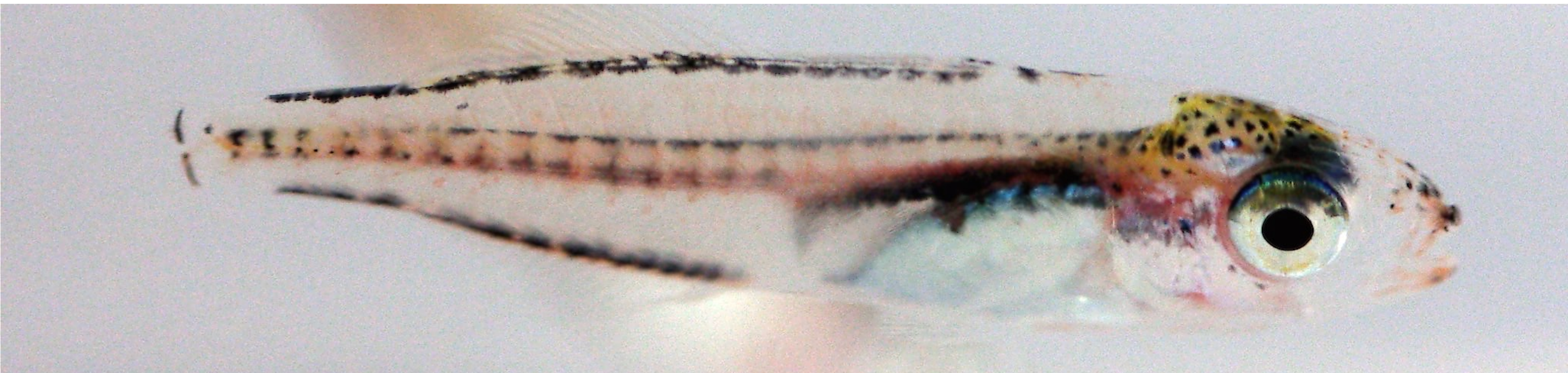
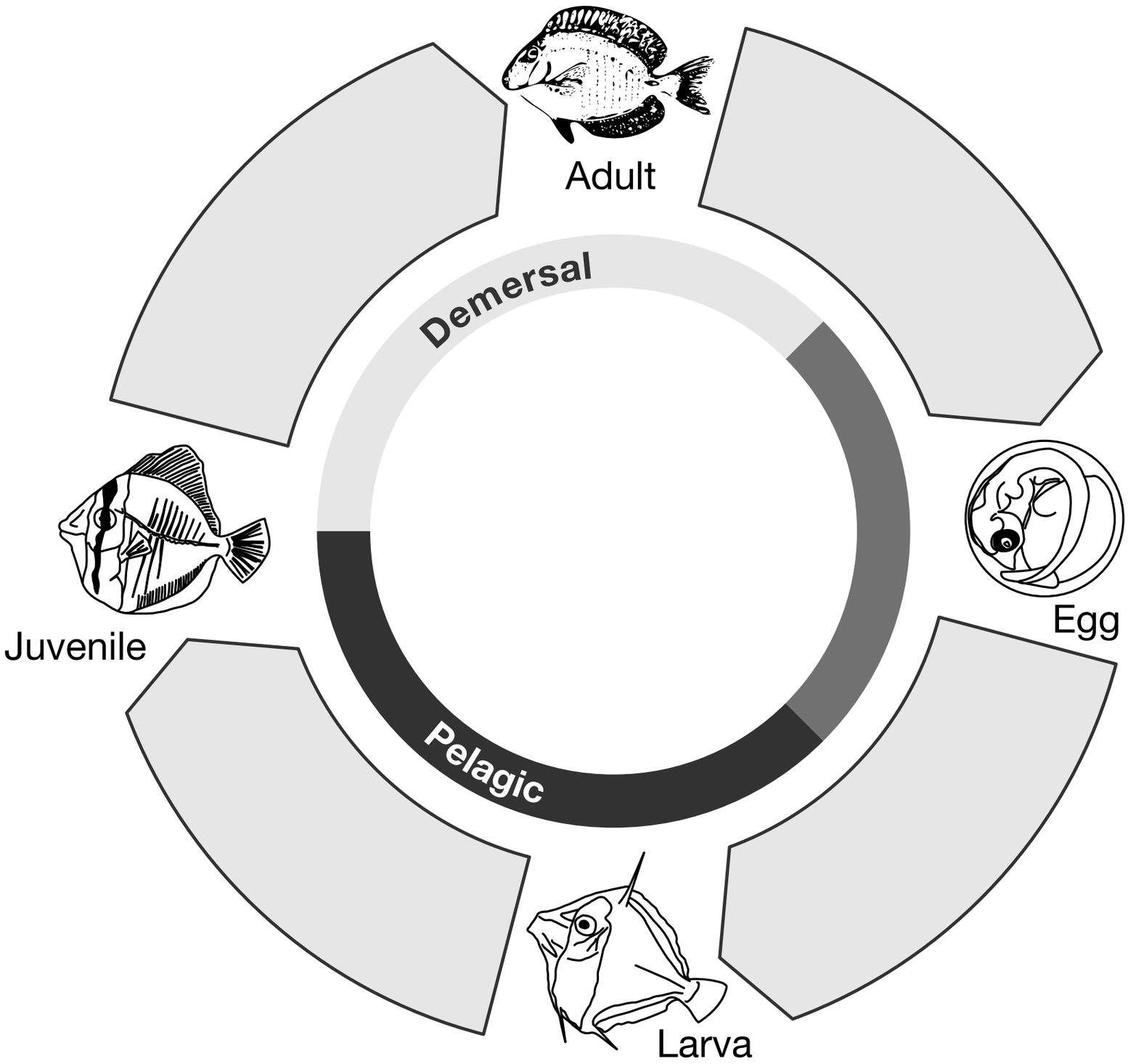
SFEcologie, 2016-10-26
Faillettaz, Durand, Paris, Koubbi, ***Irisson***

Swimming speeds of Mediterranean settlement-stage fish larvae

Nuancing Hjort's aberrant drift hypothesis



Life history of coastal organisms



CONSEIL PERMANENT INTERNATIONAL POUR
L'EXPLORATION DE LA MER

SOCIÉTÉ ZOOLOGIQUE DE FRANCE
1816
PARIS

RAPPORTS ET PROCÈS-VERBAUX

VOLUME XX

FLUCTUATIONS IN THE GREAT FISHERIES OF NORTHERN EUROPE

VIEWED IN THE LIGHT OF BIOLOGICAL RESEARCH

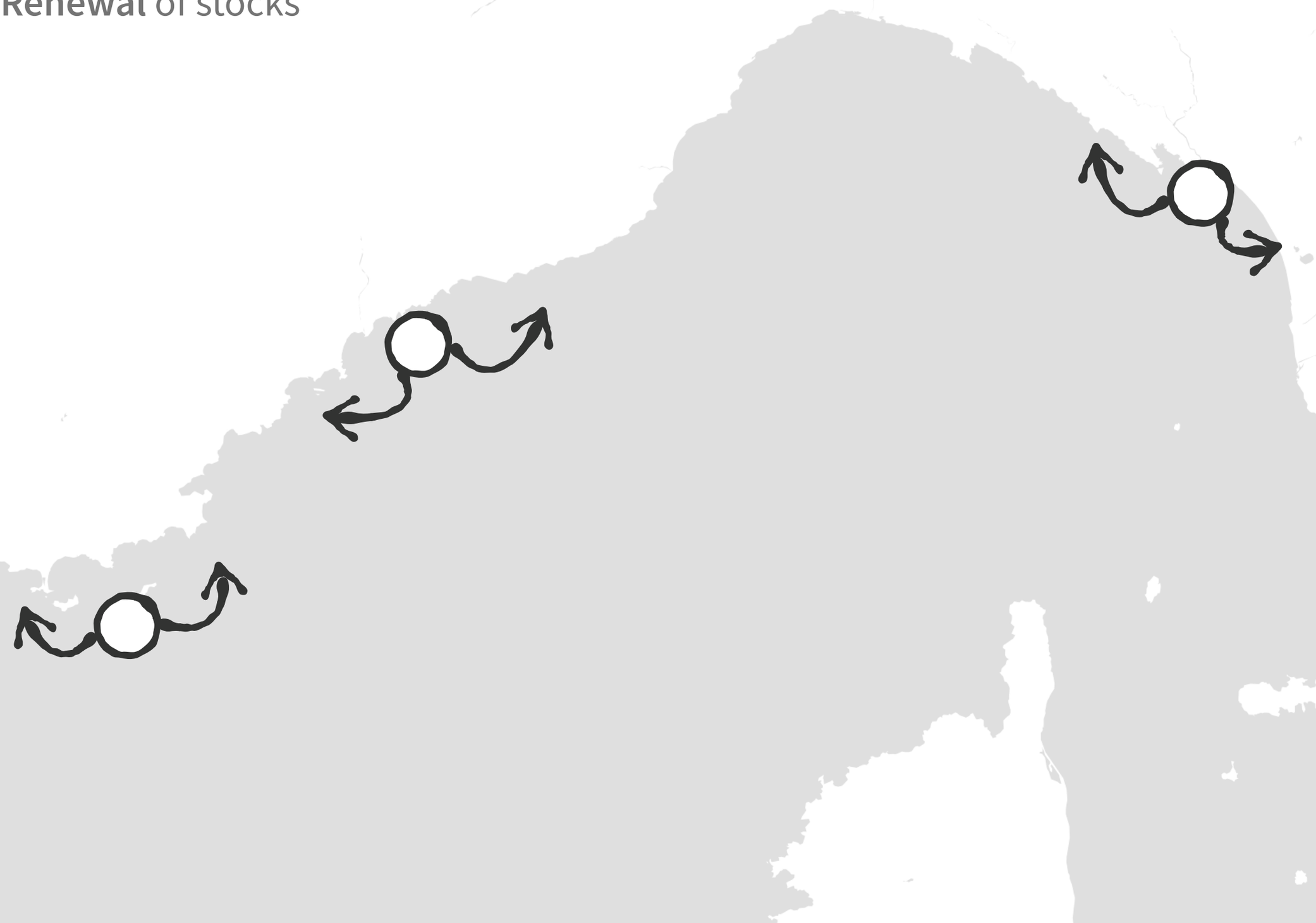
BY

JOHAN HJORT

WITH 3 PLATES

Why study fish larvae?

