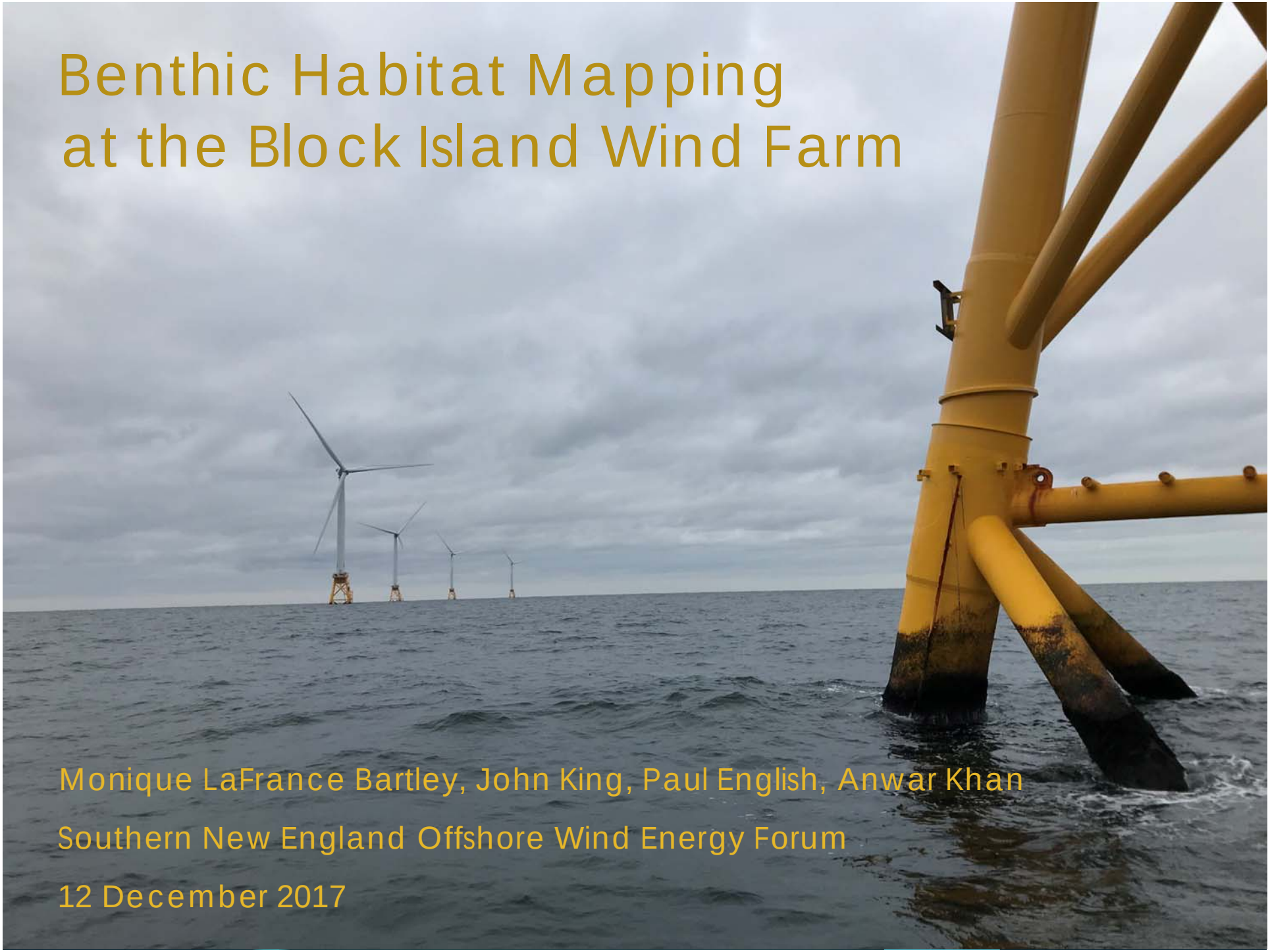
Benthic Habitat Mapping at the Block Island Wind Farm



