rmc²

Final Report

SECURING THE FUTURE OF THE WEST COAST PORTS

FEBRUARY 2020

Jag Acquisitions Ltd t/a RMC²
Prepared by Ray Mudgway

Author: Ray Mudgway

Contents

SECTION ONE

INTRODUCTION

Giving context

Contributors: **Penny Bicknell** / PDU
Sharon Mason / Chief Executive, BDC
Paul Pretorius / Chief Executive, GDC
Simon Bastion / Chief Executive, WDC

Executive Summary

The West Coast ports of Westport, Greymouth and Jackson Bay are making losses following a decline in export cargoes, the most recent example being the closure of Holcim at Cape Foulwind.

Assets of all three ports are in poor condition reflecting their financial performance and low cargo volumes, and in general, the shareholders do not have confidence that the ports can recover to strong growth businesses.

Regionally, the ports of the three areas of Buller, Grey and Westland have been operated independently. This means there is little or no alignment to create a cohesive transport and logistics strategy, and as such ports tend to compete around the margins which erodes value.

The role and strategic importance of the ports is not well understood across the West Coast. Rather, the ports are viewed as a drain on ratepayers rather than key enablers for resilience and economic growth.

Development West Coast commissioned a feasibility study into the West Coast Ports, which was completed in March 2019. The study recommended that further investigative work is required to determine the best way forward for the three West Coast Ports (ports at Westport, Greymouth and Jackson Bay). It specifically recommended that West Coast Ports operate under a single ownership and governance model.

To create a strong future for the ports, this study was commissioned in addition to the March 2019 report to:

1. Determine options for managing West Coast Ports under one ownership and governance structure;
2. Define the needs for West Coast Ports for resilience requirements, maritime safety requirements and future needs; and
3. Determine capital costs to 'right-size' each port for future requirements.

The commercially lead approach methodically worked through a multi criteria analysis to ensure the purposes of the assignment was fulfilled. The work consisted of nine key delivery phases:

1. Commercial assessment of current situation across the ports.
2. Economic assessment of current regional contribution from port activity.
3. Maritime assessment of port safety requirements and suitability for commercial operations.
4. Future view of commercial activities and opportunities completed following customer liaisons and assessments.
5. Asset assessments and modelling to understand asset base to support future activities.
6. Economic assessment of the port's regional contribution of future activities.
7. Recommendations of ownership, governance and management structures to support future activities drawing on comparable and diverse governance best practice models.
8. Understanding the lifeline obligations and purpose of the ports under a civil emergency scenario.
9. Funding proposal to the Provincial Growth Fund (if deemed appropriate).

The study identified several executable strategies which are categorised into three components; **protect**, **optimise**, **grow**:

1. Renewing the existing fishing assets at Westport and Greymouth and carrying out critical Repairs & Maintenance at Jacksons Bay, will protect the economically important fishing sector as well as enabling it to grow. Initial funding through the Provincial Growth Fund (PGF) to renew the fishing jetties at each port, will protect and grow the West Coast economies, provide confidence in the port's future as an integral part of a regional Transport & Logistics strategy, and will underpin and enable future investments.

2. The hypothesis of creating one ownership and governance structure was carefully considered but not adopted. The consolidation of the various council assets was not supported by any entity and therefore would be unlikely to be achieved. However, the recommended **optimise** strategy will achieve collaboration and efficiencies through:
    a. Creating common fishing assets for the ports and a single strategic fishing negotiation to create sustainable operations at all ports into the future.
    b. The formation of a West Coast Transport & Logistics establishment board to pursue a regional strategy to process and export Heavy Mineral Sands (HMS) directly from the West Coast. This board forms the basis of the **growth** strategy and if achieved, will provide a substantial economic stimulus for the wider region.
    c. Reassigning the river access functions for all ports to the West Coast Regional Council to ensure the safe passage of vessels (commercial and emergency craft) into the major West Coast towns of Westport and Greymouth. By regionalising the river access and creating a sustainable economic position, regional resilience strategies can include ports in their planning, where currently the condition of the river bars, and/or assets, preclude serious consideration of the Ports' uses in emergencies.
    d. Being disciplined in matching costs and benefits of each component of the port systems to ensure prudent management practices create a sustainable future for all businesses.
3. Further growth in the ports can be achieved by completed detailed business cases to **grow** the Marine Maintenance capabilities in Westport and Greymouth. Additionally, a strategic review of growth opportunities in Jacksons Bay is required to maximise the economic benefit of that port and may include commercial fishing, recreational fishing and cruise ship passenger tendering to a suitable asset. Business case funding is sought from the PGF for these two tranches of work.

By realigning the port's priorities and functions, adopting a regional and strategic mindset, incrementally improving the performance of each port business, and pursuing realistic growth to underpin future investment:

1. Losses will be minimised reducing the impact on local rate-payers for all District Council owned ports.
2. The individual ports will align their efforts and objectives through the development of a regional Transport & Logistics Strategy.
3. Resilience will be achieved commercially and for natural disasters for the benefit of all West Coasters.

By realigning the port's priorities and functions, adopting a regional and strategic mindset, incrementally improving the performance of each port business, and pursuing realistic growth to underpin future investment:

1. Losses will be minimised reducing the impact on local rate-payers for all District Council owned ports.
2. The individual ports will align their efforts and objectives through the development of a regional Transport & Logistics Strategy.
3. Resilience will be achieved commercially and for natural disasters for the benefit of all West Coasters.

Ray Mudgway

Managing Director, RMC²

West Coast economy 2000 to 2018

Methodology

The RMC^2 team methodically worked through a multi criteria analysis to ensure the purposes of the assignment were fulfilled. The work consisted of nine key delivery areas as follows:

1. Commercial assessment of current situation across the ports.
2. Economic assessment of current regional contribution from port activity and associated trades.
3. Maritime assessment of port safety requirements and suitability for commercial operations.
4. Future view of commercial activities and opportunities.
5. Asset assessments and modelling to understand the appropriate asset base to support future activities.
6. Economic assessment of the port's regional contribution of future activities.
7. Recommendations of ownership, governance and management structures to support future activities.
8. Understanding the lifeline obligations and purpose/role of the ports under a civil emergency scenario.
9. Funding proposal to the Provincial Growth Fund (if deemed appropriate). Consideration of alternative funding options as required e.g. DWC.

Report format

Rather than regurgitating well established facts in the report, the author has focused firmly on a summary of findings with clearly defined recommendations for action e.g. it is well understood that the ports are losing money, so rather than restating the obvious, the report focusses on what do to minimise or avoid losses. In short, this report is about action and in total, the study makes **72 discrete recommendations**.

The report summarises the key strategies presented and ratified by the CEO's of Development West Coast (DWC), Buller District Council (BDC), Grey District Council (GDC), and Westland District Council (WDC).

In each section, key findings are summarised and following each summary are several achievable recommendations that defines which party should carry these out.

The appendices are specialist reports which have been provided by expert third parties. The key aspects of each report are summarised through the body of the report in the key findings and recommendations.

Finally, attached are letters of support for the strategies from key stakeholders including Iwi, West Coast Regional Council (WCRC), and industry.

SECTION TWO

STRATEGIES

Transforming the business

Contributors: John Selby
Rob Humphrys
Kel Sanderson
Hugh Grey
Doug Smith
Jackie Mathers
Franco Horridge
Paresh Dayal

Economic Impact Assessment

A full economic assessment was completed by Kel Sanderson in two parts:

1. **Current state.**
2. **Future state** based on establishing a coast wide FMS sector.

This provides an important lens into the potential value created through a cohesive West Coast Transport & Logistics Strategy and is summarised below. A full report is attached at Appendix A.

CURRENT STATE SUMMARY

The overall picture shows a considerable level of change in the economy of the West Coast Region between 2000 and 2018. It is generally unusual to see two main resource-based industries like forest & wood, and mining to reduce in economy share to such an extent.

In the year 2000, these industries had 12% of the Region's employment and produced 30% of the Region's value added. By 2018, the two industries employed just 7% of the Region's employment and generated 13% of the Region's value added.

These are certainly a weak part of the Region's current economy, and presumably there are some initiatives possible to recover or replace them.

Protect and Grow Fishing

There is also the potential, presumably for a greater proportion of the fish and seafood offshore of the West Coast, to be caught and processed by the people on the West Coast.

In a 2017 report on "The economic contribution of commercial fishing to the New Zealand economy", prepared for the New Zealand commercial fishing industry by BERL, the employment in harvesting in FMA7 was shown to be 966 FTEs in 2015.

This contrasts with the level shown as 19 to 34 FTEs in the StatisticsNZ data we have in the table above. The 966 FTEs involved in commercial fishing in FMA 7 presumably mostly are domiciled in other Regions, such as Nelson-Marlborough. Talleys of Motueka utilise port facilities at Westport, and it may be possible to increase the employment based there in certain conditions.

FUTURE STATE SUMMARY

At the Minerals Forum in May 2018, Minister for Energy and Resources Hon Dr Megan Woods said "There is sky-rocketing demand around the world for minerals which are used in clean-tech and which can aid our transition to a low carbon economy. That demand represents a real opportunity for New Zealand." These 'green' minerals are needed for batteries, wind turbines, solar panels, LEDs and hybrid cars.

Minerals which fall into these groups and are present on the West Coast include Garnet, Rare Earth Elements (REEs) and Ilmenite. Work which has been done to determine the size of the deposits, and potential annual production indicates that there is a potential to sustainably produce 600,000 tonnes per year.

Establish a 600,000 tonne HMS industry

This industry would mine, process and export 200,000 tonnes of industrial garnet, and 400,000 tonnes of ilmenite, mined and extracted as a product complementary with the garnet from the West Coast deposits.

This section estimates the impacts of the full industry, including the initial Stage One 100,000 tonnes garnet operation, joined by a further 100,000 tonnes of garnet and 400,000 tonnes of high-grade ilmenite.

These volumes are thought to be conservative in terms of both the resource available and the market opportunities.

Capital expenditure on the West Coast:

Garnet processing plant (200,000 tonnes)

Capital cost:	$100 million
Construction employment	30 FTE jobs over three years
Indirect employment	4 FTE jobs over three years

Ilmenite processing (400,000 tonnes)

Capital cost:	$35 million
Construction employment	20 FTE jobs over one year
Indirect employment	16 FTE jobs over one year

Storage / portside

Capital cost	$20 million
Construction employment	10 FTE jobs over one year
Indirect employment	8 FTE jobs over one year

The indications are that the total capital expenditure to develop the mineral sands industry on the West Coast would be about $155 million. This would employ directly 30 FTE jobs over three years another 30 FTE jobs over one year, which is a total of the equivalent of 30 FTE jobs over four years. This direct employment would generate indirect or value chain employment of about 24 FTE jobs over four years, giving a total increase of the equivalent of 54 FTE jobs over four years.

Operations on the West Coast

On a similar basis to the estimates for Stage One above we now estimate the economic impacts of the established industry operating at a level of 600,000 tonnes per year.

Garnet and ilmenite mining, processing and export operations:

Employment	100 FTEs, permanent
Indirect employment	80+ FTEs, permanent

This implies that the operation of the production and processing industry will increase permanent employment on the West Coast by at least 180 fulltime employed.

Taking account of the different levels of production cost per tonne of the initial garnet plant, the later garnet plant(s) and the ilmenite plant, the expectation is that the total direct production cost will be of the order of $30 million per year. Taking account of the value chain impact the total addition to annual expenditure on the West Coast is expected to be $60 to $70 million.

Export earnings

The expected export return from the mineral sand exports, being of high grade is that an average return of US$150 to US$200 per tonne will be achieved. This is currently equivalent to NZ$240 to NZ$320 per tonne.

This implies that the value of exports from the 600,000 tonnes exported by this industry would be worth NZ$144 million to $192 million per year.

Recommend that the PGF approve the funding application to renew the fishing jetties to protect and enable growth in the fishing sector.

Recommend that the 'Establishment Board' to create a West Coast Transport & Logistics strategy be stood up and funded to attempt to maximise the economic benefit of the HMS sector.

Strategic overview

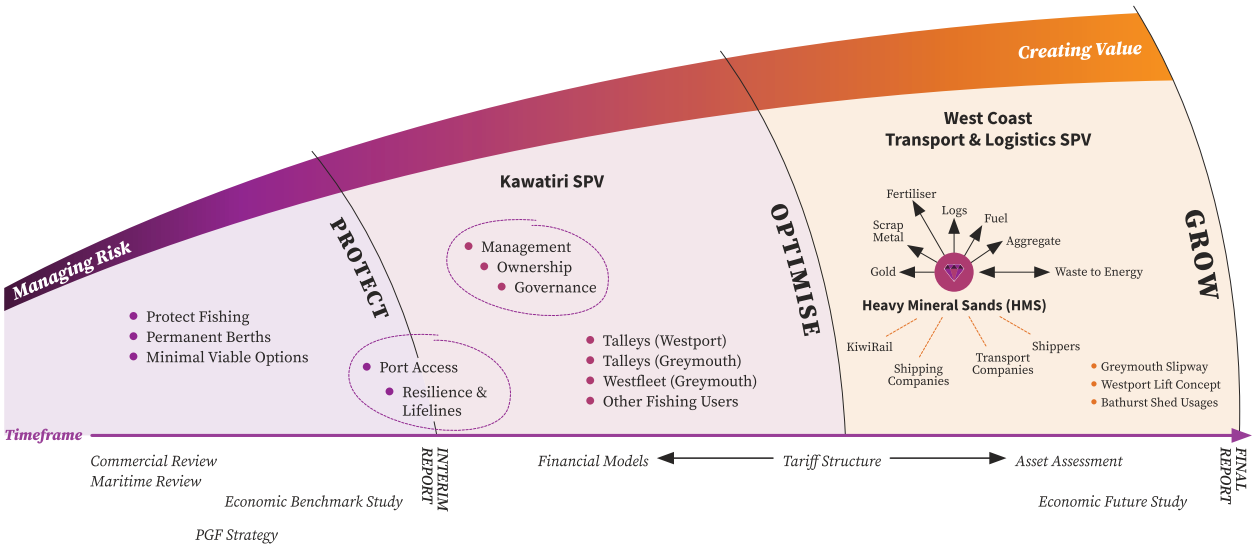
The study adopted a **Protect**, **Optimise**, **Growth** strategic model and achieves several high-level outcomes. Additionally, a **Kawatiri strategy** has been developed for the BDC due to the high impact of costs on local rate payers.

Protect strategies are defensive measures to underpin confidence, future investment and to mitigate real risk of failure. In short, the protect strategy is about mitigating existing risks.

As the strategy moves 'up the curve' towards growth, the entities can begin to strengthen their businesses and look to create genuine local and regional economic and financial benefits.

Given the current status of the ports, it is important to methodically work up the curve and to avoid the temptation to find the 'silver bullet' at the growth end of the spectrum.

However, given the scale of the businesses involved, an adequately resourced team can simultaneously pursue each strategy, shortening the timeframes for execution, and further mitigating the risk of further deterioration of the assets and operating entities.



Outcomes

The top line objectives achieved by adopting the recommended strategies are:

Protect Strategy

1. Enable the West Coast's regionally important fishing sector to grow.
2. Secure the future of all West Coast ports.

Protect & Optimise Strategies

3. Create commercial and natural resilience for the West Coast.

Optimise Strategy

4. Make the wharves and land assets of each port pay.
5. Regionalise the river access requirements to protect regional interests.

Growth Strategy

6. Create a West Coast Transport & Logistics Strategy.
7. Maximise the Heavy Mineral Sands (HMS) sector's economic benefit for the West Coast by exporting the product from West Coast ports.

Protect strategy

The concept of protecting existing assets is fundamental for ports like Westport, Greymouth and Jackson Bay, given the poor condition of their asserts, diminished trades, and sustained operational losses.

While a focus on long term growth is also required, an immediate focus on creating sustainable businesses to support existing trade is the minimum and most urgent course of action.

The 'protect strategy' is to execute in entirety, the renewal of the jetty assets at Greymouth and Westport with the express strategic aim of protecting the strategically and economically vital fishing industry.

Fishing and seafoods – economic contribution

This industry accounted for only 1% of employment in the West Coast region in 2000 and had increased to 2% by 2018. However, the actual level of employment in this industry is small compared with the size of the fishery industry on the ocean offshore.

The Fisheries Management Area off the West Coast is FMA 7 Challenger/ Central Plateau. In a 2017 report on the economic contribution of commercial fishing to the New Zealand economy, prepared for the New Zealand commercial fishing industry by BERL, the employment in harvesting in FMA7 was shown to be 966 FTEs in 2015.

This contrasts with the level shown as 19 to 34 FTEs in the StatisticsNZ data we have in the table above. The 966 FTEs involved in commercial fishing in FMA 7 presumably mostly are domiciled in other Regions, such as Nelson-Marlborough. Talleys of Motueka utilise port facilities at Westport, and it may be possible to increase the employment based there in certain conditions.

In the same report the seafood processing data is shown by Region rather than by FMA. This data shows that in 2015 the West Coast Region had 79 FTEs employed directly in seafood processing, and 243 FTEs when employment along the value chain is counted. The StatisticsNZ data above shows were 117 FTEs employed in seafood processing in 2008, and 215 FTEs in 2018.

Opportunity

The gap between the fishery and its West Coast operation is seen as market growth potential. However, it is imperative that existing assets at both ports is fit for purpose and supports the existing fishery to ensure economic value and jobs are lost.

Conversely, by providing fit for purposes assets to support existing fishing, the West Coasts' ability to attract sector growth increases on the back of a strong future and regional support for the sector.

Scope of strategy

The temptation is to solve all the issues of the ports in one hit. This is not recommended due to its much lower chances of success and the low levels of confidence in the current operating models.

Rather, the strategy is to build from a solid base that has the support and confidence of the existing users. Subsequently, several other initiatives can be explored with more confidence and a higher chance of success:

1. Bunkering facilities.
2. Slipway capability including engineering functions.
3. Ablutions.
4. Additional chiller/freezer capacity.
5. Additional processing.
6. New wharf infrastructure.
7. Increased berthing capacity.

PGF Application

The ‘protect strategy’ was ratified by CEO’s at the interim report stage of this study and execution of the strategy is well advanced.

A funding application by way of GRANT is being prepared for the PGF in November. The proposal is strongly aligned with PGF principles and can be executed quickly by employing the appropriate resources.

Sustained operations

Following a successful grant bid from PGF, the ports will be positioned to renegotiate tariffs for permanent and seasonal berths. Understanding and quantifying the overall costs to sustain the port system is required to ensure a degradation of the system does not recur.

Recommend that a common tariff across all ports is created and adopted to create consistency and a united regional approach to the fishing sector.

Recommend that the charging regime for jetties covers all operational costs and replacement costs of the assets over their expected life.

Recommend that both ports quantify the costs to sustain river and lagoon operations net of commercial recovery to sustain fishing operations. This is required as part of the negotiation with WCRC under the proposed functional realignment ‘optimise strategy’.

A funding application by way of GRANT is being prepared for the PGF in November. The proposal is strongly aligned with PGF principles and can be executed quickly by employing the appropriate resources.

Optimise strategy

Optimising the ports is about 'Taking Care of Business' and being prudent with the assets and opportunities that present themselves.

The guiding principles of this strategy are:

1. District Council ratepayers are neutral at worst in terms of financial support for the ports.
2. Regionally, it is better understood how the ports:
    a. Create resilience for the region.
    b. Are a key enabler to protect and grow the fishing sector.
    c. Enable regional economic growth.
3. Costs are matched to benefits across the port system.
4. Critically review the current ownership, management and governance practices and structures of the entities.
5. Take a regional approach and make recommendations that are in the best interests of the greater West Coast region.

These principles are best achieved by:

1. Conducting a change management process for a **functional realignment** of the port's various elements.
2. Leaving the **current ownership structures** and balance sheets as is.
3. Conduct a **strategic fishing negotiation** for all ports by having a clear and broad understanding of the fishing sector needs and opportunities.
4. Create **Special Purpose Vehicles (SPV)** to create focus and a clear mandate:
    a. Kawatiri dredge for BDC.
    b. Establishment Board for The West Coast Transport & Logistics Strategy.
5. **Utilise existing assets** wherever possible to create a platform for growth.
6. **Share the benefits** across all stakeholders.

Methodology

Ports are, by their nature, a **complex system** of inter-related elements. They are also highly strategic assets that fulfil many duties from lifelines obligations to the movement of goods.

To best understand how to manage the ports most efficiently, and for the benefit of the wider region, the study segmented the businesses into three key areas:

1. Regional infrastructure and functions termed **'Licence to Operate'** that support lifeline activity, resilience strategy, and river access.
2. Port infrastructure and functions termed **'Assets to Operate'** & **'Costs to Operate'** that enable the movement of cargo and commercial functions.

Licence to Operate

These elements are fundamental for sustainable port operations and play a key role in any resilience strategy as well as providing Lifeline functions for the region. The elements are:

1. Seawalls to train the river and to create bars.
2. Bar maintenance (dredging).
3. Navigation aids.
4. Maritime New Zealand regulatory requirements.
5. Lagoon maintenance (dredging, not wharves).
6. Harbour Master and Pilotage.

Recommend that West Coast Regional Council assumes full responsibility for these elements of all West Coast ports. This strategy is aligned with recommendations under the Maritime Act and aligns with the principle that ports are strategic regional assets.

Recommend that the Licence to Operate elements tie in with the WCRC resilience & lifelines strategy and Buller 2100 objectives.

Recommend that the assets under each balance sheet remains as is.

Recommend that WCRC, once functional realignment has occurred, review the harbour master and pilotage requirements for all ports and rationalise the activities where possible to reduce costs and complexity.

Recommend that WCRC resumes cost ownership of these functions thus sharing the strategic costs of river access across regional rate payers.

Recommend WCRC offset some costs with the current gravel consent in Greymouth, and proposed Westport consent.

Recommend that BDC and WCRC negotiate and agree costs to maintain the Buller River bar and Westport lagoon. This cost would be paid by WCRC to Buller Holdings for the use of the Kawatiri Dredge.

Recommend that GDC and WCRC negotiate and agree costs to maintain the Greymouth lagoon.

Recommend BDC and GDC maximise recovery of dredging costs from existing fishing users as part of the strategic fishing negotiations to minimise cost of maintenance to rate payers.

Assets to Operate

These elements are the core port assets that facilitate the movement of goods:

1. Wharves and jetties.
2. Operational land (adjacent to wharves) including transport lanes e.g. railway, roads.

Recommend that the 'Assets to Operate' are rationalised as per the recommendations in the strategies.

Recommend that 'Assets to Operate' elements tie in with the WCRC resilience strategy and Buller 2100 objectives.

Costs to Operate

These elements are the normal operating expenses associated with ports:

1. R&M.
2. Management.
3. Rates.
4. Insurance.
5. Other.

Recommend that 'Costs to Operate' are matched to revenues to remove rate payer subsidies.

Recommend these 'Costs to Operate' remain with the current entities.

Summary of the 'Optimise' strategy

This report recommends that:

1. WCRC resumes full responsibility for keeping the rivers and port access open and safe for all users.
2. WCRC include all ports as part of an integral resilience strategy and use the current assets to provide lifeline services.
3. The individual councils retain full ownership of assets.
4. Costs are managed to match revenue where possible, as an absolute minimum.
5. The various entities adopt a regional approach to its assets and services to maximise the benefit for the region.

Transport & Logistics (growth) strategy

To create a port business that can grow on many fronts, the business needs at least one base cargo that underpins the management, maintenance and ongoing investment of its infrastructure.

Although the fishing sector is a significant economic contributor to the West Coast economy, the sector is relatively small in terms of cargo volumes and can only pay for its specific infrastructure (at best).

Therefore, a base cargo is required to turnaround the fortunes of the West Coast ports.

Base cargoes

There are few large cargoes on the West Coast today following cessation of the Holcim cement exports from Westport.

Coal and Dairy are large but well established on rail links to the East Coast. The high levels of investment in these supply chains, and their support of the nationally significant rail network, makes these unrealistic targets for West Coast ports and are not considered opportunities from this study.

The Barton's proposed garnet operation south of Hokitika was considered as a potential base cargo but due to its grade, and special requirements for processing and transport, was ruled out and is expected to be trucked to Timaru for final processing prior to export.

Throughout the study, it became apparent that the Heavy Mineral Sands (HMS) sector was the most likely base cargo. This extractive process produces many heavy minerals including garnet and ilmenite amongst others. In total, the various prospects across the West Coast has market potential of up to 600,000 tonnes and would provide the base cargoes needed to support port investment.

Secondary cargoes

Aggregates (gravel), scrap metal, fertiliser, logs, fuel, gold are all potential cargoes that are well suited to a direct shipping option. However, none of them (in their own right) are a base cargo of the scale required to support expansion.

Maximising the economic returns to the West Coast

The study found that a partnership model is likely to achieve the best overall results to satisfy the tensions and achieve all aims. The key principles of the partnership model are:

West Coast Transport & Logistics Strategy

It is important to approach base cargoes with a multi modal, holistic framework. The ports, individually or jointly, do not in themselves influence a robust and sustainable supply chain solution.

The following is an outline of how to best approach a regional solution.

Purpose

Any regional strategy must clearly define its purpose and guiding principles clearly up front. Although requiring further development, the purpose of this strategy is:

1. To create a West Coast Transport & Logistics strategy that:
    a. Maximises economic returns for the West Coast.
    b. Considers all transport modes; shipping, rail and road.
    c. Works in the best interests of the West Coast as a whole and avoids parochial bias.
2. Is provided with a clear mandate by all key stakeholders (BDC, GDC, WDC, WCRC, DWC).
3. To ensure the strategy board has full access and commercial influence over the existing port assets that are of value to its strategic intent e.g. Holcim wharf, Greymouth's general-purpose wharf.
4. To deliver a solution within 24 months that achieves the aims or be shut down.
5. To be commercially and economically driven and led. This is not a bureaucratic function.

Structure and people

To have any real chance of success, the strategy must be supported by a well-funded and professional entity. The recommended structure is:

1. Create an **'Establishment Board'** consisting of five board members:
    a. Two are local government appointed members to ensure a balanced regional and democratic view. Ideally these members are strong commercially.
    b. Two are commercial representatives and not necessarily West Coast based, ideally with HMS experience and/or port experience.
    c. Independent Chair has strong commercial acumen and is a subject matter expert.
2. Chief Advisor to the board is fully independent and a subject matter expert who can assist with executing the board's intent and acting as a facilitator between the key stakeholders, industry and the board.

The key deliverables of the Establishment Board are:

1. Establish an agreed charter of agreed business principles.
2. Create a legal framework and templates from which to engage partners and establish a sustainable and workable supply chain.
3. Develop a logistics model that meets the needs of industry, transport operators, ports, and stakeholders.
4. Make capital, commercial and R&M recommendations to asset owners to support the logistics model.
5. Create operational forecasts, commercial structures and financial models to support the strategy amongst the various asset owners and operating models.
6. Create any business cases required to support ongoing growth.
7. Once established and a workable option agreed, make recommendations for the long-term structure of the board and operating entities.

Partners

There is no one entity in existence that is well funded, resourced or geared to achieving these aims so a partnership approach to funding is recommended to achieve the purpose and goals.

It is recommended that the Establishment Board be funded for a maximum of 24 months. If at this time, there is no workable logistics strategy that supports the strategic intent, the board would be disestablished and no ongoing costs on any entity would be incurred.

If the Establishment Board is successful in creating a sustainable logistics model that maximises economic returns for the West Coast, the board would make recommendations for the ongoing ownership, management and governance of the strategy.

To fund the Establishment Board, it is recommended that funding is sought from the following partners/ stakeholders:

1. Local Government (BDC, GCD, WDC, DWC, WCRC).
2. Central Government (NZTA).
3. Industry:
    a. For HMS (Hardie Resources, VV Minerals, Bartons etc)
    b. Westland Dairy (for resilience)
    c. Bathurst Resources (for resilience)
4. Transport & Logistics:
    a. Trucking (Johnson Brothers, Aratuna, TIL etc)
    b. KiwiRail
    c. Shipping (Coastal Bulk Shipping, Swires)

By partnering and aligning with a wide group of parties for the strategy, the costs per entity is modest while providing an opportunity for sizeable returns and significant regional upside.

By partnering and aligning with a wide group of parties for the strategy, the costs per entity is modest while providing an opportunity for sizeable returns and significant regional upside.

Kawatiri strategy

The Kawatiri is a significant drain on BDC ratepayers following the cessation of the Holcim trade in Westport. The situation is unsustainable with many councillors calling for the sale of the dredge.

The issue with this approach is that, if the Westport bar isn't dredged regularly, the fishing sector is put at risk and may not support ongoing growth in Westport, and any future growth of HMS or similar bulk product is unlikely to happen.

Therefore, the Kawatiri Strategy aims to balance and address two tensions:

1. Stem the heavy operating losses currently created by the Kawatiri.
2. Retain dredging services at Westport to enable a sustainable future and potential growth for the HMS sector.

The Kawatiri Strategy aims to balance and address two tensions:

1. Stem the heavy operating losses currently created by the Kawatiri.
2. Retain dredging services at Westport to enable a sustainable future and potential growth for the HMS sector.

Options explored

There were several options that the study assessed as part of this strategy:

1. Sell the dredge to repatriate capital funds and remove the operational liability.
2. Sell the dredge to an established operator with a service contract to sustain Westport operations.
3. 'Nationalise' the dredge (through a partnership model) to support multiple regional ports.
4. Retain the dredge in Buller Holdings and focus on selling its services nationally to cover costs.

Partnership Model

The study found that a partnership model is likely to achieve the best overall results to satisfy the tensions and achieve all aims. The key principles of the partnership model are:

1. Westport partners with other regional ports to establish a Dredging SPV that has shared value and costs. Ports (or their respective owners) are termed 'Partners'.
2. The Partners form an 'SPV Board' that meets quarterly. The board is responsible for executing the intent of the SPV, is responsible to the Partner's shareholders, and will govern the Operator.
3. Partners commit to, say, three yearly rolling 'indicative' contracts for dredging. A three-year commitment gives the partner a place on the SPV board.
4. Each Partner commits to a 'take or pay' annual contract which is ratified by the board. This guarantees the coming year's financial performance of the SPV.
5. The SPV appoints an 'Independent Chair' with commercial acumen.
6. The SPV enters into a strategic contract with a reputable and existing dredging operator (the 'Operator') who is expert in this business type. The Operator is responsible for R&M, OPEX, Capital plans (including potential dredge replacements), and reporting to the SPV board.

The benefits of this strategy are:

1. BDC ratepayers are sharing the cost of the dredging operation if the SPV continues to make losses (protecting the downside).
2. Regional port partners are securing their own future at the lowest cost.
3. Through strength of partners, the concept of replacing the Kawatiri is more plausible.
4. The dredging operation is a professional commercial entity with clearly aligned drivers.

Recommend that BDC immediately treat the Kawatiri as a Special Business Unit, giving due consideration to creating its own SPV.

Recommend that BDC employs a senior Business Development (BD) resource to create a value proposition for the dredge across multiple ports. Ports of focus are Gisborne, Nelson, Oamaru, Wellington, Whanganui, West Coast ports.

Recommend that BDC creates a simple financial model to understand the fixed and variable costs of a fully utilised operation. This model forms the basis of the approach to market.

Recommend that the BDC business development manager engage existing and reputable dredging operators nationally to discuss the potential of them operating the dredging business.

Recommend that the BDC business development manager is given 6-12 months to:

1. Fully understand the market potential.
2. Fully understand the commercial viability of the SPV.
3. Engage and negotiate strategic terms with port partners and dredge operators.

Recommend that any outright sale of the Kawatiri dredge is not executed until this strategy is fully tested.

Resilience & Lifelines strategy

Natural disaster resilience

The resilience and lifeline team at WCRC do not currently factor in the ports of Westport and Greymouth as key lifeline assets due to their perceived poor condition and uncertain futures.

This presents a serious risk in the resilience plan for the West Coast, particularly in terms of natural disaster, given the precarious nature of the roads and rail connecting the West Coast to the rest of New Zealand. In the author's opinion, the West Coast ports must play a key role in providing much need resilience for the wider region.

For an isolated region at risk from the Alpine Fault, sea transport is essential.

Commercial resilience

The closure of main roads such as Arthur's Pass, and the semi-regular disruption to rail services (the latest being October 2019), presents significant business disruption and economic impact on that largest West Coast exporters; Westland Dairy and Bathurst Resources.

Both Westland Dairy, and Bathurst Resources, have sought contingency plans to utilise ports as an alternative, but again, due to the perceived condition of assets and their future, have struggled to achieve a robust alternative to road and rail.

Opportunity

Through the renewal of fishing jetties, and the adoption of the strategies recommended in this study, the ports will provide the confidence to WCRC and the commercial exporters, to have a credible and reliable plan to utilise ports when it is required.

Accordingly, the strategies encourage increased involvement from WCRC to achieve natural disaster resilience, and it is recommended that Westland Dairy and Bathurst contribute to the 'Establishment Board' costs to enable their alternative sea logistics options.

Essential assets

The ports need to be viewed as a system, rather than just a wharf or lagoon. The critical elements of the port system in relation to resilience and lifelines are:

1. Seawalls.
2. River access (dredging).
3. Wharves that are capable of berthing large ships and offloading/loading cargoes and Pax.
4. Road and rail access to berths is ideal including marshalling land.
5. Safe passage from the sea to the wharves including navigation and marine services.

There are limited credible options available at present with the following seen as priorities:

1. Holcim wharf is by far the most resilient and valuable wharf to achieve sizeable shipping on the West Coast presently. The issue with the wharf is the Buller River bar access which requires ongoing dredging. This is a critical element which must be maintained in order to achieve resilience.
2. The Greymouth bar is self-flushing, but the general-purpose wharf is in very poor condition and not in itself a resilient structure.

Recommend that the recommended strategies to maintain the Buller River are executed to not only present commercial opportunities, but to underpin a resilience strategy that involves a credible sea option for the West Coast.

Recommend that the general-purpose wharf in Greymouth is maintained to its current state as a secondary option to Holcim wharf.

Recommend that WCRC, Westland Dairy, Bathurst Resources and other West Coast entities establish a clear resilience plan to utilise the assets at Westport and Greymouth if a natural disaster occurs and road and rail is not an option.

SECTION THREE

TACTICS

Taking care of business

Contributors: John Selby
Rob Humphrys
Jackie Mathers
Franco Horridge
Paresh Dayal
Chris Coll

Reducing losses

BACKGROUND - GREYMOUTH

Greymouth port has leased or sold all commercial wharves to Westfleet and Talleys. The assets were upgraded to a usable state by Westfleet and Talleys, presumably as the council were unwilling or unable to repair the structures.

Westfleet

Westfeet have consolidated the three licensed parcels of land at Greymouth Port into a single license to occupy. The license to occupy is for a term of 99 years with Greymouth Port. The license grants Westfleet the right to occupy Areas A, B and C for the term and transfers the licensee the right of title and interest in the wharf subject to the terms and conditions set out in the license.

The repair and maintenance of Areas A, B and C is the responsibility of Westfleet, who are required to have insurance coverage for any major damage to the wharf and is liable for any damage. The existing license fee of $9,173.78 p.a. is reviewed every 7 years with 3 months written notice.

Westfleet must allow access to the wharf for unaligned independent fisheries on the basis that they meet the Health & Safety standards and the Terms & Conditions.

Westfleet is granted the ability to charge a fee for the use of these facilities by unaligned independent fisheries. The contract does not discuss or outline a rate structure or level to be implemented.

Westfleet cannot assign or sublet without permission from the Grey District Council but third parties can utilise the wharf for fish discharge purposes.

Talleys

The Talleys license to occupy was agreed on 20 September 2007. The license grants Talleys the right to occupy the premise for the term of 99 years and transfers the right of title and interest in the wharf, subject to the terms and conditions set out in license. A license fee of $10,000 p.a can be reviewed in the 5th year with 3 months written notice.

The state of the wharf is described as poor prior to the signing of the lease. Talleys are liable for repair and maintenance of the wharf and sea wall (referred to as back wall) to ensure it meets regulation and is fit for operational purposes. Talleys is required to have insurance coverage for any major damage to the wharf. Vessels of up to 130m are permitted to berth.

Talleys are required to process a minimum of 50% of the fish they exchange over the wharf through a processing facility. Issues surrounding the standard and quality of the wharf deck have been well documented.

Talleys must allow access to the wharf for unaligned independent fisheries on the basis that they meet the Health & Safety standards and the Terms & Conditions.

Talleys is granted the ability to charge a fee for the use of these facilities by unaligned independent fisheries. The contract does not discuss or outline a rate structure or level to be implemented.

Talleys cannot assign or sublet without permission from the Grey District Council but third parties can utilise the wharf for fish discharge purposes.

H&S Work Act 2015

Westfleet and Talleys are liable under the Health & Safety at Work Act 2015 for any users of the areas they operate on port. In these areas, Greymouth Port is exempt from Health & Safety at Work Act 2016, to the fullest extent possible in the eyes of the law. Greymouth Port are not in control of these premises.

