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Identification of Phytoplankton and community changes in Irish costal waters

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Contents

Who is the Marine Institute

What do we do

Phytoplankton and HABs

Changes in Phytoplankton composition

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About us

We are the State agency responsible for marine research, technology development and innovation in Ireland.

We provide scientific and technical advice to Government to help inform policy and to support the sustainable development of Ireland's marine resource.

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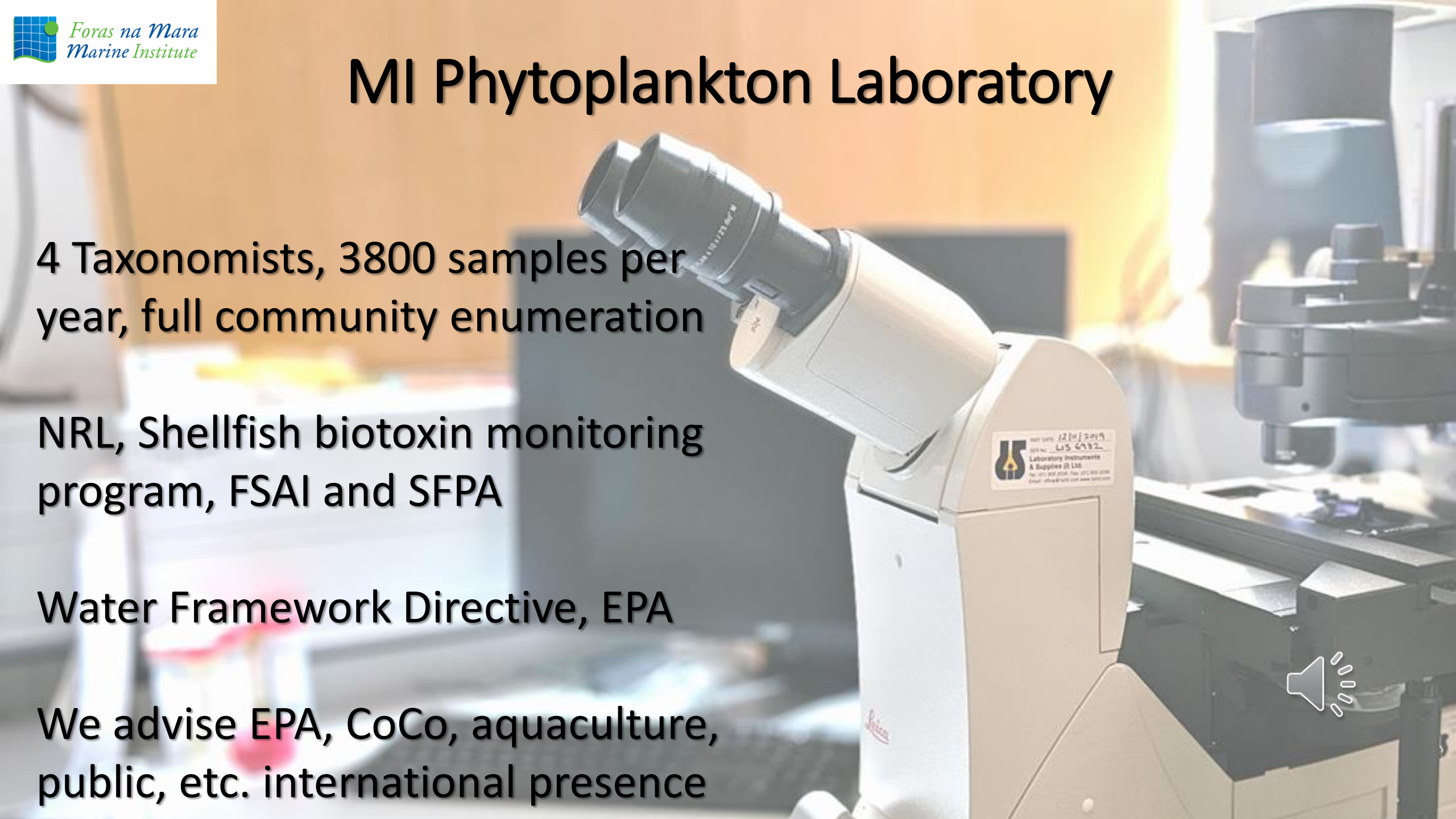
MI Phytoplankton Laboratory

4 Taxonomists, 3800 samples per year, full community enumeration

NRL, Shellfish biotoxin monitoring program, FSAI and SFPA

Water Framework Directive, EPA

We advise EPA, CoCo, aquaculture, public, etc. international presence



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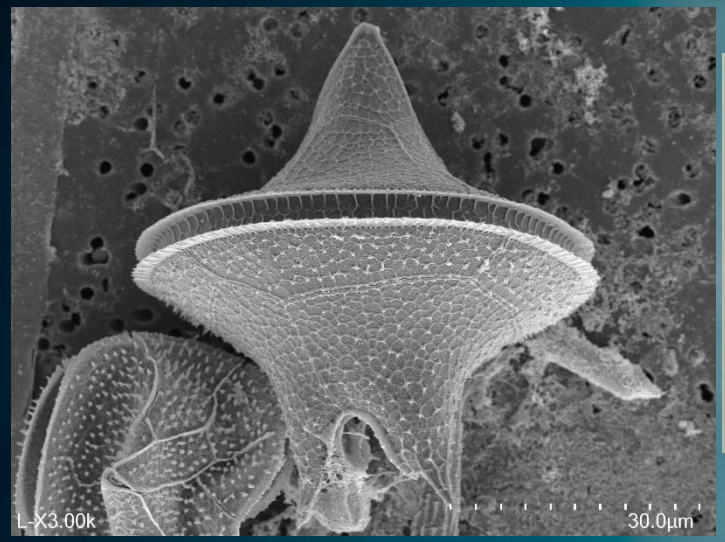
What are Phytoplankton?

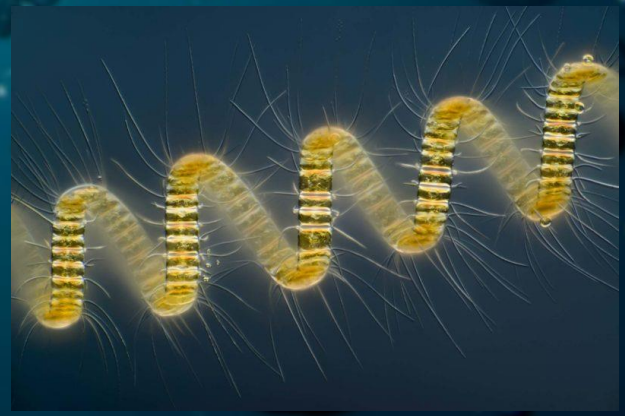


Phytoplankton are microscopic, single-celled organisms

Typically >1mm, Photosynthesize

Primary producers, provides the foundation of the food chain

Responsible for at least 50% of global Oxygen production



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Pollution and climate change

Phytoplankton are essential to the functioning of aquatic habitats and deliver essential services to our planet

The eutrophication and/or pollution of waterbodies, compounded with climate change, could reduce biodiversity and could increase the frequency in HABs

We are seeing changes in Ireland, for example *Alexandrium* in the SW, PSPsafe Project

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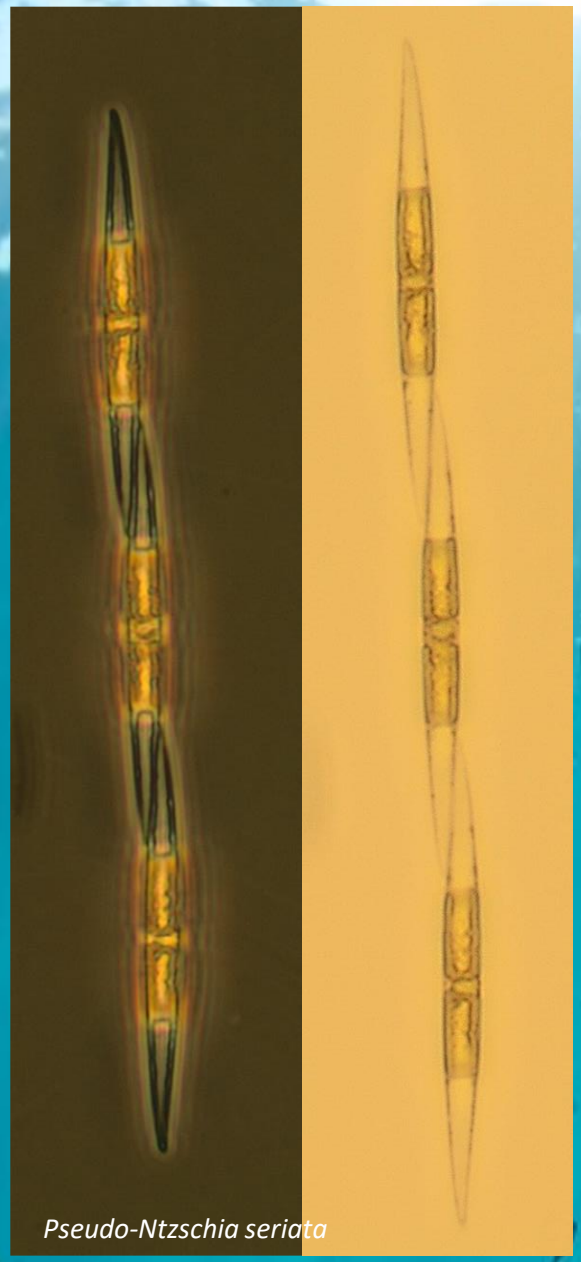
Pseudo-Nitzschia



Pseudo-Ntzschia seriata

Pennate diatom, typically occurring in the spring time, in cooler sea temperatures

Amnesic Shellfish Poisoning, ASP toxins, Domoic acids

Gastrointestinal symptoms, may include vomiting, nausea, diarrhea

Neurological symptoms may include headache, dizziness, disorientation, vision disturbances, loss of short-term memory, motor weakness, seizures…

