WHAT WE HEARD

TASMANIAN SALMON SYMPOSIUM + FORUM REPORT ON STAKEHOLDER ENGAGEMENT Q1FY23

BLUE ECONOMY
COOPERATIVE RESEARCH CENTRE

Australian Government
Department of Industry, Science and Resources

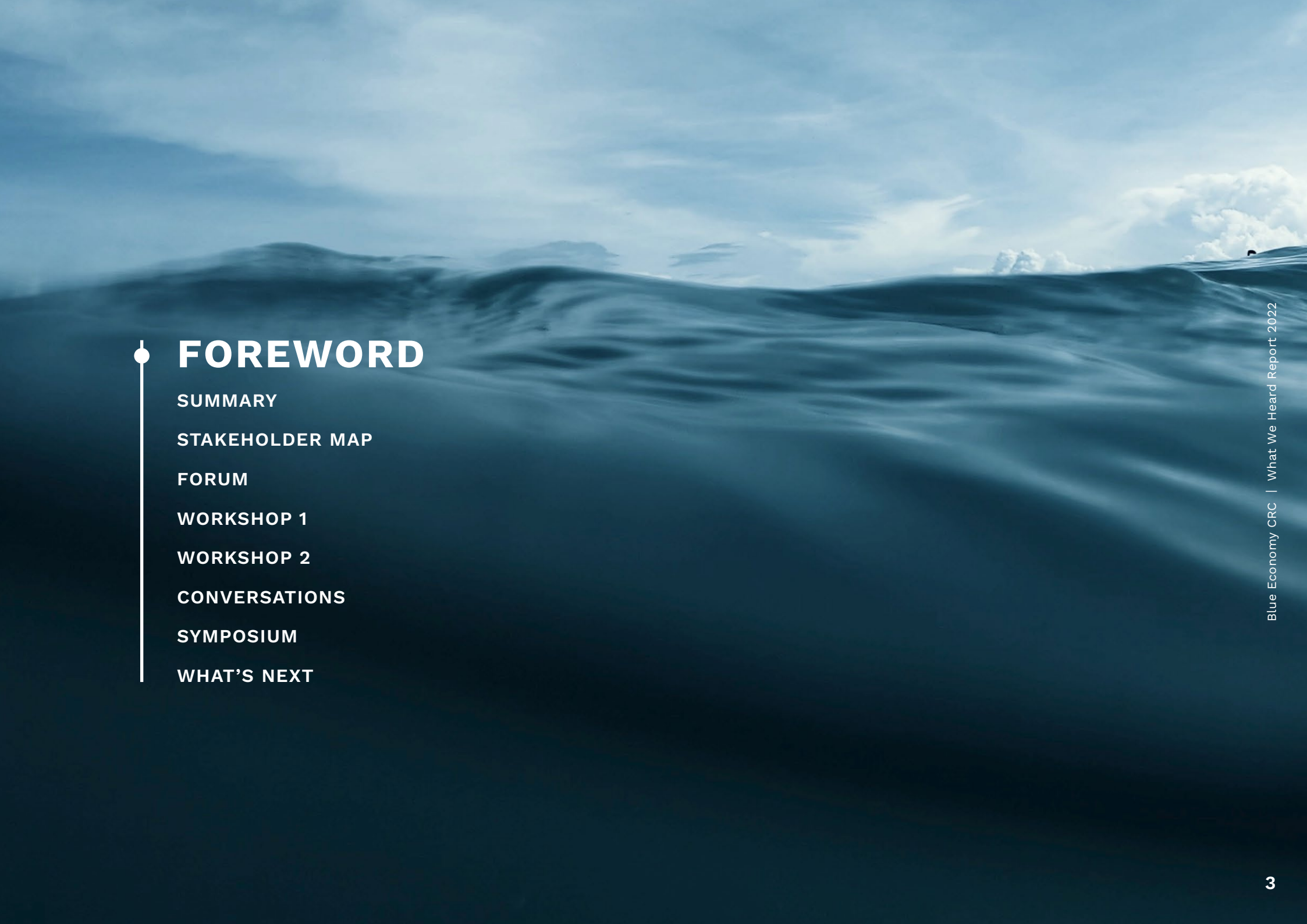
AusIndustry
Cooperative Research Centres Program

CONTENTS

The Blue Economy CRC was established in 2019 as an independent not-for-profit company limited by guarantee and is a Cooperative Research Centre under the Australian Government's CRC Program. We bring together 43 industry, government and research partners from ten countries with expertise in aquaculture, marine renewable energy, maritime engineering, environmental assessments and policy and regulation.

Blue Economy CRC-Co Ltd, Australian Maritime College, Maritime Way, Newnham TAS 7248.
For more information on this project, visit our website.

We acknowledge the Traditional Custodians of Country and their connections to land, sea and community. We pay our respects to their elders past and present and recognise that Australia is home to the oldest culture in the world.



FOREWORD

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Wealth from our oceans has been harnessed over many generations, bringing economic value to community and contributing positively to health and social, cultural and ecological wellbeing. This is our blue economy.

An ocean-based economy where effective protection and restoration, sustainable seafood production, carbon neutrality, equitable prosperity and culture go hand in hand. With 70% of the earth covered by oceans, oceans are integral to our prosperity and cannot be overlooked.

Globally, initiatives like the UN Decade of Ocean Science for Sustainable Development and the High-Level Panel for a Sustainable Ocean Economy are accelerating contemporary blue economy policies, innovation and research and building sustainable ocean literacy.

The blue economy comprises the traditional ocean uses and values, but also introduces new, emerging and transitioning industries like open ocean aquaculture and offshore renewable energy. It also embraces the renewed push for restoration and protection of habitats and biodiversity and ecosystem services.

Importantly, it includes the aspirations and wellbeing of stakeholders who are influenced by a sustainable blue economy. The workforce, the supply chain, the nature lover, the researchers, the local yachtie and the local beachcomber.

Understanding the values, experiences, concerns and aspirations of stakeholders helps businesses, industries, governments, NGOs and the research community shape strategic directions, build meaningful collaboration and a chart a future path together.

Today, Tasmania's oceans are front and centre, as new, emerging and transitioning industries enter and interest groups seek trusted governance for the shared ocean estate.

The Blue Economy CRC, Australia's leading ocean economy thought leaders, entered a project with the Tasmanian Government in 2022 to host two stakeholder focused events and report on what was learned.

Running parallel to the Tasmanian Government's formal process for developing a 10 Year Salmon Plan, these independent events stretched the conversation beyond just a single sector and lay the groundwork for an broader understanding on stakeholder views on ocean management.

A Salmon Symposium was held 10-11th May 2022, bringing together local, national and global leading aquaculture experts and practitioners and stakeholders. Cutting edge innovation and directions in infrastructure and operations were put on the table, along with the components of sustainable contemporary food production systems. Concerns held by some participants on impacts of salmon farming on the environment were also raised.

A Forum was held in mid-August 2022 that comprised of two workshops with targeted stakeholders followed by a series of one-on-one conversations with selected stakeholders over September and October. The same questions were asked to better understand visions, aspirations, challenges, opportunities and elements of a roadmap.

Both the Symposium and Forum provided an opportunity to learn about contemporary sustainability and innovation trends, insights and understand critical issues, but also for stakeholders to have their say on aspirations, scrutinise trends, identify and better understand what matters. This understanding can contribute to building a stronger foundation for collaboration and partnerships.

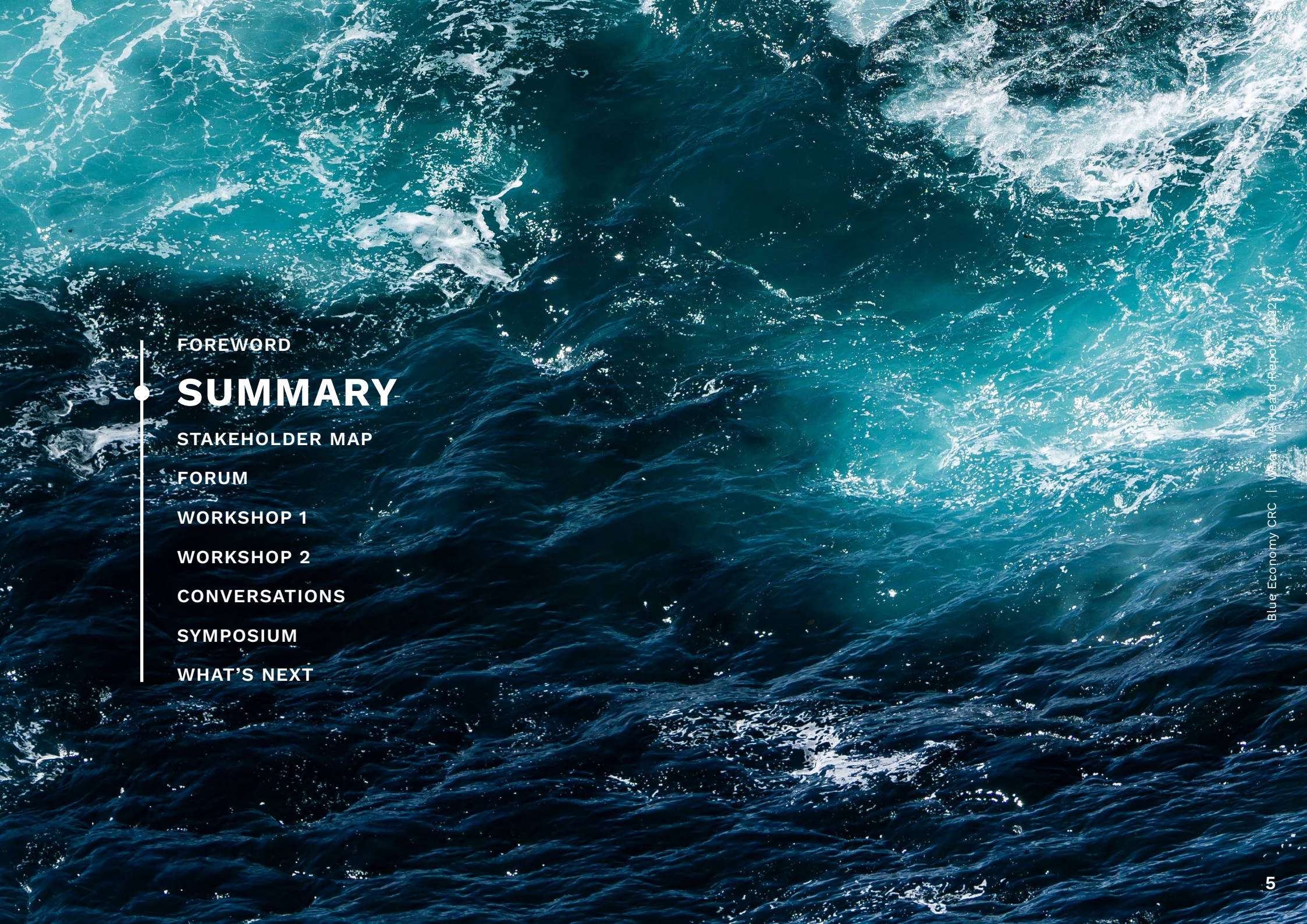
The Forum conversations provided an opportunity for additional stakeholders to describe their experiences, opportunities, aspirations and forward-looking actions for salmon farming and other aquaculture and blue economy industries.

