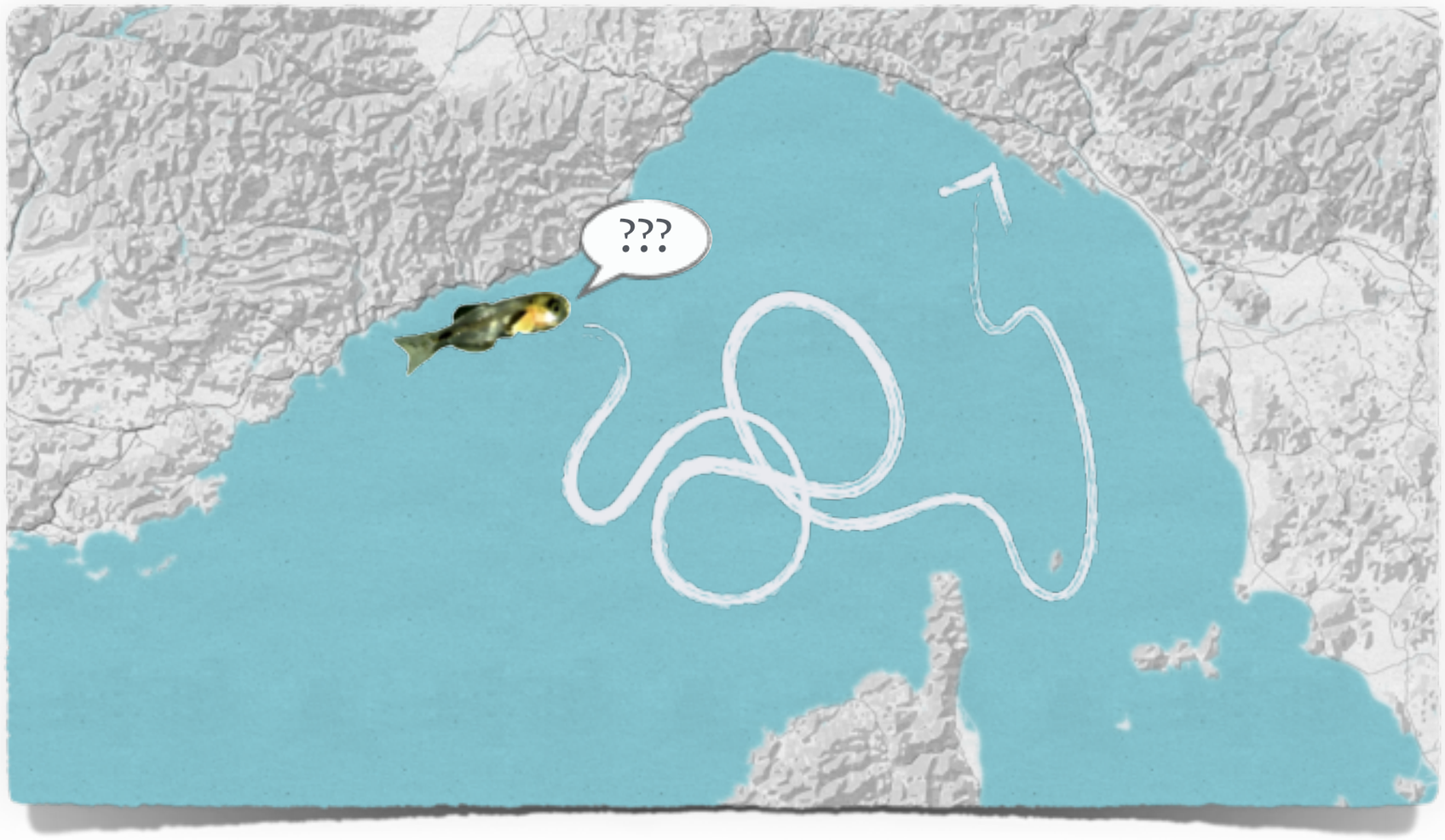
BEHAVIOUR VERSUS OCEANIC CURRENTS DURING THE DISPERSAL OF LARVAL FISH IN THE NORTHWESTERN MEDITERRANEAN SEA

