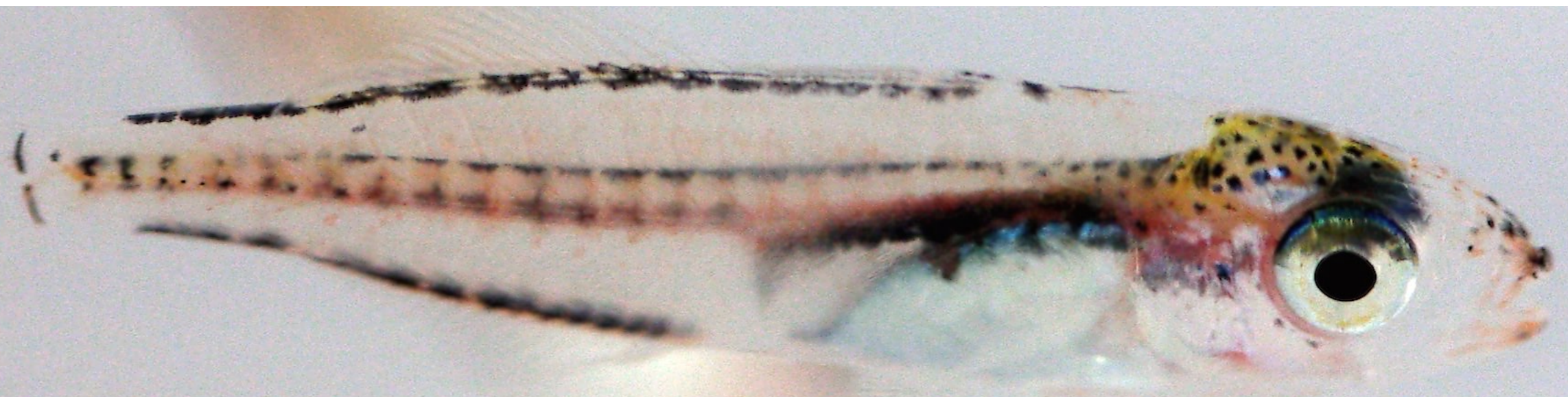


Workshop DRIVER SUBLIMO, 2015-04-27  
Faillettaz, Irisson, Koubbi, Paris, Durand, Blandin



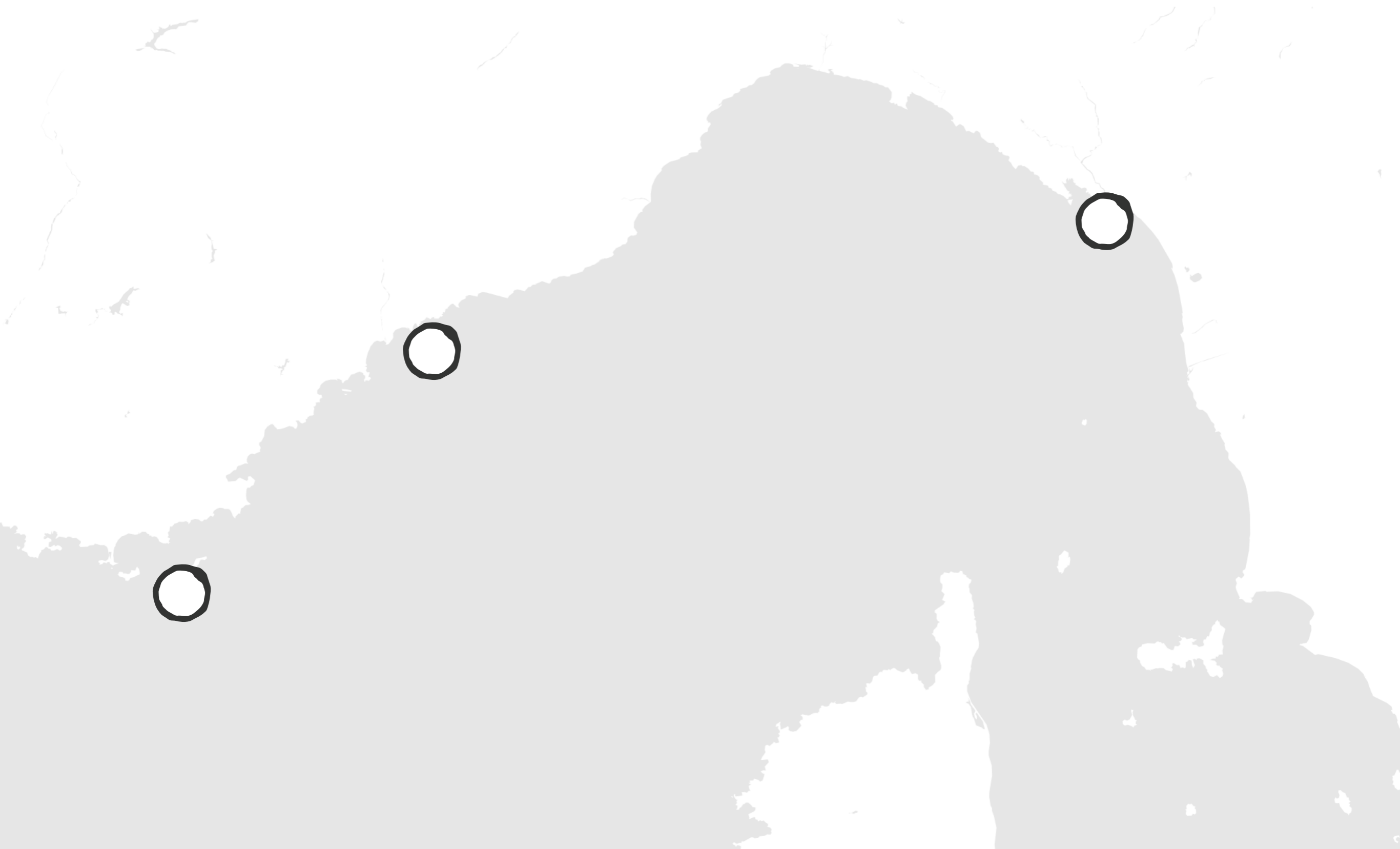
# Les larves de poissons Méditerranéens, championnes de la course d'orientation

*A vos marques... prêts... partez!*



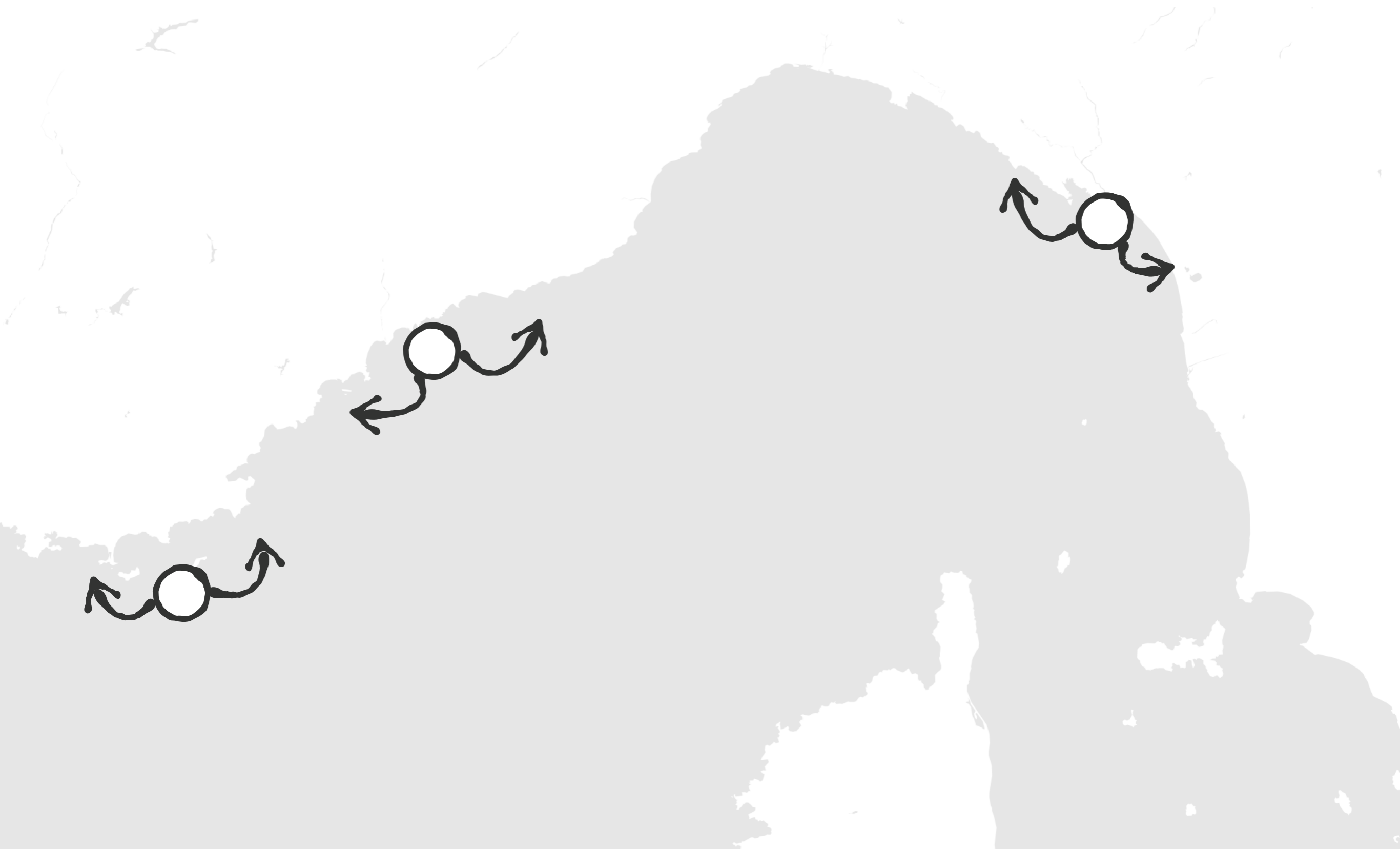
# Pourquoi les larves? = Connectivité

---



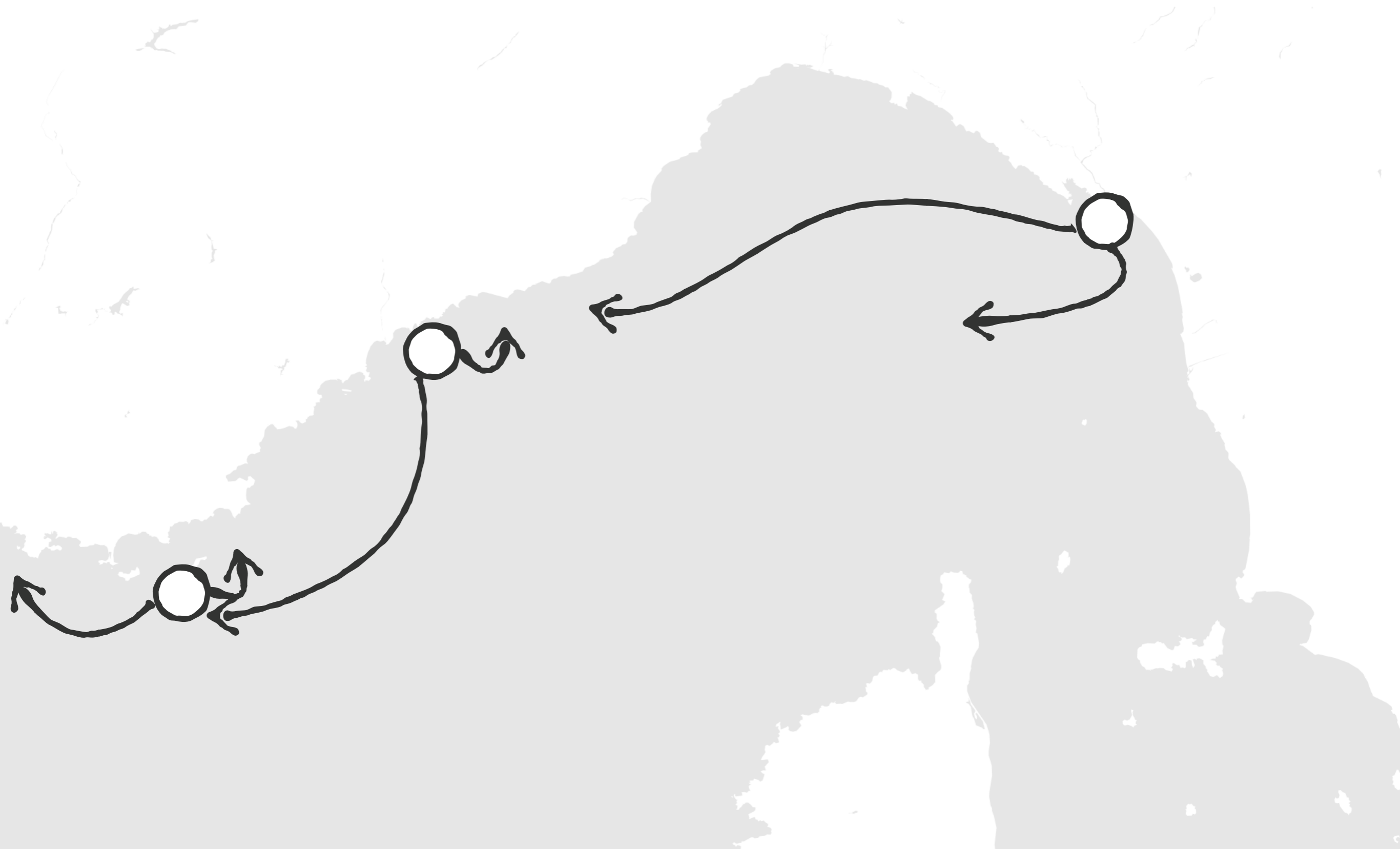
# Pourquoi les larves? = Connectivité

---



# Pourquoi les larves? = Connectivité

---



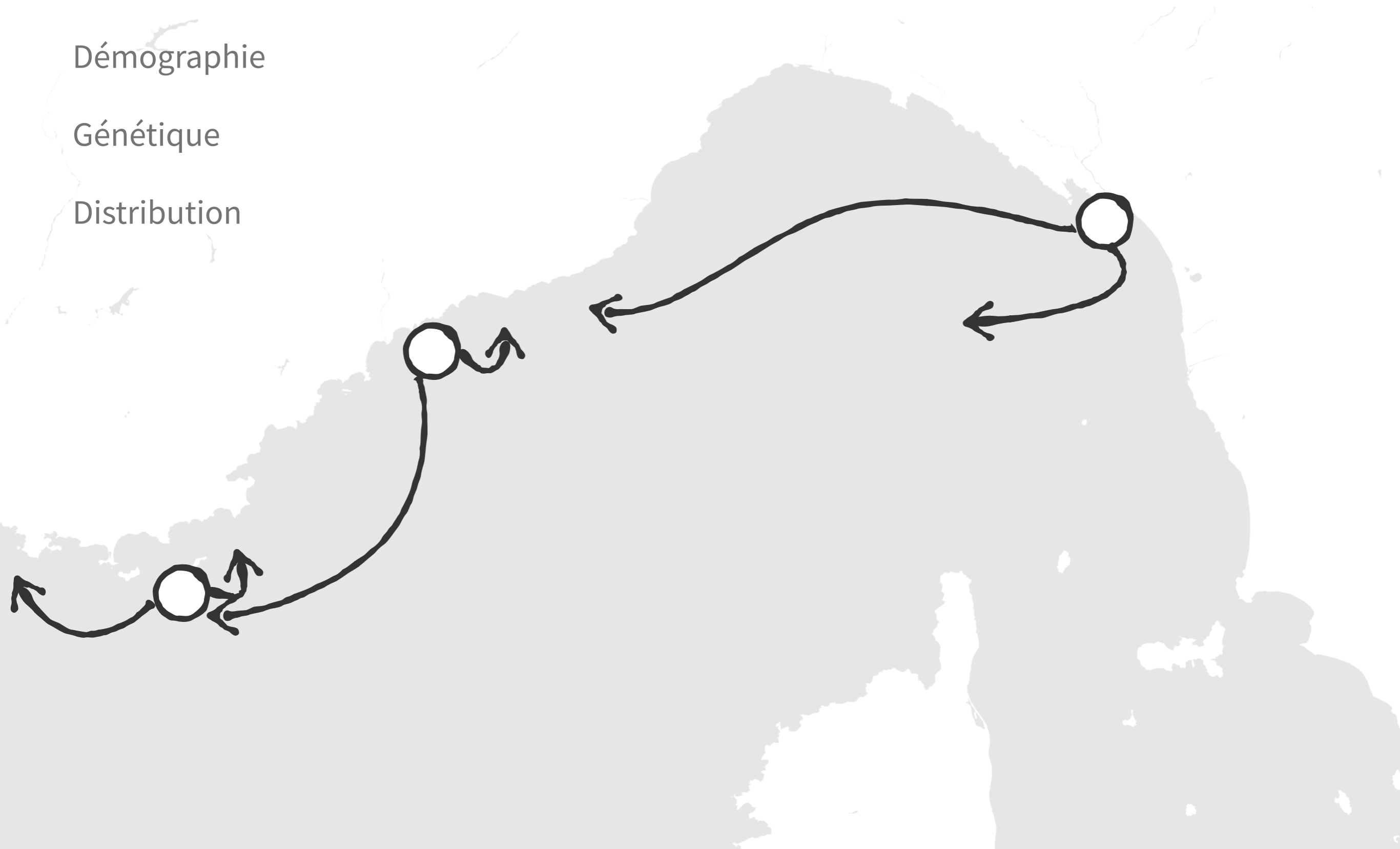
# Pourquoi les larves? = Connectivité

---

Démographie

Génétique

Distribution



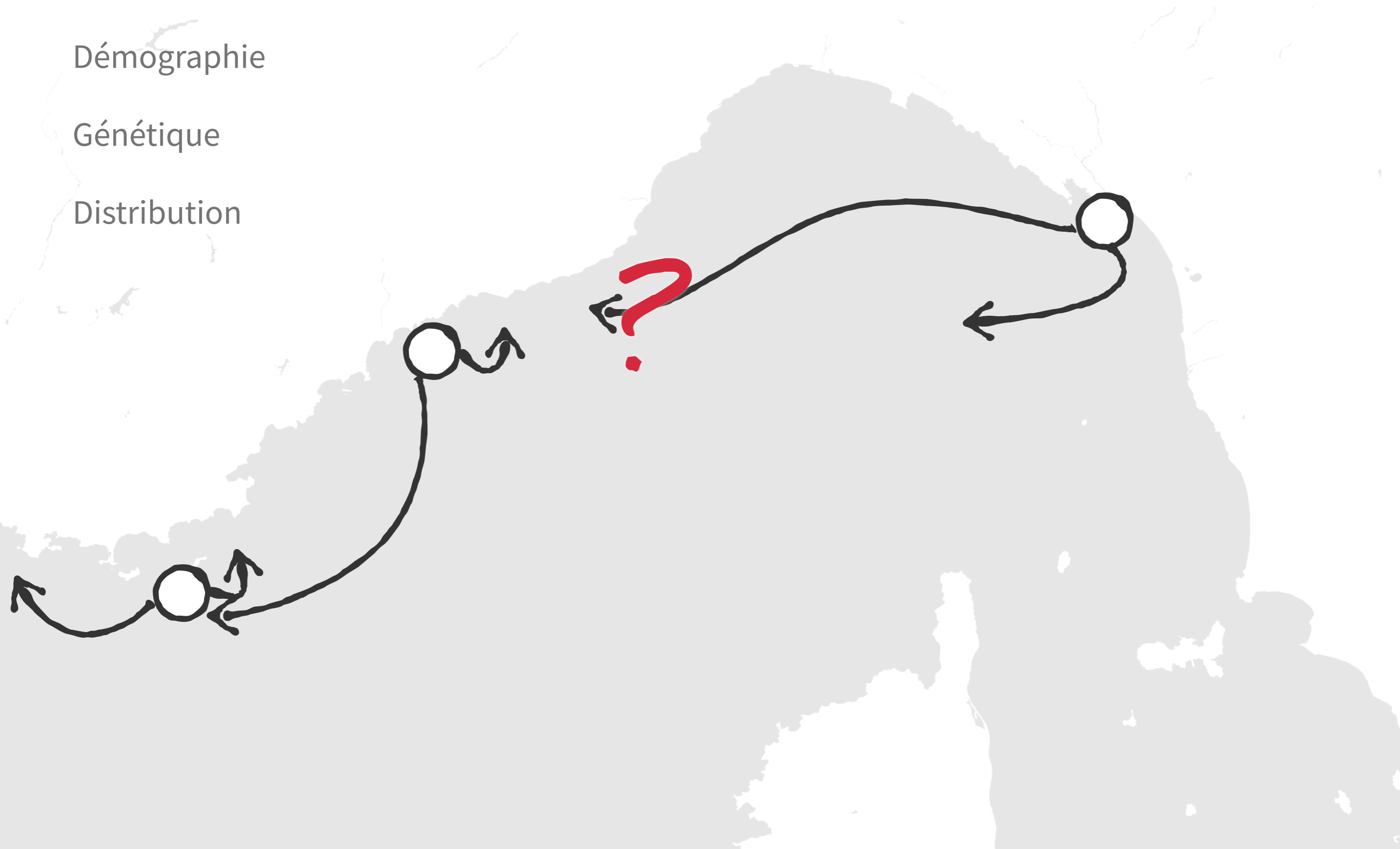
# Pourquoi les larves? = Connectivité

---

Démographie

Génétique

Distribution



# Captures de larves

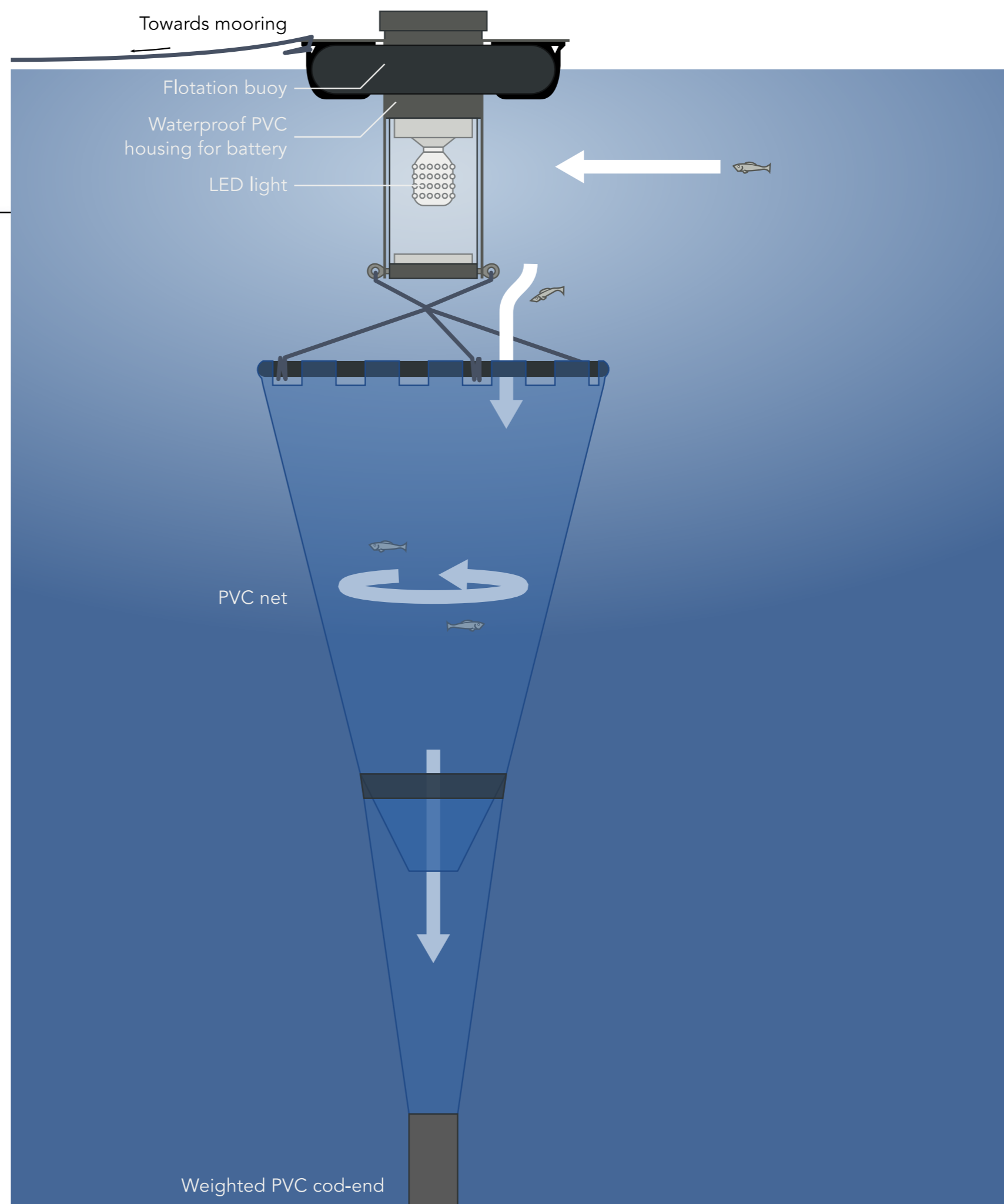
Pièges lumineux CARE



3 points en rade de  
Villefranche-sur-Mer

1 piège par point

1 nuit par semaine depuis  
Novembre 2012



# Captures de larves

---

Pièges lumineux CARE



3 points en rade de  
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1 piège par point

1 nuit par semaine depuis  
Novembre 2012





# Captures de larves

---

Pièges lumineux CARE



3 points en rade de  
Villefranche-sur-Mer

1 piège par point

1 nuit par semaine depuis  
Novembre 2012



# Captures de larves

---

Pièges lumineux CARE



3 points en rade de  
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Novembre 2012



