HARMFUL ALGAL BLOOMS IN ALASKA

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Sea Grant
Alaska
Marine Advisory Program

TWO VIEWS OF ALASKA

DOMOIC ACID

- We don't know much about domoic acid in Alaska
  - Testing of aquaculture and commercial fishery samples have shown zero positives
    - Based on Pacific oysters and geoduck clam
  - One positive test for razor clams 11.5 ppm Kachemak Bay in 1997
  - One suspected illness
  - Pacific anchovies positive test (Sitka area)
  - Recent marine mammal illnesses or possible deaths
  - Attempted phytoplankton monitoring
- Danger is not knowing

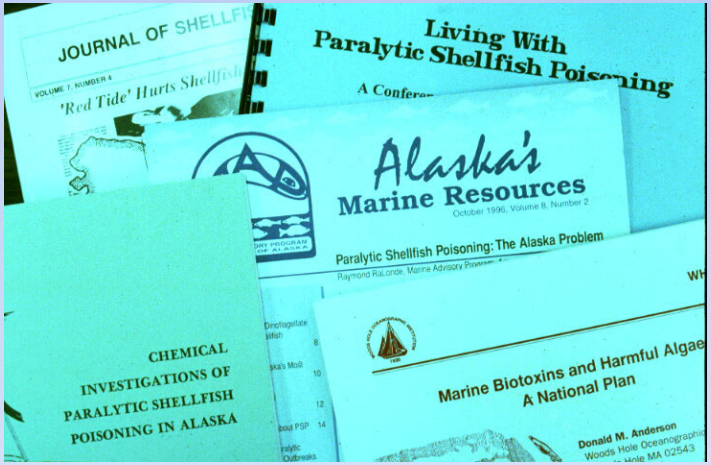
WHAT IS NEXT FOR DOMOIC ACID?

- North Pacific Research Board Project
  - Investigating DA coast wide
  - Concentrating on high risk areas
  - Volunteer submittals for testing
  - #DAK-36, Mercury Science Inc (ELISA) –Sensitive to 1ppm
- Partnerships with Alaska Native Health Consortium and Public Heal Service
- No scheduled monitoring project beyond NPRB
- Beginning phytoplankton monitoring

THE PSP PROBLEM IN ALASKA

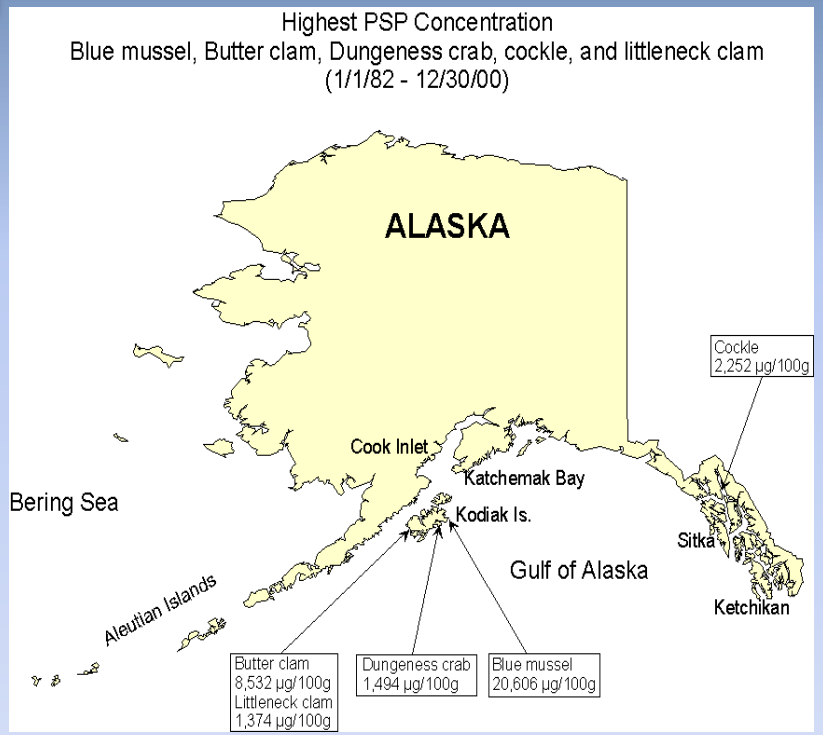
- Starting point of Alaska Sea Grant effort 1995
  - 143 outbreaks from1973-1994
  - Fatality in Kodiak plus multiple illnesses
  - Closure of live crab sales in southeastern Alaska
  - Conference "Living with PSP"
    - Futile attempts to monitor for PSP in Alaska
    - Exposed the risk that coastal Alaska's face with PSP