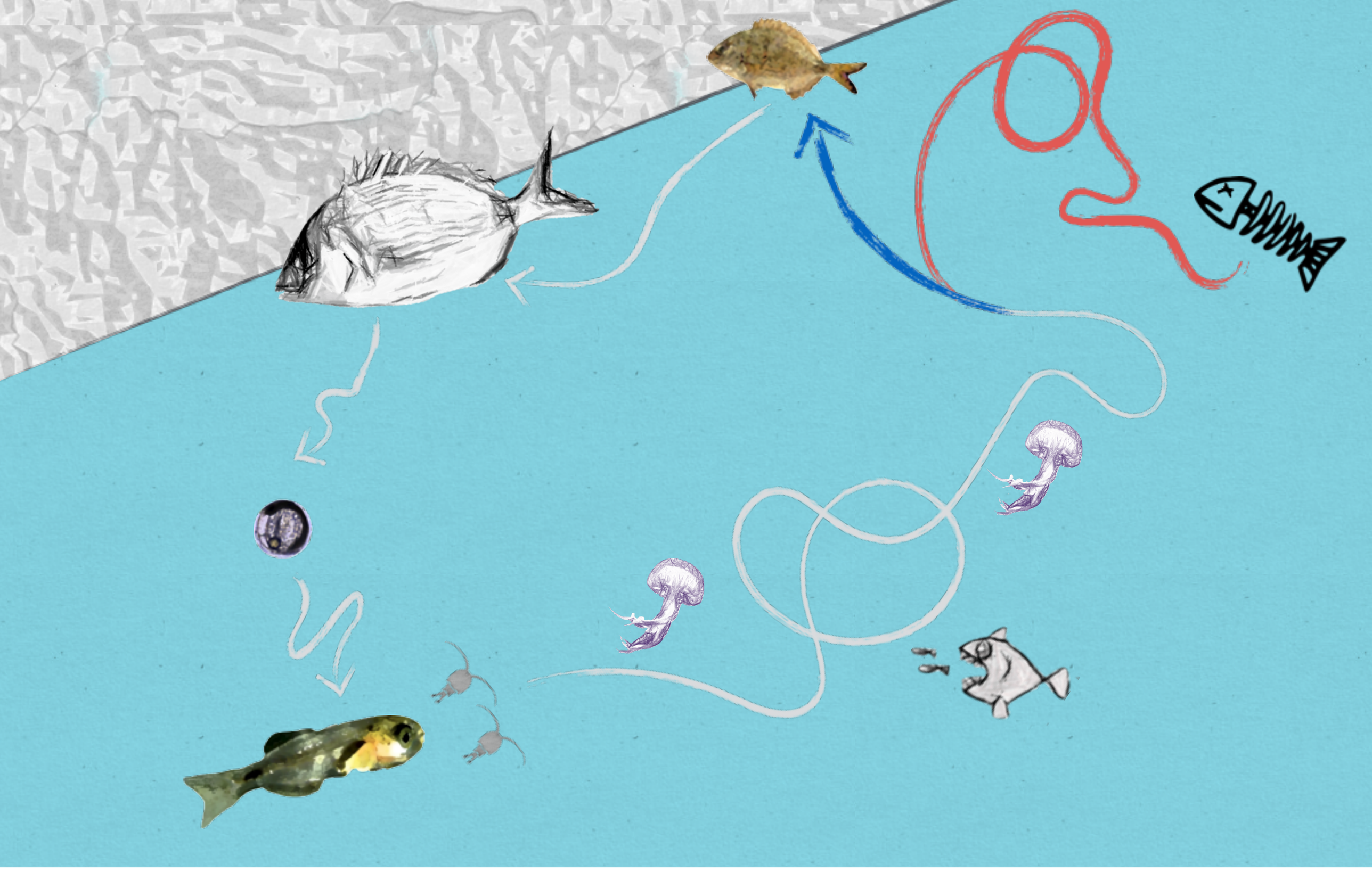


Faillettaz, Robin; Blandin, A.; Durand, E.;
Paris, C.B.; Irisson, J.O

ASLO 2015

Connectivity

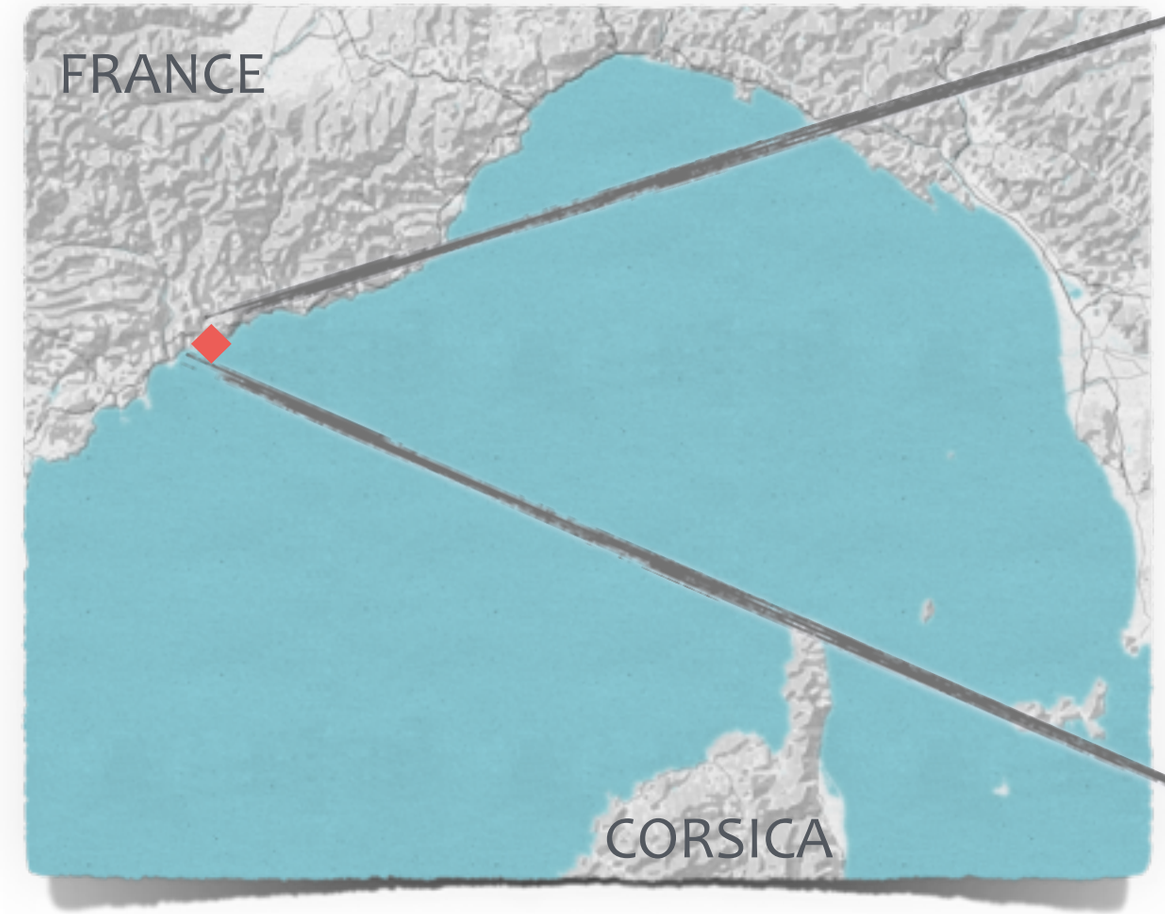
Demography
Genetics
Distribution

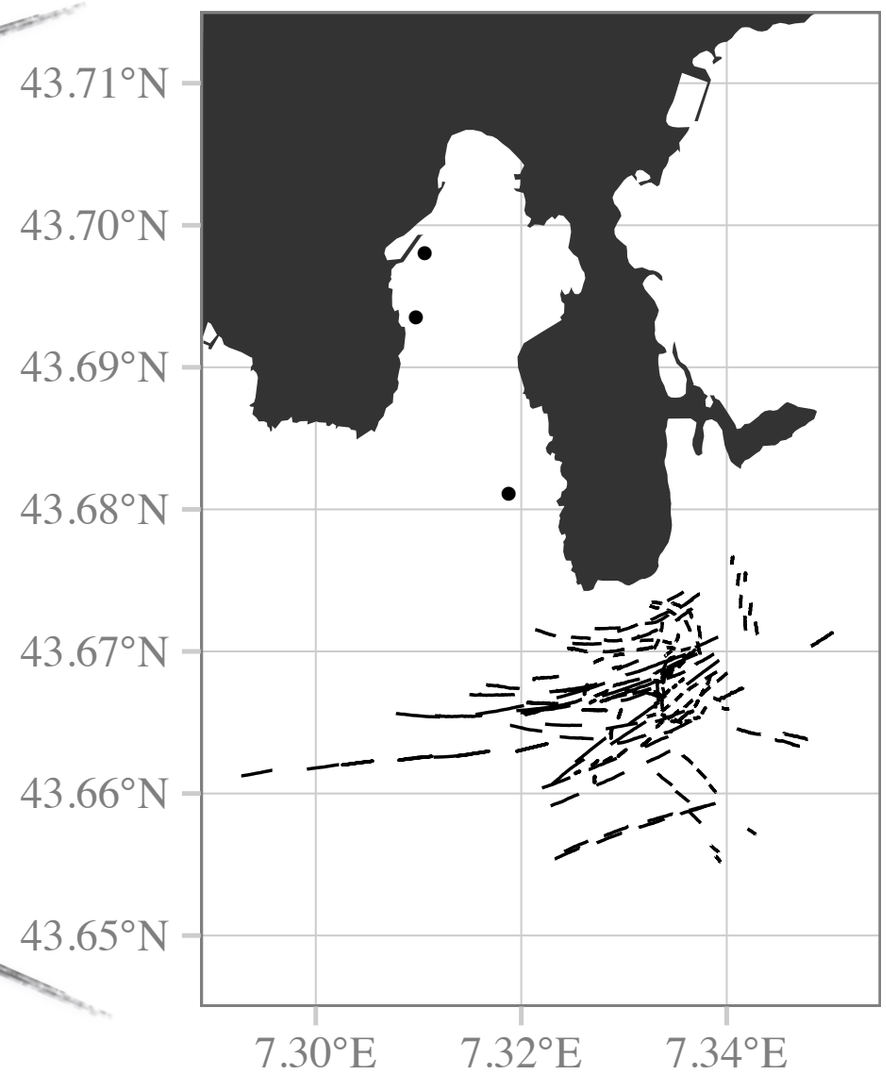


Life history

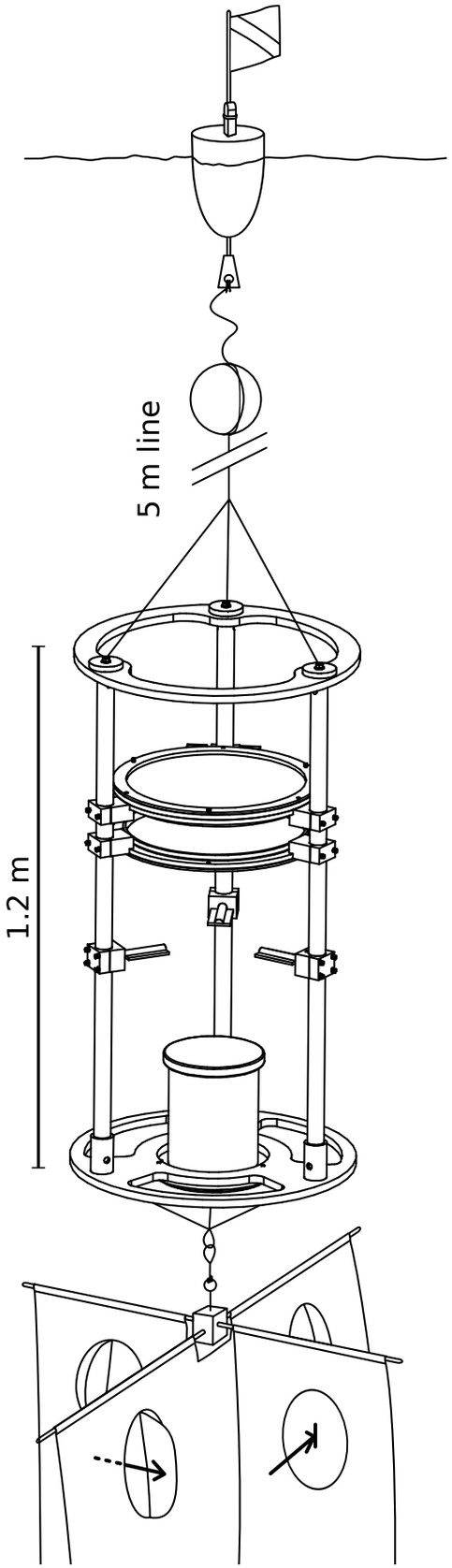
Adult —> Eggs —> Larvae —> Juveniles —> Adult

