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**Assessing the environmental control on fish life cycle:
case of temperature, discharge and photoperiod control
on shad reproduction (*Alosa alosa*)**

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Assessing the environmental control on fish life cycle: case of temperature, discharge and photoperiod control on shad reproduction (*Alosa alosa*)



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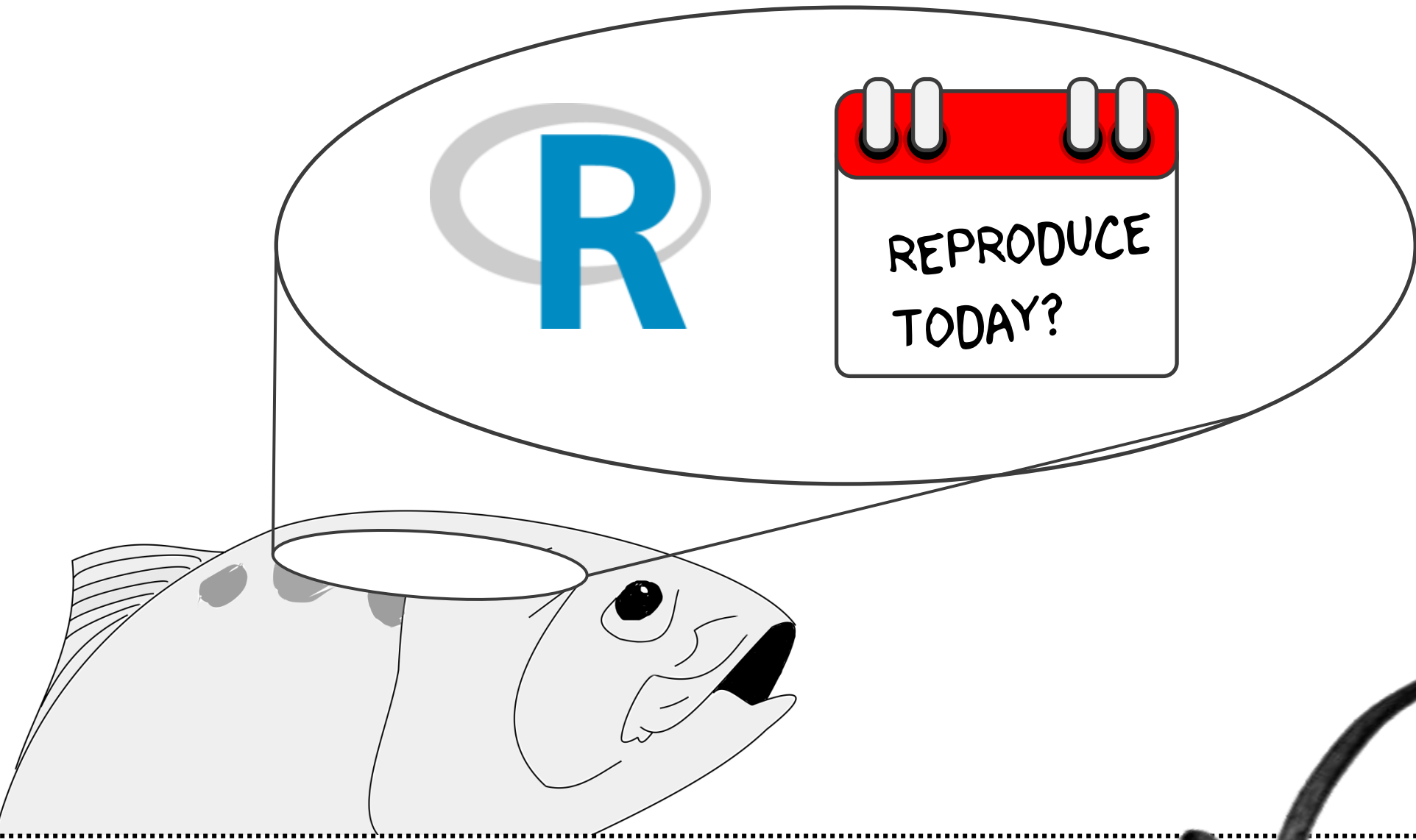
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Context

- Dramatic declines observed in North Atlantic shads (Limburg and Waldman, 2009).
- Global warming threatens the recovery of diadromous population (Lassalle et al., 2008).

