

# Sitka Tribe of Alaska Southeast Alaska Tribal Ocean Research



## Environmental Monitoring in Southeast Alaska

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Angela Hessenius

# Sitka Tribe of Alaska



## Resource Protection Department

- Marine Biotoxin Program
- Fisheries Program
- Ocean Chemistry Program
- Traditional Foods Program





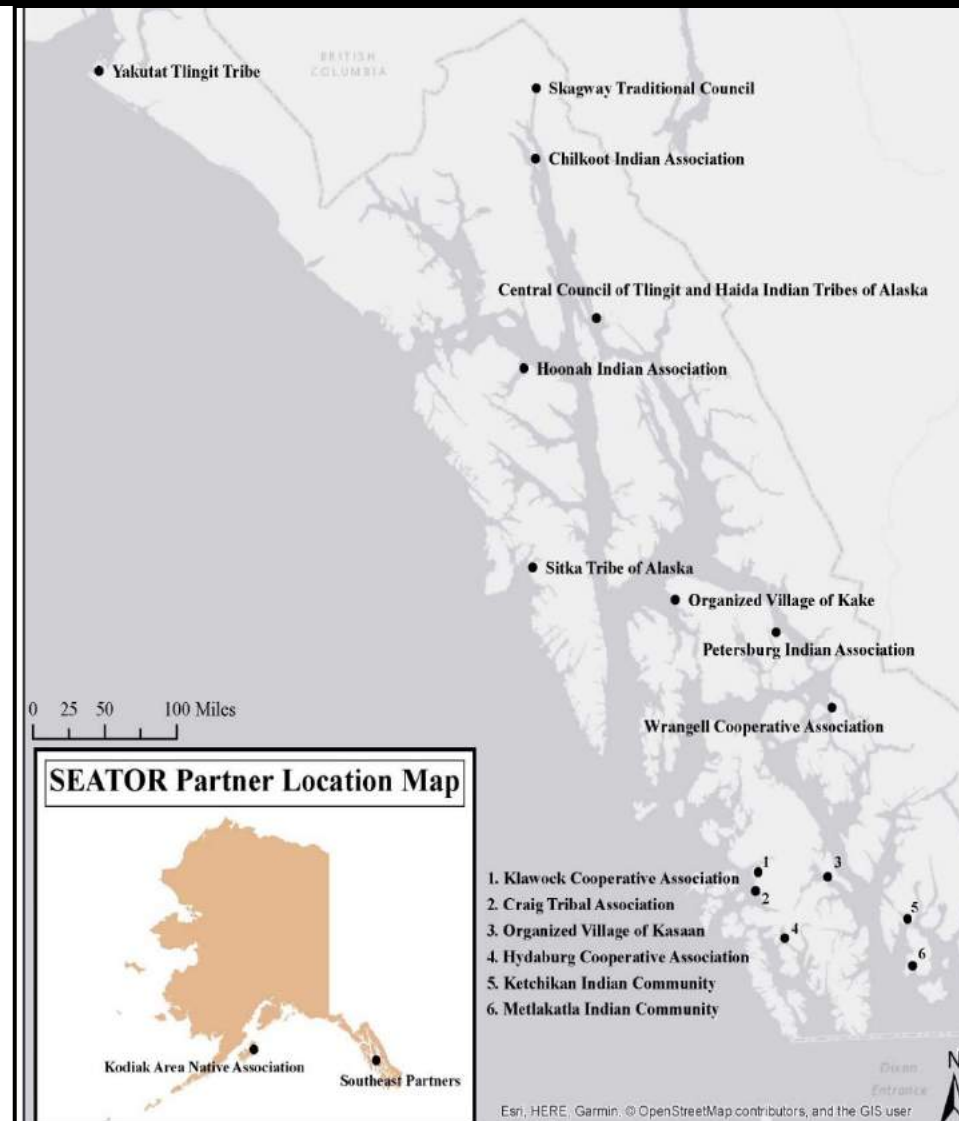
# SEATOR



Tribal governments working together to assess environmental threats that hinder access to traditional foods.



# Tribal Partners





# Subsistence Foods



Ensuring access to traditional foods in changing climatic conditions





# Shellfish



- Abundant
- Accessible
- Available year round

# The Problem



Shellfish can be dangerous to consume.  
May contain toxins dangerous to human health.

## Paralytic Shellfish Poisoning PSP

- Numbness and tingling in extremities
- Difficulty breathing
- Death

## Amnesic Shellfish Poisoning ASP

- Vomiting and nausea
- Diarrhea
- Dizziness
- Permanent short term memory loss

## Diarrhetic Shellfish Poisoning DSP

- Vomiting and nausea
- Abdominal pain
- Severe gastrointestinal distress

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# Next Steps?



How can we ensure access to shellfish, an important traditional food, when it poses a threat to human health ?



