Surface canopy-forming kelp forests support similar macrofauna to sympatric stipitate kelp forests

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Background:

- Kelps create **structurally complex** and **productive** habitats that support **valuable** ecosystem services
    - Kelp forests are dominated by a variety of species

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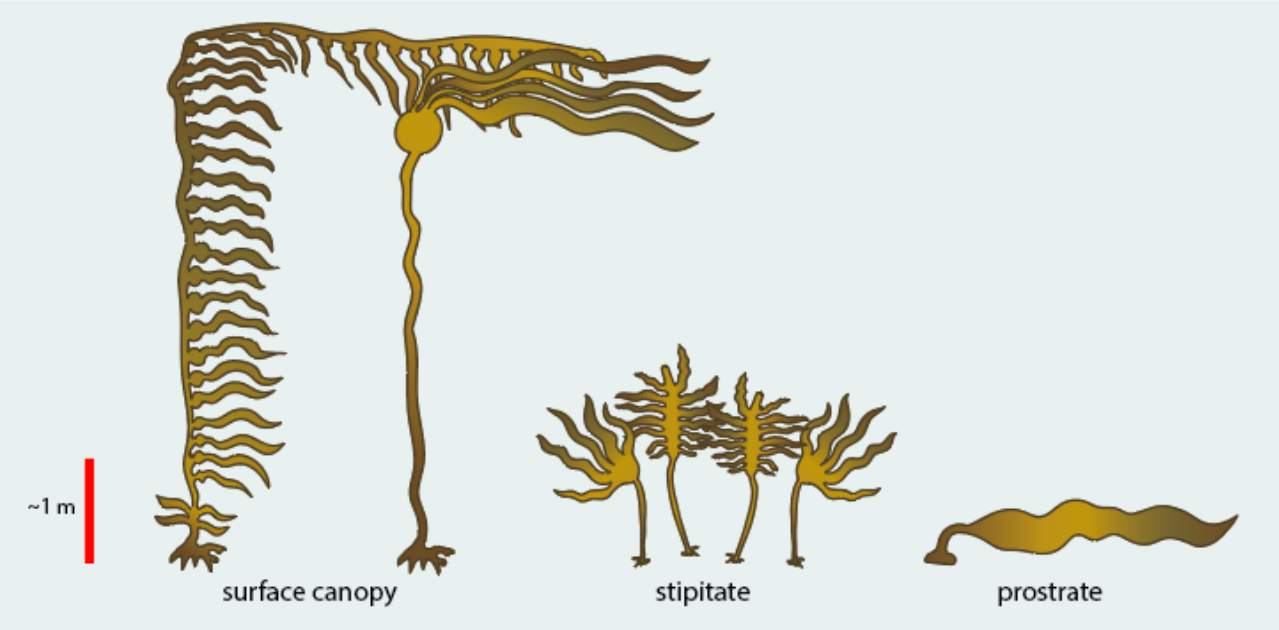
Background:

- Different kelp **morphologies** create distinct kelp forest **growth forms**



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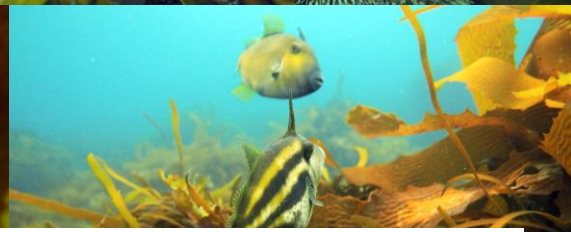
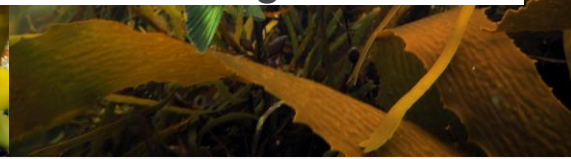
Background:

- Kelps create habitat via physical and biogeochemical changes
  - They provide:
    - Physical structure/complexity
    - Foraging opportunities
  - They modify their environment, e.g.:
    - Shading
    - Altered hydrodynamics
    - Abrasion



The product of a complex and dynamic balance between positive and negative effects



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Background:

These communities are highly variable in space and time

… and possibly also between forest types

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Background:

- In Tasmania:
  - >95% of surface canopy-forming *Macrocystis pyrifera* forests have been lost since the 1970s
  - Widely replaced by stipitate forests dominated by *Ecklonia radiata*
- There is growing interest in the conservation and restoration of these endangered communities

Do these forests support distinct communities?

