

DNA-based marine biodiversity monitoring with relevance to directives

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GEANS stakeholder event – 26 october 2022

Biodiversity monitoring is essential for MSFD (GES) assessments

GES indicators:

D1 Biodiversity (pelagic, benthic, fish, mammals, birds)

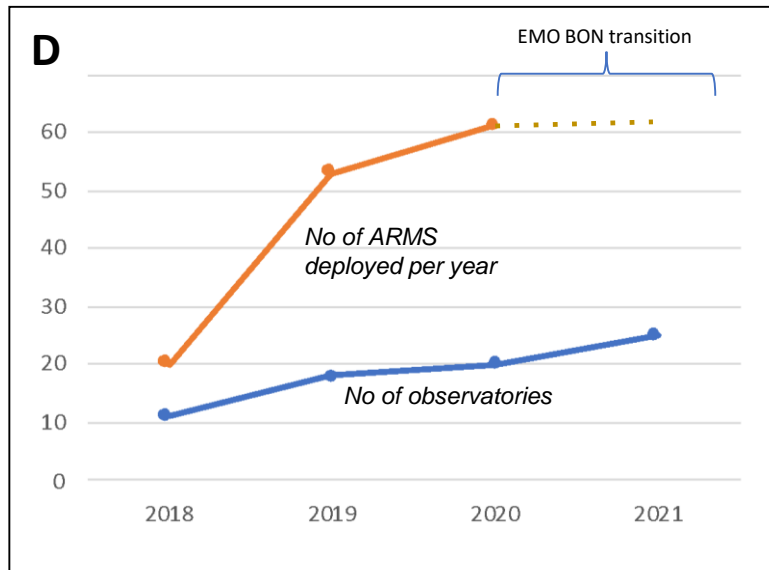
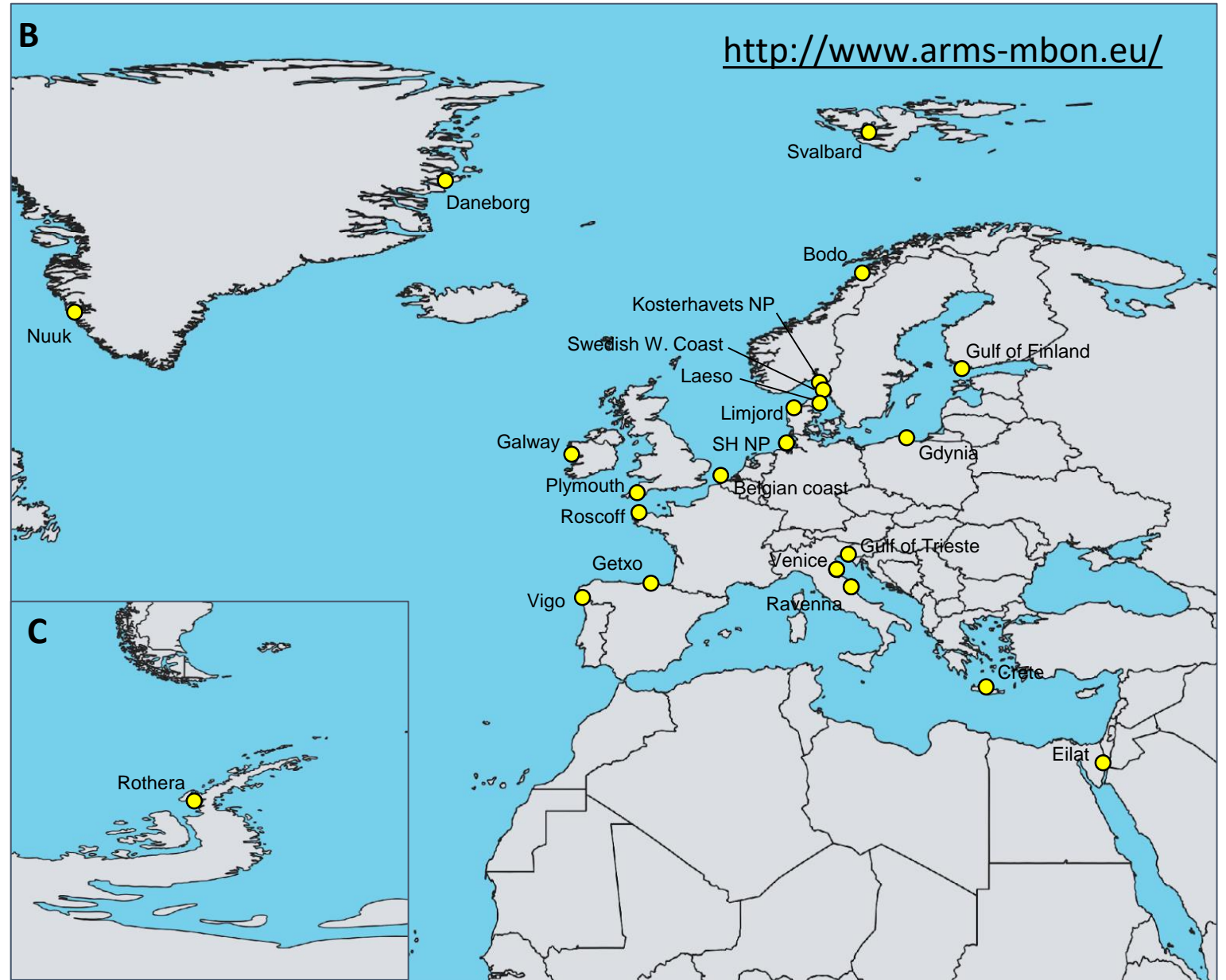
D2 Non-indigenous species (pelagic, benthic)

eDNA based monitoring of benthic biodiversity:

