
National Marine Fisheries Service

Northwest Fisheries Science Center

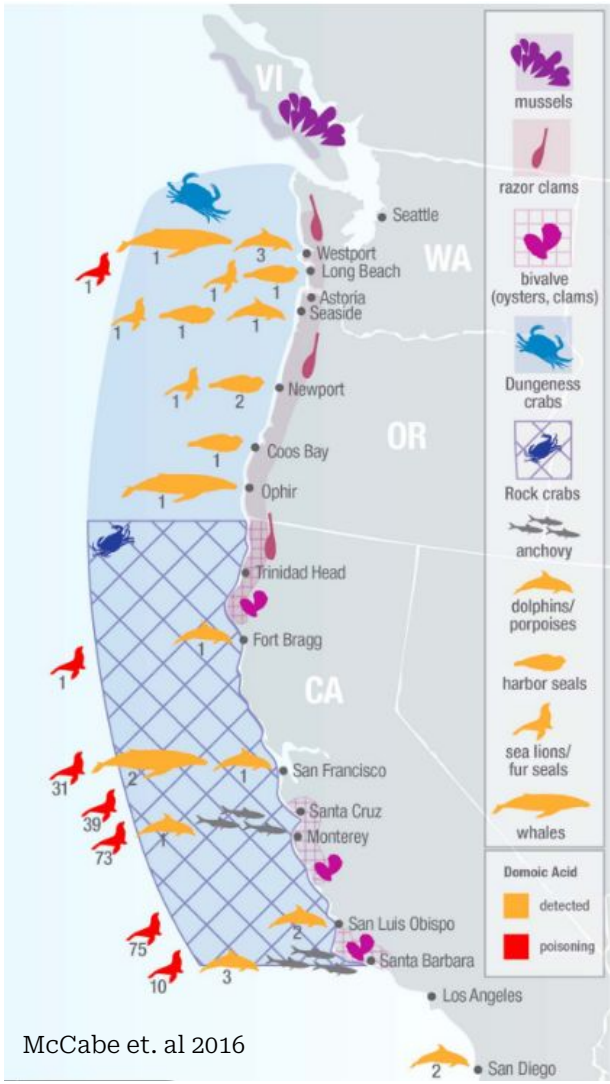
Resilient Coastal Communities and Economies

# Using autonomously collected eDNA to assess phytoplankton community composition and the presence of harmful algal species

Max Taylor, Nicolaus Adams, Stephanie Moore

**Around half of *Pseudo-nitzschia* species produce domoic acid, a potent neurotoxin that can cause Amnesic Shellfish Poisoning.**

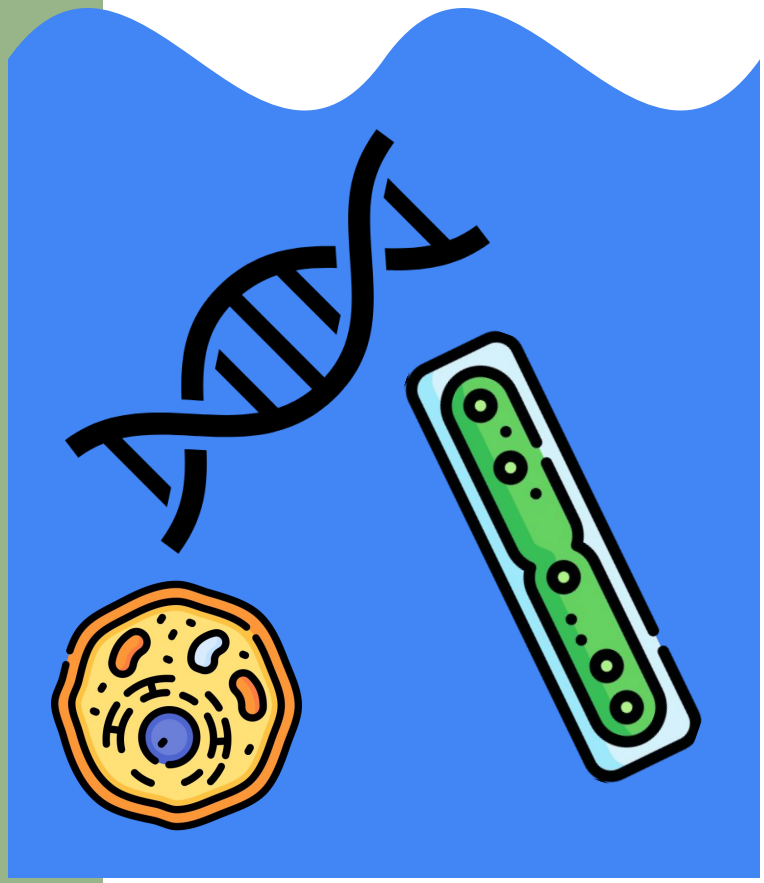
**In 2015, harmful blooms of *Pseudo-nitzschia* produced domoic acid, causing fishery shutdowns and harming wildlife.**



