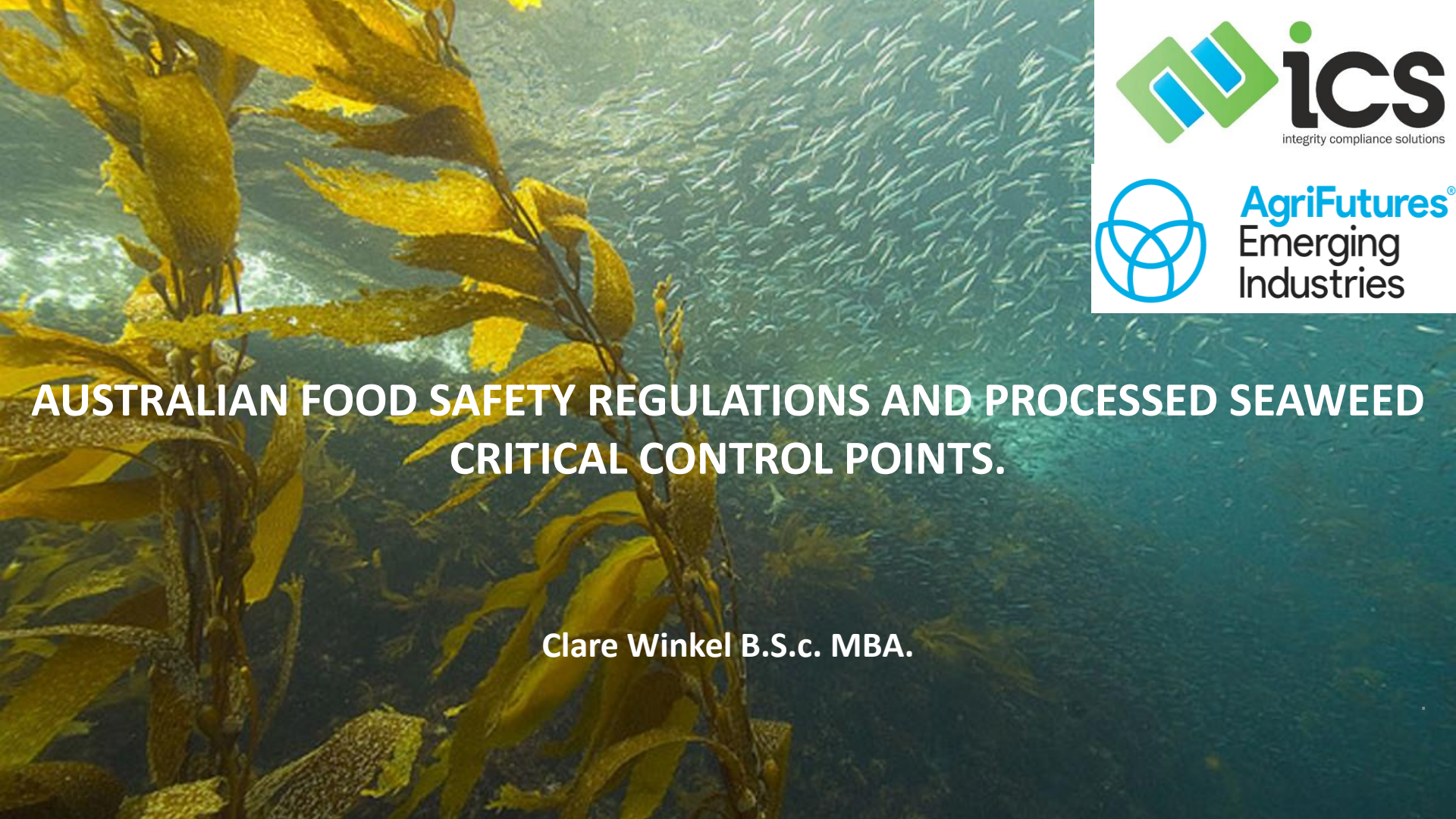


AUSTRALIAN FOOD SAFETY REGULATIONS AND PROCESSED SEAWEED CRITICAL CONTROL POINTS.

