LIFE ON THE FOREST FLOOR: Spatio-temporal variation in *Laminaria hyperborea* understorey assemblages

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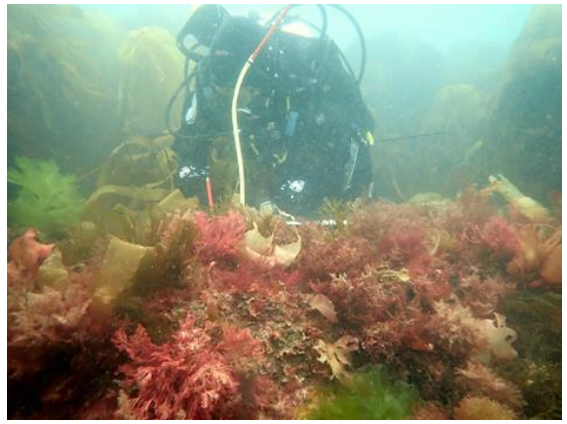
Underwater forests





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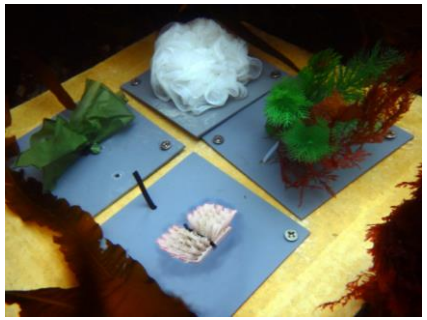
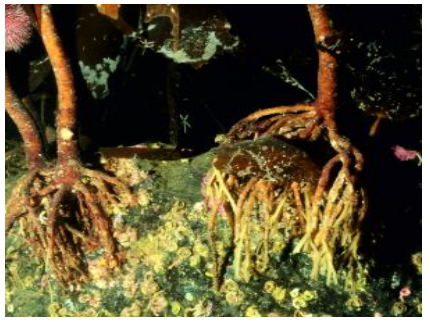
What do we know?

Variation in the structure of:

- Kelp forest (Smale & Moore 2017)
- Holdfast assemblages (Teagle et al. 2018)
- Stipe assemblages (King et al. 2021)
- Understorey algae (Smale et al. 2020)
- Understorey fauna in ASUs (Bué et al. 2019)

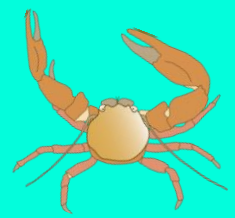




What don’t we know

- Understorey fauna directly associated with understorey algae
- Change in over time
- Drivers of variation
- Stochastic events

MISSION: Investigate spatial & temporal variation in understorey assemblage structure within UK *Laminaria hyperborea* forests



