CNL(24)74

Pink salmon at sea: Current knowledge, overlap, and potential interactions

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Pink salmon at sea

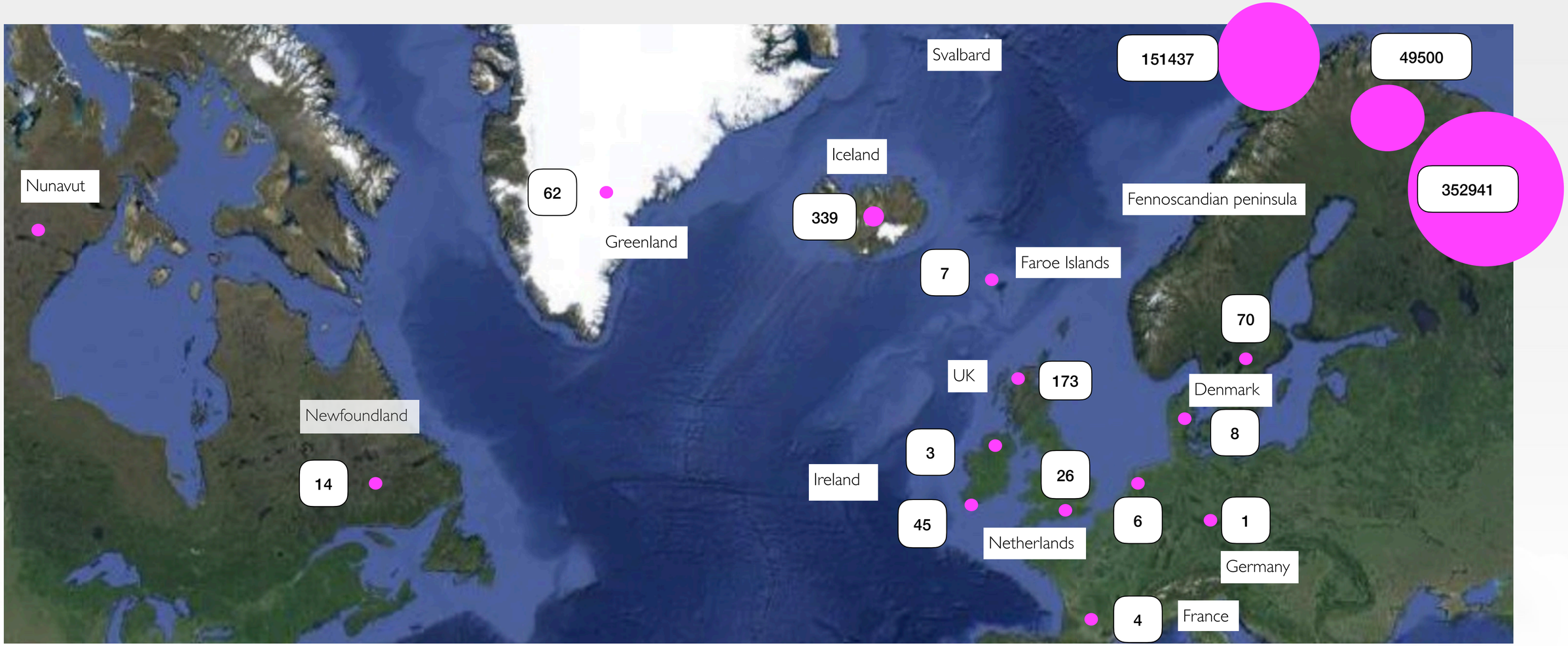
Current knowledge

- Spatial distribution in the North Atlantic Ocean
- Potential migration patterns
- Marine diet in the Northeast Atlantic

Potential interactions: Overlapping diet and distribution

Spatial distribution in the North Atlantic Ocean

Odd year: 2021



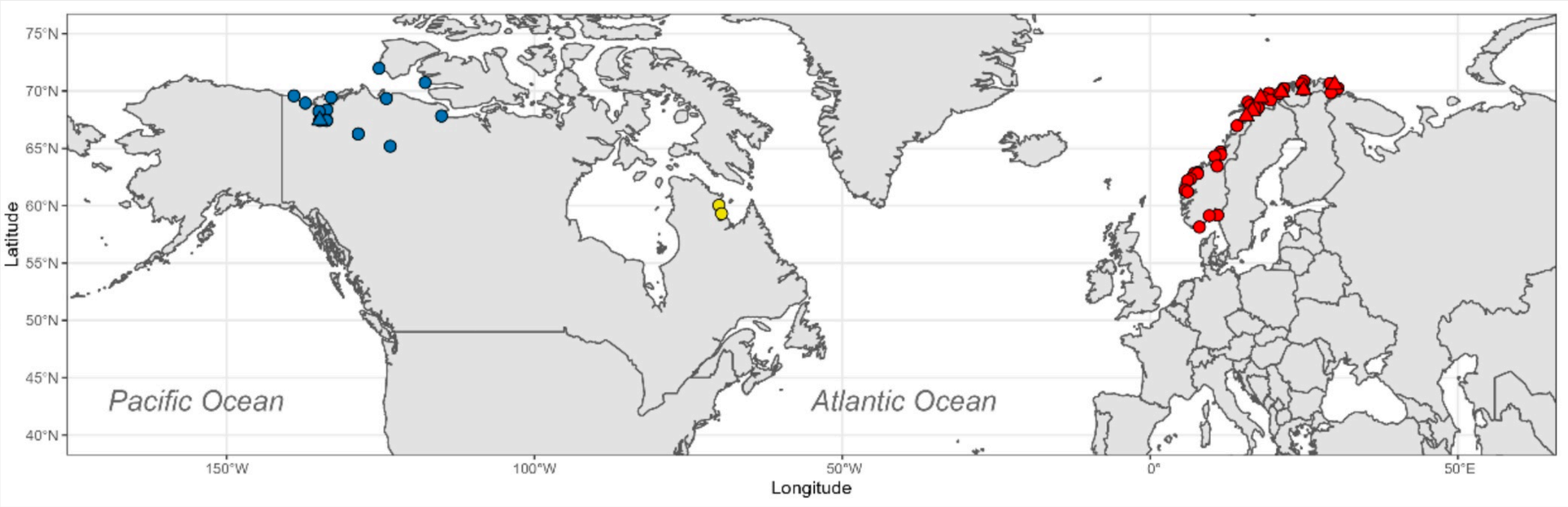
(ICES 2022; NHPSEG 2023; and references therein)

Spatial distribution in the North Atlantic Ocean

Even year

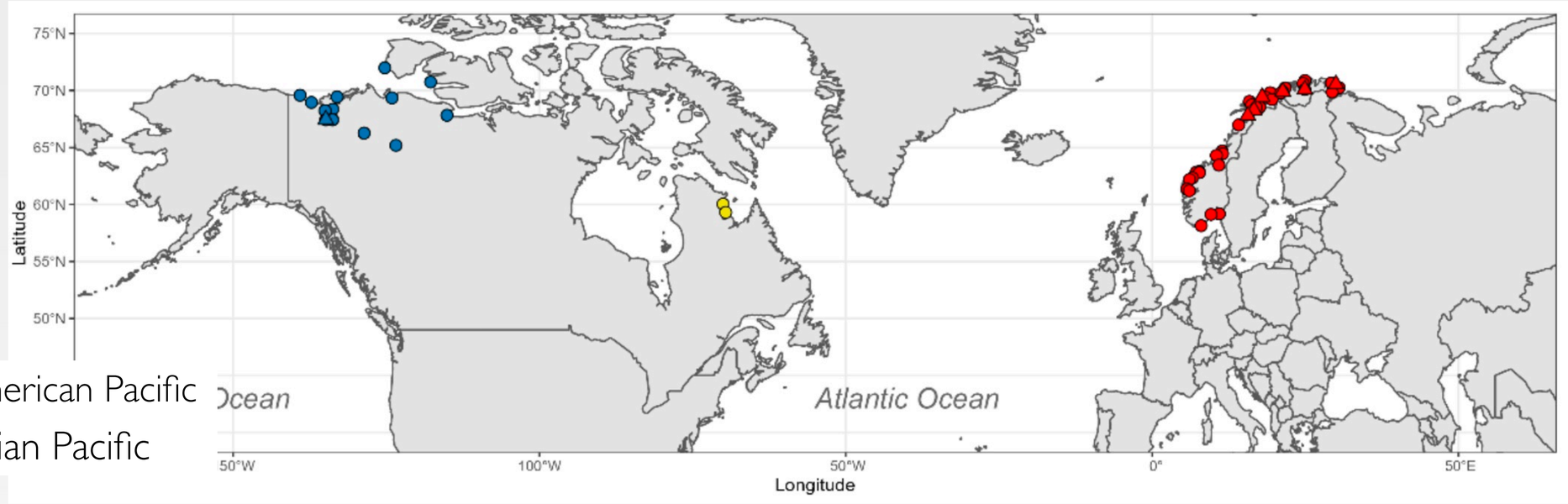
(ICES 2022; NHPSEG 2023; and references therein)

Spatial distribution in the North Atlantic Ocean



(NHPSEG 2023)

Spatial distribution in the North Atlantic Ocean

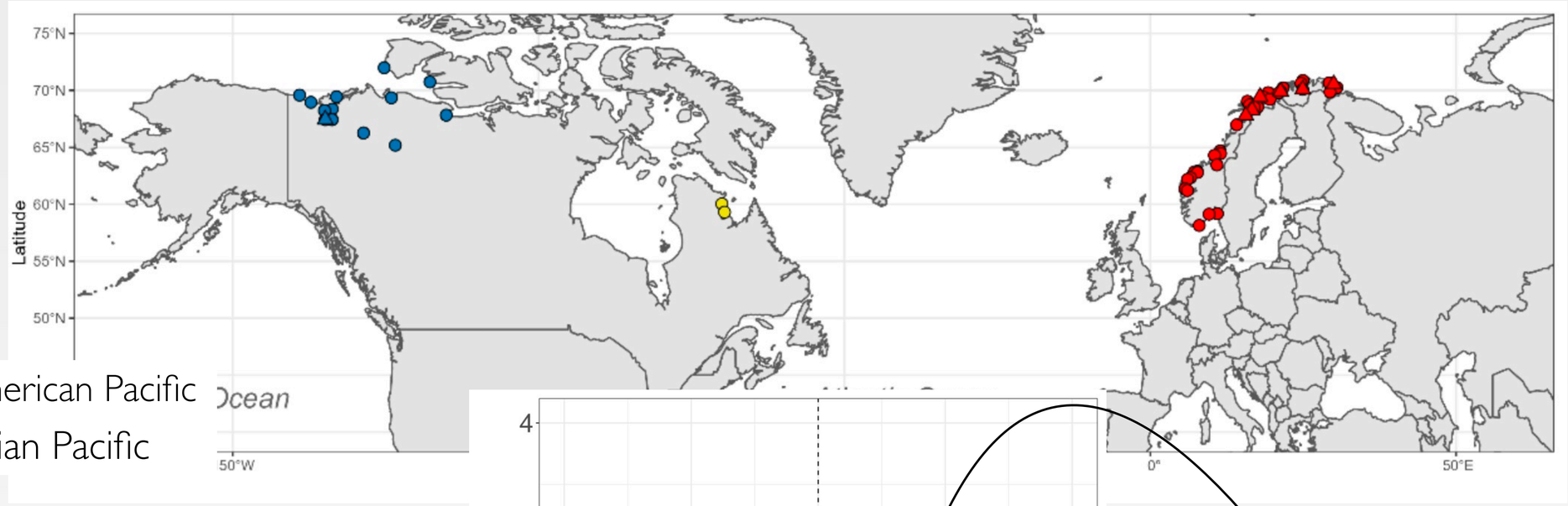


Native American Pacific

Native Asian Pacific

(NHPSEG 2023)

Spatial distribution in the North Atlantic Ocean



Native American Pacific

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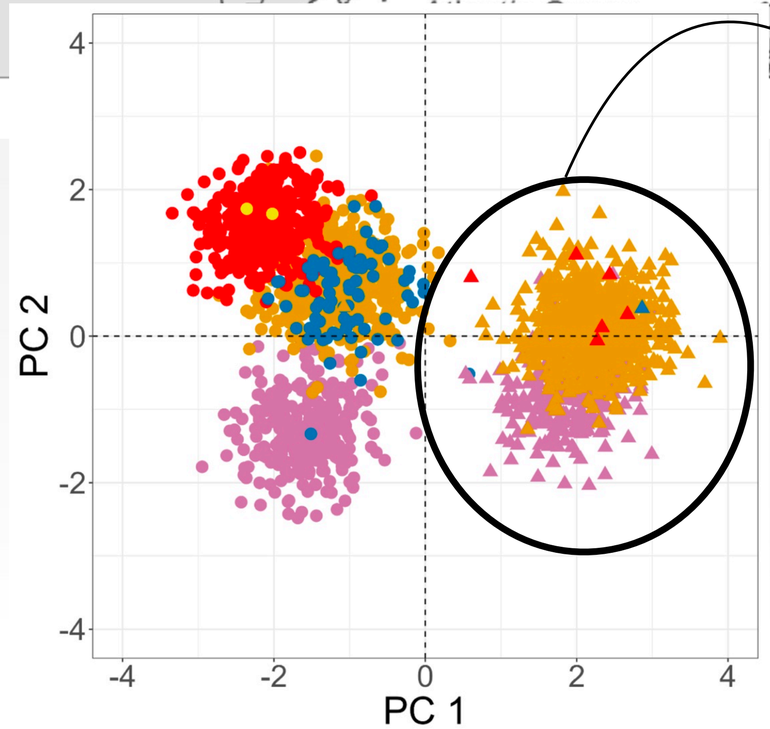
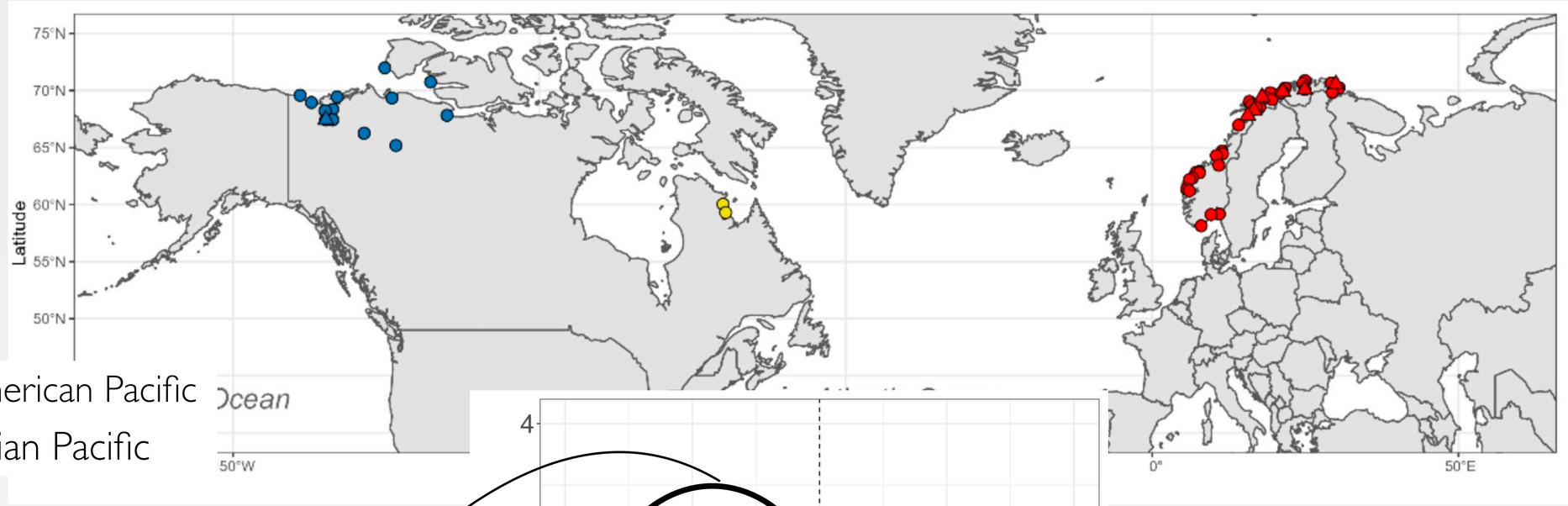


