Variation in Zooplankton Community Composition in Prince William Sound across Space and Time

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Introduction

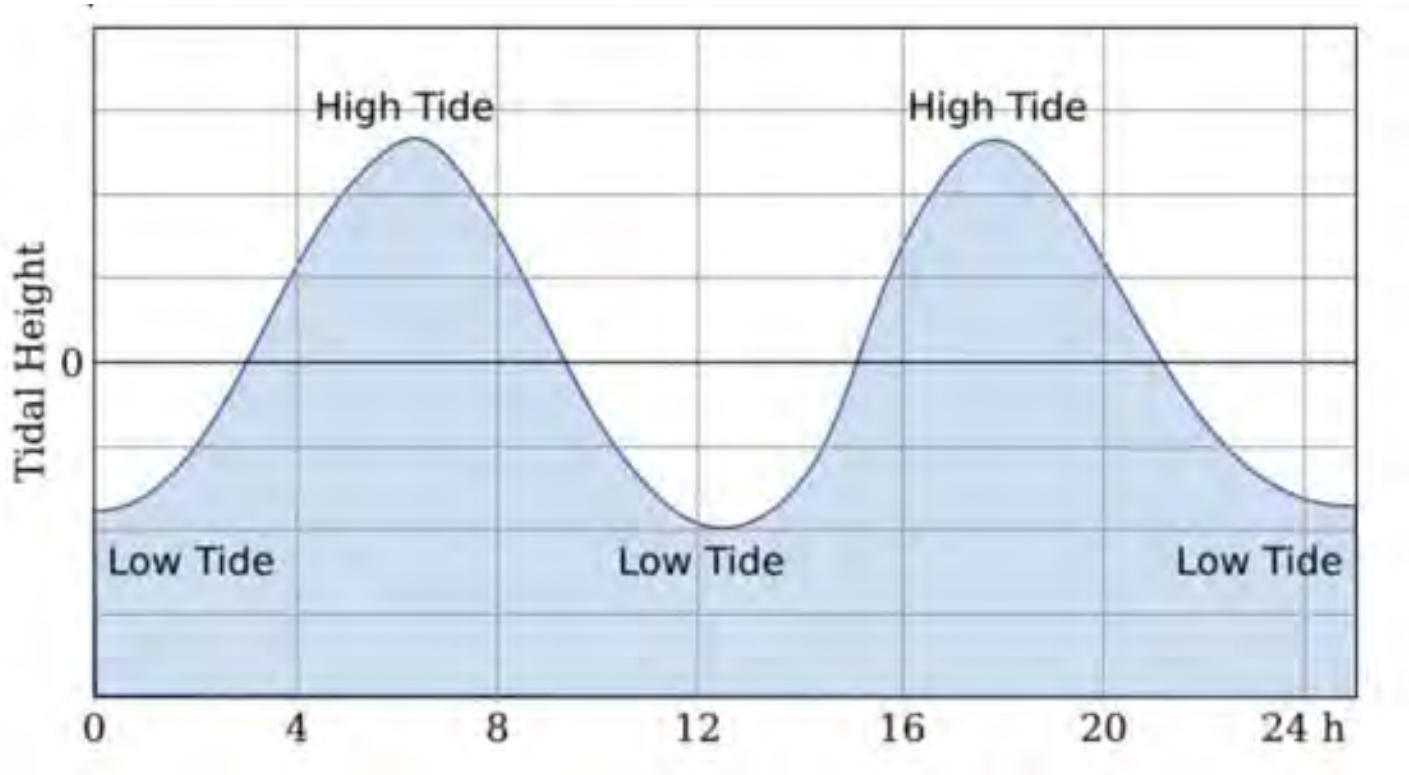
- Shipping could bring invasive species in AK
- Early eradication is key
- Genetic methods can detect larval stages
- Prior attempts involved small number of samples

