Factsheet 6: Projected Climate-related Impacts on Food Safety Systems in the Mahinga Kai/Wildfood Sector

RISK MATRIX

The risk matrix represents a sector specific overview of the climate change impacts to food safety and systems, their risk now, in the future under a high emission scenario, and following suggested adaptation options. The risks are defined as low = green, medium = yellow, high = orange, high = red. Information used to develop the risk matrices was sourced from scientific publications and industry feedback from Workshop 1 and based on the high emission scenario. The purpose of the risk matrix is to provide a summary of potential impacts for discussion with representatives from the NZ food sectors, research providers and government agencies.

Issues have been categorised as follows:

Category 1: Existing hazards affected by climate change

- Those arising from infectious agents
- Those arising from naturally occurring chemicals and biotoxins

Category 2: From risk management to address climate change issues

- Chemical interventions (pesticides, antibiotics etc.)
- Other changes in production processes

We have based our indications of climate change expected over the next 100 years on the highest representative concentration pathway (RCP) 8.5, because this enables us to more clearly assess future change.

Additional commentary is provided below the table.

CLIMATE CHANGE AND FUTURE IMPACTS

Harvesting of wild foods can provide an additional food source and collection and sharing of wild food has cultural and spiritual value for Maori. Commonly collected or hunted wild foods include seafood that also form part of recreational activities (i.e. fishing, tourism). Other wild foods include whitebait, watercress and seaweed although there are a many native plants and animals that are eaten or used for medicinal purposes.
Climate change could lead to food security issues and an increase in the reliance of wild food.
Wild foods are susceptible to the same effects of climate change as commercially grown plants and animals.

Extreme events are likely to increase and include:

- Frequency, duration and intensity of hot spells, mostly in the north of the NI and Eastern SI, however, towards the end of the Century this could affect All of the NI and Eastern SN
- Frequency of heavy precipitation events and the potential for associated flooding will affect all off NZ,
- Incidence of extremely high sea levels during storm surges,
- Longer dry spells in some areas (especially in the north of the North Island and east of both islands), and the areas affected by drought each year, are likely to increase.

Changes to the average climate will include:

- Increases in warmer and wetter weather in Western NZ and Southern SI
- Average annual rainfall in New Zealand will generally increase in the south and west and generally decrease in the north and east of the country, with seasonal variations.
- The winter season is projected to have the greatest rainfall changes (an exacerbation of the annual changes), as westerly winds (particularly across the South Island) are likely to strengthen.
- Average relative humidity is likely to increase for most areas of New Zealand.
- By the end of the 21st century, mean growing season temperatures are highly likely to equal current extremes in temperate areas (including New Zealand) and to exceed them in the tropics and subtropics, resulting in major impacts on global food production (Battisti and Naylor 2009).
- With projected warmer temperatures, some regions in New Zealand currently too cool may become suitable and some regions where crops are currently grown successfully may become less suitable over time.
- Ocean temperatures will increase and ocean pH decrease.

FOOD SYSTEM ISSUES

Increased ocean temperate and acidification

- An increase in ocean temperature will affect the range and prevalence of marine pathogens and toxins. One of the most important pathogens is *Vibrio* spp. Seawater temperatures above 19 degrees have been suggested as trigger point for increased risk and monitoring (Cruz et al., 2015). There is also the potential for foodborne and wound infections during gathering.
- Increased ocean temperature, deluge and drought may also lead to an increase risk of toxic algal blooms. Some shellfish can accumulate toxins and above certain levels if they are eaten can poison humans.
- There is some evidence to suggest that climate change will increase heavy metal and dioxin concentrations in some foods e.g. methylation of mercury

will increase levels in predatory fish (Paranjape and Hall 2017; Thomson and Rose 2011). Cadmium is also projected to increase in foods. Increased absorption may approach regulatory limits. Watercress can absorb contaminants from waterways. Molluscs are a minor contributor to overall dietary exposure - adaptation may not be necessary.

- Increased ocean temperatures and acidification will affect primary production impacting on many fish species as well as fish metabolic changes affecting behaviour and survivability.
- Ocean acidification will also affect the size and growth of harvested shellfish. Rock lobster may also be adversely affected by the effects of climate change, including acidification. Changes in sedimentation may result in muddier habitats and reductions in the abundance of seagrass meadows and intertidal shellfish beds.

Increase in hot days (maximum temperature of 25°C or higher)

- Increased animal stress. Reduction in immunity. Higher parasite loads including ticks and helminths. Potential transmission of zoonotic diseases.

Increased average temperature and changes in precipitation

- Increase in pathogen loads
- Increase in insect vectors. Possible uptake of chemicals used in vector control.
- Increased energy requirements needed for refrigeration leading to food safety concerns.
- Changes in soil nutrients and bioavailability of elements in soils.

Increased number of days with heavy rainfall

- Increased run-off from rainfall - Affects river and marine environments for fishing, gathering of plants and feral populations of shellfish, particularly important for viral contamination. Sediments also affect growth.
- Flooding events may lead to contaminated land and an increased risk of fungal growth. An increased risk of foodborne disease may result.

Establishment of new exotic pests, weeds and diseases resulting in outbreaks

- Increased risk of antibiotic-resistant pathogens developing.
- Mycotoxins, including aflatoxins will increase in range, type and amount.
- Harmful algal blooms may increase in range and type in both fresh and marine waters. There is a risk to human health from consumption of food containing toxins from HAB. This will affect harvesting through closures and restrictions (MacKenzie et al., 2014).

Adaptation options:

- Post-harvest processing options will need to account for increased risks of pathogens.
- Refrigeration will be an increasingly important component of the food chain, for both maintaining quality and preventing pathogen growth. Improved energy efficient cooling is encouraged. Public health messages regarding food cleaning, handling (washing) and storage (refrigeration) would be beneficial.
- Although there are few if no adaptation options for increased ocean temperature and acidification (apart from mitigation of greenhouse gases), studies suggest New Zealand marine fisheries are amongst the least vulnerable to climate change (Blasiak et al., 2017).
- Gatherers need to be informed of safe levels of consumption/areas unsafe for harvesting. MPI assesses the safety of commercial and wild foods.
- Increased monitoring of harvested shellfish may be required. Public health messages regarding shellfish consumption/safety.
- In terms of zoonotic disease risks – surveillance, laboratory capability, training and education required and communication of potential human health impacts.

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