

Testing the ICES Harmful Algal Event Meta-database to Archive Data from the West Coast of Canada

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Goal:

- To develop a common harmful algal bloom (HAB) data resource among PICES nations

Approach:

- Test utility of report forms designed for the ICES Harmful Algal Event meta-database for data of the west coast of Canada.



Outline

- Description of West coast of Canada data base
- Harmful Algal Event (HAE) report entry
- Problems/difficulties encountered
 - What is an event?
 - How to divide the BC coastline into areas?
 - Others



Sources of data on West Coast of Canada

- Plankton monitoring program at fish farm sites
 - Focus on HAB species likely to kill salmon
 - It has been discontinued (1999 - 2003)
 - Data has been entered in ICES-HAE database
- Shellfish biotoxin monitoring
 - There are 15 years of data (1989 to present)
 - We entered data from 2003 for the west coast of Canada.



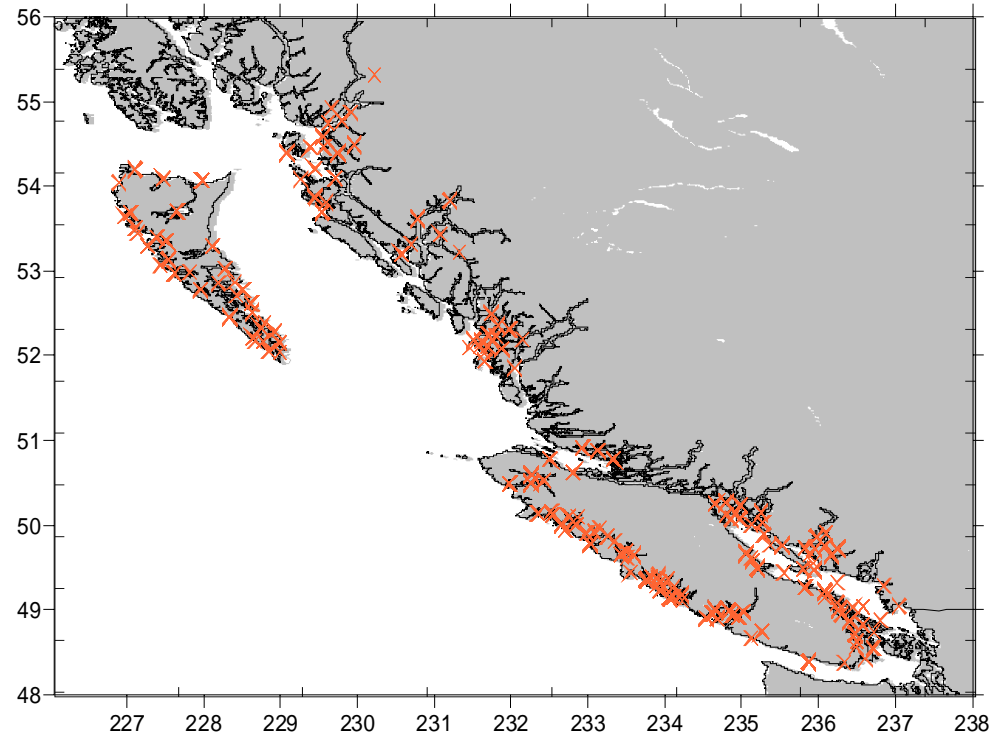
Monitoring of Marine toxins in shellfish – West Coast of Canada

- It is carried out by the Canadian Food Inspection Agency
- ~600 sites are monitored along the BC coast. Data are not GIS referenced, rather shellfish toxin data are recorded for a region, not for a specific site
- Mussels are the sentinel species for monitoring
- Monitoring includes: PSP, ASP, and recently DSP monitoring on a limited basis
- Stable, well-documented methodologies
- Data is available upon request and digitized



Shellfish Monitoring Sites

- Heavily concentrated in southern B.C.
 - Easier to get to
 - Where most of the people and industry are



Sampling Frequency

- Samples are withdrawn from 70 sentinel sites south of Cape Caution
 - every 2 weeks from Nov- April 30
 - weekly from May1-end of Oct.
- Samples of other species and other locations are taken when required.