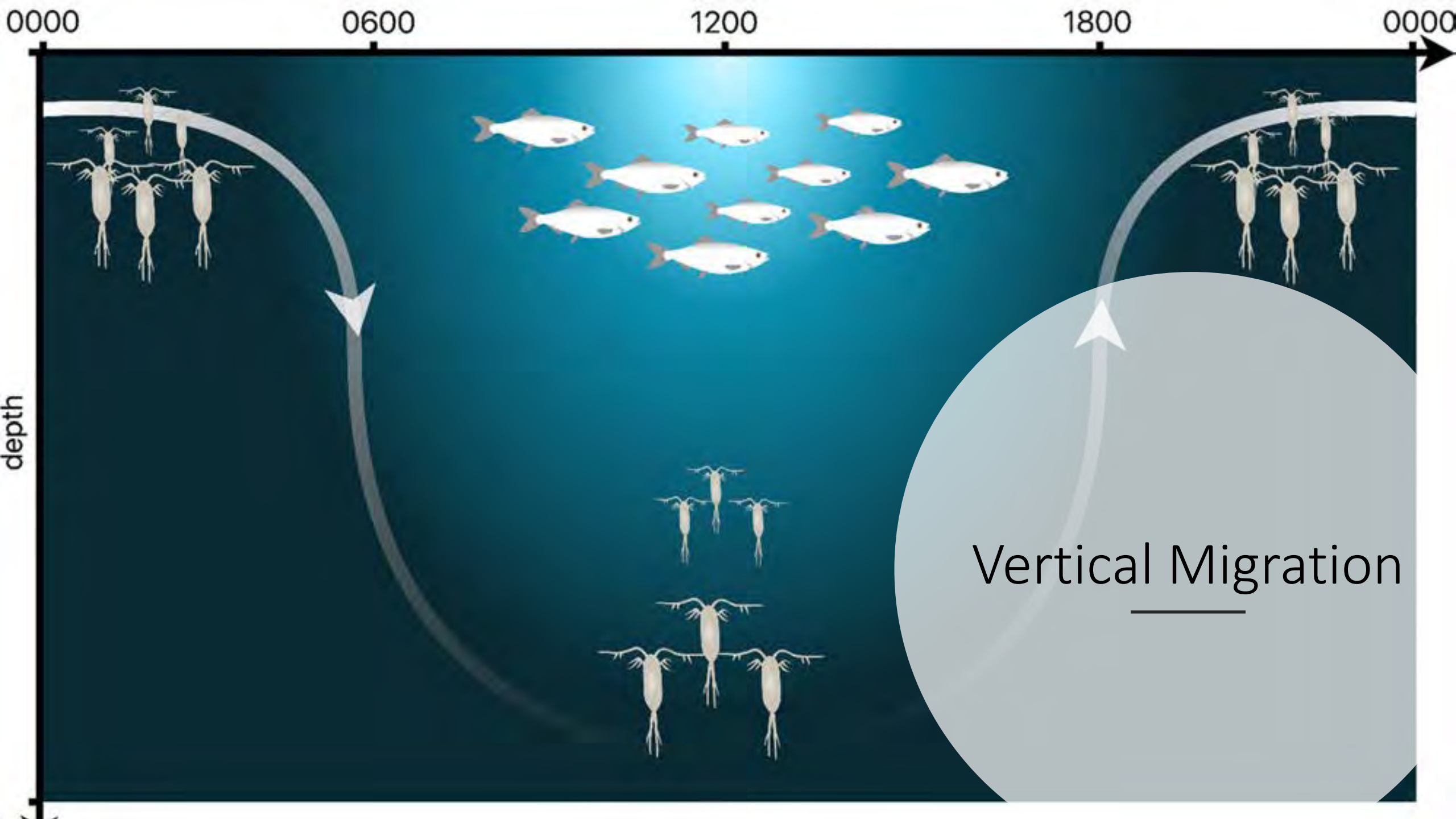
Research Questions

How do zooplankton communities vary across location, Day vs. Night, Tidal Cycle, and Time of Year?

Do these factors influence the zooplankton of potentially invasive species?

Tidal cycle


High Tide
High Tide
Tidal Height
0
Low Tide
Low Tide
Low Tide
0
4
8
12
16
20
24 h


0000
0600
1200
1800
0000
depth
Vertical Migration

Methods

238 samples collected across 3 sites, day vs. night and tidal cycle from April 2021 to September 2021