Dredging

Westfleet and Talleys are liable for any berth dredging cost and must provide Greymouth Port access for dredging purposes.

BACKGROUND - WESTPORT

Talleys rate of $4,000 p.a. for the lease of Westport Harbour's (H00037) area & building on main wharf, is below the market rate based on the Greymouth port leases $10,000 p.a. It is also pertinent to note that the Greymouth port leases are for assets which are maintained by Talleys and Westfleet.

There is little supporting documentation on the Talleys lease and operation at Westport. Westport Harbour has maintained a multi-user wharf for independent fishery use.

WESTPORT STRUCTURE

Following the cessation of Holcim, Westport continues to rationalise to fit its current trading reality. More work is required to simplify the operating model in Westport and the best way to achieve this is to segment the business into easily definable and discrete areas:

1. Land leases.
2. Fishing assets.
3. General Purpose Wharf (Holcim).

Keeping each area as simple as possible will help reduce operating costs and keep the business focused on key value drivers.

Opportunities for increasing financial returns

There are several short term tactical commercial opportunities that will decrease losses at Westport:

1. Where possible, match lease income to direct costs associated with each lease as a minimum. Additionally, where lease income can be increased to market values, do so.

   Recommend that the Westport Port Manager works through the list of leases immediately to match revenue to costs as a minimum to remove lease losses.

   Recommend that if losses cannot be removed, the sale of non-core land holdings be explored by BDC and divestments made as appropriate to generate returns to shareholders/ratepayers.

2. The current slipway is not maintained and is used, often without notice, and at little or no cost. The future of the slipway should be considered only as part of a dedicated business case.

   Recommend that the slipway is decommissioned as it presents a H&S risk.

   Recommend that a West Coast approach to slipping capability is conducted and business cased as a joint approach between both Greymouth and Westport ports.

3. Negotiation of the Talleys use of the wharf and surrounding assets require renegotiation.

   Recommend that a strategic negotiation be carried out by a senior executive with Talleys as part of the overall strategy and focus on increasing returns for Westport.

4. The Kawatiri is (in its own right) a Special Business Unit (SBU) and currently is a significant drain on BDC rate payers.

   Recommend that the Kawatiri Strategy as presented is executed immediately to minimise losses for BDC rate payers.

5. Pending the outcomes of the river study conducted by Chris Coll et al., consideration should be given to establishing gravel removal further up the Buller River to:

   a. Create a revenue stream to offset dredging the bar.

   b. Potentially decrease the dredging requirement to maintain the bar for shipping operations.

   Recommend that pending the river report, BDC establishes a consent for removal of gravel.

   Recommend that the income derived from the consent is used as a negotiating tool with WCRC to execute the recommended Optimise Strategy Functional Realignment.

   Recommend that the gravel consent is tied in with the WCRC resilience strategy and Buller 2100 objectives.

6. It is a fundamental of the Optimise Strategy that revenue must match costs wherever possible, assuming the Functional Realignment occurs as recommended.

   Recommend that BDC conduct a review of its current cost structure under a realigned model to understand what cost measures are required to break-even.

GREYMOUTH STRUCTURE

To minimise losses in the past, GDC opted to lease the fishing wharves to Talleys and Westfleet for up to 100 years. In return for 'privatisation', both companies were required to upgrade the facilities and to provide third parties access for offloading cargoes.

Consequently, Greymouth port has few assets under GDC control and is therefore a much simpler business than Westport. This does however limit the opportunities available to Greymouth in the short term to stem losses.

Opportunities for increasing financial returns

There are some commercial opportunities that will decrease losses at Greymouth:

1. Under the licence terms with Talleys and Westfleet, both are required to contribute to maintenance dredging costs. This is not being enforced.

   Recommend that GCD clearly identifies all costs involved with the operation of their new dredging operation so cost recovery is accurate and appropriate.

   Recommend that as part of the 'Strategic Fishing Negotiation' both Talleys are Westfleet are committed to a fee for maintenance dredging the lagoon.

2. Although the contracts to Westfleet enables third party access, the general feeling in the market is that this is not available. Consequently, some independent fishing companies are requesting a general-purpose berth. This is not financially viable for GDC without external funding and is unlikely to be commercially viable as a proposition.

   Recommend that through the 'Strategic Fishing Negotiation' an agreed tariff to access the wharves is made public to avoid any doubt for independent businesses as to the services available at Greymouth.

3. Assuming the fishing jetties are renewed under the Protect Strategy funding application to the PGF, GDC's operating model could be rationalised reflecting the few assets under its control.

   Recommend following the outcomes of the PGF application, that GDC reviews its cost structures to match revenue and operating costs to the greatest extent possible.

4. Assuming the fishing jetties are renewed, a robust business case for upgrading the slipping capability at Greymouth would further strengthen the West Coast fishing sector value proposition for the region.

   Recommend that a full business case is commissioned for the slipway upgrade following the jetty upgrade.

Assets & operations

Principles

To clearly assess the current asset base, and its associated opportunities, requires an agreed set of operating principles:

1. Existing assets should be fully utilised wherever possible before new assets are sought.
2. Asset expected life and R&M profiles need to be understood to derive sound commercial and financial models to inform decision making.
3. Protecting existing trades through asset renewals takes precedent over creating new assets for future trades.
4. Assets across all ports are considered regional strategic assets and will not undercut each other irrespective of ownership structures.
5. Assets will be rationalised to minimise costs and will be prioritised based on the following criteria:
    a. Utility that the asset can create now and in the future.
    b. Expected life.
    c. R&M profile.
    d. Safety.
    e. Deferred maintenance requirements.

Westport – rationalised asset base

Westport assets have benefitted from a long and solid Holcim trade. However, there are still many assets that are in poor condition and beyond end of life. The assets of value at Westport are:

1. Talleys fishing wharf.
2. Fishing jetties.
3. Holcim wharf.
4. Land leases.

Critically, Holcim wharf is the only viable general-purpose wharf on the West Coast that would enable HMS to be exported directly from the West Coast and therefore must be reserved for this purpose if the Growth Strategy is executed.

Recommend that the 'West Coast Transport & Logistics Strategy' group assess Holcim wharf as the preferred wharf for HMS export in the short to medium term.

Recommend that the potential tourism strategy for the Holcim wharf is not executed until the cargo needs of the region is understood.

Recommend that the 'Strategic Fishing Negotiation' derives commercial terms from the Talleys operation.

Recommend that the public tariff enables independent fishing companies to offload at Westport at Holcim and at Talleys.

Recommend that the fishing jetties are renewed through the Protect Strategy and PGF application.

Buller River

In agreement with the CEO's of DWC, BDC and GDC, a report was commissioned through this body of work to carry out a hydrology report on the Buller River. The report was commissioned in consultation with the Buller 2100 working group. Buller 2100 sought to understand the flood risk of increased gravel deposits in the river system.

The hydrology report, in terms of the port strategy work, was scoped to:

1. Understand the commercial implications on current and future port operations.
2. Understand the sustainability of new port investment to ensure new assets were not undermined by river currents, particularly around the ex Holcim and Bathurst Coal wharves and seawalls.
3. Test the hypothesis that removing gravel at Organ's Island (upstream of the port operation), wouldreducethedredgingrequirementaroundthe port and at the river mouth.

The key findings of the report, identified that the impacts of the port strategy are:

1. The half tide wall (wall) opposite the Holcim and Bathurst wharves, has increased gravel build up with is redirecting the river flows towards the wharves, associated seawalls, and ultimately the township of Westport.
2. Degradation of the wall is accelerated by the gravel build up.
3. The wall is critical to narrowing the river to encourage self-flushing of the river.
4. Degradation of the wall leads to a higher flood risk.
5. Gravel extraction or dredging methods should be investigated in the port and lower river areas.
6. A targeted dredging regime around the wall is required to reduce this risk (dredging elsewhere on the Buller will not materially improve the situation with respect to the wall).
7. That gravel removal at Organ's Island is:
    a. Unlikely to minimise or reduce dredging requirements downstream around the port and at the river mouth.
    b. Likely to increase flood risk downstream if too much gravel is removed, thus reducing the overflow into the Orowaiti area.

Recommend that BDC investigates gravel extraction methods for the half tide wall.

Recommend that the commercial negotiations for the fishing sector and HMS sector gives consideration to the gravel removal and ongoing dredging requirements for a safe and sustainable river system.

Recommend that WCRC, BDC and Buller 2100 work collaboratively to solve the flooding and sustainability risks including the consideration of funding models.

Greymouth

Greymouth has few assets to rationalise following privatisation of the fishing wharves:

1. General loading platform.
2. Fishing jetties.
3. Slipway.
4. Land leases.

Recommend that the general loading platform condition is understood in terms of resilience planning and lifeline obligations.

Recommend that the structure is maintained to enable the Anatoki trade on an adhoc basis.

Recommend that the fishing jetties are renewed through the Protect Strategy and PGF application.

Recommend that the safe operation of the existing slipway is maintained.

Maritime

Maritime Transport Act

The Maritime Transport Act is applicable to all operators of a commercial port. A commercial port is defined in the Act as 'a port operated by a port company or any other port that services commercial ships, whether or not it also services ships that are not commercial'.

The scope extends to include the buildings, installations, other structures, or equipment on or adjacent to a port and used in connection with the port's operation or administration.

Through the existing ownership structures, the Grey District Council and Buller District Council currently fall within this definition.

Safe passage

The responsibility to ensure safe passage to wharves and for vessels to safely berth lies with the port operator. Maritime Transport Act specifies that the 'operator of a commercial port is responsible for the management of all navigational aids on or near the coasts of New Zealand and the adjacent seas and islands.'

The operator must provide and maintain navigational aids for that facility. The act does not outline the required configuration or specify operator's navigational aids. The exact configuration is determined by the operator and governed by Maritime New Zealand.

The configuration of aids is provided through the District council by-laws. The Harbour Master's role is to ensure safety by enforcing navigation by-laws and regulations under the Maritime Transport Act.

Safety Management Systems

Maritime New Zealand's (MNZ) safety management systems ensure that commercial vessels are maintained and operated safely to prevent maritime accidents and protect the marine environment.

Ship owners and operators are responsible for the daily safe operation of their vessels.

Safety management systems cover safe operating parameters, the qualifications and training of the vessel's crew, vessel maintenance, emergency procedures, health and safety considerations and continuous improvement.

The commercial vessels owned and operated by both Westport and Greymouth are required to meet these standards through the Maritime Transport Operator Certificate. Certification of commercial vessels is required regardless of whether they meet Safety of Life at Sea (SOLAS) specifications. Non-SOLOAS vessels certification criteria have been updated based on SOLAS requirements.

HEALTH & SAFETY AT WORK ACT 2015

Commercial Vessels

MNZ administers the Health & Safety at Work Act 2015 and associated regulations for work on-board ships and where ships are places of work. MNZ provides health and safety resources including guidance about implementing the Health & Safety at Work Act 2015 in the maritime sector.

Westport and Greymouth's operation of their commercial vessels are required to meet the parameters outlined in the Act.

Port Operations

The obligations regarding health & safety for the areas under license agreements to Westfleet and Talleys at Greymouth Port, for all purposes of the Act, the licensee is deemed to be in control of the areas. There are no other commercial berths at Greymouth port. This does not impact the safety requirements outlined in the Maritime Transport Act.

Westport has maintained control of operational wharves and therefore obligations under the Health & Safety Act 2015 are applicable. Westport must ensure that all users of the operational area are meeting the standards outlined in the Act.

Port and Harbour Marine Safety Code

The Port and Harbour Marine Safety Code is a voluntary code to assist port operators and councils in managing the safety of marine activities in their ports and harbours. The code is a national standard to support national and local legislation. It promotes a high level of collaboration between operators of commercial ports, MNZ and councils (or unitary authorities) and provides guidance of good practice where standards are not prescribed by law.

Recommend that GDC ensures its new dredging operation fully complies with the various acts outlined above prior to commencing operations.

Recommend that all West Coast ports, in collaboration with WCRC, discuss the regional regulatory requirements and appropriate services to ensure the market needs and regulations can be met.

Recommend that WCRC, assuming the strategies are adopted, review the possibility to rationalise services across the ports to create efficiency and consistency.

Tariff structure

At the outset, it was expected that a standardised tariff could be created and applied across the ports. However, due to the recommended changes to management structures, and the recommended strategies to maximise economic value at a regional level, the tariff should be kept very simple and updated as each strategy is executed.

The following is the recommended actions for each tariff item and applies to all ports.

Berthing

Once the capital costs, ongoing R&M profiles, and associated management costs of the jetty renewals is understood, a common berth tariff will be recommended as follows:

1. Common pricing across all West Coast ports. Common pricing will:
    a. Provide the fishing sector with surety and a sustainable commercial model.
    b. Final pricing will most likely be a compromise between full recovery over the asset's life (including replacement) and the maximum the industry can sustain.
    c. Avoid the temptation of individual ports to undercut other West Coast ports to gain advantage i.e. the pricing is West Coast focused, not individual port focused.
    d. Pricing will ensure any investment in asset renewals is sustainable and total costs are well understood and covered through revenue streams where possible.
2. Permanent berths will apply a pricing methodology that enables the tariff to be applied as boat sizes grow over time. This may be by applying a meterage and/or GRT pricing mechanism.
3. Seasonal berths will be priced based on market elasticity. This is based on the hypothesis that the Tuna season is highly lucrative, and the fleet can sustain higher charges for short term commitments.
4. Recreational boats will be charged under the permanent fishing fleet methodology.

General Cargo

Given the tactical nature of cargoes other than fish through the ports, changing tariff will have a negligible impact on financial performance of either business.

Recommend that no changes to existing tariffs are made until the strategies as recommended are executed.

Heavy Mineral Sands (HMS)

One of the deliverables of the West Coast Transport & Logistics strategy board, would be to create a workable logistics solution for HMS and other cargoes. To achieve this, the group will have access to Holcim wharf, and the general-purpose berth at Greymouth.

The group will assess the charging regime through the ports and negotiate directly with the respective shareholders. The suggested pricing will have to balance the return on assets with the elasticity of the supply chain.

Recommend that the 'Establishment Board' create a bespoke tariff to achieve its objectives of the Transport & Logistics Strategy.

Recommend that the 'Establishment Board' adopts an open-book approach to pricing methodologies with the asset owners.

River access charges

Under the functional realignment recommended in the Optimise Strategy, river access and its associated assets and functions would rest with the WCRC. Under this scenario, WCRC is best placed to create a pricing structure for river access across all ports and where possible match costs to revenues.

Recommend that no changes to existing tariffs are made until the strategies as recommended are executed.

Recommend that a strategic review of all associated costs, benefits and management requirements are understood before adjusting river access pricing.

SECTION FOUR

OUTCOMES

Taking action

Contributors: Jackie Mathers
Franco Horridge

Summary

The ports of the West Coast are strategically important assets that can create natural disaster and commercial resilience, enable economic growth and prosper with the effective execution of sound strategies.

The following are some guiding principles that will anchor the execution of strategies back to their intended purpose:

1. If the ports adopt the same approach as the past, they will get the same outcomes and experience continual decline.
2. To get the best people on board requires appropriate funding. A 'number eight wire' approach has a high likelihood of failure given the complexity and challenges of the turnaround strategies.
3. Some aspects of the strategy appear bold and do require compromise, but the approach is about building the capability up over time starting from a solid base of fishing.
4. The long-term sustainability of the ports must be protected at each stage of the strategy. Therefore, the strategy recommends short-term funding structures that are discrete, timebound and can be ceased at any time e.g. the 'Establishment Board'.
5. Strategies, if funded, formed and executed appropriately, can be executed in parallel. The total time to execute all recommendations could be as short as 12 months.
6. There is an enormous economic prize of pursing the strategies from protecting the existing fishery and growing market share, to directly exporting HMS and its by-products directly from the West Coast.
7. The strategies are firmly focused on learning from the past and maximising the economic value created on the West Coast for extractive industries rather than exporting the value offshore or to the East Coast.

Recommendations

The following is a summary of all recommendations made in this study and ordered as follows:

1. Immediate actions for each entity as agreed and already ratified by the CEO's and can be executed relatively quickly.
2. Recommendations categorised into each discrete strategy by entity. These actions may require further analysis and a structure including resourcing to execute.
3. Recommendations of future state and initiatives that fall outside the scope of this study and its recommendations. These actions may require full business cases.

IMMEDIATE ACTIONS

These actions are intended to be small, largely tactical and if resourced appropriately, can be completed within 3-6 months. These actions have little downside or risks involved.

Buller District Council

Recommend that no changes to existing tariffs are made until the strategies as recommended are executed.

Recommend that the Westport Port Manager works through the list of leases immediately to match revenue to costs as a minimum to remove lease losses.

Recommend that if losses cannot be removed, the sale of non-core land holdings be explored by BDC and divestments made as appropriate to generate returns to shareholders/ratepayers.

Recommend that the slipway is decommissioned as it presents a H&S risk.

Recommend that a West Coast approach to slipping capability is conducted and business cased as a joint approach between both Greymouth and Westport ports.

Recommend that a strategic negotiation be carried out by a senior executive with Talleys as part of the overall strategy and focus on increasing returns for Westport.

Recommend that the potential tourism strategy for the Holcim wharf is not executed until the cargo needs of the region is understood.

Recommend that the public tariff enables independent fishing companies to offload at Westport at Holcim and at Talleys.

Recommend that a common tariff across all ports is created and adopted to create consistency and a united regional approach to the fishing sector.

Recommend that the charging regime for jetties covers all operational costs and replacement costs of the assets over their expected life.

Recommend that both ports quantify the costs to sustain river and lagoon operations net of commercial recovery to sustain fishing operations. This is required as part of the negotiation with WCRC under the proposed functional realignment 'optimise strategy'.

Recommend BDC and GDC maximise recovery of dredging costs from existing fishing users as part of the strategic fishing negotiations to minimise cost of maintenance to rate payers.

Recommend that the 'Assets to Operate' are rationalised as per the recommendations in the strategies.

Recommend that 'Assets to Operate' elements tie in with the WCRC resilience strategy and Buller 2100 objectives.

Recommend that BDC investigates gravel extraction methods for the half tide wall.

Grey District Council

Recommend that no changes to existing tariffs are made until the strategies as recommended are executed.

Recommend that the general loading platform condition is understood in terms of resilience planning and lifeline obligations.

Recommend that the structure is maintained t o enable the Anatoki trade on an adhoc basis.

Recommend that the safe operation of the existing slipway is maintained.

Recommend that a common tariff across all ports is created and adopted to create consistency and a united regional approach to the fishing sector.

Recommend that the charging regime for jetties covers all operational costs and replacement costs of the assets over their expected life.

Recommend that both ports quantify the costs to sustain river and lagoon operations net of commercial recovery to sustain fishing operations. This is required as part of the negotiation with WCRC under the proposed functional realignment 'optimise strategy'.

Recommend BDC and GDC maximise recovery of dredging costs from existing fishing users as part of the strategic fishing negotiations to minimise cost of maintenance to rate payers.

Recommend that the 'Assets to Operate' are rationalised as per the recommendations in the strategies.

Recommend that GDC clearly identifies all costs involved with the operation of their new dredging operation so cost recovery is accurate and appropriate.

Recommend that the general-purpose wharf in Greymouth is maintained to its current state as a secondary option to Holcim wharf.

Recommend that GDC ensures its new dredging operation fully complies with the various acts outlined above prior to commencing operations.

Westland District Council

Recommend that no changes to existing tariffs are made until the strategies as recommended are executed.

STRATEGIC RECOMMENDATIONS

These actions assume that initial support of the presented strategies is mandated, resourced and pursued by the entities. These actions may take up to 12 months to fully execute and do carry some risk if not executed well.

Buller District Council

Recommend that the Kawatiri Strategy as presented is executed immediately to minimise losses for BDC rate payers.

Recommend that pending the river report, BDC establishes a consent for removal of gravel.

Recommend that the income derived from the consent is used as a negotiating tool with WCRC to execute the recommended Optimise Strategy Functional Realignment.

Recommend that the gravel consent is tied in with the WCRC resilience strategy and Buller 2100 objectives.

Recommend that BDC conduct a review of its current cost structure under a realigned model to understand what cost measures are required to break-even.

Recommend that the 'Strategic Fishing Negotiation' derives commercial terms from the Talleys operation.

Recommend that the fishing jetties are renewed through the Protect Strategy and PGF application.

Recommend that the assets under each balance sheet remains as is.

Recommend that BDC and WCRC negotiate and agree costs to maintain the Buller River bar and Westport lagoon. This cost would be paid by WCRC to Buller Holdings for the use of the Kawatiri Dredge.

Recommend that 'Costs to Operate' are matched to revenues to remove rate payer subsidies.

Recommend these 'Costs to Operate' remain with the current entities.

Recommend that BDC immediately treat the Kawatiri as a Special Business Unit, giving due consideration to creating its own SPV.

Recommend that BDC employs a senior Business Development (BD) resource to create a value proposition for the dredge across multiple ports. Ports of focus are Gisborne, Nelson, Oamaru, Wellington, Whanganui, West Coast ports.

Recommend that BDC creates a simple financial model to understand the fixed and variable costs of a fully utilised operation. This model forms the basis of the approach to market.

Recommend that the BDC business development manager engage existing and reputable dredging operators nationally to discuss the potential of them operating the dredging business.

Recommend that the BDC business development manager is given 6-12 months to:

1. Fully understand the market potential.
2. Fully understand the commercial viability of the SPV.
3. Engage and negotiate strategic terms with port partners and dredge operators.

Recommend that any outright sale of the Kawatiri dredge is not executed until this strategy is fully tested.

Recommend that the recommended strategies to maintain the Buller River are executed to not only present commercial opportunities, but to underpin a resilience strategy that involves a credible sea option for the West Coast.

Recommend that WCRC, BDC and Buller 2100 work collaboratively to solve the flooding and sustainability risks including the consideration of funding models.

Grey District Council

Recommend that as part of the 'Strategic Fishing Negotiation' both Talleys are Westfleet are committed to a fee for maintenance dredging the lagoon.

Recommend that through the 'Strategic Fishing Negotiation' an agreed tariff to access the wharves is made public to avoid any doubt for independent businesses as to the services available at Greymouth.

Recommend following the outcomes of the PGF application, that GDC reviews its cost structures to match revenue and operating costs to the greatest extent possible.

Recommend that GDC and WCRC negotiate and agree costs to maintain the Greymouth lagoon.

Recommend that the fishing jetties are renewed through the Protect Strategy and PGF application.

Recommend that the assets under each balance sheet remains as is.

Recommend that 'Costs to Operate' are matched to revenues to remove rate payer subsidies.

Recommend these 'Costs to Operate' remain with the current entities.

Establishment Board – West Coast Transport & Logistics Strategy

Recommend that the 'Establishment Board' create a bespoke tariff to achieve its objectives of the Transport & Logistics Strategy.

Recommend that the 'Establishment Board' adopts an open-book approach to pricing methodologies with the asset owners.

Recommend that a strategic review of all associated costs, benefits and management requirements are understood before adjusting river access pricing.

Recommend that the 'Establishment Board' assess Holcim wharf as the preferred wharf for HMS export in the short to medium term.

Recommend that the 'Establishment Board' to create a West Coast Transport & Logistics strategy be stood up and funded to attempt to maximise the economic benefit of the HMS sector.

Recommend that the commercial negotiations for the fishing sector and HMS sector gives consideration to the gravel removal and ongoing dredging requirements for a safe and sustainable river system.

Provincial Growth Fund

Recommend that the PGF approve the funding application to renew the fishing jetties to protect and enable growth in the fishing sector.

West Coast Regional Council

Recommend that WCRC, once functional realignment has occurred, review the harbour master and pilotage requirements for all ports and rationalise the activities where possible to reduce costs and complexity.

Recommend that WCRC resumes cost ownership of these functions thus sharing the strategic costs of river access across regional rate payers.

Recommend WCRC offset some costs with the current gravel consent in Greymouth, and proposed Westport consent.

Recommend that BDC and WCRC negotiate and agree costs to maintain the Buller River bar and Westport lagoon. This cost would be paid by WCRC to Buller Holdings for the use of the Kawatiri Dredge.

Recommend that 'Assets to Operate' elements tie in with the WCRC resilience strategy and Buller 2100 objectives.

Recommend that the gravel consent is tied in with the WCRC resilience strategy and Buller 2100 objectives.

Recommend that West Coast Regional Council assumes full responsibility for these elements of all West Coast ports. This strategy is aligned with recommendations under the Maritime Act and aligns with the principle that ports are strategic regional assets.

Recommend that the Licence to Operate elements tie in with the WCRC resilience & lifelines strategy and Buller 2100 objectives.

Recommend that the recommended strategies to maintain the Buller River are executed to not only present commercial opportunities, but to underpin a resilience strategy that involves a credible sea option for the West Coast.

Recommend that WCRC, Westland Dairy, Bathurst Resources and other West Coast entities establish a clear resilience plan to utilise the assets at Westport and Greymouth if a natural disaster occurs and road and rail is not an option.

Recommend that all West Coast ports, in collaboration with WCRC, discuss the regional regulatory requirements and appropriate services to ensure the market needs and regulations can be met.

Recommend that WCRC, assuming the strategies are adopted, review the possibility to rationalise services across the ports to create efficiency and consistency.

Recommend that WCRC, BDC and Buller 2100 work collaboratively to solve the flooding and sustainability risks including the consideration of funding models.

FUTURE STATE RECOMMENDATIONS

These actions fall outside the scope of this work and identify potential future opportunities for growth. These recommendations carry significant risk if not fully understood nor supported by a full business case and due diligence.

Grey District Council

Recommend that a full business case is commissioned for the slipway upgrade following the jetty upgrade.

Buller District Council

Recommend that a full business case is commissioned to derive some future value from the Bathurst 'coal shed' and adjacent wharves.

APPENDICES

APPENDIX A

ECONOMIC IMPACT ASSESSMENT

Author: Kel Sanderson

rmc²

Economic Impact Assessment

Final Report

OCTOBER 2019

Author: Kel Sanderson

©BERL Reference No: #4034 October 2019

PART ONE

CURRENT STATE

Contents

Tables

SECTION ONE

Ports in the West Coast economy

The Ports of Westport and Greymouth have had an historical place in the West Coast communities and economy.

Being river and estuary ports on the west coast of New Zealand, these ports including Whanganui, Manukau and Hokianga have always each had a bar which from time to time makes access problematic. They have not enjoyed the access to international freighters which the deeper ports like Lyttelton, Dunedin, Wellington, Marsden Point and others have.

Nevertheless, the West Coast has a number of minerals, quality timber and agricultural products with strong export markets. As well, the ocean off the West Coast is the location of a significant Fisheries Management Area. All of these resources have had a major part in driving the shape of the economy of the West Coast Region.

1.1 Relevance of the economy profile

The economy and community of the West Coast has experienced a range of positive and negative impacts over the past 20 years. Many of these changes were caused by changes in the important resource-based industries.

In order to appreciate the current and potential place and the potential future impacts of the Ports it is necessary to first appreciate the pattern and nature of the changes in main industries on the West Coast from 2000 to 2018. This will provide an understanding of the way in which industry changes are reflected through the overall economy.

We stress from the outset that the description of the profile of the economy is dependent upon using some local knowledge to interpret various sets of data, most of which come originally from StatisticsNZ. The main sets of these data come from the Business Demographics database. This is not a complete census of data from all businesses, but a survey of a sample of businesses. For this reason, we can have a reasonable level of confidence that the picture of the shape of overall change over time, especially of employment in industries will generally reflect the changes which have taken place, or are now taking place. However we cannot expect that the specific number shown as FullTime Equivalent (FTE) employed in a specific industry in a specific year in the Region will be exactly the number which local people would know to be employed in that industry in the Region in that year.

The other matter is the level of value added which when totalled becomes the Region's GDP. The estimate of value added is based upon the level of employment and the average value added by each employee. Again there is not a detailed estimation of this coefficient of value added per employee for every industry in every Region. Therefore again the shape of overall GDP change over the years will be a reasonable representation of the change. However the fine details will not show if there have been some changes in productivity per employee in some industries in some Regions, separate from changes at the national level.

What the economy profile does do is to give a sound overall picture of changes in the size and shape of the economy, generated on a consistent basis over the years.

Hopefully it will give the research team and the West Coast Clients some pointers as to places where the economy can potentially be expanded and improved in future.

SECTION TWO

West Coast economy 2000 to 2018

The overall economy of the West Coast increased very strongly in the eight year period from 2000 to2008. However in the ten years from 2008 to 2018 there was little further growth.

The key drivers of growth in the West Coast have been the resource-based primary production industries and the associated processing, the tourism and hospitality industry, and the construction required by these industries.

At the high level, employment in the West Coast Region increased from about 11,300 FTEs in 2000 to 14,100 FTEs in 2008, an increase by 2,800 FTEs in 8 years. This was an increase by 25% in 8 years, which is a high compound growth rate of 2.8% per annum. The estimated total value added or GDP expressed in inflation-adjusted terms, increased by the same compound growth rate of 2.8% per annum.

The performance since 2008 has not been as good. In fact in the 10 years from 2008 to 2018, the total employment increased by only about 230 FTEs, or 1.6% on the 2008 employment. The compound growth rate averaged just 0.2% per annum. The estimated total value added or GDP actually declined by 1.5% as between 2008 and 2018. This was a reduction by 0.2% per annum compound.

These overall numbers indicate the importance for the future of investigating where possible the causes of the significant change between the periods 2000 to 2008 and from 2008 to 2018.

2.1 West Coast industries

The industries which have traditionally been the key drivers of economic activity on the West Coast have been the primary industries, and tourism, hospitality and retail. At times when these industries are growing, construction and the trades also grow as a consequence.

The employment in the primary industries in 2000 made up 25% of the total employment in the Region, hospitality, tourism and retail was 23%, and construction and trades 13%.

Within the primary industries group, the dairy industry, other farming and processing, forest and wood products, and mining quarrying and processing each made up a similar 5% to 7% of total employment. Fishing and seafood was only 1% of employment.

The remaining employment was largely driven by population levels, and was in the provision of public and private services with 34% of employment, and all transport activities with 4%.

2.2 Changes in main industries 2000 to 2018

The strong growth in employment by over 2,800 FTEs (25%) on the West Coast between 2000 and 2008 was led by an increase by nearly 600 FTEs in the dairy industry, an increase by 90% in the 8 years. There was also a strong increase recorded in the mining and quarrying, especially their support services in the years around 2008. However this increase reversed later.

In the primary industries there was a serious reduction in employment in the forest and wood industry by 200 FTEs, or 30%.

The growth in other areas included hospitality and retail which contributed over 670 FTEs (26%), construction and trades, with 750 FTEs (50%) and social and private services about 560 FTEs (15%).

The full breakdown of employment changes from 2000 to 2008 and from 2008 to 2018 in most of the detailed industries are shown in the table on the next page.

2.3 Employment levels and changes

The employment levels recorded for 23 industries of interest in the West Coast Region are shown in the table.

The changes in the main large industries or sectors have been discussed above, but there are some other levels and changes of interest in the more-detailed industries.

Table 2.1 West Coast Region Industry Employment 2000 to 2018 (FTEs)

Industries and sectors	Industry employment *FTEs*			Employment share *Percent*		Change *Percent*
	2000	2008	2018	2000	2018	2000 to 2018
Dairy farming	522	1,044	925			
Dairy products	136	204	539			
Dairy industry	**658**	**1,248**	**1,464**	**6%**	**10%**	**123%**
Other farming	425	364	461			
Meat and other food products	313	367	397			
Farming, meat and food products	**738**	**731**	**858**	**7%**	**6%**	**16%**
Forest and logging	194	95	60			
Wood products, prefabs	489	385	383			
Forest and wood products	**683**	**480**	**443**	**6%**	**3 %**	**-35%**
Fishing	34	23	19			
Seafood processing	126	117	215			
Fishing and seafood	**160**	**140**	**234**	**1%**	**2%**	**46%**
Coal mining	286	357	350			
Gold mining	95	75	129			
Other mining, quarrying, support	97	498	88			
Mineral processing	140	146	19			
Mining, quarrying and processing	**618**	**1,076**	**585**	**5%**	**4%**	**-5%**
All Primary and processing	**2,897**	**3,675**	**3,584**	**25%**	**25%**	**25%**
Other manufacturing	341	420	380			
Building and construction etc	1,167	1,836	2,067			
Construction and trades	**1,508**	**2,256**	**2,447**	**13%**	**17%**	**62%**
Road transport	262	313	347			
Rail transport	68	40	54			
Water transport	51	43	0			
Port operation	35	14	3			
Rail and water forwarding, storage	17	32	45			
Air transport	49	52	75			
Transport	**482**	**494**	**524**	**4%**	**4%**	**9%**
Hospitality and retail	**2,597**	**3,274**	**3,061**	**23%**	**21%**	**18%**
Finance and business services	710	1,127	1,081			
Public, social and personal services	3,130	3,276	3,635			
Private and public services	**3,840**	**4,403**	**4,716**	**34%**	**33%**	**23%**
TOTAL EMPLOYMENT	**11,284**	**14,102**	**14,332**	**100%**	**100%**	**27%**

Source: StatisticsNZ. BERL, Kel Sanderson analyses

Forest and wood products: This industry lost over one-third of its total employment between 2000 and 2018. The then-current system of logging in 2000 in the indigenous forests was thought by many to be little-understood by those who caused the reduction in logging. It was scientifically developed as a process of selective, age-balanced extraction, using helicopters to extract the individual logs. This ensured that most elements in the forest ecology other than the logs remained in place. We are not aware of any moves now to again produce the high value timber and encourage effective management of these rainforests.

Fishing and seafoods: This industry accounted for only 1% of employment in the West Coast region in 2000 and had increased to 2% by 2018. However the actual level of employment in this industry is small compared with the size of the fishery industry on the ocean offshore. The Fisheries Management Area off the West Coast is *FMA 7 Challenger/ Central Plateau*. In a 2017 report on The *economic contribution of commercial fishing to the New Zealand economy*, prepared for the New Zealand commercial fishing industry by BERL, the employment in harvesting in FMA7 was shown to be 966 FTEs in 2015. This contrasts with the level shown as 19 to 34 FTEs in the StatisticsNZ data we have in the table above. The 966 FTEs involved in commercial fishing in FMA 7 presumably mostly are domiciled in other Regions, such as Nelson-Marlborough. Talleys of Motueka utilise port facilities at Westport, and it may be possible to increase the employment based there in certain conditions.

In the same report the seafood processing data is shown by Region rather than by FMA. This data shows that in 2015 the West Coast Region had 79 FTEs employed directly in seafood processing, and 243 FTEs when employment along the value chain is counted. The StatisticsNZ data above shows were 117 FTEs employed in seafood processing in 2008, and 215 FTEs in 2018.

Coal mining and gold mining: Employment in coal mining itself was relatively constant in 2000, 2008 and 2018 between 290 and 350 FTEs. However in some years between 2008 and2018 the recorded employment was much higher. In 2013 employment in coal mining was recorded as 1077 FTEs, but by 2018 it had declined again to 350 FTEs.

Gold mining recorded 95 FTEs in 2000, had fallen to 75 FTEs by 2008. In some years between 2008 and 2018 the employment recorded was much higher. In 2013 it was recorded as 366 FTEs. By 2018 it had settled back to a still-relatively strong 129 FTEs. These changes in coal and gold mining indicate that the economics of the production and export clearly changed over the period. The level of value added or GDP generated by these industries as shown in the table below, approximately halved as between 2000 and 2018.

Other mining, quarrying and support services. This classification of industries had a roller-coaster ride, as the employment is recorded to have increased from 95 FTEs in 2000 to 498 FTEs in 2008 (and the years around that time). The employment then dropped back to 88 FTEs by 2018. The main high-flyer was Other Mining and Support services which peaked at 455 FTEs. Another element of the mining and quarrying industry is exploration which has had a minor revival in the last 5 to 7 years. Employment in mineral exploration was recorded as 20 FTEs in 2018.

There have been a number of changes in fortune of different parts of this industry, ranging as it does from poenamu jewellery of different types provided to the tourist visitors through to construction and roading minerals.

We understand that there is also some interest in garnet extraction on the West Coast. Garnet as an industrial mineral has seen a very rapid increase in world production since before 2000. Garnet is used in industrial waterjet cutting, abrasive blasting, water filtration and abrasive powders. One official source indicates that world production has increased from very little in 1980 to about 300,000 tonnes in 2000 and to 1.7 million tonnes in 2015. This same source indicates that net use by US industries has increased from about 70,000 tonnes in 2000 to about 280,000 tonnes in 2015.

For the other mining, quarrying and support services, the value added dropped over the period. This presumably reflects the drop in the economic buoyancy in the coal and gold mining. In this industry, in 2000, from 97 FTEs the value added was $45 million, and from 88 FTEs in 2018 was only $17 million, showing again that the economics of the activities had fallen.

