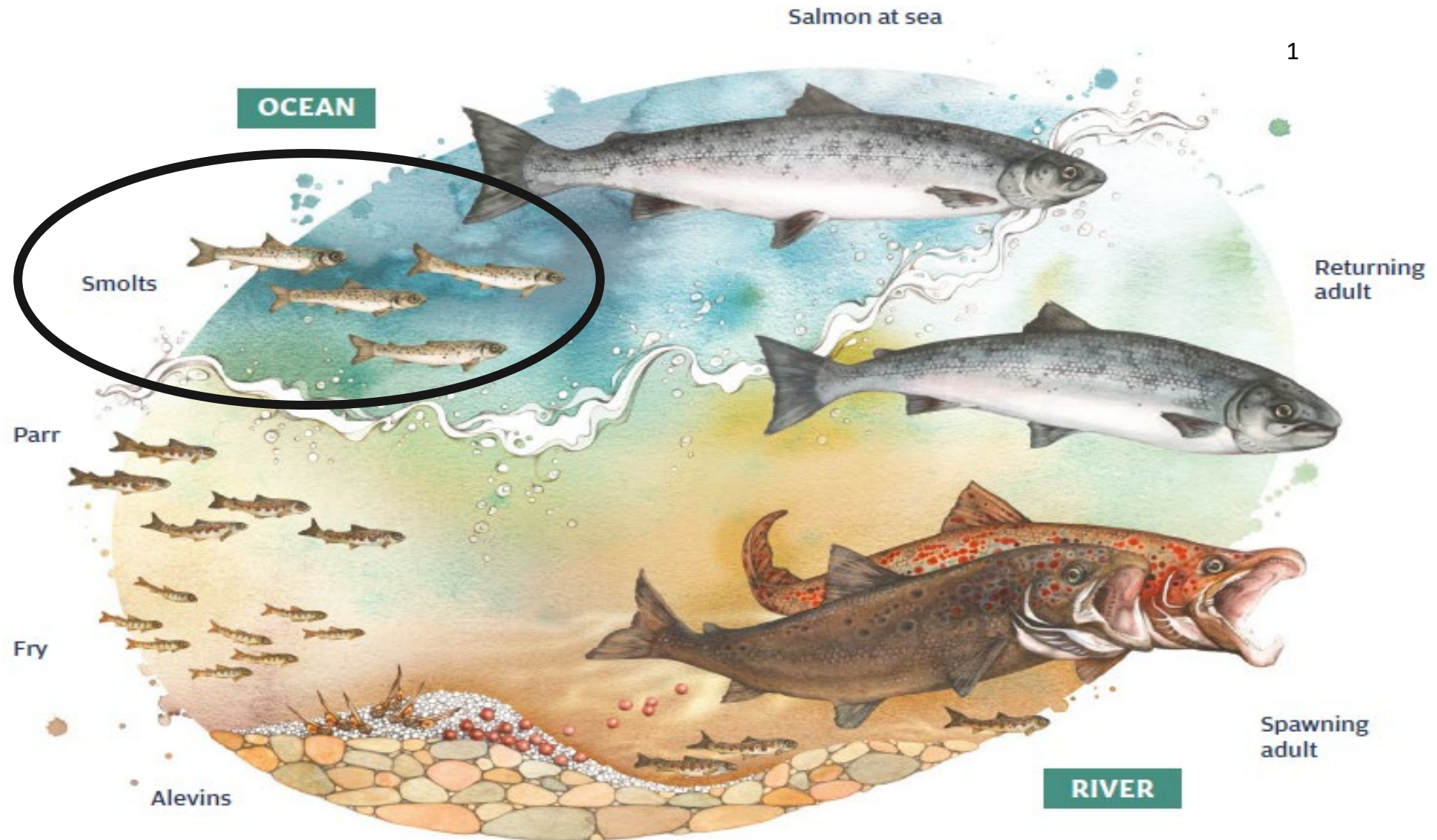


Investigating the behavior of Atlantic salmon smolts during their early marine migration through the Clyde Marine Region



Jessie Lilly, Hannele M. Honkanen, David M. Bailey, Colin W. Bean, Ruaidhri Forrester, Jessica R. Rodger, Colin E. Adams

Background



Loss rates

River: 0.3 – 7% km⁻¹

Estuary: 0.3 – 36% km⁻¹

Early marine: 0.3% to 3.4% km⁻¹ 2



Migratory cues

Riverine:

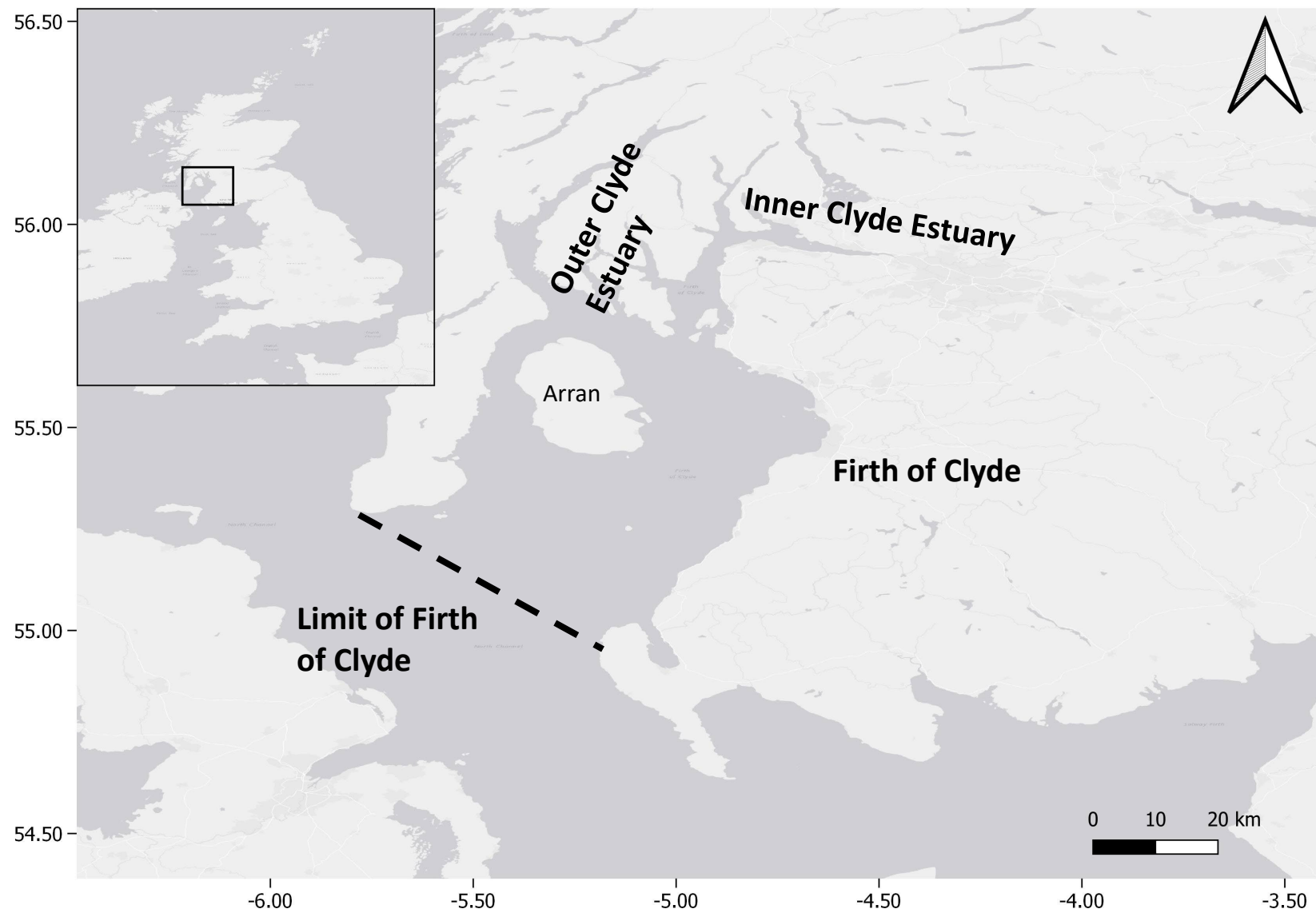
- Rheotactic³

Estuarine:

- Passive versus active swimming?^{3,4}



Clyde Estuary