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Aims:

- Our aims were to:

    1) **Characterise** fish and macroinvertebrate communities in remnant Tasmanian *Macrocystis* forests

    2) **Compare** them to the communities associated with sympatric *Ecklonia* forests

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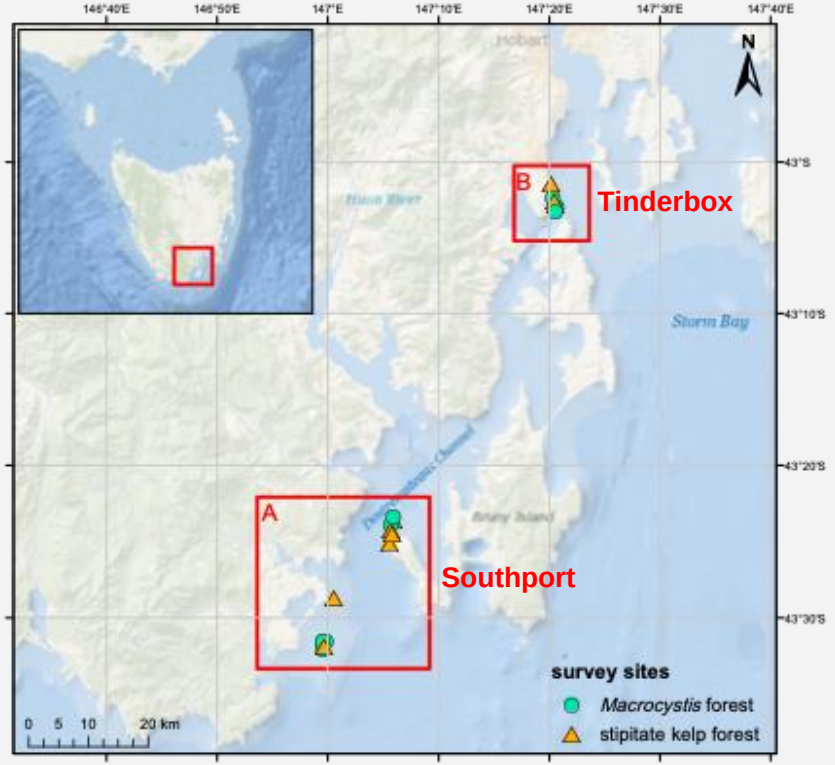
Methods – Sites:

- Surveys were conducted in **south-eastern Tasmania**
- We selected *Macrocystis* and *Ecklonia*-dominated stipitate forests at similar depths, in two regions
    - Surveyed 18 forests, 9 of each type



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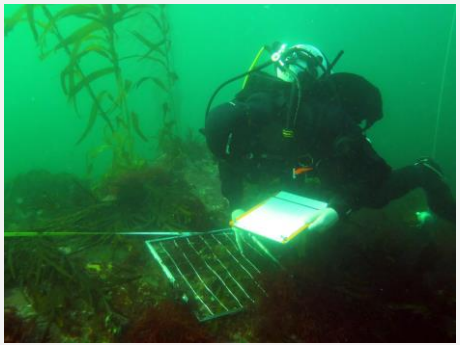
Methods – Surveys:

- Surveys used an extended **Reef Life Survey (RLS) method**:
  1) Lay a 50 m transect line
  2) Count and size all mobile fishes
  3) Count and size all macroinvertebrates and cryptic fishes
  4) Count *Macrocystis* individuals and stipes*
  5) Count stipes of other large brown macroalgae*
  6) Estimate the percent cover of eight substrate categories*
  7) [Photo-quadrats and point intercept quadrats of understorey macroalgae and sessile invertebrates]



