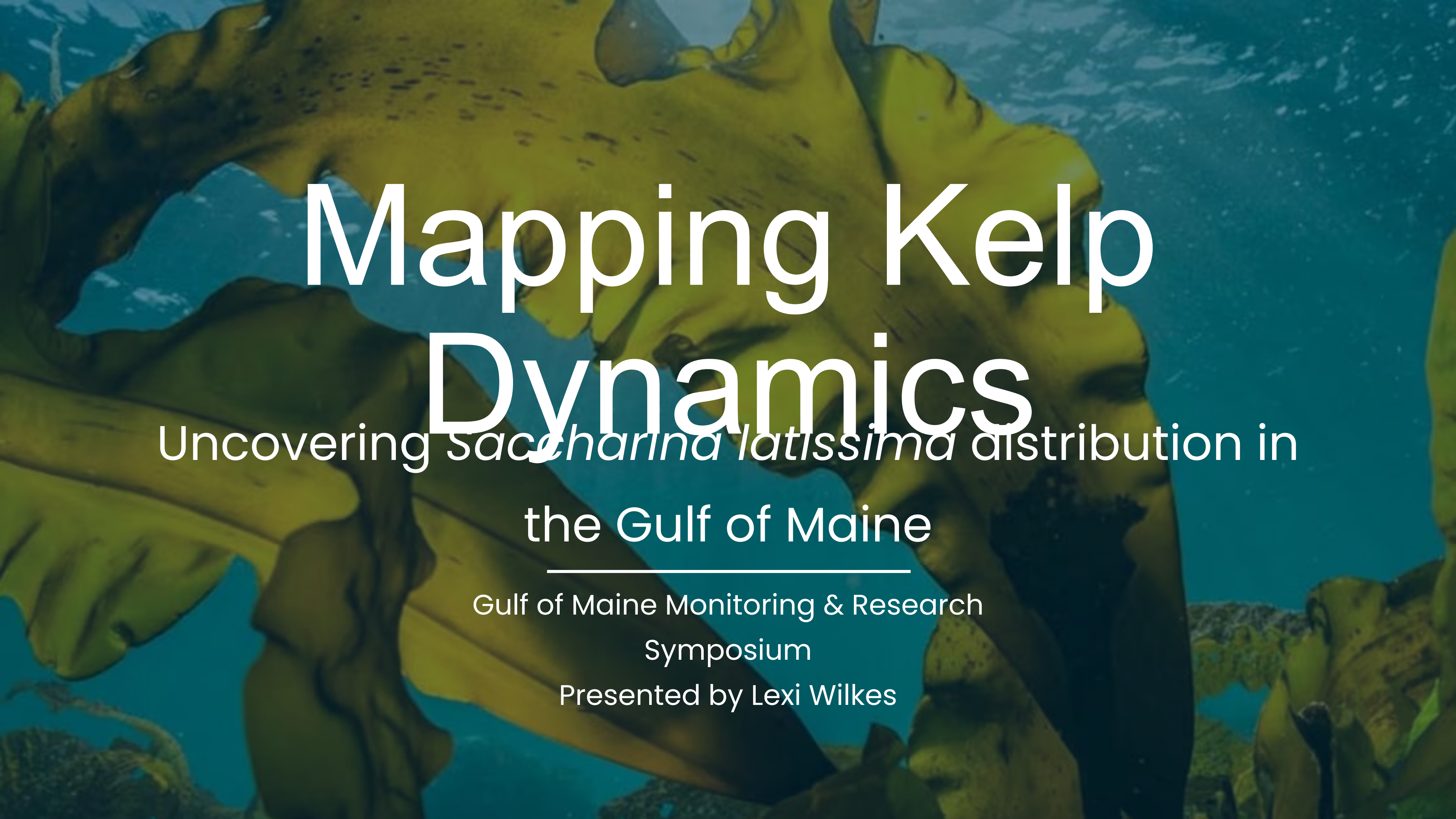




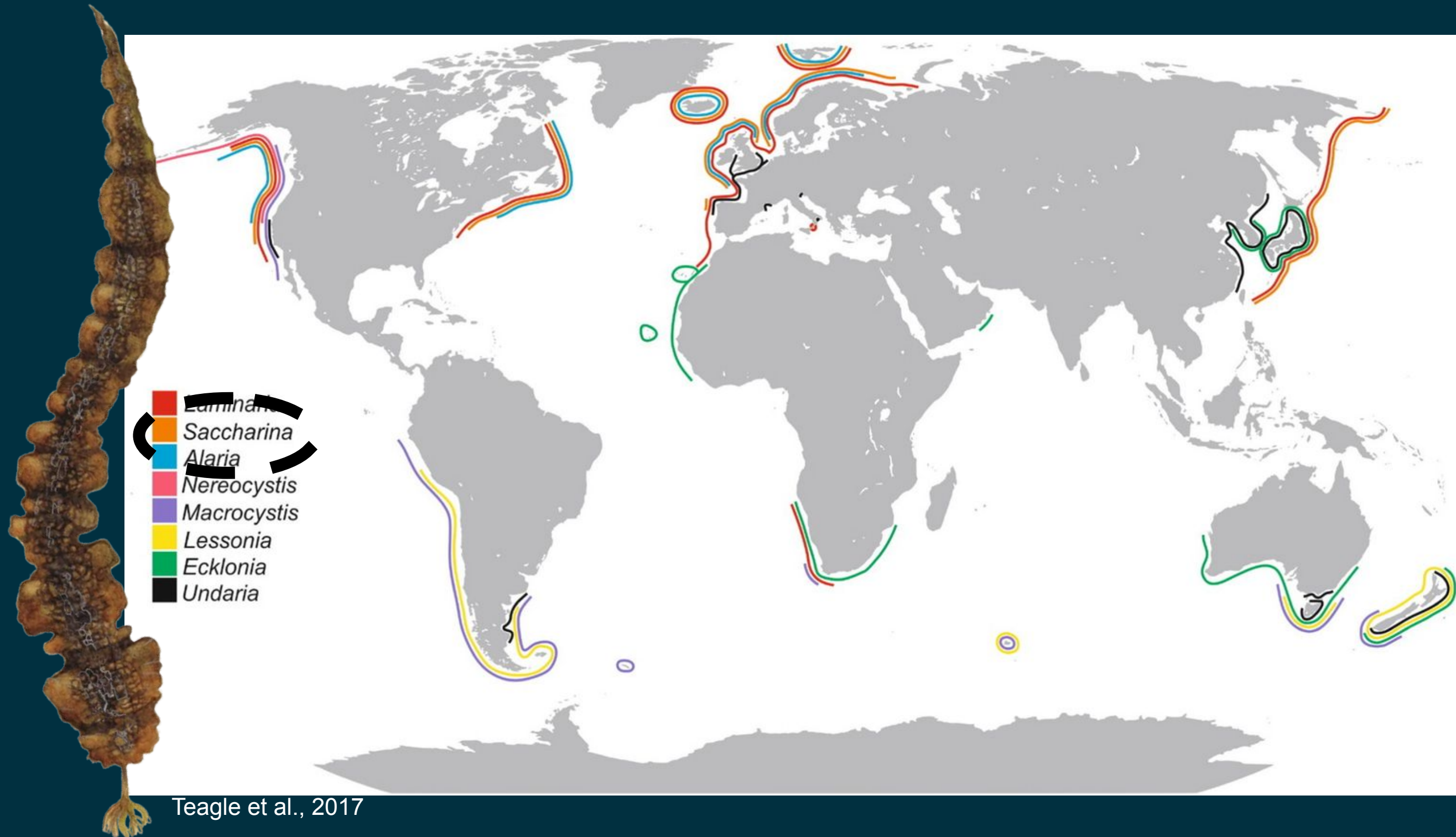
Mapping Kelp Dynamics

Uncovering *Saccharina latissima* distribution in
the Gulf of Maine

Gulf of Maine Monitoring & Research
Symposium

Presented by Lexi Wilkes

What is *Saccharina latissima*?