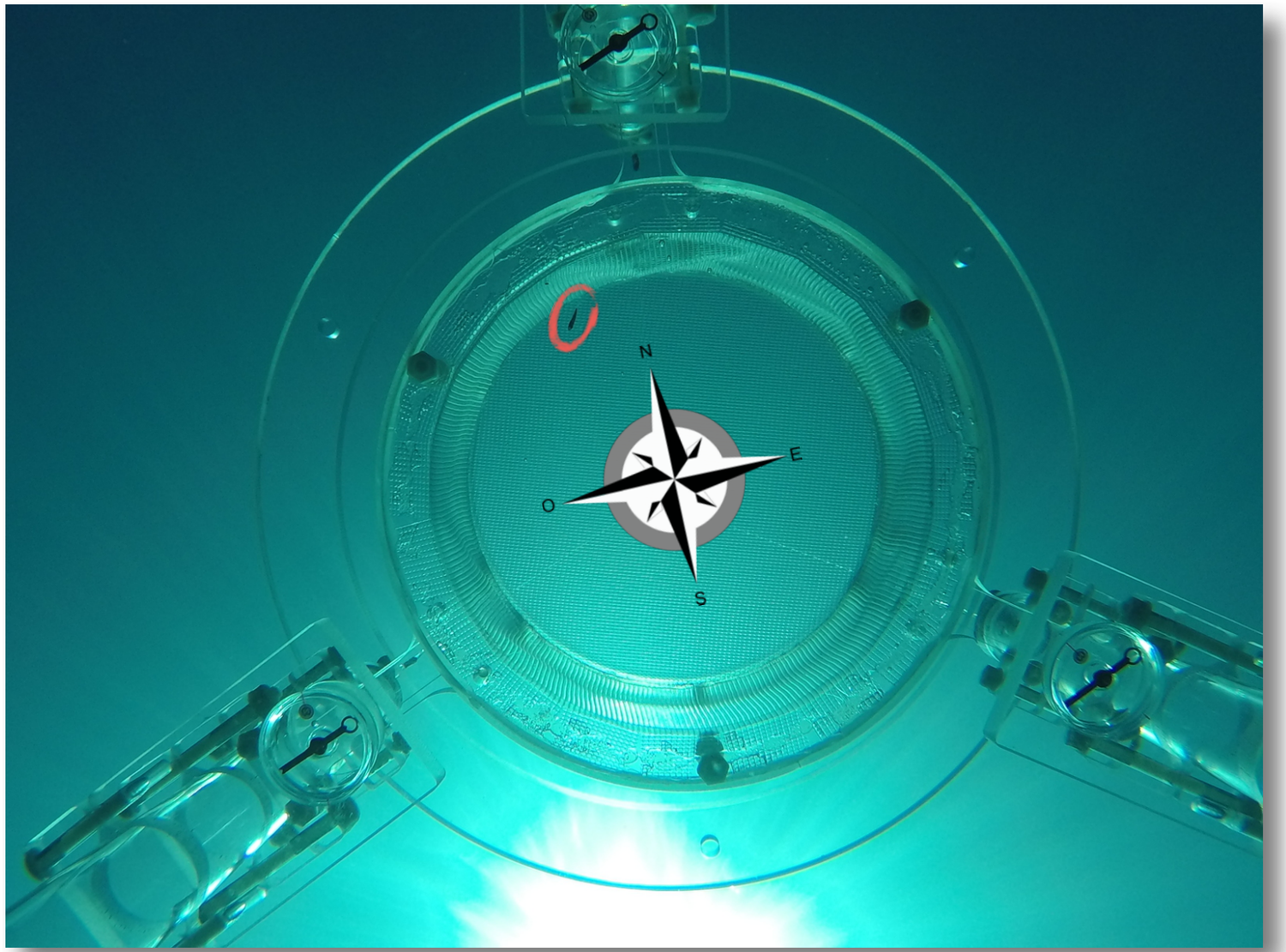
Measuring larval fish orientation: DISC





Measuring larval fish orientation: DISC





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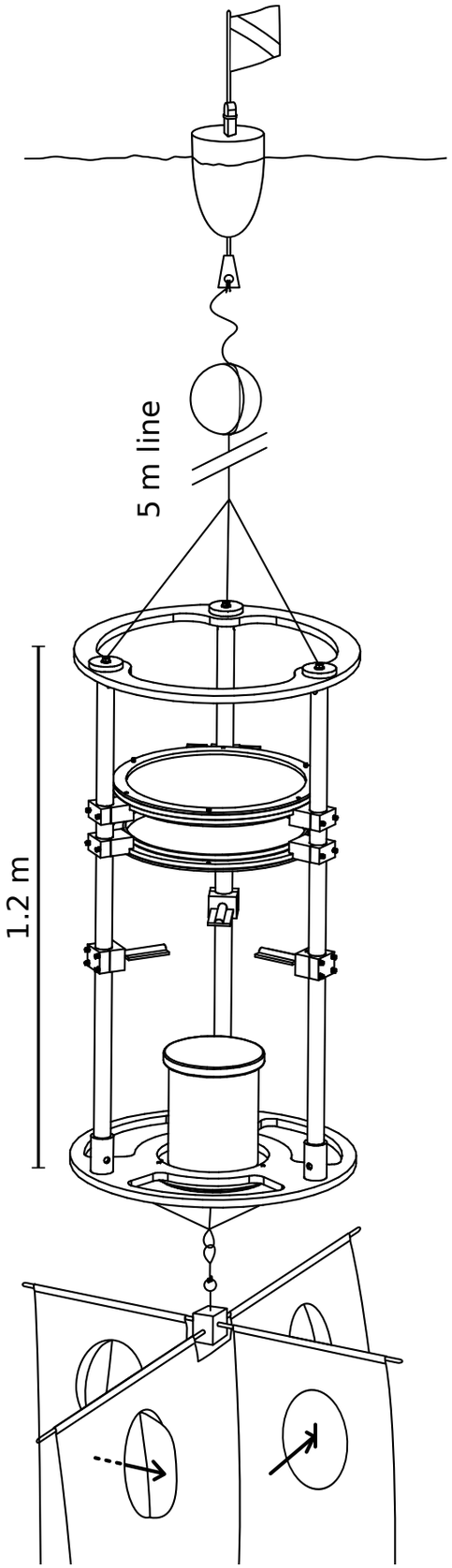
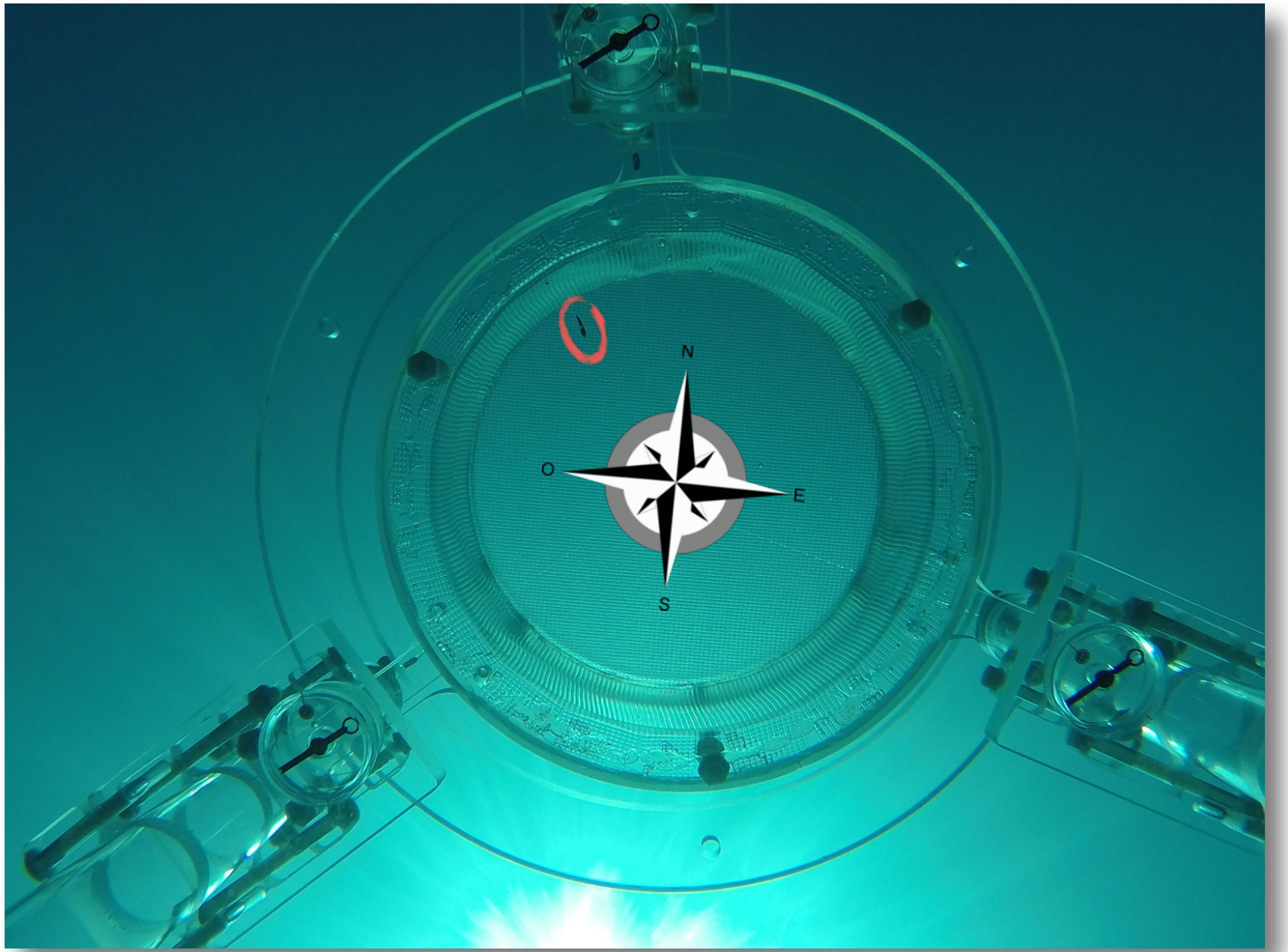
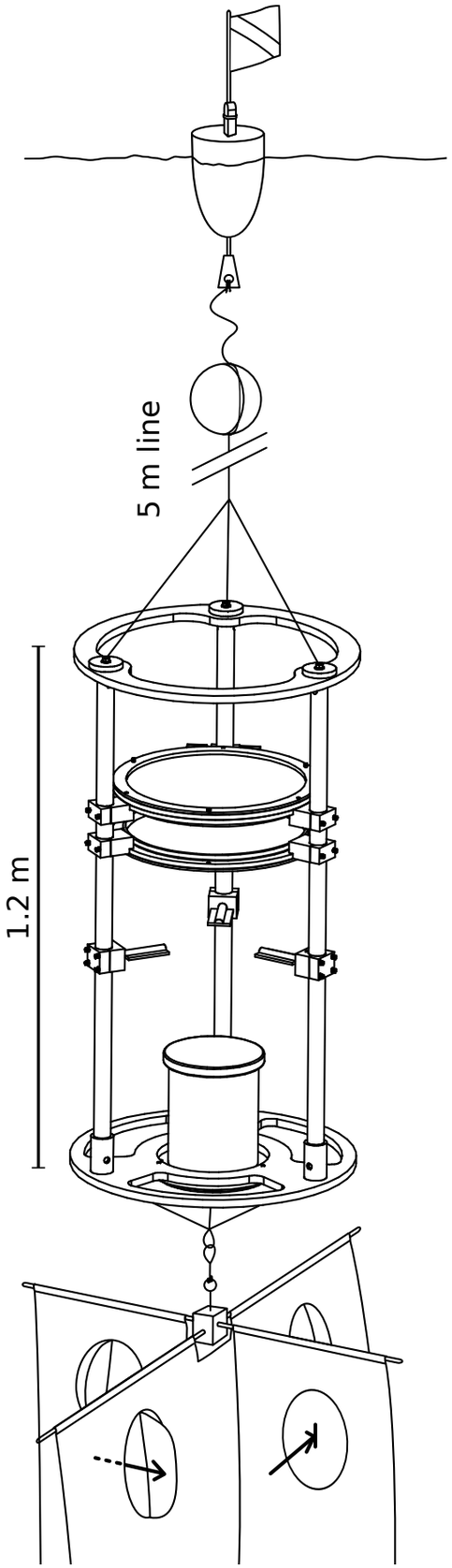