# SEATOR Program



- Phytoplankton Observations
- Shellfish Toxin Testing
- Communicating Results

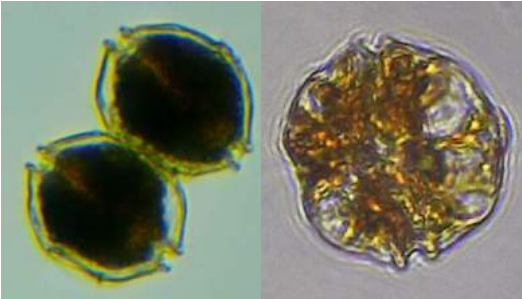




# Phytoplankton Observations



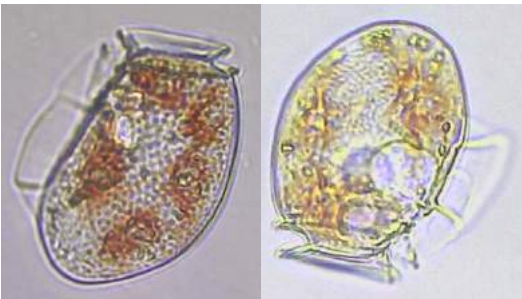
## Alexandrium



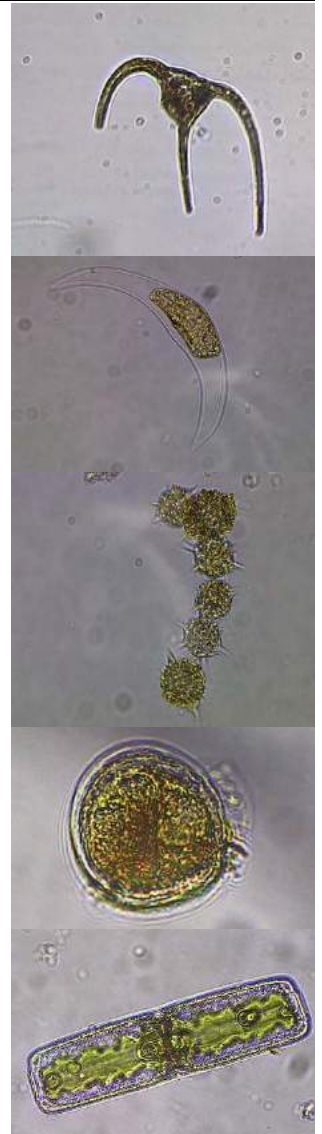
## Pseudo-Nitzschia



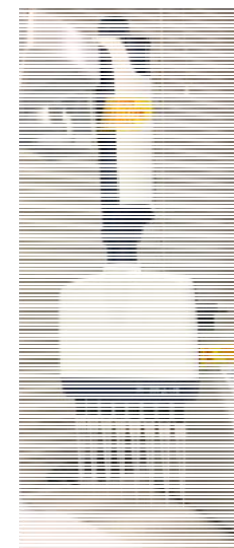
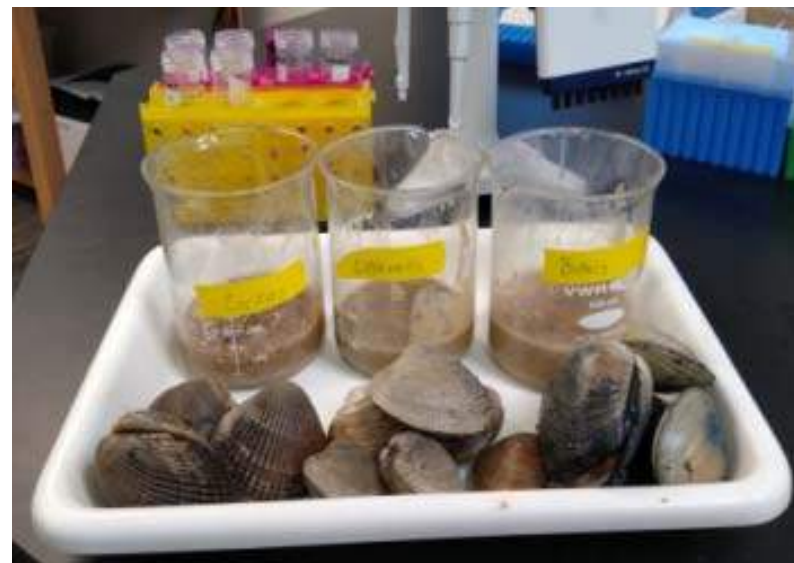
## Dinophysis



- Prioritize HAB species in microscopy
- Categorized by abundance (bloom, common, present, absent)
- Phytoplankton observations inform shellfish testing
- Over 1,500 phytoplankton observations made by SEATOR partners



# Shellfish Testing Program





# Communication: Marine Biotoxins



## Southeast Alaska Tribal Ocean Research

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429 Katlian Street, Sitka Alaska (907) 966-9650

[seator@sitkatriben-sn.gov](mailto:seator@sitkatriben-sn.gov)



### PSP Report

11/09/2017

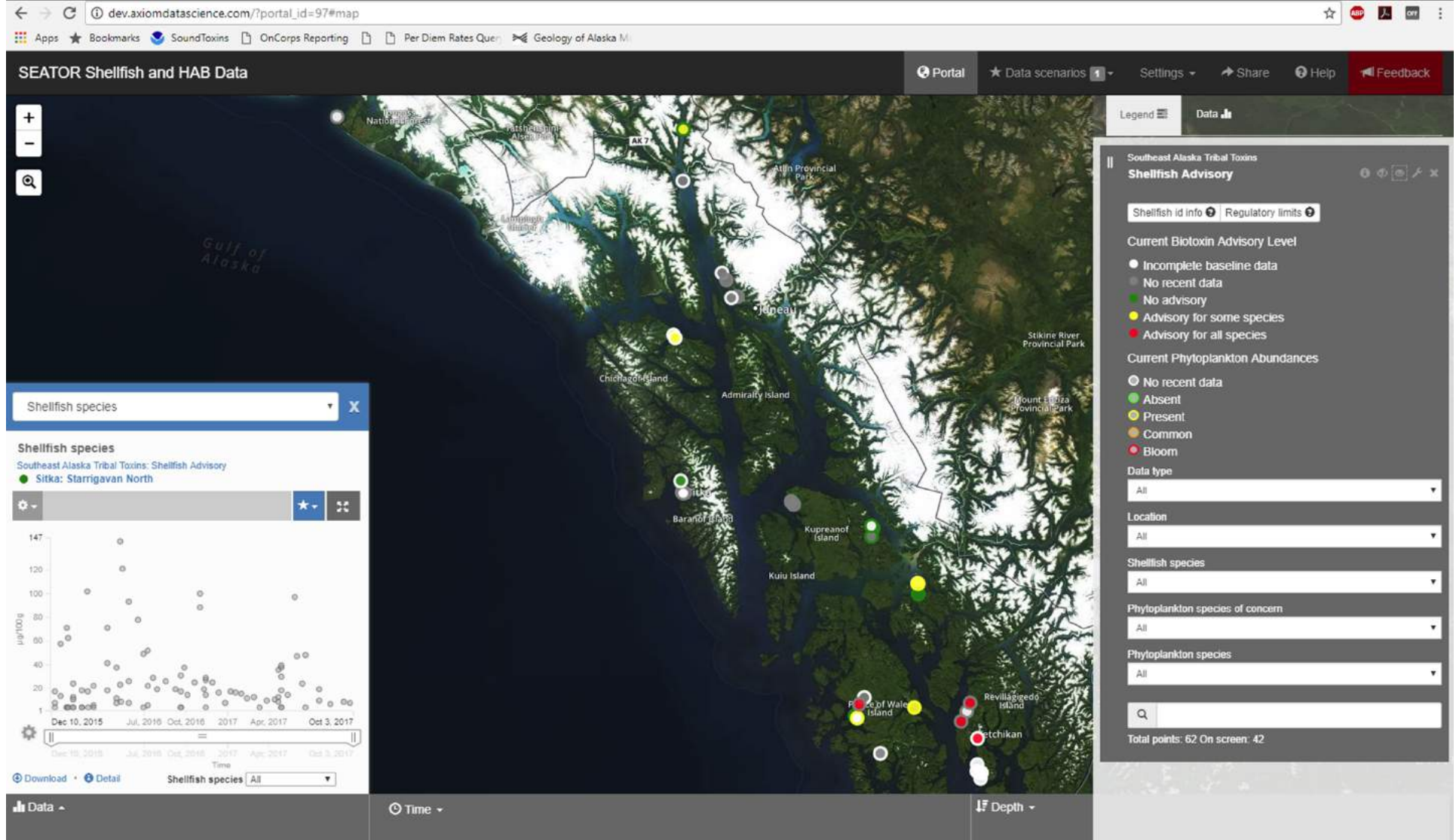
STAERL ID	Date Collected	Location	Sample Site	Species	PSP Result* (µg/100g)	Sample Type	Collector
170922	11/7/2017	Sitka	Starrigavan North	Blue Mussel	4	whole	Sitka Tribe of Alaska
170923	11/7/2017	Craig	False Island Boat Launch	Blue Mussel	44	whole	Craig Tribal Association
170924	11/7/2017	Kasaan	Kasaan Harbor	Blue Mussel	7	whole	Organized Village of Kasaan
170925	11/6/2017	Wrangell	Shoemaker Beach	Blue Mussel	8	whole	Wrangell Cooperative Association
170926	11/6/2017	Wrangell	Pat's Creek Beach	Blue Mussel	6	whole	Wrangell Cooperative Association
170927	11/7/2017	Klawock	City of Klawock Boat Launch	Blue Mussel	29	whole	Klawock Cooperative Association
170928	11/7/2017	Petersburg	Sandy Beach	Blue Mussel	4	whole	Petersburg Indian Association
170929	11/7/2017	Petersburg	5.5 Mile	Blue Mussel	5	whole	Petersburg Indian Association
170930	11/5/2017	Kodiak	Near Island	Butter Clam	106	whole	Sun'aq Tribe of Kodiak