Common
name =
Sugar kelp

Found in the
north Atlantic,
Arctic, and north
Pacific Oceans

Subcanopy
forming



Why Sugar Kelp?

Sugar Kelp is Ecologically & Economically Important

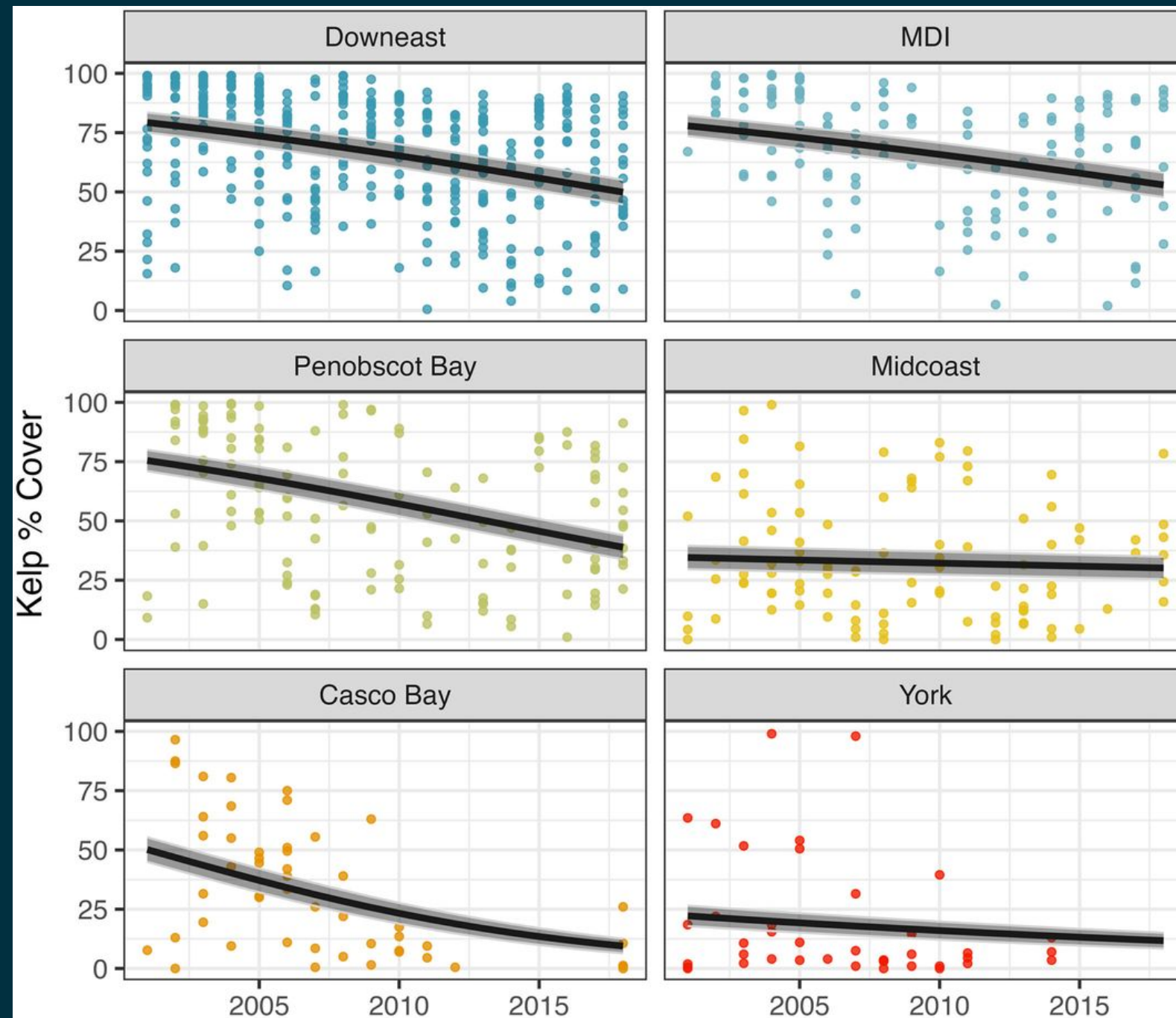
Ecological

- Absorb carbon from the atmosphere
- Buffer wave energy to protect coastlines
- Alter light, flow, and sedimentation rates
- Form multi- dimensional habitats for many species

Economic

- Provide habitat for commercially and recreationally important species
- Focal species of aquaculture in the Northeastern U.S.