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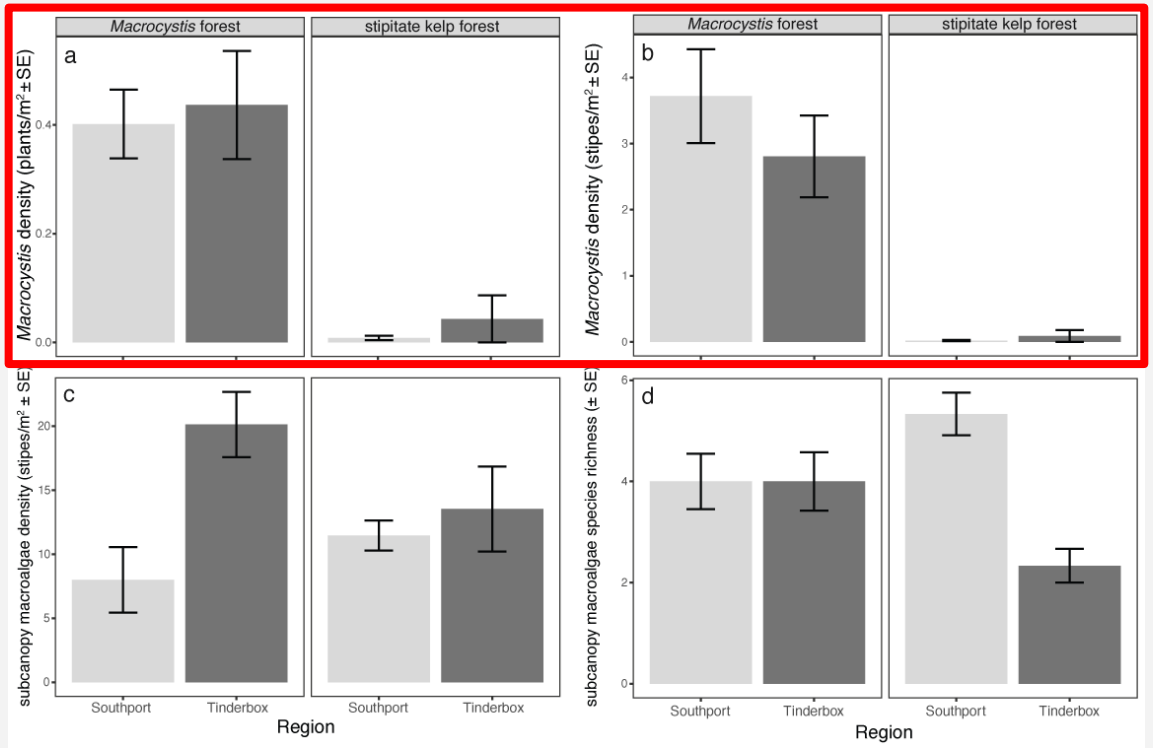
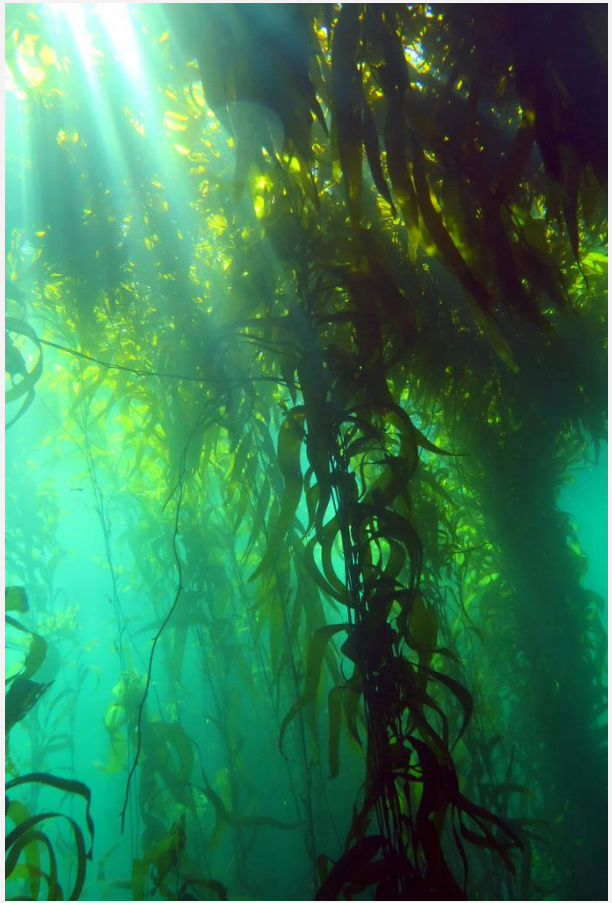
We recorded 51 species: 24 fishes and 27 invertebrates