Renewal of stocks



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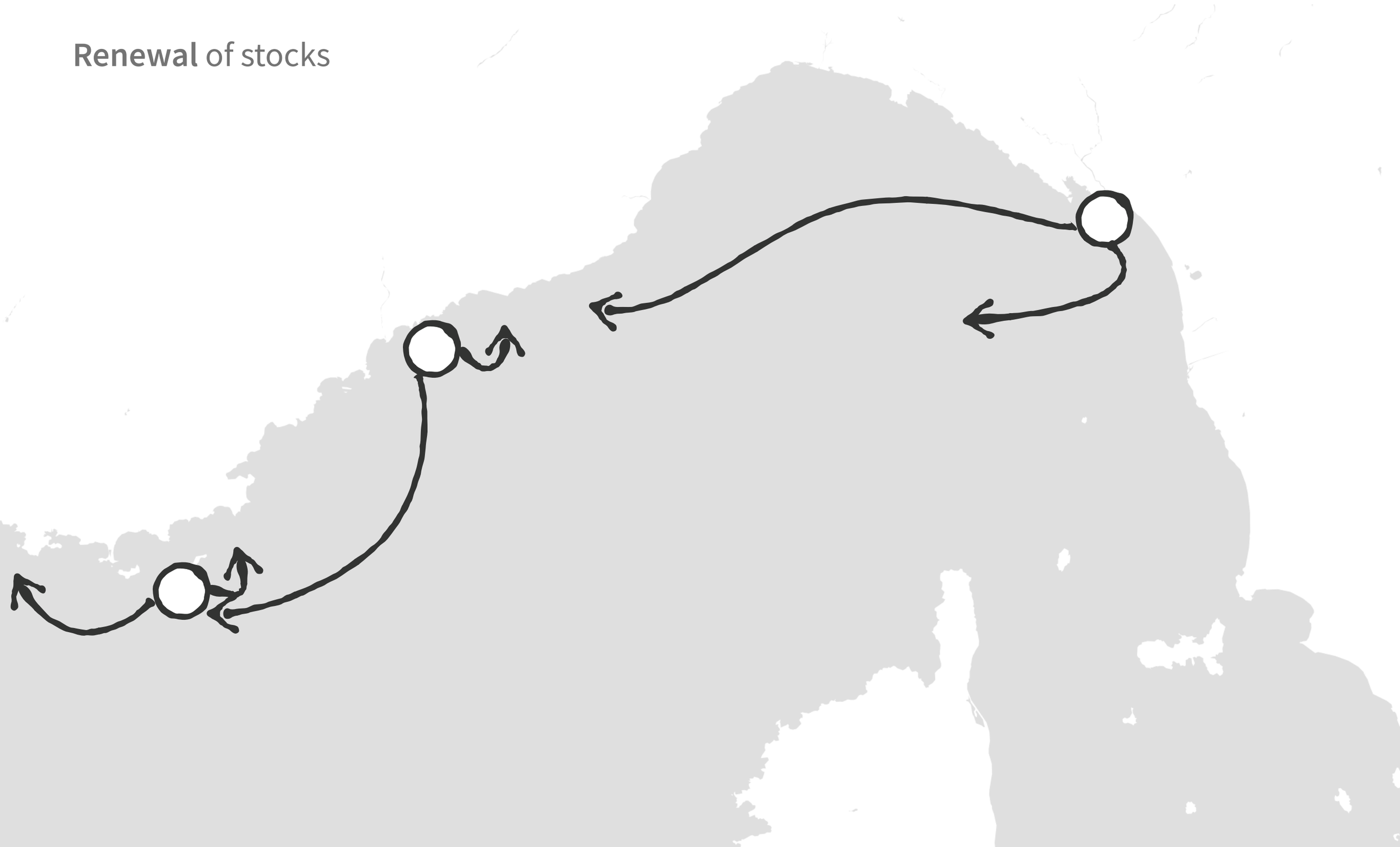
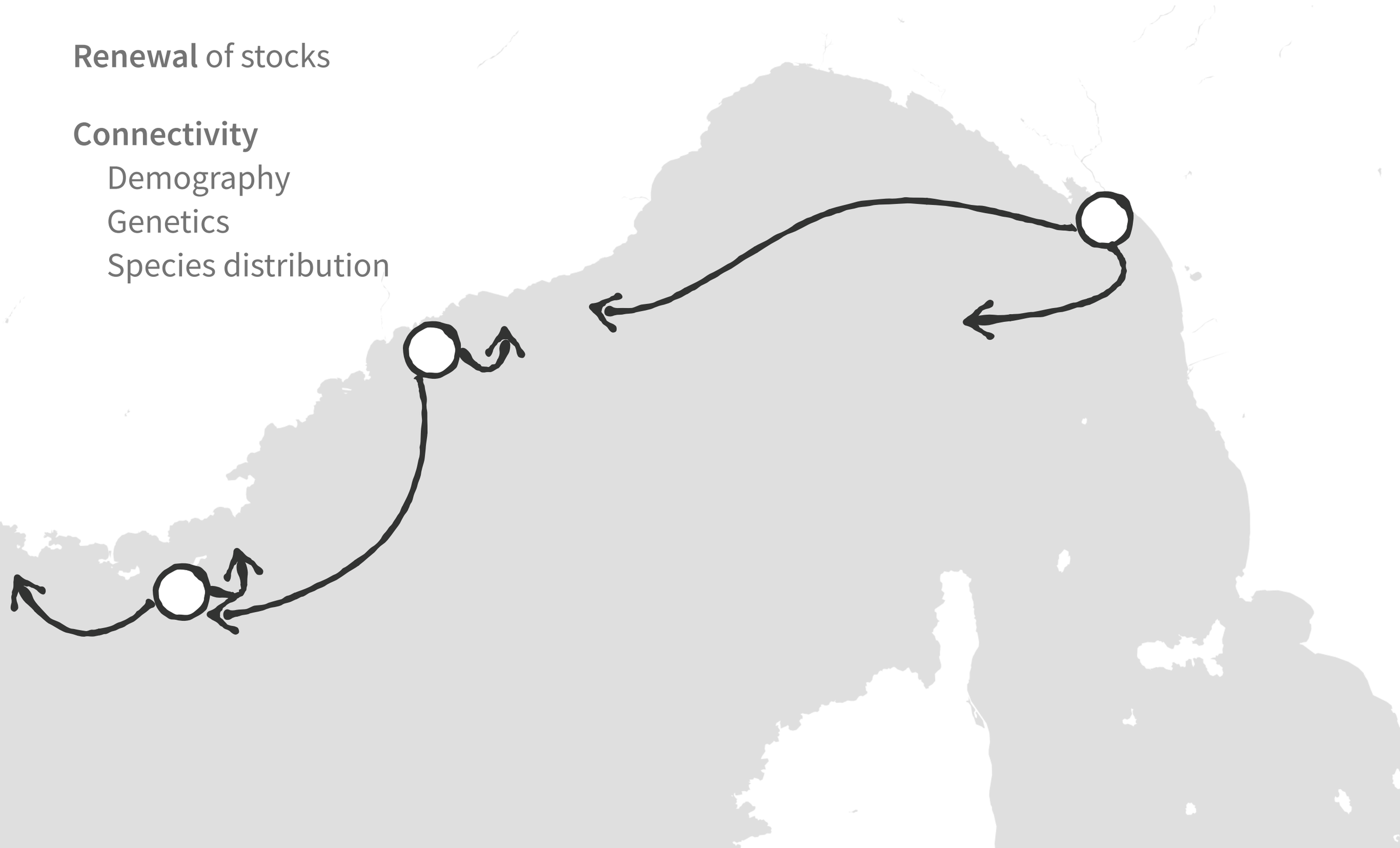


Why study fish larvae?

Renewal of stocks

Connectivity

- Demography
- Genetics
- Species distribution



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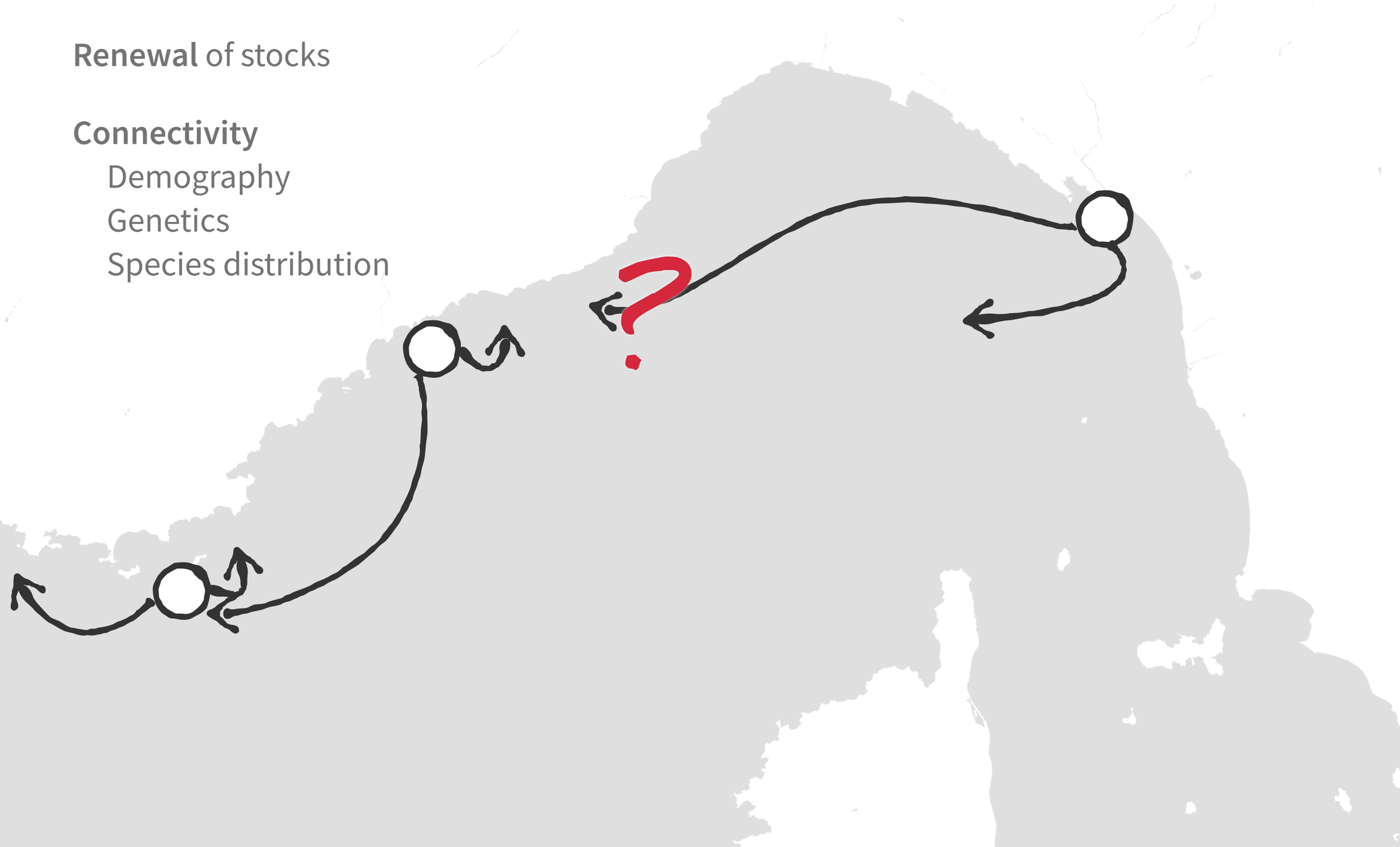


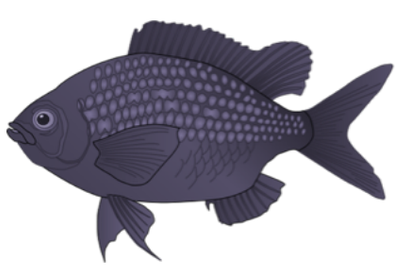
2mm

© R. Crechi'riou

Sarpa salpa

2mm

© R. Crechriou



Chromis chromis

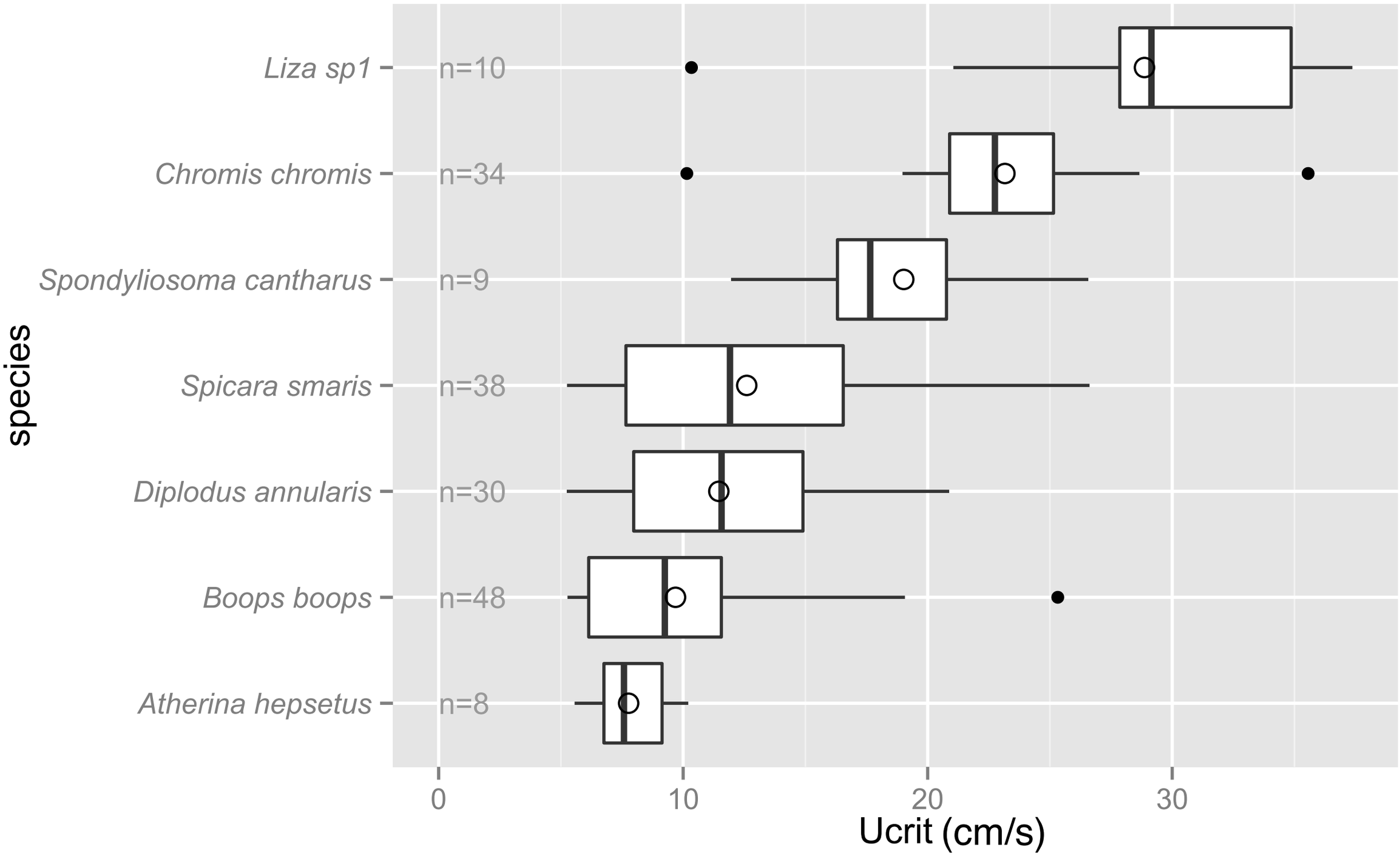
FLUCTUATIONS IN THE GREAT FISHERIES OF NORTHERN EUROPE

It would be especially desirable to ascertain the extent of such movement, and **how far the young fry are able to return, of their own volition**, to such localities as offer favourable condition; for their further growth.