5,6

Clyde Estuary

15



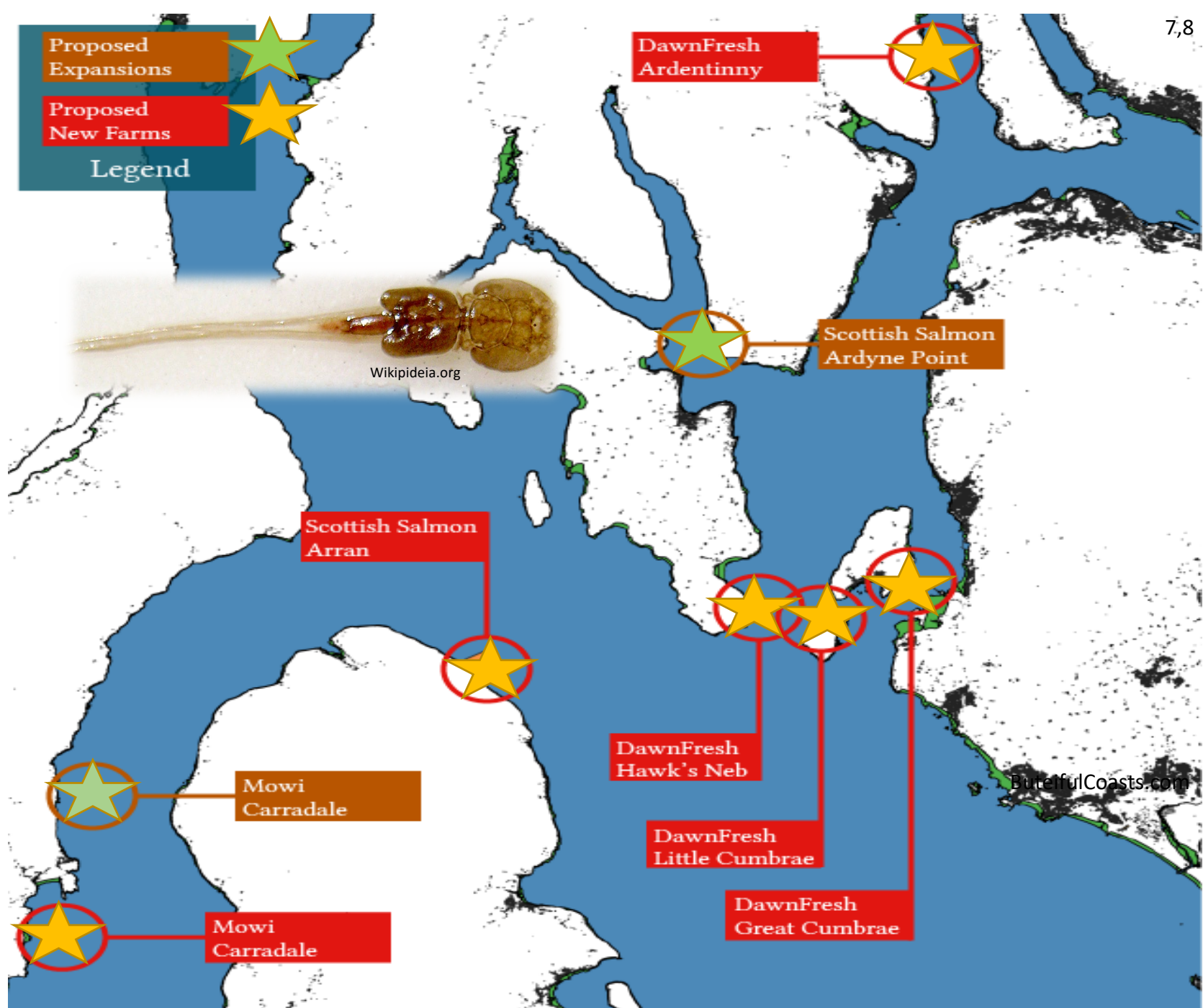
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Hypotheses

