

Marine Non-indigenous Species (NIS) in Prince William Sound: Detection, Synthesis, & Risk

Greg Ruiz

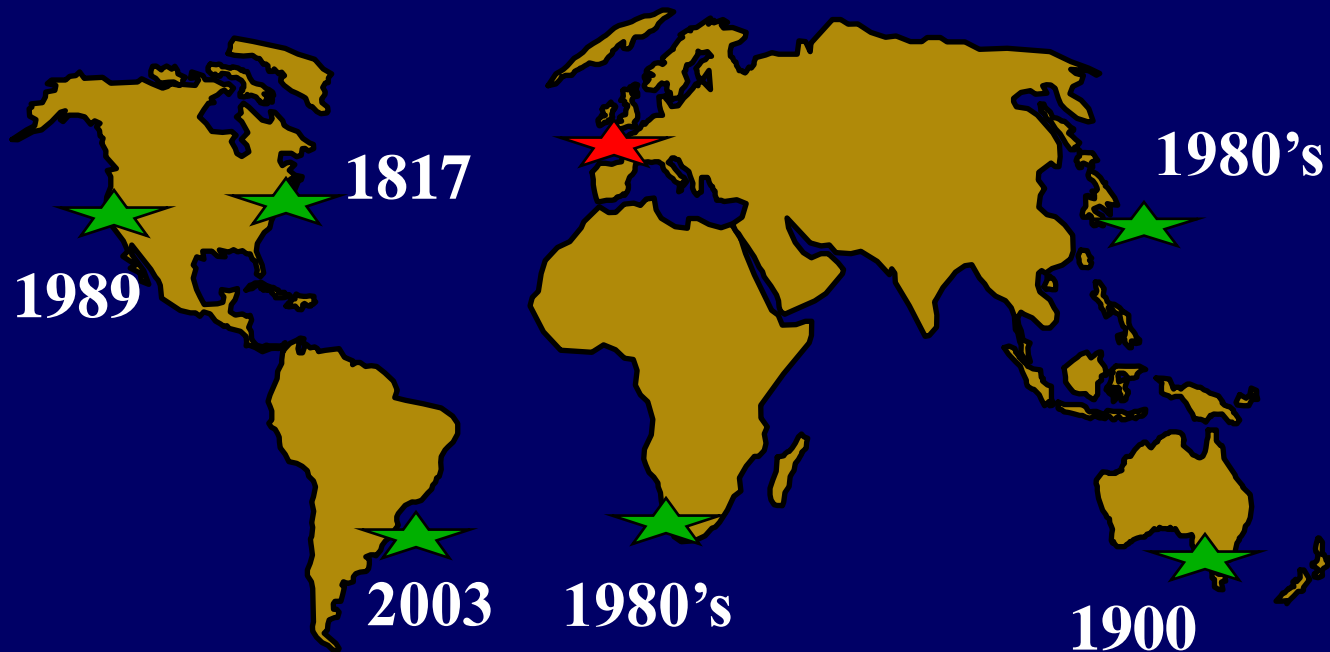
Smithsonian Environmental Research Center

Presentation to

Prince William Sound Regional Citizens' Advisory Council

June 20, 2024

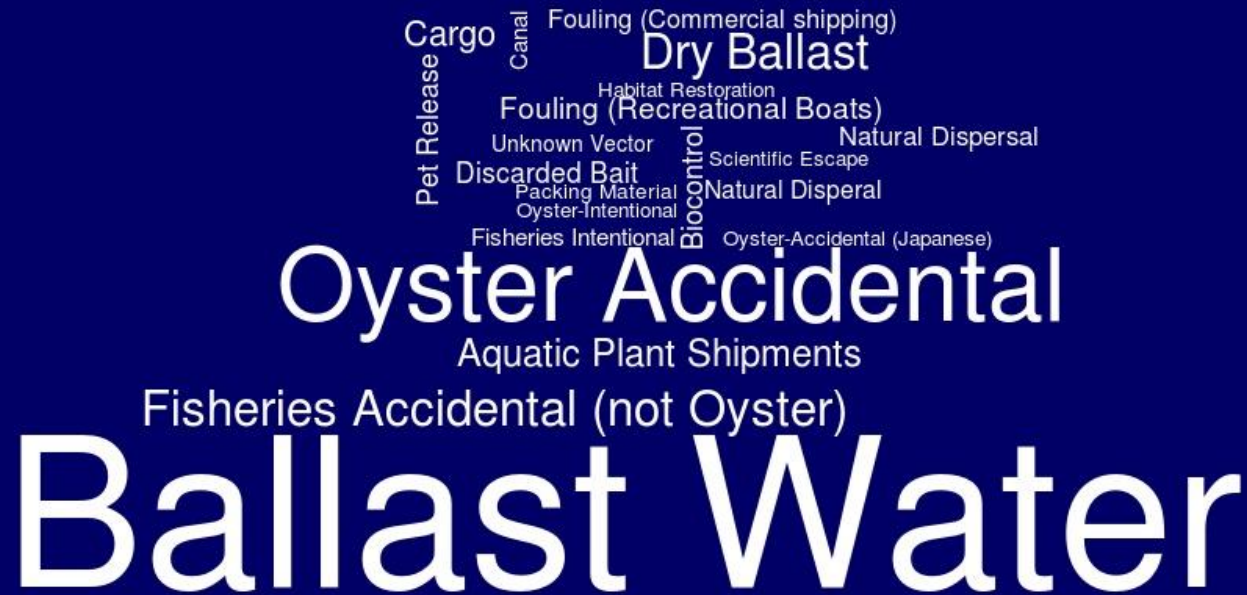
Invasions by European Crab (*Carcinus maenas*)



