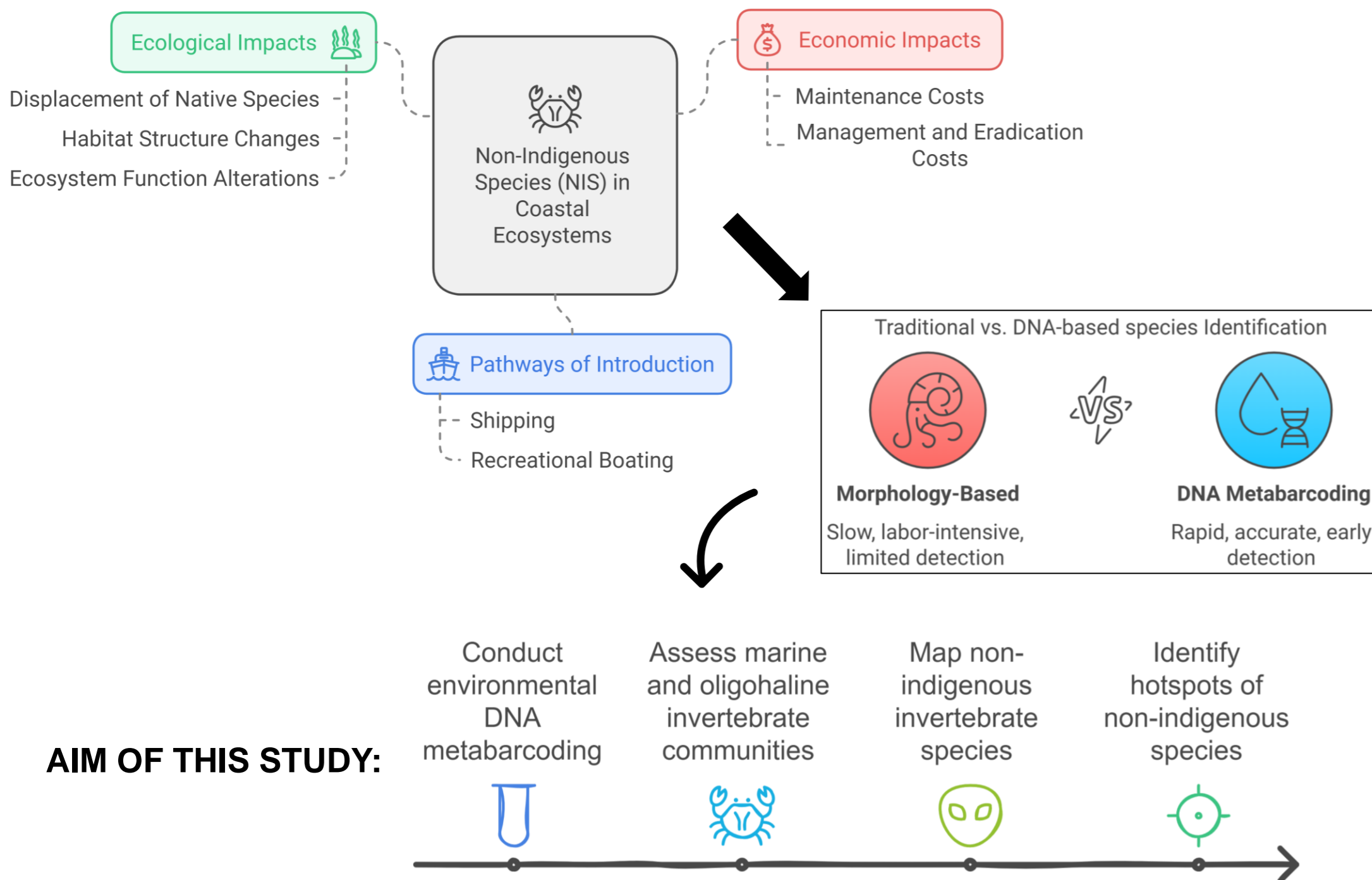# Assessing distribution patterns of non-indigenous invertebrates in ten marinas across mainland Portugal, Madeira and Azores, through DNA metabarcoding