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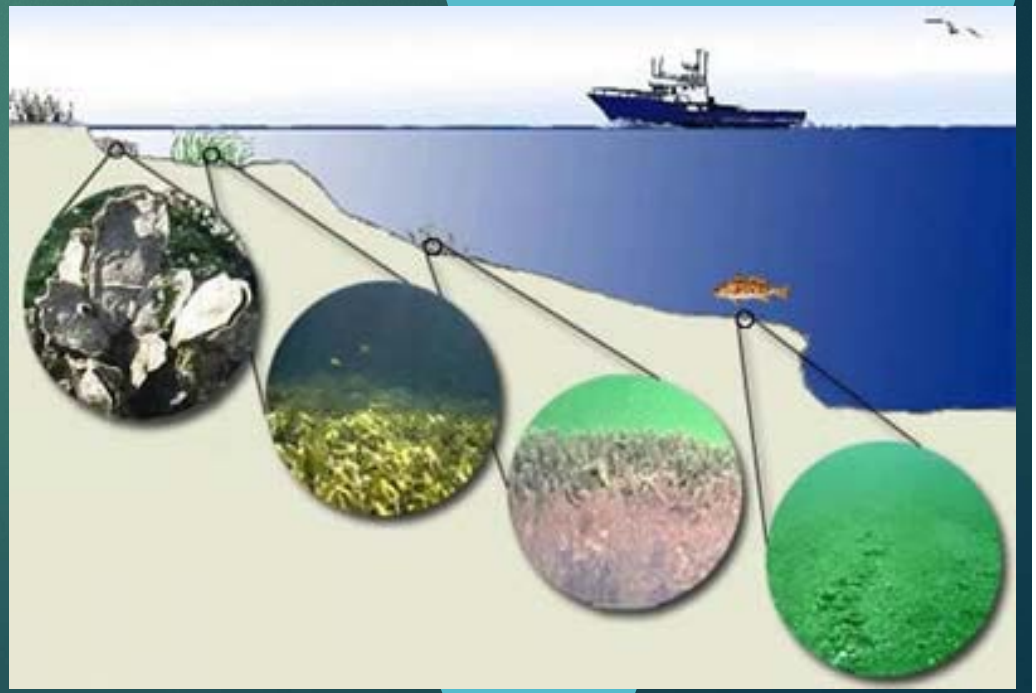
What is benthic habitat mapping?

- **Benthic** = Associated with the seafloor
- **Benthic habitat** = "a spatially defined area where the physical, chemical, and biological environment is distinctly different from the surrounding environment" (Kostylev et al., 2001)
- **Benthic Habitat Mapping** = Illustrates biological & physical characteristics, distribution, and extent seafloor environments geo-spatial context



From left: oyster bed, seagrass meadow, amphipod tube mat, sand flat. (From *NOAA Coastal Services Center)*

Benthic studies

- Improve understanding of benthic habitats
  - Distribution, patterns, processes
  - Establish meaningful relationships
- Establish environmental baselines or assess change
- Identify habitats and species that are
  - Important food sources
  - Economically valuable
  - Sensitive / in need of protection
- **Goal of this study: Assess potential changes in benthic habitats due to the construction and initial operation of the BI wind turbines**

Hypotheses

- H0 1 – There will be no difference in benthic communities among turbine sites.
- H0 2 – There will be no difference in benthic communities between control sites and turbine sites.
- H0 3 – There is no impact on distance from the wind farm foundation regarding benthic communities or organic enrichment.
- Also provided an opportunity to compare pre (Ocean SAMP) and post (this study) construction datasets and habitat classifications