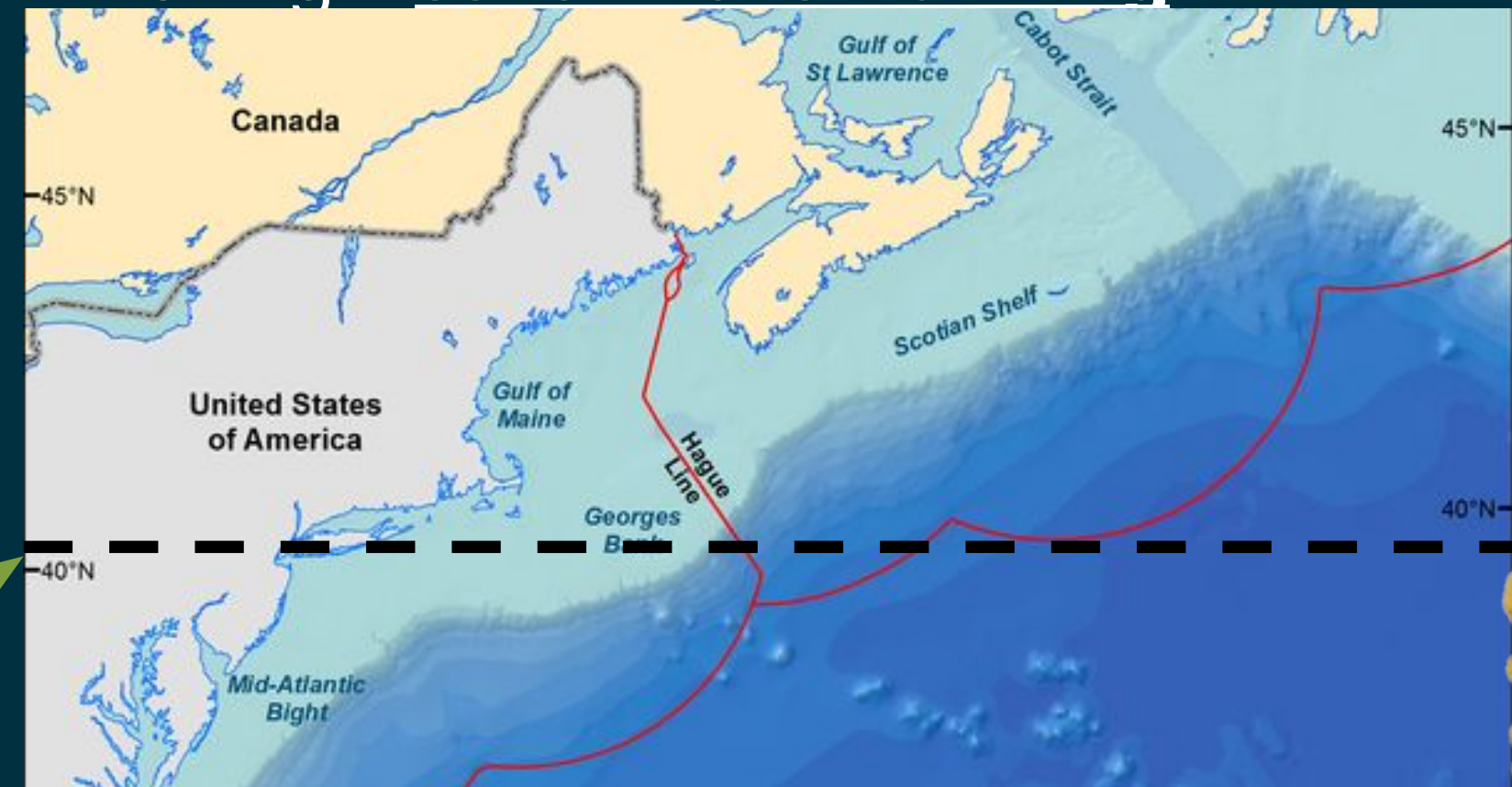
Saccharina in the GOM



Suskiewicz et al., *Ecological Society of America*, 2024

Southern
range limit

- Kelp was historically abundant in the Gulf of Maine, but is **declining**
- Competes with turf algae and invasive species for resources
- Exists near the southern limit of its range, making it **sensitive to warming**



Map from Shackell, Ricard, & Stortini, *PLOS One*, 2014

Project Goals

1.

Abundance Drivers

Determine what environmental drivers shape kelp abundance and distribution in the Gulf of Maine

2.

Current Distribution

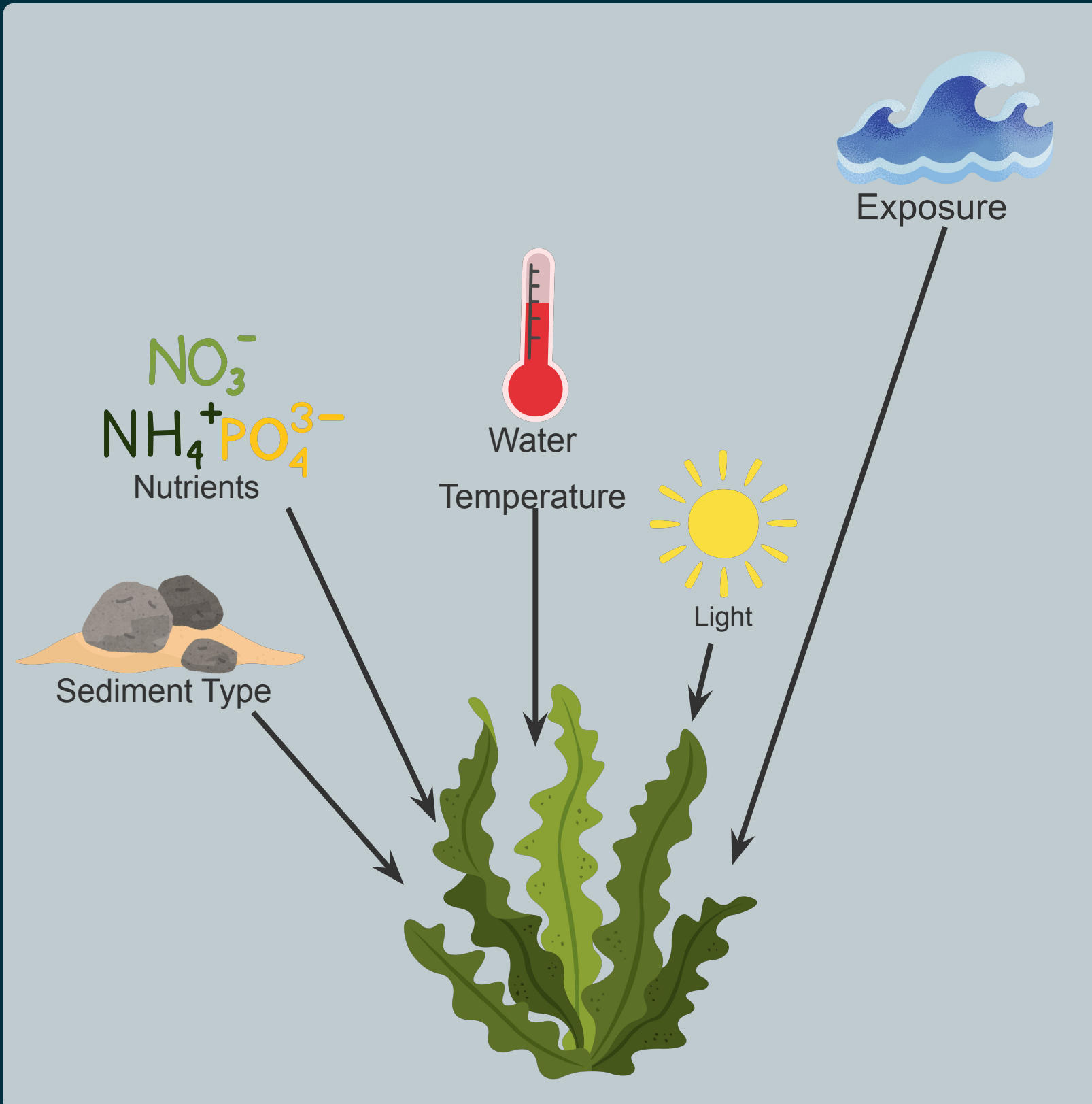
Project current abundance and distribution of kelp in the Gulf of Maine at a fine scale

3.