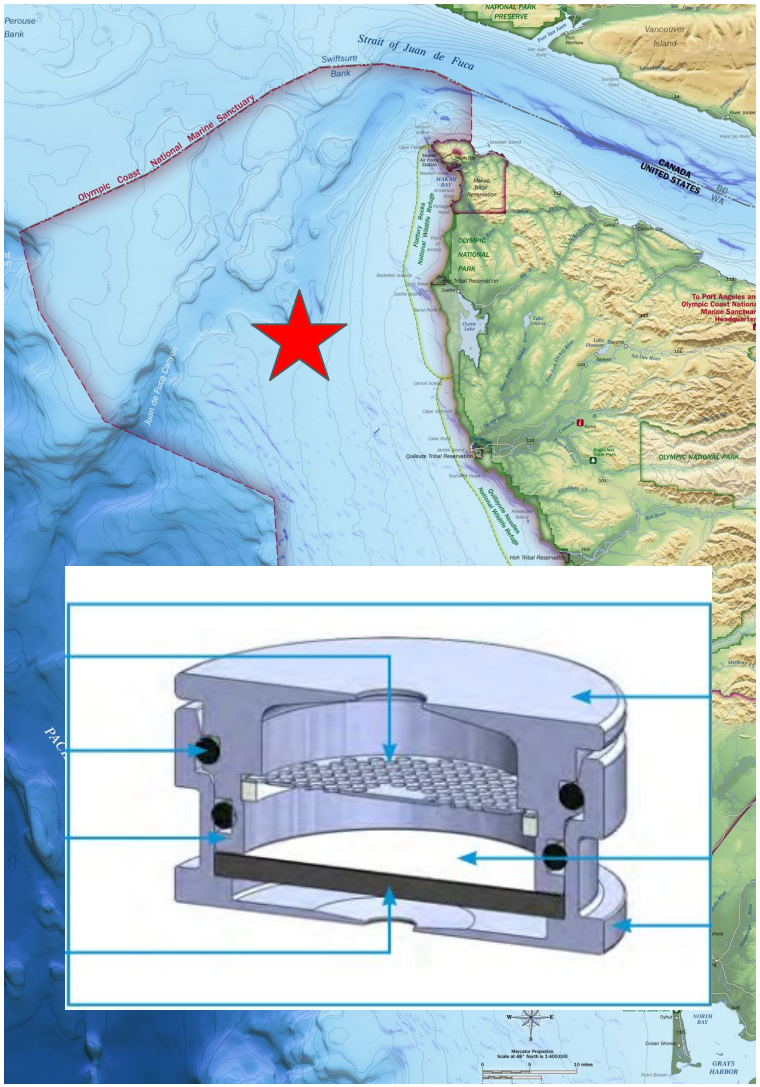

McCabe et. al 2016

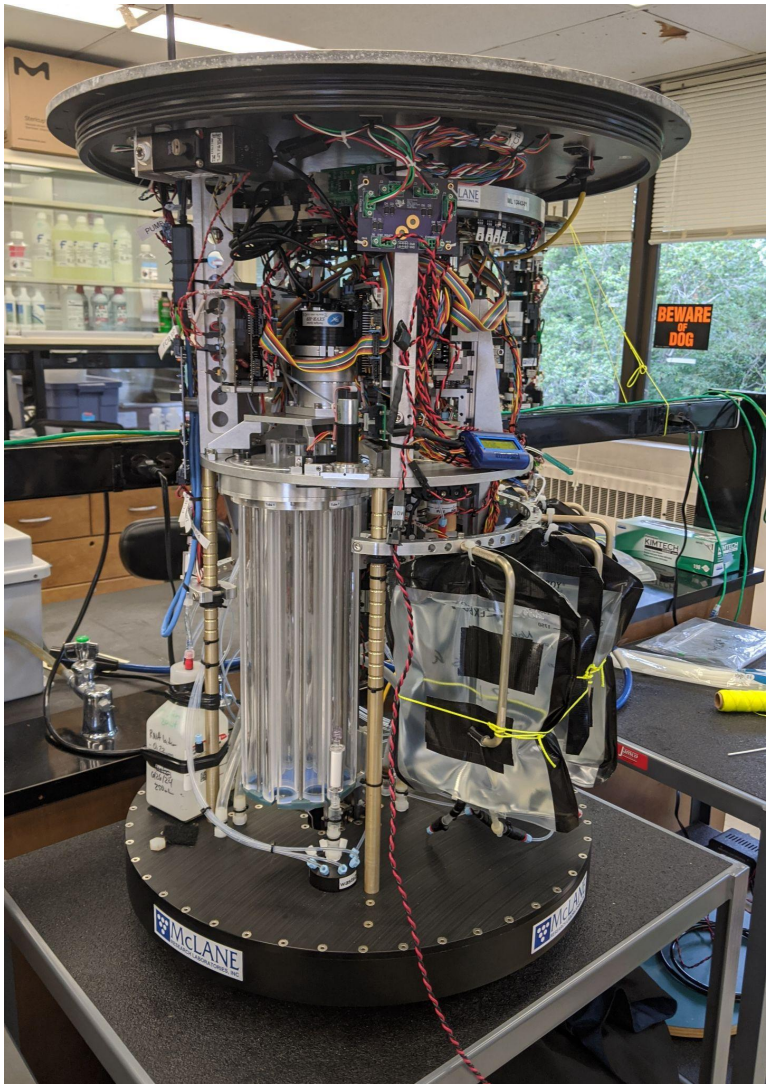
What allows *Pseudo-nitzschia* to outcompete other phytoplankton and form toxic blooms?