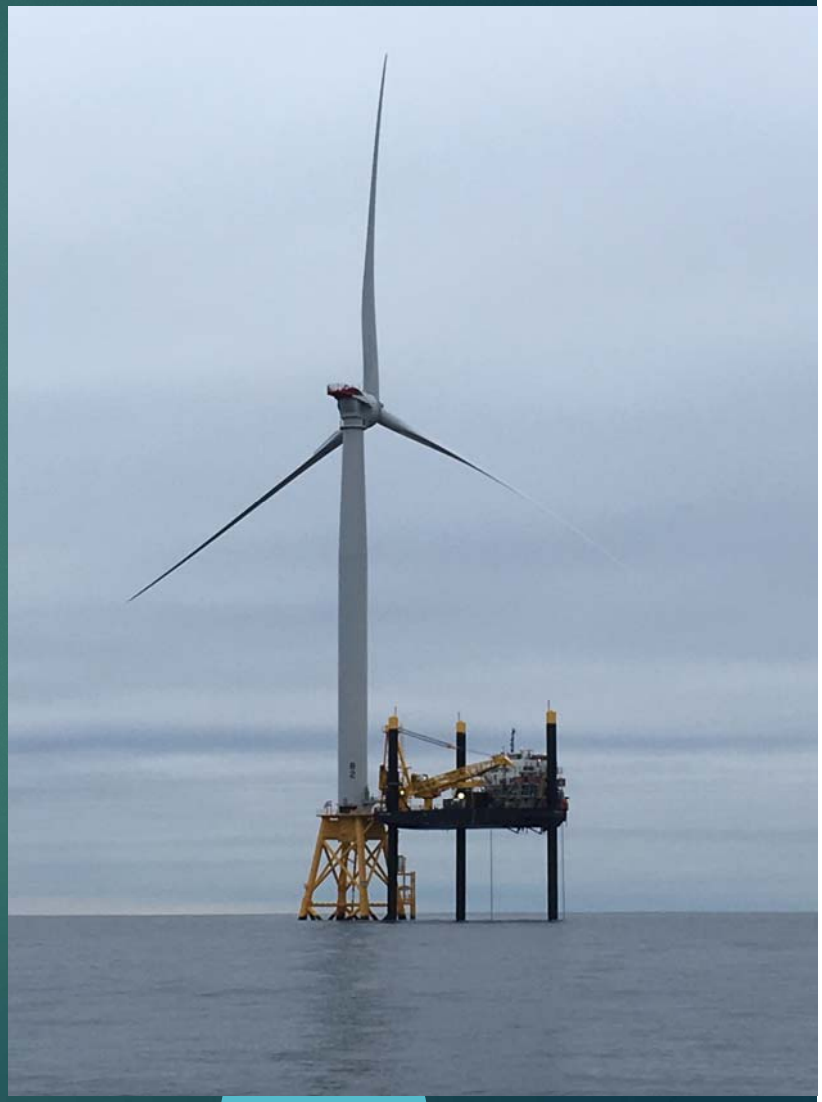
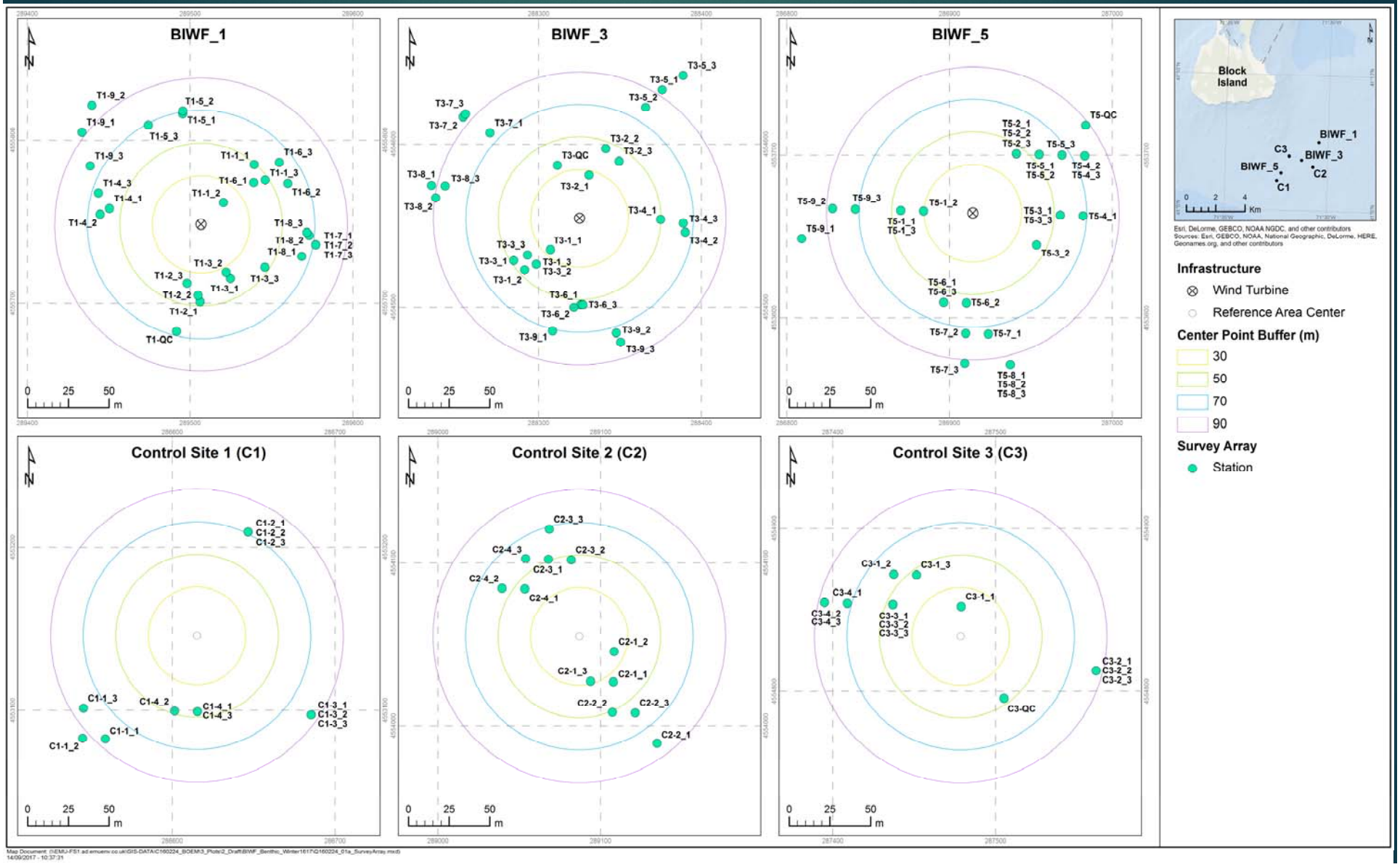


Image courtesy of Brian Caccioppoli

Sampling Locations



Grab Sample Data

- Sediment grain size classes
  - Grain size distribution
- Biology
  - Organisms living on or within the sediments of the seafloor
  - 18,000+ individuals
  - 139 species
- Go-Pro camera
  - Broader context

Macrofaunal Species

- Amphipods (Crustaceans)
- Polychaetes (Annelids)
- Bivalves (Mollusks)

Nematodes

Pisione sp.