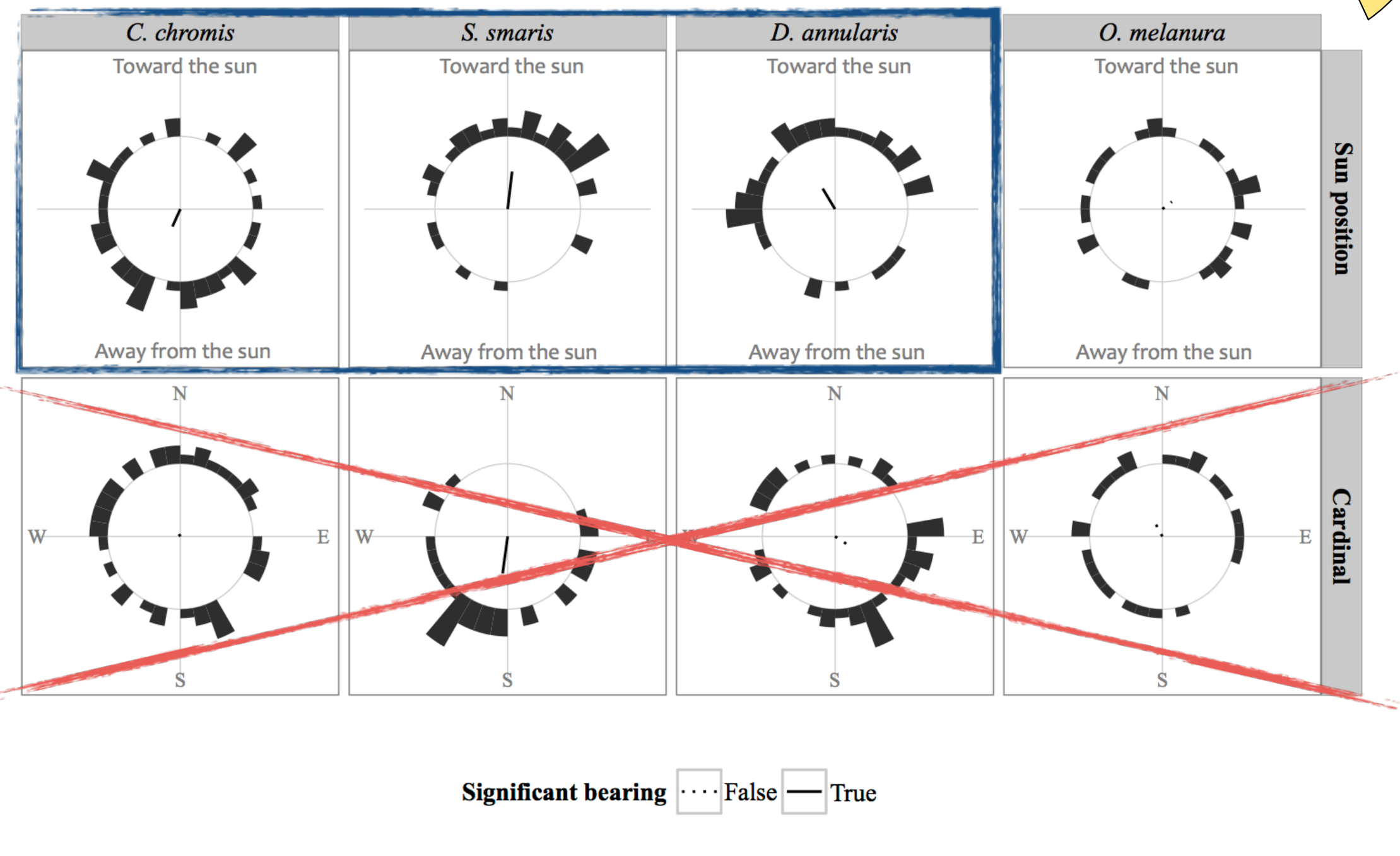


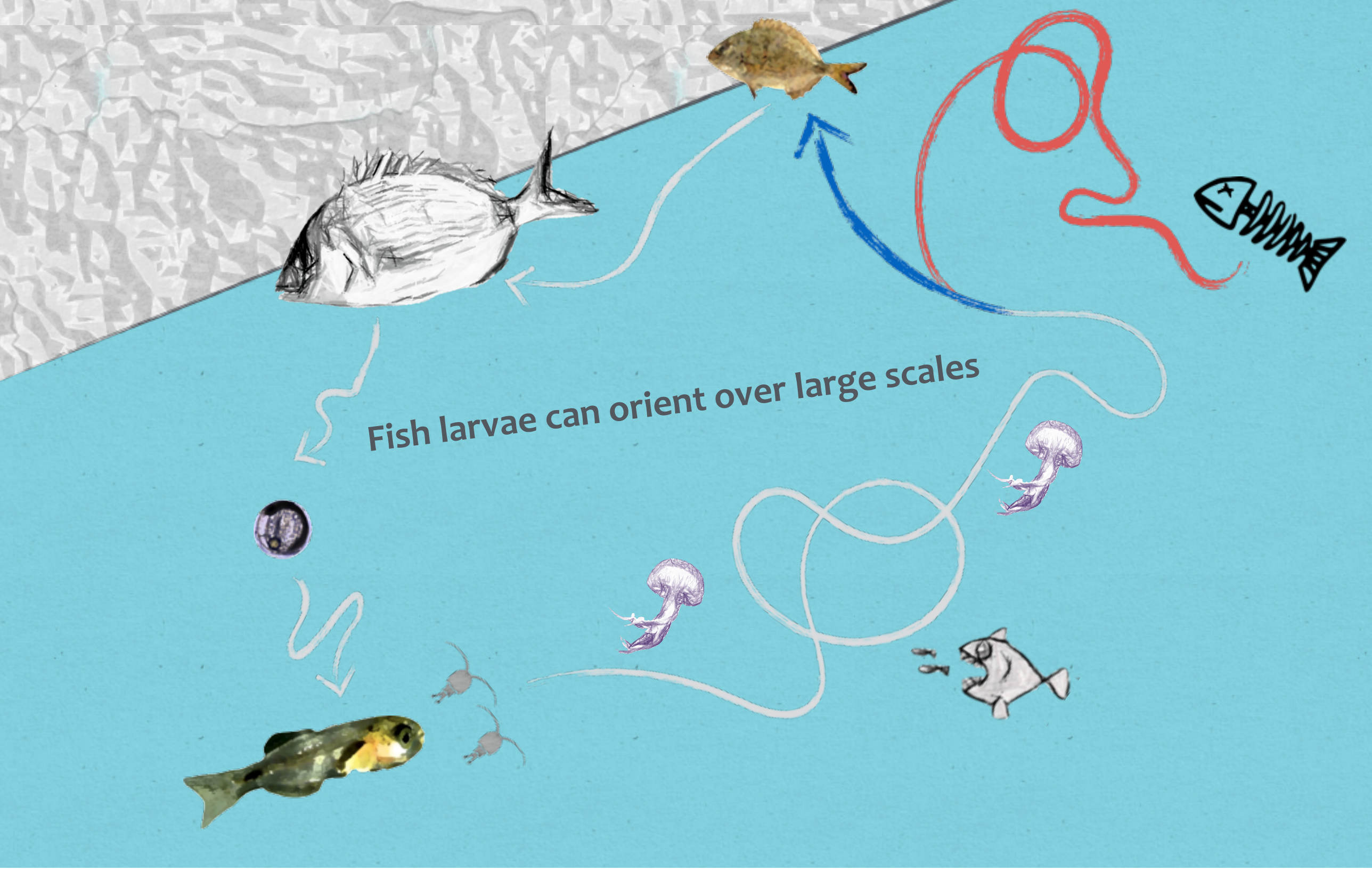
Measuring larval fish orientation: DISC



Measuring larval fish orientation: DISC

> 85 % of larvae significantly keep a bearing

