Fisheries New Zealand

Tini a Tangaroa

Science to inform climate change impacts for NZ Seafood

NZFSSRC Industry forum

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Context

- We all face the challenges of a changing climate
- Seafood is a component of the NZFSSRC
- Most of FNZ science focuses on:
  - How many fish are in the sea, and how many can we take? (stock assessment)
  - How do our fisheries interact with the environment (aquatic environment):
    - e.g. seafloor, protected species, climate, aquaculture.
  - Some involvement in food safety issues e.g. milky flesh snapper
- A Seafood Sector Climate adaptation strategy has been agreed

Aotearoa Circle

The Aotearoa Circle
Mā te Kaitiakitanga ko te Tōnuitanga
Prosperity Through Guardianship

- Seafood Sector Climate adaptation strategy
- Chaired by:
  - Dan Bolger (FNZ) and
  - Maru Samuels (Iwi collective Partnership)

  - agrees the urgent need to address climate-related risk is beyond debate
  - focuses on commercial sector, but recreational and customary sectors will also have key roles to play
  - recognises multi-stakeholder collaborations are key to building resilience

Our strategy on a page

OUR VISION

"A thriving marine environment, blue economy, and seafood community"

OUR MISSION

"As kaitiaki we work together to adapt to climate change and ensure a resilient future"

OUR STRATEGIC GOALS & SPECIFIC OBJECTIVES

Culture and wellbeing

Bold leadership

"We share a clear, common purpose and take collective responsibility for change"

- **1.1** We will proactively and visibly lead our stakeholders toward the achievement of our vision, taking accountability for driving adaptation action and publicly celebrating our successes
- **1.2** We will identify the adaptation options available to us and reach agreement on when and how they will be implemented
- **1.3** We will ensure that our stakeholders understand the risks and opportunities posed by climate change well enough to be able to prioritise and implement adaptation actions

Resilient prosperity

"Our businesses are effectively adapting to disruptive market changes and stewarding marine ecosystems"

- **2.1** Our climate change adaptation actions enhance the resilience of a climate-stressed marine environment
- **2.2** Our sector is diversifying its methods, products and markets to better cope with climate-related disruption
- **2.3** Our climate change adaptation actions enhance the resilience of a climate-stressed marine environment
- **2.4** Our climate change adaptation performance is transparently communicated and converted into long-term increased value

Systems and settings

Practical knowledge

"Our knowledge system supports mātauranga Māori and provides the evidence required for innovation and good decision-making about climate-related risks and opportunities"

- **3.1** Vulnerability to climate change within the sector is assessed by identifying climate-related hazards, assessing exposure to them and gauging sensitivity to their impacts
- **3.2** The growth of a collaboratively resourced and holistic seafood adaptation data and information system in Aotearoa is supported
- **3.3** How data and information are used to make adaptation decisions is transparently communicated
- **3.4** Insights into the evolution of risk and opportunity in the seafood sector are captured, and lessons learnt from adaptation are gathered to inform decision making

Values-based governance

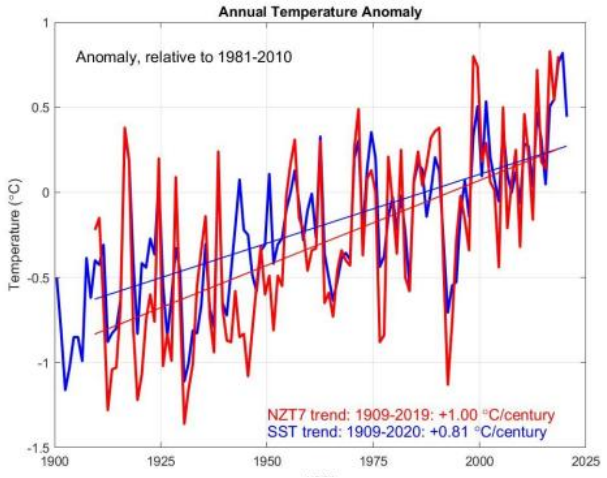
"Our legislative, regulatory, and resource management systems reflect our principles, and respond quickly and boldly to the challenges that climate change poses to New Zealand's marine environment and seafood community"