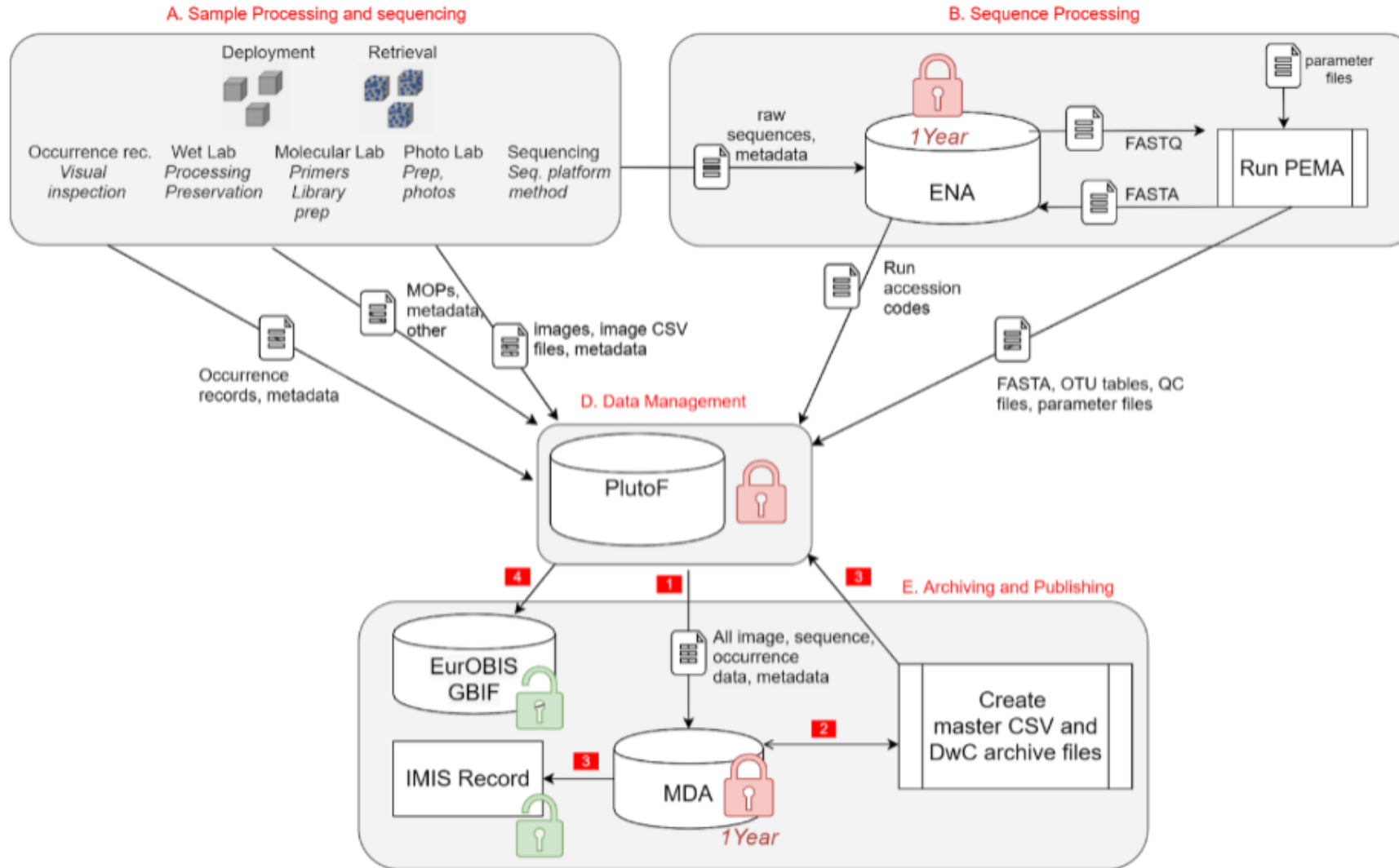
A) Autonomous Reef Monitoring Structures (ARMS)