These conversations focused on cross-sectoral shared R&D beyond salmon farming, with a strong focus on planning and governing the marine estate more broadly.

Independent and transparent processes like this can provide stakeholders an opportunity to have their say.

This report sets out what was heard throughout this engagement process.

The views expressed are those of the symposium and forum attendees and not the Blue Economy CRC.



SUMMARY

STAKEHOLDERS CONSULTED

Over 350 attendees attended the Symposium

160 virtual

191 in person

29 presenters and panellist

17 companies, institutions and interest groups participated in workshops

Ten targeted stakeholder conversations initiated (ongoing)

WE HEARD A RANGE OF VIEWS

“Clear ethical code and trustful and transparent in relationships. Good governance. Foster and support collaborative relationships.”

“This tiny island is leading the world in food security, improving health outcomes, creating meaningful career pathways and creating communities which are thriving.”

“No farms in sheltered, inshore biodiverse waters.”

“Vibrant industry which is valuable to the community.”

“We are celebrating the cessation of the industrial salmon industry so that Tasmania can once again enjoy the clean green environment it is known for and revered.”

Table 1: Summary of key challenges and opportunities identified by stakeholders. Read more here.

KEY OPPORTUNITIES IDENTIFIED BY STAKEHOLDERS
» A stronger focus on sustainability
» Delivering carbon positive aspirations
» Building stronger community relationships
» Demonstrating the collaboration, scope and achievements of current industry
» Introducing integrated planning for the marine estate
» Demonstrating evidence-based actions
» Continuing to support innovation and R&D

KEY CHALLENGES IDENTIFIED BY STAKEHOLDERS
» Lack of trust in both government and industry
» The need to communicate with impact
» The need to build workforce pride and ensure workforce planning
» Demand for more transparency
» Demonstrably responsible use of public water
» Commitment to work on climate and zero carbon and nutrient aspirations

STAKEHOLDER MAP

Tasmania has a considerable salmon farming and aquaculture stakeholder network spread across the state. This demonstrates both the depth of the industry, its supply chain and workforce, but also its intersection with coastal communities.

While we accept that this engagement will not meet everyone's expectations, we are confident that giving stakeholders a say demonstrates the integrity and commitment to participatory conversations on the future of the health of our oceans and existing, new, emerging and transitioning ocean industries.

How We Engaged Our Stakeholders

FIRST NATIONS PEOPLE (Symposium, conversation)

LOCAL COMMUNITIES (Symposium)

SUPPLIERS (Symposium, workshop)

RETAILERS (Symposium, conversation)

CONSUMERS (Not specified)

COMPANIES (Symposium, workshop)

RESEARCH (Symposium, workshop)

INTEREST GROUPS (Symposium, workshop)

INDUSTRY (Symposium, workshop)

DEPARTMENTS (Symposium, workshop)

POLITICAL (Not specified)

NGOS (Symposium, workshop)

ACCREDITATION BODIES (Symposium, conversations)

OTHER OCEAN INDUSTRIES (Symposium, workshop)

RECREATIONAL WATERWAY USERS (Symposium, workshop)

FORUM

In August 2022, the BECRC hosted two independently facilitated workshops that provided invited stakeholders an open, safe and candid space to have their say and consider a suite of questions that aimed to explore sentiment, experiences and aspirations.

These were followed by a series of targeted one on one conversations with additional stakeholders to gain further information.

These workshops and conversations focused on the following questions:

- **A shared vision for 2033**
- **Working back from 2033 together**
- **Looking toward 2033 together**

A Shared Vision For 2033
Global Recognition

What does sustainable aquaculture and the blue economy look like in 2033?

- Integrated
- Value
- Production
- Zero Emissions
- Low Emissions
- Healthy
- Thriving
- Prosperity
- Circular Economy
- Restoration + Rehabilitation
- Shift From Monoculture to Polyculture
- Seaweed + Shellfish
- Innovation
- Transparency
- Responsible
- Integrated
- Value
- Production
- Zero Emissions
- Low Emissions
- Healthy
- Thriving
- Prosperity
- Circular Economy
- Restoration + Rehabilitation
- Shift From Monoculture to Polyculture
- Seaweed + Shellfish
- Innovation
- Integrated Marine Management
- Collaborative Decision Making
- Transparency
- Responsible
- Resilient
- Governance
- Ocean Stewardship
- Social Responsibility
- First Nations
- Marine Spatial Planning
- Capacity Building
- Blue Food
- Tailored
- Adapts
- Balance Sheet
- Supported
- Seascapes
- Contemporary
- Fair
- Local Community
- Global Community
- Biodiversity
- Ocean Wind Energy
- Ocean Wave Energy
- Shared Infrastructure
- Freshwater Security
- Nutrition
- Consumer Trends
- Confidence
- Stability
- Enduring
- Landscapes

Working Back from 2033 Together

Building blocks of this vision:

- **Ambition + Opportunities**
- **Future Issues + Challenges**

Ambition + Opportunities

Think beyond salmon. Be ambitious.

- What do you think is good about today's approach to aquaculture?
- What are the elements that you think show progress and change practices?
- What would you change?
- What is ahead (i.e. operation, consumer, market, investor, policy planning) that has not yet been harnessed?
- What are the enablers?
- What are the advantages and disadvantages?
- What are the megatrends that will intersect with aquaculture?

Future Issues + Challenges

Learn from salmon. Be bold. Be fair.

- What don't you value about today's approach to aquaculture?
- What elements would be present in your view of sustainable aquaculture that aren't present today?
- What would you change?
- What are the enablers?
- What are the advantages and disadvantages?
- What are the megatrends that will intersect with aquaculture?

Looking Toward 2033 Together

Building blocks of this vision:

- **Insights + Profiles**
- **Toward Definitions**

Insights + Profiles

Global. Local. Industry. Consumer. Market.

- What is going on globally, nationally, within blue economy industry, within other industries?
- What could that mean for sustainable aquaculture and the blue economy here?

Toward Definitions

- Offshore. High Energy. Open Ocean. Deeper. Not Sheltered.
- Community. Interest Groups. Local. Issue Based. Contributors. Lived Experience.

Climate change	**Community connection**	**Non R&D innovation**	**Innovation + footprint/growth**
Emerging aquaculture species	**Megatrends**	**Ocean renewables**	**Circular economy**
Offshore	**Freshwater + RAS**	**Regulation + transparency**	**Blue Economy balance sheet**
Indigenous + local community participation	**Workforce + training**	**Nature based solutions - seaweed**	**Nutrition**
Innovation + engineering (i.e novel pens)	**Innovation + Production models**	**Public participation + trust**	**Land based aquaculture**
Certification + disclosure	**Fish Welfare**	**Sustainable feed**	**Types of proteins**
Novel ingredients	**Biodiversity + marine ecosystems**	**Blue Economy Zones**	**R&D**

| WORKSHOP 1

What was said

Industry + Research | 16th August 2022

Participants included representatives from:

- Huon Aquaculture
- Petuna
- Tassal Group
- Skretting
- Biomar
- FRDC
- IMAS
- TSGA
- Tasmanian Farmed Salmon Alliance

Observers included:

- Natural Resources and the Environment Tasmania
- Department State Growth
- Minister Palmer's Office
- Blue Economy CRC

| A Shared Vision For 2033 | Global + National + Local

What does sustainable aquaculture and the blue economy look like in 2033? Visions were created by asking workshop participants to set themselves in 2033 and deliver an acceptance speech for achieving the best blue economy in the world.

Vision 3

"Vibrant industry which is valuable to the community."

"Thank you to our researchers at IMAS, FRDC and CSIRO. Our industry now has no significant impact on the environment."

"We are well on the way to meeting our net zero target by 2040."

"One in every three meals on Australian plates is now the healthiest protein to more Australians, backing in our nations food security."

"We are the hub of many growing Tasmanian industries and businesses from manufacturing, feed, technology and engineering."

"We are now a centre of excellence and expertise. We are also a leading global example of climate adaptation with many other industries following our lead. The salmon industry is opening up pathways for other aquaculture industries through shared farming operations such as microalgae and abalone, helping us to offset our impact (nitrogen, nutrient, carbon)."

"Our industry is now one of the most competitive in the world with the next generation lining up at our door."

Vision 1

- Positive carbon profile- exporting extra back to the grid (i.e. hydrogen)
- Offshore aquaculture incorporating renewable energy in its operation. Multi-trophic farming system – including nutrient circularity
- Nature positive – supporting biodiversity increase with surveys & support. Significant economic impact from food produced +$500 million
- Physically and psychologically safe workplace – employer of choice (training etc). Equality and diversity amongst workforces. Net zero freshwater (i.e. 100% recycle)
- Healthy products for consumers
- High productivity of food produced per land acres squared
- Innovative farming/energy practices developed and in use
- Circularity of by-products 100% re-purpose. Zero discernible benthic and marine impacts
- Clear ethical code and trustful and transparent in relationships.
- Good governance
- Foster and support collaborative relationships

Vision 4

"Our acceptance of this award is a good time to reflect on the global acceptance of aquaculture is a sustainable resource."

"We have a true stewardship role in integrated marine management. We have integrated energy and aquaculture operations, creating a sustainable resource and protein source. We are meeting increased demand for seafood – healthy and affordable."

"Through our operating environment, we are a truly recognised innovator. We have far lower emissions and wave energy has us well positioned. We have moved from conflict to collaboration. We understand our footprint and apply a circular economy."

"We are an employer of choice rather than location, bringing opportunities for the community. We have learned from the past and got here from the past. We have united all the players in the room. We are continually improving."

Vision 2

"I come from a small island, closer to the Antarctic continent than most of our markets. Ten years ago, some clever people with a whole of country vision met to challenge themselves on the part they should play in harnessing the potential of our island and its blue economy."

"Together with contemporary regulations and a good vision, we have created a future for our state which harnesses the numerous opportunities right on our doorstop."

"We have created a responsible industry, thriving community which showcases the innovation and ocean stewardship. We have created the leading meat production and renewable energy sectors, with the lowest carbon footprint. We lead with circular economy projects. We are strongly governed."

"This tiny island is leading the world in food security, improving health outcomes, creating meaningful career pathways and creating communities which are thriving. I am proud to say I'm part of Tasmanian aquaculture."

Working Back From 2033 Together | Ambitions + Challenges

What are the building blocks of this vision?