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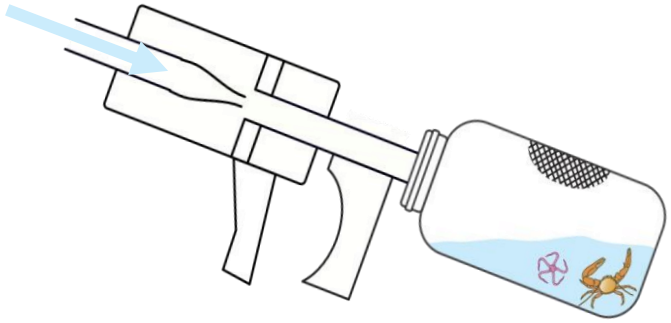
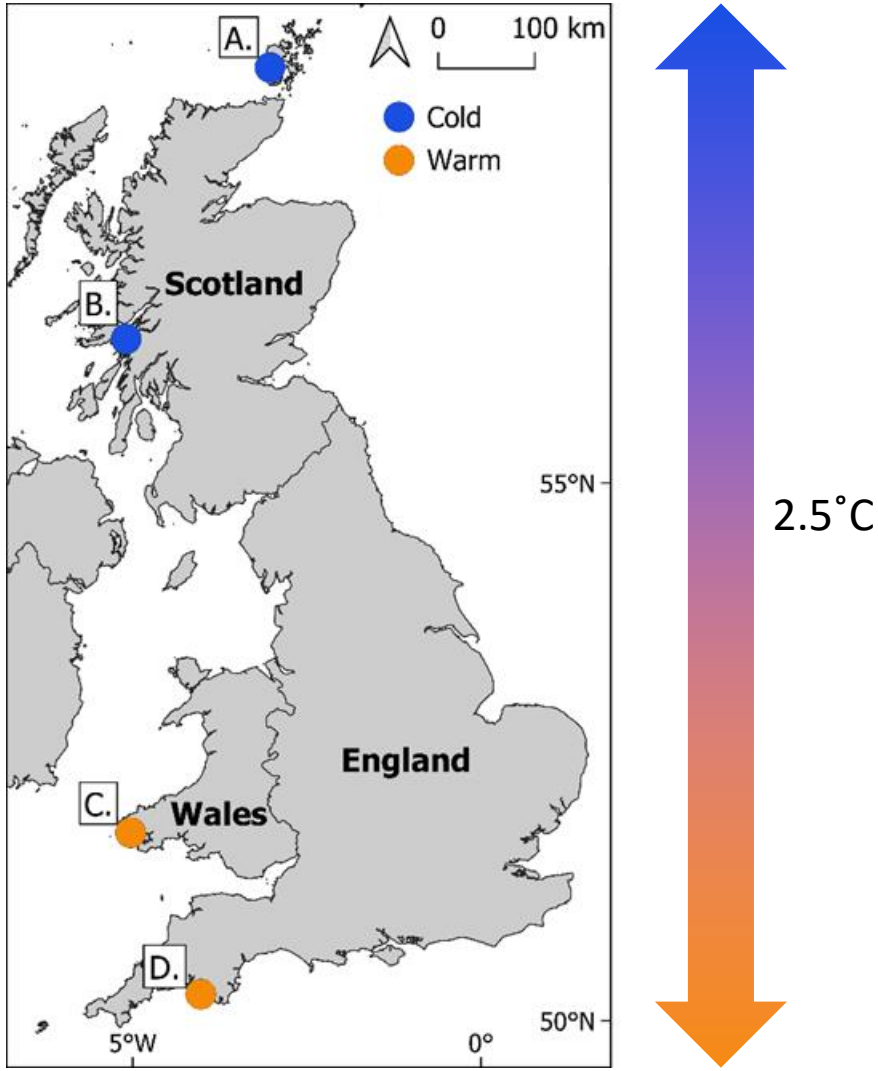
The adventure

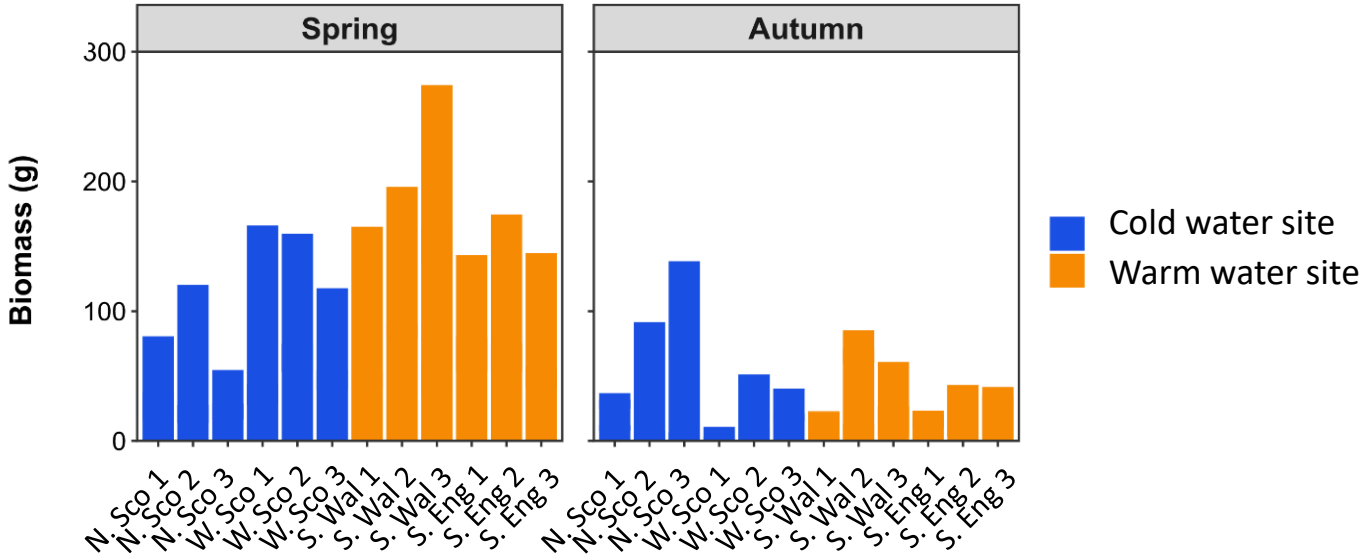
- 12 sites across 4 regions
- Spring & Autumn 2017
- Underwater suction sampler