**Objective: Identify phytoplankton species that co-occur with *Pseudo-nitzschia* and share its ecological niche.**



**eDNA includes sloughed cells, metabolic wastes, and whole organisms – such as phytoplankton.**


Perouse Bank
Strait of Juan de Fuca
Swiftsure Bank
Olympic Coast National Marine Sanctuary
Vancouver Island
CANADA
UNITED STATES
OLYMPIC NATIONAL PARK
OLYMPIC NATIONAL PARK
Juan de Fuca Canyon
GRAYS HARBOR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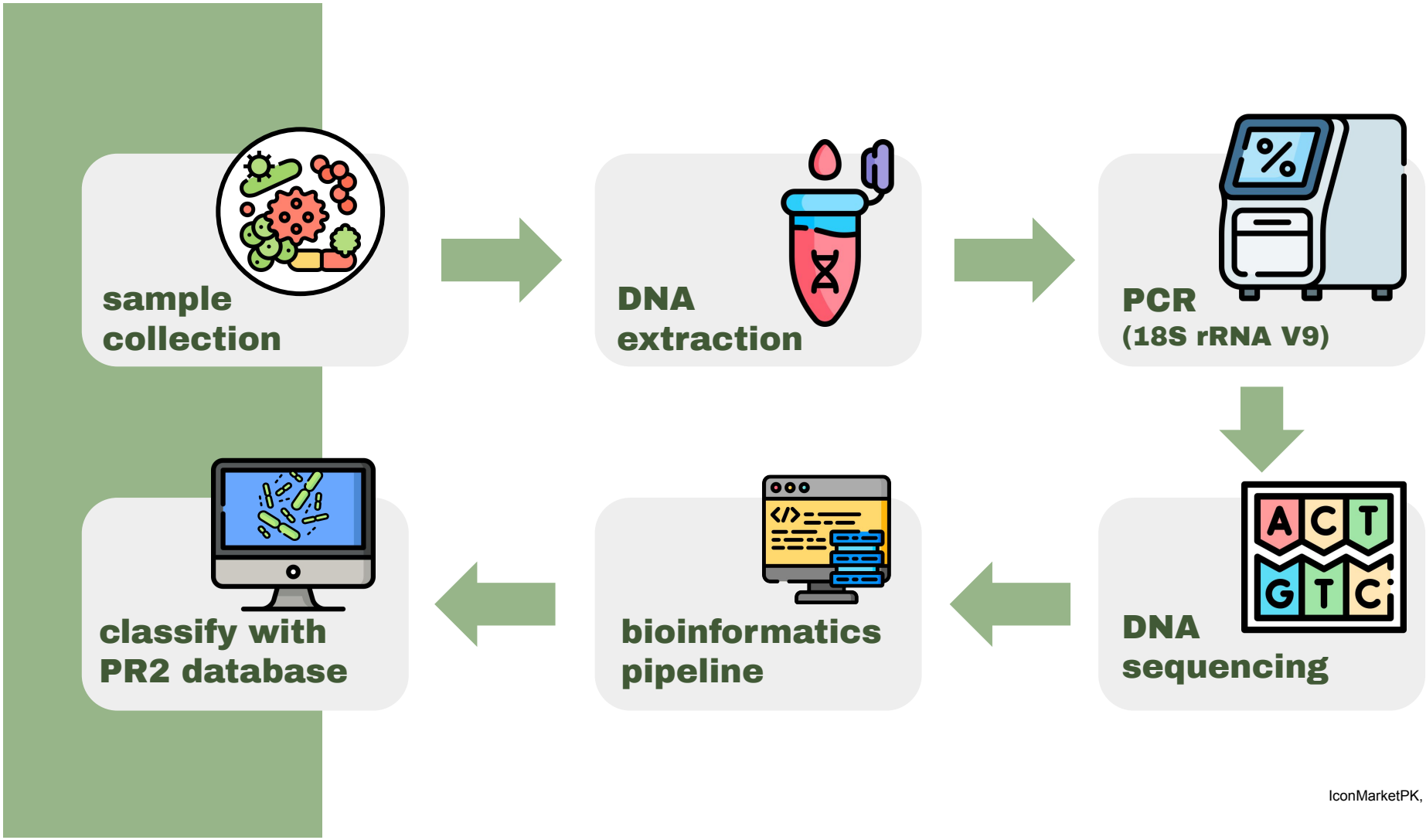