1. Estuarine loss rate

- 1.↑ Than freshwater
- 2.↑ Longer freshwater migration
- 3.↑ Smaller smolts

2. Environmental drivers of movement

1. Movements driven by tide.

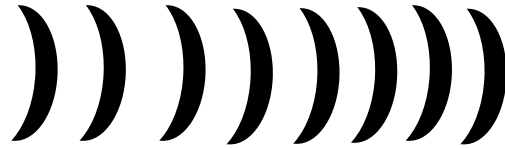
3. Migratory pathways

- Overlap with fish farms?

Acoustic tagging technology



69 kHz



Transmission: ~ 30 ms
Nominal delay: 18-38 sec

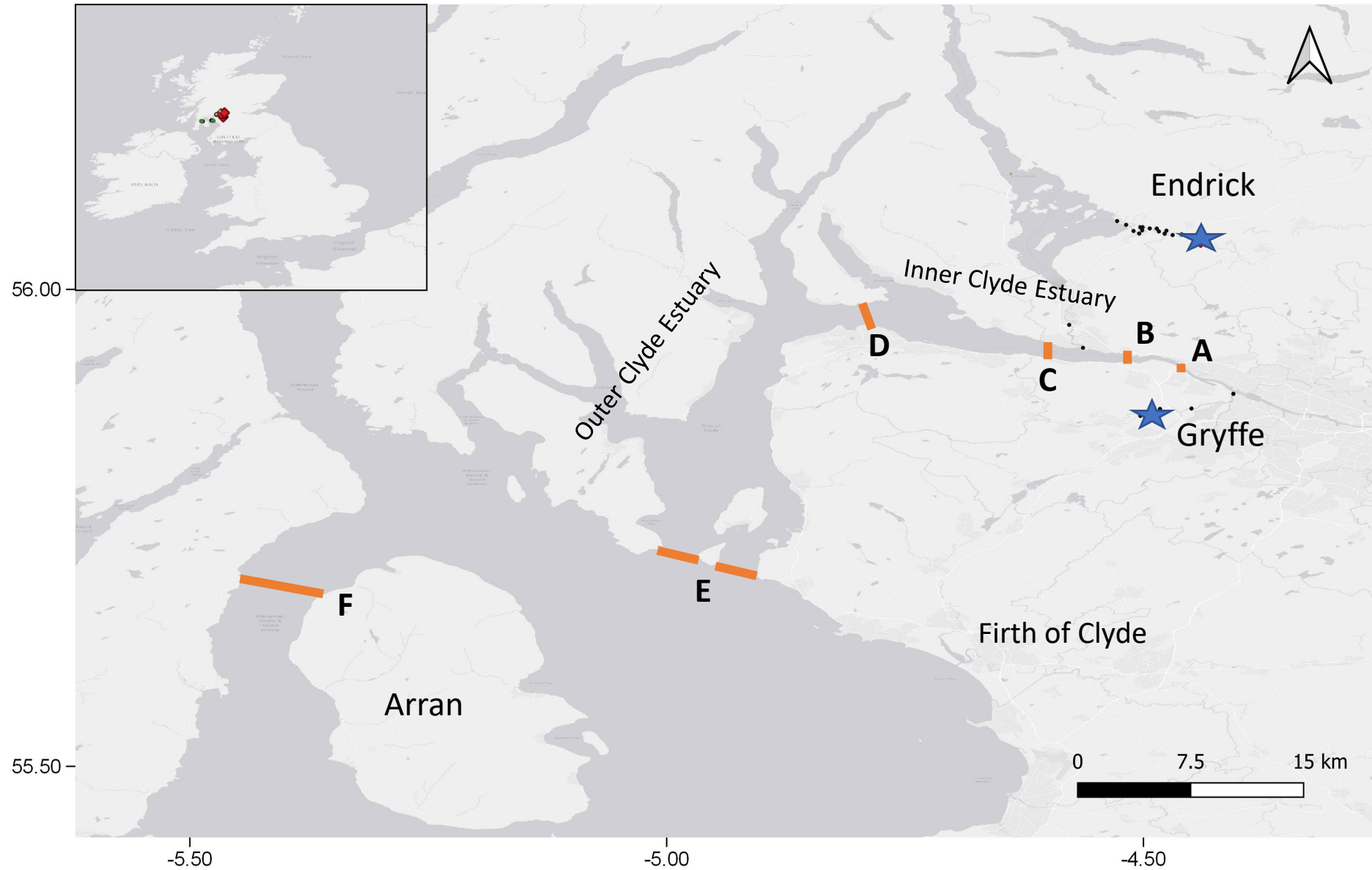


Innovasea

Smolt Tagging



Receiver deployment



1. Is estuarine mortality higher than freshwater?

Freshwater mortality

- Endrick: 2.27%/km
- Gryffe 1.08%/km

Estuarine mortality (E)

