Domoic acid (DA) in the waters of Haida Gwaii, British Columbia: A summary of occurrences and details on anthropogenic and environmental considerations

Tamara Russell: Harmful Algae Monitoring Program, Microthalassia Consultants Inc., Nanaimo, BC, Canada
In this talk

• A bit about Haida Gwaii: the land and the people
• Marine biotoxin monitoring program in BC
• Results: the recent history of domoic acid in Haida Gwaii (2012 & 2015)
• Environmental and anthropogenic influences in 2012 and 2015
A bit about Haida Gwaii
Haida Gwaii

We are here
South Haida Gwaii
Rugged coastline
Fjords
North Haida Gwaii
150 km long sandy beach
The Haida People

- 45% of the population of Haida Gwaii is native Haida people
- Strong dependence on wild caught seafood
- Clam creation story
The Haida and Shellfish

- Crab (meat & viscera), geoduck, abalone (illegally), sea cucumber, urchin, razor clam, oyster, and scallops.
- Crab and razor clams are the most important (both as a food source and as a source of income)
Razor clams

- The northern Haida have a stronger dependence on razor clams than southern Haida
- Razor clams are eaten fresh and stored (frozen and canned) for year-long consumption
- Razor clams depurate DA slowly
- Northern Haida may be more at risk of DA exposure
DA Exposure

- No reported incidents of ASP to date
- There may be unreported cases
- There may be a risk of chronic low dose exposure to DA
The Canadian Shellfish Sanitation Program (CSSP)

• Federal food safety program jointly administered by the Canadian Food Inspection Agency (CFIA), Environment Canada (EC) and Fisheries and Oceans Canada (DFO)

• Mandate for routine testing of shellfish for marine biotoxins

• Publicly available data presented here
Results
Canadian Food Inspection Agency’s reported domoic acid (DA) concentrations (µg/g) in north and south Haida Gwaii from 2004-2015

N. Haida Gwaii
S. Haida Gwaii

Regulated 20(µg/g) closure limit
Canadian Food Inspection Agency’s reported domoic acid (DA) concentrations (µg/g) in all BC monitored sites 2004-2015

Regulated 20(µg/g) closure limit
2012: Sea surface temperature Haida Gwaii

BC lighthouse data (Langara): sea surface temperature (SST) (°C) in 2012 compared to 1936-2016 mean
2012: Salinity Haida Gwaii

BC lighthouse data (Langara): Salinity in 2012 compared to 1936-2016 mean

Russell, DA in Haida Gwaii, PICES 2016
2012: Ocean fertilization in Haida Gwaii

- July, 2012: 120 tons of iron sulphate were dumped off west Haida Gwaii over a period of 30 days.

- Hypothesis: increase salmon stocks and capture carbon
2012: Ocean fertilization in Haida Gwaii

- Following the fertilization experiment, there was a 35,000 km² plankton bloom that lasted for several months.

Image: Yellow and brown colours show relatively high concentrations of chlorophyll in August 2012, after iron sulphate was dumped into the Pacific Ocean as part of a controversial geoengineering scheme. Photograph: Giovanni/Goddard Earth Sciences Data and Information Services Center/NASA
Haida Gwaii Currents

- Generally the Alaskan current pushes water towards Haida Gwaii
Canadian Food Inspection Agency’s reported domoic acid (DA) concentrations (µg/g) in north and south Haida Gwaii from 2004-2015

- N. Haida Gwaii
- S. Haida Gwaii
2015: Sea surface temperature Haida Gwaii

BC lighthouse data (Langara): sea surface temperature (SST) (°C) in 2015 compared to 1936-2016 mean
2015: Salinity Haida Gwaii

BC lighthouse data (Langara): Salinity in 2015 compared to 1936-2016 mean
2015: DA and Pn

- Haida Gwaii experienced similar elevated DA levels to other areas.
- No known phytoplankton samples, so no species ID.
Summary:

• 2012: dramatic increase in DA levels in N. Haida Gwaii (Sept)
• July 2012 ocean fertilization
• 2015: Similar elevated DA as other regions and increased SST
• Haida people may be especially at risk from DA exposure due to geography and a heavy reliance on wild caught seafood (inc. razor clams).
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Thanks for listening!
Any questions?

The HAMPsters