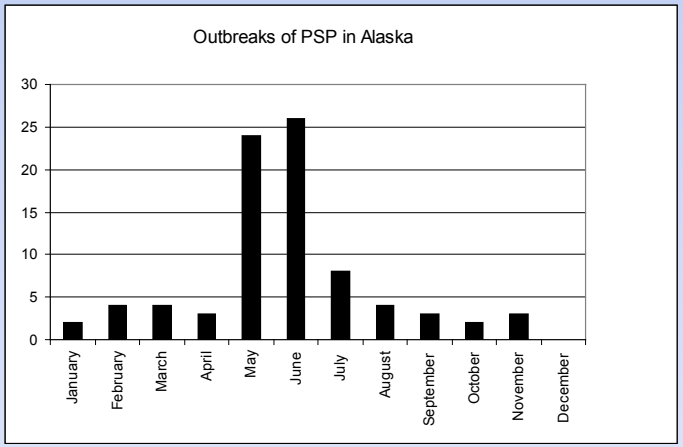
Bulletin No. 11
April 27, 1995
Paralytic Shellfish Poisoning
Strikes Again
Alaska Division of Epidemiology



PARALYTIC SHELLFISH POISON (PSP)

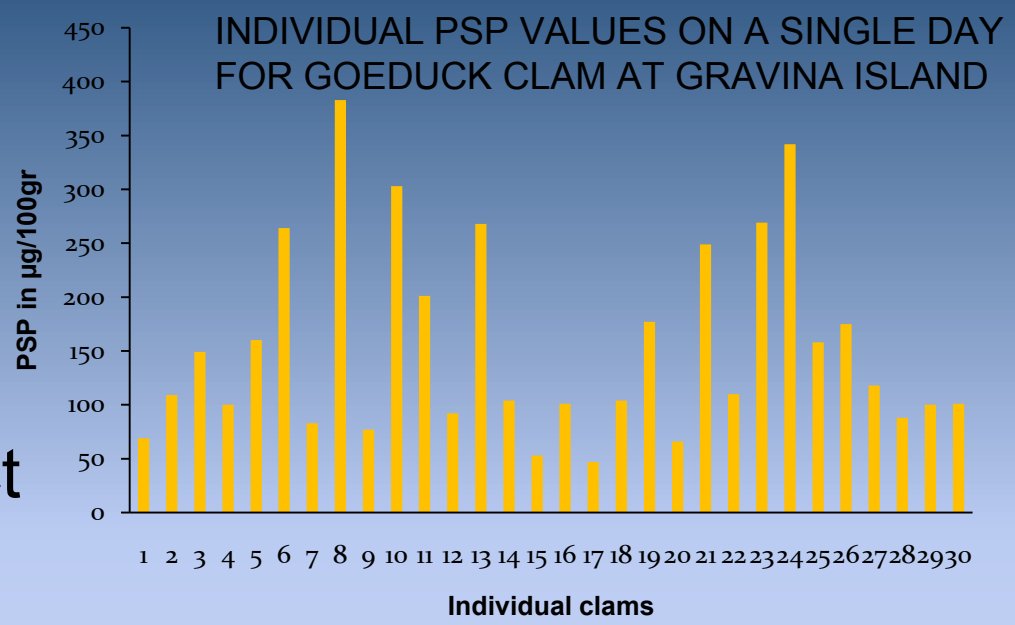
- Documented fatalities dating back to 1799
- Pervasive problems with wide-spread high values
- Outbreaks mainly seasonal