# Captures de larves

---

Pièges lumineux CARE



3 points en rade de  
Villefranche-sur-Mer

1 piège par point

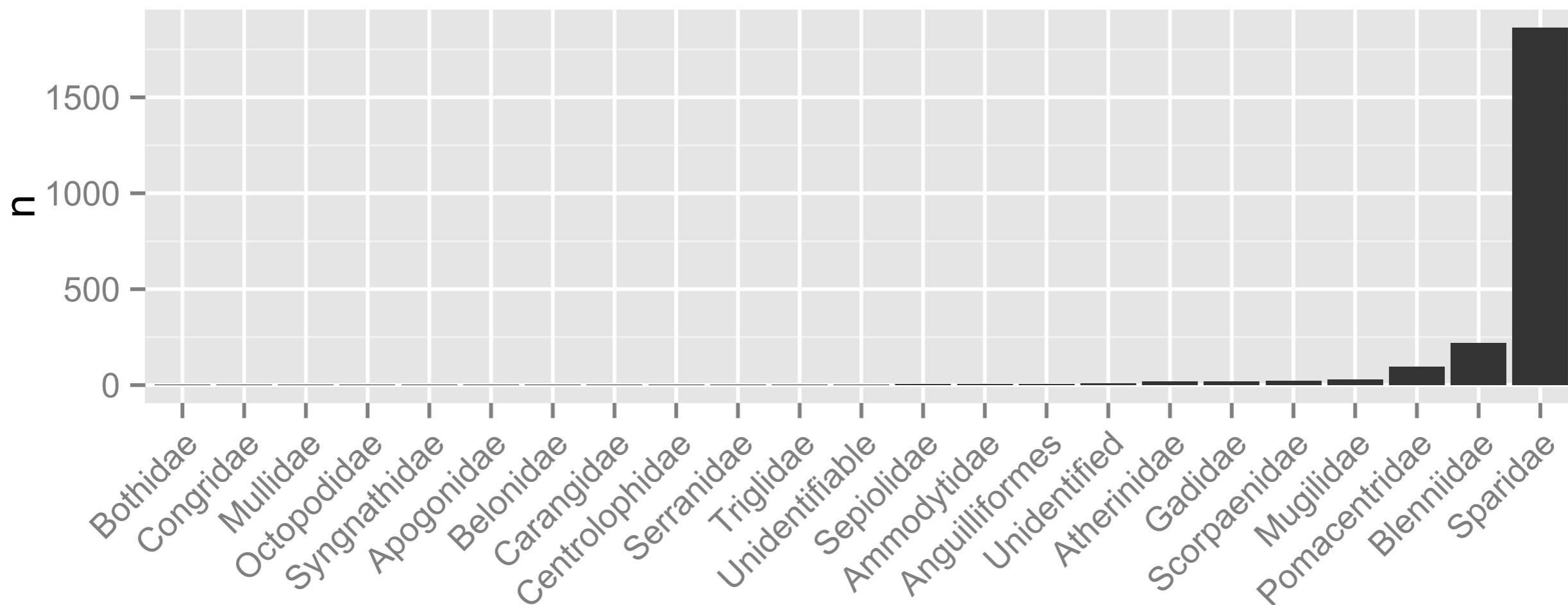
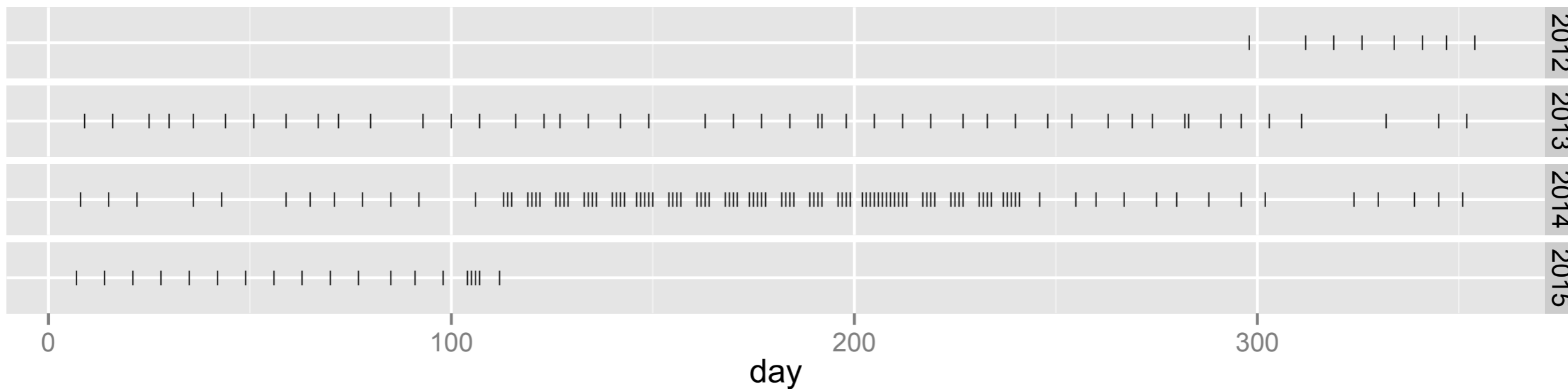
1 nuit par semaine depuis  
Novembre 2012



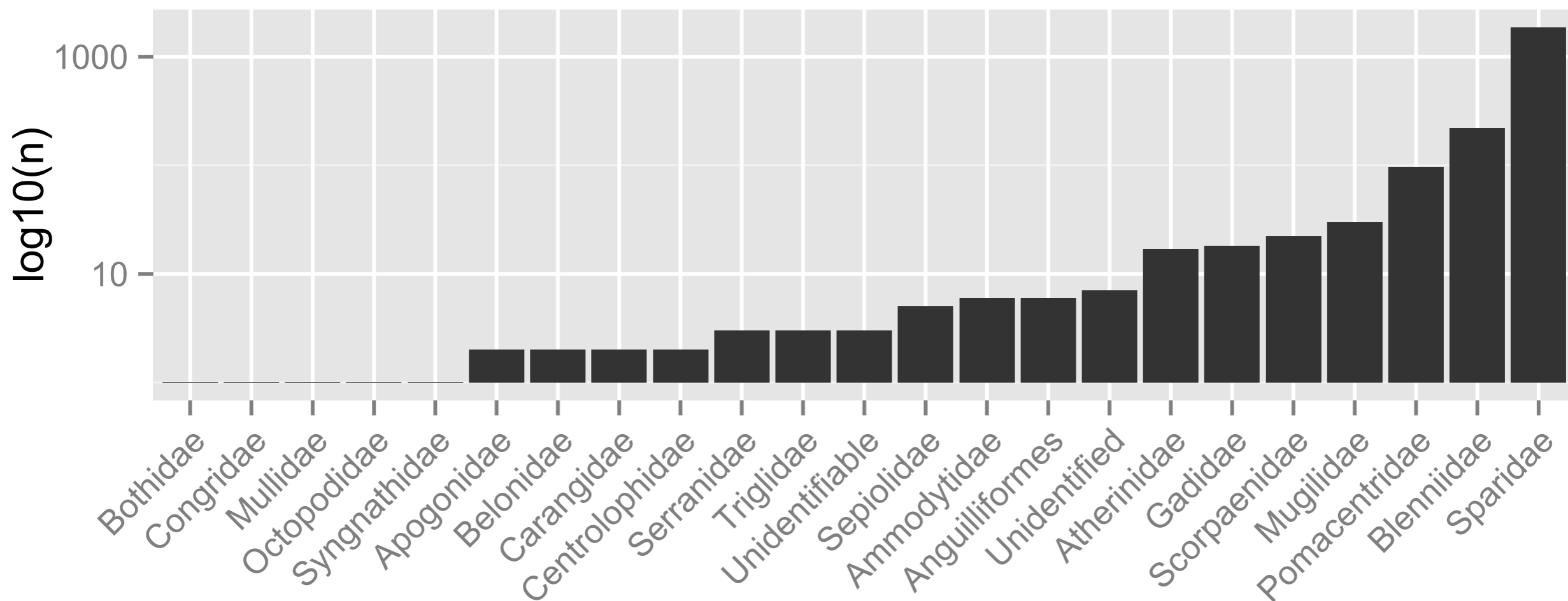
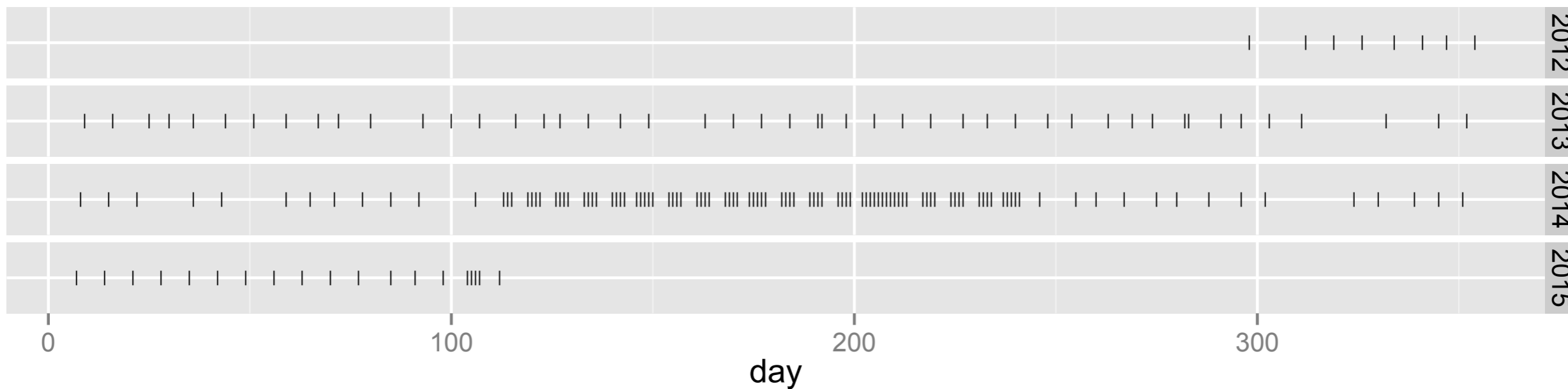
400 m