Even years

All genetically very similar

(NHPSEG 2023)

Spatial distribution in the North Atlantic Ocean



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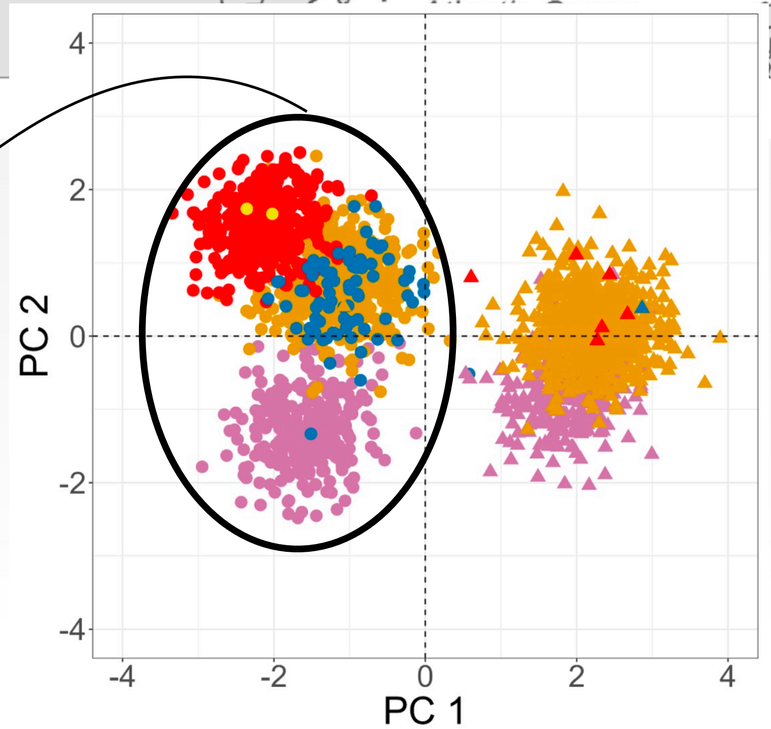


Odd years

Norwegian samples diverged native Asian Pacific

Eastern Canadian samples similar to Norwegian

Even years

All genetically very similar

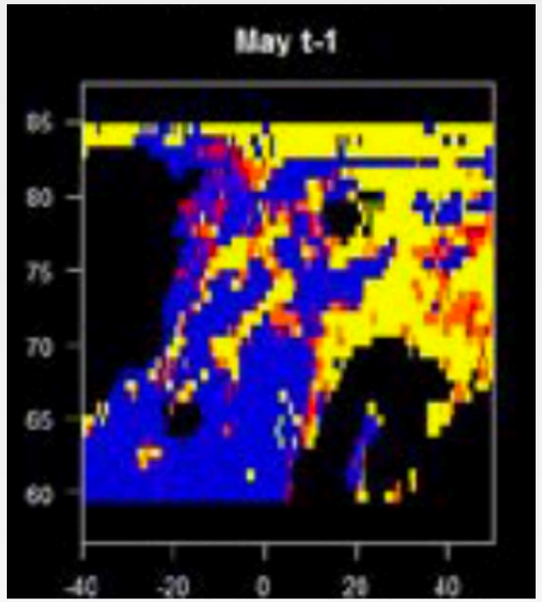
(NHPSEG 2023)

Spatial distribution in the North Atlantic Ocean

Distribution expansion linked to high temperature

Spatial distribution in the North Atlantic Ocean

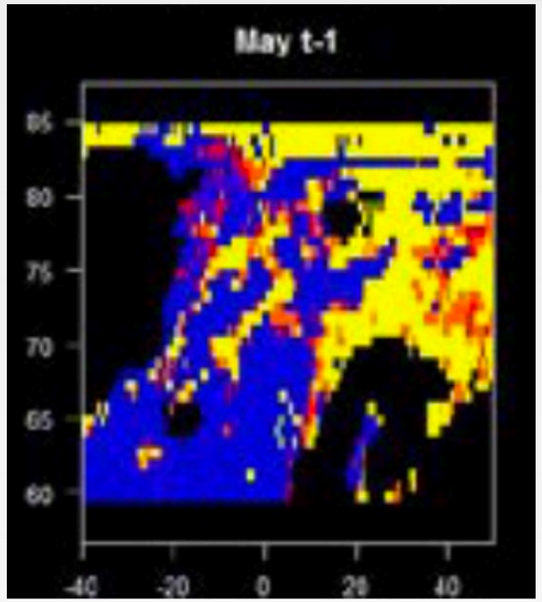
Distribution expansion linked to high temperature



VKM et al. (2020): sea surface temperature in May around Finmark coast and Svalbard (marked yellow) correlates with number of pink salmon returning to rivers the following year.

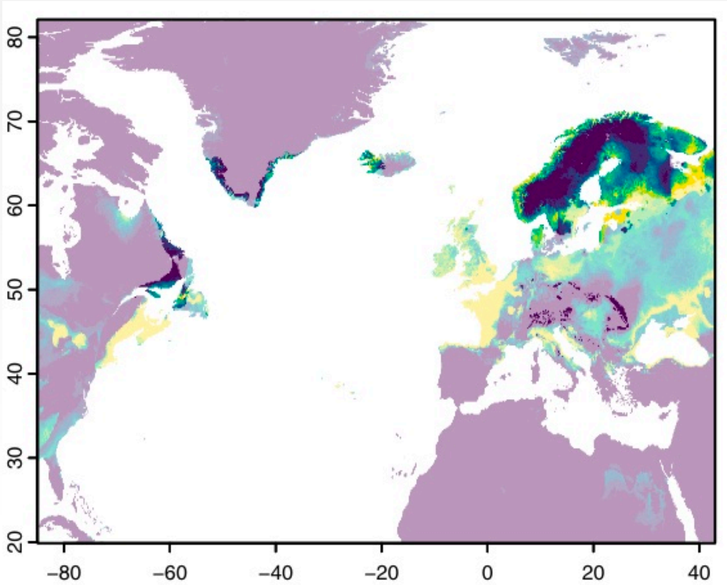
Spatial distribution in the North Atlantic Ocean

Distribution expansion linked to high temperature



VKM et al. (2020): sea surface temperature in May around Finmark coast and Svalbard (marked yellow) correlates with number of pink salmon returning to rivers the following year.

Maduna et al. (2024): High habitat suitability (marked yellow) related to temperature and precipitation at the time of river ascent.



Still potential for expansion!

Spatial distribution in the North Atlantic Ocean

Based on river records
Very little known about distribution in offshore areas

Spatial distribution in the North Atlantic Ocean

Norwegian marine data:

Spatial distribution in the North Atlantic Ocean

Norwegian marine data:

1. Marine (IMR: Norway, Denmark, Faroe)

- Scientific surveys targeting other pelagic species:
  International Ecosystem Survey in Nordic Seas (May)

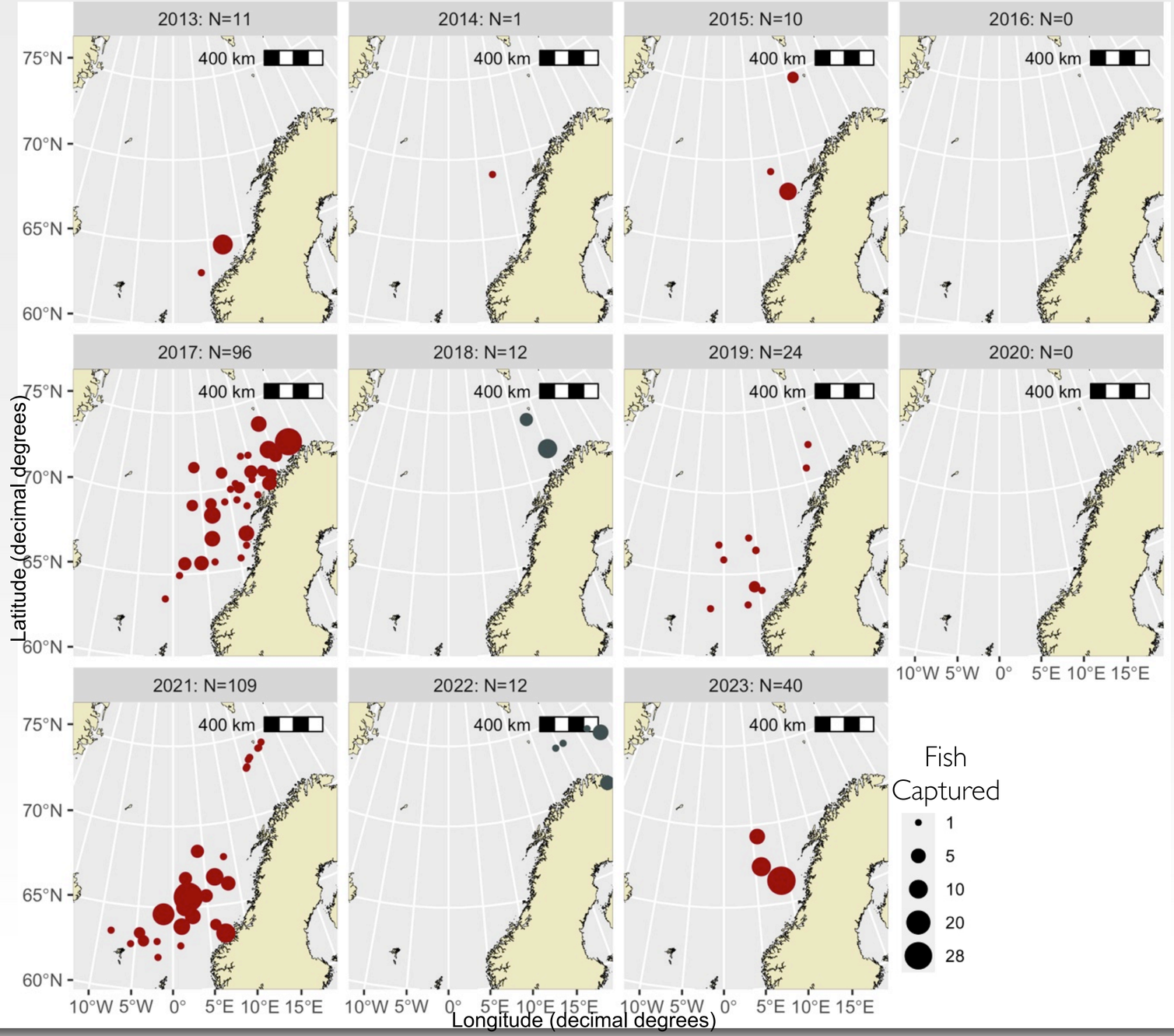
2. Coastal fishery (ssb.no, NINA)

- Salmonid
- Recreational

3. Norwegian Reference Fleet (IMR)

(Diaz Pauli et al. 2023)

Norwegian marine data

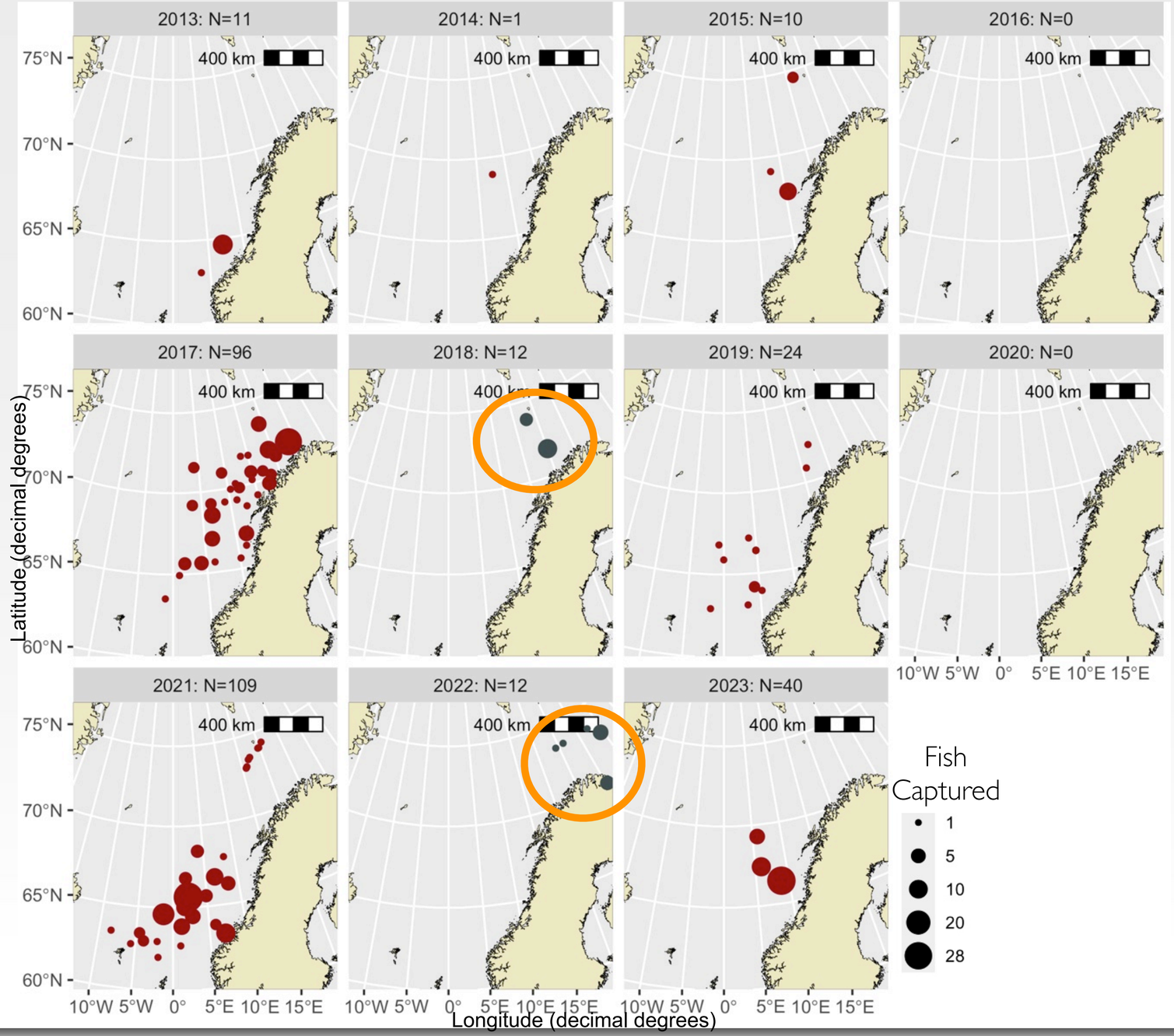


Adult

Post-smolts

(Diaz Pauli et al. 2023)