Limitations

- Monitoring sites are not evenly distributed but mainly concentrated in southern B.C.
- Monitoring is not even among locations
- Database is on marine toxins in shellfish only
- At present, there is no monitoring program of phytoplankton and environmental parameters



Harmful algal Event (HAE) Report Entry

- We entered data from 2003 because it is the most recent complete year.
- What is an event?
 - We used the definition of harmful events as “biotoxin accumulation in seafood above levels considered safe for human consumption”



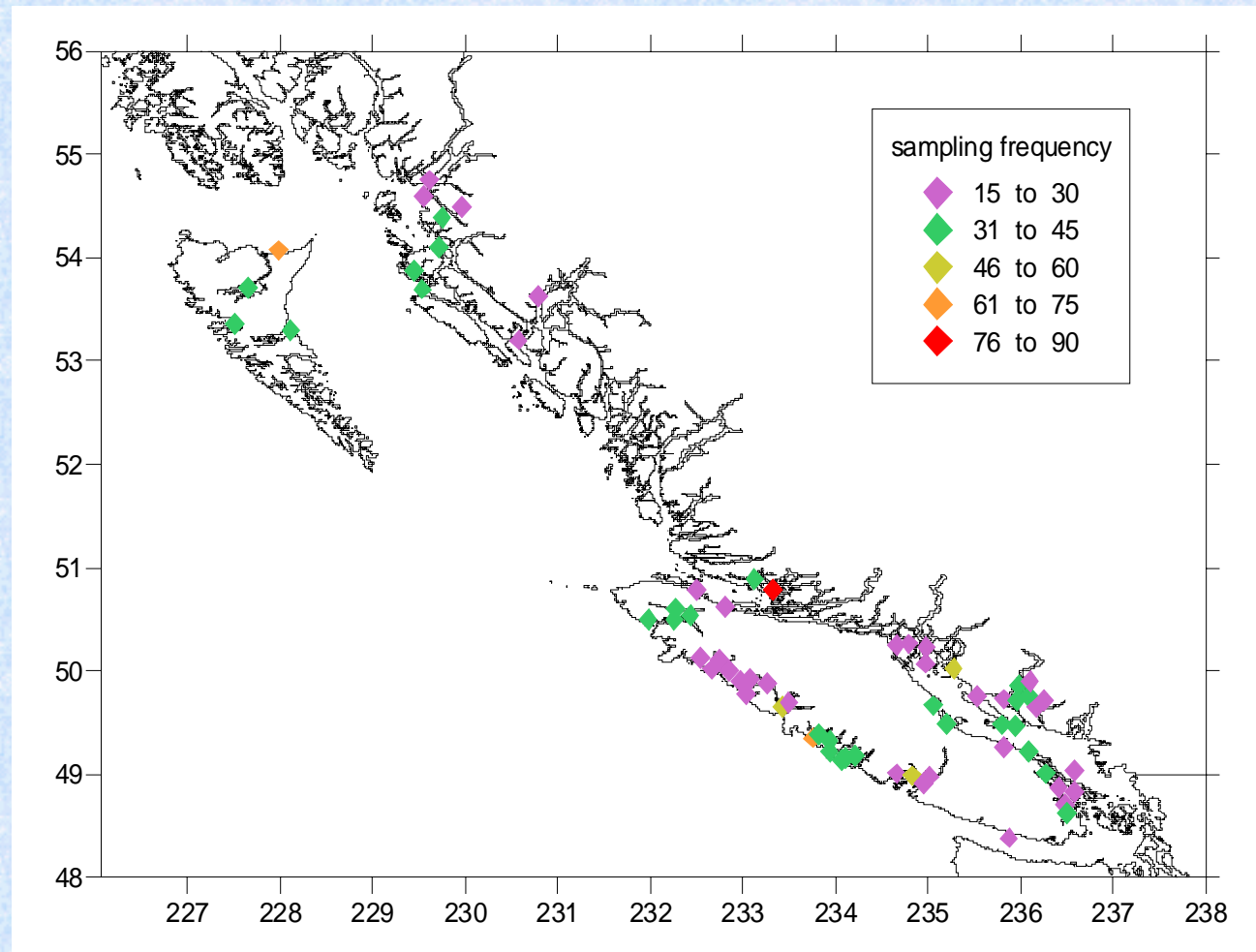
Regulatory Limits

- The regulatory action limit for PSP is 80 micrograms per 100 grams of the edible portion.
- For ASP it is 20 ppm.
- If these levels are exceeded, the area is closed for harvesting. The area may be reopened when 3 consecutive tests in at least 14 days are below the regulatory value.

... Of course any detectable toxin indicates a bloom, either happening or in the past.

