

Science, Service, Stewardship



Hazard Assessment of Amnesic Shellfish Poisoning in New England

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Poisoning Syndromes Associated with HABs

1. Paralytic Shellfish Poisoning (PSP)
2. Neurotoxic Shellfish Poisoning (NSP)
3. Diarrhetic Shellfish Poisoning (DSP)
4. Amnesic Shellfish Poisoning (ASP)
5. Ciguatera Fish poisoning (CFP)

Aerial Photograph of a Harmful Algae Bloom (HAB) affecting Salmon Cages in Southern Chile. (Rodriguez-Benito et al. 2003).

PSP in New England

Alexandrium fundyense

2005, worst New England Harmful Algal Bloom in 30 Years

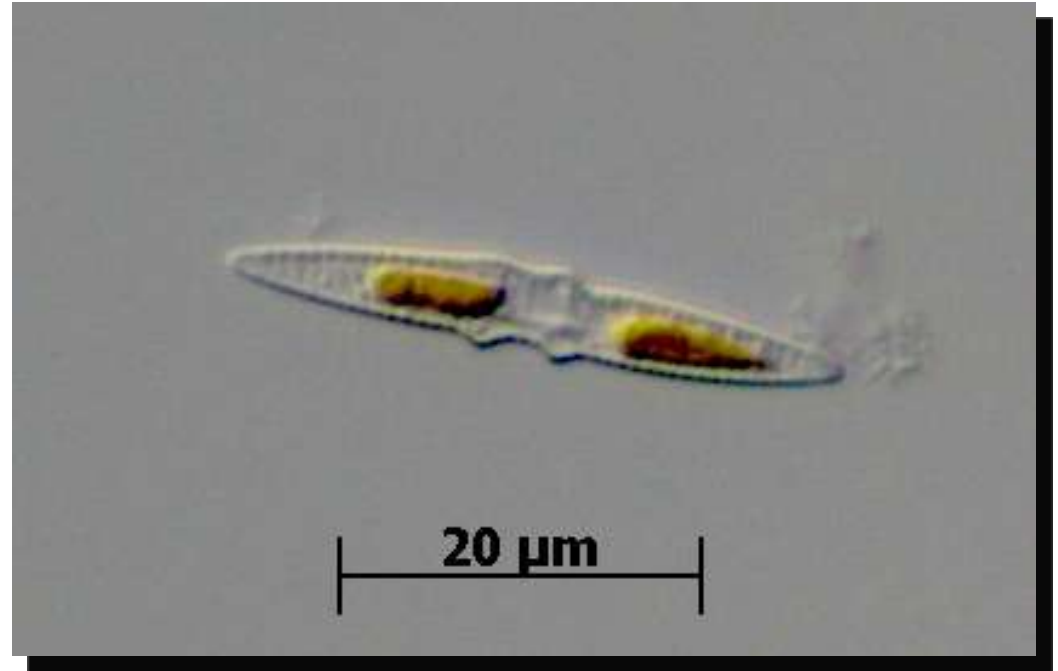


"You're paralyzed from the knuckle of your left big toe down — it could have been a lot worse."



Monitoring networks implemented to detect any PSP outbreaks

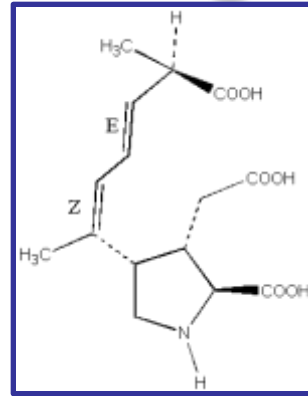
Pseudonitzschia are endemic in northern New England coastal waters



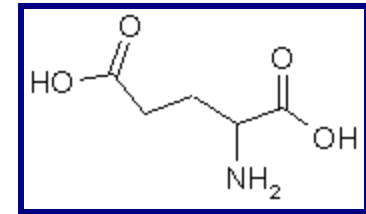
Amnesic Shellfish Poisoning

Domoic acid (DA) and Amnesic Shellfish Poisoning (ASP)