B) Water samples around biodiversity hotspots

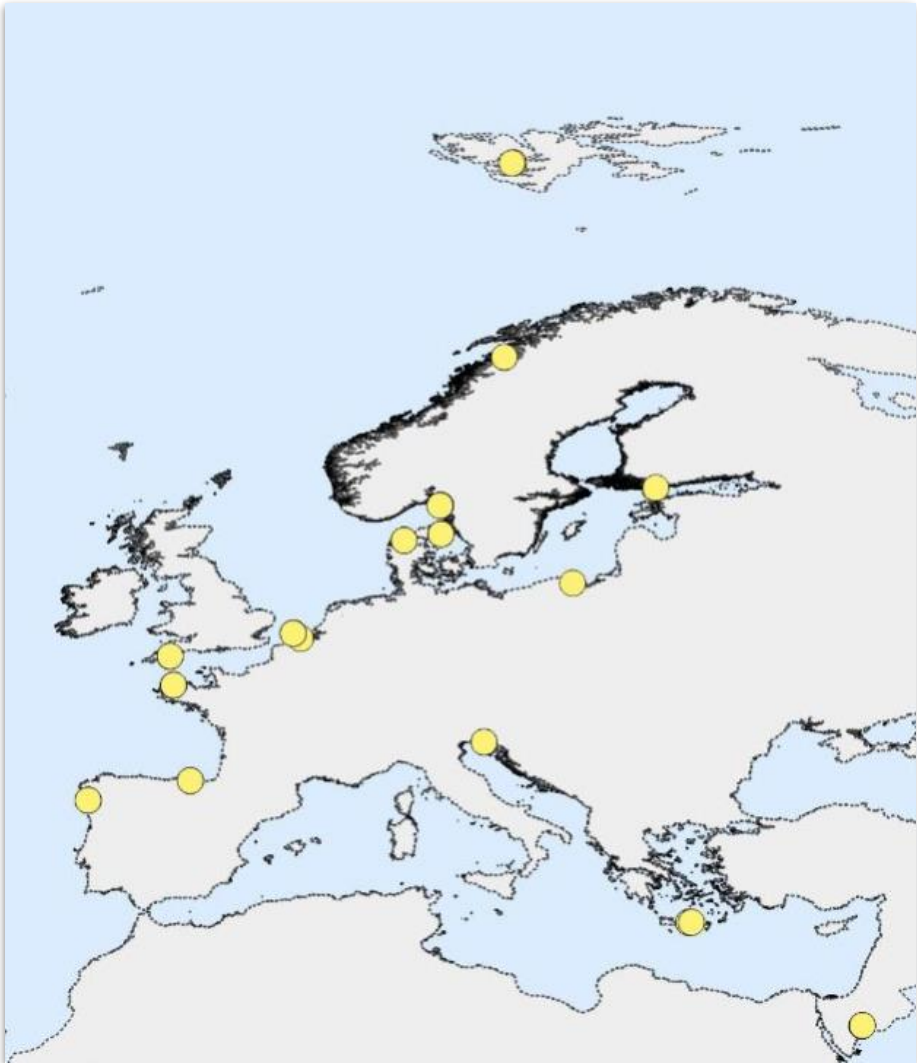
ARMS monitoring Overview over stations and samples deployed since 2018



ARMS: Data management & access portal



ARMS: Results from 2018-2019 sampling

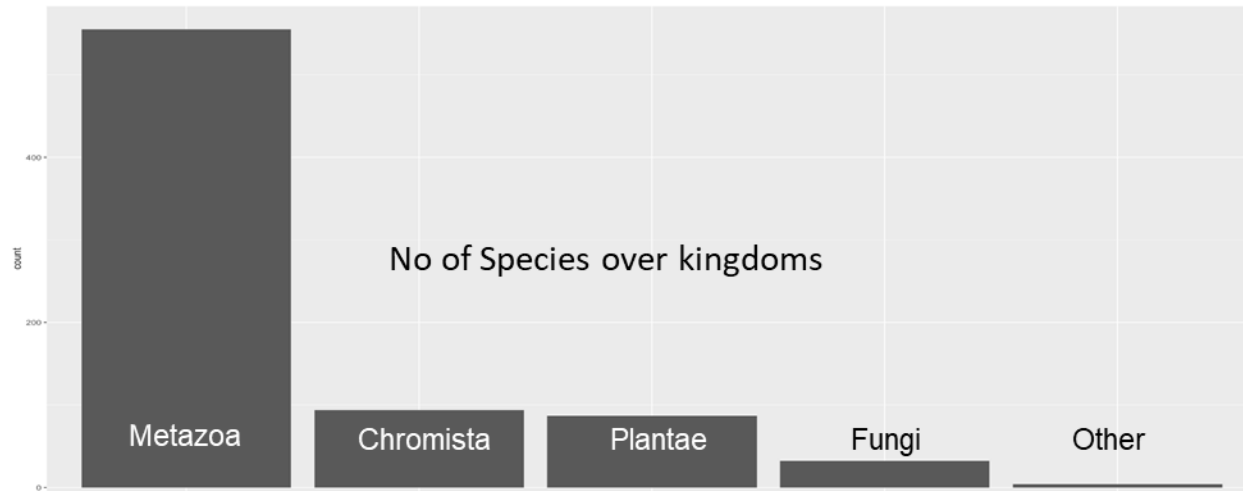


Geographic coverage

- 59 ARMS, 19 observatories in 7 regions of coastal Europe
- 9 samples from 3 ARMS failed