- Endrick : 0.59%/km
- Gryffe: 0.23%/km



2. Is estuarine mortality higher for smolts with longer freshwater migration?

Estuarine mortality (E)

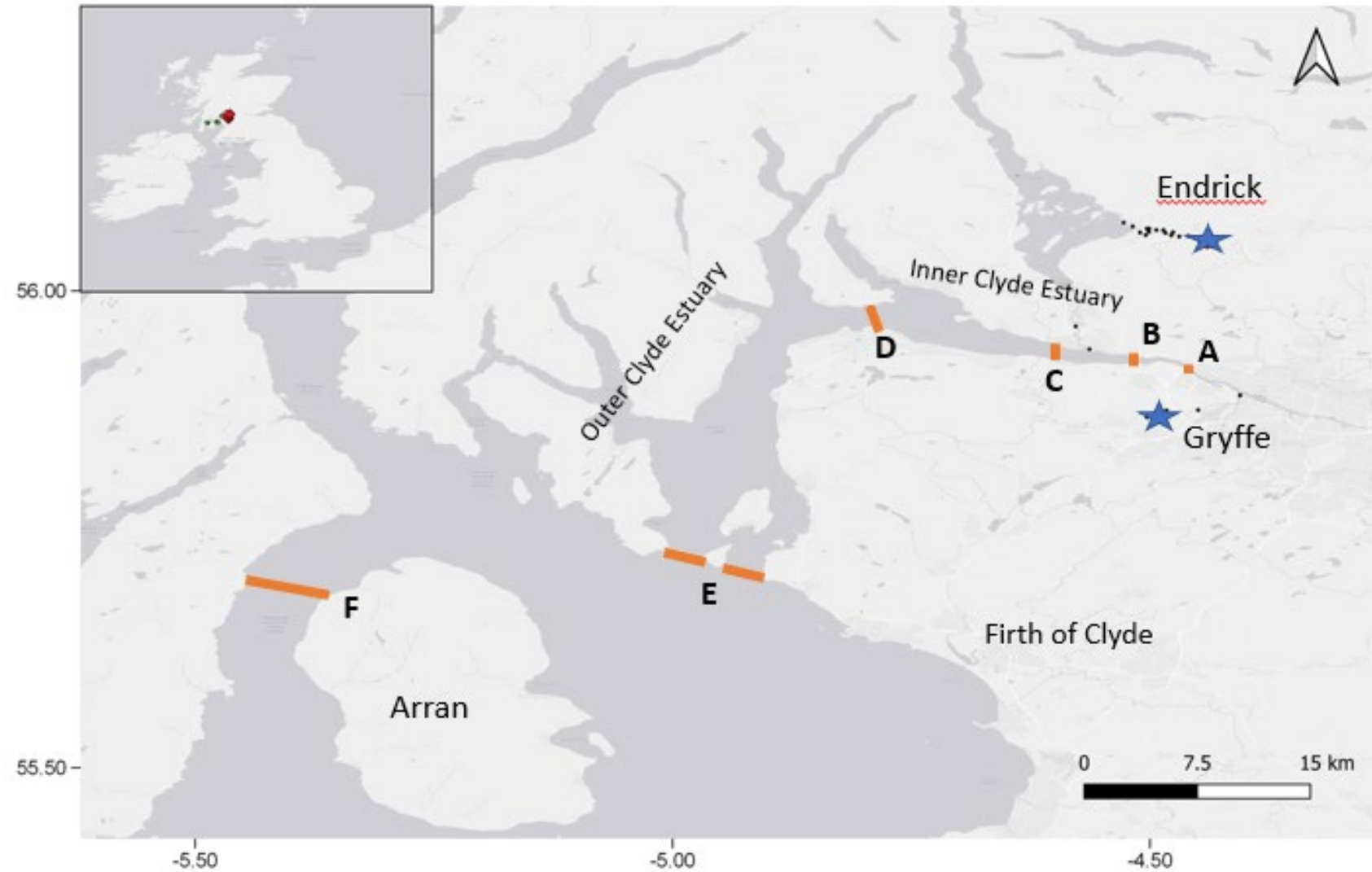
- Endrick: 0.59%/km
- Gryffe: 0.23%/km



3. Is estuarine mortality higher for smaller smolts?

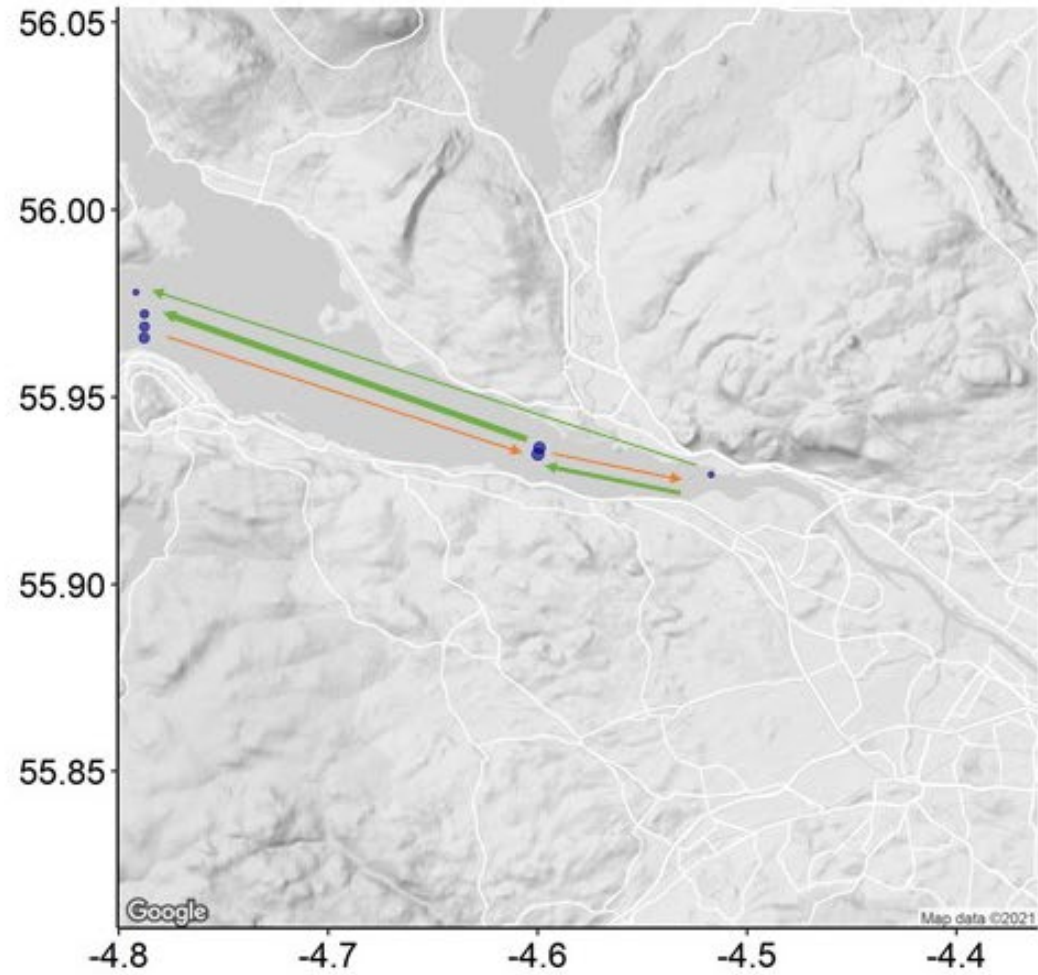
Survival probability (Φ)

