

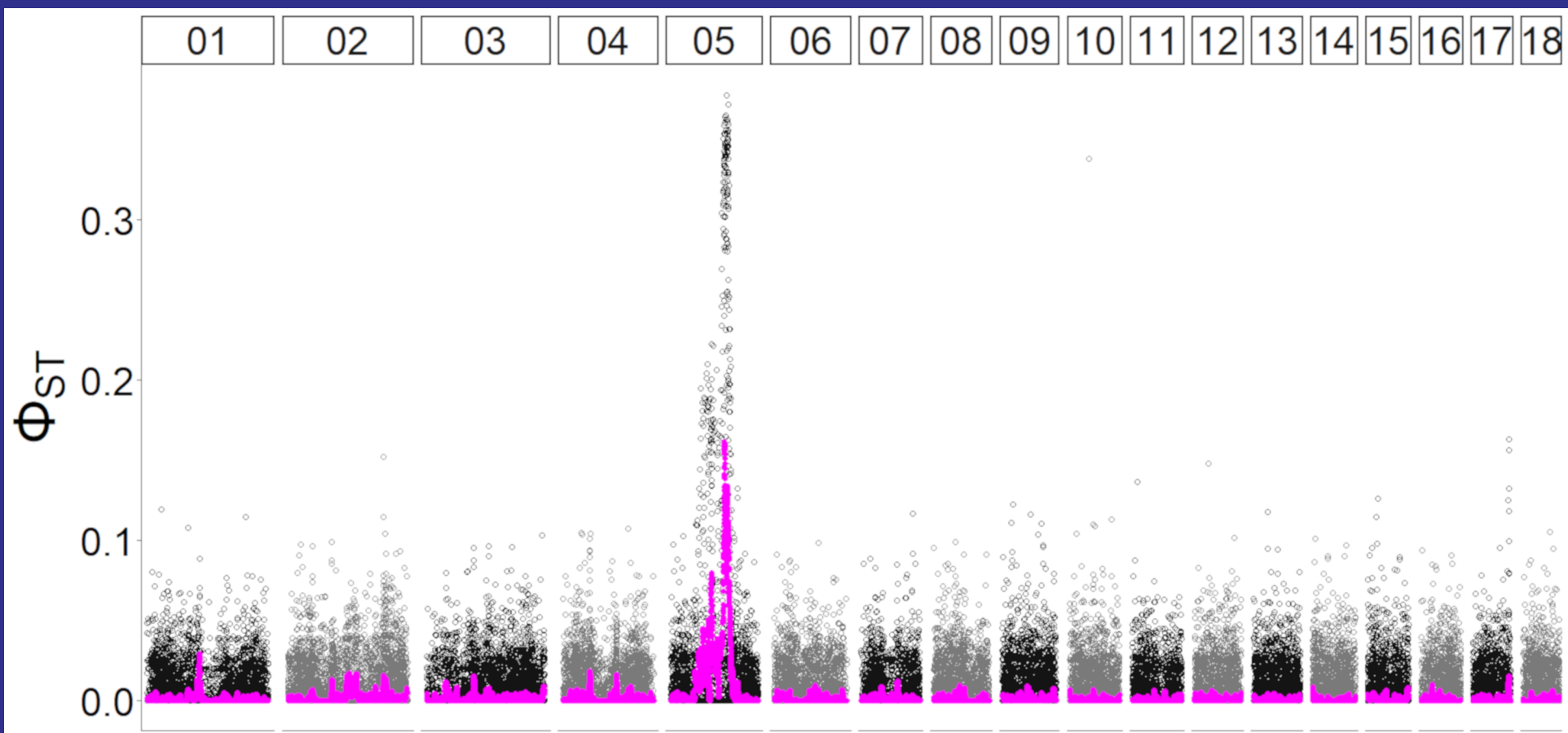
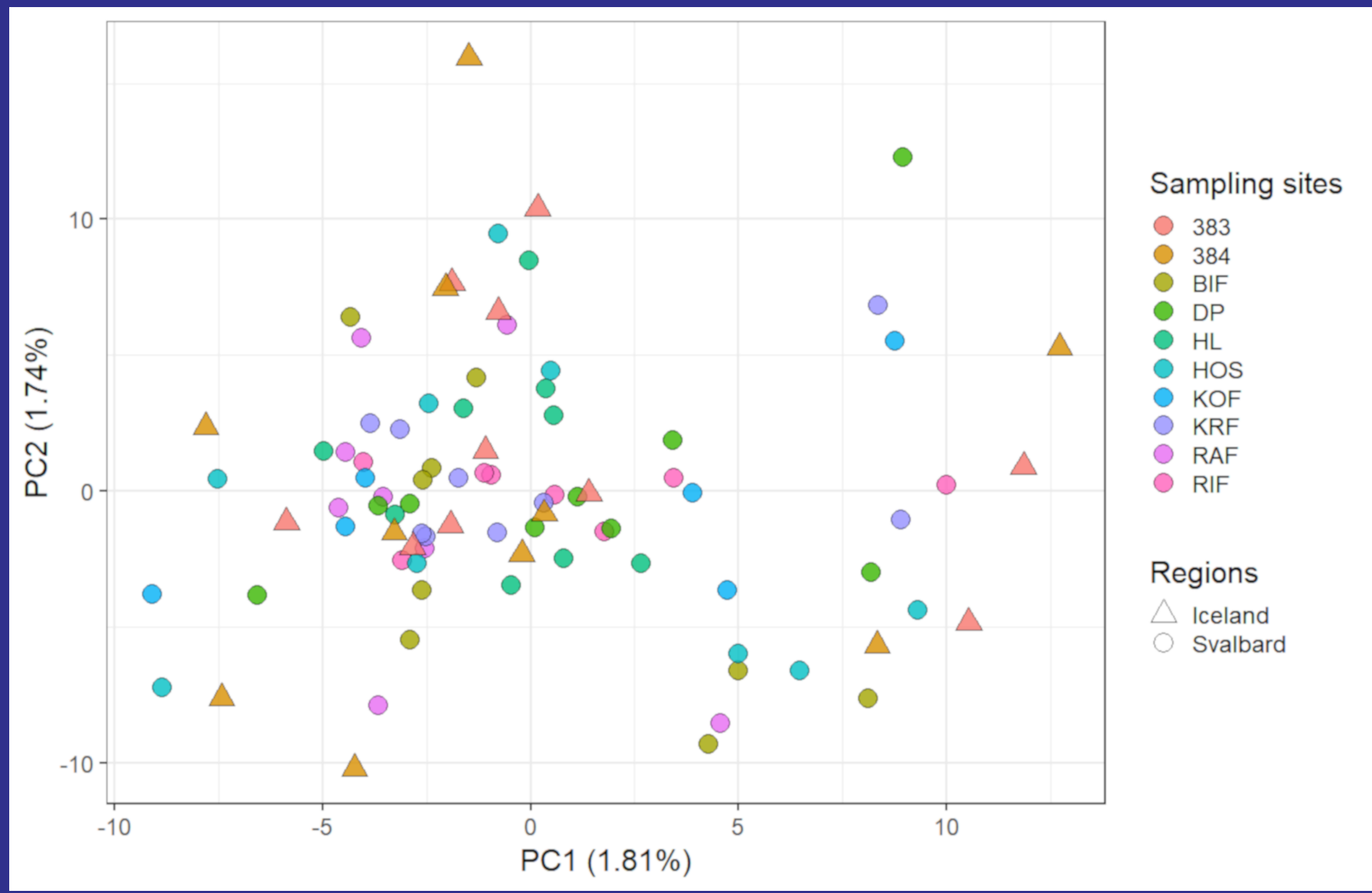
Multidisciplinary approach to study population dynamics of the Polar cod in a changing environment

