Ecosystem Responses to Offshore Wind Novel Structures

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Artificial Reef Effect

Novel structures
lead to ecological shifts (connectivity) at multiple scales

Species Distributions

Benthic species colonize structures
Changes in community structure + diversity
Facilitate poleward expansion of species
Opportunistic non-indigenous colonization

Net Positive Impact on Biodiversity

Artificial Reef Effect

Novel structures
lead to ecological shifts (connectivity) at multiple scales

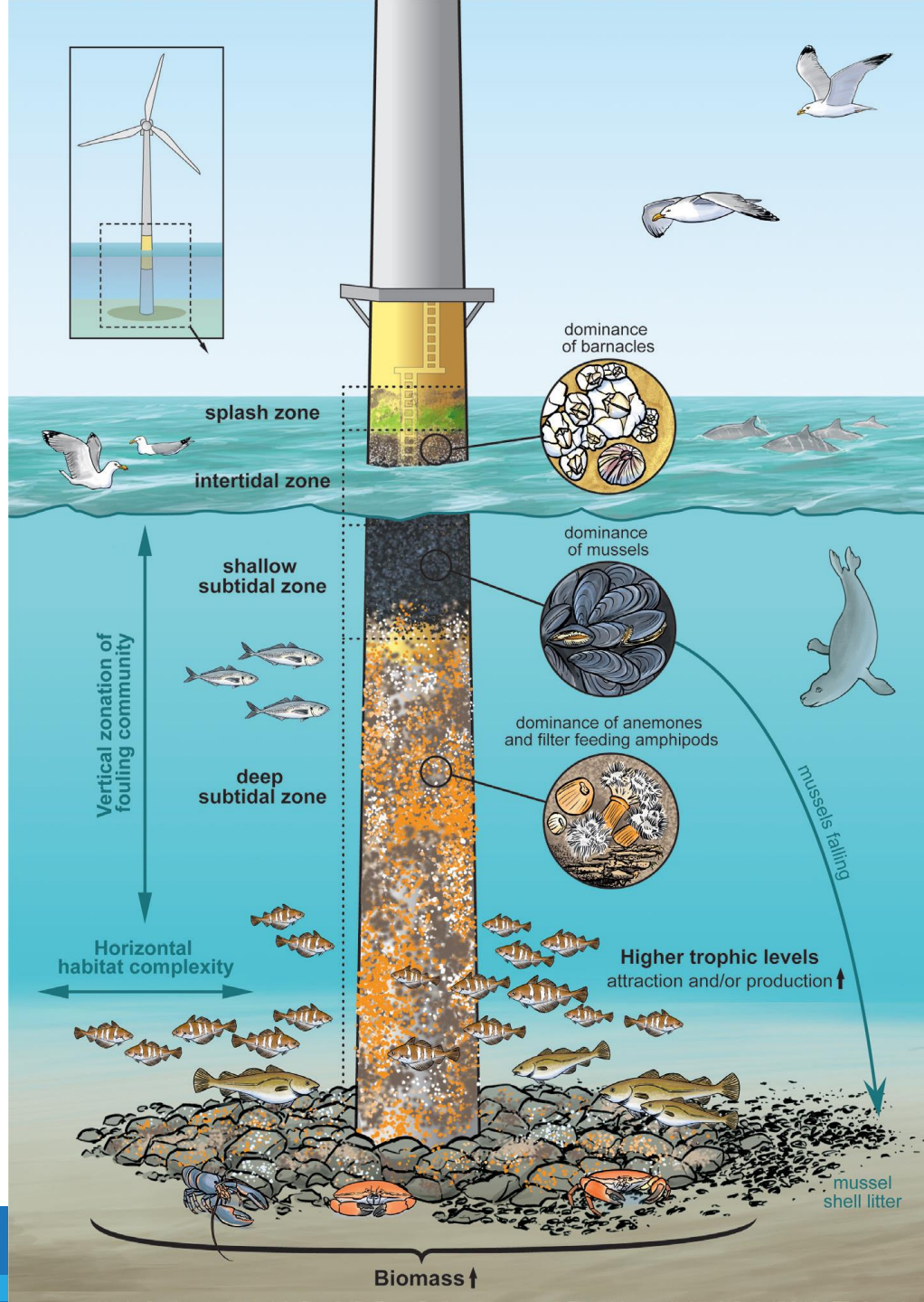
Species Distributions

Benthic species colonize structures
Changes in community structure + diversity
Facilitate poleward expansion of species
Opportunistic non-indigenous colonization