- Not dependent on FL, tag burden

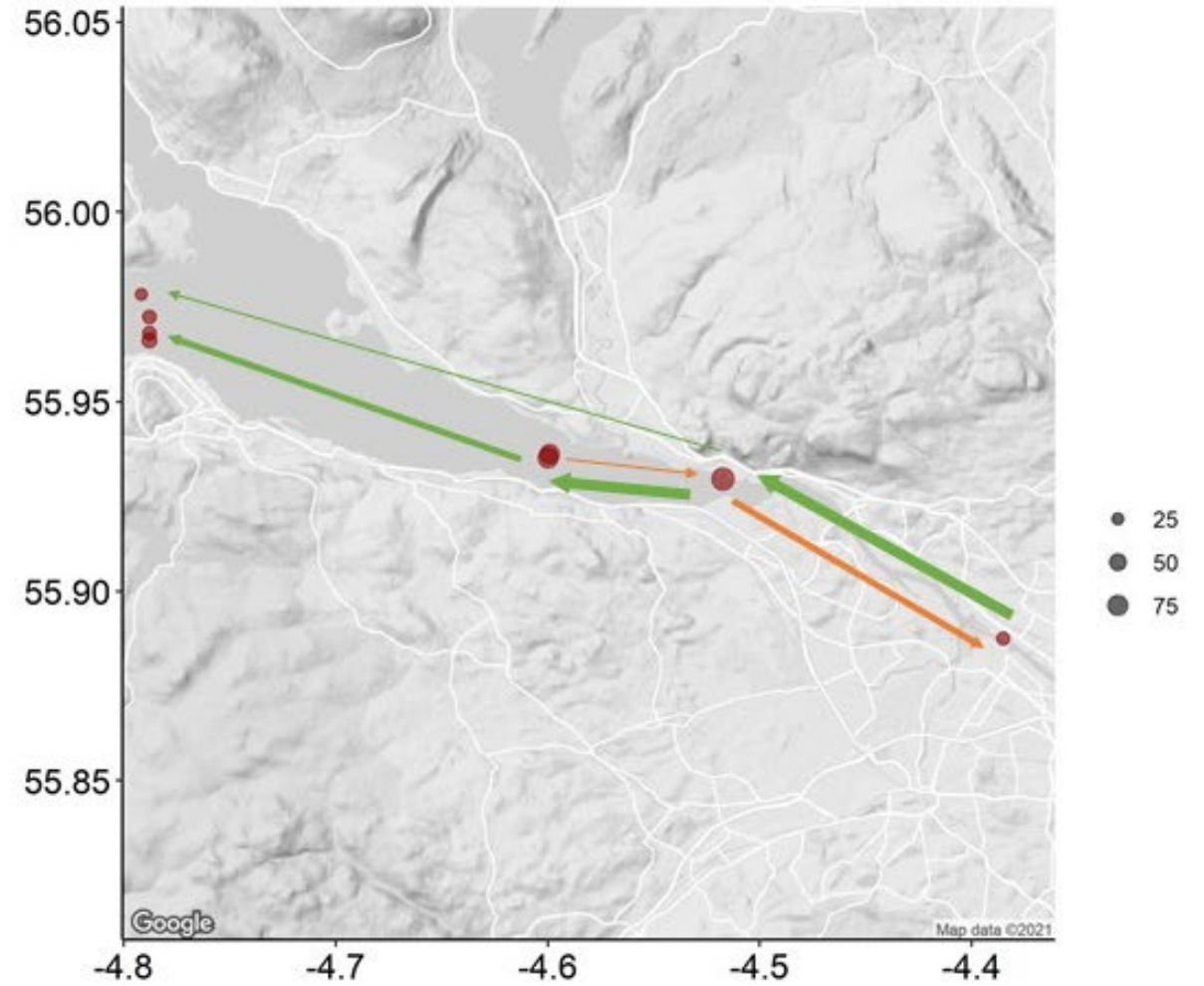


Environmental drivers of movement

Endrick

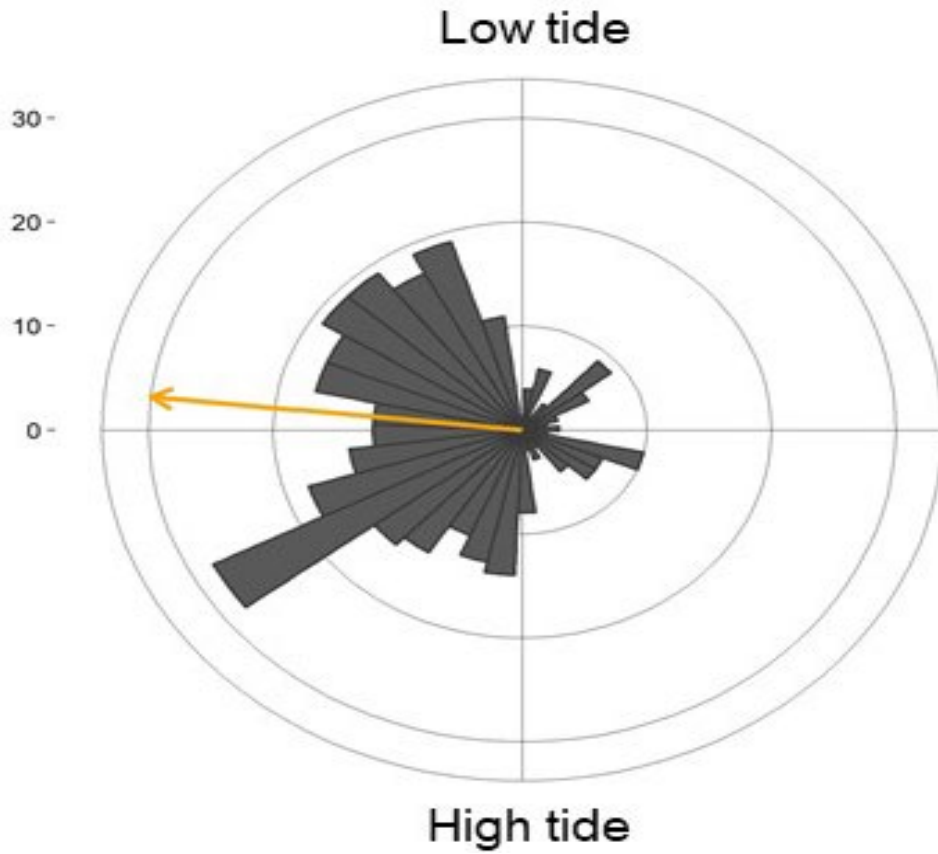


Gryffe

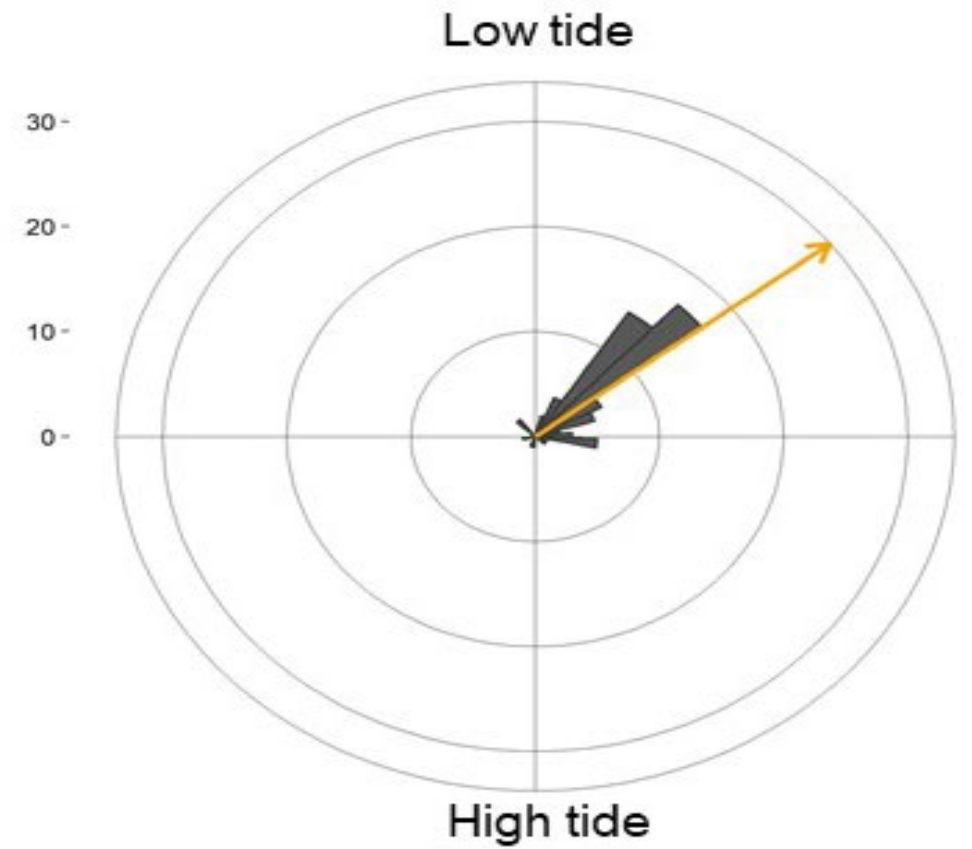


1. Are movements driven by the tide?

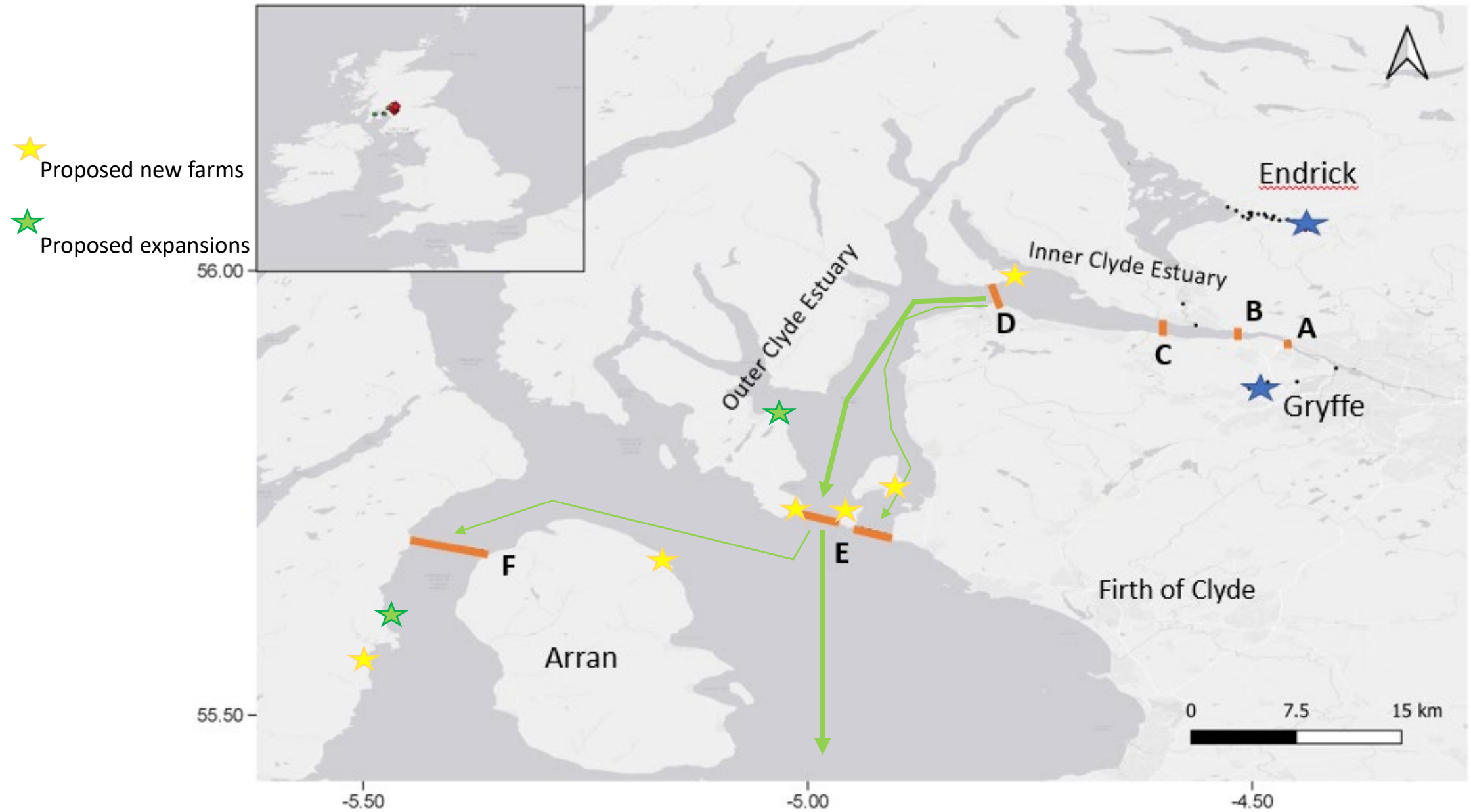
Forward



Backwards



Migratory pathways



Discussion

1. Is estuarine loss higher than freshwater?
2. Is estuarine loss higher for smolts with longer freshwater migration?
3. Is estuarine loss higher for smaller smolts?
4. Are movements driven by tide?
5. Do migratory trajectories overlap with potential stressors?