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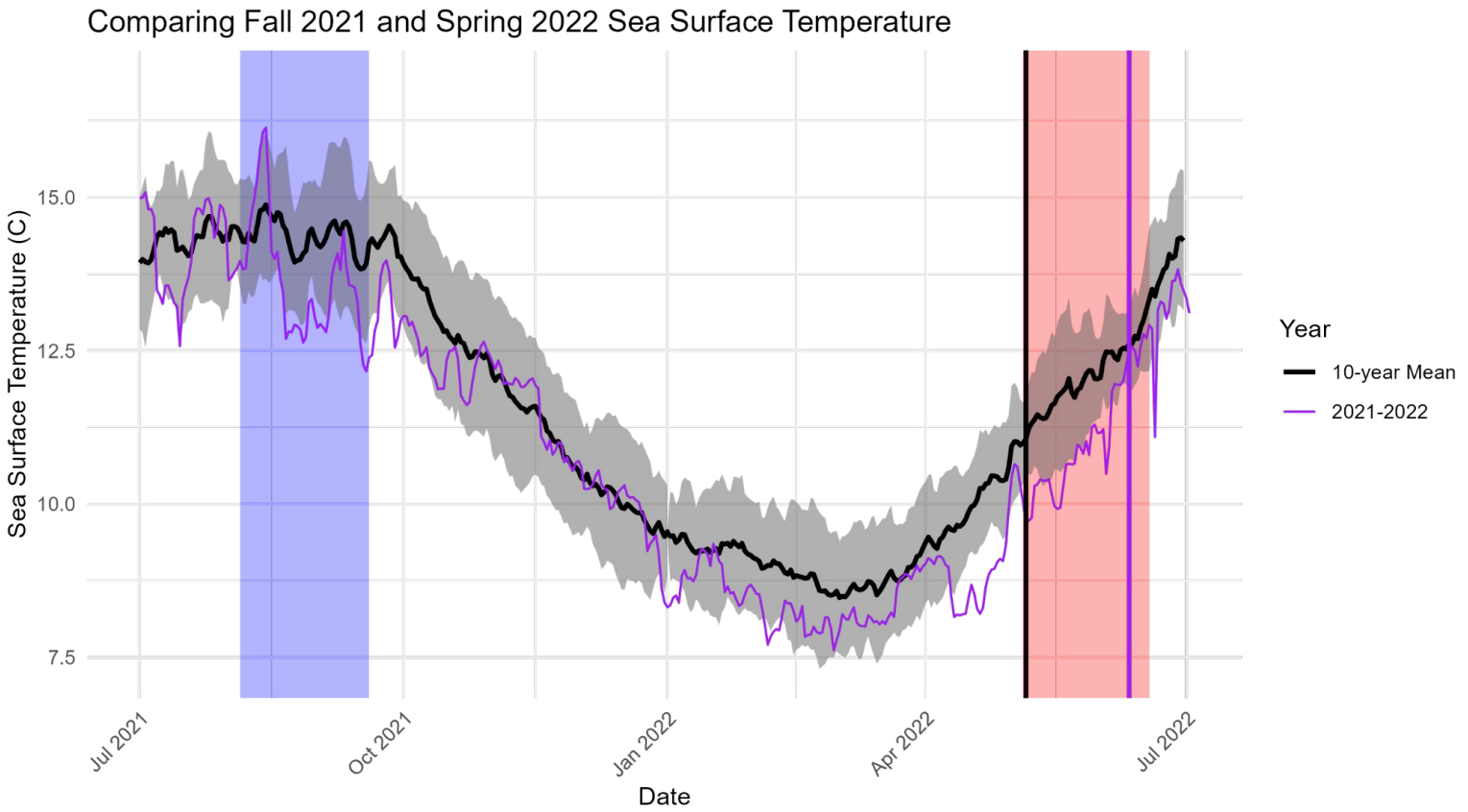
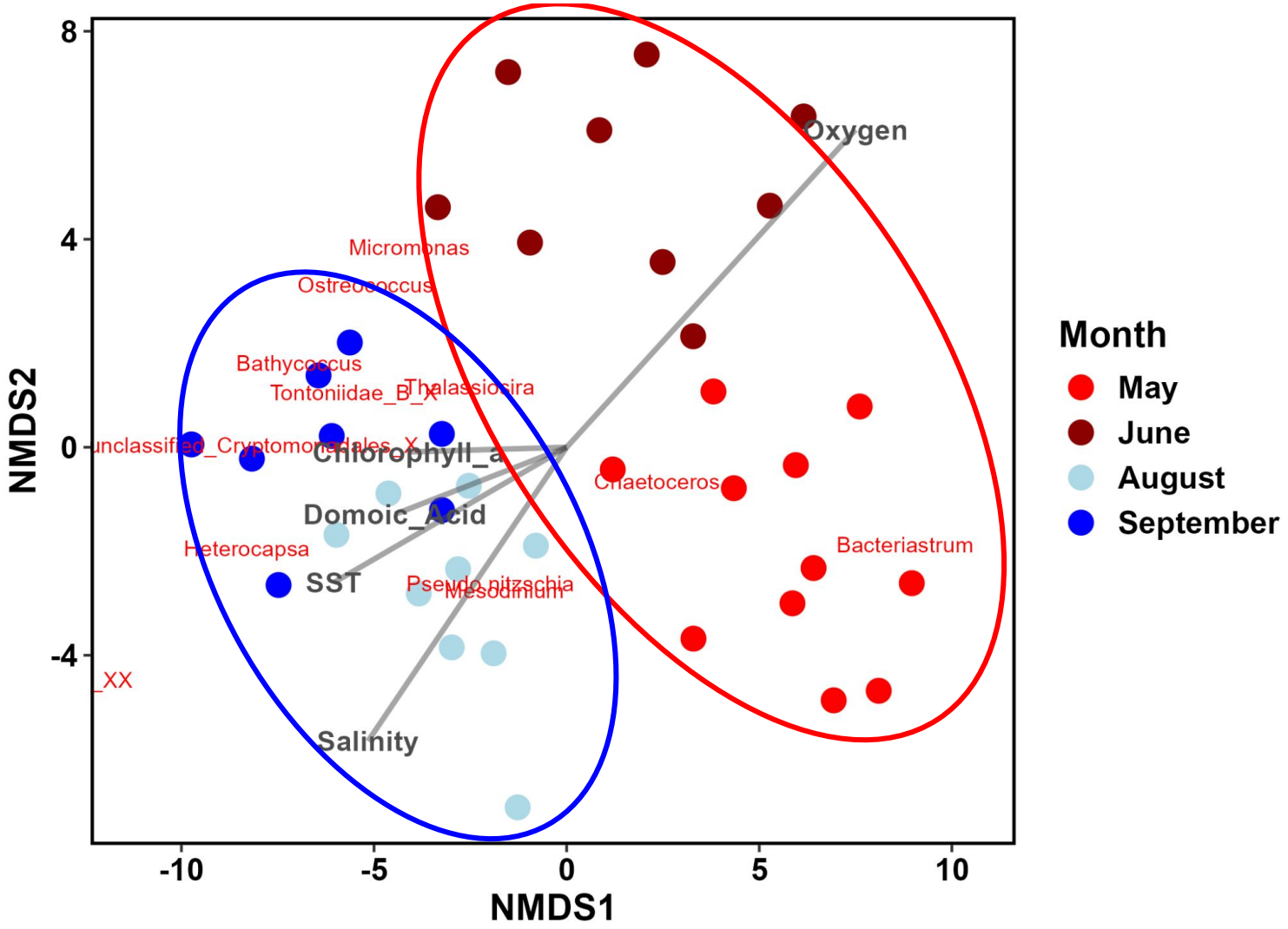