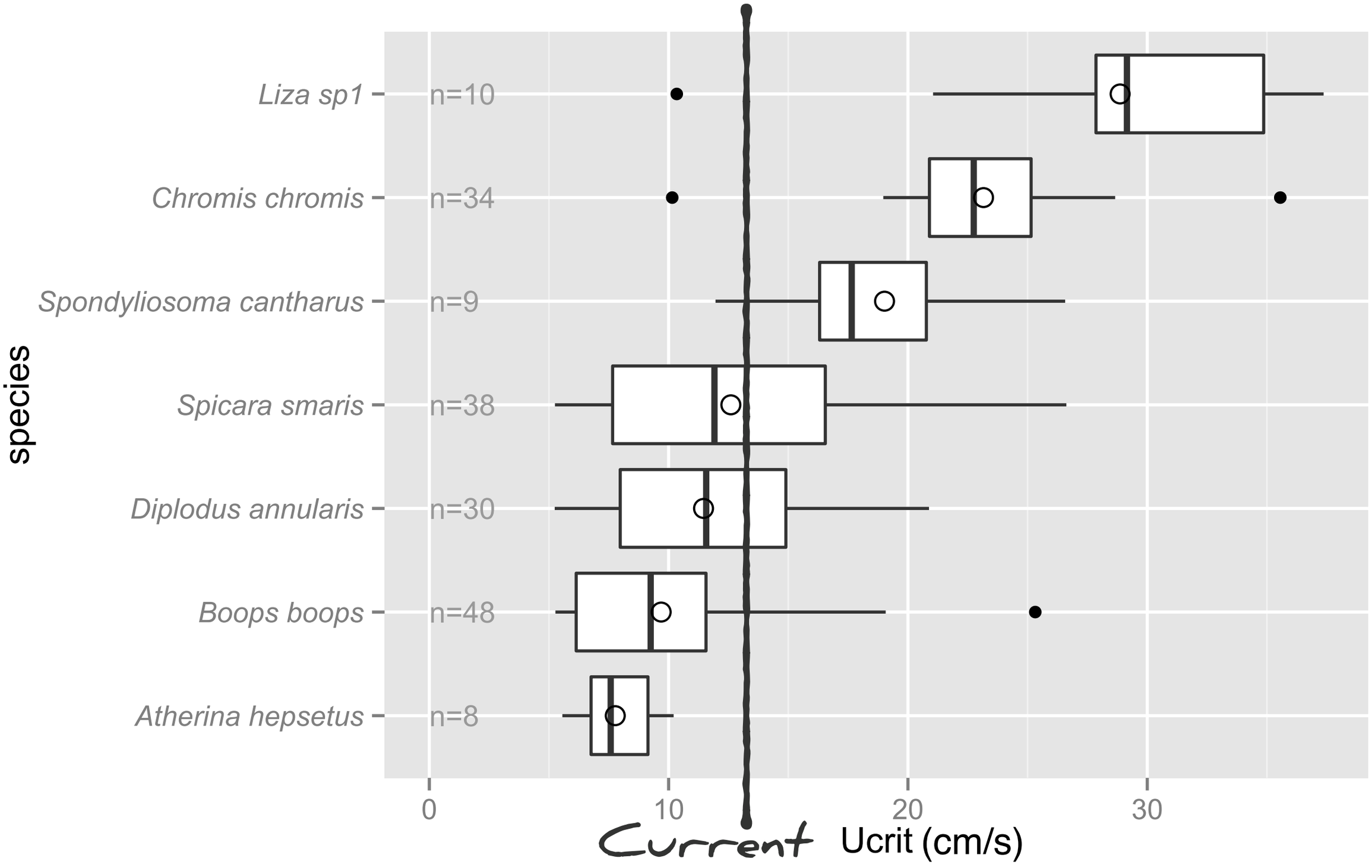
Swimming speed measurement

Mullidae

High speeds!


species
Liza sp1
n=10
Chromis chromis
n=34
Spondyliosoma cantharus
n=9
Spicara smaris
n=38
Diplodus annularis
n=30
Boops boops
n=48
Atherina hepsetus
n=8
0
10
20
30
Ucrit (cm/s)

High speeds!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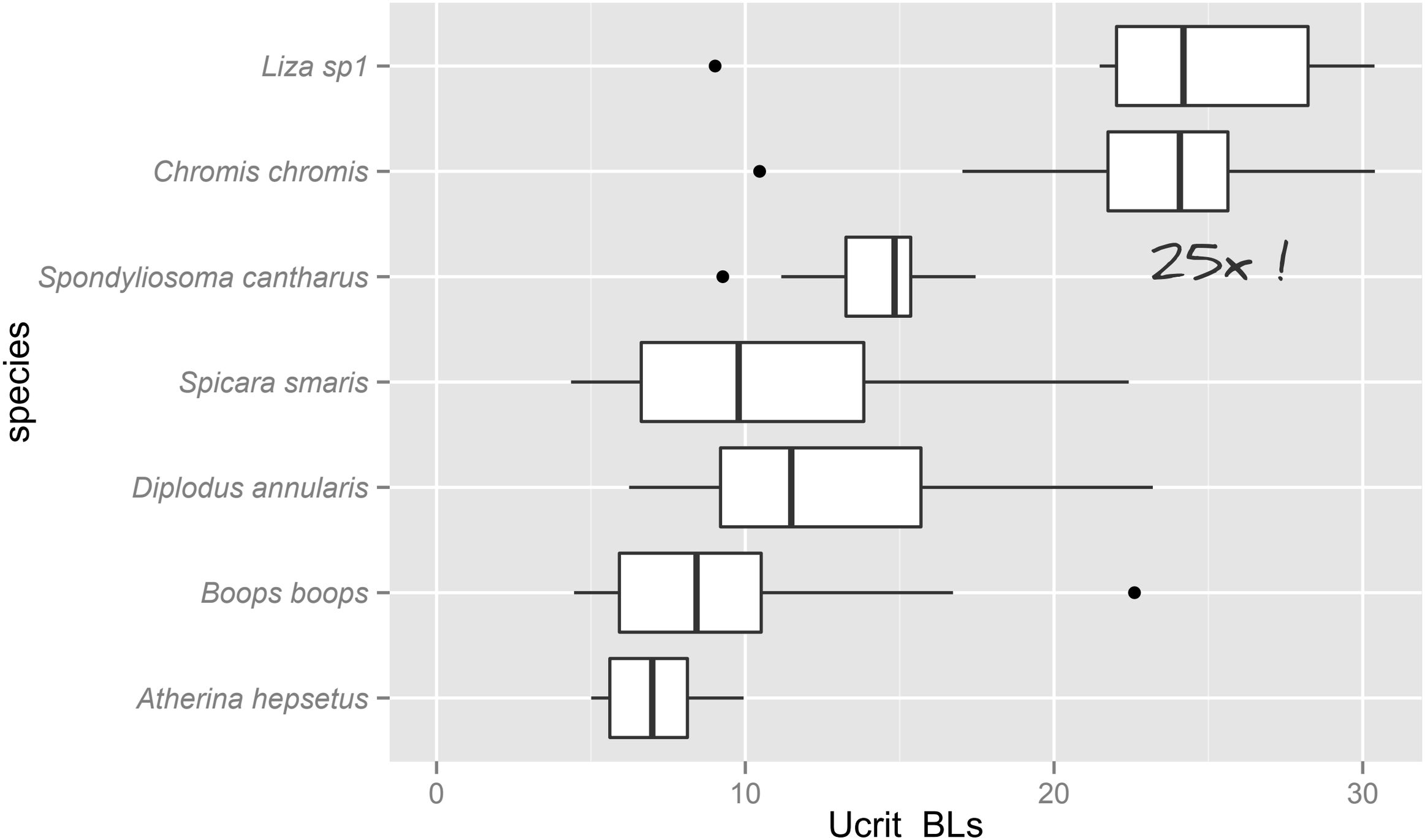
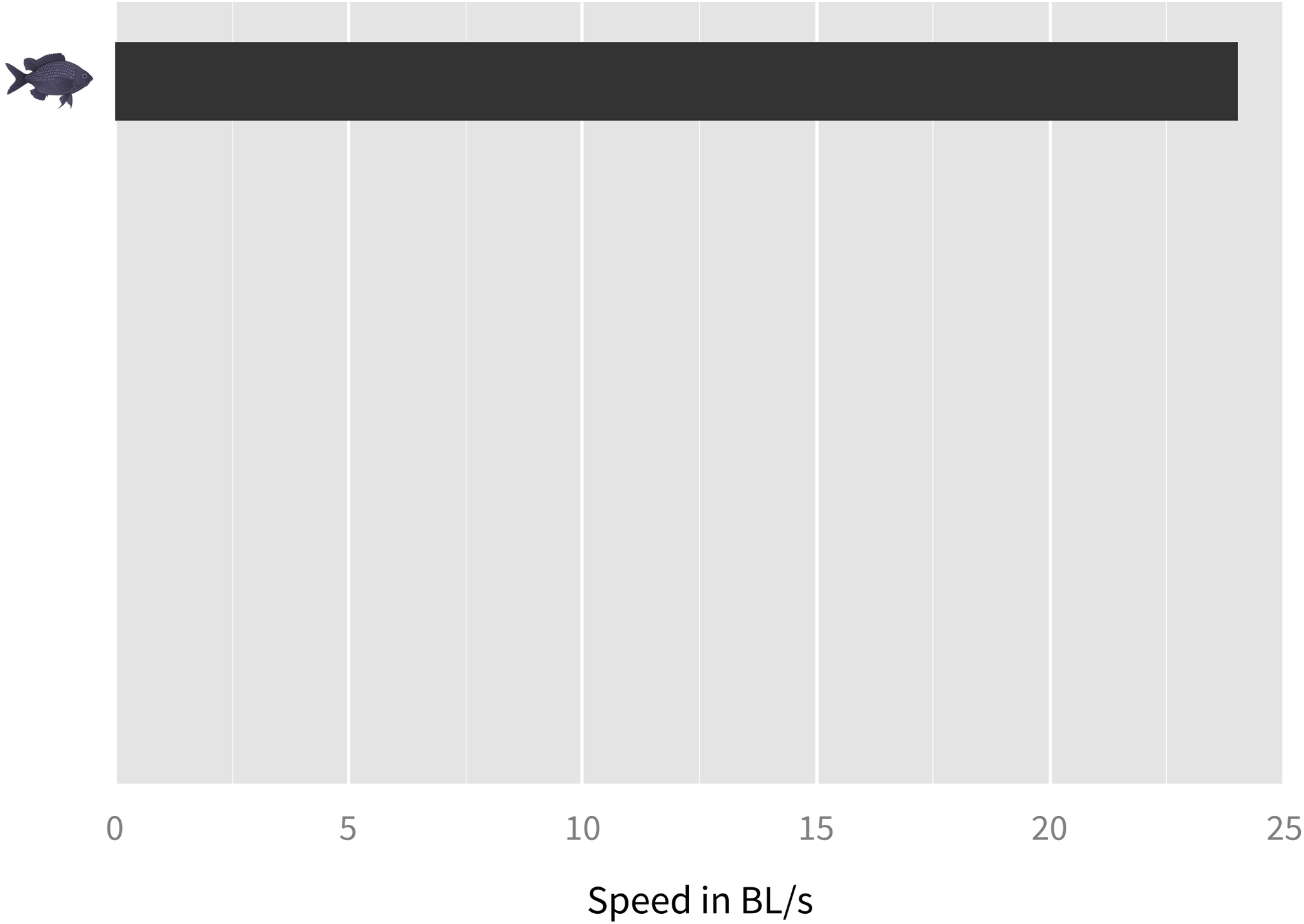
n=8
species
0
10
20
30
Current
Ucrit (cm/s)

In body lengths per second



Fun comparisons!