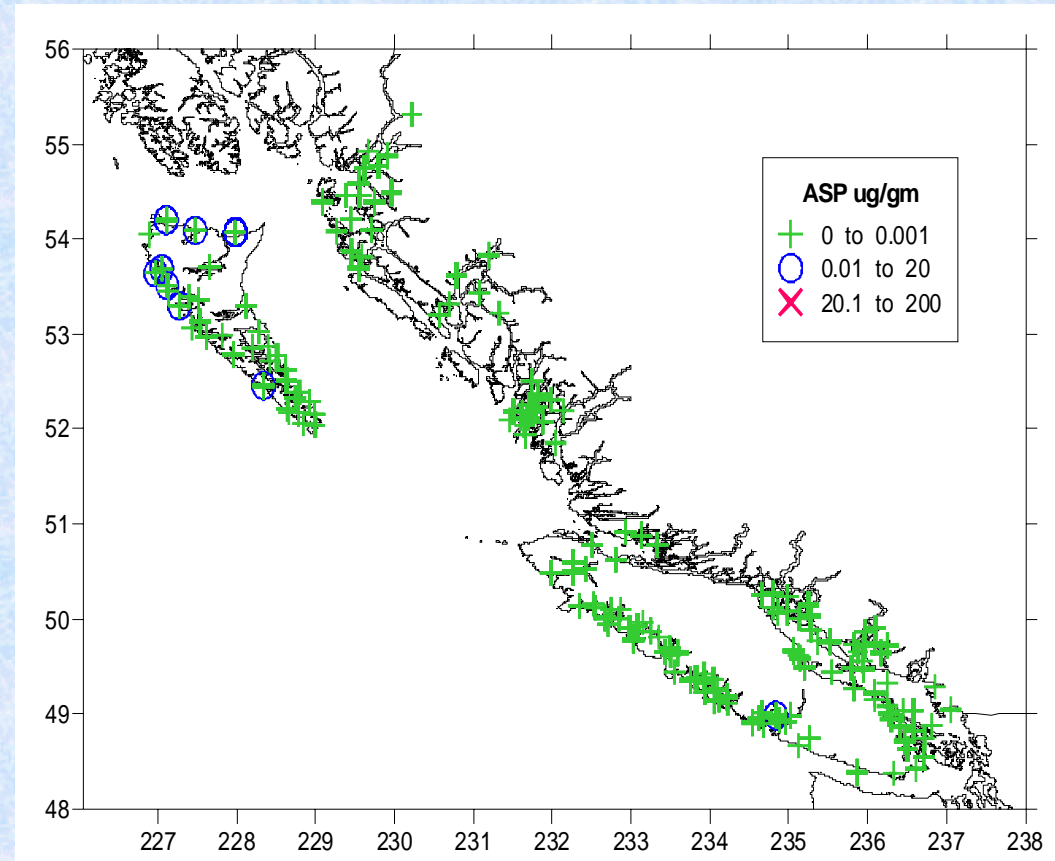


There were a total of 3204 records of shellfish monitoring at 178 sites in BC in 2003.



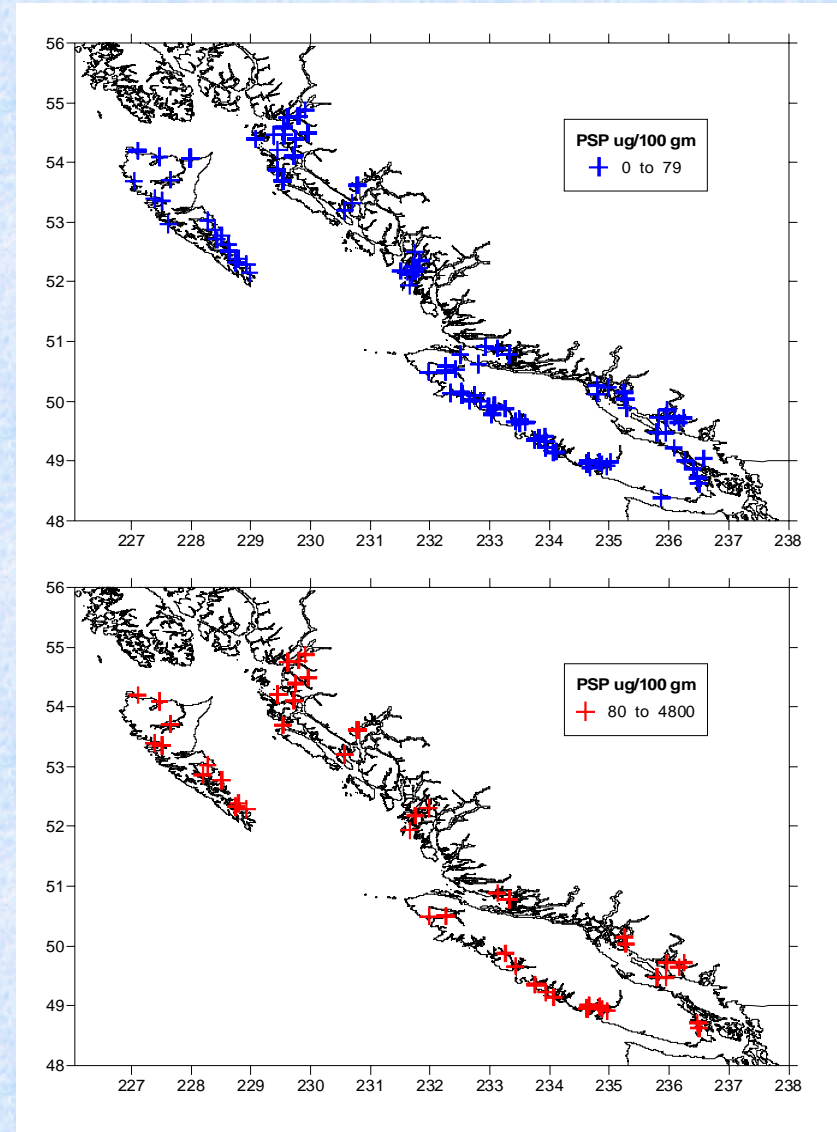
ASP records

- There were 2398 records of ASP monitoring
- Of these, 31 ASP records were >0 , and none were above the regulatory limits.