Lavrador AS[1,2], Afonso I[3], Chainho P[3,4], Costa AC[5,6,7], Medeiros JP[3,] Parente MP[5,6,7], Parretti P[8], Vieira PE[1,2], Costa FO[1,2], Duarte S[1,2]
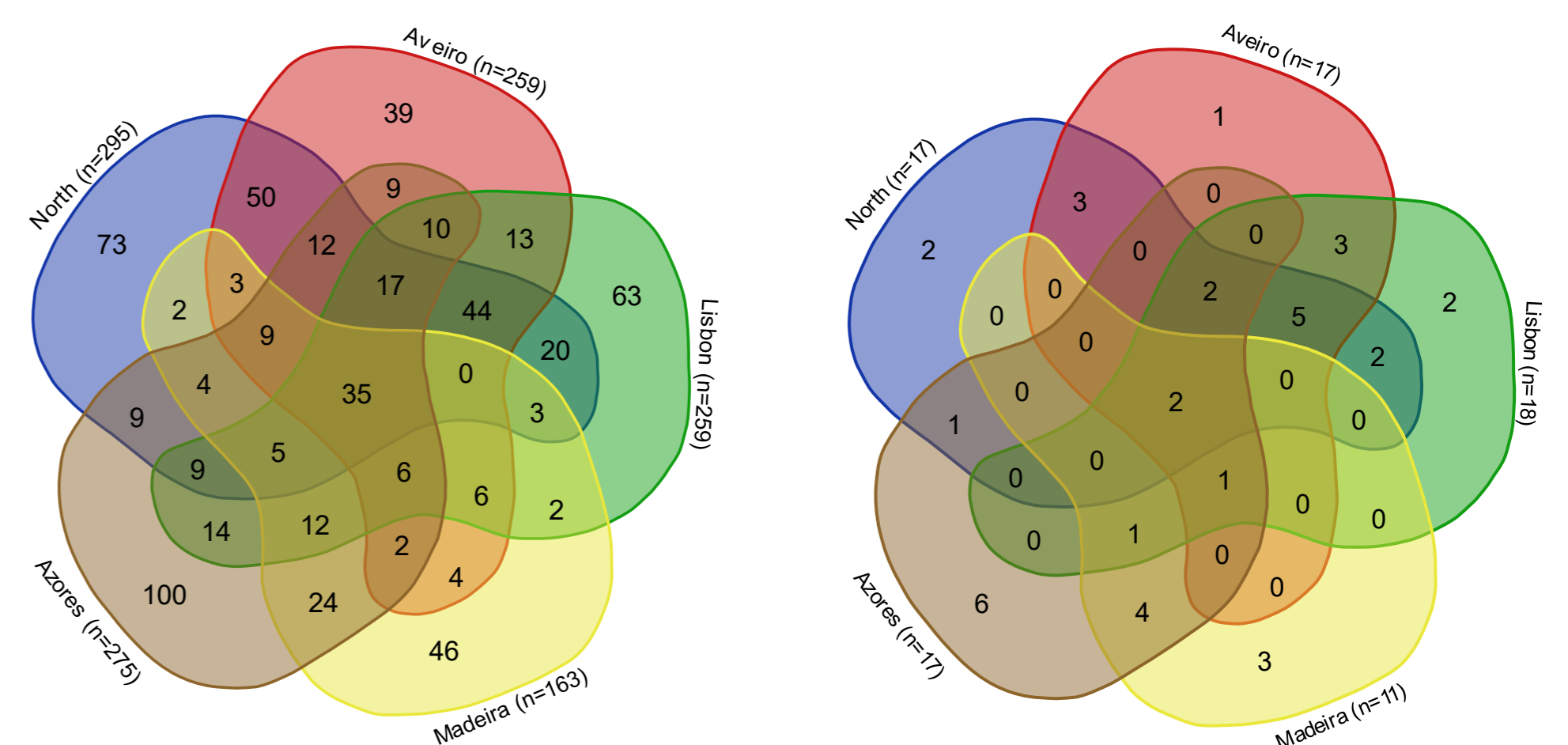
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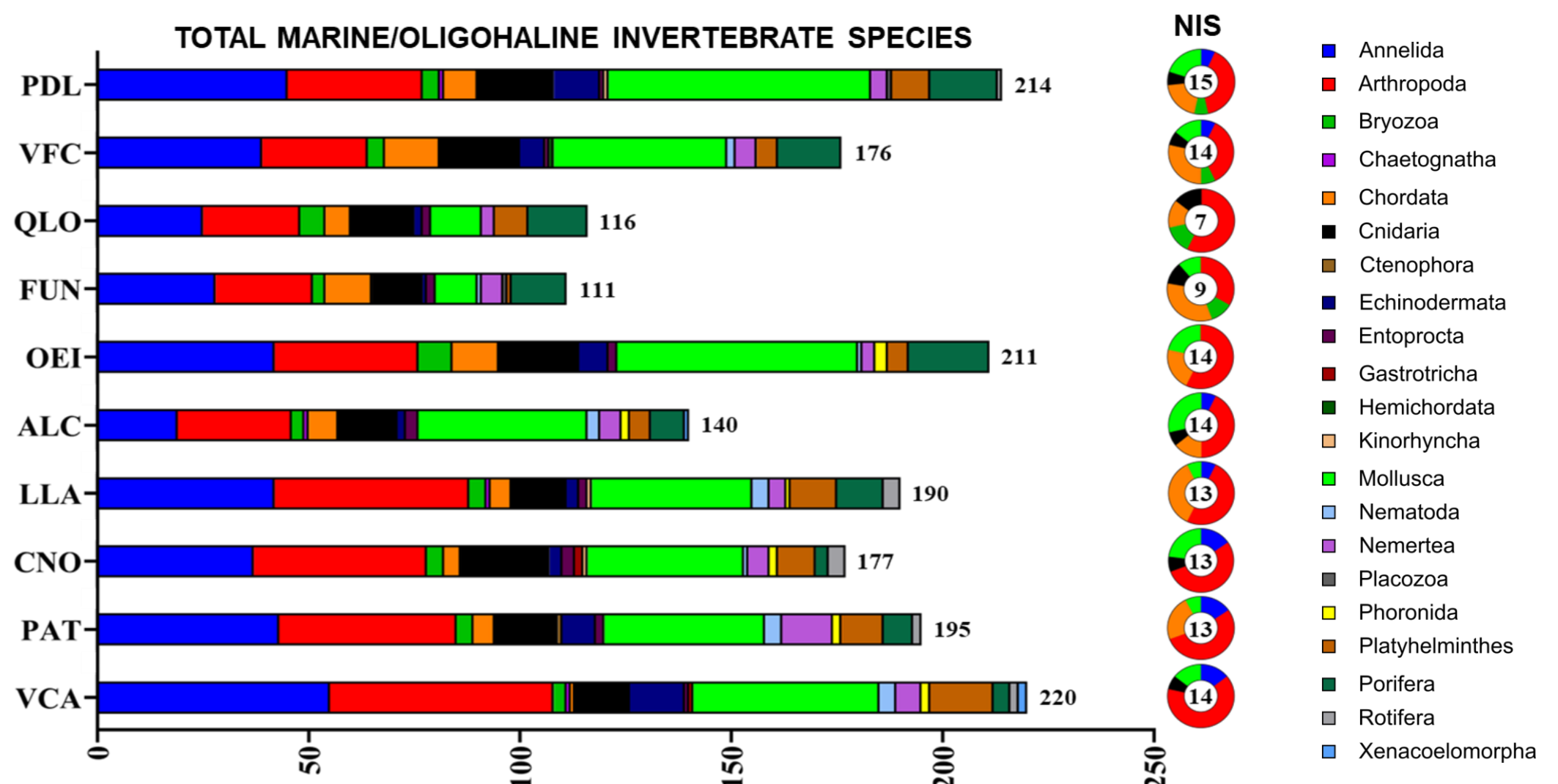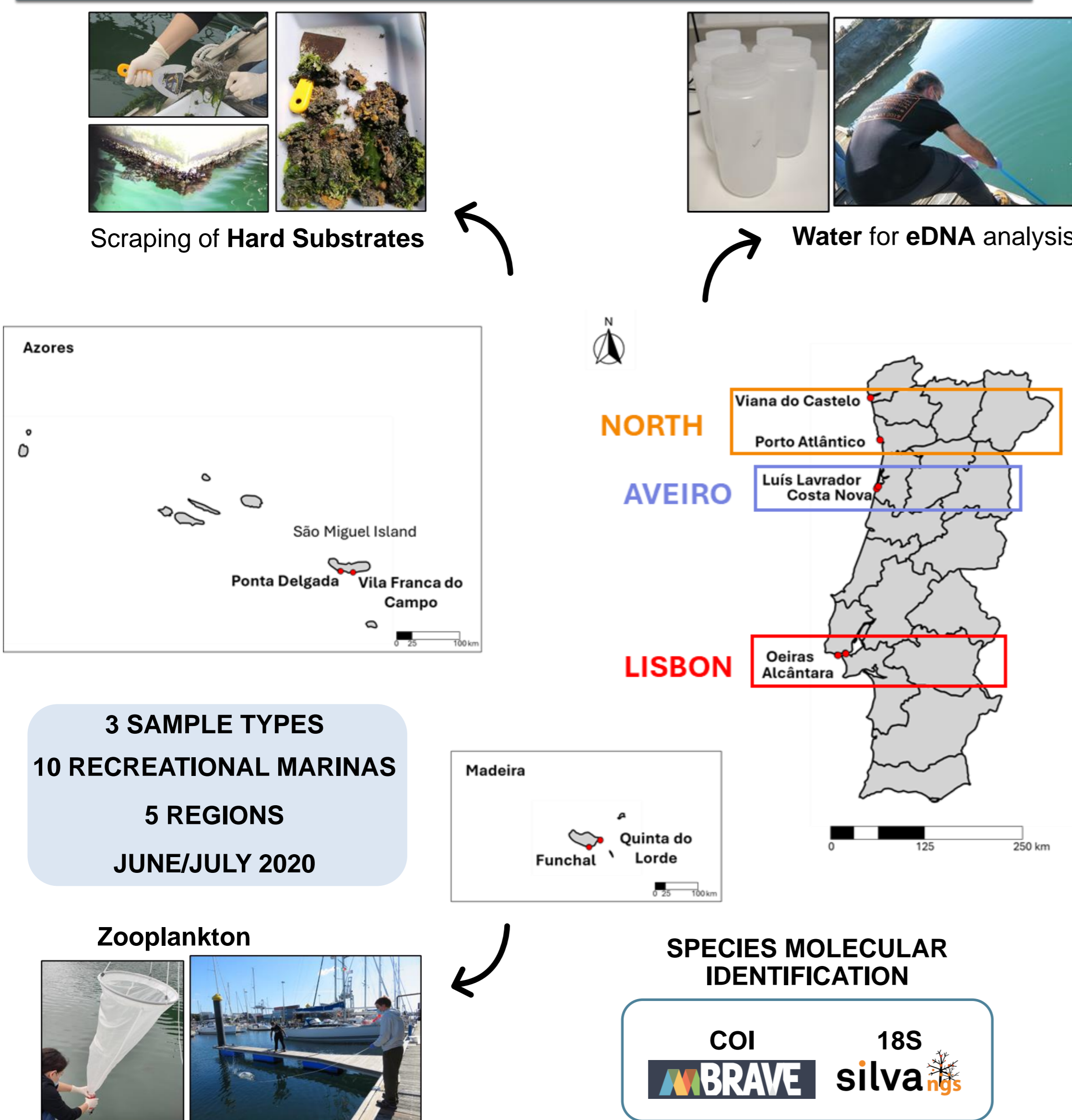
INTRODUCTION & AIM