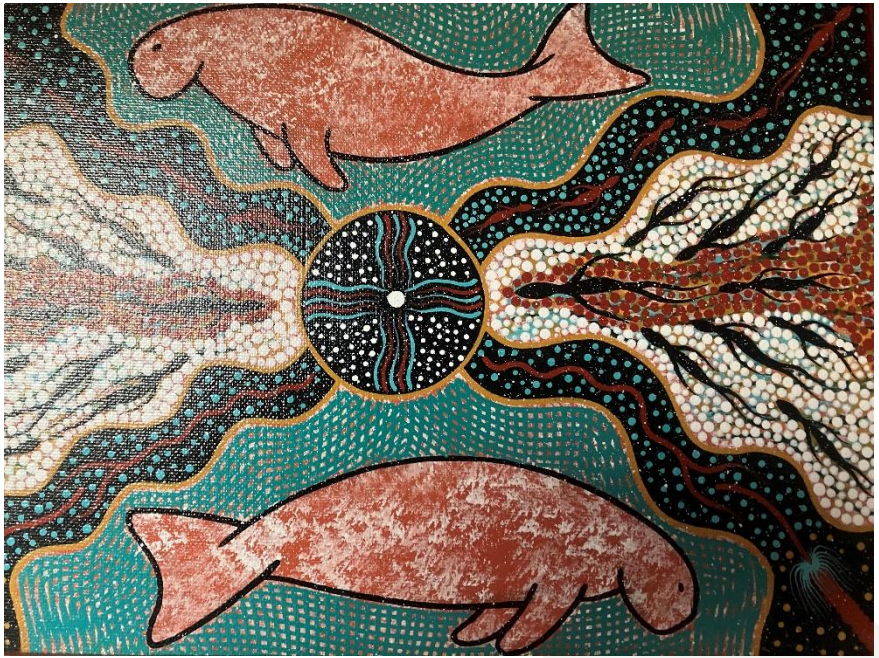
Clare Winkel B.S.c. MBA.

Acknowledgment of Country

I acknowledge the traditional custodians of the land that I work & live on-

The Quandamooka people.

I pay my respects to the Elders past present and emerging & recognise the unique cultural & spiritual relationship to the land, sea and sky.



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Acknowledgment of Country

I also acknowledge the traditional custodians of the land that this project was undertaken on-

The Yuin people.

Seaweed was extremely important to the indigenous people of Australia, playing a part in cultural activities, ceremonial activities, medicinal uses, clothing, cultural history, food, fishing, shelter & domestic uses (like water storage baskets). https://southcoastseaweed.com.au/

https://nit.com.au/23-02-2023/5067/one-of-the-most-significant-aboriginal-items-in-any-museum-collection-returned-as-ancient-kelp-water-carrier-is-repatriated-to-tasmania

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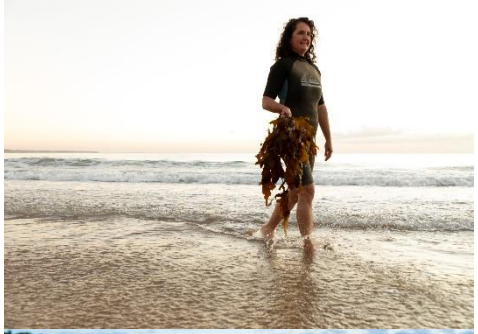
PRJ-012985 Development of a Seaweed Food Safety program, meeting FSANZ & 3rd party HACCP.



Jo Lane of Sea Health Products:

https://www.seahealthproducts.com.au/

Beach collection of wild kelp that is then sun dried and processed in Southern NSW.

Pia Winberg of Phyco Health & Venus Shell Systems:
https://www.venusshellsystems.com.au/

Farmed sea lettuce that is then heat dried and processed in Southern NSW.

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https://agrifutures.com.au/product/development-of-a-seaweed-food-safety-program/

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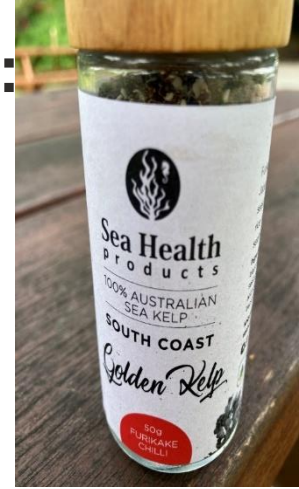
Seaweed food industries identified within Australia:



- ***growing of seaweed*** **in tanks, grinding, drying** to create seaweed powder that can be used in any processed food like pasta, chips, salts, crackers, snacks & breakfast cereal.
- ***beach collection*** **of seaweed, drying, grinding** to create seaweed flakes that can be eaten as a condiment or used in other food i.e. cheese, chocolate, pasta etc.
- ***beach collection*** **of seaweed** by individuals who then use it as a **fresh ingredient** in their restaurants/food business or sell onto other restaurants.
- ***beach collection*** **of seaweed, drying/freezing** & packaging for retail sale.
- ***beach collection*** **of seaweed, drying, grinding** to create seaweed flakes that are exported to international processors to be used as **alginate**.
- ***importation*** **of dried processed packaged** products from overseas for sale online/retail.
- ***importation*** **of dried whole products** from overseas (like sea grapes from Vietnam) for rehydration to be used in a salad.
- ***purchasing dried seaweed*** from other collectors to be made into value added products for retail sales.
- ***purchasing parts of seaweed*** from large corporations (non-food seaweed processors) who do not use that part of the plant, for further processing into flakes for retail sale.

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Regulatory review:

The general approach by even the most diligent state regulators can be summed up by the email received explaining why seaweed processors *do not need to implement a written food safety program*:

"Currently, producers of seaweed would not be required to be accredited or implement a Food Safety Program (FSP), but must comply with the requirements of the Food Standards Code & the generic provisions of the Primary Produce Act (PPP)."

"This state only requires FSP's for high-risk primary production and processing activities. The PPP activities that are currently …are the activities that are covered by Chapter 4 of the Food Standards Code. Further to this, under the state Food Act (Regulated by Dept of Health & local gov) the only facilities that are required to have a FSP are the facilities that cater for vulnerable populations (Nursing homes, Childcare centres & hospitals)."

"As the Department does not accredit these (seaweed) producers, …. producers would only need to show that they meet the requirements of the Food Standards Code." i.e., heavy metals compliance etc…

The assumptions made are that the seaweed businesses fall under the Primary Production Act & that no one is processing seaweed for human consumption, particularly for consumption.

When in fact, a number of parties are doing exactly that & are openly selling it directly to the consumers.
There are good reasons for these assumptions..

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Regulatory review:

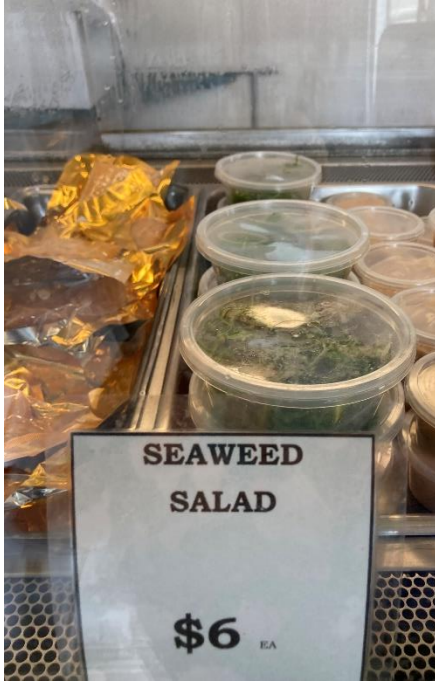
One reason for this is that the “food safety program” regulations conflict with each other.

ANZ Food Standards Code: Section 3.1.1: (Interpretation) states that primary production does not include substantial transformation of the food such as manufacturing.

ANZ Food Standards Code: Section 3.2.1: it is stated that all food businesses, except for primary producers, *require a written food safety program*.

ANZ Food Standards Code: Section 4.1.1: (The Primary Production Chapter of the Food Std Code), the stated scope for that section of the code includes: processing, manufacturing, ….preparing, treating, preserving, packing & cooking. It also states that, where a standard in this Chapter of the Code provides that a person or business is required to comply, then that business *must have & operate under a food safety management statement.*

ANZ Food Standards Code: Section 4.2.1: (Seafood) specifically excludes edible seaweeds. The conclusion is then that *seaweed businesses do not need a written food safety management statement*.