Methods

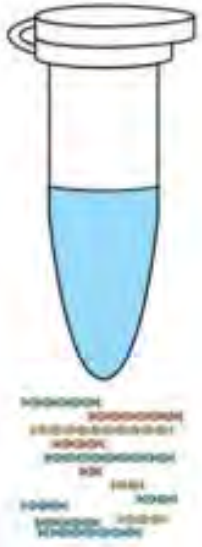
24,447,209 reads identified as animals

1

Collect an environmental sample

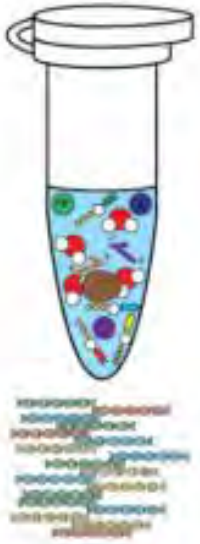
2

DNA extraction from environmental sample



3

Amplify DNA markers

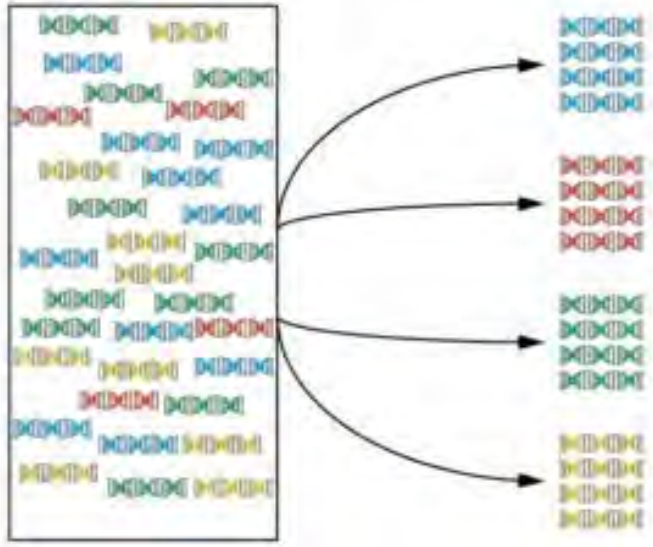


4

High-throughput sequencing

5

Bioinformatic processing

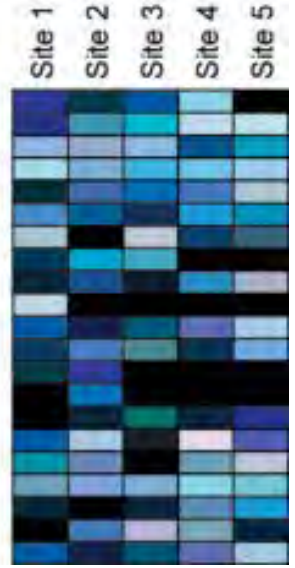


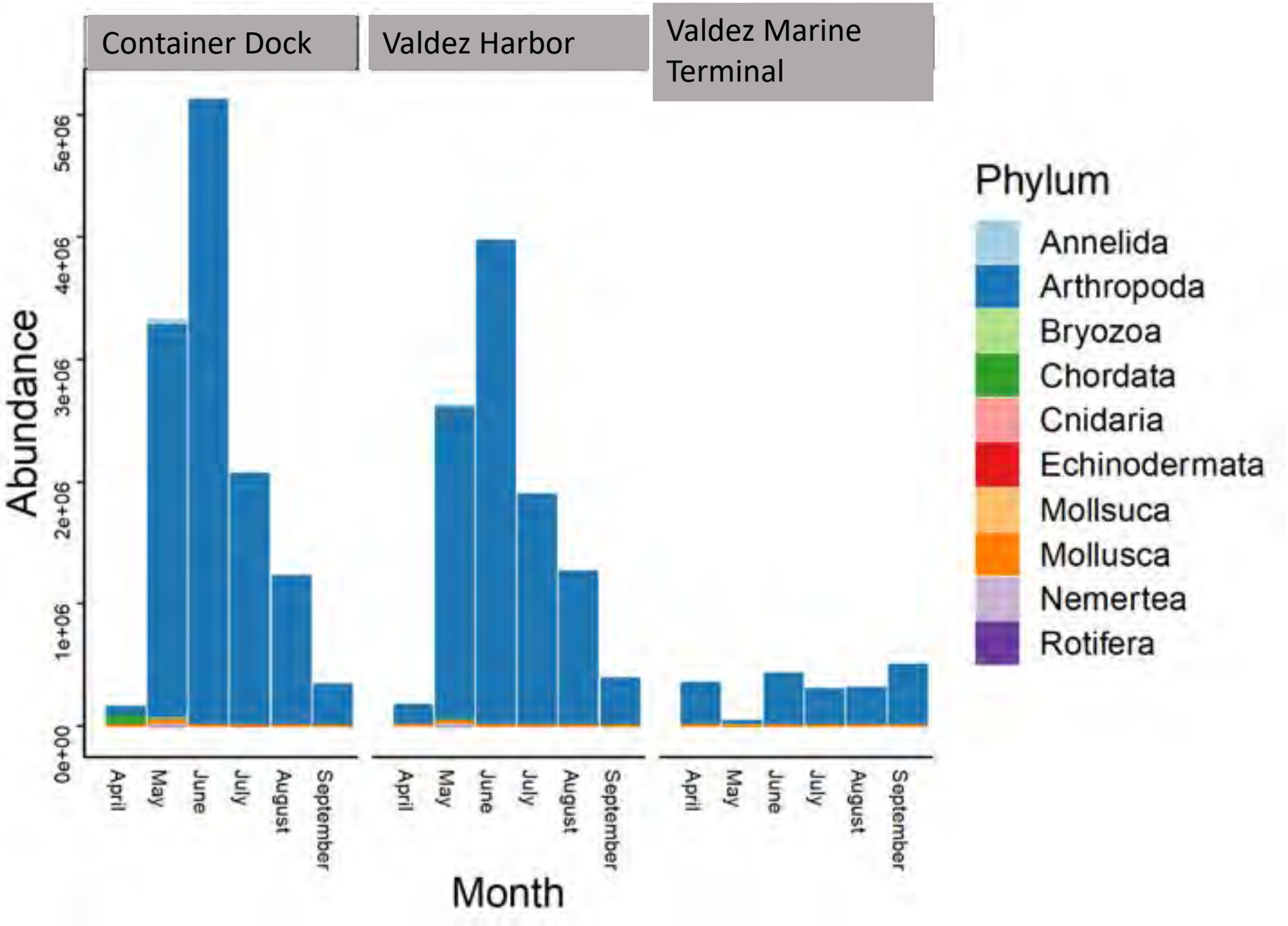
6

Species identification

7

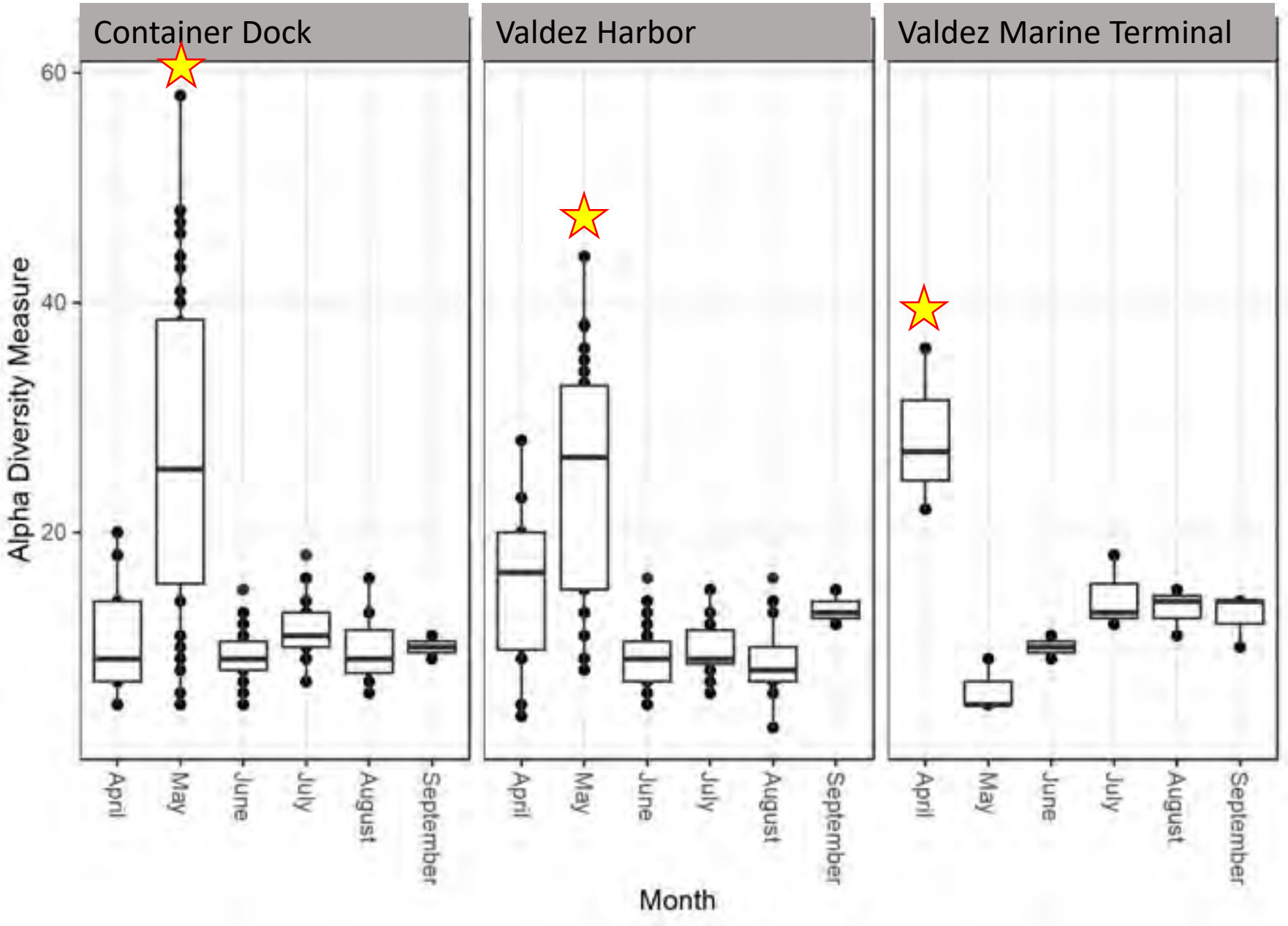