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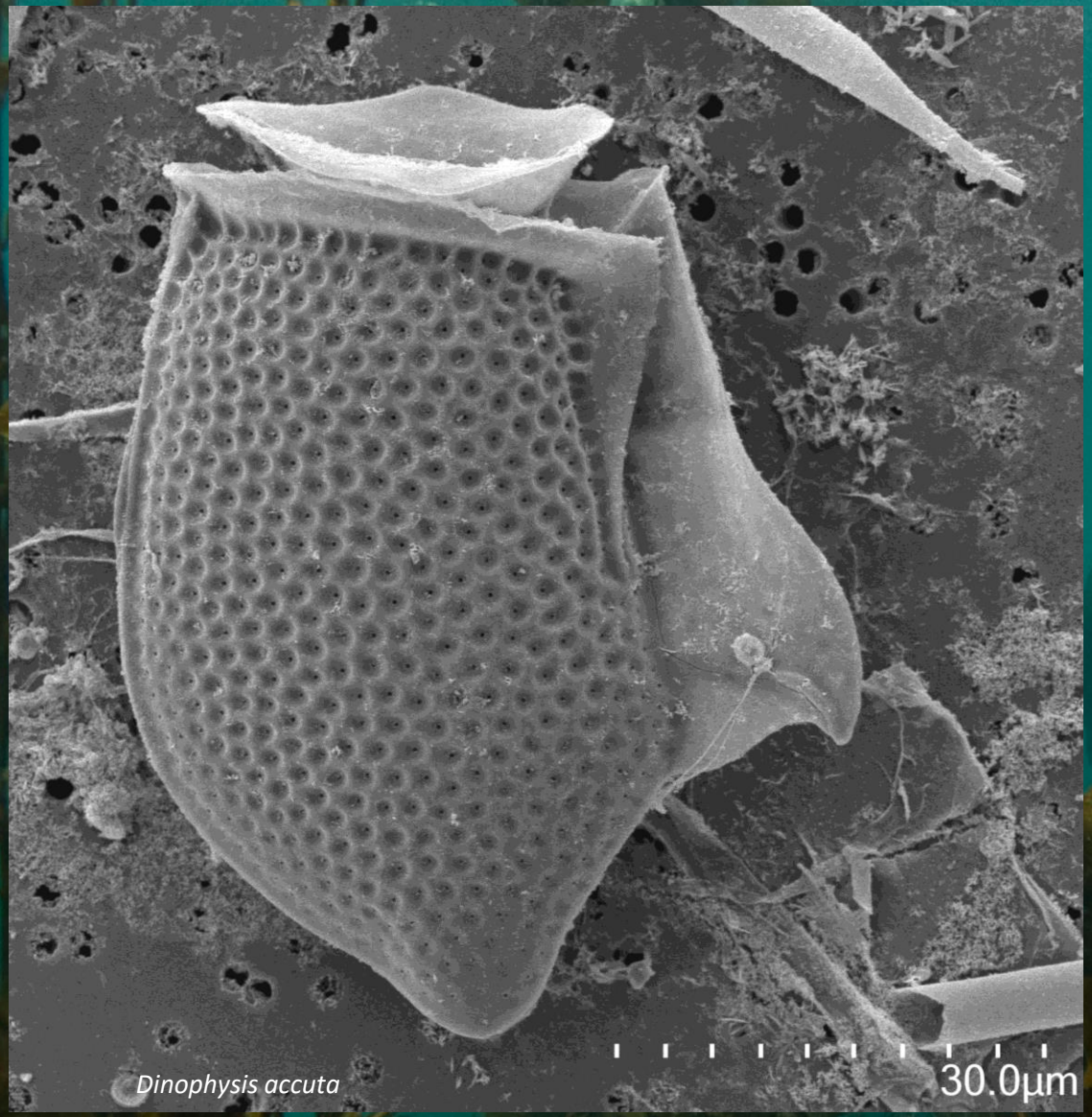
Dinophysis



Dinophysis accuta

Dinoflagellate, typically occuring from June onwards, as sea temperatures increase

Diarrheic shellfish poisoning, DSP toxin, okadaic acid

Okadaic acid, symptoms include severe diarrhea, severe abdominal pains, nausea and vomiting

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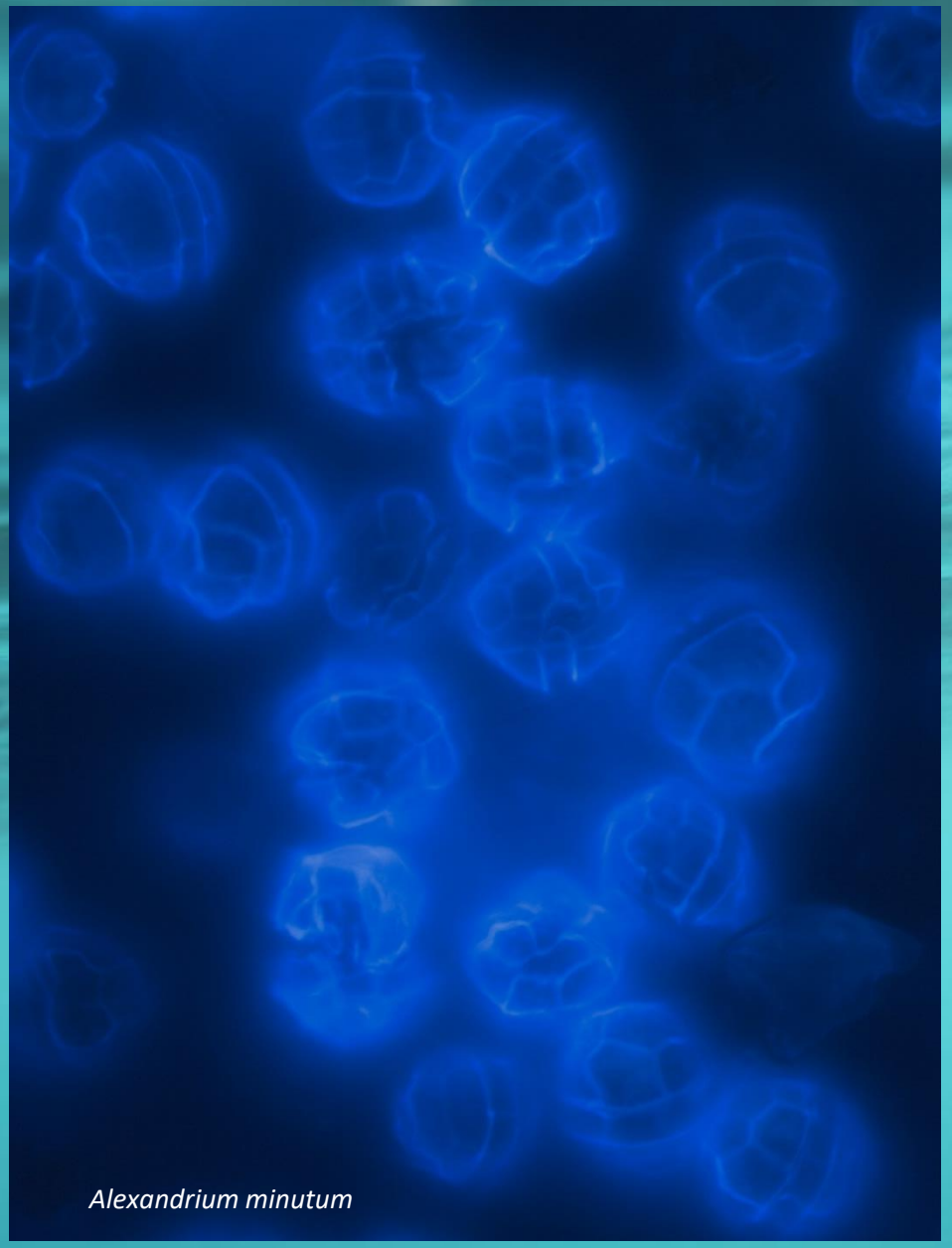
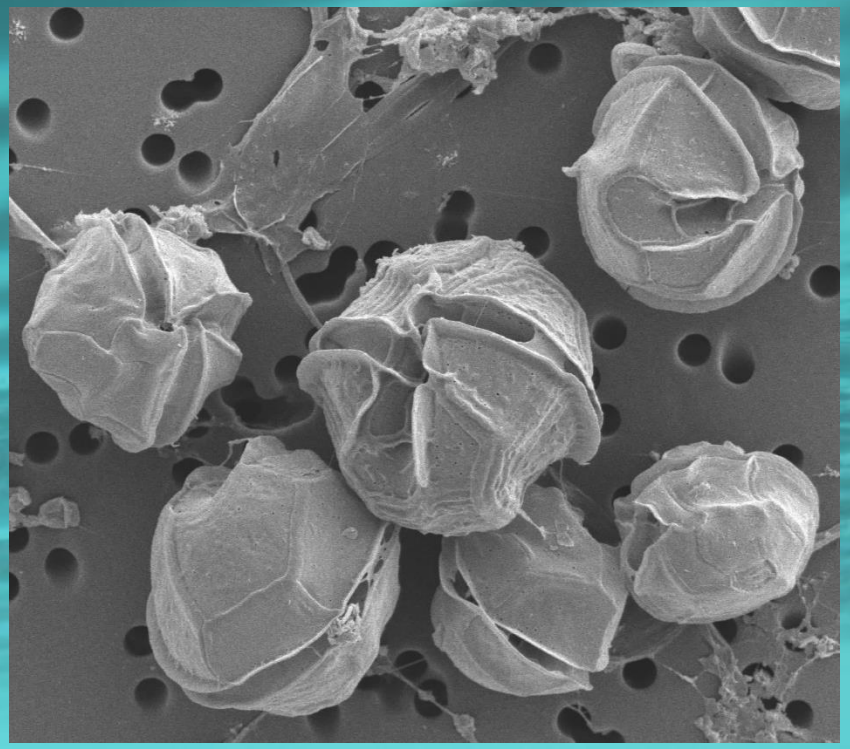
Alexandrium