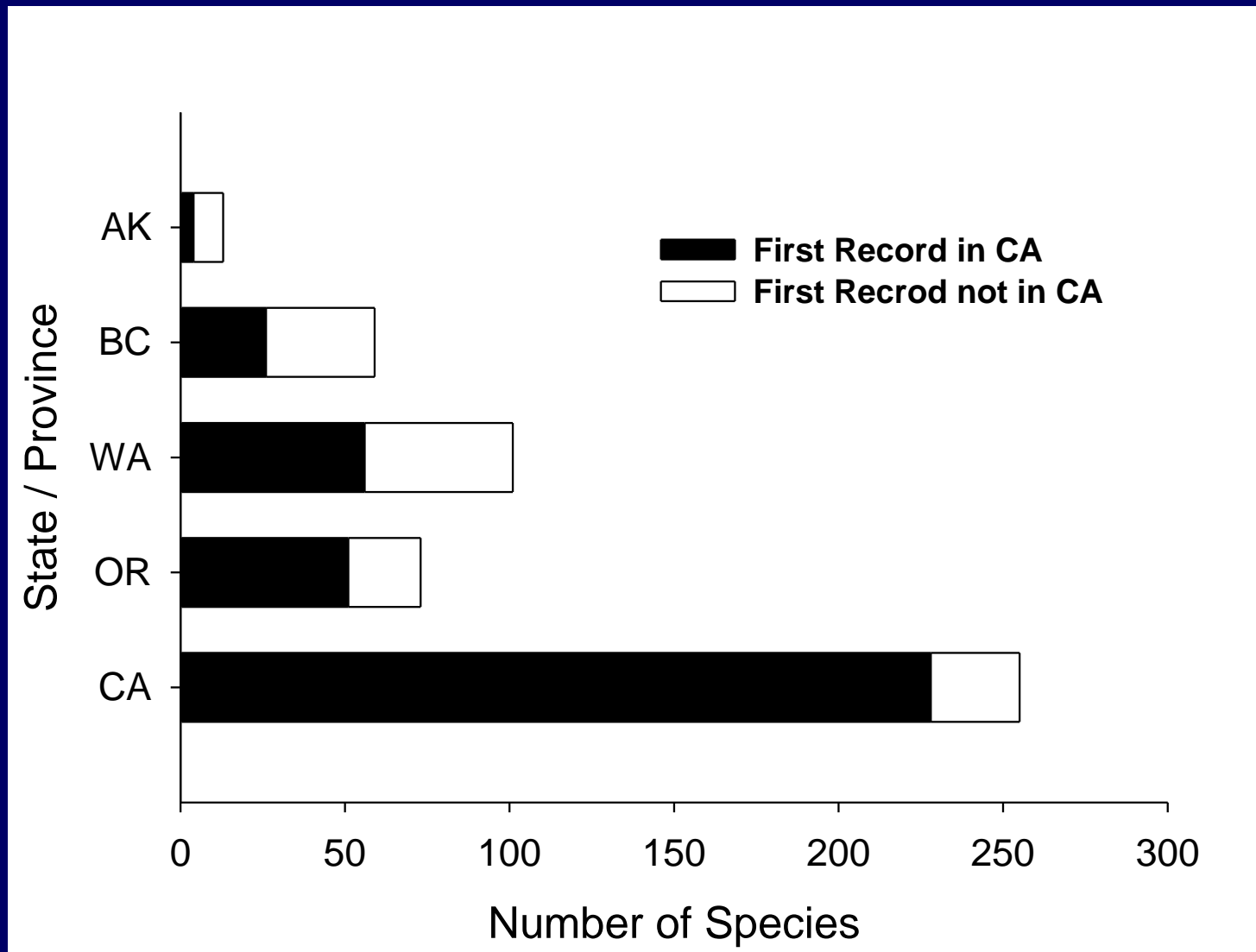


Vector Strength

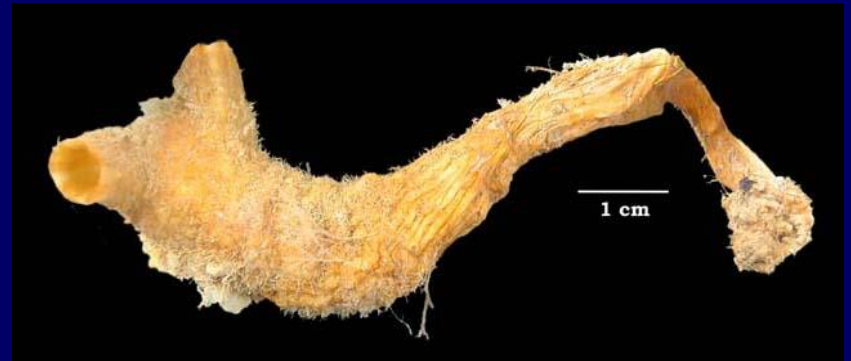
Hull Fouling



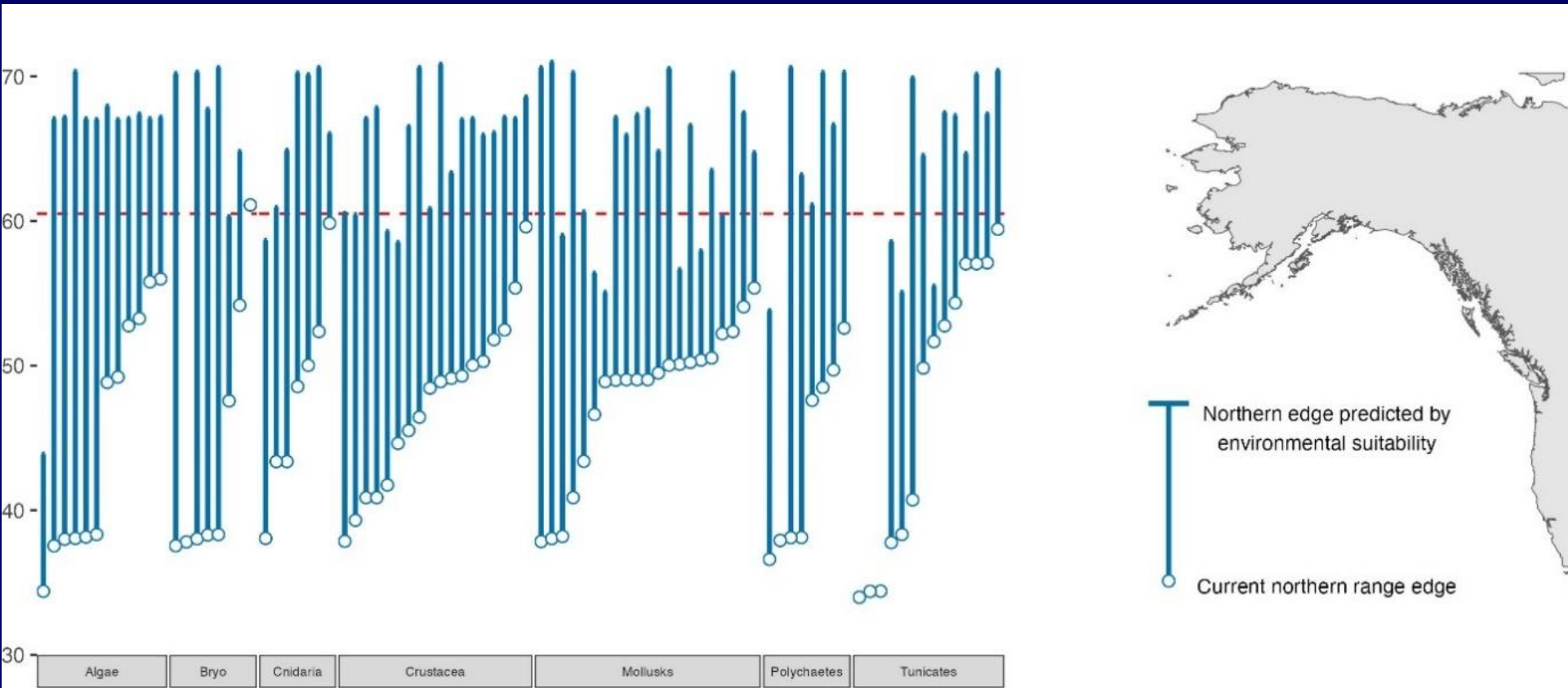
Northward Spread of California Invasions



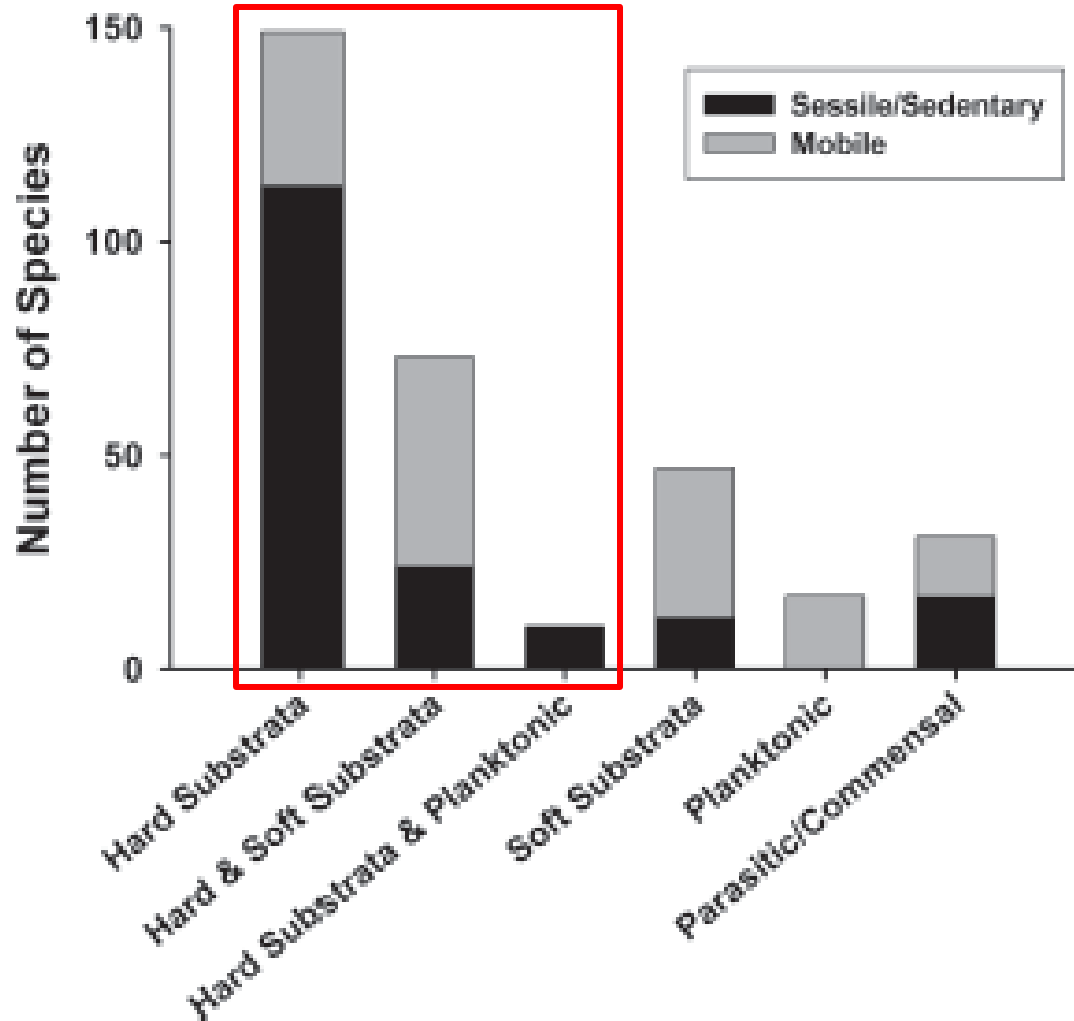
Potential for continued Northward Spread ?