- Algae: to functional groups & dried
- Fauna: to lowest taxa possible
- Environmental conditions: diver surveys, WF model, BIO-oracle
- Statistics: Primer



What did we find - Algae



- ↑ **biomass** in spring

  ↑ **functional groups** in autumn, particularly at warm water sites

- PERMANOVA: significant seasonal differences across sites

- SIMPER: seasonal dissimilarity (35%) driven by ↑ spring biomasses of foliose + corticated foliose & filamentous algae

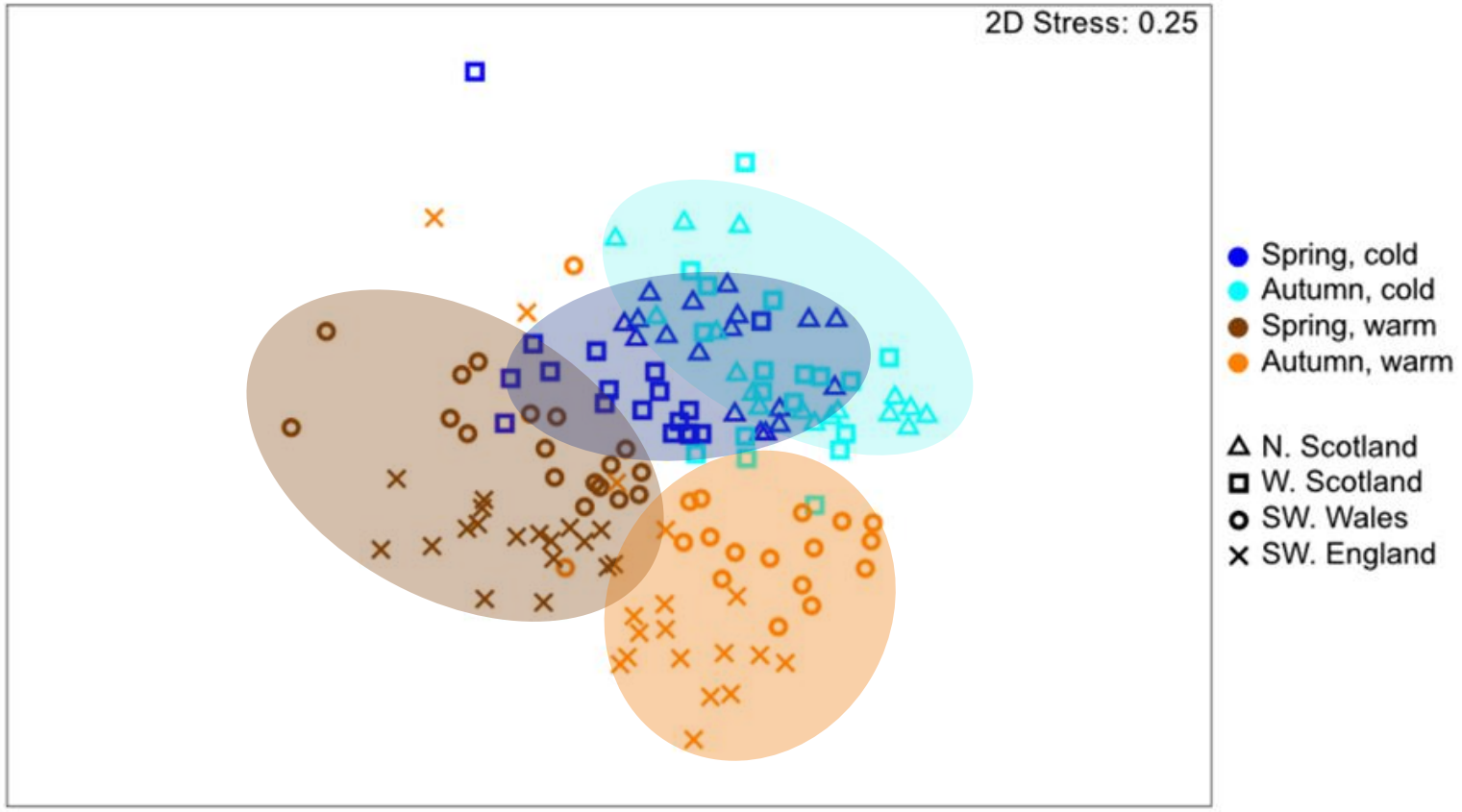
Earp et al. In prep.

