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# The Future of NZ's Agricultural Workforce

**Guest Speaker - Dr Richard Lynch, MPI**

**23 April 2024 4.00pm-5.30pm**

B.linc Workshop, Lincoln University



A Business Unit of

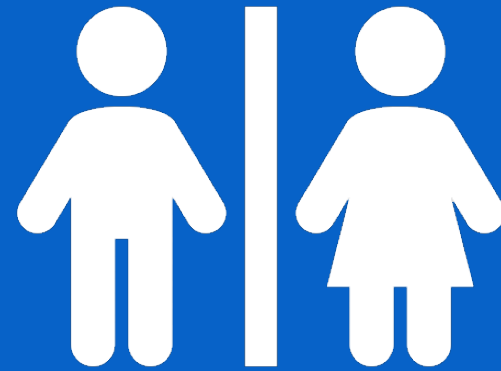


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# Housekeeping



Emergency Exits

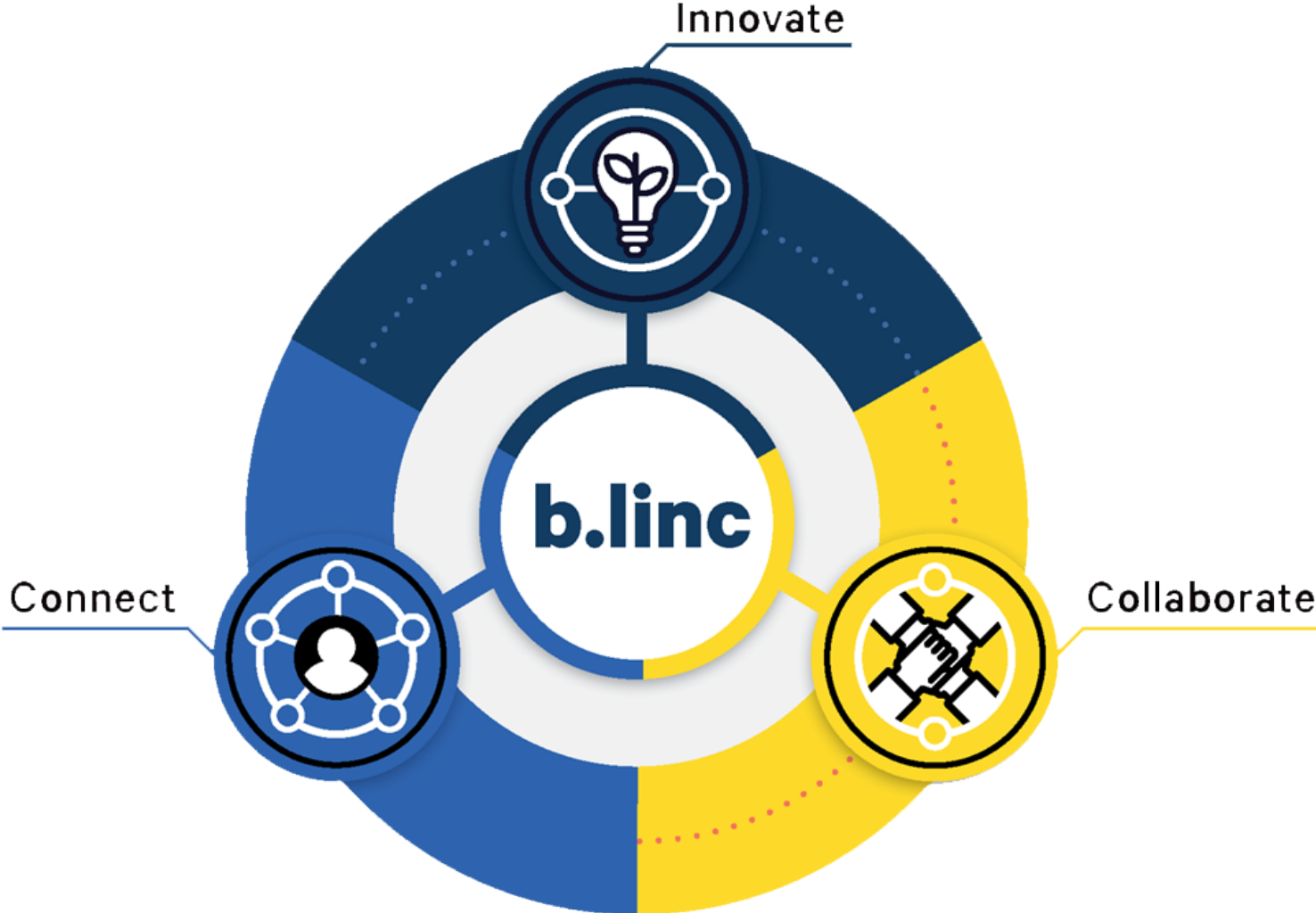


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# Introducing our speakers

**Richard Lynch**  
MPI



# Presentation on the food and fibre workforce

## B.linc Innovation VIBE event

Name of presenter     Dr Richard Lynch, MPI  
Venue                     Lincoln University  
Date of presentation     23 April 2024



# Acknowledgements

The work I am presenting today is the product of a dedicated group of people including:

- The Primary sector workforce policy team at MPI
- Dr Bill Kaye-Blake and the team at NZIER
- Aquaculture New Zealand
- Many people in industry who shared their data and expert knowledge

This work was undertaken in close partnership with an industry and cross government Working Group, who tested many of the assumptions underlying the work. Membership included MIA, Beef & Lamb NZ, DairyNZ, Horticulture NZ, NZ Wine, NZKGI, Seafood NZ, Forestry and Wood Processing Workforce Council, Te Awanui, Muka Tangata, MBIE, TEC, Lincoln University

# Disclaimer

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Access to the data used in this study was provided by Stats NZ under conditions designed to give effect to the security and confidentiality provisions of the Data and Statistics Act 2022. The results presented in this study are the work of the author, not Stats NZ or individual data suppliers.

These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) and Longitudinal Business Database (LBD) which are carefully managed by Stats NZ. For more information about the IDI and LBD please visit <https://www.stats.govt.nz/integrated-data/>

The results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements.

# Outline of presentation

- Aim of today
- Why is it important to analyse and understand the workforce
- How to define and measure the workforce
- Who is in the workforce today
- What the workforce may look like in the future
- What does this all mean and what actions should we all be thinking about



## Aim of today

Today is an opportunity to discuss:

- The current food and fibre workforce
- How the workforce may look in the future
- What actions are important to ensure the sector has the labour and skills to continue to be successful
- How to lift labour productivity

But first I want to talk about the work MPI has already undertaken

## Why it is important to understand the workforce

- The food and fibre sector is a key part of the New Zealand economy
- People are fundamental to the success of the sector
- The sector is dynamic and is rapidly transforming in response to economic and environmental factors, and changes in knowledge and technology
- The workforce is also equally dynamic, and labour and skill needs will change over time
- Preparing for these changes will take investment and time
- Good evidence is important for providing high quality policy advice