# Captures



# Captures



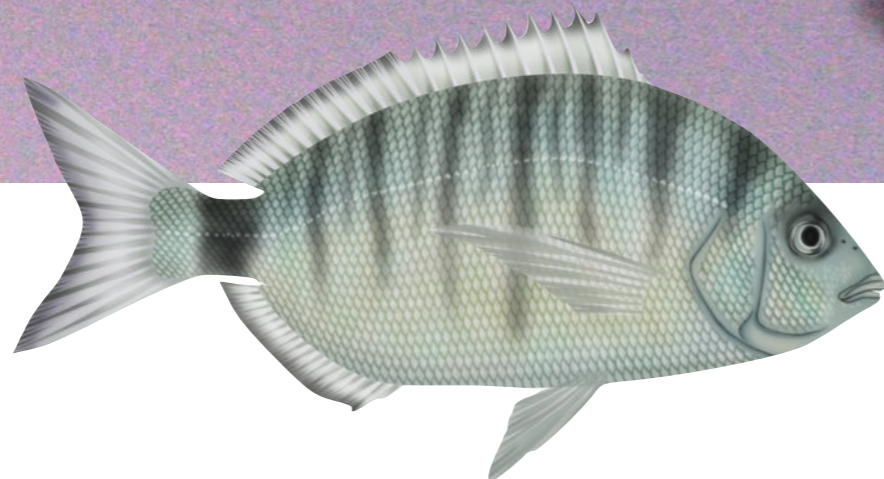
# Quelques photos

---

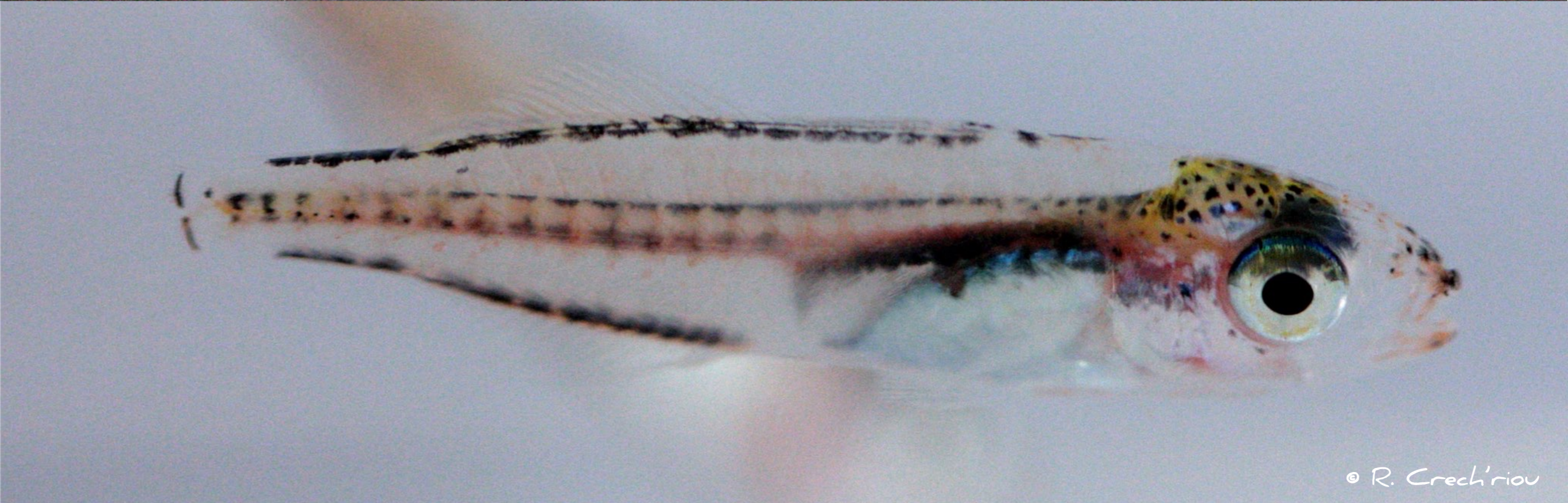


© R. Crech'riou

env. 12mm



*Diplodus puntazzo*



© R. Crechi'riou

env. 12mm



*Sarpa salpa*

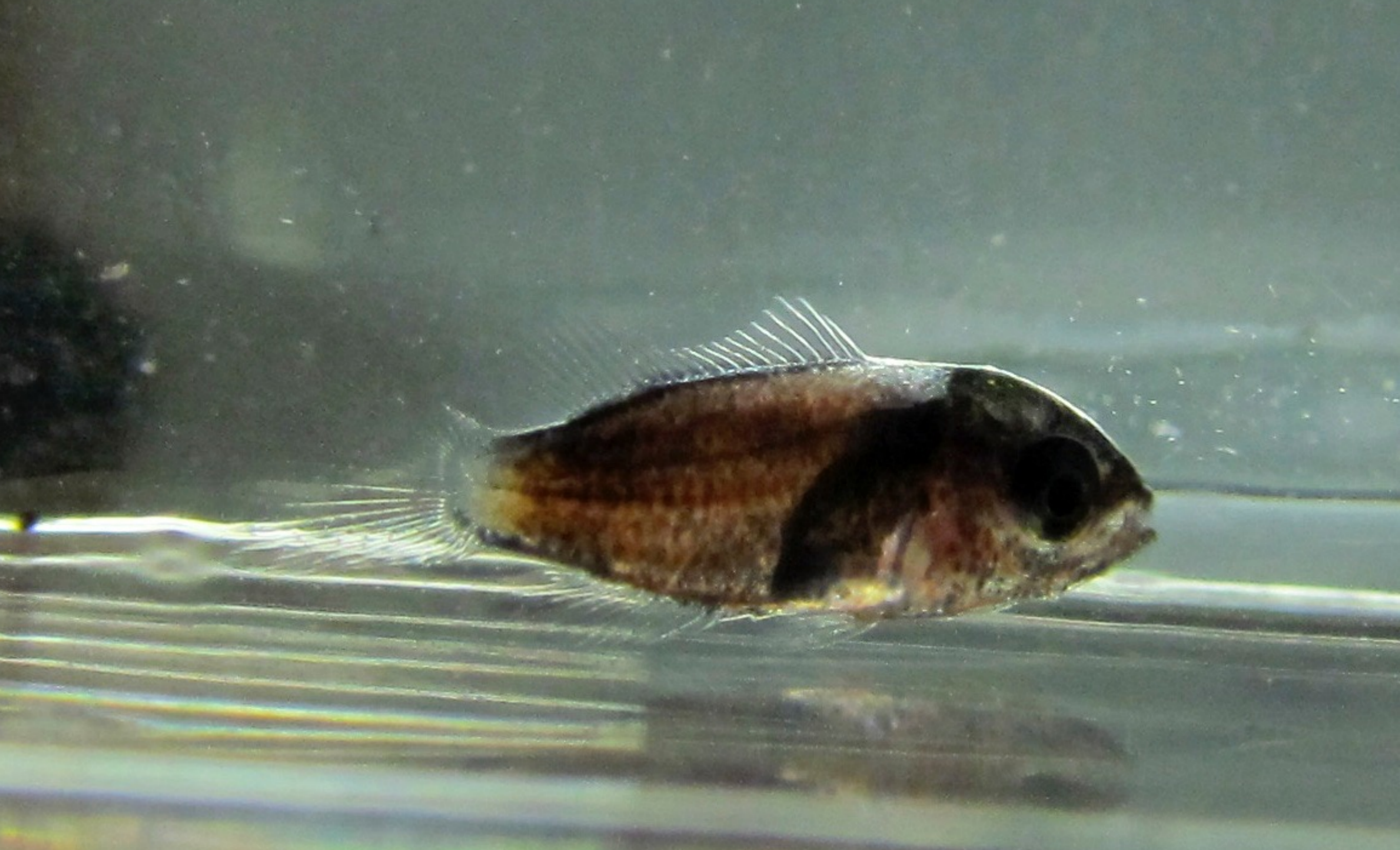




env. 11-14mm

Mugilidae

© R. Crech'riou

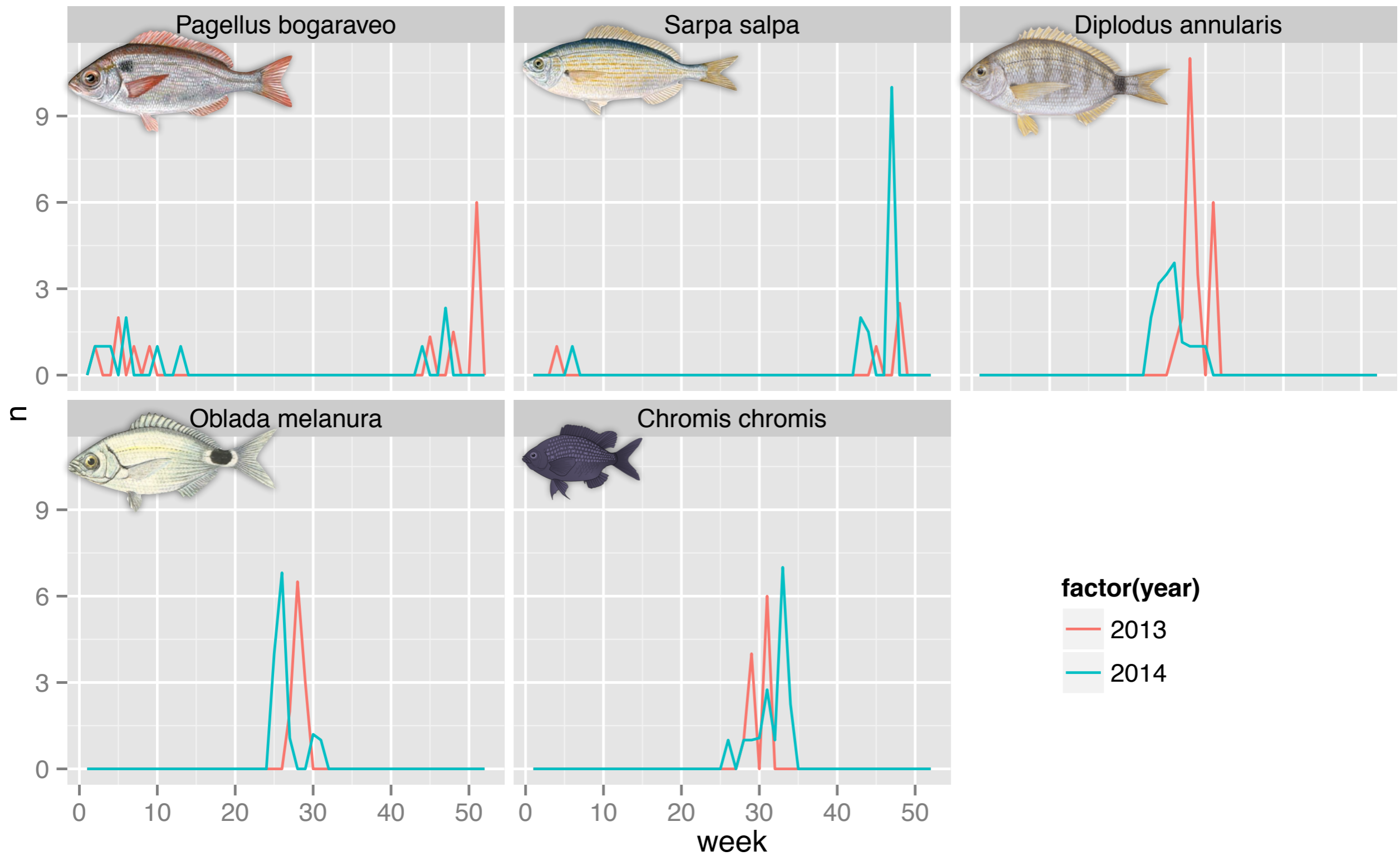


env. 10mm

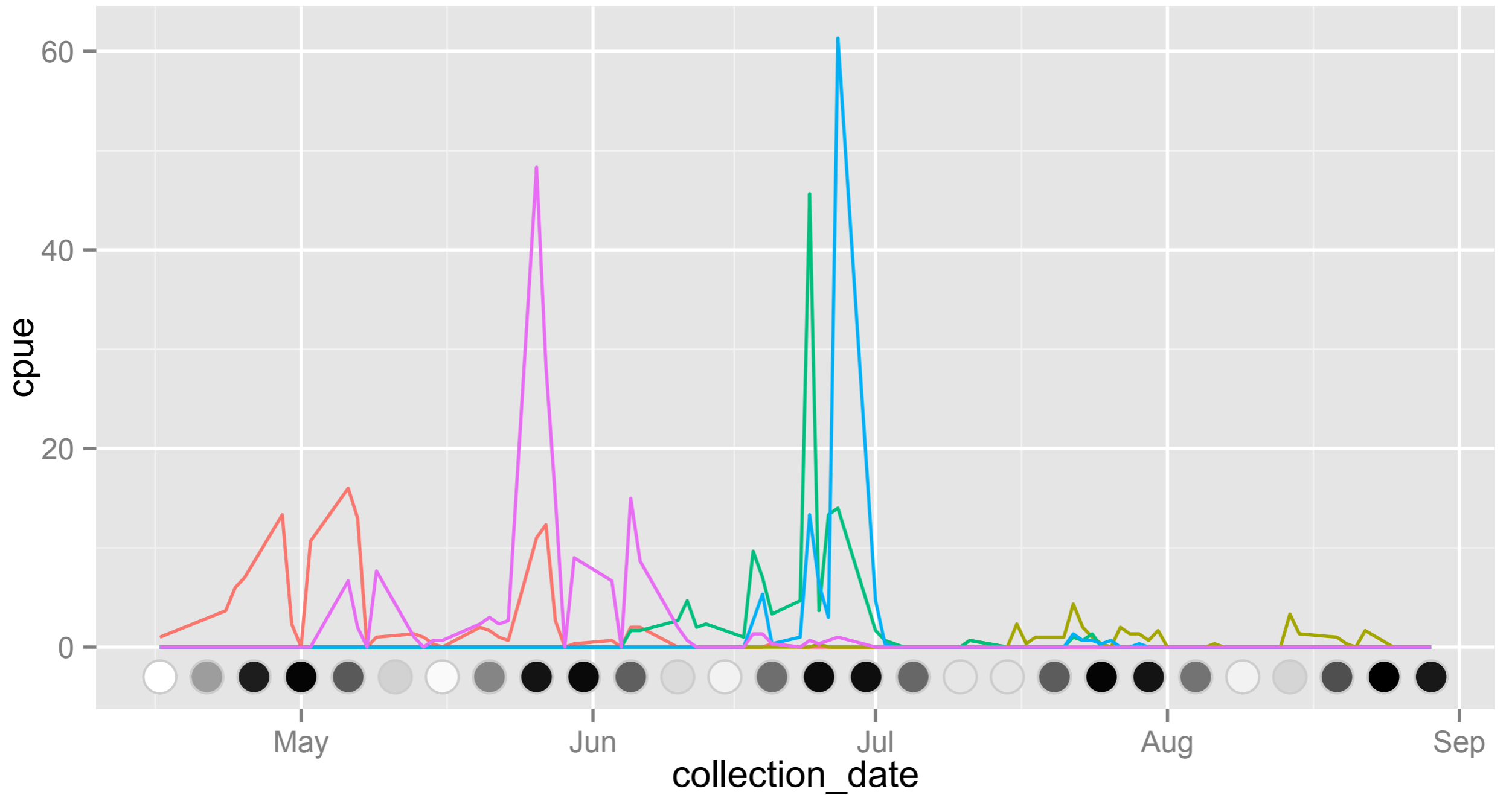


*Chromis chromis*

# Une forte saisonnalité

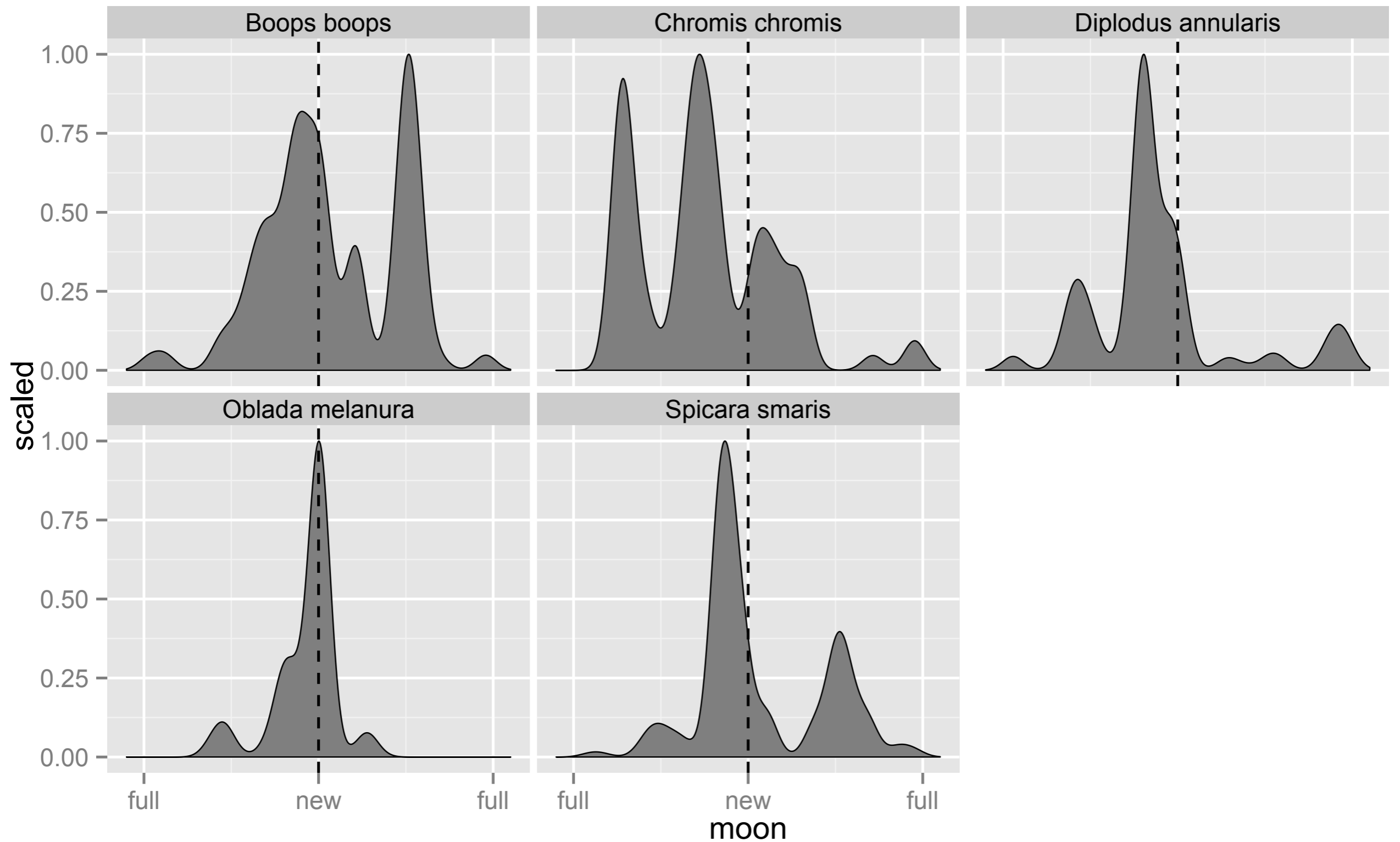


# Influence de la lune



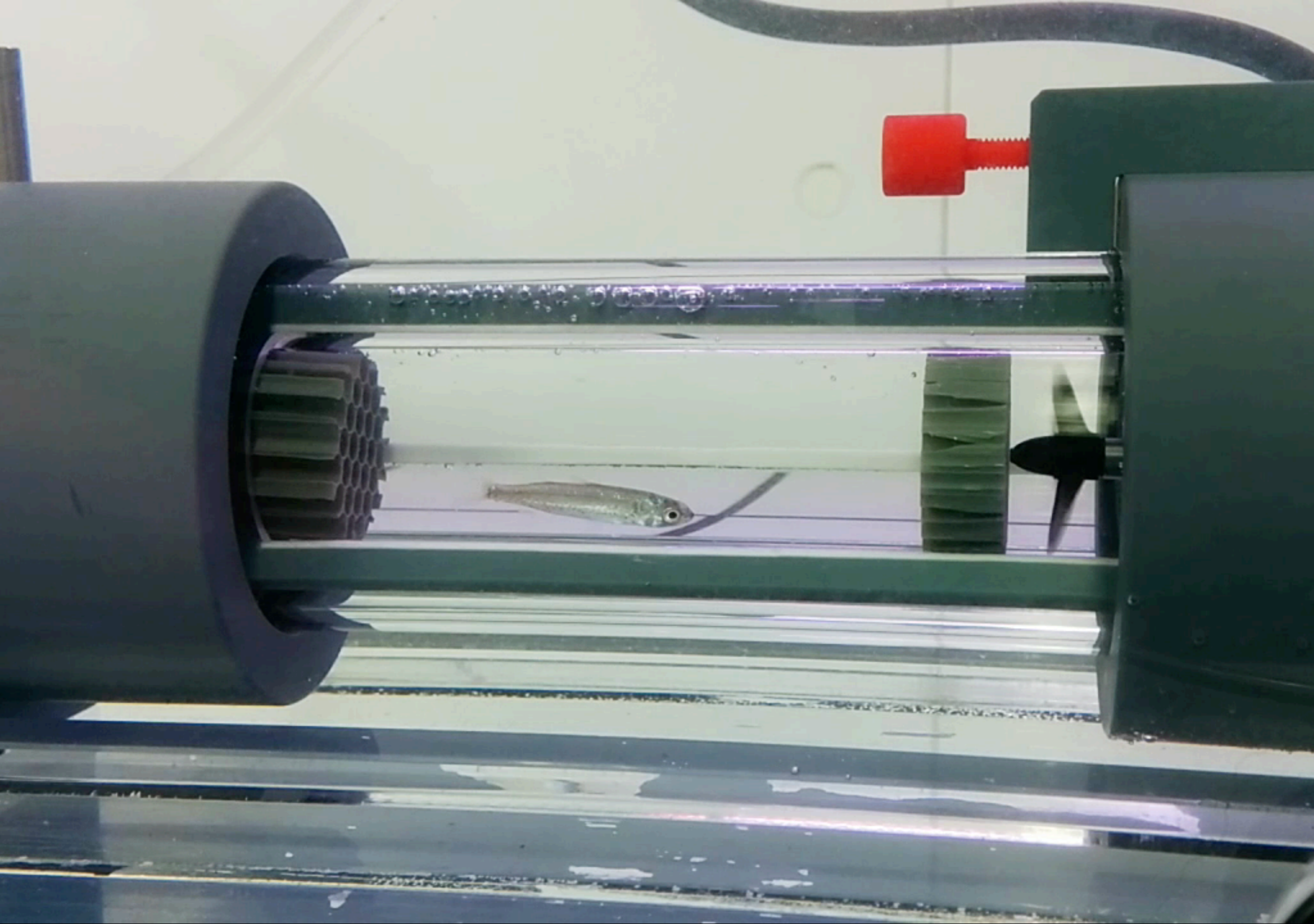
**species** Boops boops Chromis chromis Diplodus annularis Oblada melanura Spicara smaris

# Influence de la lune

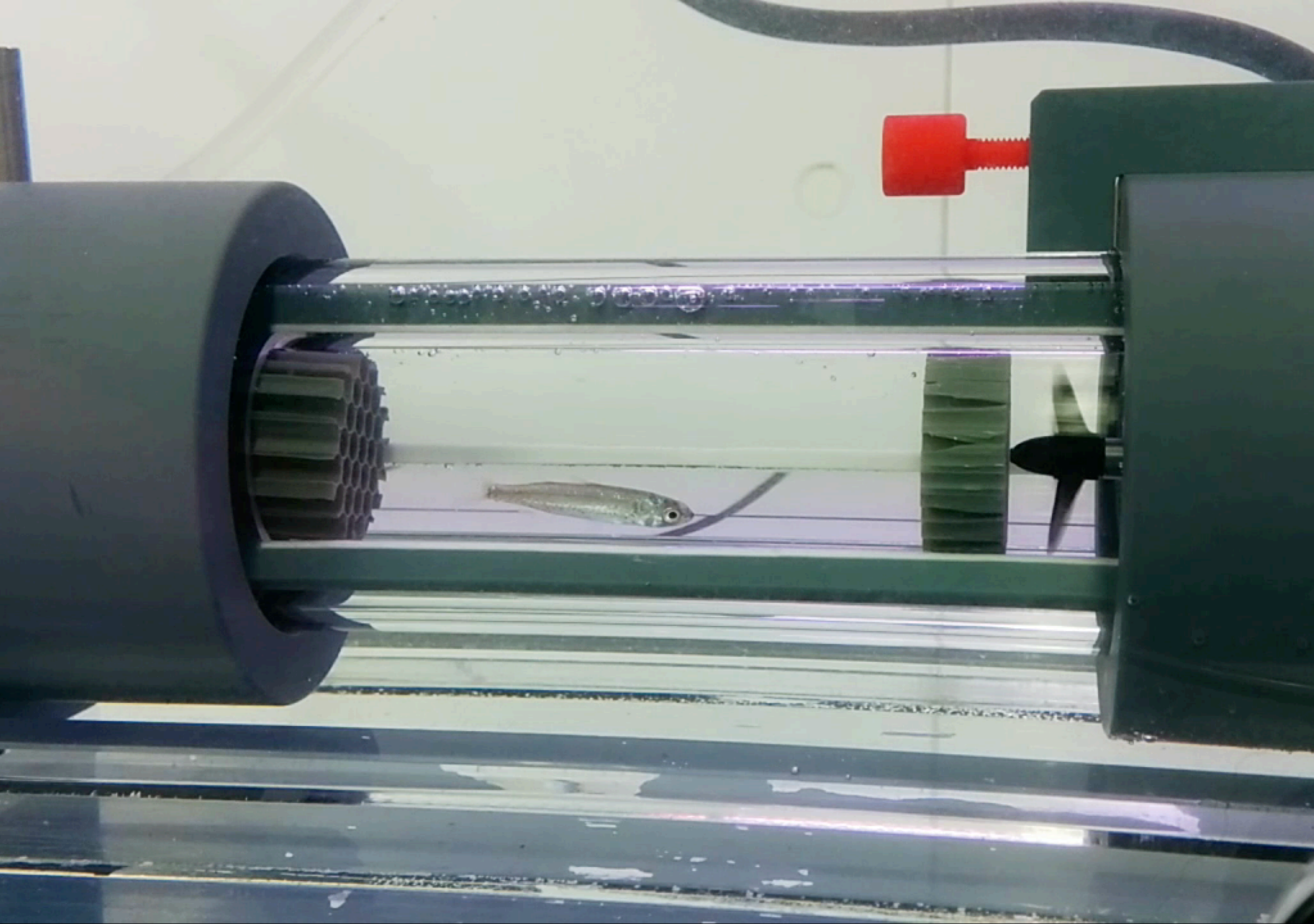


La course...