**Both of our sampling periods experienced colder-than-average temperatures.**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Thalassiosira
unclassified_Cryptomonadales_X
Chlorophyll_a
Chaetoceros
Domoic_Acid
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Bacteriastrum
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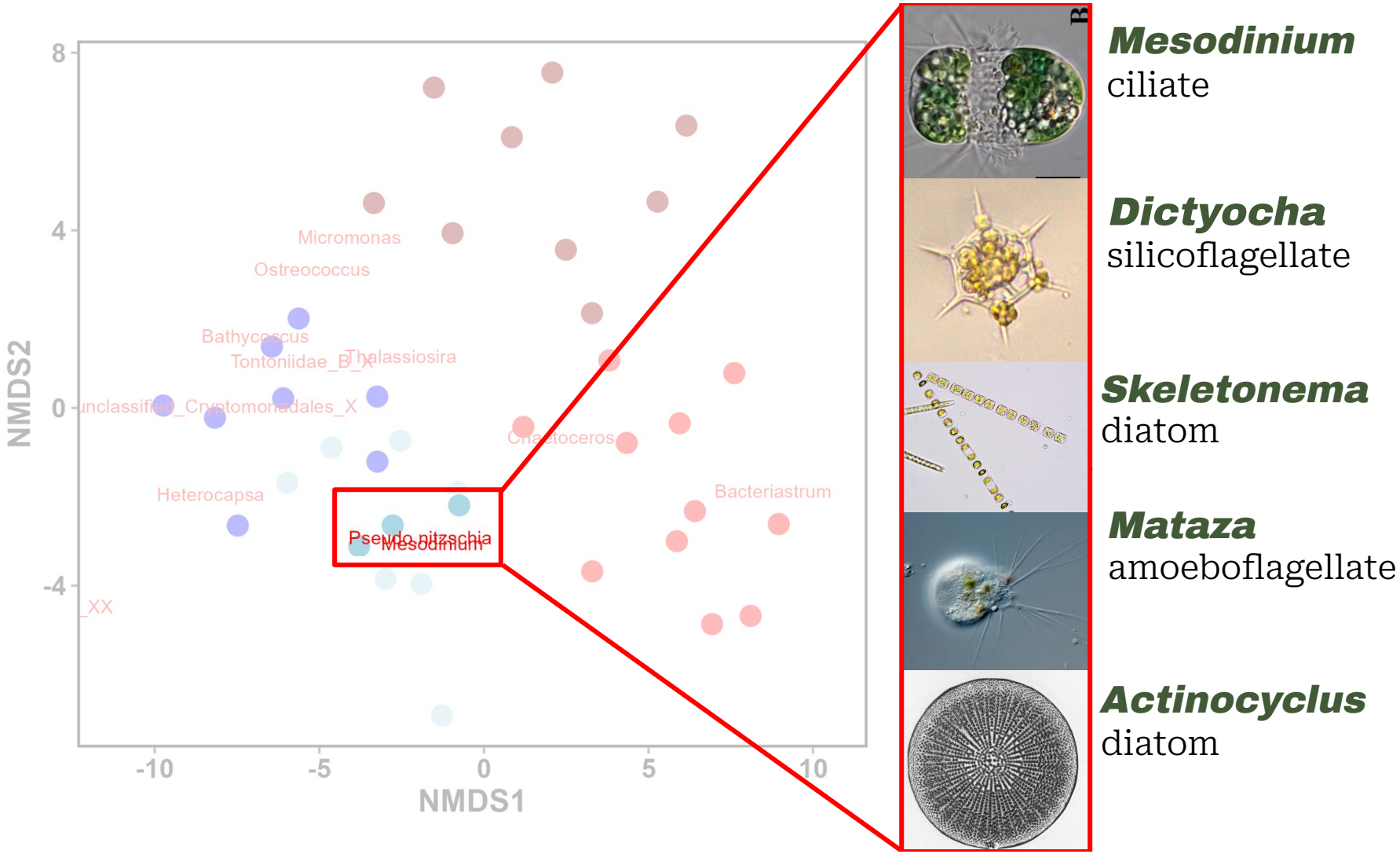