PSP records

- There were 3204 records of PSP monitoring
- 671 PSP records were $>0 \mu\text{g}/100 \text{ gm}$
- Of those records, 148 records were over the regulatory limit.
- Area 14 (Baynes Sound, south of Courtenay) is historically low in PSP events.



HAE Report

- Part 1: General information
 - Only seafood toxin monitored
 - Shellfish only
 - We entered all records over the regulatory limit: 126 events of PSP and no event of ASP for the year 2003



Section 1. General Information

Constant entries are:

- Country: Canada
- Region: West coast
- Year: 2003
- Seafood toxin, affecting shellfish, no unexplained toxicity, reported as an outcome of the CFIA monitoring programme, and contact information

Harmful Algal Event Report - HAE-DAT PICES test form		COUNTRY : Canada Region : West Coast Year : 2003
1 - GENERAL INFORMATION		
Please note: NOT all information requested on this form is required. Some respondents may choose to stop at the end of the first page, but others may wish to add detailed bloom information, as requested on page 2. Any information you provide is of value.		
Indicate the nature of the reported harmful event:		
<input type="checkbox"/> Water discoloration	<input type="checkbox"/> High Phyto concentration	<input checked="" type="checkbox"/> Seafood toxin
<input type="checkbox"/> Mass mortalities	<input type="checkbox"/> Foam/mucilage in the coast	<input type="checkbox"/> Other:
Has the event directly affected?		
<input type="checkbox"/> Planktonic life	<input checked="" type="checkbox"/> Shellfish	<input type="checkbox"/> Birds
<input type="checkbox"/> Benthic life	<input type="checkbox"/> Aquatic mammals	<input type="checkbox"/> Seaweeds
		<input type="checkbox"/> Natural Fish
		<input type="checkbox"/> Aquaculture Fish
		<input type="checkbox"/> Humans
		<input type="checkbox"/> Other terrestrial :
Has any toxicity been detected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, approximate range: 350 ug/100gm meat		
Associated syndrome <input checked="" type="checkbox"/> PSP <input type="checkbox"/> DSP <input type="checkbox"/> ASP <input type="checkbox"/> AZP <input type="checkbox"/> NSP <input type="checkbox"/> CFP <input type="checkbox"/> Other:		
Unexplained toxicity <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, comments:		
If intoxications occurred, please indicate the species implicated in the transmission of toxins (Transvector):		
Additional comments:		
Is this report the outcome of a monitoring programme? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
If yes, which programme(s)? Canadian Food Inspection Agency marine biotoxin monitoring program		
Has this event occurred before in this location? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, comments:		
Individual(s) to contact (name, address, e-mail, web page, etc.): Klaus Schallie (schalliek@inspection.gc.ca) Canadian Food Inspection Agency, Ste. 400 - 4321 Still Creek Drive, Burnaby, B. C. V5C 6S7 or Melanie Quenneville (QuennevilleM@dfo-mpo.gc.ca) Institute of Ocean Sciences, 9860 West Saanich Rd., Sidney, B.C. V8L 4B2		



Section 1. General Information

Variable entries are:

- Range of toxicity (ug/100 gm meat)
- Associated syndrome

Harmful Algal Event Report - HAE-DAT PICES test form

COUNTRY : **Canada**
Region : **West Coast**
Year : **2003**

1 - GENERAL INFORMATION

Please note: NOT all information requested on this form is required. Some respondents may choose to stop at the end of the first page, but others may wish to add detailed bloom information, as requested on page 2. **Any information you provide is of value.**

Indicate the nature of the reported harmful event:

☐ Water discoloration ☐ High Phyto concentration ☒ Seafood toxin
☐ Mass mortalities ☐ Foam/mucilage in the coast ☐ Other:

Has the event directly affected?