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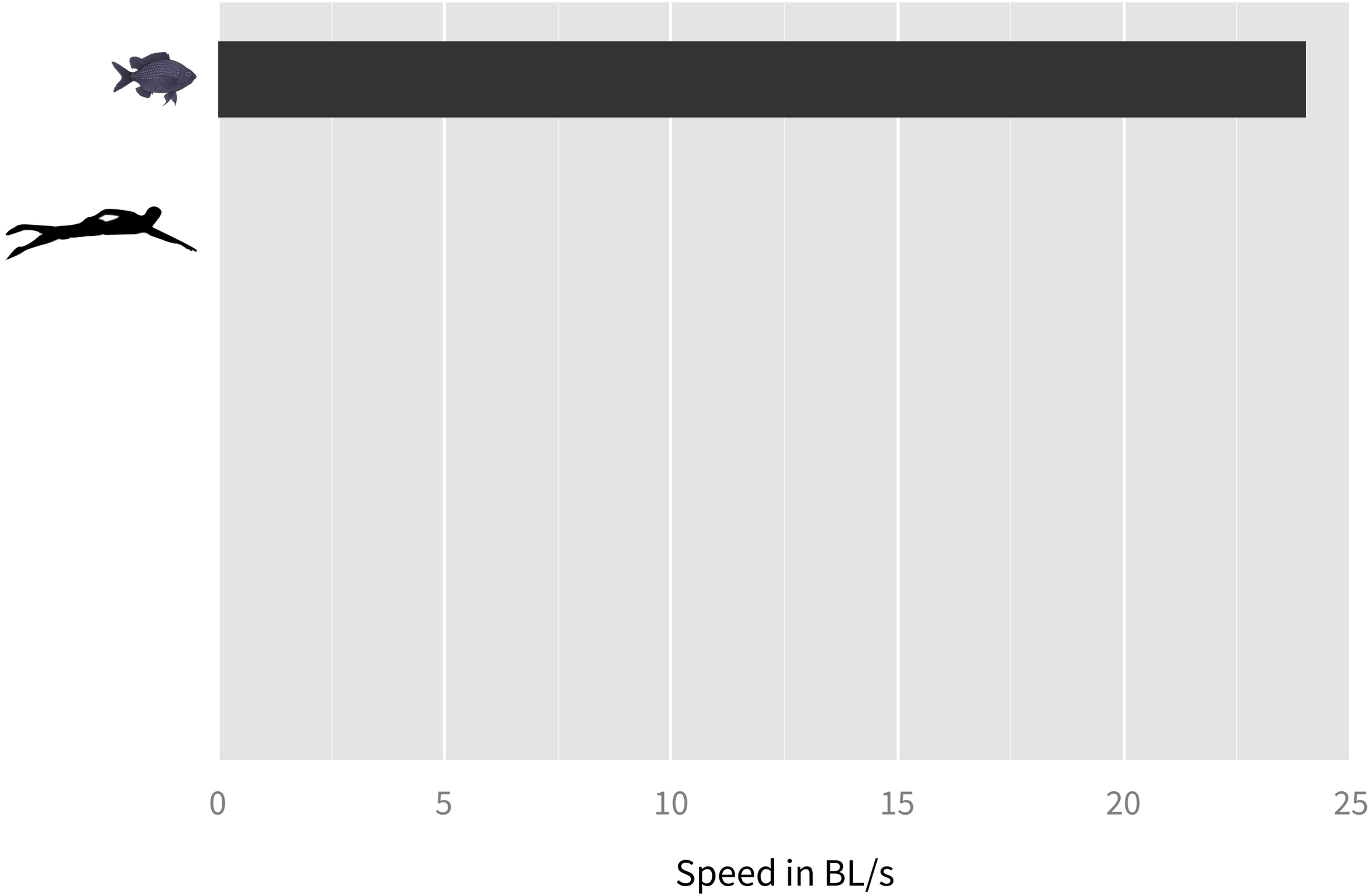

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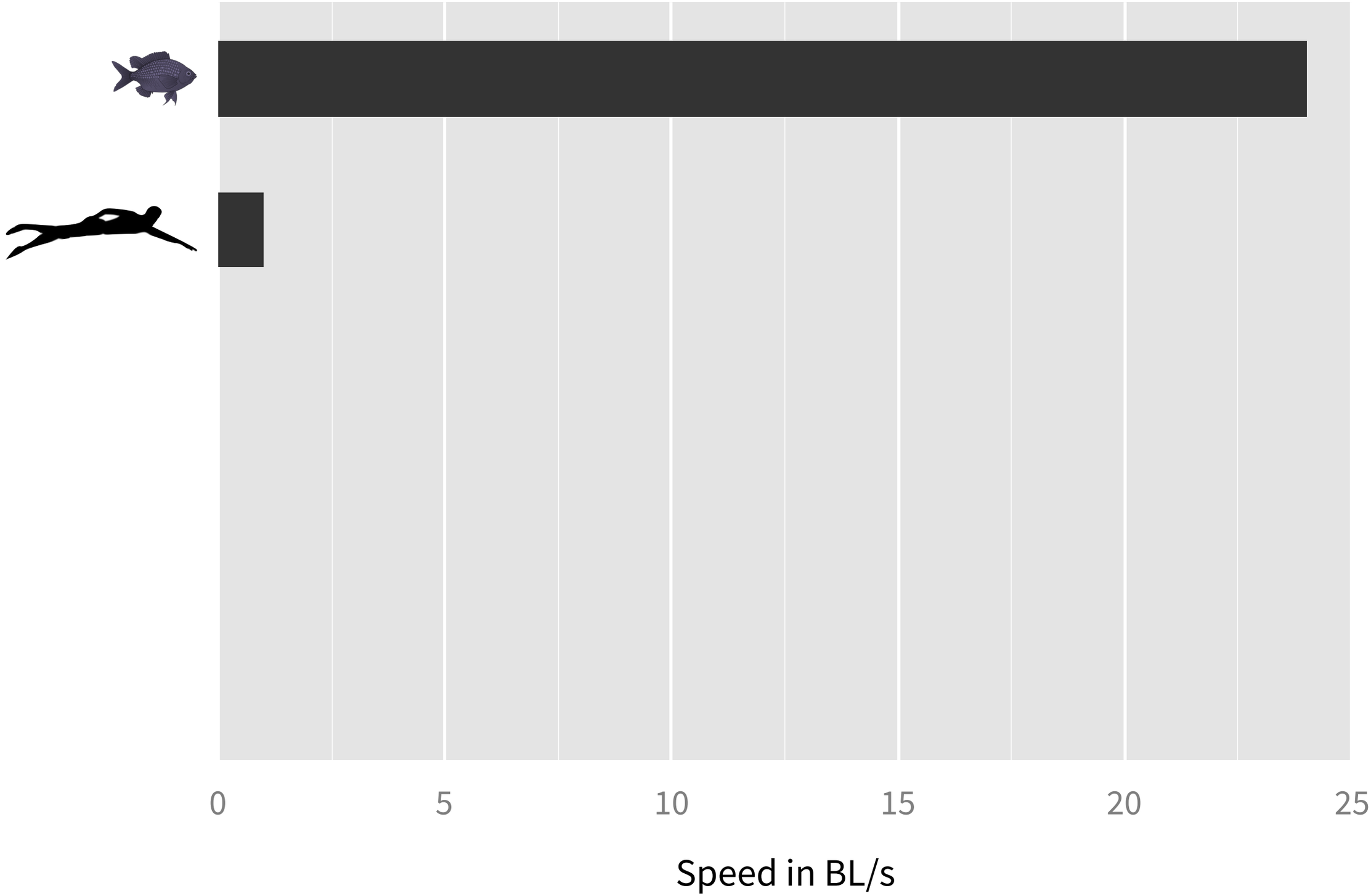

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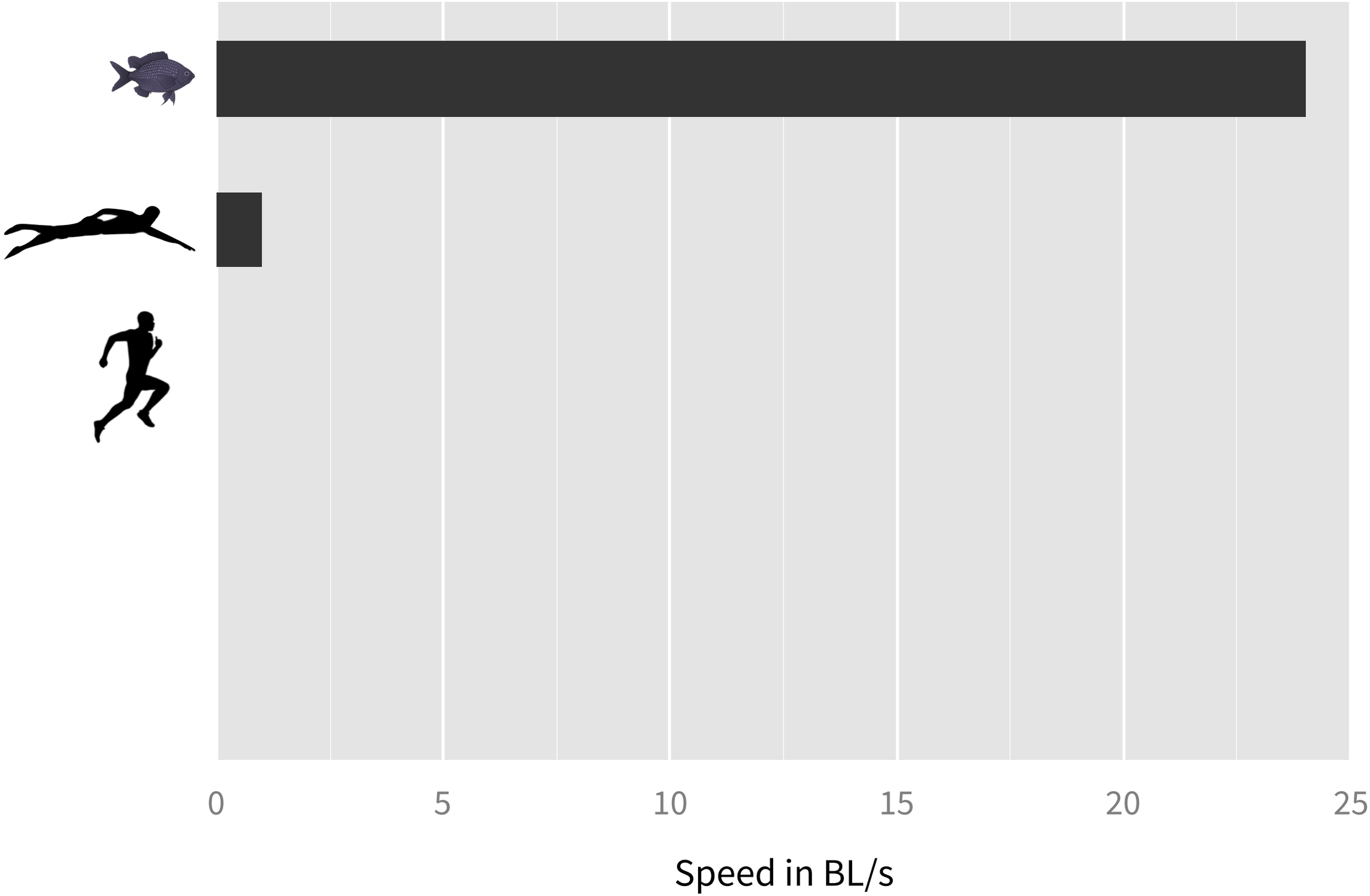