Norwegian marine data

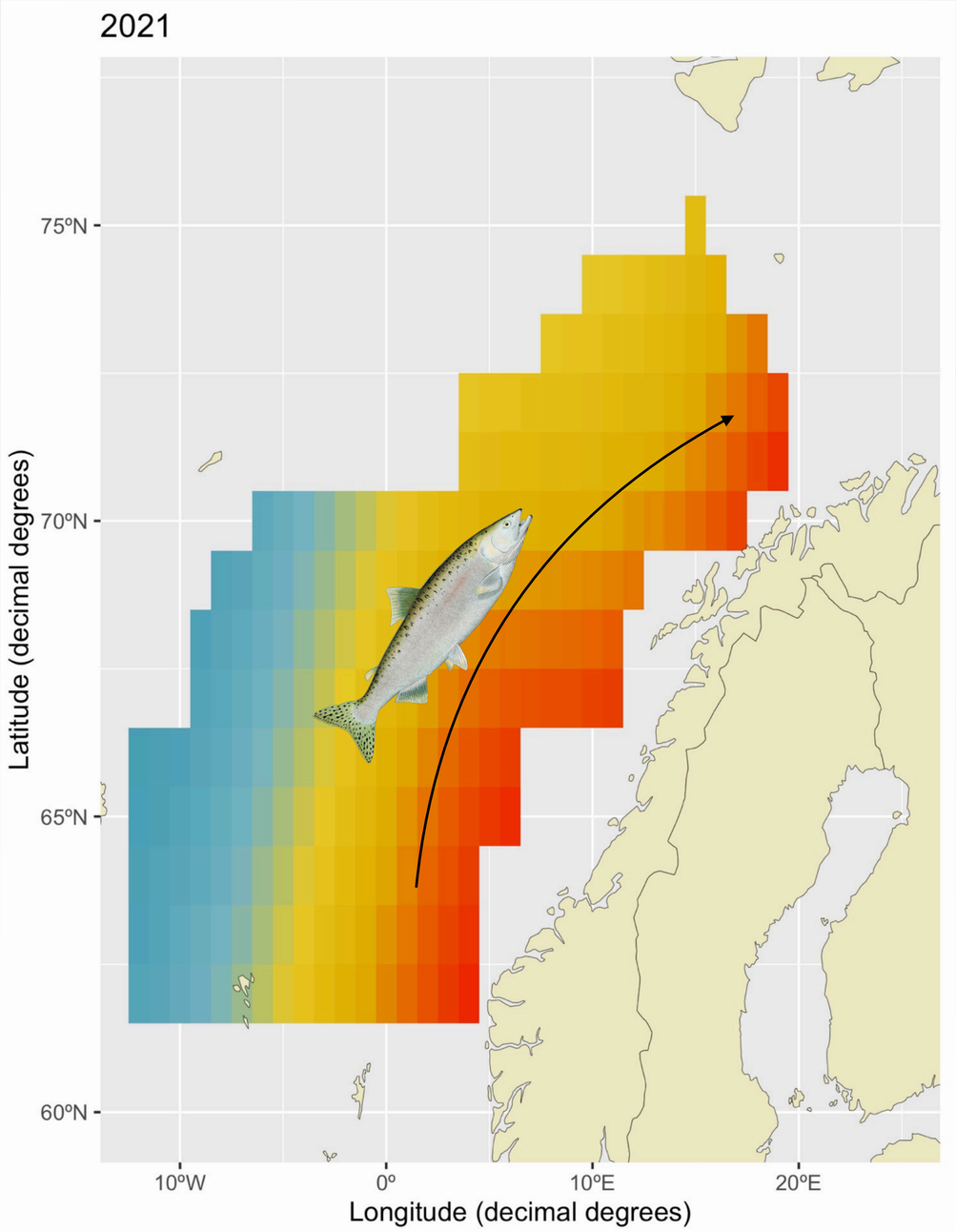


Adult

Post-smolts

(Diaz Pauli et al. 2023)

Potential migration patterns

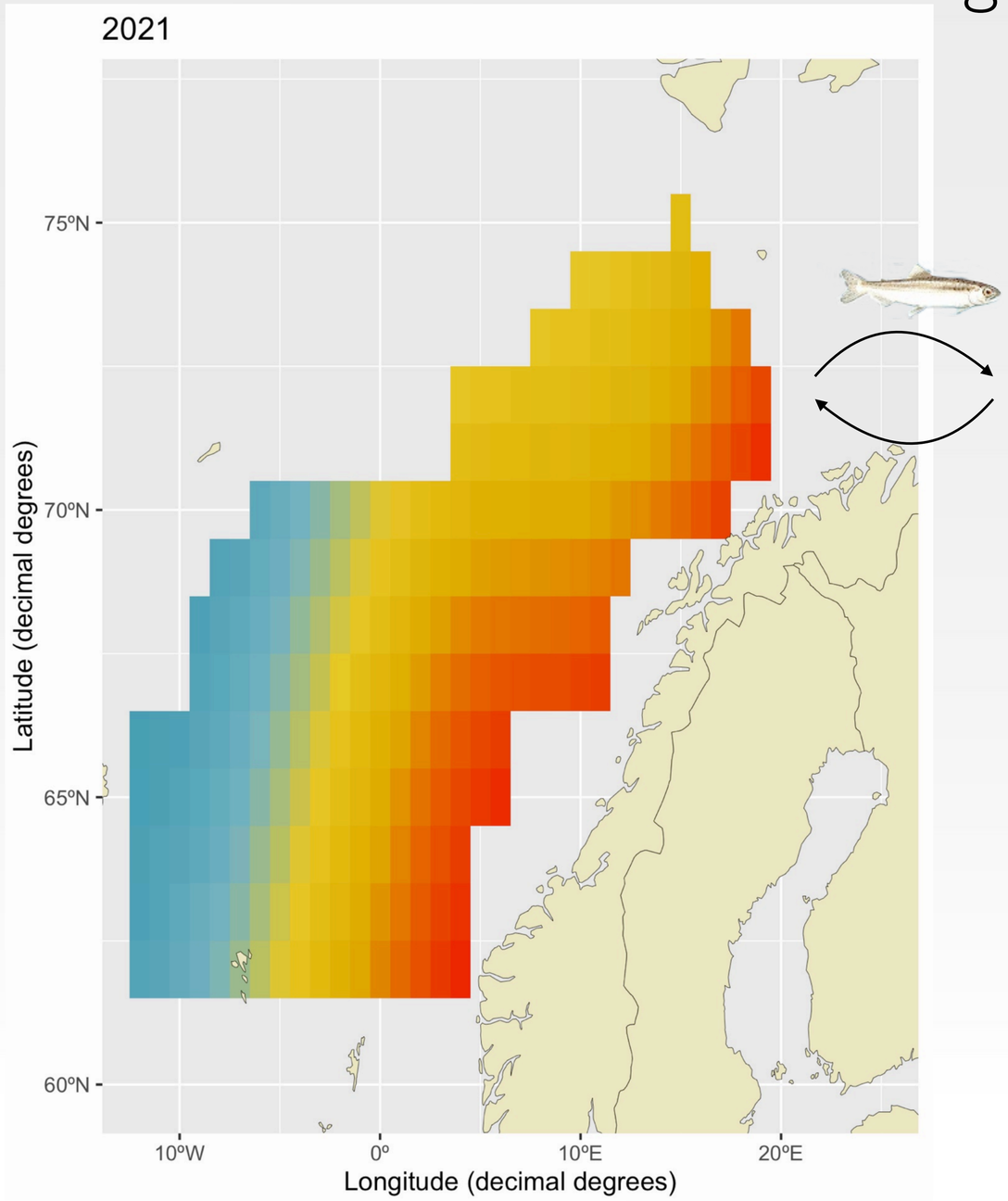


Probable return migration:
Upwards close to Norwegian coast
before entering the Barents Sea and rivers

Probability of capture **highest**:
on the eastern side close to the coast
up towards the entrance to the Barents Sea

(Diaz Pauli et al. 2023)

Potential migration patterns



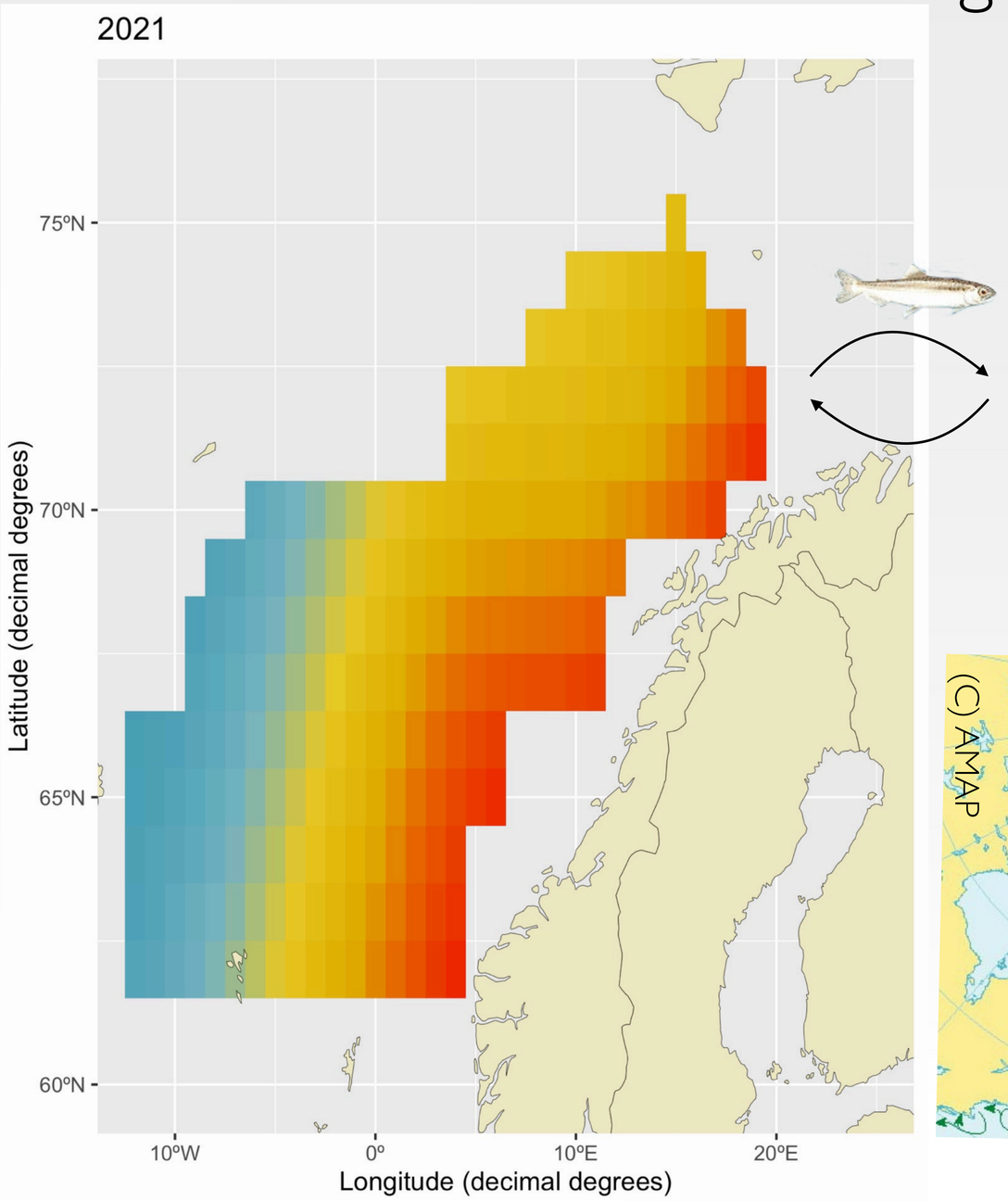
Possible sea migration:

- Some stay in eastern part of the Barents Sea
-

seldom caught in Norwegian surveys in Barents Sea
catching other small pelagic fish

(Diaz Pauli et al. 2023)