\*NTD: No Toxins Detected  
FDA Action Level: 80 µg/100g

[www.seator.org/data](http://www.seator.org/data)

Shellfish Marine Biotoxin Bulletin

# Data Accessibility





# Data Accessibility



# Group Activity





# Alaska





# Case Study Areas



Yakutat

Petersburg

Ketchikan

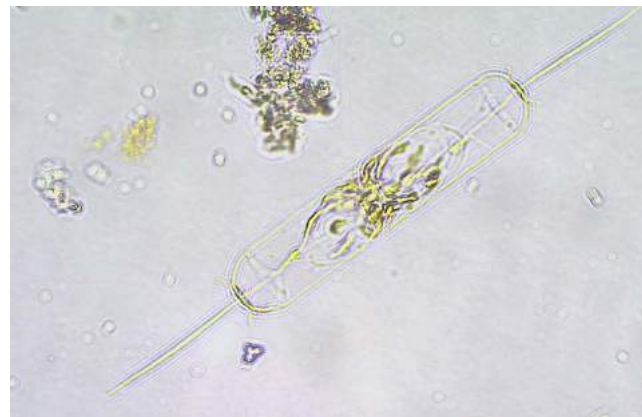
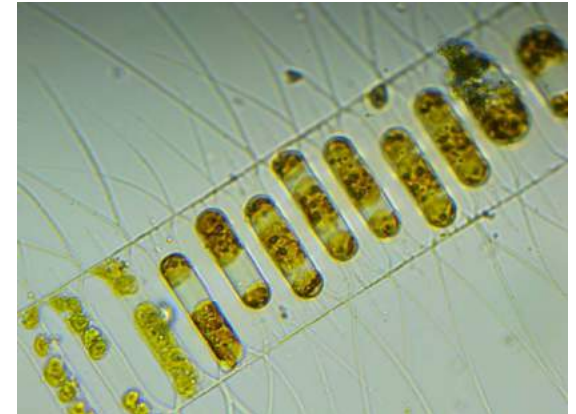
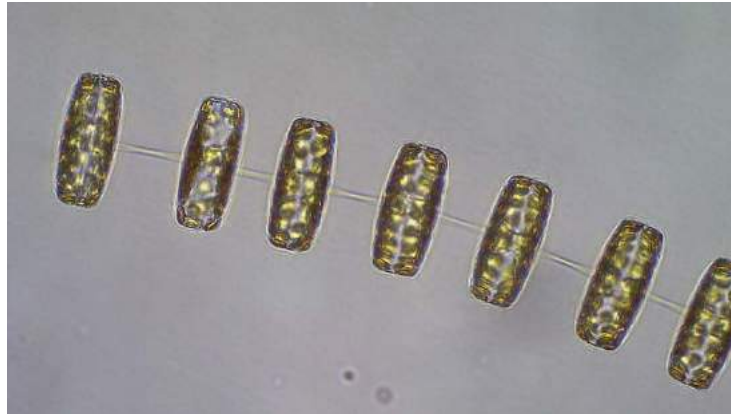


# Yakutat





# Yakutat: Phytoplankton

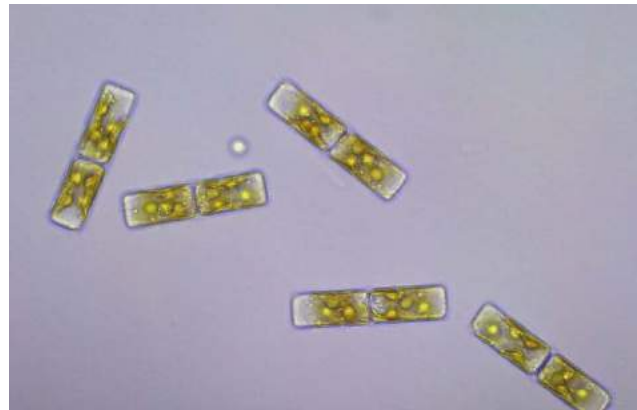
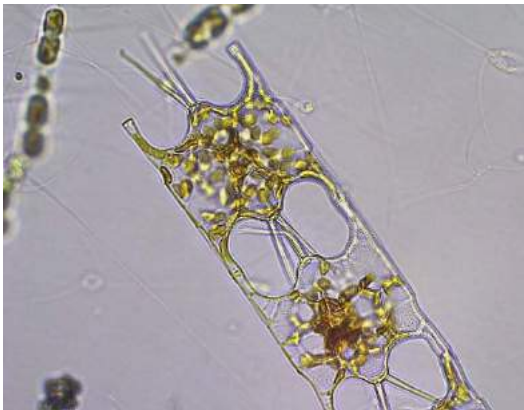
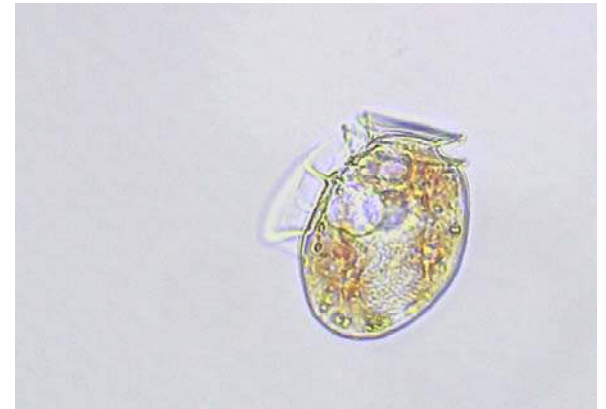
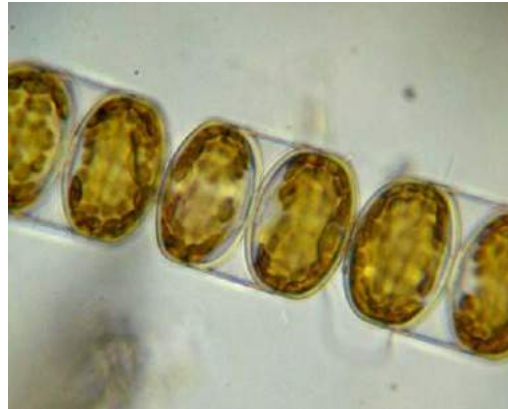