47% of species were found in both forest types



Results – Forest Structure:





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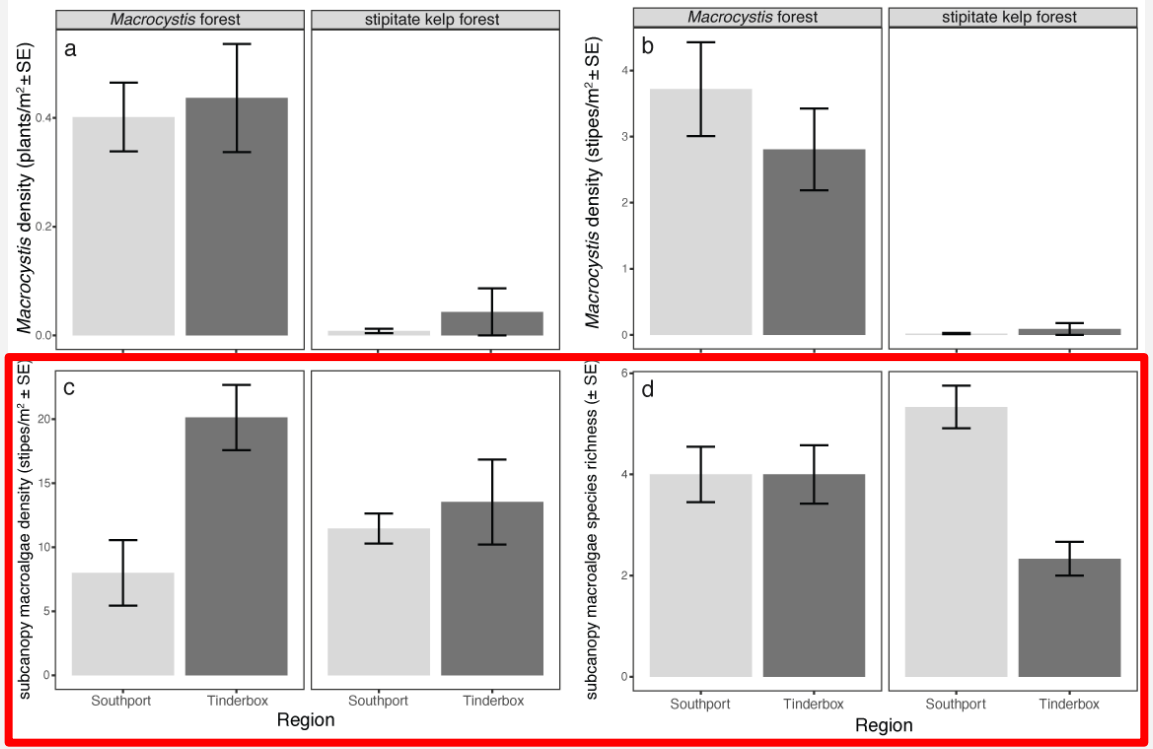