Potential migration patterns



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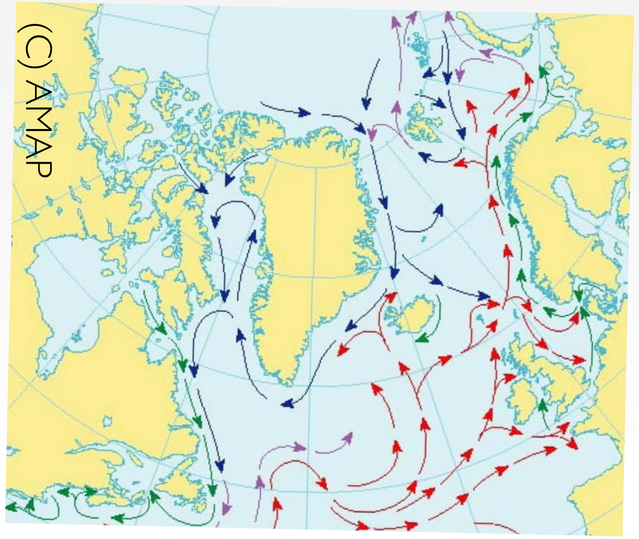
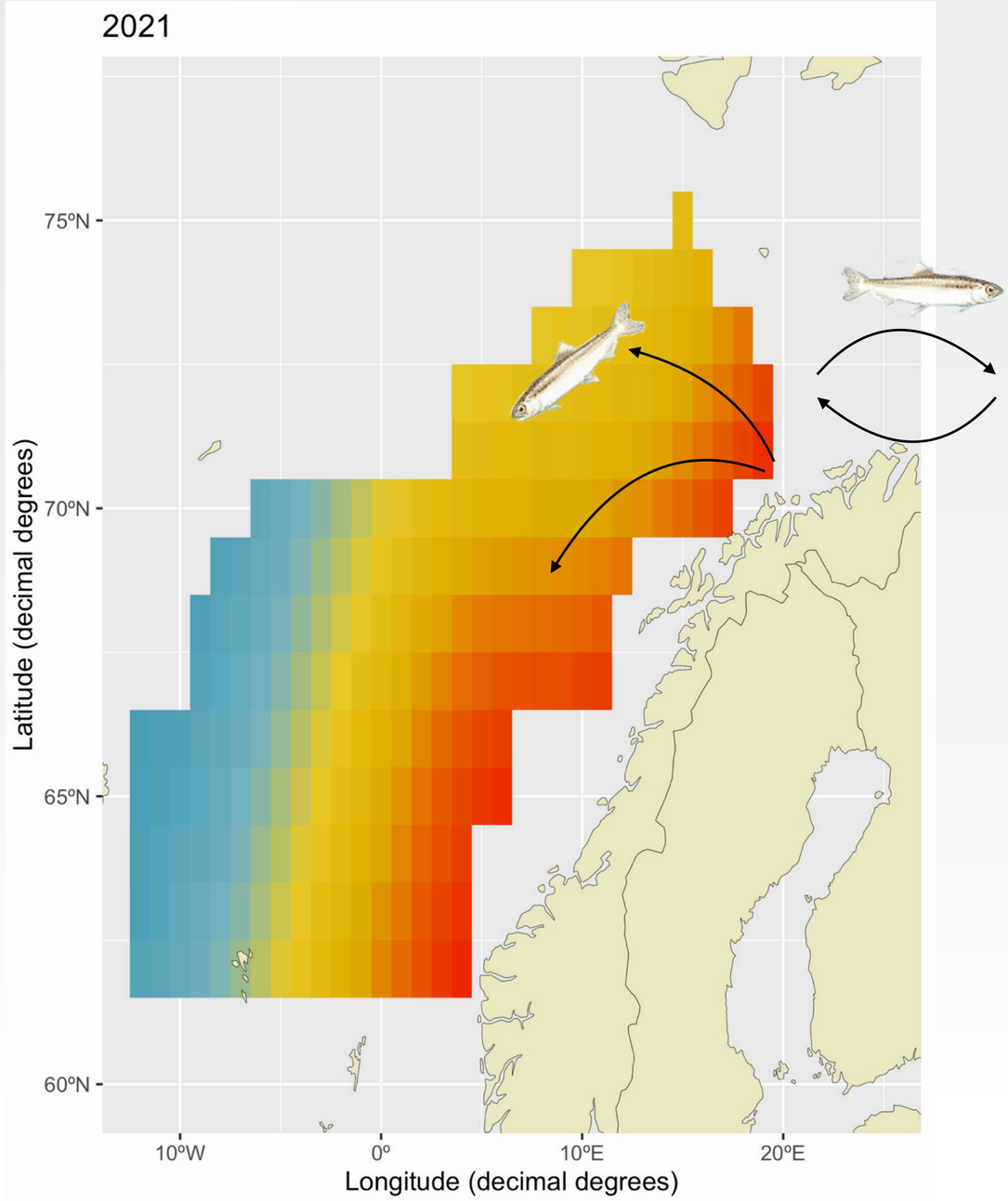


Maybe post-smolts are in upper layers and taken eastwards by the **Norwegian coastal currents** towards Novaja Zemlya

(Diaz Pauli et al. 2023)

Marine migration



Possible sea migration:

- Some stay in eastern part of the Barents Sea
- Others go west into north of Norwegian Sea

(Diaz Pauli et al. 2023)

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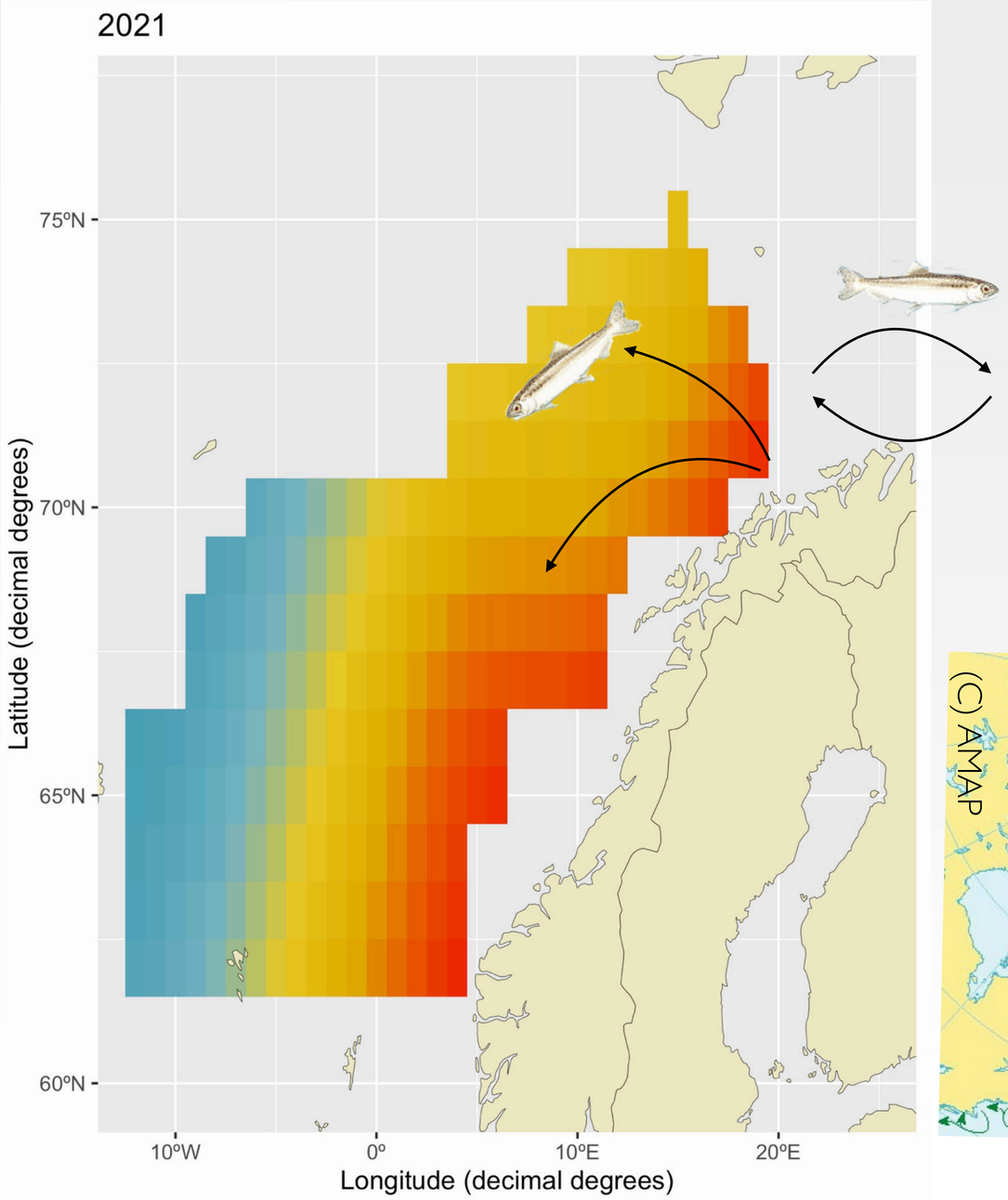
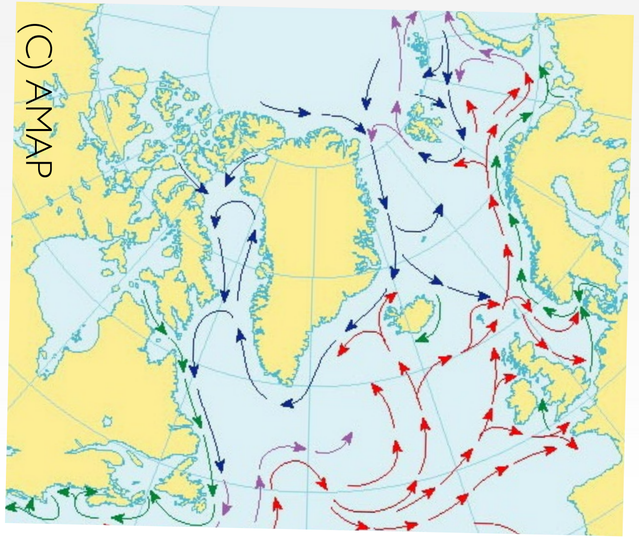


Possible sea migration:

- Some stay in eastern part of the Barents Sea
- Others go west into north of Norwegian Sea

Taken southwards with **Arctic waters** to Ireland & Scotland

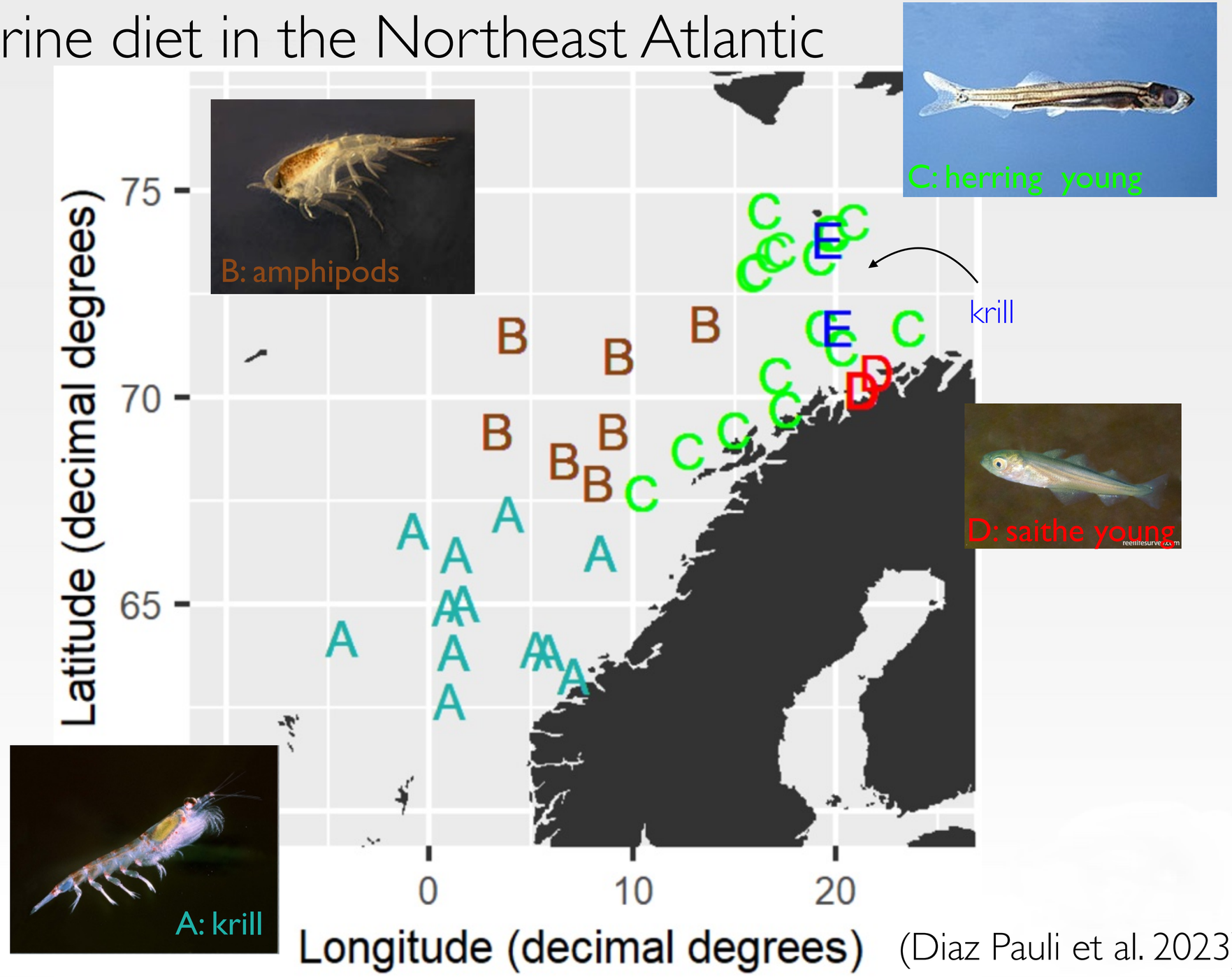


(Diaz Pauli et al. 2023)

Marine diet in the Northeast Atlantic

They eat what they find:

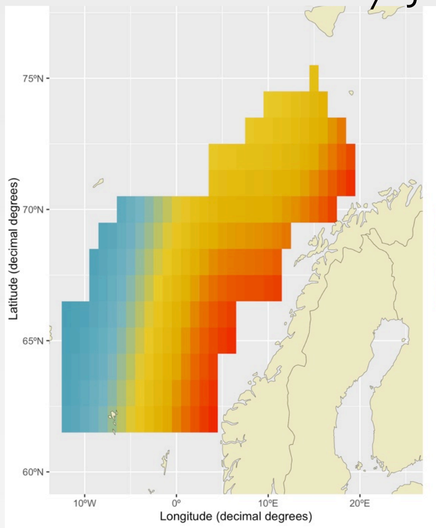
- South: krill
- Northwest: amphipods
- Northeast: fish



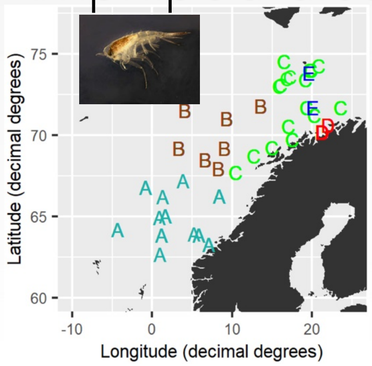
(Diaz Pauli et al. 2023)

Potential interactions

Distribution: May-June



Amphipod diet



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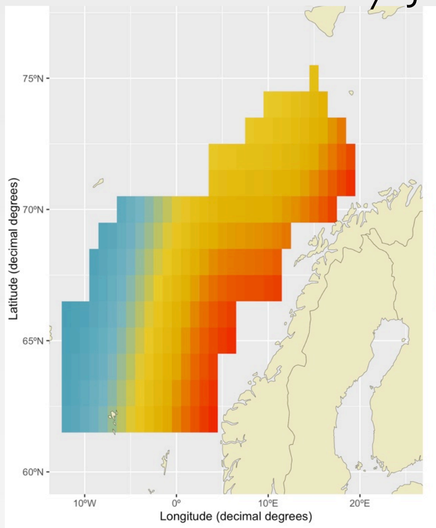