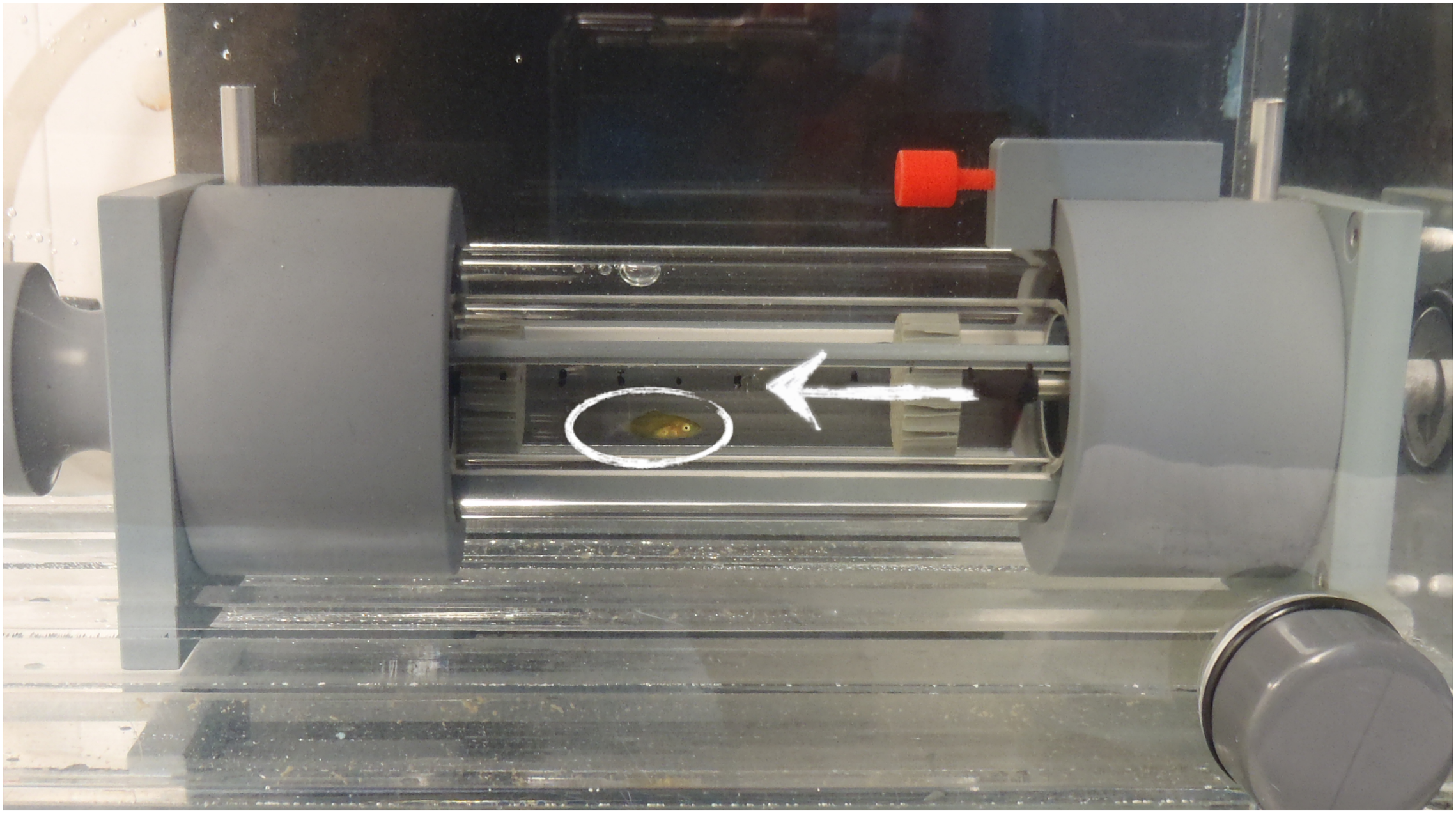




Life history

Adult —> Eggs —> Larvae —> Juveniles —> Adult

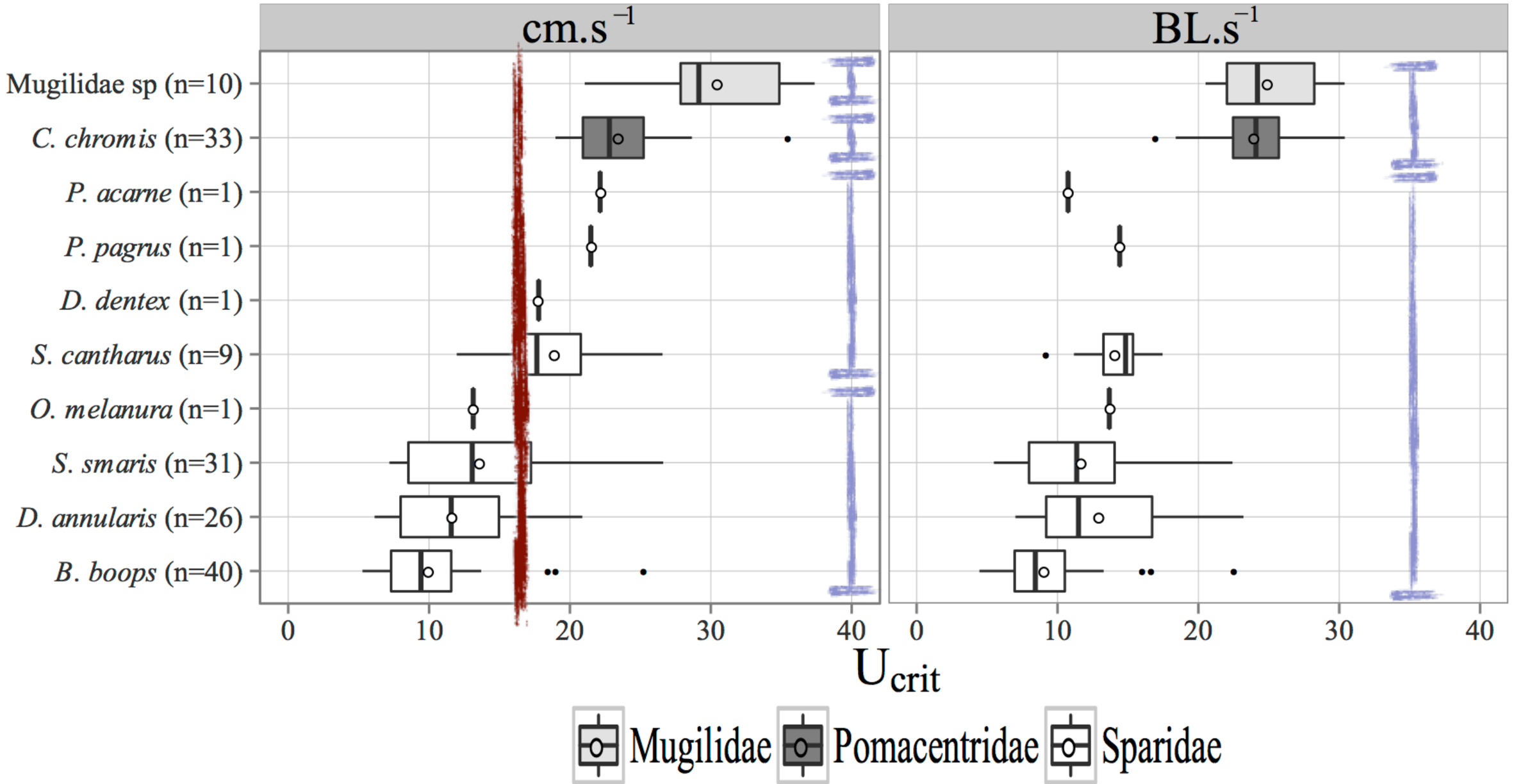
Measuring critical swimming speed (U_{crit})