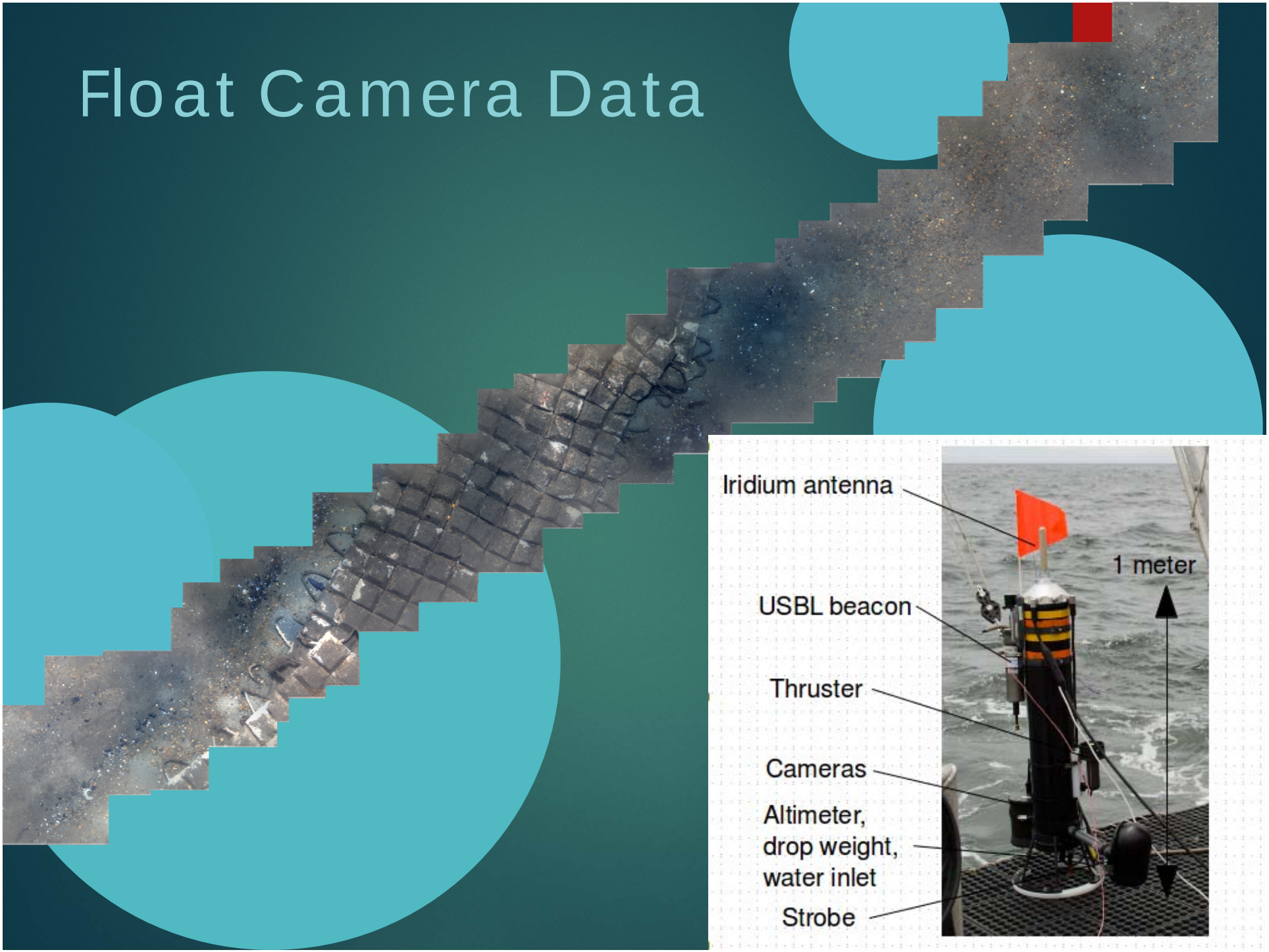
Lumbrineris sp.

Polygordius sp.