Alexandrium minutum

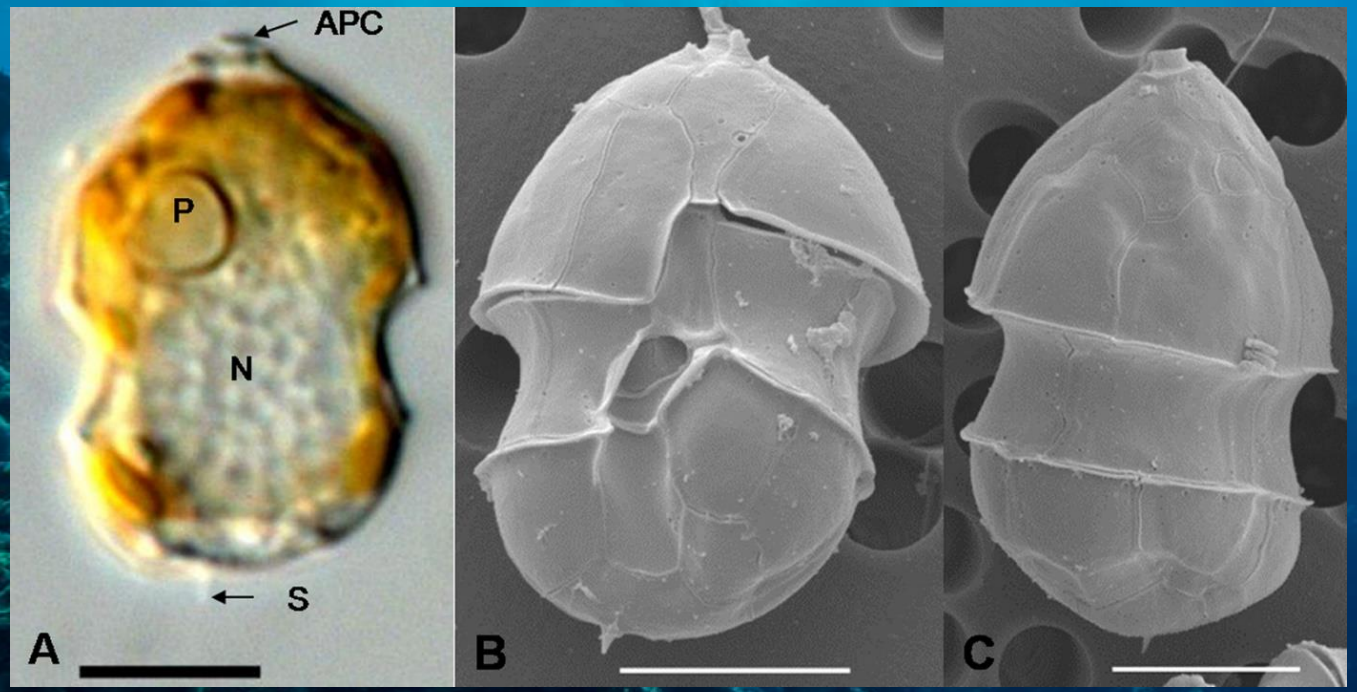


Dinoflagellate, typically occurring from June onwards, as sea temperatures increase

Paralytic Shellfish Poisoning, PSP toxin, Saxitoxin

PSP toxin can cause paralysis in extreme cases

Azadinium



Azadinium spinosum, Urban Tillmann

Dinoflagellate, typically occuring in the Autumn and Winter

Azaspiracids, AZA toxins

DSP-like symptoms of gastrointestinal illness, including nausea, vomiting, severe diarrhea, and stomach cramps

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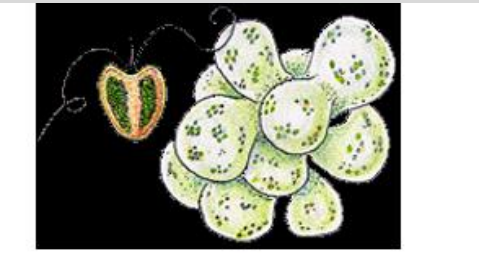
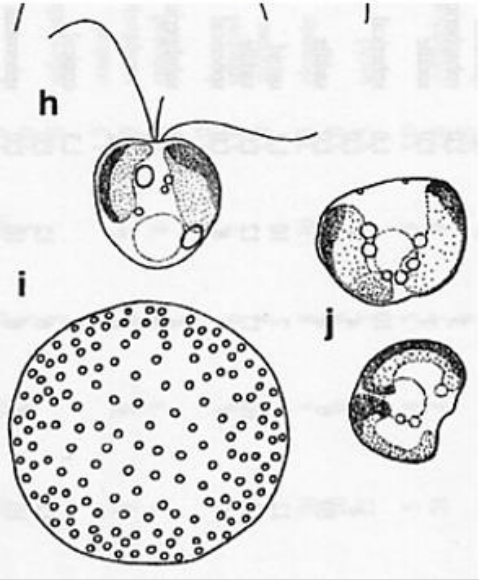
Karenia Mikimotoi

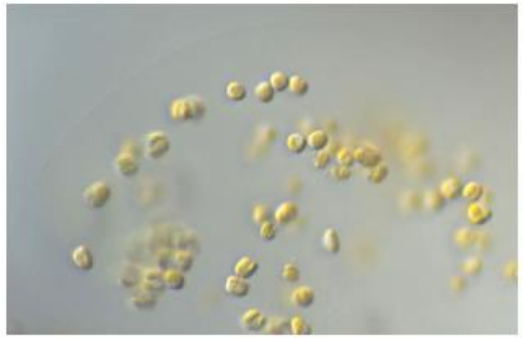
Brevetoxins

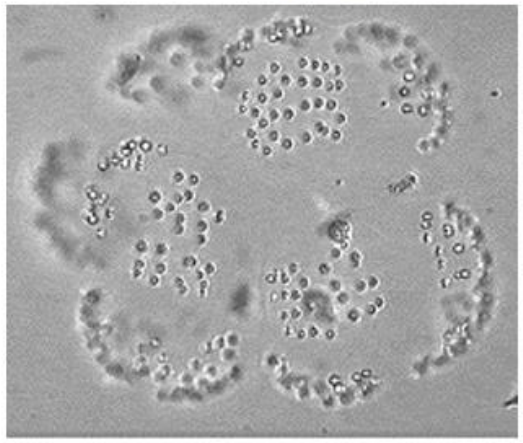
Karenia mikimotoi

Phaeocystis, foam producing









Death of five surfers in storm shocks Netherlands (The Guardian, May 2020)

Group caught in heavy seas and thick sea foam off coast of The Hague

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Noctiluca scintillans

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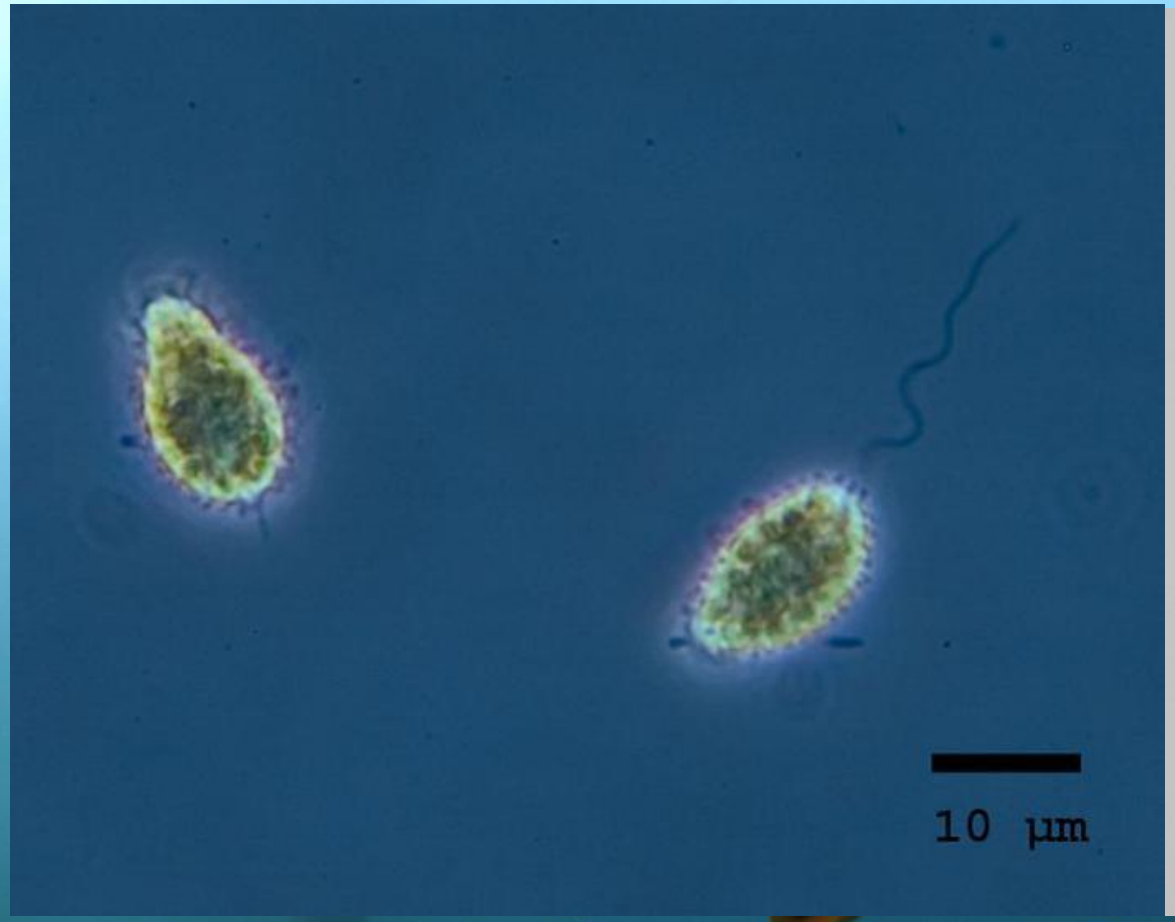
Ichthyotoxic species