Net Positive Impact associated with changes in Ecosystem Function

Energy Distributions

Redistribution of Carbon
Seafloor Enrichment
Foraging for Higher Trophic Levels



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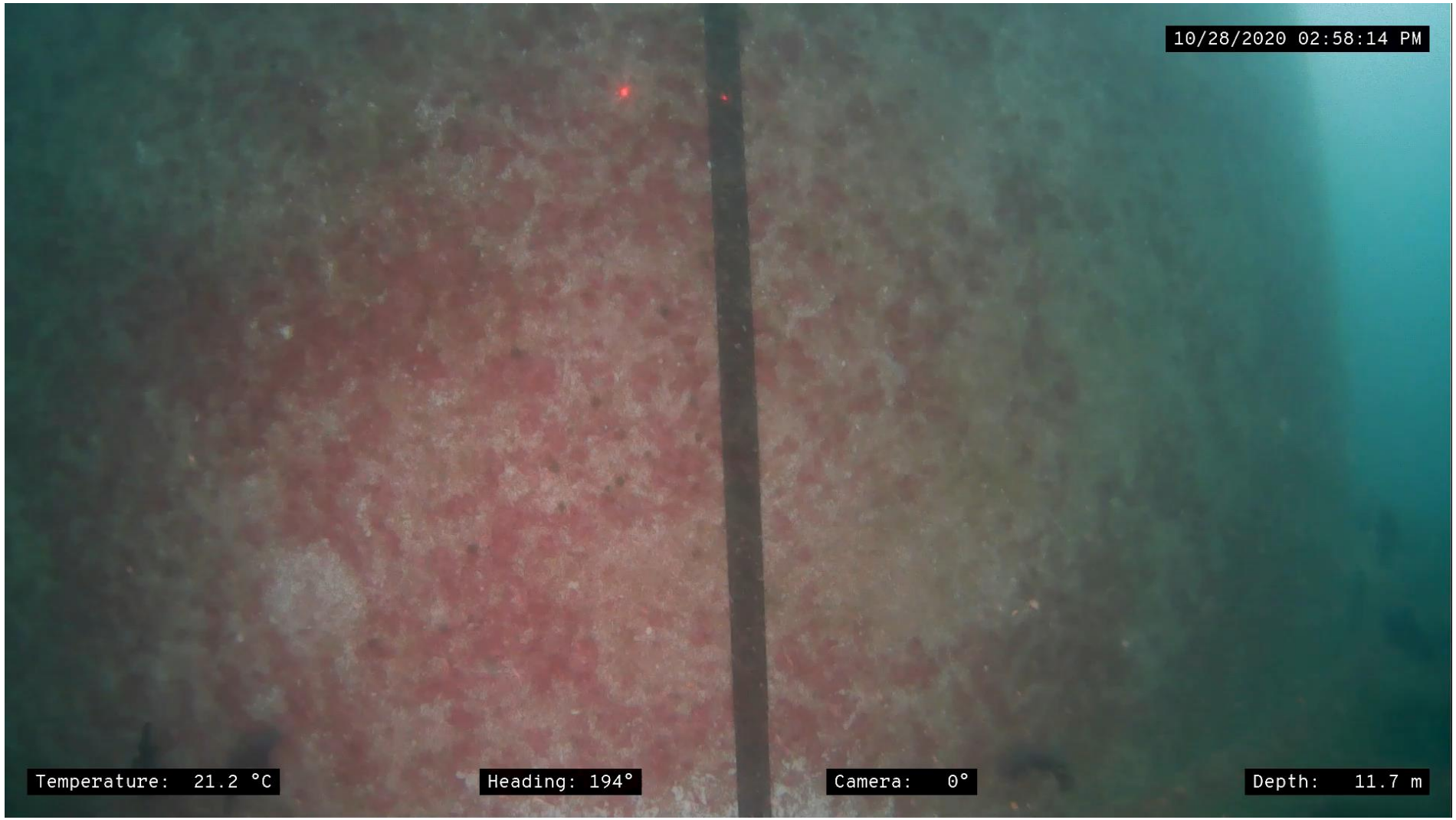
CVOW
2020 Anode Cage