Mineral processing is the final industry in this group, and the main contributor to employment and economic activity was cement production. This activity employed about 120 FTEs in 2000 and 2008, however it-had ceased by 2018. The ceasing of production and export of cement by the Swiss company Holcim, has had a significant impact on the activity at Westport Port.

Construction and trades industry employment grew really strongly, by 50% between 2000 and 2008, along with buoyancy across the Region's economy. The industry continued growing but at a slower rate and added a further 8% to its employment between 2008 and 2018.

Transport: Across the spectrum of the transport industries there was moderately strong growth in employment in Road transport, Air transport, and Rail and water forwarding and storage. However in the two industries of interest to the ports, employment in Port operation is recorded to have dropped from 35 in 2000 to just 3 in 2018. We are aware that provision of services in the sector have changed, including from employees to contractors, and these StatisticsNZ data may not be an accurate representation. The other industry, water transport in the West Coast Region is recorded to have decreased from35 FTEs in 2000 to zero FTEs in 2018.

Hospitality and retail: As we noted above, this group of industries increased from employing about 2,600 FTEs in 2000 to 3,100 FTEs in 2018. This is an increase by 18% over the 18 year period and is largely due to growth in tourism in the Region.

2.4 Economic activity levels and changes

The level of value added by the industries in the region largely reflects at a high level the changes in employment levels in those industries.

As we have noted above, there are some industries where the value added by the employees has reduced with a decline in the strength of the industry. This has been the case with elements in the mining, quarrying and mineral processing industries. In some others like transport, there appears to have been an increase in the value added for each employee at the national level, and reflected in these figures.

Table 2.2 West Coast Region Industry Value Added 2000 to 2018 (GDP $Million)

Industries and sectors	Industry Value Added *FTEs*			Share of GDP *Percent*		GDP Change *Percent*
	2000	2008	2018	2000	2018	2000 to 2018
Dairy farming	49	93	109			
Dairy products	13	25	60			
Dairy industry	**63**	**118**	**169**	**5%**	**11%**	**169%**
Other farming	43	33	48			
Meat and other food products	31	45	44			
Farming, meat and food products	**74**	**78**	**92**	**6%**	**6%**	**24%**
Forest and logging	58	34	23			
Wood products, prefabs	46	43	42			
Forest and wood products	**104**	**77**	**65**	**9%**	**4%**	**-38%**
Fishing	4	2	1			
Seafood processing	13	14	24			
Fishing and seafood	**16**	**17**	**25**	**1%**	**2%**	**54%**
Coal mining	133	87	69			
Gold mining	44	18	25			
Other mining, quarrying, support	45	122	17			
Mineral processing	22	27	3			
Mining, quarrying and processing	**244**	**254**	**115**	**20%**	**8%**	**-53%**
All Primary and processing	**501**	**544**	**466**	**42%**	**32%**	**-7%**
Other manufacturing	30	50	42			
Building and construction etc	124	192	226			
Construction and trades	**153**	**242**	**268**	**13%**	**18%**	**75%**
Road transport	28	41	52			
Rail transport	7	5	8			
Water transport	5	6	0			
Port operation	4	2	0			
Rail and water forwarding, storage	2	4	7			
Air transport	5	7	11			
Transport	**52**	**65**	**78**	**4%**	**5%**	**50%**
Hospitality and retail	**124**	**170**	**207**	**10%**	**14%**	**66%**
Finance and business services	102	150	134			
Public, social and personal services	270	323	321			
Private and public services	**372**	**473**	**455**	**31%**	**31%**	**22%**
TOTAL VALUE ADDED	**1,203**	**1,495**	**1,472**	**100%**	**100%**	**22%**

Source: StatisticsNZ. BERL, Kel Sanderson analyses

2.5 Summary employment and GDP changes 2000 to 2018

The information shown for the 23 individual industries of interest in the table above is shown in summary form for the nine main industry groups. This provides a compact set of information for ease of comparison.

Table 2.3 West Coast Region Summary industry employment and GDP changes 2000 to 2018

Industries and sectors	Share of employment *Percent*		Employment Change *Percent*	Share of GDP *Percent*		GDP Change *Percent*
	2000	2018	2000 to 2018	2000	2018	2000 to 2018
Dairy industry	6%	10%	123%	5%	12%	169%
Farming, meat and food products	7%	6%	16%	6%	7%	24%
Forest and wood products	6%	3%	-35%	9%	5%	-38%
Fishing and seafood	1%	2%	46%	1%	2%	54%
Mining, quarrying and processing	6%	4%	-5%	21%	8%	-53%
All Primary and processing	26%	26%	25%	44%	33%	-7%
Construction and trades	14%	17%	62%	13%	19%	75%
Transport	4%	4%	9%	5%	6%	50%
Hospitality and retail	24%	22%	18%	11%	15%	66%
Private and public services	36%	34%	23%	32%	33%	22%
TOTAL EMPLOYMENT, GDP	11,284	14,332	30%	$1,203	$1,472	21%

Source: StatisticsNZ. BERL, Kel Sanderson analyses

Preliminary Conclusion:

The overall picture shows a considerable level of change in the economy of the West Coast Region between 2000 and 2018. It is generally unusual to see two main resource-based industries like forest & wood, and mining to reduce in economy share to such an extent. In the year 2000, these industries had 12% of the Region's employment and produced 30% of the Region's value added. By 2018, the two industries employed just 7% of the Region's employment, and generated 13% of the Region's value added.

These are certainly a weak part of the Region's current economy, and presumably there are some initiatives possible to recover or replace them.

There is also the potential, presumably for a greater proportion of the fish and seafood offshore of the West Coast, to be caught and processed by the people on the West Coast.

SECTION THREE

Economic Impacts of Port activity 2013 to 2019

The economic baseline provided in section 2 above provides an indication of the scale of current activity requiring the infrastructure and logistics capability on the West Coast, including that of the Ports.

The current section takes the reported income and expenditure patterns in recent years from the two main ports, namely Westport Port and Greymouth Port.

At this Draft outline stage, we have not been fully briefed on the changes which are reflected in the recent patterns of income and expenditure i n these ports.

We therefore submit these summarised figures on incomes and expenditures, so that we can as necessary be provided with the information on the changes in activity patterns. It will then be useful to model the economic impacts from the activity of the Ports in recent years. This will provide the base to be able to show the extent of benefits possible if and when the pattern of activity is expanded and developed.

The approach to measuring the current shape will to some extent depend upon the intended future changes.

3.1 Changes in Westport Port activity to 2018

The activity at Westport Port, we understand was quite dependent upon the shipping activity related to the Holcim cement production at its plant at Cape Foulwind. This production ceased in June 2016. There is also some activity reported from Talleys fishers, and other fishing operations.

3.2 Westport Port Income and Expenditure 2013 to 2018

The first set of information which we have to hand is from accounts for years YE June 2013 to YE June 2017. These do not give breakdown of oncome sources, except for a total as 'Services'. The more-detailed accounts we have are for YE June 2018 and YE June 2019.

The expenditure items for the years 2013 to 2017 can generally be compared in main groups of expenditure items. We have arranged these groups as Personnel, Direct Operating expenses and Administration expenses.

In comparing these groups and their items across the years we find one or two aberrations, and have therefore selected what appear to be three rather similar operating years before the closure of Holcim, and take the average of these three years as representative of the "Before" situation.

The main changes at the transition were in the total annual income which was generally $3.1 to $3.2 million per annum up to and including YE June 2016. It then dropped to $1.7 million in YE 2017.

The other item of major change was in Personnel, which ran at about $1 million to $1.1 million from YE 2013 to YE 2015. It then jumped to $1.5 million in YE 2016, and dropped to $0.7 million in YE 2017. We presume the high level in YE 2016 could have included some redundancies with scaling down.

We therefore suggest that the "Before" situation is best represented by the average of the years YE 2013 to YE 2015. The figures for YE June 2018 appear incomplete, and so we show as the representative "After" situation, the year YE June 2019.

It is relevant that the major part of the income is from charges for dredging in 2018, which indicates the income from the port operation is not great.

These comparisons are now shown in the table on the next page.

Table 3.1 Westport Port Income and Expenditure 2013 to 15 and 2019

Income and Expediture item	YE 30 June 2019	Average 2013 to 2015
Berthage	97,861	
Wharfage	18,873	
Lease income	27,886	
Other Sundry Income	15,610	
Dredging income	1,382,504	
Total Income	**1,542,734**	**3,151,667**
Personnel: Salaries, leave, super	**167,703**	**1,045,000**
Fuel costs	101,372	173,000
Operating lease	222,844	206,000
Vessel surveys		33,000
Dredge slipping cost	275,295	208,667
Other operating expenses	262,712	481,000
Total Direct Operating Expenses	**862,223**	**1,101,667**
Total Operating Expenses	**1,029,926**	**2,146,667**
Insurance	68,614	176,667
Management fees (BHL)		178,667
Other Admin expenses	200,000	191,667
Audit fees		21,333
Total Administration expenses	**268,614**	**568,333**
Total Expenditure	**1,466,243**	**2,715,000**

Sources: Buller District Council Harbour Authority and Westport Harbour Limited.

The high level indication from this information is that the Westport Port's contribution to the West Coast economy from its employment and expenditure items in YE June 2019 was about $1.5 million, which is a little above one-half of what it was in a representative year from YE June 2013 to YE June 2015, namely $2.7 million.

3.3 Economic impacts of Westport Port activity

If the above is accepted as a reasonable interpretation of the income and expenditure of Westport Port, then these figures can be used by us to generate estimates of the value chain impacts of the Port before and after the reduced activity on departure of the Holcim cement flow.

3.4 Changes in Greymouth Port activity to 2019

The major change-in Greymouth Port activity as between early years and that in YE June 2019 is that in YE June 2019 there were three large, and probably related figures. The first two were in insurance reimbursement of $1.199 million, and grants and subsidies of $0.75 million. Neither of these items occurred in other years.

On the expenditure side there was Capital Expenditure for Breakwater Renewal of $1.77 million in YE June 2019. Again, unsurprisingly this item occurred only in that year.

There were items of repairs and maintenance including the Breakwater in other years. Possibly the 2019 expenditure may have been by way of deferred maintenance and replacement of accumulated exhausted capital.

3.5 Greymouth Port Income and Expenditure 2016 to 2019

The actual income and expenditure estimated from the account documents provided for YE June 2019, and the average for years YE June 2016 to YE June 2018 are shown in the table.

Table 3.2 Greymouth Port income and expenditure 2016 to 2018 and 2019

Income and Expediture item	YE 30 June 2019	Average 2016 to 2018
User fees and charges	416,333	322,922
Rates, grants, insurance payout	2,183,513	153,655
Total Income	**2,599,846**	**476,577**
Personnel: Salaries, leave, super	**216,695**	**179,400**
Finance and Insurance	203,162	150,172
Admin and internal charges	224,298	254,719
Total Administration Expenses	**427,460**	**404,892**
External Maintenance services	55,996	92,900
Consultants, contractors, materials	901,548	32,261
Breakwater replacement, renewal	1,813,981	152,937
Total R&M and Replacement	**2,771,525**	**278,098**
Total Expenditure	**3,415,681**	**862,390**

Sources: Buller District Council Harbour Authority and Westport Harbour Limited.

3.6 Economic impacts of Greymouth Port activity

If the above is accepted as a reasonable interpretation of the income and expenditure of Greymouth Port, then these figures can be used by us to generate estimates of the value chain impacts of the Greymouth Port. They can then be adjusted and used to assess the economic impacts for changes and developments proposed for the Port and its operations.

PART TWO

FUTURE STATE

Contents

SECTION ONE

The potential supply of minerals from West Coast

The West Coast has derived much of its activity, employment and incomes from minerals, starting from poenamu in pre-European days, to gold, and then coal, and with some continuing poenamu activity until now.

Gold and coal continue to be significant industries in the economy, the employment recorded in these industries in 2000 was 381 FTEs and in 2018 was 479FTEs. The employment in all mining, quarrying and processing was recorded as 618 FTEs in 2000 and 585 FTEs in 2018. The reduction is due to a loss of about 120 jobs with the closure of the Holcim cement plant.

The potential mineral resource on the West Coast has been investigated by GNS as a part of a national study funded by MBIE in 2018. There are other minerals now being considered which can provide further expansion to the mining industry.

1.1 Potential for future 'Green' minerals production

At the Minerals Forum in May 2018, Minister for Energy and Resources Hon Dr Megan Woods said "There is sky-rocketing demand around the world for minerals which are used in clean-tech and which can aid our transition to a low carbon economy. That demand represents a real opportunity for New Zealand." These 'green' minerals are needed for batteries, wind turbines, solar panels, LEDs and hybrid cars.

Minerals which fall into these groups and are present on the West Coast include Garnet, Rare Earth Elements (REEs) and Ilmenite.

1.1.1 Ilmenite world market

Ilmenite, an iron titanium oxide FeTiO3 and the other main titanium yielding mineral, Rutile have been important industrial minerals for many years. The titanium oxide used in the US alone in 1975 was over 500,000 tonnes. The US consumption of titanium oxide doubled to one million tonnes per annum by 1992, and since 2003 has been sitting at around 1.2 million tonnes per annum. About one half of the titanium oxide consumed in the US is used in paints, varnishes and lacquers, with the rest being used mainly in plastics and in paper.

The largest volumes of mine production of Ilmenite mineral concentrates are in Canada, China, Australia, Mozambique and South Africa. In 2019 there is an ilmenite project expected to begin production in Greenland, contingent upon obtaining customer offtake agreements. Other projects are being explored or developed in Sierra Leone, Australia, Mozambique and Tanzania. World mine production of ilmenite mineral concentrates is estimated at 5.4 million to 5.5 million tonnes per year. World resources are estimated 880 million tonnes.

Ilmenite prices for export to US from Australia in recent years have been in the range US$105 to US$170 per tonne bulk, minimum content 54% TiO2, f.o.b. Australia.

1.1.2 Garnet world market

Garnet is the name given to a large group of rock-forming minerals which have a common crystal structure of silicates with various mineral combinations. These minerals include calcium, magnesium, iron, manganese, vanadium and chromium in various compositions. They are found widely around the world, and the world demand for and production of industrial garnet has grown rapidly from 20,000 tonnes per annum in 1975 to 500,000 tonnes in 2000 and is now up to about 1.7 million tonnes per annum. World resources, excluding those not available from the three of the largest producers Australia, South Africa and China, are estimated at over 25 million tonnes.

Industrial garnet is largely used as an abrasive blasting media, and in precision waterjet cutting. In many of its uses garnet can be reclaimed, processed and re-used. The largest buyers of the high grade

garnet are Airbus and Boeing who use the garnet in precision cutting of aircraft components. This indicates the likelihood of an ongoing, strong world market for quality garnet.

The United States Geological Survey in February 2019 noted that a new garnet processing plant in Pennsylvania together with a new processing plant in Oregon have a combined production capacity of 422,000 tonnes of refined garnet per year. This is additional to the apparent consumption of 340,000 tonnes in the US in 2018

The largest producers have been Australia, South Africa, India, China and US. India has imposed export restrictions on industrial garnet, which has seen prices kept firm in the range $US260 to 280 per tonne imported to the US.

1.2 West Coast mineral sand deposits

West Coast mineral sands which contain heavy sands of garnets and ilmenite have been deposited in depressions along the West Coast. The general process over the millennia has been that the natural erosion of the rock from the Southern Alps has fed large volumes of these rocks into the ocean, where they have been ground to sands. These sands have then been washed ashore, being deposited in lakes and estuaries and/or, spread northwards up the coast by the action of littoral drift.

Over time the estuaries and lakes, filled with stable sand have then had topsoil formed on top. Hence there is a potential to extract the minerals with the following process. Firstly remove and 'store' the topsoil, then mine the mineral sands, process them to extract the garnet and/or ilmenite and then potentially replace the topsoil to resume agricultural or horticultural production, or urban development on the land.

Work which has been done to determine the size of the deposits, and potential annual production indicates that there is a potential to sustainably produce 600,000 tonnes per year.

SECTION TWO

Mineral Sand export logistics and processing options

The main impacts on the West Coast ports and on the West Coast region's economy in general will be the logistics of transport of the ore from the West Coast mines, and the location and extent of processing of the ore, and then the export of the processed product.

2.1 Two main options

The two main options which have been proposed are as follows:

1. Transport to Canterbury for processing and export; or
2. Processing on the West Coast and export through a West Coast port.

Within each of these main options there are some variations depending upon how the ore transport interacts with other main transport flows, and the format of the storage to accumulate shipping volumes.

The efficiency of logistics depends upon whether the ore carried from West Coast to Canterbury is carried as a back-load or as the main load, with the trucks mostly returning empty. In the former case the cost of the transport of the ore would be 'subsidised' by the fact that the trucks would be returning empty anyway. The cost to the ore would be the fuel, wear and tear on trucks and roads, and other costs of running the truck through the Pass fully laden rather than empty. Where the ore is the main load with trucks returning empty, the transport costs will be significantly greater

Another key logistics aspect is the location and cost of storage of ore and/or processed product for consolidation of export shipping loads. This storage, which can be quite specialised for the processed product, is likely to have to be constructed either on the West Coast or in Canterbury, or at other export ports like Picton or Port of Taranaki or be onboard an anchored vessel on the open seas.

2.2 Economic effects of options

The economic effects will be seen from the mining, along the processing and logistics chain to export shipping.

Mining: the direct employment in developing, constructing and operating the mine as well as the value chain employment is expected to be similar whether the process and export is from West Coast or from Canterbury.

Processing: There are the two components of impacts:

Processing plant construction: design, equipment manufacture, and plant construction;

Processing plant operation: including direct employment and supporting or 'value chain' employment.

The location of the processing in West Coast will have a significant impact on economic activity on the West Coast.

Transport and storage: The nature and location of the elements in the supply chain including logistics, transport and storage has the potential to have very different levels of impact on the West Coast ports and on the West Coast economy.

Loading and shipping: Similarly these functions would be carried out either on the West Coast or in Canterbury, so the effects on the West Coast will be very different according to where the product is exported from.

Port operation: The export of these minerals from the West Coast will require continued (or resumed) maintenance and operation of a West Coast port and its facilities. The port most suited to this activity is Westport. This operation adds to the economic activity on the West Coast.

2.3 Specific options modelled

The specific options modelled to estimate their impacts on the West Coast economy are

Stage one: Mining and Processing 100,000 tonnes on the West Coast. The logistics alternatives are for

a) road transport to Washdyke and shipping from port Timaru; and

b) road or rail transport to a West Coast port, and in the first instance shipping to Picton for consolidation and export.

This Stage will test the feasibility of the logistics and transport as well as the viability of marketing these volumes into markets of identified customers. This will provide the confidence as to whether or not the increased volumes in the established 600,000 tonne industry would yield prices to make it viable.

Established 600,000 tonne industry: Once the logistics, transport, and marketing have been proven through successful implementation of Stage One, to be financially viable and economically beneficial, the industry can be expanded to its realistic potential.

The established industry is expected to mine about 200,000 tonnes of industrial garnet per annum, probably from three sites, and associated production of 400,000 tonnes of ilmenite high grade sand. In total this industry would produce and export up to 600,000 tonnes per annum. In terms of the reserves of these resources we understand these volumes of annual yield to be conservative.

SECTION THREE

Impacts on the West Coast economy

This section will estimate the impacts on the West Coast of the initial Stage One operation to mine 100,000 tonnes of garnet for export alternatively through a Canterbury port, or through a West Coast port, initially for export through Picton or Port of Taranaki. The later expansion could justify developing an ocean-going storage option directly off the West Coast if it is found to be cost effective.

3.1 Stage One: mining and export of 100,000 tonnes per annum

We do not estimate the mining development cost as that will be the same to mine 100,000 tonnes irrespective of the export logistics chain.

3.1.1 Capital expenditure on the West Coast:

Processing plant (100,000 Tonnes)

The cost of the plant shown here is purely for the mineral processing plant. It will also require a building, but such a building may well already be available.

Capital cost	*$50 million*
Construction employment	*30 FTE jobs over one and a half years*

This construction employment will generate more employment along the value chain of suppliers to the construction and engineering. The 30 people employed for a year and a half will also, through their household spending generate some more jobs in the West Coast economy. Using standard multiplier techniques applied to the West Coast economy, we estimate the total number of indirect jobs generated:

Indirect employment	*24 FTE jobs over one and a half years*

This implies that the construction of the processing plant will generate a total of the equivalent about 54FTE jobs over one and a half years, or 81 FTES for a year.

Storage / portside

On a similar basis we estimate the impact of the investment needed for storage and portside for this limited Stage One initial mining and export operation.

Capital cost	*$5 million*
Construction employment	*15 FTE jobs over one year*
Indirect employment	*7 FTE jobs over one year*

Therefore the total employment generated from this minor capital investment project is 22 FTE jobs for a year.

3.1.2 Operations on the West Coast

Mining, processing and export operations:

Employment	*30-35 FTEs, permanent*

Again, using the West Coast multipliers for the mining and processing industry. There will be a further 37 FTEs in permanent employment on the West Coast, and so the operating industry would generate a total of about 70 FTEs in permanent employment on the West Coast.

The expenditure on production and processing will also generate direct and indirect expenditure. The total production cost has been estimated at $100 per tonne. With the initial production of 100,000 tonnes per year, the direct expenditure would be $10 million per year.

Direct expenditure	*$10 million per year*

Again there is expenditure with indirect suppliers to the production and processing, and these are expected to generate expenditure of about $11 million per year. This means that the production and processing operation will increase spending on the West Coast by $21 million per year.

3.1.3 Logistics capital expenditure and operations on the West Coast

In the initial construction and operation of the Stage One development generating exports of 100,000 tonnes, it is expected that this volume can initially be handled as a backload on trucks currently hauling goods from Canterbury to the West Coast.

However the development of this export activity will create the possibility that another logistic chain could be tested, using coastal shipping to haul the product by coastal shipping to an export port, either Picton or Port of Taranaki for consolidation. Currently it is thought that such a logistics chain may not be viable. The Stage One development will provide the opportunity to test this.

It should be remembered that whereas the potential 'subsidy' of the ore transport to Canterbury as a back-load on the trucks has been mentioned, similarly the case applies to coastal shipping. Some of the prime load of those trucks coming in to the West Coast may also be available to the coastal shipping mode. In that case the ore transport cost would be a more-balanced one.

The operation of a substantial trade by coastal shipping would ensure the ongoing maintenance of Westport port.

A further consideration in this is that both the maintenance of operability of the port, and the development of a regular coastal shipping service provides a strong element of resilience in access to the West Coast.

3.2 Comparison of logistics impact from Export Port options

The impacts depending upon whether the ore is transported to Timaru for export, or is hauled by road or rail to a West Coast port for transhipping via and export port like Picton rest upon the impacts of the trucking to Timaru, compared with the road or rail from the mining site to the port on the West Coast, and the coastal shipping to an export port.

The initial intention is that a tonnage up to 100,000 tonnes per annum could be carried from West Coast to Canterbury as a back-load, hence no more trucks on the road. However, the fact is that these trucks will be fully loaded with ore on their back-load.

The implications of being fully loaded is that the fuel use, emissions and wear on trucks and road shall be significantly more for the fully-loaded trucks than for an empty back-load.

These impacts could be compared with the fuel use and emissions of coastal shipping from the West Coast port to Picton or Port of Taranaki.

3.3 Established 600,000 tonne industry

Once the concept is fully proven, then a fully operational industry can be established.

This industry would mine, process and export 200,000 tonnes of industrial garnet, and 400,000 tonnes of ilmenite, mined and extracted as a product complementary with the garnet from the West Coast deposits.

This section estimates the impacts of the full industry, including the initial Stage One 100,000 tonnes garnet operation, joined by a further 100,000 tonnes of garnet and 400,000 tonnes of high grade ilmenite. As we have noted above these volumes are thought to be conservative in terms both of the resource available and the market opportunities.

3.3.1 Capital expenditure on the West Coast:

Garnet processing plant (200,000 tonnes)

Capital cost	*$100 million*
Construction employment	*30 FTE jobs over three years*
Indirect employment	*24 FTE jobs over three years*

Ilmenite processing (400,000 tonnes)

Capital cost	*$35 million*
Construction employment	*20 FTE jobs over one year*
Indirect employment	*16 FTE jobs over one year*

Storage / portside

Capital cost	*$20 million*
Construction employment	*10 FTE jobs over one year*
Indirect employment	*8 FTE jobs over one year*

The indications are that the total capital expenditure to develop the mineral sands industry on the West Coast would be about $155 million. This would employ directly 30 FTE jobs over three years another 30 FTE jobs over one year, which is a total of the equivalent of 30 FTE jobs over four years. This direct employment would generate indirect or value chain employment of about 24 FTE jobs over four years, giving a total increase of the equivalent of 54 FTE jobs over four years.

3.3.2 Operations on the West Coast

On a similar basis to the estimates for Stage One above we now estimate the economic impacts of the established industry operating at a level of 600,000 tonnes per year.

Garnet and ilmenite mining, processing and export operations:

Employment	*100 FTEs, permanent*
Indirect employment	*80+ FTEs, permanent*

This implies that the operation of the production and processing industry will increase permanent employment on the West Coast by at least 180 fulltime employed.

Taking account of the different levels of production cost per tonne of the initial garnet plant, the later garnet plant(s) and the ilmenite plant, the expectation is that the total direct production cost will be of the order of $30 million per year. Taking account of the value chain impact the total addition to annual expenditure on the West Coast is expected to be $60 to $70 million.

3.4 Export earnings

The expected export return from the mineral sand exports, being of high grade is that an average return of US$150 to US$200 per tonne will be achieved. This is currently equivalent to NZ$240 to NZ$320 per tonne.

This implies that the value of exports from the 600,000 tonnes exported by this industry would be worth NZ$144 million to $192 million per year.

3.5 Logistics chains, ports and resilience on the West Coast

These aspects will depend upon the logistics chain for the established industry which is found during the Stage One operation to be most financially and economically effective.

A key feasibility need is to determine whether or not it is feasible and financially effective to operate a storage vessel permanently anchored in the oceanic Tasman Sea offshore from a West Coast port. Is it feasible to tranship the volumes of 600,000 tonnes of ore per year, throughout the year in this way?

Equally it is necessary to test with an alternative logistics chain, if it is feasible and viable for a total of 600,000 tonnes to be effectively and efficiently transported from West Coast port to Picton or Port of Taranaki with current and intended upgrades to coastal shipping capacity.

Similarly the costs and feasibility of the transfer from truck or coastal ship to consolidation storage either on the ocean, or at export ports for eventual transfer to the export vessel.

A further importance of these logistics chains is that they both take trucks off the road and by ensuring continued operation of the port, provide ongoing resilient access for the West Coast.

Most of these feasibilities and costs are currently being explored and estimated to ensure a sound basis for implementing Stage One initially.

rmc²

The economic contribution of commercial fishing to the New Zealand economy

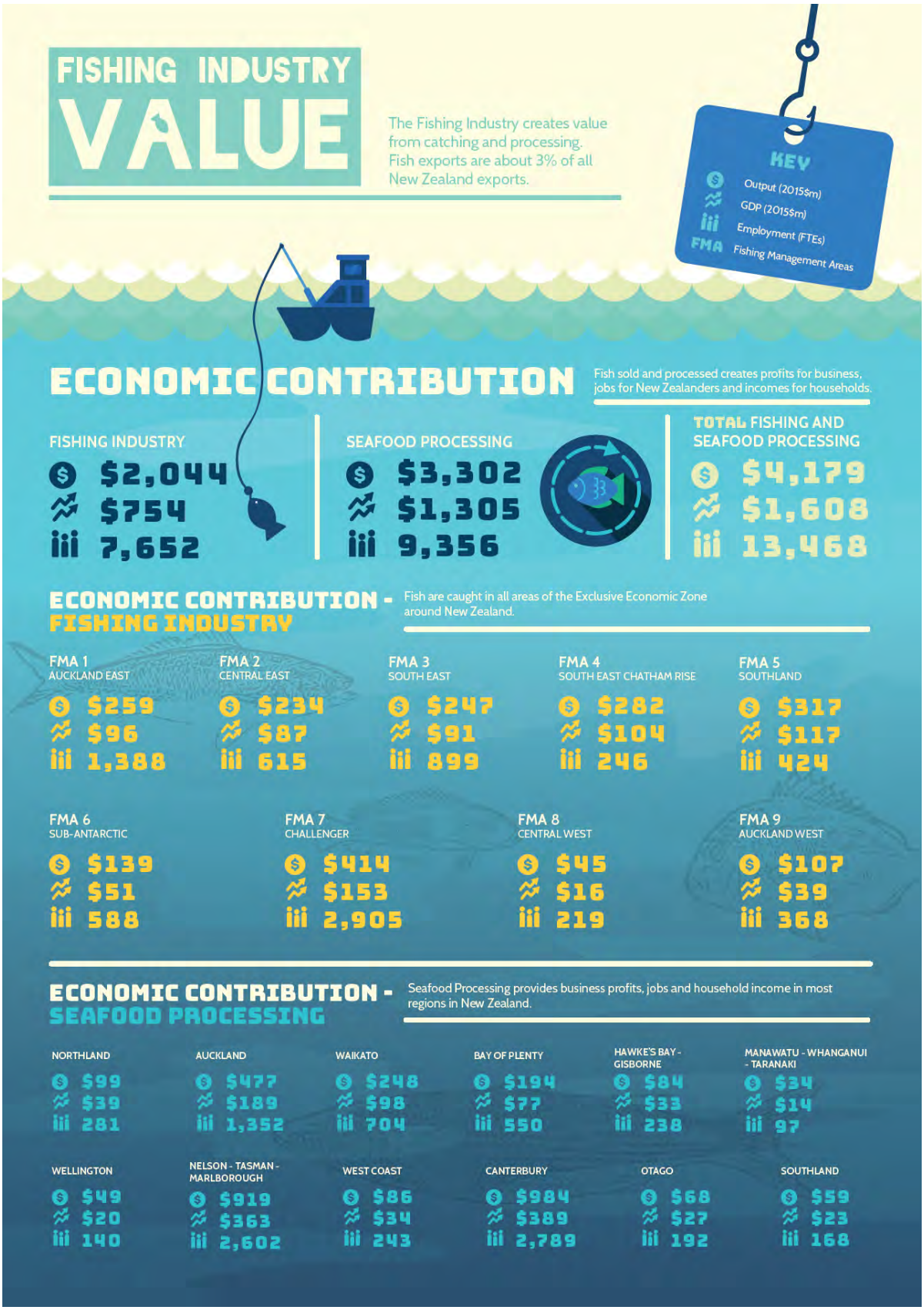
August 2017

www.berl.co.nz

M4KING SEN5E OF
7HE NUMBERS

Authors: Julian Williams, Fiona Stokes, Hugh Dixon and Konrad Hurren

©BERL Reference No: #5643 August 2017


FISHING INDUSTRY
VALUE
The Fishing Industry creates value from catching and processing. Fish exports are about 3% of all New Zealand exports.
KEY
Output (2015$m)
GDP (2015$m)
Employment (FTEs)
FMA Fishing Management Areas
ECONOMIC CONTRIBUTION
Fish sold and processed creates profits for business, jobs for New Zealanders and incomes for households.
FISHING INDUSTRY
$2,044
$754
7,652
SEAFOOD PROCESSING
$3,302
$1,305
9,356
TOTAL FISHING AND SEAFOOD PROCESSING
$4,179
$1,608
13,468
ECONOMIC CONTRIBUTION - FISHING INDUSTRY
Fish are caught in all areas of the Exclusive Economic Zone around New Zealand.
FMA 1 AUCKLAND EAST
$259
$96
1,388
FMA 2 CENTRAL EAST
$234
$87
615
FMA 3 SOUTH EAST
$247
$91
899
FMA 4 SOUTH EAST CHATHAM RISE
$282
$104
246
FMA 5 SOUTHLAND
$317
$117
424
FMA 6 SUB-ANTARCTIC
$139
$51
588
FMA 7 CHALLENGER
$414
$153
2,905
FMA 8 CENTRAL WEST
$45
$16
219
FMA 9 AUCKLAND WEST
$107
$39
368
ECONOMIC CONTRIBUTION - SEAFOOD PROCESSING
Seafood Processing provides business profits, jobs and household income in most regions in New Zealand.
NORTHLAND
$99
$39
281
AUCKLAND
$477
$189
1,352
WAIKATO
$248
$98
704
BAY OF PLENTY
$194
$77
550
HAWKE'S BAY - GISBORNE
$84
$33
238
MANAWATU - WHANGANUI - TARANAKI
$34
$14
97
WELLINGTON
$49
$20
140
NELSON - TASMAN - MARLBOROUGH
$919
$363
2,602
WEST COAST
$86
$34
243
CANTERBURY
$984
$389
2,789
OTAGO
$68
$27
192
SOUTHLAND
$59
$23
168

Commercial Fishing a Significant Contributor to New Zealand Economy

Commercial fishing plays a significant part in the New Zealand economy. This report, prepared for the New Zealand commercial fishing industry, concludes that on average, in the five years to 2015, commercial fishing provided:

- a direct output value of $1,727 million and a total output value of $4,179 million;
- a direct contribution to gross domestic product (GDP) of $544 million and a total GDP contribution of $1,609 million, being 0.7% of New Zealand GDP,
- direct employment of 4,305 full time equivalents (FTEs) and total employment of 13,468 FTEs, being 0.7% of NZ employment; and
- exports of $1,500 million, being New Zealand's fifth largest export commodity by value and representing 3.2 percent of total exports.

Commercial fishing comprises both capture fishing and seafood processing activities. Fishing activities made up about 50 percent of the output value and the GDP contribution of commercial fishing.

The Fishing industry provides raw products for processing, and relies on the Seafood Processing industry to purchase its harvest. The Fishing industry and the Seafood Processing industry are strongly connected and a number of New Zealand companies operate in both. Consequently, important synergies are exploited in their fishing, processing and marketing. Our valuations account for this overlap.

The commercial fishing industry valuations in this report are unique and given in terms of economic contributions:

- for fishing sectors: Deepwater; Inshore; Highly Migratory Species (HMS); and Shellfish
- for fishing gear and species
- for the Fishing industry and the Seafood Processing industry, separately as well as combined
- derived from catch data from the Ministry for Primary Industries
- for "capture" fishing and so excludes the contribution of the aquaculture industry

In the five years to 2015, on average:

- Deepwater fishing produced a total output value of $1,762 million, total contribution to GDP of $679 million and total employment of 5,679 FTEs
- HMS produced a total output value of $197 million, total contribution to GDP of $76 million and total employment of 637 FTEs
- 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
- Shellfish produced a total output value of $1,022 million, total contribution to GDP of $394 million and total employment of 3,291 FTEs

The species that underpin the catch value of the fishing sectors are:

- Deepwater: Hoki (38 percent); Ling (13 percent); Arrow Squid (11 percent)
- HMS: Southern Bluefin Tuna (32 percent); Albacore Tuna (23 percent); Skipjack Tuna (20 percent)
- Inshore: Snapper (15 percent); Blue Cod (9 percent); Tarakihi (6 percent)
- Shellfish: Rock Lobster (63 percent) and Paua (28 percent)

The trawling, seining and netting gear sub-industry is the most significant contributor of value, providing just over 60 percent of the fishing value and economic contribution.

FMA 7 Challenger has the largest average catch value, at $164 million over the five years to 2015, followed by FMA 5 Southland ($149 million) and FMA 1 Auckland East ($120 million). FMA1 has the largest catch value for a North Island FMA. Employment in the Fishing sector is similar in magnitude to that of Beef Cattle Farming. Within the Fishing sector, the Seafood Processing industry has greater employment than the Fruit and Vegetable Processing industry and has similar employment to the Apple and Pear Growing industry.

Contents

Tables

Figures

1 Introduction

The focus of our research is marine fishing, excluding aquaculture.

This report was commissioned by Fisheries Inshore New Zealand Limited (FINZ) to provide an evidence base of the value of commercial fishing to the New Zealand economy in order to inform fisheries management decisions. FINZ is a non-profit organisation that was established by quota owners, annual catch entitlement (ACE) holders and fishers to work together to advocate for their interests in inshore finfish, pelagic and tuna fish stocks. FINZ ensures that New Zealand gains the maximum economic yields from its inshore fisheries resources, managed within a long-term sustainable framework.

This report is unique in that we provide estimates of catch value and economic contribution for segments of the commercial fishing industry by:

- sector - Deepwater, Highly Migratory Species (HMS), Inshore, and Shellfish
- geographic location
- method of catch
- species

We have done this on the basis of the catch data held by the Ministry for Primary Industries (MPI).

In this report, "economic contribution" is defined as the gross change[1] in a nation's existing economy that can be attributed to a given industry. It is expressed in three different ways:

- gross output contribution
- gross domestic product (GDP) contribution
- employment contribution

Economic contributions occur from transactions in a market setting. Commercial fishing refers to commercial (profit-oriented businesses) fishing for the capture (non-farmed) and processing of marine (non-freshwater) fish. The economic contribution of the commercial fishing industry is set in a historical context as well as a global context.