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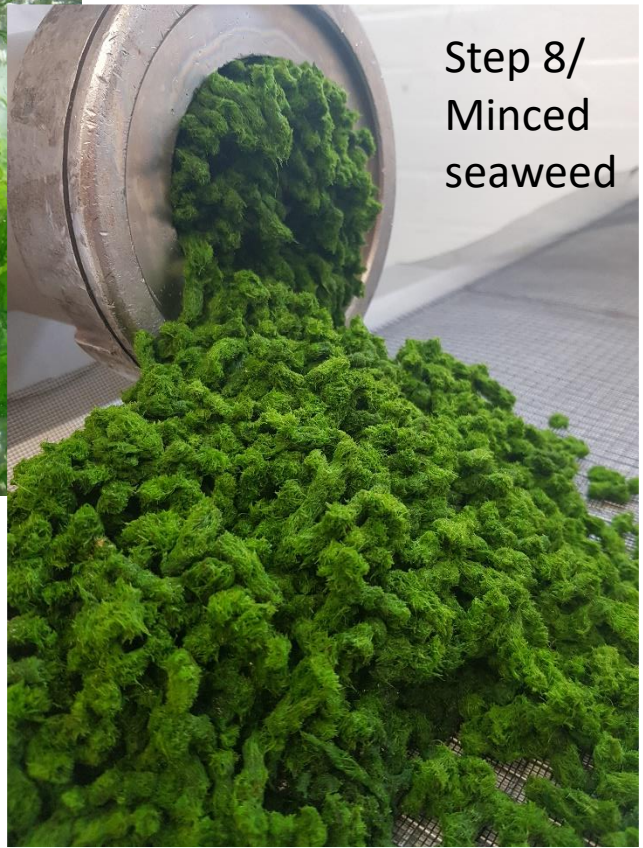
Seaweed case study 1: Land grown sea lettuce.



1. Seaweed Nursing tanks
2. Growing in tanks
3. Harvest seaweed by pump
4. Separate water and seaweed
5. Weighed in to bins
6. Transported to processing factory
7. recieve and weight wet seaweed to bin
8. Mincer
9. Load on to Trays
10. Desication over 6 hours 50deg celsius
11. Dried seaweed pellets (Au)
12. Packed in to sealed buckets for ambient storage
13. Sold as bulk ingredient for food processors

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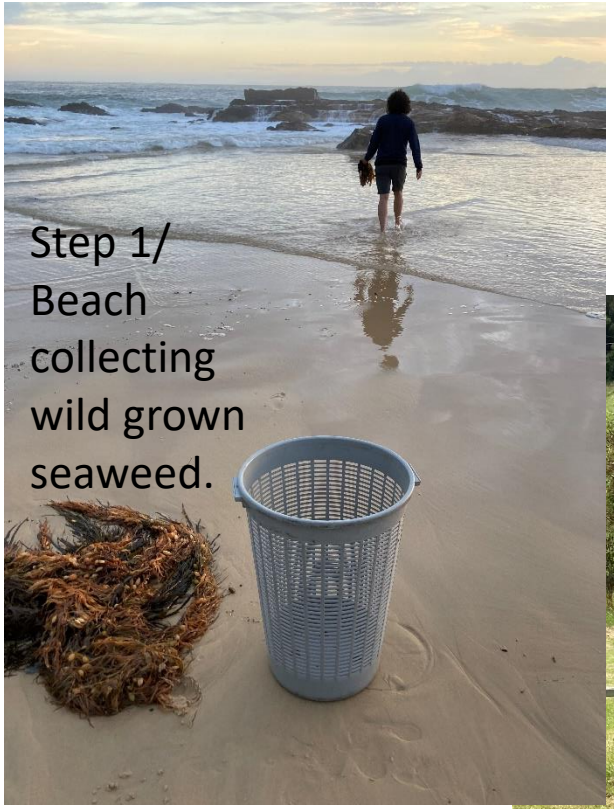
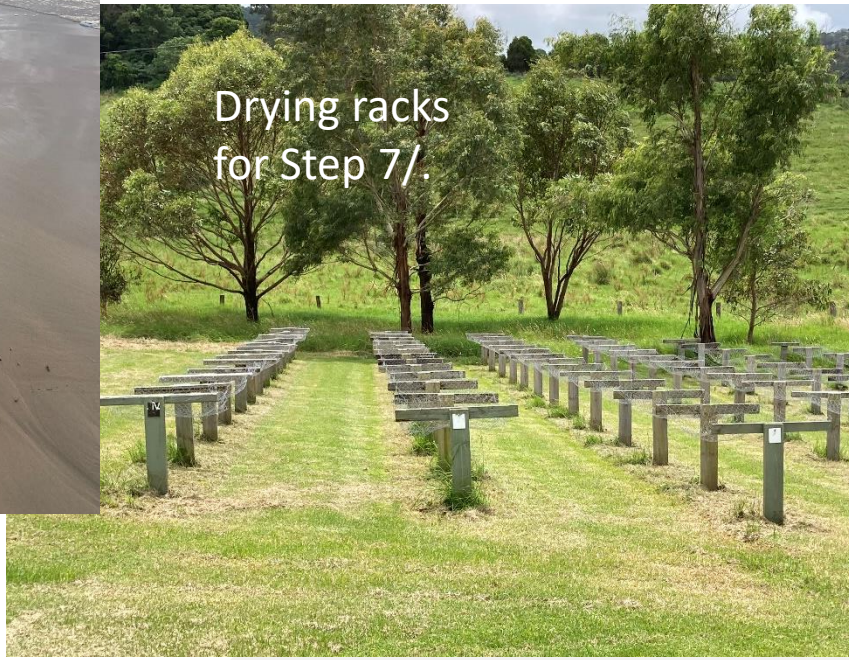
Seaweed case study 2: Hand collected kelp.