# Defining the food and fibre workforce

# Scope of the food and fibre sectors

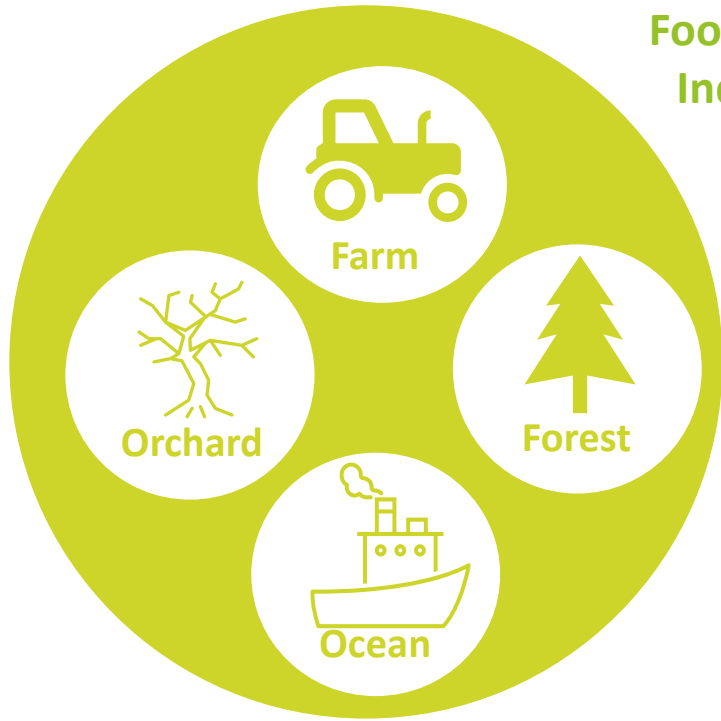
The food and fibre sectors include:

- Arable
- Dairy
- Forestry and wood processing
- Horticulture (including viticulture and winemaking)
- Pork, poultry, bees and other
- Red meat and wool
- Seafood
- Cross sector activities

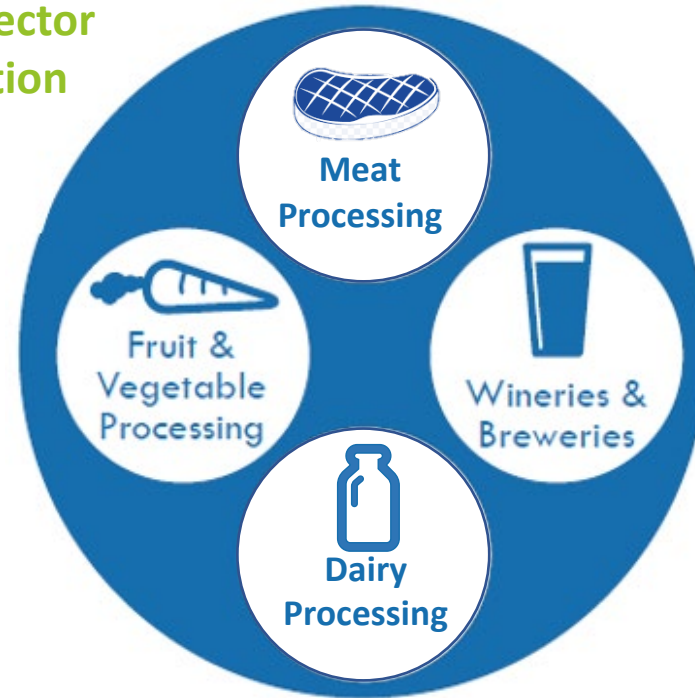
Under each of these sectors we group the ANZSIC06 class codes into Core Production, Core Processing/Manufacturing, Strongly Connected, Relevant and Other.



## Food and Fibre Sector Industry Allocation



**Core Production**



**Core Processing/Manufacturing**  
(1<sup>st</sup> level processing)



**Strongly Connected**  
(Includes 2<sup>nd</sup> level processing)



**Relevant**  
(includes other processing, engineering, road transport)

**Wider Labour Market**

# How to count people

While there are many ways to count who is working in the food and fibre sector, we use **monthly numbers** as labour demand (seasonal peaks) can be estimated

For roles and skills, we use:

- Managers – highly skilled
- Semi-autonomous – skilled
- Managed or front-line – semi-skilled





For further information see *The food and fibre workforce data on its size and composition* report

<https://www.workforceinsights.govt.nz/assets/Documents-and-reports/NZ-food-fibre-sector-workforce-NZIER-MPI-June-2022.pdf>

## The food and fibre workforce

### Data on its size and composition

NZIER and Ministry for Primary Industries (MPI)

June 2022

# The food and fibre sector workforce today

<https://www.workforceinsights.govt.nz/>



## Key facts on today's food and fibre workforce

- There are around 360,000 people employed across the food and fibre sectors
- One in every 7.5 employed people in New Zealand (13 %) works in the sector
- The workforce has grown over the last decade from 328,000 in 2012
- **Around half of the workforce is in production** (e.g. on-farm, on-orchard, in forests, or on the water), while the remaining workforce are in roles beyond the farmgate (manufacturing and processing)
- Approximately **60 percent of the workforce are in skilled or higher skilled roles**
- Two-thirds of the workforce is male
- It is ethnically diverse (e.g. 37% of the forestry workforce and 28% of the meat processing workforce identify as Māori)
- Self-employment, especially in production, is high (26% overall and 42% within core production)



## Migrants are a small but important component of the workforce

- Seasonality drives large fluctuations in the workforce
- Approximately 90 percent of the workforce are New Zealanders
- Migrants are, on average, 18 percent of the horticulture sector's workforce
- This compares to the rest of the sectors where migrant labour represents between 3 percent for red meat and wool and 11 percent in the dairy farming

## How many work in the food and fibre sectors?

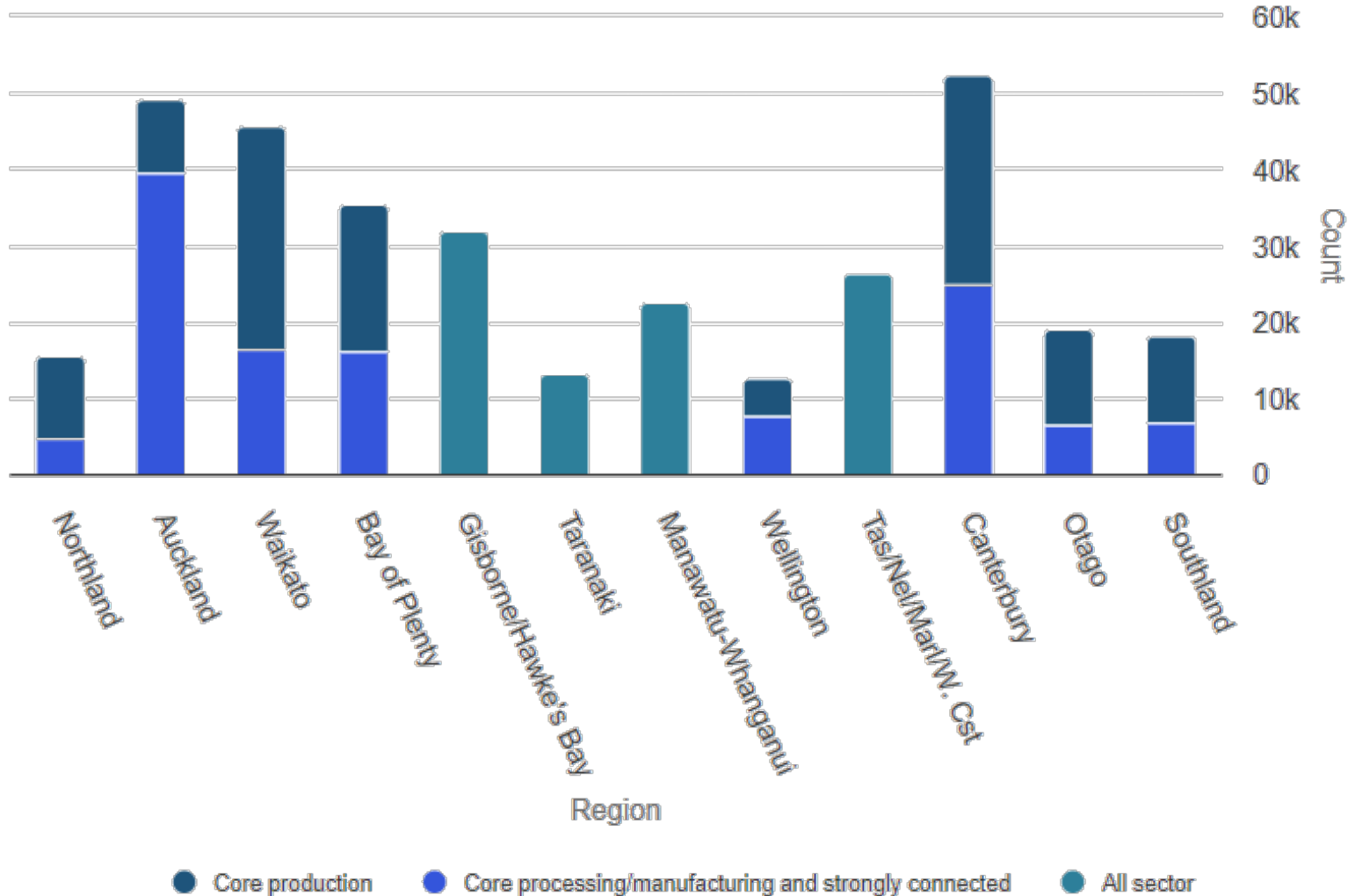
Sector	Core production	Core processing	Strongly connected	Relevant	Other	Total
Arable	4,975	2,033	16,675	280	n/a	<b>23,963</b>
Dairy	39,783	14,400	1,108	n/a	n/a	<b>55,208</b>
Forestry and wood processing	12,783	11,442	18,500	196	n/a	<b>42,880</b>
Horticulture	35,075	26,192	4,117	256	n/a	<b>64,815</b>
Pork, poultry, bees and other	9,167	3,458	13,975	n/a	n/a	<b>26,542</b>
Red meat and wool	46,183	24,375	5,292	396	n/a	<b>75,996</b>
Seafood	6,017	4,450	1,022	541	n/a	<b>11,908</b>
* Cross sector	26,800	n/a	11,900	22,580	5,769	<b>66,990</b>
Indicative %	<b>49%</b>	<b>24%</b>	<b>20%</b>	<b>6%</b>	<b>2%</b>	<b>359,327</b>