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Most NIS utilize Hard Substrata



Standardized Surveys (Sessile Invertebrates)

10 SITES/BAY X 5 PLATES = 50 PLATES/BAY

- **PVC Plate (14x14 cm)**
- **Suspended from dock / pier @ 1m depth**
- **High salinity (>25 ppt) sites**
- **3 months deployment (summer)**
- **Sessile species richness / plate**
- **Invasion status (NIS, Native, or Cryptogenic)**



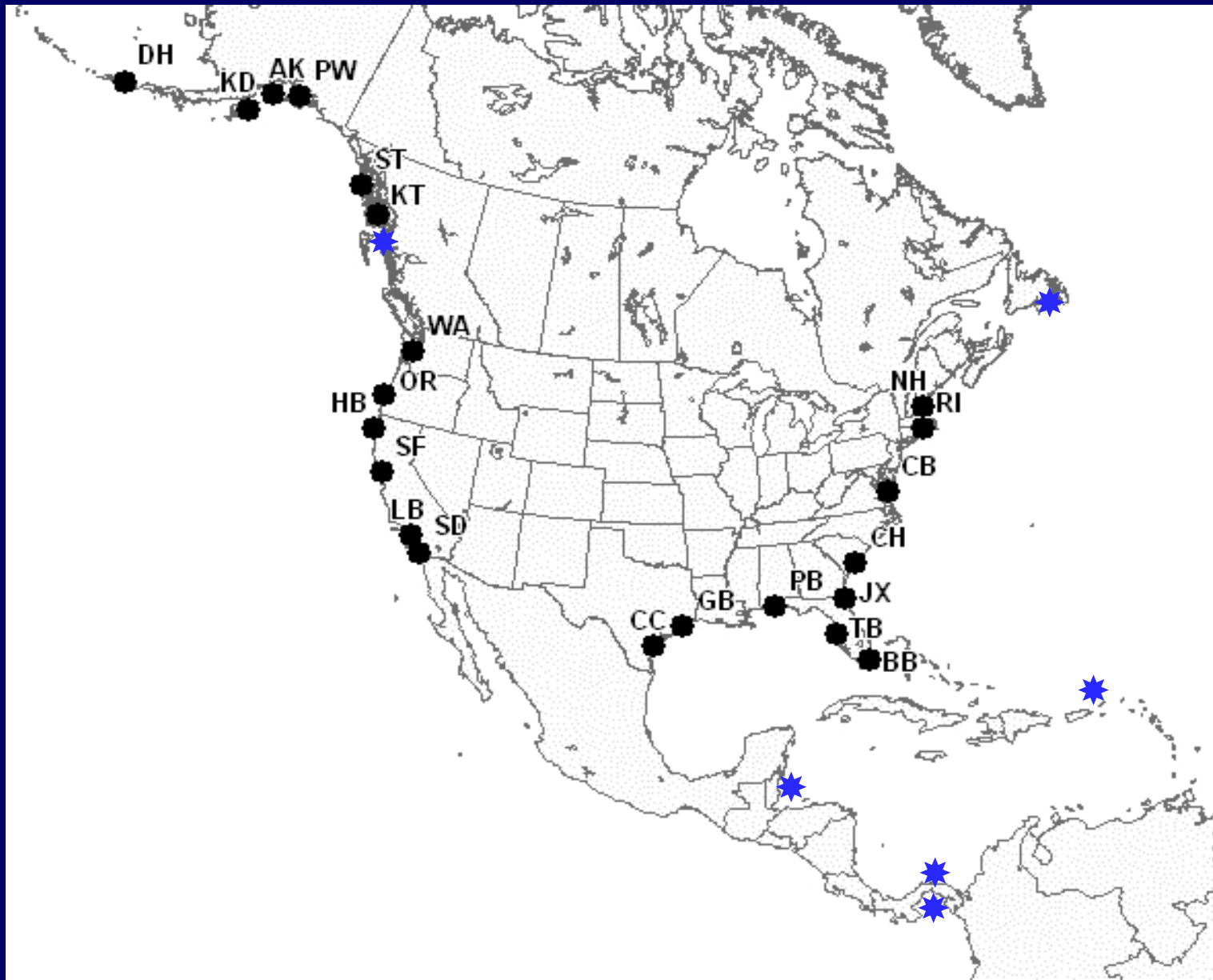
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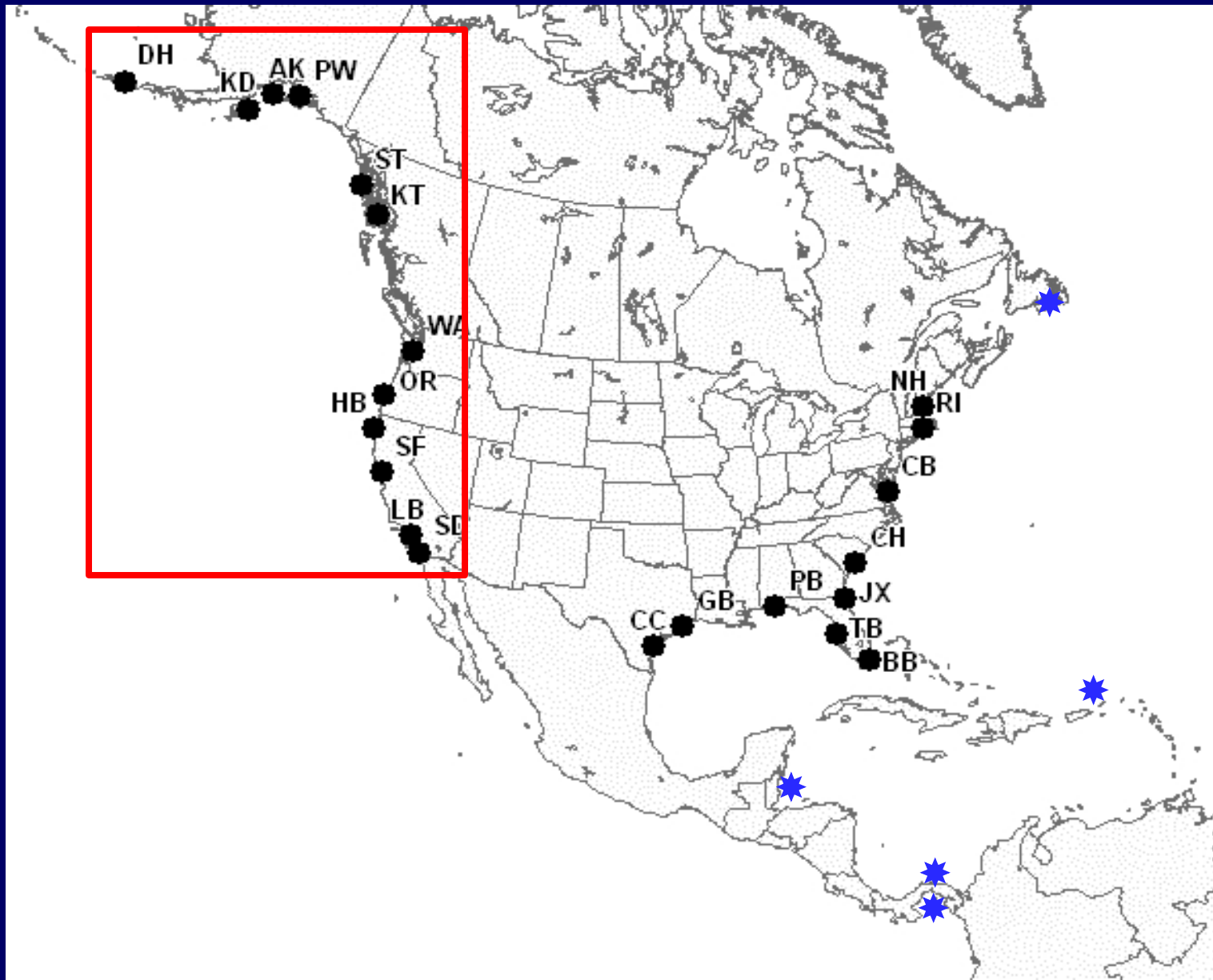


