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How does the European catfish *Silurus glanis* behave under an hypoxic stress ?

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➤ How does the European catfish *Silurus glanis* behave under an hypoxic stress ?

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FSBI Symposium – 5-8 July 2021 – Virtual conference

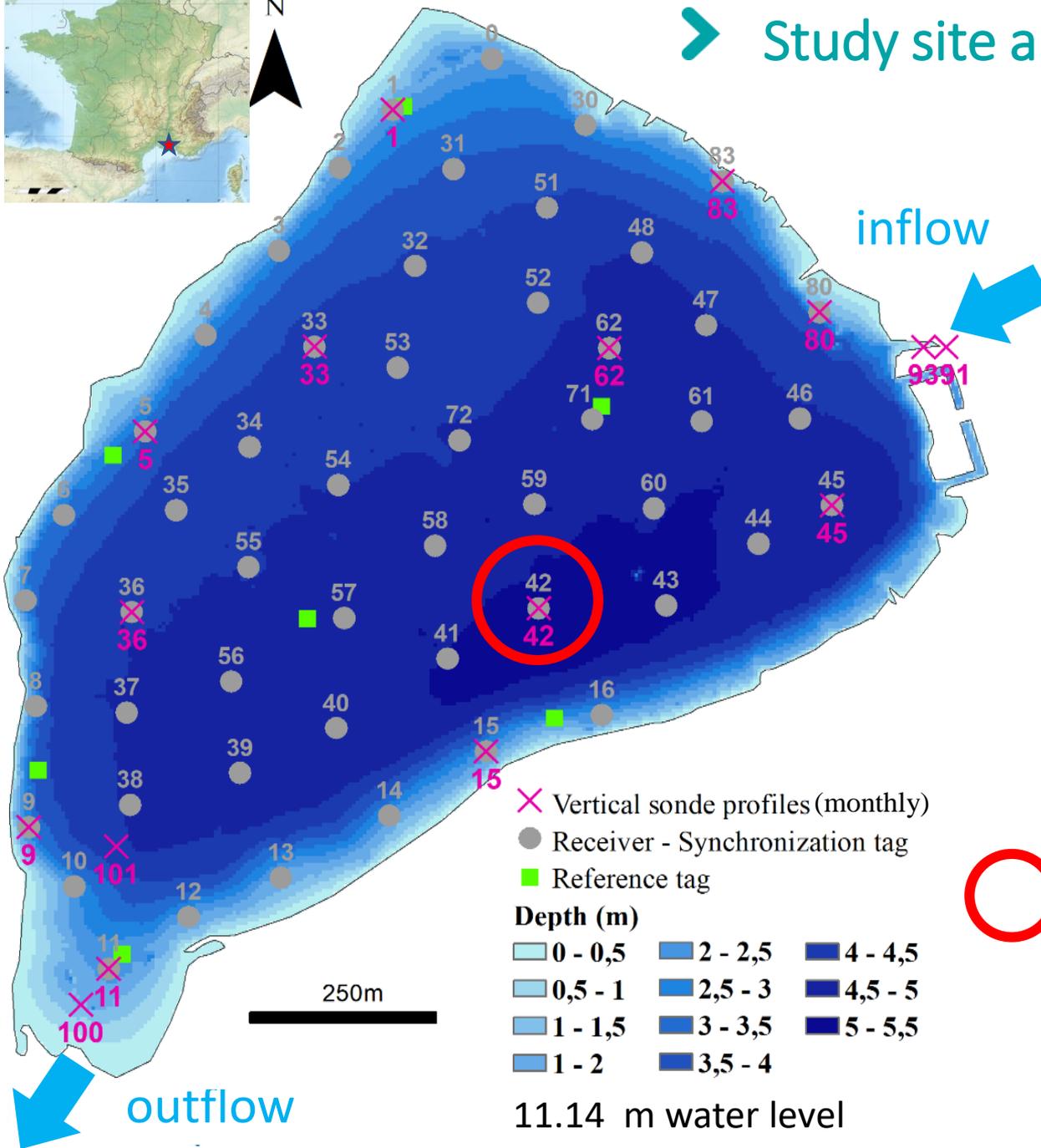
➤ Context

- Increase of low dissolved oxygen events in freshwater ecosystems with human activities (*Domenici et al, 2017*)
- $[O_2]$ can drop below suitable physiological thresholds (**hypoxia**)
- European catfish is known to have low oxygen requirements (*Massabuau and Forgue 1995*).
- We tracked 40 European catfish during a summer hypoxic event

➤ Questions

- Did hypoxia lead to changes in spontaneous swimming activity (*Danek et al. 2014*) ?
- Which were the individual responses to hypoxic stress ?