Data for year ending 31 March 2022.

\* Cross sector includes activities/services that are not attributable to a single sector, rather they span multiple sectors and include veterinarian services, fertiliser & pesticide manufacturing, aerial topdressing, road transport, agritech and contracting firms (especially horticulture)

# Where are people located?

All food and fibre sectors | Year to 31 March 2022



## Regions

- Sector importance varies across regions (e.g. dairy important to Waikato, horticulture to Hawke's Bay).
- Canterbury, Auckland and Waikato contain the largest food & fibre workforces, though they have different profiles Auckland has a large core processing/strongly connected composition while Canterbury & Waikato have a much more significant core production profile.

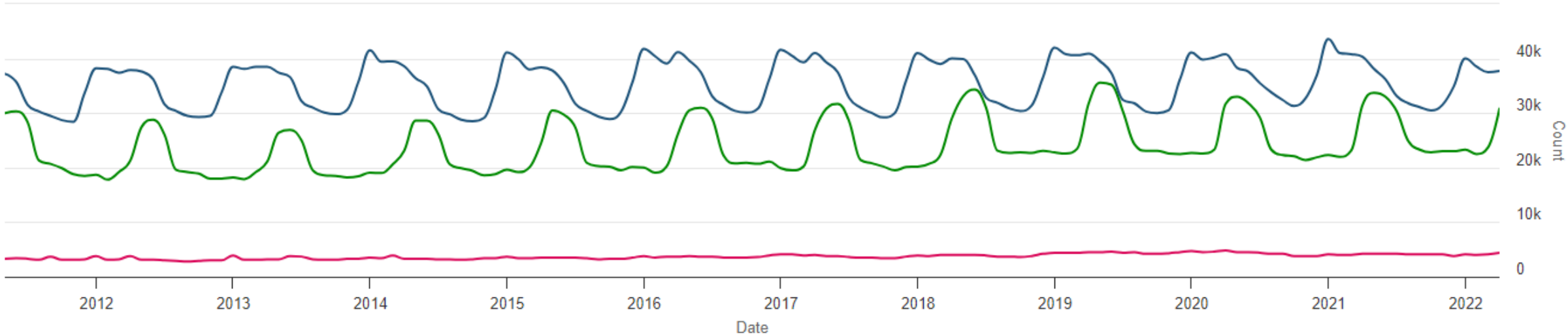


# Annual counts hide seasonal variability

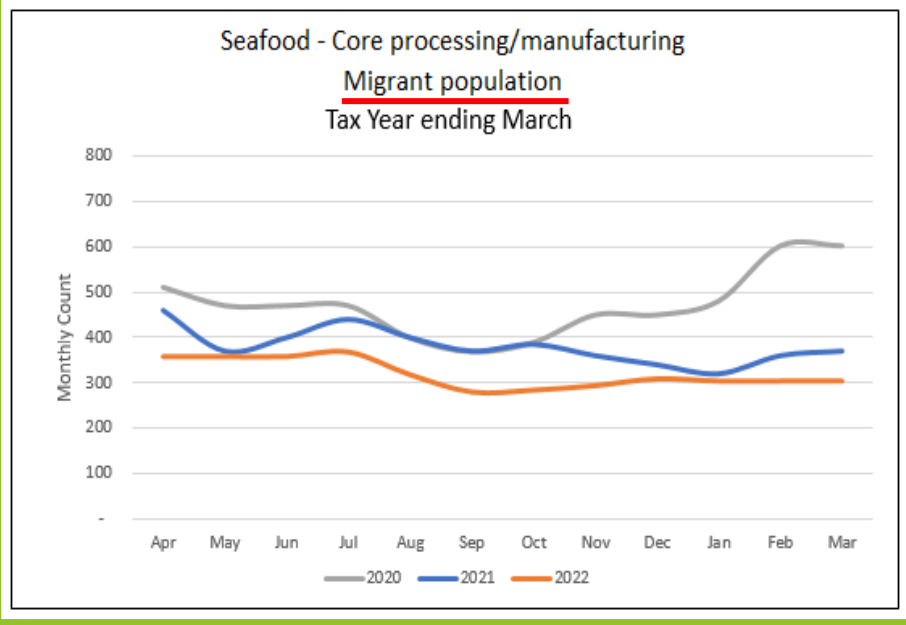
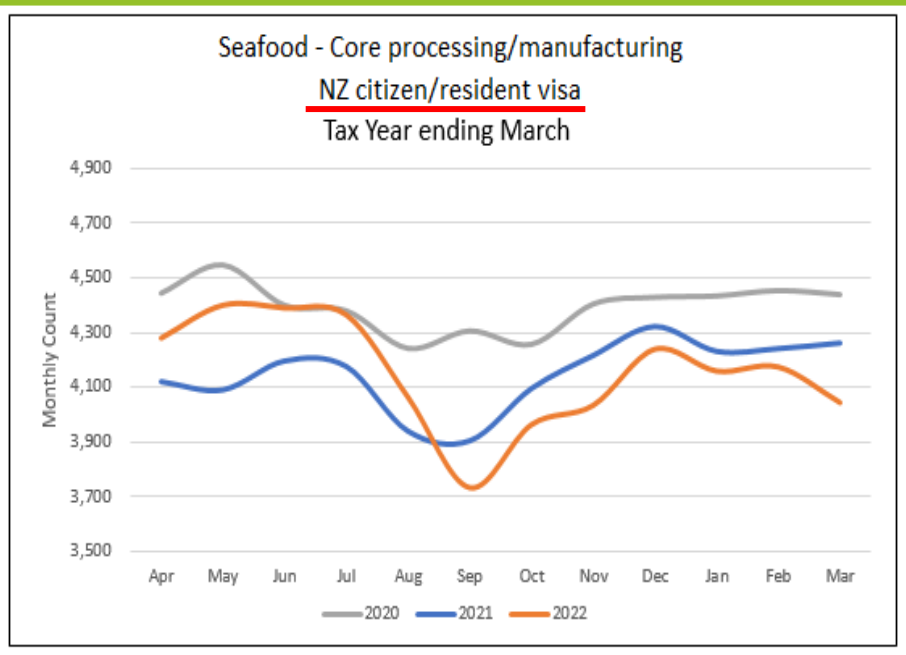
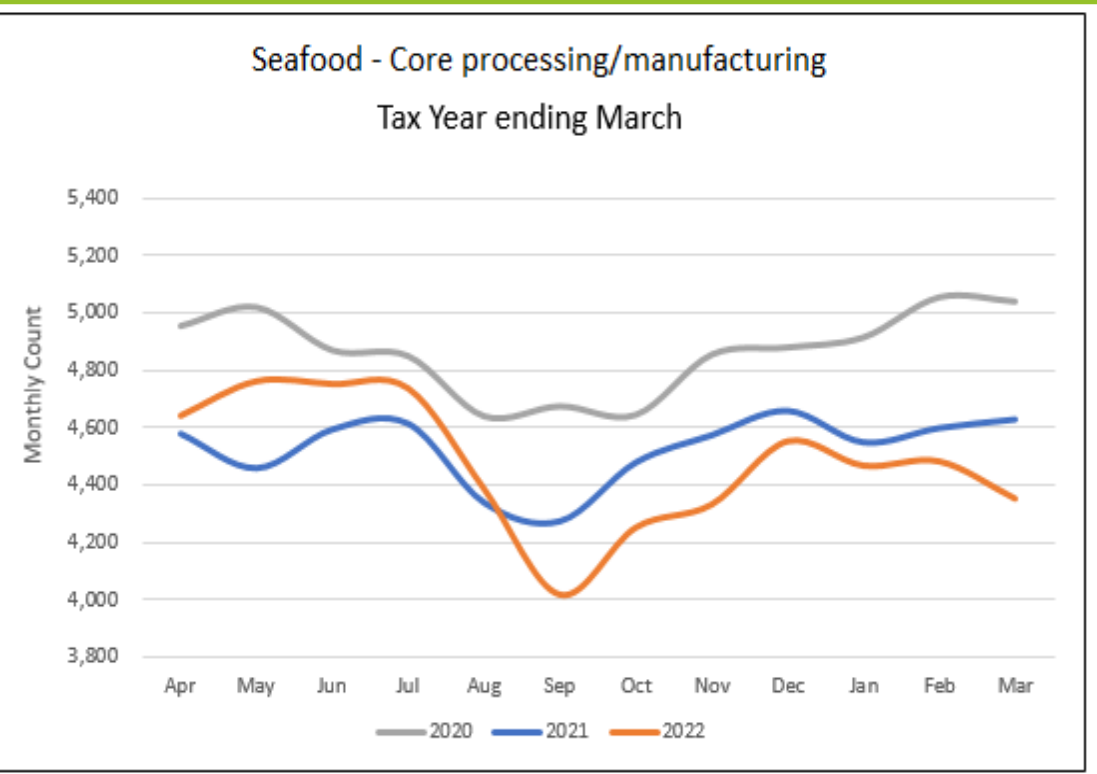
Monthly workforce counts by sector-designation

Horticulture

Zoom 1y 5y All



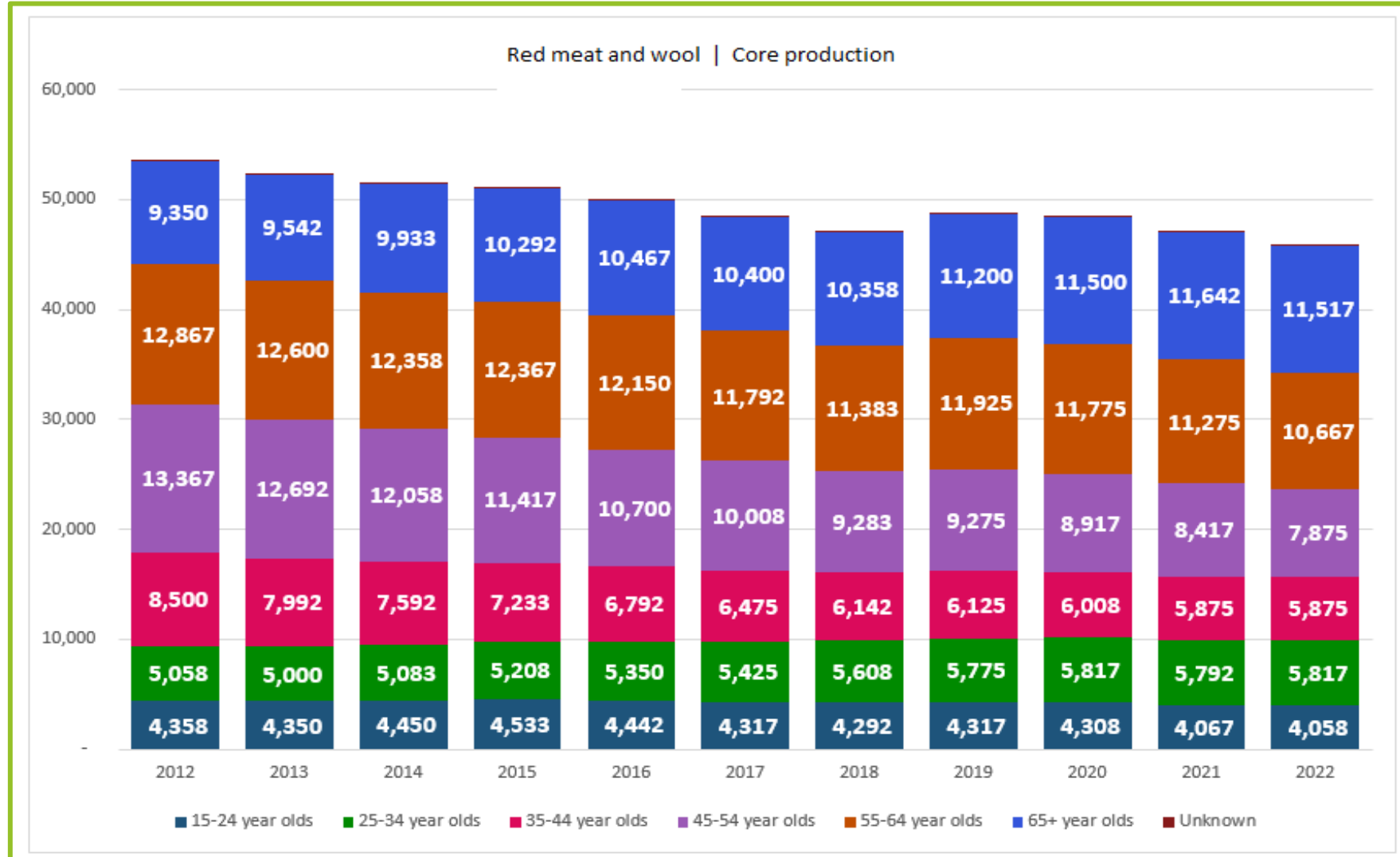
Core processing/manufacturing Core production Strongly connected