SERC Marine Biofouling Community Surveys





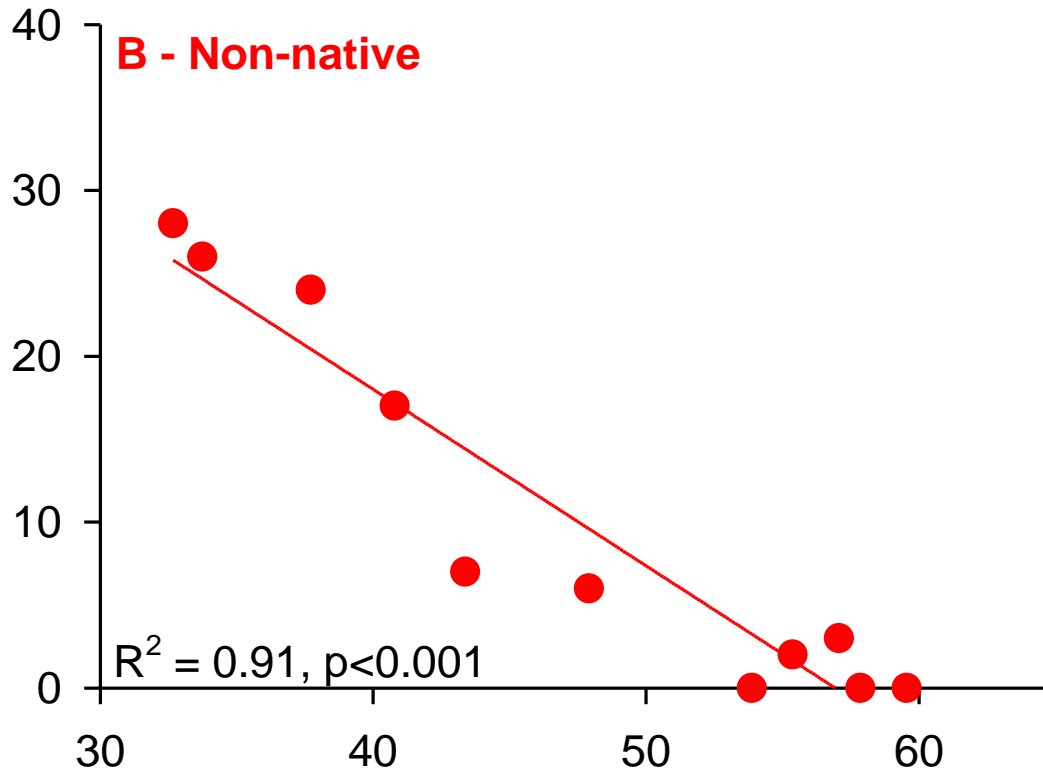
SERC Marine Biofouling Community Surveys



Diversity Gradient (31-61° N)

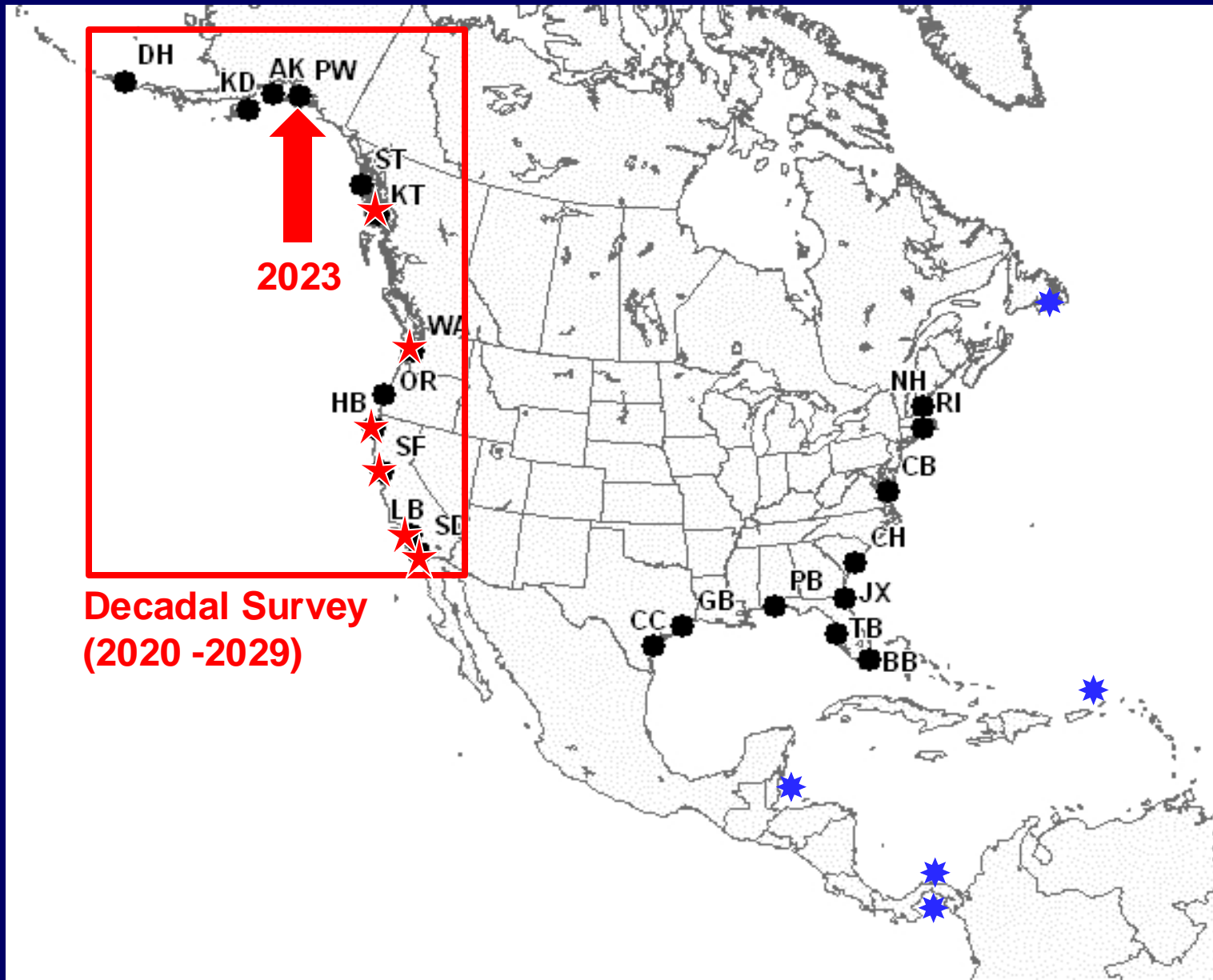
First Decadal Survey (2000-2010)