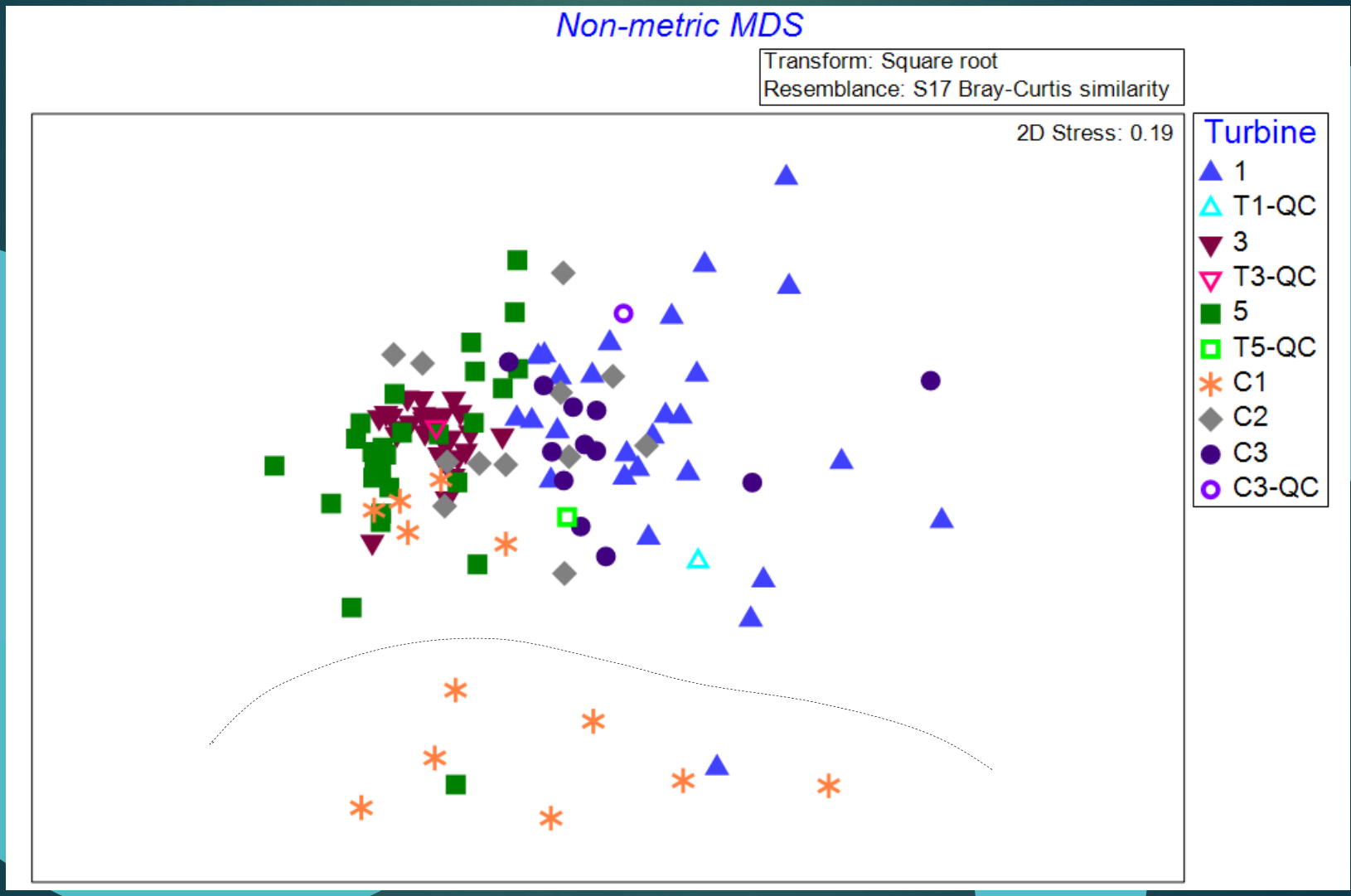
Polycirrus sp.