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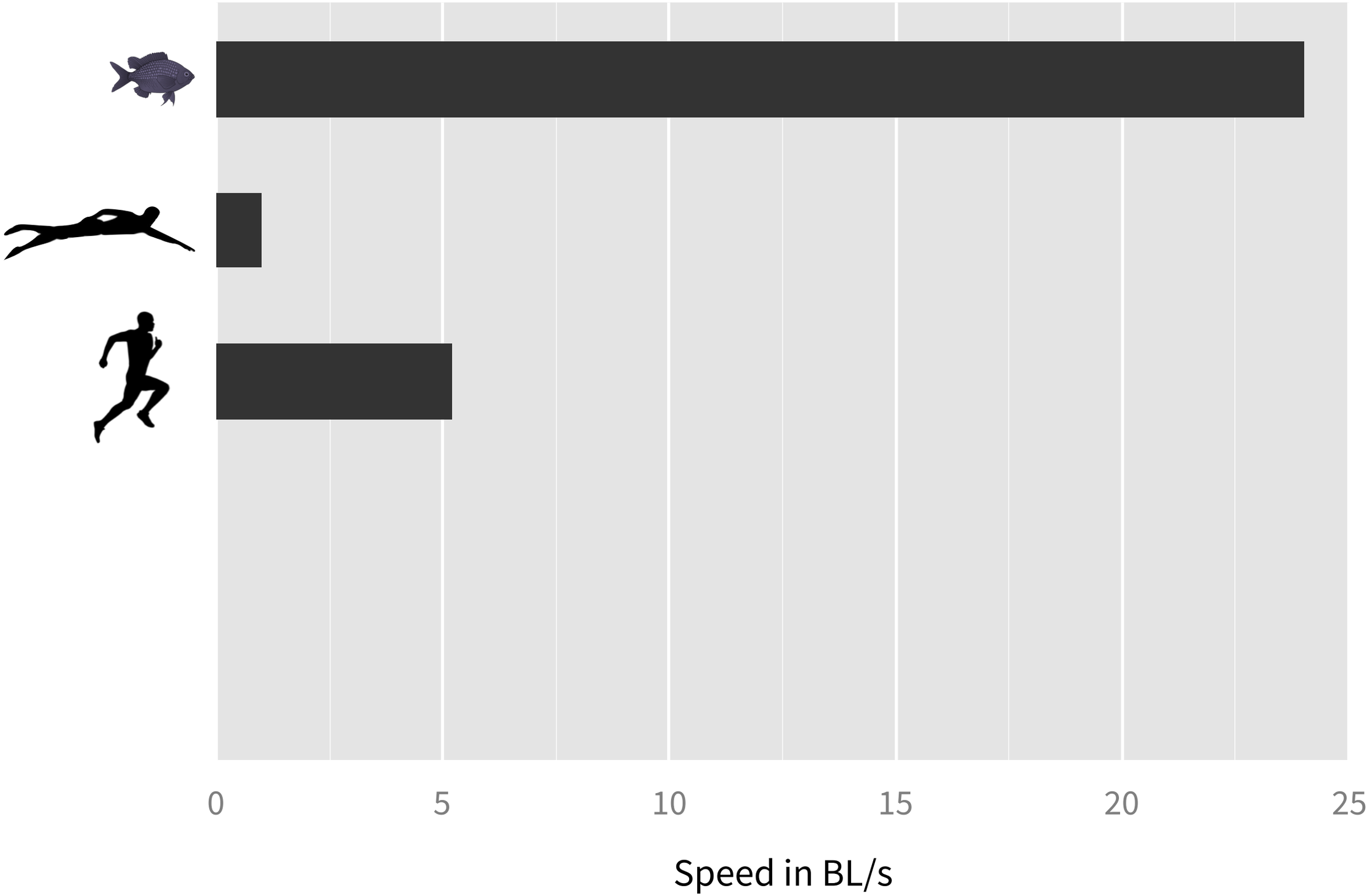

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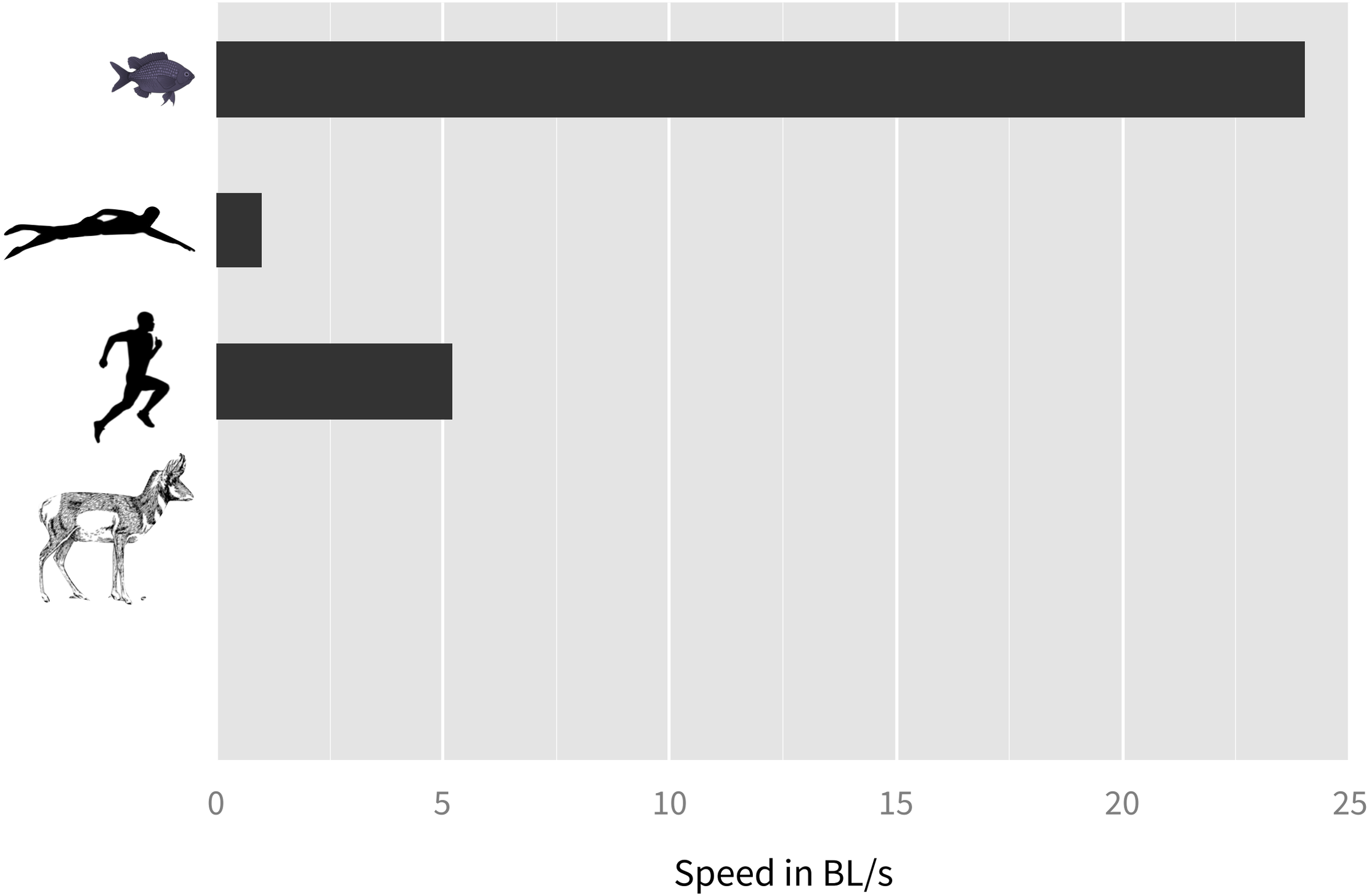

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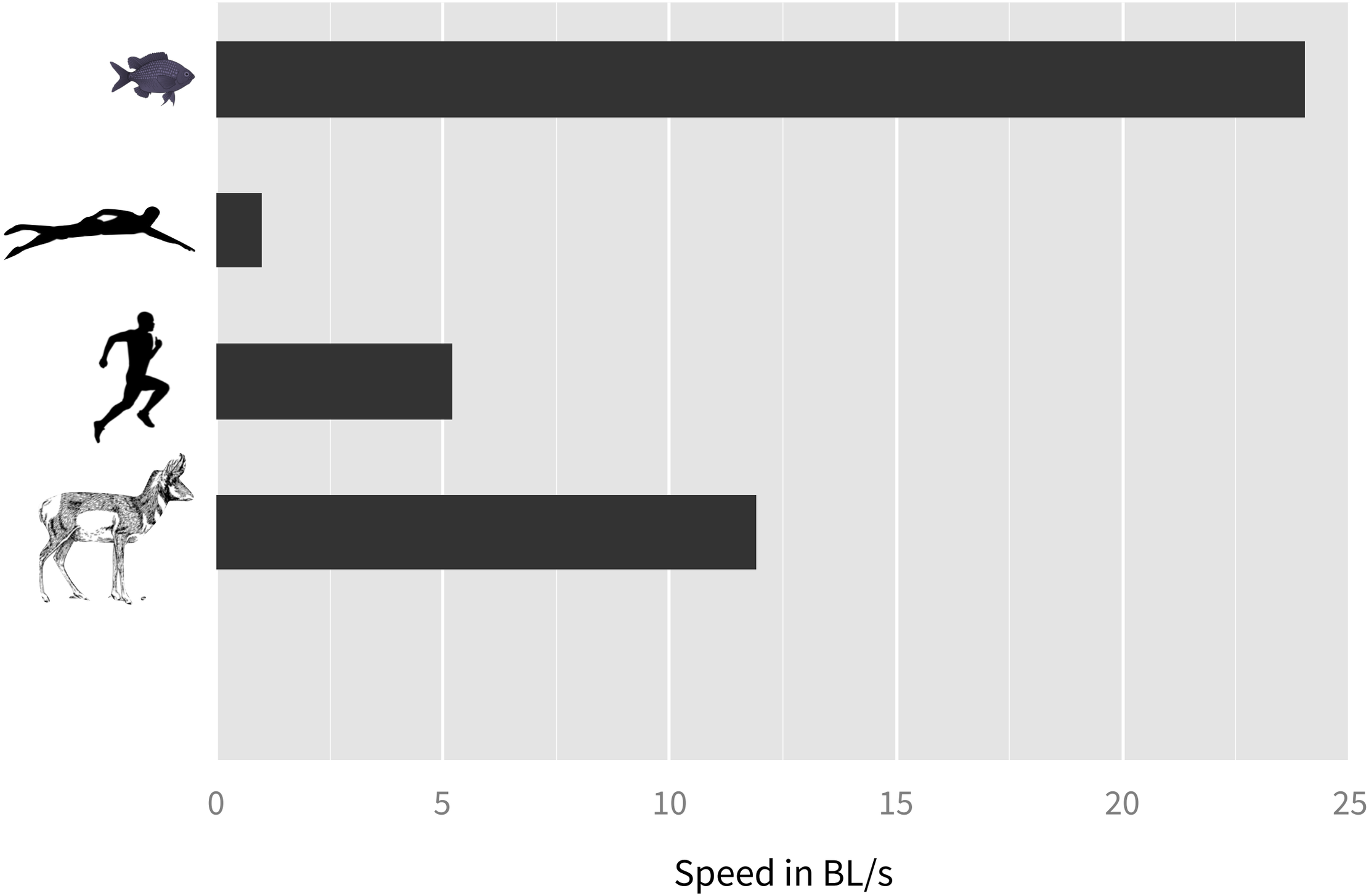

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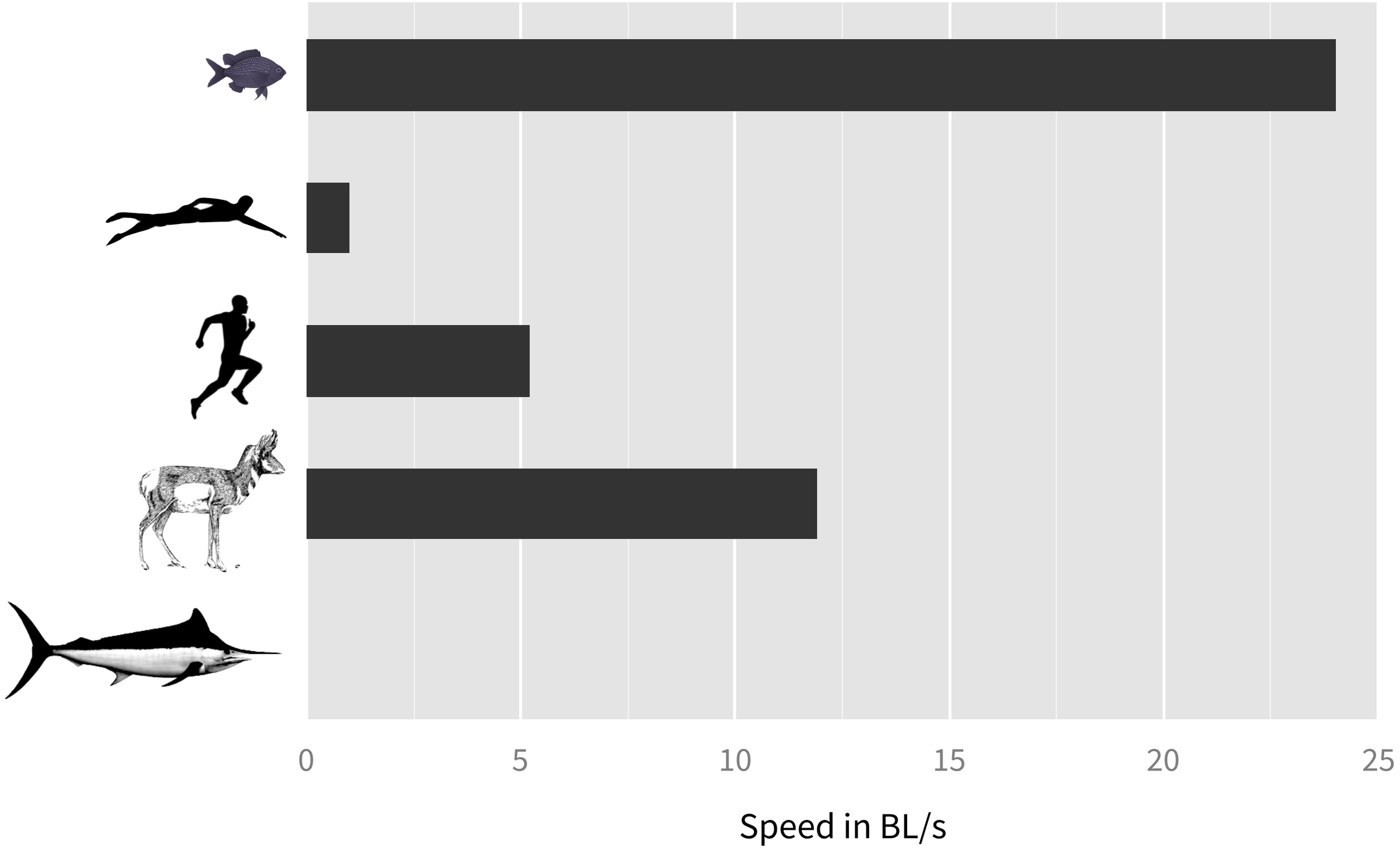