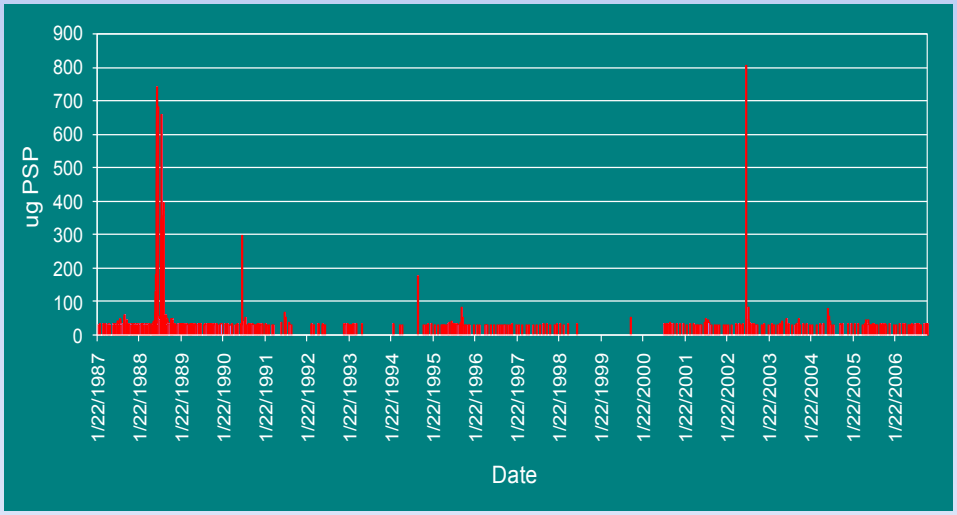




MONITORING FOR PSP

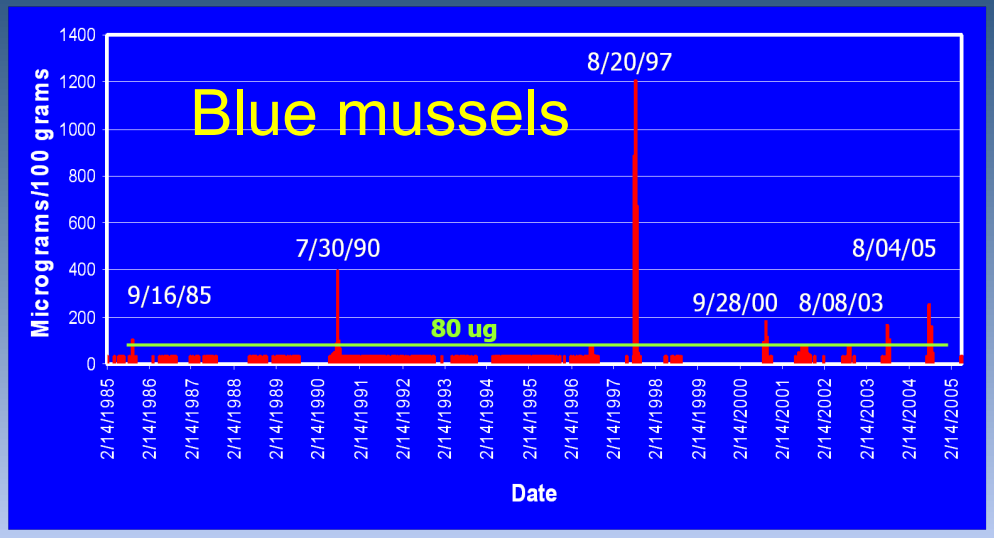
- ADEC only responsible for commercial fishery and aquaculture product
  - Geoduck clams
  - Farmed oysters