Future Distribution

Project future abundance and distribution in the Gulf of Maine using various climate change scenarios at fine scales

Environmental Drivers of Kelp Abundance

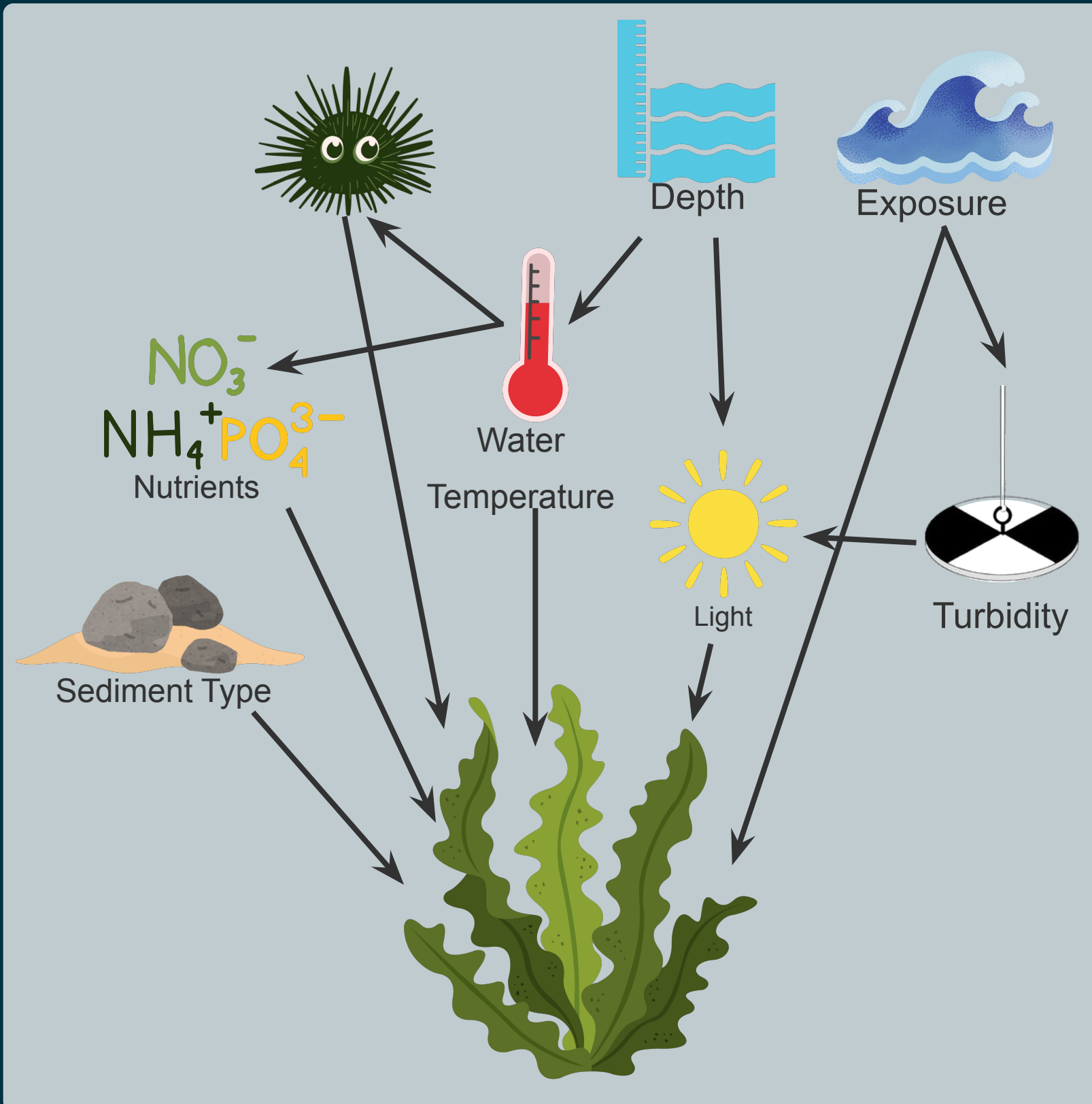


Environmental factors important to kelp:

- Cool, salty, nutrient rich water
- Rocky substrate to attach to
- Enough light to maintain photosynthesis
- Wave exposure (?)