Unciola irrorata

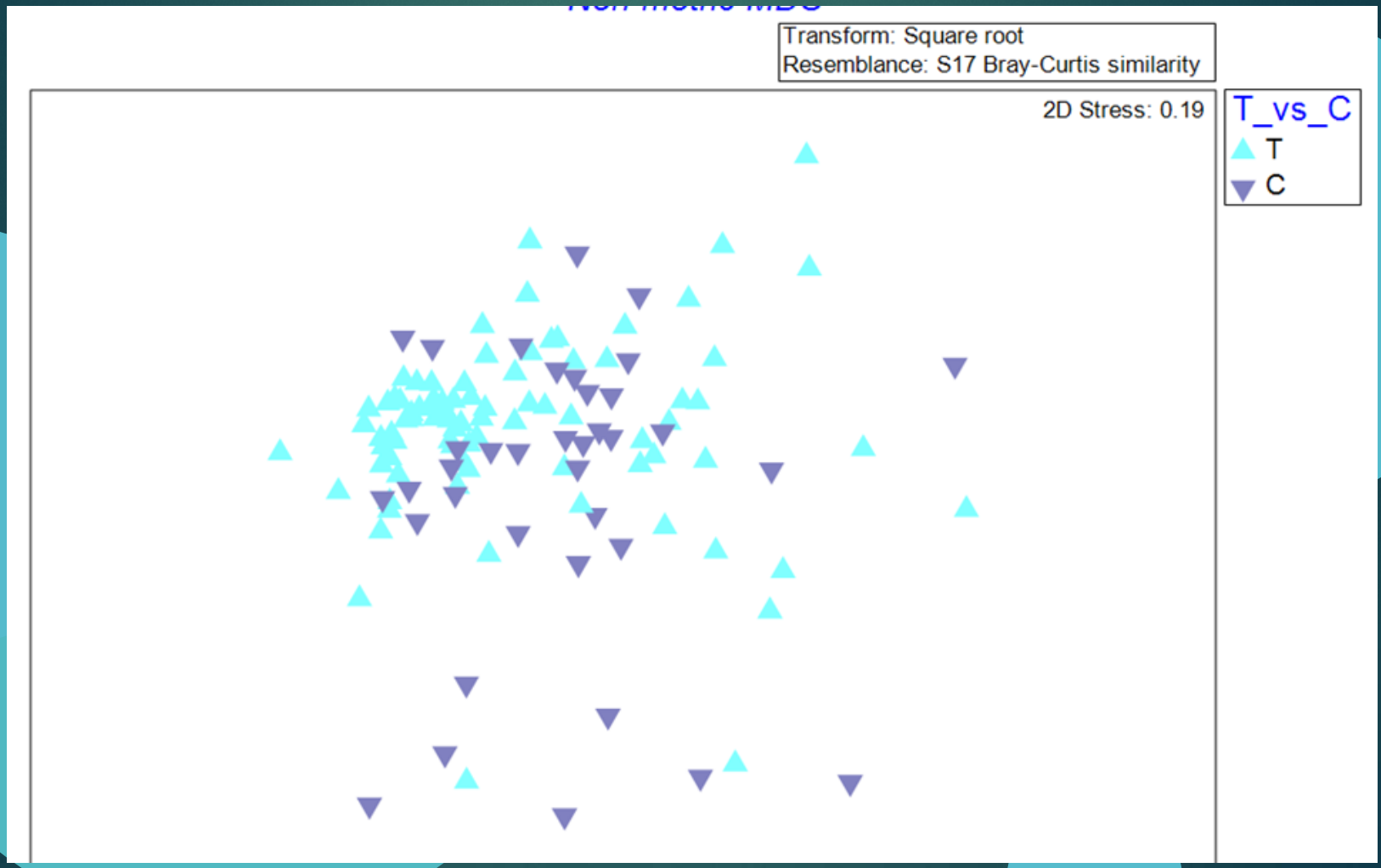
Float Camera Data



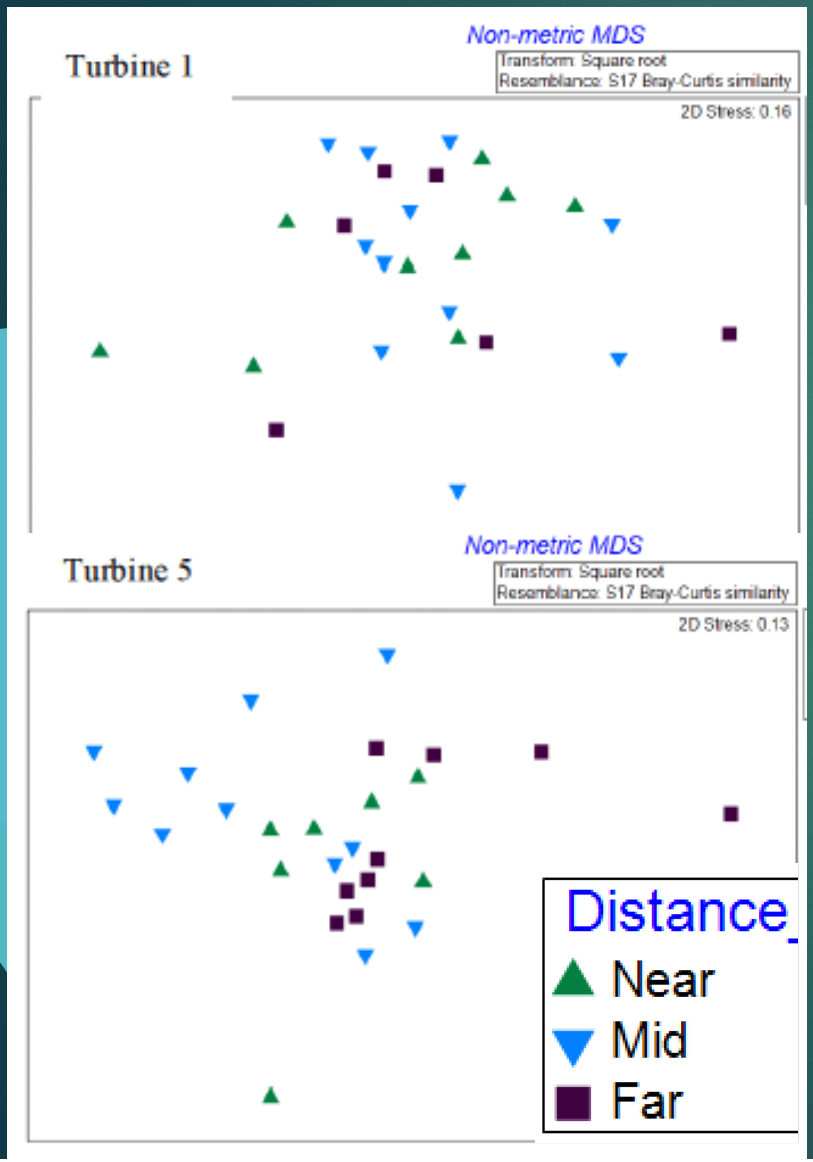
H0 1: Turbine Areas



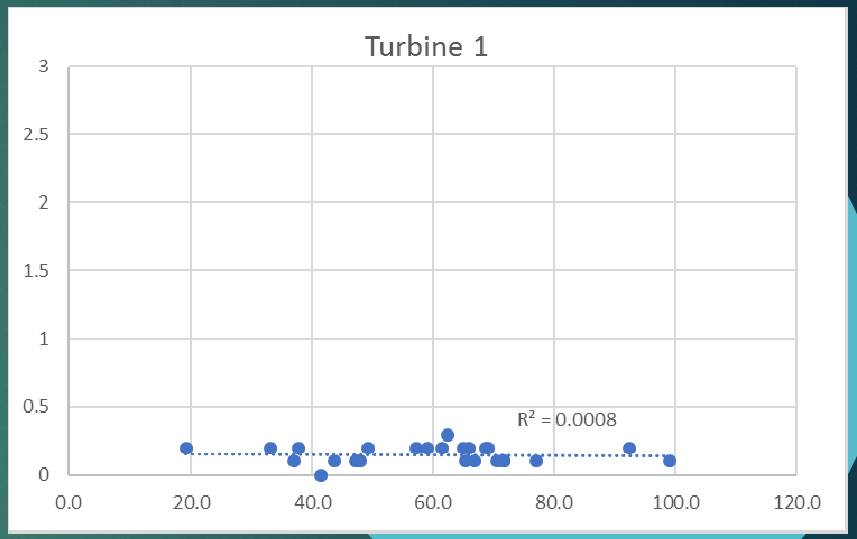
H0 2: Turbine vs Reference Areas

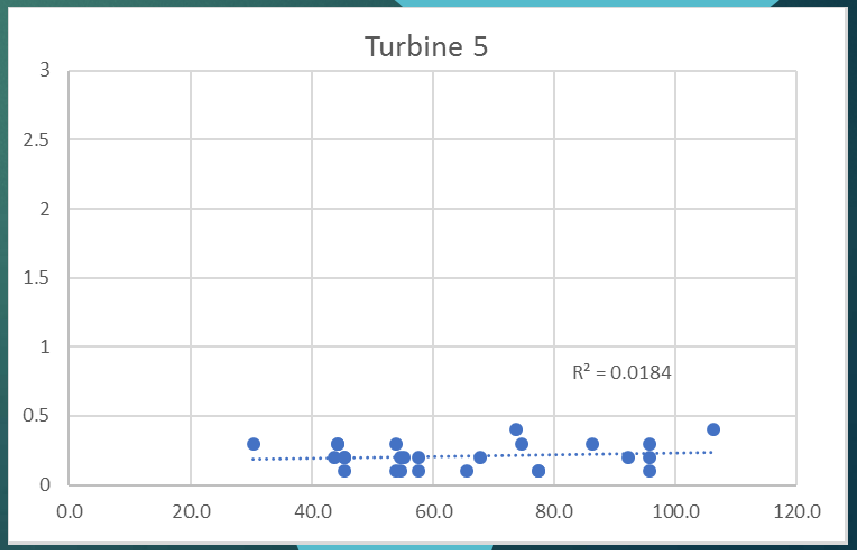


H0 3: Changes with Distance from Turbine

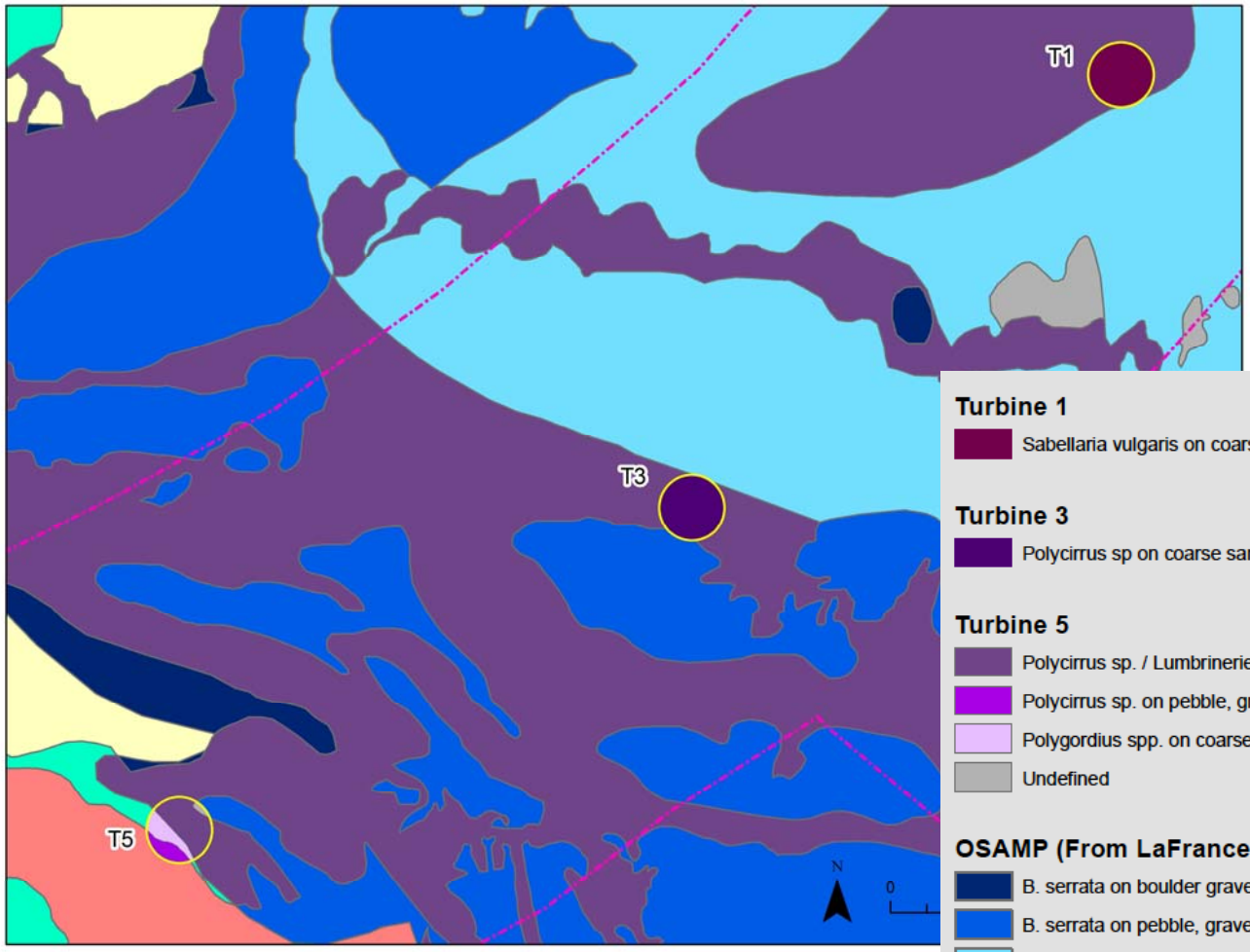


Proportion of sediment organic content (%)





Comparison of Habitat Classifications



Turbine 1

- Sabellaria vulgaris on coarse sand with small dunes within glacial alluvial fan

Turbine 3

- Polycirrus sp on coarse sand with small dunes within glacial alluvial fan

Turbine 5

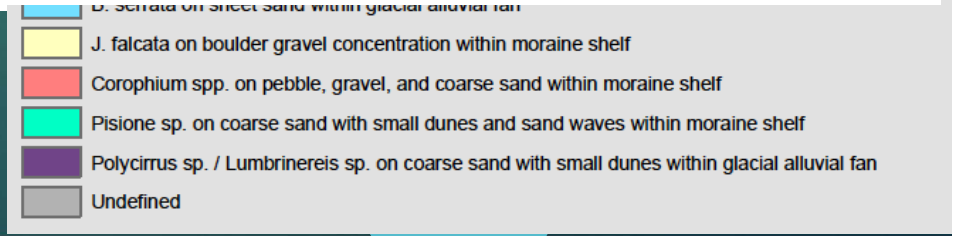
- Polycirrus sp. / Lumbrineries sp. on coarse sand with small dunes within glacial alluvial fan
- Polycirrus sp. on pebble, gravel, and coarse sand within moraine shelf environment
- Polygordius spp. on coarse sand with small dunes / sand waves within moraine shelf environment
- Undefined

OSAMP (From LaFrance et al., 2014)