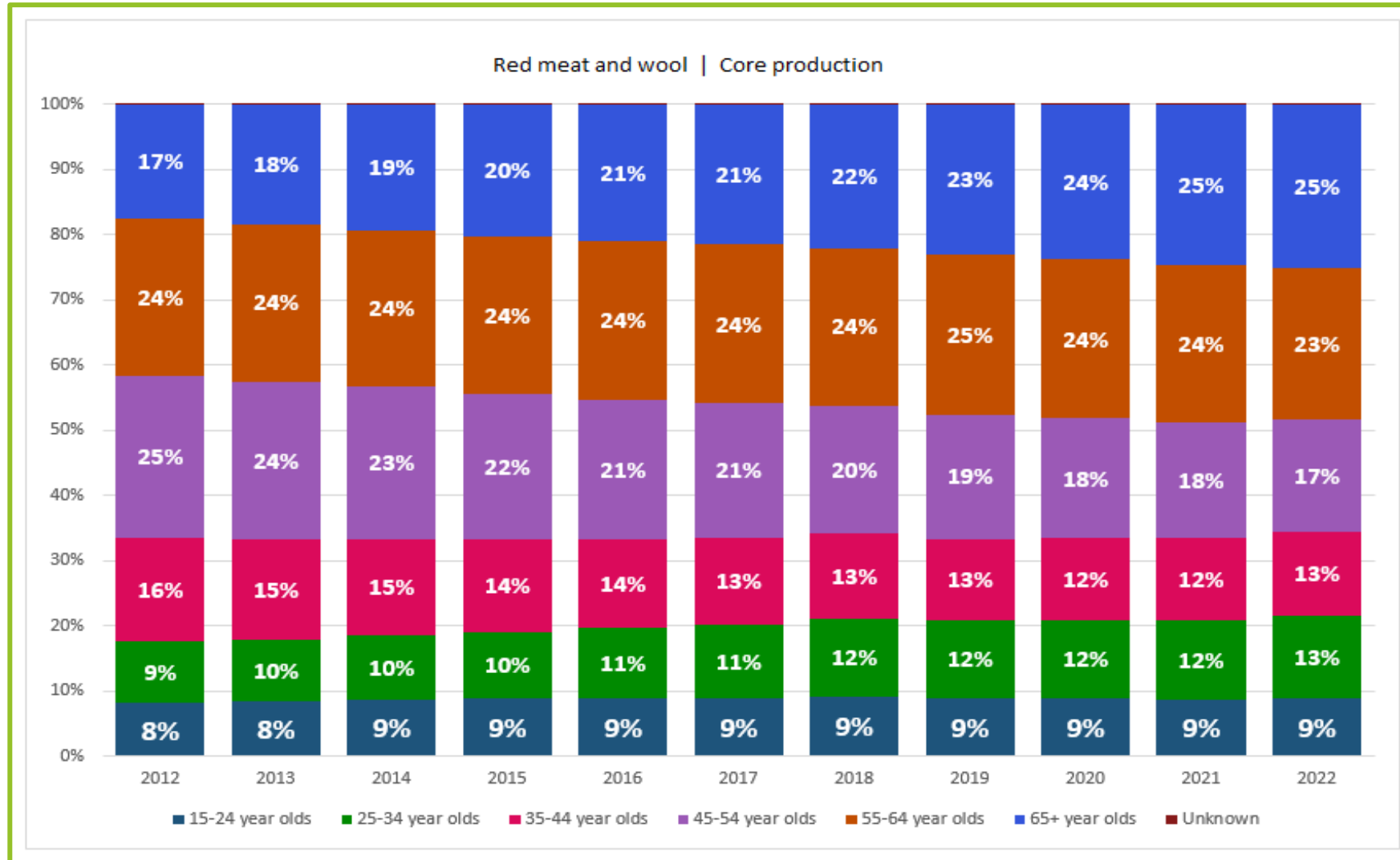
The seafood core processing workforce was smaller throughout the latter part of the 2022 tax year compared to previous years. The reduction in numbers was predominately due to fewer New Zealanders, although the smaller number of working holiday visa holders throughout the year also had an impact.

**Note:** Workforce counts in each graph above are depicted using various numerical scales via the “y axis”, therefore a measure of caution should be exercised when interpreting this information.

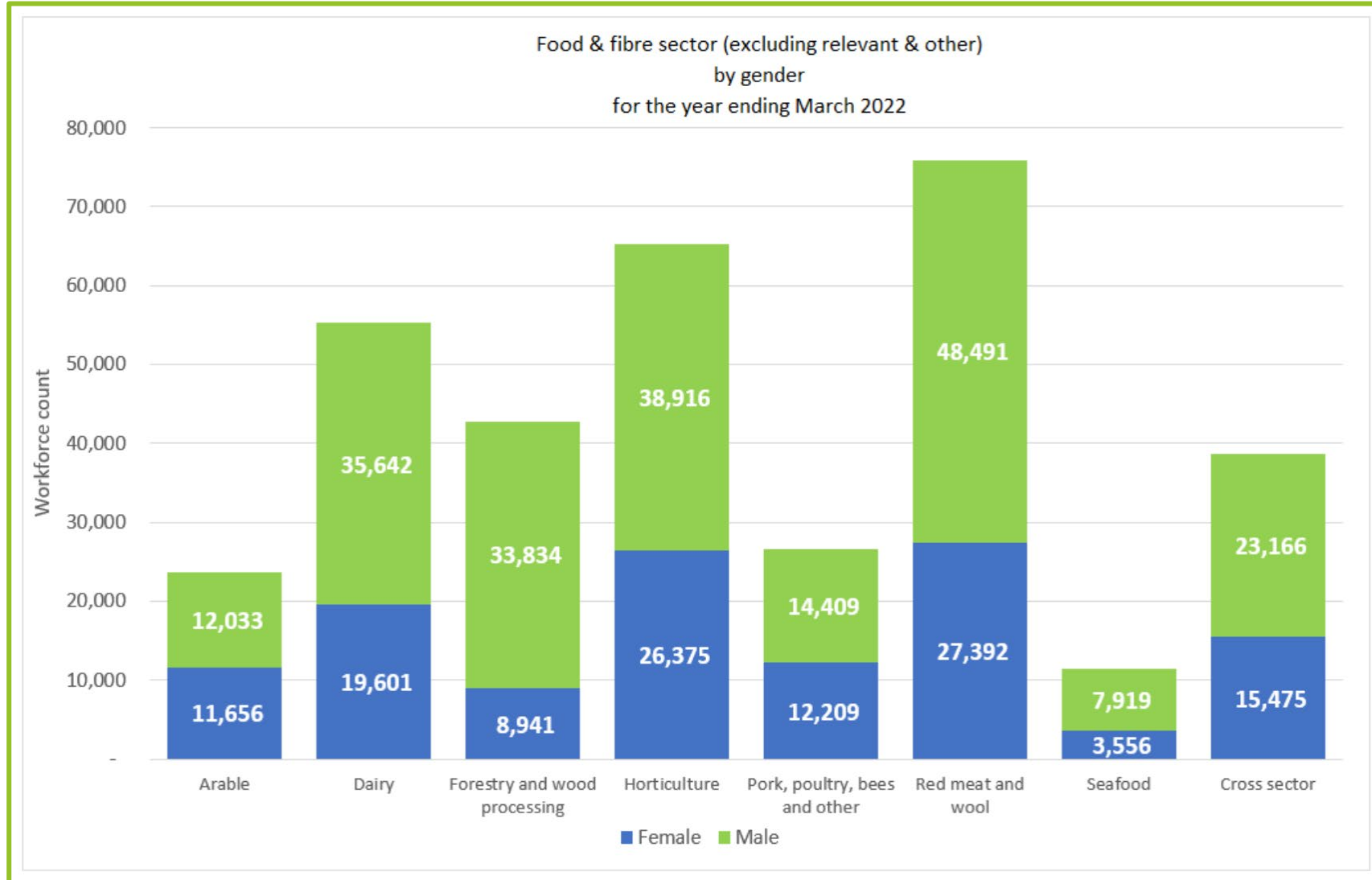
# The workforce is aging



There are (i) more people over 65 and (ii) fewer 45–54 year olds in sheep & beef farming than a decade ago