Ecological analysis





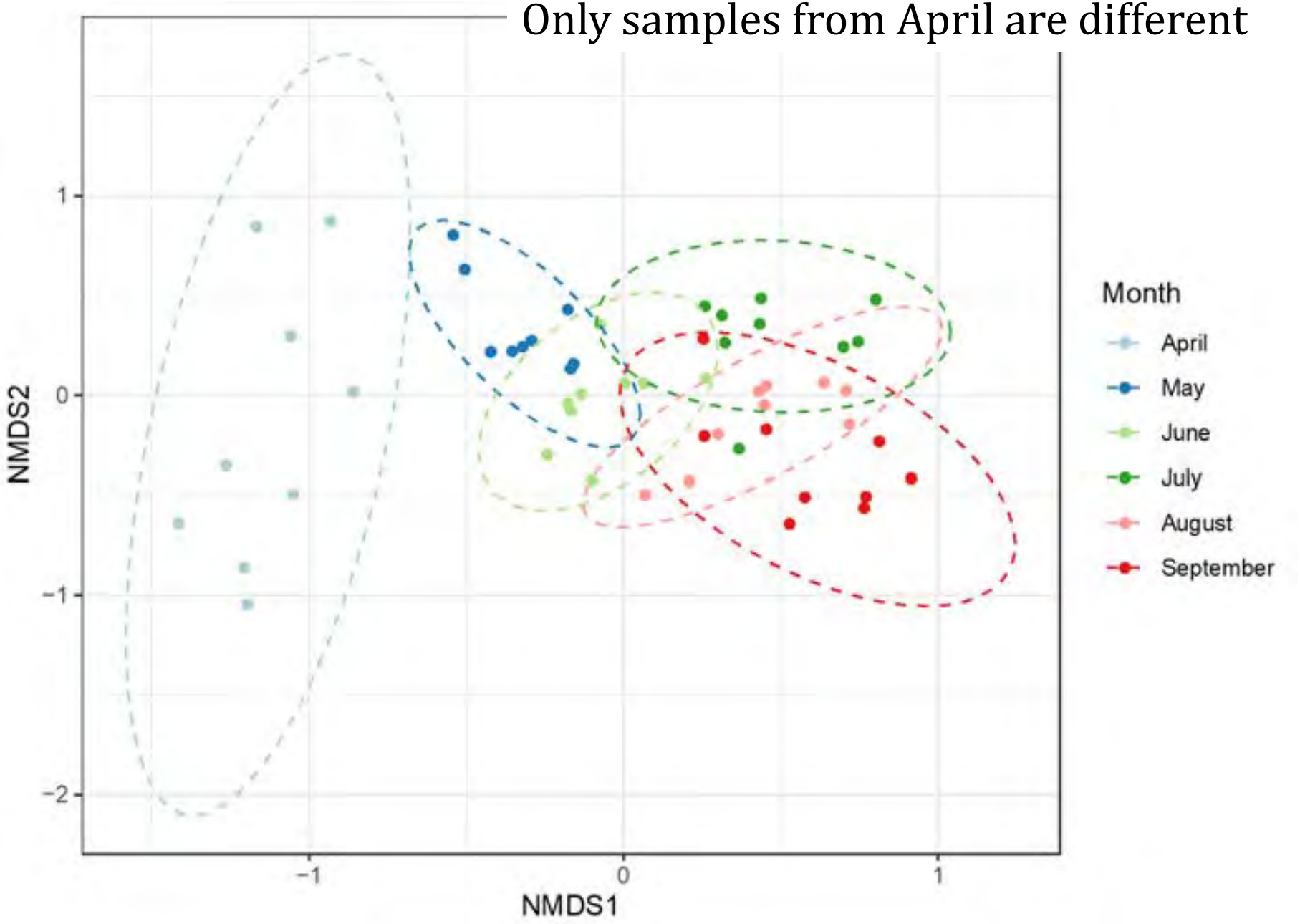
- Most of the animals identified were copepods – live their entire life in the plankton

- Not many sequences from animals that live on the bottom as adults (bryozoans, bivalves)