Mullidae

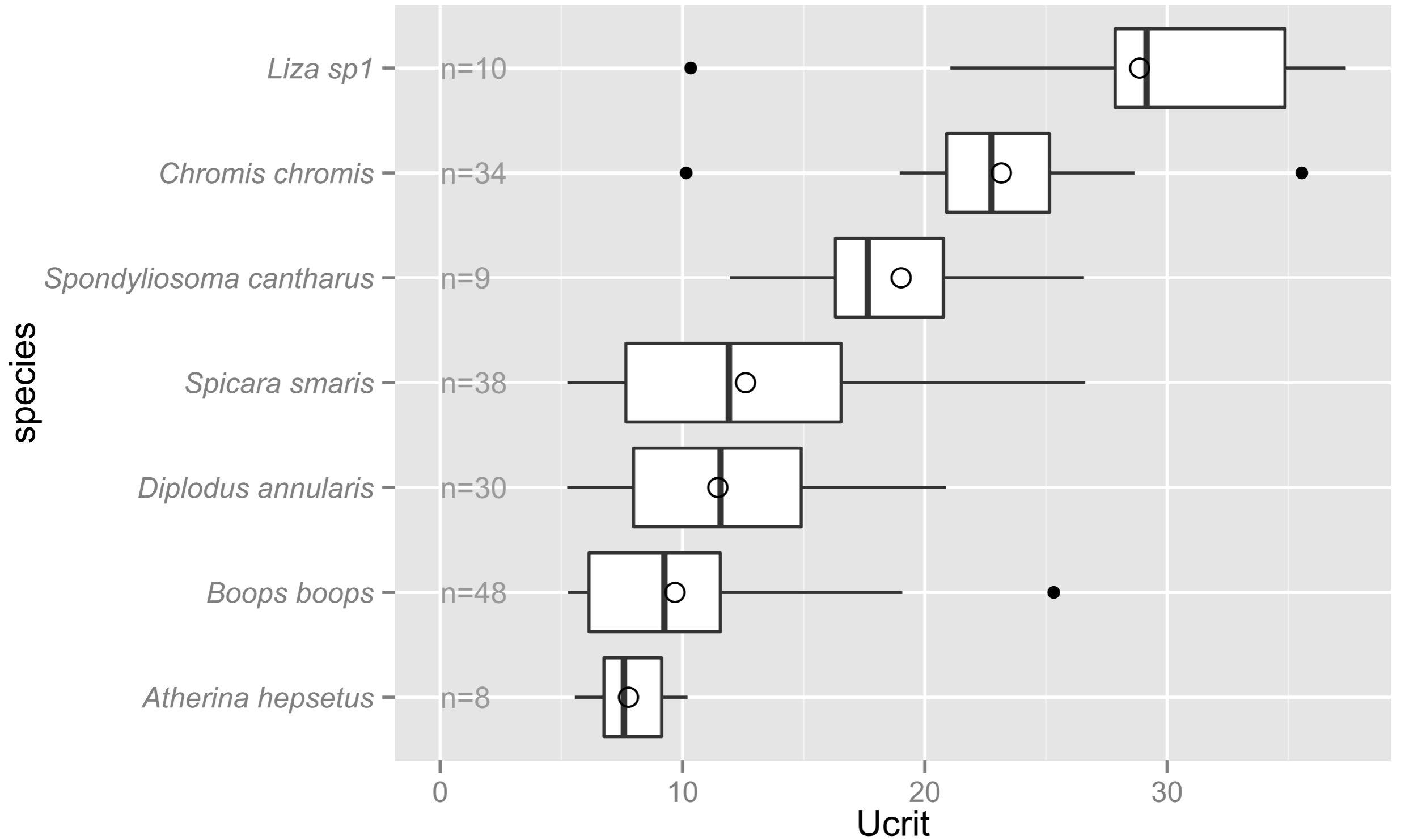


Mullidae

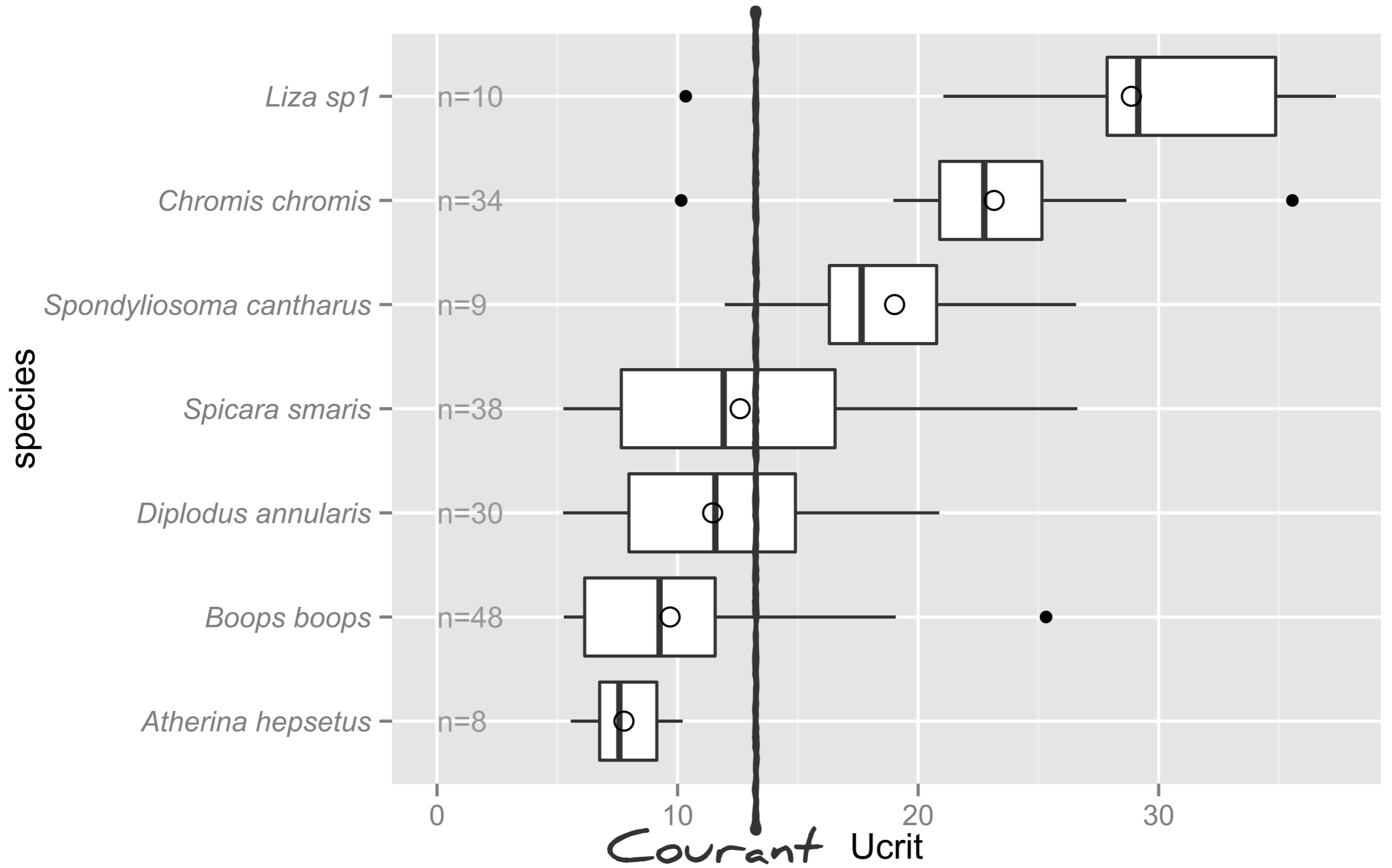


# Vitesses élevées

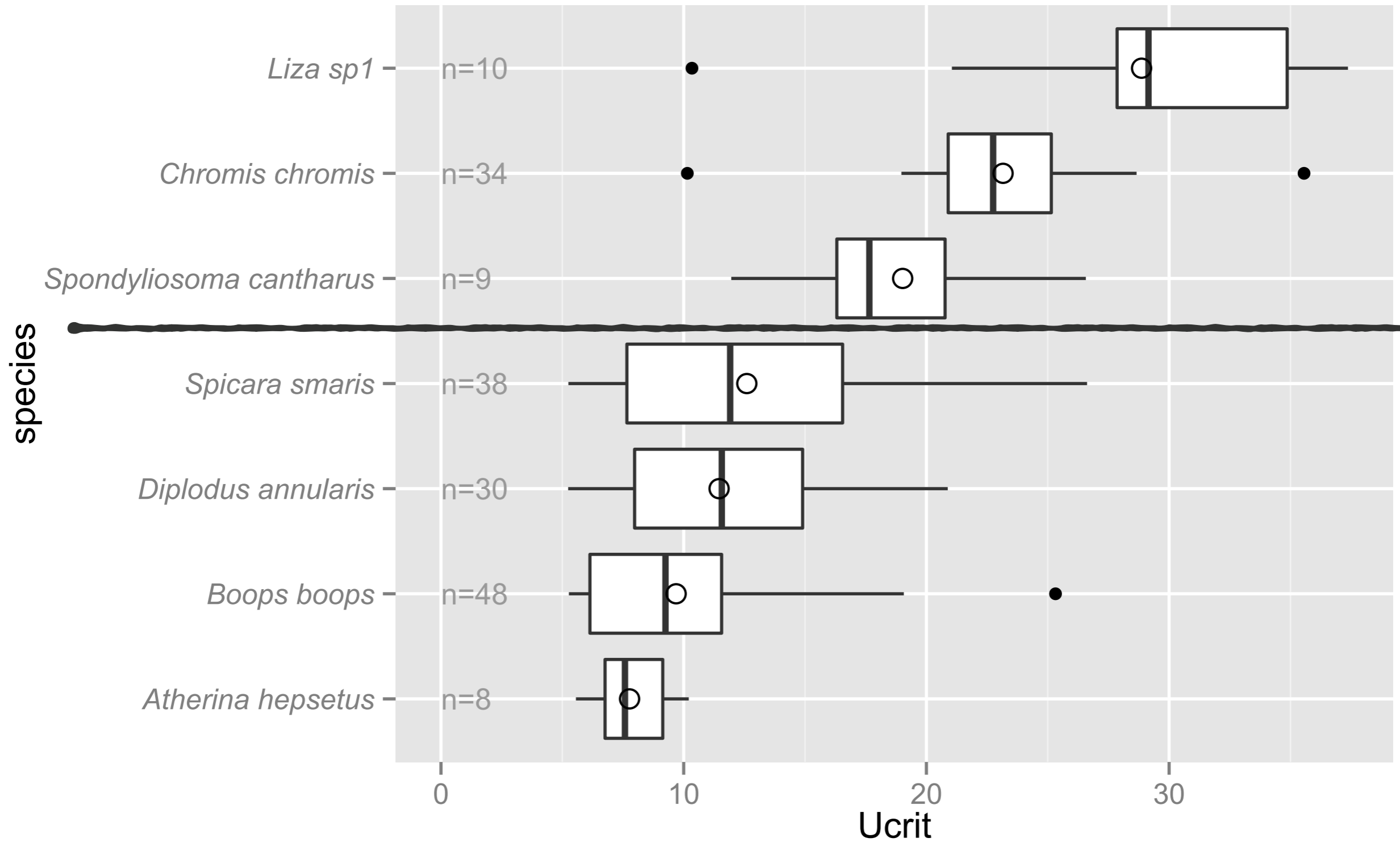
---



# Vitesses élevées



# Vitesses élevées



# Différences morphologiques

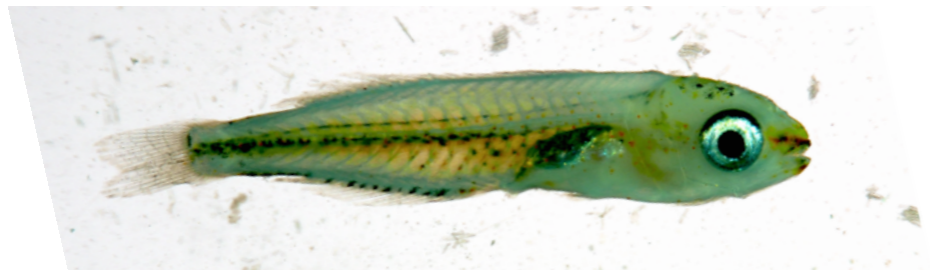
---



*S. smaris*



*Liza sp.*



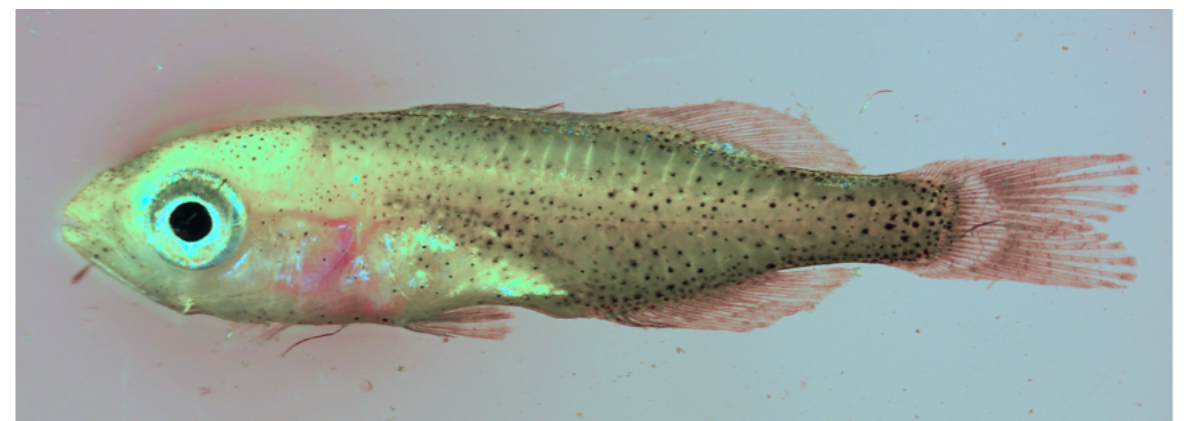
*D. annularis*



*C. chromis*



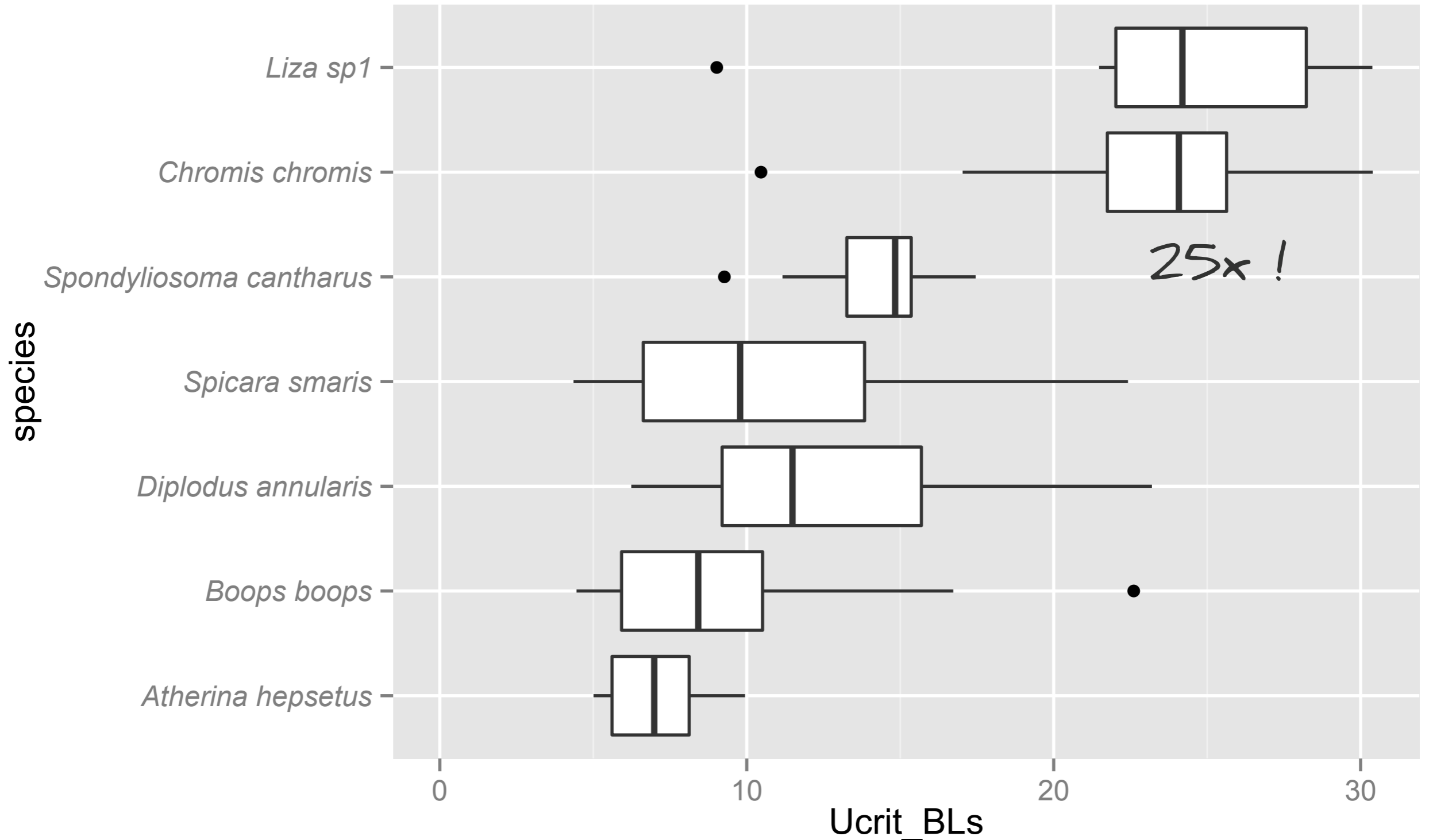
*B. boops*



*S. cantharus*

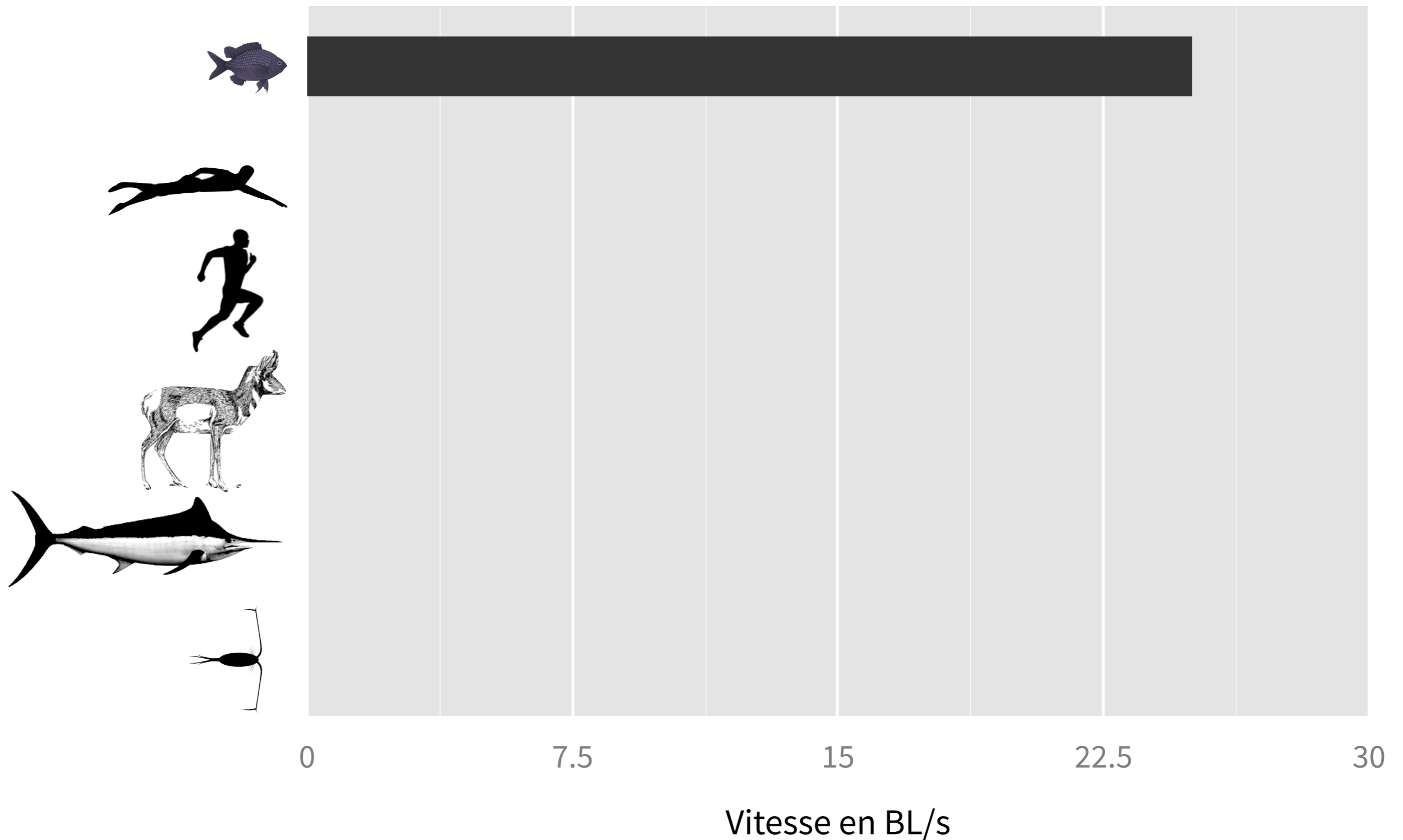
# En longueur de corps par seconde

---



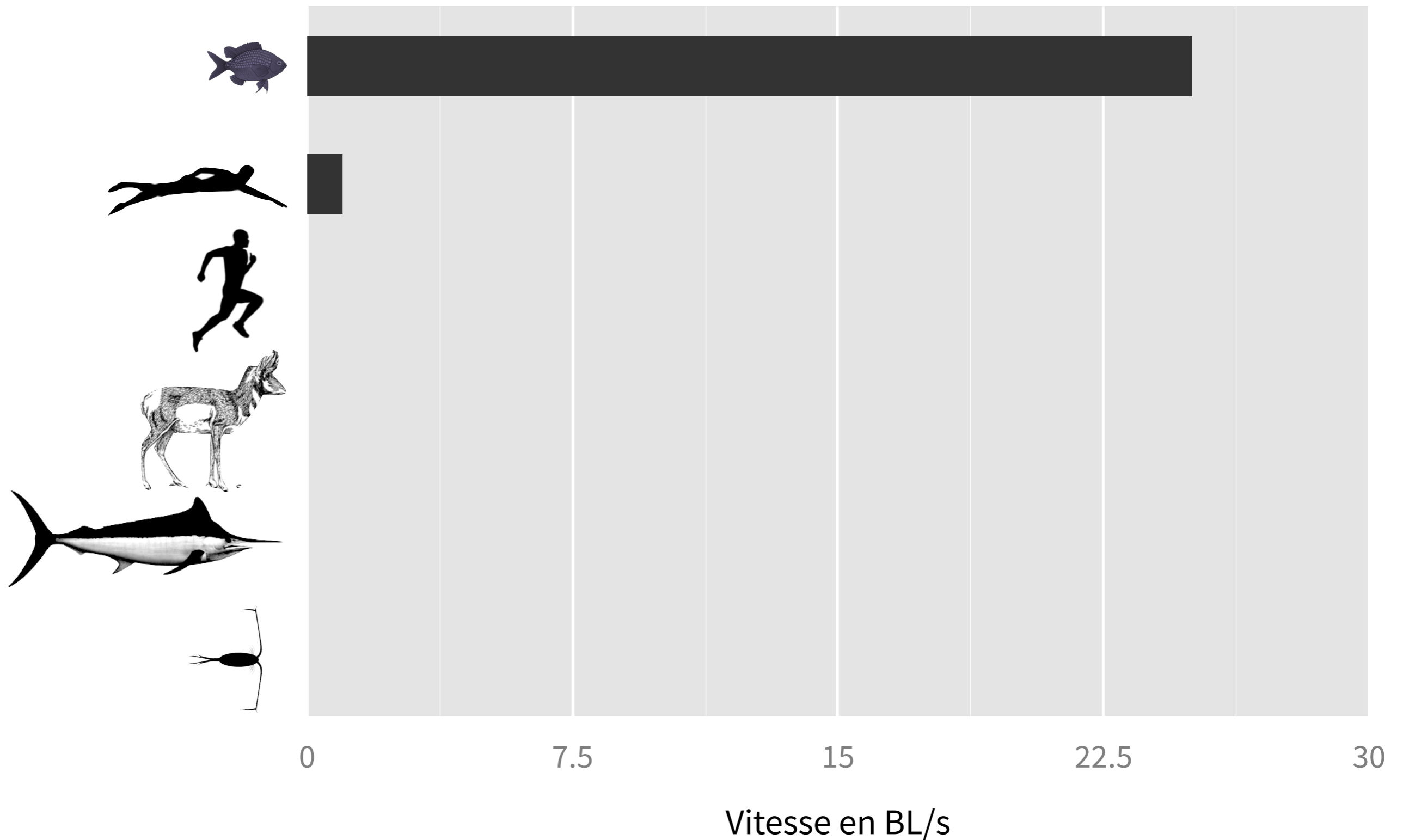
# Comparaisons amusantes

---



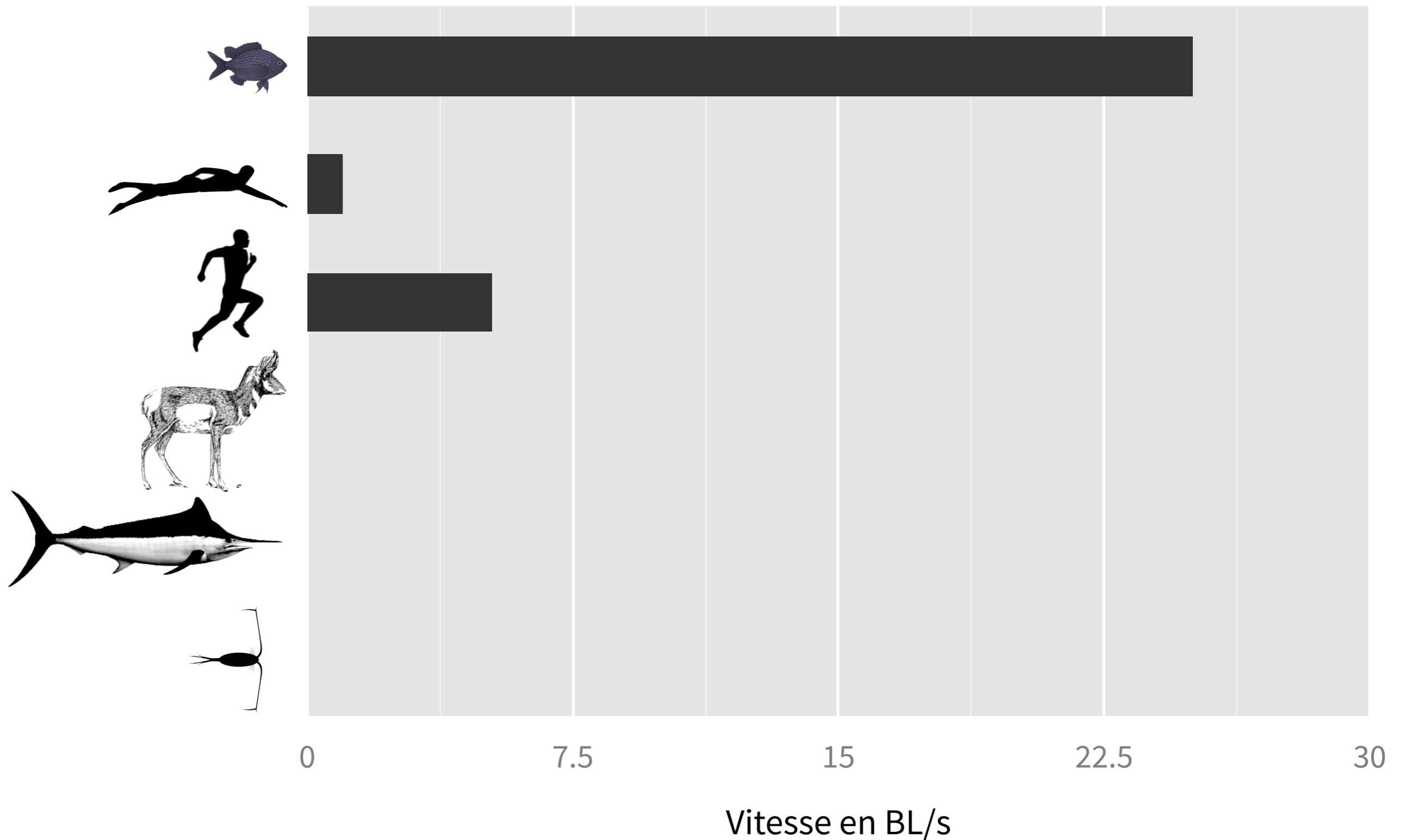
# Comparaisons amusantes

---



# Comparaisons amusantes

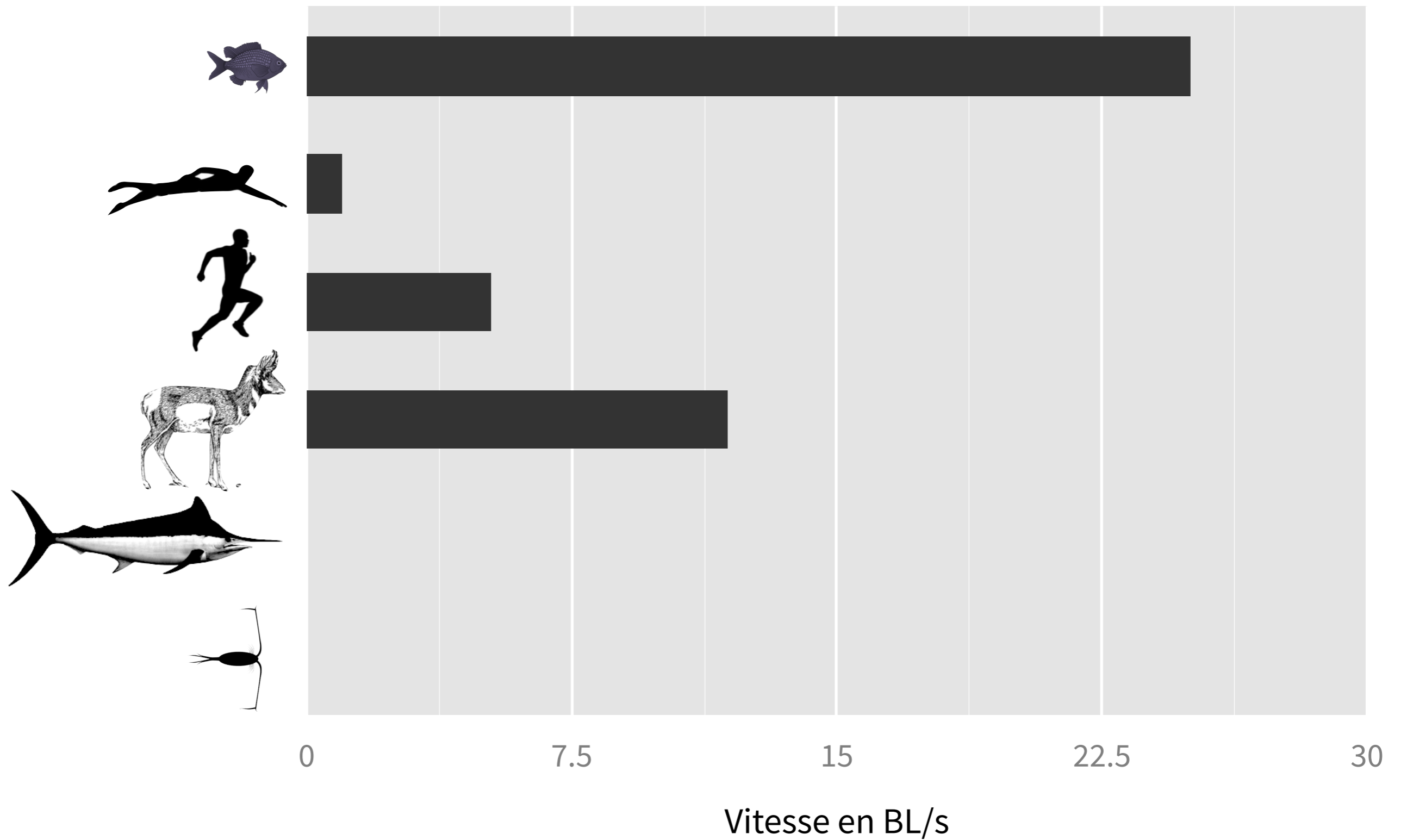
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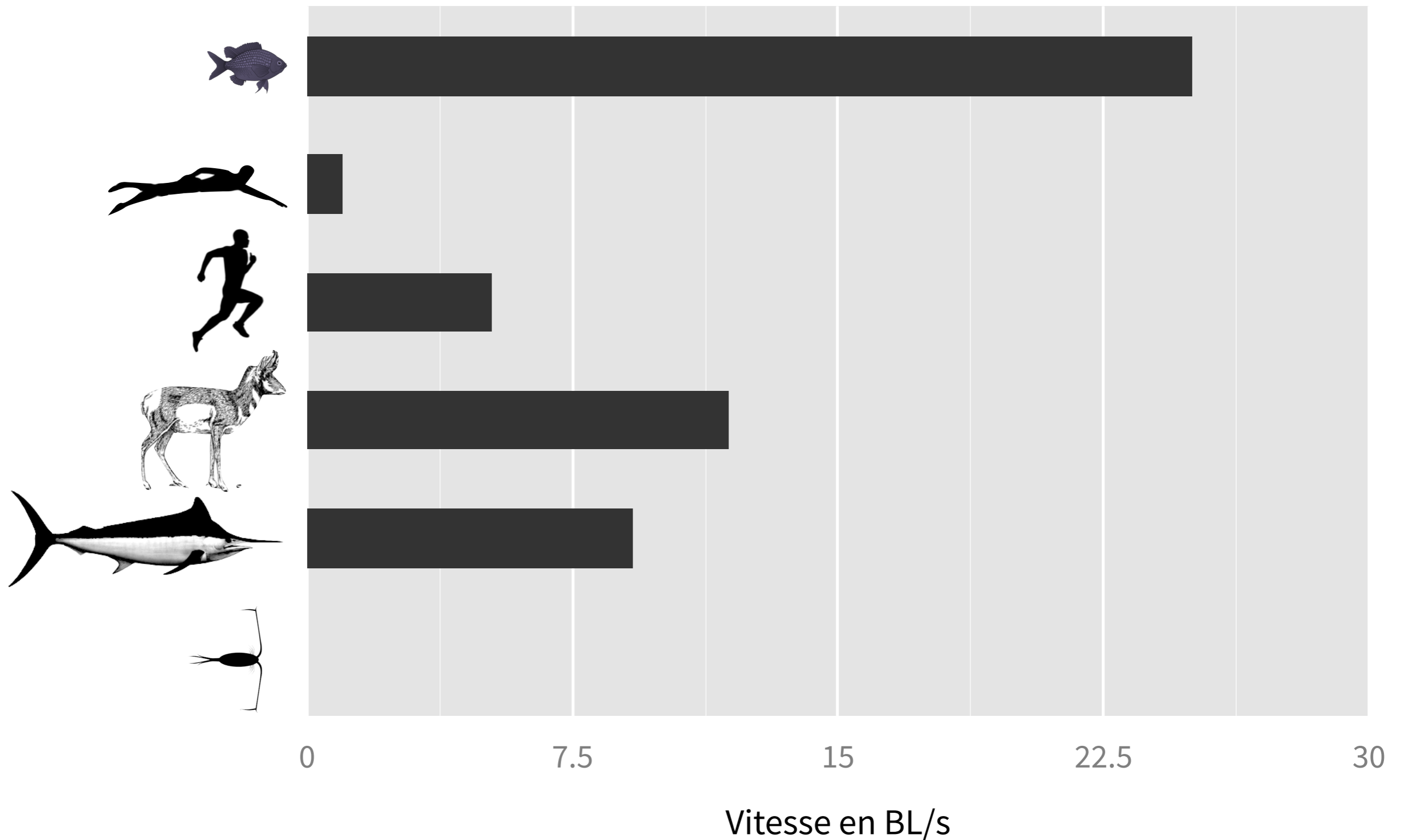
# Comparaisons amusantes