Number of Species

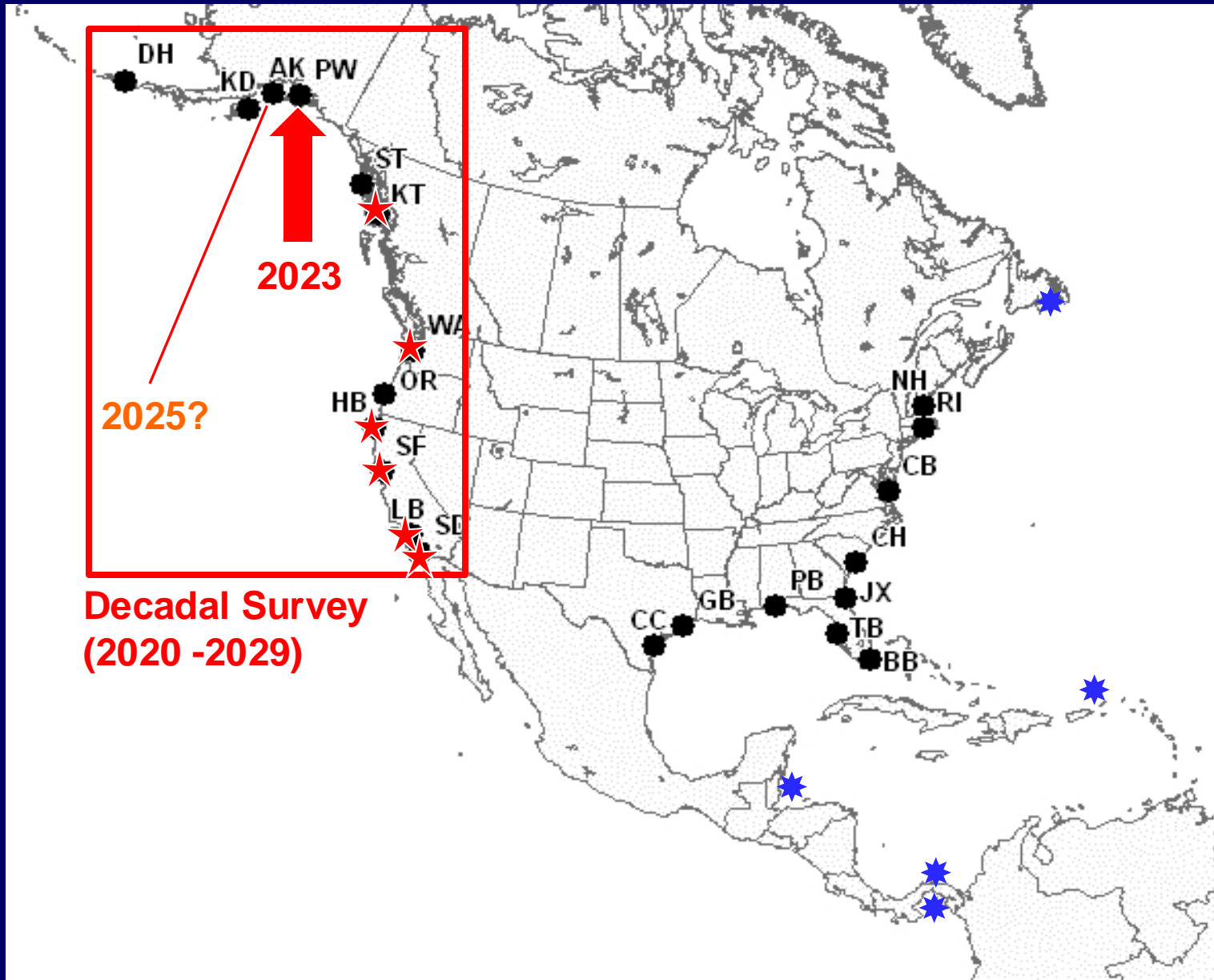


Latitude (Degrees N)

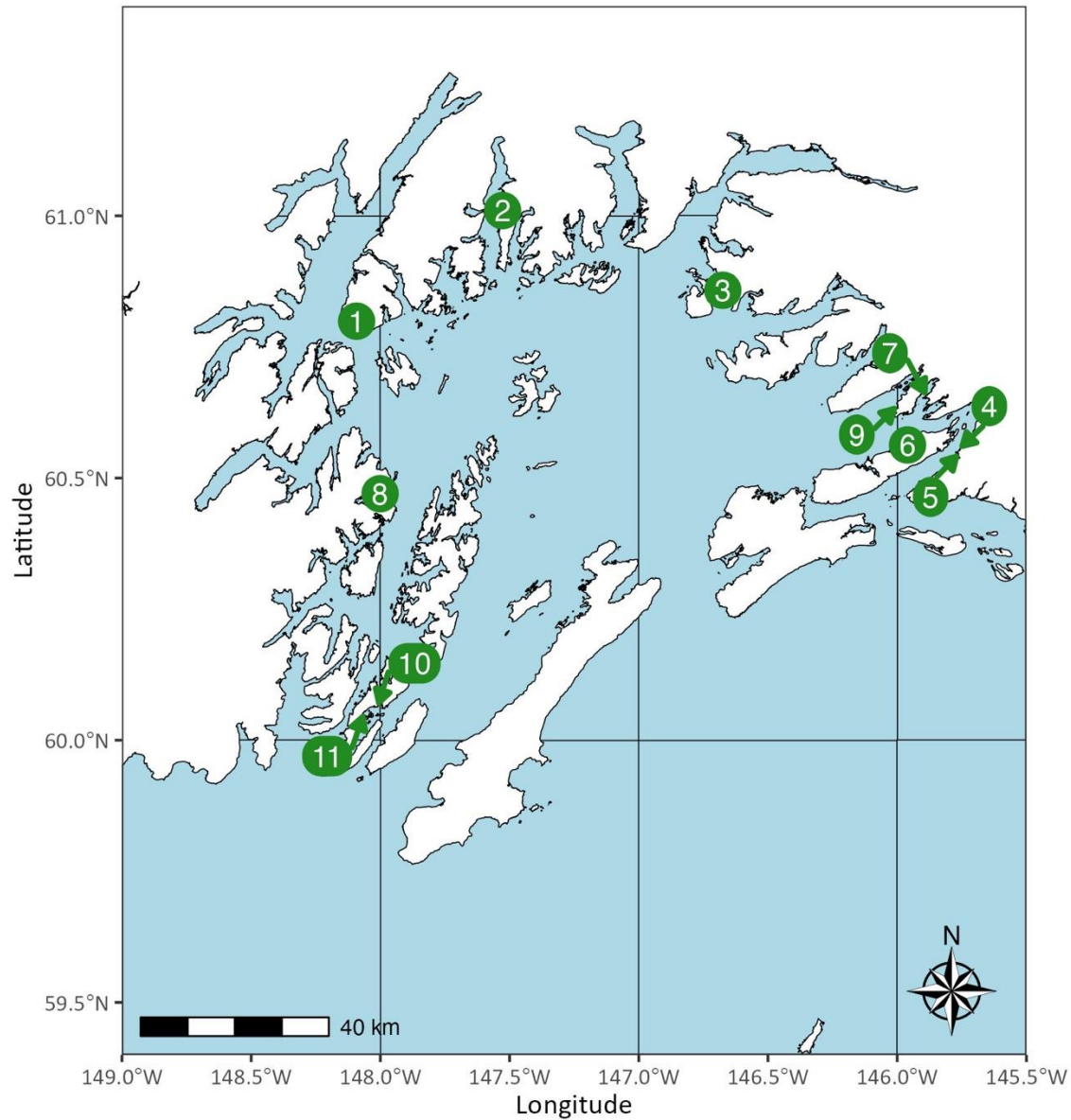
SERC Marine Biofouling Community Surveys



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Survey Sites: PWS 2023



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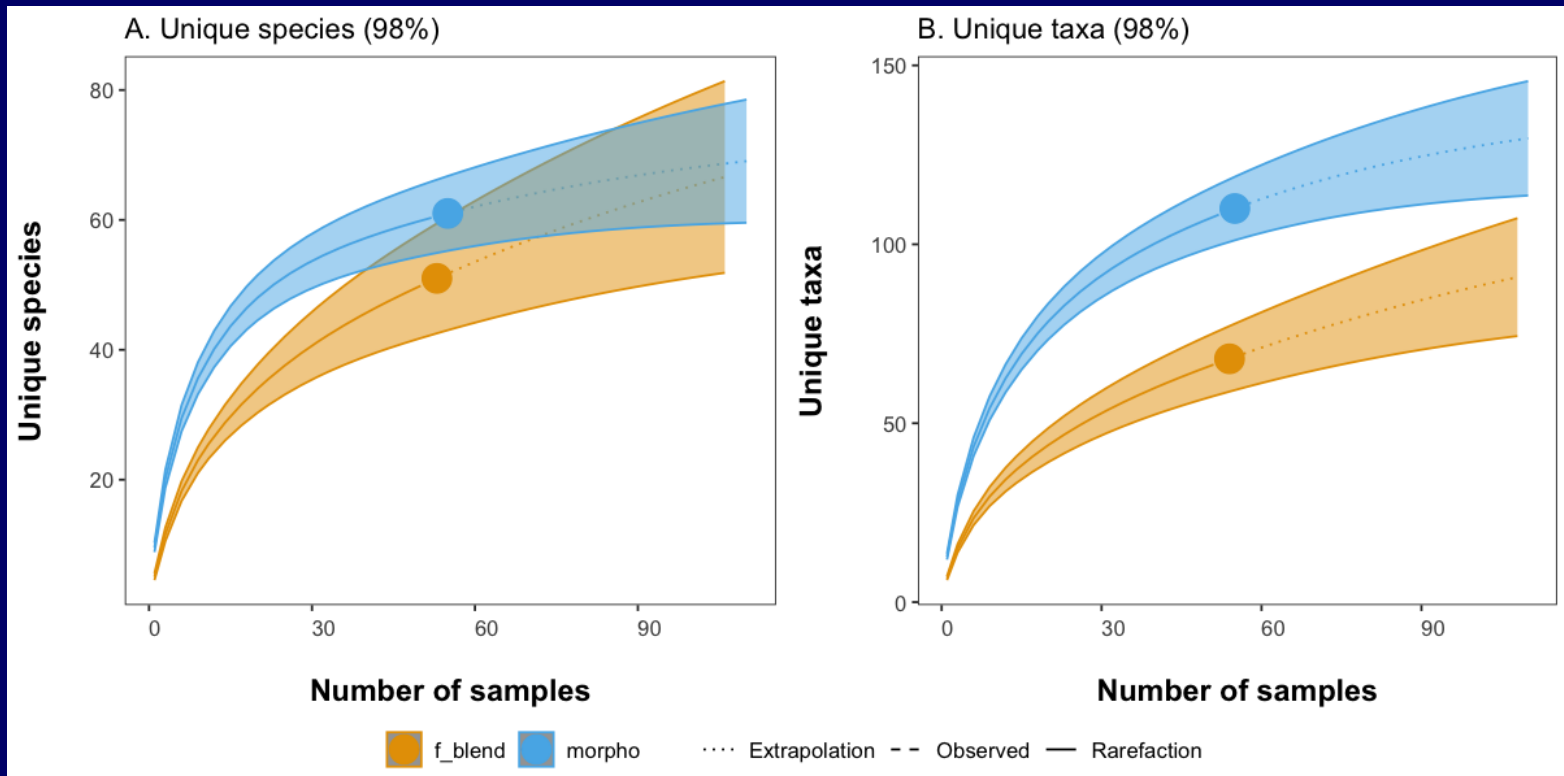
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Accumulation curves: (98% identity for genetics)