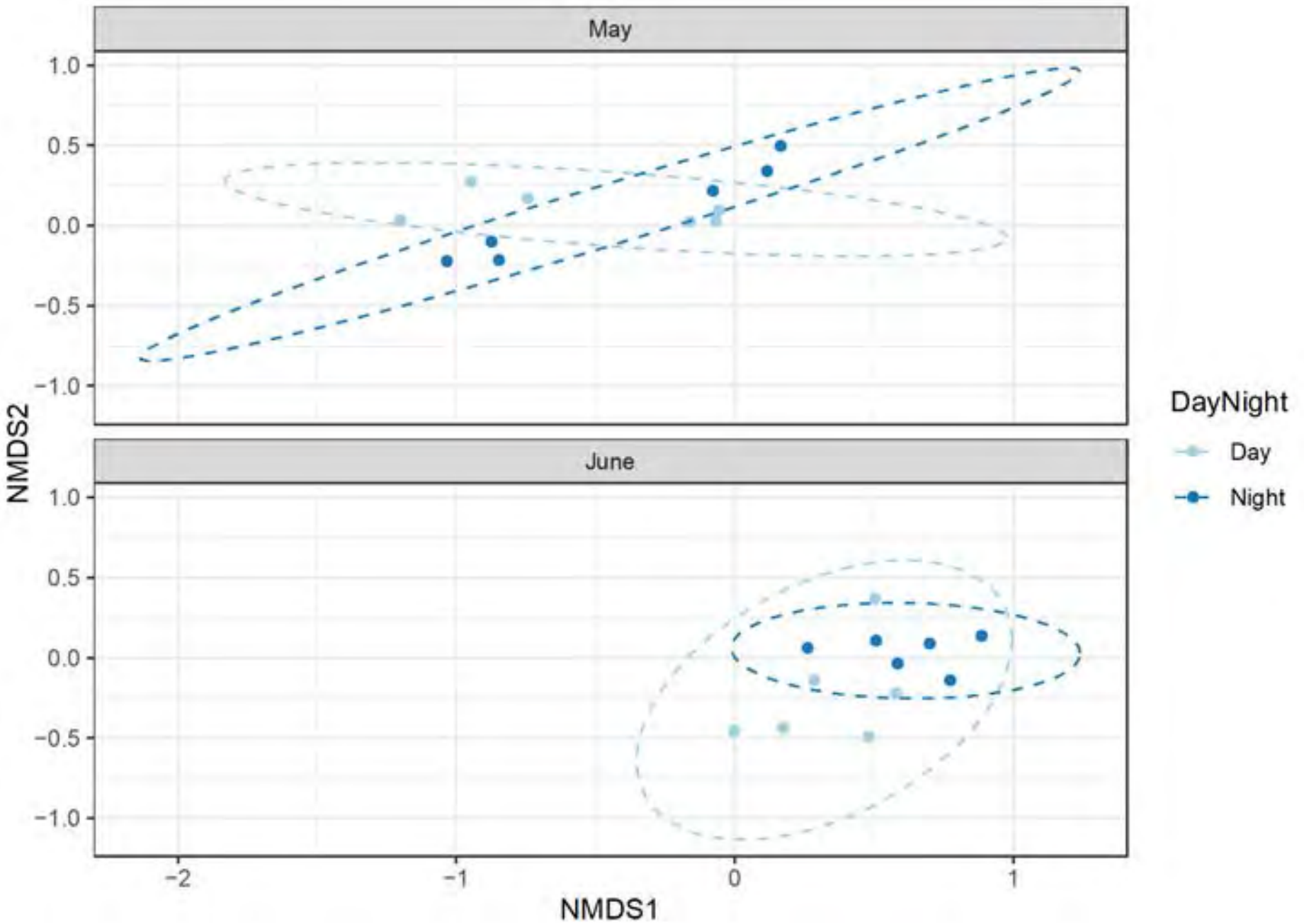
- Species richness = estimate of the number of species
- Highest in May at two locations and April at the third
- Lots of different species in spring time is what we would expect