Erica Difronzo, Sarah Kempf, Luca Schiavon, Ilaria A. M. Marino, Chiara Papetti, Magnus Lucassen



SNPs analysis Method: double-digest restriction site-associated DNA sequencing, ddRAD seq (3)

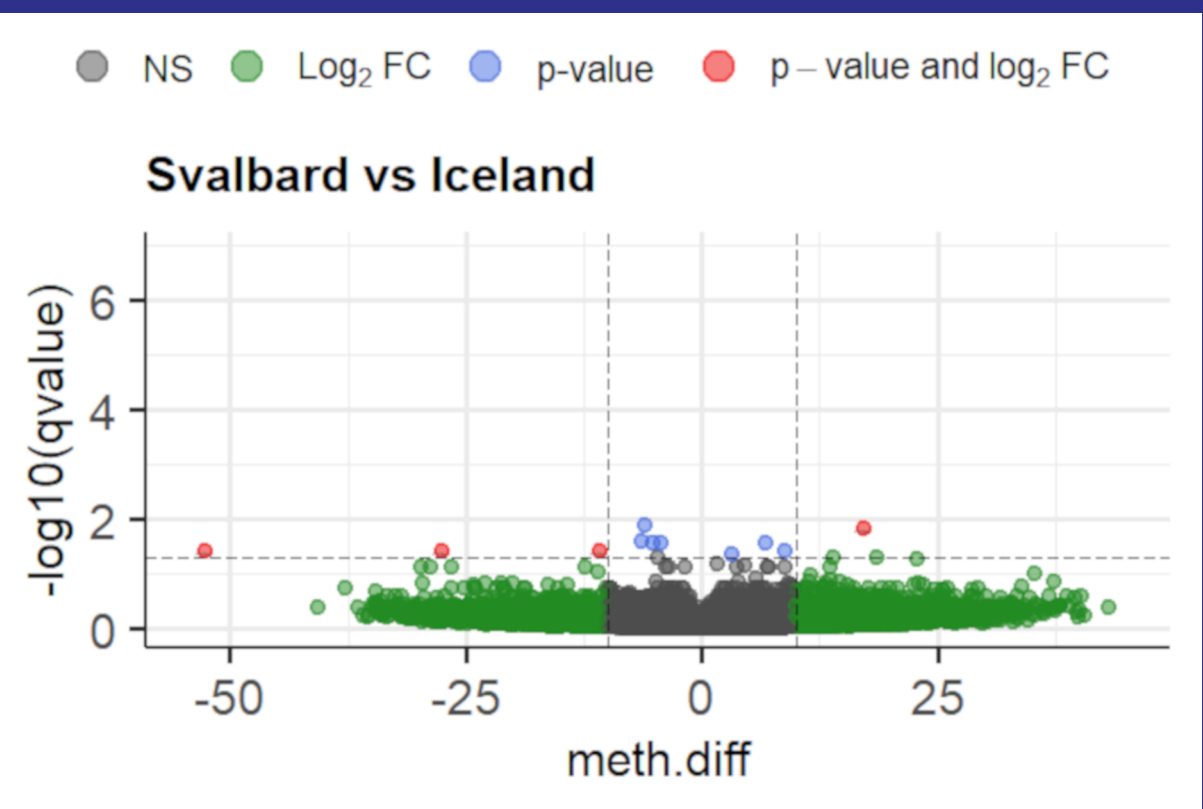
- Do Svalbard and Iceland individuals show genetic differentiation?
- What is the genetic differentiation between females and males?