# The workforce is predominately male



# Workforce Forecasts

## Approach to forecasting

Forecasting is important to it helps us understand how the workforce may change and what actions we need to undertake to ensure we have the workforce we need

Because of the very broad scope of the food and fibre sectors we used a macroeconomic model to help forecast the workforce

Enables the food and fibre sectors and their workforce demands to be put into the context of the New Zealand economy and enables a consistent approach for all sectors

It does mean that specific sector issues and assumptions may not be able to be addressed

A partial analysis for a particular industry may (or may not) produce a different result, since some of the critical workforce detail may be missing in the economy wide approach. For example, we have not modelled explicit land use change, or livestock projections



## Modelling scenarios

Our forecast horizon was out to 2032

Three scenarios were modelled

- **BAU (Business as usual):** This scenario uses past performance to describe the food and fibre sectors in 2032. It is based on trends in the recent past around investment, productivity and technology
- **Increased use of technology:** Scenario 2 envisions food and fibre sectors that take maximum advantage of existing and emerging technologies
- **Transformed sector:** Scenario 3 builds on the increased use of technology in Scenario 2 and adds an increased focus on sustainability and high-value products and markets

The scenarios are akin to “**what if**” questions:

- What if sectors can reach growth aspirations by changing the composition of **exports** to higher value products valued by consumers and what it means for workforce requirements.
- What if **productivity** grows faster or slower and what that means for workforces in different sectors.

## Assumptions- BAU scenario

Productivity growth 2020-2032

Core Production – 27% - except dairy 0%

Core Processing - 1% - except dairy 0%

Export demand 10% - except horticulture at 42%

Based on historical productivity data from Stats NZ and FAO/OECD forecasts

Looking at 8% increase in overall food and fibre workforce

## Workforce numbers – BAU scenario by sector and value chain

Workforce requirements in 2032

Sector	Core production	Core processing /Manufacturing	Strongly connected	Relevant	Other	Total	% Change from 2020
Arable	4,707	2,394	16,062	317	-	23,481	4.8%
Dairy	40,859	13,572	1,409	-	-	55,840	5.5%
Forestry and Wood Processing	14,258	12,325	18,186	193	-	44,963	8.6%
Horticulture	41,444	27,729	4,268	262	-	73,703	11.7%
Pork, Poultry, Bees and Other	10,745	4,874	13,622	-	-	29,241	12.2%
Red Meat and Wool	48,099	31,235	5,517	377	-	85,227	9.7%
Seafood	6,548	5,296	1,233	498	-	13,574	5.2%
Cross Sector	26,067	-	10,818	21,803	6,466	65,155	2.2%
<b>Total</b>	<b>192,727</b>	<b>97,425</b>	<b>71,115</b>	<b>23,451</b>	<b>6,466</b>	<b>391,184</b>	<b>7.7%</b>

# Assumptions for increased use of technology scenario

Productivity growth 2020-2032

Core Production – 37% - except dairy 0%

Core Processing - 11% - except wood processing 21% and red meat 1%

Export demand 10% - except horticulture 42% and arable 20%

Looking at 9% increase over 2020 numbers

## Workforce numbers – Increased use of technology by sector and value chain

Workforce requirements in 2032

Sector	Core production	Core processing/ Manufacturing	Strongly connected	Relevant	Other	Total	% Change from 2020
Arable	4,778	2,548	15,760	355	-	23,441	4.6%
Dairy	40,990	13,653	1,459	-	-	56,102	6.0%
Forestry and Wood Processing	14,948	12,130	17,040	185	-	44,303	7.0%
Horticulture	42,634	28,133	4,423	269	-	75,458	14.3%
Pork, Poultry, Bees and Other	10,953	5,399	14,824	-	-	31,176	19.6%
Red Meat and Wool	45,767	34,315	5,772	382	-	86,236	11.0%
Seafood	6,767	5,473	1,277	502	-	14,019	8.7%
Cross Sector	25,697	-	11,101	22,331	6,605	65,734	3.1%
<b>Total</b>	<b>192,534</b>	<b>101,650</b>	<b>71,657</b>	<b>24,023</b>	<b>6,605</b>	<b>396,470</b>	<b>9.2%</b>



## Assumptions for transformation scenario

Productivity growth 2020-2032

Core Production – 37% - except dairy 0% and seafood 27%

Core Processing - 11% - except wood processing 21% and red meat 1%

Export demand 10 -50%

Looking at 16% increase over base line workforce forecasts

## Workforce numbers – Transformed sector scenario by sector and value chain

Workforce requirements in 2032

Sector	Core production	Core processing/ Manufacturing	Strongly connected	Relevant	Other	Total	% Change from 2020
Arable	4,976	2,563	15,923	366	-	23,828	6.3%
Dairy	42,207	14,068	1,496	-	-	57,772	9.1%
Forestry and Wood Processing	16,340	12,895	17,328	198	-	46,762	12.9%
Horticulture	42,510	28,855	4,531	271	-	76,167	15.4%
Pork, Poultry, Bees and Other	11,439	6,272	15,246	-	-	32,957	26.5%
Red Meat and Wool	54,080	39,972	6,120	382	-	100,553	29.4%
Seafood	7,020	5,659	1,310	504	-	14,492	12.4%
Cross Sector	27,374	-	11,352	22,667	6,689	68,083	6.8%
<b>Total</b>	205,946	110,284	73,306	24,389	6,689	<b>420,615</b>	<b>15.8%</b>



# Overall results for the food and fibre sector

- The modelling suggests that employment in the food and fibre sector could increase between **8 percent and 16 percent from the 2020 base to 2032**
- Overall NZ employment growth for the same period is around 11%
- There is a **trend towards more highly skilled people** within the food and fibre sector. Results show an increase of between 1 percent and 3 percent from the 2020 base. Highly skilled workers are required to support the expected growth of technology and complexity in the next decade.
- **Technology creates employment in the sector.** This is a positive story about what technology can offer the food and fibre sectors. As technology is introduced and demand increases, it improves the efficiency and effectiveness of operations, increasing labour demand

# Key features of the results

- The modelling highlights the importance of lifting productivity and the export demand.
- Lifting productivity and export demand makes it easier for the sectors to attract labour and skills. Both factors are important, but lifting export demand, which is a combination of price changes, changing product mix towards higher value products, and volume (as modelled in the transformed scenario), the gains are greater
- Forecasted employment growth is sensitive to the assumptions
- It is more important to understand the “direction of travel” and the factors that drive this, rather than focusing on the exact numbers
- The modelling provides an indication of “demand”, that is, how the workforce may grow over time, and in which regions. It does not provide any insights on “supply”, that is, how this projected growth will be met.

# A deeper dive into the future aquaculture workforce

# Why did we undertake an aquaculture-specific forecast?

- The aquaculture sector is transforming, and we wanted to better understand what that means for the workforce.
- Our earlier work used a macroeconomic model to help forecast the whole food and fibre workforce. This enables the workforce demands to be put into the context of the New Zealand economy and enables a consistent approach for all sectors.
- However, it means that specific sector issues and assumptions may not be able to be addressed.
- The forecasts were based on delivering on the 2035 aquaculture strategy

# Approach to the aquaculture workforce forecast

- NZIER interviewed people from across the aquaculture sector to understand their views on future development
- NZIER created a spreadsheet model of the sector to estimate future levels of revenue and the associated workforce
- The data for the model was provided to AQNZ and MPI
- Forecasts of workforce efficiency by skill levels were developed in earlier MPI work based on OECD research
- The model allowed NZIER to test the impact of several assumptions about growth rates, prices and labour efficiency in the sector.