# Petersburg: Sandy Beach



# Petersburg: Phytoplankton

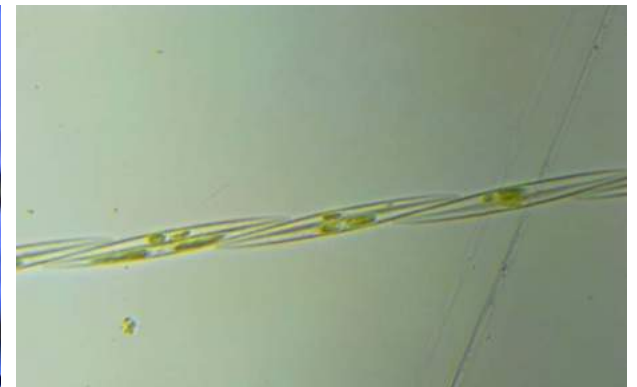




# Ketchikan: Seaport Beach



# Ketchikan: Phytoplankton





# Blue Mussels



- Picks up toxins quickly
- Removes toxins quickly
- Best indicator of current water column conditions



# Cockles



- Picks up toxins 1-2 weeks after blue mussels
- Usually removes toxins before winter
- Looks like a Ruffles chip



# Butter Clams



- Largest commonly harvested clam in Southeast
- Retains toxins for years
- Namesake for the primary toxin in PSP- saxotoxin-saxidomus gigantea



# STAERL PSP Report



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Shellfish Marine Biotoxin Bulletin



# STAERL PSP Report: March



# STAERL PSP Report: April





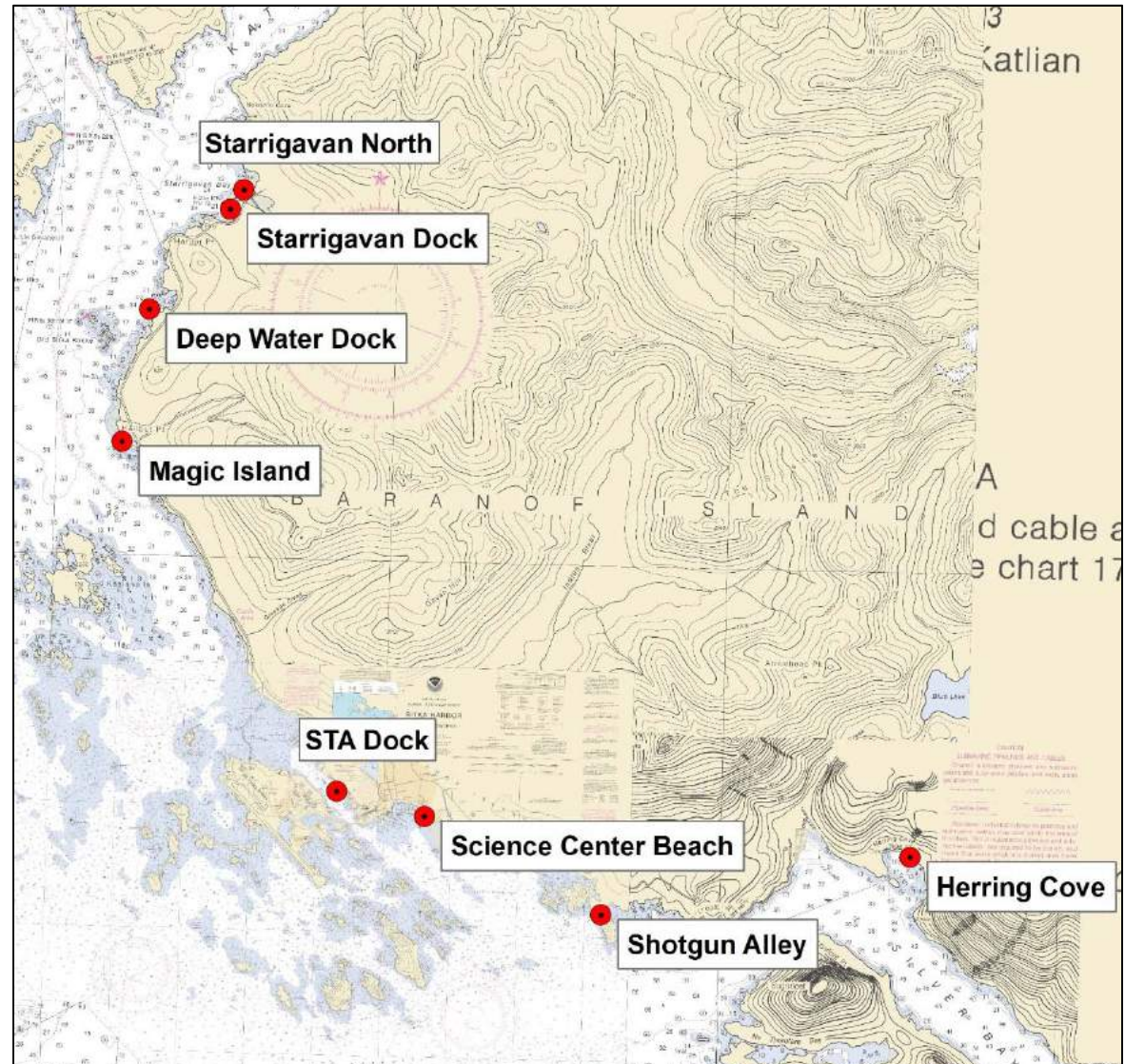
# STAERL PSP Report: May



# Sitka, AK July 2018

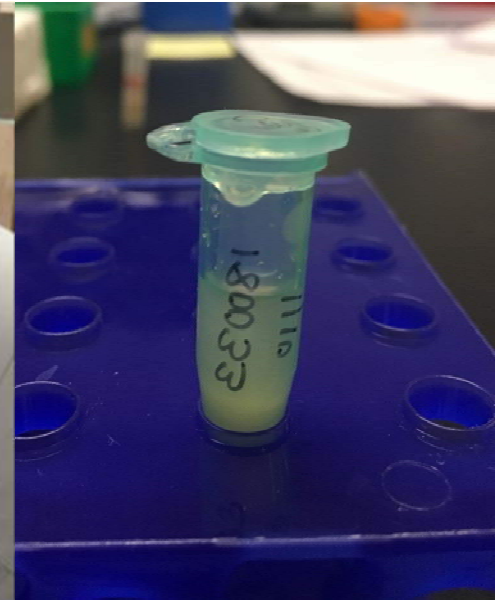


"You have a bloom of Pseudo-Nitzschia going on. It is probably toxic with domoic acid. You may find ill sea lions at some point soon."