AMBITION + OPPORTUNITIES

- Interaction between aquaculture and Blue Economy potential industries – i.e wind farm collocated with aquaculture
- Sharing talent and expertise – existing salmon experts providing advice to broader aquaculture – world leading talent incubator
- Continue to use evidence-based approaches – missed opportunities
- Mitigating challenge of climate change
  - i.e selective breeding/vaccine development/ feeding innovation
  - Opportunity to 'sell/market' existing expertise (commercialisation)
- Ecosystem services i.e. rehabilitation (co-located kelp farms and fish farms)
- Circular economy & re-purposing (i.e. mortalities – soldier fly farm – fish feed)
- Science driven / innovation driven – informing/supporting industry and regulators
- Technology leadership – aquaculture and beyond e.g – new processes/new species
- Decarbonisation of food – aquacultures role and beyond
- Improved biosecurity and food security and understanding of this
- Community acceptance of normalising aquaculture as a farmed protein
  - Access to info / education and training / context and perception (i.e free range beef vs farmed salmon)
- Proud of industry – community and consumer acceptance
- More local raw materials for feed
- Product to be the 'go to' leading program of choice
- Career pathways from school aged (CHCS)
- Commercial focused research
- Support for new supply chain industries in Tasmania
- Innovative culture
- Resilient
- Sustainability focused
- Healthy inputs = healthy product
- Support from Govt grants / R&D to improve practices and infrastructure
- Profitability and ethical business
- NGO/community pressure
- Third party certifications
- Operational adoption
- Investment in R&D / people / waste management
- Regulation – adaptive management
- Transparency
- Egg to plate story
- Scalable sustainable raw ingredients
- Nature balance sheet
- Carbon credits
- Nitrogen and biodiversity units
- Vanguard standards
- % Reinvestment into developing emerging markets or green projects
- First nations/targeted projects and investment funds
- Community development
- Incubation funds for start ups
- Pre-permitted land-based facility and marine leases
- Change opportunity - net emission model for environment regulations

FUTURE ISSUES + CHALLENGES

- A need for a resilient, cohesive govt which makes decisions for the broader community
- Whole of government and industry collaboration and workforce development
- Lack of real understanding about aquaculture benefits and challenges – big picture/feeding the world/UN sustainability goals
- Effective marine spatial planning process that all stakeholders support following integrated marine principles
- Biosecurity – planning and execution challenges/ opportunities
- Contemporary nature-based regulation
- Acceptance and value of science-based decisions
- Bringing the community along with industry (e.g expectations around tech)
- Supporting industry/supply chain capability increase and ability to meet emissions targets
- State Govt appetite to lead a nationally important industry
- Maintain competitive advantages (e.g salmon vs other species)
- Cell based/alternative proteins (market share)
- Global economic / political changes / instability in markets
- Fresh water hatchery regulation
- Climate change – adapting to a changing environment and meeting decarbonisation targets
- Population growth
- Food security – are we helping to feed the world?
- Growth prosperity and middle classes
- Keeping pace with global innovations/technologies
- New food opportunities – other ways to feed growing populations – new species and ingredients
- Attracting and retaining the right people in the right places – skills/education/training/rewards
- Circular economy – resource use and awareness
  - Ecosystem stewardship
  - collaborative approach to environmental condition/ nature at a regional level
  - Translate data and science/ methods into practical terms for customers and communities
  - Easy to understand risk assessments for consumers and stakeholders
  - Regulatory standards – easy to understand/communicate and report performance
- Well-rounded approach to governance – how can govt create an environment of certainty
- Meeting growing demand – new products
- Board alignment with industry vision – demonstrating value
- Business case stacking up as new sustainability innovation develops
- Identifying opportunities for shared investment in R&D
- Communicating the robustness of the science (existing)
- Turning the narrative around
- Public trust in regulation and science – understanding the real issues and calling out hypocrisy
- Regulatory and planning certainty
- Managing community and stakeholder expectations
- Workforce development and skills development
- Operational challenges in new environments
- Don't have a collective strategy for aquaculture as an industry or cross-sectoral
- Lack of cross industry minimum standards
- No industry-wide commitment to sustainability
- Industry don't tell their story well
- Social balance sheet
- Elements that should be present that are not:
  - Minimum operational/ environmental and social standards
  - Commitment as an industry
  - Concept and actions to move towards neutrality
  - Government policy and funding to support CE
  - Rapid think tanks with external experts and other industries
  - Consumer community awareness / education re environmental regulations and acceptable impact
  - Science communication
  - Cumulative impact assessments
- Enablers
  - $$
  - Certainty
  - Lack of competition in domestic market
  - Incentivisation schemes for social/environmental credits
    - E.g. establishment of KPIs (i.e. for carbon, nutrients (nitrogen and phosphorus), feed utilisation) credits for new lease applications

Looking Toward 2033 Together

Insights + Innovation

How would you profile these terms?

OFFSHORE

- The problem that offshore is 'fixing', does it fix it?
- High energy
- Open ocean
- Perception that inshore opportunities have been taken up
- Biosecurity considerations
- Natural evolution to offshore
- Managing view line/amenity
- Risk management considerations

COMMUNITY

- Interest groups – direct versus indirect
- An intersection with a company
- State your interest
- Community should be represented by government
- Validity - skin in the game
- Validity versus invalid - who, where, why
- Variety of views
- Councils

Insights

What are the trends and insights globally, nationally, within industry and in other industries, in markets, by consumers and in innovation?

What could that mean for sustainable aquaculture and the blue economy here in Tasmania?

WELFARE

- Reviews – like in place in VIC/SA
- State based policies
- NGO's focused (EU) on humane slaughter
- Retailer talking point
- RSPCA (UK) Food standard
- BBFAW and retailers
- Certification development standards
- Retailers – 3rd party certification, food & welfare
- Audit from retailers
- Performance – food, genetics & growth
- Improving sustainability
- Technology to monitor
- Computer vision options – to monitor performance – lesions etc.
- Water quality – getting smarter and more preventive

CIRCULAR ECONOMY

- Developing local and local supply
- We could introduce a target to be 95% Australian – to a Tasmanian target
- Novel ingredients
- Producing and processing raw materials
- Synergies with other production areas (ie. Animals)
- If not Tas – South Australia?
- Unique raw material opportunities
- Lowering carbon & water
- Traceability – transparency

DECARBONISATION

- Reduction / Footprint
- Diesel reduction – key
- Feed reduction
- Hydrogen/Wave energy – partnership & collaboration
- Investment in technology
- Ten-year time scale
- Early adopter industry – stretch targets
- Mapping raw materials to understand our footprint
- Targets – net zero by 2040 (JBS)
- Starting point footprint is strong – promote / maintain lead
- Niche areas for the industry to lead in – public facing

NATURE BASED SOLUTIONS – SEAWEED

- Giant Kelp trial – success
- IMAS lines near farm
- Seedling growth rates high
- SA – looking at license allocations for seaweed and farming
- IMCA (Canada) partnerships with industry
- (oysters) prawn farms (3% nitrogen)
- Opportunity as stand-alone – high value product
- Income generative
- Big feature in the next 10 years
- Nutrient accessibility
- Selective breeding for the right species

INNOVATION FOOTPRINT + GROWTH

- Is growth the right word?
- Footprint performance
- Capacity bigger than ten years
- Optimising performance of existing leases to extending into higher energy
- Role in global marketplace, alignment of language

REGULATION AND TRANSPARENCY

- Overregulated because government doesn't have enough understanding
- Contemporary regulation
- Flexible/adaptive
- Inconsistency in government environmental regulation timeframes
- If full cost recovery is sought, industry will look for service agreements from government
- Seek use of evidence-based science
- Review/reframe regulation in light of genuine community concerns (e.g. mortalities), current approach is vulnerable to market tactics
- Transparency – need clarity what and who is it for
- Companies host subject matter experts, but this doesn't get acknowledged by government
- Transparency, i.e. website antibiotics
- Co-regulation opportunity
- Public good that comes out of aquaculture research
- Frameworks that build people's trust
- It's not about the salmon, it's about the quality of regulatory system and how it can do what it is meant

Roadmap to 2033

What R&D and non-R&D innovation actions are required to support and shape the 2033 sustainable aquaculture and blue economy vision?

2 YEARS

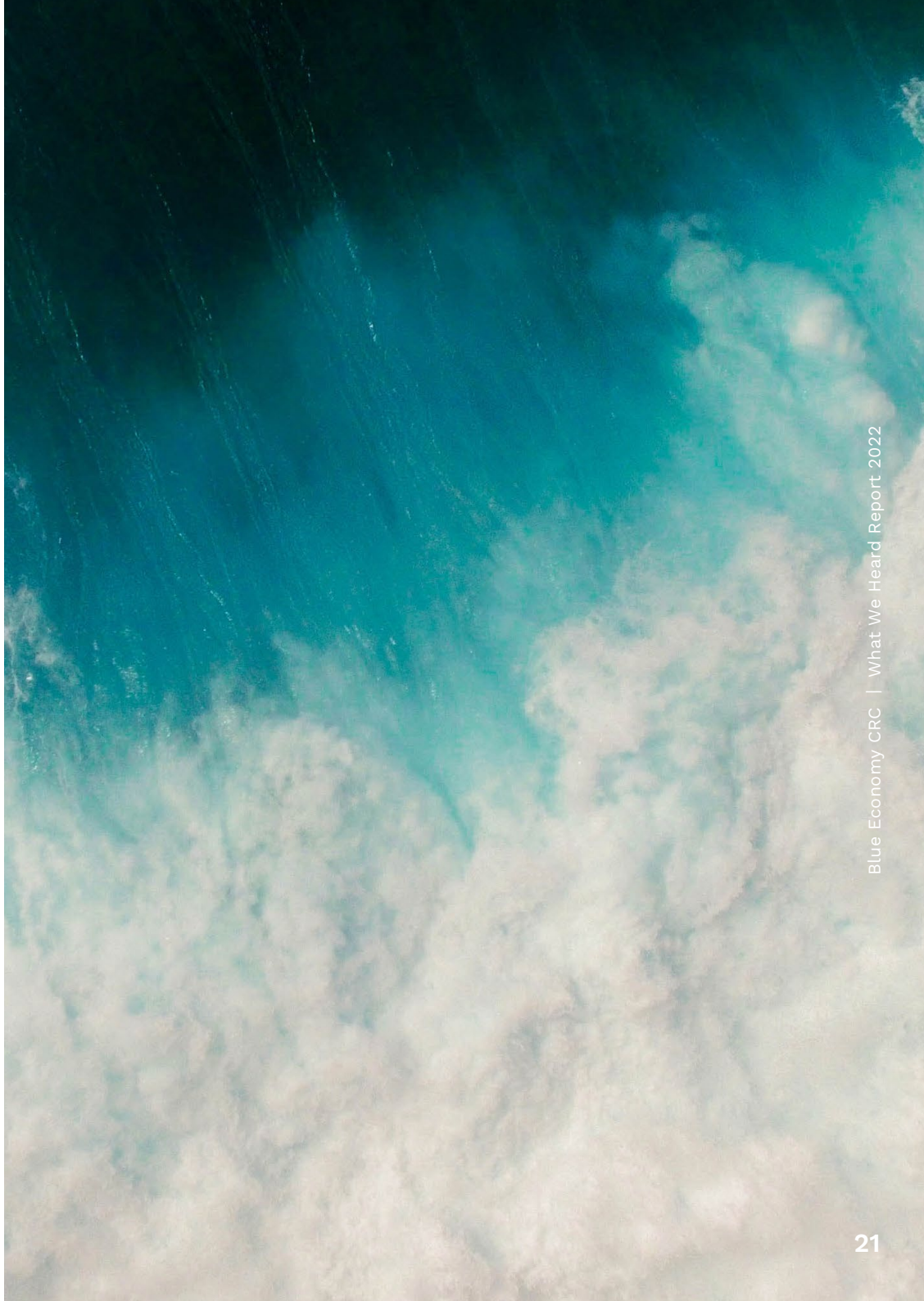
- Establish Office of Chief Scientist (across all agri/ primary industries – this is more than aquaculture)
- Aquaculture ministerial portfolio established
  - Office of aquaculture (policy development, market support, workforce development, R&D)
  - Allows for supply chain involvement
  - Ensures cross-government agency coordination
- Commit to review of SMRCA – it's purpose, its membership, its governance etc include a focus on decreasing carbon footprint and brining in examples of successes overseas
- Establish an aquaculture innovation fund
- Undertake a workforce development plan which includes examination of relationship or lack thereof in education and VET sectors
  - Offer certificate 1 to key trade training centre
- Government to shift to an 'incentive' approach rather than 'stick' approach
- Recycling all plastic waste and organic waste on a two-year timeframe
- Working with state growth (3rd party funding)
- Include identification of raw material production/processing for decarbonisation
- Scholarships to attract on a shorter timeline
- Government funded seafood maritime training
- Industry wide life cycle analysis (centralised with government)
- Industry
  - Major broadcast campaign
  - Tourism experience
  - Marketing collateral
  - Salmon alliance
  - Right research
  - Collaboration with other key industries
- Others
  - Science and academics provide their science