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Chaetoceros
Heterocapsa
Bacteriastrum
Pseudo-nitzschia
Mesodinium
_XX
Mesodinium
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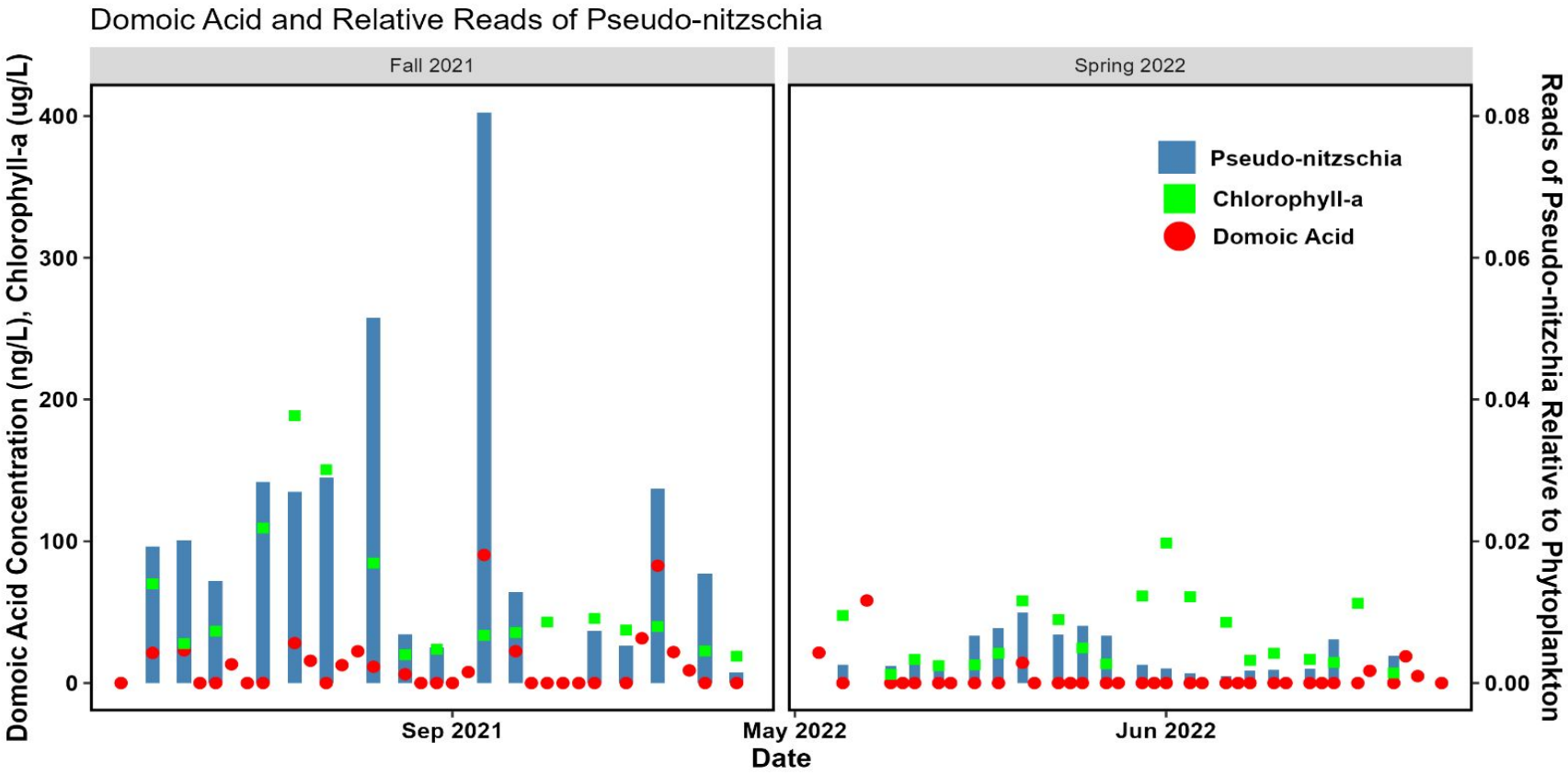
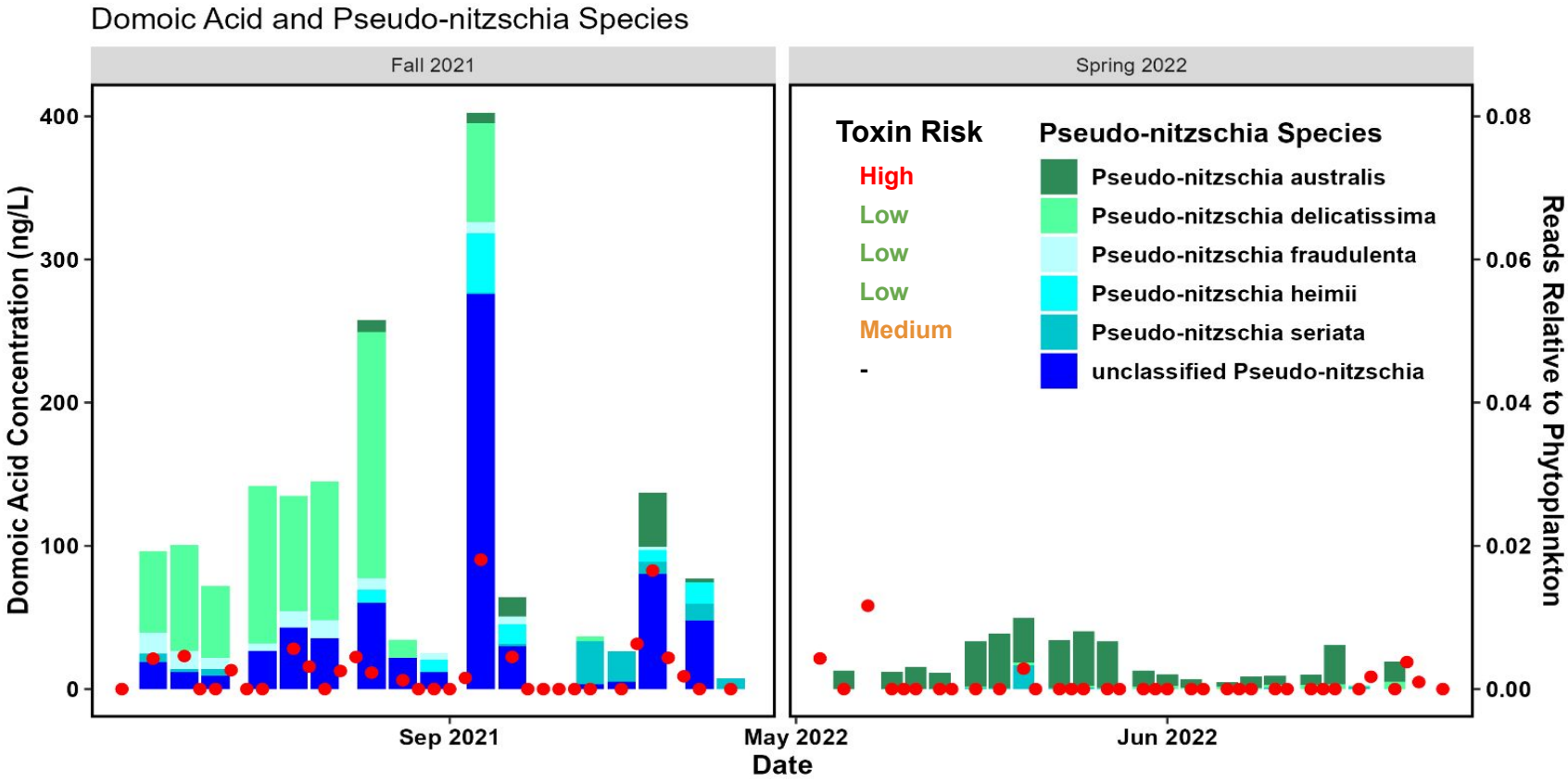
Dictyocha
silicoflagellate
Skeletonema
diatom
Mataza
amoeboflagellate
Actinocyclus
diatom