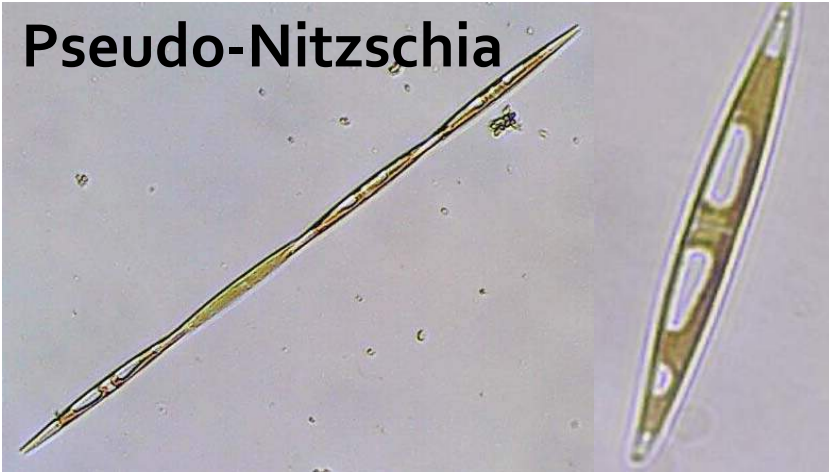
# Sitka, AK July 2018



# Electron Microscopy: PMN Methodology



## Pseudo-Nitzschia

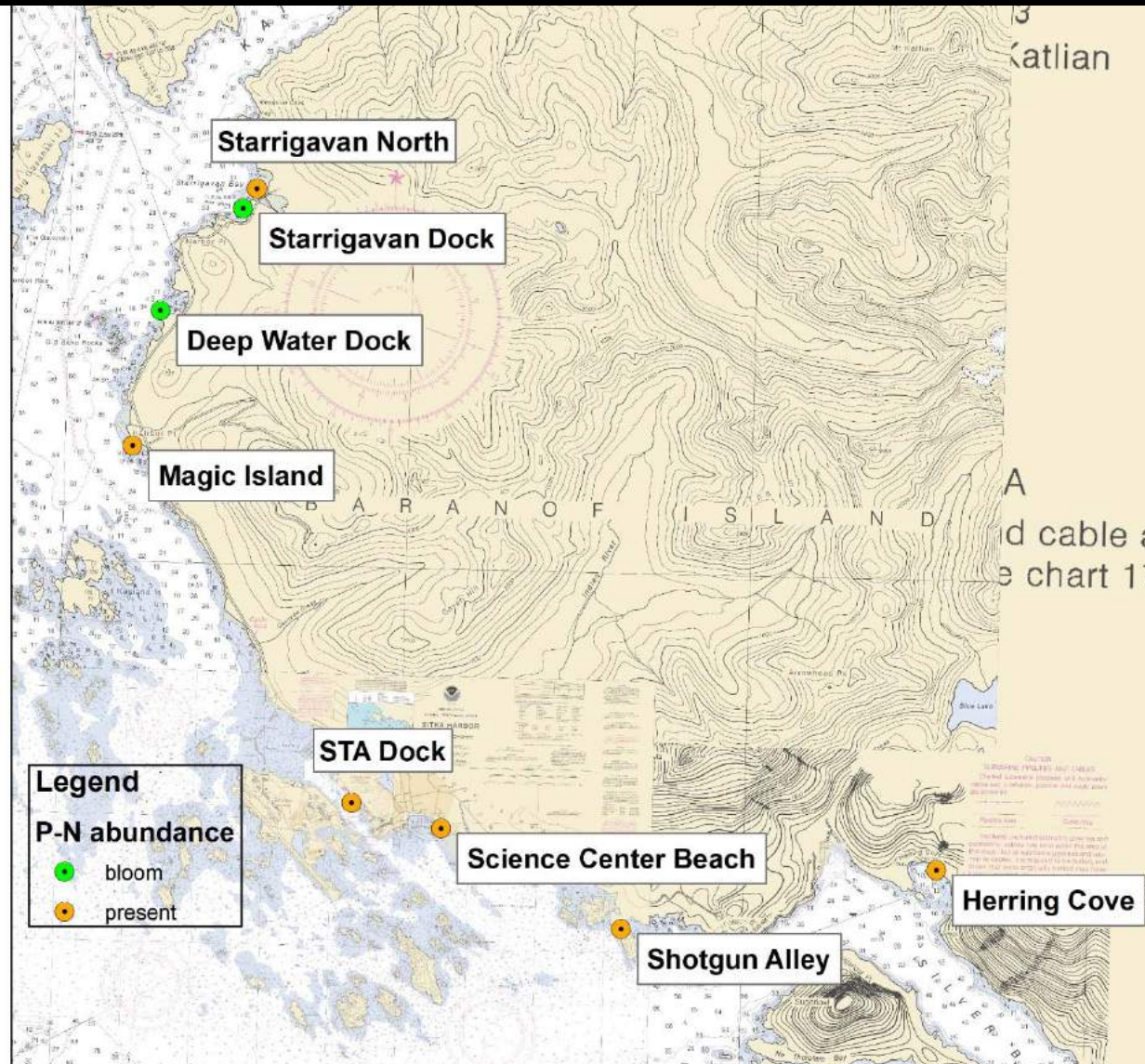


### Phytoplankton Abundance Categories

Category	Average number of P-n cells per square area
Bloom	$\geq 21$
Common	$8 \geq 20$
Present	$0 \geq 7$
Absent	0

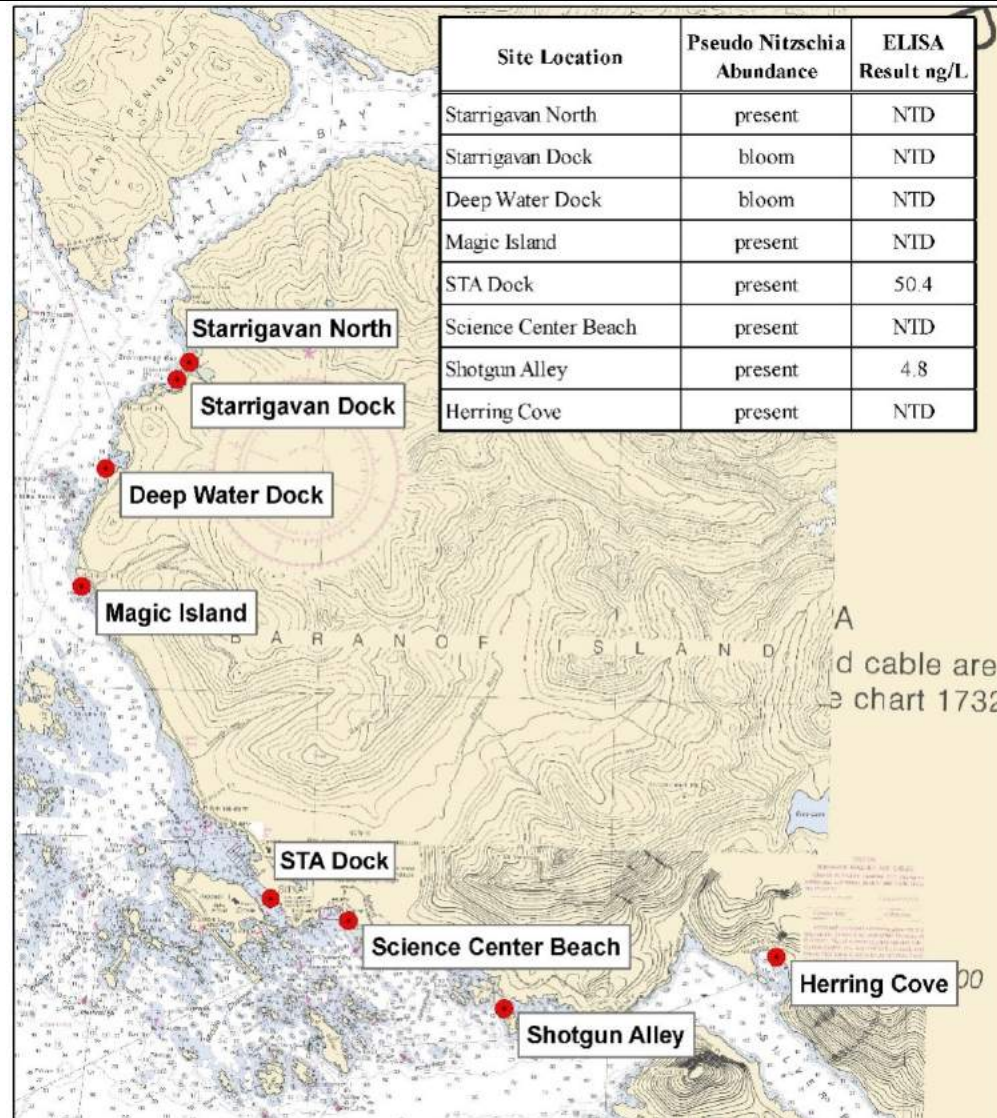
Sample Site	Average # of cells/square (approximate)	P-n concentration (present, common, bloom)
Starrigavan North	7	present
Starrigavan Dock	65	bloom
Deep-water Dock	89	bloom
Magic Island	4	present
STA Dock	2	present
Science Center	<1	present
Shotgun Alley	4	present
Herring Cove	<1	present