Our study reported here differs in important ways from previous studies of other authors on economic contributions of the commercial fishing industry. In particular, this study:

- estimates direct output for the fishing sector that is specifically designed to cover capture fishing and to exclude aquaculture (in either seafood processing or fishing industries).
- uses a five year average catch and value data, which covers the five years up to 2014/15.
- makes use of the latest version of Statistics New Zealand Input-Output tables, whereas previous studies could not.

Chapter 2 provides an overview of the evolution of the commercial fishing industry. Chapter 3 presents the conceptual and empirical methodologies of the study. Chapter 4 presents catch volumes and value. Chapter 5 reports the economic contribution resulting from catch value. Chapter 6 explains the scale and scope of employment in the commercial fishing industry.

[1] Where the change is often measured in terms of output, value added, and employment.

Key themes presented here are:

- Sector:

  A fundamental difference of this report compared with other previous reports is that it provides sector valuations. Such valuations clearly show the impact on the economy that would arise from fisheries management decisions including variations in the total allowable commercial catch.

- Species

  This report reveals the considerable value that is concentrated in a limited number of species. It reveals the risk to economic value should the catch of those species be reduced by fisheries management decisions.

- Region

  This report highlights the importance of different fishing areas to overall economic value. Value by region is influenced by sector and species. Reduction in fishing activity in one geographical area is not compensated by increased fishing in other areas.

- Employment

  This report shows that employment in the fishing sector is comparable to employment in other sectors important to the economy including for export revenue.

- Methodology

  This study uses a transparent input/output multiplier methodology to calculate economic contribution. The results are easily verifiable and reproducible.

2 Overview

We begin our discussion with descriptive statistics on fisheries resources and the fishing industry including for species, exports and quota.

2.1 Fisheries management in New Zealand

New Zealand's fisheries resources in the territorial sea and the wider Exclusive Economic Zone (EEZ) are managed under the Fisheries Act and the Treaty of Waitangi Settlement Act. The Fisheries Act embodies the concepts of sustainable utilisation of our fisheries resource and ensuring the long-term viability and bio-diversity of the aquatic environment. Environmental considerations are also managed under other enactments such as the Wildlife Act, the Marine Mammals Protection Act, the Marine Reserves Act, and the Resource Management Act. The main environmental impacts are managed under the Fisheries Act. This allows for the resource to be utilised within the limits of ensuring for utilisation of the resources by future generations.

The Quota Management System (QMS) sets the harvest levels of fish species within the EEZ and the Territorial Sea. The main provisions of the QMS are to: maintain fisheries at a sustainable level through the Total Allowable Catch (TAC); allocate that TAC to sectors; allocate the commercial allocation to commercial stakeholders; provide economic incentives and enable rational industry participation; enable quota to be tradable and leasable; track catch against quota via a government monitoring system; and allow quota owners to catch their entitlement. New Zealand currently has 97 fish species or groups of species subject to the QMS. Each species has separate Quota Management Areas (QMA) that are based on biological boundaries. The species are managed as 637 separate fish stocks, a stock being a species within a QMA.

Through the QMS, the Minister for Fisheries sets the annual total allowable catch (TAC) and total allowable commercial catches (TACCs) within this area. The TAC is the total quantity of fishing-related mortality allowed for a QMS stock in a given fishing year. Effectively, the TACs for fish stocks are set so that enough fish remain for breeding at a sustainable level for the future. According to MPI, 83.2 percent of New Zealand's fish stocks are at a healthy status. From the TAC an allowance is made to provide for recreational fishing and customary uses before the TACC is set. The TACC is the total quantity of each fish stock that the commercial fishing industry can catch for that year. Once the TACC is set, the fishing rights are distributed as Annual Catch Entitlement (ACE) to quota owners proportional to their quota shareholdings in that stock. Quota is a right in perpetuity to a share of the available TACC. Both quota and ACE can be traded.

Some components of the QMS are reviewed annually, including the TACCs, deemed values and government levies.

In addition to the species in the QMS, there are a number of other species that are managed outside the QMS. These are stocks that are perceived not to be targets for commercial targets or have no sustainability or utilisation concerns that would warrant their inclusion in the QMS.

The Ministry for Primary Industries (MPI) manages New Zealand's fisheries resources, policy development and fisheries management, including science, monitoring and compliance roles. Strategic and operational fisheries plans are developed for each of New Zealand's fisheries. These give rise to stock assessment and aquatic environment research.

2.2 The fishing industry

Approximately 450,000 tonnes of wild fish are sustainably harvested each year through the Quota Management System (QMS). The export value of this harvest ranges from $1.2 to $1.5 billion per annum. In addition to this,

the aquaculture industry contributes about $350 million per annum. There are 1,178 commercial fishing vessels registered in New Zealand, and 239 licensed fish receivers and processors.[2]

In the 2014 year – the latest year available - there were 309 enterprises engaged in the Fish Trawling, Seining and Netting industry, 348 in the Line Fishing industry, 366 in Other Fishing enterprises, and 246 enterprises in the Rock Lobster and Crab Potting industry. In the 2014 year there were 132 business units in the Seafood Processing industry.

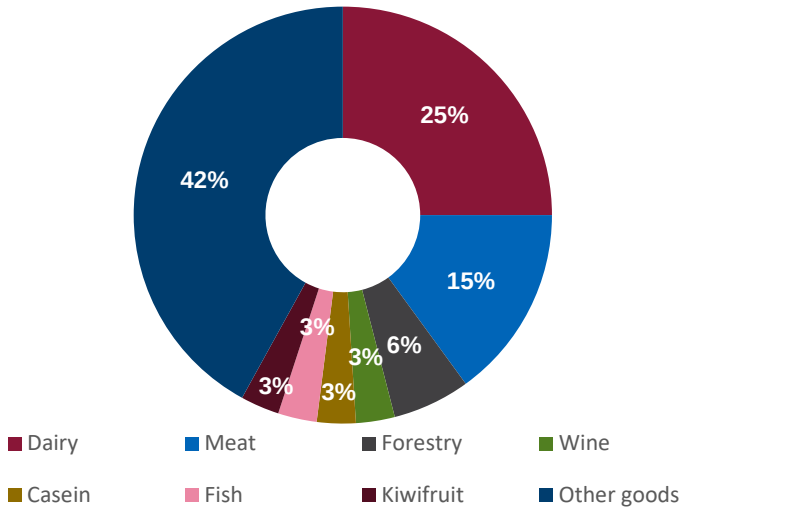
Some 2,200 individuals and companies now own quota as part of the QMS, and this quota is estimated to be worth $3.5 billion. Companies or organisations with large quota ownership in inshore finfish stocks include Te Ohu Kai Moana Trustee Limited, Sanford Limited, Aotearoa Fisheries Limited, Sealord Limited, Talley's Fisheries Limited and Ngai Tahu Fisheries Settlement Limited.

Today the interests of the fishing industry - including rock lobster, paua, deepwater, aquaculture and inshore finfish - are represented by Sector Representative Entities (SREs).[3] Fisheries Inshore New Zealand also represents inshore finfish, pelagic and Tuna quota owners, ACE holders, and commercial fishers. Seafood New Zealand operates as a peak body for the commercial fishing sector.

2.3 Exports

In the March 2016 year, fish exports at $1.5 billion are New Zealand's fifth largest export commodity by value. This represents 3.2% of total exports of $46.6 billion, as shown in Figure 1 below. Of this $205 million are exports of frozen Hoki and $302 million are exports of live rock lobster. Processed seafood makes up a substantial proportion of our fish exports.

Figure 1 Exports, selected merchandise, year to March 2016



Source: *Statistics* New Zealand

[2] For further information see, www.fishserve.co.nz.

[3] For further information see, www.seafoodnewzealand.org.nz/industry/our-sectors/

3 Methodology

In this chapter we present the conceptual framework and empirical methodology used to estimate the economic contribution of commercial fishing to the New Zealand economy. We compare our methodology to those for previous studies, to explain differences in methods that produce different results.

3.1 Definition of the commercial fishing

In this report "commercial fishing" means the industrial activity of the combination of certain sub-groups of the Fishing industry and the Seafood Processing industry. These are described fully in Appendix A. The relevant sub-groups of the Fishing industry are: (i) Fish Trawling, Seining and Netting; (ii) Line Fishing; (iii) Rock Lobster and Crab Potting; Other Fishing. We refer to the combination as the combined Fishing and Seafood Processing industry.

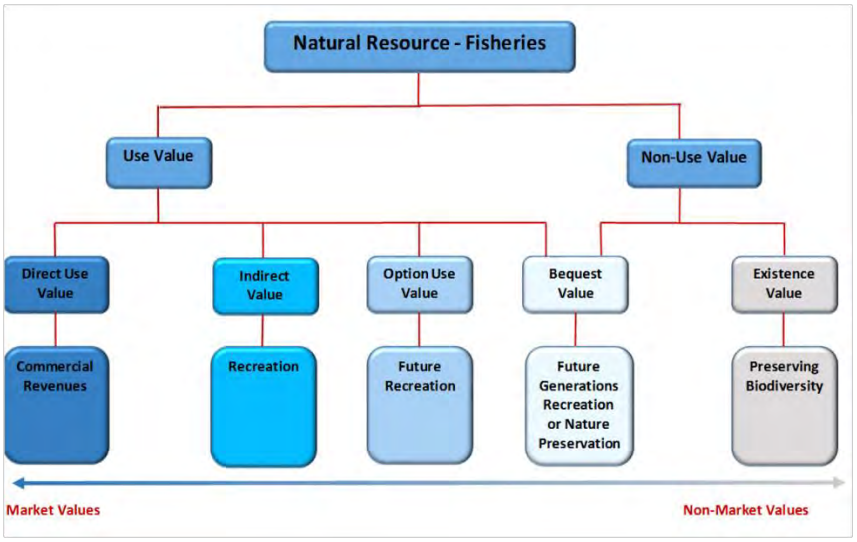
3.2 Economic contribution and economic value

In order to derive the economic contribution of the combined Fishing and Seafood Processing industry (in Chapter 5), we first establish the respective gross output values (in Chapter 4) of each of the Fishing industry (as we has defined it) and the Seafood Processing industry. Notably, these are both only concerned with capture marine fishing. These gross output values are calculated using estimates of greenweight catch data multiplied by estimates of port prices in the case of the Fishing industry and by estimates of export prices in the case of the Seafood Processing industry. The output of the Fishing industry is largely an input of the Seafood Processing industry. We account for this overlap in deriving the economic contribution of the combined Fishing and Seafood Processing industry.

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.

Economic contribution is one part of the suite of the total economic value of a fishery resource, as shown in Figure 2.

Figure 2 Total economic value of a fisheries resource



In general, the total economic value of a natural resource is comprised of:

- Use values derived from the actual use of the resource together with other factors in production, including:
    - direct use - actual use resulting in a marketed output
    - indirect use - recreational use resulting in a non-marketed output
    - option use - the right to use the resource in the future for direct or indirect uses
    - bequest use - the conferring of a right to another to use in the future.
- Non-use values where the values are independent of the individual's present use, including:
    - bequest value - the conferring of a right on another to enjoy in the future
    - existence value – the enjoyment or displeasure in the present of knowing that a resource exists.[4]

The use value from commercial fishing can be measured with the associated market-based transactions. The economic contribution is the measure of the use value.

As a comparison, the non-market use value of recreational fishing is not part of the measure of its economic contribution. The non-market use value can be estimated by the willingness of recreational fishers to pay for their enjoyment. This is not easily measured and will differ for different people.

Option values are linked to potential future uses. They can change with changes in future conditions. In the present if few substitutes exist for a use, then the option value is high. In the future if many substitutes are likely to be available, then the future option value is likely to be low.

Bequest values can have either "use" or "non-use" values. This depends on whether the future recipient is able to "use" or simply "enjoy" the natural resource.

Existence values are personal and not objective. They can be simultaneously beneficial and detrimental to different people. Hence changes in them can result in an increase or decrease in value to each person. For example, one person may enjoy rainfall, while another may take displeasure in it.

3.3 Components of economic contribution

Since the economic contribution of an activity is measured in a market setting, the process for its measurement is well-defined and there are a number of useful guiding principles. These include the following:[5]

- the definition of the activity should correspond with the industry classification of an official statistics agency. This means that there is a clear link to the impact of this activity on the national accounts in terms of output, GDP, wages and employment
- the share of the activity that is directly relevant should be determined because not all industry activities are solely concerned with one type of output. For example, not all boat building is marine-based
- multiple counting of the impact of an activity must be avoided
- land-based processing/distribution of resources should be included, where the resource does not undergo drastic transformation. For example, seafood marketing and processing should be included.

[4] SACES. (1999).

[5] GSGislason (2007).

Commercial fishing is a collection of market-based activities. These activities are set within the industries that make-up the combined Fishing and Seafood Processing industry. As noted above, in this study we define the Fishing and Seafood Processing industry as consisting of five sub-industries: (i) Fish Trawling Seining and Netting; (ii) Line Fishing; (iii) Other Fishing; (iv) Rock Lobster and Crab Potting; and (v) Seafood Processing.

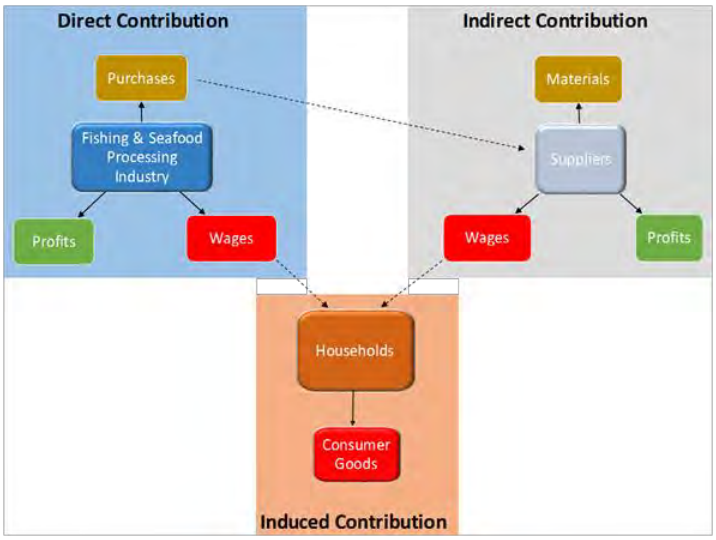
Commercial fishing generates revenues (outputs) and it has associated costs. It requires capital investment in vessels, and the wages it pays and the number of people employed are well-defined. Firms in this industry purchase goods and services and create revenue in closely associated firms, such as Ship Building and Repairs, and in more distantly related firms, such as in Road Transportation.

The economic contributions of the combined Fishing and Seafood Processing industry are made up by (refer Figure 3):

- a direct contribution resulting from revenue earned by the combined Fishing and Seafood Processing industry
- an indirect contribution resulting from revenue earned by firms supplying goods and services to commercial fishers
- an induced contribution resulting from income earned by employees of commercial fishing firms and supplier firms

Throughout this report, we refer to these direct, indirect and induced economic contributions. We also refer to them in the aggregate as the total economic contribution.

Figure 3 Economic contribution of the Fishing and Seafood Processing industry



3.4 Measuring economic contribution

We use multiplier analysis using multipliers derived from inter-industry input-output tables to measure the direct, indirect and induced effects of additional[6] industrial activity or expenditure. There are three different and complementary measures: gross output, GDP; and full-time equivalent (FTE) employment.

[6] Industrial activity and expenditure is "additional" in the sense that its impact does not displace an existing impact.

3.4.1 Measures

Gross Output Multiplier

Gross output is a measure of the value of production, built up through the national accounts as a measure, in most industries, of gross sales or turnover.

GDP (Value added) Multiplier

The GDP (value added) multiplier measures the increase in value generated along the production chain, which, in national aggregate, totals Gross Domestic Product (GDP). Value added is made up of the sum of:

- compensation of employees (i.e. salaries and wages) and self-employed
- income from self-employment
- taxes on production and imports less subsidies
- gross operating profit (accounting for operating expenses and depreciation).

Employment Impact Multiplier

The employment impact multiplier measures the number of FTE roles that are created by industrial activity. It provides a measure of total labour demand associated with gross output.

An FTE is an estimate of numbers employed assuming full-time positions equal one employee and part-time positions equal 0.5 of an employee.

3.4.2 Overview of output calculation

We calculated the output values of the catch for use with the input-output multipliers. Our method is fully explained in chapter 5. In summary:

- MPI commercial catch data by greenweight (kg) is assembled by species, fishing management area (FMA), method and sector. Such data exclude records where any one of these categories is missing. Hence the corresponding greenweight of the aggregate is less than the total of all commercial catch
- accordingly greenweight data are scaled up to reconcile with the total catch greenweight
- output value (catch value) corresponding to the fishing sector is calculated by multiplying port process by greenweight
- output value (catch value) corresponding to the seafood processing sector is calculated by multiplying export prices by greenweight
- output value (catch value) corresponding to the combined Fishing and Seafood Processing industry is calculated using revised multipliers to account for the overlap between them due to Fishing industry outputs being inputs to the Seafood Processing industry.

3.4.3 Impacts

Direct, indirect and induced effects

The underlying logic of multiplier analysis is relatively straightforward. An initial expenditure (direct effect) in an industry creates flows of expenditures that are magnified, or "multiplied", as they flow on to the wider economy.

This flow occurs in two ways (refer Figure 3):

- the industry purchases materials and services from supplier firms, who in turn make further purchases from their suppliers. This generates an indirect (upstream) effect
- people employed in the direct development and in firms supplying services earn income (mostly from wages and salaries, but also from profits) which, after tax is deducted, is then spent on consumption. There is also an allowance for saving by households. These are the induced (downstream) effects.

Hence, for any amount spent in an area (direct effect), the actual output generated from that spend is greater once the flow-on activity generated (indirect and induced effects) is taken into account.

Leakages

Generally the more developed, or self-sufficient an industry in a region (for regional analysis) or country is, the higher the multiplier effects. Conversely, the more reliant an industry is on supply inputs from outside the region or country, the lower the multipliers. These outside factors can be referred to as "leakages".

For example, if a house was purchased in the Taranaki region, and all the materials and labour were sourced in the Taranaki region, and all the materials and labour that went into making the housing materials were made in the Taranaki region, and then the labour spent their wages or salaries in the Taranaki region, again on goods or services produced solely in the Taranaki region, then all the multiplier effects would be captured by the Taranaki region. Where inputs or outputs come from outside the Taranaki region, leakages are said to exist, and the multiplier effect is reduced.

3.4.4 Limitations of multiplier analysis

Partial equilibrium analysis

Multiplier analysis is only a "partial equilibrium" analysis, assessing the direct and indirect effects of the development being considered, without analysing the effects of the resources used on the wider national and regional economy.

In particular, it assumes that the supply of capital, productive inputs and labour can expand to meet the additional demand called forth by the initial injection and the flow-on multiplier effects, without leading to resource constraints in other industries. These constraints would lead to price rises and resulting changes in the overall patterns of production between industries.

To assess inter-industry impacts in full would require economic modelling within a "general equilibrium" framework. Applying such models becomes more relevant where the particular development is considered significant within the overall economy.

Additionality

Related to "partial equilibrium", using multipliers for economic impact assessments assumes that economic impact is caused by the industrial activity and that it will not displace existing activity. That is, the event is additional to existing activity. If there limited causation and partial additionality, the economic impact is less than that measured by the multiplier and this must be accounted for in the calculation.

Impact

Again related to "partial equilibrium", multiplier analysis assumes that an industrial activity will not have an impact on relative prices. However, in a dynamic environment, it can be assumed that a large industrial activity would have an impact on demand and supply and hence prices. Hence, the larger the industrial activity and the more concentrated it is in a single industry or region, the more likely it is that the multipliers would give an inaccurate analysis of impacts. For example, if multiplier analysis was used to determine the effect of residential

building construction nationally it would likely be inaccurate as residential building construction accounts for over six percent of GDP.

Aggregation

Industries outlined in input-output tables are aggregates of smaller sub-industries. Each sub-industry has unique inputs and outputs. The higher the level of aggregation the less accurate is the recognition of these inputs and outputs. Thus, if determining the multiplier effect of a very specific industrial activity using highly aggregated data, there will be a lower level of accuracy. Similarly, if an industrial activity encompasses a range of industries but are measured using multipliers from a single industry the accuracy level will also diminish.

Regions and boundaries

The smaller or less defined a region and its boundaries, the less accurate the multiplier analysis will be. Similarly, the easier it is to move across boundaries, the less accurate the analysis will be. For example, at the national level, the multipliers will be very accurate as it is easy to determine the inputs and outputs crossing through a countries borders.

Similarly, accuracy diminishes when locations of industrial activities and households are not identical. As smaller regions without obvious geographic boundaries are selected, more assumptions need to be made and the multipliers become less accurate. For example, an individual could work in the Auckland region but live in the Waikato region.

3.4.5 Industry multipliers

Input-Output tables produced by Statistics New Zealand have 106 industries representing the total economy. This means that there is one multiplier industry that covers the entire fishing and aquaculture catching and harvesting industries. It was impractical for this project to develop individual multipliers for the fishing industry separately from the aquaculture industry. Hence we have used “fishing and aquaculture” multipliers for our data concerned with only “fishing”. We have used the latest 2013 Input-Output tables produced by Statistics New Zealand in April 2016, to generate national level multipliers for the fishing and aquaculture, and the seafood processing industries, as shown in Table 1.

Table 1 Multipliers by industry

Multiplier Industry	Indirect	Induced	Total
Fishing and aquaculture			
Output	0.99	0.27	2.26
Value Added	1.46	0.50	2.96
Employment	1.52	0.49	3.01
Seafood processing			
Output	1.14	0.39	2.54
Value Added	1.35	0.61	2.96
Employment	1.46	0.60	3.07

The above multipliers were used to calculate our estimates for the national economic impact of the fishing and seafood processing industries separately. For our estimates of the combined economic value of the joint fishing and processing industries, we created overall multipliers for each of the calculations in the report. These were developed in a way that seeks to eliminate the impact of any double counting between the fishing and the seafood processing industries.

3.5 Prior Studies

In February 2016, the New Zealand Institute of Economic Research (NZIER, 2016) produced a report for the Ministry of Primary Industries on the *Economic impact of the seafood sector*. This report looked to update estimates of direct and flow-on impacts of the seafood sector (aquaculture, capture fishing and seafood processing) on the New Zealand economy and each regional council area. This report was for the 2013/14 year and updated an earlier report produced by Market Economics in 2008.

Our economic impact estimates are not directly comparable to those produced by NZIER, because of the following reasons:

- this report's estimate of direct output for the combined Fishing and Seafood Processing industry is specifically designed to cover capture marine fishing and to exclude aquaculture. The NZIER report includes aquaculture in its estimates
- this report uses a five year average catch and value data, which covers the five years up to 2014/15. This means that we use different base data to the NZIER report which uses the 2013/14 year. This means that even if BERL included aquaculture estimates into the calculations, we would have different direct outputs for the fishing and seafood processing industries different to NZIER's. To illustrate this: we would estimate a BERL fishing output at $903 million and this would compare with an estimate at $1,110 million, calculated using the NZIER approach. Similarly, we would estimate BERL Seafood

Processing output at $1,302 million and this would compare with $1,947 million calculated using the NZIER approach

- the NZIER estimates were based on data for the seafood sector including both fishing and aquaculture obtained by the Statistics New Zealand's Annual Enterprise Survey. The information is only available on an aggregate basis and cannot be disaggregated to sector or species outputs
- while the NZIER report was published in February 2016, a new 2013 version of the Input-Output Tables produced by Statistics New Zealand was released in April 2016. BERL is making use of the latest version of Statistics New Zealand Input-Output tables, while NZIER used the previous 2006 version of the Input-Output tables. As a result, multipliers for the Fishing and Seafood Processing industries in our calculations are different to those used by NZIER. For example, NZIER have a type II multiplier for fishing and aquaculture output of 2.42, while for BERL the multiplier is now 2.26. That change results in lower values for the BERL analysis when compared to the earlier NZIER analysis
- NZIER estimates do not account for the interdependency between the Fishing industry and the Seafood Processing industry when producing their aggregate seafood sector numbers. One of the main input industries into seafood processing is fishing and aquaculture, and one of the main output industries from fishing and aquaculture is seafood processing. This means that the individual total economic impacts for each industry (Gross output, GDP and Employment) overlap those from the other industry. BERL has estimated that the approximate overlap between the industries is around 22 percent. We have therefore removed this portion when merging the industries into a combined Fishing and Seafood Processing industry to avoid double counting and therefore potentially inflating our estimate of the economic contribution.

Table 2 below shows that the data from the different studies are not comparable.

Table 2 GDP for Seafood Sector, NZIER and BERL reports

	NZIER (incl Aquaculture)	BERL (excl Aquaculture)
Direct ($m)	896	544
Indirect ($m)	1,345	756
Induced ($m)	282	308
Total ($m)	**2,524**	**1,608**

4 The volume and value of the commercial catch

This section of our report discusses the commercial catch values from which the economic contribution of commercial fishing was estimated.

The commercial catch values for the economic contribution of the Fishing industry are based on port prices and catch volumes supplied by MPI. We have adjusted up the port prices and catch volumes to account for missing catch volume data in the detailed MPI dataset; and to reconcile the total output calculated using port prices to the gross output reported for the Fishing industry in the Annual Enterprise Survey of Statistics New Zealand. These methodologies are explained further below.

The commercial catch values for the economic contribution of the Seafood Processing industry are based on export volume, and export prices. These may be subject to some imprecision or uncertainty but accepted, in absence of any other information, to be indicative of relative value. Port prices are also accepted by the industry in respect of levy allocation between stocks. It would not be acceptable to use port prices to determine the value of the Seafood Processing industry, because export prices include value added by processing and marketing. Port prices are believed to be better indicators of revenue to the Fishing industry, which catches and harvests the fish. Again, this methodology is explained in more detail below.

4.1 Commercial catch data

MPI supplied commercial catch volumes in kilograms (total greenweight) by year, month, species, fishing management area, statistical area, fishing method, distance from shore, vessel length and 2014/15 port prices by species and fishing management area, for all target species, caught within the 200 nautical mile EEZ.

This dataset covered five fishing seasons from October 2010 to September 2015. We therefore calculated a five year average to smooth out annual fluctuations.

4.2 Commercial catch volumes

The MPI data comprised about 92 percent of the total commercial catch data. As noted above, this was a consequence of missing data at the level of detail we requested. By comparison, MPI report a higher aggregate catch volume when the data is segmented by fish stock and FMA only. We therefore adjusted our catch data to reconcile species totals with those reported by MPI.

To do this we adjusted our total catch per year to match: (i) the total reported commercial catch per year for these species and (ii), the total reported commercial catch numbers for each fishing year for 54 of the main species caught in New Zealand. These 54 species include: Hoki, Snapper, Ling, Arrow Squid, Southern Blue Whiting, Orange Roughy, Tarakihi, Flatfish, Jack Mackerel, Southern Bluefin Tuna, Barracouta, SkipJack Tuna, Blue Mackerel, Silver Warehou, Hake and Spiny Red Rock Lobster.

These 54 species represented around 93 percent of the total catch across the five fishing years. For example, as a result of the adjustment, the largest catch species Hoki went from a reported catch in our detailed dataset of 157 thousand tonnes in the 2014/15 fishing year to an adjusted total catch of 162 thousand tonnes in the 2014/15 fishing year.

For the remaining fish species, we allocated the balance of the total reported catch to their respective proportions. For example, Sunfish had a reported catch in the 2014/15 fishing year of 205 thousand tonnes in the initial dataset. This represented 6.9 percent of the remaining fish catch after the 54 main species were removed. This percentage was then multiplied by 29.94 thousand tonnes, being the balance in 2014/15 data after the 54 main species were removed. Consequently, the adjusted total for Sunfish in the 2014/15 fishing year was 251 thousand tonnes.

Overall these adjustments raised the total average catch over the five fishing years from 400.79 thousand tonnes to 434.34 thousand tonnes.

4.3 Commercial catch volumes by FMA

Table 3 shows the distribution of the adjusted catch by FMA. A map showing the FMAs is provided in Appendix B. In total across all 10 FMAs an average of 434.3 thousand tonnes of fish is caught annually.

FMA 7 Challenger had the largest average catch of 104 thousand tonnes over the five years analysed. The second largest catch was in FMA 3 South East Coast, with 66 thousand tonnes, and the third was FMA 6 Sub-Antarctic with 60 thousand tonnes. These three FMAs are fished from South Island ports.

The largest catch volume for a North Island FMA is the 39 thousand tonnes caught in FMA 1 Auckland East.

Table 3 Commercial catch volume by FMA

Fishing Management Area	Total Commercial Fish Catch (tonnes)					
	2010-11	2011-12	2012-13	2013-14	2014-15	Average
1 Auckland East	38,287	37,320	39,160	37,626	43,138	39,106
2 Central East	28,990	27,049	31,846	31,241	31,533	30,132
3 South East Coast	70,148	65,104	68,120	65,753	62,129	66,251
4 South East Chatham Rise	38,084	45,105	37,912	42,463	47,315	42,176
5 Southland	49,198	56,588	53,010	44,196	45,403	49,679
6 Sub-Antarctic	71,572	60,444	58,319	59,555	52,388	60,456
7 Challenger	86,681	97,111	97,281	115,579	123,484	104,027
8 Central West	24,880	25,613	26,795	24,739	18,562	24,118
9 Auckland West	18,486	17,340	18,617	16,202	21,227	18,375
10 Kermadec	43	26	1	11	7	18
Grand Total	**426,369**	**431,699**	**431,061**	**437,365**	**445,187**	**434,336**

Source: Ministry for Primary Industries & BERL

4.4 Commercial catch values by FMA

Port prices paid by licenced fish receivers in the 2014/15 fishing season were used to estimate the value of the adjusted fish catch. This value is an estimate of the revenue of the Fishing industry for the detailed segments of the dataset.

These detailed values were then aggregated by the four methods of fishing within the Fishing industry: (i) Trawling, Seining and Netting; (ii) Line Fishing; Other Fishing; and Rock Lobster and Crab Potting. The detailed values making up each aggregate value were then adjusted so that the aggregate reconciled with the

corresponding values for the same industries, as reported in the Annual Enterprise Survey (AES) of Statistics New Zealand.

Only information on total revenue and total expenditure is available from the AES. More detailed information on the make-up of the revenue and expenditure is available at the "division" level of the AES. However, at this higher level of aggregation, all the fishing industries are merged. In addition they are merged with aquaculture industries. This is not useful because we have specifically excluded aquaculture from our analysis.

Overall this industry value adjustment sees the average value of the commercial fish catch increase from our initial estimate of $646 million to $903 million, as shown in Table 4.

Table 4 Commercial catch value (adjusted by FMA)

Fishing Management Area	Estimated value of fish ($millions)					
	2010-11	2011-12	2012-13	2013-14	2014-15	Average
1 Auckland East	125	122	121	116	116	120
2 Central East	108	97	109	110	105	106
3 South East Coast	114	108	110	105	110	110
4 South East Chatham Rise	109	117	107	120	126	116
5 Southland	148	159	154	140	142	149
6 Sub-Antarctic	87	73	68	71	62	72
7 Challenger	146	161	155	171	185	164
8 Central West	23	23	24	23	20	23
9 Auckland West	43	43	46	44	48	45
10 Kermadec	0.3	0.2	0.0	0.1	0.0	0.1
Grand Total	**904**	**904**	**895**	**900**	**914**	**903**

FMA 7 Challenger continues to have the largest average catch value, at $164 million over the five year period. The second largest catch is in FMA 5 Southland, at $149 million and the third is FMA 1 Auckland East, at $120 million. Again, this is the largest catch value for a North Island FMA.

4.5 The value of outputs from the Seafood Processing industry

The value of the catch to the Fishing industry (the catcher of the fish) is different to the value to the Seafood Processing industry, which purchases the catch at port process from the Fishing industry and then adds further value through processing and export marketing. To illustrate this with examples, we compare the following catch and export revenues:

Spiny Red Rock Lobster: average catch revenue of $202 million, using port price of $72 per kg and average export revenue of $286 million, using export prices of $102.22 per kg.

Scampi: average catch revenue of $11 million, using port price of $13.8 per kg and average export revenue of $21 million, using export prices of $27.6 per kg.

Paua: average catch revenue of $15 million, using port price of $16.5 per kg and export revenue of $23 million, using export prices of $24.75 per kg.

Snapper: average catch revenue of $40 million, using port price of $6.24 per kg and export revenue of $59 million, using export prices of $9.34 per kg.

The output values from the Seafood Processing industry are likely to reflect export prices rather than port prices. Export volume and value data for the 2013, 2014 and 2015 years were provided by Seafood New Zealand, which sourced the data from Statistics New Zealand.

These data showed the average export volume and average export price per kilogram for 50 species. These 50 species included Hoki, Snapper, Rock Lobster and others that represent approximately 80 percent of the total commercial catch. For example, this dataset showed that around 90 percent of the Hoki caught annually is exported. It also showed that the average price per kilogram for exported Hoki in 2015 was 2.4 times the 2014/15 port price.

As part of our calculations to determine the average export price per kilogram, we converted the export weights to greenweight. This allowed us to assess and compare the price per kilogram across the different export products on the same basis.

Of the 50 species, only four species had less than 10 percent of their annual total catch exported. Of the remaining 46 species, another five species had between 10 and 20 percent of their total annual catch exported, and 33 species had more than 50 percent of their total annual catch exported. On average across these 50 species, the export price was around 170 percent higher than the port price.

We estimated a price per kilogram in order to estimate the Seafood Processing output value. To do this we assumed:

- for the 46 fish species that had more than 10 percent of their total catch exported, every kilogram caught per year would attract the export price when sold by the Seafood Processing industry, irrespective of it being exported
- all other species attracted a mark-up of 150 percent on their port price, given that the 50 species had an average mark up of 170 percent when exported, irrespective of it being exported.

National aggregates of data provided by the AES are not useful in this study. This is because the AES revenue data for the Seafood Processing industry includes revenue for the aquaculture industry that is not identifiable. At best we can use the total revenue data from the AES as a guide as to the maximum value of the Seafood Processing industry dealing with the fishing industries. In the 2014/15 fishing year, the Seafood Processing industry in total had an annual revenue of $1.9 billion.

4.5.1 Deepwater and inshore fishing catch volumes and values

Across the deepwater and inshore fisheries, there are four sectors: Deepwater, Highly Migratory Species (HMS), Inshore, and Shellfish. There are a variety of species of fish that comprise these sectors. To provide an understanding on the main species of fish that are included in each sector, we provide Tables 5, 6, 7, and 8 for the average catch volumes and values, for the five years to 2015. Note that the values reported are values to the

catcher, based on port prices. Hence they do not include any value attributable to processing or export marketing.

As shown in Table 5, the top commercial fish species for deepwater fishing is Hoki, followed by Ling and Arrow Squid. The bulk of the value of the deepwater fishery is tied to its three main species, in particular Hoki. This fish by itself accounts for 38 percent of the deepwater fisheries value, despite having an annual average catch of 138 thousand tonnes, or 45 percent of the total catch of the fishery.

The top 10 fish species account for 92 percent of the total value of the deepwater fishery, and 82 percent of the volume of the commercial catch.

Table 5 Catch and value of deepwater commercial catch, 2010-2015

Fish Species	Total Commercial Deepwater Fish Catch (tonne) Average (2010-2015)	Estimated value of fish ($millions) Average (2010-2015)
Hoki	137,672	145
Ling	13,125	51
Arrow Squid	25,702	43
Southern Blue Whiting	33,175	26
Orange Roughy	6,603	22
Oreo	12,159	15
Scampi	758	15
Hake	6,807	11
Silver Warehou	8,168	9
Alfonsino	2,695	8
Sub Total	**246,864**	**346**
Other Fish species	56,000	32
Grand Total	**302,755**	**377**

Source: Ministry for Primary Industries & BERL

As shown in Table 6, the top commercial fish species for inshore fishing is Snapper followed by Blue Cod and Tarakihi.

The top 10 fish species account for 50 percent of the total value of the inshore finfish fishery and 50 percent of the volume of the commercial catch. The bulk of the value of the inshore finfish fishery is tied to its three main

species, in particular Snapper. This fish by itself accounts for 15 percent of the inshore finfish fisheries value, despite having an annual average catch of just 6.3 thousand tonnes.

Table 6 Catch and value of inshore finfish commercial catch, 2010-2015

Fish Species	Total Commercial Inshore Catch (tonne) Average (2010-2015)	Estimated value of fish ($millions) Average (2010-2015)
Snapper	6,342	60
Blue Cod	2,232	36
Tarakihi	5,701	23
Flatfish	2,652	20
Hapuku & Bass	1,428	11
Bluenose	1,263	11
School Shark	3,231	11
Jack Mackerel	25,036	11
Gurnard	3,625	10
Trevally	3,382	8
Sub Total	**54,892**	**201**
Other Fish species	54,000	203
Grand Total	**109,317**	**404**

Source: Ministry for Primary Industries & BERL

As shown in Table 7, the top commercial fish species by value within HMS fishing is Southern Bluefin Tuna, followed by Albacore Tuna and Skipjack Tuna. The annual catch of these three species combined is worth more than $30 million to the Fishing industry.