Morpho vs. Genetic Detection: Taxonomic Overlap

98% identity - with binomial names



NIS Detected by Morpho & Genetic Analyses

Group	Taxon	Morphology	Metagenetics - blends		
		N panels	N reads	N samples	Sites
Amphipoda	Monocorophium acherusicum	1	Not found	Not found	Not found
Bryozoa	Schizoporella japonica	5	281 reads (3 ASVs)	3	Tatitlek Ferry Dock
Caprellidae	Caprella mutica	5	37 reads(2 ASVs)	2	Tatitlek Ferry Dock

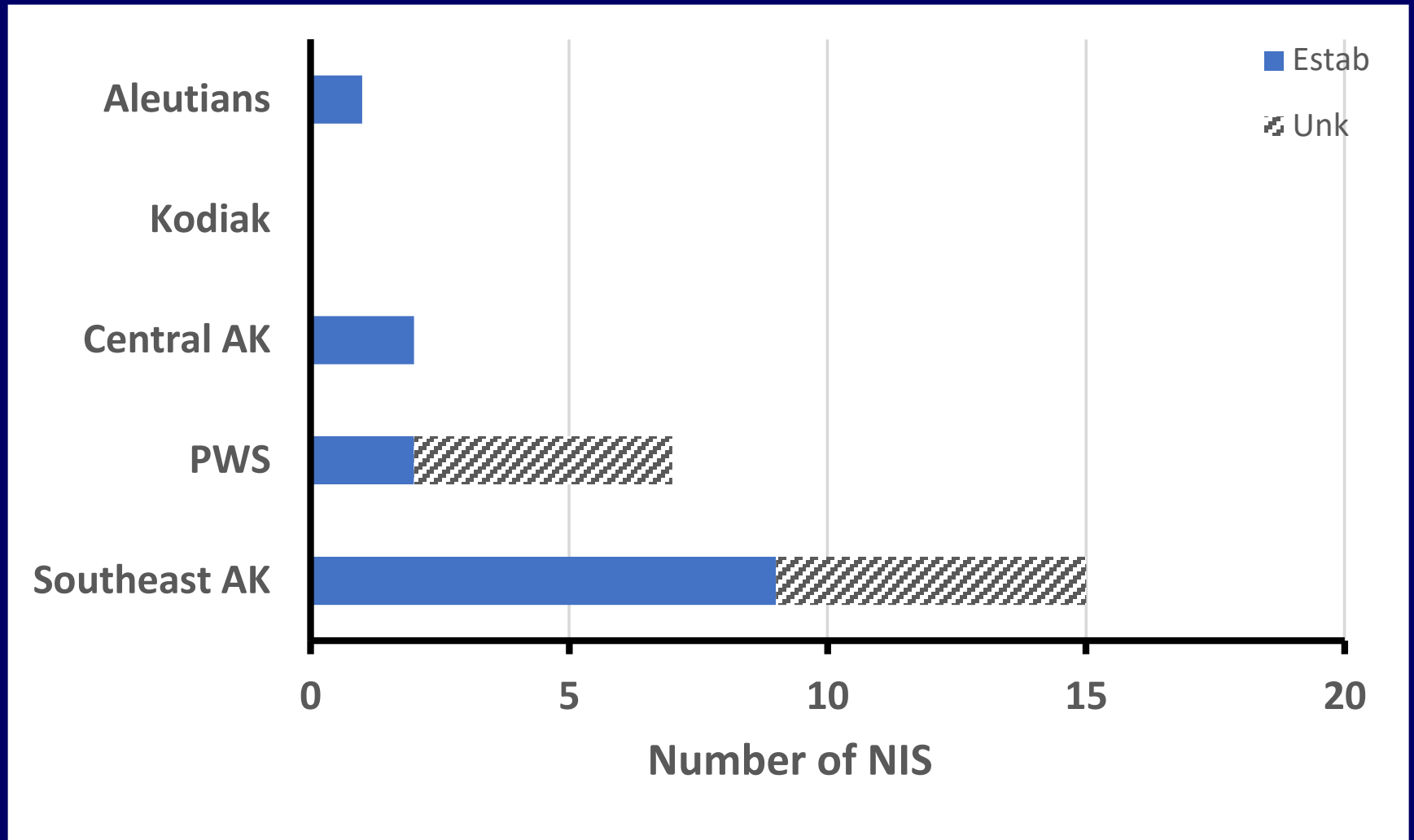
Ciona savignyi Detection in PWS:
Plate Watch (2023)



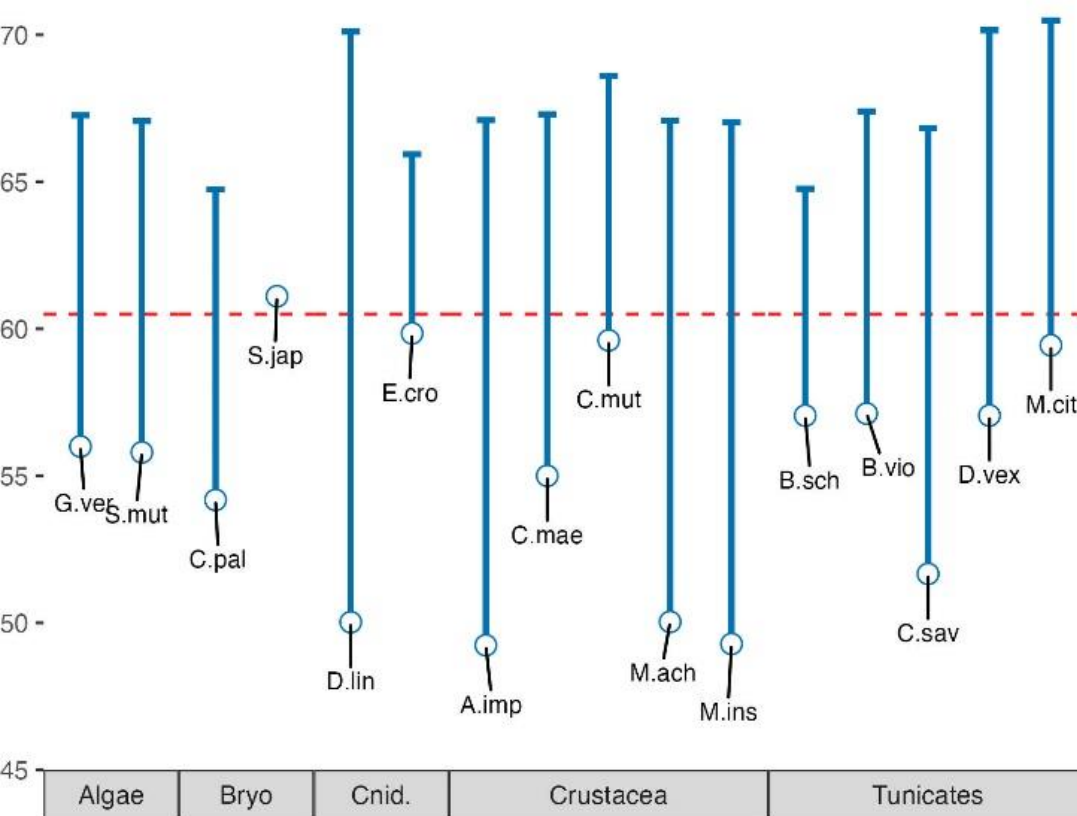
NIS Detections in Alaska by Region (21 Invertebrates)