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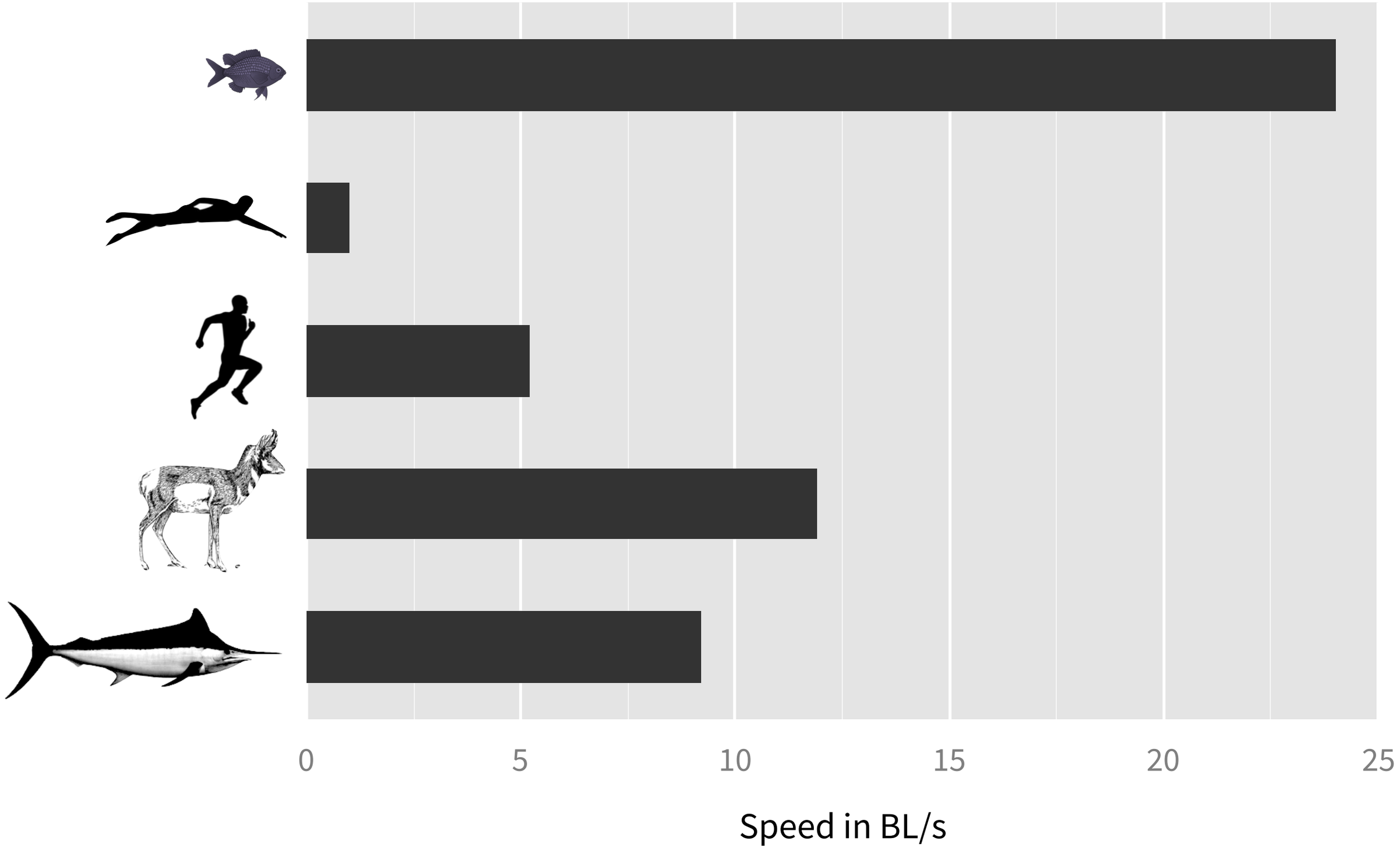


Ecological consequences: model advection + swimming

Current field (MARS3DMed)

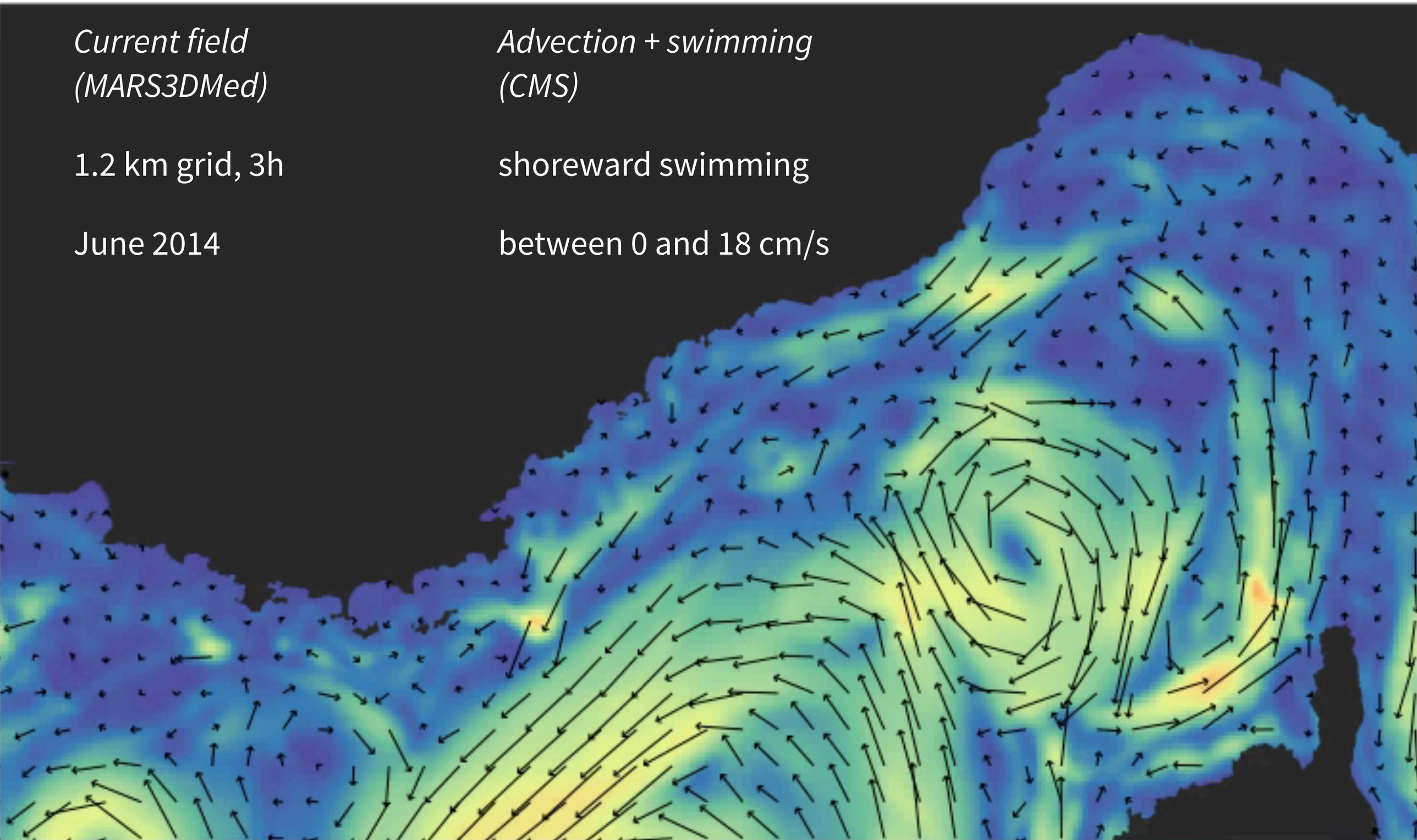
1.2 km grid, 3h

June 2014

Advection + swimming (CMS)