5 YEARS

- 5-10% novel ingredients scalable and affordable
- Methane capture (retailers i.e. outside industry)
  - Partnering with retailers
- Strategic relationships/ partnerships now delivering
  - Eg. Electric boats now on water
- Environmental standards of regulation well embedded and fit for purpose
- Legislation, review complete and functioning (MFP Act, EMPCA)
- Review of our:
  - 5-year industry R&D plan
  - Government's marine estate policy
  - First environmental report card
- Linked in communications to 'community' (integrated framework, shared responsibility)
- Ecosystem services
  - Nutrient flows for restoration
  - Biodiversity offsets
  - Regenerative aquaculture (we've learned a lot from agriculture)
- Continued investment in selective breeding (not just salmon)
- Clear understanding (goals for decarbonisation) informed by 2-year industry wide life cycle assessment as per NZ now) tracking of inputs
- Ocean engineering/technology - (where we are in 5 years)
- Seafood production (advocacy role too) - (where we are in 5 years)
- Renewable energy – electrification of vessels, hatcheries etc and installation of infrastructure to support this
- Industry target for waste management - re-use, recycling, reduce, repair.
- Establish flexible pathways for secondary and tertiary students in aquaculture and associated skills (selection of skills/areas and work placement apprenticeships)

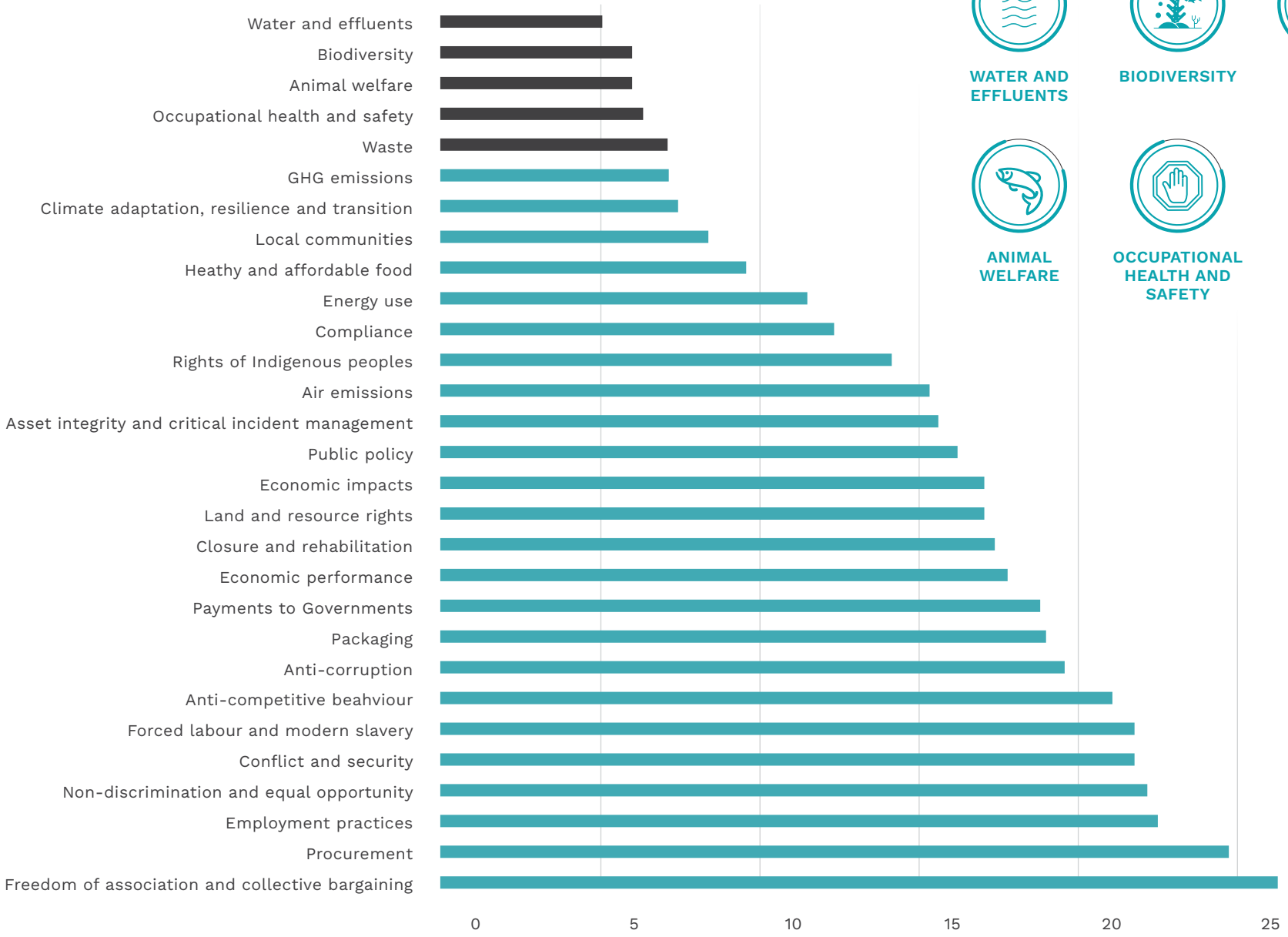
10 YEARS

- Circular economy
  - Strong policy support and across primary industries
  - Government is investing in circular ingredients/ processing in Tasmania and Australia – start-ups, encourage bigger companies to the region
  - Consultation advisory for raw ingredients
  - Full domestic market and mature market for novel feed ingredients
- Decarbonisation
  - Government is leading decarbonisation for all industries
- Our socio-economic predictions from year 1 have been released (i.e., assessment of blue economy potential)
- An integrated seafood & aquaculture industry with offshoots like ecosystem restoration and engineering innovation
- Commercial multi-species farms established per regulation/policy (incl Commonwealth based)
- Offshore platform development
- Mobile farms
- Utilising expertise/staffing from now extinct industries
- Tasmanian innovating their own offset arrangements (e.g., no net increase in nutrients, opens doors for other emerging industries)
- Real-time sensor technology embedded in farms
  - Collaborative reporting
  - Linked to regulation
  - Model policy across jurisdictions
- Qualified workforce transitioned to exposed waters – offshore oilrig training
- Recognition of aquaculture's strong position in national food security
- Diversity in our workforce
- Digitisation in farming
- Flagship industry of the state



What Matters | Workshop Survey

Participants ranked a set of material sustainability topics from greatest to least importance.



Top 5 Priorities

- WATER AND EFFLUENTS
- BIODIVERSITY
- WASTE
- ANIMAL WELFARE
- OCCUPATIONAL HEALTH AND SAFETY

| WORKSHOP 2

What was <u>said</u>

Interest Groups | 17th August 2022

Participants included representatives from:

- Tasmanian Alliance Marine Protection
- Neighbours of fish farms
- Bob Brown Foundation
- Tasman Peninsular Marine Protection
- Killora Community Association
- Tasmanian Conservation Trust
- Australia Institute
- Tasmanian Independent Scientific Council

Observers included:

- Natural Resources and the Environment Tasmania
- Department State Growth
- Minister Palmer's Office
- Blue Economy CRC

A Shared Vision For 2033 | Global + National + Local

What does sustainable aquaculture and the blue economy look like in 2033? Visions were created by asking workshop participants to set themselves in 2033 and deliver an acceptance speech for achieving the best blue economy in the world.

Vision 1

- No farms in sheltered, inshore biodiverse waters
- Industry has moved onshore
- Fully implemented coastal and marine ecosystem-based management and integrated oceans management – catchment – coast – ocean continuum
- Modern ecosystem monitoring i.e state of the environment reporting
- Gold standard in social licence and support from community
- Ecological restoration of degraded ecosystems
- Comprehensive, adequate and representative, do not take marine protected areas
- Replacement technology to remove marine plastics
- Nature-based climate solution protected to keep carbon stored
- Thriving wild fisheries providing employment and commerce in local communities

Vision 2

- Integrated management approach
- Multiple uses
- World class
- Top-down approach
- No open pen salmon farms in Bass Strait
- Existing leases ok – alternate products and polyculture
- Local species
- Bigger than industry
- Environment + community = sustainability
- Pest issues – AGD & jellyfish
- Truly sustainable
- Well regulated (effective)

Vision 3

- Thank you for this award.
- We are celebrating the cessation of the industrial salmon industry so that Tasmania can once again enjoy the clean green environment it is known for and revered.

Working Back From 2033 Together | Ambitions + Challenges

What are the building blocks of this vision?