➤ Study site and experimental setup



Aulnes pond

- 90 ha
- mean depth 3.8m
- max depth 6m



○ T, O₂ hourly vertical profile

➤ Fish tracking

➤ 40 tagged catfish

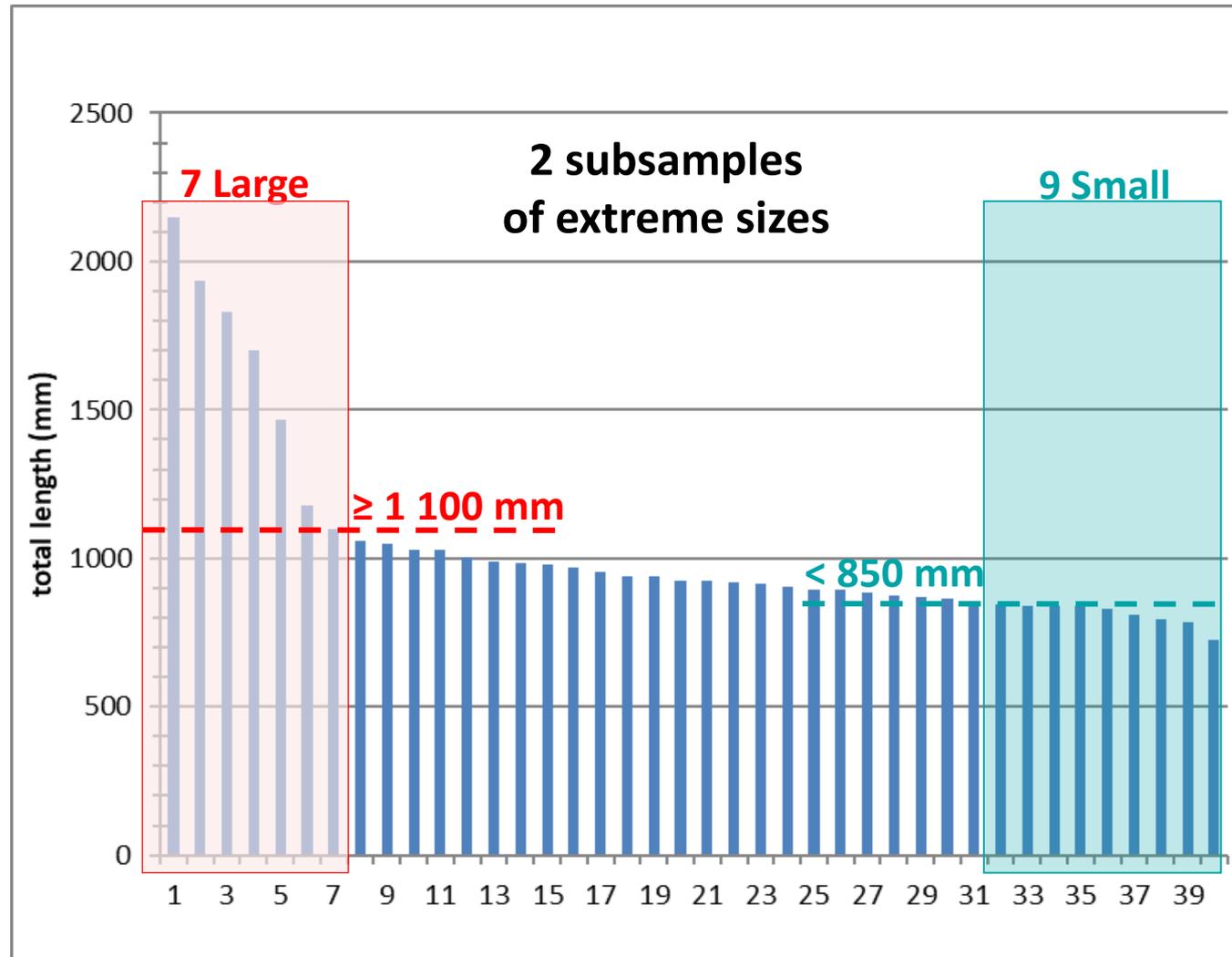
- ✓ mean size: 1 033 mm [727; 2 150] mm
- ✓ mean weight: 9 658 g [2 301; 64 380] g