---



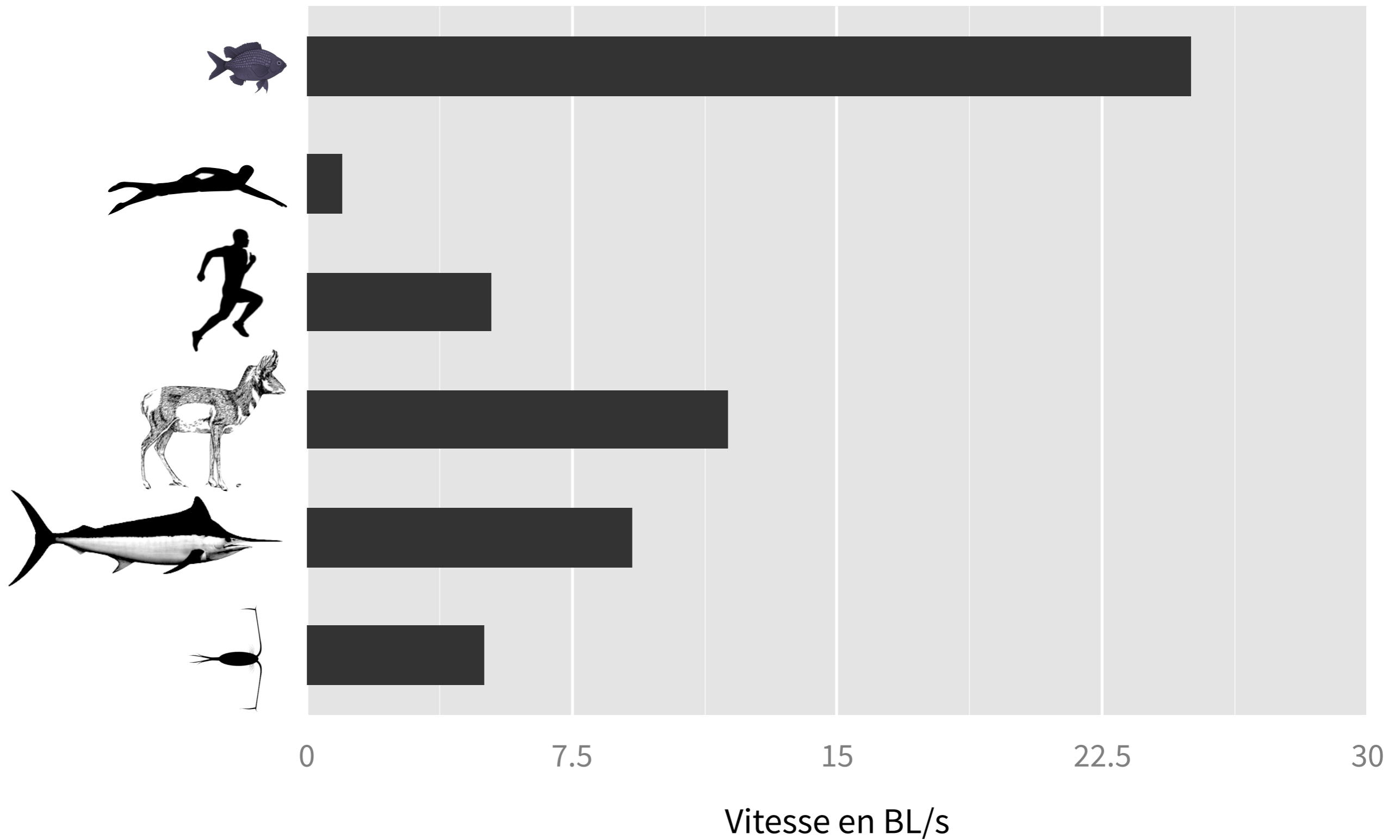
# Comparaisons amusantes

---



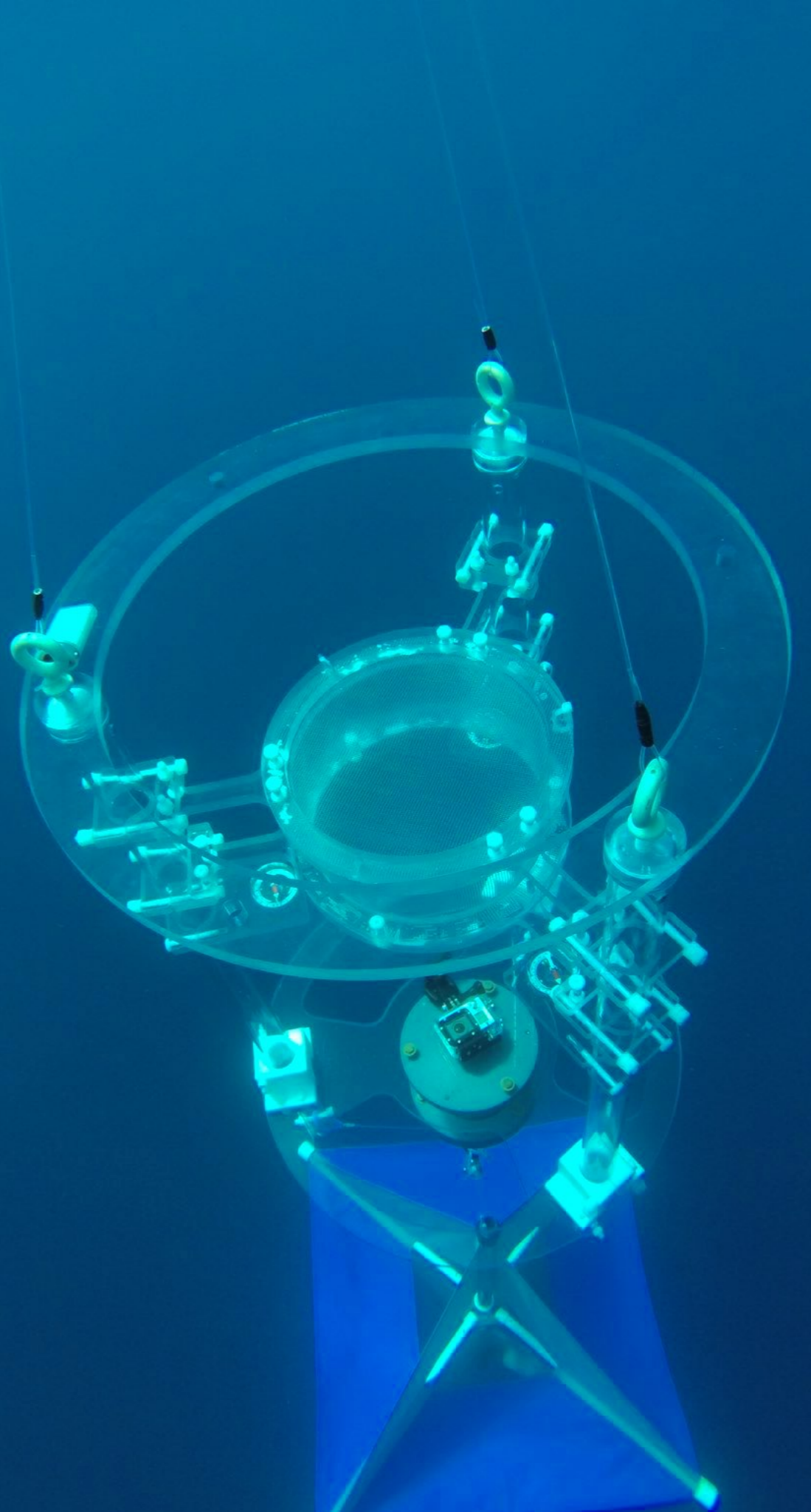
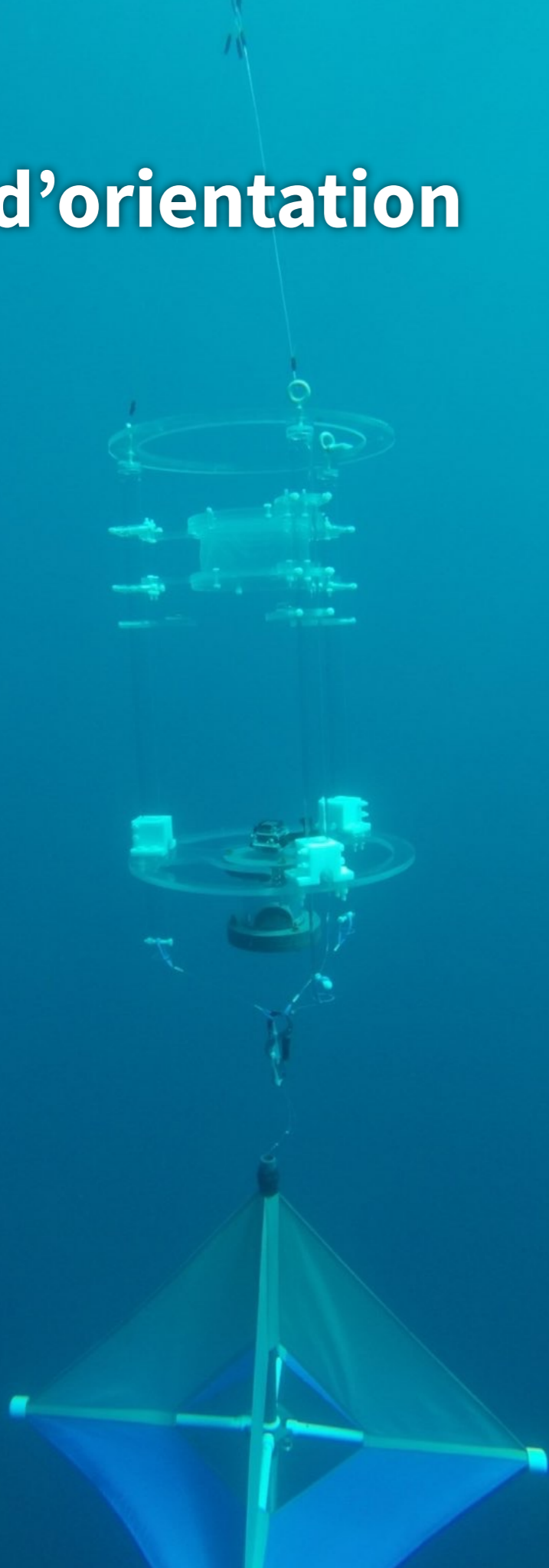
# Comparaisons amusantes

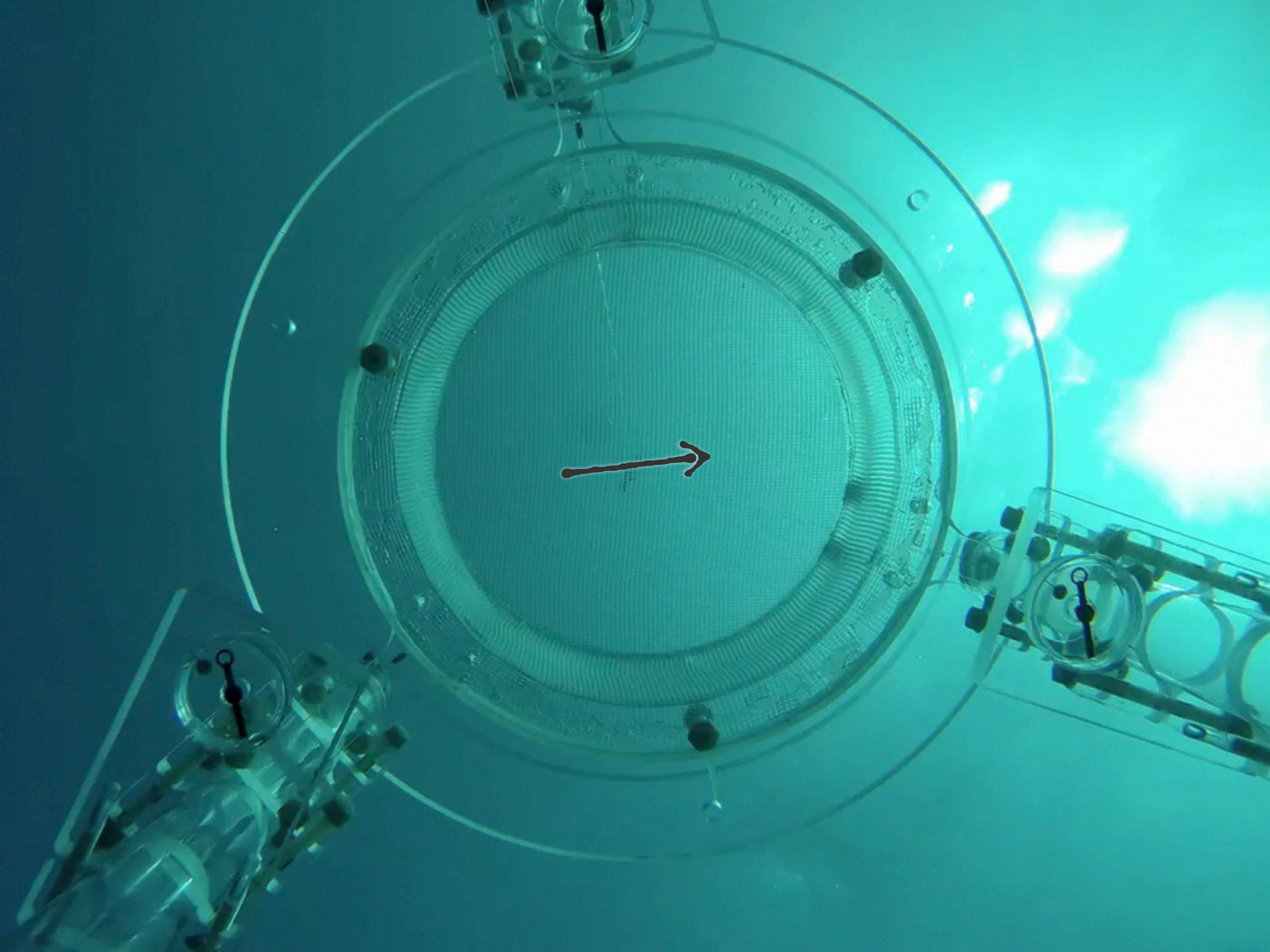
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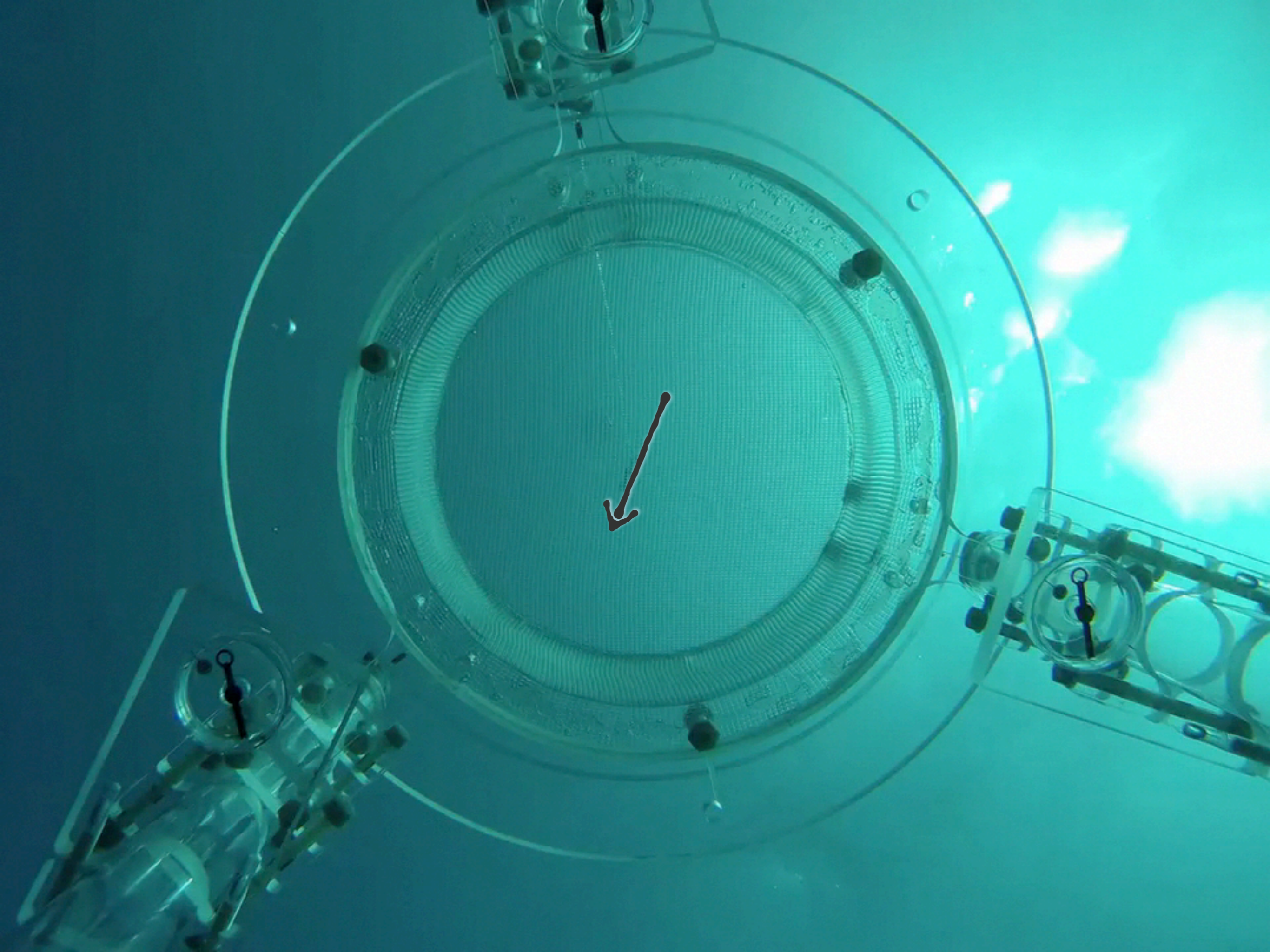




**... d'orientation**

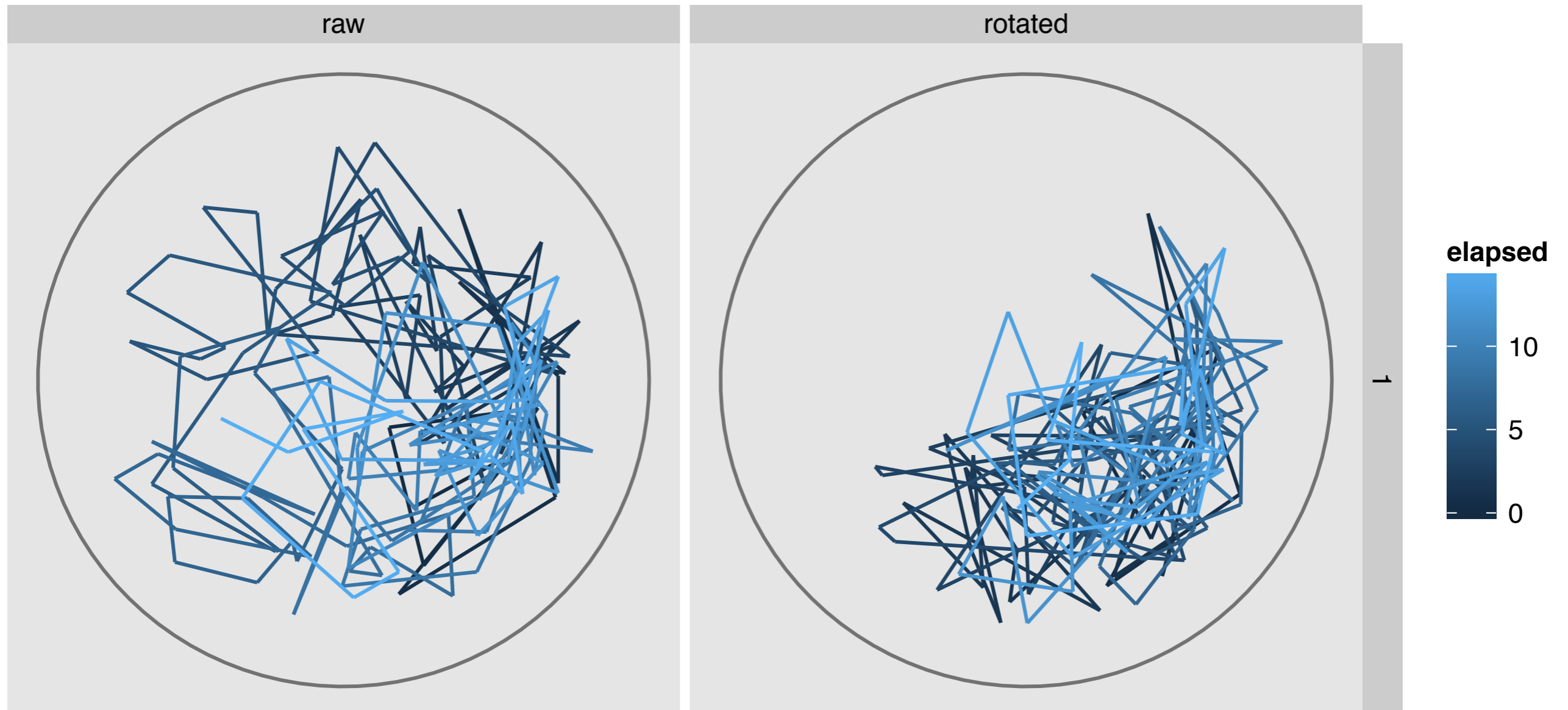






# Trajectoire d'une larve

---





# Stratégie expérimentale

---

Extérieur rade Villefranche

*Tests:*

Courant

Distance à la côte

Direction de la côte

Direction du vent (~  
vagues)

Orientation cardinale

Soleil: azimuth et zenith



400 m

# Stratégie expérimentale

---

Extérieur rade Villefranche

Tests:

Courant

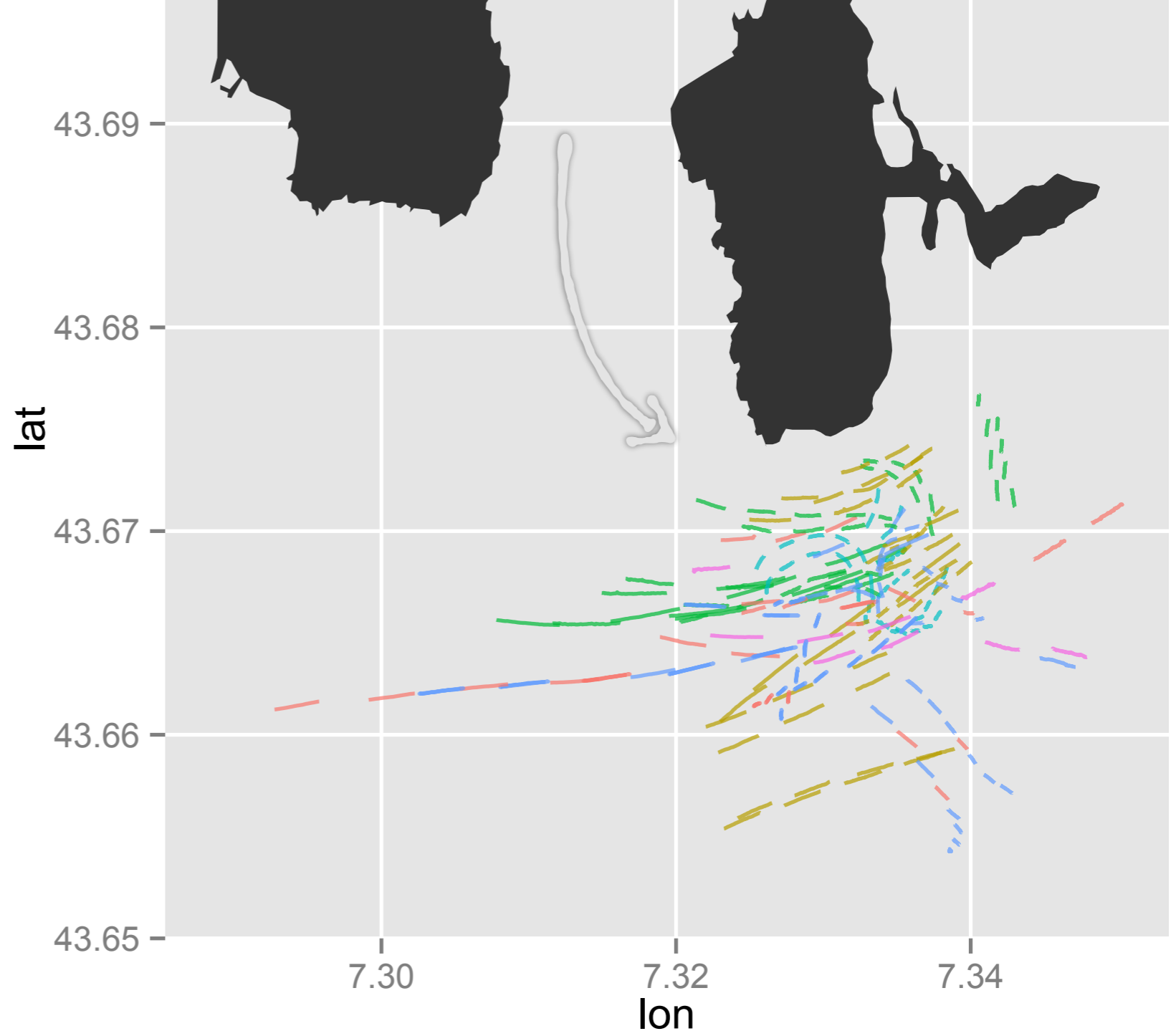
Distance à la côte

Direction de la côte

Direction du vent (~  
vagues)

Orientation cardinale

Soleil: azimuth et zenith



## species

- Boops boops
- Chromis chromis
- Diplodus annularis
- Oblada melanura
- Spicara smaris
- Spondylisoma cantharus

# Stratégie expérimentale

---

Extérieur rade Villefranche

*Tests:*

Courant

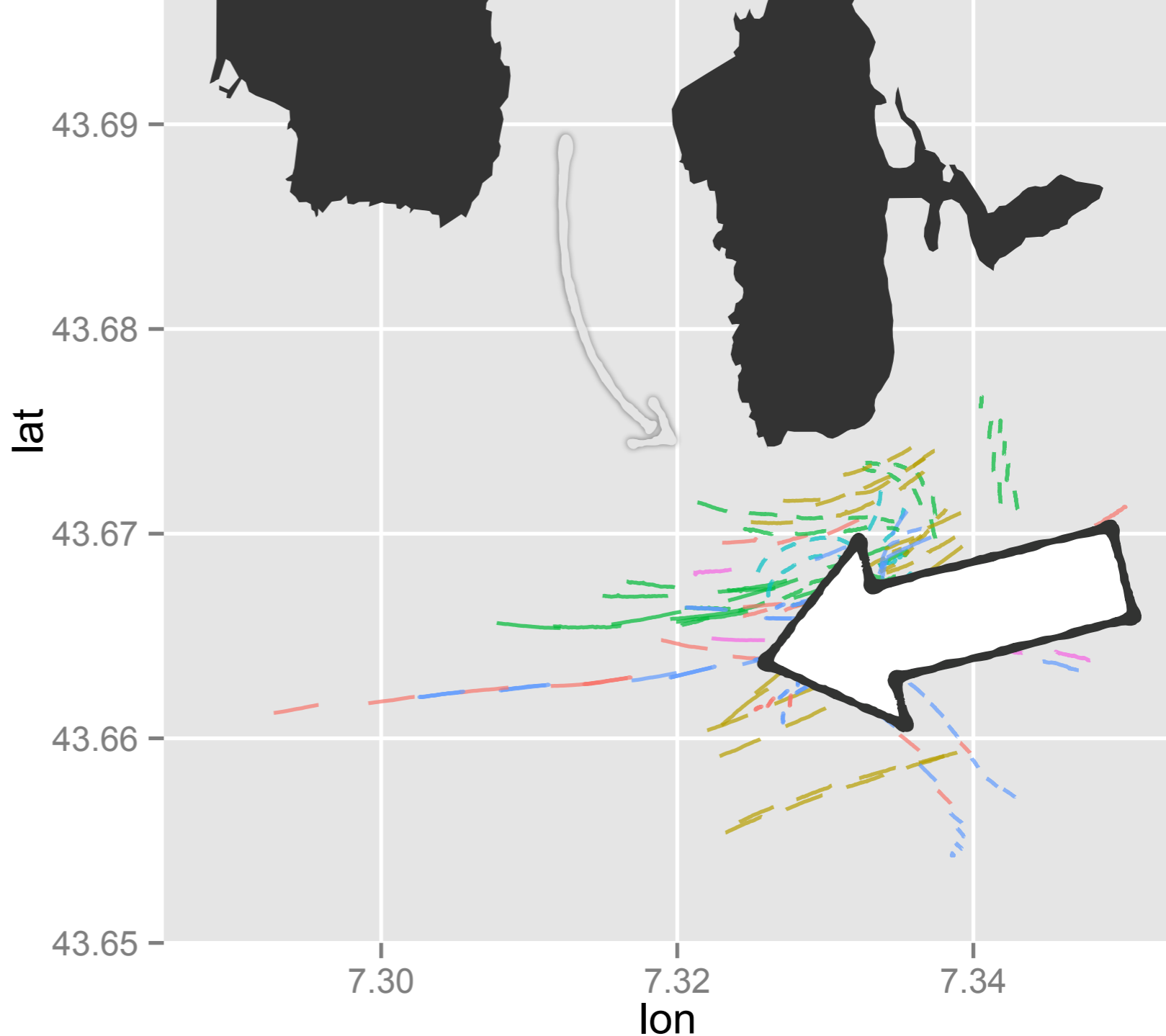
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# Stratégie expérimentale