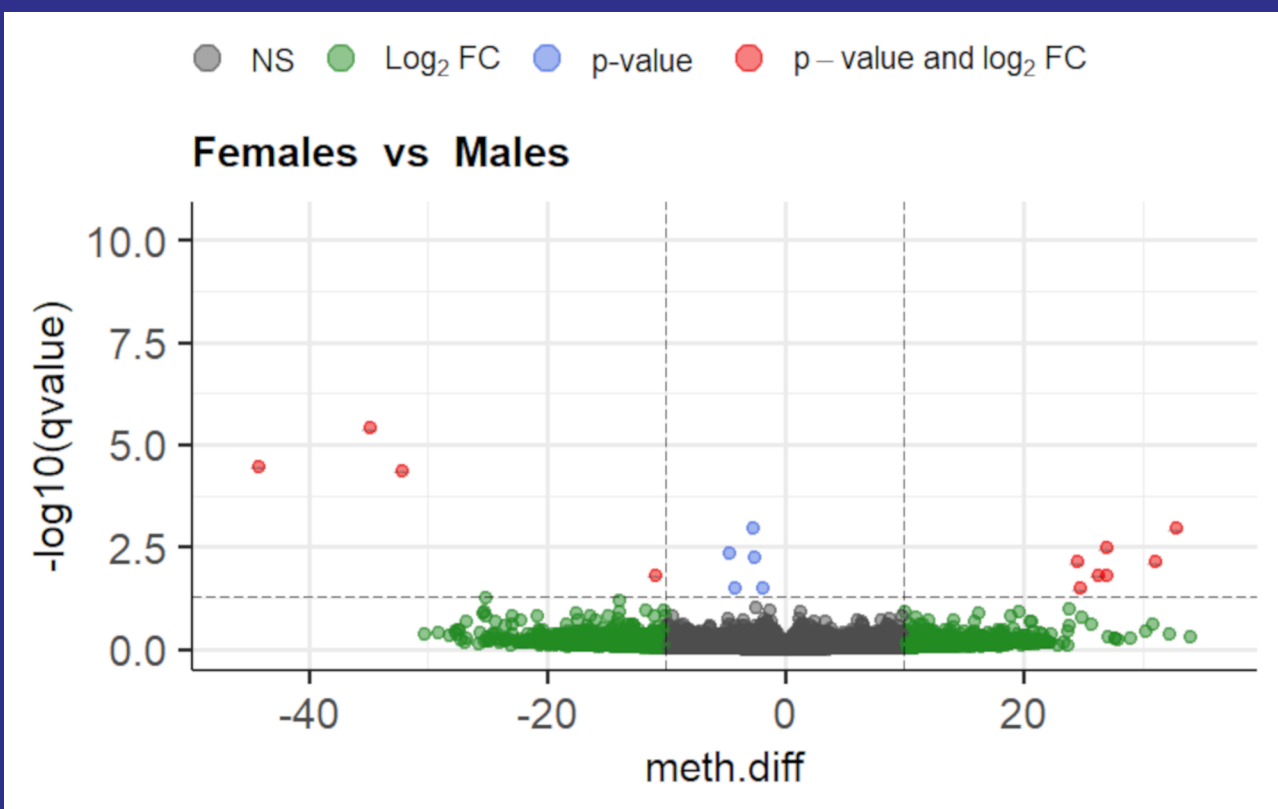
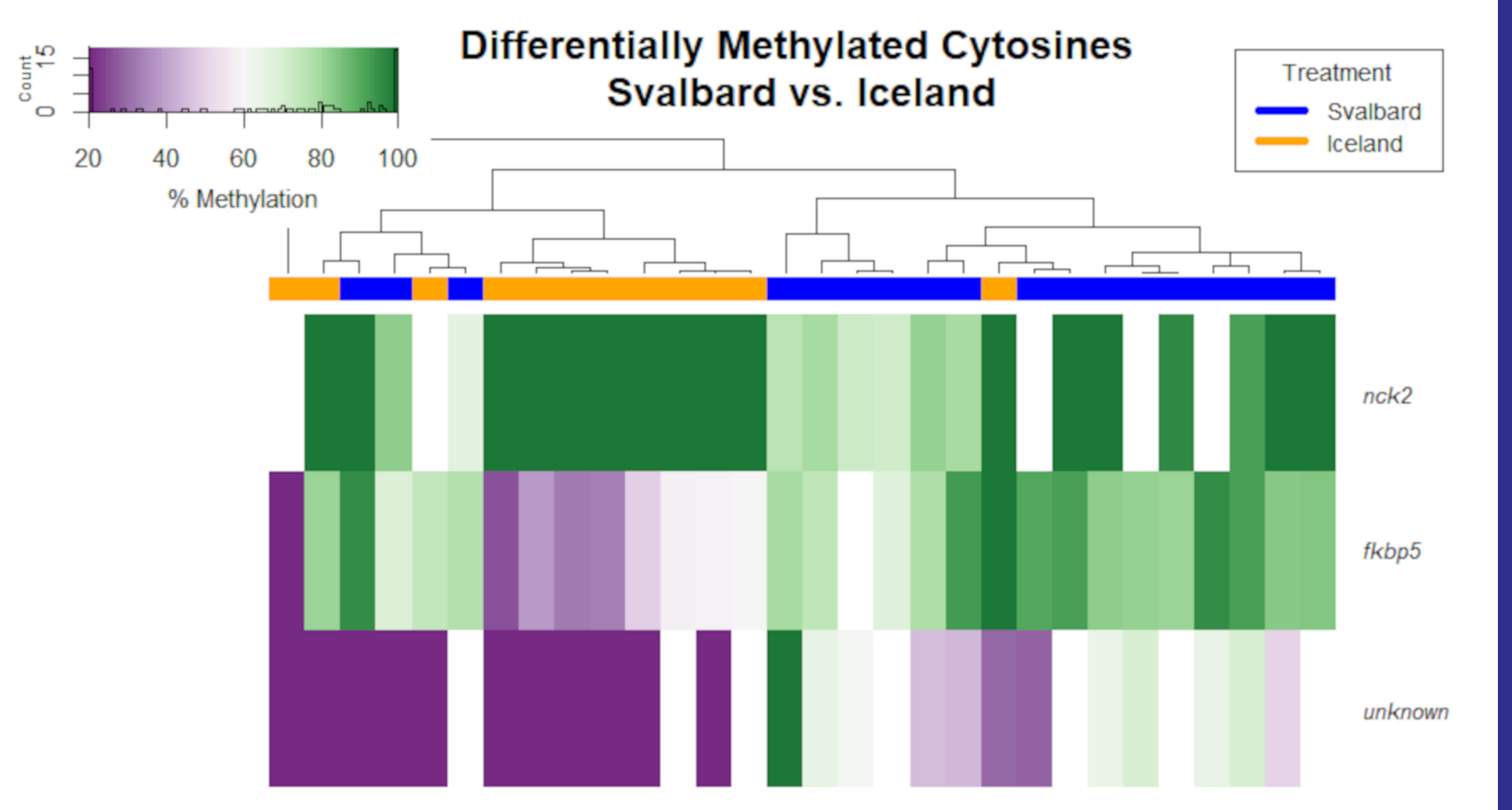
On the left, Scatter plot of the first two principal components across the SNP data set. No differentiation between Svalbard and Iceland individuals is observed. On top, manhattan plot of haplotype-based divergence statistics ϕ_{ST} calculated between males and females of *Boreogadus saida*. Alternating black and gray dots represent single-site values in different scaffolds. Smoothed ϕ_{ST} average is displayed in fuchsia. Chromosome 5 shows differentiation between males and females.