***Pseudo-nitzschia* was significantly correlated with chlorophyll-a (0.03) and domoic acid (<0.01).**




**Higher relative reads of high-toxin species were not always associated with higher domoic acid production.**

# Summary

Autonomously collected eDNA can be used to characterize phytoplankton communities.

Other taxa that occupy a similar ecological niche to *Pseudo-nitzschia* include a ciliate, a silicoflagellate, an amoeboflagellate and two other diatoms.

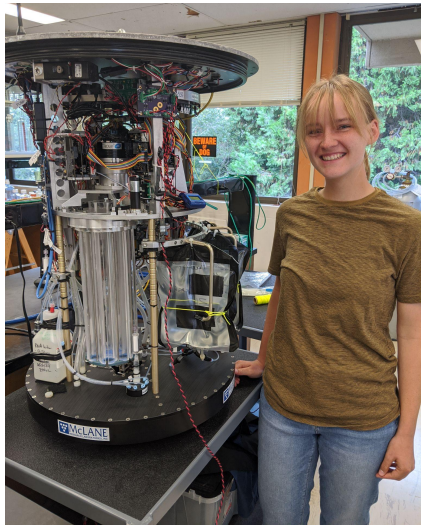
Different *Pseudo-nitzschia* species with different toxin risk occur at different times of the year.

**Identifying environmental and biological drivers of *Pseudo-nitzschia* blooms helps NOAA build resilience to domoic acid events.**

**Elucidate bloom dynamics**

**Inform and improve early warning of HABs**

**Prepare coastal communities to withstand HAB events**


# Thank You!

## Questions?

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PMEL ‘Omics Lab

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