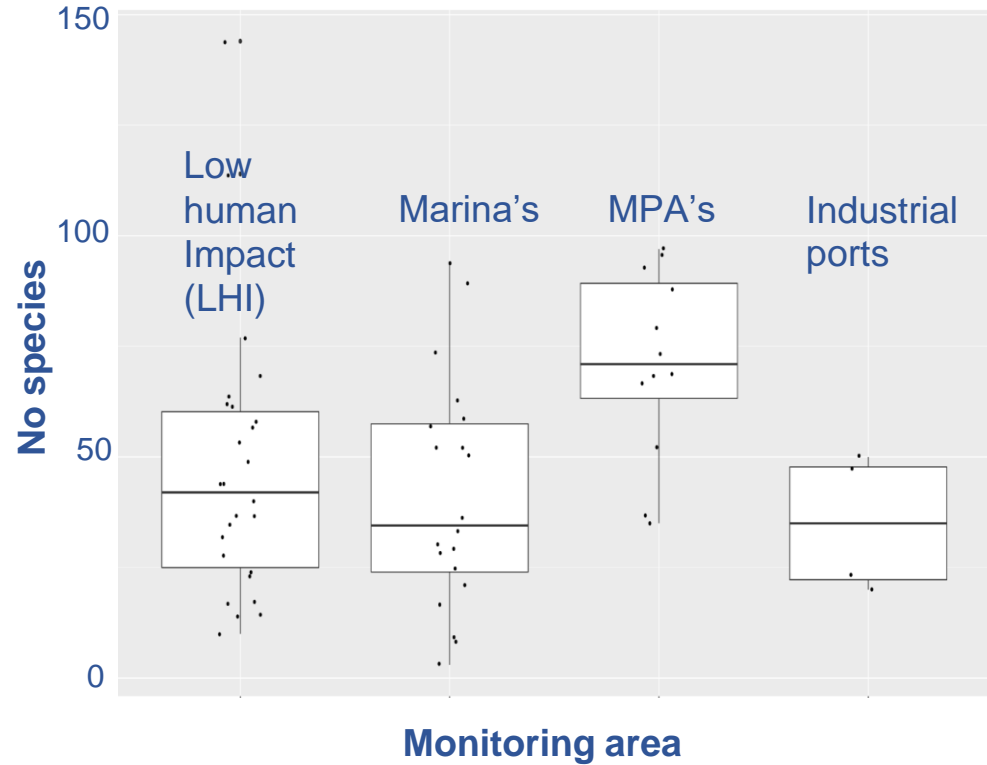
Taxonomic coverage

- 778 species captured based on COI

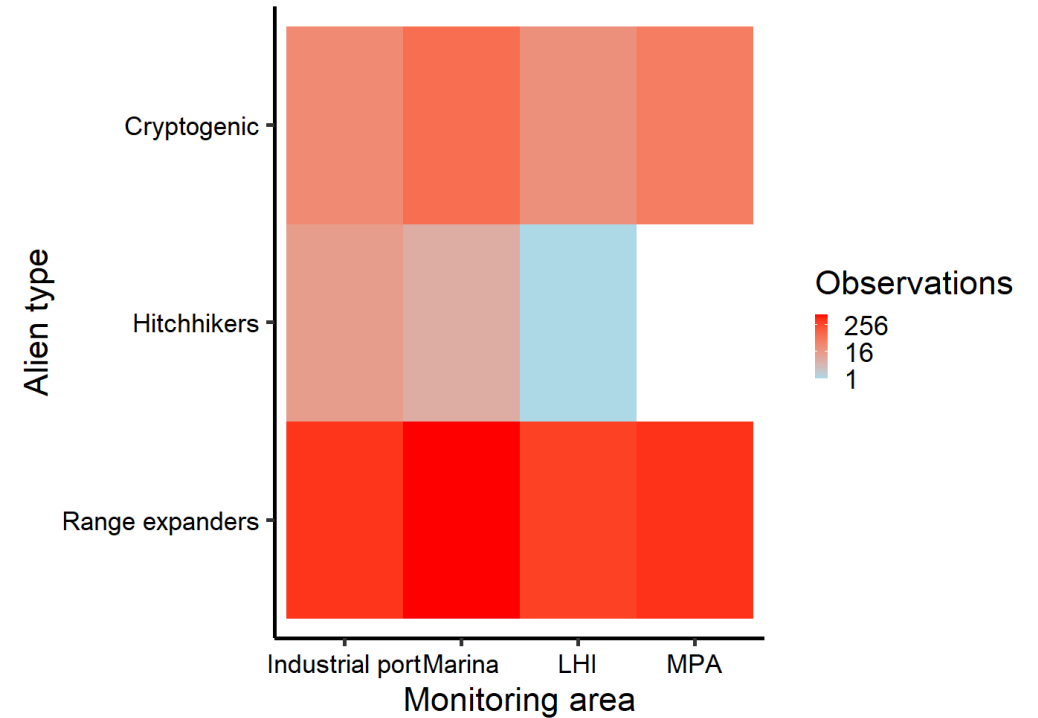


ARMS: Results from 2018-2019 sampling