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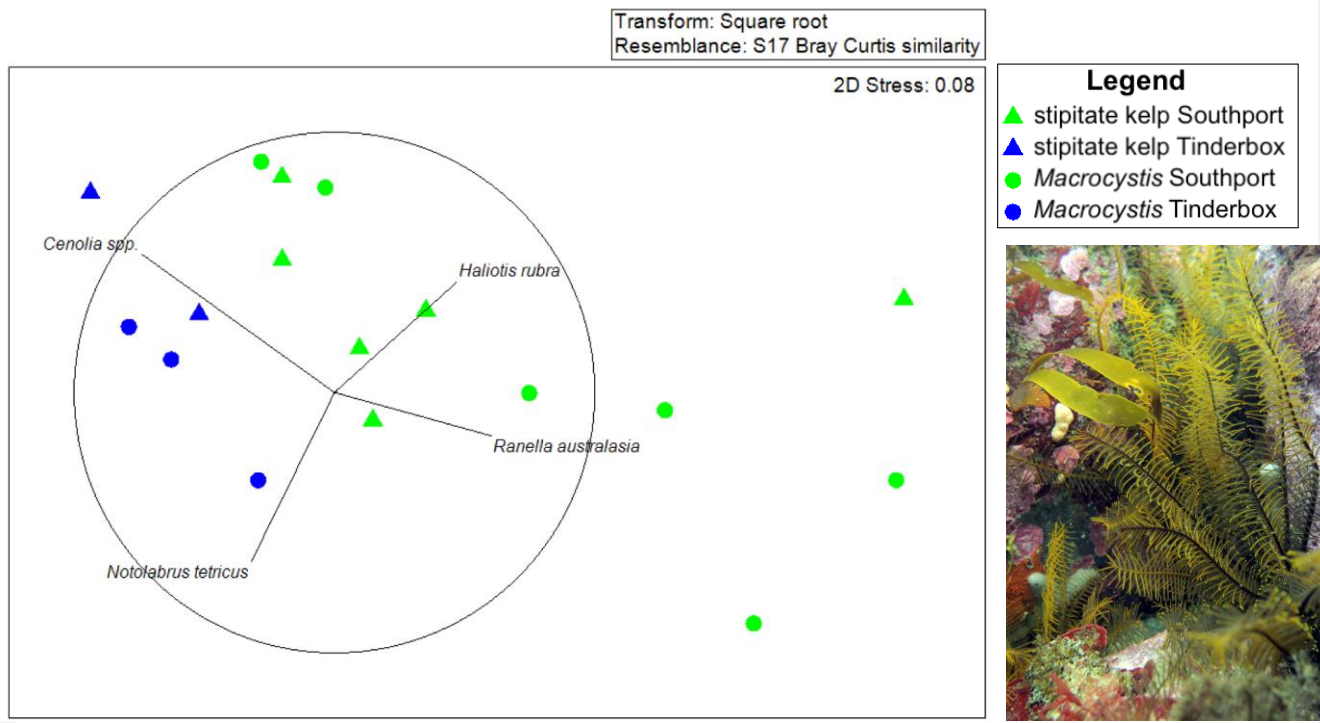
Results – Multivariate Analyses:



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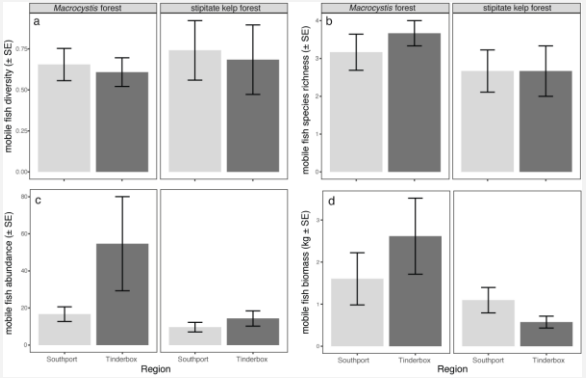
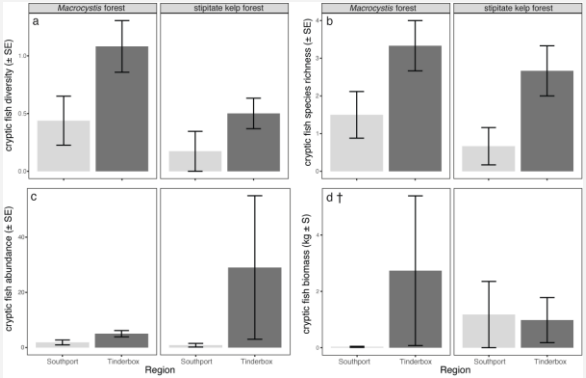
Results – Univariate Analyses:

We looked at lots of ecological parameters!