What did we find - Fauna

>65, 300 individuals from 179 taxa

What did we find - Fauna

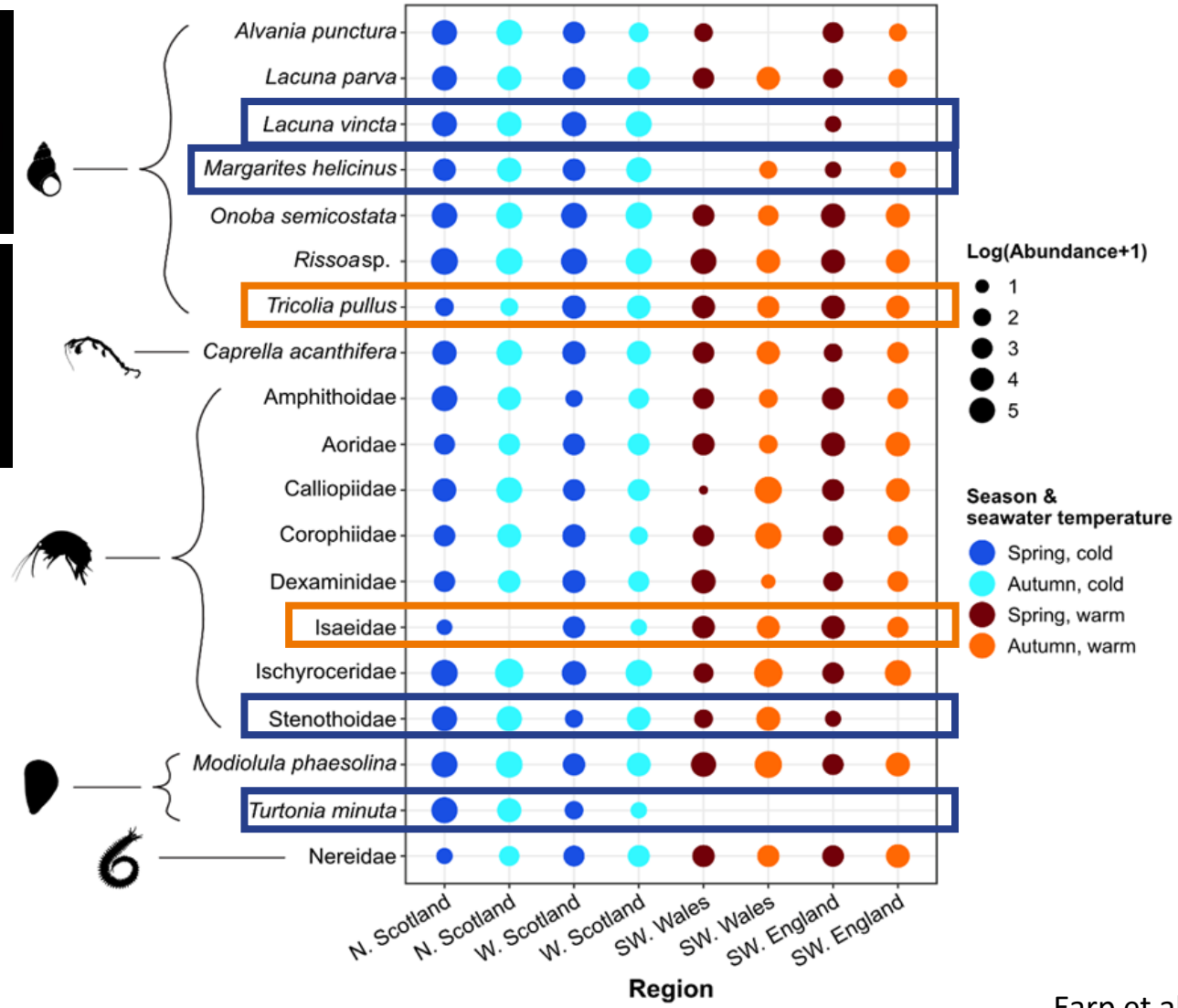
- **Spring**: ↑ gastropods & bivalves
- **Autumn**: ↑ amphipods
- **Cold** water sites: ↑ gastropods
- **Warm** water sites: echinoderms & polychaetes
- PERMANOVA: significant seasonal differences across sites



Earp et al. In prep.