Diversity over human pressure



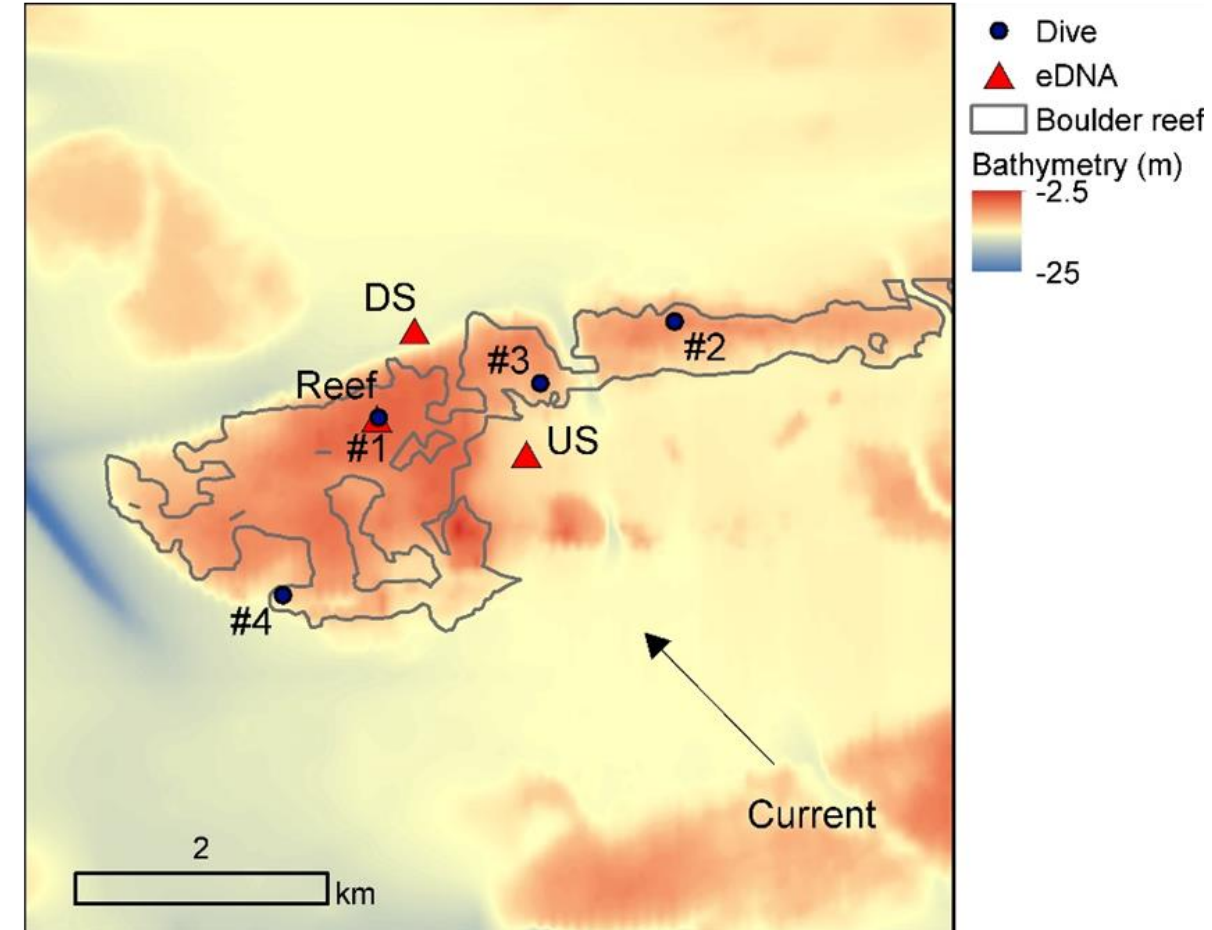
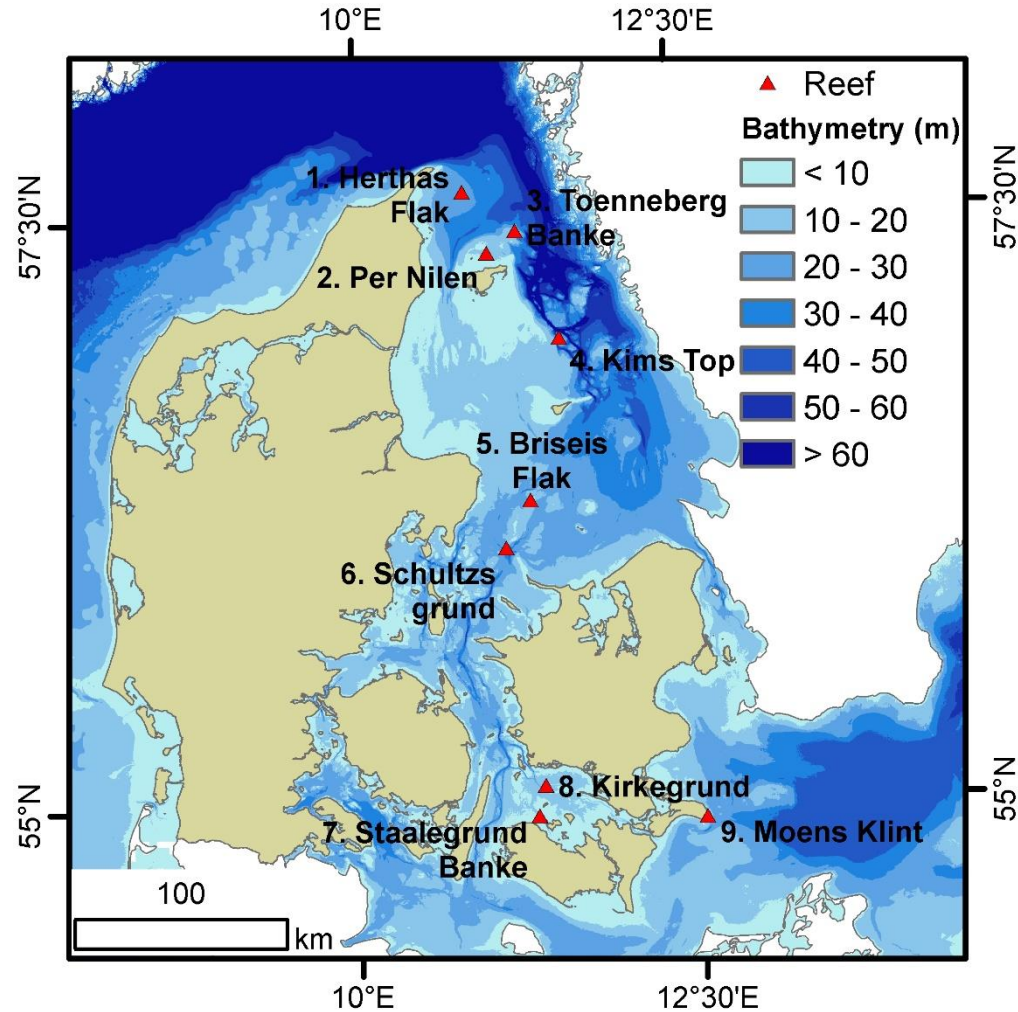
Aline species over human pressure