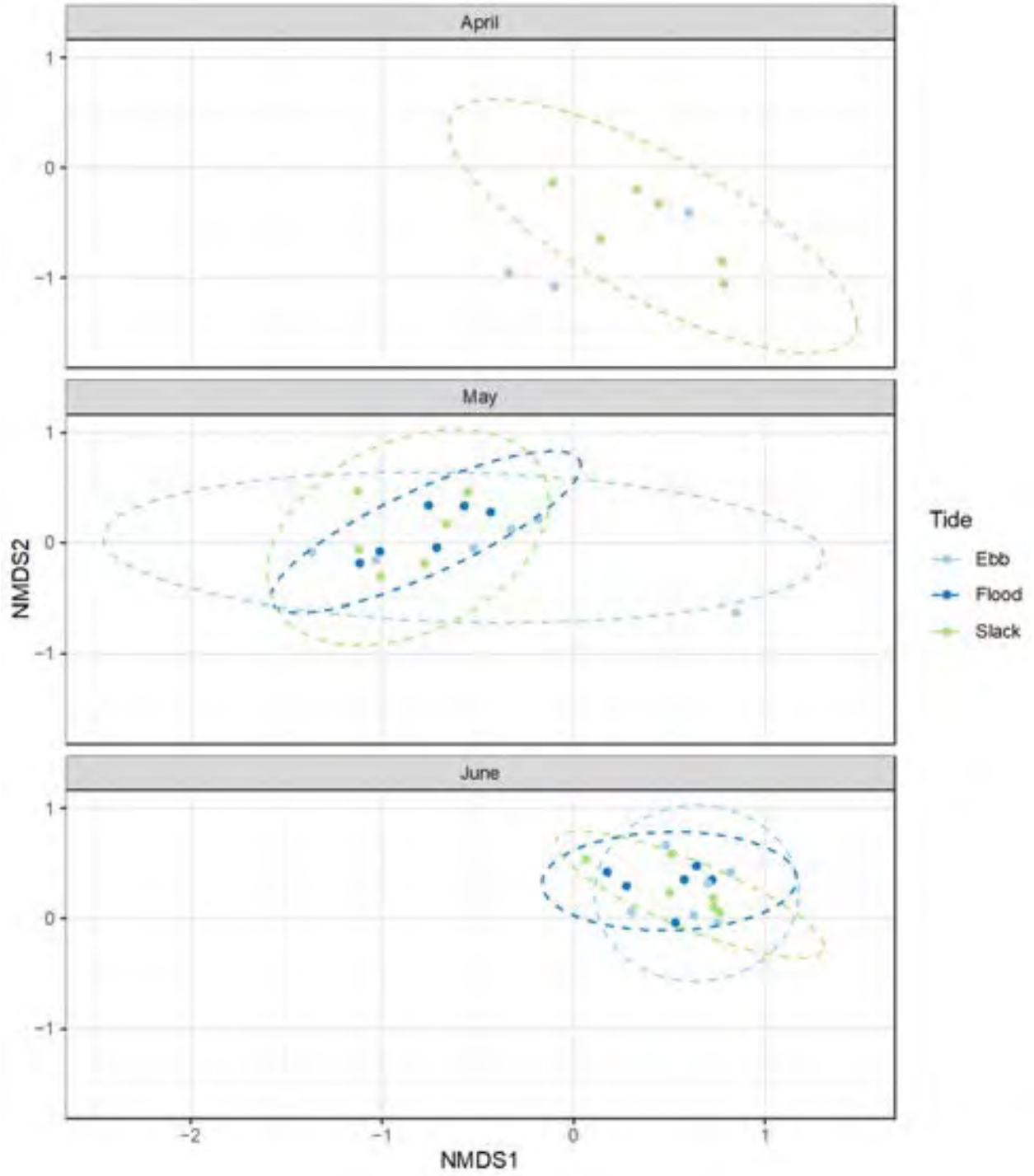
Only samples from April are different



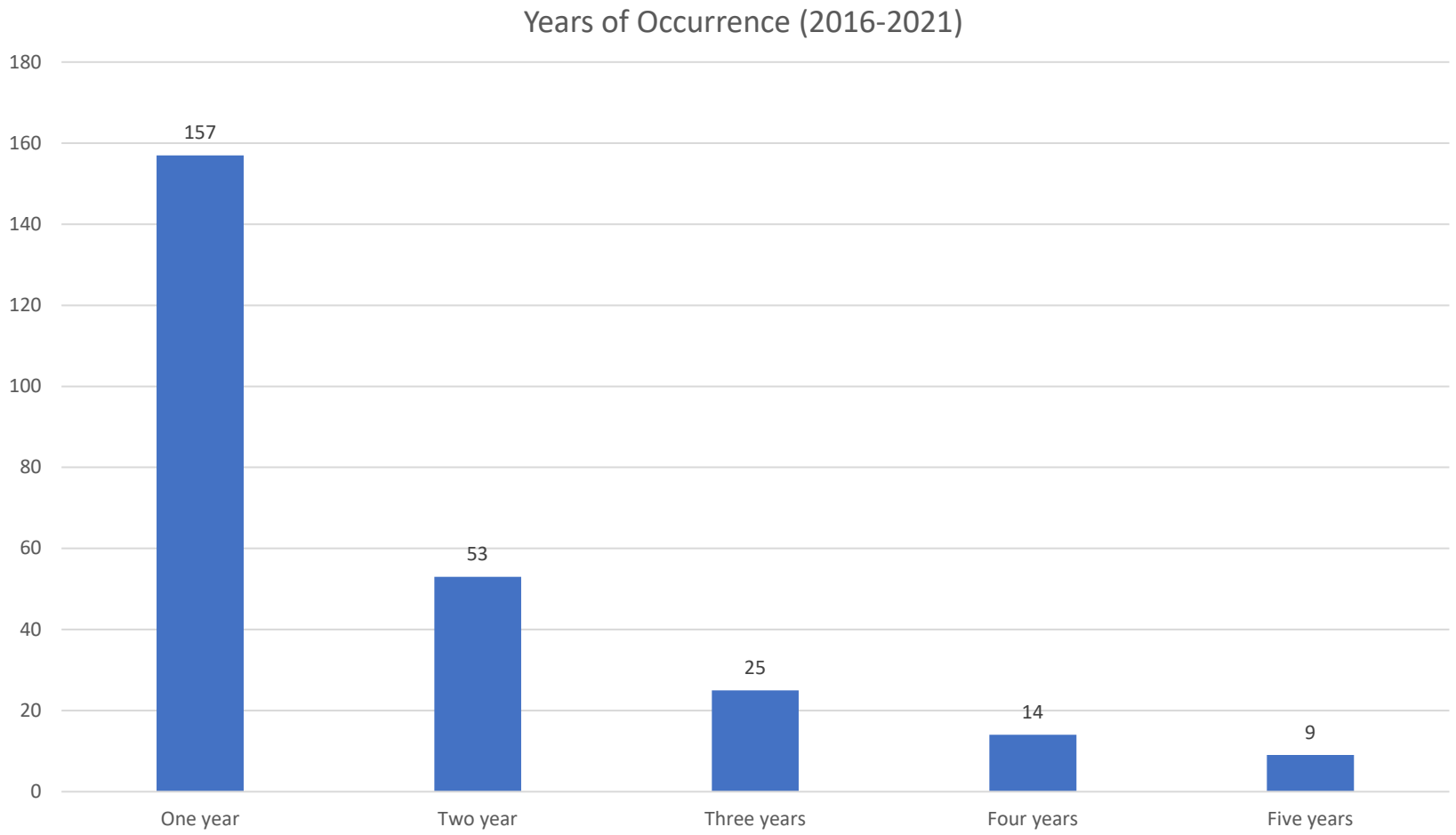
- Looking at overlap in the community across months
- Light blue (April) dots are to the side by themselves, while the dots representing the other months are jumbled together