***In situ* swimming speed = 1/2 U_{crit}**

Measuring critical swimming speed (U_{crit})

Average current speed



Fastest human : 7.67 km/h = **1.1 BL.s^{-1}**

Fastest fish : 109 km/h = **15.1 BL.s^{-1}**

Mullet larva : 1.26 km/h = **30.4 BL.s^{-1}**

Bonus = fastest car : 434 km/h = **27 BL.s^{-1}**

Fish larvae can orient over large scales

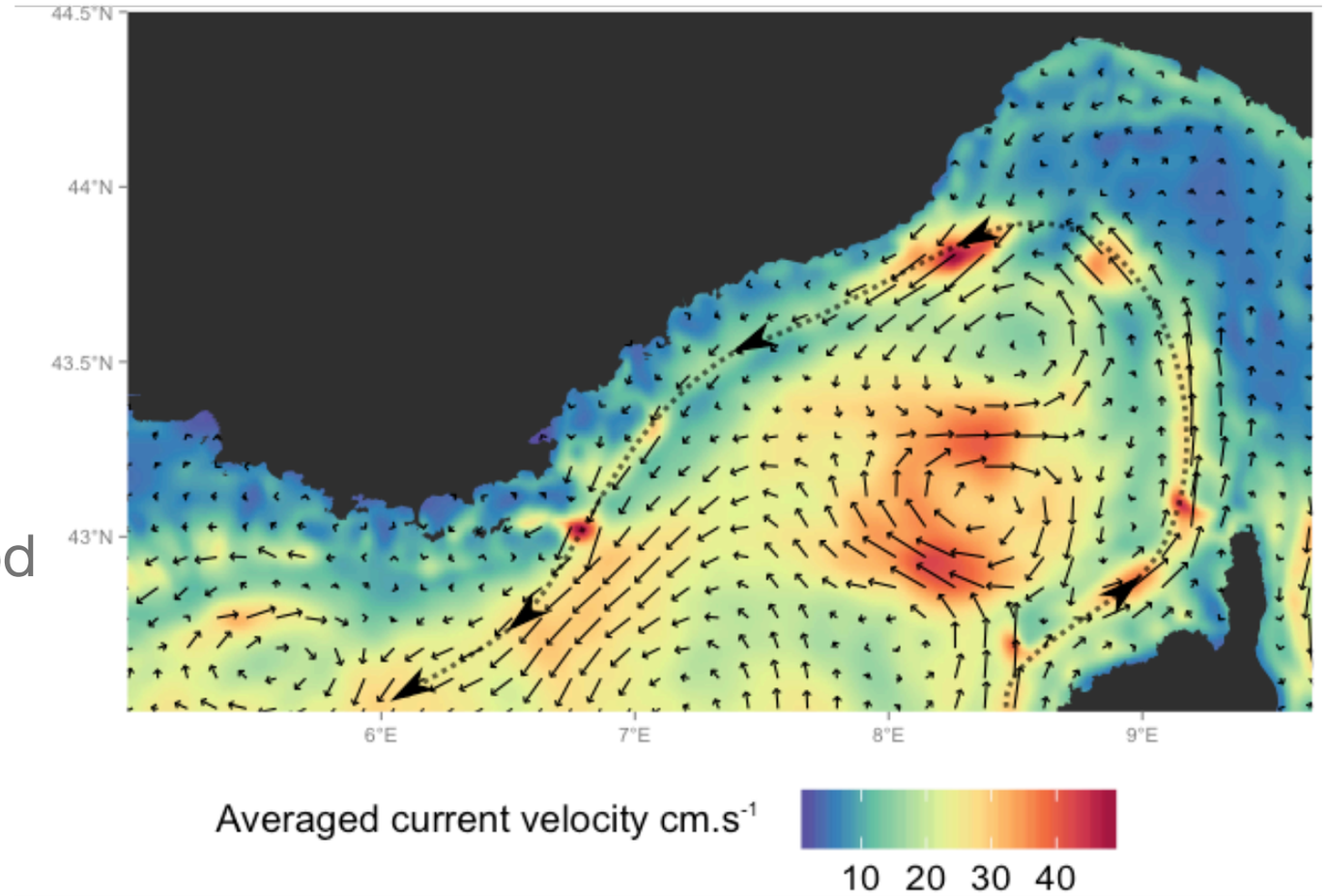
Fish larvae can swim quite fast

Life history

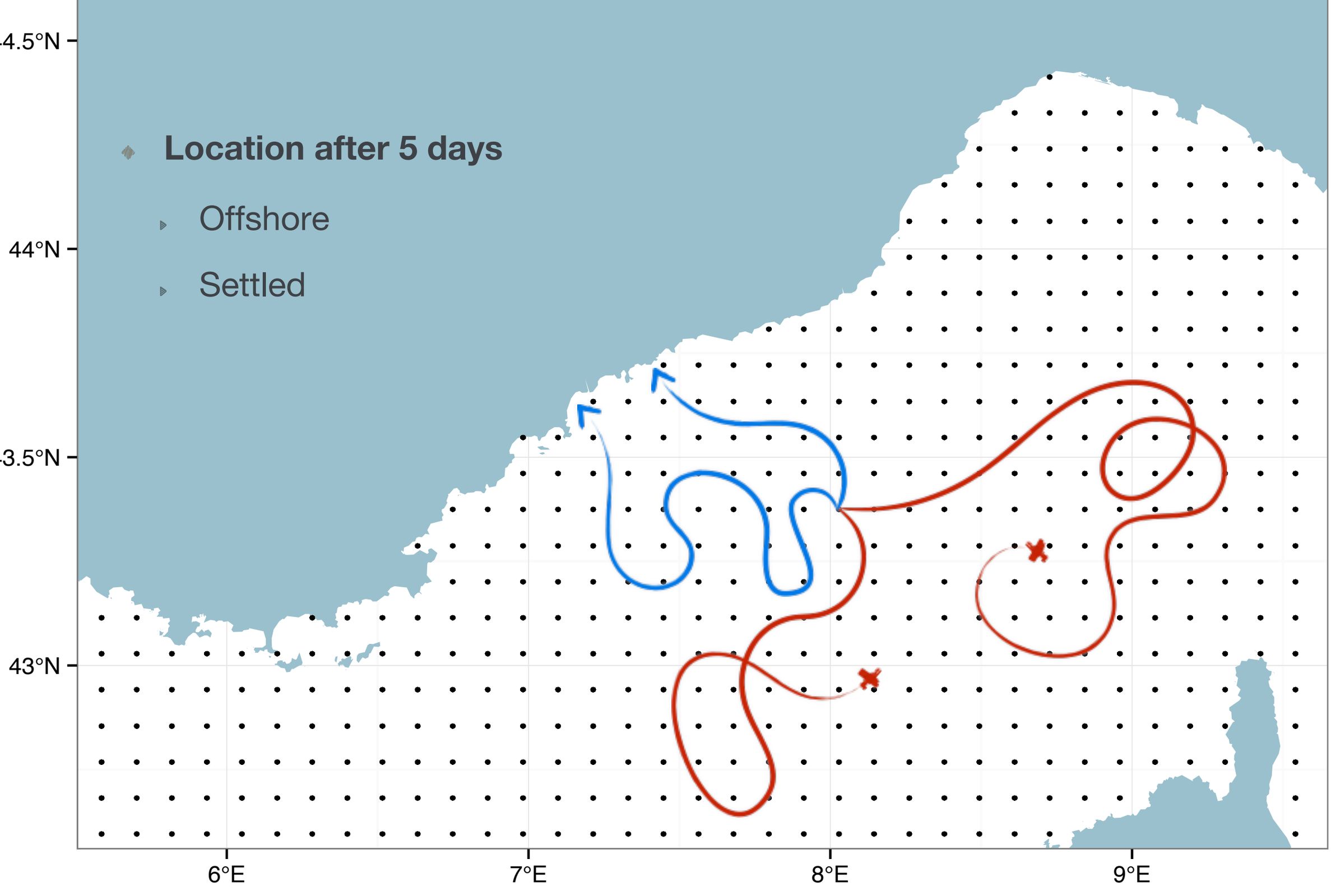
Adult —> Eggs —> Larvae —> Juveniles —> Adult