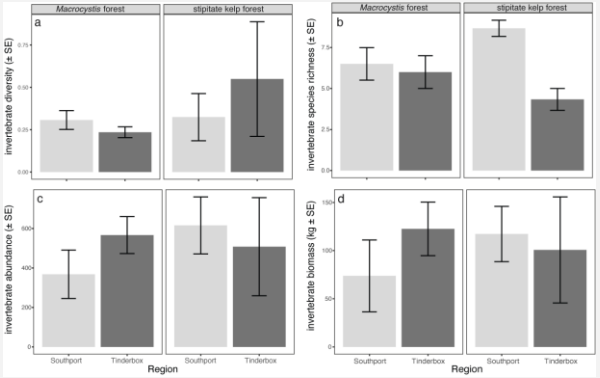
mobile fish



cryptic fish



invertebrates



And found **no differences** in faunal assemblages between forest types

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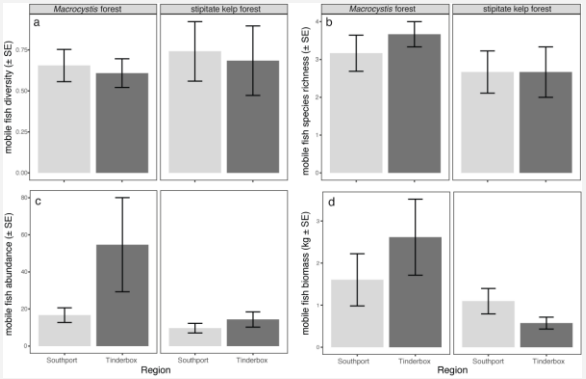
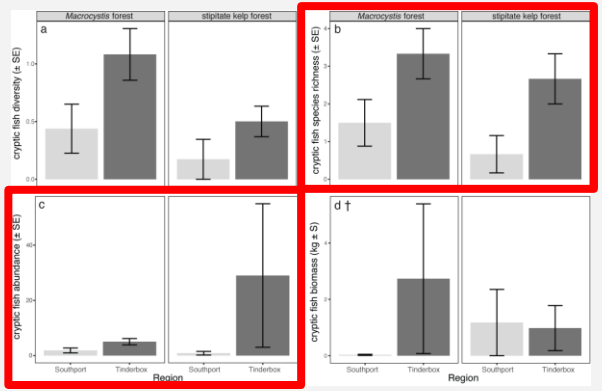


cryptic fish



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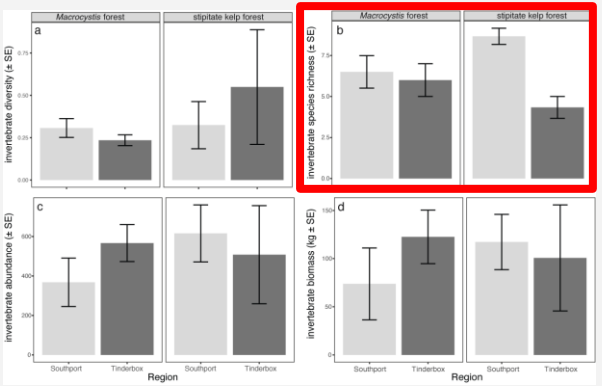