Environmental Drivers of Kelp Abundance

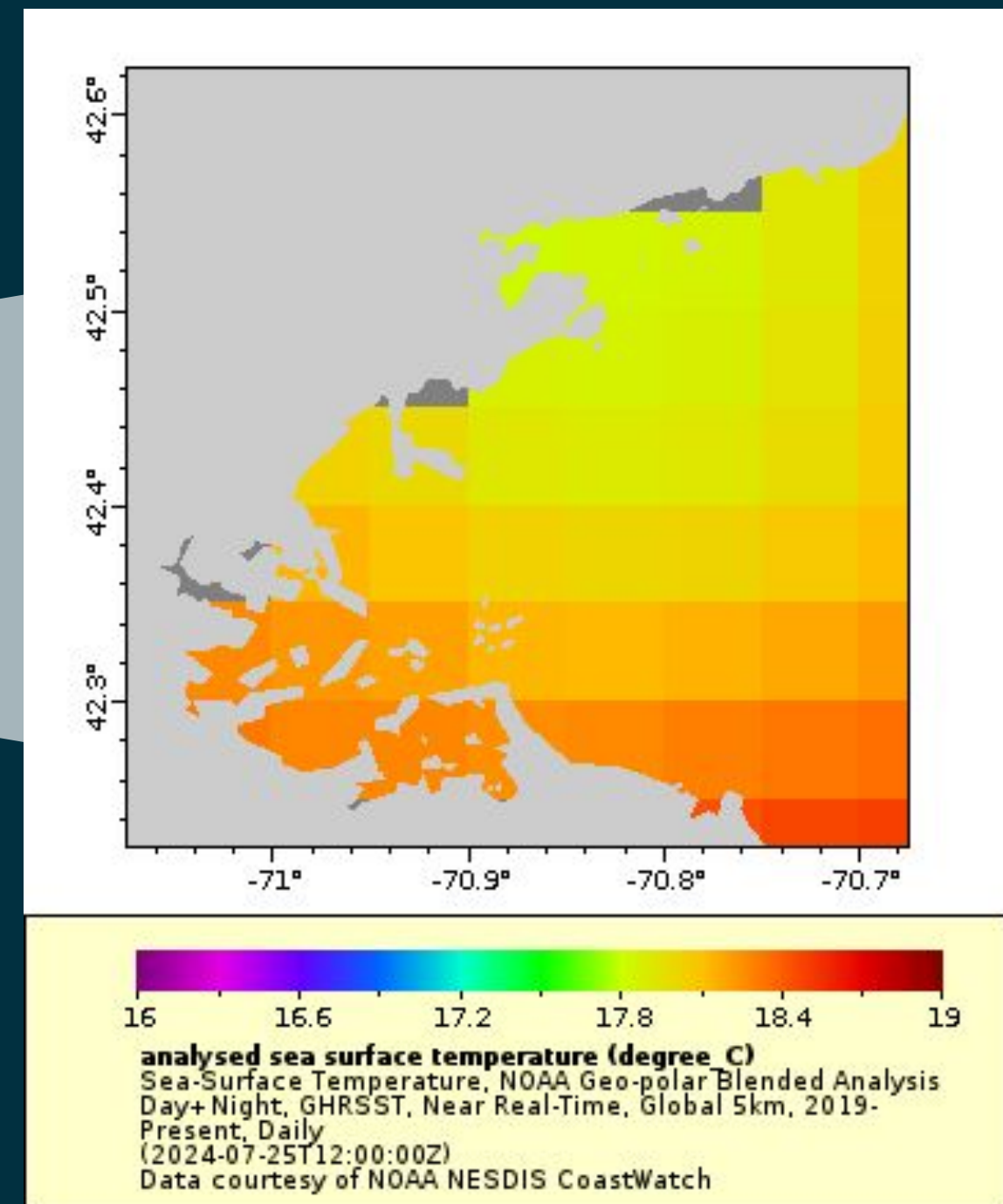
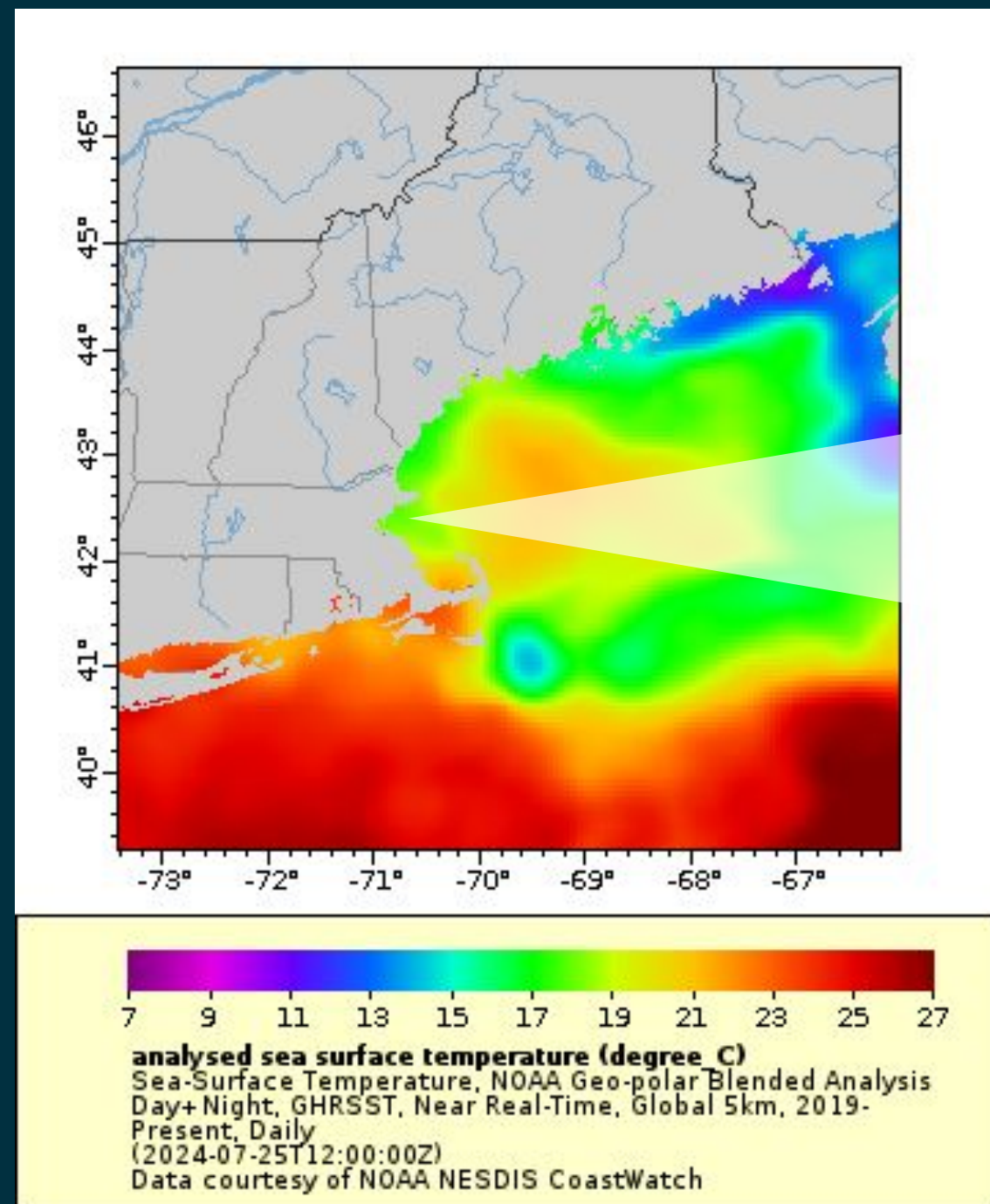


Other important variables:

- Urchins & invasive species competing for resources
- Depth's influence on light, temperature
- Wave exposure's influence on light via turbidity
- Temperature's influence on nutrient concentrations

Environmental Drivers of Kelp Abundance

Environmental drivers work across scales



Data Collection

Data Recorded

Water temperature

Depth

Latitude/Longitude

Time

Secchi disk depth (turbidity)