Modeling larval fish dispersal

- Biophysical dispersal model
- MARS3D current fields
  - Grid 1/64° = 1.2 km
  - 3h time-steps
  - June 2014 during settlement period



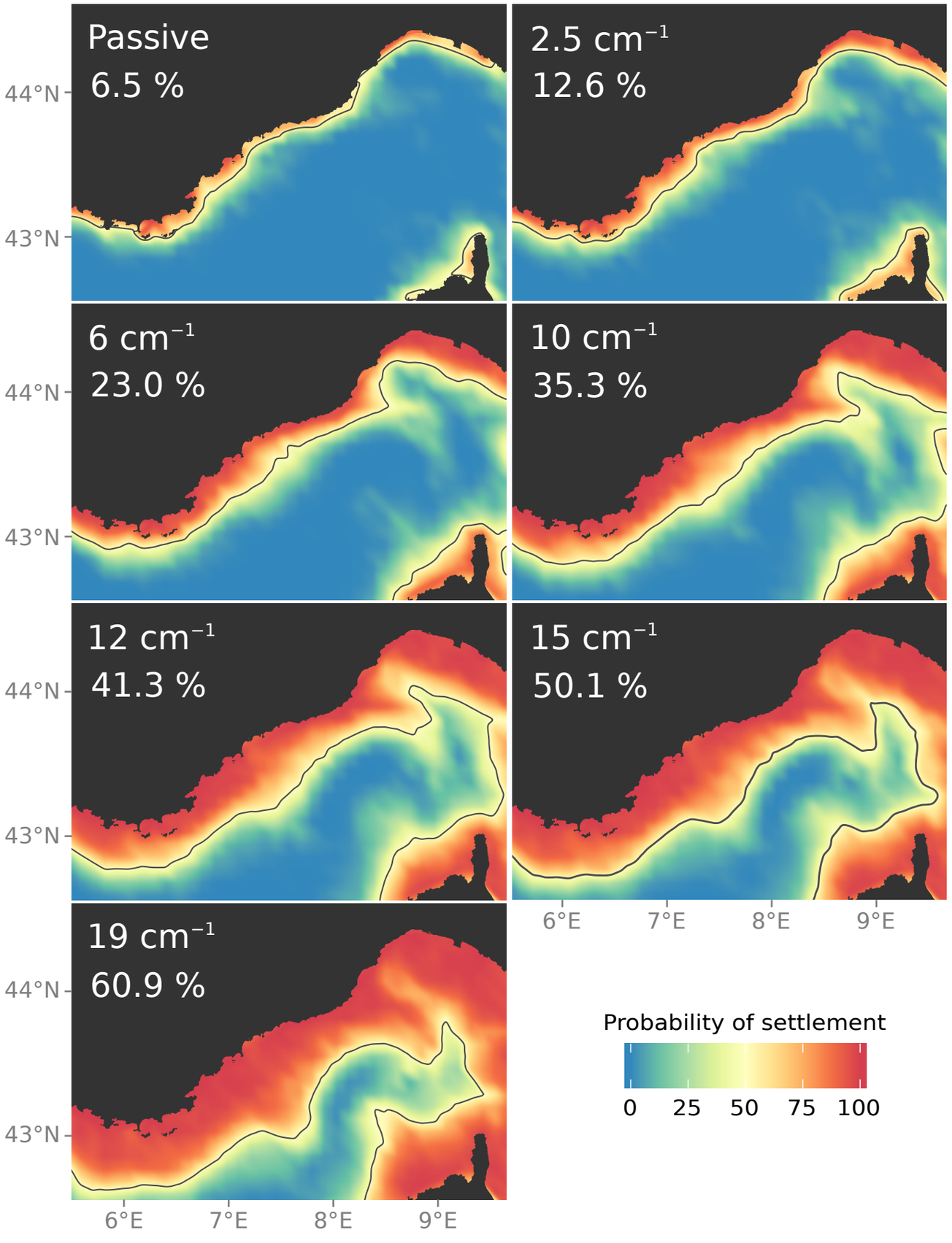
- Behavioural module
  - Orientation = fixed toward the coast
  - Swimming speed
    - 0 $cm.s^{-1}$
    - Slowest
    - Measured U_{crit} (4 morphological groups)
    - Fastest