Species Distribution

Energy Distribution



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CVOW
2022 Anode Cage

Species Distribution

Energy Distribution

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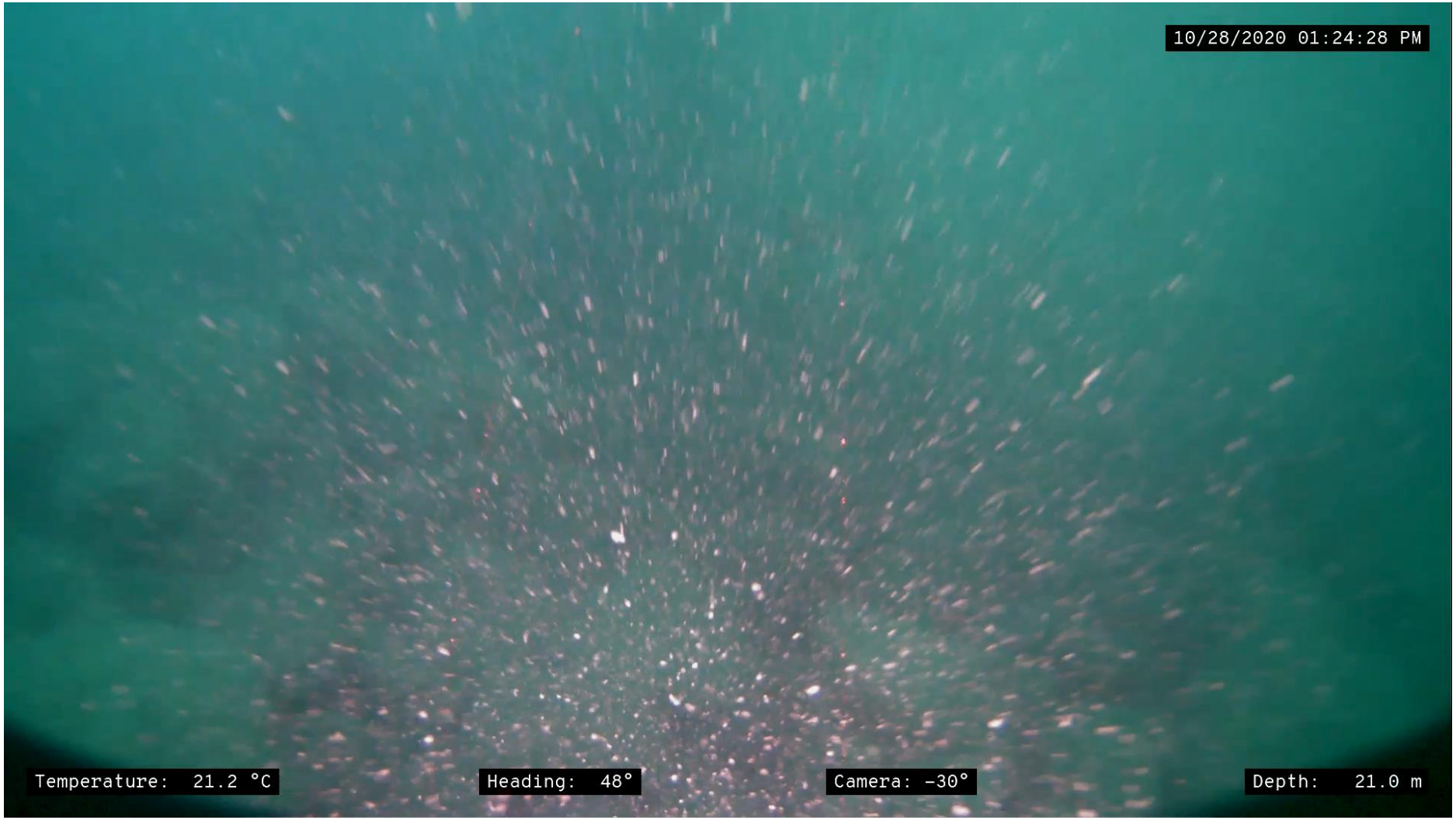
CVOW
2020 Scour Protection Layer