The top 8 fish species account for 99 percent of the total value of the HMS fishery, and 94 percent of the volume of the commercial catch. The bulk of the value of the HMS fishery is tied to its three main species, in particular Southern Bluefin Tuna. This fish accounts for 32 percent of the HMS fisheries value, despite having an annual average catch of just 766 tonnes.

Table 7 Catch and value of Highly Migratory Species (HMS) commercial catch, 2010-2015

Fish Species	Total Commercial HMS Fish Catch (tonne) Average (2010-2015)	Estimated value of fish ($millions) Average (2010-2015)
Southern Bluefin Tuna	766	14
Albacore Tuna	2,847	10
SkipJack Tuna	12,021	9
Swordfish	704	6
Bigeye Tuna	131	3
Pacific Bluefin Tuna	19	1
Ray's Bream	394	1
Moonfish	75	0.2
Sub Total	**16,957**	**44**
Other HMS species	1,000	0.5
Grand Total	**17,953**	**44**

Source: Ministry for Primary Industries & BERL

As shown in Table 8, Rock Lobster is the top commercial fish species by value within Shellfish, followed by Paua and Kina. There are seven species consistently caught in this fishery, with just 820 kilograms of other shellfish caught annually. The bulk of the value of the shellfish fishery is provided by Rock Lobster and Paua. These shellfish account for 91 percent of the shellfish fisheries value.

Rock lobster is comprised entirely of three species: the spiny red rock lobster, packhorse rock lobster, and the Spanish lobster. Of these three species, the spiny red rock lobster is worth $130.5 million a year on average, while the packhorse rock lobster is worth $1.2m a year on average, and Spanish lobster has an insignificant value. The spiny red rock lobster comprises 99 percent of the overall value of the rock lobster fishery by itself.

Table 8 Catch and value of Shellfish and Rock Lobster commercial catch, 2010-2015

Fish Species	Total Commercial Shellfish Catch (tonne) Average (2010-2015)	Estimated value of fish ($millions) Average (2010-2015)
Rock Lobster	2,839	132
Paua	926	58
Kina	853	7
Scallops	101	6
Cockles	1,107	4
Sea Lettuce	384	0.7
Paddle Crab	115	0.5
Sub Total	**6,325**	**209**
Other shellfish species	820	1
Grand Total	**7,149**	**210**

Source: Ministry for Primary Industries & BERL

5 The economic contribution of commercial fishing

As noted in Chapter 3, economic contribution is measured in three complementary ways using: gross output; GDP (value added); and employment. In this chapter economic contribution of the combined Fishing and Seafood Processing industry is reported for the four sectors: Deepwater; HMS; Inshore; and Shellfish. Economic contribution is calculated as described in section 3.3.2, using input-output multipliers. The multipliers of the combined Fishing and Seafood Processing industry adjust for the input-output overlap between the Fishing industry and the Seafood Processing industry. The output values used in the multiplier calculation are the values of the catch to each of the Fishing industry and the Seafood Processing industry calculated using estimates of port prices and export prices respectively as described above.

Table 9 Economic contribution of commercial fishing, 2015

Sector	Measure	Direct	Indirect	Induced	Total
Deepwater (excl HMS)	Output (2015$m)	728	785	249	1,762
	GDP (2015$m)	230	319	130	679
	Employment (FTEs)	1,813	2,796	1,070	5,679
HMS	Output (2015$m)	82	88	28	197
	GDP (2015$m)	26	36	14	76
	Employment (FTEs)	204	313	119	637
Inshore (Finfish only)	Output (2015$m)	496	533	168	1,197
	GDP (2015$m)	156	217	88	460
	Employment (FTEs)	1,242	1,898	721	3,861
Shellfish	Output (2015$m)	421	456	145	1,022
	GDP (2015$m)	133	185	76	394
	Employment (FTEs)	1,045	1,622	624	3,291
Grand Total	**Output (2015$m)**	**1,727**	**1,862**	**590**	**4,179**
	GDP (2015$m)	**544**	**756**	**308**	**1,608**
	Employment (FTEs)	**4,305**	**6,630**	**2,534**	**13,468**

The total economic contribution of commercial fishing, represented by the combined Fishing and Seafood Processing industry, as an average for the five years to 2015 was comprised of:

- output of $4,179 million
- GDP (value added) of $1,608 million
- Employment (FTEs) of 13,468.

Deepwater and HMS fishing together have a similar impact on total GDP contribution as do Inshore and Shellfish fishing together. Rock Lobster makes up about 79 percent of the total GDP contribution of the Shellfish sector. Snapper contributes about 19 percent of the total GDP contribution of the Inshore sector.

The following section 5.1 provides separate tables of economic contribution for each of:

- the Fishing industry, which catches the fish
- the Seafood Processing industry which processes the catch
- the combined Fishing and Seafood Processing industries seen as one integrated industry.

Then sections 5.2 and 5.3 provide tables of economic contribution by fishing sector and fishing method respectively.

In the appendices to this report, to complement this chapter, we provide:

- Appendix A: definitions of industry classification
- Appendix B: a fishing management area map
- Appendix C: economic contribution of the Fishing industry by FMA
- Appendix D: economic contribution of the Seafood Processing industry by region.

5.1 The economic contribution, fishing, seafood processing, and combined

Over the five years to 2015, on average the Fishing industry (harvesting of fish only) earned $903 million in gross revenue and directly employed approximately 2,544 full-time equivalents (FTEs).[7] This means that the Fishing industry contributed a total of $754 million in GDP to the New Zealand economy, and employed approximately 7,652 FTEs. A detailed breakdown of this economic impact by FMA is shown in Appendix C.

Table 10 Economic contribution of the Fishing industry

	Direct	Indirect	Induced	Total
Output (2015$m)	903	897	244	2,044
GDP (2015$m)	255	372	127	754
Employment (FTEs)	2,544	3,860	1,248	7,652

[7] A full-time equivalent is defined differently to a count of a person employed and so the employment numbers here differ from the Annual LEED data, even though they are derived from the same database.

The Seafood Processing industry (processing of fish only) purchases raw fish and seafood from the Fishing industry. It then adds value by processing these raw products for export or domestic consumption. Over the five years to 2015, on average, the Seafood Processing industry earned a gross revenue of $1.3 billion and employed approximately 3,051 FTEs. A detailed breakdown of this economic impact by FMA is shown in Appendix D.

Table 11 Economic contribution of the Seafood Processing industry

	Direct	Indirect	Induced	Total
Output (2015$m)	1,302	1,486	514	3,302
GDP (2015$m)	442	595	268	1,305
Employment (FTEs)	3,051	4,466	1,839	9,356

A large amount of seafood processing occurs in land-based factories. Employment counts by region (Annual LEED employment data) were used to allocate the direct output values of the Seafood Processing industry to regional council areas within New Zealand. This allocation is based on the assumption that number employed are proportional to revenue earned.

The three regional council areas with the highest output are Canterbury with $388 million (or 30 percent); Nelson-Tasman-Marlborough with $362 million; and Auckland with $188 million. Combined these three regional councils generated $938 million or around 72 percent of the overall estimated revenue of the Seafood Processing industry.

There is a high degree of dependency between the Fishing and the Seafood Processing industries. The fishing industry provides the raw products for processing, and relies on the Seafood Processing industry to purchase its harvest. A number of New Zealand companies operate in both of these sectors because of this high degree of dependency. This allows them to exploit synergies in their fishing, processing and marketing.

This high dependency also has implications in terms of estimates of measurement of economic contribution. In particular, the overall economic contribution of these two sectors combined needs to account for the overlap between them, where the output of one industry is an input into the other.

This means that we cannot simply add together the total economic contribution of both of these sectors, as that would double count some of the output, GDP and employment generated by the Fishing industry.

To account for this overlap, we have treated the two industries as a single industry. In this way our multiplier methodology, using the input-output tables generated by Statistics New Zealand, allows us to eliminate the double-counted economic impact that would otherwise have resulted.

As shown in Table 12, in the five years to 2015, on average, the combined Fishing and Seafood Processing industry contributed a direct output of $1.73 billion, $544 million in direct GDP and employment of 4,305 FTEs.

Table 12 Economic contribution of combined Fishing & Seafood Processing

	Direct	Indirect	Induced	Total
Output (2015$m)	1,727	1,862	590	4,179
GDP (2015$m)	544	756	308	1,608
Employment (FTEs)	4,305	6,630	2,534	13,468

Using multiplier analysis we estimate that this combined industry contributes an estimated $1.61 billion in GDP to the New Zealand economy, and supports the employment of 13,468 FTEs.

5.2 The economic contribution by fishing sector

5.2.1 The economic contribution of Deepwater fishing

Table 13 shows that in the five years to 2015, on average, the share for Deepwater fishing, of the combined fishing and seafood sector's total economic contribution to the New Zealand economy, was made up by total output of $1,762 million, GDP of $679 million and employment of 5,679 FTEs.

Table 13 Economic contribution of Deepwater fishing

	Direct	Indirect	Induced	Total
Output (2015$m)	728	785	249	1,762
GDP (2015$m)	230	319	130	679
Employment (FTEs)	1,813	2,796	1,070	5,679

5.2.2 The economic contribution of Highly Migratory Species fishing

Table 14 shows that in the five years to 2015, on average, the share for HMS, of the combined Fishing and Seafood Processing industry's total economic contribution to the New Zealand economy, was made up by output of $197 million, GDP of $76 million and employment of 637 FTEs.

Table 14 Economic contribution of Highly Migratory Species fishing

	Direct	Indirect	Induced	Total
Output (2015$m)	82	88	28	197
GDP (2015$m)	26	36	14	76
Employment (FTEs)	204	313	119	637

5.2.3 The economic contribution of inshore fishing

Table 15 shows that in the five years to 2015, on average, the share for Inshore species, of the combined Fishing and Seafood Processing industry's total economic contribution to the New Zealand economy, was made up by output of $1,197 million, GDP of $460 million and employment of 3,861 FTEs.

Table 15 Economic contribution of Inshore fishing

	Direct	Indirect	Induced	Total
Output (2015$m)	496	533	168	1,197
GDP (2015$m)	156	217	88	460
Employment (FTEs)	1,242	1,898	721	3,861

Snapper is the highest valued inshore species and Rock Lobster and Paua are the highest valued Shellfish species. Any reduction in the commercial catch of this species would have significant impacts on GDP and employment. Such a reduction could arise from a reduction in the total allowable commercial catch, or a depletion of stocks from an environmental hazard.

Table 16 shows that in the five years to 2015, on average, the share for Snapper, of the combined Fishing and Seafood Processing industry's total economic contribution to the New Zealand economy, was made up by output of $226 million, GDP of $86 million and employment of 731 FTEs.

Table 16 Economic contribution of inshore fishing, Snapper

	Direct	Indirect	Induced	Total
Output (2015$m)	95	100	31	226
GDP (2015$m)	29	41	16	86
Employment (FTEs)	240	357	133	731

Fishing Management Area 1 provides the largest source of commercially caught Snapper. On average over the last 5 years, 4,530 tonnes of Snapper was commercially caught in FMA1. This amounts to 71 percent of the total annual catch. In total this 4,530 tonnes of Snapper represents $69 million in direct gross output. The average

gross output per kilogram of catch is therefore $15.20, which in turn directly generates $4.70 per kilogram in GDP.

As an indication of the impact on GDP of a reduction in Snapper catch in FMA 1, a 50 percent reduction of the 2,265 tonne catch will result in a loss of $34 million in direct output and a loss of $11 million in direct GDP.

5.2.4 The economic contribution of Shellfish (including Rock Lobster) fishing

Table 17 shows that in the five years to 2015, on average, the total economic contribution of Shellfish (including Rock Lobster) to the New Zealand economy was an estimated $394 million in GDP and total employment of approximately 3,291 FTEs.

Table 17 Economic contribution of Shellfish (including Rock Lobster)

	Direct	Indirect	Induced	Total
Output (2015$m)	421	456	145	1,022
GDP (2015$m)	133	185	76	394
Employment (FTEs)	1,045	1,622	624	3,291

Error! Reference source not found. Table 18 shows that in the five years to 2015, on average, the total economic contribution of Rock Lobster to the New Zealand economy was an estimated $311 million in GDP, and total employment of approximately 2,569 FTEs.

Table 18 Economic contribution of inshore fishing, Rock Lobster

	Direct	Indirect	Induced	Total
Output (2015$m)	326	358	117	800
GDP (2015$m)	105	145	61	311
Employment (FTEs)	796	1,273	500	2,569

The $326 million in total gross output comes from average annual catch of 2,839 tonnes of Rock Lobster. This means an average gross output of $114.60 per kilogram of catch, which in turn directly generates $37 per kilogram in GDP.

As an indication of the impact on GDP of a reduction in Rock Lobster catch, a reduction of 100 tonnes will result in a loss of $11 million in direct outputs, and a loss of $4 million in direct GDP.

Table 19 below shows that in the five years to 2015, on average, the total economic contribution of Paua was an estimated $58 million in GDP and total employment of approximately 502 FTEs.

Table 19 Economic contribution of inshore fishing, Paua

	Direct	Indirect	Induced	Total
Output (2015$m)	66	68	20	154
GDP (2015$m)	20	28	10	58
Employment (FTEs)	176	242	84	502

5.3 The economic contribution by fishing method

In this section we present the total economic contribution for the combined Fishing and Seafood Processing industry by method, based on the average gross output across the five years to 2015.

The largest of the four fishing industries is the Trawling, Seining and Netting Fishing industry. This industry averages $1,085 million per season in gross revenue or output. This is over five times as large as the next largest industry, Other Fishing.

The Trawling, Seining and Netting Fishing industry includes fish caught using methods such as bottom trawl, Danish Purse Seine, set net, ring net, Purse Seine, and mid-water trawl. Hoki, Ling, Orange Roughy and Snapper are the most commonly caught fish in this industry.

As shown in Table 20, the Trawling, Seining and Netting Fishing industry causes the direct employment of an estimated 2,697 FTEs across Fishing and Seafood Processing and generates approximately $343 million in GDP. Using multiplier analysis, this industry in total contributes $1.01 billion in GDP and the employment of 8,478 FTEs throughout the New Zealand economy.

Table 20 Economic contribution of Trawling, Seining and Netting Fishing

	Direct	Indirect	Induced	Total
Output (2015$m)	1,085	1,173	374	2,632
GDP (2015$m)	343	476	195	1,014
Employment (FTEs)	2,697	4,177	1,603	8,478

The Line Fishing industry includes methods such as all bottom longline, hand line, dropline, squid jigging, surface longline, and troll fishing methods. Snapper and Ling are the two main species caught using Line Fishing. This industry averages $169 million in output per season. As shown in Table 21, the industry contributes a total of $154 million in GDP and 1,308 FTEs to the economy from the combined Fishing and Seafood Processing industry.

Table 21 Economic contribution of Line Fishing

	Direct	Indirect	Induced	Total
Output (2015$m)	169	180	56	404
GDP (2015$m)	52	73	29	154
Employment (FTEs)	430	640	238	1,308

Fishing methods used in the Other Fishing industry include catch by cod pots, octopus pots, hand gathering, fish traps, dredging, and diving. Blue Cod and Paua are the two main species commercially caught in this industry. This industry averages $159 million per season in direct revenue or output.

As shown in Table 22 below, the Other Fishing Industry directly contributes the employment of approximately 960 FTEs and generates approximately $70 million in GDP across its fishing and seafood processing activities. Using multiplier analysis, the total economic contribution of this industry is an estimated $164 million in GDP and the employment of approximately 1,836 FTEs throughout the New Zealand economy.

Table 22 Economic contribution of Other Fishing

	Direct	Indirect	Induced	Total
Output (2015$m)	159	139	66	364
GDP (2015$m)	70	60	35	164
Employment (FTEs)	960	591	285	1,836

The Rock Lobster and Crab Potting industry averages $323 million in direct output per season. As shown in Table 23, the Fishing and Seafood Processing economic contribution generated by this industry directly contributes $104 million in GDP and 787 FTEs. Because not all Rock Lobster is caught using Rock Lobster Pots, the output value of this group is lower than reported above for the economic contribution of the Fishing industry by species. Other catch methods are commercial diving and hand gathering, and in bycatch with set netting, fish traps, dredging etc.

The total economic contribution of the Rock Lobster and Crab Potting industry is an estimated $308 million in GDP and the employment of approximately 2,546 FTEs throughout New Zealand.

Table 23 Economic contribution of Rock Lobster and Crab Potting

	Direct	Indirect	Induced	Total
Output (2015$m)	323	355	116	793
GDP (2015$m)	104	143	60	308
Employment (FTEs)	787	1,262	497	2,546

6 Employment

In this chapter we provide insights into employment in the Fishing industry[8]. The following discussion focuses on employment in the Fishing industry and its associated sub-industries, including Shipbuilding and Repair and Fish and Seafood Wholesaling. This discussion is broken down by industry and regional council areas. Annual employment counts in the Fishing sector are for the March years from 2000 to 2014.

6.1 Employment in the Fishing sector

Employment in the Fishing sector is dominated in New Zealand by the Seafood Processing industry. Overall, the Fishing sector includes the following industries:

- Seafood Processing
- Fish Trawling, Seining and Netting
- Line Fishing
- Other Fishing
- Rock Lobster and Crab Potting
- Shipbuilding and Repair Services
- Fish and Seafood Wholesaling.

Between 2000 and 2014, the fishing sector has seen a slight decline in employment, from 11,919 people in 2000 to 10,734 people in 2014, as shown in Table 24.

Table 24 Employment in the Fishing sector, by industry, 2000-2014

Industries within the Fishing sector	2000	2005	2010	2014	Change between 2000 and 2014 (% per annum)
Shipbuilding and Repair Services	753	771	582	885	1.2%
Seafood Processing	6,951	7,026	5,883	5,928	-1.1%
Fish and Seafood Wholesaling	447	648	687	789	4.1%
Fish Trawling, Seining and Netting	2,088	1,800	1,773	1,692	-1.5%
Line Fishing	870	792	612	573	-2.9%
Other Fishing	225	219	375	468	5.4%
Rock Lobster and Crab Potting	585	441	402	399	-2.7%
Total Fishing sector	**11,919**	**11,697**	**10,314**	**10,734**	**-0.7%**

Source: Statistics New Zealand

As shown in the table and in Figure 4, across the 14 year period, three of the seven industries have seen an overall increase in employment. These are Shipbuilding and Repair Services; Fish and Seafood Wholesaling; and Other Fishing. Other Fishing and Fish and Seafood Wholesaling have seen increases across the entire 14 year

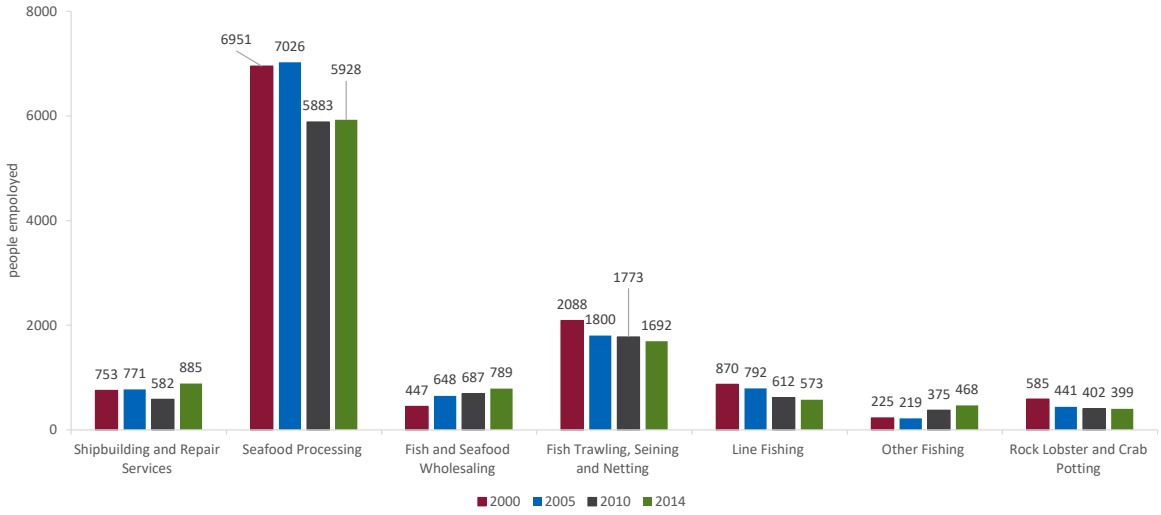
[8] The data in this section is annual LEED data from Statistics New Zealand. This data is actual employment counts derived from the PAYE and IR3 taxation returns of individuals. The geographic location is defined as the location of the business unit where the individual is employed and so the data accurately reflects business activity for each location and not the residence of the individual for each location (as for other types of LEED data).

period, while Shipbuilding and Repair Services after a large drop in employment between 2005 and 2010, have seen a substantial rebound in employment numbers across the four years from 2010 to 2014.

Of the remaining four industries the largest decline in absolute employment has come from the Seafood Processing industry, which after seeing a small increase of around 70 people between 2000 and 2005, has seen almost 1,100 people leave the industry between 2005 and 2014. For the second largest industry, Fish Trawling, Seining and Netting, there has been a steady decline in employment numbers across the 14 year period. Employment numbers for this industry are down almost 400 between 2000 and 2014.

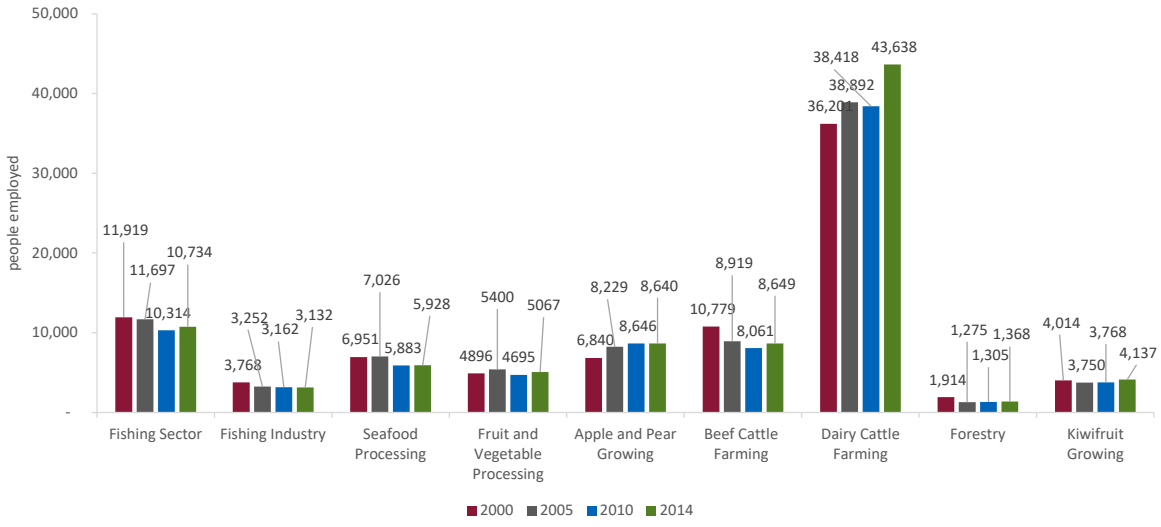
As shown in Figure 4, fishing sector employment is dominated by Seafood Processing (including on-vessel processing).

Figure 4 Fishing sector employment, New Zealand, 2000-2014



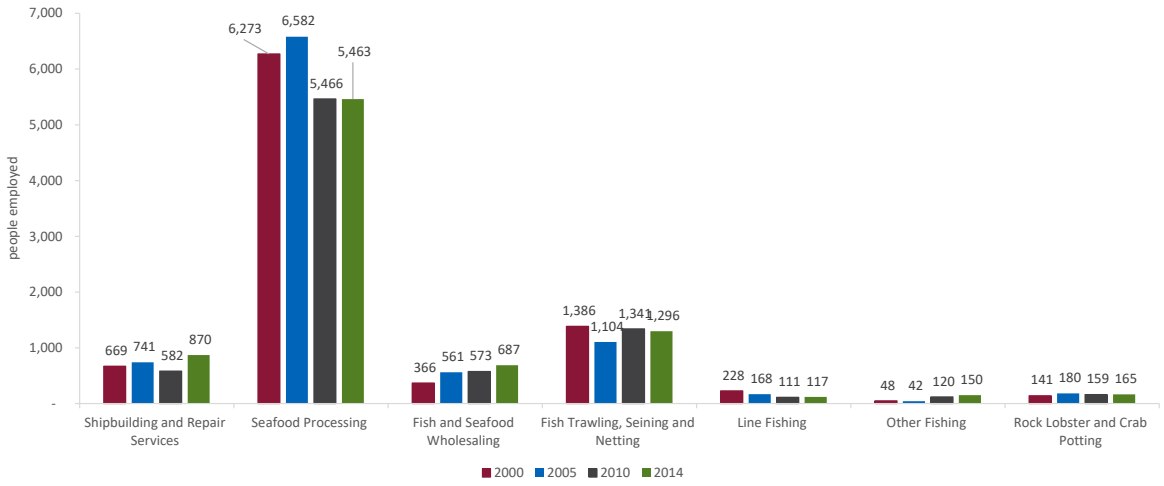
As a comparator, employment in the Fishing sector is similar in magnitude to that of Beef Cattle Farming. In turn, employment in the Seafood Processing industry is somewhat larger than employment in the Fruit and Vegetable Processing industry and similar in size to the Apple and Pear Growing industry.

Figure 5 Fishing sector employment compared to other industries, New Zealand, 2000-2014



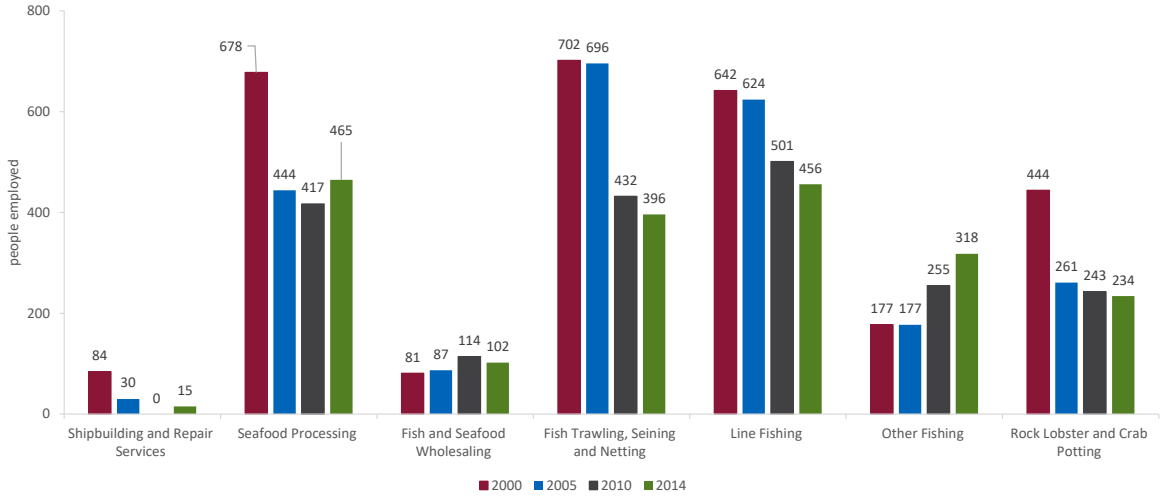
In wage and salary employment, numbers have fallen in Fish Trawling, Seining, and Netting and in Line Fishing. A noticeable feature of these two industries, and for Rock Lobster and Crab Potting, is that self-employment declines have been larger than for wage and salary employment. By comparison, Other Fishing employment has increased for both wage and salary employment and self-employment. This is consistent with a consolidation of businesses in these industries.

Figure 6 Fishing sector wage and salary employment, New Zealand, 2000-2014



Self-employment in Seafood Processing was 31 percent lower in 2014 compared to 2000. Again, this is consistent with consolidation and rationalisation of effort. Interestingly, Fish and Seafood Wholesaling employment has risen both for wage and salary workers and for self-employed workers. By comparison, wage and salary employment in Shipbuilding and Repair Services has increased since 2000.

Figure 7 Fishing sector self-employment, New Zealand, 2000-2014

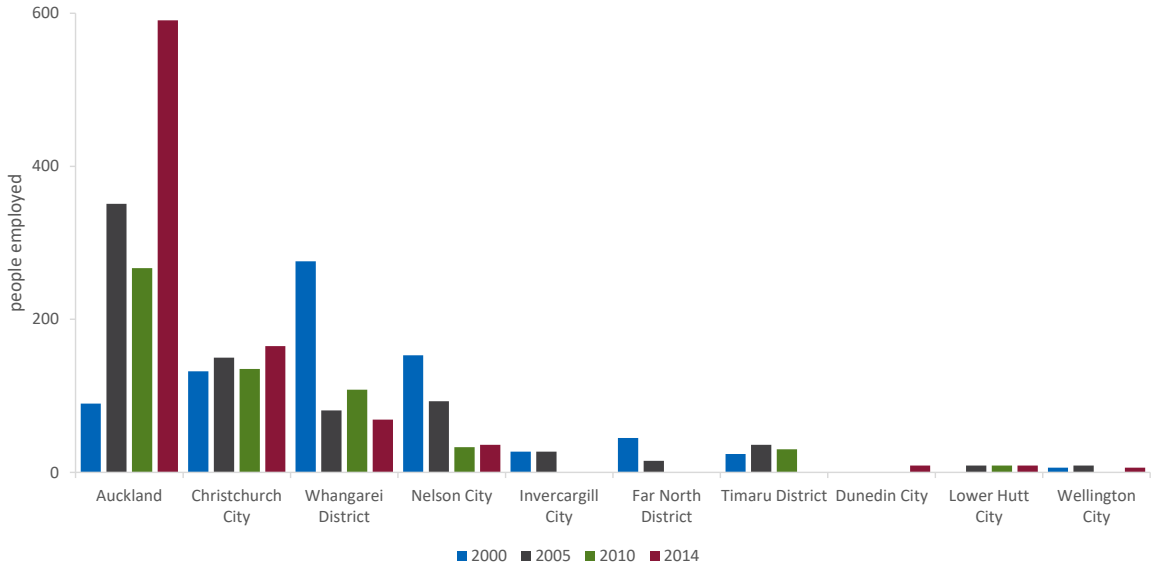


6.2 Employment changes by location

Across the fishing sector between 2000 and 2014, two industries have shown substantial changes in the location of employment in New Zealand. These two industries are Shipbuilding and Repair Services, and Seafood Processing. The 753 people employed in 2000 in Shipbuilding and Repair Services (Figure 8) have become more concentrated in urban areas between 2000 and 2014, shifting from regional locations. In 2000, employment was largely located in Whangarei (276 people employed), Nelson (153 people employed) and Christchurch (132

people employed). Interestingly, Invercargill, Far North District, and Timaru all had a small amount of employment in this industry in 2000, showing the rural location of the shipbuilding industry and the dominance of the Northland region (43 percent of total employment) in this industry. In 2014, the main employment numbers have concentrated in Auckland (591 people employed) and Christchurch (165 people employed) out of total employment in the industry of 885. In 2014, there were no people employed in this industry in Invercargill, Far North District, and Timaru.

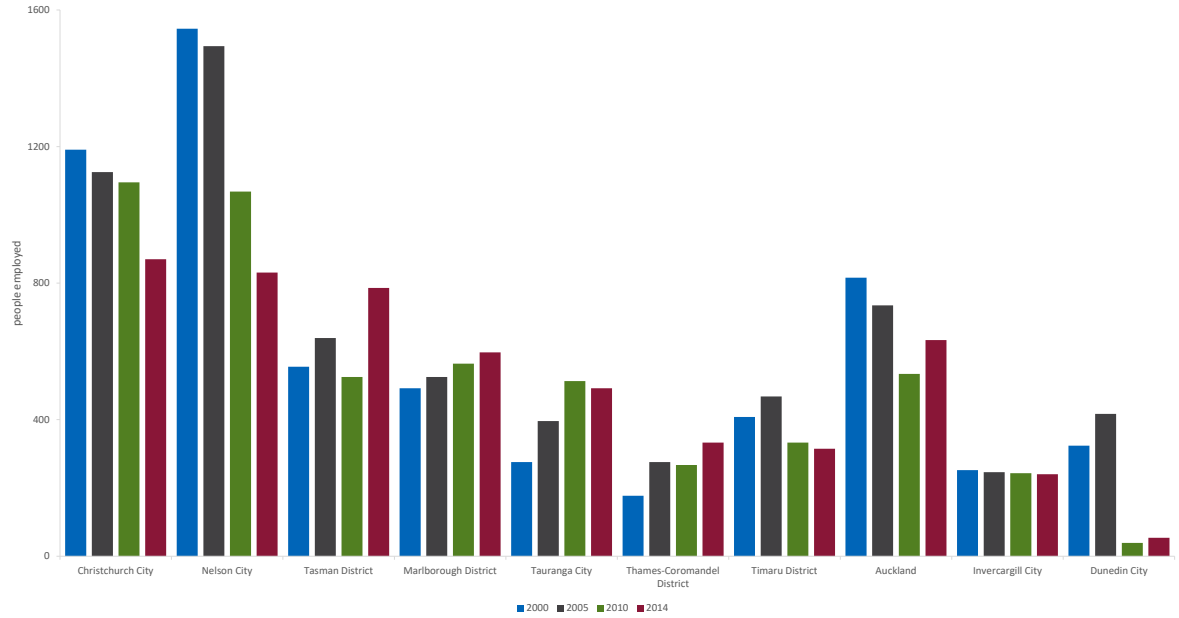
Figure 8 Shipbuilding and Repair employment by top 10 local authority, 2000 - 2014



The Seafood Processing Industry which employed 6,951 people in 2000 (Figure 9), has since 2000 shown a small number of large changes in employment by location. This has been due in large part to relocation of processing activity around New Zealand. In 2000, Nelson (1,545 people employed), Christchurch (1,191 people employed), and Auckland (816 people employed) had the largest number of people employed in the industry. These three areas employed just over half of all people employed in this industry.

From 2005 to 2014, employment in this industry has fallen from 7,026 to 5,928. Along with this fall in employment, the industry has seen employment moved out of the three dominant areas of Seafood Processing to other locations, which have seen the industries employment more evenly spread. This relocation of employment has seen rises in employment to 2014, in Tasman (786 people employed), Marlborough (597 people employed), Tauranga (492 people employed) and Thames-Coromandel (333 people employed). At the same time the employment has heavily fallen in Nelson (831 people employed in 2014), Auckland (633 people employed in 2014) and Christchurch (870 people employed in 2014.

Figure 9 Seafood Processing industry employment by top 10 local authority, 2000 – 2014



Appendix A Definitions of industry classifications

Fish Trawling, Seining and Netting

This class consists of units mainly engaged in trawling, seining or netting in mid-depth to deep ocean or coastal waters using a variety of net fishing methods. Trawling methods involve one or two boats towing a very large bag net, either on the sea bed or in mid-depth waters. Seining methods include purse, Danish or beach seining. Netting methods include surface or bottom gill netting.

Primary activities

- Beach seining, fishing
- Bottom gill netting, fishing
- Danish seining, fishing
- Finfish trawling
- Pair trawling
- Purse seining
- Set netting, fishing
- Surface netting, fishing.

Exclusions/References

Units mainly engaged in:

- line fishing are included in Class 0413 Line Fishing
- hatching or farming fish in controlled environments are included in the appropriate classes of Group 020 Aquaculture
- wholesaling fresh or frozen finfish are included in Class 3604 Fish and Seafood Wholesaling.

Line Fishing

This class consists of units mainly engaged in Line Fishing in inshore, mid-depth or surface waters. This class includes units engaged in several fishing methods, including surface or bottom long lining, trolling, or hand or powered-reel fishing.

Primary activities

- Bottom long line fishing
- Line fishing
- Ocean trolling
- Squid jigging
- Surface long line fishing

Exclusions/References

Units mainly engaged in: trawling, seining or netting are included in Class 0414 Fish Trawling, Seining and Netting.

Rock Lobster and Crab Potting

This class consists of units mainly engaged in catching rock lobsters or crabs from their natural habitats of ocean or coastal waters, using baited pots.

Primary activities

- Crab fishing or potting
- Rock lobster fishing or potting
- Saltwater crayfish fishing

Exclusions/References

Units mainly engaged in:

- wholesaling fresh or frozen rock lobsters are included in Class 3604 Fish and Seafood Wholesaling; and
- farming crustaceans in tanks or ponds onshore are included in Class 0203 Onshore Aquaculture.

Other Fishing

This class consists of units mainly engaged in fishing not elsewhere classified or in other types of marine life gathering.