1. Collect kelp from beach
2. Seaweed into baskets to drain
3. Transport to processing site
4. Seaweed placed on table for inspection
5. Seaweed dipped in freshwater
6. Drain Seaweedand transport to racks
7. Dry seaweed in racks
8. Remove seaweed from racks and inspect
9. Pack seaweed in cartons
10. Mill dried seaweed
11. Seaweed flakes collected in to buckets
12. Decant seaweed flakes in to 4 kg drums
13. Storage in airtight drums
14. Seaweed packed to order





Food Safety Hazards in collected seaweed: *physical & allergens.*

Food Safety Hazard in Seaweed consumed as human food: *potential controls so far in real life.*

- Allergens: crustaceans & molluscs: *washing in fresh water*.
- Physical contamination: sand & marine debris: *washing in fresh water.*
- Micro contamination: Salmonella: ***Aw below 0.83* in final product*** *& salt content*.
- Chemical contamination: iodine: *possibly blanching of raw material*.
- *Growing seaweed in controlled tank conditions*.
- ** Possibly much lower at 0.66* (unpublished work by **Jennifer Perry, Ph.D Uni of Maine USA)**.

Variables that need to be considered:

- Seaweed plant age, species & which parts of the plants are used.
- Local harvest environmental conditions.
- Rainfall levels in the local harvest area.
- Water temperature.
- Blanching process.

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Food Safety Hazard in Seaweed consumed as human food: *Recalls and import alerts worldwide: 2000 - 2022*.

- Iodine: **262** incidents across 2000 – 2022.
- Inorganic arsenic: **64** incidents across 2000 – 2022.
- USA Import refusals: **35** across 2002 – 2021 including: labelling failure, processing failure, “filth” & unauthorised colours.
- Cadmium: **13** incidents across 2005 – 2020.
- Salmonella: **11** incidents across 2011- 2018.
- E. coli O7:H4: **3000** school students & staff in Japan over 2020 (red seaweed salad).

Reference: https://horizon-scan.fera.co.uk/

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Food Safety Hazard in Seaweed consumed as human food: *Recalls and import alerts worldwide: 2000 - 2022*.

- Chemical hazards: Nitrofurans, sulphites, benzopyrene & aluminium.
- Unauthorised colours.
- Unauthorised irradiation.
- Microbiological organisms: Listeria, mould & coliforms.
- Allergens: soy, gluten & sesame.
- Fraud: documentation (labelled as organic Nth Korea 2020) & species substitution (Vietnam 2021).

Reference: https://horizon-scan.fera.co.uk/

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Food Safety Hazard in Seaweed consumed as human food: *EU Rapid Alert system for food and feed*.

22 food safety hazards in the European seaweed chain were ranked into major (4), moderate (5) & minor (13) hazards.

- Inorganic arsenic, cadmium, iodine & Salmonella were identified as major hazards.
- Hazards, where data gaps exist, should be carefully assessed. These include: pesticide residues, dioxins, polychlorinated biphenyls, brominated flame retardants, polycyclic aromatic hydrocarbons, pharmaceuticals, marine biotoxins, allergens & nanoplastics.
- Other pathogenic bacteria: norovirus & hepatitis E virus.