Taxa Group	Taxon	Aleutians	Kodiak	Central Alaska (Cook Inlet)	Prince William Sound	Southeast Alaska
Brozoan	<i>Bugula neritina</i>					Unk
Bryozoans	<i>Cryptosula pallasiana</i>					Unk
Bryozoans	<i>Schizoporella japonica</i>				Estab	Estab
Bryozoans	<i>Watersipora subatra</i>					Unk
Cnidarians-Anthozoans	<i>Diadumene lineata</i>					Unk
Cnidarians-Hydrozoans	<i>Ectopleura crocea</i>					Estab
Crustaceans-Amphipods	<i>Ampithoe valida</i>					Estab
Crustaceans-Amphipods	<i>Caprella mutica</i>	Estab		Estab	Unk	Estab
Crustaceans-Amphipods	<i>Monocorophium acherusicum</i>				Unk	
Crustaceans-Amphipods	<i>Monocorophium insidiosum</i>					Unk
Crustaceans-Barnacles	<i>Amphibalanus improvisus</i>				Unk	
Crustaceans-Crabs	<i>Carcinus maenas</i>					Estab
Crustaceans-Isopods	<i>Orthione griffenis</i>					Estab
Mollusks-Bivalves	<i>Magallana gigas</i>					Stock
Mollusks-Bivalves	<i>Mya arenaria</i>				Estab	
Tunicates	<i>Botrylloides violaceus</i>				Unk	Estab
Tunicates	<i>Botryllus schlosseri</i>					Estab
Tunicates	<i>Ciona savignyi</i>				Unk	Unk
Tunicates	<i>Didemnum vexillum</i>					Estab
Tunicates	<i>Molgula citrina</i>			Estab		

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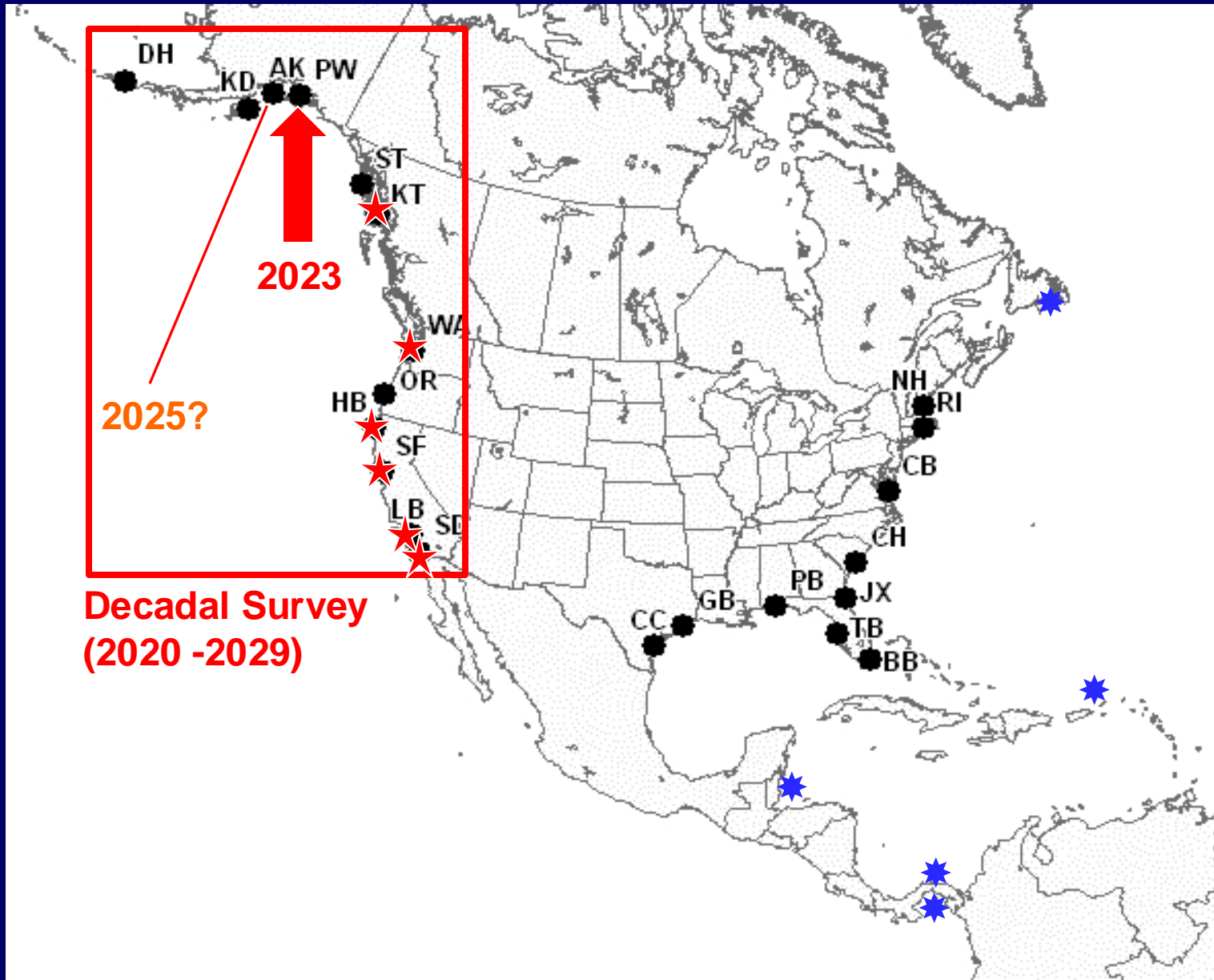
Potential Range of NIS Detected in Alaska



Recommendations

- Decadal survey of PWS & Cook Inlet to evaluate:
 - (a) biosecurity management & policy
 - (b) long-term changes in marine community
- Expanded PlateWatch Program:
 - (a) genetic detection
 - (b) training workshop & pilot test
- More frequent measures at transportation hubs:
 - (a) Valdez Marine Terminal
 - (b) Tatilek Ferry Dock