DNA methylation analysis Method: reduced representation bisulfite sequencing, epiGBS2 (4)

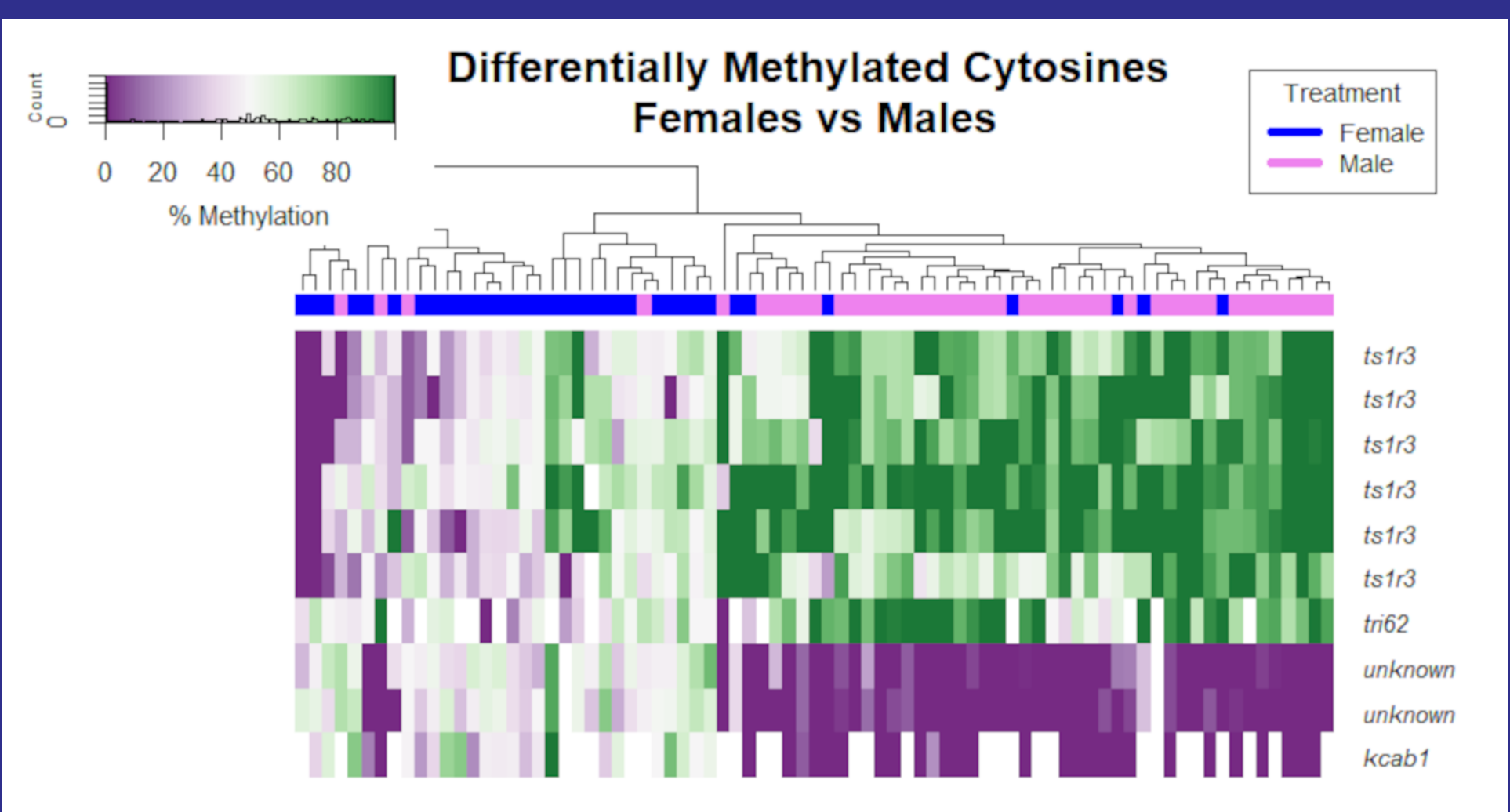
- Do DNA methylation patterns differ between Svalbard and Iceland?
- Do DNA methylation patterns differ between females and males?
- How does heat exposure alter DNA methylation in Polar cod?