2021, First confirmed occurrence of Pseudochatonella sp., Fibrocapsa sp. and Heterosigma sp. In Irish waters

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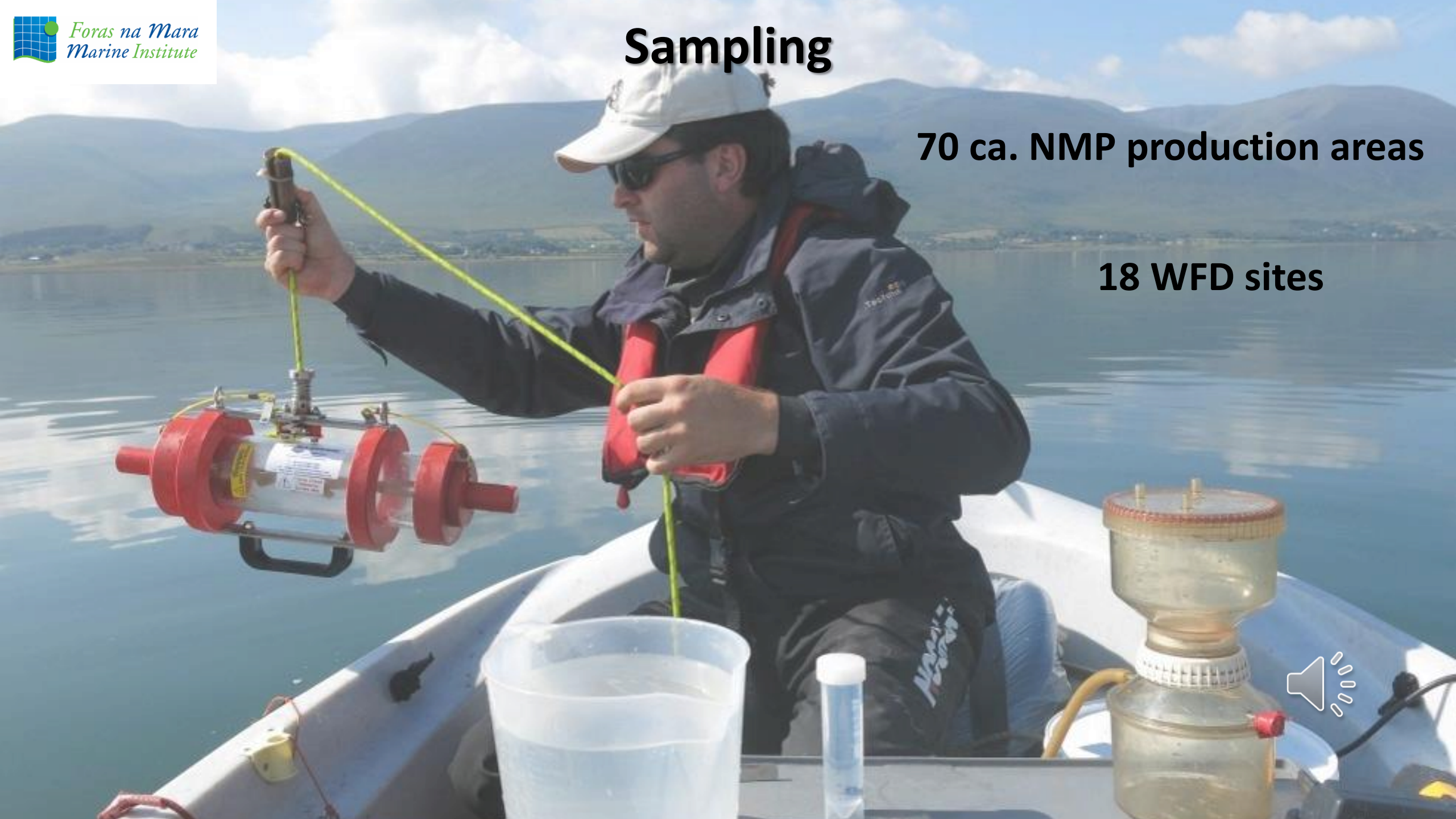
Sampling

70 ca. NMP production areas

18 WFD sites



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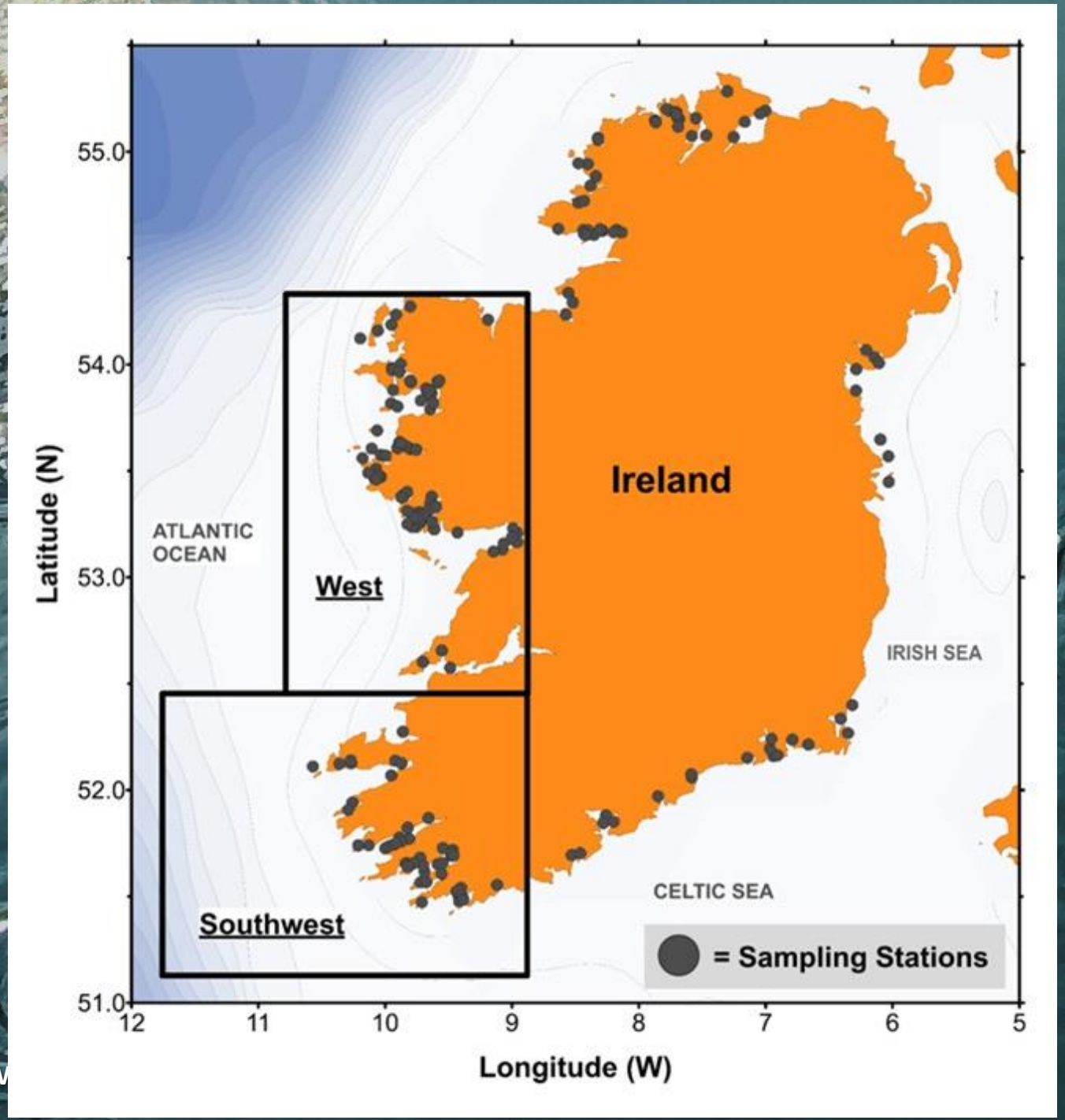

EPA, W

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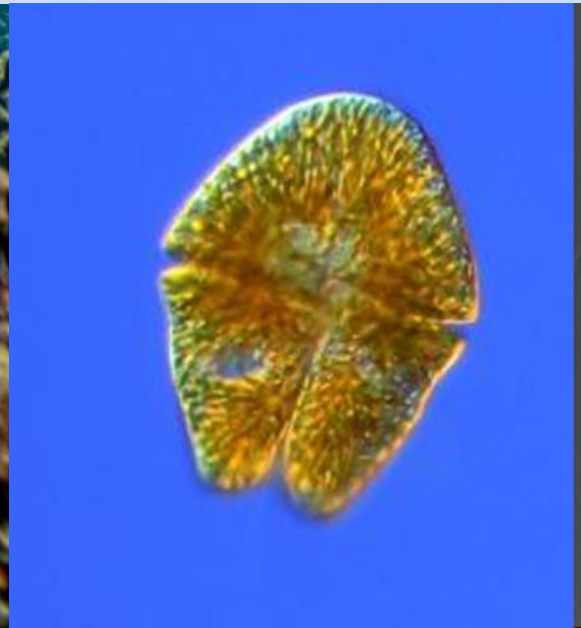
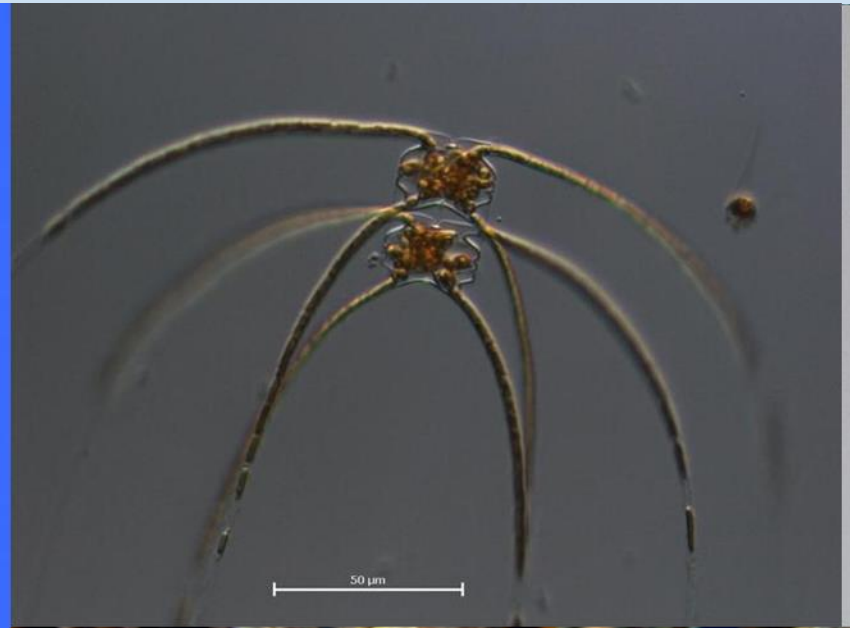
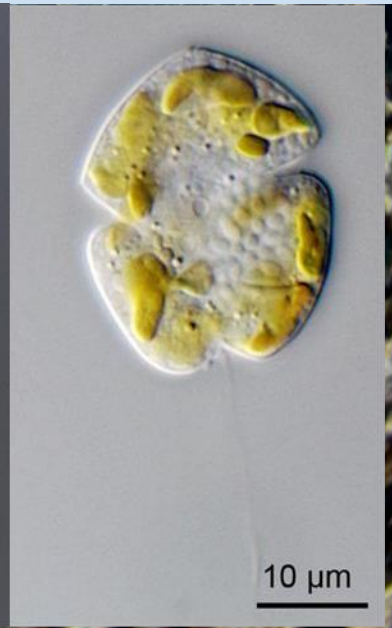
- Phytoplankton in coastal waters are abundant from February to October.
- Diatom blooms occur in both spring and autumn, with higher abundances in spring.
- There is an overall increase in monthly cell abundance for the total phytoplankton community from 2012 to 2020 compared to 2003 to 2011.
- Higher levels of phytoplankton are observed in late autumn and winter (October to January).