Species Distribution

Energy Distribution



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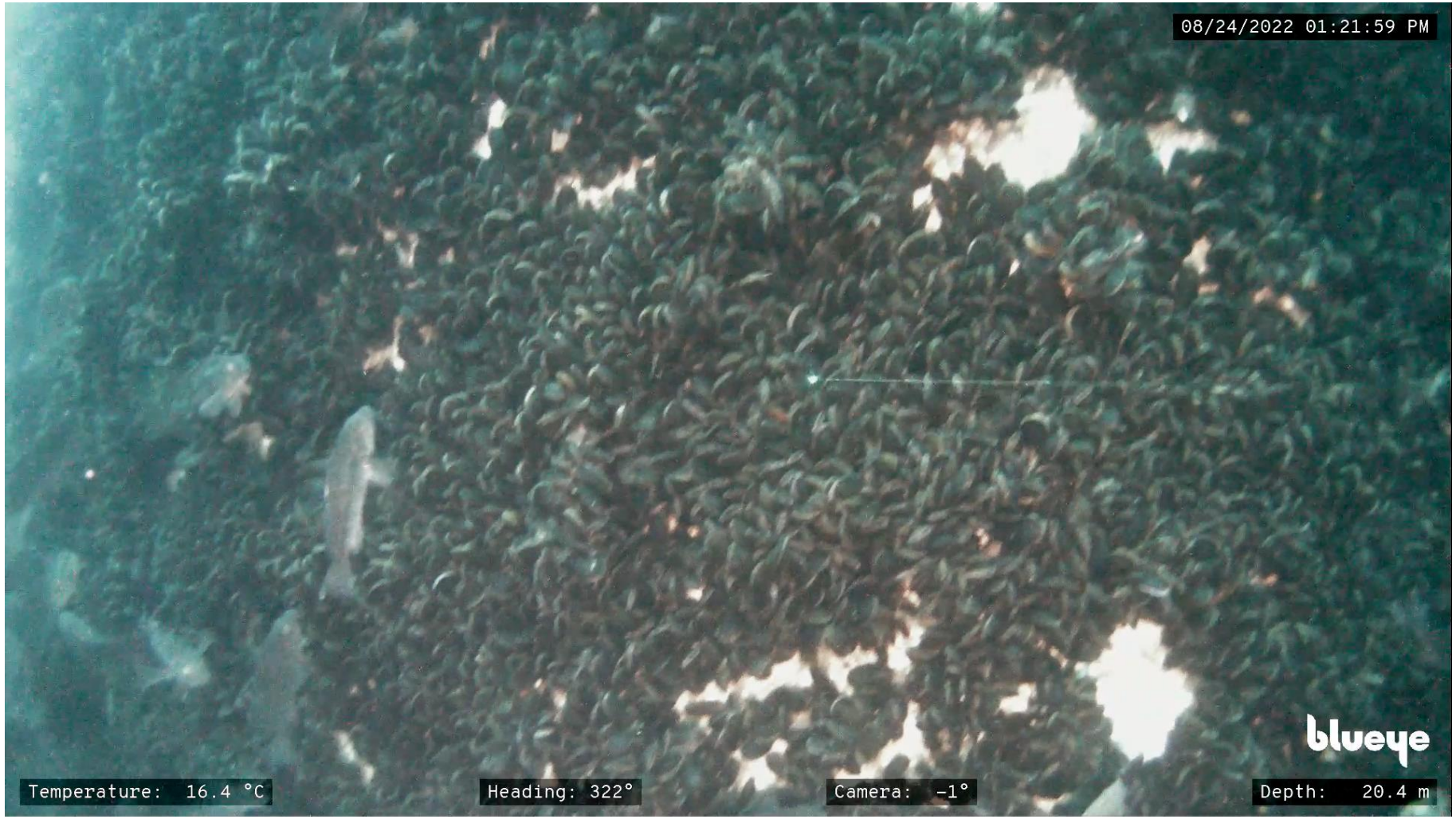
CVOW
2022 Scour Protection Layer