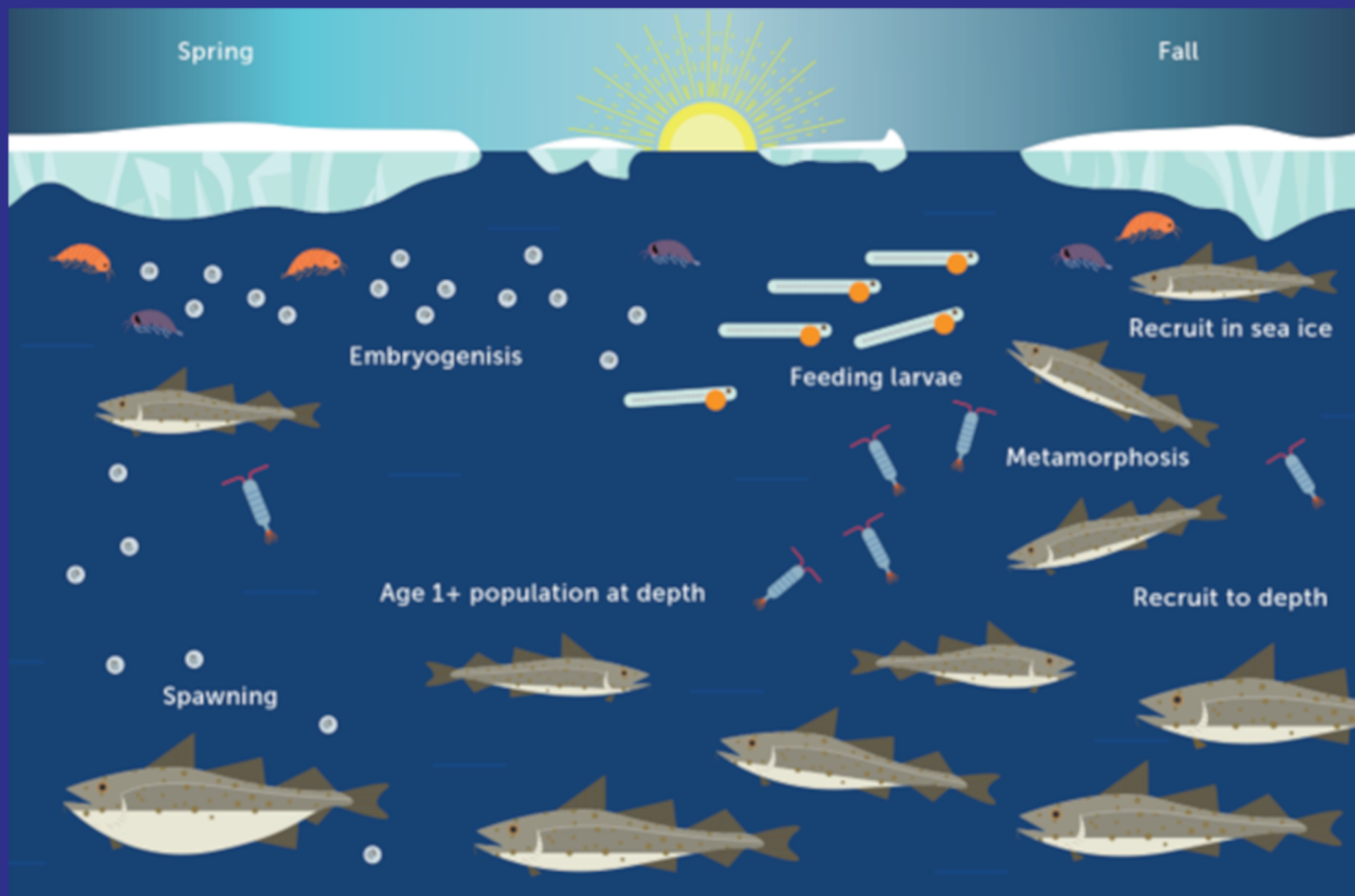
On the left, volcano plot comparing methylated cytosines between Svalbard and Iceland. Red dots indicate differentially methylated cytosines (DMCs). On the bottom, heatmap showing per-individual methylation patterns of DMCs. Right labels show nearest DMGs. Svalbard and Iceland individuals show no differences in DNA methylation patterns.



On the left, volcano plot comparing methylated cytosines between females and males of *B. saida*. Red dots indicate DMCs. On the bottom, heatmap showing per-individual methylation patterns of DMCs. Right labels show nearest DMGs. Few DMCs are detected, all located on chromosome 5.