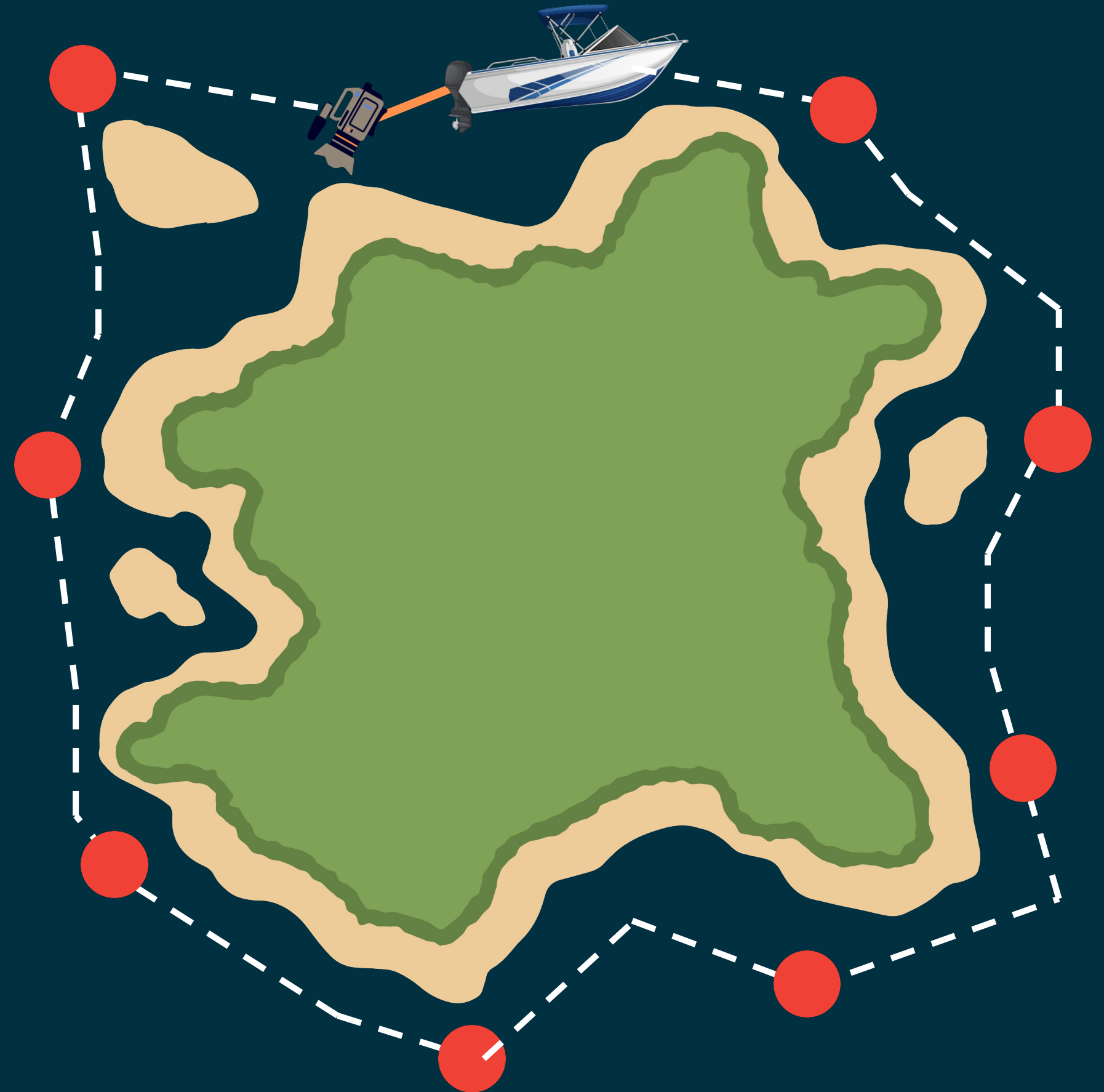
Exposure

Water Sample

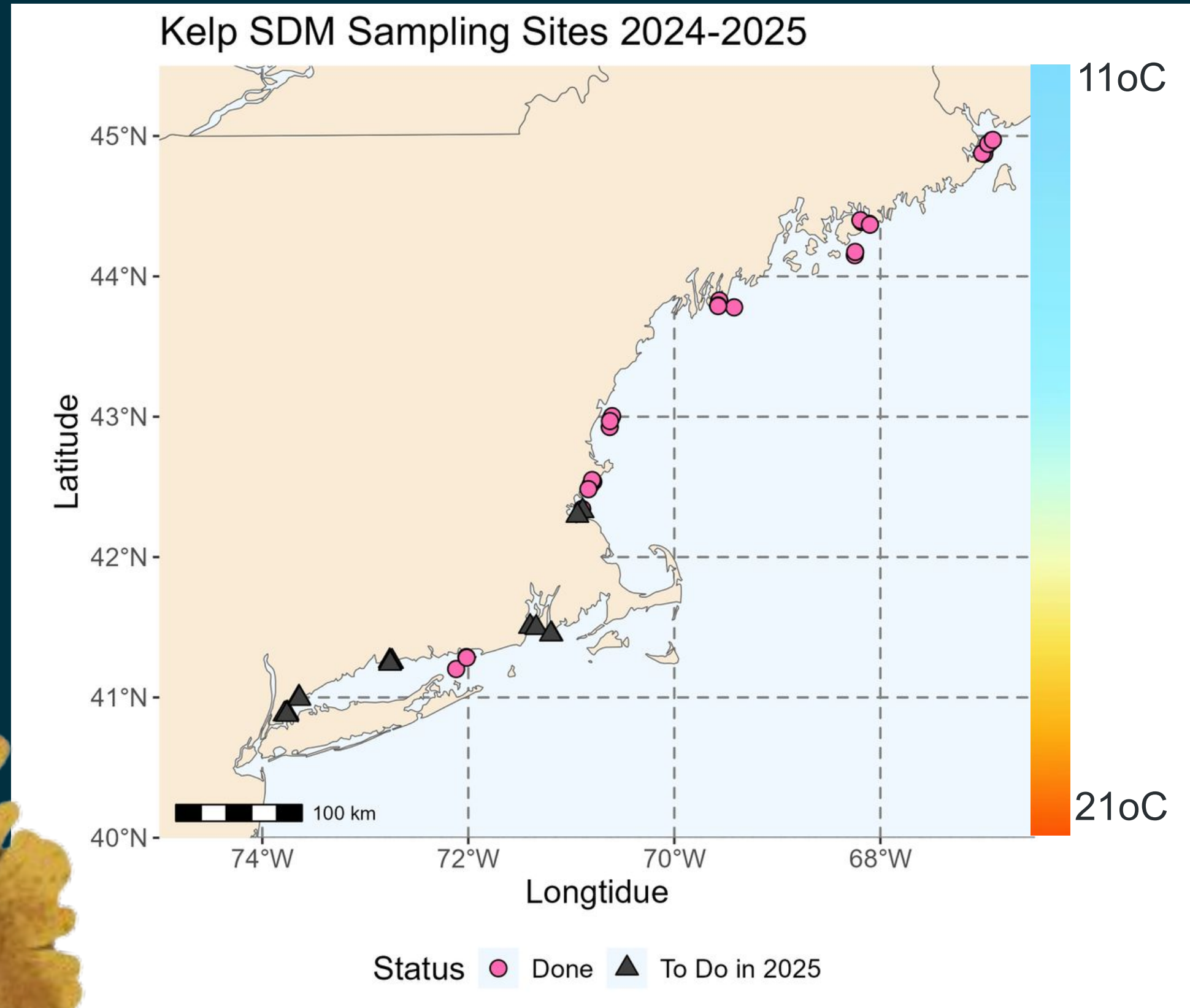
Nitrate

Ammonium

Phosphate



Data Collection



2024

6 sites

29 islands

203 water samples

Many hours of benthic
videos



2025