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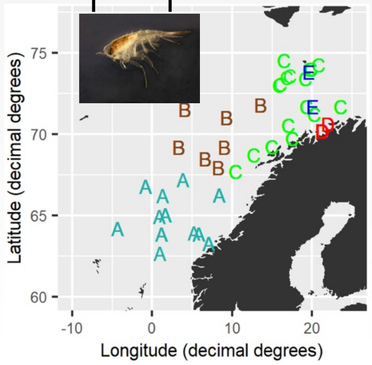


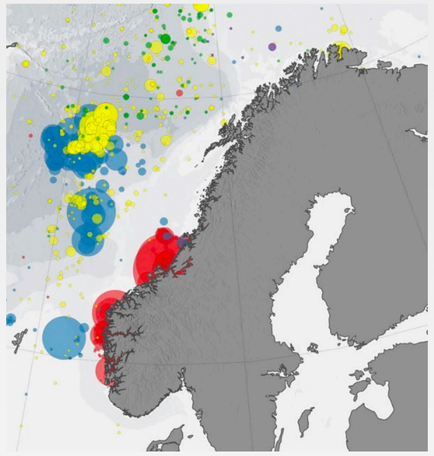
Geographic distribution & diet overlaps

↓

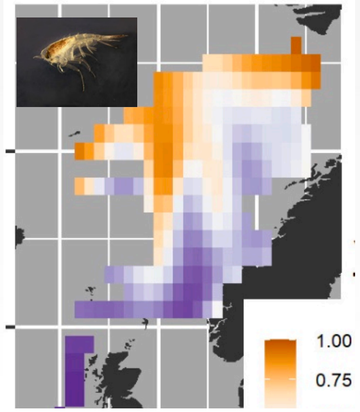
Potential for interaction

Atlantic salmon

Distribution: June-July



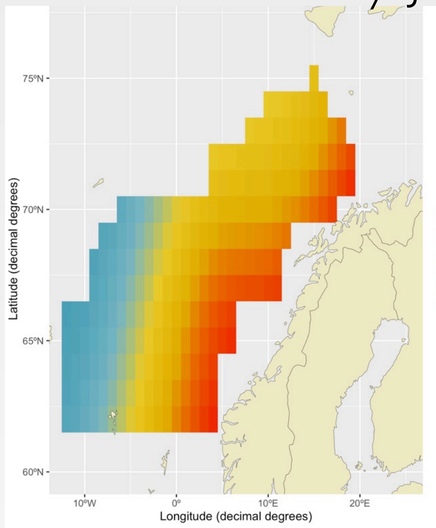
Amphipod diet



(Diaz Pauli et al. 2023; Gilbey et al. 2020; Utne et al. 2022)

Potential interactions

Distribution: May-June



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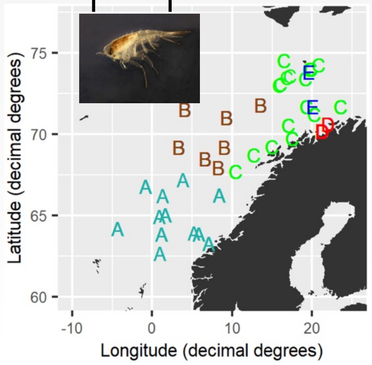

Geographic distribution & diet overlaps

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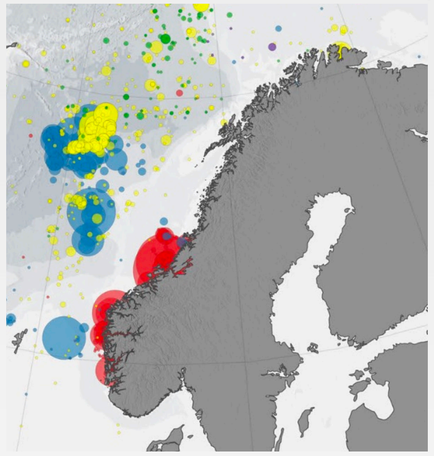
Potential for interaction

Actual evidence ?

Atlantic salmon

Distribution: June-July



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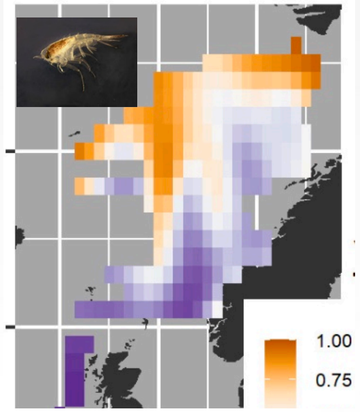
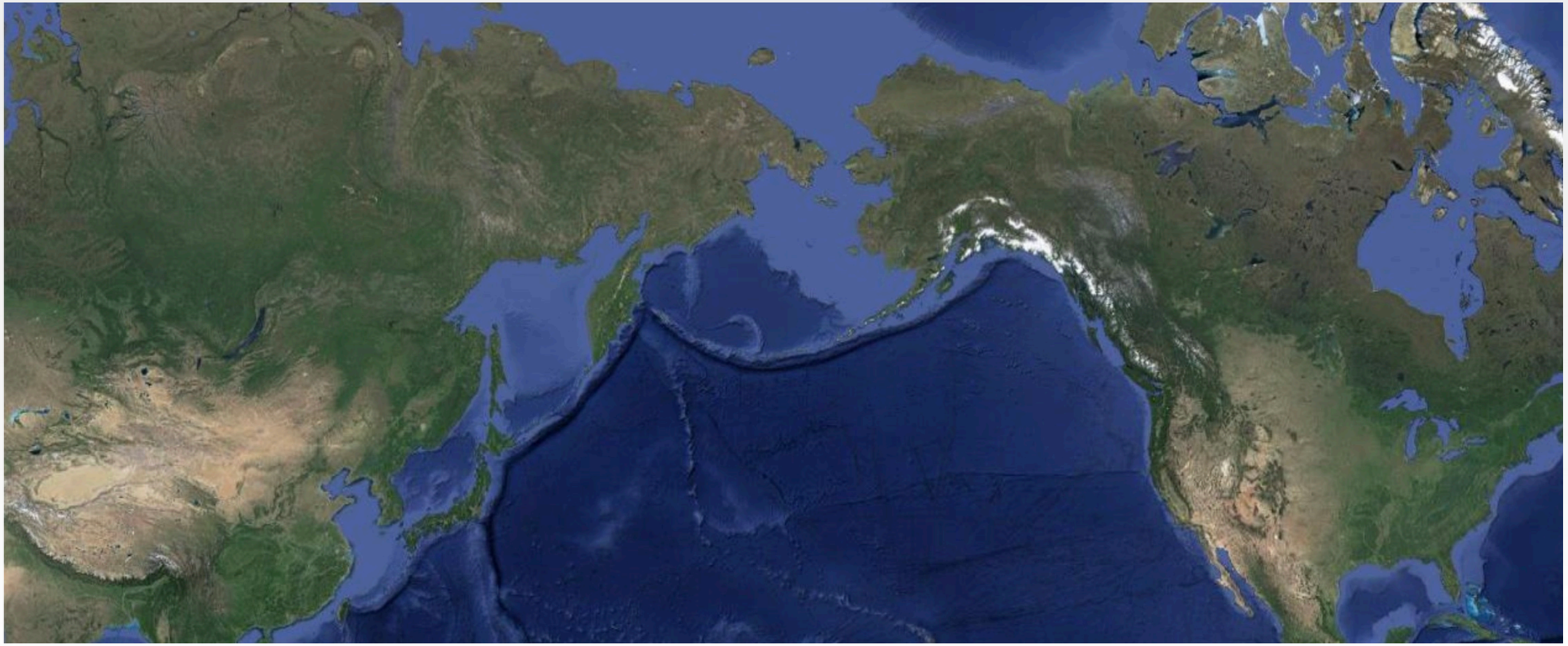


(Diaz Pauli et al. 2023; Gilbey et al. 2020; Utne et al. 2022)

Potential interactions

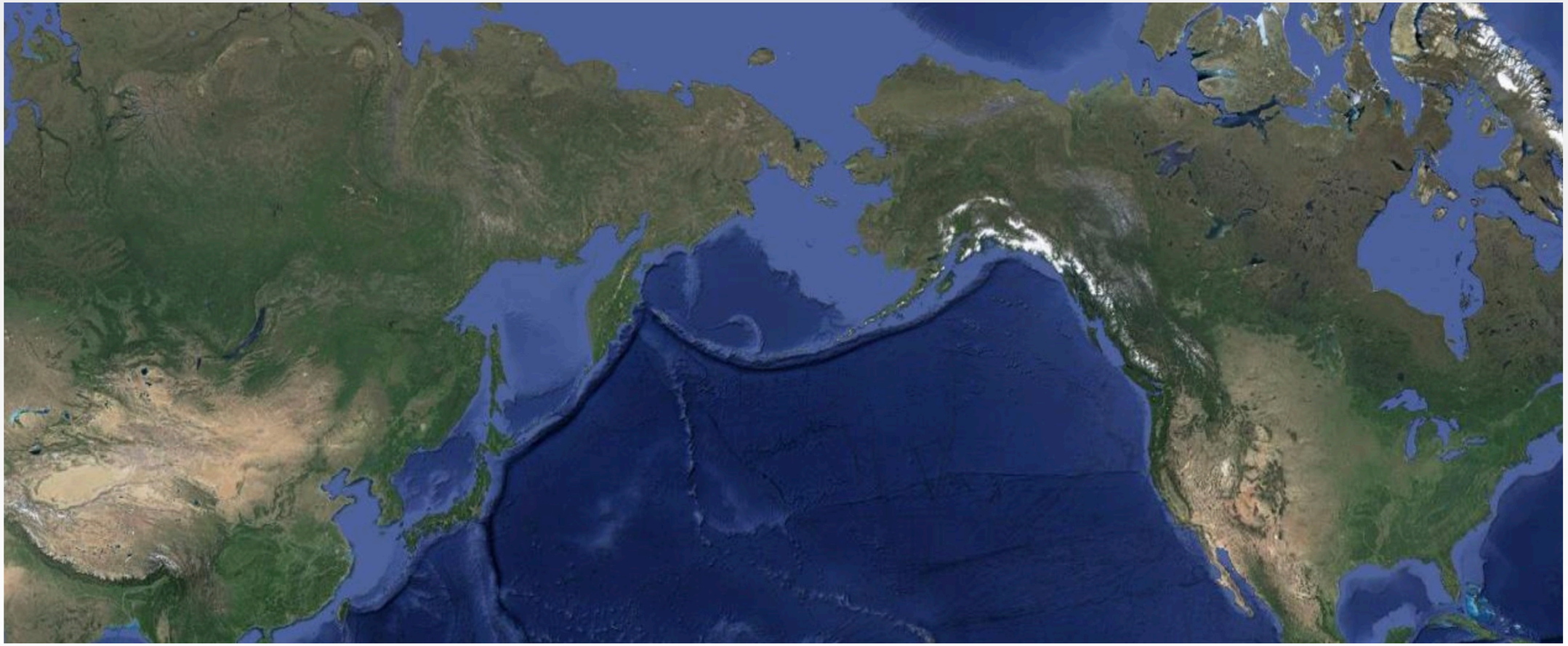
Evidence



(NHPSEG 2023)

Potential interactions

Evidence ⟶ No consensus



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Potential interactions

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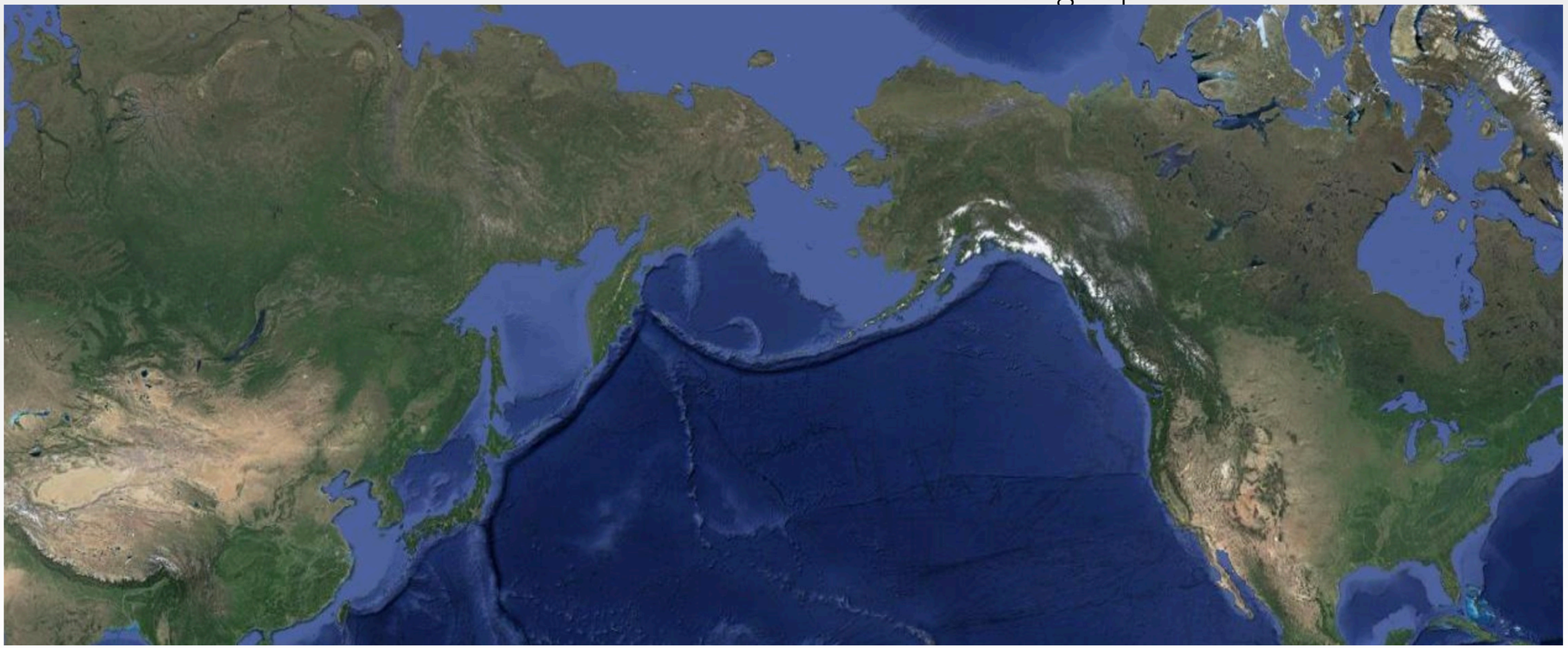
Evidence from North America
Strong top-down effects