Tags 36mm, 11g

Emission
every 5 min

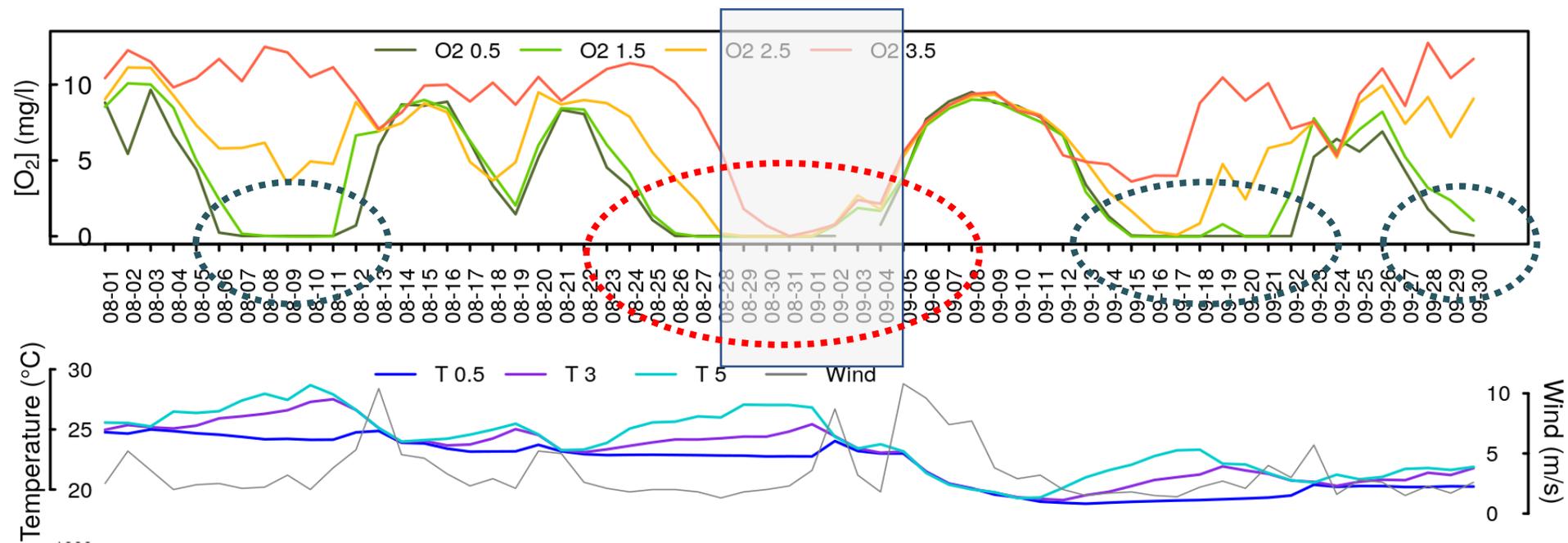
Lifespan ~5 years

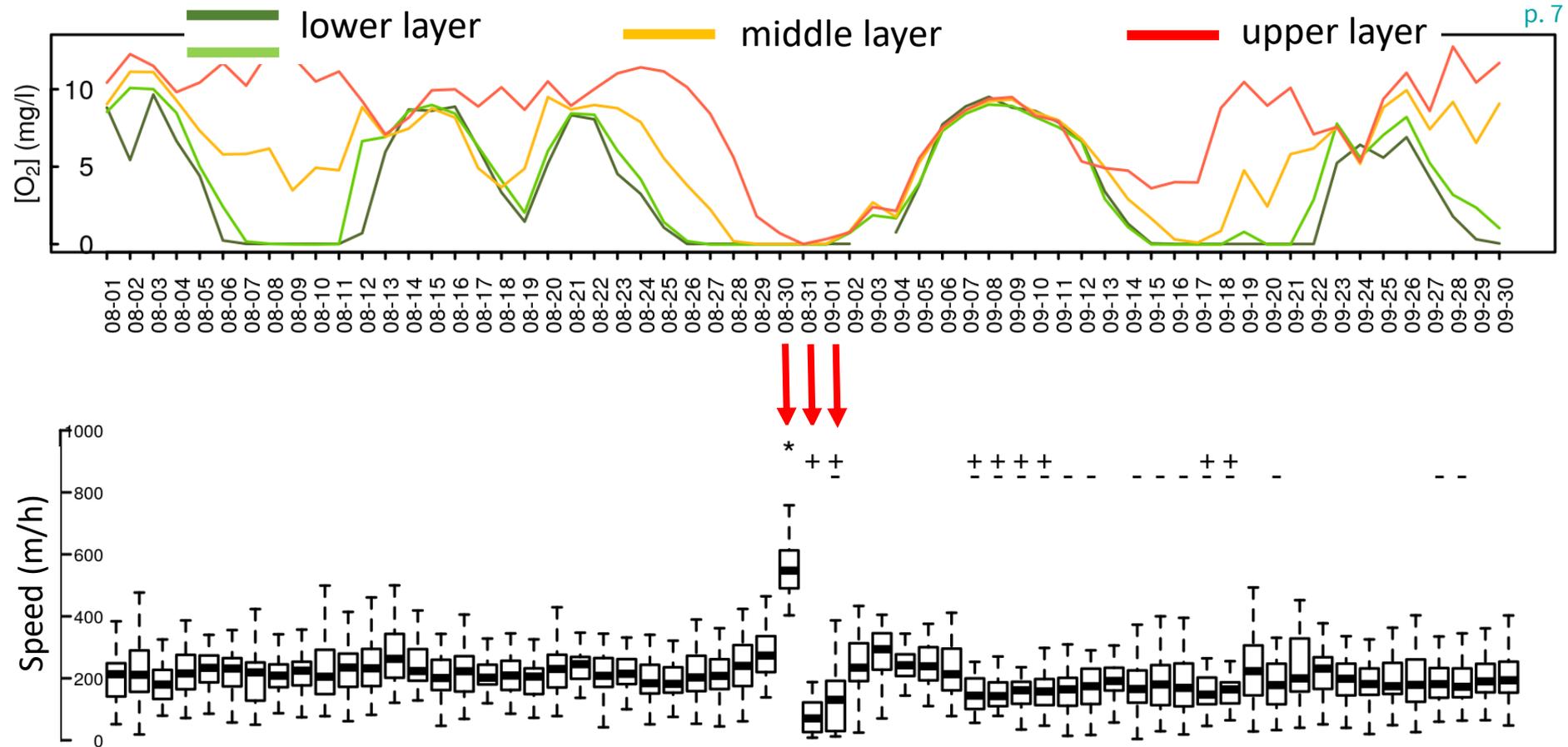


➤ [O₂] time series

August – September 2019

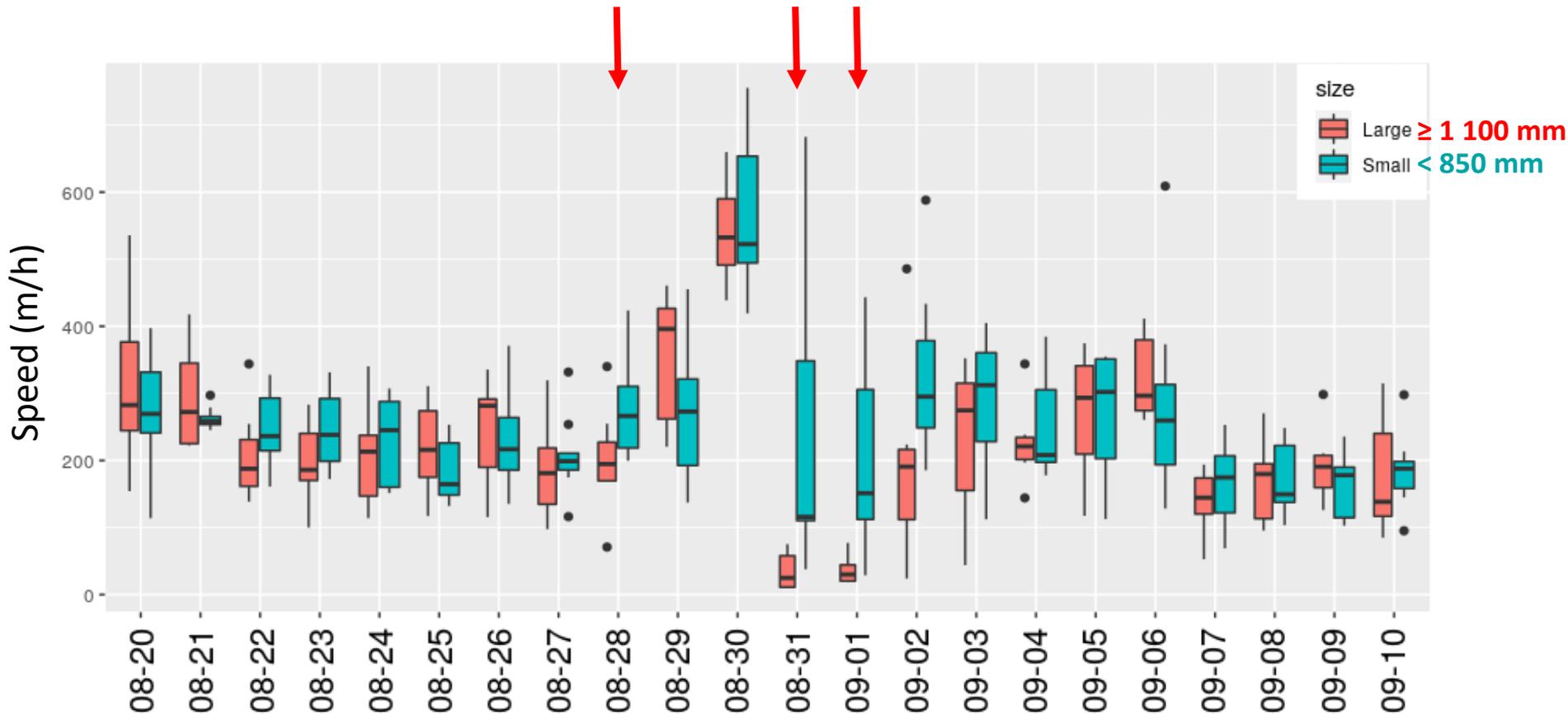
▬ lower layer
 ▬ middle layer
 ▬ upper layer





- Only comparisons involving 30th, 31st August, 1st Sept
- On 30th, when anoxia was extending to surface layer, activity was the highest
- On 31st and 1st, when anoxia was global, activity was the lowest (but not different from some other days in Sept.).

➤ Daily activity comparisons of Large vs Small



- On 28th, 31st and 1st, Large were less active than Small
- No differences on 30th

➤ Discussion / Conclusions

- Catfish could go through very low oxygen conditions
- Movements impacted only when the $[O_2]$ in the upper layer went below 2-2.4 mg/L (*as Danek et al, 2014*)
- Increased activity when hypoxia was worsening
 - ✓ Avoidance response that helped to find a more suitable place ? (*Domenici 2000, herbert 2006, Chapman 2009*)
- Found a more suitable place, probably the most oxygenated available in the lake, and stayed there during the anoxia
- Large even less active than Small during the anoxia

➤ Remaining questions

- How do catfish manage with anoxia of the lower half of the water column ?
- How it can happen that all fish converge in a short time interval towards the same place ?
 - ? Did they map the lake (*Braithwaite and de Perera 2006*) and know where to refuge ?
- How to explain the differential behavior of Small vs Large during the anoxia ?



Thank you for your attention !

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