Ecological Impacts
- Displacement of Native Species
- Habitat Structure Changes
- Ecosystem Function Alterations

Non-Indigenous Species (NIS) in Coastal Ecosystems

Economic Impacts
- Maintenance Costs
- Management and Eradication Costs

Pathways of Introduction
- Shipping
- Recreational Boating

Traditional vs. DNA-based species Identification

Morphology-Based
Slow, labor-intensive, limited detection

VS

DNA Metabarcoding
Rapid, accurate, early detection

AIM OF THIS STUDY:
- Conduct environmental DNA metabarcoding
- Assess marine and oligohaline invertebrate communities
- Map non-indigenous invertebrate species
- Identify hotspots of non-indigenous species

METHOD

Scraping of **Hard Substrates**

Water for eDNA analysis

NORTH
- Viana do Castelo
- Porto Atlântico

AVEIRO
- Luís Lavrador
- Costa Nova

LISBON
- Oeiras
- Alcântara

Azores
- São Miguel Island
- Ponta Delgada
- Vila Franca do Campo

Madeira
- Funchal
- Quinta do Lorde

3 SAMPLE TYPES
10 RECREATIONAL MARINAS
5 REGIONS
JUNE/JULY 2020

Zooplankton

SPECIES MOLECULAR IDENTIFICATION
COI — mBRAVE
18S — silva ngs

RESULTS & DISCUSSION

645 MARINE/OLIGOHALINE INVERTEBRATES WERE DETECTED IN THE TEN MARINAS, OF WHICH **38 NON-INDIGENOUS SPECIES**

North (n=295), Aveiro (n=259), Lisbon (n=259), Madeira (n=163), Azores (n=275)