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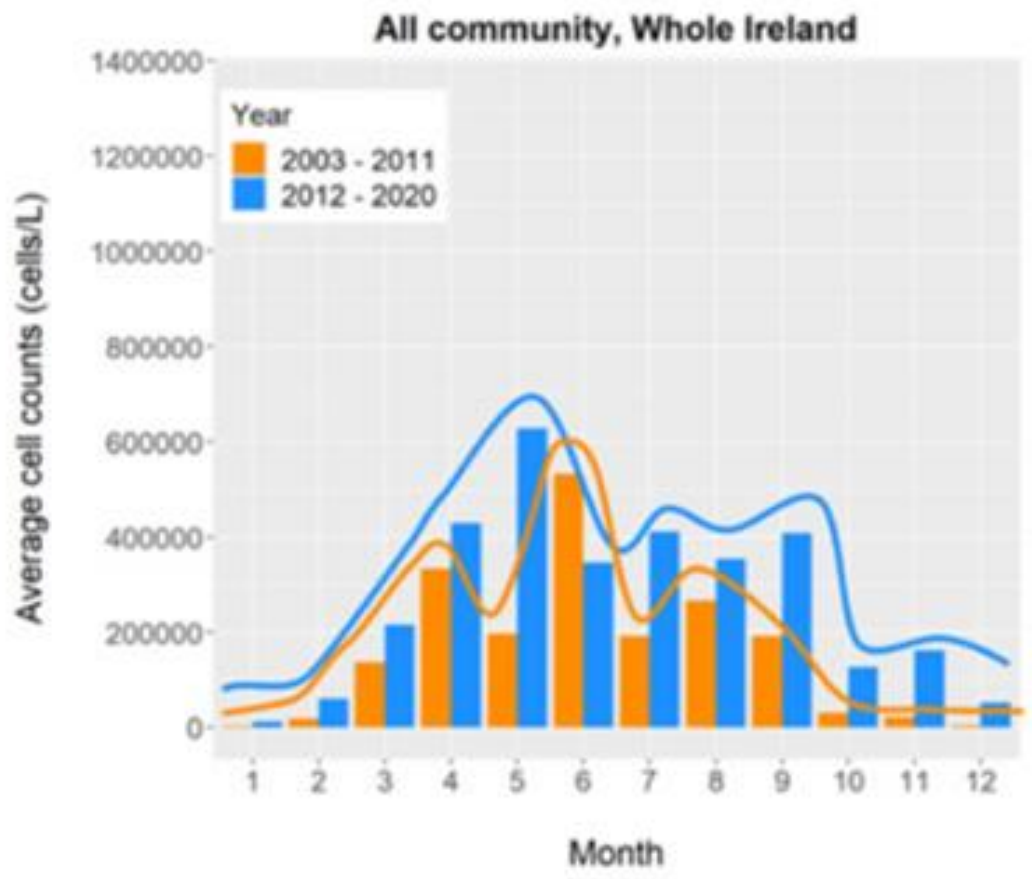

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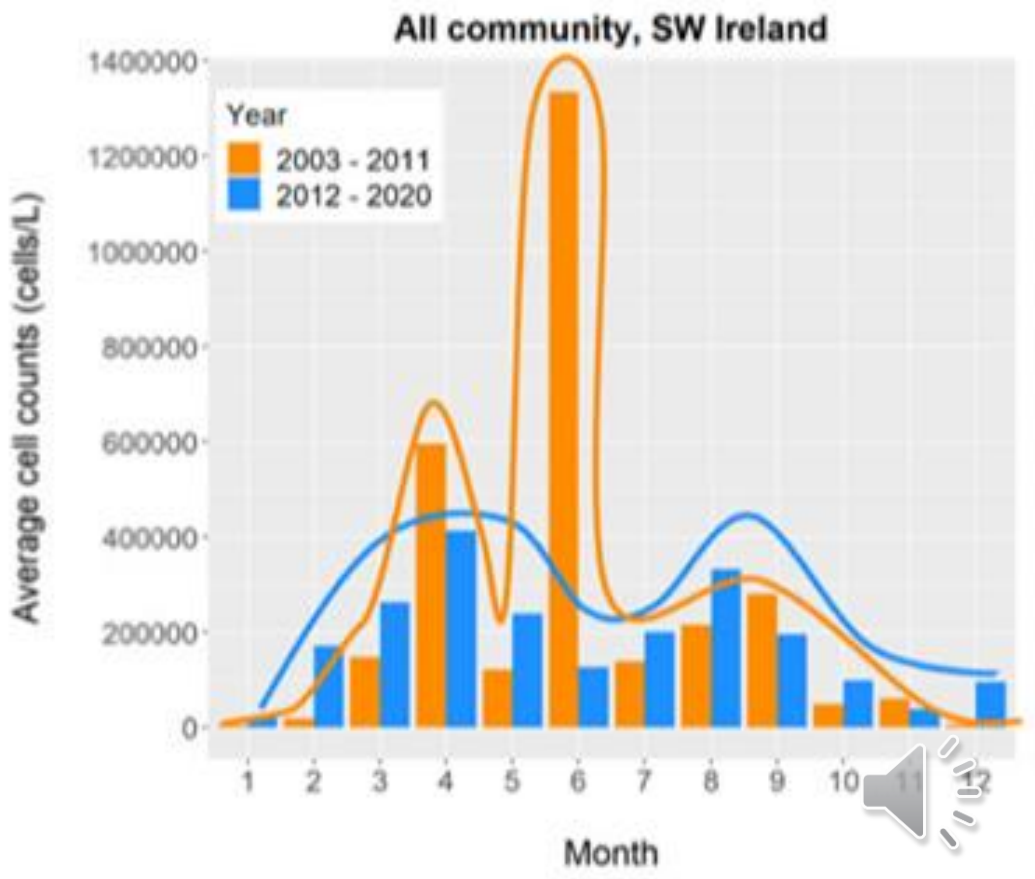

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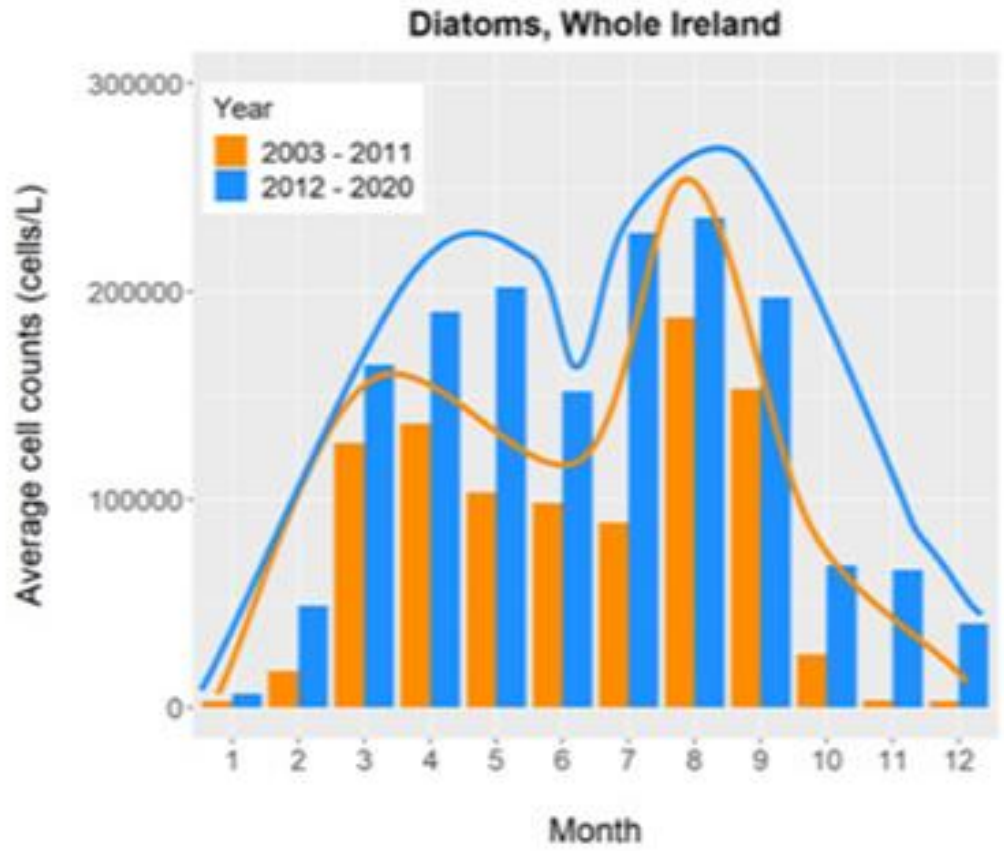