☐ Planktonic life ☒ Shellfish ☐ Birds ☐ Natural Fish ☐ Humans
☐ Benthic life ☐ Aquatic mammals ☐ Seaweeds ☐ Aquaculture Fish ☐ Other terrestrial :

Has any toxicity been detected? ☒ Yes ☐ No If yes, approximate range: **350 ug/100gm meat**

Associated syndrome ☒ PSP ☐ DSP ☐ ASP ☐ AZP ☐ NSP ☐ CFP ☐ Other:

Unexplained toxicity ☐ Yes ☒ No If yes, comments:

If intoxications occurred, please indicate the species implicated in the transmission of toxins (Transvector):

Additional comments:

Is this report the outcome of a monitoring programme? ☒ Yes ☐ No

If yes, which programme(s)? **Canadian Food Inspection Agency marine biotoxin monitoring program**

Has this event occurred before in this location? ☐ Yes ☐ No If yes, comments:

Individual(s) to contact (name, address, e-mail, web page, etc.): **Klaus Schalliek (schalliek@inspection.gc.ca) Canadian Food Inspection Agency, Ste. 400 - 4321 Still Creek Drive, Burnaby, B. C. V5C 6S7 or Melanie Quenneville (QuennevilleM@dfp-mpo.gc.ca) Institute of Ocean Sciences, 9860 West Saanich Rd., Sidney, B.C. V8L 4B2**



Section 1. General Information

Problem encountered:

Has this event occurred before in this location?

- We are only reporting one year's data, so could not comment on annual trends.

Harmful Algal Event Report - HAE-DAT PICES test form

COUNTRY : **Canada**
Region : **West Coast**
Year : **2003**

1 - GENERAL INFORMATION

Please note: NOT all information requested on this form is required. Some respondents may choose to stop at the end of the first page, but others may wish to add detailed bloom information, as requested on page 2. Any information you provide is of value.

Indicate the nature of the reported harmful event:

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Has the event directly affected?

☐ Planktonic life ☒ Shellfish ☐ Birds ☐ Natural Fish ☐ Humans
☐ Benthic life ☐ Aquatic mammals ☐ Seaweeds ☐ Aquaculture Fish ☐ Other terrestrial:

Has any toxicity been detected? ☒ Yes ☐ No If yes, approximate range: **350 ug/100gm meat**

Associated syndrome ☒ PSP ☐ DSP ☐ ASP ☐ AZP ☐ NSP ☐ CFP ☐ Other:

Unexplained toxicity ☐ Yes ☒ No If yes, comments:

If intoxications occurred, please indicate the species implicated in the transmission of toxins (Transvector):

Additional comments:

Is this report the outcome of a monitoring programme? ☒ Yes ☐ No

If yes, which programme(s)? **Canadian Food Inspection Agency marine biotoxin monitoring program**

Has this event occurred before in this location? ☐ Yes ☐ No If yes, comments:

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Section 2. Location and Date

Location:

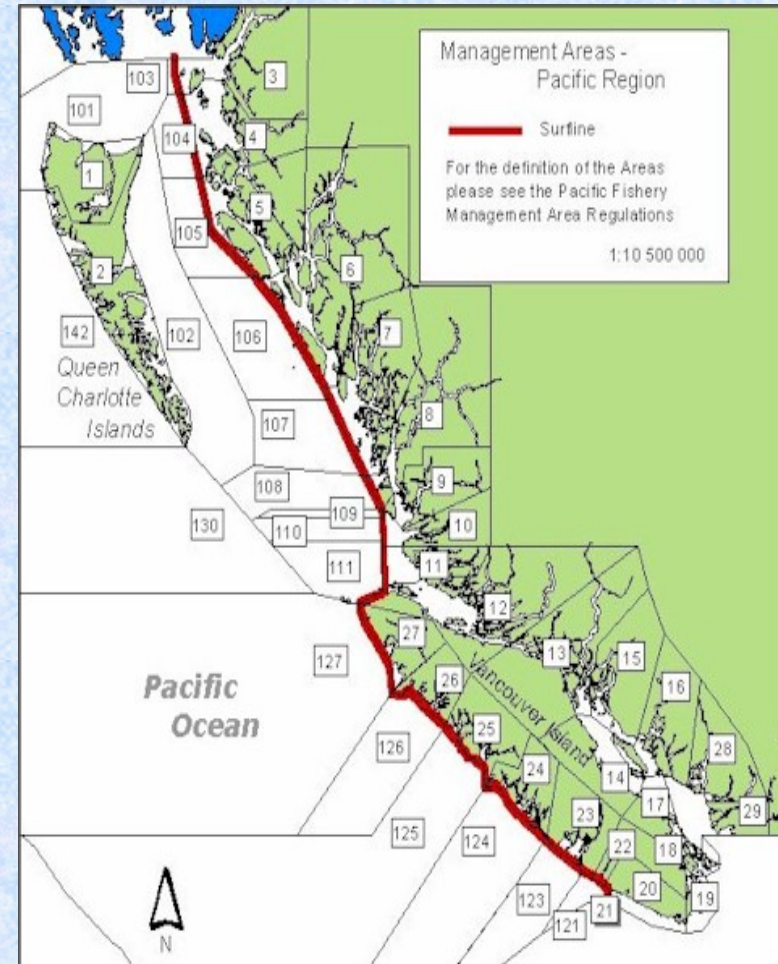
- The BC Coast, including its many islands and inlets, has 27,000 km of coastline. If the coastline were divided into 100 - 200 km sections, there would be 270 - 135 areas.
- The shellfish monitoring database is already divided into 48 areas and further divided into 650 subareas used for fisheries management.
- We decided to use those areas with some minor modifications since it was impractical to divide the BC coast into 100-200 km sections.
- Thus, the West coast was divided into 28 areas