- B. serrata on boulder gravel concentration within glacial alluvial fan
- B. serrata on pebble, gravel, and coarse sand within glacial alluvial fan
- B. serrata on sheet sand within glacial alluvial fan
- J. falcata on boulder gravel concentration within moraine shelf
- Corophium spp. on pebble, gravel, and coarse sand within moraine shelf
- Pisione sp. on coarse sand with small dunes and sand waves within moraine shelf
- Polycirrus sp. / Lumbrinereis sp. on coarse sand with small dunes within glacial alluvial fan
- Undefined

Comparison of Habitat Classifications

	BIWF Biotope	OSAMP Biotope
Turbine 1	*Sabellaria vulgaris* on coarse sand with small dunes within glacial alluvial fan	*Polycirrus* sp. / *Lumbrinereis* sp. on coarse sand with small dunes within glacial alluvial fan
Turbine 3	*Polycirrus* sp. on coarse sand with small dunes within glacial alluvial fan	*Polycirrus* sp. / *Lumbrinereis* sp. on coarse sand with small dunes within glacial alluvial fan
Turbine 5	*Polycirrus sp.* / *Lumbrinereis* sp. on coarse sand with small dunes within glacial alluvial fan	*Polycirrus* sp. / *Lumbrinereis* sp. on coarse sand with small dunes within glacial alluvial fan
	Polycirrus sp. on pebble, gravel, and coarse sand within moraine shelf	*Corophium spp.* on pebble, gravel, and coarse sand within moraine shelf environment
	Polygordius spp. on coarse sand with small dunes / sand waves within moraine shelf	*Pisione* sp. on coarse sand with small dunes / sand waves within moraine shelf environment
	Undefined	*Byblis serrata* on pebble, gravel, and coarse sand within glacial alluvial fan



Overall Conclusions

- No clear changes in benthic habitats or associated biological communities have been detected due to the presence of the wind farm at this point in time
- Comparison of BIWF and Ocean SAMP data further confirm minimal changes have occurred over time
- Have established detailed baseline dataset at the turbine sites
- Next iteration of this study is underway