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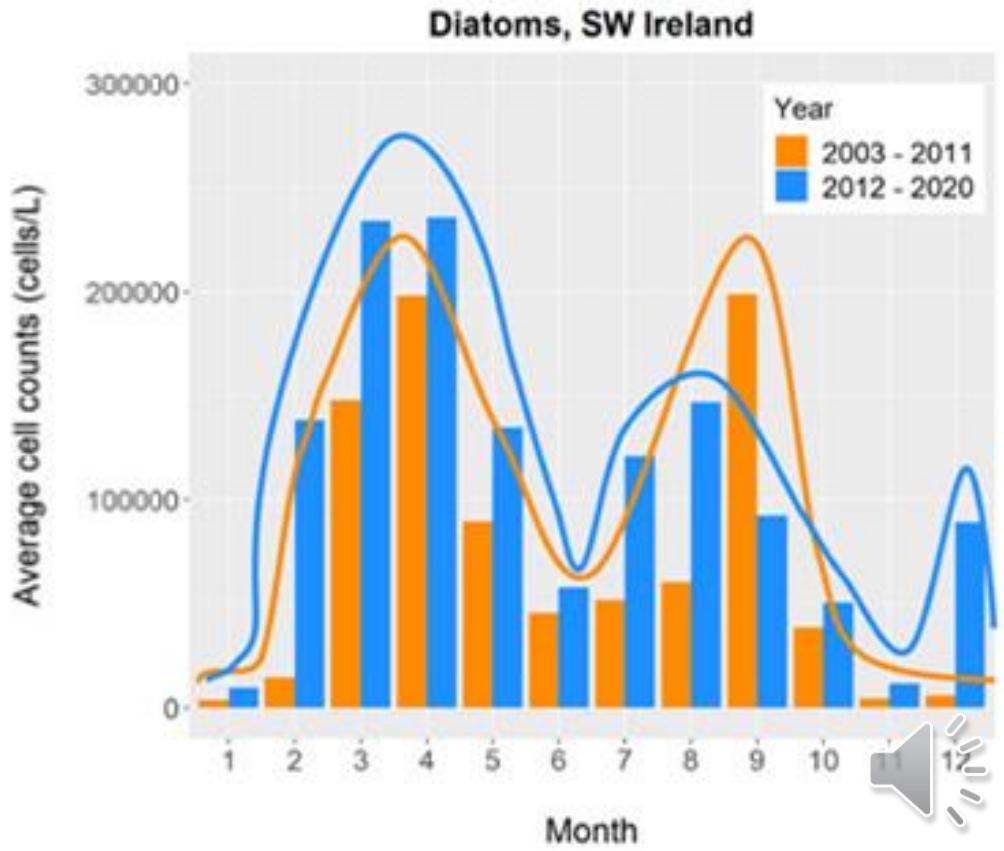

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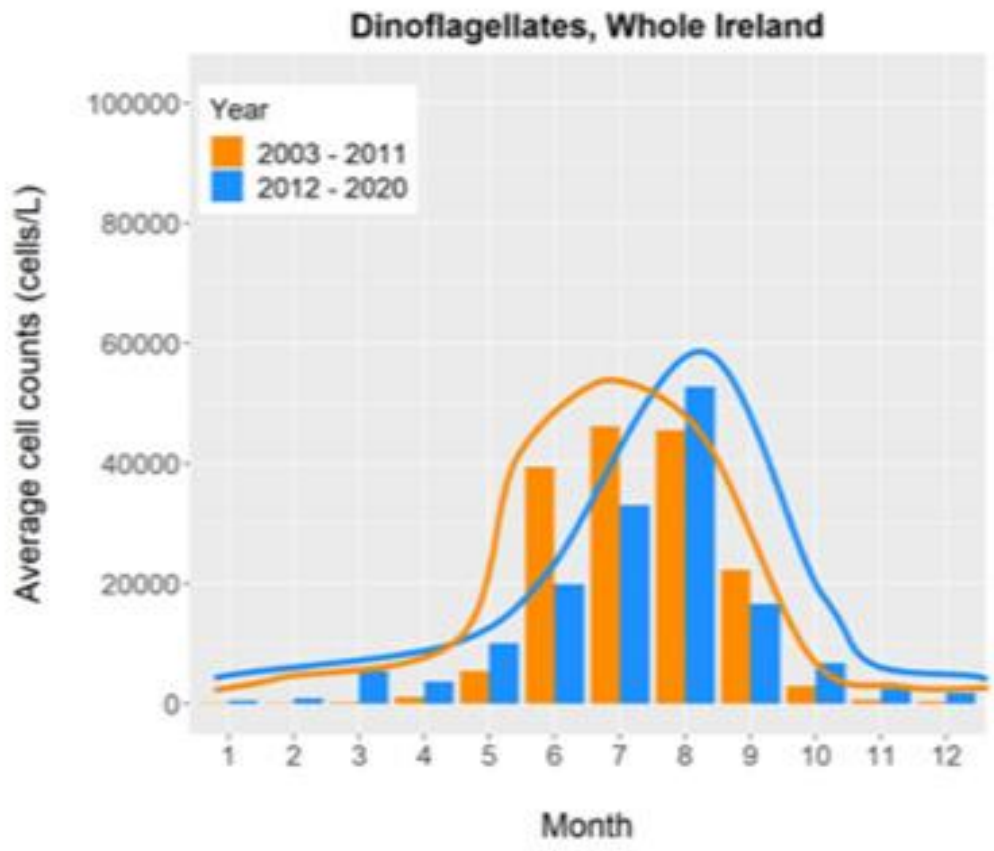

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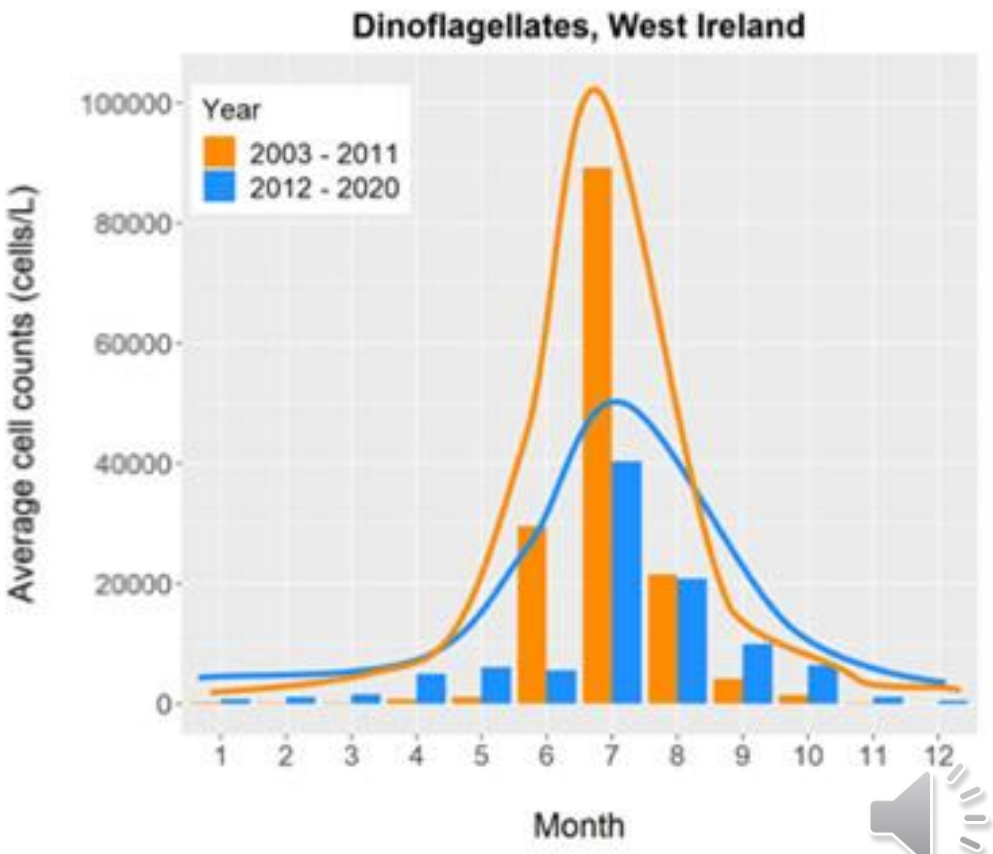