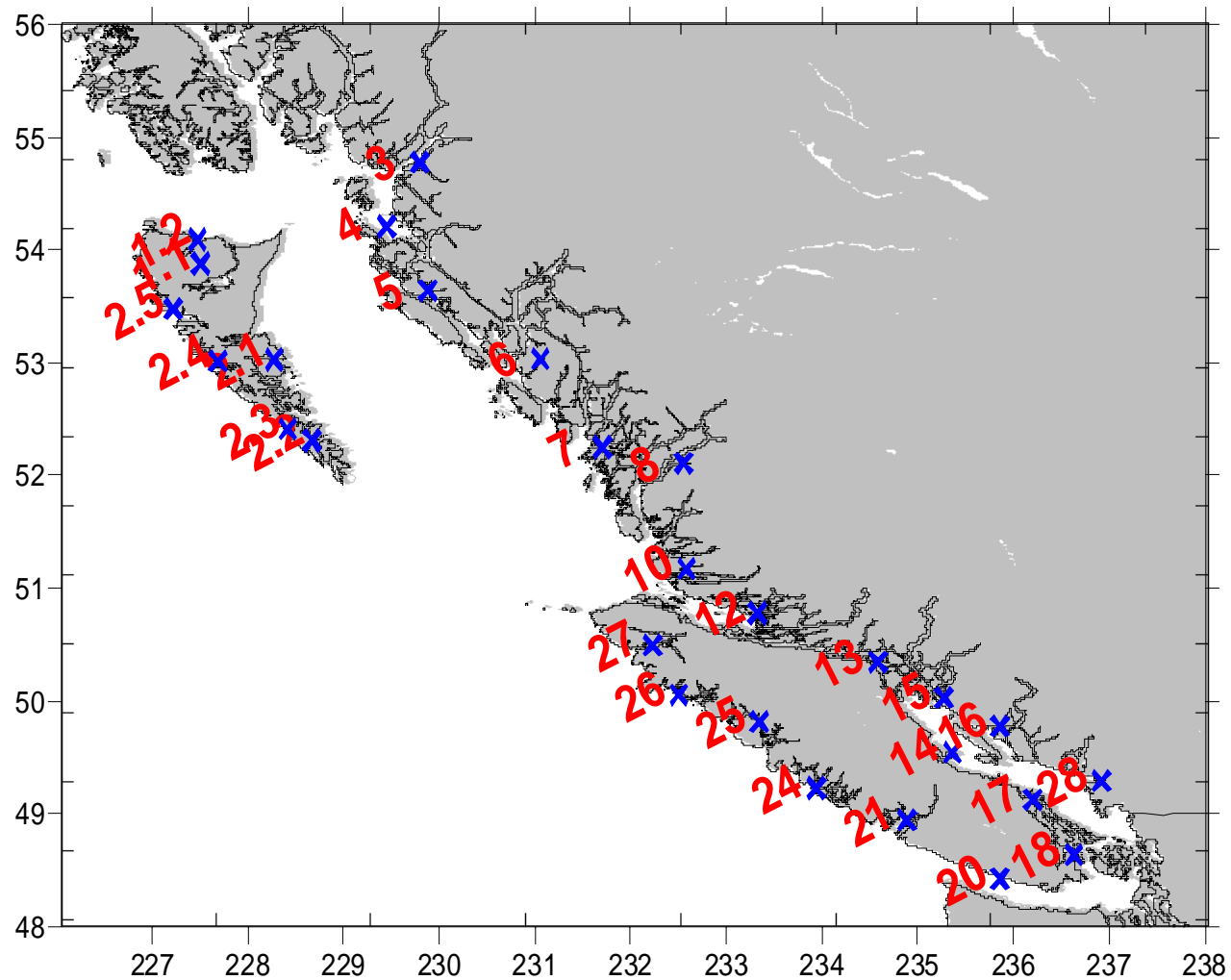
HAE areas - West of Canada

Adaptation of DFO Fisheries management area locations

- The offshore areas were eliminated (19)
- The northern Queen Charlotte island areas were divided into nine areas (rather than 2 areas and 107 subareas)
- Some areas in the south coast were grouped together (23 areas rather than 29)



HAE area locations



Section 2: Location and Date

- Names of area taken from DFO Fisheries management areas
- Latitude and longitude in decimal format of the area reported in the database, negative values are west.
- HAE Area code: our HAB area codes were used.