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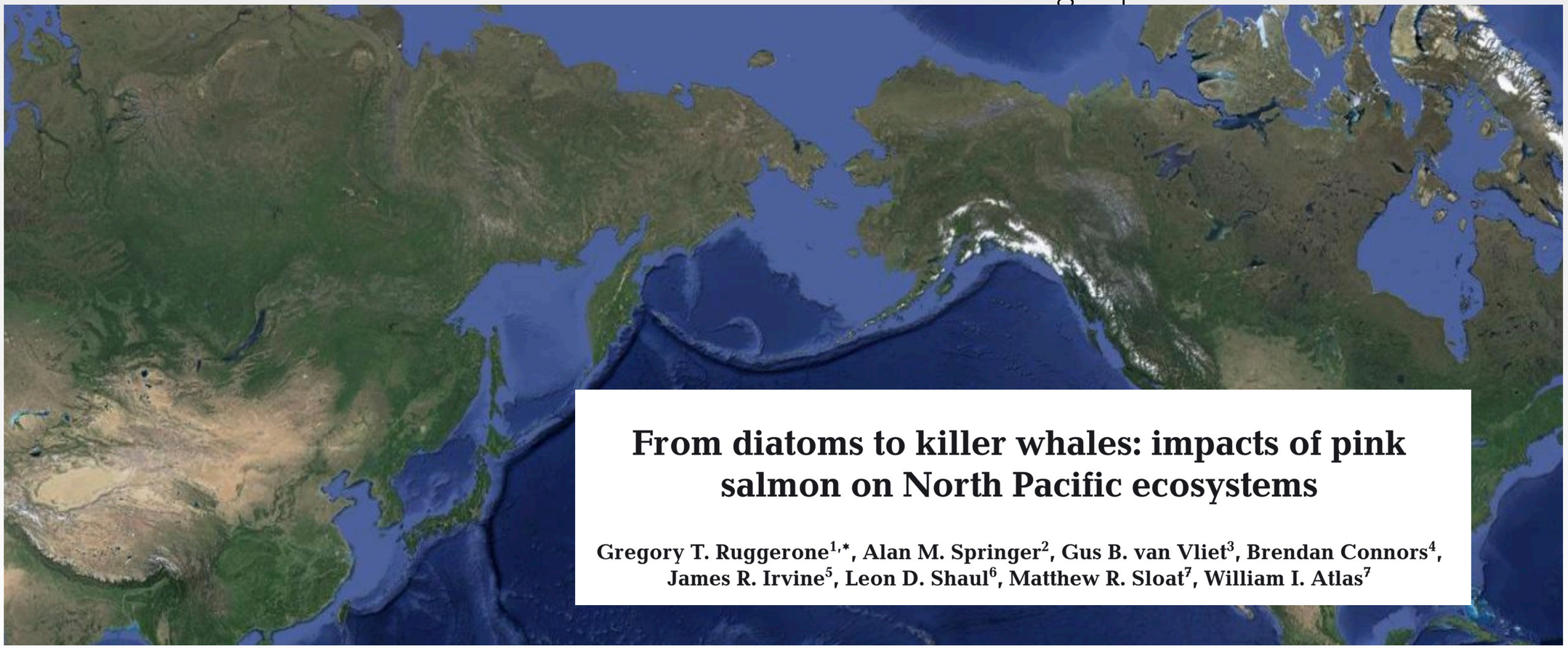


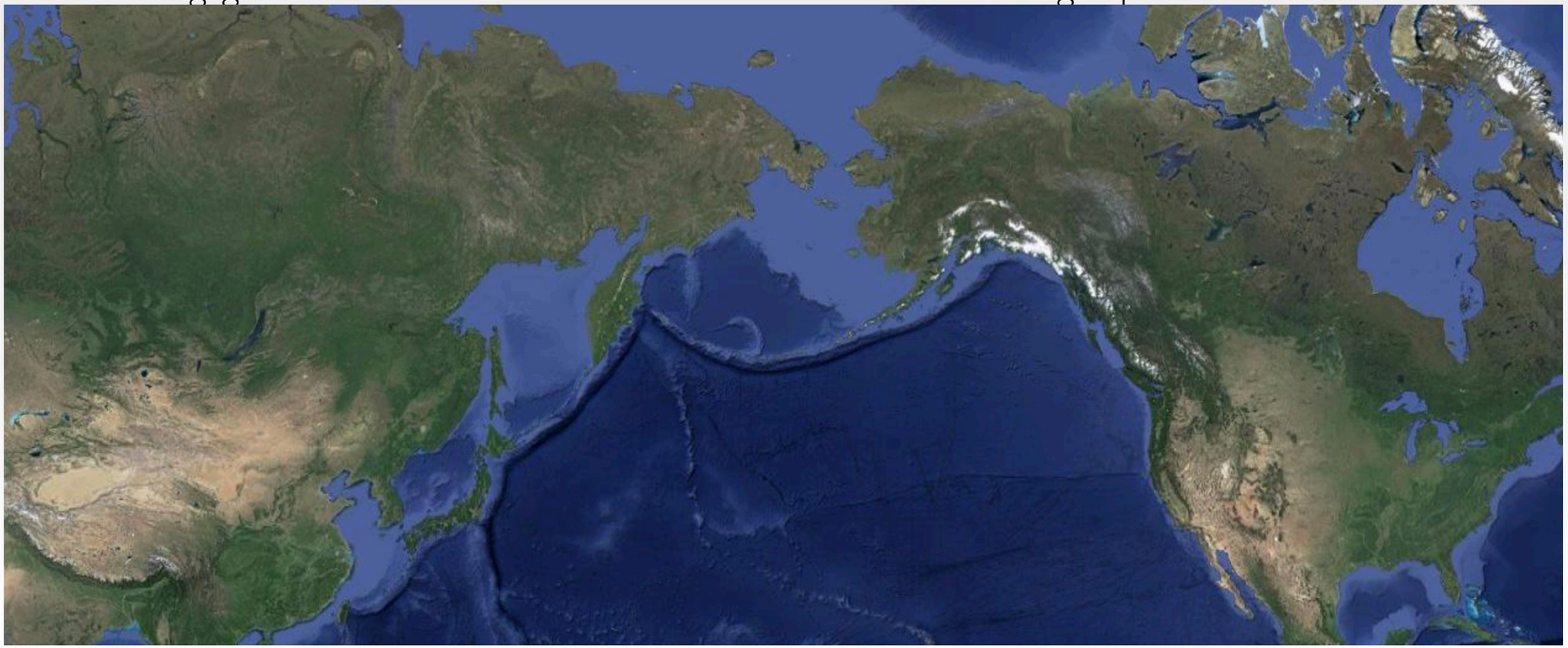
(NHPSEG 2023)

Potential interactions

Evidence → No consensus

Evidence from Asia
Negligible effects

Evidence from North America
Strong top-down effects



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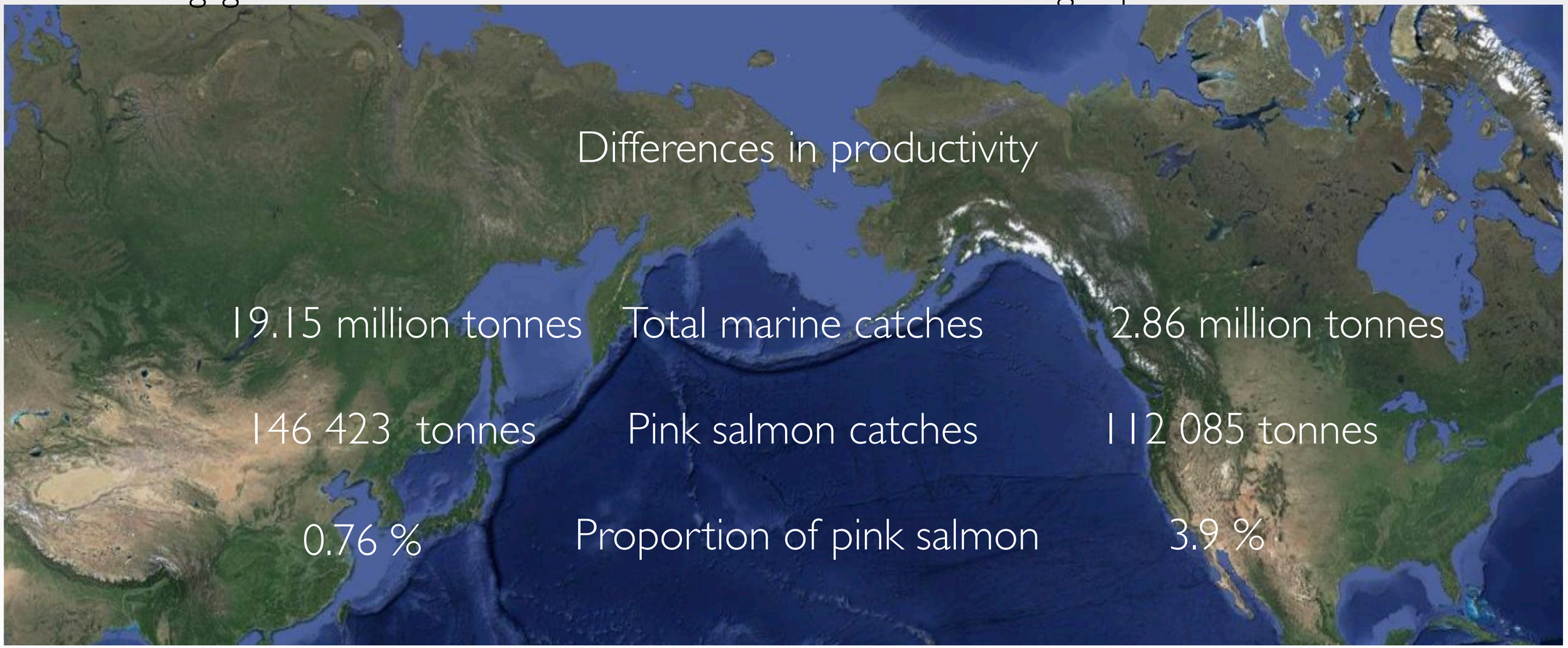

(FAO 2023; NPAFC 2023)

Potential interactions

North Atlantic

Evidence from Asia
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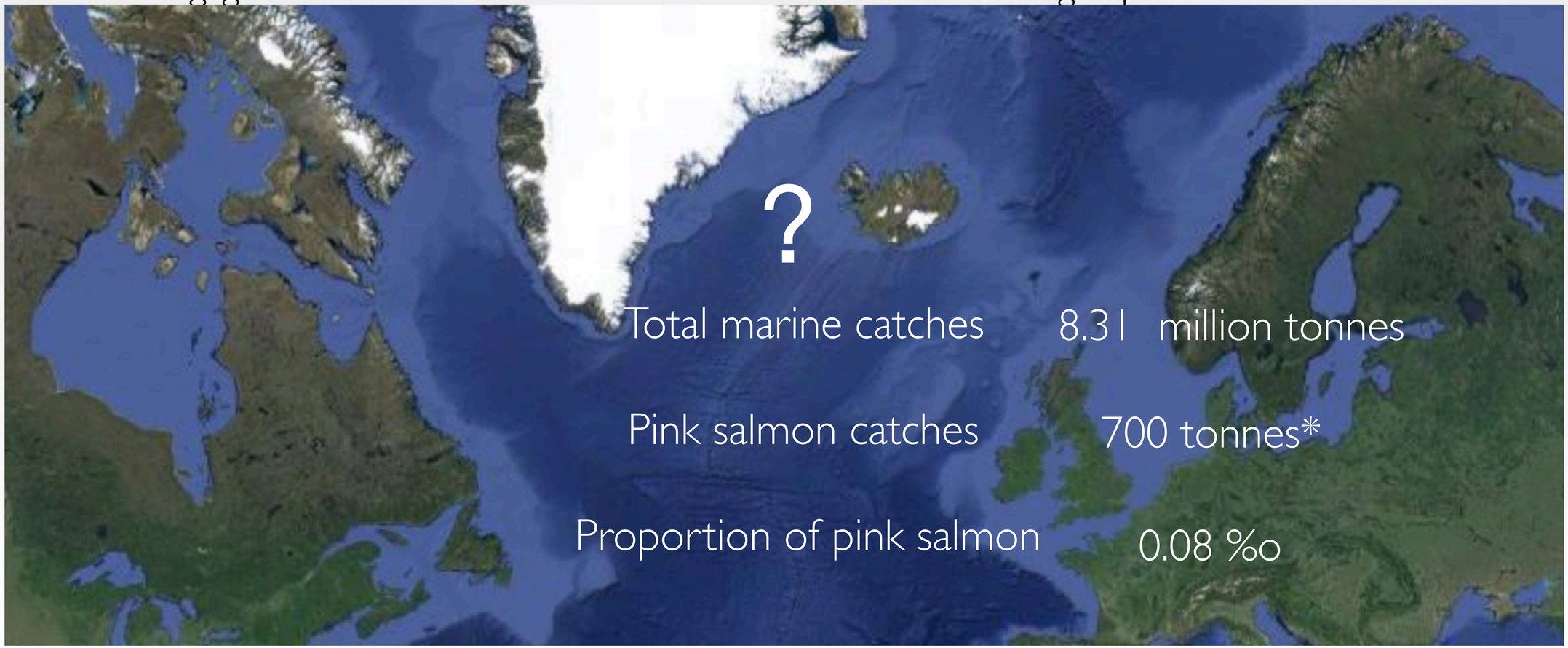