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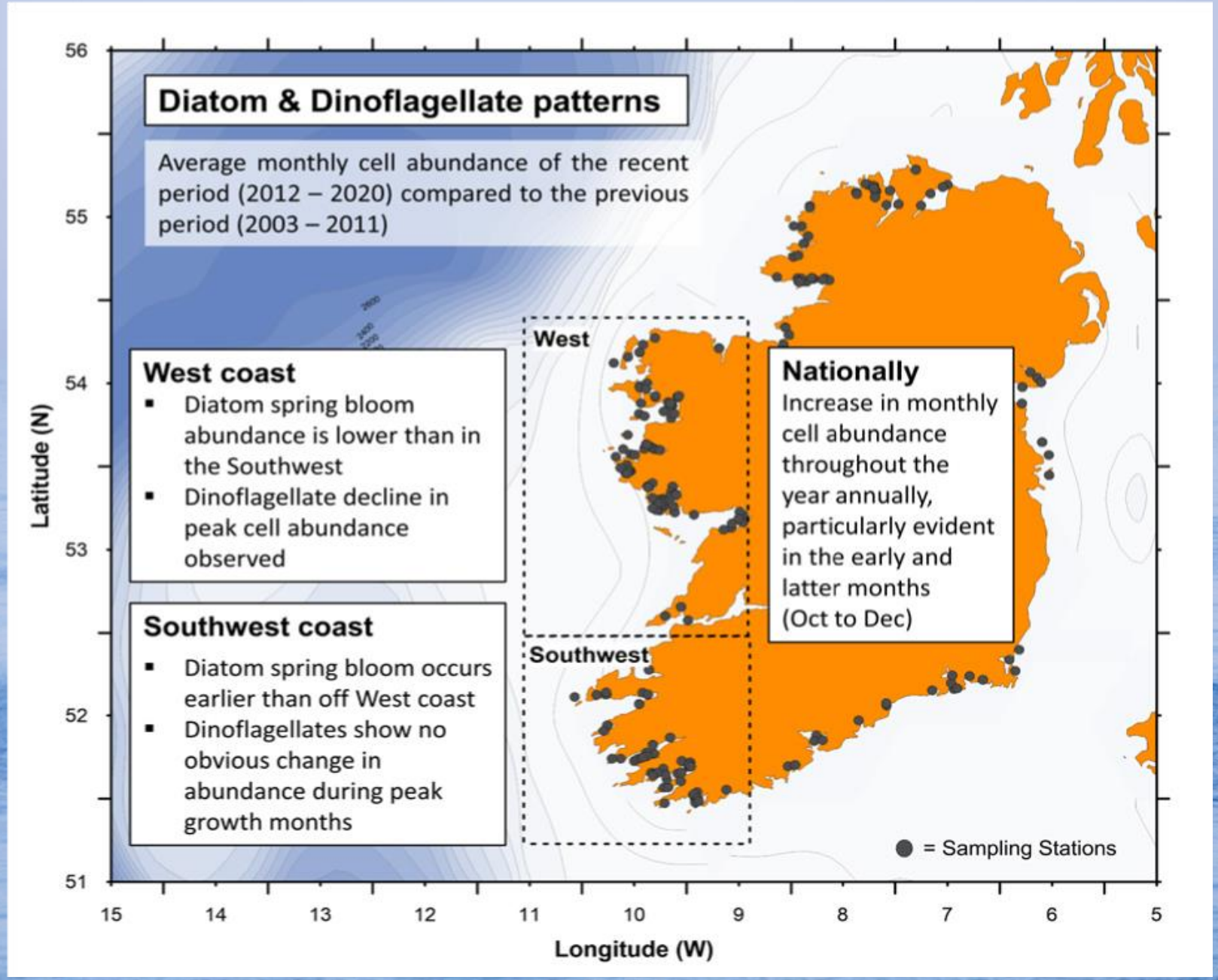

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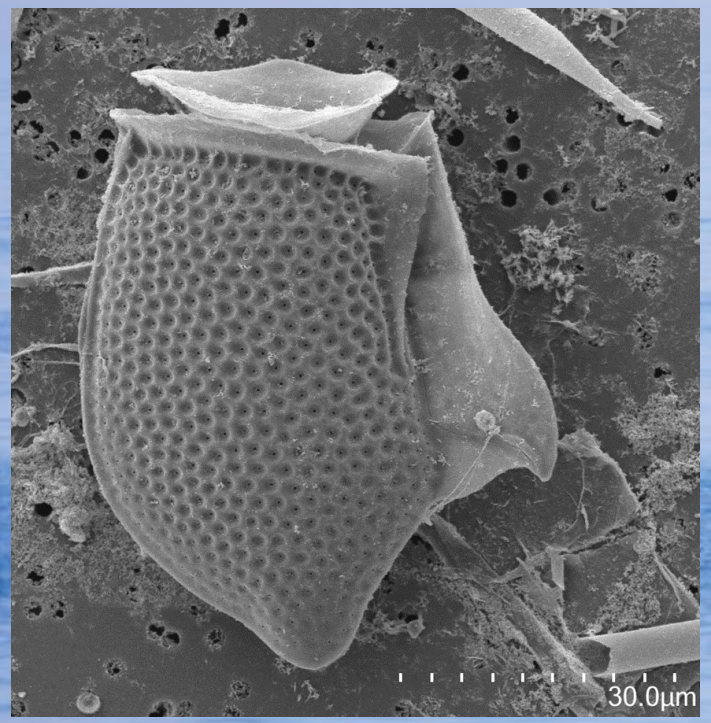

Dinophysis patterns in the last decade

Average monthly cell abundance of the recent decade (2011 – 2020) compared to the previous decade (2001 – 2010)

West coast

- *D. acuminata* showed greater abundance and occurring earlier in the year compared to *D. acuta*
- General decrease in abundance throughout the year

Southwest coast

- General increase in abundance
- *D. acuminata* seasonal pattern changed to bimodal
- *D. acuta* peak abundance observed later in the year

Nationally

D. acuta

- No Change

D. acuminata

- Peak average cell abundances observed later in the year

West

Southwest

● = Sampling Stations

Latitude (N): 56, 55, 54, 53, 52, 51

Longitude (W): 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5

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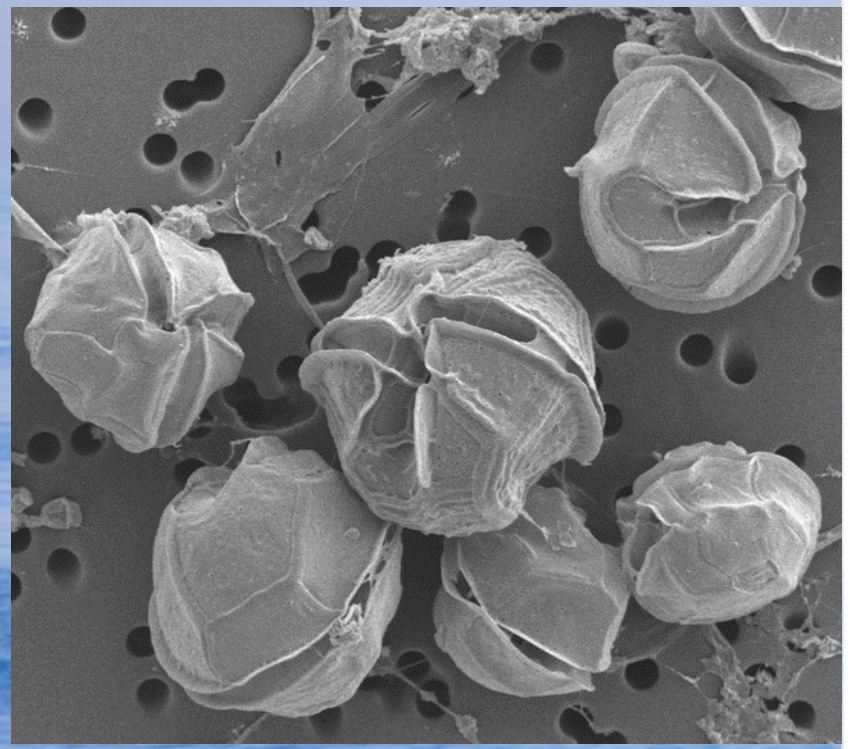