2 - LOCATION AND DATE

Location (if a single site)	Latitude:	52.309° N	° S
	Longitude:	° E	-128.024° W
General location information	Name of the area: Prince Island, Hunter Island Region: British Columbia HAE Area code: 7		
Additional location information (i.e., length of covered shoreline or aerial coverage of bloom, ecosystem type, etc.):			
Date of detection of quarantine levels (dd/mm/yy) : Detection date: Final date: 17/10/2003 17/10/2003			
Additional information (i.e., start and end date of the bloom): same location had levels above the regulatory action limit during the time period of 17/10/2003 - 22/10/2004			

Section 2. Location and Date

Date:

- Date of detection = date of the record.
- Final date was more difficult to determine. We decided to make a note in the additional information section when high levels had been detected in the area within ~4 weeks

2 - LOCATION AND DATE

Location (if a single site)	Latitude:	52.309° N	° S
	Longitude:	° E	-128.024° W
General location information	Name of the area: Prince Island, Hunter Island Region: British Columbia HAE Area code: 7		
Additional location information (i.e., length of covered shoreline or aerial coverage of bloom, ecosystem type, etc.):			
Date of detection of quarantine levels (dd/mm/yy) : Detection date: Final date: 17/10/2003 17/10/2003			
Additional information (i.e., start and end date of the bloom): same location had levels above the regulatory action limit during the time period of 17/10/2003 - 22/10/2004			

HAE Report

- Section 3: Microalgae
 - No information available
- Section 4: Environmental conditions
 - No information available



Section 5: Toxin assay information

- The species of shellfish, type of toxin, concentration, and type of assay entries were straightforward.

5 - TOXIN ASSAY INFORMATION

Species containing the toxin	Toxin type	Toxin details	Max. Concentration (specify units)	Assay type	Use of a kit (if yes, what type of kit)
FZ SEA MUSSELS	PSP	saxitoxins	350 ug/100gm meat	mouse bioassay	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type:
ADDITIONAL INFORMATION (e.g. positive animal assay, chemical details, analytical methods, etc.): AOAC Official Method mouse bioassay					
ECONOMIC LOSSES (production value, direct loss, indirect loss...):					
MANAGEMENT DECISION: PSP >80 ug/100 gm meat always results in closure					
ADDITIONAL HARMFUL EFFECT INFORMATION:					



Section 5: Toxin assay information

- Additional Information section: we refer to the AOAC protocol
- Economic losses cannot be assessed from the database information
- Management Decision section: levels reported are always above regulatory limit

5 - TOXIN ASSAY INFORMATION

Species containing the toxin	Toxin type	Toxin details	Max. Concentration (specify units)	Assay type	Use of a kit (if yes, what type of kit)
FZ SEA MUSSELS	PSP	saxitoxins	350 ug/100gm meat	mouse bioassay	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type:
ADDITIONAL INFORMATION (e.g. positive animal assay, chemical details, analytical methods, etc.): AOAC Official Method mouse bioassay					
ECONOMIC LOSSES (production value, direct loss, indirect loss...):					
MANAGEMENT DECISION: PSP >80 ug/100 gm meat always results in closure					
ADDITIONAL HARMFUL EFFECT INFORMATION:					



Summary

- We filled an HAE form for all records over the regulatory limit for 2003: 126 events of PSP and no event of ASP
- The main problems/uncertainties encountered were in determining:
 - What is an event?
 - Location: What is the best way to divide the BC coast?
 - Duration: How to determine how long an event lasted?



Summary - Continued

What is an event?

- By defining an “event” as those records above the regulatory limit, we did not include those records where toxin was detectable at lower levels.
- But..., any detectable toxin indicates a bloom, either happening or in the past.

Summary - Continued

Location: What is the best way to divide the BC coast?

- Because the west coast of Canada includes many islands and inlets, it was not practical to divide the coastline into 100 - 200 km sections.
- Instead, we defined 28 areas based on existing fisheries management areas in BC.
- These areas are used to report data from the shellfish monitoring program

Summary - Continued

Duration: How to determine how long an event lasted?