Conclusions on use of ARMS

- ARMS is an effective method to harmonize monitoring of hard bottom environments
- ARMS are very suitable for early detection and continuous monitoring of alien species
- Data management is still a challenge and currently addressed

eDNA biomonitoring of hot-spots of biodiversity in Danish waters

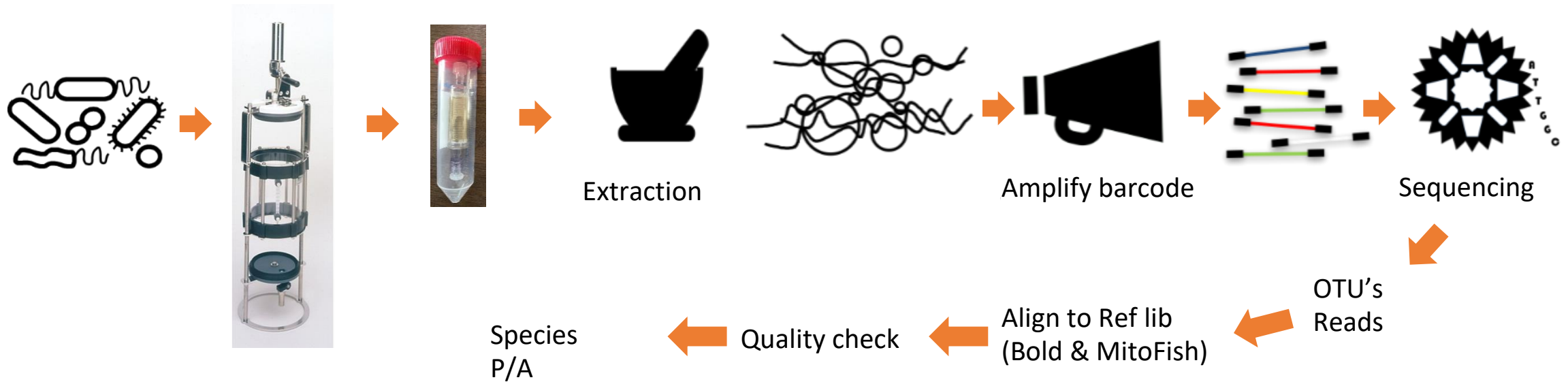


Diver based Method

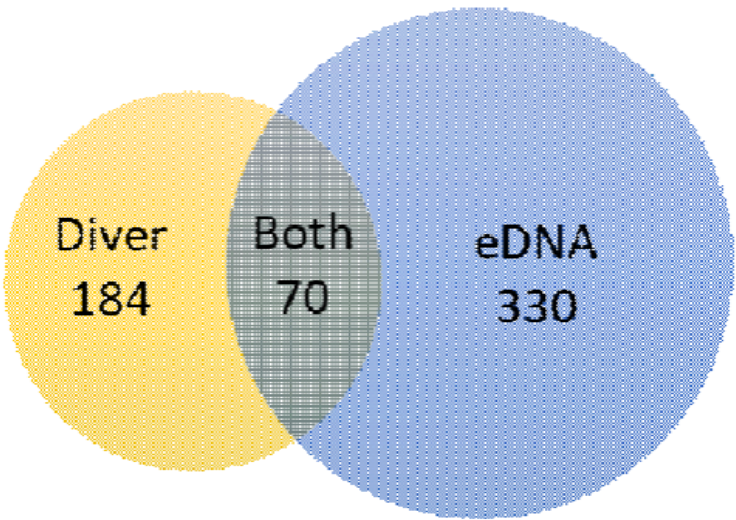


Species P/A
% Cover

eDNA method - metabarcoding