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*Tests:*

Courant

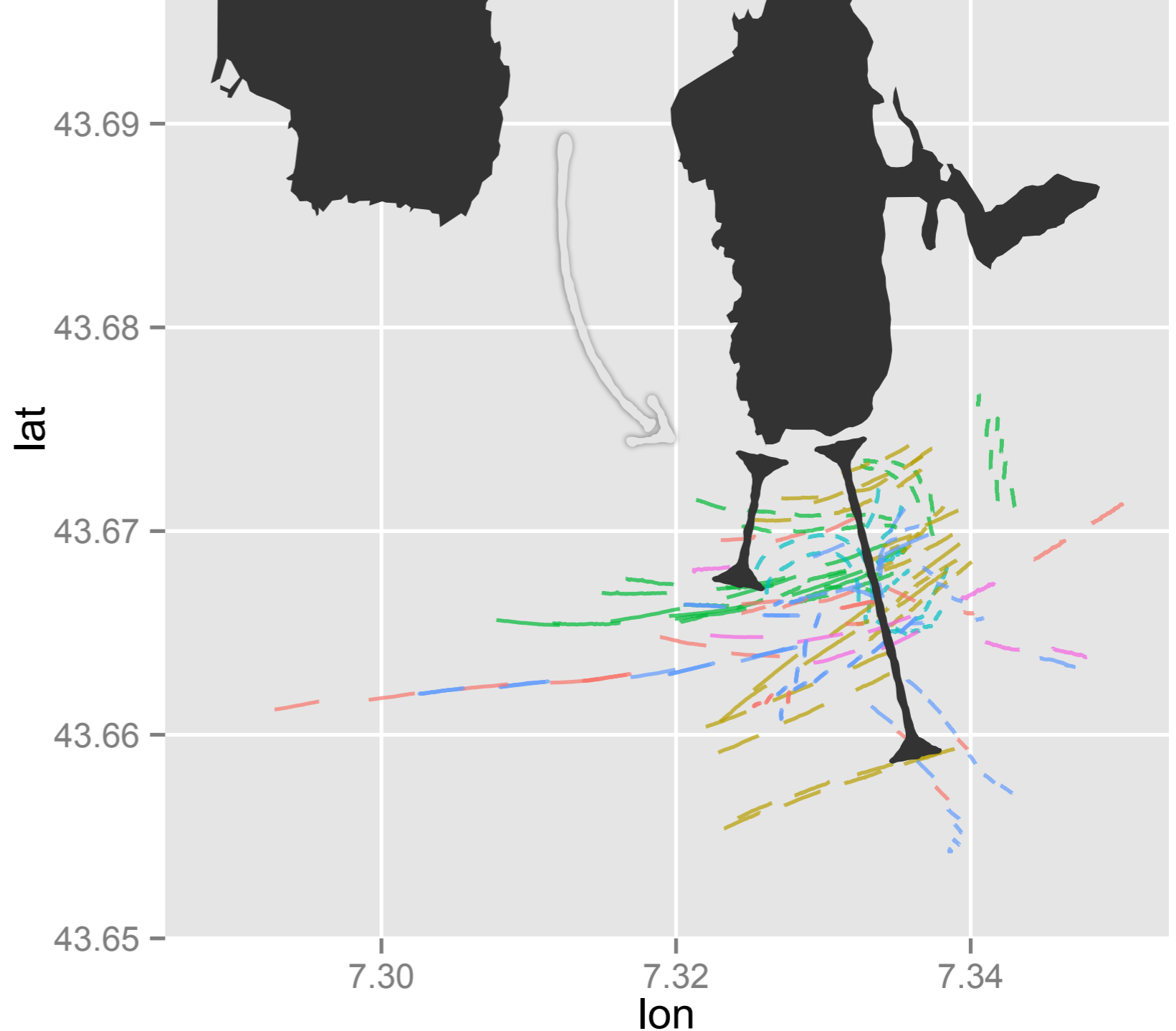
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# Stratégie expérimentale

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Extérieur rade Villefranche

Tests:

Courant

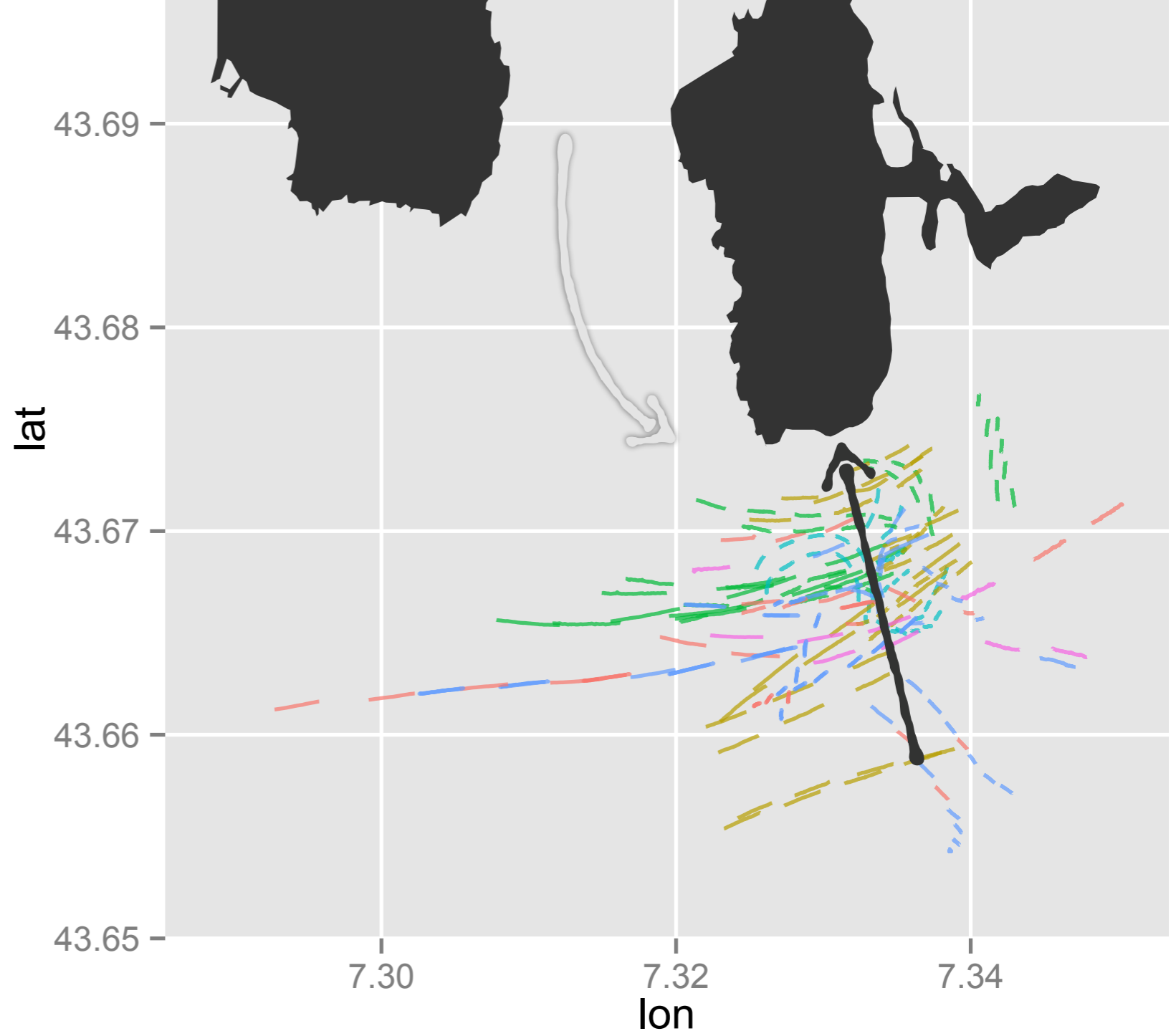
Distance à la côte

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# Stratégie expérimentale

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Extérieur rade Villefranche

Tests:

Courant

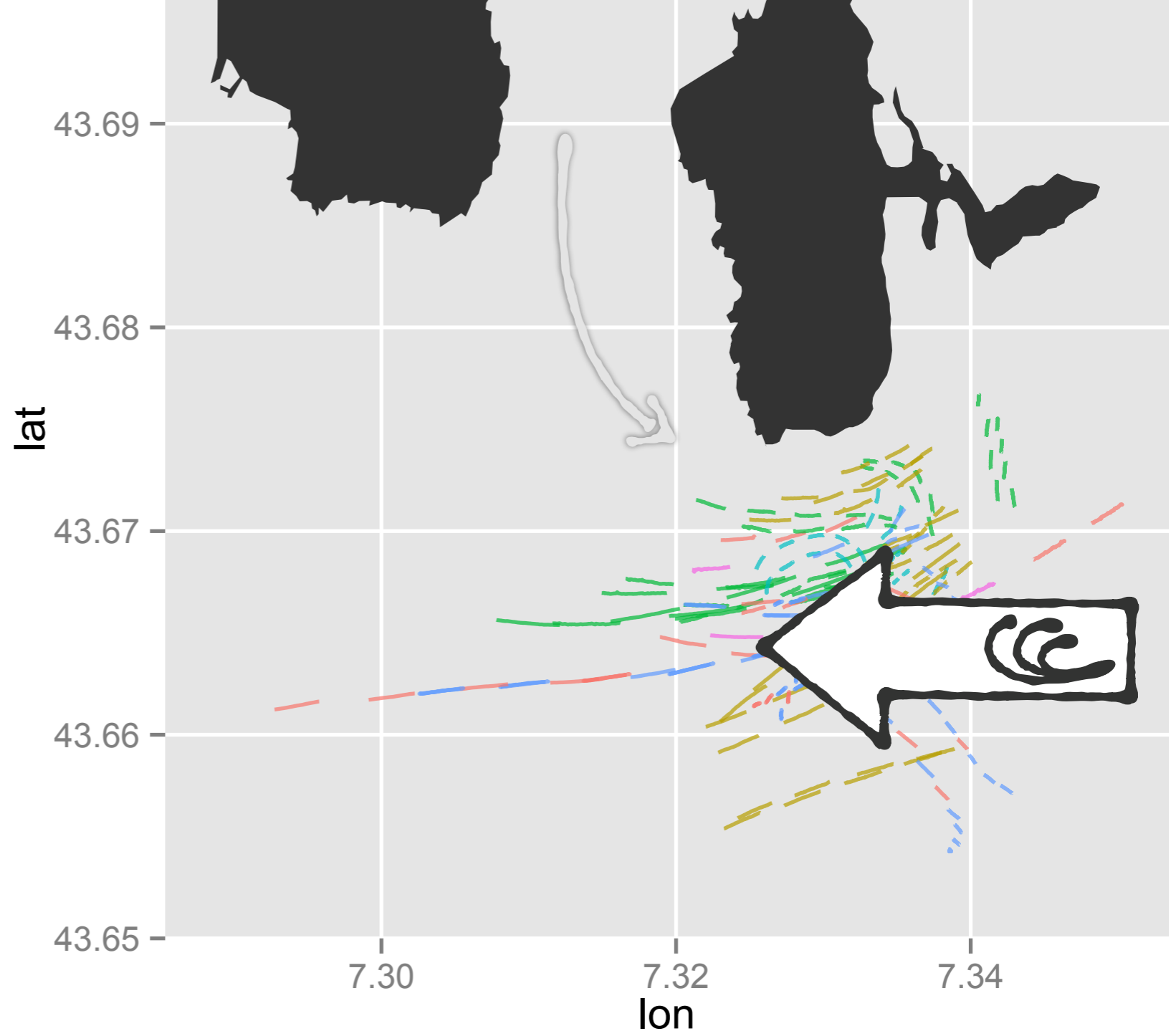
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Direction de la côte

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# Stratégie expérimentale

---

Extérieur rade Villefranche

*Tests:*

Courant

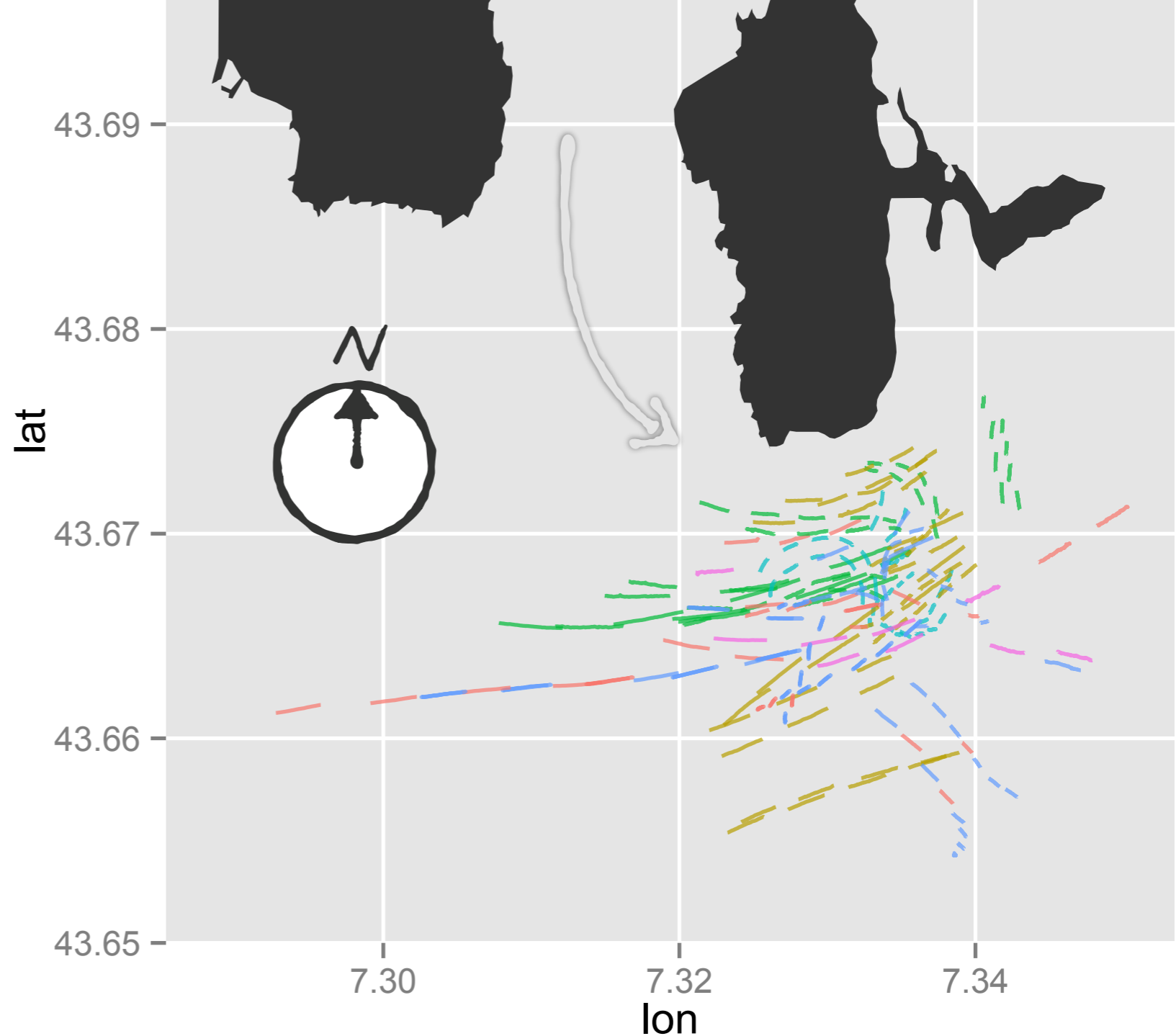
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# Stratégie expérimentale

---

Extérieur rade Villefranche

Tests:

Courant

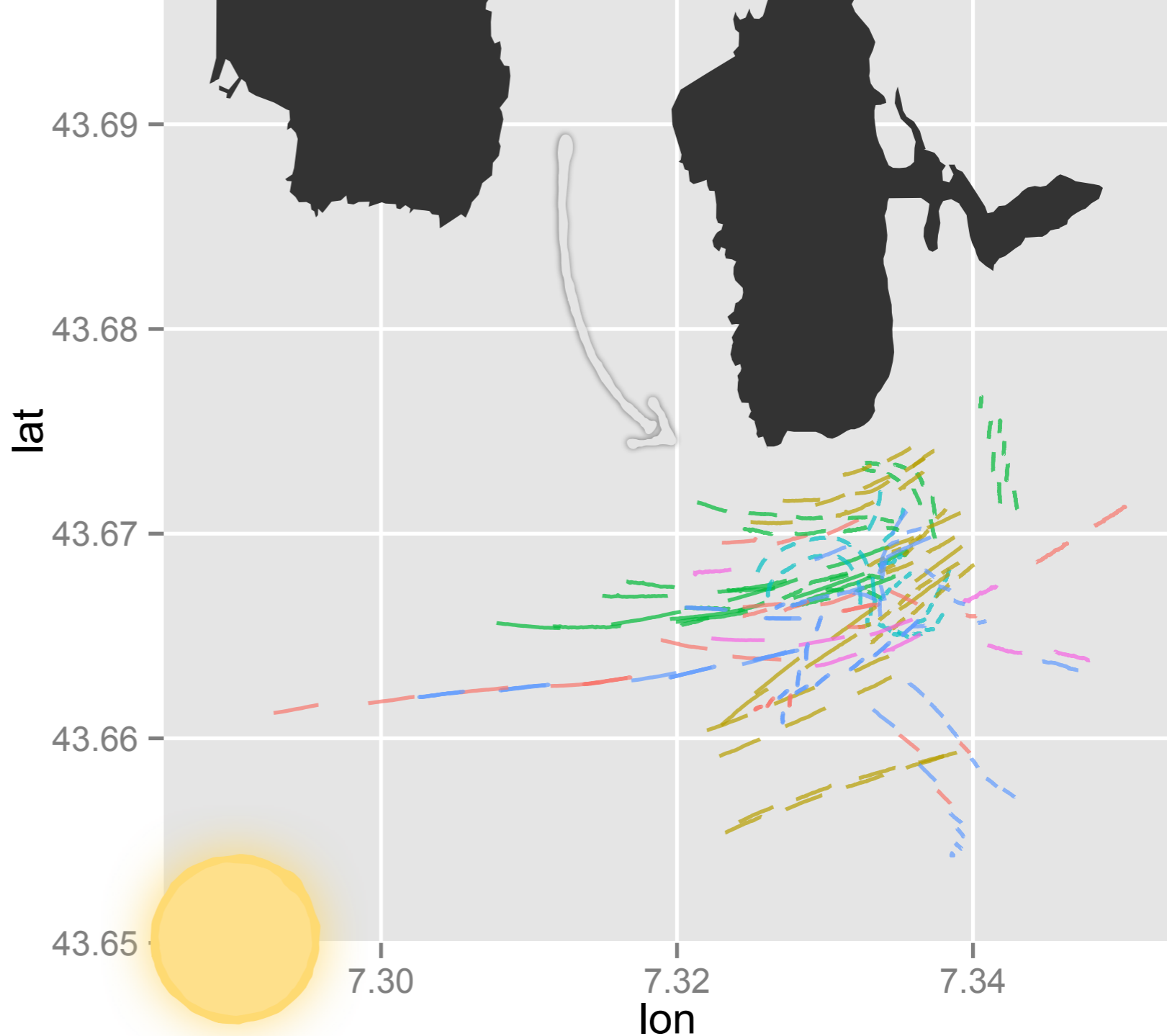
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# Stratégie expérimentale

---

Extérieur rade Villefranche

Tests:

Courant

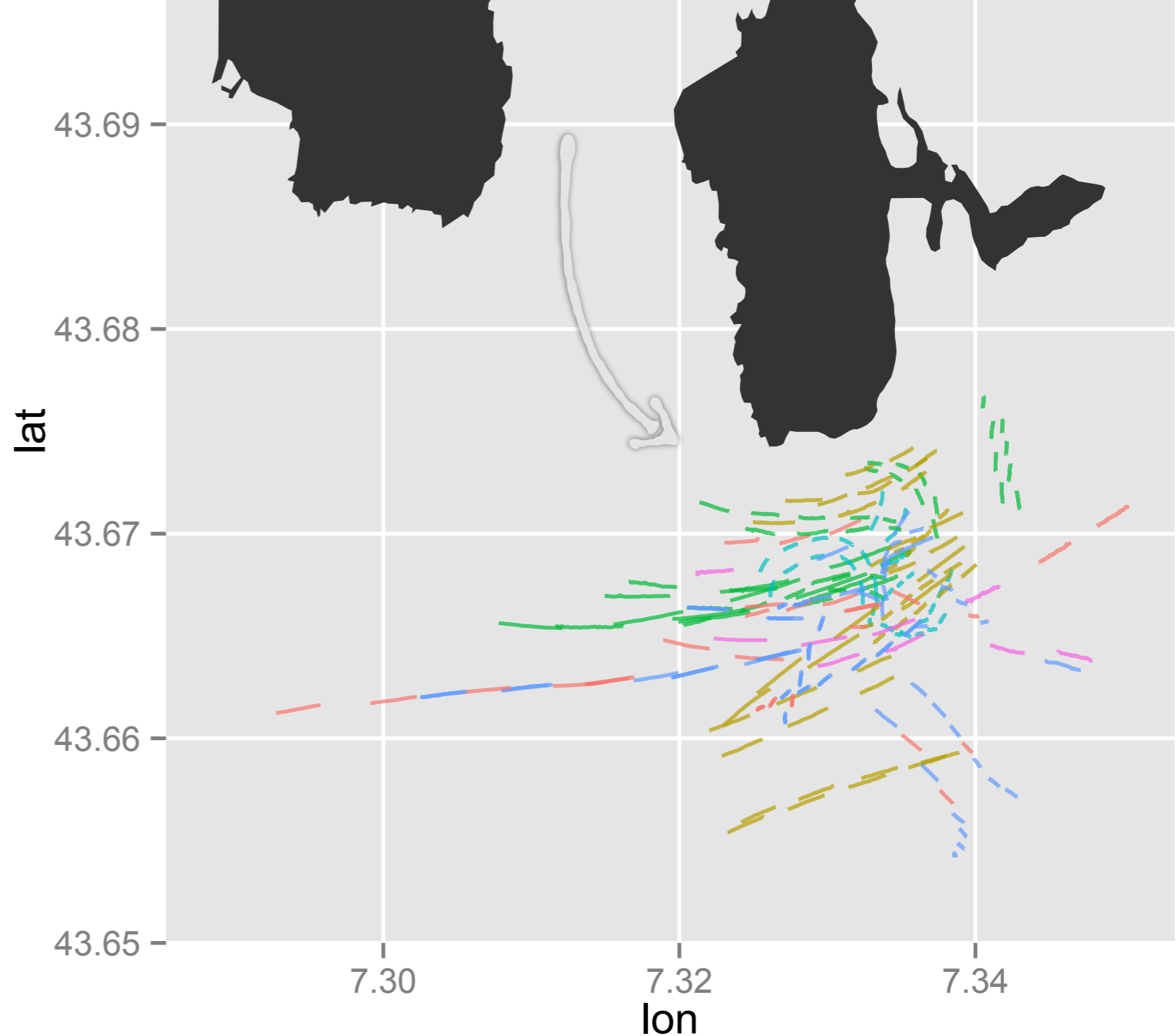
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Direction de la côte

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Orientation cardinale

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## species

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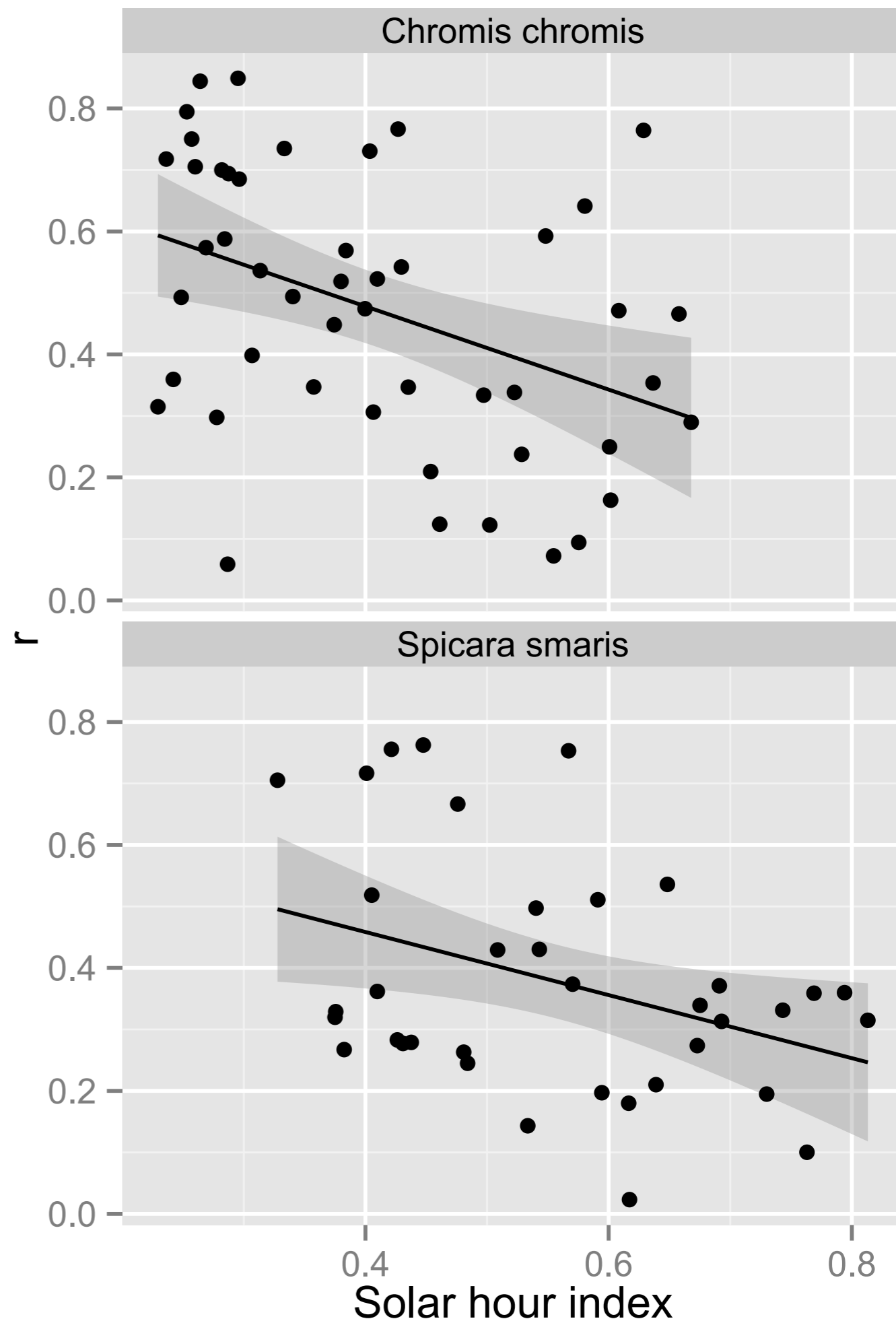
# Heure de la journée et précision