AMBITION + OPPORTUNITIES

- Better governance structures
- Scientific reference areas
- Improving returns to communities from use of public waterways
- Equitable prosperity
- Royalties
- Non-salmonid polyculture (native)
- Public money spent on public interest/benefit
- Utilise existing legislative opportunities to better protect environment, e.g. bonds
- Independent science and increased transparency
  - Independent body by law
- Reducing carbon footprint
  - Onshore forms can use renewable energy
  - Alternatives to wild caught fish
- State-wide marine plan
- Blue economy is more than aquaculture, what about all the other users
- Respect science for what it is – the best available evidence
- Better and stronger regulation
- BE CRC as a key stakeholder
  - They have a role in broader marine science and policy, e.g. marine spatial planning and community participation
- Industry (TSGA) support for integrated management
- Rethink for truly sustainable
  - Economically sustainable
  - Environmentally sustainable
  - Socially sustainable
- Top-down approach world class versus top-up historical
- Effective compliance
  - Makes it more sustainable
  - Voters can see it
- Polyculture
- Improved welfare standards
  - Pest management
  - Marketing opportunity to get it right
- Be truly innovative rather than patchwork
- Ability to meet 30% by 2030 marine protection
- Stronger EPBC/setting standards for all states
- Future industry learn from salmon industry failure
- Better regulation as a result
- Diversified industry
- Better planning and integrated marine management
- Healthier and better food
- Higher welfare standards
- Better protection for wildlife
- Survival and protection of endangered species (red hand fish)
- Future aquaculture
- Regulation matches community expectation
- Community has a voice in the place they live

FUTURE ISSUES + CHALLENGES

- Climate change
- Industry capture of governance
- Transparency – lack of
- Science – independence/benchmark
- Growth is the goal – free or near free
- Seen as creating jobs
- Seen as healthy
- Carbon intensive
- Community influence
- Impact on tourism
- Lack of integrated management
- Lack of regulation, no impetus to do better
- EPBC Act reform (impact on aquaculture)
- Ownership
- Just transition
- Climate change and warming waters
- Continued community distress/impacts
- Noise pollution
- Drinking water
- Jellyfish – wild monoculture environment
- Loss of wild fisheries
- Challenges
  - Industry
  - Government and politicians
  - Transparency
  - Length of leases
  - Use of public waters
  - No returns to community
  - Vested interest
  - Pests inherent to aquatic systems (amoeba, vibrios, jelly fish etc)
- Ocean warming getting worse, Tasmania fastest warming – oxygen and pests
- Costs of getting it wrong (e.g., Macquarie Harbour)
- Adaptive management is not working (need precautionary approach)
- Got to focus on minimising problems rather than focusing on maximising profits; they are related but former is more sustainable (poison itself out of business)
- Dead seals in nets and around the nets are bad for business – bad optics – dead and injured dolphins and penguins too
- Compliance historically not ideal and in today and future world where companies are now foreign, that could have negative optics

Looking Toward 2033 Together | Insights + Innovation

How would you profile these terms?

OFFSHORE

- Offshore is deep ocean – not Bass Strait, not Storm Bay
- Wave patterns – term offshore is being used dangerously by industry
- No commitment to stopping or getting out of inshore – it is a plus
- Offshore is out of sight
- Why do we want to create division – we should be moving out of the silos (i.e. on offshore)
- Offshore has an expense, economically and sustainability of the industry
- Offshore - oil field
- Beyond the continental drop off, Commonwealth waters and international waters (though don't agree with farming there)
- Visible now, how would regulation look where not visible?
- Wrong question – not how we grow/not grow the industry
- (Noting vision for some participants is for a no salmon or marine farming island)

COMMUNITY

- Website – sociallicence.com
- Existing local community
- Social acceptance is ongoing
- Stakeholders – evidence of interest versus local community
- Local – directly affected; community – all Tasmanians
- LUPA – open to all humans
- Right to have a say to any human being
- Ethical and philosophical
- Forest stewardship model – economy, conservation, society
- Traditional owners, first nations people
- The licence $ are for the whole community
- Principle 1 – do no harm
- Not actors – passengers
- Consultation process – internet submission
- Need to develop mechanism to define social licence – should be part of salmon plan
- Planning systems – land good, marine not good
- Defining a stakeholder set that gets consulted
- Getting the whole system in the room
- Bridge to stop seeing us as the enemy
- Jobs. Noise & light pollution. Product heath. Consumer reaction
- Government terminology – independence. Continuous improvement

Insights

What are the trends and insights globally, nationally, within industry and in other industries, in markets, by consumers and in innovation?

What could that mean for sustainable aquaculture and the blue economy here in Tasmania?

FRESHWATER RAS

- Facilities should be true RAS – flow through hatcheries gone, far enough away from any watershed – so can't pollute
- Small, closed loop RAS farms – on brand for Tasmania – high quality, low volume, superior, fresh, circular economy)
- Salmon bigger need RAS too
- There are always outputs – need to be managed at the right standard
- Water usage deal
- Low nutrient ecosystems can't sustain in freshwater
- Do no harm principle – how do we do this better – nutrients in the water
- Climate change
- Capacity 10 years
- Agriculture versus aquaculture impact on Long Bay
- Massive freshwater requirements
- Water accountability
- Net zero impact
- Do not harm
- Carbon neutral
- Return to community
- Animal welfare
- Water transparency
- Water towing examples

REGULATION + TRANSPARENCY + INDEPENDENCE

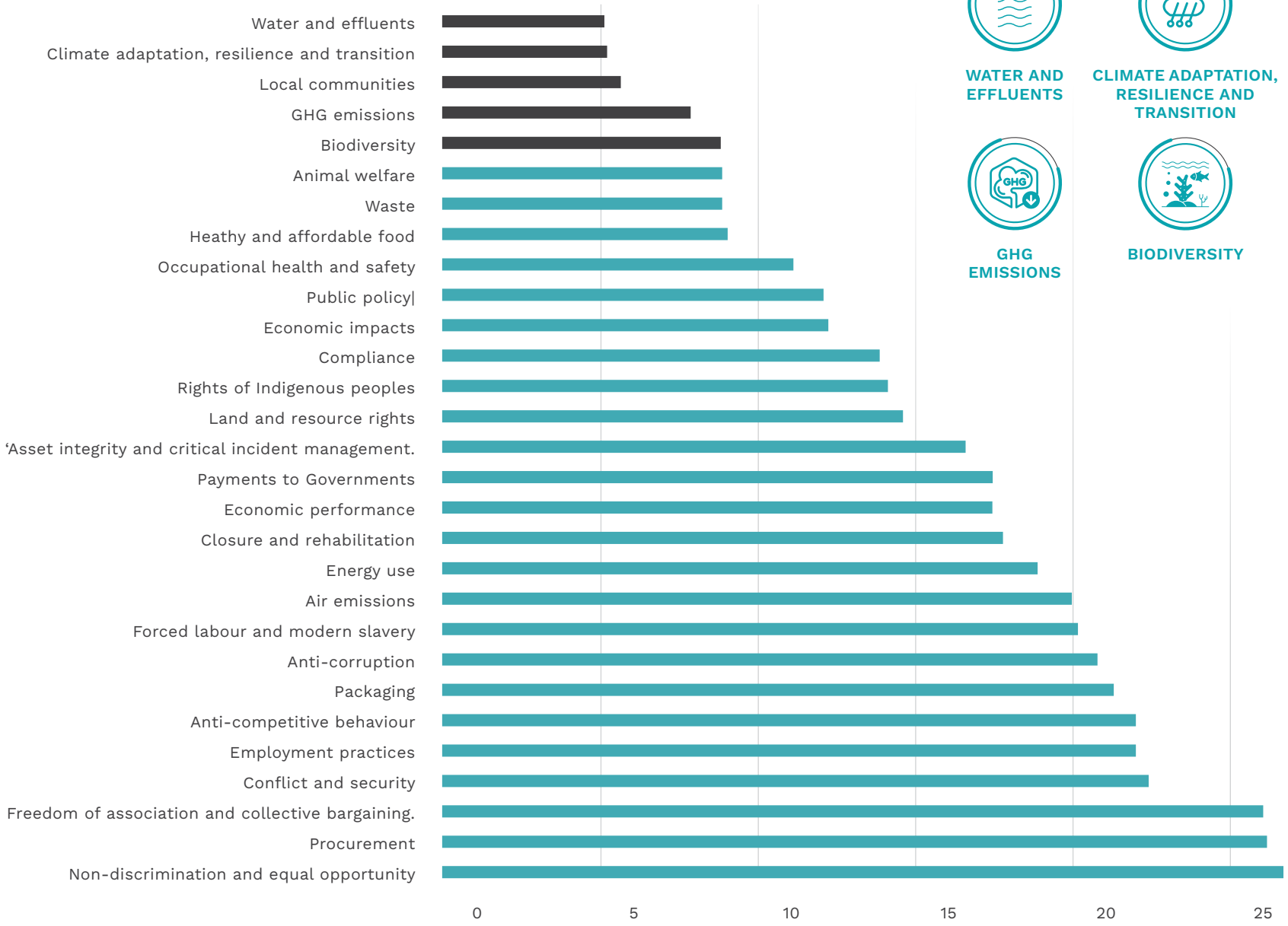
- Yes please
- Independent marine farm review panel
- Need to cap this industry off to move to more sustainable factors
- Independent observers – boats, diving
- What is regulation trying to achieve?
- Landscapes open to activities/regulatory systems
- EPA mining is clear
- Define the landscape, where can and can't go, limits and capacity, where and how
- Compliance – target and spend
- Currently multiple acts to govern the industry – capability/capacity of compliance
- We need to ensure rules are applied
- Allocation – director sign off is not enough
- Dedicated workforce of fisheries officers
- Capability for dedicated workforce to go offshore
- Independent compliance capability
- Not just outputs - time to define what is acceptable level
- Paid by industry
- Recommendation 42 – environmental bonds, government response – why won't government act (algae example)
- Transparency of data collected and free as soon as collected – so we know what is being collected
- Civil enforcement example

ADDITIONAL MATTERS

- Work with industry to look at the bigger picture
- Come out of the shadows, use its muscle
- Active players in a better future for everyone, not just double the industry
- Enable a real forum where community gets a voice when it is considered not working
- Heavy primary industry alongside of people/residents
- Need to see outcomes, shorter leases and they break the rules – break the lease

What Matters | Workshop Survey

Participants ranked a set of material sustainability topics from greatest to least importance.



Top 5 Priorities

- WATER AND EFFLUENTS
- CLIMATE ADAPTATION, RESILIENCE AND TRANSITION
- LOCAL COMMUNITIES
- GHG EMISSIONS
- BIODIVERSITY

CONVERSATIONS

The following section is an aggregate of what was heard from conversations with representatives from a series of other sectors.