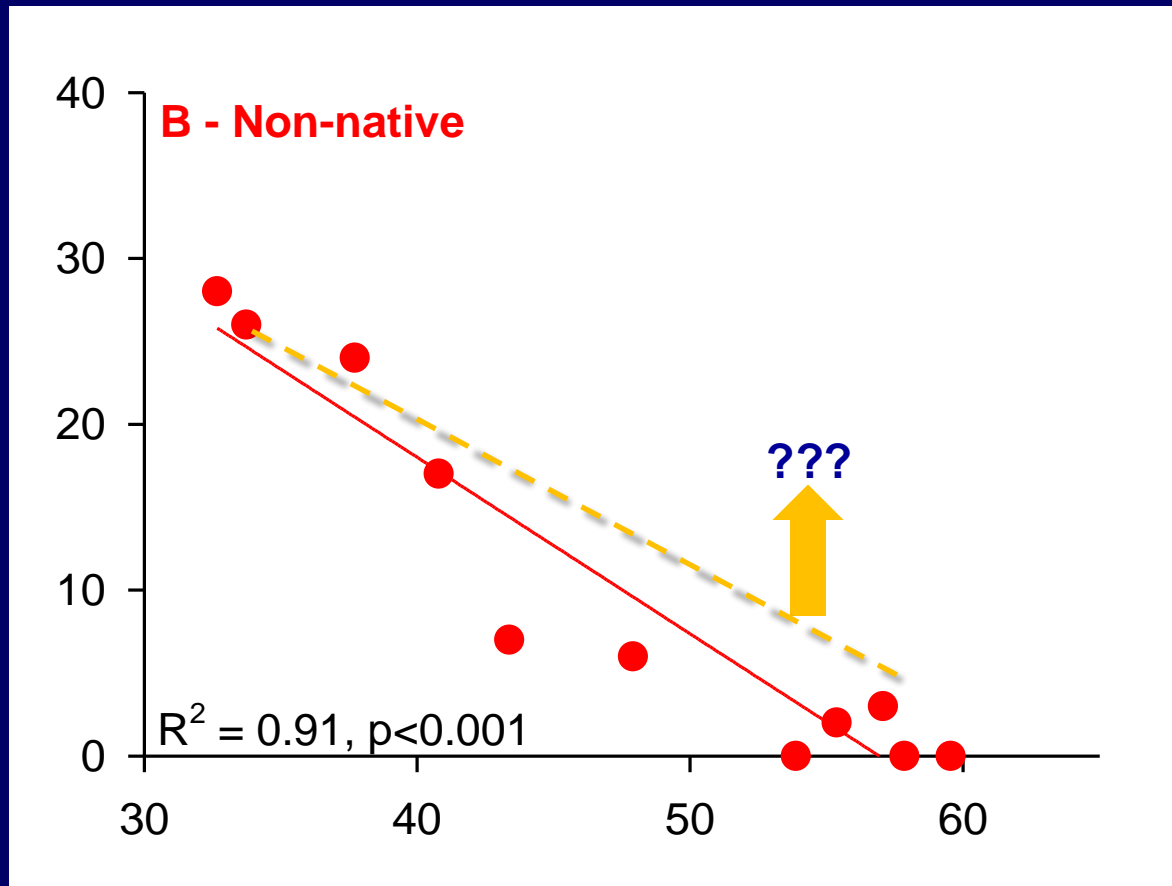
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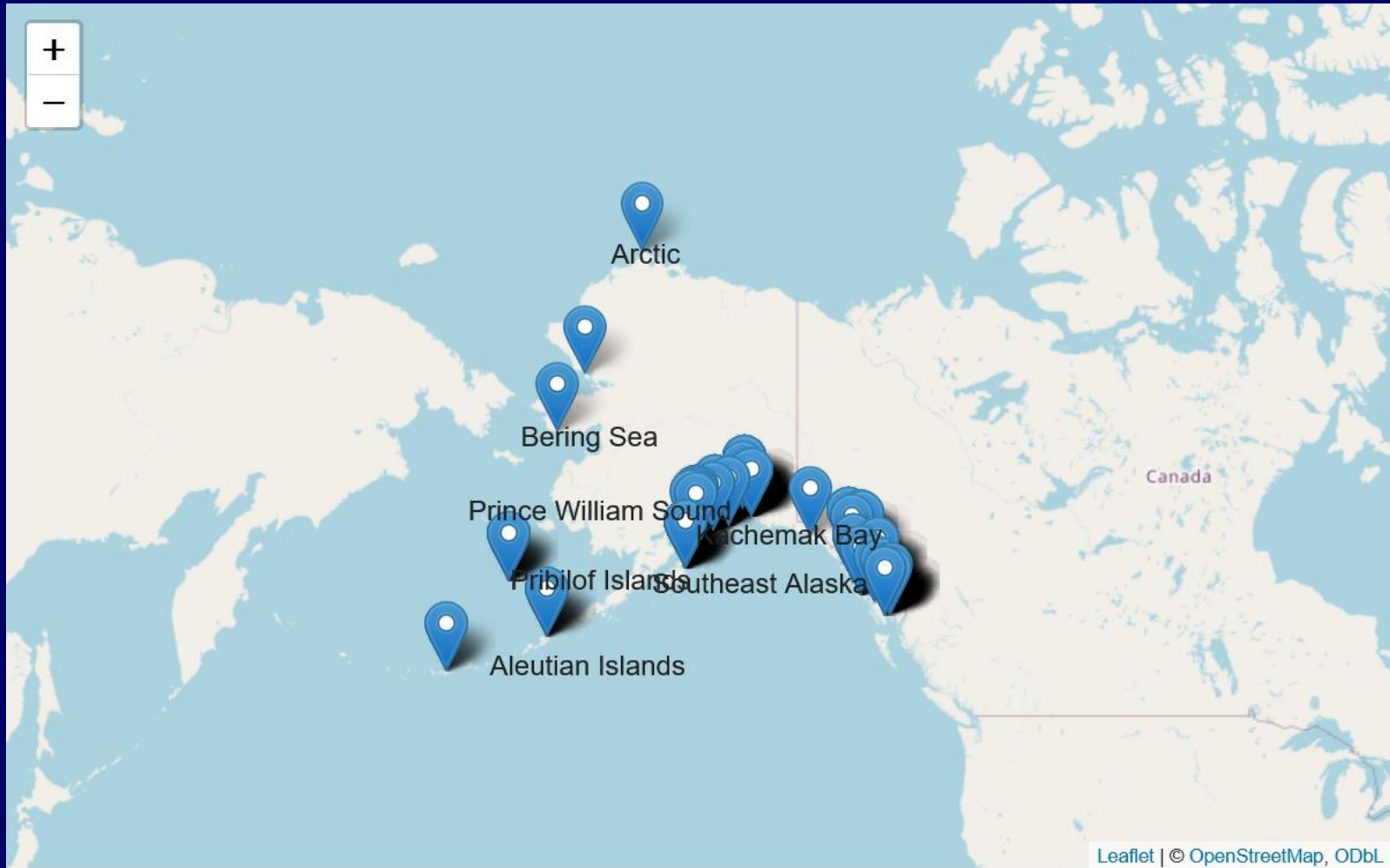
Second Decadal Survey (2020-2030)

Number of Species



Latitude (Degrees N)

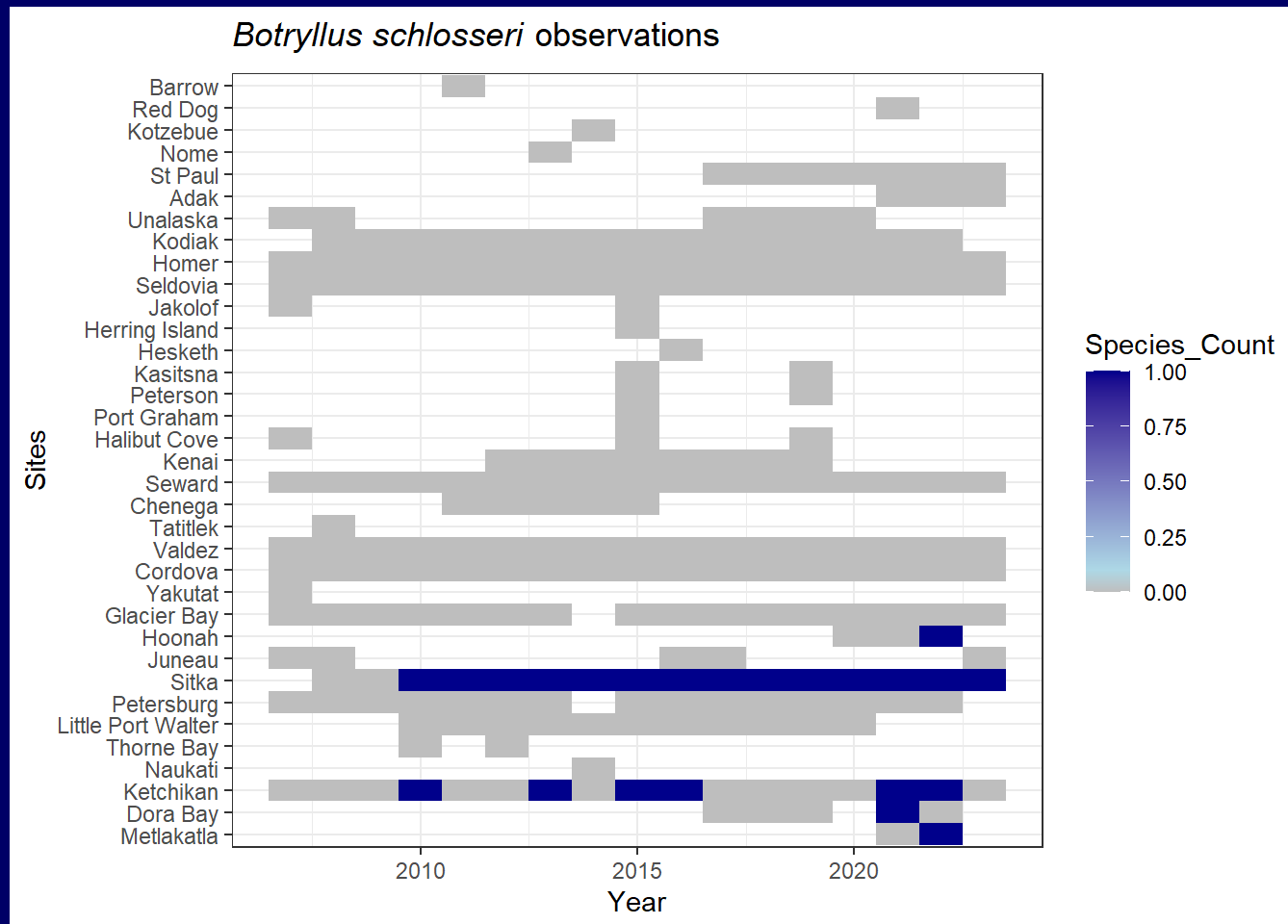
PlateWatch: Non-Native Species Detection in AK



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Acknowledgements

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P. Fofonoff, J. Geller, R. DiMaria, M. Arena, & K. Pagenkopp Lohan**

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