---

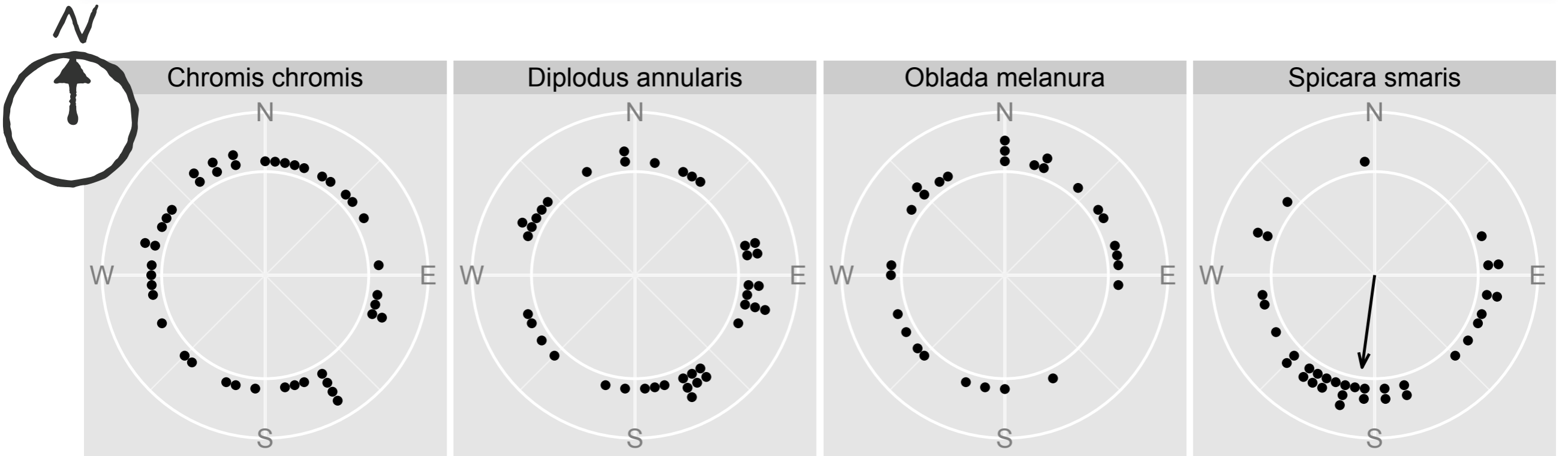
$r$  = précision de l'orientation individuelle

index = heure relative entre lever et coucher du soleil

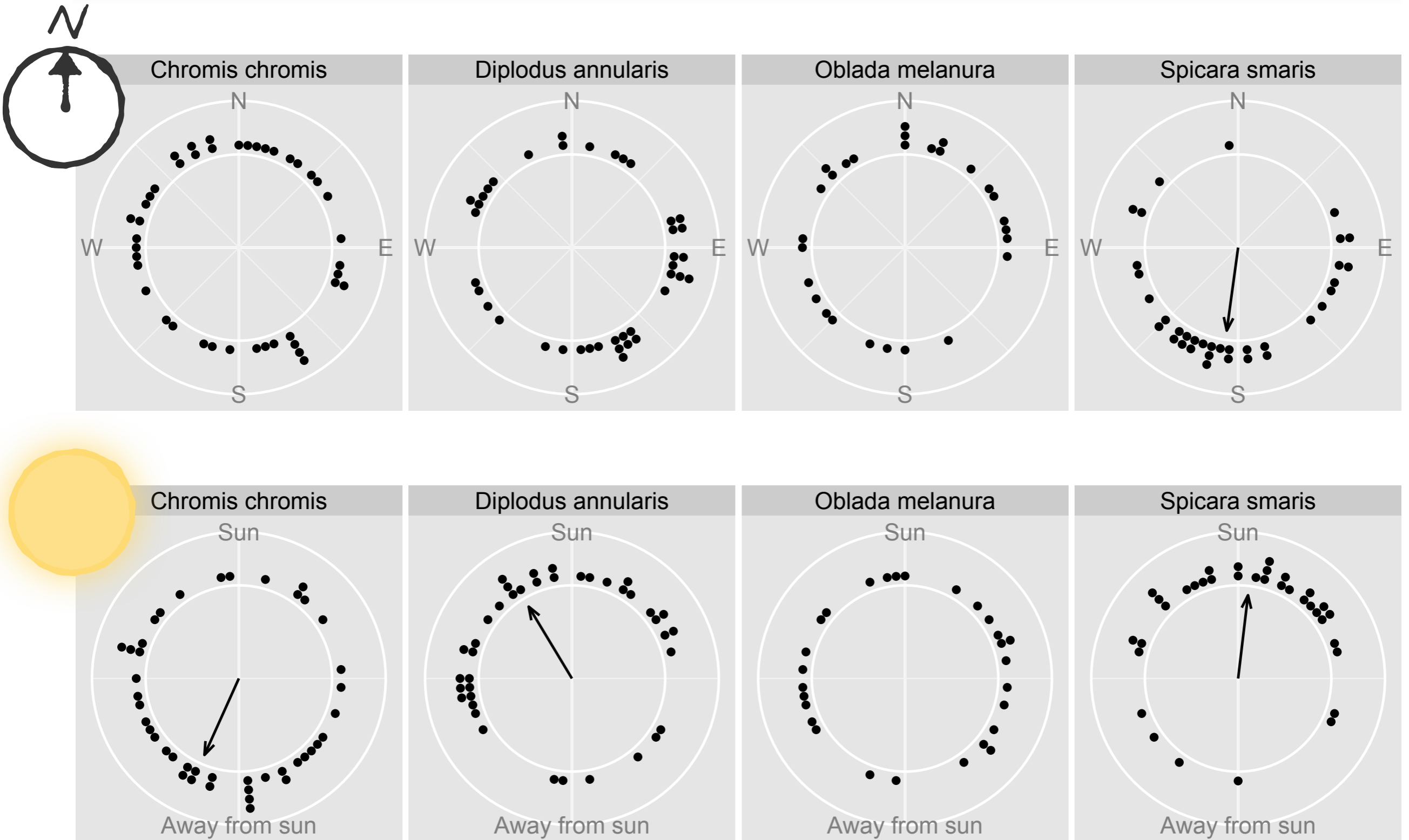
Orientation plus efficace le **matin**, quand la direction du soleil est facilement visible



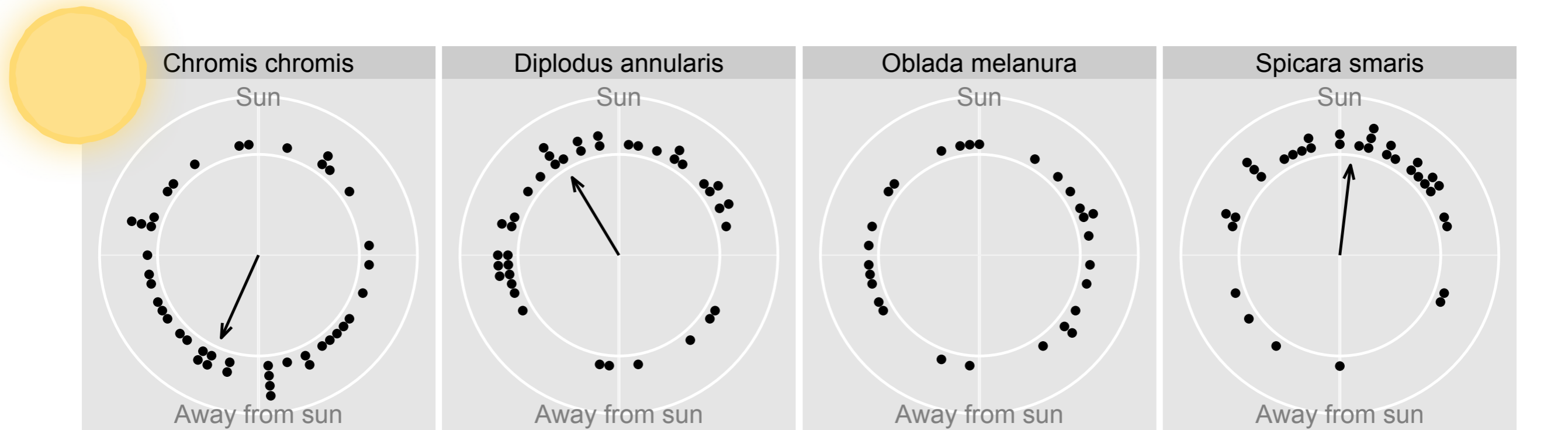
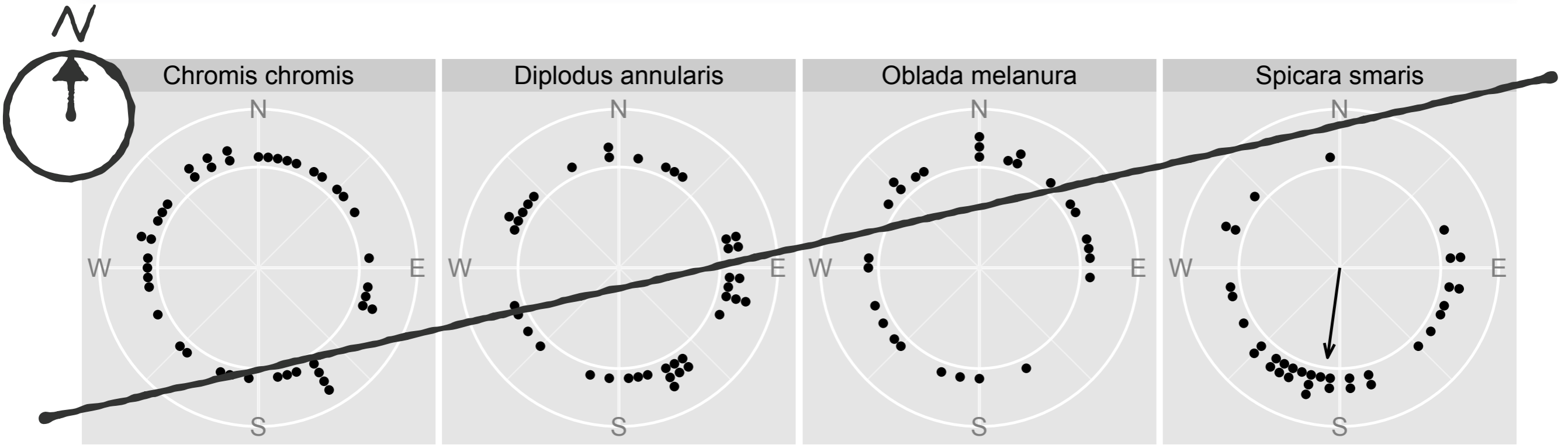
# Orientation cardinale et/ou solaire



# Orientation cardinale et/ou solaire



# Orientation cardinale et/ou solaire



# Simulation du comportement et des courants

---

*Advection + comportement  
(CMS)*

orientation vers la côte

nage de 0 à 19 cm/s

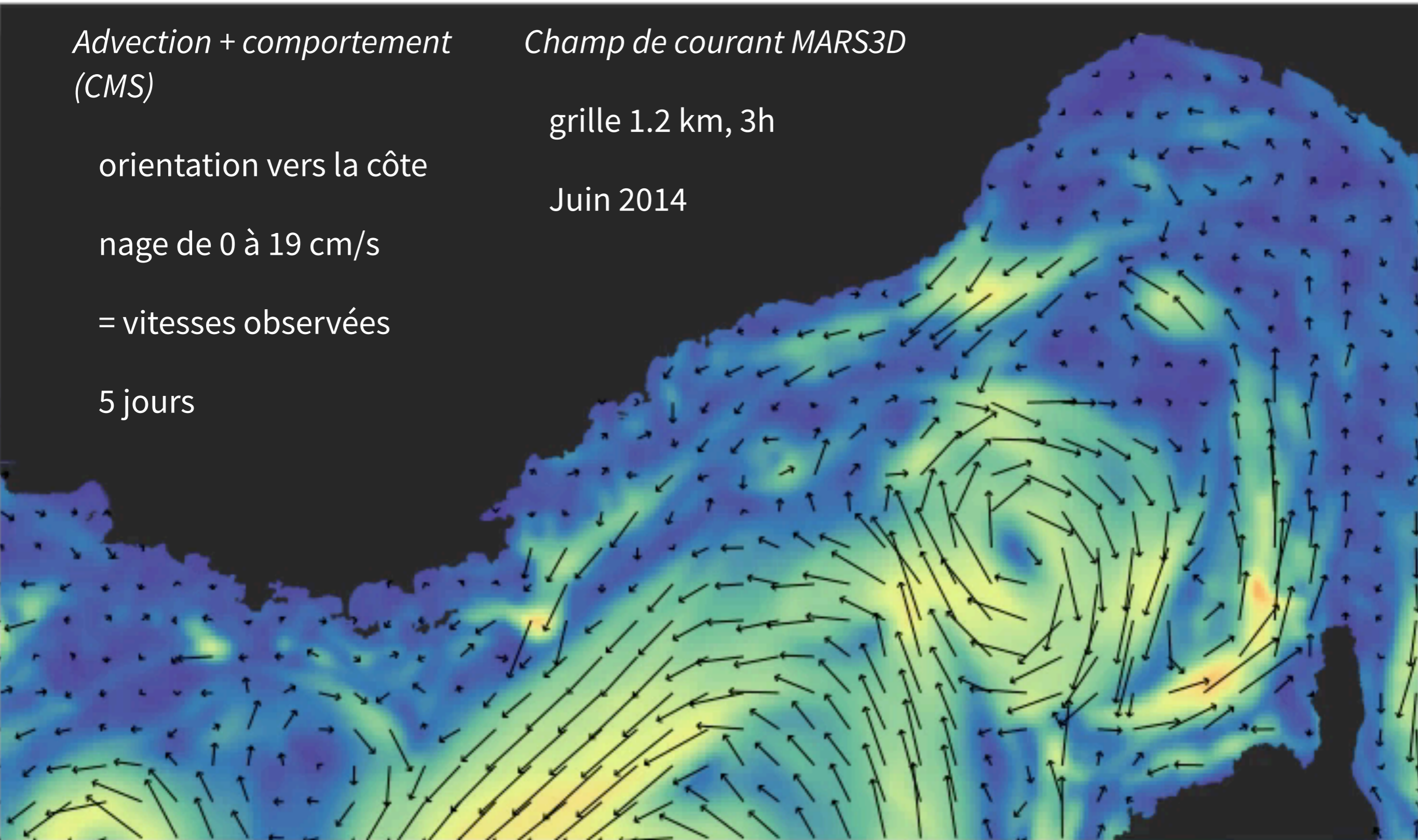
= vitesses observées

5 jours

*Champ de courant MARS3D*

grille 1.2 km, 3h

Juin 2014



# Simulation du comportement et des courants

---

*Advection + comportement  
(CMS)*

orientation vers la côte

nage de 0 à 19 cm/s

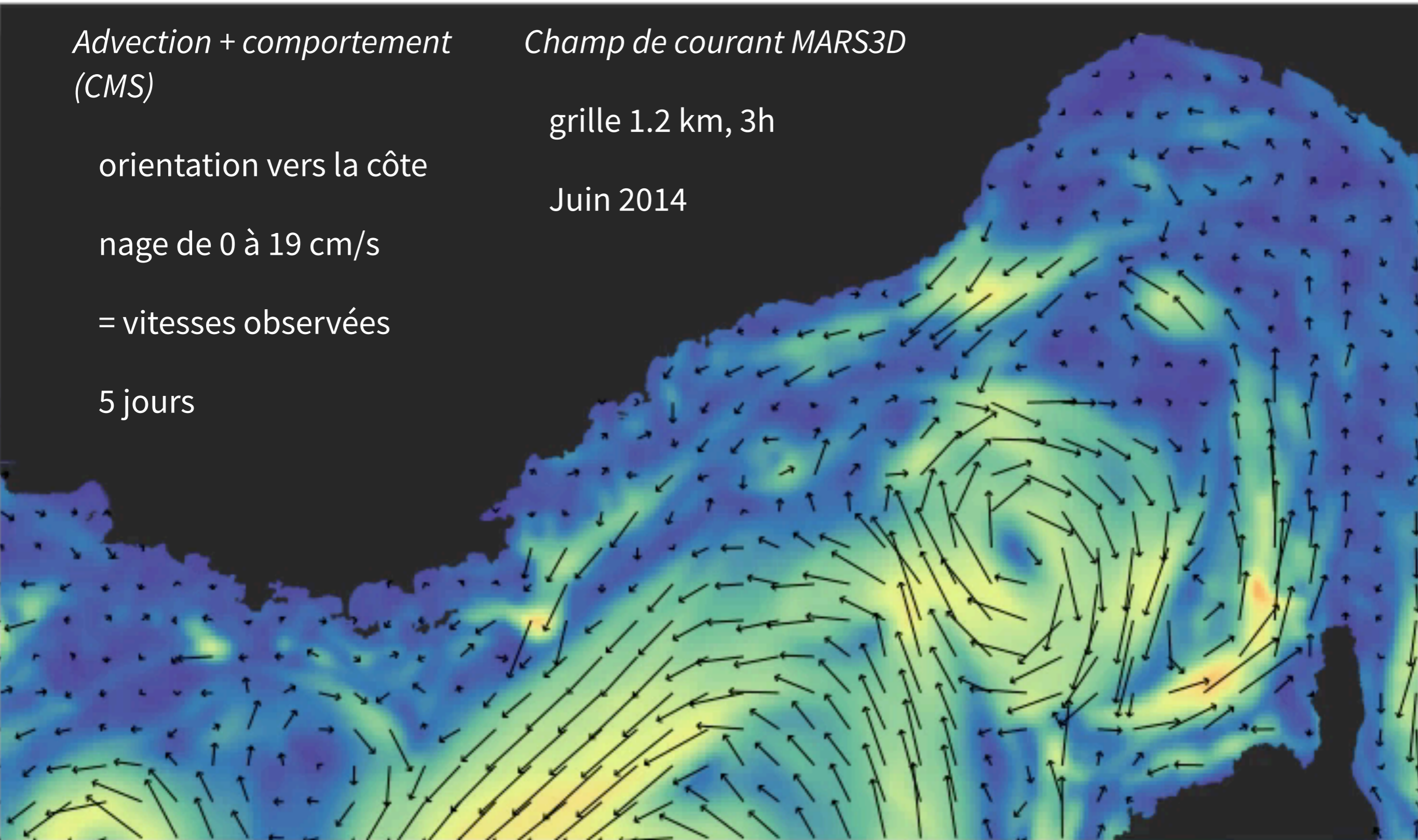
= vitesses observées

5 jours

*Champ de courant MARS3D*

grille 1.2 km, 3h

Juin 2014



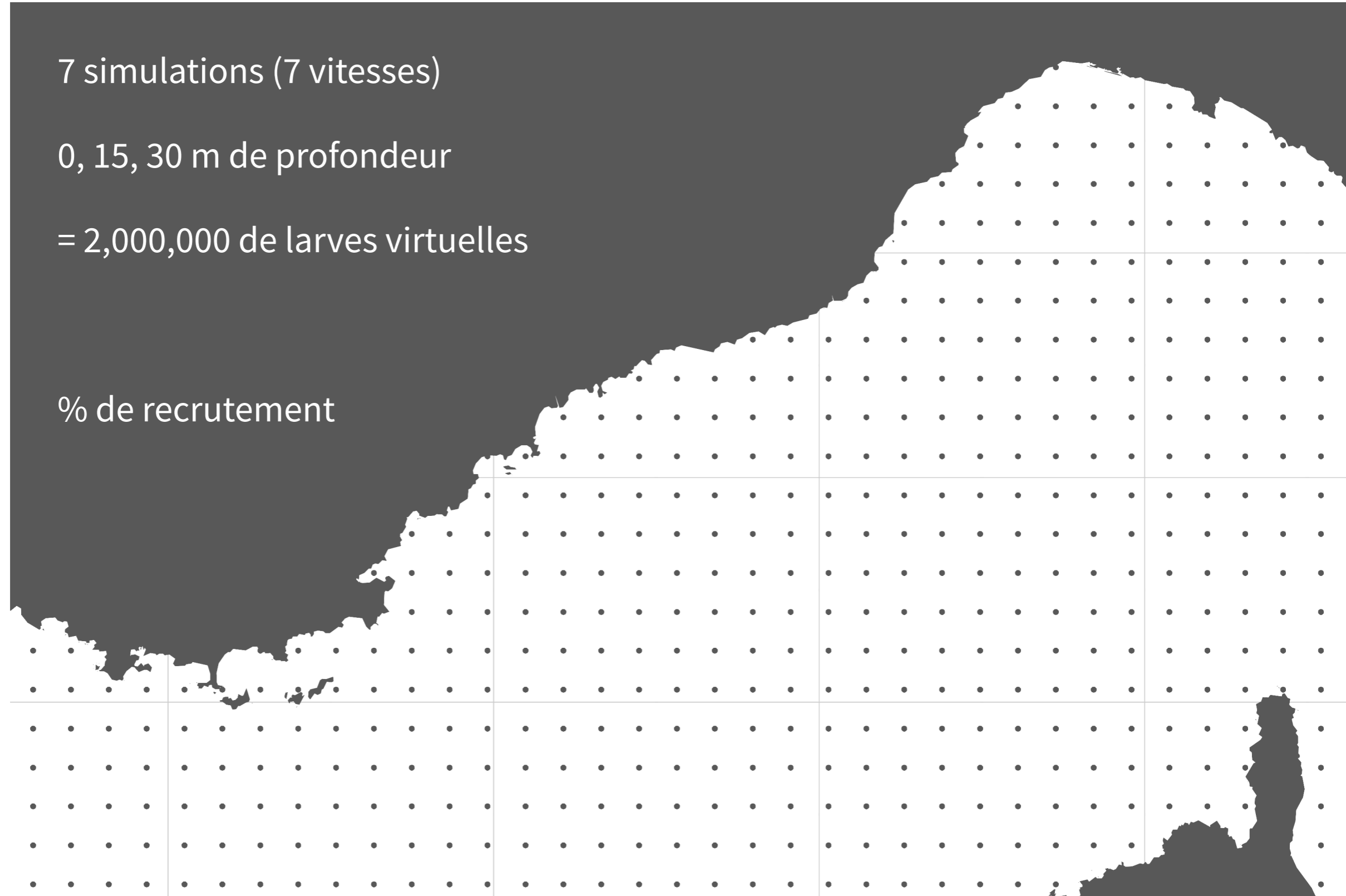
# Lâcher de larves virtuelles

7 simulations (7 vitesses)