Primary activities

- Abalone/paua fishing
- Freshwater eel fishing
- Freshwater fishing n.e.c.
- Marine water fishery product gathering
- Oyster catching (except from cultivated oyster beds)
- Pearling (except pearl oyster farming)
- Seaweed harvesting
- Spat catching
- Turtle hunting

Exclusions/References

Units mainly engaged in:

- hatching or farming seaweed, fish, crustaceans or molluscs in controlled environments are included in the appropriate classes of Group 020 Aquaculture; and potting for rock lobster or crabs are included in Class 0411 Rock Lobster and Crab Potting.

Shipbuilding and Repair Services

This class consists of units mainly engaged in manufacturing or repairing vessels of 50 tonnes and over displacement, submarines or major components for ships and submarines not elsewhere classified.

Primary activities

- Drydock operation

- Hull cleaning
- Ship repairing
- Ship wrecking
- Shipbuilding
- Submarine constructing

Exclusions/References

Units mainly engaged in: building boats are included in Class 2392 Boatbuilding and Repair Services.

Fish and Seafood Wholesaling

This class consists of units mainly engaged in wholesaling fresh or frozen fish or other seafood (except canned).

Primary activities

- Crustacean wholesaling (including processed, except canned)
- Fish wholesaling
- Mollusc wholesaling (including processed, except canned)
- Seafood, fresh or frozen, wholesaling

Exclusions/References

Units mainly engaged in:

- operating vessels which both catch and process fish or other seafood are included in the appropriate classes of Group 041 Fishing;
- cleaning, cooking or freezing crustaceans or molluscs (including shelling and bottling oysters) or in freezing filleted fish (including whole fin fish) are included in Class 1120 Seafood Processing; wholesaling canned fish or seafood are included in Class 3609 Other Grocery Wholesaling; and wholesaling fish or seafood in conjunction with a wide variety of other grocery items are included in Class 3601 General Line Grocery Wholesaling.

Seafood Processing

This class consists of units mainly engaged in processing fish or other seafoods. Processes include skinning or shelling, grading, filleting, boning, crumbing, battering and freezing of the seafood. This class also includes units mainly engaged in operating vessels which gather and process fish or other seafoods.

Primary activities

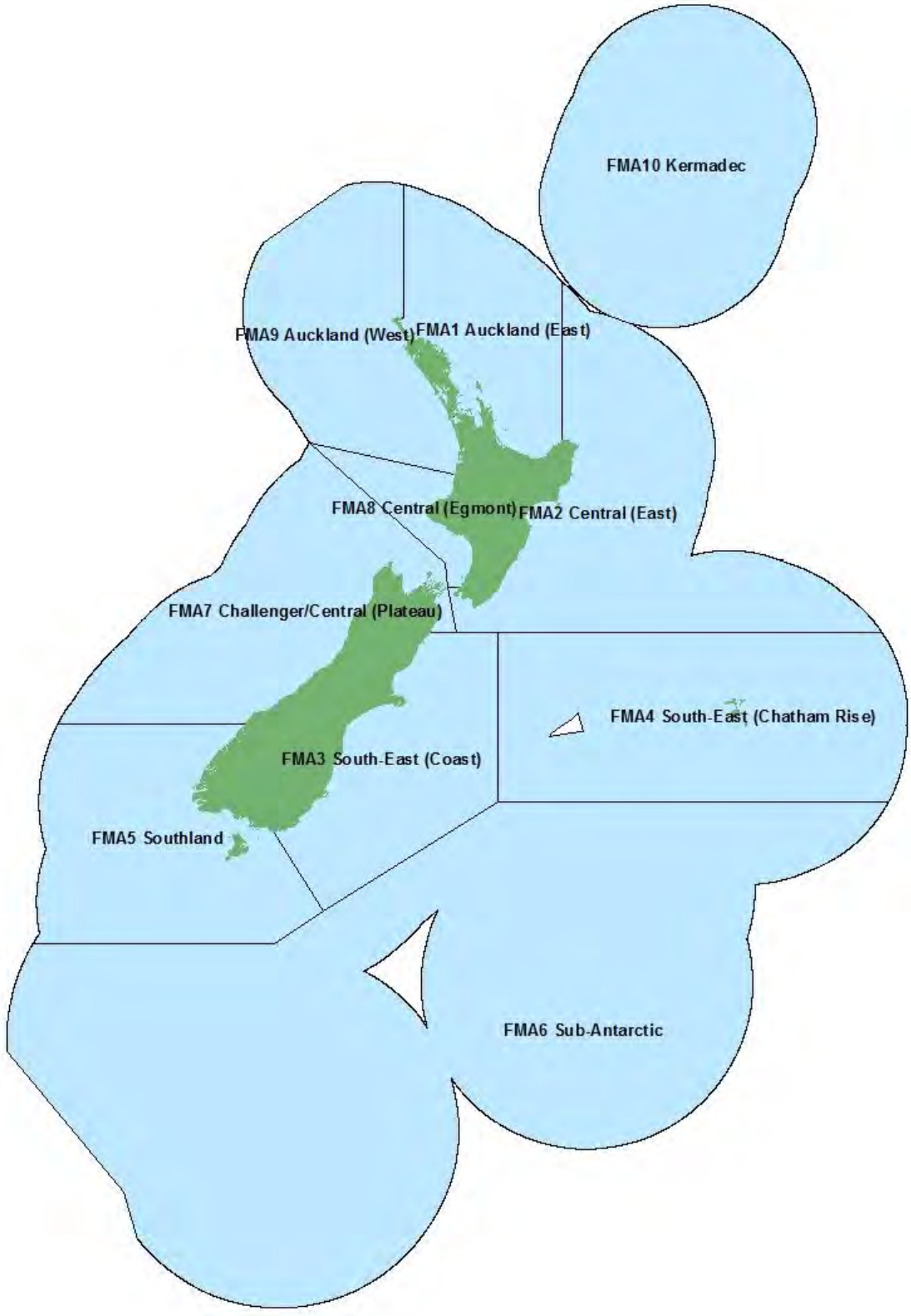
- Crustacean, processed, manufacturing (including cooked and/or frozen) n.e.c.
- Fish cleaning or filleting
- Fish fillet manufacturing
- Fish loaf or cake manufacturing
- Fish paste manufacturing
- Fish pate manufacturing
- Fish, canned, manufacturing

- Fish, dried or smoked, manufacturing
- Mollusc, processed, manufacturing (including shelled)
- Oyster, shelling, freezing or bottling in brine
- Scallop, preserved, manufacturing
- Seafood, canned, manufacturing
- Seafood, preserved, manufacturing
- Whole fin fish freezing

Exclusions/References

Units mainly engaged in gathering fish or other seafoods are included in the appropriate classes of Group 041 Fishing.

Appendix B Fishing Management Area (FMA) map



Appendix C Economic contribution of the Fishing industry by FMA

Table 25 FMA1

	Direct	Indirect	Induced	Total
Output (2015$m)	115	114	31	259
GDP (2015$m)	32	47	16	96
Employment (FTEs)	462	700	226	1,388

Table 26 FMA2

	Direct	Indirect	Induced	Total
Output (2015$m)	104	103	28	234
GDP (2015$m)	29	43	15	87
Employment (FTEs)	205	310	100	615

Table 27 FMA3

	Direct	Indirect	Induced	Total
Output (2015$m)	109	108	29	247
GDP (2015$m)	31	45	15	91
Employment (FTEs)	299	453	147	899

Table 28 FMA4

	Direct	Indirect	Induced	Total
Output (2015$m)	125	124	34	282
GDP (2015$m)	35	51	18	104
Employment (FTEs)	82	124	40	246

Table 29 FMA5

	Direct	Indirect	Induced	Total
Output (2015$m)	140	139	38	317
GDP (2015$m)	40	58	20	117
Employment (FTEs)	141	214	69	424

Table 30 FMA6

	Direct	Indirect	Induced	Total
Output (2015$m)	61	61	17	139
GDP (2015$m)	17	25	9	51
Employment (FTEs)	195	297	96	588

Table 31 FMA7

	Direct	Indirect	Induced	Total
Output (2015$m)	183	182	49	414
GDP (2015$m)	52	75	26	153
Employment (FTEs)	966	1,465	474	2,905

Table 32 FMA8

	Direct	Indirect	Induced	Total
Output (2015$m)	20	20	5	45
GDP (2015$m)	6	8	3	16
Employment (FTEs)	73	110	36	219

Table 33 FMA9

	Direct	Indirect	Induced	Total
Output (2015$m)	47	47	13	107
GDP (2015$m)	13	19	7	39
Employment (FTEs)	122	186	60	368

Appendix D Economic contribution of the Seafood Processing industry by region

Table 34 Northland

	Direct	Indirect	Induced	Total
Output (2015$m)	39	45	15	99
GDP (2015$m)	13	18	8	39
Employment (FTEs)	92	134	55	281

Table 35 Auckland

	Direct	Indirect	Induced	Total
Output (2015$m)	188	215	74	477
GDP (2015$m)	64	86	39	189
Employment (FTEs)	441	645	266	1,352

Table 36 Waikato

	Direct	Indirect	Induced	Total
Output (2015$m)	98	112	39	248
GDP (2015$m)	33	45	20	98
Employment (FTEs)	230	336	138	704

Table 37 Bay of Plenty

	Direct	Indirect	Induced	Total
Output (2015$m)	77	87	30	194
GDP (2015$m)	26	35	16	77
Employment (FTEs)	179	263	108	550

Table 38 Hawke's Bay – Gisborne

	Direct	Indirect	Induced	Total
Output (2015$m)	33	38	13	84
GDP (2015$m)	11	15	7	33
Employment (FTEs)	78	114	47	238

Table 39 Manawatu – Taranaki – Whanganui

	Direct	Indirect	Induced	Total
Output (2015$m)	14	15	5	34
GDP (2015$m)	5	6	3	14
Employment (FTEs)	32	46	19	97

Table 40 Wellington

	Direct	Indirect	Induced	Total
Output (2015$m)	20	22	8	49
GDP (2015$m)	7	9	4	20
Employment (FTEs)	46	67	28	140

Table 41 Nelson – Tasman – Marlborough

	Direct	Indirect	Induced	Total
Output (2015$m)	362	413	143	919
GDP (2015$m)	123	166	75	363
Employment (FTEs)	849	1,242	512	2,602

Table 42 West Coast

	Direct	Indirect	Induced	Total
Output (2015$m)	34	39	13	86
GDP (2015$m)	11	15	7	34
Employment (FTEs)	79	116	48	243

Table 43 Canterbury

	Direct	Indirect	Induced	Total
Output (2015$m)	388	443	153	984
GDP (2015$m)	132	177	80	389
Employment (FTEs)	909	1,331	548	2,789

Table 44 Otago

	Direct	Indirect	Induced	Total
Output (2015$m)	27	31	11	68
GDP (2015$m)	9	12	6	27
Employment (FTEs)	63	92	38	192

Table 45 Southland

	Direct	Indirect	Induced	Total
Output (2015$m)	23	27	9	59
GDP (2015$m)	8	11	5	23
Employment (FTEs)	55	80	33	168

Appendix E References

GSGislason (2007). "A marine sector national report card for Canada, methodology report", prepared for: Canada Fisheries & Oceans Ottawa, Ontario by GSGislason & Associates Ltd. Vancouver, BC, February 2007.

NZIER (2016). "Economic impact of the seafood sector, an input-output and CG assessment", NZIER final report to Ministry for Primary Industries, Wellington, 29 February 2016.

SACES (1999). Value of New Zealand recreational fishing, Project: REC9801, undertaken for New Zealand Ministry of Fisheries by the South Australian Centre for Economic Studies, November 1999.

APPENDIX B

ASSET ASSESSMENT SUMMARIES

Author: Chris Coll

rmc²

Asset Assessments – West Coast Ports

Part I - Holcim Wharf, Talleys Westport, Richmond Wharf Greymouth.

OCTOBER 2019

Author: Chris Coll

Document: Asset Assessments - West Coast Ports

Reference: 3517 _CJCSL_ Asset Assessments West Coast Ports_October 2019

Revision: 3

Revision date: 2019-10-21

Prepared by: Chris J Coll Surveying Limited
Chris J Coll
FNZIS, RPSurv., Regd. Surveyor, DIP. SURV., NZCE(Civil),
Mine Surveyor Certificate of Competence

Contents

SECTION ONE

Introduction

This assessment looks at two river ports in the West Coast of the South Island. The river ports examined were in the Buller River and Grey River.

In the Buller River, there are two wharf facilities that are operational and are known as the Holcim (Merchandise) Wharf and the Talley's (Fisherman's) Wharf. This report examines both wharf structures.

In the Grey River, there are two wharf facilities that are operational. One is known as the Blaketown or Erua.

Moana Lagoon area used and owned by Talley's Group Limited (TGL) and Westfleet Seafoods Limited (WSL).

fishing companies. The other is known as the "Richmond Wharf' fronts the Grey River. However, this report only covers the latter.

SECTION TWO

Buller River Wharf Structures

2.1 Holcim (Merchandise) Wharf

2.1.1 Background

Appended are two plans (refer Appendix A 1 and Appendix A2) of the ex-Holcim port showing the land ownership and boundaries. The infrastructure has recently had the three cement silos demolished (September -October 2019) and will remain as a concrete platform with concrete piles. The wharf known as the Holcim (Merchandise) Wharf is 50 years old with the addition of an extra third steel silo downstream of the two concrete silos built in the early 1980s.

The piles are driven concrete piles and are still in very good condition. Chris J. Coll Surveying Ltd (CJCSL) used to supply a diving service to Buller Port Services and Holcim. This involved inspecting structures and vessels used for dredging berthages and/or transporting bulk cement. These ships used bow thrusters because this allowed the ships to turn in the tight constraints and restrictions found in river ports. The wooden fenders and concrete piles were checked by divers for scouring by river currents or wash from the bow thrusters. No damage was apparent. CJCSL in conjunction with Works and Development divers also had to check for any of the rock protection at the back (shore side) of the wharf in case rocks had migrated out into the main river channel. Occasionally, this happened, and the rocks were individually removed by the “Kawatiri” dredge crane or blasted into smaller, manageable sizes. The wooden fender piles were of a durable timber from Australian hardwood. These piles were subject to infestation by a marine borer insect that attacks piles in the salt water zone. Wooden fenders were used to minimise damage to vessels’ hulls. If the piles were not maintained, the marine borer would render the piles unserviceable in the salt water “wedge” after about 30-40 years. Works and Development (a government organisation) designed an ingenious fibreglass wrapping bag around the piles in the saltwater zone and filled the surrounding bag with reinforced concrete making the piles impervious to the marine borer. Most of the wooden piles along the Holcim (Merchandise) Wharf were treated in this manner increasing the wharf structure lifetime indefinitely.

Ownership of the wharf platform has some interesting boundaries. The land shown on the appended plan labelled Appendix A2 shows the access and platform is owned by KiwiRail and was leased to Holcim when the silos and cement carriers were operational.

The area of the platform to the west and north (where the silo N° 3 was constructed) is owned by the Buller District Council (BDC) as a harbour asset.

2.1.2 Potential

Previously, bulk cement carriers of about 7,000 tonne capacity uploaded cement from Holcim-owned silos on the wharf and used the port weekly. The river and bar crossing meant that crossings were timed to coincide with high tide. The berthage depths are approximately 6.5 metres deep at low tide. This depth has gradually decreased by approximately 0.5 metres since dredging operations ceased when Holcim’s cement works operations closed. The main potential for the wharf structure with the recent demolition of the three large cement silos can be a general purpose merchandise wharf with ready access for rail and road transport operators.

The concrete platform is on concrete piles and has the capability to accommodate heavy machinery. Bulk cement trucks have brought may tonnes of cement from the Cape Foulwind Works to the silos to discharge to cement carrier ships. The two silos upstream were 10 metres in diameter and approximately 30 metres high. The later downstream one was even bigger being 16 metres in diameter and a similar height. The loading specification required by the wharf to accommodate these silos will exceed any eventual truck or rail transport machinery.

The wharf complex is approximately 50 years old with the first two silos being built in 1970. The wharf structure is exposed to flooding by the Buller River and ships moored during a major flood required robust mooring systems and bollards. The infrastructure is well built and designed but requires regular inspections and planned

maintenance. With a suitable regime in place, the wharf could be expected to last at least another 50 years.

With the changes anticipated and already being experienced related to the extractive industry in the Buller Region, the wharf area has generated interest from other bodies - in particular, recreational and town revitalisation interests. Careful thought and planning need to be given to the potential development in the waterfront area. Some of these interests can co-exist but those that conflict or a compete may need to be segregated. Public and work safety issues will be among the decisive factors. Being able to link the proposed bike trail through or around the industrial and commercial work sites will be a typical challenge in the revitalisation project initiated by BDC.

The first steps must be to protect and maintain the wharf structure facility while the Westport Town revitalisation and/or industry focussed processes are continuing.

2.2 Talley's (Fisherman's) Wharf

2.2.1 Background

Appendix A3 is a plan of the wharf structure around the ice making plant on the Talley's (Fisherman's) Wharf. The wharf staging area and plant are a concrete platform on concrete piles. The wharf is in a lagoon area protected from the river fiows during river flooding because it is in an area called "the Fisherman's Lagoon" separated from the main flow of the Buller River by the wharf infrastructure. The Harbour Master's office is also located in this proximity. The ice plant and fish processing factory owned by TGL use the wharf area for unloading harvested fish and replenishing vessels returning to sea (refer Appendix A3). The lagoon area has a jetty complex which mediumsized fishing boats use for anchorage and shelter when not at sea.

The ownership of the area is complicated. There are parcels owned by Kiwi Rail, BOC, the Crown and TGL. The accompanying plan shows the parcels labelled with the current owners. Section 1 SO 511639 is under action to become owned as a harbour asset by the BOC. This parcel (currently occupied by TGL's ice making plant and weighing shed and equipment) was overlooked when the harbour facilities were transferred by gazettal to BOC by the Minister of Transport in June 1988. This action should be finalised in the next 6-12 months to complete the process started in 1988.

The concrete piles and platform are in very good condition and, because it is used daily for fishing and associated activities, remains in good condition by "default". It is primarily an industrial site with associated health and safety rules and requirements.

2.2.2 Potential

The wharf and lagoon area will continue to provide unloading and loading capability for fishing boat sizes ranging from small to large -up to a maximum of 30m length and 100 tonne vessels. It also provides a safe haven for fishing boats to shelter if they obtain sufficient warning from severe storm events. They are able to tie up in the lagoon area away from the strong currents that can be encountered in any large flood in the Buller River. The Talley's (Fisherman's) Wharf area has accommodated over 10 of the 20-30m sized boats in the hoki season. On average, a bad storm can be predicted 3-4 days in advance and most boats that would avail themselves of the shelter in this wharfage are within 1-2 days' radius.

So, apart from the day-to-day use of the fish processing facility, an important feature is this "safe haven". Vessels over 100 tonne or having a draught of 3m or more have to be piloted across the Buller River bar entrance. At present, this service is provided by the local Westport Harbour Master. He is the only "resident" harbourmaster on the West Coast. Greymouth and Jackson's Bay employ non-resident harbourmasters to assist with regulatory compliance but are not available as pilots for these larger vessels.

The potential for this area is also being explored by the BOC revitalisation project. As mentioned in the Holcim wharf potential uses, this aspect will need to be included in future management and planning. Again, some "competing" activities may or may not be able to coexist. Imaginative planning and cooperation will be necessary to obtain an outcome that will be positive and cater for all parties involved. An industrial site represents all sorts of potential hazards and risks for recreational users even around the periphery of the site. TGL may want exclusive ownership of the wharf area but BOC may prefer to retain ownership and generate income from site rental.

SECTION THREE

Grey River Wharf Structures

3.1 Richmond Wharf

3.1.1 Background

The Richmond Wharf is a wooden structure tied back to sheathing and hard fill. It is over 80 years old and, apart from some of the mooring bollards, is probably reaching the end of its commercial life unless some urgent replacement to piles and platforms is carried out. The wharf is mainly used for unloading a bulk fertiliser ship called the "Anatoki" which visits approximately 3-4 times per year. The main activity in the wharf area is in the Erua Moana (Blaketown) lagoon area where there are mooring jetties and facilities for local fishing vessels and fish factory processing plants on the east side of the lagoon. These fish processing plants are operated by TGL and WSL.

The ownership of the land along the Richmond Wharf is shown on the appended plan labelled Appendix 81. Greymouth District Council owns it as Lot 2 DP 477107 about 2.5 hectares. Because the remaining adjacent wharf facilities are on land privately owned and operated by TGL and WSL, those facilities have not been included in the discussion of this report.

3.1.2 Potential

The Erua Moana Lagoon has been recently dredged and deepened in late 2018 and has better depths than the Richmond Wharf. The Richmond Wharf requires some extensive work to both the wooden platform area and the pile structures to extend the useful life of the wharf as a commercial facility. The depths along the river frontage have improved over the last 5-10 years by approximately 0.5m. The average depth below chart datum (i.e. low tide) along the Richmond Wharf berthage is approximately 5.0 metres. This compares with the average depth along the Holcim (Merchandise) Wharf in the Buller River of approximately 6.5 metres. The river has not been dredged and the depth improvement seems to be a collateral consequence of gravel extraction approximately 3.5km upstream. This proposition is explored later in the report because it could have implications for something similar in the Buller River situation. Greymouth's waterfront area extends from opposite the town centre to the eastern end of the Good Sheds (owned by the Grey District Council).

This grassed area and walkway along the stopbank is fenced off from the working area of the Richmond Wharf. It provides a recreational observation portal to the wharf area and is important as a social facility for residents and visitors. It is identified on the plan labelled Appendix B1.

SECTION FOUR

Comparison of Grey and Buller Rivers Existing Uses

A comparison of the Grey and Buller River demonstrates significant similarities between the two. This evaluation provides insight into where similar improvements and opportunities could apply to both rivers.

4.1 Grey River

There is an extensive gravel extraction facility approximately 3.5km upstream from the Richmond Wharf operated by Fulton Hogan contractors. Their site removes over 100,000m3 per year from a bend in the Grey River opposite the Omoto Racecourse. CJCSL have carried out regular echo sounding cross-sections for the West Coast Regional Council from the Grey River mouth to above this gravel extraction operation and have observed a gradual deepening since 2014 of the river channel past Richmond Wharf area below the Greymouth to Cobden State Highway bridge. This deepening averages over 0.5 metres. Greymouth does not have the presence of a dredge so is at the vagary of the river accreting or eroding.

It seems highly likely that the gravel being transported along the riverbed is being intercepted by the Fulton Hogan gravel extraction plant. An appended oblique aerial view shows the relationships of this plant and the Richmond Wharf (refer Appendix C1).

4.2 Buller River

Appended is an oblique aerial (refer Appendix C2) view from a similar relative position looking at the Buller River between the river mouth and Organ's Island. There is a small gravel extraction plant at Organ's Island with gravel removal of less than 10,000m3 per year. Organ's Island is approximately 6km from the Holcim (Merchandise) Wharf but the similarities are worth further investigation. When Holcim was operational and the local dredge "Kawatiri" was employed keeping the river mouth bar navigable and berthages deepened, the annual volume of material taken out to sea and dumped was around 150,000m3 per year.

4.3 Conclusions

If a similar gravel extraction plant to the Fulton Hogan one at Omoto on the Grey River could be setup at Organ's Island on the Buller River and the gravel volumes of 100,000m3 or more were removed each year, the benefits could be significant

For example:

- Gravel for roadworks and construction is always required.
- Intercepting the gravel before it "invaded" the wharf areas and compromised vessel draughts would save dredging costs.
- The flood hazard to the town of Westport would be lessened because the river channel would have more capacity.

- Any excess gravel could be utilised for stopbank construction and maintenance around Westport Town. The close proximity of the gravel source and supply to Westport has significant economic implications and benefits.
- The supply of gravel is, for all intents and purposes, unlimited and replenishes with each flood event in the Buller.
- Testing of gravel from this site has indicated that it meets standards for concrete aggregate. In fact, the Buller River bridge was constructed using aggregate that was won and processed from the Organ Island source.

4.4 Cautionary Note

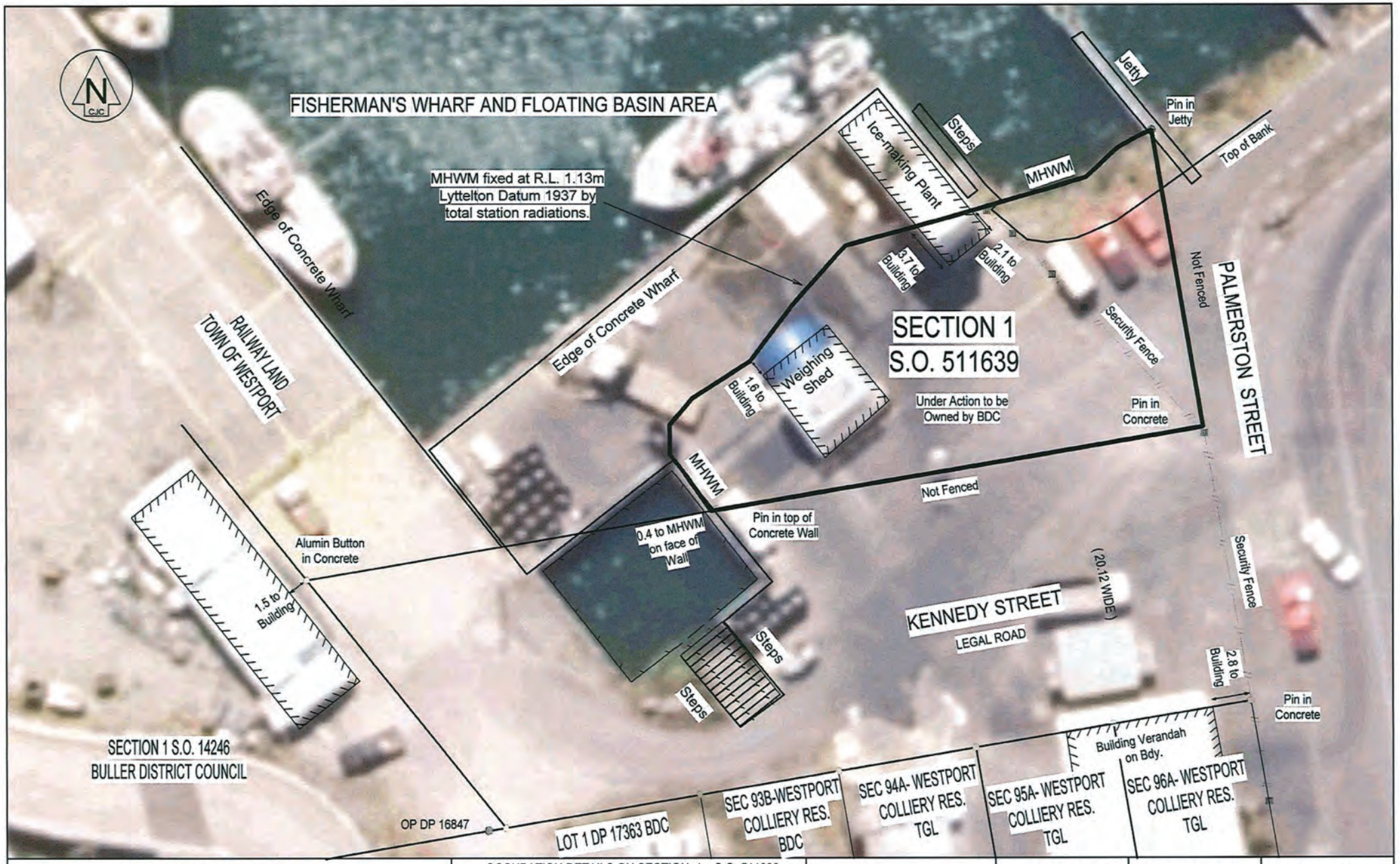
On a more urgent note, there are gravel islands building up around the Holcim (Merchandise) Wharf and appear to be diverting flood flows (even minor flood flows) towards the wharf infrastructure. The assessment being carried out for the resilience and sustainability of the town and wharf infrastructure may be compromised or even wasted if that threat is not addressed by some credible and effective measures. In other words, there may be no viable wharf facility if the change in the direction of the river flow turns out to be a significant threat and hazard.


SECTION 2 SO 10996
CT NL9B/1302
BULLER DISTRICT COUNCIL
Harbour Works Gazette 1972 Page 362
BULLER RIVER LEGAL RIVER
OUTER-MOST LINE OF WHARF PILES
STILLWATER WESTPORT RAILWAY
PROC. 9
Gazette 1861 Page 1127
VIEWING PLATFORM
CROWN LAND
No Apellation
CROWN LAND
Below MHWM
SO 10401
CROWN LAND
Above MHWM
SO 10401
25.80
1.19
105.21
54.49
59.61
CERTIFICATION NOTE
APPROVED
PLAN OF HOLCIM (MERCHANDISE) WHARF
AND PARCEL BOUNDARIES DREDGE MOORING
WESTPORT HARBOUR
CHRIS J COLL SURVEYING Ltd.
Regd Land Surveyor, Resource Management Consultant
19 BROUGHAM STREET PO BOX 204 WESTPORT
DRAWN CJC
CHECKED CJC
SCALES 1:750(A3) 1:375(A1)
DATE JULY 2019
REF. 3591 WHARF TOPO
SHEET 1
SHEETS 1 OF 3

APPENDIX A1


SECTION 2 SO 10996
CT NL9B/1302
BULLER DISTRICT COUNCIL
Harbour Works Gazette 1972 Page 362
CEMENT SILOS DEMOLISHED OCTOBER 2019
SEC 1223, SO 15422.
Leased to Holcim from
Kiwi Rail
STILLWATER WESTPORT RAILWAY
PROC. 9
Gazette 1881 Page 1127
BULLER RIVER LEGAL RIVER
SECTION 3 SO 10996
CT NL9B/1302
BULLER DISTRICT COUNCIL
Harbour Works Gazette 1972 Page 362
CERTIFICATION NOTE
APPROVED
PLAN OF HOLCIM (MERCHANDISE) WHARF
AND PARCEL BOUNDARIES SILOS AREA
WESTPORT HARBOUR
CHRIS J COLL SURVEYING Ltd
Regd Land Surveyor, Resource Management Consultant
19 BROUGHAM STREET PO BOX 204 WESTPORT
C.J.C
OCT 2019
C.J.C
3461 WHARF TOPO
1:750(A3)
1:375(A1)
2

APPENDIX A2



CHRIS J COLL SURVEYING LTD.
Licensed Cadastral Surveyors, Resource Management Consultants
19 Brougham Street PO Box 204 Westport

OCCUPATION DETAILS ON SECTION 1, S.O. 511639
TALLEY's (FISHERMAN'S) WHARF
WESTPORT HARBOUR

BDC = BULLER DISTRICT COUNCIL
TGL = TALLEYS GROUP LIMITED

DATE : OCT 2019 | REF: 1277 OCC. PLAN | SCALE: 1:250 (A3)

TERRITORIAL AUTHORITY : BULLER DISTRICT COUNCIL | LAND DISTRICT: NELSON

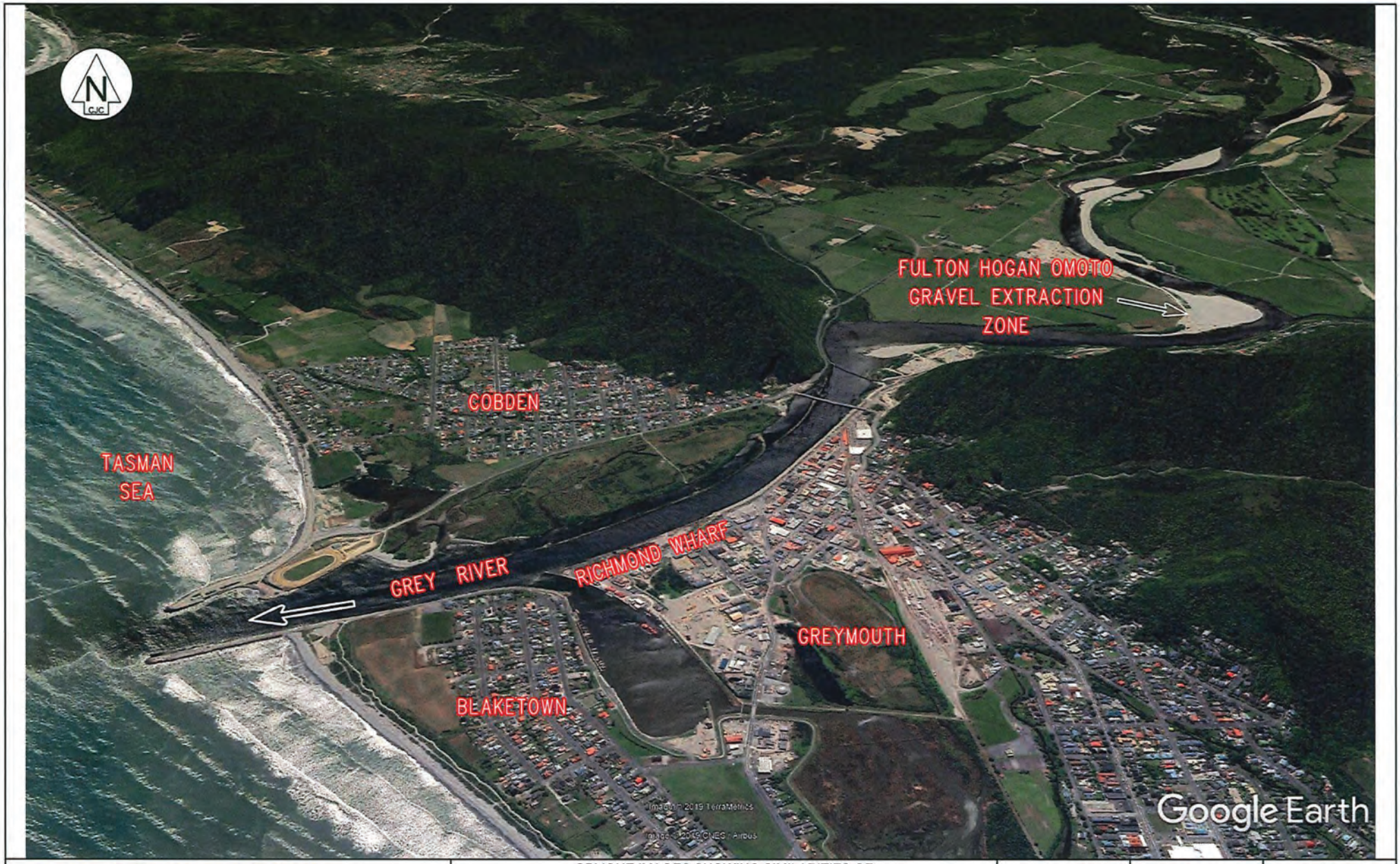
APPENDIX A3

CHRIS J COLL SURVEYING LTD.
Licensed Cadastral Surveyors, Resource Management Consultants
19 Brougham Street PO Box 204 Westport

OCCUPATION DETAILS ON LOT 2 DP 477107
RICHMOND WHARF GREY RIVER HARBOUR

DATE : OCT 2019	REF: 3517 OCC. PLAN	SCALE: 1:1500 (A3)
TERRITORIAL AUTHORITY : GREY DISTRICT COUNCIL		LAND DISTRICT: WESTLAND

APPENDIX B1



CHRIS J COLL SURVEYING LTD. Licensed Cadastral Surveyors, Resource Management Consultants 19 Brougham Street PO Box 204 Westport	OBLIQUE IMAGES SHOWING SIMILARITIES OF GRAVEL INTERCEPTION ZONE ON GREY RIVER – 1 of 2 SHEETS	DATE : OCT 2019	REF: 3517	SCALE: N.T.S. (A3)
		TERRITORIAL AUTHORITIES : BULLER & GREY DISTRICT COUNCILS		LAND DISTRICTS: NELSON & WESTLAND

APPENDIX C1

CHRIS J COLL SURVEYING LTD.
Licensed Cadastral Surveyors, Resource Management Consultants
19 Brougham Street PO Box 204 Westport

OBLIQUE IMAGES SHOWING SIMILARITIES OF GRAVEL INTERCEPTION ZONE ON BULLER RIVER – 2 of 2 SHEETS

DATE : OCT 2019	REF: 3517	SCALE: N.T.S. (A3)
TERRITORIAL AUTHORITIES : BULLER & GREY DISTRICT COUNCILS		LAND DISTRICTS: NELSON & WESTLAND

APPENDIX C2

rmc²

rmc²

Assessment – Buller River

Part II - Assessment of potential impacts of gravel buildup.