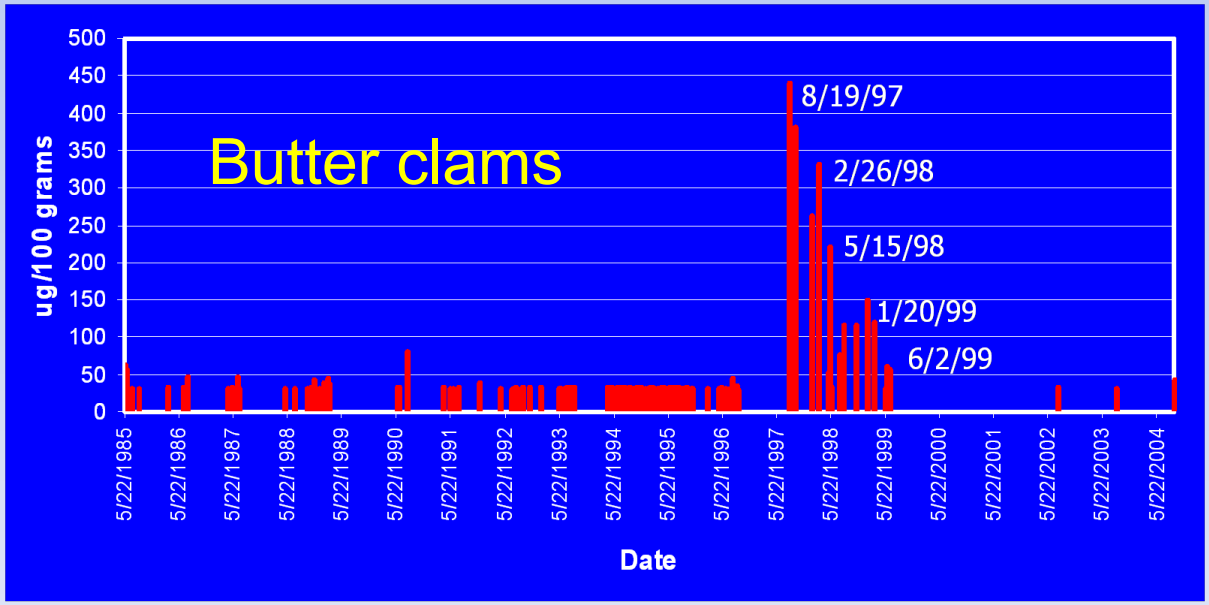




MONITORING FOR PSP

- Kachemak Bay
  - Blue mussel monitoring
  - Risk of butter clam





ALTERNATIVE TESTING?

The Jellet Biotek Alert Kit™

Pluses

- Rapid (one hour)
- Accurate when test is negative
- No toxic chemicals
- Easy to use
- Inexpensive
  - processing kit for 40 samples $120 and $20/test