# Domoic Acid

## Amnesic Shellfish Poisoning

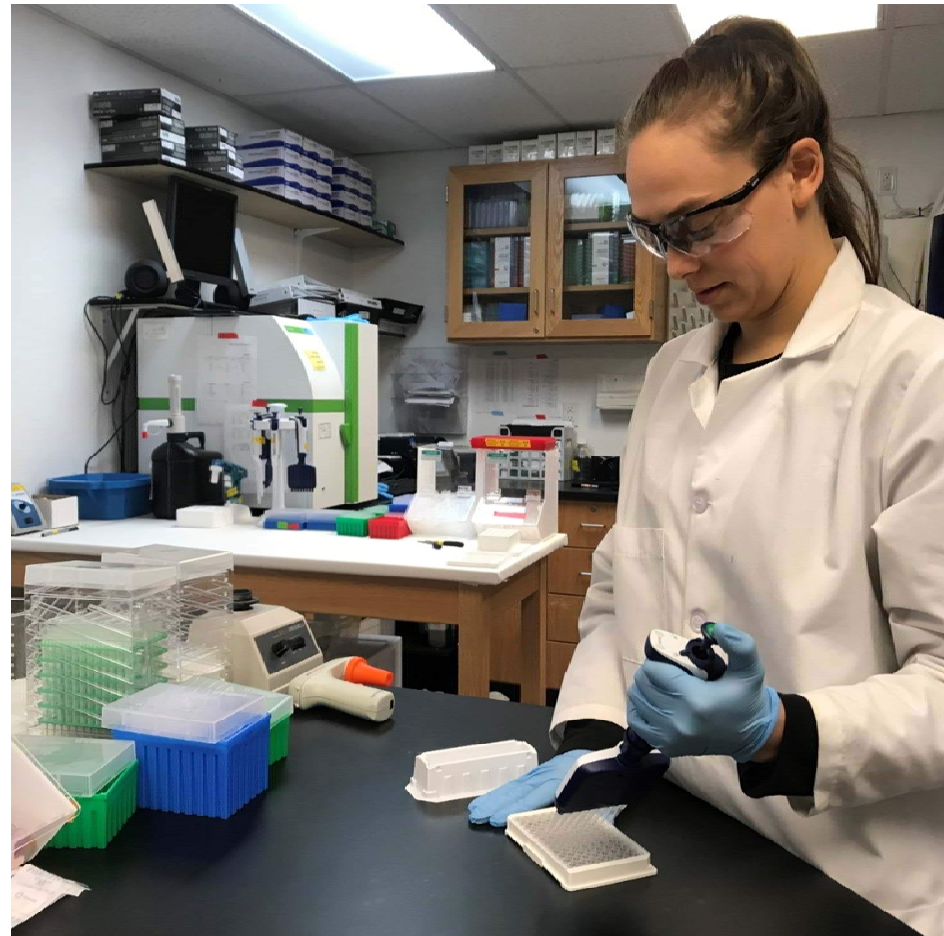




# NOAA Emergency Response Program



- No current or consistent monitoring for ASP in Southeast Alaska.



# NOAA Emergency Response Program- Pilot Study



- Collect additional phytoplankton samples when P-n is observed
- Better understand the temporal and spatial distribution of P-n among SEATOR Partner sites
- Test for domoic acid at SEATOR Partner sites





# Event Response Results: Phytoplankton



Community	Bloom	Common	Present	Absent	Total Observations
Craig	2	5	25	347	379
Haines	0	0	0	2	2
Hoonah	7	3	31	98	139
Hydaburg	1	1	24	17	43
Juneau	1	5	19	74	99
Kasaan	4	8	41	57	110
Ketchikan	0	3	13	39	55
Klawock	1	2	14	200	217
Petersburg	1	38	97	337	473
Sitka	16	24	153	136	329
Skagway	0	1	6	90	97
Wrangell	0	2	110	87	199
Yakutat	0	0	6	26	32
Total	33	92	539	1510	2174