Interest groups | Ocean Industries | Retail | Accreditation | First Nations

Representives from above were invited to participate in a conversation. Six of these conversations have been taken up, with other insights to be added to this report as more information comes forward

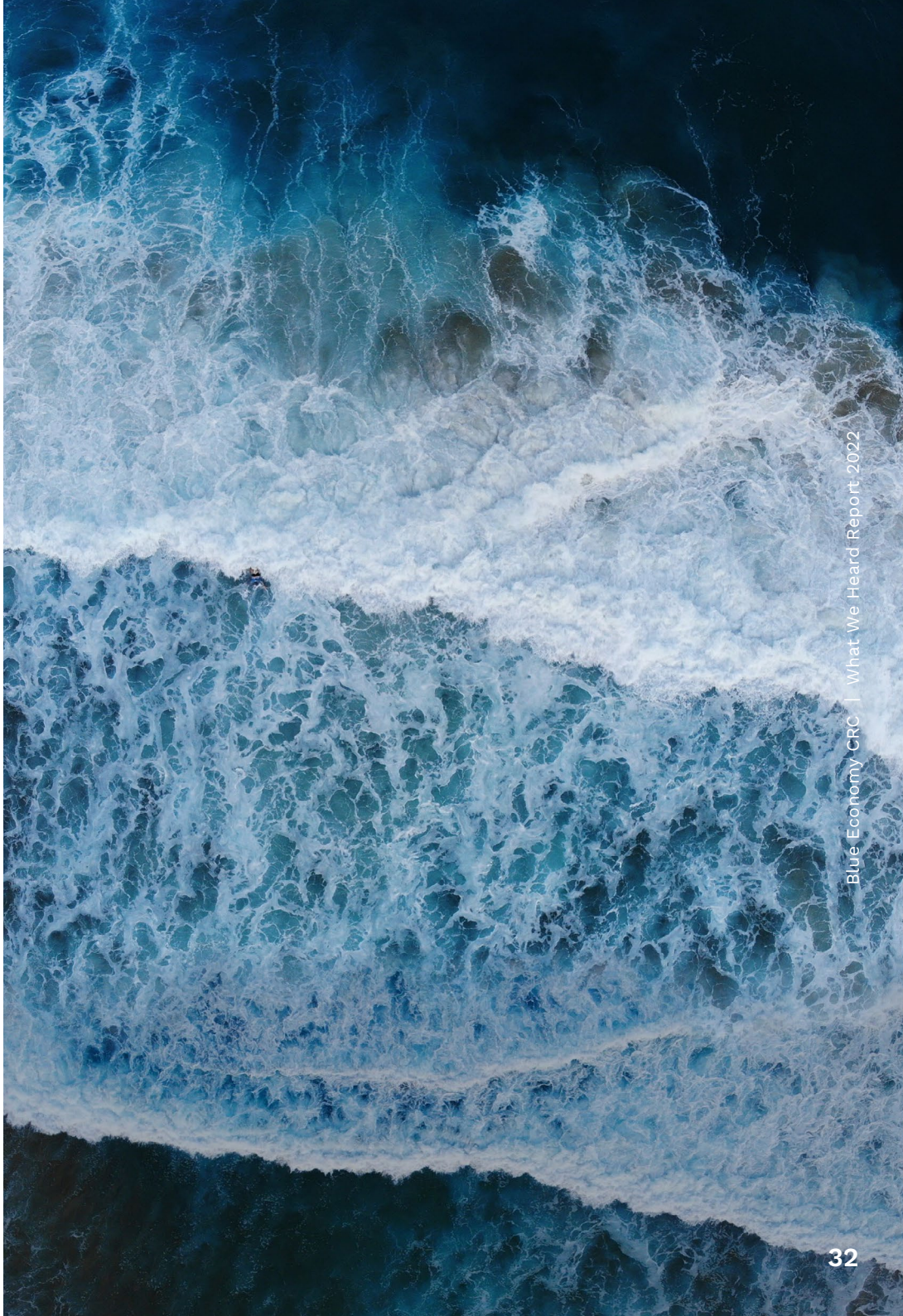
A Shared Vision For 2033

Global + National + Local

What does sustainable aquaculture and the blue economy look like in 2033?

Attributes of a vision

- Overarching marine environment regulation that involves a consultative and fully participatory approach
- Integration instead of sector based
- Wholistic approach to marine conservation management
- Broad social licence
- Marine spatial planning – opportunities, where to grow, how to regulate and wholescale reform
- Broad social licence gained
- Socially acceptable, generating jobs, sustainable
- Doesn't end up on the front page
- Part of the landscape same way you see farms on a drive up the midlands
- Greatly improved public support
- No BBF vessels blocking aquaculture vessels
- Blue economy – offshore infrastructure that is mobile and taking a leaf from other countries
- Salmon in Tasmania is supported. Aquaculture in Tasmania is supported
- Tasmanian businesses are supported



Working Back From 2033 Together | Ambitions + Challenges

What are the building blocks of this vision?

AMBITION + OPPORTUNITIES

- Good that government has acknowledged the need for reform post Macquarie Harbour, EPA transfer of authority a great first step
- Move to a more independent EPA needs to also include fulsome public participation when compared to other states
- To give tools so the EPA can do their job better
- More needed on accountability and transparency of industry and government
- To make space better planned and regulated
- If the drive within industry to be more sustainable is genuine, this could be harnessed but should be led by government
- Certification standards go toward transparency and accountability, however they are set off the base of government standards
- Other species (low trophic) with low impact farming, providing ecosystem processes and marketing associated opportunities
- Whole of product use, in case of oyster, better use of shell
- Better understanding of environment and nutrients that species use (i.e. shellfish) and use these nutrient maps to help build where farms are and new areas
- Marine spatial planning and marine estate policy and planning – is the start of a trust building process, people having a say
- Absence of a coordinating agency for oceans and waterways
- Support Tasmania's natural advantages
- Bring in other stakeholders in the move to offshore aquaculture (i.e. oil and gas) to share experiences and technology
- Need a system where policy and rules can be agile given the pace of technology
- Ensure decommissioning and removal of equipment so that taxpayer isn't left with costs
- Get enablers right and drive forward together – industry, science, community
- Salmon companies need to tell their story better
- Need to connect other commercial users – noting mixed salmon industry support, and considering impact and displacement (geographic and temporal) of future aquaculture on existing users and need for just transition and evaluation of economic impact

FUTURE ISSUES + CHALLENGES

- Climate change and rapidly warming waters and implications on expansion
- The current disjointed approach to marine management, policy and planning
- This is a large industry with a large impact (salmon farming)
- Currently community feels unengaged, feel shut down, dismissed, not worthy of engagement
- Cannot always bundle every aquaculture species together on opportunity or challenge
- Important to work with communities about perception of industry
- Need to distinguish legitimacy of amenity issues for residents versus campaign related
- Moving away from social licence and continuous approval to developing ethical outreach and community language
- Urban population and tension regarding water treatment and discharge
- Tension between environment and planning given absence of view that planning is participatory
- Blue economy – interactions with other species, following and other user access
- Inshore farming footprint and opportunity to consider future of high public amenity leases
- Everyone has a role to play, but these aren't clearly defined

Looking Toward 2033 Together

Insights + Innovation

How would you profile these terms?

OFFSHORE

- Storm Bay is not offshore
- Locations selected need to reduce environmental impacts
- Deeper, not sheltered
- Open, far off the coast
- Away from inshore sheltered waters, much deeper
- High energy means can be closer to shore
- Community expectation they can't see the farms

COMMUNITY

- Organised as a group versus individual
- Communities are organising around this, this organisation shouldn't be dismissed, they are joining to face the powerful industry together
- Need to be long-term, fulsome at an equal level, using a proper whole of value versus one way-lopsided
- Producers are also part of the community
- Consumers are also part of the community
- Residents can be defined within a distance of farms
- Any people with a direct interest in what happening in public spaces (air, land and sea)
- Impactee – direct beneficiary
- Term over used by lobby groups

Insights

What are the trends and insights globally, nationally, within industry and in other industries, in markets, by consumers and in innovation?

What could that mean for sustainable aquaculture and the blue economy here in Tasmania?

REGULATION + TRANSPARENCY

- Salmon issues are magnifying the broader issues
- Need an assessment of the marine environment and status and then undertake marine environment reporting
- Introduce marine spatial planning
- Introduce state of the environment reporting
- How to communicate complex issues and topics when some pockets of the community don't want to learn

INNOVATION + FOOTPRINT/GROWTH

- Need a better understanding of existing hectares
- Other aquaculture species growth is accepted (i.e., seaweed, shellfish)
- Across aquaculture sectors nationally, there are examples of better and smarter ways of operating and farm designs that can be brought to Tasmanian operations

PUBLIC PARTICIPATION AND TRUST

- The numbers indicate that a small number of the Tasmanian population strongly support the industry and a small number don't support the industry, however this small number of non-supporters have changed the media lens

BIODIVERSITY + MARINE ECOSYSTEMS

- Sustainable operations and predictability of ocean industries is liked to pristine waters and Tasmanian brand
- Need to develop the current understanding of pristine waters and establish strategies beyond a decade to achieve pristine waters
- Need to establish a baseline of the working environment and place effort to optimise that environment
- Need a greater understanding of pristine waters
- Need transparency and accountability for nutrient loads from finfish marine farming – proper accounting for what leaves leases
- There appears to be a different view to using land than the sea and also a view that we do better on land and are on water

CERTIFICATION + DISCLOSURE

- Certification plays a role after development application not before
- Certifications are a communications tool not the ultimate solution

LAND BASED AQUACULTURE

- Let's get real about this
- Land based is currently about longer periods on land, it is not about shifting to full lifecycle and saltwater – biosecurity, freshwater and density concerns
- Doesn't optimise the unique strengths and offerings of growing in Tasmania
- No Tasmanian benefits
- Every choice comes with a consequence, is this swapping some impact for another impact, some will ignore impacts of a favoured decision, i.e. energy use versus using ecosystem services provided by nature

Roadmap to 2033

What R&D and non-R&D innovation actions are required to support and shape the 2033 sustainable aquaculture and blue economy vision?

SUGGESTIONS

- Hit pause – maintain moratorium and undertake a review of Marine Farming Act, then broaden to a whole of marine activities act
- A legislative process that provides for genuine engagement
- Climate modelling, tracking trends and status updates
- Differentiation across aquaculture sectors is necessary
- Marine spatial planning
- Climate mapping
- Industry marketing and promotion of seafood better
- Need a strategy to get moving
- Ensure strategy is developed for the different layers of communication: salmon aquaculture, seafood community and Blue Economy CRC
- Commonwealth waters – complex process that hasn't been tested - trial engineering technology and application – doesn't have to be fish – test infrastructure first, science and monitoring is coming along i.e GPS trackers, coded ropes/pipes
- Is wise, allows for price changes, consumer preferences changes and climate change
- Workforce – need to address both our here and now needs as well as future needs, seafood doesn't have access to support/budget allocation
- Blue economy zone – need to plan for the future workforce, skills and training well in advance

2022 TASMANIAN SALMON SYMPOSIUM

Salmon Symposium

The 2022 Tasmanian Salmon Symposium was held on 10th and 11th May 2022 and was attended by over 350 attendees, 160 virtual and 191 in person.

It examined and discussed international best practice, research, and developments in contemporary offshore and associated land-based aquaculture systems.

It had strong international panels with invited speakers from Australia, New Zealand, Chile, Norway, Belgium, Greece, USA and attendees from several other countries online.

The event concentrated on the technical aspects of salmon aquaculture from an industry perspective with a strong focus on sustainability.

The symposium considered ethics, values and social licence of aquaculture in offshore environments.

The risks and opportunities of moving into offshore environments were discussed, including innovative ocean accounting, opportunities for multispecies and integrated multitrophic aquaculture, offshore engineering and innovative technologies, responsible feed production and low carbon farming technologies.