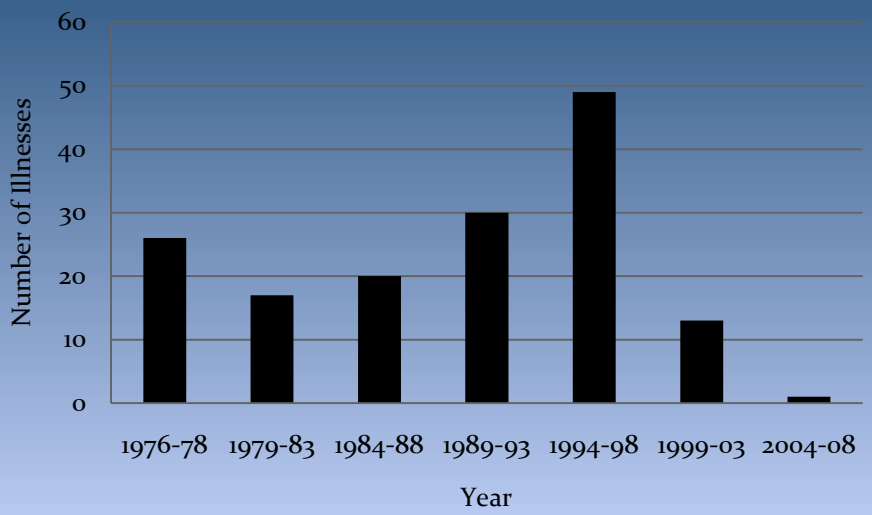
Minuses

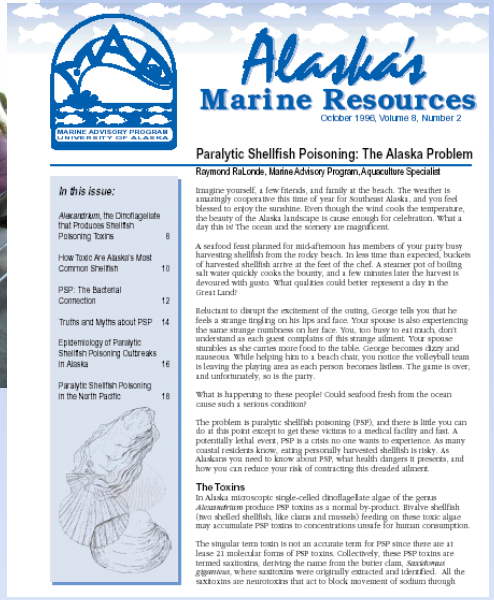
- Representative sampling
- May be too sensitive (measure toxins)
- Not FDA approved
- High number of false positives
- Misreads by inexperience testers

Category	Number	Percent
Number of readers	69	
Total Readings	690	
Total Missreadings	97	14.06%
Total false positives	51	7.39%
Total false negatives	46	6.67%

THE OUTREACH EFFORT

- 26 statewide workshops
- Field testing
- 2 conferences with proceedings
- Alaska' marine resources pub
  - Over 5,000 copies
  - Downloadable





Alaska's Marine Resources

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MARINE ADVISORY PROGRAM UNIVERSITY OF ALASKA

Paralytic Shellfish Poisoning: The Alaska Problem

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Imagine yourself, a few friends, and family at the beach. The weather is amazingly cooperative this time of year for Southeast Alaska, and you feel blessed to enjoy the sunshine. Even though the wind cools the temperature, the beauty of the Alaska landscape is cause enough for celebration. What a day this is! The ocean and the scenery are magnificent.

A seafood feast planned for mid-afternoon has members of your party busy harvesting shellfish from the rocky beach. In less time than expected, buckets of harvested shellfish arrive at the feet of the chef. A steamer pot of boiling salt water quickly cooks the bounty, and a few minutes later the harvest is devoured with gusto. What qualities could better represent a day in the Great Land!

Reluctant to disrupt the excitement of the outing, George tells you that he feels a strange tingling on his lips and face. Your spouse is also experiencing the same strange numbness on her face. You, too busy to eat much, don't understand as each guest complains of this strange ailment. Your spouse stumbles as she carries more food to the table. George becomes dizzy and nauseous. While helping him to a beach chair, you notice the volleyball team is leaving the playing area as each person becomes listless. The game is over, and unfortunately, so is the party.

What is happening to these people? Could seafood fresh from the ocean cause such a serious condition?

The problem is paralytic shellfish poisoning (PSP), and there is little you can do at this point except to get these victims to a medical facility and fast. A potentially lethal event, PSP is a crisis no one wants to experience. As many coastal residents know, eating personally harvested shellfish is risky. As Alaskans you need to know about PSP, what health dangers it presents, and how you can reduce your risk of contracting this dreaded ailment.

The Toxins

In Alaska microscopic single-celled dinoflagellate algae of the genus *Alexandrium* produce PSP toxins as a normal by-product. Bivalve shellfish (two shelled shellfish, like clams and mussels) feeding on these toxic algae may accumulate PSP toxins to concentrations unsafe for human consumption.