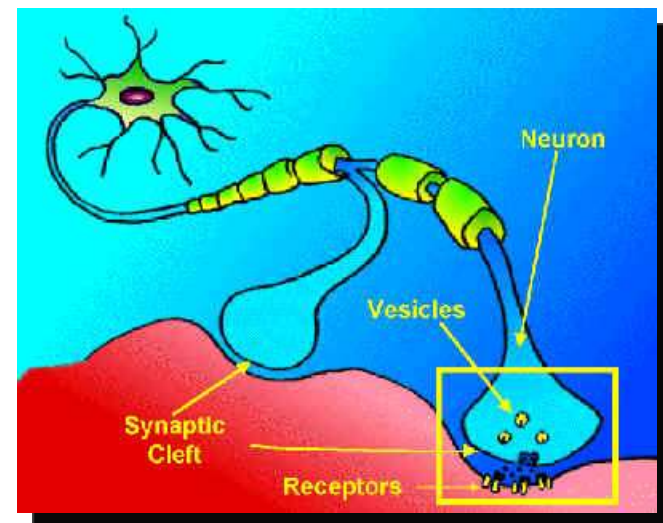
- Tricarboxylate amino acid
- Water soluble
- Binds to the glutamate receptor (L-glutamic acid)
- Binding affinity 100 times greater than glutamate



Domoic acid



Glutamic acid



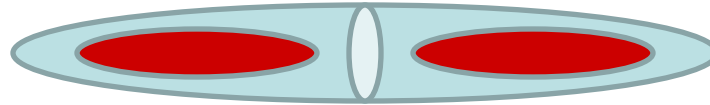
Symptoms:

- Diarrhea
- Severe headache
- Vomiting
- Abdominal cramps
- Loss of short-term memory



Production of DA is Variable

Toxic ?????



- Species
- Strain
- Physiological status of the population

Monitoring and Management Difficult

Increasing Risk???



[http:// www.dfo-mpo.gc.ca](http://www.dfo-mpo.gc.ca)