About Polar cod

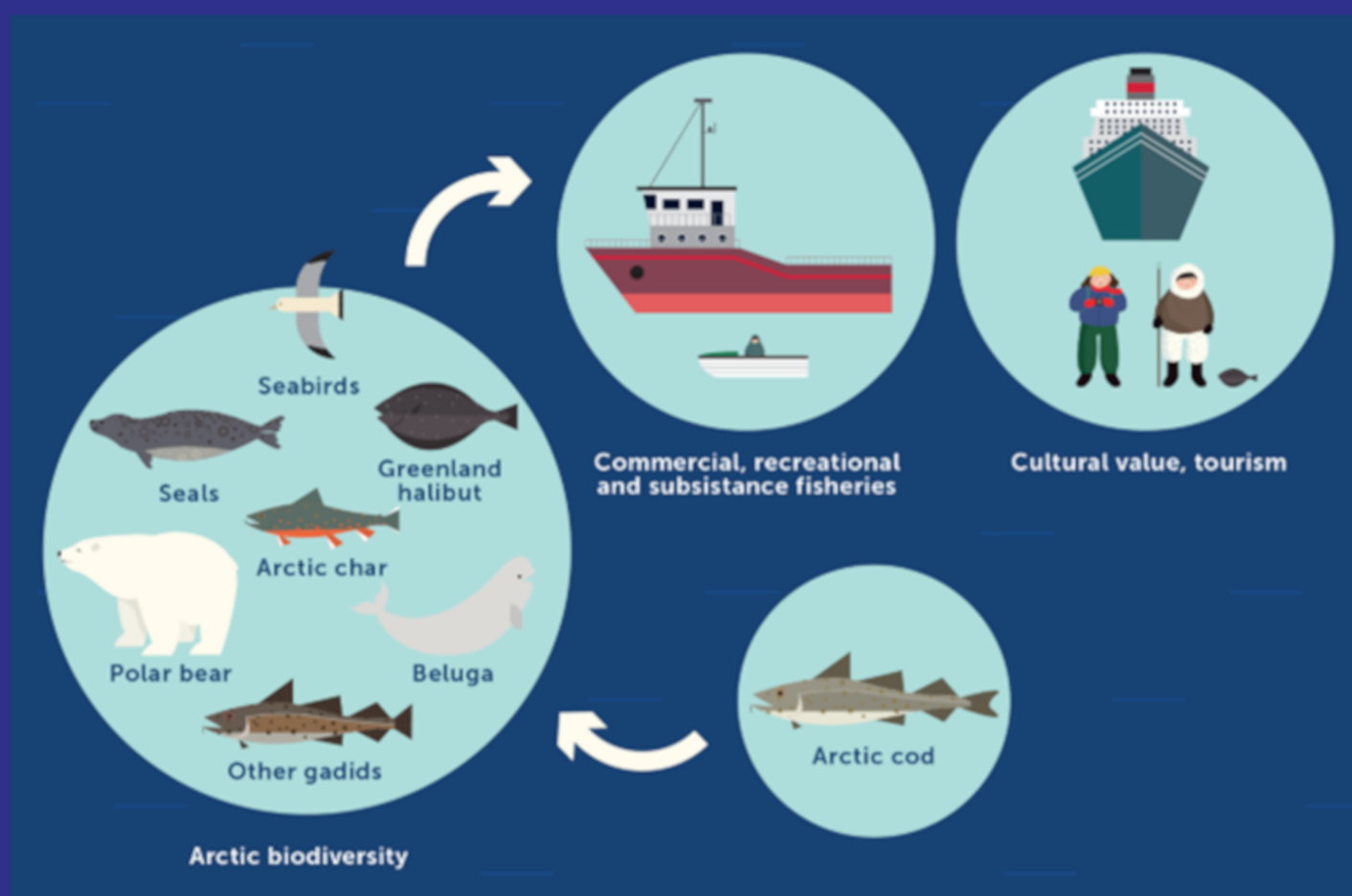


Life Cycle of Polar cod (1) is strictly dependant on the ice.