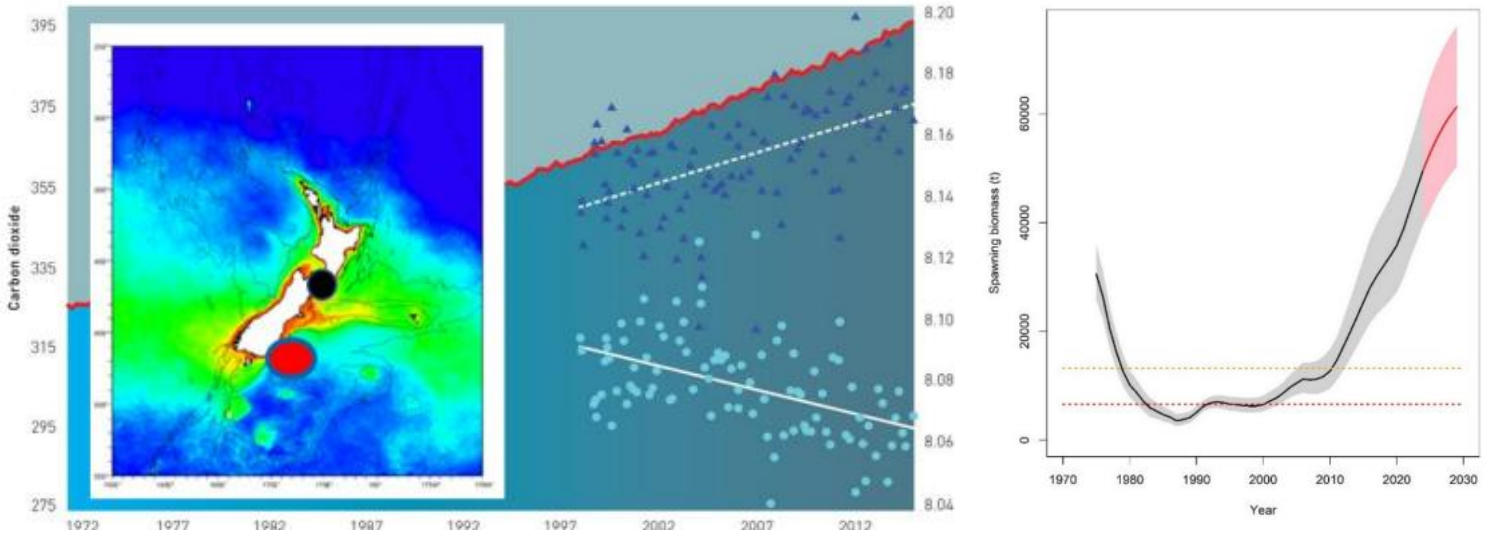
- **4.1** Climate-related risk is mainstreamed within regulatory and management-level decision-making
- **4.2** The capacity of the legislative, regulatory and management systems to respond to climate change risk and opportunity, and take action to support and enable their improvement, will be regularly assessed

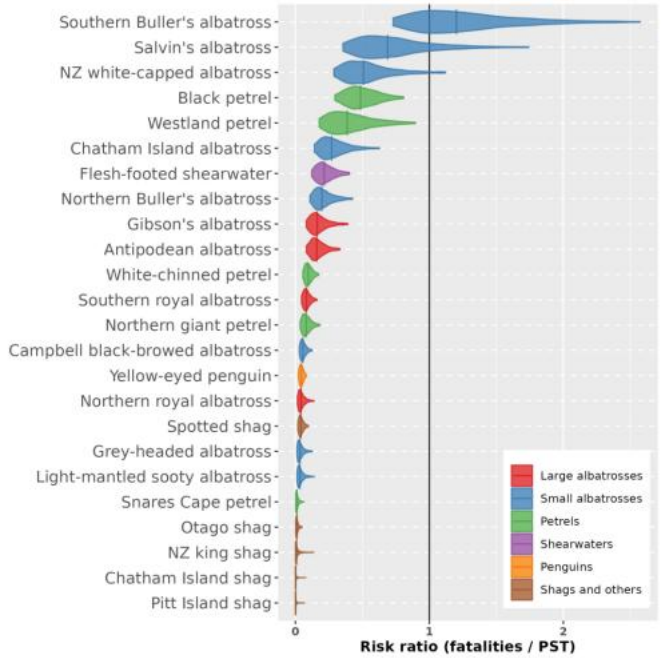
Common issues for Food Safety and FNZ regarding climate change:

- baselines
- change
- uncertainty
- what information do we need?
- are our systems prepared?
- a system challenge, not just a science challenge

Baselines help us determine change and risk





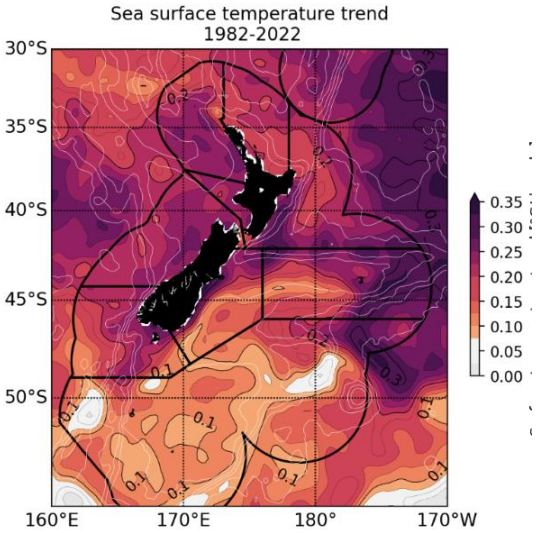


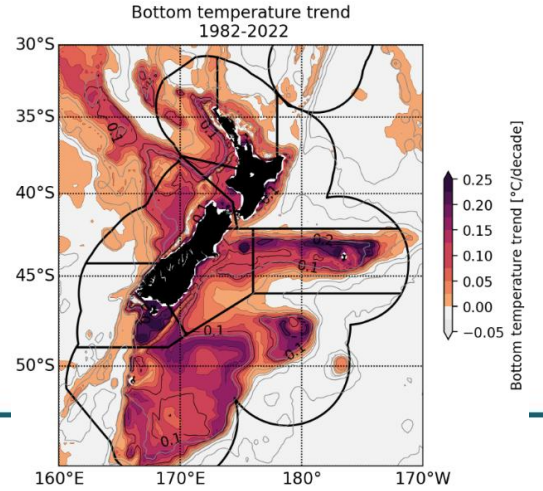
But cause and effect are usually harder to disentangle - what is climate change effects versus other causes?

Climate and ocean trends relevant to NZ

- NZ warming at 0.2 to 0.3 degrees per decade
  - One of the fastest rates in the Pacific
- Regional variability
  - surface temperatures are warming faster in the North
  - bottom temperature are warming faster in the South
- Ocean acidity increasing affects shell formation
- Primary productivity decline since 2019

- Positive and negative impacts
  - rate of growth, range, abundance, spawning success, loss of key prey or habitat