shoreward swimming

between 0 and 18 cm/s

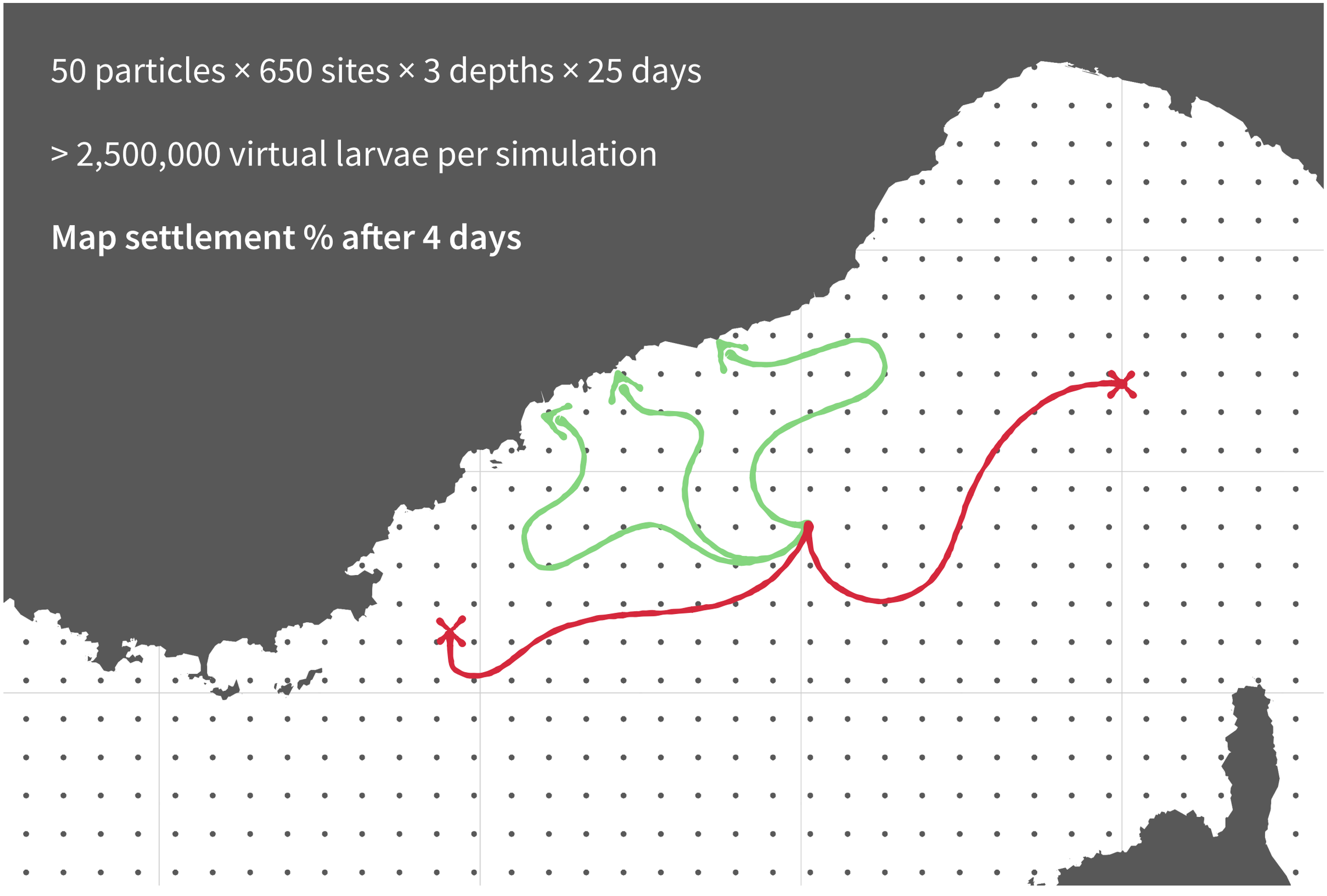


Model seeding

50 particles × 650 sites × 3 depths × 25 days

> 2,500,000 virtual larvae per simulation

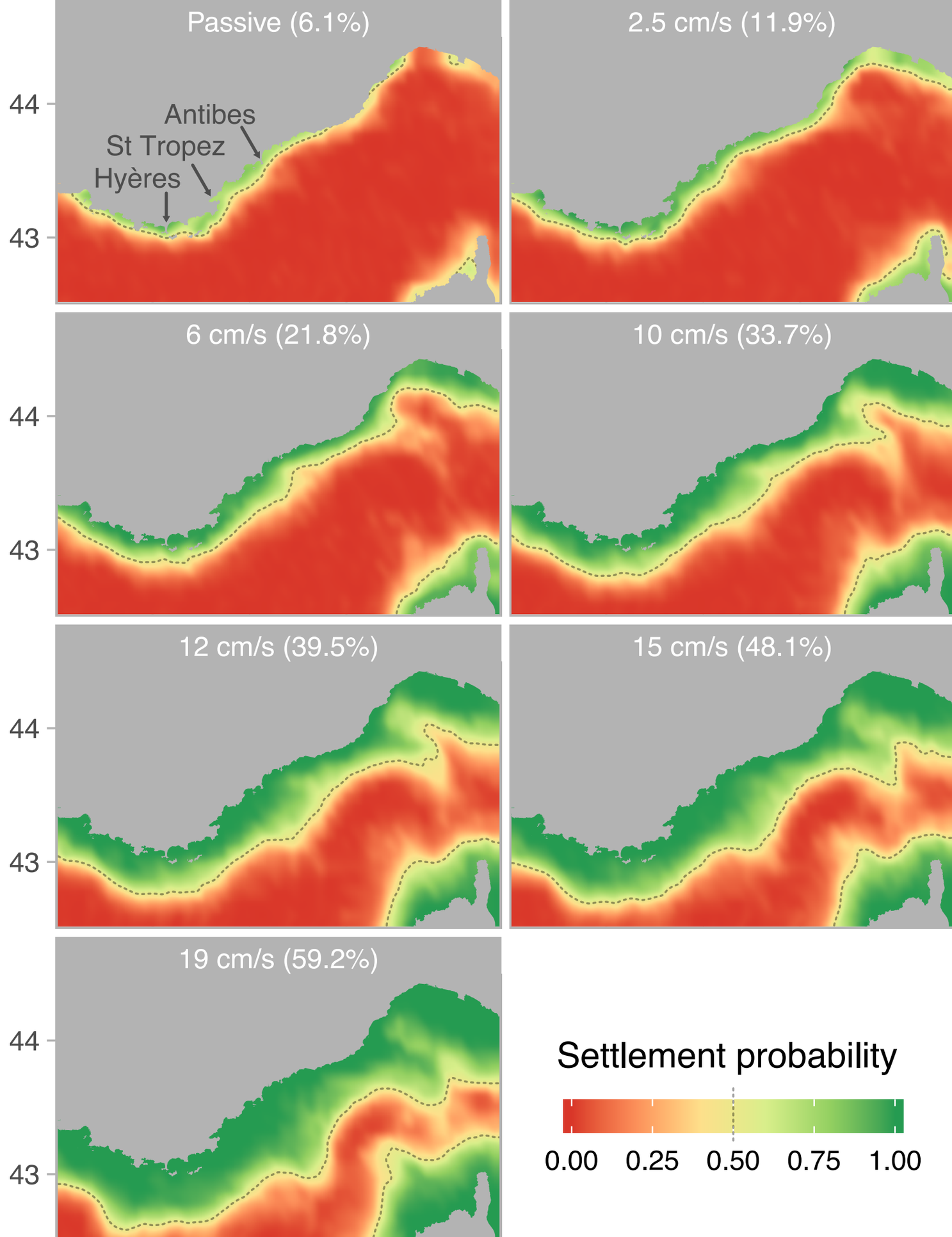
Map settlement % after 4 days

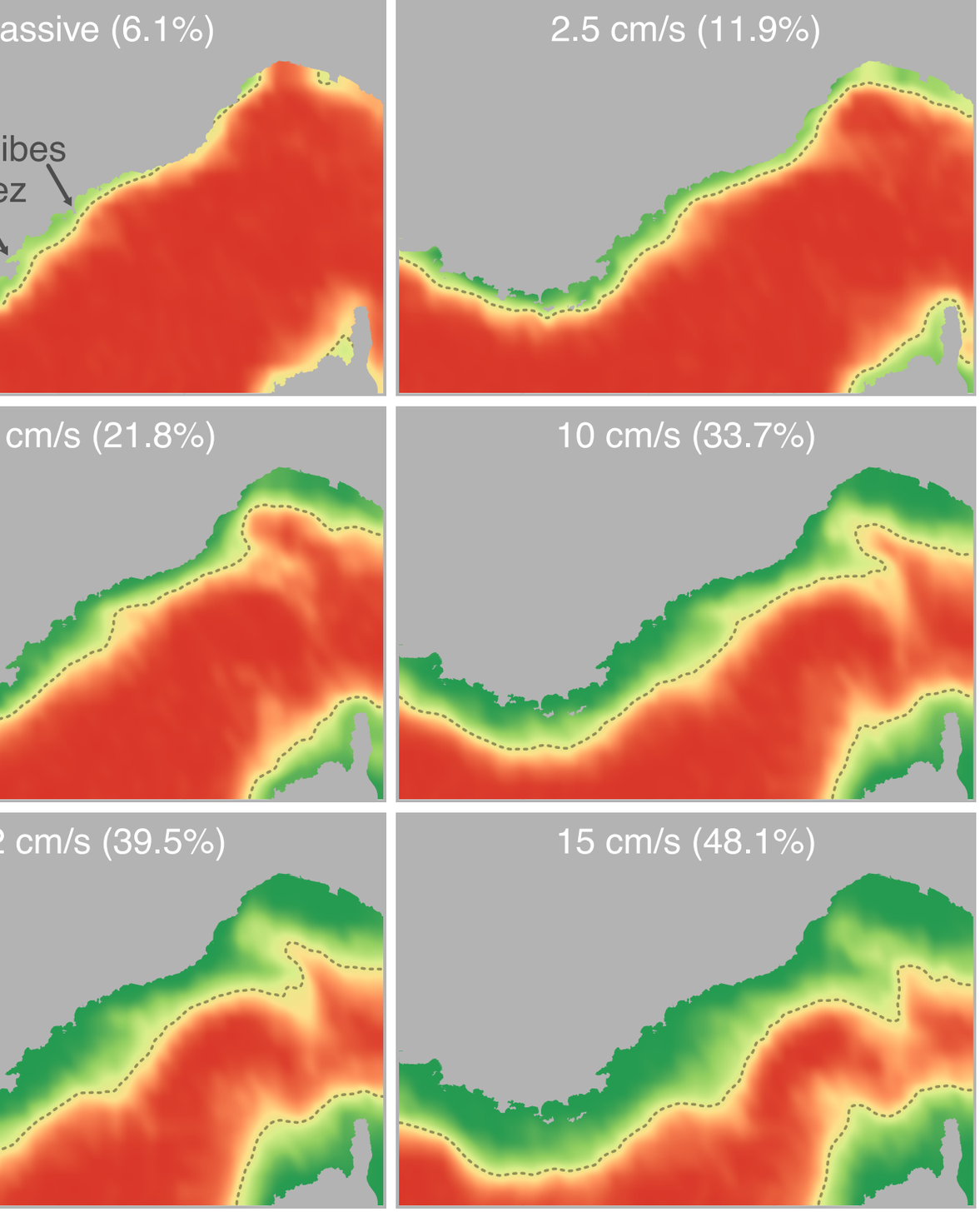


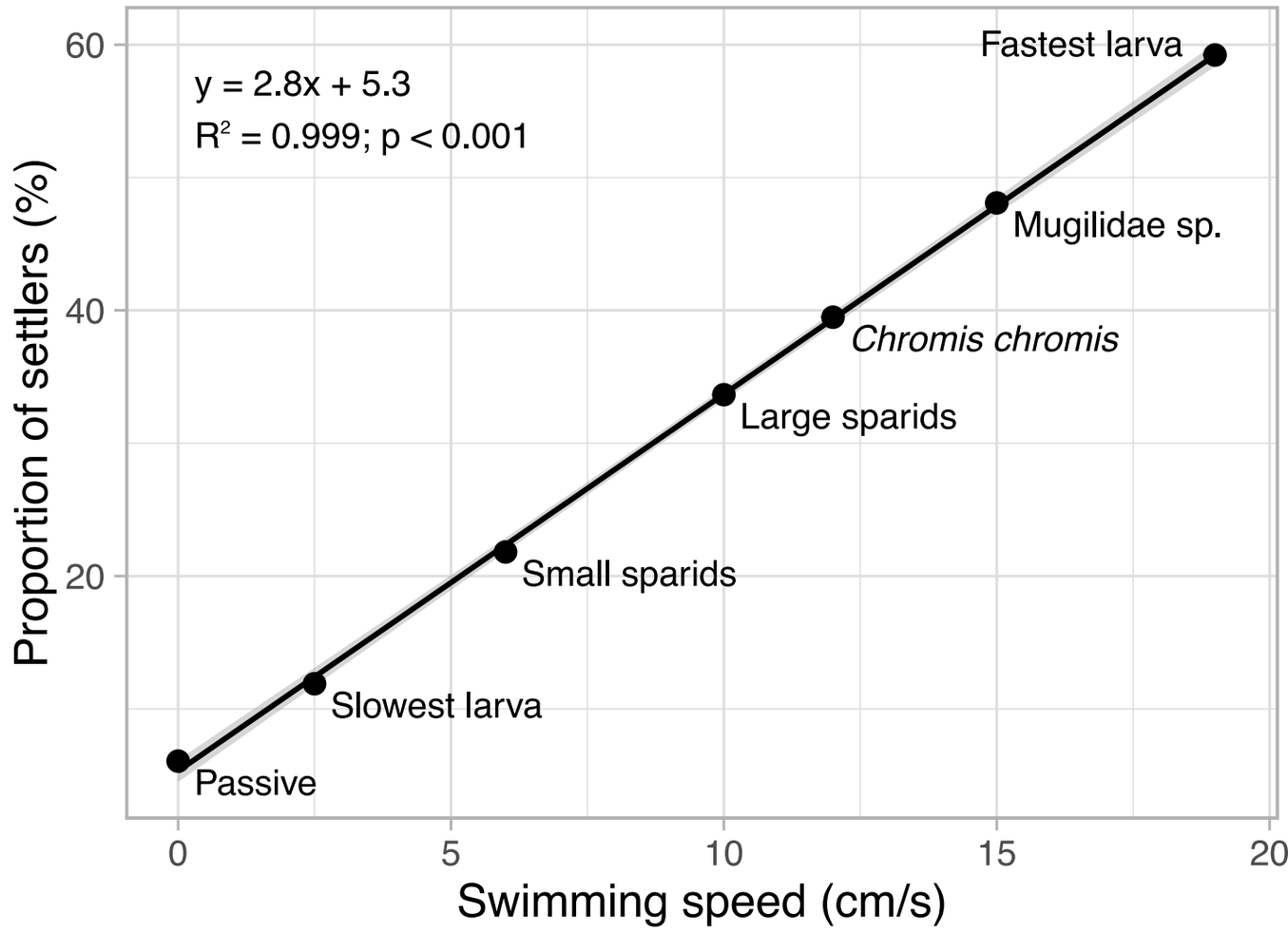
Settlement probability map

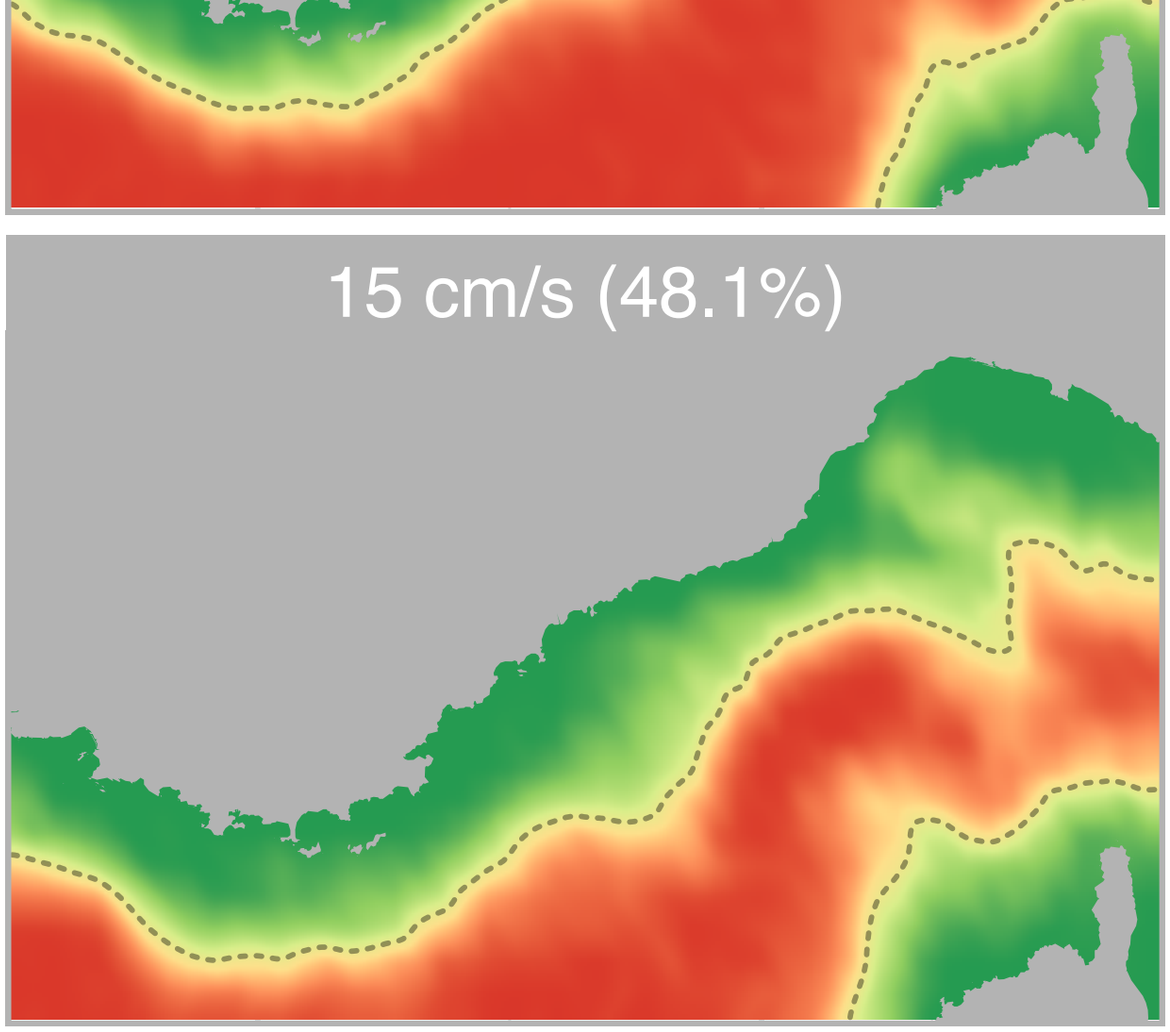
Settlement possible from **>20km away** in only 4 days

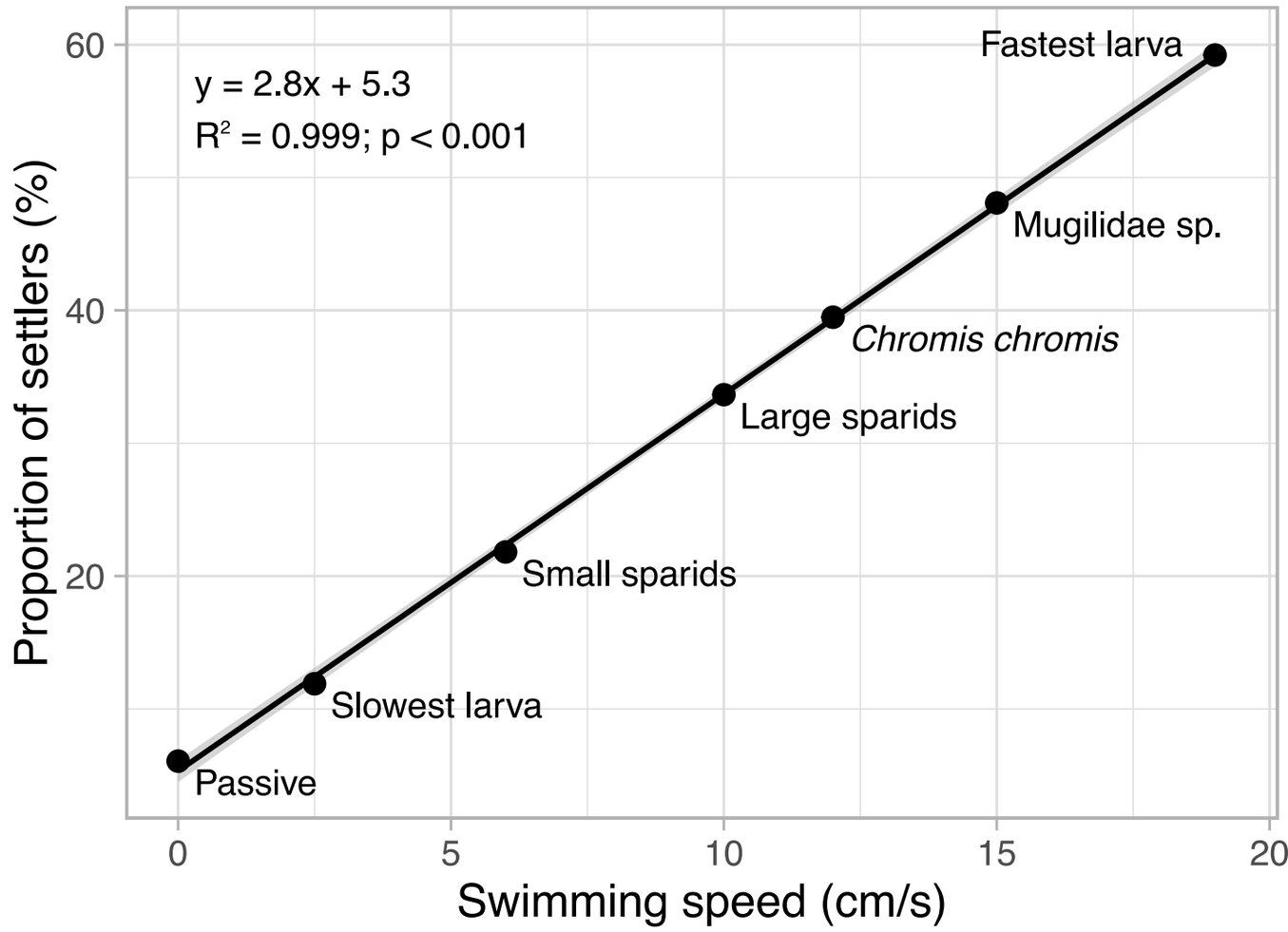
Settlement **proportion** ⟶ ×10




assive (6.1%)
ibes
ez
2.5 cm/s (11.9%)
cm/s (21.8%)
10 cm/s (33.7%)
2 cm/s (39.5%)
15 cm/s (48.1%)
cm/s (59.2%)
Settlement probability
0.00
0.25
0.50
0.75
1.00


y = 2.8x + 5.3
R² = 0.999; p < 0.001
Proportion of settlers (%)
60
40
20
0
5
10
15
20
Swimming speed (cm/s)
Fastest larva
Mugilidae sp.
Chromis chromis