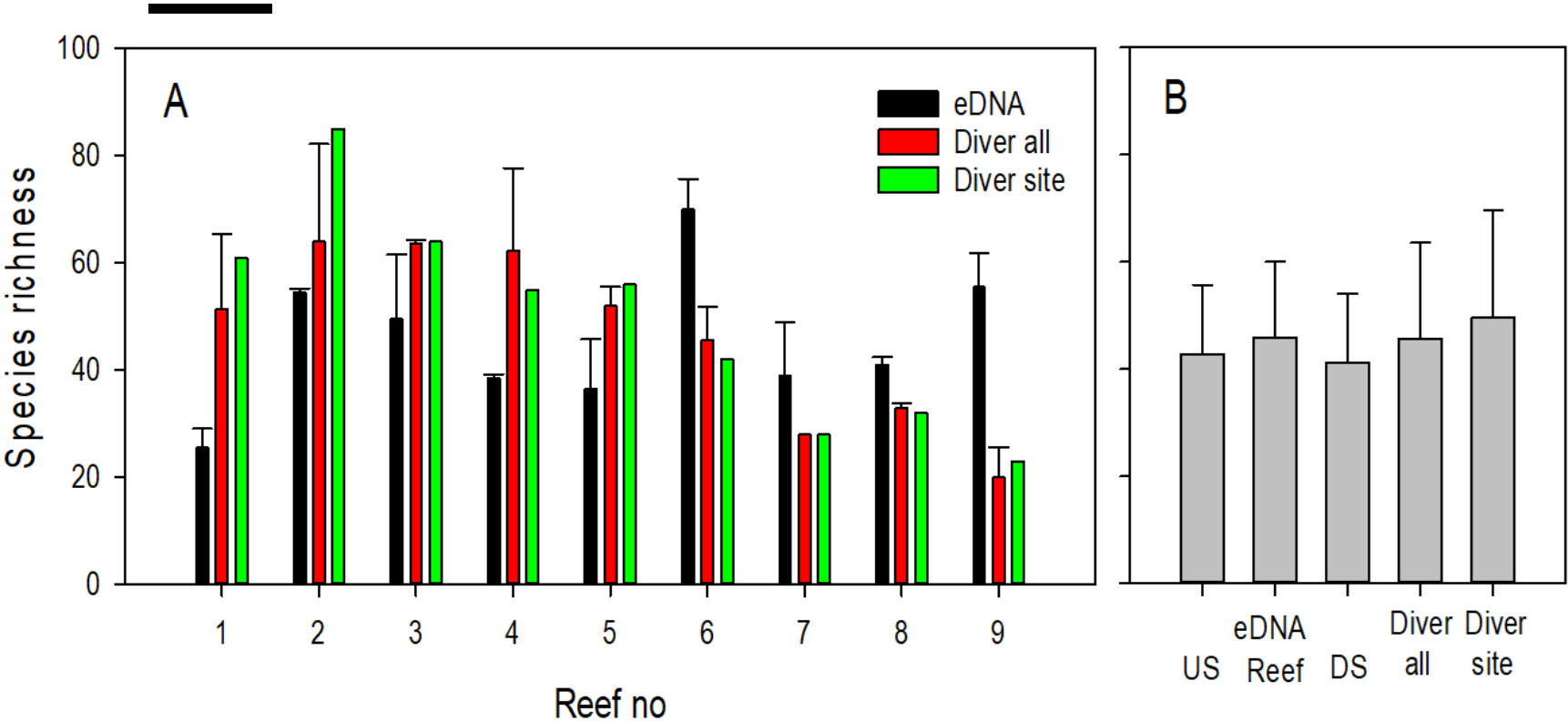


Sensitivity in detection of species using eDNA



Taxonomic level	Functional groups	Only diver	Only eDNA	Both (% of total)	Total
Species	Macroalgae	78	33	16 (13)	127
	Epifauna	94	143	48 (17)	285
	Fish	8	36	4 (8)	48
	Infauna	4	118	2 (2)	124
	Total	184	330	70 (12)	584

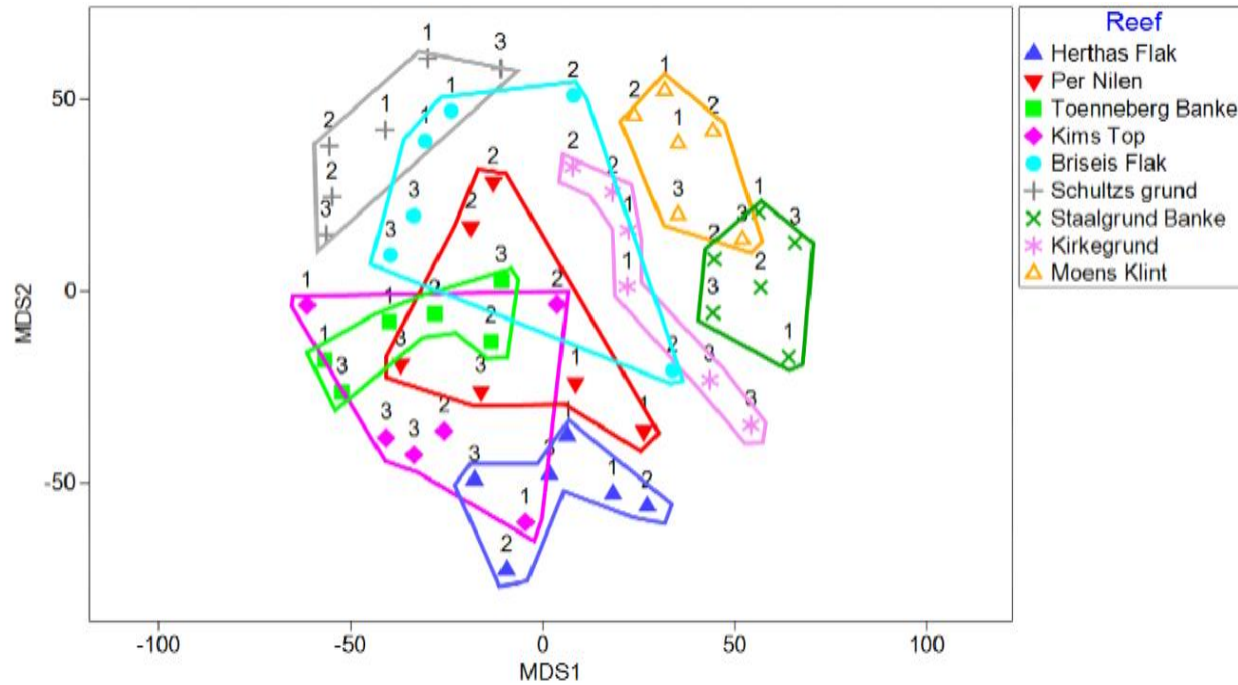
Species richness



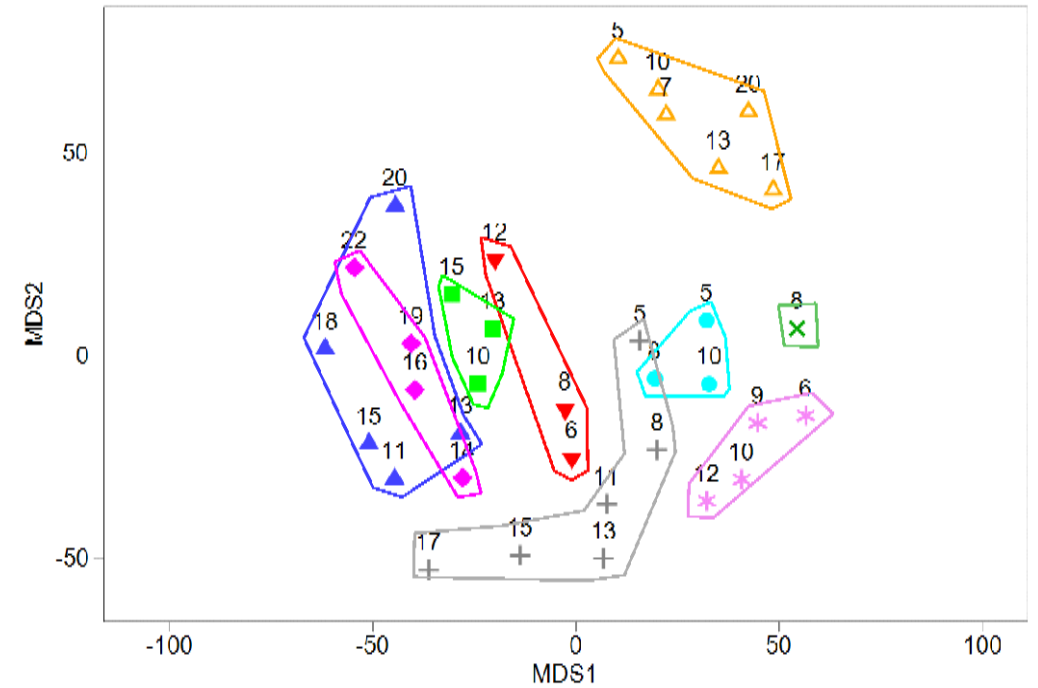
Habitat	DS	Reef	US
Mixed bottom	11	12	11
Pelagic	2	1	1
Hard bottom	17	20	18
Soft bottom	13	13	13
Total	43	46	43