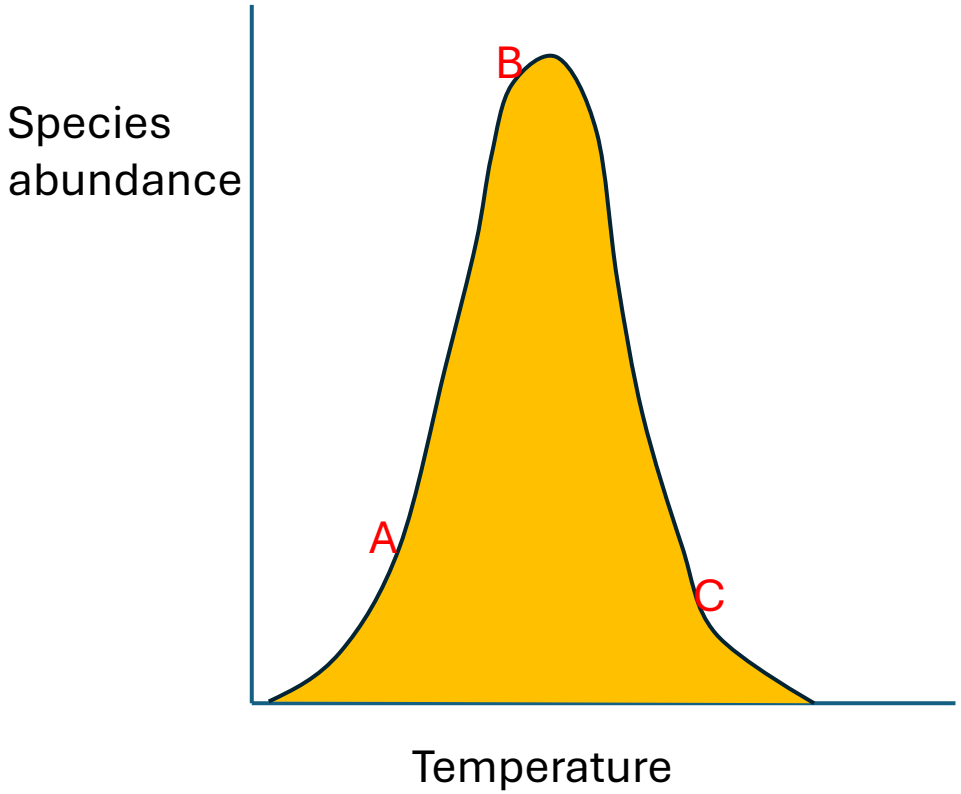


Look at known current climate impacts

- Impacts on aquaculture (siting and infrastructure)
- Impacts on fisheries (productivity and distribution)
- Stronger storms and more runoff and damage
- Range expansions (snapper, tuna and kingfish)
- Decreased range/productivity (red cod, blue cod and paua)
- Warm water invasive species increase (Caulerpa)

Predict the future

- It depends where a species is on their thermal tolerance curve.
  - A increase a lot
  - B increase less
  - C decrease
- Physical effects easier to predict than biological responses, but some mitigations are possible:
  - Salmon selective breeding can increase the temperature range over which they feed.



Seafood production and climate change

Attribute	Challenge	Opportunity
Warmer water and species range changes	Salmon in the Marlborough Sounds, estuarine shellfish declines, long-spined urchin increase.	More tuna in our waters, new species to exploit in the future, e.g. greasyback prawn in Northern harbours?
Juvenile survival linked to water temperature	Hoki	Snapper
Productivity predicted to decrease	Maintain capacity, profitability	More use of % based (rather than absolute) fisheries targets
Current changes due to warming water	Will be location specific	Will be location specific
Overlap of fisheries with protected species impacted by warming water	Avoiding species more at risk e.g. Hoiho, Leatherback turtles	Some species may become less threatened by unintentional captures
More damaging storms	Aquaculture siting and engineering, health and safety	????

How do we implement change?

- Climate vulnerability assessment to quantify and prioritise threats
- Not just a Fisheries New Zealand task…
- No one answer, not just a science problem, for example:
  - Selective breeding for Salmon
  - More use of proportionate targets for setting catch from wild fisheries (rather than assuming stock size is constant)
  - Quicker ability to change catch limits (change legislation)
  - Multi-threat risk assessments for protected species (what to address to best affect change)?
- Some of these mitigations are useful for not just climate change

Relevance to food safety science (an e.g.)?

- Vibrio in raw or uncooked shellfish
  - In 2019 this led to hospitalisations
  - Predicted to increase with warming waters
  - Genome sequencing helps determine strain (and sometimes source)

- For this predicted increase in the future
  - Is there an agreed strategy, can people work together?
  - Do we have good baselines?
  - Is there additional science we should prioritise beforehand?
  - Can we predict prevalence and impacts?
  - How appropriate are our animal products notices (monitoring temp/time for harvest)?
  - Can we respond quickly enough to detect vibrio for public safety?
    - Should new methods be investigated?

Thanks to New Zealand Food Safety for input