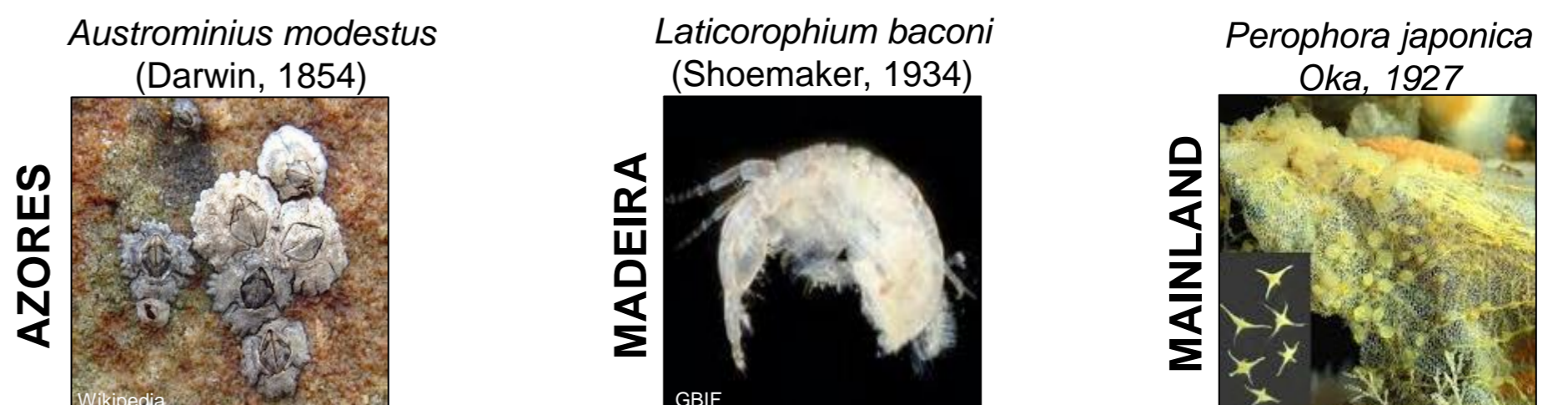North (n=17), Aveiro (n=17), Lisbon (n=18), Madeira (n=11), Azores (n=17)

- Only **5% of total species** and **5% of NIS** were detected in common among the five regions
- Both **sample type and marina significantly influenced species composition**

TOTAL MARINE/OLIGOHALINE INVERTEBRATE SPECIES

Marina	Total species	NIS
PDL	214	15
VFC	176	14
QLO	116	7
FUN	111	9
OEI	211	14
ALC	140	14
LLA	190	13
CNO	177	13
PAT	195	13
VCA	220	14

NIS legend:
Annelida, Arthropoda, Bryozoa, Chaetognatha, Chordata, Cnidaria, Ctenophora, Echinodermata, Entoprocta, Gastrotricha, Hemichordata, Kinorhyncha, Mollusca, Nematoda, Nemertea, Placozoa, Phoronida, Platyhelminthes, Porifera, Rotifera, Xenacoelomorpha

1 NEW NIS RECORD FOR MAINLAND PORTUGAL, MADEIRA AND AZORES EACH!

AZORES — *Austrominius modestus* (Darwin, 1854) — Wikipedia

MADEIRA — *Laticorophium baconi* (Shoemaker, 1934) — GBIF

MAINLAND — *Perophora japonica* Oka, 1927

CONCLUSION

WE SUGGEST THAT **PORTUGUESE NIS MONITORING CAMPAIGNS** START INTEGRATING DNA METABARCODING BY **PERFORMING FREQUENT MOLECULAR ASSESSMENTS WITH PERIODIC MORPHOLOGICAL ASSESSMENTS**

FUTURE WORK

A **COMPREHENSIVE TEMPORAL NIS ASSESSMENT**, USING DNA-METABARCODING WAS PERFORMED IN FOUR MARINAS IN THE NORTH AND CENTER OF PORTUGAL **OVER A TWO-YEAR PERIOD** (2021-2022) TO DETERMINE THE EFFICACY OF THIS METHODOLOGY FOR **INVERTEBRATE NIS EARLY DETECTION**

ACKNOWLEDGMENTS