	SESSION NAME	SPEAKERS
DAY 1 – TUESDAY 10TH MAY, 2022	**Registration**	
	Welcome	**Facilitator:** Ms Kym Goodes **Welcome:** John Whittington, CEO, Blue Economy CRC **Opening Address:** Honourable Jo Palmer MLC, Minister for Primary Industries and Water, Minister for Disability Services, Minister for Women
	Keynote Presentation: Australia's ocean story: What does success look like?	Ms Jas Chambers, Chair, Ocean Decade Australia
	Sustainable Aquaculture in 2033 - Visions for aquaculture in 10 years time *Visions for the future followed by panel and Q&A*	**Presenters & panel:** Dr Albert Tacon, Founder & Owner, AquaHana LLC Dr Richard Cottrell, Research Fellow, Institute for Marine and Antarctic Studies, University of Tasmania Prof Charles Sampford, Director, The Institute for Ethics, Governance & Law, Griffith University Mr David Whyte, Managing Director, Biomar Pty Ltd
	Technology and systems for future ocean aquaculture Followed by Q&A	Dr Cristian Cifuentes, Researcher and R&D Coordinator for Engineering, Universidad Austral de Chile Mr Per Arild Aland, Business Development Manager - Offshore, DNV Dr. Langley Gace, SVP, Business Development, Innovasea
	International perspectives for future ocean aquaculture (Part A) *Followed by Q&A*	Dr Lien Loosvelt, Innovation Manager Aquaculture, De Blauwe Cluster Mr Torgeir Torgersen, Ship Designer - Project Manager, NSK Ship Design Mr Gary Hooper, CEO, Aquaculture New Zealand
	Healthy Fish, Healthy Feed, Healthy Food *Followed by Q&A*	Dr Anna Farmery, Senior Research Fellow, University of Wollongong Mr Duncan Leadbitter, Director, Aquaculture Stewardship Council Australia Mr Jorge Diaz, Global Sustainability Manager, Skretting
	Closing remarks	Mr Greg Johannes, Chair, Blue Economy CRC
DAY 2 – WEDNESDAY 11TH MAY, 2022	**International Perspectives For Future Ocean Aquaculture (Part B)**	Prof Elena Mente, Aristotle University of Thessaloniki Prof Daniel Benetti, Director of Aquaculture, University of Hawaii Dr Gonzalo Tampier, Associate Professor, Universidad Austral deChile Dr Mark Powell, CEO Marineholmen RASLab Norway
	Integration In Future Ocean Aquaculture	Dr Beth Fulton, Principal Research Scientist, CSIRO Ms Lily Stuart, Research and Engagement Manager, Oceans and Biodiversity, FAIRR Initiative Dr Albert Tacon, Founder & Owner, AquaHana LLC Mr Gary Hooper, CEO, Aquaculture NZ
	What Can Future Ocean Aquaculture Deliver To Society? *Panel & Q&A*	Ms Sue Grau, CEO, Tasmanian Salmonid Growers Association Dr. Beth Fulton, Principal Research Scientist, CSIRO Mr Gary Hooper, CEO, Aquaculture New Zealand Prof Charles Sampford, Director, The Institute for Ethics, Governance & Law, Griffith University Dr Albert Tacon, Founder & Owner, AquaHana LLC Mr Patrick Hone, Managing Director, Fisheries Research and Development Corporation
	Closing Remarks	Mr Greg Johannes, Chair, Blue Economy CRC

Presentations

DAY 1 – TUESDAY 10TH MAY, 2022		
Welcome	» Honourable Jo Palmer MLC, Minister for Primary Industries and Water, Minister for Disability Services, Minister for Women	View Day 1 Recordings
Australia's Ocean Story: What Does Success Look Like?	» Ms Jas Chambers, Chair, Ocean Decade Australia	
Sustainable Aquaculture In 2033 - Visions For Aquaculture In 10 Years Time	» Dr Albert Tacon, Founder & Owner, AquaHana LLC » Dr Richard Cottrell, Research Fellow, Institute for Marine and Antarctic Studies, University of Tasmania » Prof Charles Sampford, Director, The Institute for Ethics, Governance & Law, Griffith University » Mr David Whyte, Managing Director, Biomar Pty Ltd	
Technology And Systems For Future Ocean Aquaculture	» Dr Cristian Cifuentes, Researcher and R&D Coordinator for Engineering, Universidad Austral de Chile » Mr Per Arild Aland, Business Development Manager - Offshore, DNV » Dr. Langley Grace, SVP, Business Development, Innovasea	
International Perspectives For Future Ocean Aquaculture (Part A)	» Dr Lien Loosvelt, Innovation Manager Aquaculture, De Blauwe Cluster » Mr Torgeir Torgersen, Ship Designer - Project Manager, NSK Ship Design » Mr Gary Hooper, CEO, Aquaculture New Zealand	
Healthy Fish, Healthy Feed, Healthy Food	» Dr Anna Farmery, Senior Research Fellow, University of Wollongong » Mr Duncan Leadbitter, Director, Aquaculture Stewardship Council Australia » Mr Jorge Diaz, Global Sustainability Manager, Skretting	

DAY 2 – WEDNESDAY 11TH MAY, 2022		
International Perspectives For Future Ocean Aquaculture (Part B)	» Prof Elena Mente, Aristotle University of Thessaloniki » Prof Daniel Benetti, Director of Aquaculture, University of Hawaii » Dr Gonzalo Tampier, Associate Professor, Universidad Austral de Chile » Dr Mark Powell, CEO Marineholmen RASLab Norway	View Day 2 Recordings
Integration In Future Ocean Aquaculture	» Dr Beth Fulton, Principal Research Scientist, CSIRO » Ms Lily Stuart, Research and Engagement Manager, Oceans and Biodiversity, FAIRR Initiative » Dr Albert Tacon, Founder & Owner, AquaHana LLC » Mr Gary Hooper, CEO, Aquaculture NZ	
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Panel Session And Closing	» Mr Greg Johannes, Chair, Blue Economy CRC	

In-session Question Log

OFFICIAL SYMPOSIUM WELCOME AND KEYNOTE

- Many are concerned that expansion of aquaculture into Commonwealth waters will place it out of sight, out of mind. How can the Tasmanian and broader Australian public be informed and engaged? What would accountability look like? For example, the recent consultation about the experimental Blue Economy CRC off-shore site in Bass Strait (off Burnie) resulted in over 1000 submissions but received a very cursory 2-page response. Surely there is a better way?
- I'd love to know what Jas believes to be the biggest challenge facing the ocean in the next decade?
- How do we build trust amongst the many, many ocean stakeholders?
- Two outcomes for what we want oceans to look like were safe and predicted. Can you give examples of what safe and predicted actually mean or look like?
- I hear the word "sustainable" used a lot. what is your definition or, better still the CONFERENCE definition of sustainable?
- Do you have any suggestions on how we measure 'success' at end of decade?
- What is Jas' perspective on the "safety" of Tasmanian oceans currently? i.e., what areas would the scaffold target locally?
- Will access to capital or government policy be a constraint to Australia meeting the vision?
- How do you see progress toward better outcomes for the oceans given the increasingly fraught geopolitical tensions in our oceans (south China sea, illegal fishing in northern Australia)
- Q: Salmon is a high end, high-on-the-food chain, relatively expensive product – and growing a lot more salmon in Tasmanian waters is unlikely to be the solution to world hunger. Is there a healthier and more sustainable aquaculture option than salmon (e.g. mackerel) that should be supported in regions closer to the need? Is on-shore or off-shore production preferred?
- The Tasmanian salmon industry is a significant employer and economic driver for the state (with hundreds of millions of dollars of exports). What role do you see for workers in supporting a sustainable aquaculture industry, and what skills will they need going forward as the industry develops and grows?
- How much krill being exploited a source of fishmeal (including in Tasmania)? How fast is this happening, is it sustainable, and what are the ecological implications of this for the Antarctic seas?

SUSTAINABLE AQUACULTURE IN 2033 - VISIONS FOR AQUACULTURE IN 10 YEARS TIME

- Wondering how much of the Tasmanian aquaculture industry & program is contributing to this global problem?
- As scientists, what would you say would be the most effective action we can take to support aquaculture as a sustainable solution to the global issues of malnutrition?
- NOFF today released a video in which they claim that Tas salmon is not a healthy option, not a 'superfood' but a 'fat bomb'. Please comment
- Are the presenters suggesting that by 2033 we will be seeing 'designed' aquaculture products with different nutritional profile, and farmers having cages & tanks with stock on different feeds?
- Are you aware if similar analysis is done for terrestrial animal feed, and in this context how do aquaculture feeds compare?
- Thank you for your presentation Richard, very impressive data driven research methods. In the research to date, where do you see the biggest changes we can make now to improve sustainability of feed supply and environmental impact of waste products in marine aquaculture?
- Great project! How do we deal with tradeoffs? E.g. A soy source that is better for biodiversity but worse for GHG footprint? And are you accounting for travel distance (GHG emissions)?
- Question for Albert - has he considered that we don't need fish for food. We can feed the world a very healthy diet using plants. Please comment
- Q for David and Rich. what do we know about the effects of the dietary change on waste production and the subsequent environmental footprint and ecosystem response
- Would we be better served to eat the plant products directly rather than use them to grow fish?
- What is being done to tackle eutrophication? how can we move forward and leave behind such a mess (e.g algal blooms, marine debris etc)
- For all speakers - what are the drivers and barriers for more localised production of ingredients?
- Can lower trophic level feed production provide the volumes demanded by industry
- It's a big achievement for the shift from marine-based ingredients to plant-based. But the mineral level, high fibre and anti-nutritional factors in plants could impact the mineral bioavailability for fish, how do you deal with the micronutrient requirement of fish (e.g. minerals)? Beyond the fish requirement, do you consider improving the mineral value in the fish products for human consumption through the fish feed?
- For Albert. Do we have any studies that touch on the implications of changing the fish feed away from more natural sources for a human nutritional perspective?
- Charles - a wonderful view for the top - thank you. have ethicists or law makers considered what happens to the EEZ of a country that has lost its above-sea footprint?
- The majority of aquaculture is based on a few production systems and species. around 300 aquaculture species can be farmed. what might aquaculture look like in terms of systems and number of species
- Salmon is a high end, high-on-the-food chain, relatively expensive product – and growing a lot more salmon in Tasmanian waters is unlikely to be the solution to world hunger. Is there a healthier and more sustainable aquaculture option than salmon (e.g. mackerel) that should be supported in regions closer to the need? Is on-shore or off-shore production preferred?
- How much krill being exploited a source of fishmeal (including in Tasmania)? How fast is this happening, is it sustainable, and what are the ecological implications of this for the Antarctic seas?
- Rich. will your tool be a tool that the public can use directly (in some form) to make food choices
- The negative outcomes have already occurred!!! please address.