Species Distribution

Energy Distribution



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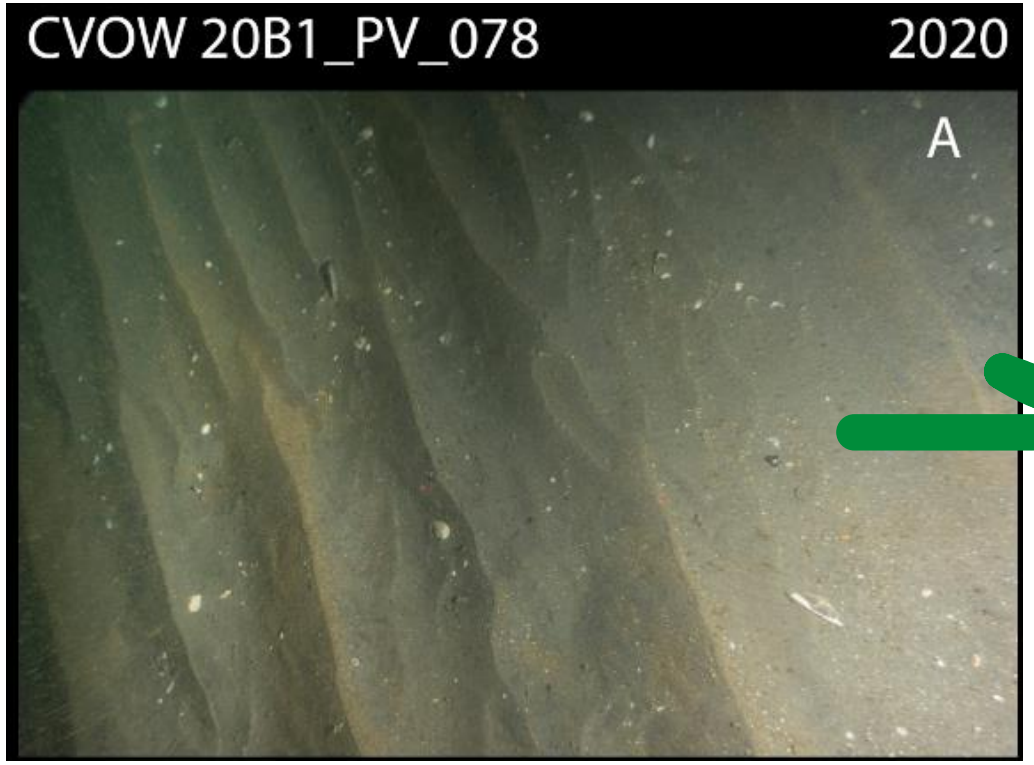
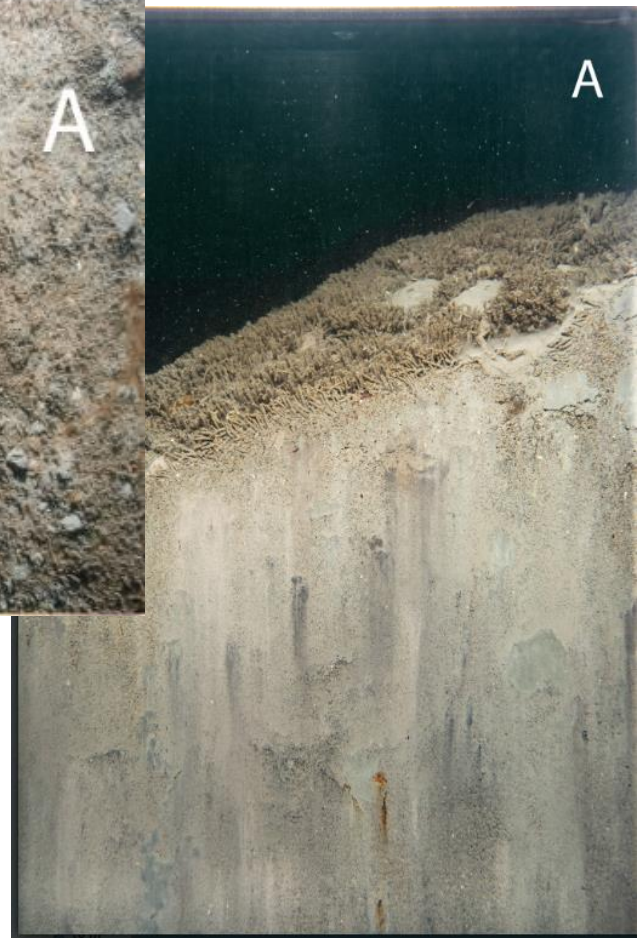
2020 and 2022 Surrounding Seafloor