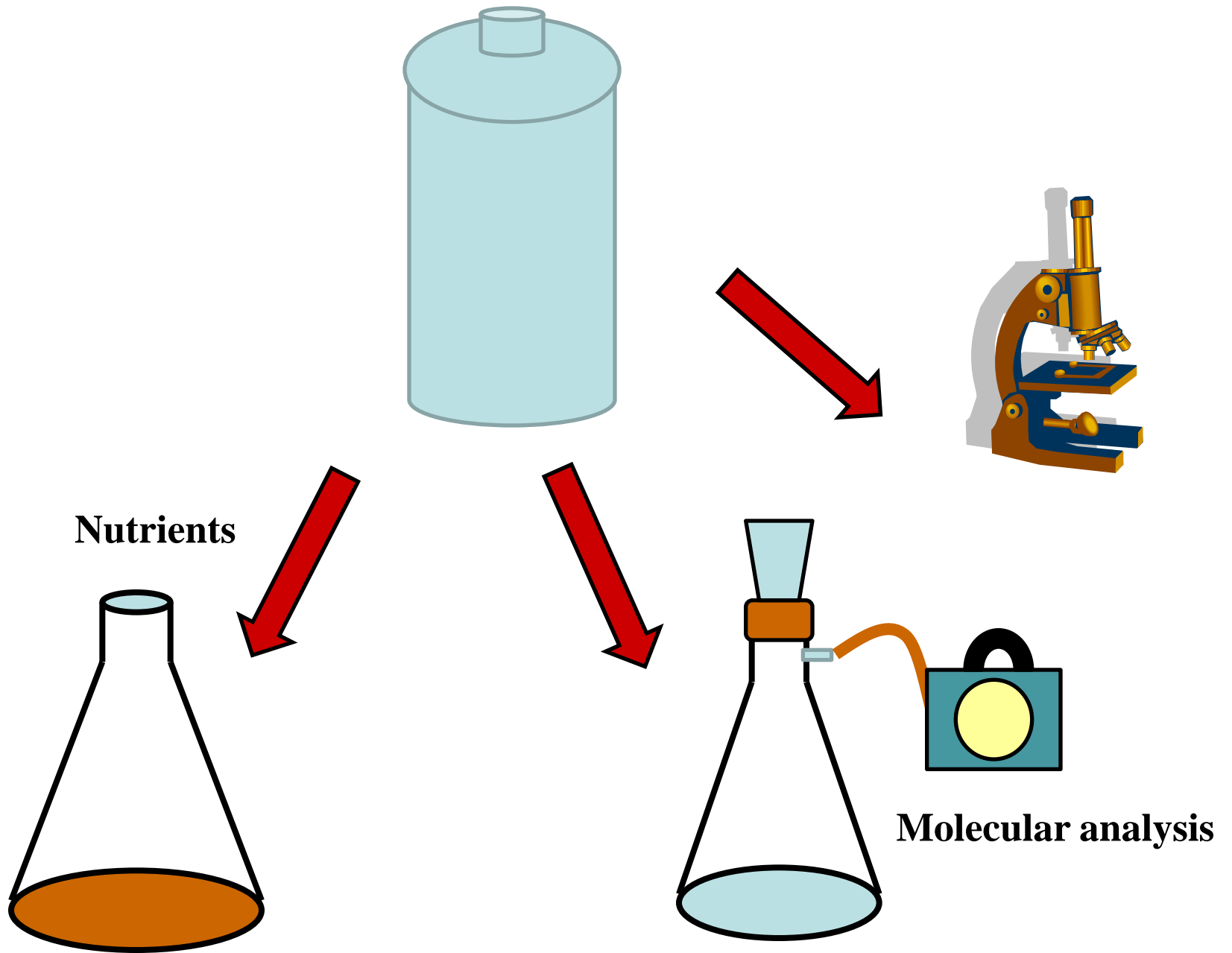
<http://wonkroom.thinkprogress.org>

Objective:

Assessing the risk of ASP in two mussel farming sites in New England

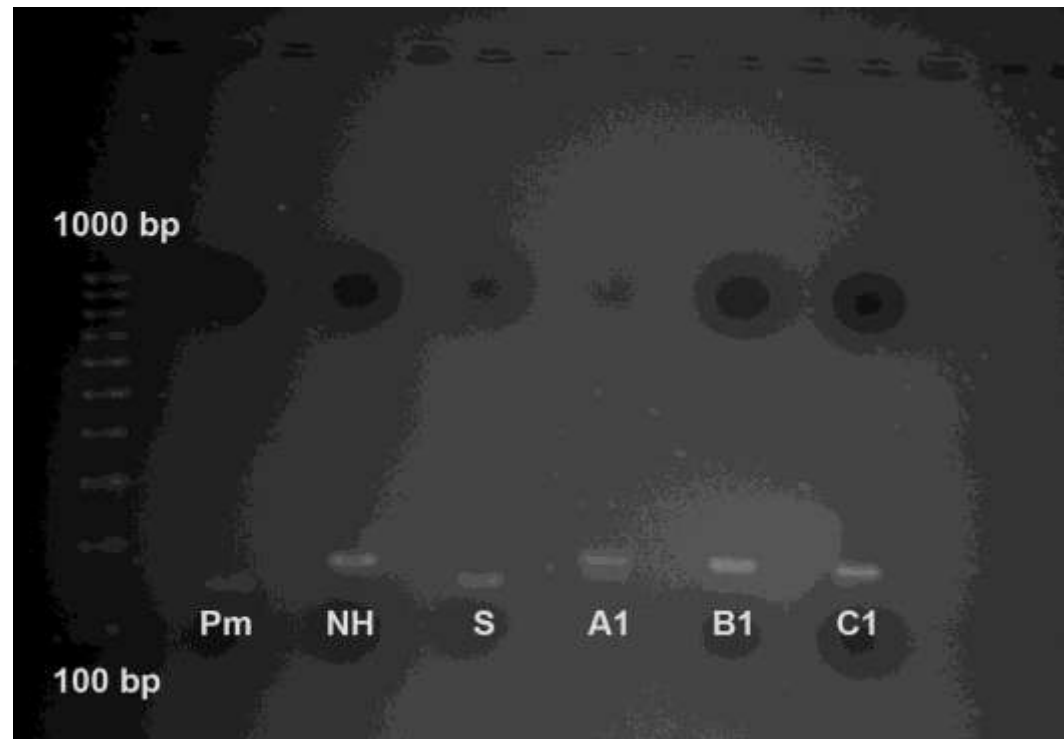
1. Hampton, New Hampshire (Isles of Shoals farm)
2. Cape Cod, Massachusetts (proposed farming site)