* 350 000 pink salmon caught in Norway 2023

Potential interactions

North Atlantic

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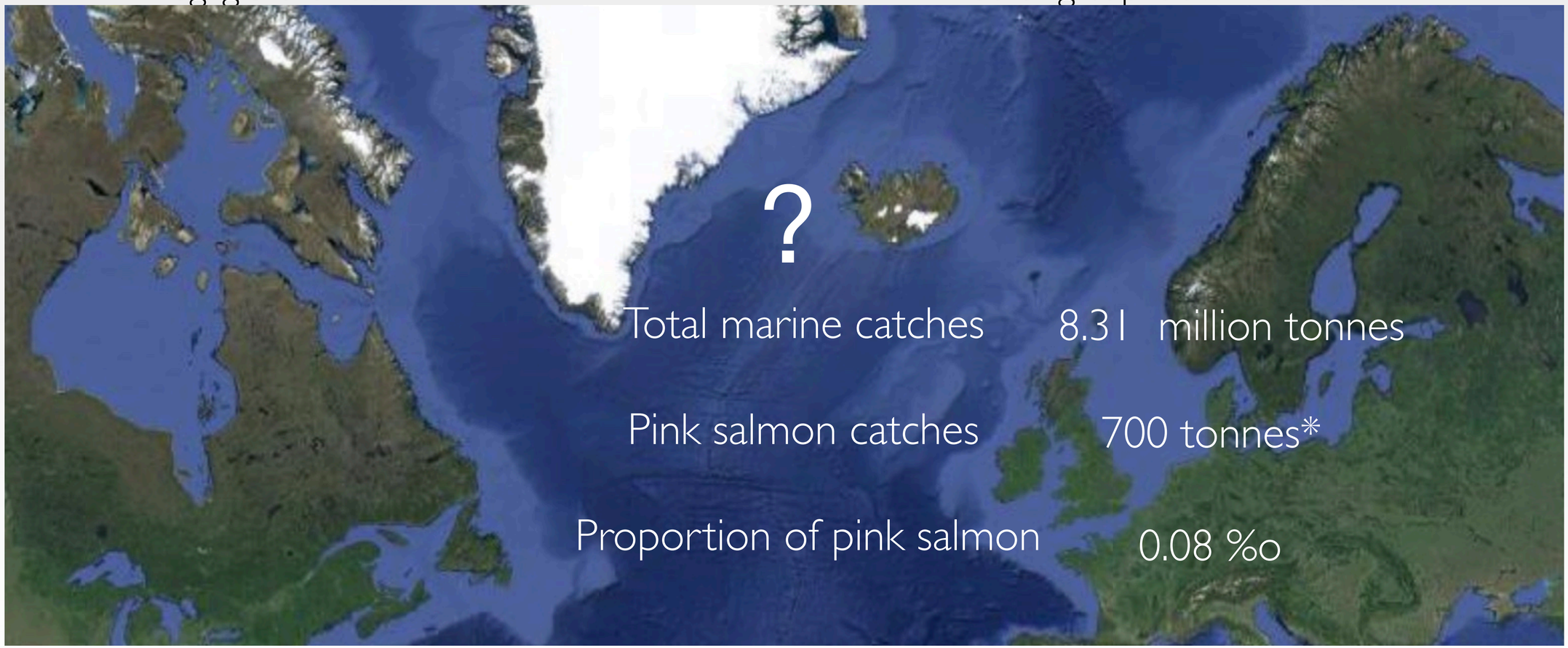

Negligible effects in offshore ecosystems

Potential interactions

North Atlantic

Local effects: Coastal areas, fjords, estuaries

Pink salmon intensively feed:
in coastal areas when migrating towards rivers
in estuaries after leaving rivers

(VKM 2020; Bengtsson et al. 2023; Erkinaro et al. (2023)

Potential interactions

North Atlantic

Local effects: Coastal areas, fjords, estuaries

Pink salmon intensively feed:
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Coastal feeders:
Sea trout,
Artic char

(VKM 2020; Bengtsson et al. 2023; Erkinaro et al. (2023)

Potential interactions

North Atlantic

Local effects: Coastal areas, fjords, estuaries

Only direct comparison pink salmon vs. Artic char

(Bengtsson et al. 2023)

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North Atlantic

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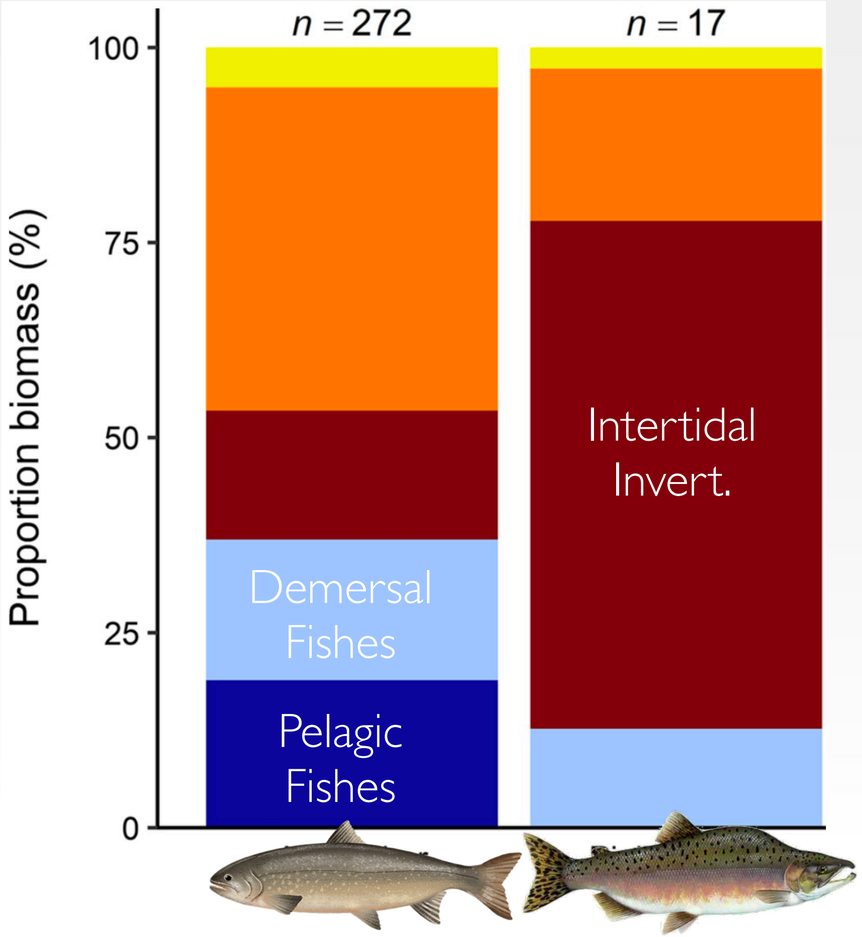

Intermediate-high invertebrate diet overlap

(Bengtsson et al. 2023)

Potential interactions

North Atlantic

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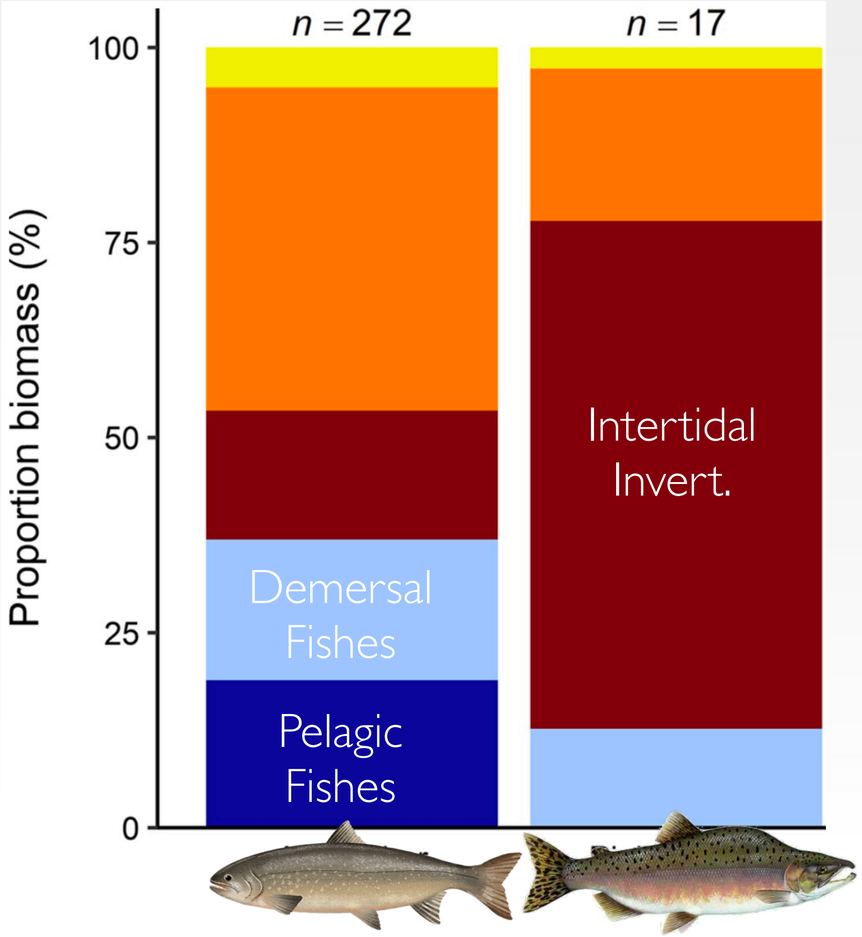

Intermediate-high invertebrate diet overlap

But char ate more pelagic fish, pink salmon more demersal fish

(Bengtsson et al. 2023)

Potential interactions

North Atlantic

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Pink salmon intensively feed:
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↑ Local competition for prey

(VKM 2020; Bengtsson et al. 2023; Erkinaro et al. (2023)

Potential interactions

North Atlantic

Local effects: Coastal areas, fjords, estuaries

How long do they stay in coastal areas?

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(VKM 2020; Bengtsson et al. 2023; Erkinaro et al. (2023)

Potential interactions

North Atlantic

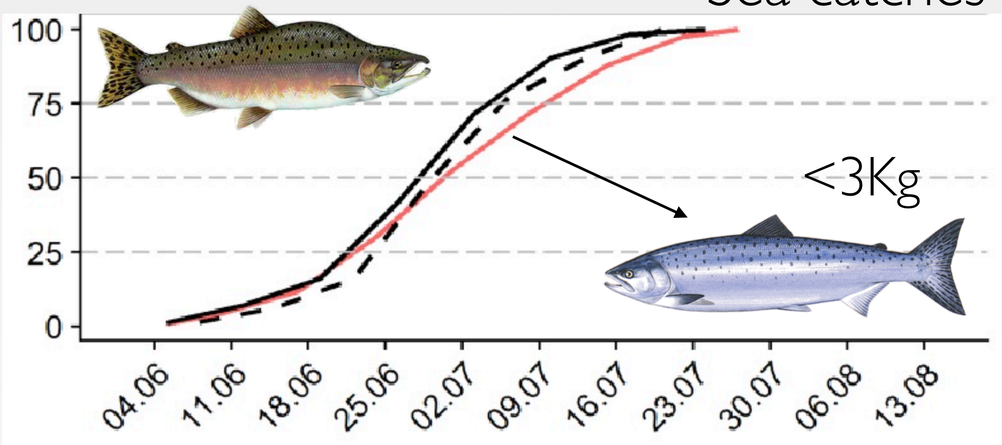
Local effects: Coastal areas, fjords, estuaries

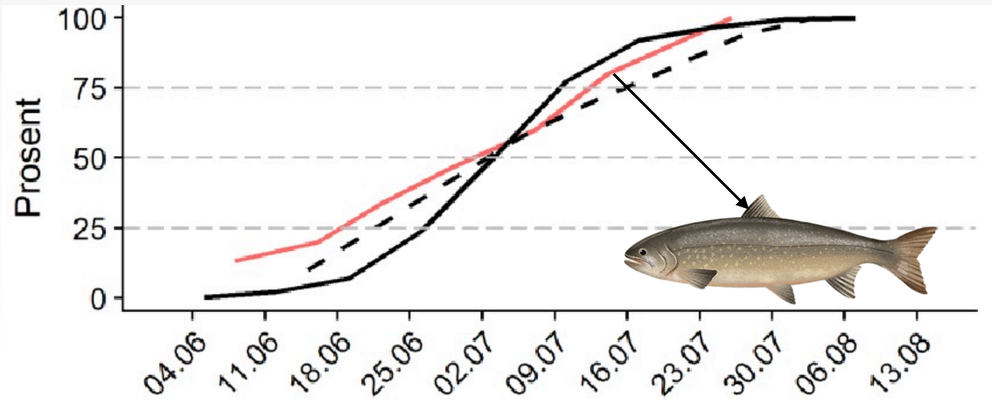
How long do they stay in coastal areas?

Adults mainly overlap

↑ Local competition for prey

Sea catches





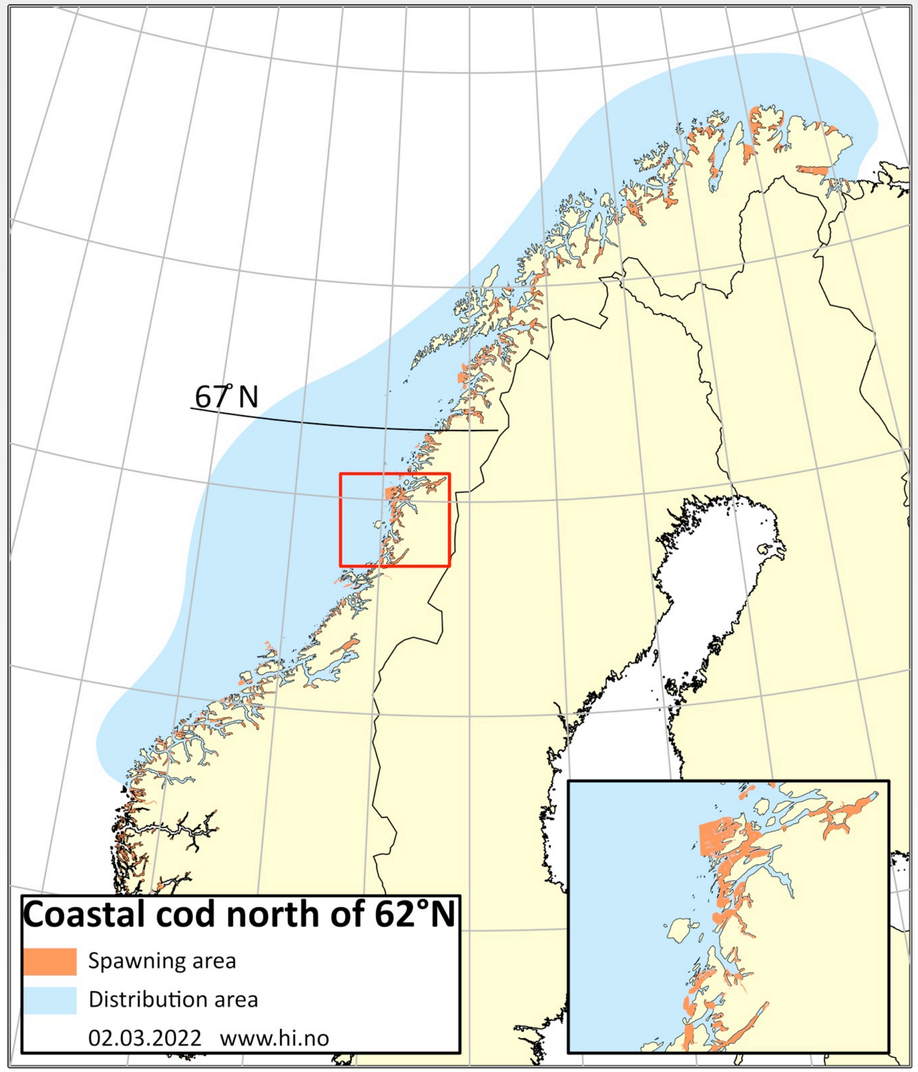
(VRL 2023)