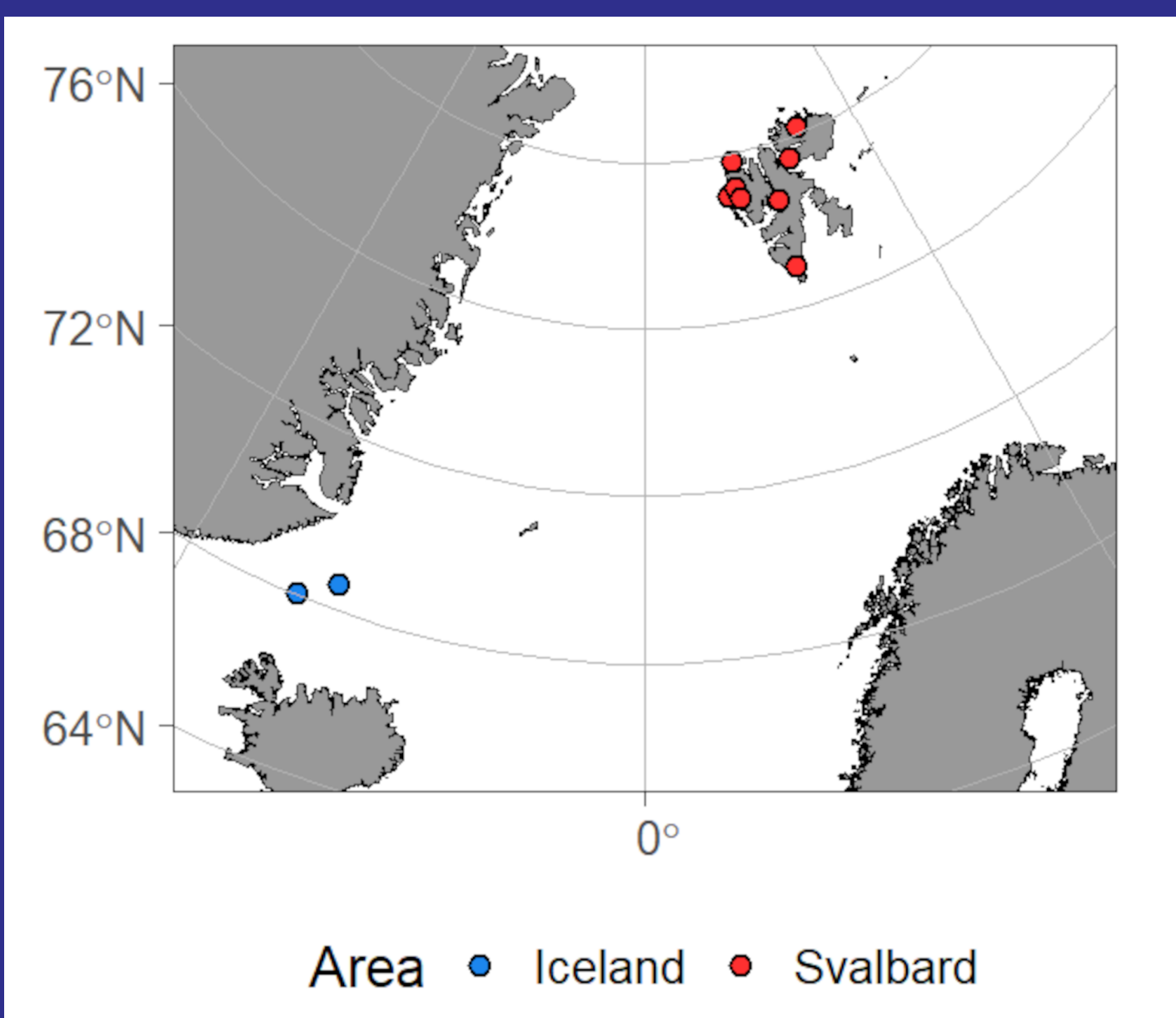
Circumpolar distribution of Polar cod in the Arctic (2).

Why studying Polar cod?



Ecosystem services supported by Polar cod (1), a key species that maintains biodiversity. Polar cod acts as energy transformer between its small preys and big predators, some of which are commercial target.

Sampling locations



ericadifronzo@gmail.com
956904@stud.unive.it
@ericadifronzo.bsky.social

REFERENCES

- (1) Geoffroy, M, et al. (2023). The circumpolar impacts of climate change and anthropogenic stressors on Arctic cod (*Boreogadus saida*) and its ecosystem. Elem Sci Anth, 11:1.
 - (2) Mecklenburg, C W, Mecklenburg, A T, Sheiko, B A, & Steinke, D (2016). Pacific Arctic marine fishes atlas. CAFF International Secretariat.
 - (3) Rivera-Colón, A G, Catchen, J (2022). Population Genomics Analysis with RAD, Reprised: Stacks 2. In: Verde, C., Giordano, D. (eds) Marine Genomics. Methods in Molecular Biology, vol 2498. Humana, New York, NY.
 - (4) Gawehns, F, Postuma, M, van Antro, M, Nunn, A, Sepers, B, Fatma, S, et al. (2022). epiGBS2: Improvements and evaluation of highly multiplexed, epiGBS-based reduced representation bisulfite sequencing. Molecular Ecology Resources, 22(5), 2087-2104.
- * Picture of Polar cod in the ice: Bjørn Gulliksen, University of Tromsø. Drawing of Polar cod: L. H. Todd.