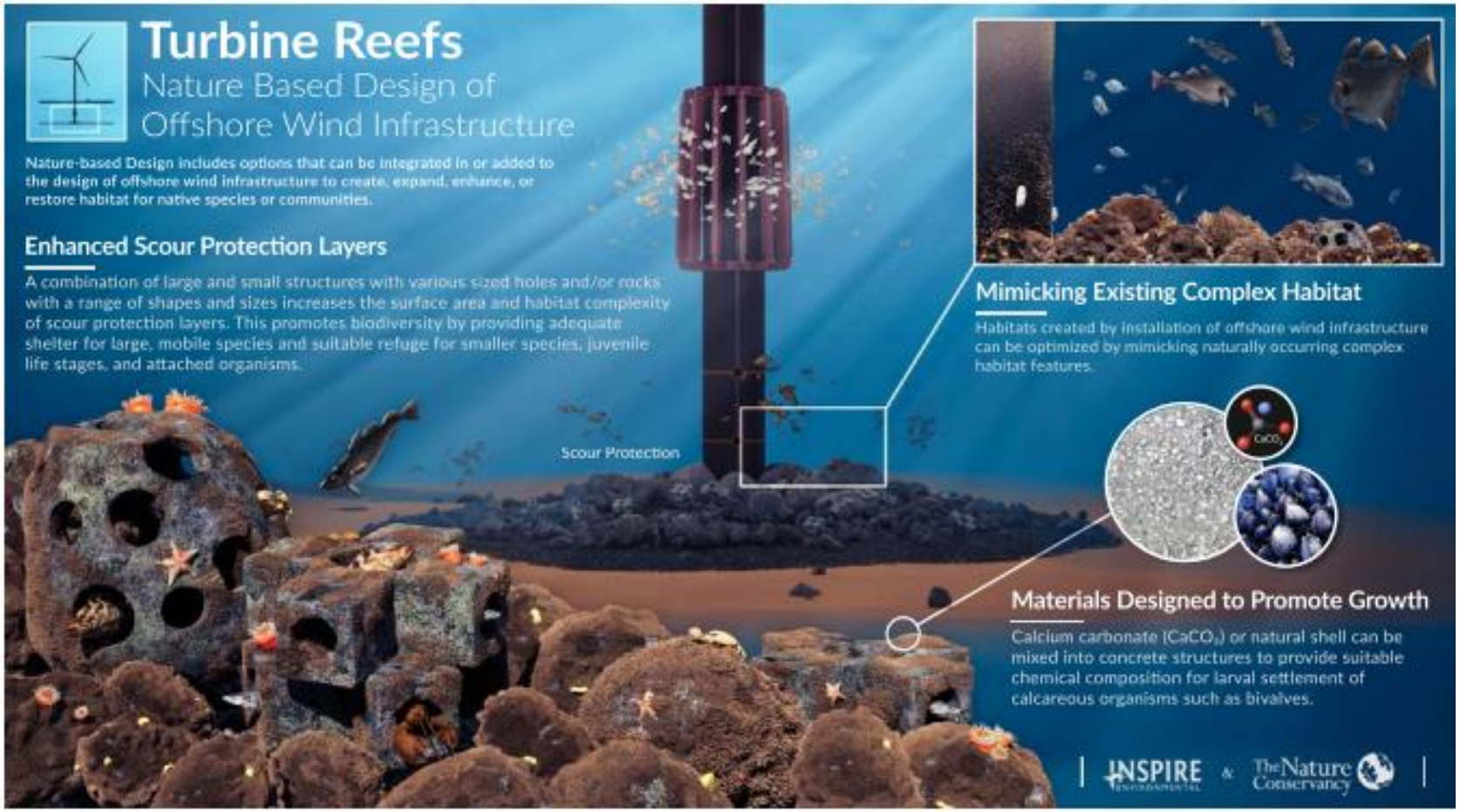
Species Distribution

Energy Distribution





Deliberate Designs



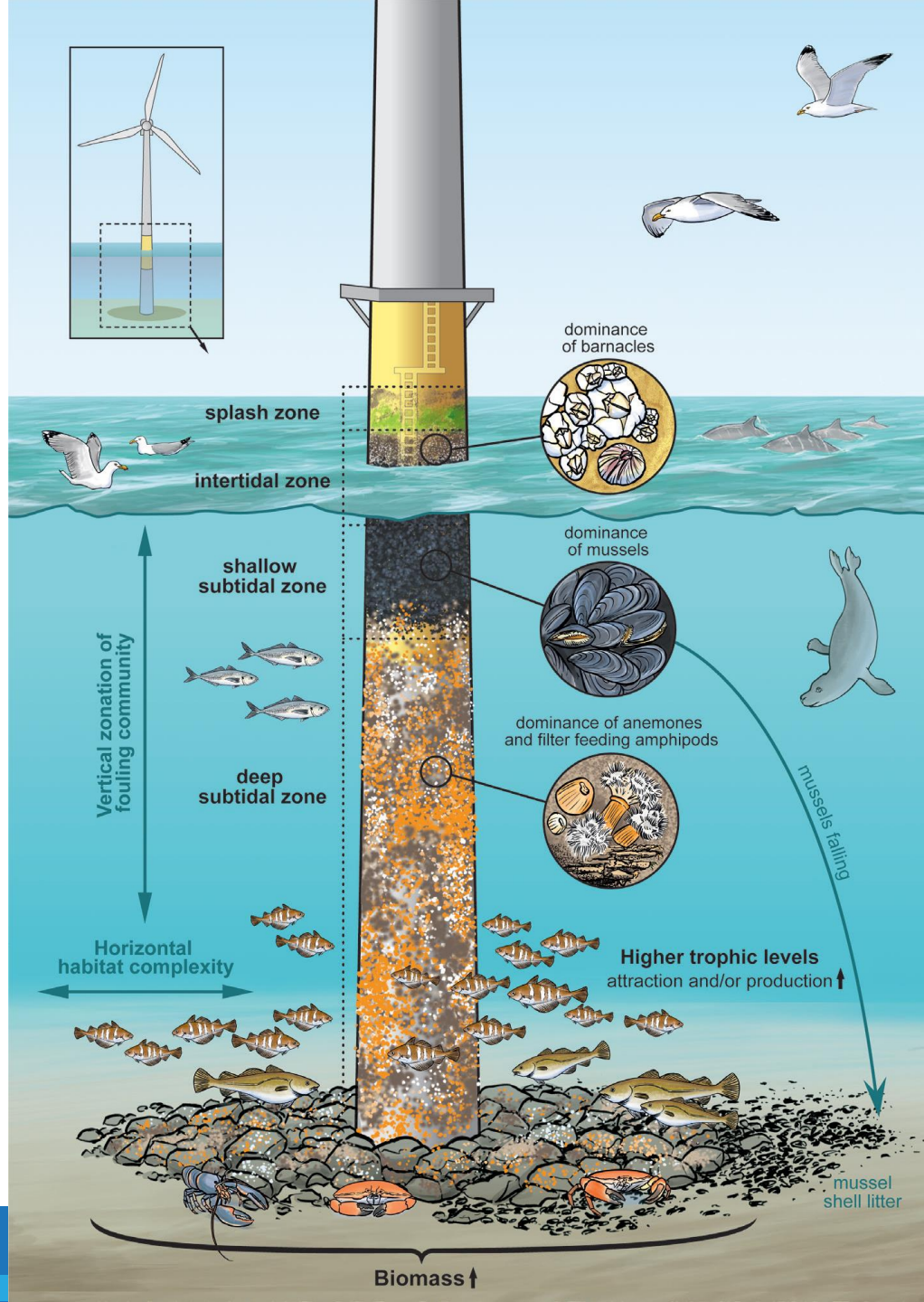
<u>Net Positive Impact Targets</u>

- Enhance Benthic Biodiversity
- Promote Diverse Fish Assemblages
- Increase Fish Production
- Increase Sediment Carbon Storage

Hypothesis-Driven Monitoring

- Aim for Net Positive Impact, but …
  - What is the specific goal?
  - What is being targeted?
  - What is expected …hypothesis?

- Use this to design monitoring to test the hypothesis –
  - Was the goal accomplished?
  - Was the target met?
  - Was the hypothesis supported by the data?



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Future Work

- Shift in Benthic Community Diversity/Structure
  - Continued monitoring with high resolution underwater imagery
- Shift in Benthic Functions –
  - Create photogrammetric models of structure (stereo imagery) to estimate biomass/volume of dominant species – to inform ecosystem models, decipher carbon cycling implications
  - Link with fisheries monitoring data to explore ecosystem connectivity shifts (trophic dynamics)