are only just financially viable now, over the edge into insolvency.
6.	Multiple shipyards	Incorporate a New Zealand shipyard into the production process of an overseas firm.	An international firm with Crown backing.	No accelerated retirement	New facility and transition funded via industry levy.	This option limits the Crown's involvement to imposing a levy and seeking overseas interests to operate in New Zealand. From a Crown perspective, it has the lowest cost (zero) of all the other options. Market forces would determine the retirement of existing vessels.

Source: NZIER