Large sparids
Small sparids
Slowest larva
Passive


15 cm/s (48.1%)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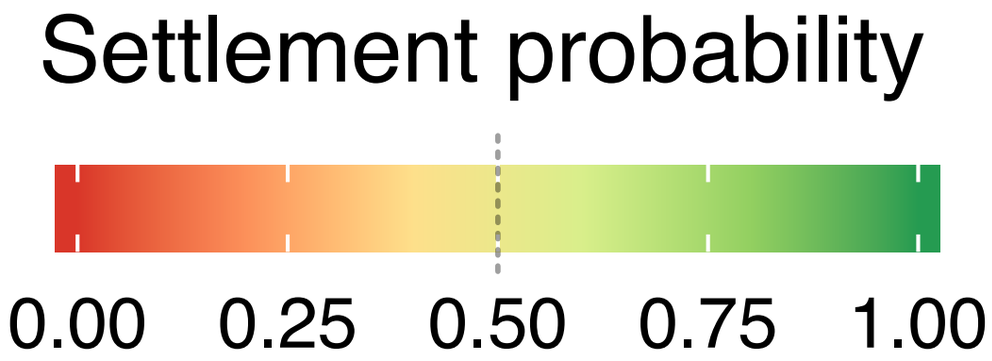
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It would be especially desirable to ascertain the extent of such movement, and **how far the young fry are able to return, of their own volition**, to such localities as offer favourable condition; for their further growth.

From very far!

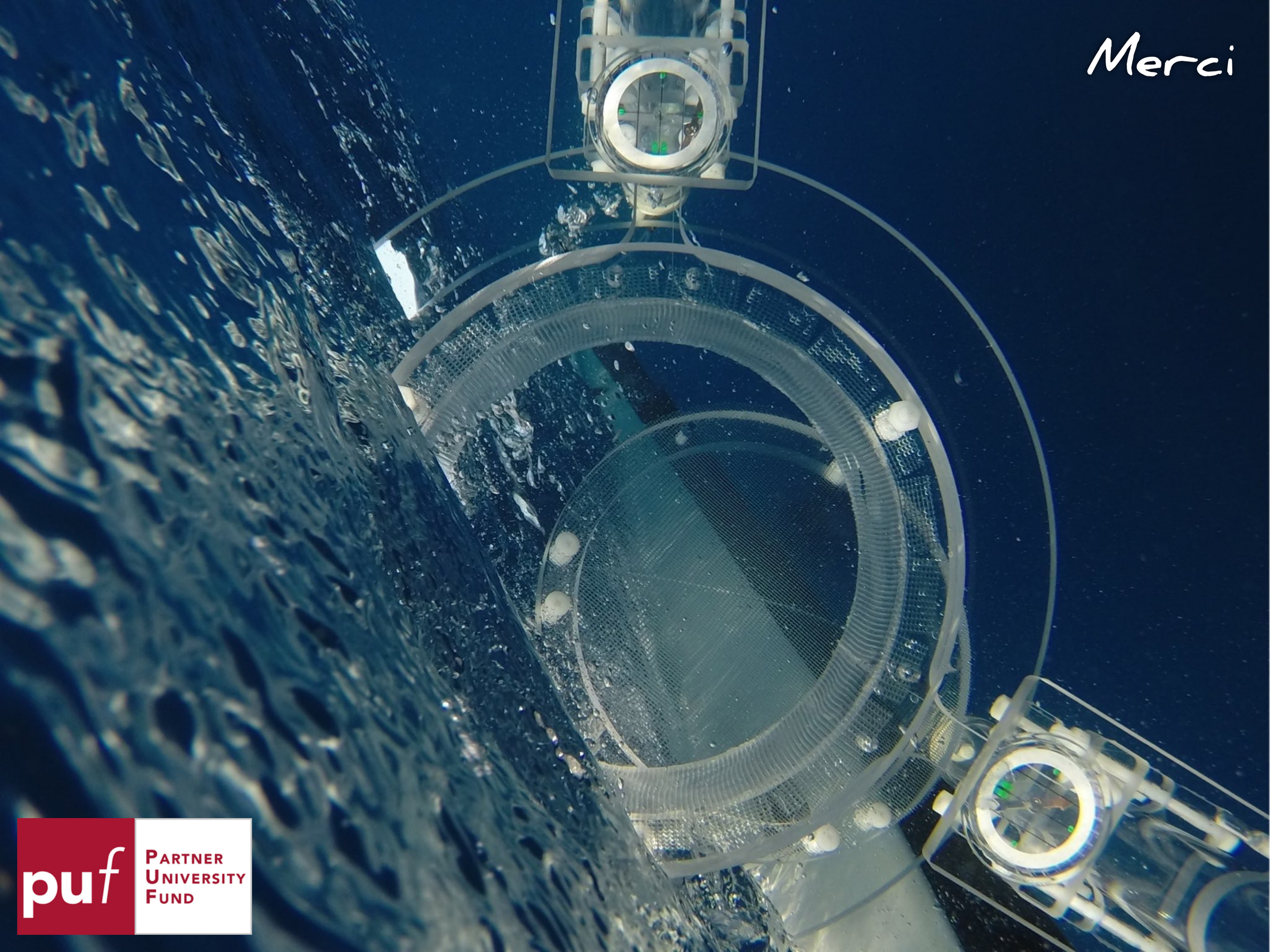
Advection is (almost) **negligible** compared to swimming at the end of the larval stage

Key research perspectives

- More species to examine **generality**
- **Mechanism** for incredibly high speeds in larvae
- Better understanding of **orientation** over large scales

Merci

puf
PARTNER
UNIVERSITY
FUND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