No Difference Between Day and Night





No Difference Across Tidal Cycle

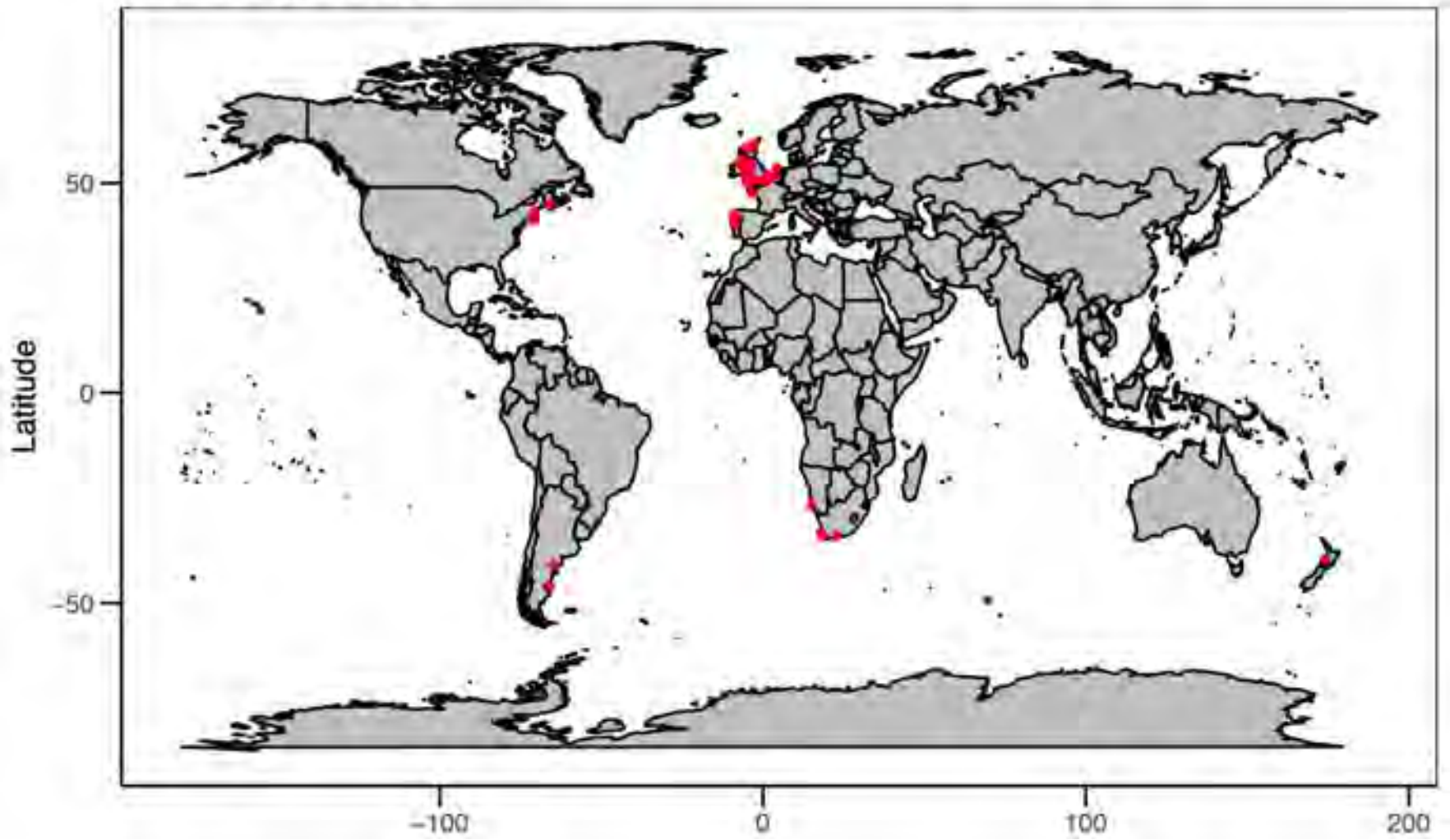


How many species were sampled year after year?

After five years, only 9 were detected every year.

The overlap in species declines over the years, indicating that there are a lot of different species present in these waters.

Hincksia granulosa



- Looked at the locations of animals around the world to see if where they live indicates that they have invaded other areas
- 17 species identified that could be invasive in AK

Conclusions

1) Lots of different animals in Prince William Sound. Copepods dominate the zooplankton community and could block our ability to detect invasive species.

2) Only time of the year (aka season) had an impact on zooplankton composition. A spring to summer shift was noticed and expected.

Recommendations

More targeted approaches:

1) Prevent DNA from copepods from overwhelming the sample

2) Genetics + visual assessment of benthic communities