# Domoic Acid Detection



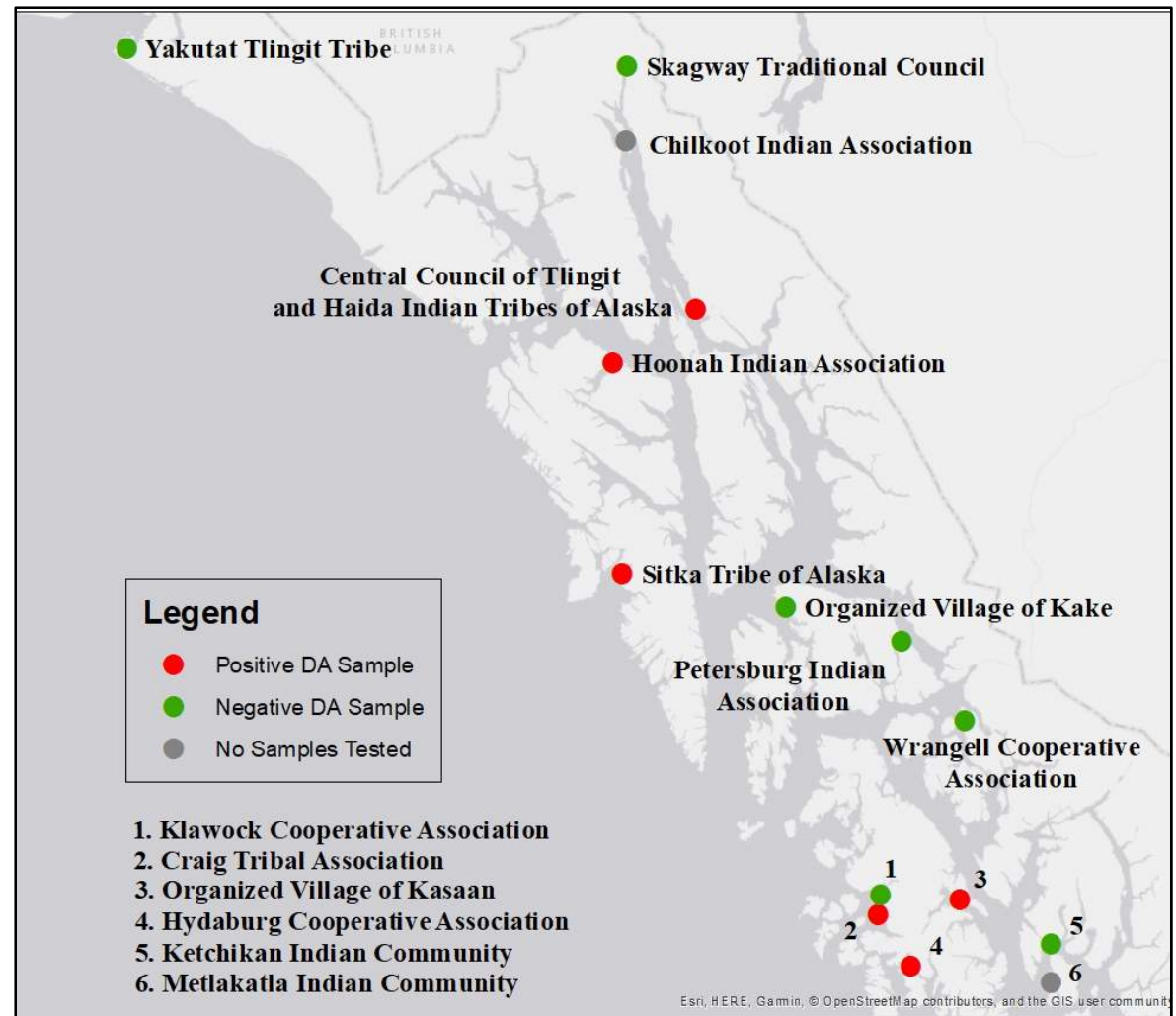
- 1L of seawater filtered through a .45 $\mu$ m nitrocellulose filter
- Extracted in 4mL of MQ water, sonicated and centrifuged.
  - Samples analyzed within 24 hours of extraction
- Mercury Science ELISA Test Kit
  - Detection Limit: .1ppb
  - Quantitative Range: .3ppb-6ppb
- Analysis assistance from Northwest Fisheries Science Center and WA Department of Fish and Wildlife



# Event Response Results: Seawater Filters



- Tested 75 Seawater Filters from 12 SEATOR communities
- 10 were positive for Domoic Acid
- Max Value 62 ng/L in Juneau from July 3rd



# Event Response Results: Seawater Filters



STAERL ID	Date Collected	DA Result (ng/L)	Community
180704	7/5/2018	4.8	Sitka Tribe of Alaska
180833	8/10/2018	5.7	Hydaburg Cooperative Association
180854	8/13/2018	5.8	Craig Tribal Association
180710	7/6/2018	6	Sitka Tribe of Alaska
180662	5/7/2018	7.6	Craig Tribal Association
180698	6/28/2018	8.9	Hoonah Indian Association
180684	6/28/2018	18.5	Central Council of Tlingit and Haida Indian Tribes of Alaska
180629	6/13/2018	19.8	Organized Village of Kasaan
180701	7/6/2018	50.4	Sitka Tribe of Alaska
180766	7/3/2018	61.5	Central Council of Tlingit and Haida Indian Tribes of Alaska

\*200-300 ng/L action level for testing shellfish samples, NOAA Northwest Fisheries Science Center



# Next Steps



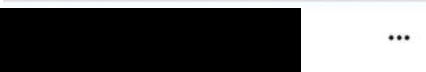
- Submitted applications for funding to continue DA work in Southeast Alaska (MERHAB)
- Phytoplankton Training for SEATOR partners (PMN)
- Incorporate P-n and domoic acid information into current projects
  - Test SEATOR shellfish samples for PSP and DA



# Thank You NOAA



11:35 AM  
facebook.com

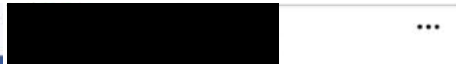


RED TIDE ALERT!!! This picture was taken in Metlakatla by J Russell Hayward. And there was another person that said they took a picture out by refuge cove Beware!!



37 23 Comments 142 Shares

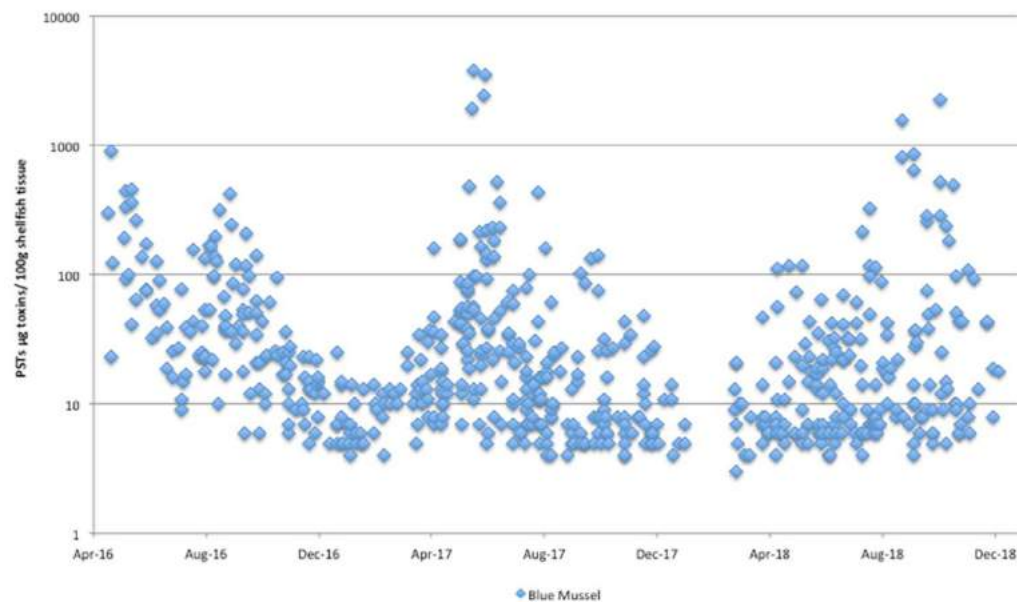
Like Comment Share



This is what the red algae bloom of the last few days looks like. It is Noctiluca, which is harmless, and it floats on the water, as you can see in the bottle Under a microscope they are round and mostly clear. This is the one that is phosphorescent at night if disturbed. From my sampling today it looks like there is more out north than there is out south right now.