Similarities in benthic community structure

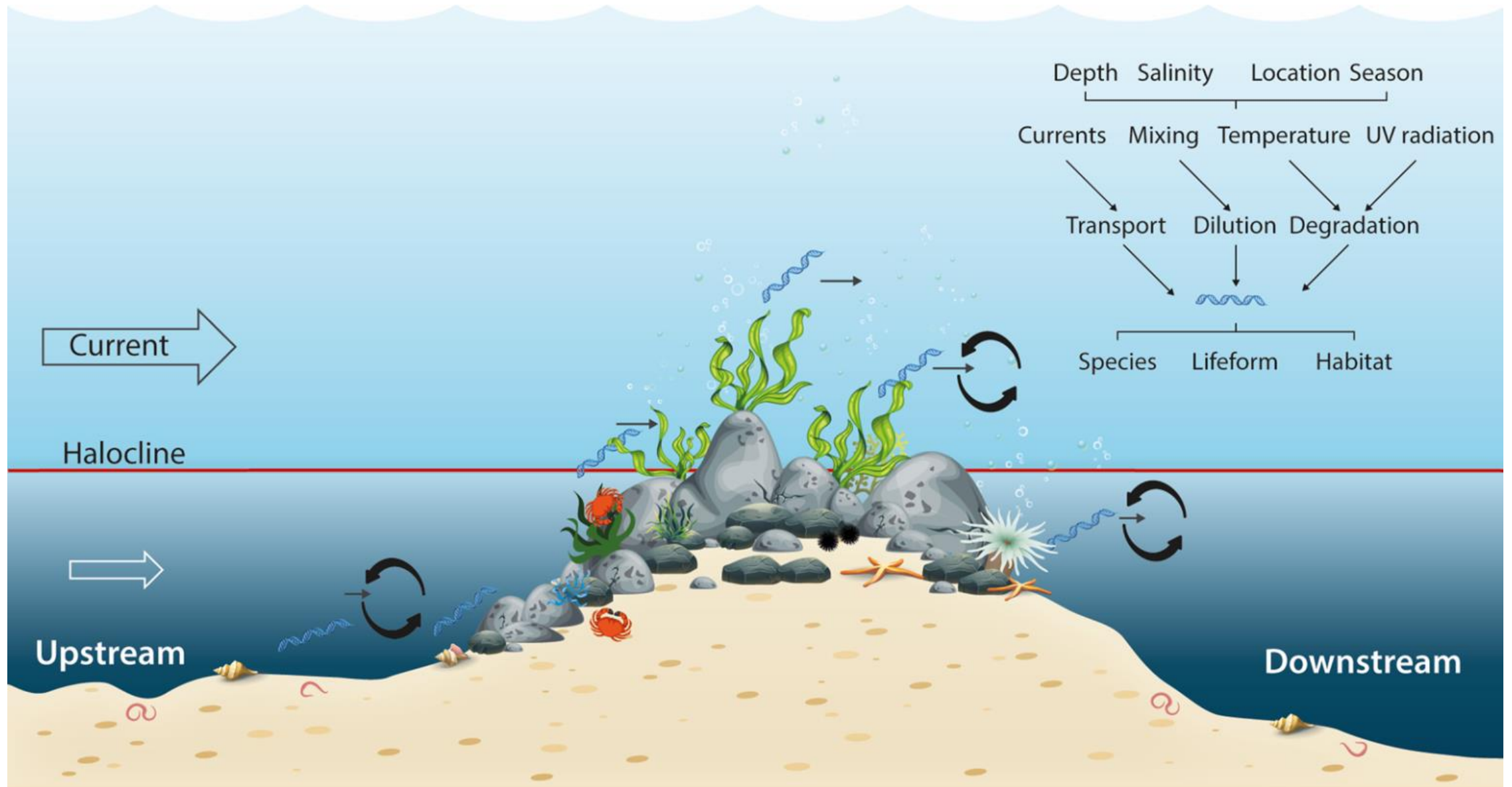
eDNA



Diver based



How local is an eDNA sample?



Conclusions on use of eDNA for reef monitoring

- eDNA ≠ diver. Different sensitivity towards macroalgae and infauna
- Only the diver based method is quantitative, but both can provide relative abundance
- Both eDNA and diver method documents significant differences among reef locations
- eDNA method is capable of separating upstream – over reef and downstream sites
- Both methods provide interesting data on species distribution that can be related to environmental conditions

QUESTIONS?

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