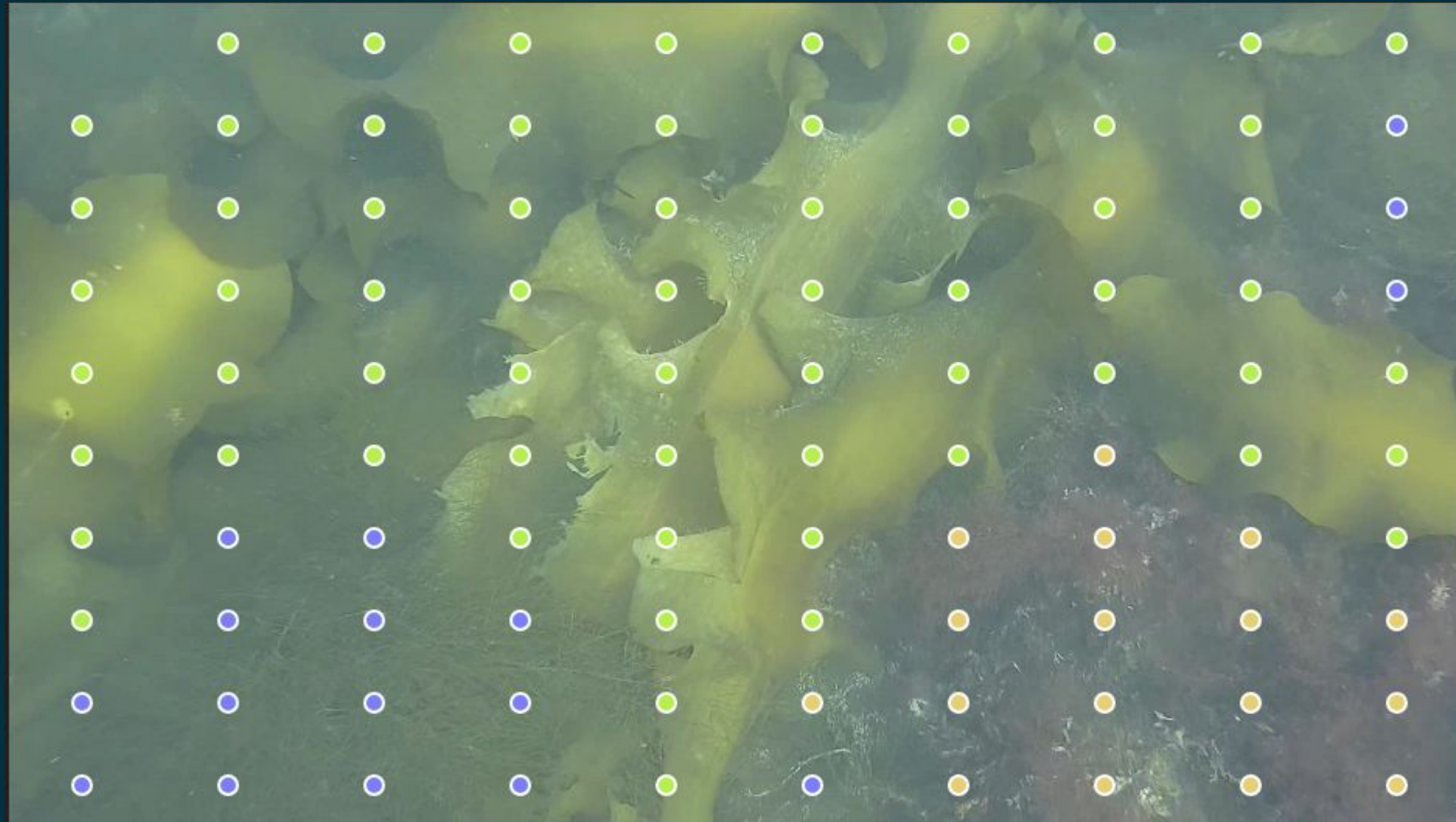
3-4 sites

10-12 islands

80-96 water samples

A lot more hours of

Calculating Kelp Abundance using Machine Learning



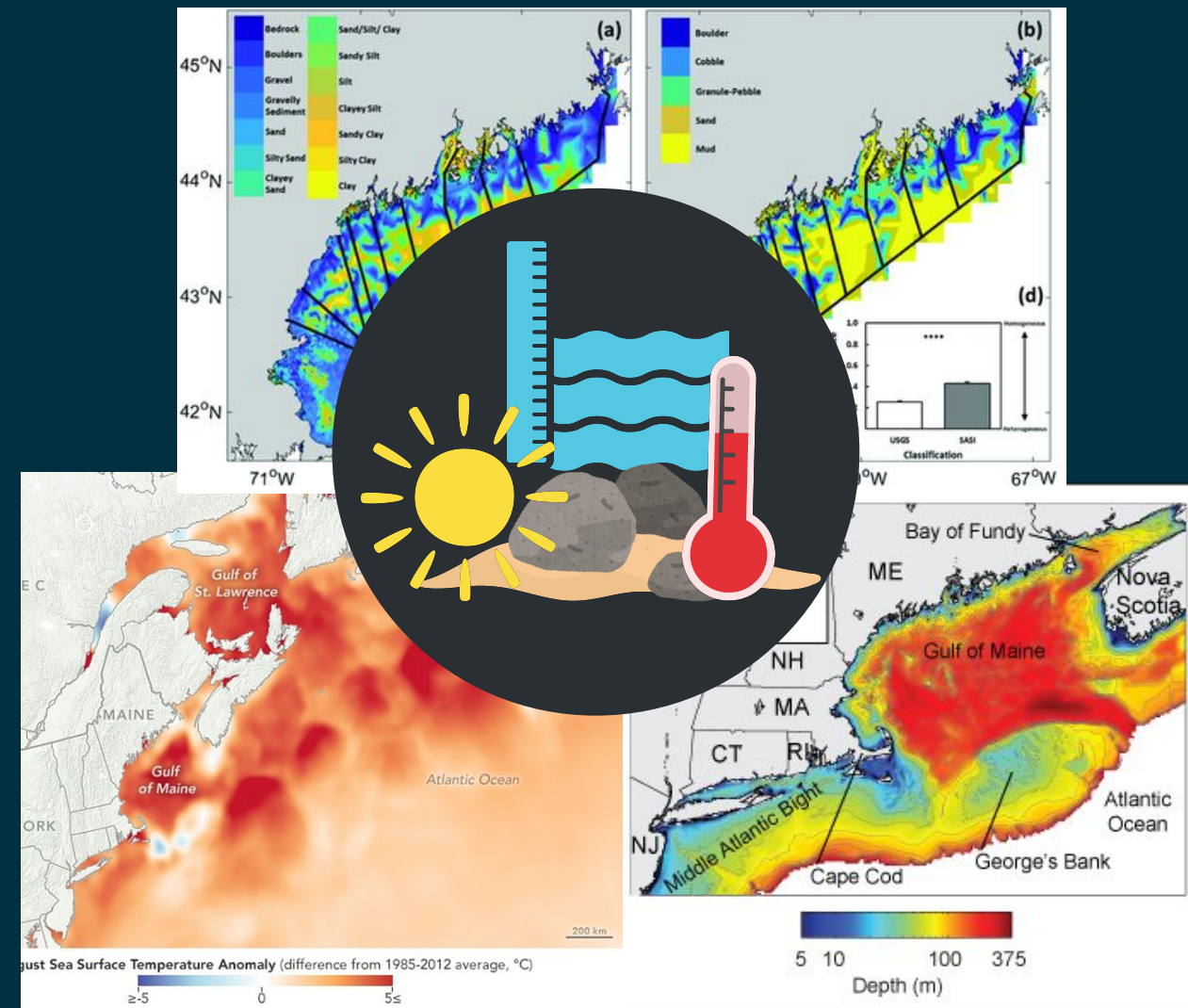
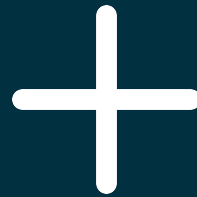
LW SDM Labels