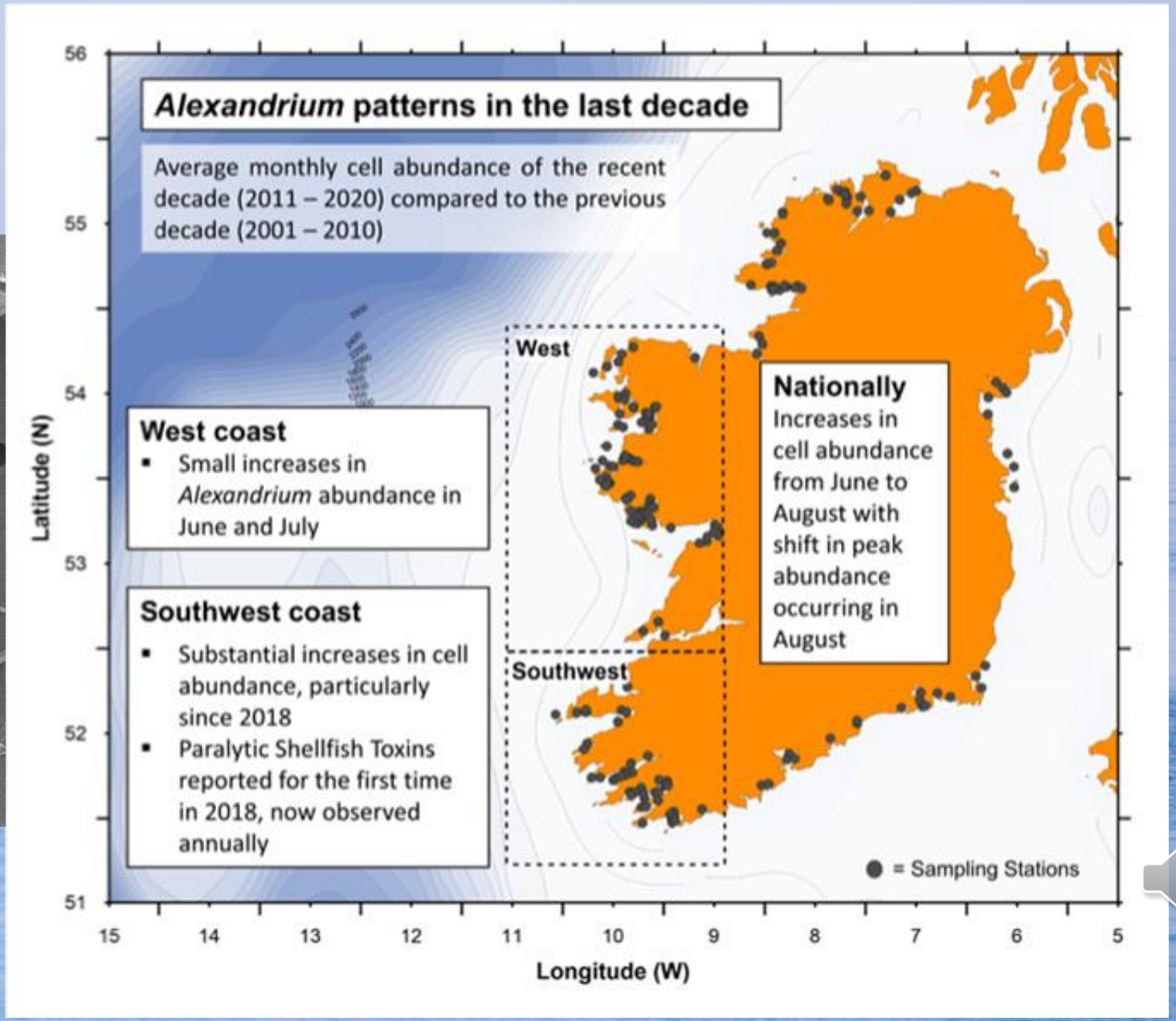

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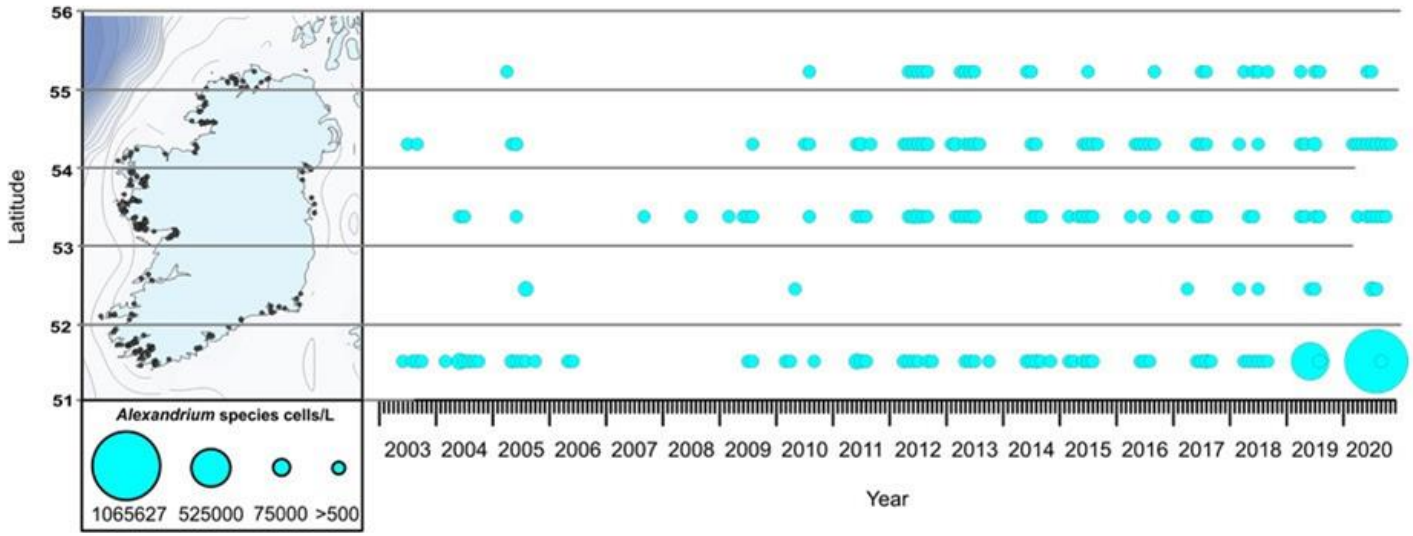

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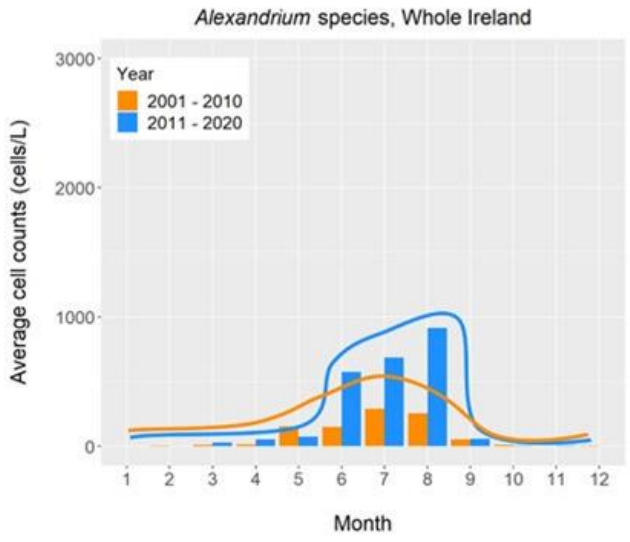

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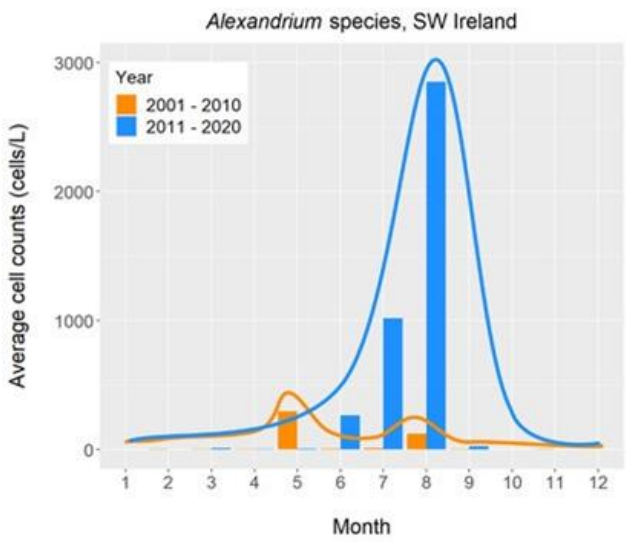

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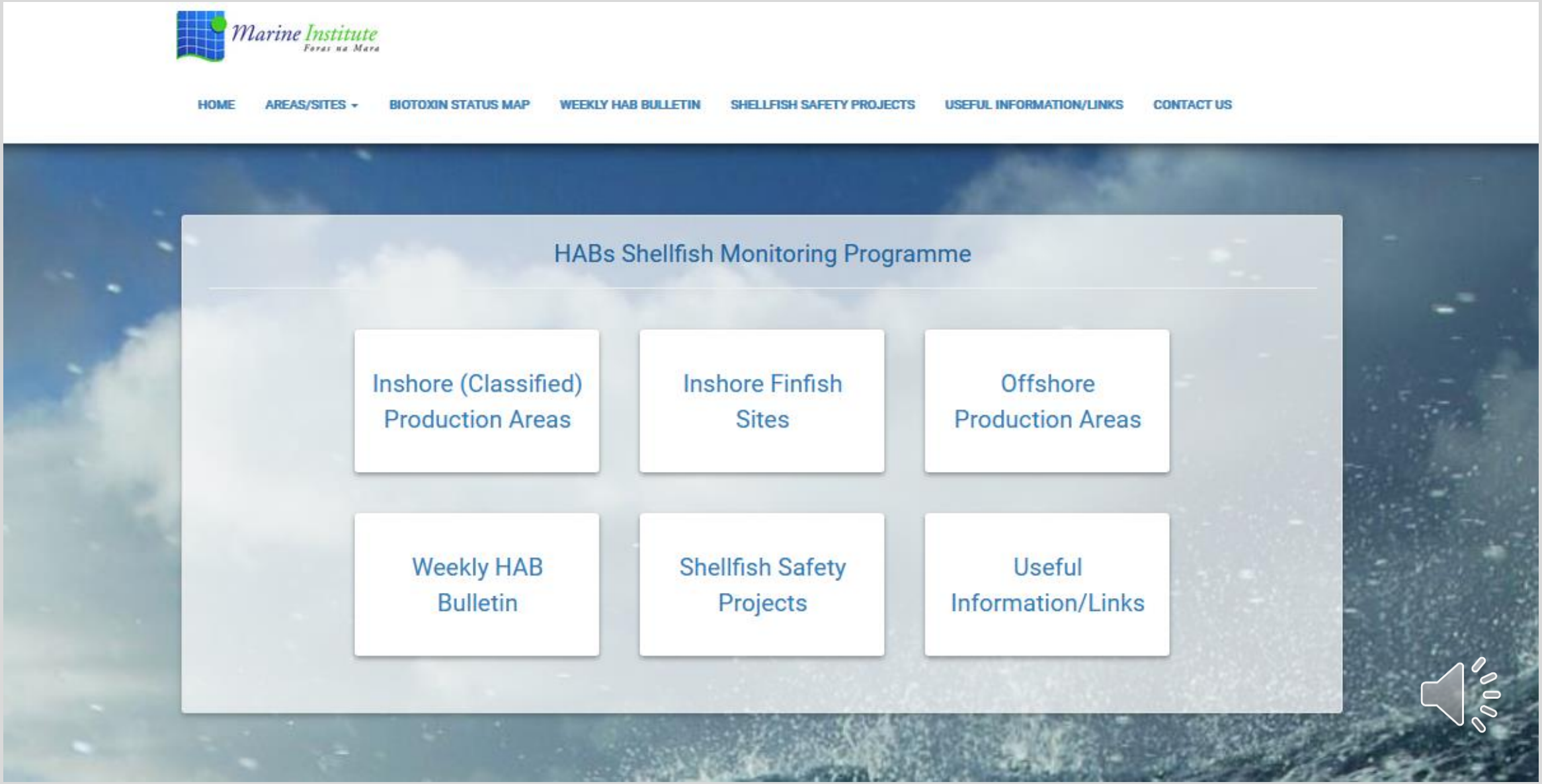
Conclusions

Phytoplankton are vital to the correct functioning of many habitats

We are seeing some changes in community structures, increases in Diatom abundance with a reduction in diversity and abundance of dinoflagellates, with the exception of Alexandrium sp. For example.

HABs Vs Biodiversity

MI Phytoplankton data



https://webapps.marine.ie/HABs/