Molecular Detection

- DNA extraction
- PCR using genus-specific primers (PnAll F/R; Hubbard et al., 2008)



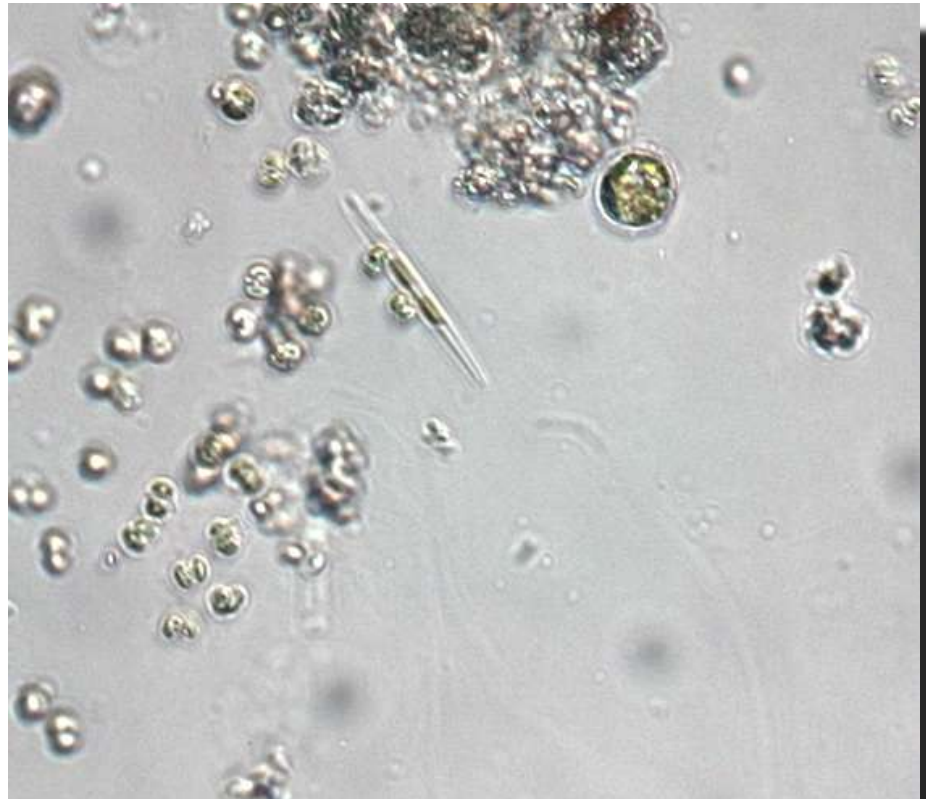
Pseudo-nitzschia detected in field samples