JANUARY 2020

Authors: Matthew Gardner *Water Resources Engineer, CMEngNZ, CPEng;* **Ian Heslop** *BE (Agric) CMEngNZ (Ret)*

Document: Buller River: Assestment of potential impacts of gravel buildup

Revision: 1

Revision date: 20/01/2020

Authorised by: Chris Coll

Organisation: Buller 2100 Working Group

Land River Sea Consulting Limited, 5 Achilles Street, Burwood, Christchurch
M: +64 27 318 9527 / E: matthew@landriversea.com / W: landriversea.com

Contents

SECTION ONE

Introduction

1.1 Scope

The Westport 2100 Working Group was set up by West Coast Regional Council and Buller District Council in February 2019. The goal of the Group is to develop recommendations for future emergency management, hydrology, and operations works programmes to manage natural hazards to the Westport Community such as coastal erosion, tsunami, earthquake, and flood.

The Chair of the Working Group, Chris Coll, commissioned Land River Sea Consulting Ltd to investigate the effect of gravel build-up on flood risk to Westport, and to comment on Buller River gravel extraction as a means of reducing this flood risk.

The main locations where gravel build-up is of concern is along the Martins Island and Port reach (between cross section 4 and 5), as well as immediately upstream of the SH67 Buller River Bridge (between cross sections 7 and 8). A plan showing the surveyed cross section locations is presented in Appendix A.

SECTION TWO

Cross section survey

In 1972 a network of 22 cross sections was established over the 12 km length between Te Kuha and the river mouth. This network included 4 cross sections around the Organs Island overflow channel. With the exception of cross sections 1 to 4, this network was completely surveyed in 1972 and 1999, and partially surveyed (6 cross sections only) in each of 1983 and 1994. Cross sections 1 to 4 were excluded, probably due to port dredging activities dictating bed levels in this lower reach. Cross section locations are shown in Appendix A.

These survey results were analysed in the August 2000 Connell Wagner report (Connel Wagner Limited, 2000). Over the period from 1972 to 1999 (refer Figure 2-1) there was an increase in mean bed levels between Te Kuha and upstream of Organs Island (cross sections 24 to 21), a reduction at Organs Island

(Cross sections 14 and 15), and increases as far as Westport Town (cross sections 13 to 6).

The overall trend over this 27 year period was aggradation, with an estimated increase in river bed material volume of 1,058,000 cubic metres (refer Figure 2-2). This was equivalent to an average rise in bed level of 0.19 metres over the total reach.

Figure 2-1: Bed level changes from 1972 to 1999

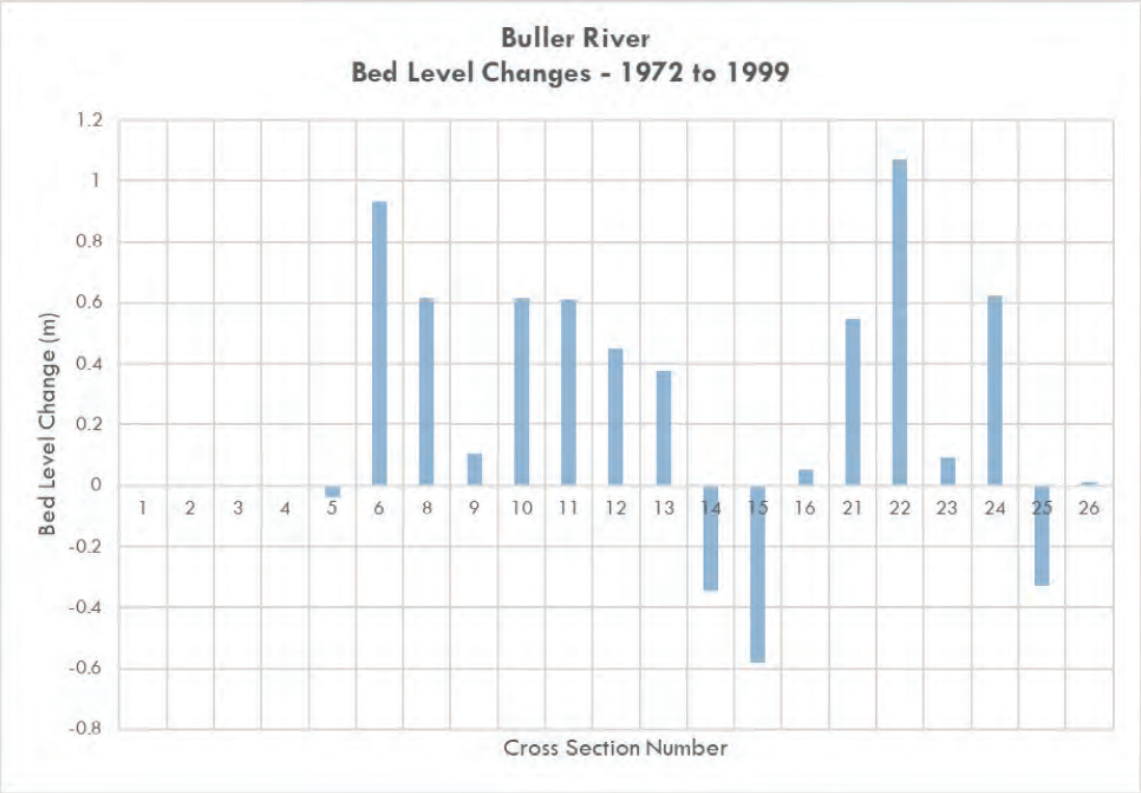
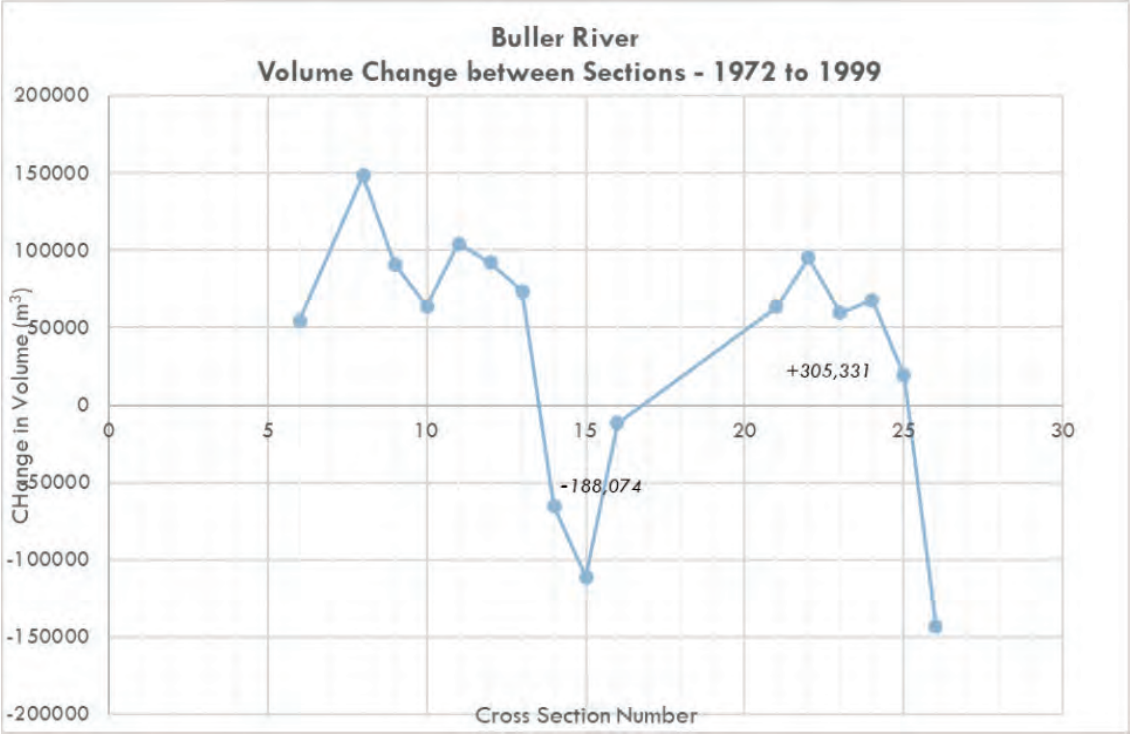


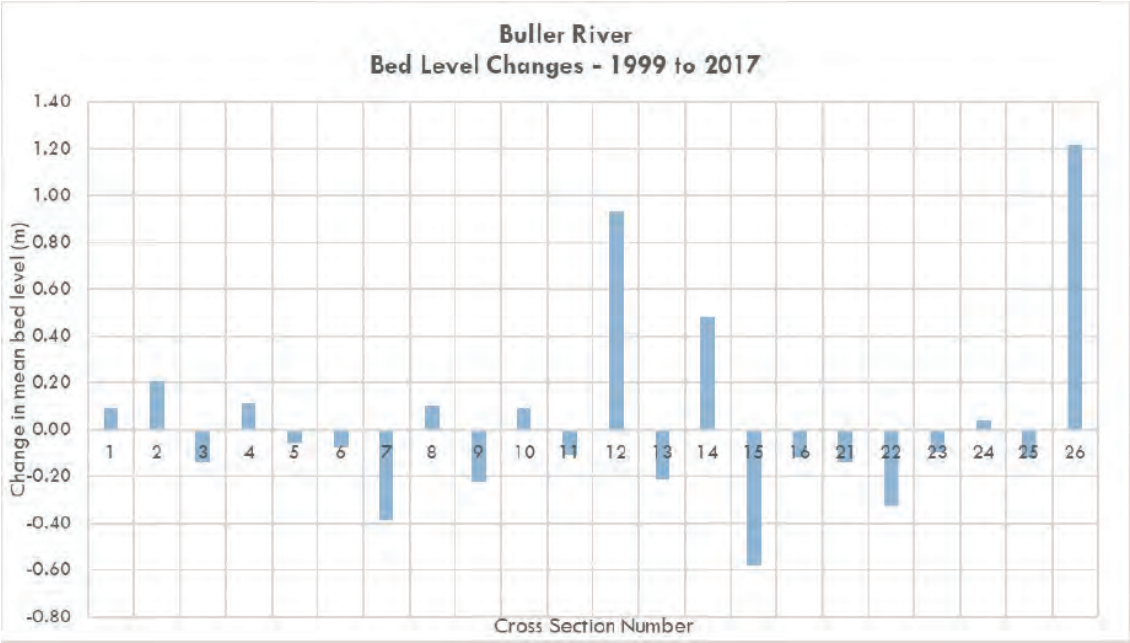
Figure 2-2: Volume changes from 1972 to 1999



Over the period from 1999 to 2017 three additional bed level surveys were carried out in 2010, 2014, and 2017. These surveys included cross sections 4 to 1 extending downstream to the river mouth, and the results were analysed by Chris J. Coll Surveying Ltd. The overall trend over this 18 year period was no significant change, with an estimated net increase in river bed material volume of only 30,000 cubic metres (refer).

Within this overall pattern (refer Figure 2-3) there was bed degrade between Te Kuha and Organs Island (cross sections 25 to 15), aggrade at the bend downstream of Organs Island (14 to 12), and a stable to degrade trend downstream of Organs Island to the port (11 to 5).

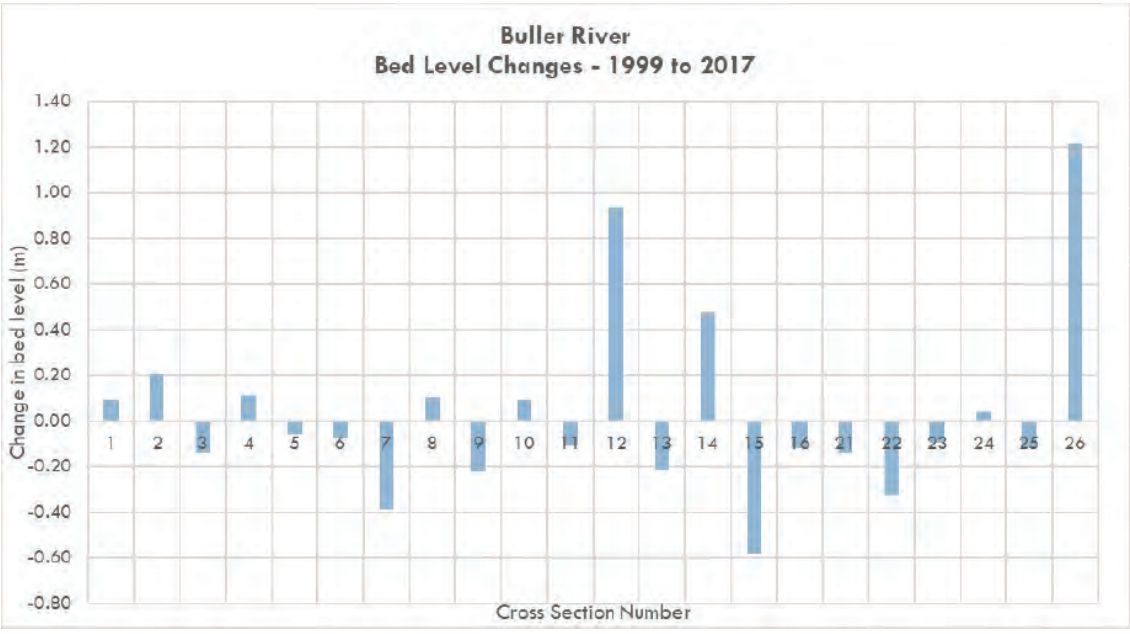
Figure 2-3: Bed level changes from 1999 to 2017



Over the period from 1999 to 2017 three additional bed level surveys were carried out in 2010, 2014, and 2017. These surveys included cross sections 4 to 1 extending downstream to the river mouth, and the results were analysed by Chris J. Coll Surveying Ltd. The overall trend over this 18 year period was no significant change, with an estimated net increase in river bed material volume of only 30,000 cubic metres (refer Figure 2-4).

Within this overall pattern (refer Figure 2-3) there was bed degrade between Te Kuha and Organs Island (cross sections 25 to 15), aggrade at the bend downstream of Organs Island (14 to 12), and a stable to degrade trend downstream of Organs Island to the port (11 to 5).

Figure 2-4: Volume changes from 1999 to 2017



SECTION THREE

Gravel extraction and dredging

Organs Island

Gravel extraction has been ongoing on the beach at the downstream end of Organs Island (cross section 14) over many years. Extraction over the period from 1995 to 1999 has only however averaged 4,560 cubic metres per year (Connel Wagner Limited, 2000), and would not have had a significant downstream influence.

It has been suggested that increased gravel extraction, for example by excavating across the river channel, could capture gravel that would otherwise move downstream and deposit in the lower reaches.

Evidence from the monitoring and modelling of gravel extraction in other rivers suggests that any gravel capture, and the resulting lowering of bed level, would mainly occur at and upstream of the site due to head cut erosion. The excavation would refill relatively quickly during fresh or flood. Although there could be some bed lowering for a short distance downstream as the river remobilises bed material, this would not extend as far as the SH67 bridge.

Large scale gravel extraction, especially from within the river channel, could have unexpected effects such as destabilisation of the river bed and erosion of river banks.

A safer approach is continued extraction from the gravel beach on the inside of the bend at a sustainable rate to maintain a "design bed level". This bed level needs to be determined, but would ensure flood overflows into the Orowaiti Stream are balanced so that flood risk to Westport is minimised (refer Section 6.3).

Lower Reach

Dredging had been ongoing from the port to the river mouth up until 2017, when it was suspended due to lack of deep-water shipping. The extraction rate was substantial and averaged 250,000 cubic metres per year over the period from 1991 to 1999 (Connel Wagner Limited, 2000). Over the period from 1999 to 2017 the extraction rate was closer to 150,000 cubic metres per year (personal conversation with Chris Coll – 16/1/2020).

The dredging had occurred mainly in the river mouth and offshore dune area, with only minor dredging occurred in the Half-tide wall and port area. Reactivation of this dredging programme would not be expected to have a significant effect on reducing build-up at the Half-tide wall (as discussed in Section 4).

Dredging or other methods or gravel extraction would need to be targeted at locations where build-up is a potential problem, such as directly alongside the Half-tide wall.

SECTION FOUR

Half tide wall and port

The Half-tide wall (refer Figure 4-1) is an embankment constructed of quarried rock, and extends a distance of 2.5 kms along the true left bank downstream of the SH67 Bridge. The wall has a top level of 0.3 m MSL (Lyttleton Datum) so that it overtops with higher river levels, and substantially narrows the river channel from the unconstrained 300 m width at the bridge, to 180 m from the natural 340 m width 1.2 km downstream of the bridge, and to 150 m from the natural 210 m width at the downstream end.

This restriction partially funnels tidal and flood flows between the wall and true right bank (wharf) side, with the goal of flushing sediment downstream, thus reducing wharf and downstream channel dredging requirements. Downstream there are Full-tide and mouth walls which maintain a fixed river outlet and navigation route to the sea.

Drone photogrammetric survey and soundings carried out by Chris J. Coll Surveying Ltd in late 2019 confirm some deposition has occurred on either side of the wall at the Martins Island beacon site since 2017 (refer XS4 Appendix B).

It appears that the gravel deposits between the wall and Martins Island are caused by gravel being carried over the wall from the upstream main channel during flood (Figure 4-2). These deposits are then washed downstream to accumulate in the narrow constriction between the wall and Martins Island at the beacon site. This causes partial blockage of the side channel with some of the deposits overtopping the wall and returning to the main channel.

The rock wall is progressively deteriorating due to loosening of the rock, localised lowering of the wall crest by overflows, and formation of at least two holes from concentrated tidal and flood flows. If the gravel deposits remain or increase in height, the wall is expected to deteriorate further due to overflow damage from tidal and flood flows.

There is concern that this gravel build-up is reducing channel flood capacity and increasing flood risk to Westport. This issue is addressed as follows in Section 5 of this report.

Figure 4-1: Half tide wall

Figure 4-2: Gravel Build-up at Half Tide Wall

SECTION FIVE

Hydraulic modeling

5.1 Impact of gravel buildup

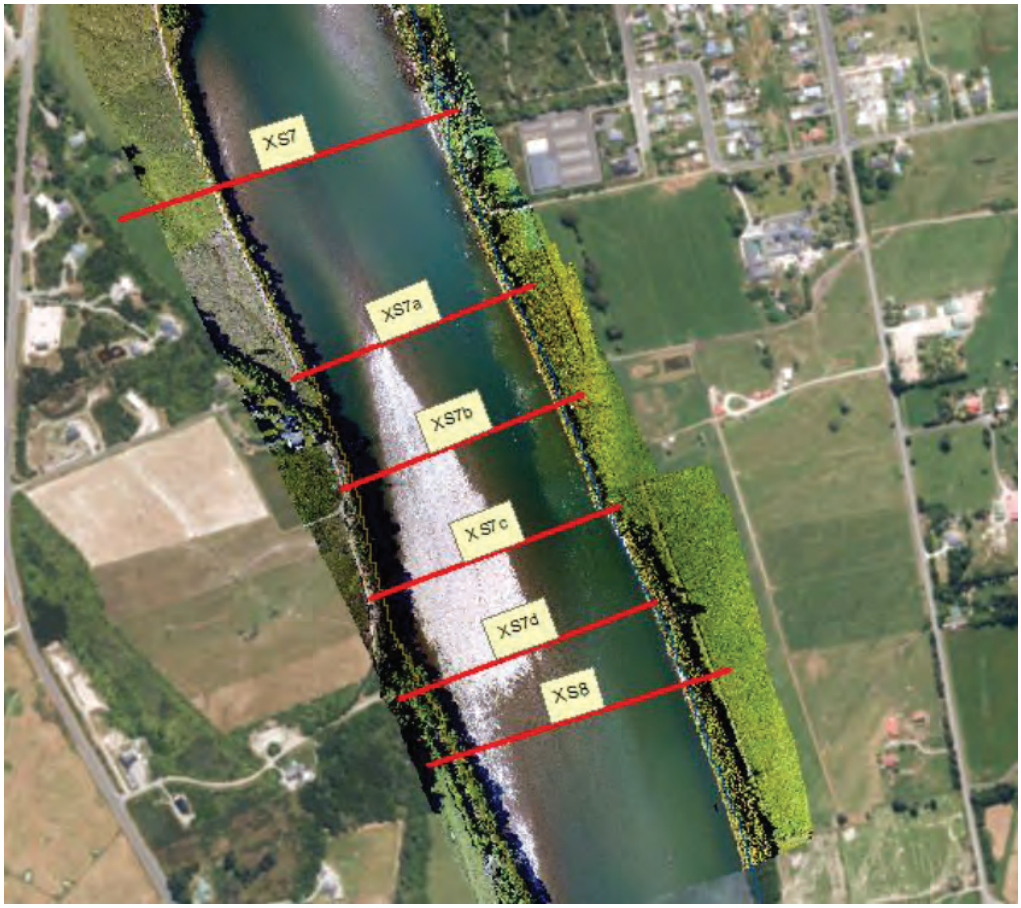
5.1.1 Model setup

In order to assist in understanding the potential impacts caused by the visible aggradation, the existing Hydraulic Model (Gardner, 2017) has been used to simulate a range of scenarios with varying bed conditions as well as inflows and tidal conditions.

Bed conditions have been based on 2017 cross section survey combined with underwater soundings and drone survey data collected in December 2019 by Chris Coll. The 2019 survey was between cross sections 4 and 5 as shown in Figure 5-1, and cross sections 7 and 8 as shown in Figure 5-2, and identified a combination of pre and post 2017 island build-up.

Figure 5-1: Gravel Island between XS4 and XS5 (overtopping the half tide wall)

Figure 5-2: Gravel Island between XS7 and XS8



Cross sections 4a to 4d and 7a to 7d were produced to better represent actual bed levels between the established cross sections. Prior to this information being available, the hydraulic model averaged the cross sections to interpolate bed contour between cross sections 4 to 5, and 7 to 8 respectively. The 2019 survey has enabled further modelling to be carried out to determine the effects of historic and projected gravel build-up. Modelling was undertaken using three cross section scenarios;

1. Based on the 2017 cross section survey. It is important to note that this doesn't recognise island build-up between cross sections .
2. Based on the combined 2017 and 2019 drone and sounding survey. This captures historic and recent island build-up between cross sections 4 to 5 and 7 to 8.
3. Based on a combination of the 2017 survey, and modified cross sections 4a to 4d and 7a to 7d, to allow for further projected island build-up. The modified cross sections assume that aggradation continues in the same locations, and allows the gravel bars to approximately double in width and increase in height by 0.5m. (NB. This should be considered a worst-case scenario and would take a significant time period to develop). The extent of this hypothetical gravel build-up is shown in Figures 5-3 and 5-4.

Figure 5-3: Modelled hypothetical gravel build-up between XS4 and XS5 (yellow area indicates exposed gravel)

Figure 5-4: Modelled hypothetical gravel build-up between XS7 and XS8 (yellow area indicates exposed gravel)

Multi-plots for cross sections 4 to 4d and 7a to 7d, for the cases of interpolation between the 2017 cross sections, the 2019 survey, and allowing for further aggradation, are included in Appendix B.

5.2 Impact of timing of tide with flood peak

In order to get a feel for the sensitivity of the flood magnitude in respect to the timing in respect to the coincidence of the tide with high or low tide, the model has been run so that the main flood peak in the Buller River coincides with both low and high tide scenarios for the Mean High Water Neap Scenarios.

5.3 Impact of blocking off the Orowaiti overflow

The impact of limiting or preventing flow from going down the Orowaiti Overflow has been discussed on multiple occasions. The hydraulic model has been used to assess the impact of blocking off all overflow as a worst case scenario. The channel was blocked off by inserting a 'glass wall' into the model in the location shown in Figure 5-5 on the next page.

Figure 5-5: Location of 'glass wall' inserted into model to prevent overflow down the Orowaiti

Whilst blocking off the entire flow down the Orowaiti is an unlikely scenario, limiting the flow down the overflow through extraction or modification of the sill level is a realistic option. This scenario helps gain an understanding of the effectiveness of the existing overflow conditions.

The following runs have been simulated through the model as part of these investigations:

Table 5-1: Summary of modelled scenarios

Number	XS	Flow	Tide
01	2017	26 July 2012	26 July 2012
02	2019	26 July 2012	26 July 2012
03	Hypothetical Aggradation	26 July 2012	26 July 2012
04	2017	50 year	MHWS +SS (flood peak coincides with high tide)
05	2019	50 year	MHWS +SS (flood peak coincides with high tide)
06	Hypothetical Aggradation	50 year	MHWS +SS (flood peak coincides with high tide)
07	2017	50 year	MLWN (flood peak coincides with low tide)
08	2017	50 year	MHWS +SS (flood peak coincides with high tide)
09	2019	50 year	MLWN (flood peak coincides with low tide)
10	2019	50 year	MHWS +SS (flood peak coincides with high tide)
11	2017 (Orowaiti Blocked)	50 year	MHWS +SS (flood peak coincides with high tide)
12	2017 (Orowaiti Blocked)	100 year	MHWS +SS (flood peak coincides with high tide)

SECTION SIX

Modeling results

6.1 Impact of gravel buildup

The model was run using the three cross section scenarios set out in the previous section, and for both the July 2012 (calibration event) and 50-year return period flood flows. In addition the 50 year flood was modelled with high tide and storm surge, and with low tide with no storm surge cases.

The modelling results are mapped for changes in peak flood extent and flood depth increase for each of these cases, as shown in Appendix C.

Key observations for the July 2012 event were;

- For the 2017 to 2019 case, the increase in flood depths and extent was negligible (Figure C1 & C3).
- For the 2017 to hypothetical future aggraded bed level case, the flood extent increased in localised areas around eastern Westport, with bank overflows between XS8 and XS9, and resulting significant flood depth increases (typically between 0.1 and 0.5 m). (Figure C2 & C3)
- For the 2017 to hypothetical future aggraded bed level case, there was a minor backwater effect extending upstream to XS13 (below Organs Island). (Figure C2)

Key observations for the 50-year flood case with high tide and storm surge were;

- For the 2017 to 2019 case, a negligible increase in flood extent, and moderate increase in flood depth (typically around 0.1 m or more) in central Westport. (Figure C4 & C6)
- For the 2017 to hypothetical future aggraded bed level case, the increase in flood extent was noticeable within Westport, with significant increases in flood depth typically in the range of 0.1 to 0.5 m, and greater than 0.5 m in localised areas. (Figure C5 & C6)
- For the 2017 to hypothetical future aggraded bed level case, there was reduced backwater effect which only extended as far as XS11. (Figure C5)

Key observations for the 50-year flood case with low tide and no storm surge were;

- For the 2017 to 2019 case, the increase in flood extent was noticeable within Westport, with increases in flood depth typically less than 0.1, and in the range of 0.1 to 0.5 m in localised areas. (Figure C8 & C9)

6.2 Sensitivity of flood magnitude to coincidence with tide timing

Model results have shown that the flood extent is not sensitive to the timing of the tide, however is sensitive to the magnitude of the tide – ie the results which coincide with a mean high water spring have a significantly greater flood extent that the results which coincide with a mean high water neap. This lack of sensitivity to the tide timing is most likely due to the fact that the Buller River typically has a fairly long flood peak which spans both high and low tide cycles. (Figure C7 & C8)

6.3 Impact of blocking off the orowaiti overflow

Model results show that preventing overflow from going down the 'Orowaiti Overflow' will cause significant increases in both flood level and extent, with levels increasing between 0.1 and 0.5m for almost the entire urban area of Westport, and increases in flood level of more than 0.5 m experienced for some areas (Figure C10).

This suggests that if gravel extraction along the Organs Island reach lowered bed levels sufficiently, overflows into the Orowaiti would reduce, and excessive flows could pass down the Buller River increasing flood risk to Westport.

Further modelling to determine target "design bed levels", and appropriate ongoing management of gravel extraction, would help manage this risk.

6.4 Flow split

If manipulation of the proportion of flow going down the Orowaiti Channel in the future is to be considered, it will be important to know the volume of water currently going down the Orowaiti Overflow channel during design events. Model results have been interrogated for the July 2012 Calibration event as well as for a 50 year design event and the flow proportions are summarised in Table 6-1 below.

Table 6-1: Summary of flow split

	Total Flow (m3/s)	Flow in Orowaiti (m3/s)	Percentage flow in Orowaiti (m3/s)
Calibration Event	7460	730	9.8
50 Year Event	8920	1200	13.5

SECTION SEVEN

Conclusions and recommendations

1. Overall survey results show relatively stable bed levels downstream of Te Kuha.
2. There is a pulse of gravel moving downstream past Organs Island, which is not expected to cause substantial downstream bed aggrade.
3. Gravel extraction at Organs Island is not expected to reduce downstream gravel movement or aggradation rates.
4. Modelling simulations which block the flow down the Orowaiti Overflow show that flood levels in Westport Town are significantly increased.
5. There is a risk of excessive gravel extraction at Organs Island lowering bed levels to the extent that Orowaiti flood overflows would reduce, thus increasing flood risk to Westport.
6. There is also the possibility that gravel build-up in the Organs Island area may send more water down the Orowaiti Overflow, thus reducing Westport flood risk.
7. Modelling should be undertaken to determine "design bed levels" at Organs Island, for managing gravel extraction and Orowaiti River flood overflows. This would require further cross section survey, and ideally development of a 2-D overflow model.
8. Any gravel extraction at Organs Island should be restricted to the adjacent dry beach, and at a sustainable ongoing rate to maintain "design bed levels".
9. Measurable gravel build-up is occurring on the islands between cross sections 7 and 8 and cross sections 4 and 5 in the lower reaches. This build-up is beginning to increase flood risk for Westport.
10. Historical cross section surveys have not included these islands, so the rate of island build-up and increasing flood risk is difficult to quantify and the existing modelling has the potential to overestimate the likely increase in flood levels as a result of the build-up.
11. Modelling of hypothetical future aggradation of these islands produces noticeable increases in flood extent, and significant increases in flood depth.
12. This future aggradation case is hypothetical, and its' rate or likelihood of occurrence is unknown
13. More frequent cross section surveys, including underwater soundings and drone survey between cross sections downstream of cross section 8, should be undertaken to monitor aggradation, and to enable prediction of future aggradation trends.
14. Ongoing hydraulic modelling should be undertaken as needed to determine aggradation effects on flood risk.
15. Practical gravel extraction or dredging methods should be investigated in anticipation of unacceptable aggradation occurring in the lower reaches.
16. Reactivation of port dredging at the historic river mouth and offshore locations is not expected to reduce aggradation in the Half-tide wall area. Dredging or gravel extraction would need to be targeted at the problem locations.

SECTION EIGHT

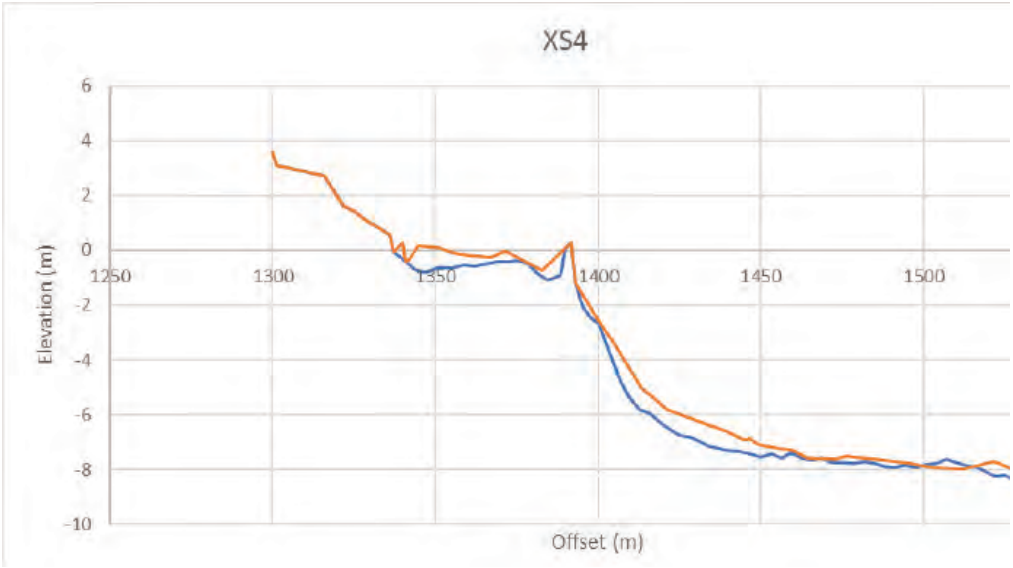
References

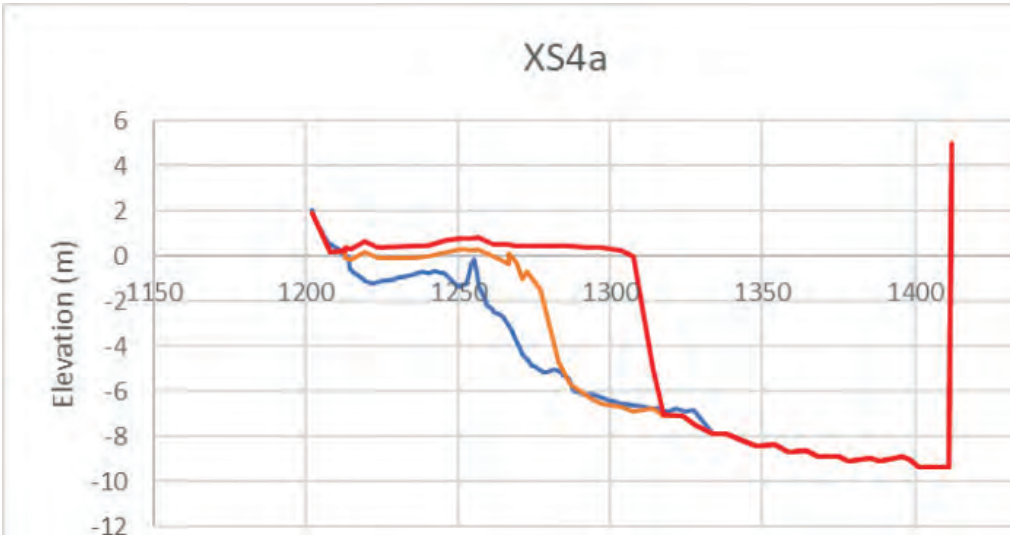
Connel Wagner Limited. 2000. *Preliminary Flood Study of the Buller River at Westport.* Wellington : Connel Wagner Limited, 2000. Reference 5435.40/CN.

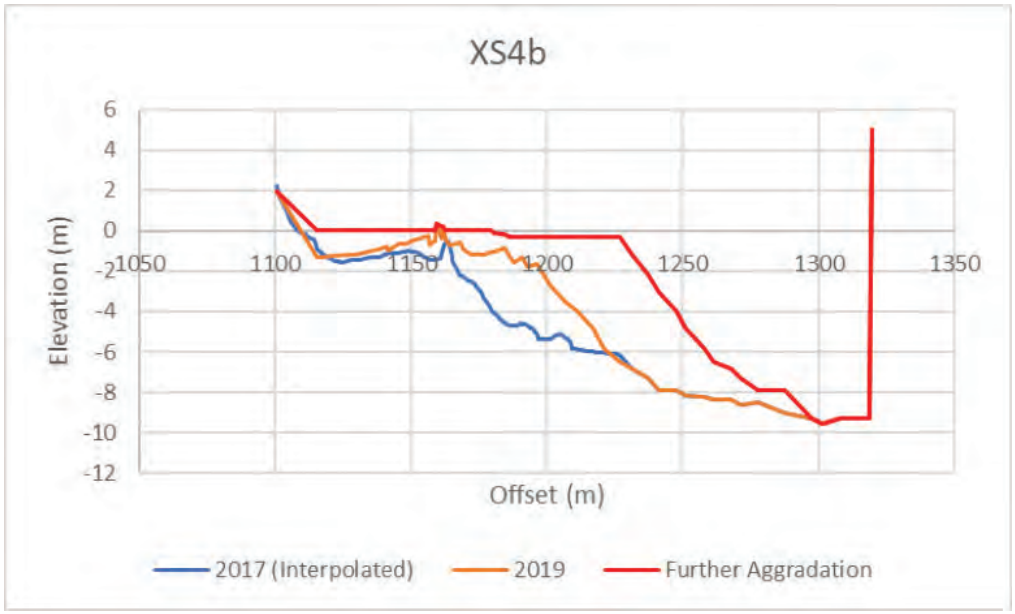
Gardner, Matthew. 2017. *Buller River: Update of Hydraulic Modelling.* Christchurch : Land River Sea Consulting Ltd, 2017.