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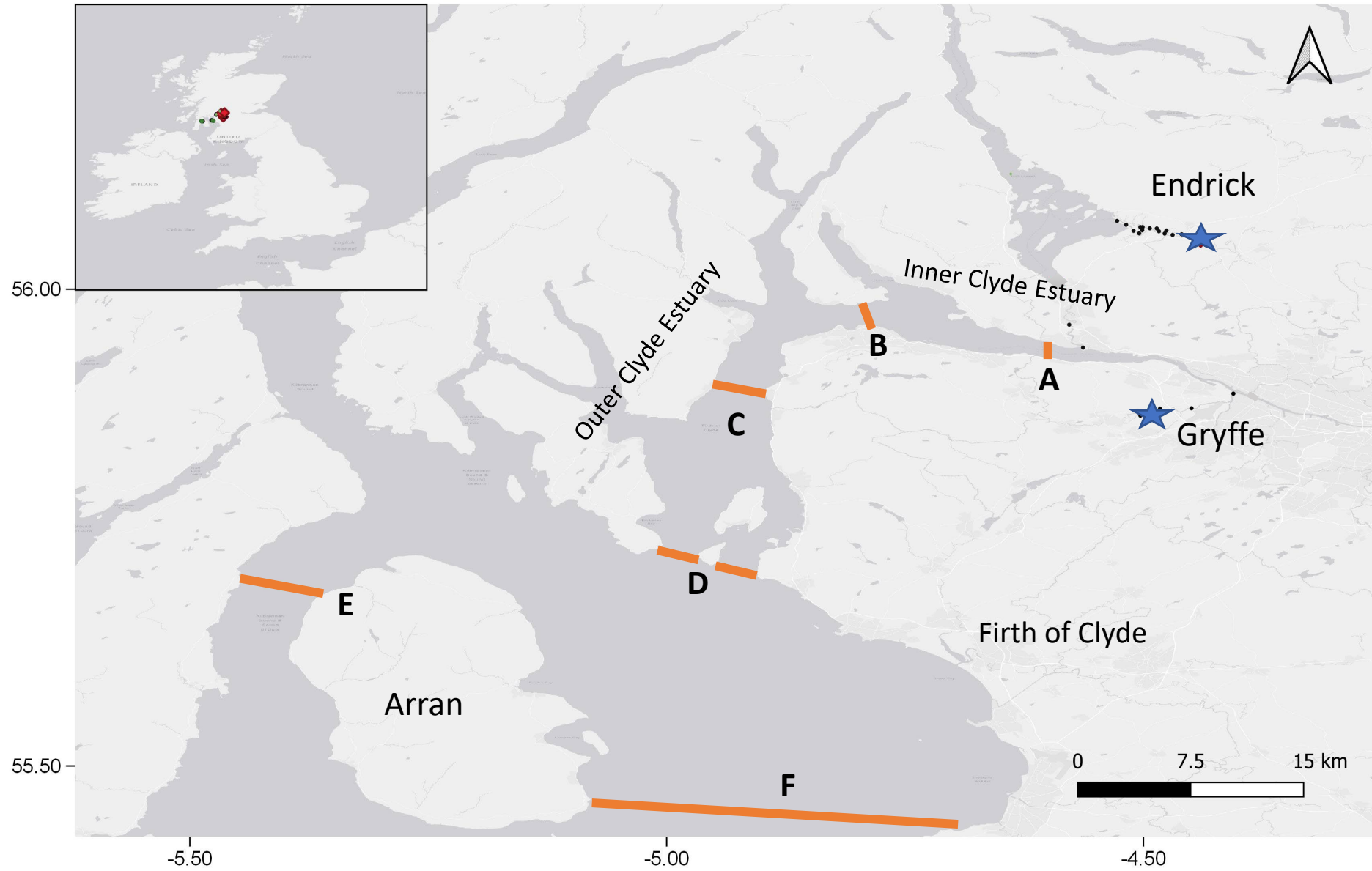
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Investigating the behaviour of Atlantic salmon (*Salmo salar* L.) post-smolts during their early marine migration through the Clyde Marine Region

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Ruaidhri Forrester¹ | Jessica R. Rodger¹ | Colin E. Adams¹

2022



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Thank you!



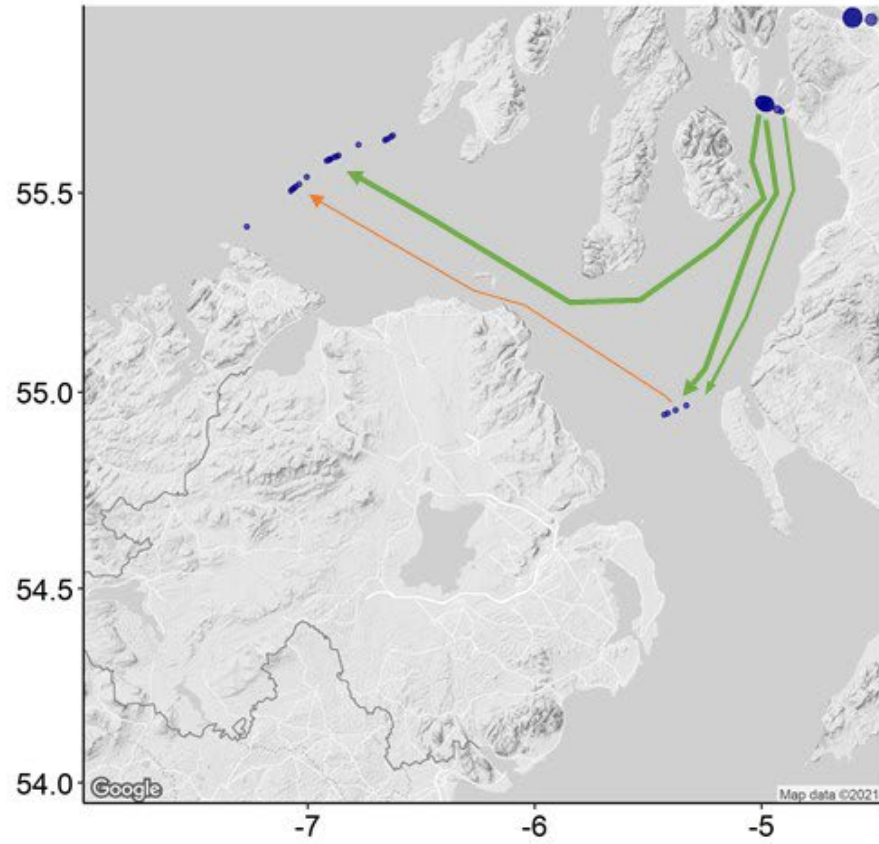
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Results

Endrick combined



Gryffe