The singular term toxin is not an accurate term for PSP since there are at lease 21 molecular forms of PSP toxins. Collectively, these PSP toxins are termed saxitoxins, deriving the name from the butter clam, *Saxidomus gigantous*, where saxitoxins were originally extracted and identified. All the saxitoxins are neurotoxins that act to block movement of sodium through

NORTH PACIFIC RESEARCH BOARD PROJECT

- Broad sampling program
  - Southeast Alaska to Russia
  - Trained local samplers
  - Jellett kit field test
    - Lab confirmation of positive results
    - Excellent outreach tool
- Public outreach program
- Collaboration with the NW Fisheries Science Center
- Traditional knowledge assessment
- One-time event not a monitoring program

NPRB PROJECT SIGNIFICANT FINDINGS

- PSP in the Bering Sea
- PSP is high levels in surf clams (138.9 µg/100g)
- Traditional knowledge causes high risk
- Largest most diverse baseline date in the North Pacific
  - 106 samples from 7 species over 2 years

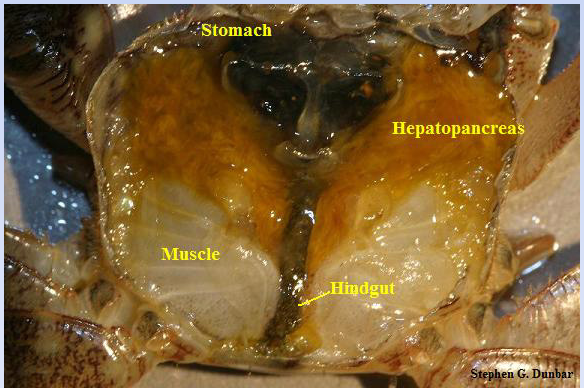
Traditional knowledge
- Water color observation
- Current intensity and direction

Knowledge deficit
- Knowledge of species
- Knowledge of the observation
- Knowledge of shellfish PSP retention

ECONONIC IMPACT

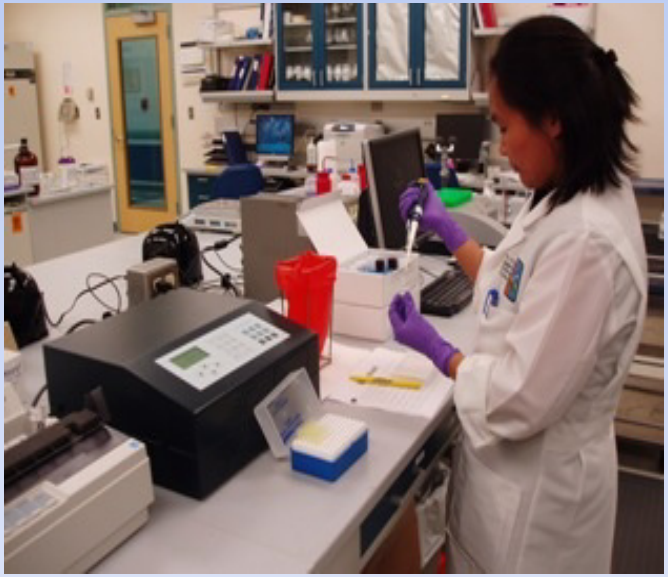
- $50 million commercial fishery in Bering Sea?
  - PSP only is one factor
  - Logistics of fishery
  - Bottom dredging environmental impact
  - Old stock assessment projecting harvest
  - Walrus listing?
- Geoduck testing $1,000+ per sample
  - Decrease value of processed geoduck
    - Over $4.00 to $0.75/lb
- Impact on aquaculture growth
- Self pay program $80,000/yr
- Commercial crab fishery (Kodiak)

UNIFORM SHELLFISH SAMPLING PLAN FOR PARALYTIC SHELLFISH POISON (PSP)



ADEC RESEARCH TO REDUCE COST OF TESTING

- Testing ELISA method as a screening tool
- Abraxis-direct competitive assay
- Rapid screen format
- Reduce analysis time for non-detect samples
- Well-accepted



WHAT IS NEXT FOR PSP?

- Phytoplankton monitoring
- Updating PSP publication
- Bering Sea study?
- Marine mammals
- Controlled harvest program