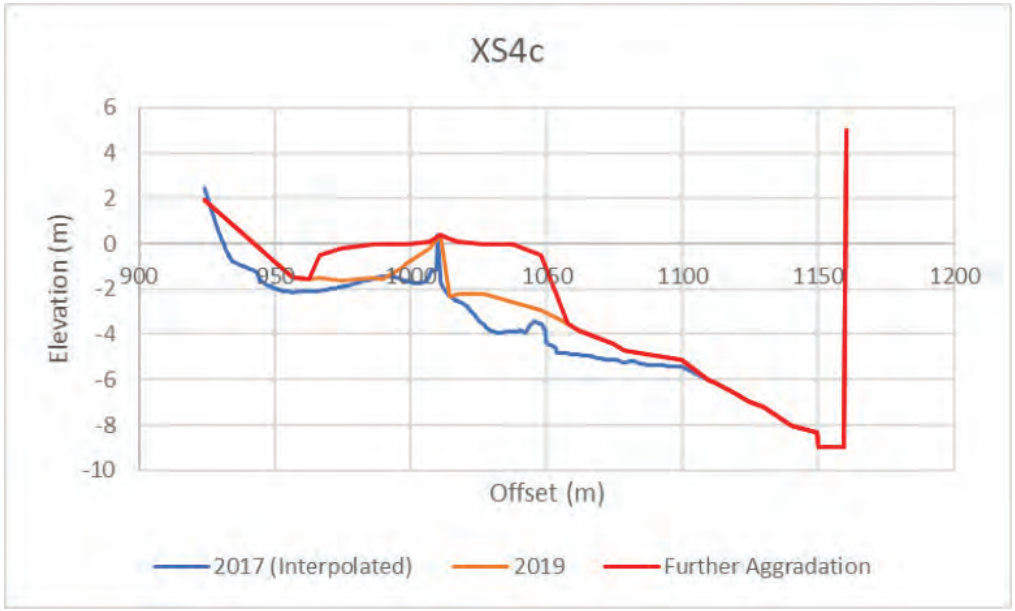
Appendix A - Cross section locations

Appendix B - Comparison of cross sections for modelled scenarios



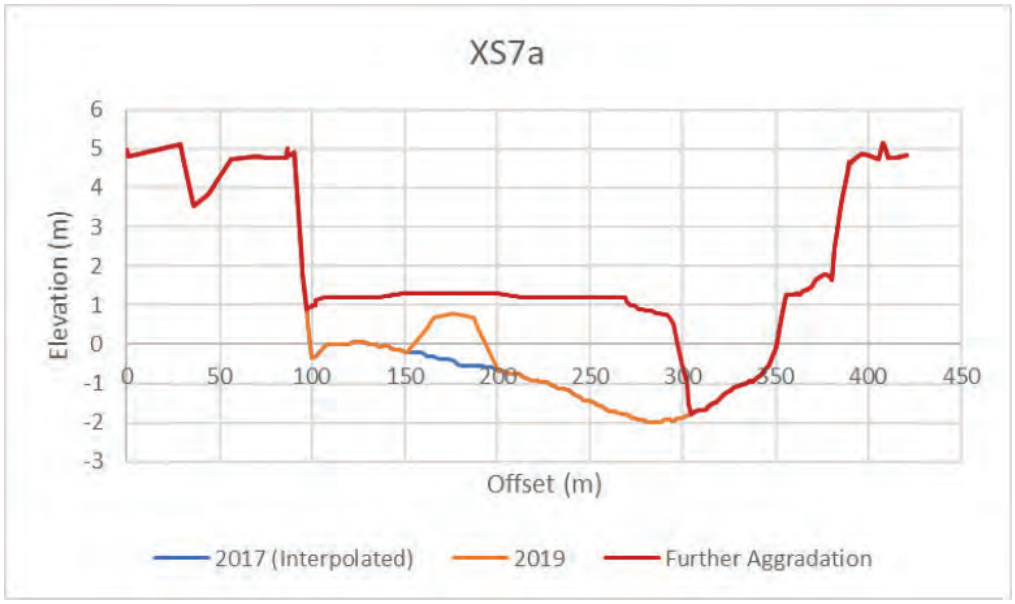


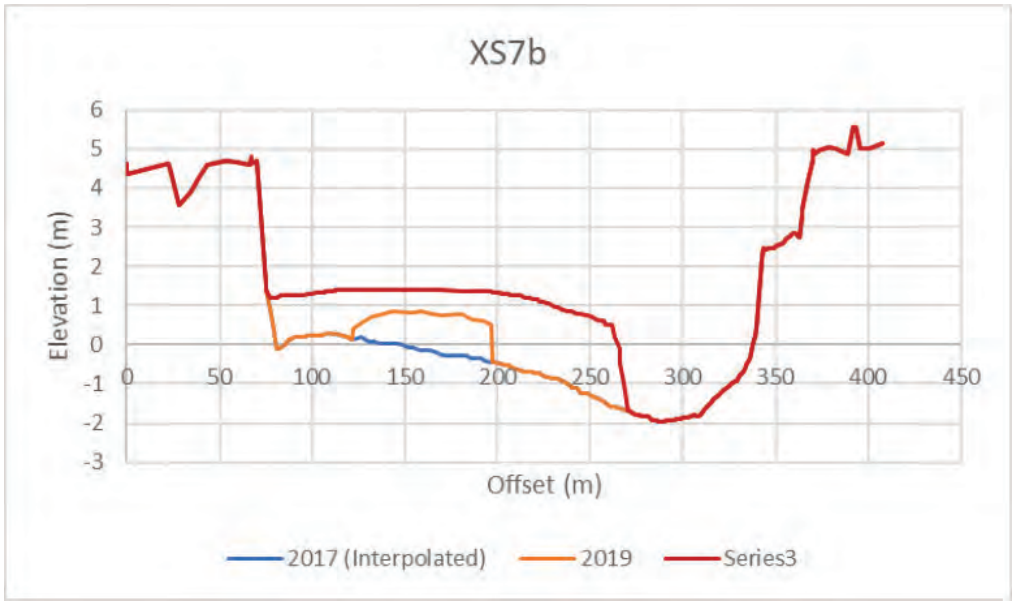

XS4b
Elevation (m)
6
4
2
0
-2
-4
-6
-8
-10
-12
1050
1100
1150
1200
1250
1300
1350
Offset (m)
2017 (Interpolated)
2019
Further Aggradation


XS4c
Elevation (m)
6
4
2
0
-2
-4
-6
-8
-10
900
950
1000
1050
1100
1150
1200
Offset (m)
2017 (Interpolated)
2019
Further Aggradation


XS4d
Elevation (m)
6
4
2
0
-2
-4
-6
-8
800
850
900
950
1000
1050
1100
1150
Offset (m)
2017 (Interpolated)
2019

XS7 to XS8


XS7a
Elevation (m)
6
5
4
3
2
1
0
-1
-2
-3
0
50
100
150
200
250
300
350
400
450
Offset (m)
2017 (Interpolated)
2019
Further Aggradation


XS7b
Elevation (m)
6
5
4
3
2
1
0
-1
-2
-3
0
50
100
150
200
250
300
350
400
450
Offset (m)
2017 (Interpolated)
2019
Series3


XS7c
Elevation (m)
7
6
5
4
3
2
1
0
-1
-2
-3
0
50
100
150
200
250
300
350
400
450
Offset (m)
2017 (Interpolated)
2019
Further Aggradation


XS7d
Elevation (m)
8
6
4
2
0
-2
-4
0
50
100
150
200
250
300
350
400
450
Offset (m)
2017 (Interpolated)
2019
Adjusted

APPENDICES

Appendix C - Hydraulic modelling runs and results

Summary of Figures

Figure Name	Map Type	Cross Section Sets	Tide Conditions	
Figure C1	Difference in peak depth	2017 to 2019	MHWS + SS	July 2012 (7460 m3/s)
Figure C2	Difference in peak depth	2017 to Hypothetical Aggrade	MHWS + SS	July 2012 (7460 m3/s)
Figure C3	Peak Flood Extent	2017, 2019. Hypothetical	MHWS + SS	July 2012 (7460 m3/s)
Figure C4	Difference in peak depth	2017 to 2019	MHWS + SS	Q50 (8920 m3/s)
Figure C5	Difference in peak depth	2017 to Hypothetical Aggrade	MHWS + SS	Q50 (8920 m3/s)
Figure C6	Peak Flood Extent	2017, 2019. Hypothetical	MHWS + SS	Q50 (8920 m3/s)
Figure C7	Difference in peak depth	2017 to 2019 Mean High Water Neap	MLWN	Q50 (8920 m3/s)
Figure C8	Difference in peak depth	2017 to 2019 Mean Low Water Neap	MLWN	Q50 (8920 m3/s)
Figure C9	Peak Flood Extent	2017 to 2019 Mean Low Water Neap	MLWN	Q50 (8920 m3/s)
Figure C10	Difference in peak depth	Orowaiti Blocked 2017	MHWS + SS	Q50 (8920 m3/s)

Legend

- Cross sections
- Increased Island Size
- Base Scenario Flood Extent

Change in Peak Depth (m)

- <-0.5
- -0.5 to -0.1
- -0.1 to -0.05
- -0.05 to 0.05
- 0.05 to 0.1
- 0.1 to 0.5
- >0.5

LANDRIVERSEA CONSULTING

Figure C1

REVISION	DATE	
01	10 Jan 2020	N
A3 SCALE	AUTHOR	
1:25,000	Matthew Gardner	

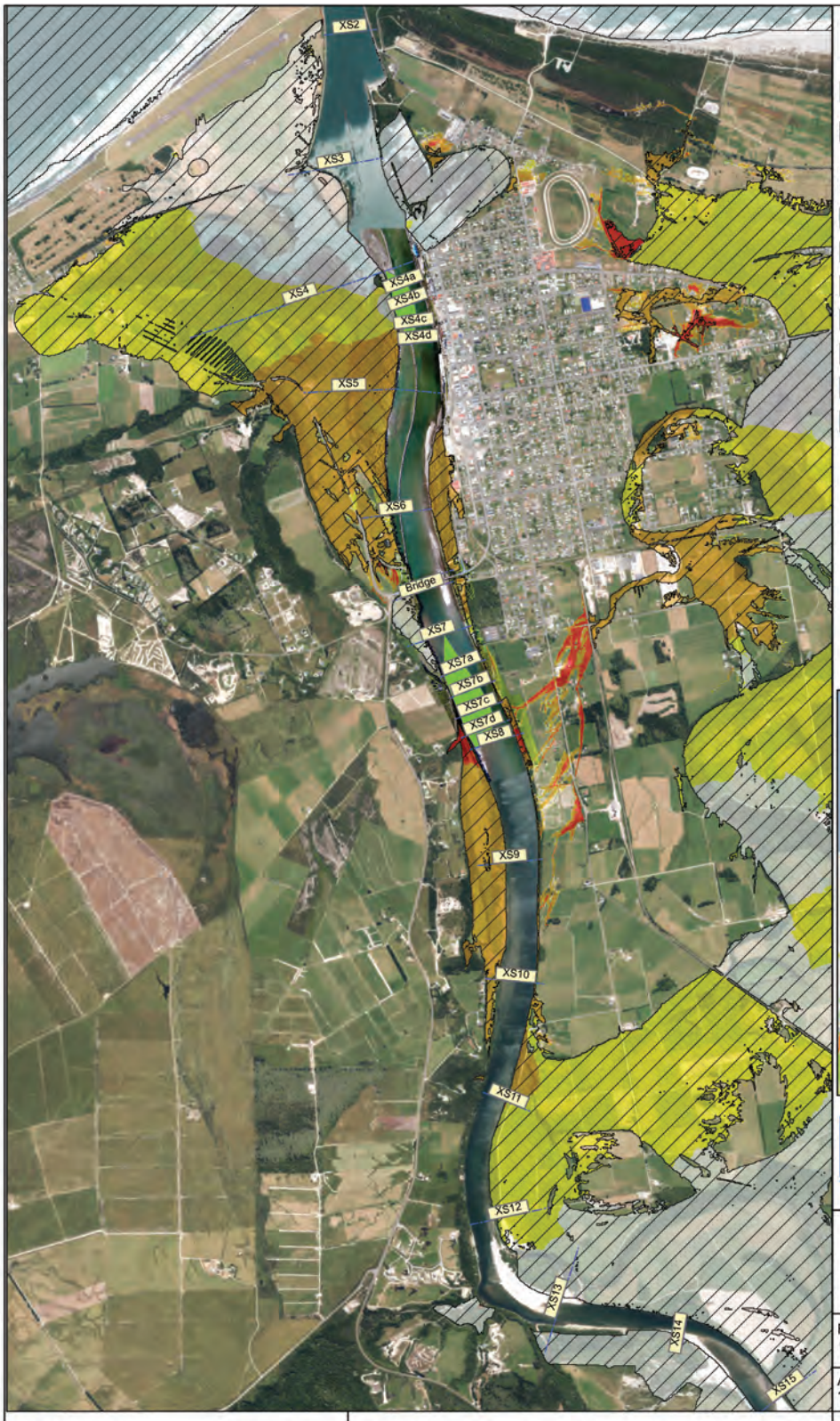
PROJECT

Buller River Gravel Investigations

MAP TITLE

July 2012 Flow
Change in peak flood depth map
2017 (interpolated) to 2019 (surveyed) bed levels

0 0.375 0.75 1.5
Kilometers



Legend

- Cross sections
- Increased Island Size
- 2017 Modelled Flood Extent

Change in Peak Depth (m)

- <-0.5
- -0.5 to -0.1
- -0.1 to -0.05
- -0.05 to 0.05
- 0.05 to 0.1
- 0.1 to 0.5
- >0.5

LANDRIVERSEA CONSULTING

Figure C2

REVISION	DATE
01	10 Jan 2020
A3 SCALE	AUTHOR
1:25,000	Matthew Gardner

PROJECT

Buller River Gravel Investigations

MAP TITLE

July 2012 Flow
Change in peak flood depth map
2017 (interpolated) to hypothetical future gravel aggradation bed levels

0 0.375 0.75 1.5
Kilometers

Legend

- Cross sections
- Increased Island Size

Peak Flood Extent

- 2017 (Interpolated)
- 2019 (Surveyed)
- Further Aggradation

LANDRIVERSEA CONSULTING

Figure C3

REVISION	DATE	
01	10 Jan 2020	N
A3 SCALE 1:25,000	AUTHOR Matthew Gardner	

PROJECT

Buller River Gravel Investigations

MAP TITLE

July 2012 Calibration Event Flows Peak Flood Extent Summary

0 0.375 0.75 1.5
Kilometers

Legend

- Cross sections
- Base Scenario Flood Extent

Change in Peak Depth (m)

- <-0.5
- -0.5 to -0.1
- -0.1 to -0.05
- -0.05 to 0.05
- 0.05 to 0.1
- 0.1 to 0.5
- >0.5

LANDRIVERSEA CONSULTING

Figure C4

REVISION	DATE	
01	10 Jan 2020	N
A3 SCALE 1:25,000	AUTHOR Matthew Gardner	

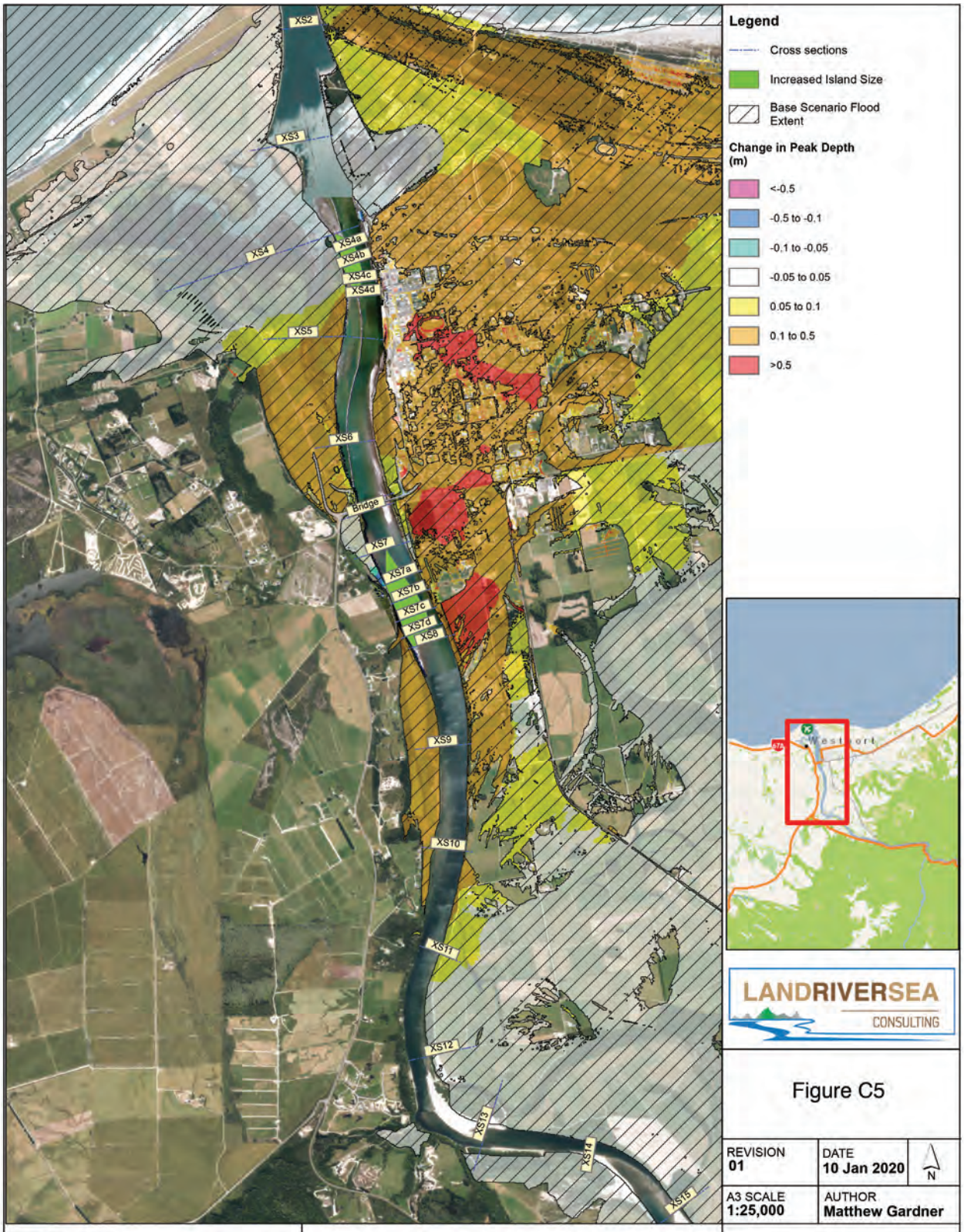
PROJECT

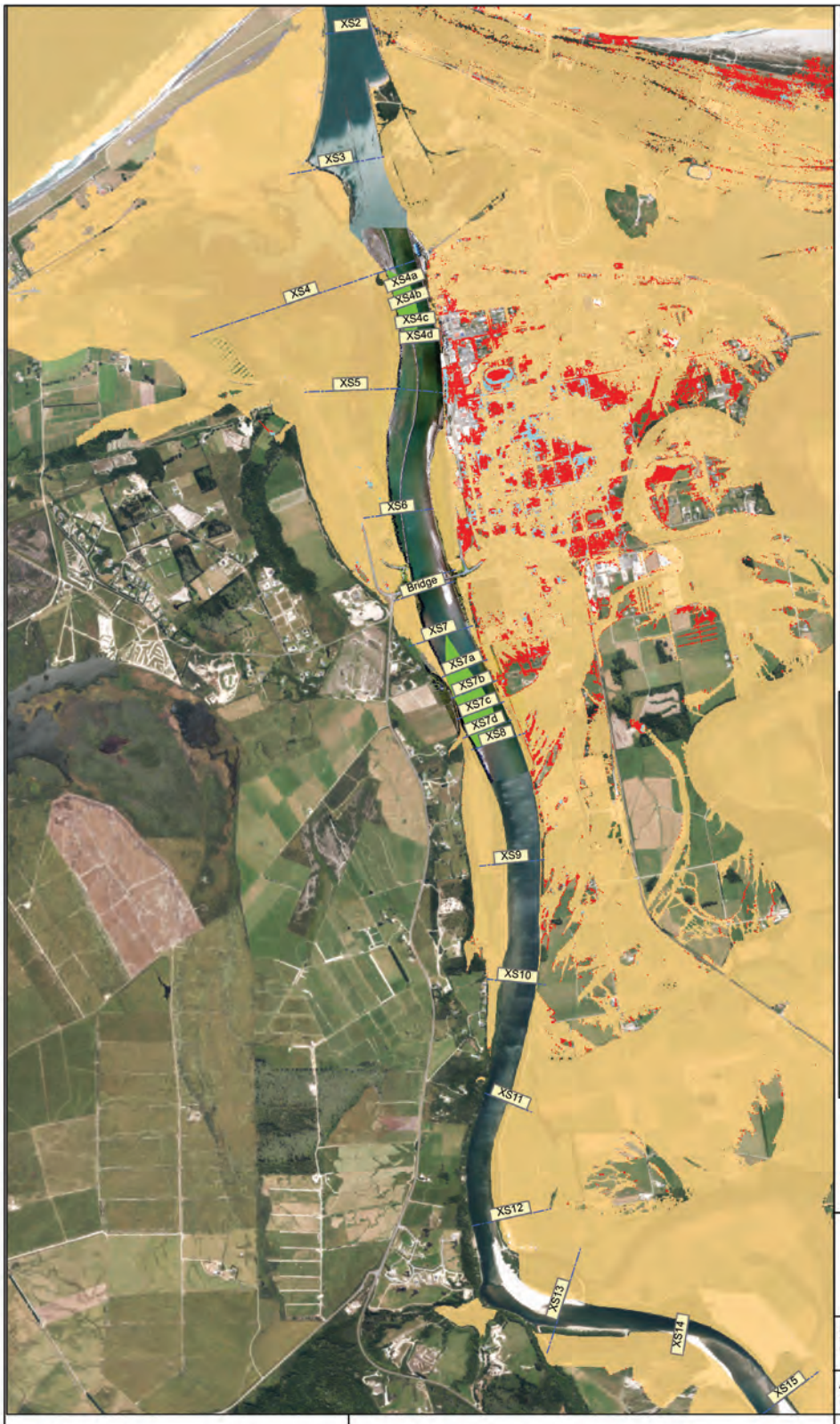
Buller River Gravel Investigations

MAP TITLE

Q50 Flow - High Tide (MHWS) and Storm Surge Change in peak flood depth map 2017 (interpolated) to 2019 (surveyed) bed levels

0 0.375 0.75 1.5
Kilometers





Legend

- Cross sections
- Increased Island Size

Peak Flood Extent

- 2017 (Interpolated)
- 2019 (Surveyed)
- Further Aggradation

LANDRIVERSEA CONSULTING

Figure C6

REVISION	DATE	
01	10 Jan 2020	N
A3 SCALE 1:25,000	AUTHOR Matthew Gardner	

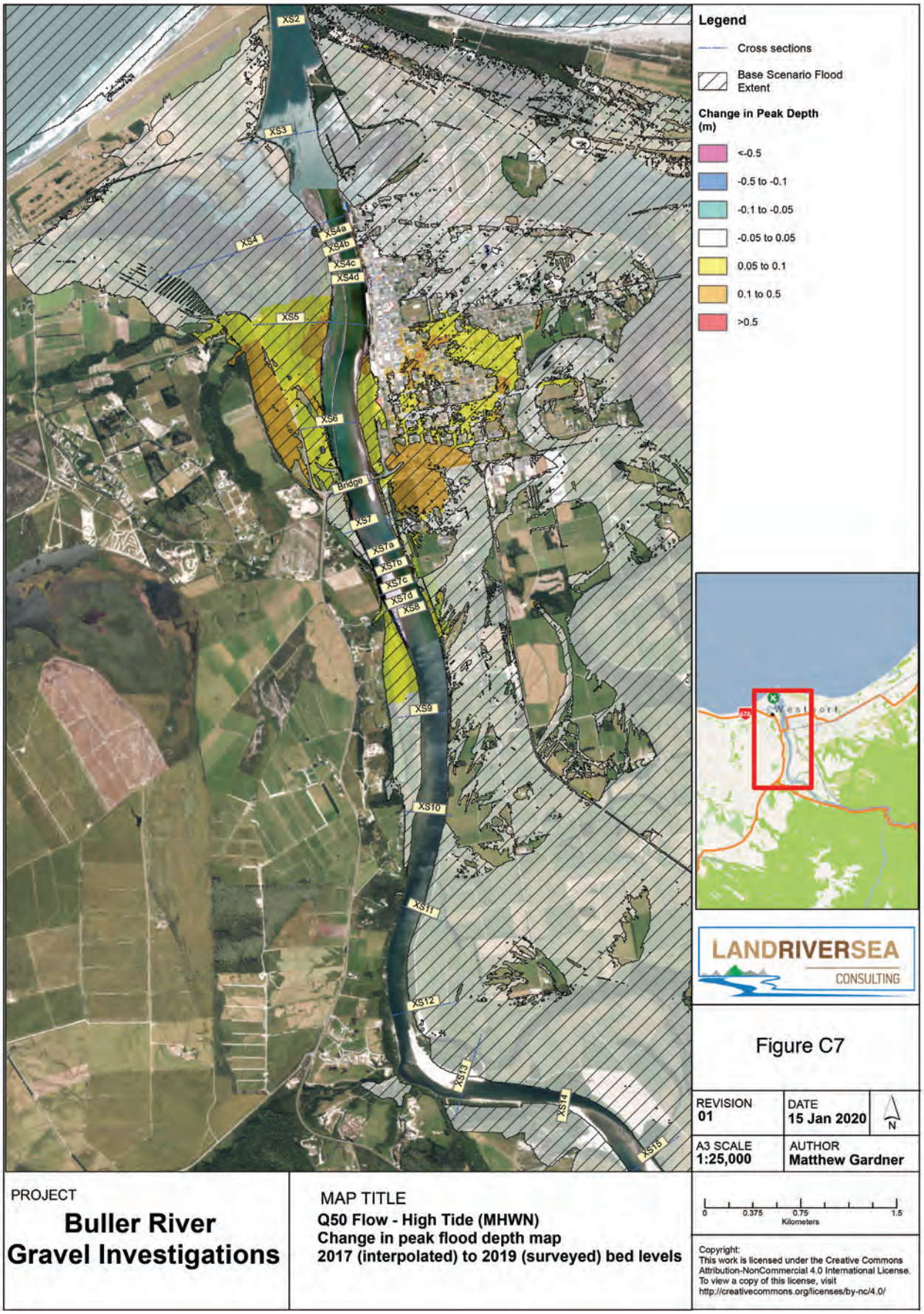
PROJECT

Buller River Gravel Investigations

MAP TITLE

50 year Flow High Tide (MHWS) Storm Surge Peak Flood Extent Summary

0 0.375 0.75 1.5
Kilometers



Legend

Cross sections

Base Scenario Flood Extent

Change in Peak Depth (m)

- <-0.5
- -0.5 to -0.1
- -0.1 to -0.05
- -0.05 to 0.05
- 0.05 to 0.1
- 0.1 to 0.5
- >0.5

LANDRIVERSEA CONSULTING

Figure C8

REVISION	DATE	
01	10 Jan 2020	N
A3 SCALE 1:25,000	AUTHOR Matthew Gardner	

PROJECT

Buller River Gravel Investigations

MAP TITLE

Q50 Flow - Low Tide (MLWN) No Storm Surge Change in peak flood depth map 2017 (interpolated) to 2019 (surveyed) bed levels

0 0.375 0.75 1.5
Kilometers

Legend

Cross sections

Peak Flood Extent

2017 (Interpolated)

2019 (Surveyed)

LANDRIVERSEA CONSULTING

Figure C9

REVISION	DATE	
01	10 Jan 2020	N
A3 SCALE 1:25,000	AUTHOR Matthew Gardner	

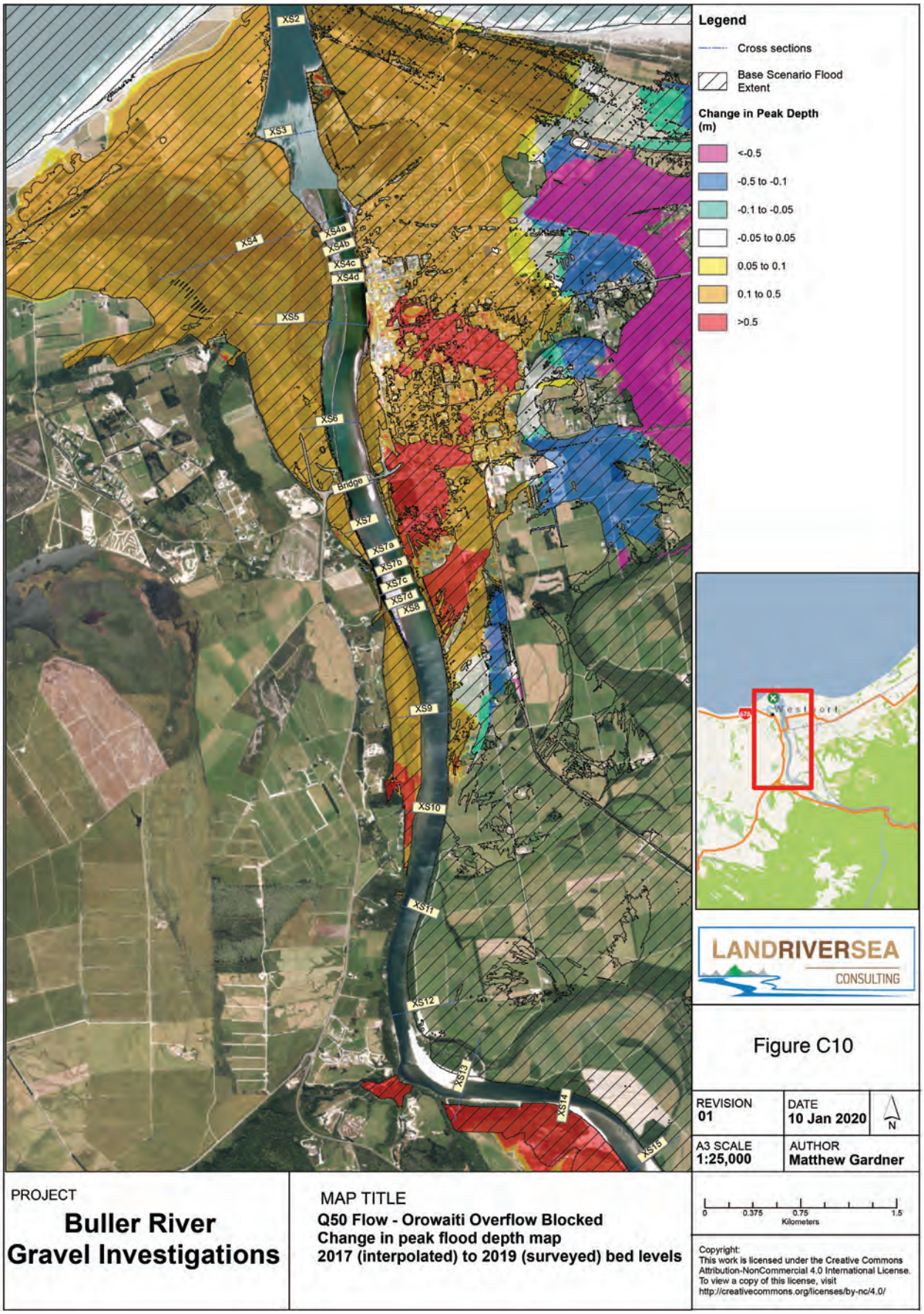
PROJECT

Buller River Gravel Investigations

MAP TITLE

50 year Flow Low Tide (MLWN) no Storm Surge Peak Flood Extent Summary

0 0.375 0.75 1.5
Kilometers



rmc²

APPENDIX C

LETTERS OF COMMITMENT

20 November 2019

Hon Shane Jones,
Minister for Regional Economic Development
Parliament Buildings
Wellington 6160

By email: shane.jones@parliament.govt.nz

Dear Minister

Support of the West Coast ports opportunity review

We write in our capacity as the Mayors of the Buller, Grey and Westland District Councils and the Chairs of the West Coast Regional Council, Development West Coast, Te Rūnanga o Ngāti Waewae and Te Rūnanga o Makaawhio.

We write in support of the work that Ray Mudgway is undertaking in reviewing the opportunities for the Buller, Grey and Jacksons Bay ports in the West Coast region. The application to the Provincial Growth Fund (PGF) supports capital investment into these vital assets that will unlock economic development opportunities and enhance resilience for the region. Looking into the future, the region supports examining what other economic opportunities can be developed through further investment and engagement.

As leaders of the West Coast, we believe that the success of New Zealand depends on the ability for regions to prosper. The PGF will assist in seeing this come to fruition.

Thank you for your ongoing support for the West Coast. We look forward to you visiting the region again soon to discuss this, and the many other opportunities on our horizon that we can work towards together.

Yours sincerely

Jamie Cleine
Buller District Council

Tania Gibson
Grey District Council

Bruce Smith
Westland District Council

Renee Rooney
Development West Coast

Allan Birchfield
West Coast Regional Council

Francois Tumahai
Te Rūnanga o Ngāti Waewae

Paul Madgwick
Te Rūnanga o Makaawhio

cc Minister Damien O'Connor
Al Morrison

Postal address: c/- The West Coast Regional Council
PO Box 66
Greymouth 7840

WEST COAST NEW ZEALAND
UNTAMED NATURAL WILDERNESS

Westport 2100
Hazard Planning for Future Generations

18 November 2019

Ray Mudgway
C/- ray@rmc2.co.nz

Dear Ray,

Upgrade of West Coast Ports

This is a letter on behalf of the Westport 2100 Group, a group tasked with engaging with the Westport Community to identify:

- the work required to enhance the resilience, and protect, the Westport community
- prioritise the projects within the work programme to deliver this;
- how this work will be funded.

A copy of the Terms of Reference is attached.

The Westport 2100 Group has identified that an aspect that needs to be investigated and considered as part of the Group's work is the maintenance and improvement of the wharf structures and other facilities associated with the river.

The Group wishes to support the application to the Provincial Growth Fund as there will be direct benefits for the protection for the town of Westport.

Yours faithfully

Chris Coll
Chair of Westport 2100 Group.

APPENDIX D

FINANCIAL SUMMARY

FINANCIAL CALCULATION FOR NEW JETTIES IN GREYMOUTH AND WESTPORT PORTS

Greymouth Port

Current State	2020	2021	2031	2041
Revenue	234,000	234,000	234,000	234,000
Expenses	- 690,000	- 700,350	- 812,785	- 943,270
EBITDA	- 456,000	- 466,350	- 578,785	- 709,270
Construction costs	- 4,025,000	-	-	-
Net cash flow	- 4,481,000	- 466,350	- 578,785	- 709,270
IRR				**0%**

Commercial Return of 7.5%	2020	2021	2031	2041
Revenue	1,170,978	1,170,978	1,170,978	1,170,978
Expenses	- 690,000	- 700,350	- 812,785	- 943,270
EBITDA	480,978	470,628	358,193	227,708
Construction costs	- 4,025,000	-	-	-
Net cash flow	- 3,544,022	470,628	358,193	227,708
IRR				**10.5%**
Percentage Increase in Revenue Required				**400%**

The current financial performance would provide the Greymouth Port with an internal rate of return of 0%. To achieve a commercial rate of return of 10.5% on the construction of a new jetty, the Greymouth Port would require an increase in revenue by 400%.

Westport Port

Current State	2020	2021	2031	2041
Revenue	116,734	116,734	116,734	116,734
Expenses	- 574,993	- 583,618	- 677,312	- 786,049
EBITDA	- 458,259	- 466,884	- 560,578	- 669,315
Construction costs	- 4,025,000	-	-	-
Net cash flow	- 4,483,259	- 466,884	- 560,578	- 669,315
IRR				**0%**

Commercial Return of 7.5%	2020	2021	2031	2041
Revenue	1,039,977	1,039,977	1,039,977	1,039,977
Expenses	- 574,993	- 583,618	- 677,312	- 786,049
EBITDA	464,984	456,360	362,665	253,929
Construction costs	- 4,025,000	-	-	-
Net cash flow	- 3,560,016	456,360	362,665	253,929
IRR				**10.5%**
Percentage Increase in Revenue Required				**791%**

The current financial performance would provide the Westport Port with an internal rate of return of 0%. To achieve a commercial rate of return of 10.5% on the construction of a new jetty, the Westport Port would require an increase in revenue by 791%.

Consolidated

Current State	2020	2021	2031	2041
Revenue	350,734	350,734	350,734	350,734
Expenses	- 1,264,993	- 1,283,968	- 1,490,097	- 1,729,319
EBITDA	- 914,259	- 933,234	- 1,139,363	- 1,378,585
Construction costs	- 8,050,000	-	-	-
Net cash flow	- 8,964,259	- 933,234	- 1,139,363	- 1,378,585
IRR				**0%**

Commercial Return of 7.5%	2020	2021	2031	2041
Revenue	2,210,208	2,210,208	2,210,208	2,210,208
Expenses	- 1,264,993	- 1,283,968	- 1,490,097	- 1,729,319
EBITDA	945,215	926,240	720,111	480,890
Construction costs	- 8,050,000	-	-	-
Net cash flow	- 7,104,785	926,240	720,111	480,890
IRR				**10.5%**
Percentage Increase in Revenue Required				**530%**

Taking the current state, to achieve a commercial rate of return of 10.5% across both Ports, combined revenue would need to increase by 530%.

rmc²

Ray Mudgway

Managing Director

+ 64 27 575 7993

ray@rmc2.co.nz