2016-2018 SEATOR Blue Mussel Data





# 2019 Annual SEATOR Workshop

May 6 - May 10

*Sitka, Alaska*

- Participate in hands-on technical training to monitor for HABs, OA, shellfish toxins, and more.
- Learn how to perform shellfish population assessments and see the results from last year's surveys.
- Get involved with new projects.
- Limited travel support available. Contact us for more details.

WE HOPE TO SEE YOU  
THERE!

Email [seator@sitkatriben-sn.gov](mailto:seator@sitkatriben-sn.gov)  
or call 907-747-7197 for more  
information.

Agenda and updates will be posted at  
[seator.org](http://seator.org) and at  
[facebook.com/seator.org](https://facebook.com/seator.org)



Photo Credit: Bethany Goodrich, SSP



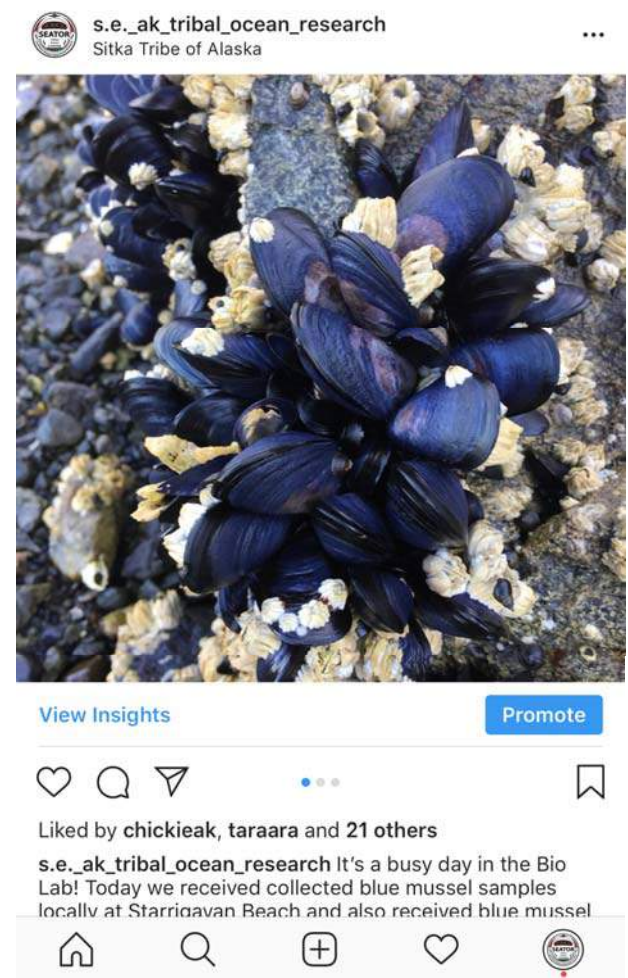
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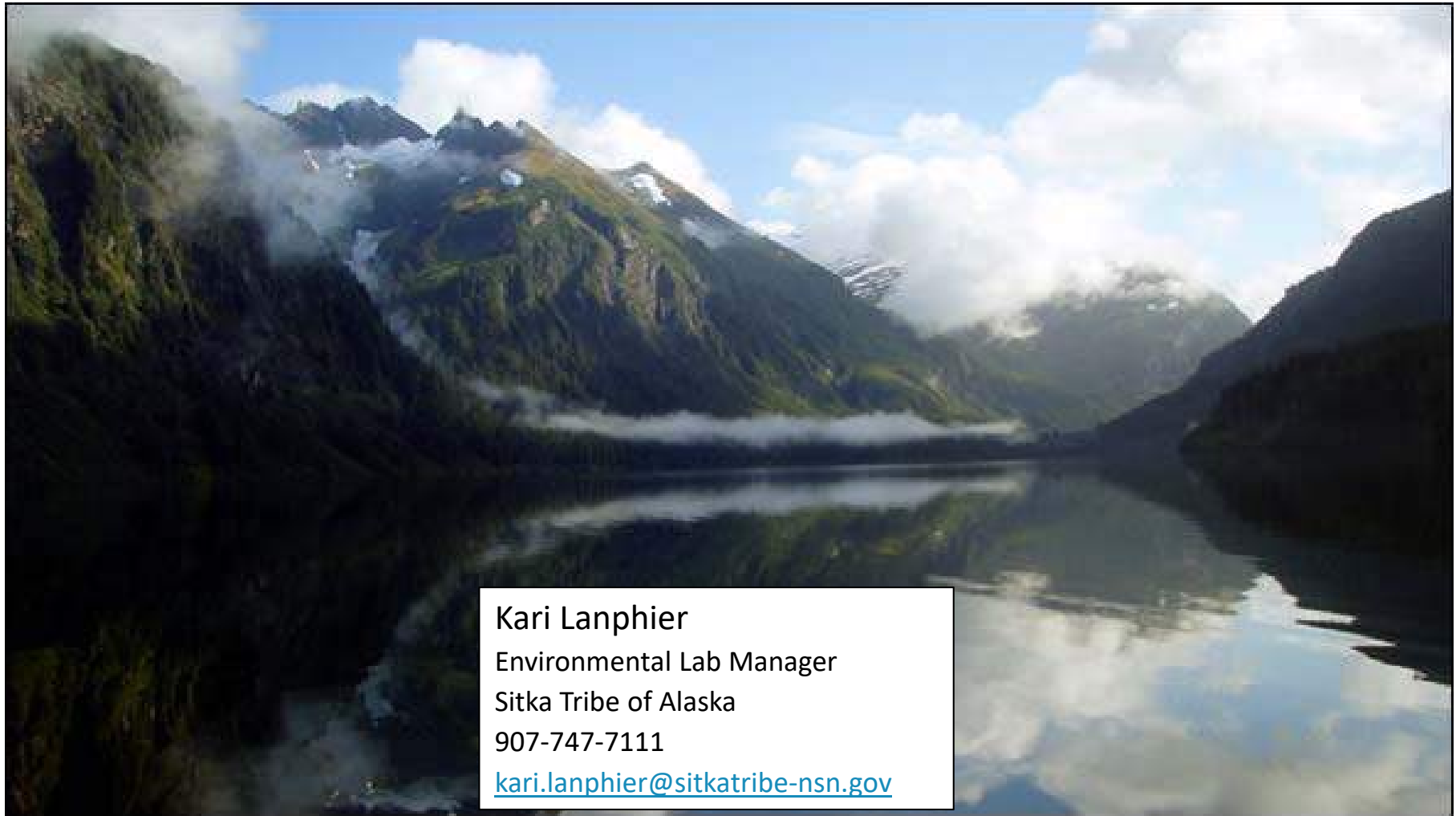


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# Questions



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