0, 15, 30 m de profondeur

= 2,000,000 de larves virtuelles

% de recrutement





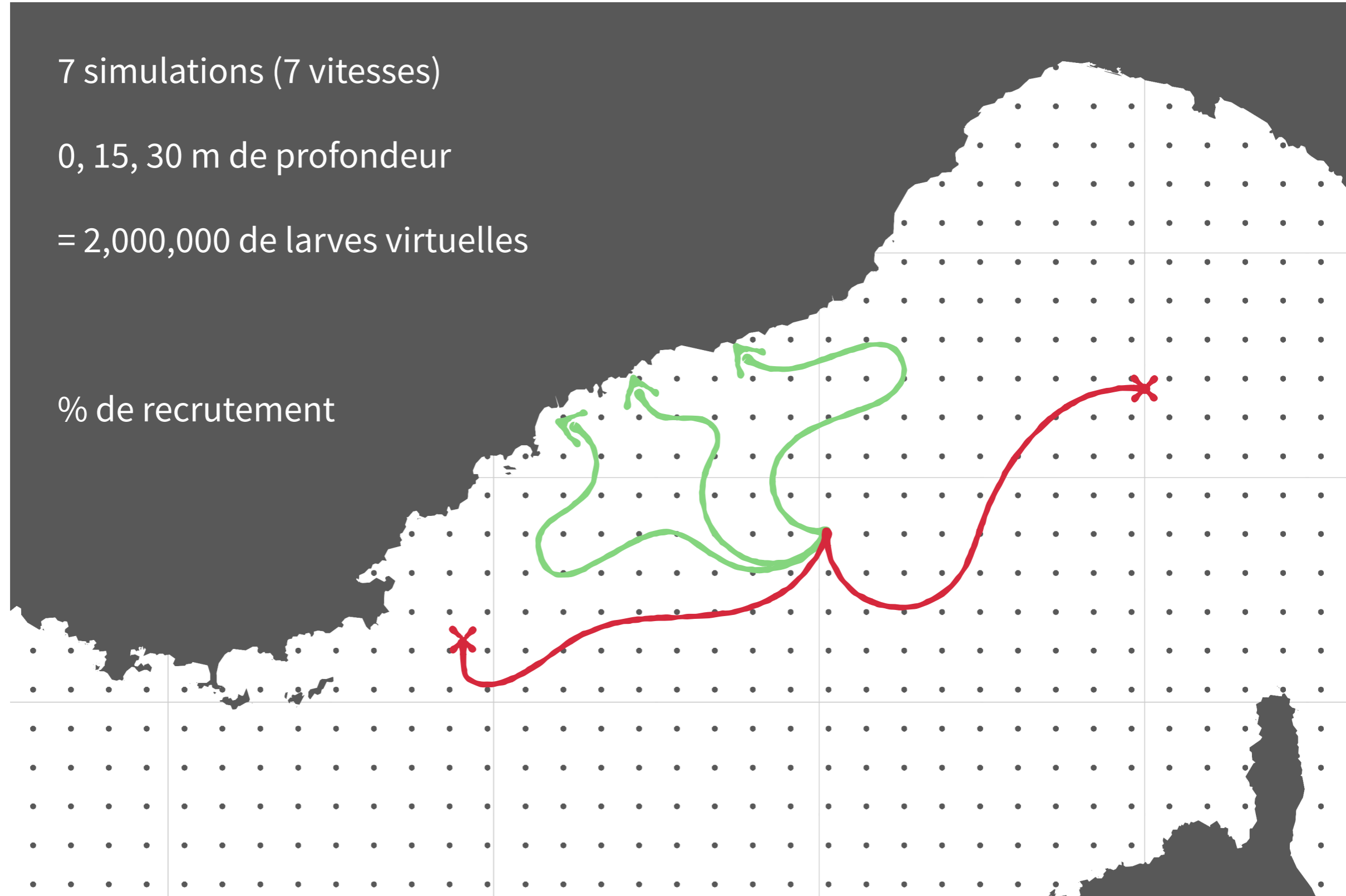
# Lâcher de larves virtuelles

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0, 15, 30 m de profondeur

= 2,000,000 de larves virtuelles

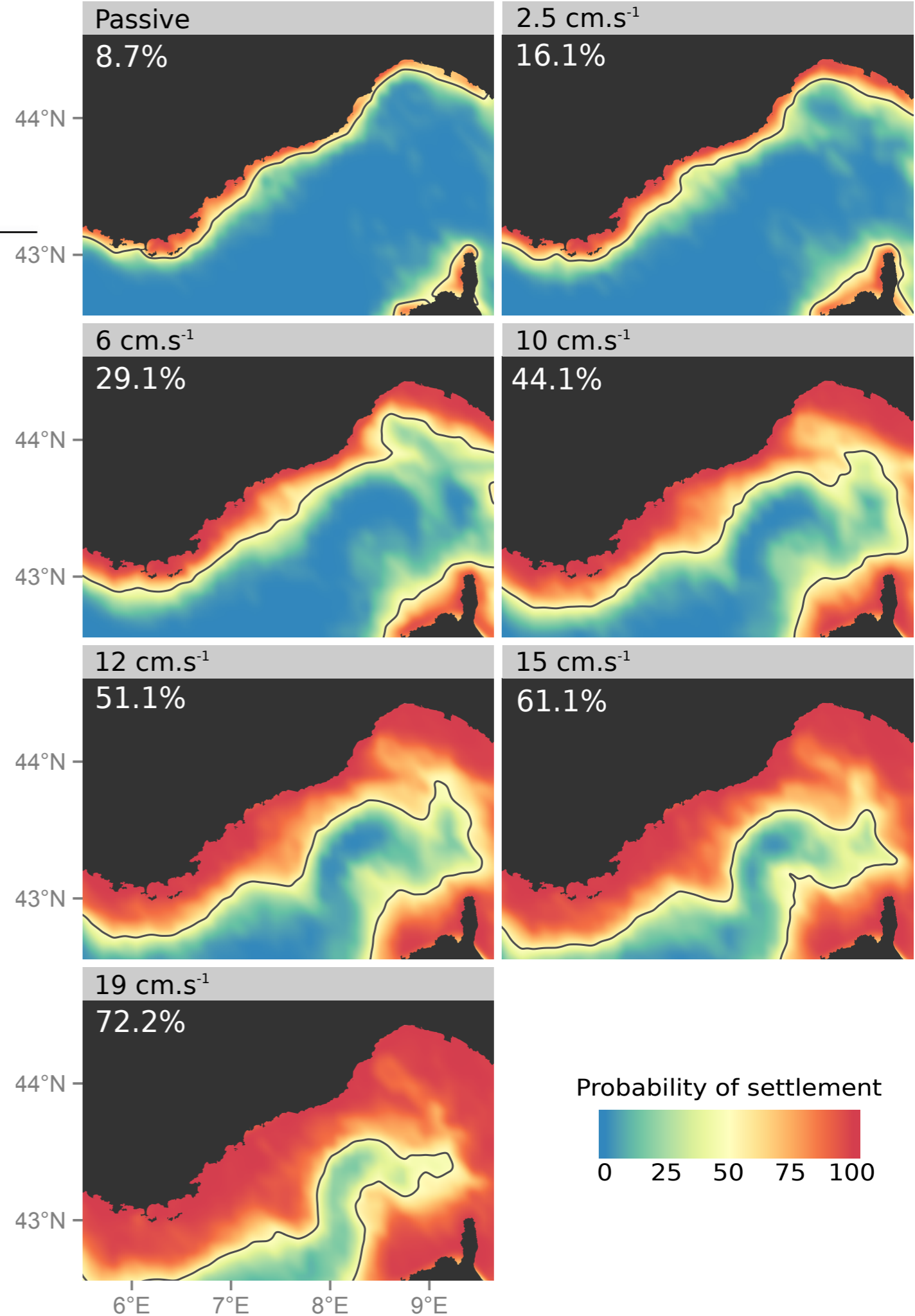
% de recrutement

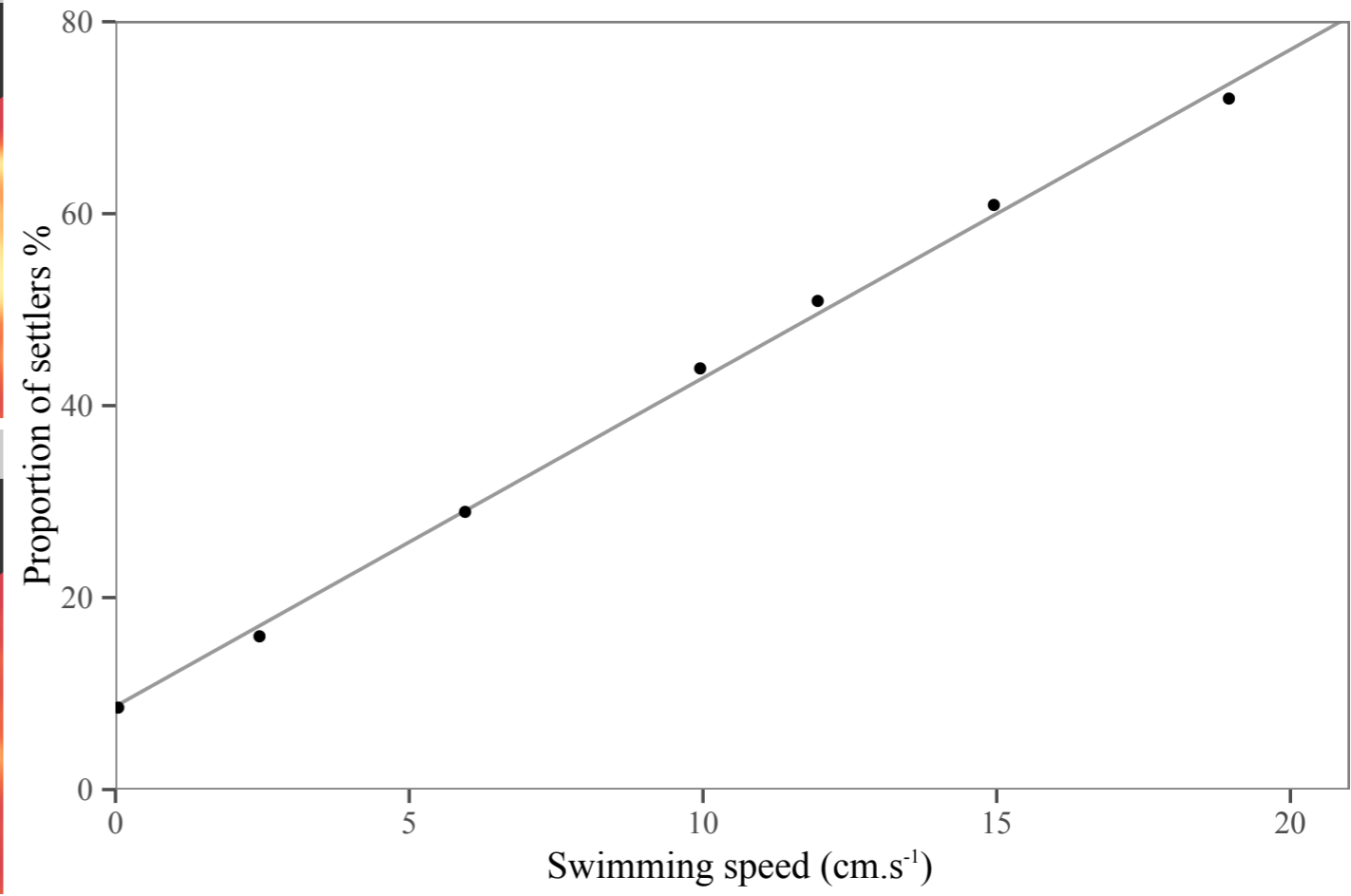
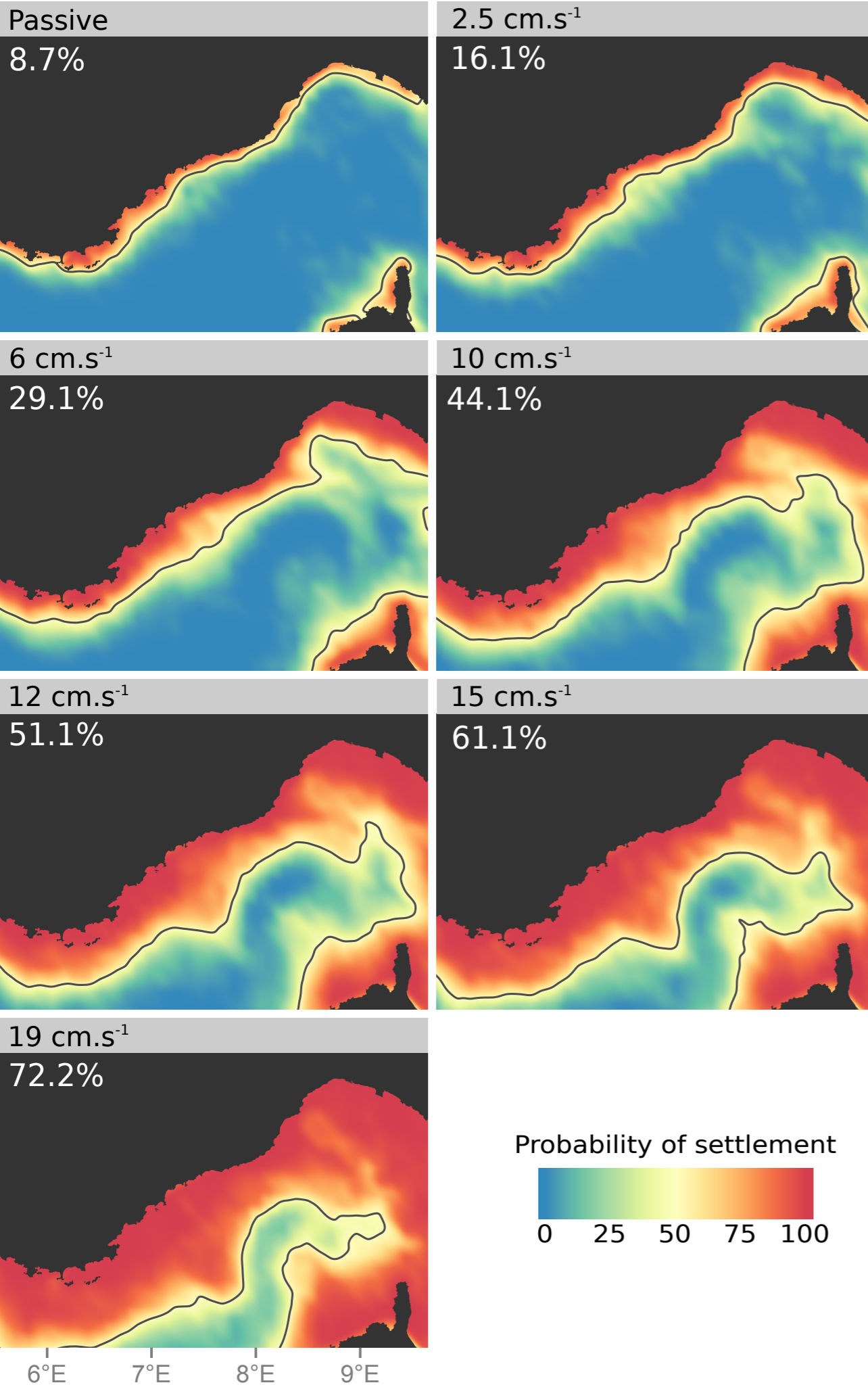


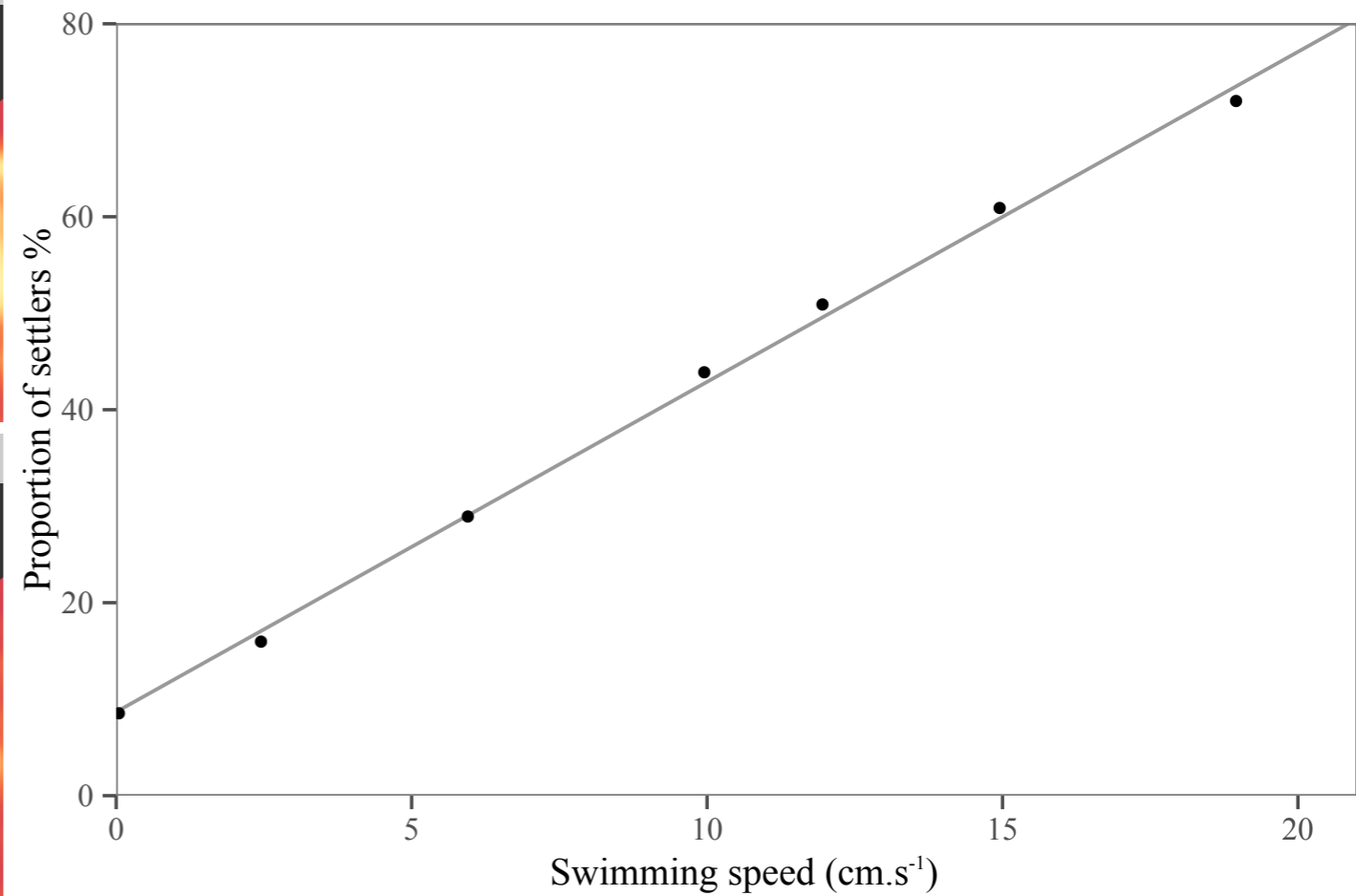
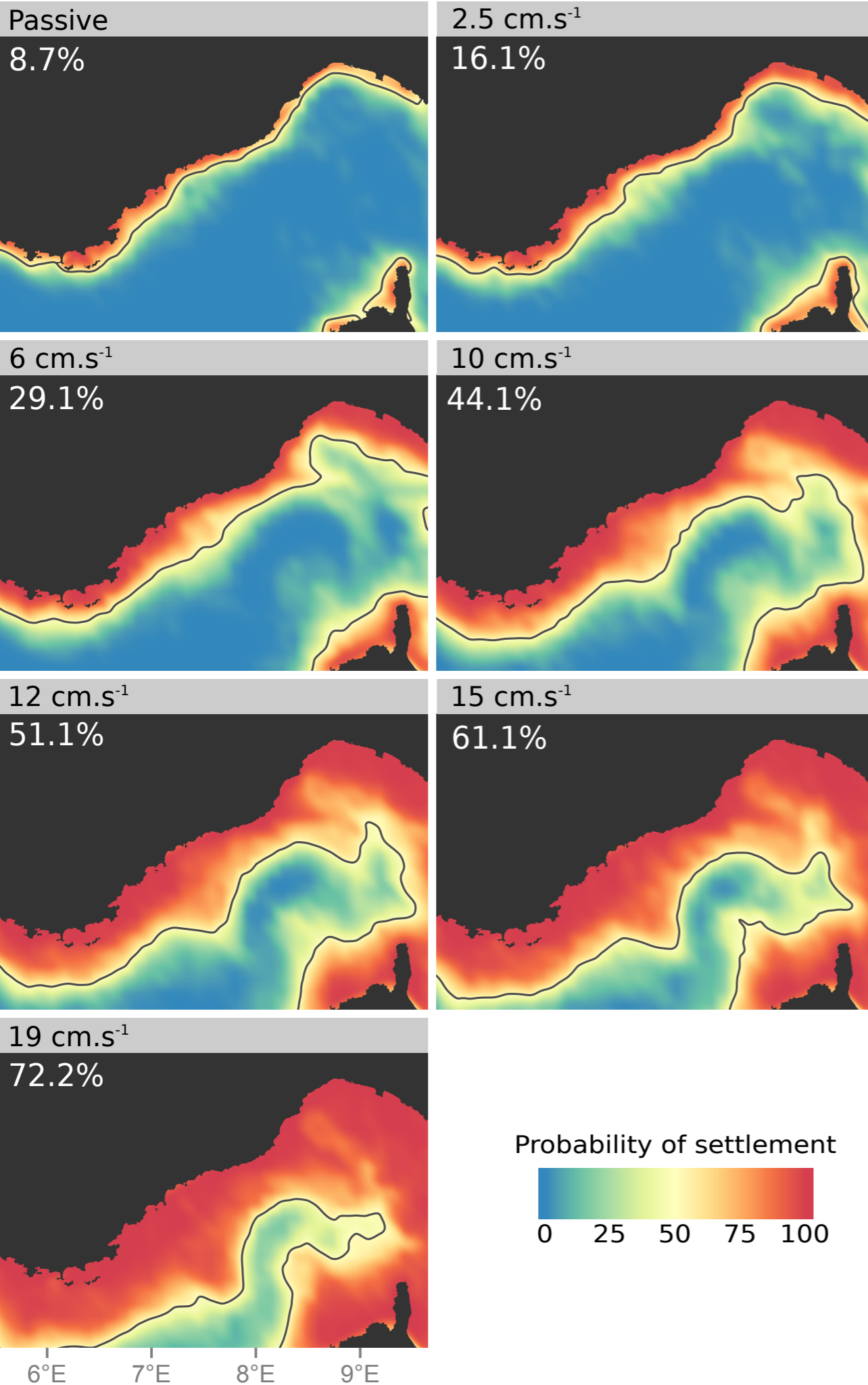
# Proportion de recrutement

% de recrutement  $\times 10$

Recrutement possible depuis **plusieurs dizaines de km** en 5 jours







Pas de barrière courantologique

# Bilan

---

L'arrivée des larves dans les habitats côtiers suit une **chronologie** marquée

Les larves de poissons en Méditerranée peuvent

nager vite

s'orienter

et influencent leur dispersion (au moins autant que les courants)



# Et la restauration?

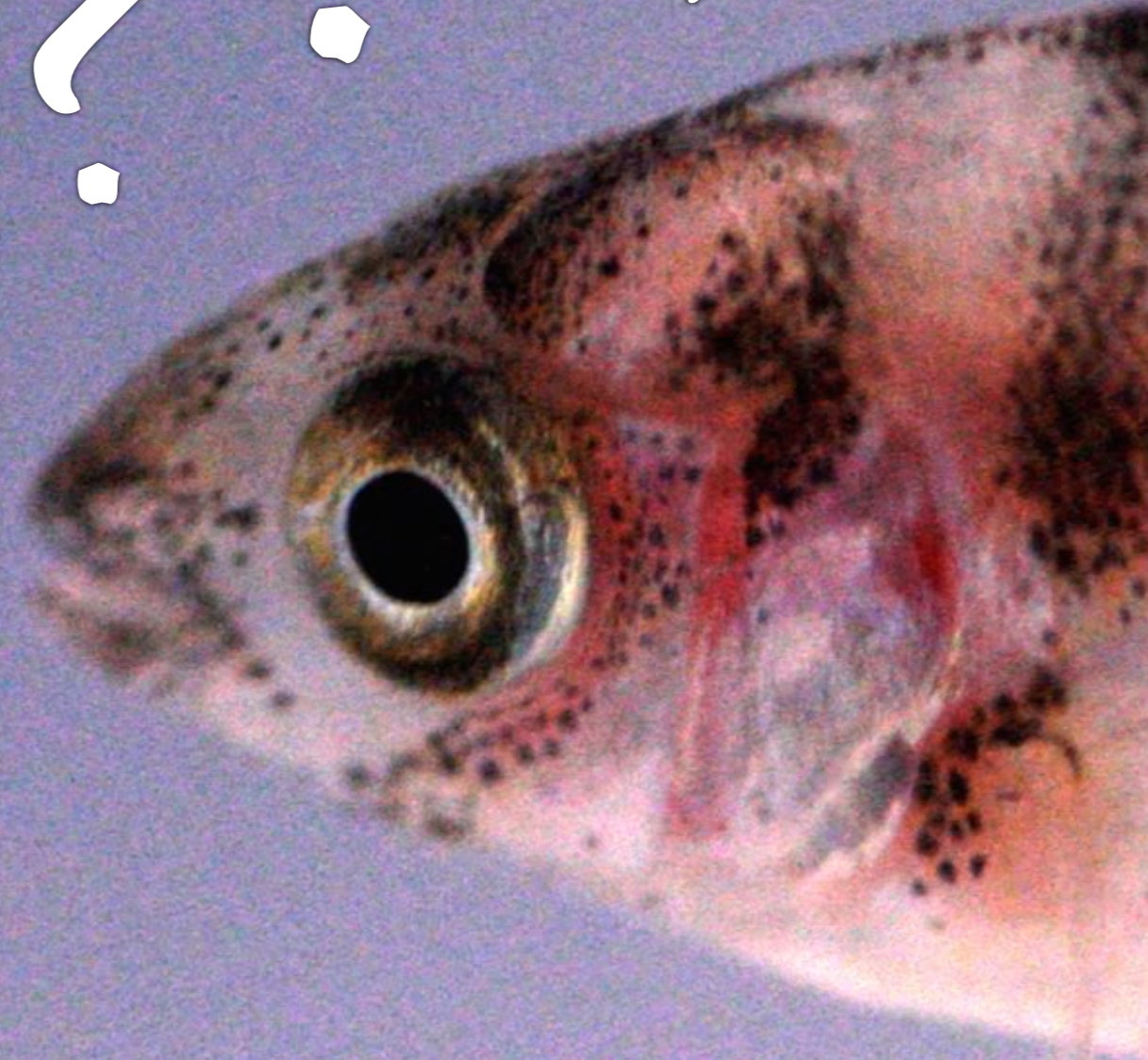
---

Prévision précise du recrutement/de la connectivité **impossible** actuellement

⇒ importance de la disponibilité des habitats à l'arrivée

Manque de **connaissances** sur la phase larvaire, qui détermine les stocks

⇒ nécessité d'observations pour bien allouer les ressources à l'arrivée



*Merci*



*Merci*