And found **no differences** in faunal assemblages between forest types

But some between regions

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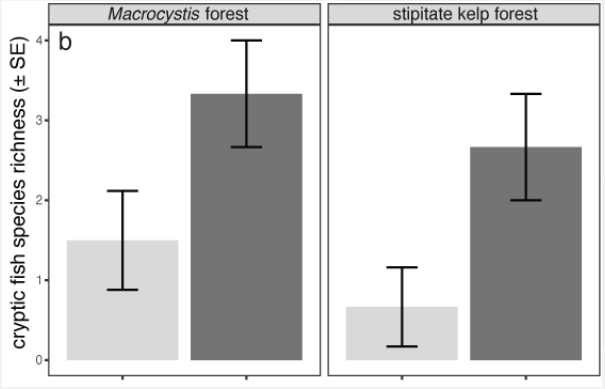
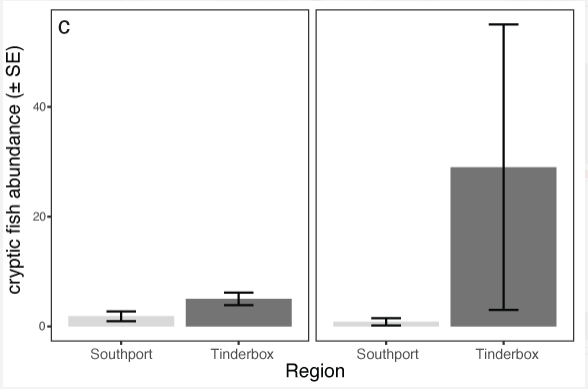
Results – Univariate Analyses:

We looked at lots of ecological parameters!

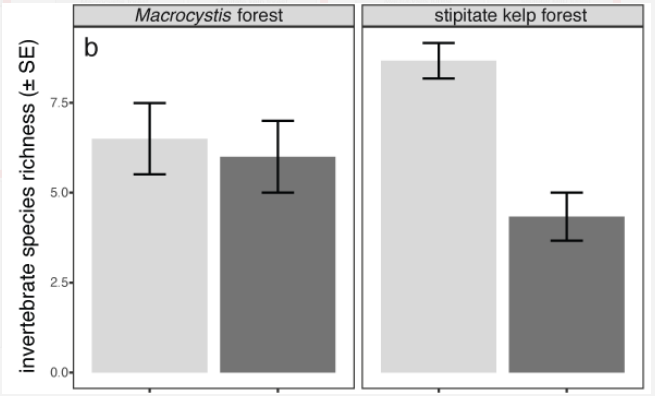
cryptic fish species richness



cryptic fish abundance



invertebrate species richness



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Results – Linear Regressions:

We also tested lots of linear relationships... and found few that were significant

- Faunal assemblages were not well explained by:
  - *Macrocystis* density
  - Subcanopy macroalgae density
  - Substrate diversity
  - Proportion boulder habitat




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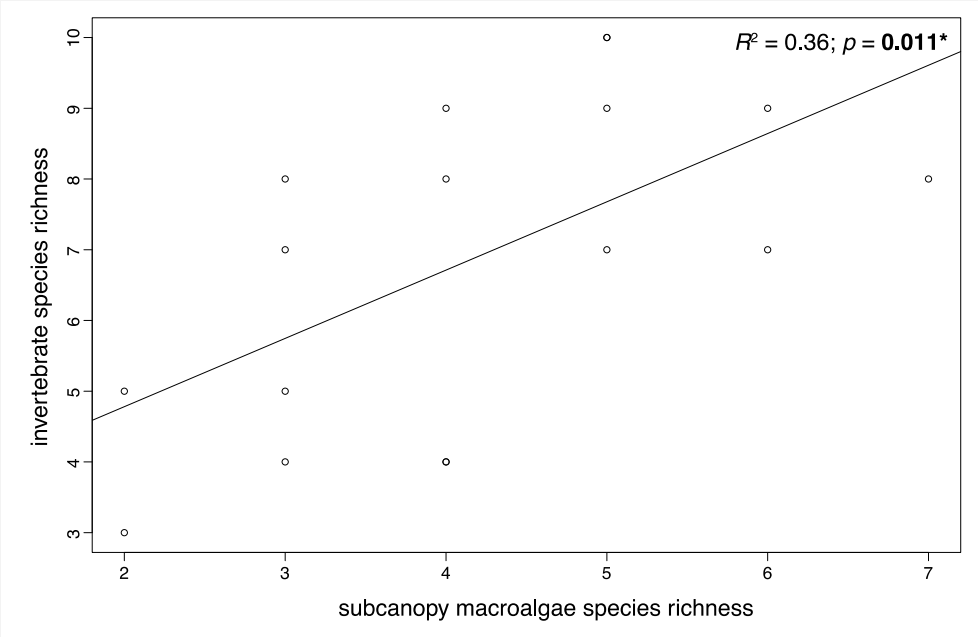
Results – Linear Regressions:

BUT invertebrate species richness was well explained by the **richness** of subcanopy macroalgae:



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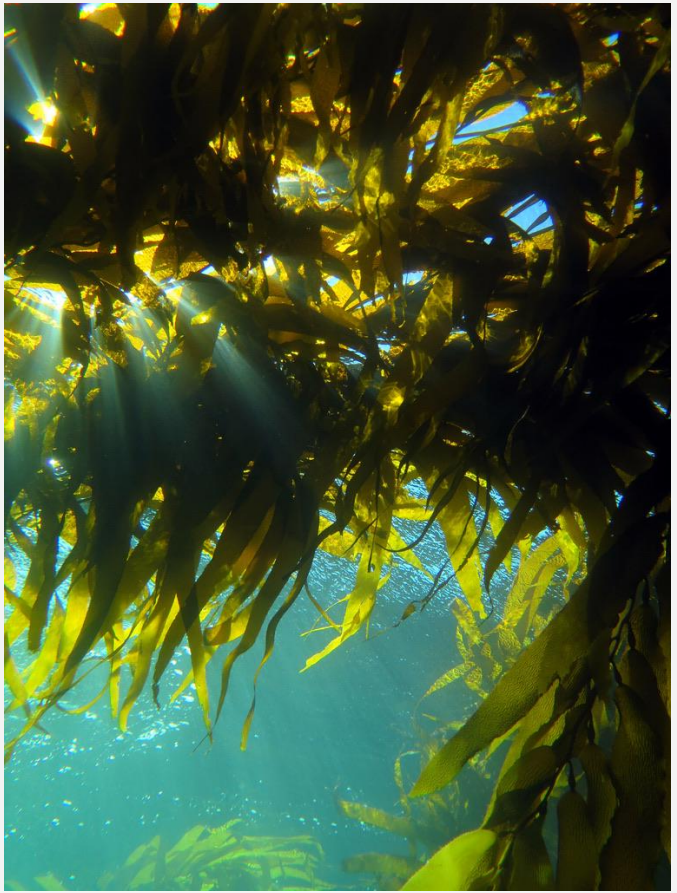
Discussion:

- ***Macrocystis Ecklonia* forests did not support different fish and macroinvertebrate communities**

1) Other taxa may differ between these forest types (e.g. macroalgae)
2) There may be seasonal or annual differences between forest types
3) There may be no surface canopy-associated fauna in this ecosystem
4) Remnant *Macrocystis* forests may support distinct communities



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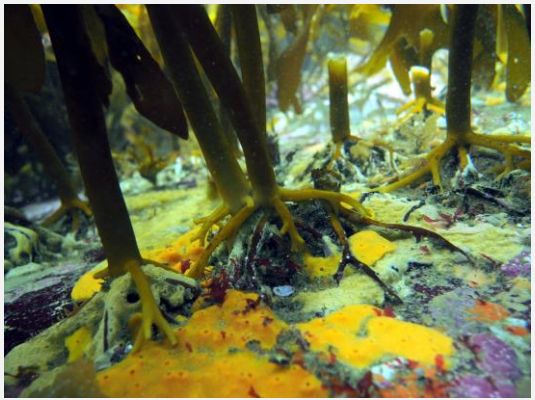
Next Steps:

1) Examine other taxa that might respond differently – e.g. macroalgae, epibiota, small invertebrates



2) Characterise Tasmanian *Macrocystis* forest communities on greater spatial and temporal scales

3) Experimentally test the importance of mechanisms structuring kelp forest communities

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Applications:

- Provides a **baseline** to help guide conservation and restoration activities, by quantifying this understudied community
- Suggests that *Ecklonia* forests could provide **some functional redundancy** for lost *Macrocystis* forests

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