- Agarum
- Laminaria
- Non-Kelp Vegetation
- Saccharina
- Seagrass
- Substrate

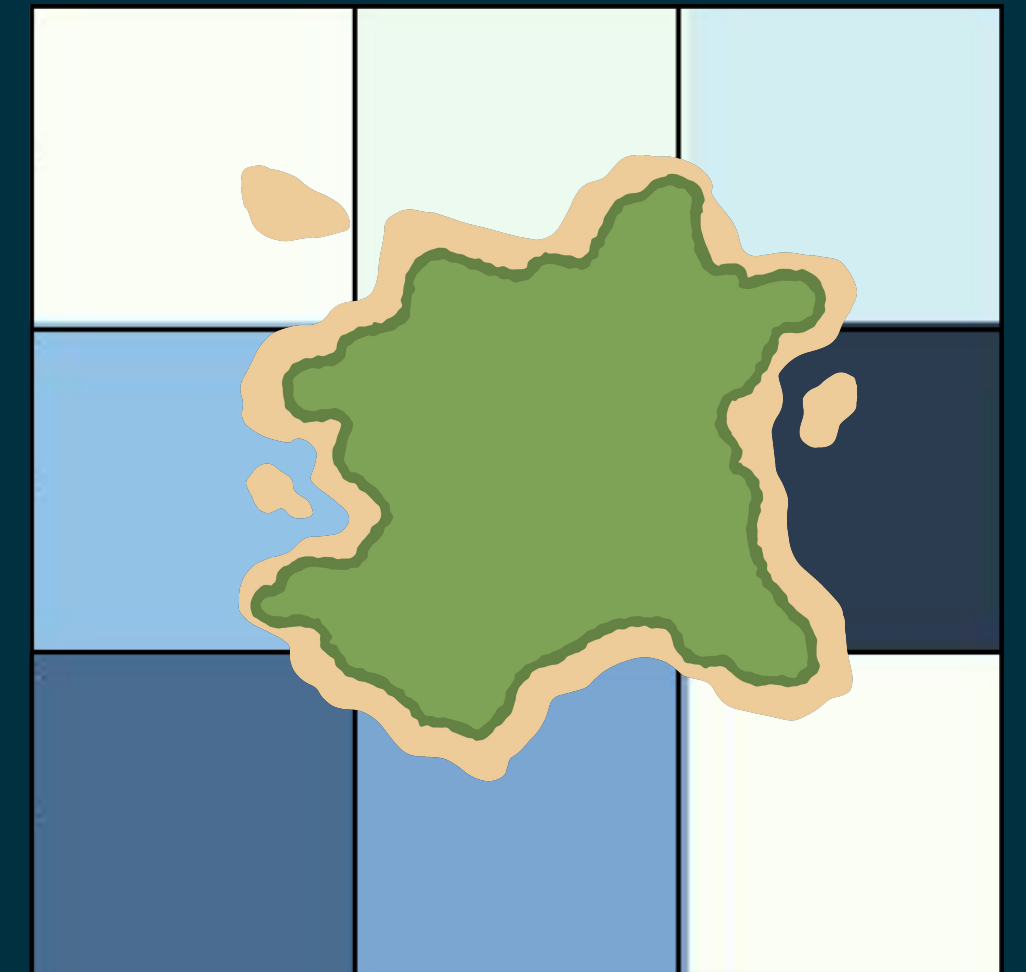
Species Distribution Model



Kelp abundance
data



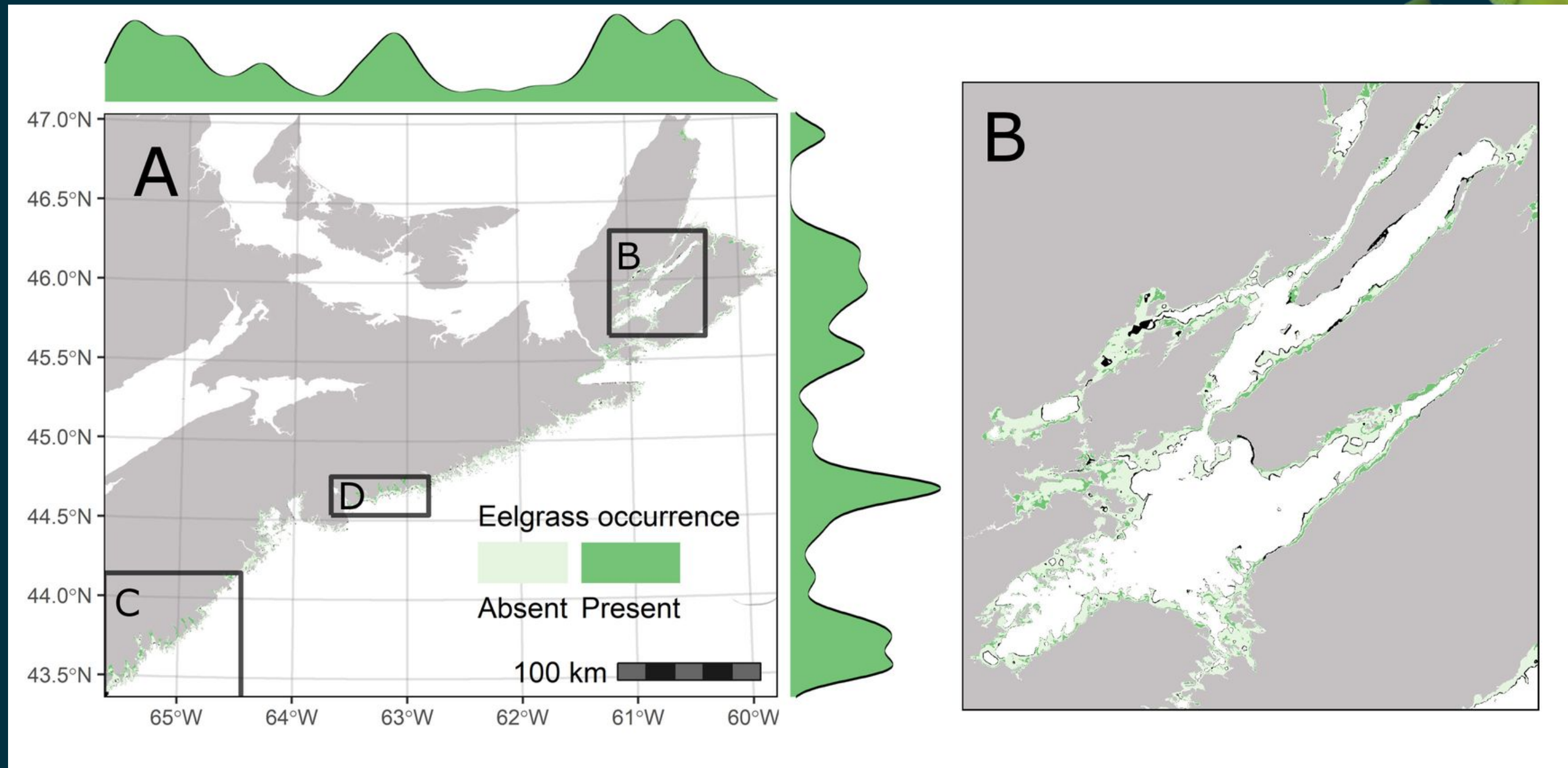
Environmental driver data



Map of kelp
abundance

Expected Results

10 x 10m resolution maps of current saccharina abundance



Conservation and Management



● = target area for conservation

Acknowledgements

Jarrett Byrnes and the Byrnes Lab

All of my undergrad techs!

The many people and marine labs
who have supported and enabled
me to do my fieldwork

Massachusetts Bays NEP



**Massachusetts
Bays** NATIONAL ESTUARY
PARTNERSHIP