TECHNOLOGY AND SYSTEMS FOR FUTURE OCEAN AQUACULTURE

- Question for Moor power. how much power may be produced on a feed barge?
- Does MoorPower have the potential to be deployed on fish pen mooring lines to enhance capacity?
- Has the wave technology for the moor power barges received approval or approval in principle from DNV for the PTO wave technology in lieu of the Diesel Generators?
- Is there any new developments in offshore aquaculture structures that will improve the sustainability of production, either closed or open systems that are integrated with renewables?
- Is there any capacity (or feasibility) to retrofit existing feed barges for wave power or better to build new?
- For the biometrics app in the data-driven aquaculture, how do you develop the algorithms and how much is done prior (e.g. in a lab) or post (e.g. ML in-situ) deployment?
- How do you manage fish which need to regularly access air to fill their swim bladders with submersible pens?
- W to Mr Grace,, what does he mean by 'life support system' in submerged pens?
- Will access to capital be a constraint to achieving offshore aquaculture? these structures are not cheap and still underdeveloped. how can we assist industry to achieve this?
- If the industry is planning to move further out to sea and deeper waters, surely that just means it's simply moving the sewage out of sight but still directly discharging into the ocean?

INTERNATIONAL PERSPECTIVES FOR FUTURE OCEAN AQUACULTURE (PART A)

- Have you any examples of successful application of IMTA or other commercial aquaculture that reduces eutrophication levels in the Blue Cluster?
- How can aquaculture enhance nature, and how can not intrude?
- Does Havfarm accept that coastal & inshore salmon production is no longer fit for purpose in the 21st century?
- How are the fish wastes from these mega vessels treated? And how would you manage a major mortality event? How and where to dispose of potentially enormous quantities of morts as a result of disease or jellyfish?
- What is the embodied energy and operational greenhouse gas emissions of these large offshore Havfarm systems?
- For Torgeir, you mentioned that Havfarm is space efficient. Can you expand on this? How does production potential per hectare compare to conventional pen farms?
- Presumably, offshore production still requires on-shore smolt production. How can this be provided without damaging freshwater ecosystems and using excessive volumes of water? What RAS standards would you consider to be world's best practice? Would you consider flow-through smolt production systems without removal of nutrients to be adequate?
- There have been on-going concerns that discharges from giant well boats such as the Aquaspa and Ronja Storm are unregulated in Tasmania. These discharges are likely to contain fish wastes, disinfectants, and possible disease. Are well boat discharges regulated in other countries, and who does it best?
- Please address the reasons for King Salmon moving to Cook Strait - it's impact on Marlborough Sounds, community concern etc.
- Salmon is a high end, high-on-the-food chain, and relatively expensive product – and growing a lot more salmon in Tasmanian waters is unlikely to be the solution to world hunger. Is there a healthier and more sustainable aquaculture option than salmon (e.g. mackerel) that should be supported in regions closer to the need? Would on-shore or off-shore production best fill this need?
- What did you discover the new functional requirements for offshore fish farming?
- How do the government & other stakeholders in Norway support the industry for growth and sustainably?

INTERNATIONAL PERSPECTIVES FOR FUTURE OCEAN AQUACULTURE (PART B)

- What have you learnt about the distribution of fish and feed in cages how can we improve feeding?
- What can be done to reduce retail price of fish farmed offshore so we can make fish more available to those who can least afford this valuable protein source?
- Have you any examples of how on fish biometrics have improved productivity in an existing offshore remotely operated sea cage or are these still emerging technologies?
- What objections are environmental groups leveling at offshore farming?
- Will the long-term cost of offshore fish truly be higher if production increases?
- To what extent are these challenges disclosed to stakeholders or to what extent and in what manner do you think stakeholders should be informed about these challenges?
- How do these heavy pen surface structures compare with submerged cages in major storms like cyclones?
- What is the life of these massive structures and what happens to them at end of life?
- What is project status for OCEAN Arch Tech
- Has Chile considered land-based aquaculture as an alternative to offshore
- How does the aquaculture industry in Chile engage with local communities?
- How developed is the flexible pen technology in Chile? submersible yet?
- Is the Chilean government offering any incentives to industry to encourage a move offshore?
- What were some of the key steps to achieving industry consensus on sustainability?
- Can you talk about Biosecurity between farms, distances between operations etc is this different in open ocean?
- What environmental aspects do you think might impact & improve mineral nutrients in fish products for consumption?

HEALTHY FISH, HEALTHY FEED, HEALTHY FOOD

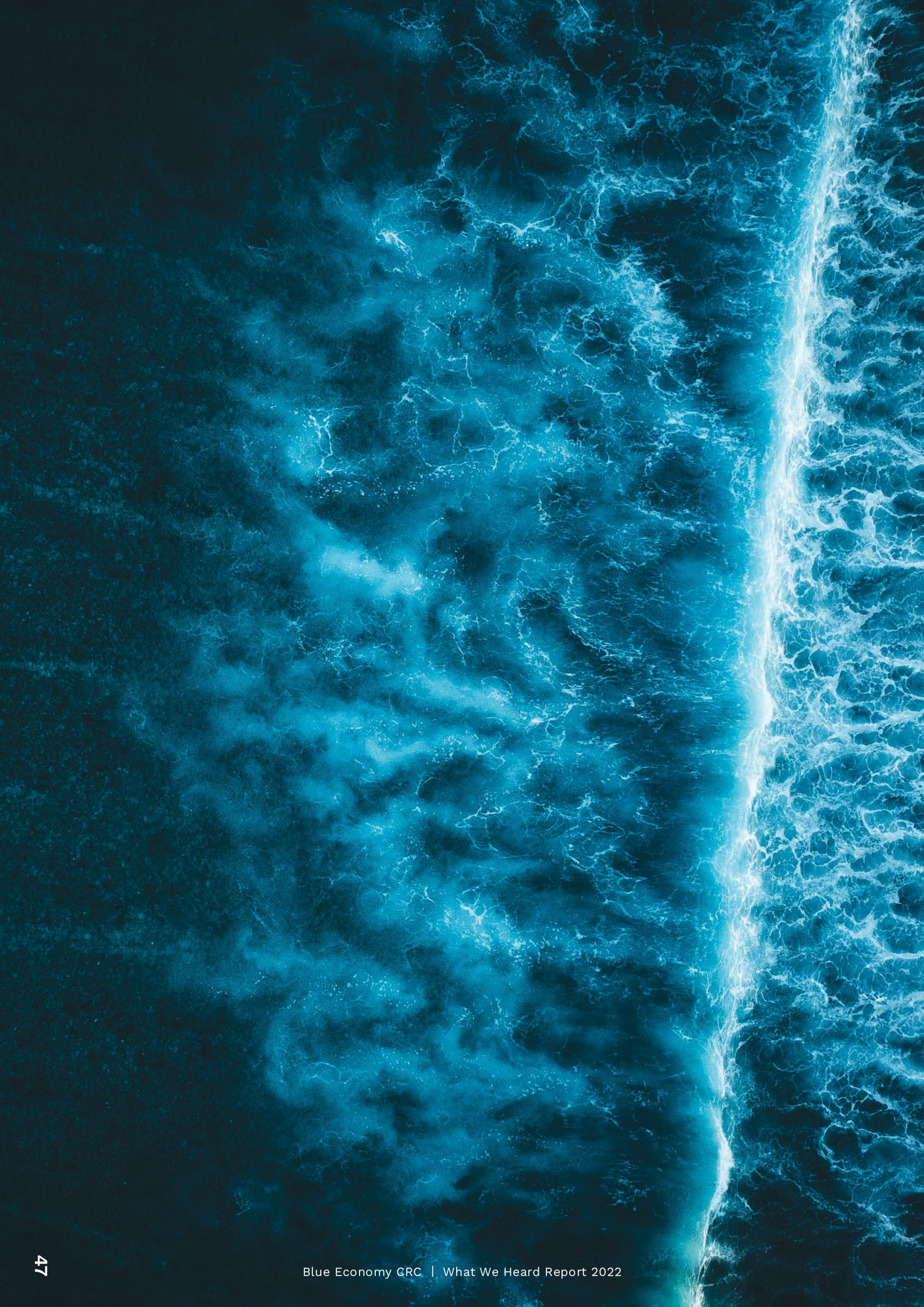
- Why do you think Best Aquaculture Practices is a more prevalent standard in Australia than ASC?
- We pay considerable attention 2 feed formulation for fish nutrition. Ru aware of anyone (groups, organisations etc) paying particular attention to formulating fish 4 optimal human nutrition?
- How does ASC ensure the same standards are consistently applied in different countries when the same fish type is being assessed
- Have you any data on farms that have increased production by improved fish health through application for ASC certification and are these data available to the public?
- Which Tasmanian salmon farms have ASC certification?

INTEGRATION IN FUTURE OCEAN AQUACULTURE

- Is their cultural health modelling, monitoring and reporting that has been built in partnership with First Nations people?
- When considering the economic & technological hurdles of ocean farming is anyone comparing it to land-based RAS? including environmental factors.
- What in your experience works best to collaborate on a large scale through data collection, curation and access to improve predictive performance in aquaculture models?
- Are there sufficient modellers being trained to meet future demand around offshore aqua?
- Does enough data currently exist to undertake a real marine spatial planning exercise that includes detailed natural, social and cultural values?
- Is consultation mandated for aqua proposals in NZ? Has government or other organisation produced/issued engagement and consultation guidelines?
- You mentioned that Havfarm is space efficient. Can you expand on this? How does production potential per hectare compare to conventional pen farms?

WHAT CAN FUTURE OCEAN AQUACULTURE DELIVER TO SOCIETY

- In remote areas much of the workforce is non-resident, they do not have same positive impact on communities and can have negative impacts, how can the salmon industry maximise benefits to remote communities while using non-resident workers.
- Has there been any greenhouse gas LCA for the HavFarm system (including embodied energy)? How does this compare to other (e.g submerged) systems over the the same life span?
- Would anyone like to ask why the symposium has no representation of communities - First Nations or others? how is it possible to talk about social licence while excluding community's voice??
- Can Hugh Breakey tell is about any ethical concerns for public and private companies entering into cooperative arrangements with non profit entities. How are these best managed?
- Is enough data currently available to undertake real marine spatial planning in Tasmanian waters - that includes detailed information on natural, social and cultural values?
- What goes into the $1 billion value? Is it a contribution to national income or an overall measurement of assets? I'm happy to know how that value is measured.
- How should the salmon industry ensure economic benefits to local communities that live with aquaculture, should some of the direct revenue go to local communities?
- What research is happening on the seal issue and the use of crackers - 8000 in 14 months according to recent media reports. How can we move away from using these devices?
- To a comparison to the rest of the world. Tasmanian current salmon farm sites, storm bay and others close by how exposed are they to the harsh seas.
- What research is happening on the seal issue and the high use of crackers - 8000 in 14 months according to recent media? What is the industry working on to try to minimise use of these devices?
- How should the 10 year plan consider licence fees for aquaculture? What should be the process for setting those fees (and other government charges) to ensure they are fair for industry and community?
- What can the industry do develop a transparent approach to studying and explaining social and economic impacts on communities?
- It is encouraging to see the move away from FM and FO in aquafeed. Yet there is a concern that Tas salmon has more chicken fat than a chicken itself and is therefore not healthy. please comment
- How is FRDC delivering on the E of your strategic plan? How can we improve public understanding of research processes?
- What environmental aspects do you think might impact and improve mineral nutrients in fish products for consumption?
- Is there a symposium policy to exclude questions from non-industry participants who would like some difficult questions asked?



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