## Four scenarios were developed but will only present Scenario 1 today

Scenario	Description
Scenario 1	<p>Salmon dominated sector, highly technical workforce</p> <ul style="list-style-type: none"><li>● Requires a high capital investment to achieve technical gains.</li><li>● A highly technical workforce will be required.</li><li>● There will be a reduction in the share of manual labour due to automated processes.</li><li>● Changes to workforce will apply both on and off-water.</li></ul>
Scenario 2	<p>Salmon dominated sector, less technical workforce</p> <ul style="list-style-type: none"><li>● Requires some investment but not as much as scenario 1.</li><li>● Technical workers will increase somewhat with the adoption of new technology.</li><li>● Increase in workforce is largely driven by production volume.</li></ul>
Scenario 3	<p>Mussel dominated sector, highly technical workforce</p> <ul style="list-style-type: none"><li>● Requires a high level of capital investment, but lower than the capital investment required for the salmon dominated, highly technical scenario due to capital investment in processing rather than farming.</li><li>● A highly technical workforce will be required, particularly in processing.</li></ul>
Scenario 4	<p>Mussel dominated sector, less technical workforce</p> <ul style="list-style-type: none"><li>● Requires some investment but not as much as in scenario 3.</li><li>● Technical workers will increase somewhat with the adoption of new technology.</li><li>● Will require a significant increase in the area used for farming due to the increase in mussel volume needed to reach \$3 billion.</li></ul>



For each scenario NZIER forecast 28 positions

For today's presentation we have grouped the positions by skill level

- Frontline (managed)
- Semi-autonomous
- Managers

We have also grouped these roles across the value chain

- Hatchery
- Farming
- Processing
- Support





# Key features of the current aquaculture workforce

The current workforce is



- dominated by mussels
- concentrated in processing
- heavily dominated by frontline staff



# Current aquaculture workforce 2023

Industry	Skill level	Hatchery	Farming	Processing	Support functions	Total
Mussels	Front-line	36	269	1,631	31	1,967
	Semi-autonomous	27	50	192	23	291
	Managers	3	17	96	3	119
Oysters	Front-line	7	107	85	2	200
	Semi-autonomous	4	13	8	1	27
	Managers	2	13	13	1	30
Salmon	Front-line	32	170	296	43	541
	Semi-autonomous	13	38	44	4	99
	Managers	8	16	26	4	53
<b>Total</b>		133	693	2,390	111	3,327

# Key features of the workforce in 2035 under Scenario 1

In a salmon dominated, highly technical scenario we can see that the workforce:

- Has increased in overall numbers by 1,500 people from 3,327 in 2023 to 4,835 in 2035. Most of employment growth is in salmon processing because of larger volumes of fish
- Is still dominated by mussels and concentrated in processing
- However, the skill mix is moving markedly towards a semi-autonomous workforce



**Table 9 Aquaculture workforce in 2035 – scenario 1**

Salmon dominated industry, highly technical workforce

Industry	Skill level	Hatchery	Farming	Processing	Support functions	Total
Mussels	Frontline	10	192	1,307		1,509
	Semi-autonomous	88	173	951	84	1,296
	Managers	5	19	119	4	148
Oysters	Frontline	5	120	135	3	263
	Semi-autonomous	19	60	40	5	124
	Managers	5	20	24	3	53
Salmon	Frontline	49	33	462	112	655
	Semi-autonomous	89	170	349	31	39
	Managers	24	15	61	11	111
Kingfish	Frontline	1		10	2	14
	Semi-autonomous	2	1	8	1	11
	Managers	1		1		2
Seaweed	Frontline			5		5
	Semi-autonomous			3		4
	Managers					0
<b>Total</b>		<b>301</b>	<b>804</b>	<b>3,474</b>	<b>256</b>	<b>4,835</b>

Source: NZIER



# Summary of the overall findings

The modelled results suggest a few trends:

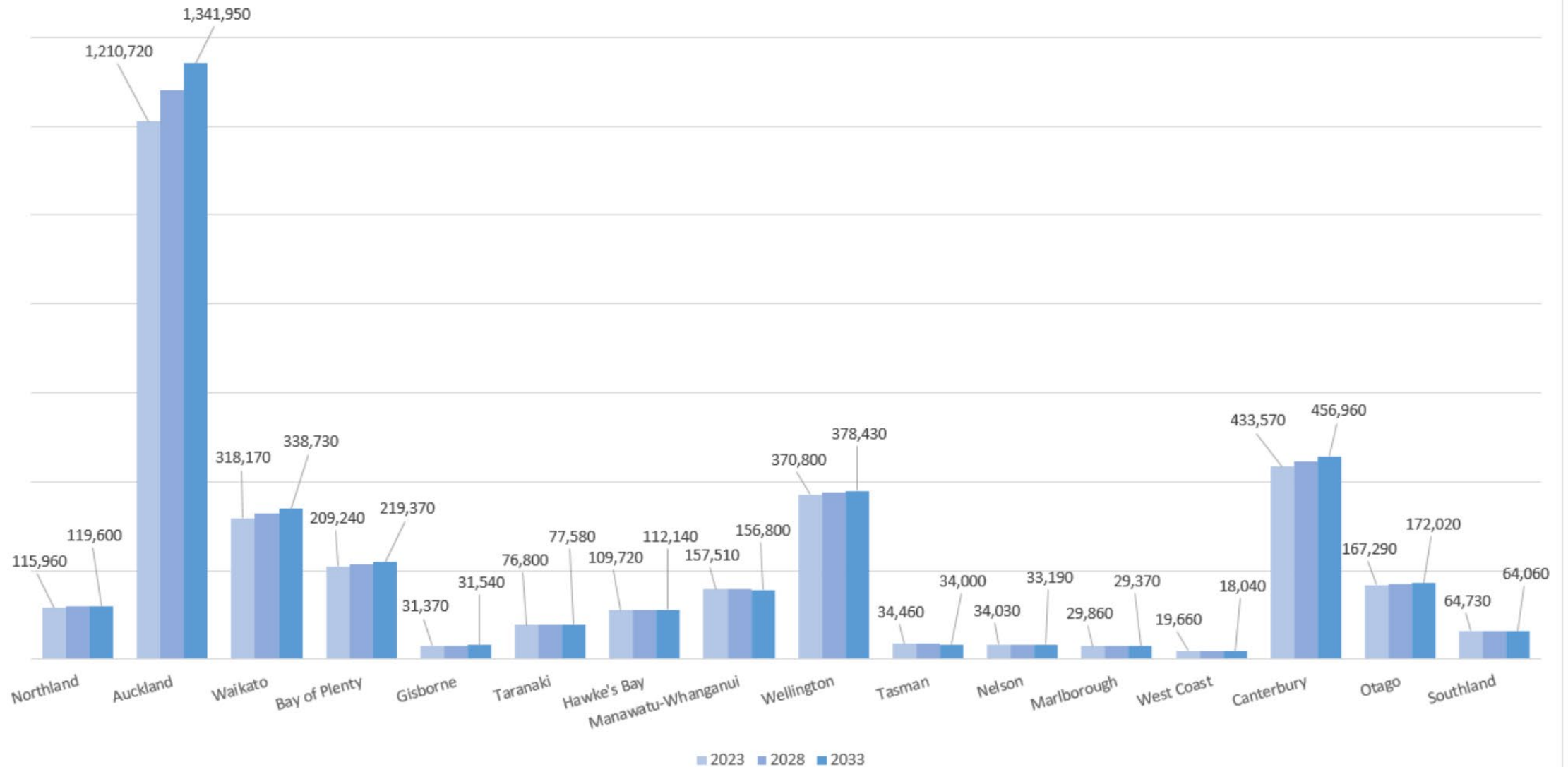
- The sector can expect to need a larger workforce, resulting from the large increase in output.
- The more automation the slower the growth in the workforce, but there is a need for a more highly skilled workforce.
- In all scenarios, the mussel industry has the largest workforce. Mussels is not expected to have the same level of mechanisation or automation
- The labour force will still be dominated by frontline staff with relatively manual jobs in 2035, particularly in farming and processing.
- However, there is expected to be growth in roles for all skill levels. The aquaculture sector will need more managers, but there will be a huge growth in semi-autonomous and technical roles. Many of these people may not be directly employed by the aquaculture industry.