Reference:

Banach, JL, Hoek-van den Hil, EF, van der Fels-Klerx, HL. Food safety hazards in the European seaweed chain. Compr Rev Food Sci Food Saf. 2020; 19: 332– 364. https://doi.org/10.1111/1541-4337.12523

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Food Safety Hazard in Seaweed consumed as human food: *literature review*.

- **Pathogens from the harvest area** are considered to be potentially SIGNIFICANT because the seaweed may be intended for use as a raw product for human consumption, without any additional processing step that is a kill step. Pathogens of concern include *Vibrio*, *Salmonella*, *E.coli* O157:H7, *Shigella, Norovirus &* Hepatitis.
- **Environmental contaminants** are considered potentially SIGNIFICANT chemical hazards because certain species of seaweeds exhibit a high affinity for accumulating heavy metals & other contaminants in their tissues.
- **Natural toxins** from the harvest area including outbreaks related to the consumption of several *Gracilaria* species. These toxins are often heat-stable & even if seaweed is cooked the toxin will remain in the final product.
- **Clostridium botulinum toxin formation**: spores of the pathogenic bacteria, *Clostridium botulinum*, are naturally occurring in the marine & estuarine environment. It could be considered potentially SIGNIFICANT for seaweed products that are raw or blanched & then packaged in a modified/reduced atmosphere package (e.g., MAP/vacuum packed).

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Reference: https://seagrant.uconn.edu/ University of Connecticut, USA.

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Food Safety Hazard in Seaweed consumed as human food: *FAO & WHO: published after project finished*.

FAO & WHO Report of the expert meeting on food safety for seaweed – Current status & future perspectives. Rome, 28–29 0ct 2021. Food Safety & Quality Series No. 13. Rome. https://doi.org/10.4060/cc0846e.

- **Heavy metals:** cadmium, lead, inorganic arsenic & mercury.
- **Chemicals**: organic pollutants, iodine, pesticide residues, allergens & biotoxins.
- **Microbiological:** Salmonella spp., Bacillus spp., & norovirus**.**
- **Physical:** metal pieces, glass splinters, crustacean shells & micro/nanoplastics.

CODEX ALIMENTARIUS COMMISSION

Food and Agriculture Organization of the United Nations

World Health Organization

Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - E-mail: codex@fao.org - www.codexalimentarius.org

Agenda Item 3

CX/CF 21/14/3
March 2021

JOINT FAO/WHO FOOD STANDARDS PROGRAMME
CODEX COMMITTEE ON CONTAMINANTS IN FOODS
14th Session
(virtual)
3-7 and 13 May 2021

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Australian Food Contaminate regulations:

Australia **does have regulations** for several the potential seaweed chemical hazards identified in this project including for inorganic arsenic, cadmium & lead.

ANZ Food Standards Code section 1.4.1 Contaminants & natural toxicants, lists the maximum levels for ***lead*** at 0.01 mg/kg & ***cadmium*** at 0.005 mg/kg with cross reference to Schedule 19 for the maximum levels of contaminants & natural toxicants.

Schedule 19 lists the maximum levels for ***inorganic arsenic*** in seaweed as 1 mg/kg & lists the maximum allowable levels for ***cadmium*** (0.1 mg/kg) & ***lead*** (0.1mg/kg) but *not specifically for seaweed.*

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Australian Food Contaminate regulations:

Iodine requirements in Australian seaweed products

There are **no regulations for the maximum iodine levels in Australian produced seaweed** despite have regulations for iodine levels in imported brown algae/seaweed vegetables.

The maximum level of iodine in **imported** brown seaweed of the Phaeophyceae class (brown seaweed) is 1000 mg/kg.

*FSANZ also provided AQIS with risk assessment advice regarding **iodine** levels in brown algae/seaweed vegetables. Introduction & maintenance of a maximum level (1000 mg/kg) of iodine in imported brown seaweed of the Phaeophyceae class in October 2010 at the Australian border. There is currently **no permitted maximum level** in the Australia New Zealand Food Standards Code for naturally occurring iodine in brown seaweed* Brown seaweed and Iodine.pdf (foodstandards.gov.au)

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Conclusions:

There is a lot of inconsistency within the Australian federal and state regulations, with regard to:

-jurisdiction of "*seaweed collection*" between different states: **councils** in Victoria, **Dept of Agriculture/Primary Industries** in Tasmania, South Aust & Tasmania & Parks & Wildlife in Western Australia. All with different limits & rules. And basically, **not allowed at all in QLD**.