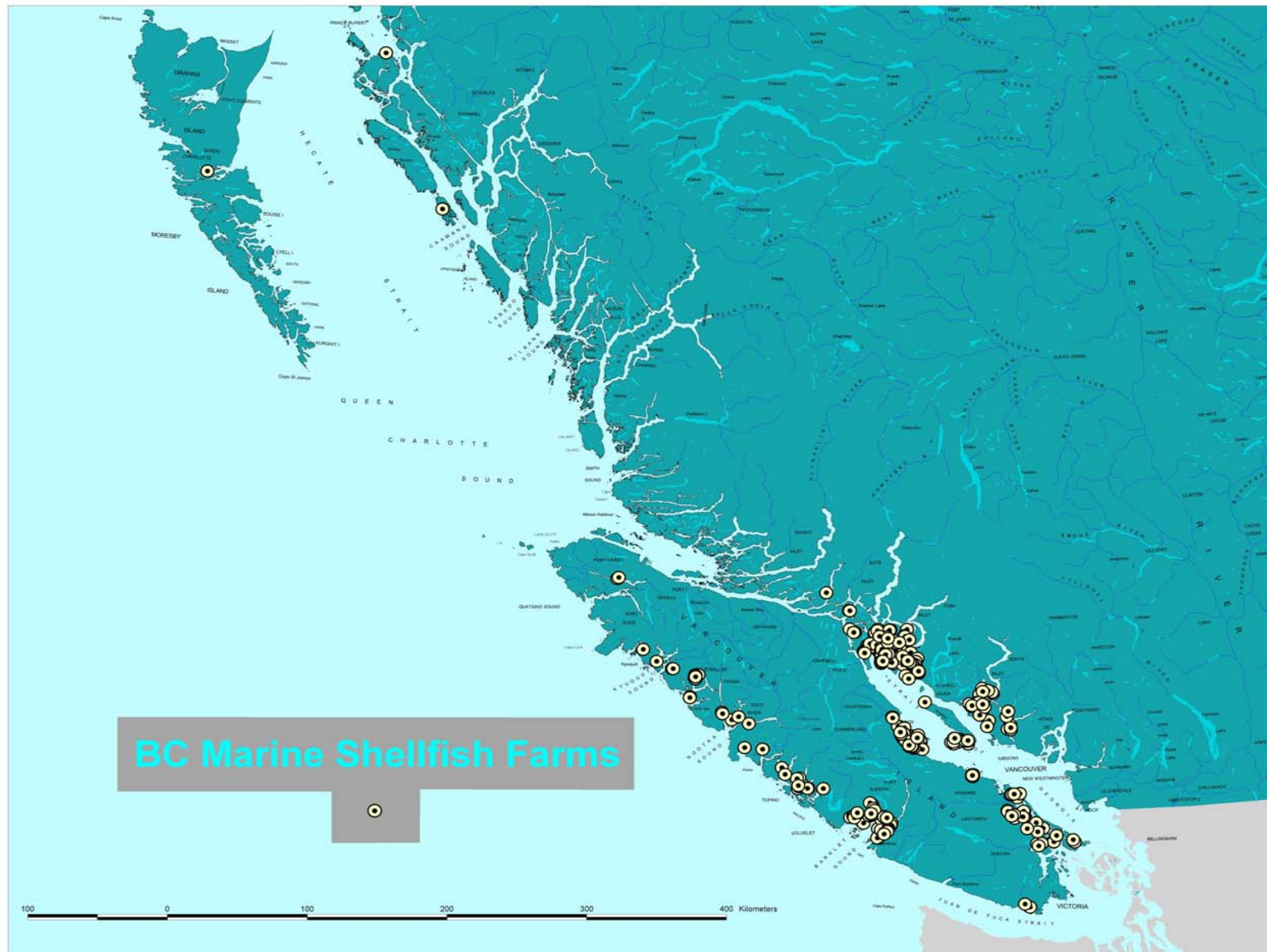
- Where there were data from several sites in one area over the same time period, the data was sometimes very variable
- It was difficult to determine how long an event lasted. We decided to make a note in the additional information section when high levels had been detected in the area within 4 weeks

Summary - Continued

General concerns:

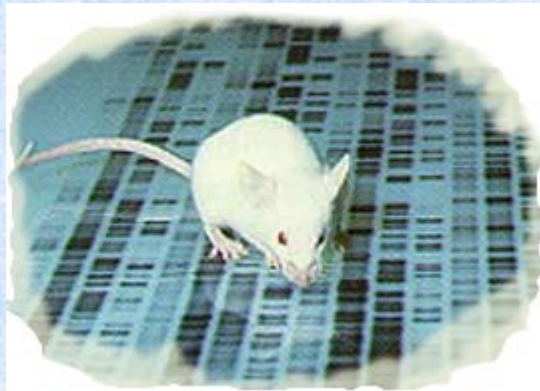
- The data available for the west coast of Canada have very limited usefulness for scientific purposes
- It is not possible to put together the broad picture of the relationship between biological, physical and chemical factors that influence the development and spreading of blooms in this region.
- These data do not allow inter-comparison of HAB species composition and the magnitude of environmental and economic impacts with data from other PICES nations.





Sample Analysis

- Determination of PSP (saxitoxins) is by mouse bioassay using the standard AOAC method.
- Determination of ASP (domoic acid) is by HPLC.



Sample Analysis

- Mussels are the sentinel species for monitoring. They are hung in mesh bags in harvest areas; samples are withdrawn from 70 sentinel sites south of Cape Caution every 2 weeks from Nov-April 30, then weekly from May 1-end of October. Samples of other species and other locations are taken when required.



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