Potential interactions

North Atlantic

Local effects: Coastal areas, fjords, estuaries

Example
Different populations of coastal cod
have different life history and behaviour



Potential interactions

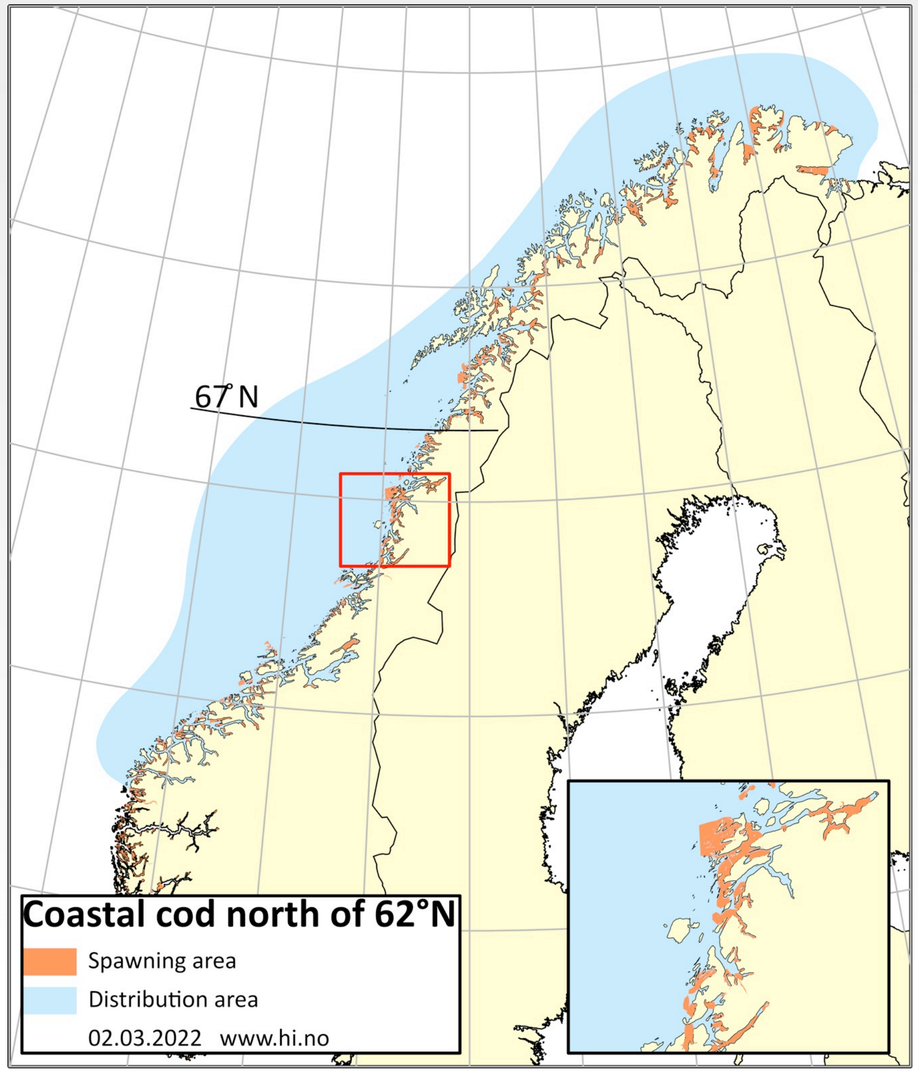
North Atlantic

Local effects: Coastal areas, fjords, estuaries

Example
Different populations of coastal cod
have different life history and behaviour

↑ Local competition for prey

Pink salmon might strongly
impact some populations but
not others



Potential interactions

North Atlantic

Lack knowledge
Extrapolating from Pacific useful, but maybe not always applicable
Introduced pink salmon are expanding, but also evolving

Potential interactions

North Atlantic

Lack knowledge
Extrapolating from Pacific useful, but maybe not always applicable
Introduced pink salmon are expanding, but also evolving

Introduced pink salmon in White & Barents Seas:
Shorter foraging marine phase
Equal or larger size —> Faster growth
Higher fecundity, but smaller eggs
Longer migration routes?

(Gordeeva and Salmenkova 2011)

Conclusion
Pink salmon in North Atlantic

Geographic distribution & diet overlaps with other fishes

Potential impact:

- Limited offshore
- Larger locally in coastal areas

Conclusion
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Geographic distribution & diet overlaps with other fishes

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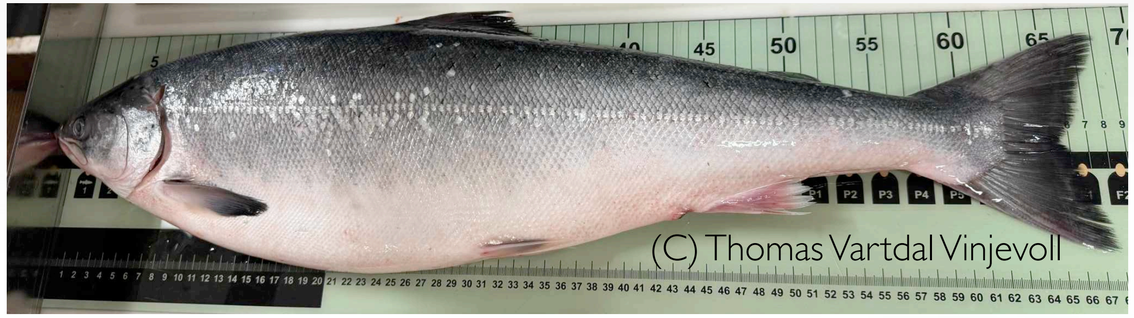
Lack knowledge from **introduced areas**
- Ecological impact in local areas:
  Where are the post-smolts?
  How long do they stay in the coast?

- Life history:
  Invasive potential?

Lack knowledge from introduced areas

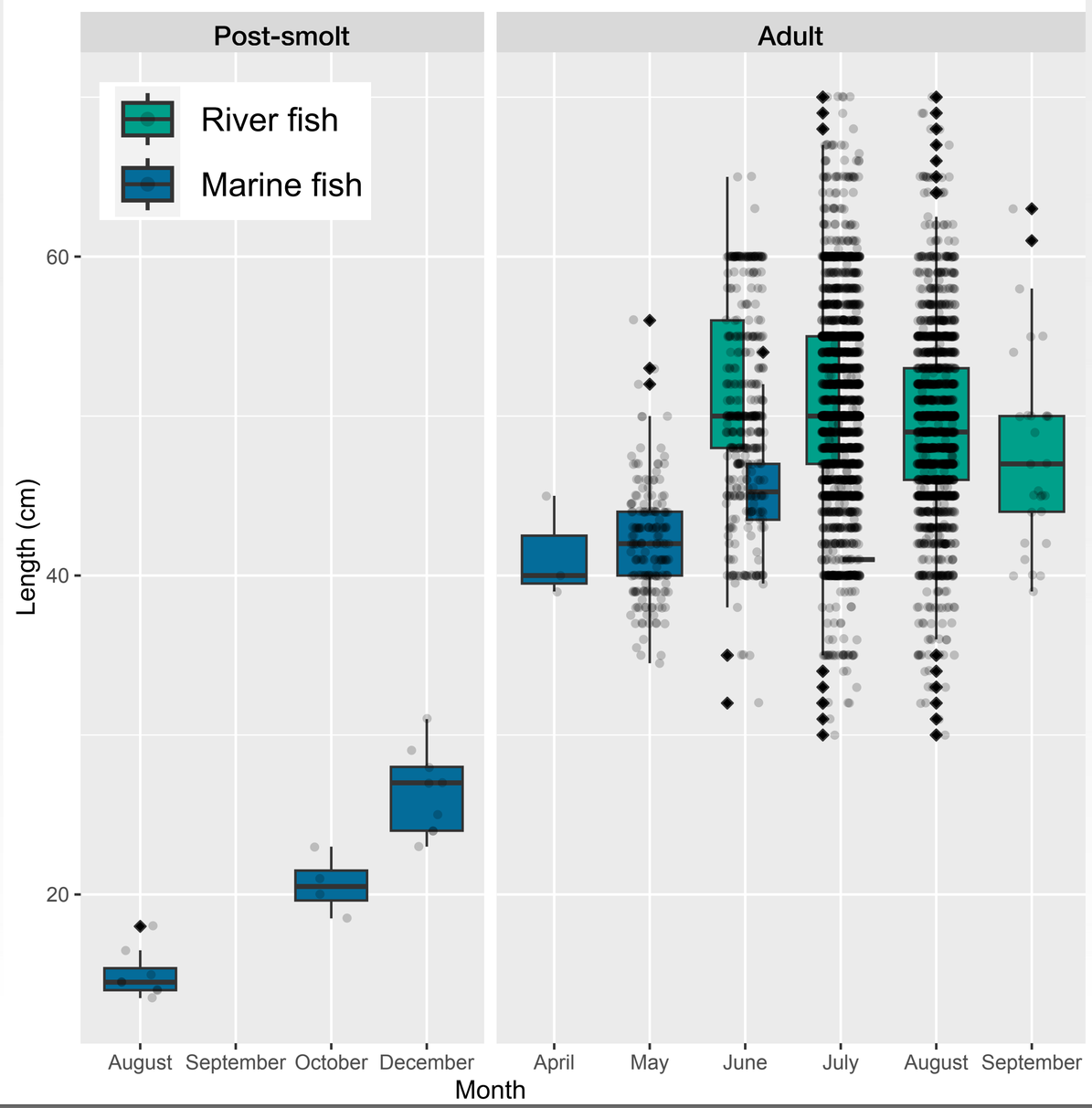
Pink salmon in North Atlantic

26th **February** 2024
67 cm



Lack knowledge from introduced areas

Pink salmon in North Atlantic



Lack knowledge from introduced areas

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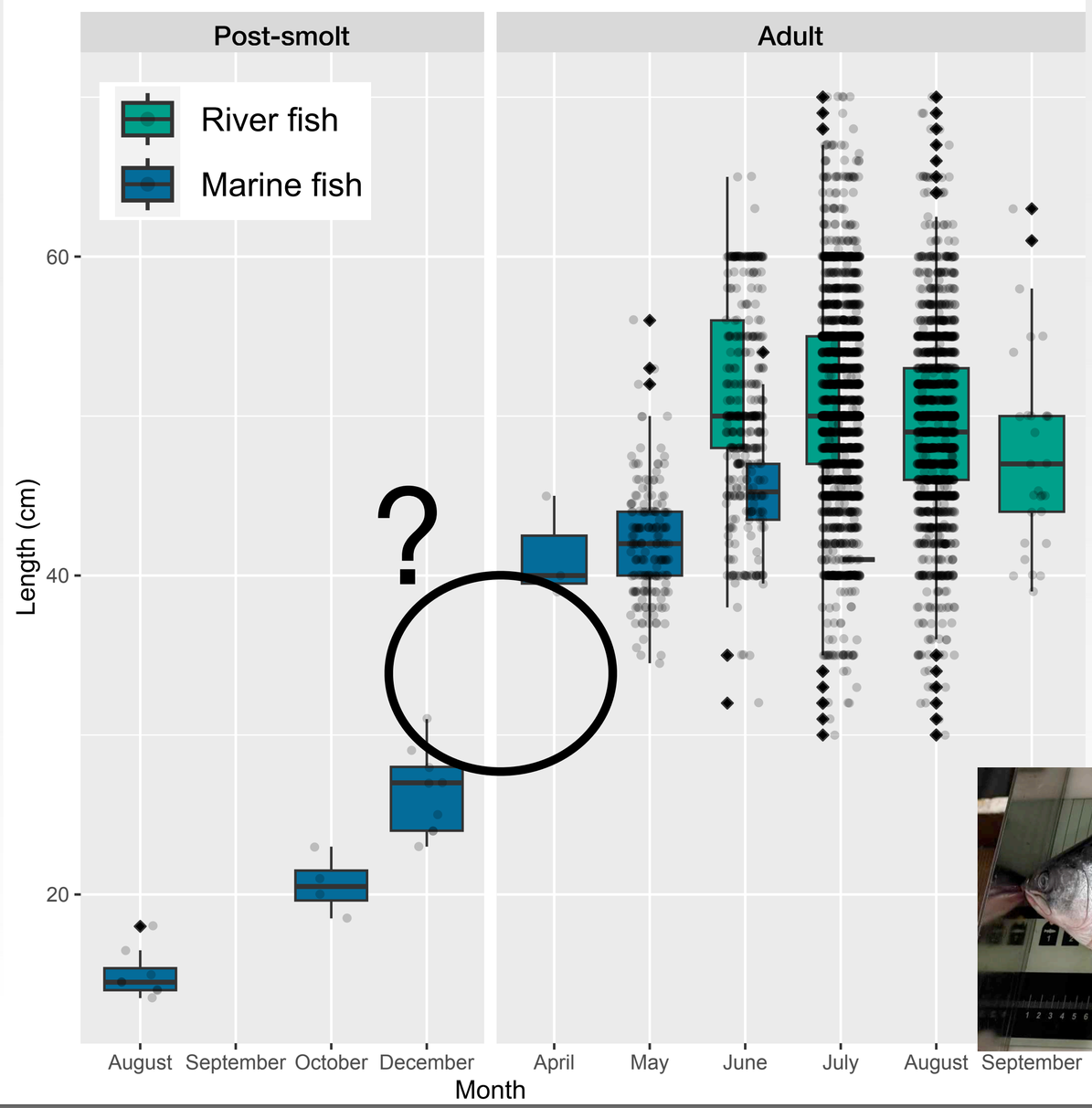

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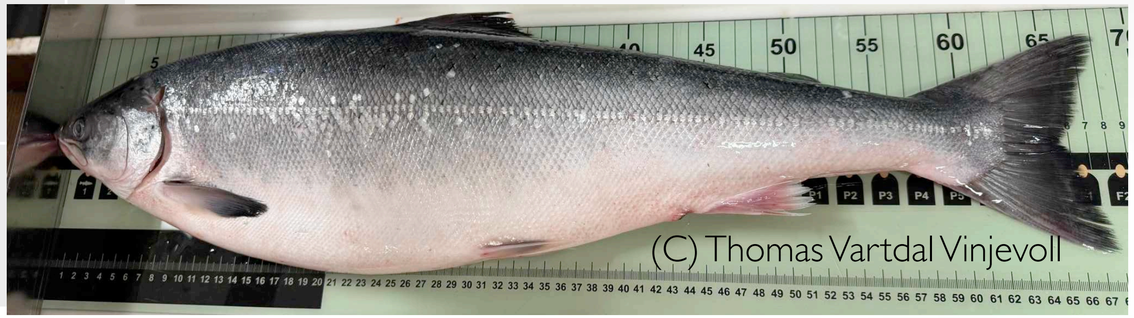

Thank you for listening