-between whether seaweed collectors & processors need to work under a *food safety program*: ANZ Food Standards Code: Section 3.2.1 **vs** ANZ Food Standards Code: Section 4.1.1 **vs** ANZ Food Standards Code: Section 4.2.1.

-between *iodine* MRL for imported products **vs** Australian made products: maximum level (1000 mg/kg) of iodine in imported brown seaweed of the Phaeophyceae class in October 2010 at the Australian border **vs** no limits in FSANZ Schedules 19 & 20.

https://agrifutures.com.au/wp-content/uploads/2023/02/23-014.pdf

Seaweed aquaculture governance in Aust

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FOOD STANDARDS Australia New Zealand

Te Mana Kounga Kai – Ahitereiria me Aotearoa

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Next project: Cornell University NYC USA.

To develop a Seaweed Hazards & Controls Guide that will the basis of an effective food safety training.

a. Seaweed Hazards Guide.
b. Food Grade Seaweed Standards including safe thresholds.
c. Best Practices guides for handling and processing seaweed.
d. Standardized Seaweed Food Safety Training to meet US food safety regulations (FSMA PC).

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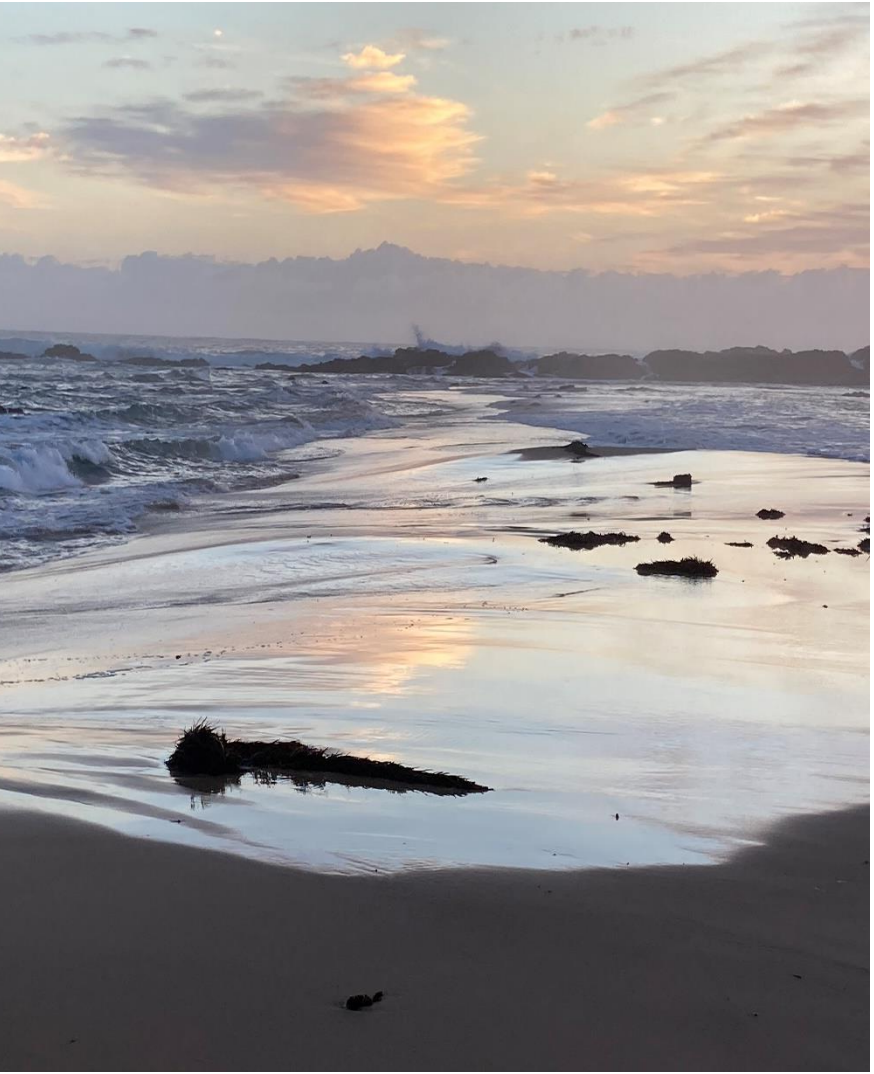

Any Questions?

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