# The wider context

# NZ Population projections vary regionally, and this will have workforce implications...

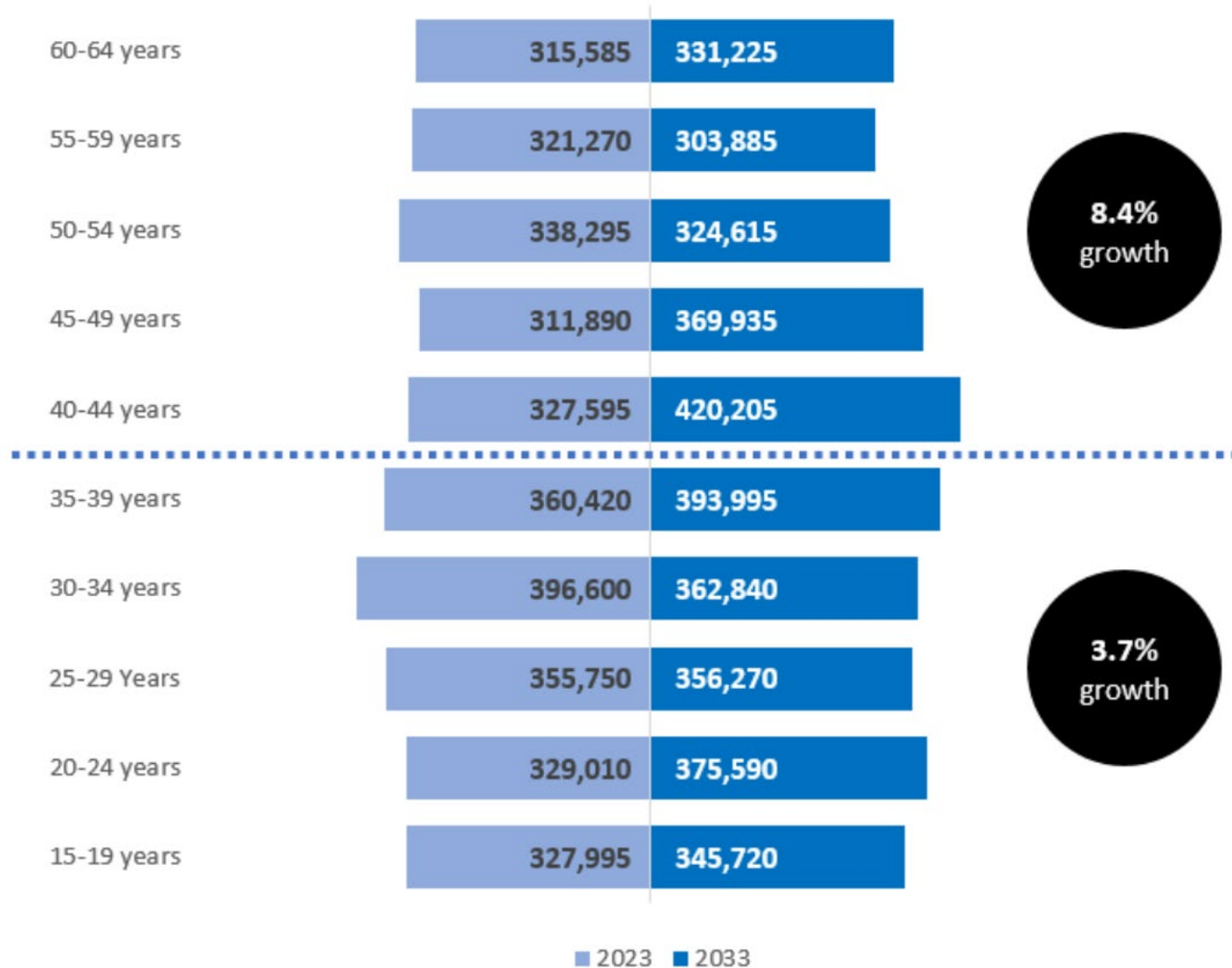
Core working age population (15-64 year olds) 2023 to 2033 by regions



## The New Zealand population is also aging

Core working age population (15-64 year olds)

2023 vs 2033 by age bands





What does this all mean and what actions should we  
all be thinking about

# Key take aways

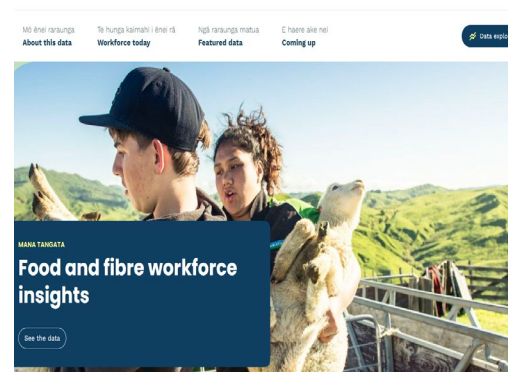
- There is bright future for the food and fibre sector
- To continue to be successful we will need a larger more highly skilled workforce in the future
- The competition for labour and skills is likely to increase
- The majority of our future workforce already works in the sector

# Key actions we need to focus on

- Lifting productivity and export demand
- Investing more in technology to augment labour and free up people to do more highly valued roles
- Upskilling the existing workforce
- Valuing both informal and formal education and training
  - Formal education can be particularly important for developing future skills
- Attracting new workers with a different skill profile, some of whom will be in high demand in other sectors

# Thank you

[www.workforceinsights.govt.nz](http://www.workforceinsights.govt.nz)



# Question Time

Richard Lynch  
MPI





# Upcoming Events



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Transformative  
Agribusiness

**The value of interpersonal  
conversations to engage  
individuals in agricultural  
transition processes**

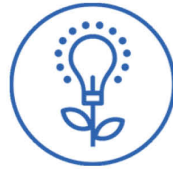
**Guest Speaker - Madita Olvermann**

**24 April 2024 9.30am-11.00am**

Lincoln University, B.linc Workshop



# Upcoming Events



**Innovation**  
New conversations,  
new opportunities

## Growth of the Green Economy

**30 April 2024 10.00am-1.30pm**

Lincoln University, B.linc Workshop & virtual livestreaming



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# Upcoming Events



**Excellence**  
Sharing research outputs

## Implementing farming systems for the future: which way now?

Guest Speaker - Prof. Alison Bailey

15 May 4.00pm-5.30pm

Lincoln University, Waimarie Building



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# Upcoming Events



**Vibe**  
Connecting the community

## The Future of Farmer Wellbeing

**Guest Speaker - FarmSalus**

**28 May 2024 4.00pm-5.30pm**

B.linc Workshop, Lincoln University



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# Thank you!

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