What did we find - Fauna

- **Spring**: ↑ gastropods & bivalves
- **Autumn**: ↑ amphipods
- **Cold** water sites: ↑ gastropods
- **Warm** water sites: echinoderms & polychaetes
- SIMPER: dissimilarity spread across several taxa



Earp et al. In prep.

What did we find - Drivers

distLM

Algae

✓ Sediment/detritus weight
✓ **Sea surface temperature**
Wave exposure
Chlorophyll *a* concentration
Nitrate concentration
✓ **Phosphate concentration**
L. hyperborea density

Most parsimonious model: 11%

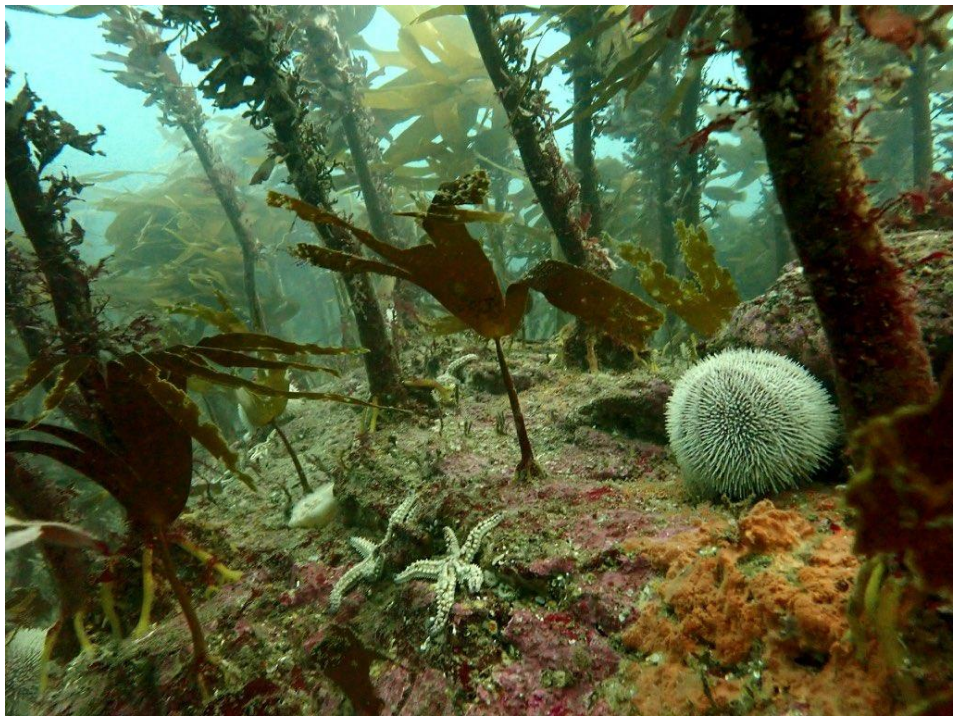
Fauna

✓ **Understorey filamentous biomass**
✓ Understorey foliose + corticated foliose biomass
Understorey corticated biomass
✓ Understorey leathery biomass
✓ Understorey articulated calcareous biomass
✓ Sediment/detritus weight
✓ **Sea surface temperature**
✓ **Wave exposure**
✓ *L. hyperborea* density
✓ *L. hyperborea* age

Most parsimonious model: 36%

Earp et al. In prep.

What does it mean?

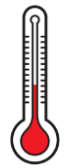


- Diverse & abundant understorey

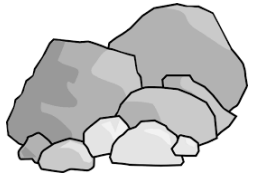
273.3g m^2

7,308 inds m^2

- Complex interactions among environmental variables likely drive local variability







- Baseline for comparison

Thank you for your attention

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