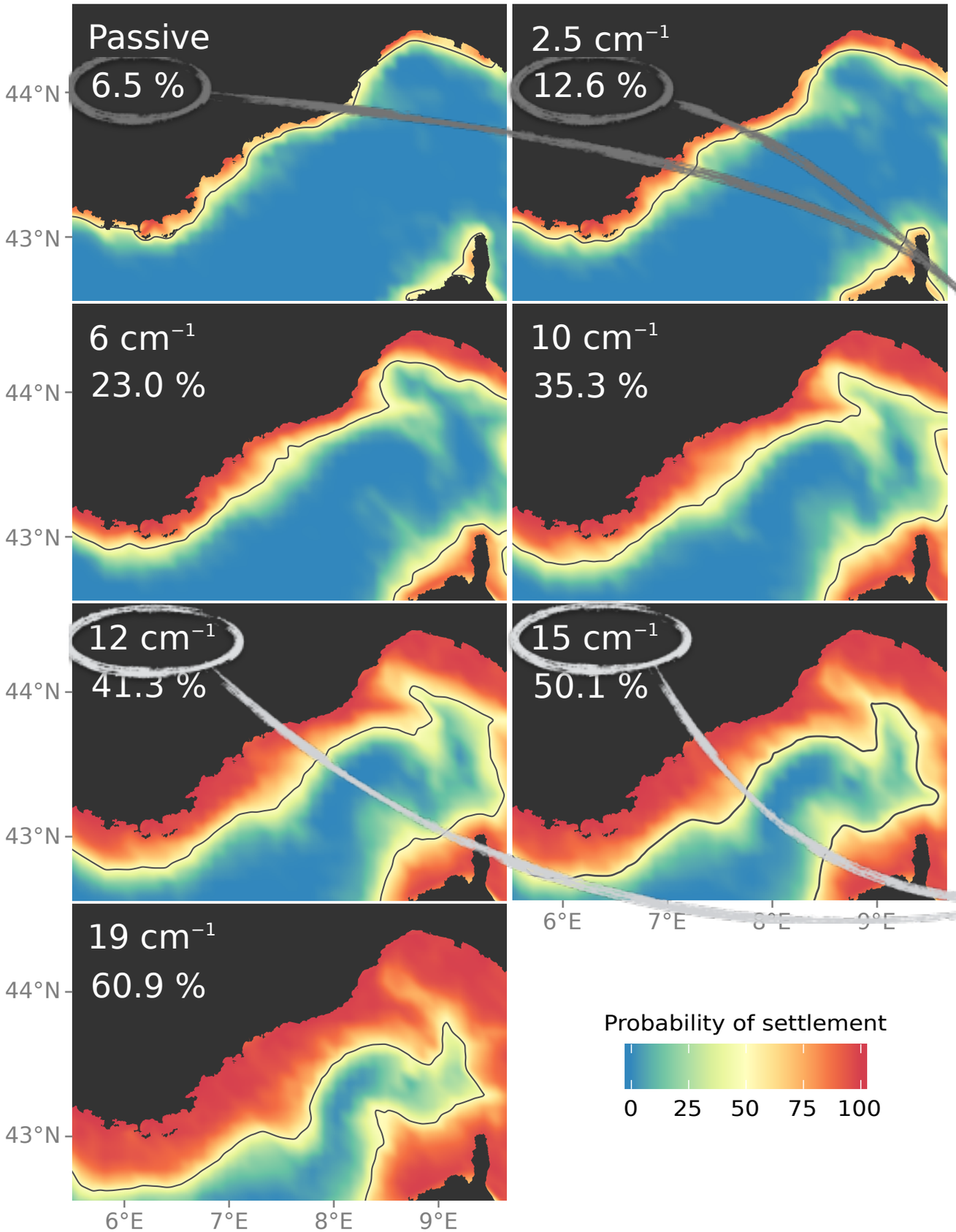
Release of virtual larvae

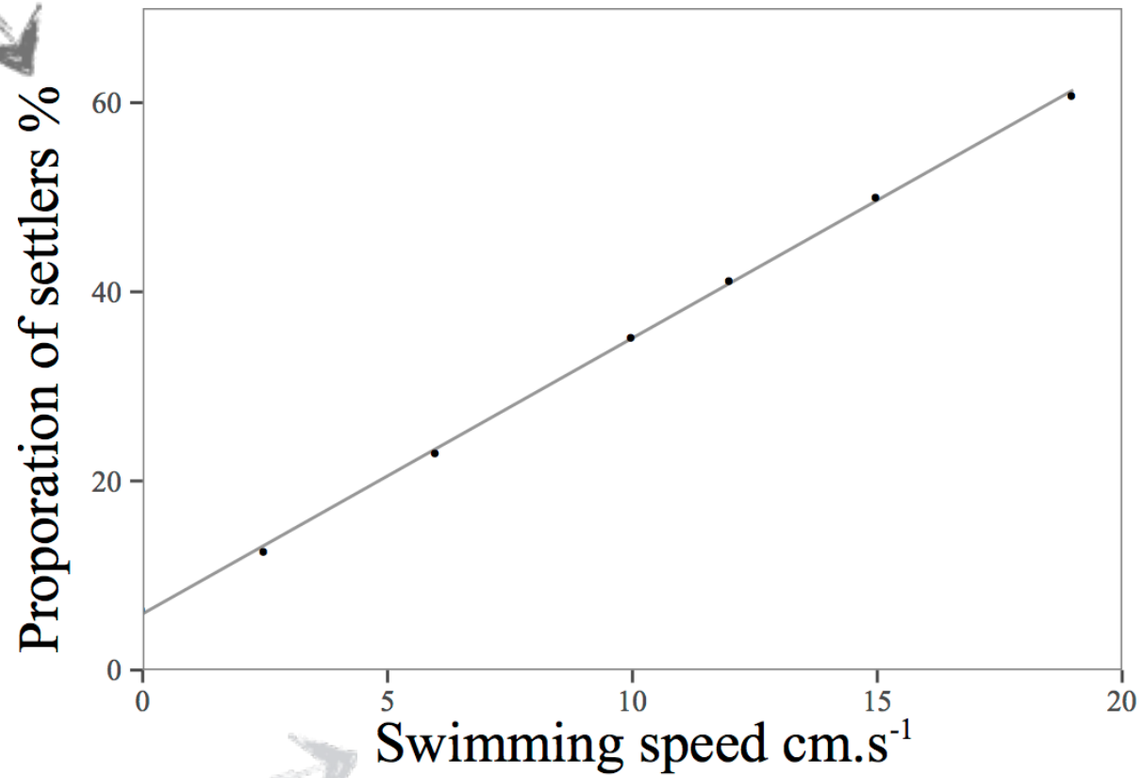
7 simulations each with **> 2 000 000 virtual larvae**

Modeling larval fish dispersal



Modeling larval fish dispersal





Conclusion

HJORT'S "ABERRANT DRIFT HYPOTHESIS"

Oceanographic currents determine larval transport and may hinder survival

Conclusion

HJORT'S "ABERRANT DRIFT HYPOTHESIS"

WE OBSERVED THAT FISH LARVAE CAN…

✓ Use **coastal-independent cues** for orientation

✓ **Swim quite fast**

✓ **Settle from up to tens of km** from the coast with active swimming

Conclusion

HJORT'S "ABERRANT DRIFT HYPOTHESIS"

WE OBSERVED THAT FISH LARVAE CAN…

*FISH LARVAE MAY SETTLE FROM **MUCH FURTHER OFFSHORE THAN EXPECTED***

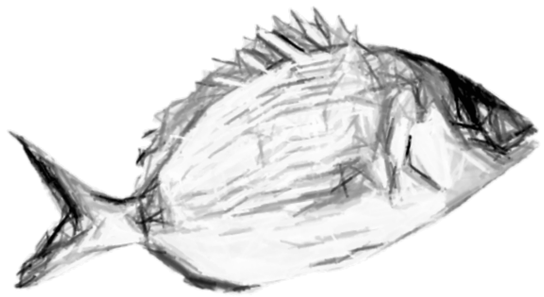
*THEY CAN BE **PASSIVE FOR WEEKS** AND **STILL SETTLE SUCCESSFULLY***

*THIS NUANCES THE **"ABERRANT DRIFT HYPOTHESIS"***

THANK YOU FOR YOUR ATTENTION !

"Rien ne sert de partir à point,
il faut courir à la fin"

modified from Jean de La Fontaine, 1668



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- My **supervisors** Philippe Koubbi and JO Irisson for their **implication**
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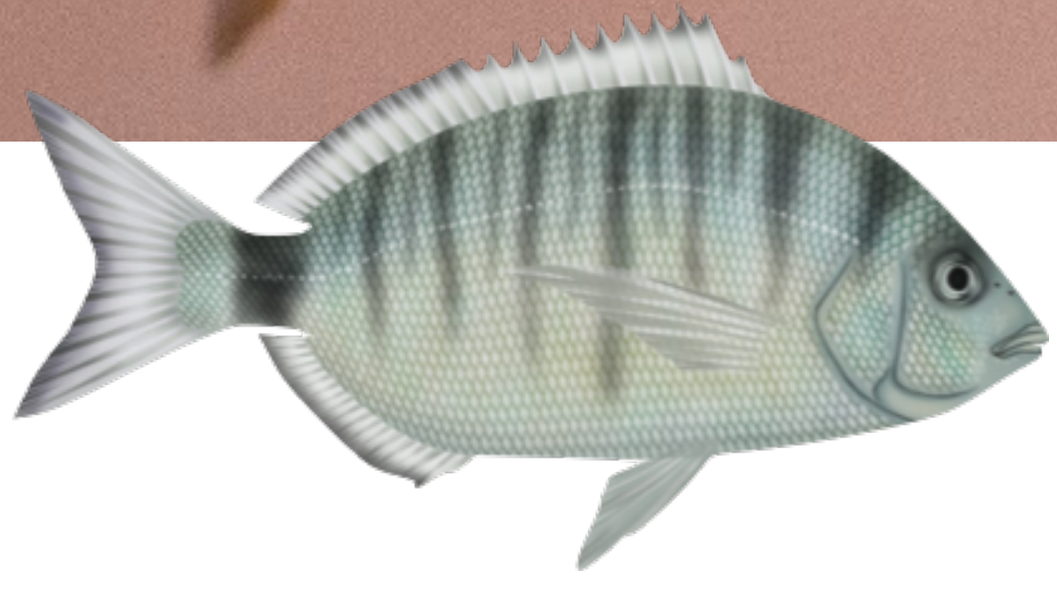
- To Lars Stemmann for its quote

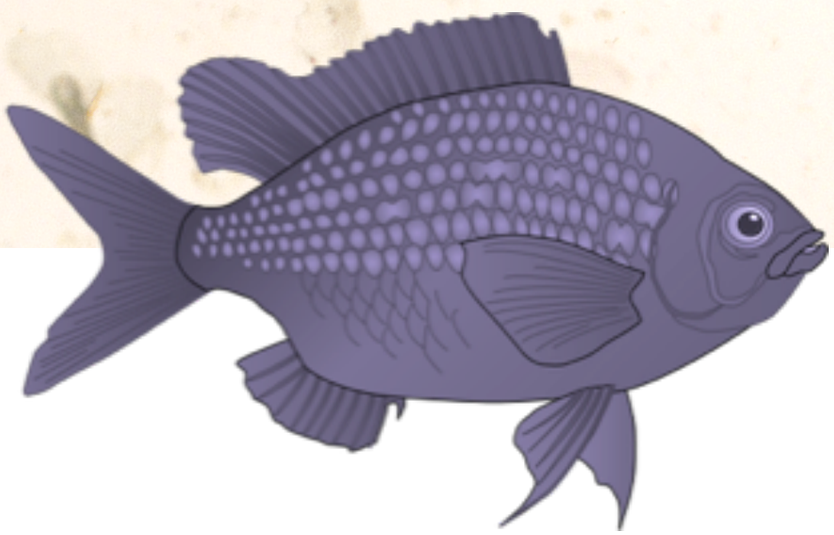
- The **Partner University Fund** that supports the field expenses
- The **French ministry of Research and Education** for funding my doctoral fellowship

12 mm

Diplodus puntazzo



10 mm



Chromis chromis