Microscopically

- Isles of Shoals farm (NH):
April, 14
July, 7

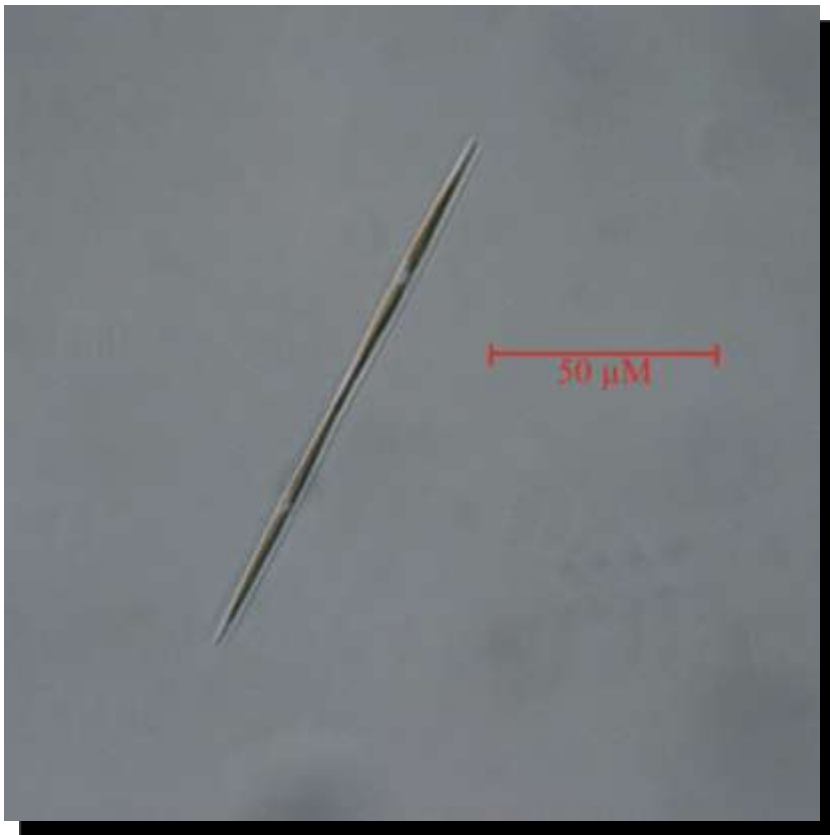
Molecular detection

- Isles of Shoals farm (NH):
April, 14
July, 7
- Cape Cod (MA)
•May, 11



Pseudo-nitzschia Isolates

Isles of Shoals farm, NH, July 7

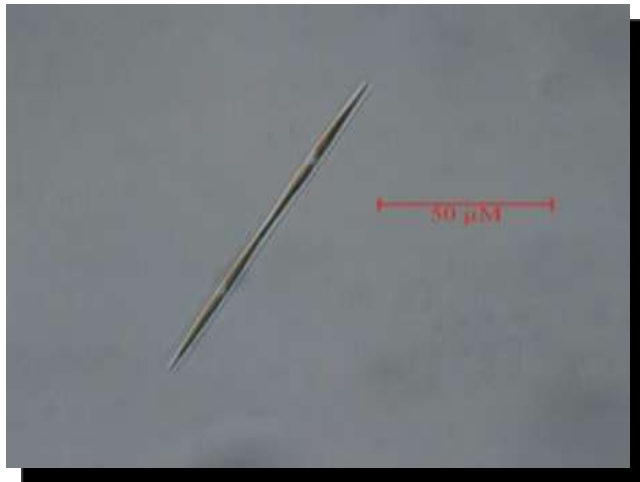


Identification of the two *Pseudo-nitzschia* species

- DNA extraction
- Sequencing
- Blast Analysis



3130 xl Genetic Analyzer, AB



P. delicatissima



P. granii

DA > 1pg per cell

Conclusions

- Confirm *Pseudo-nitzschia* in New England
- *Pseudo-nitzschia* species (*P. delicatissima* and *P. granii*) capable of producing domoic acid are present in New England
- Important to understand environmental triggers that up-regulate domoic acid production

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