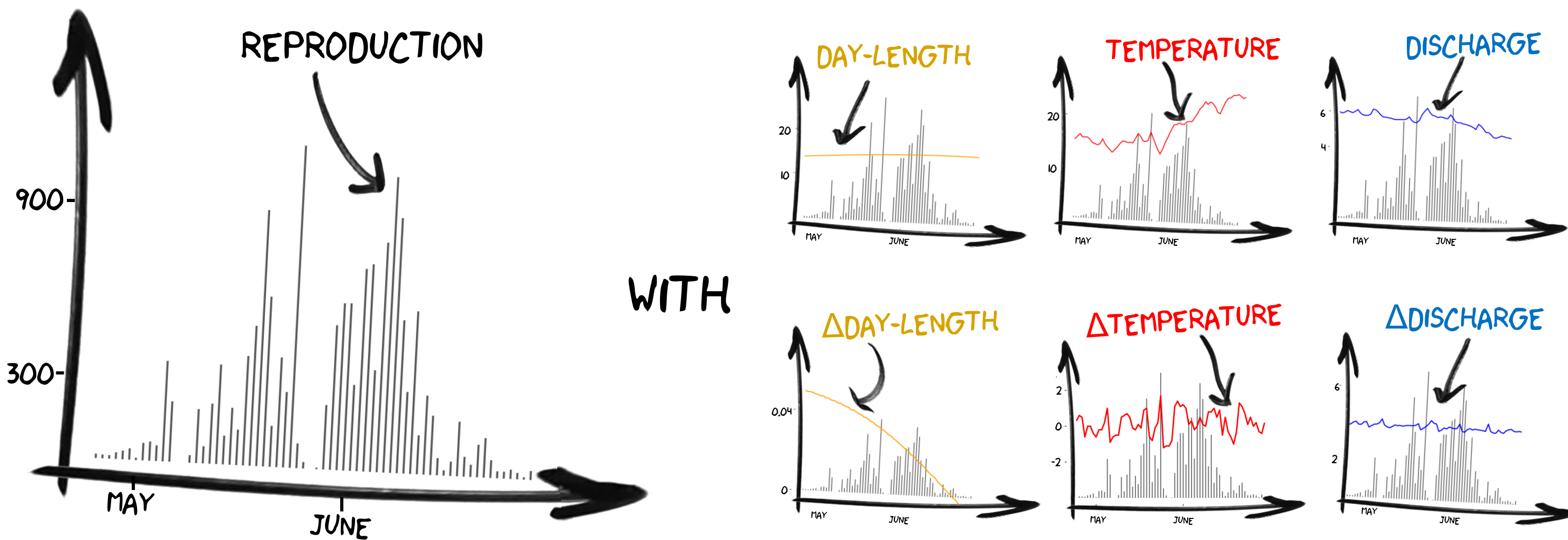
IS SHAD REPRODUCTION TRIGGERED BY ENVIRONMENTAL CUES THAT MAY BE DISRUPTED BY GLOBAL WARMING?



Data and Method

14 years of field monitoring in two French rivers

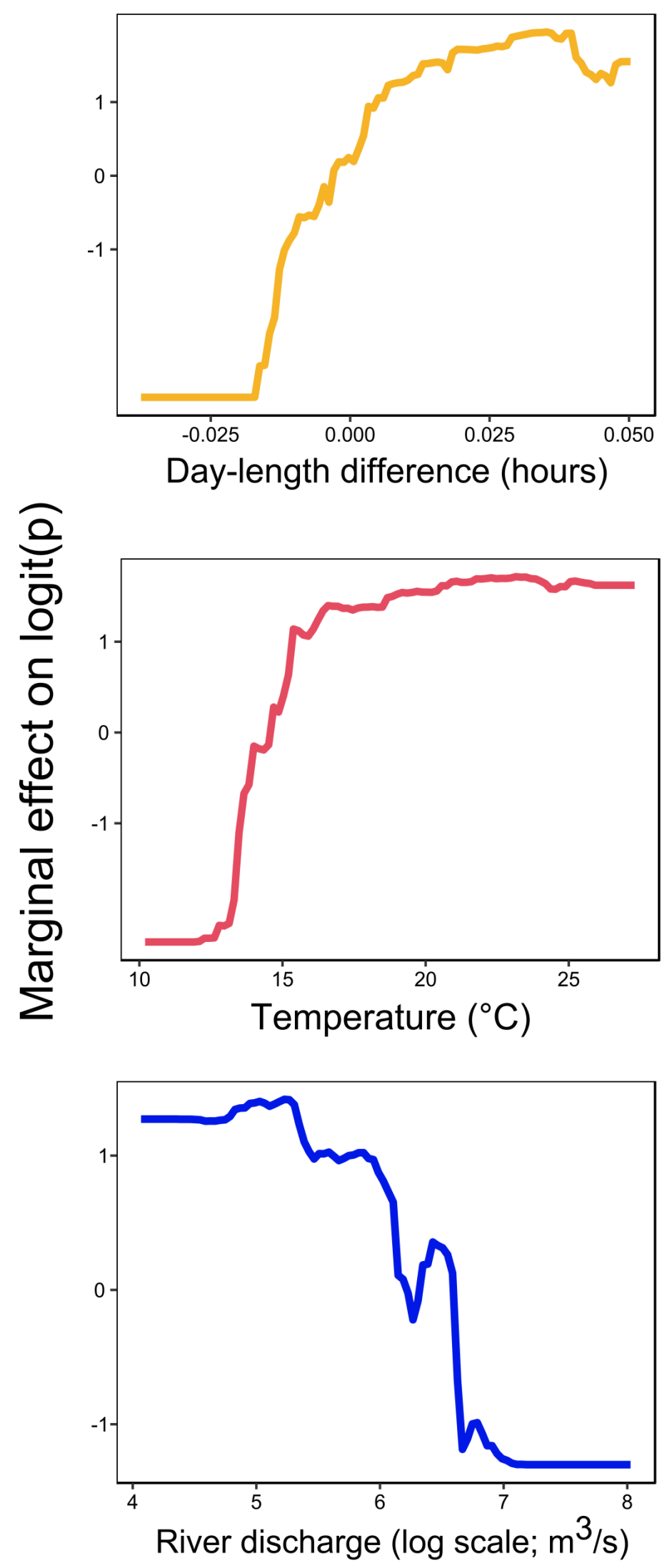
EXAMPLE IN THE GARONNE RIVER IN 2003



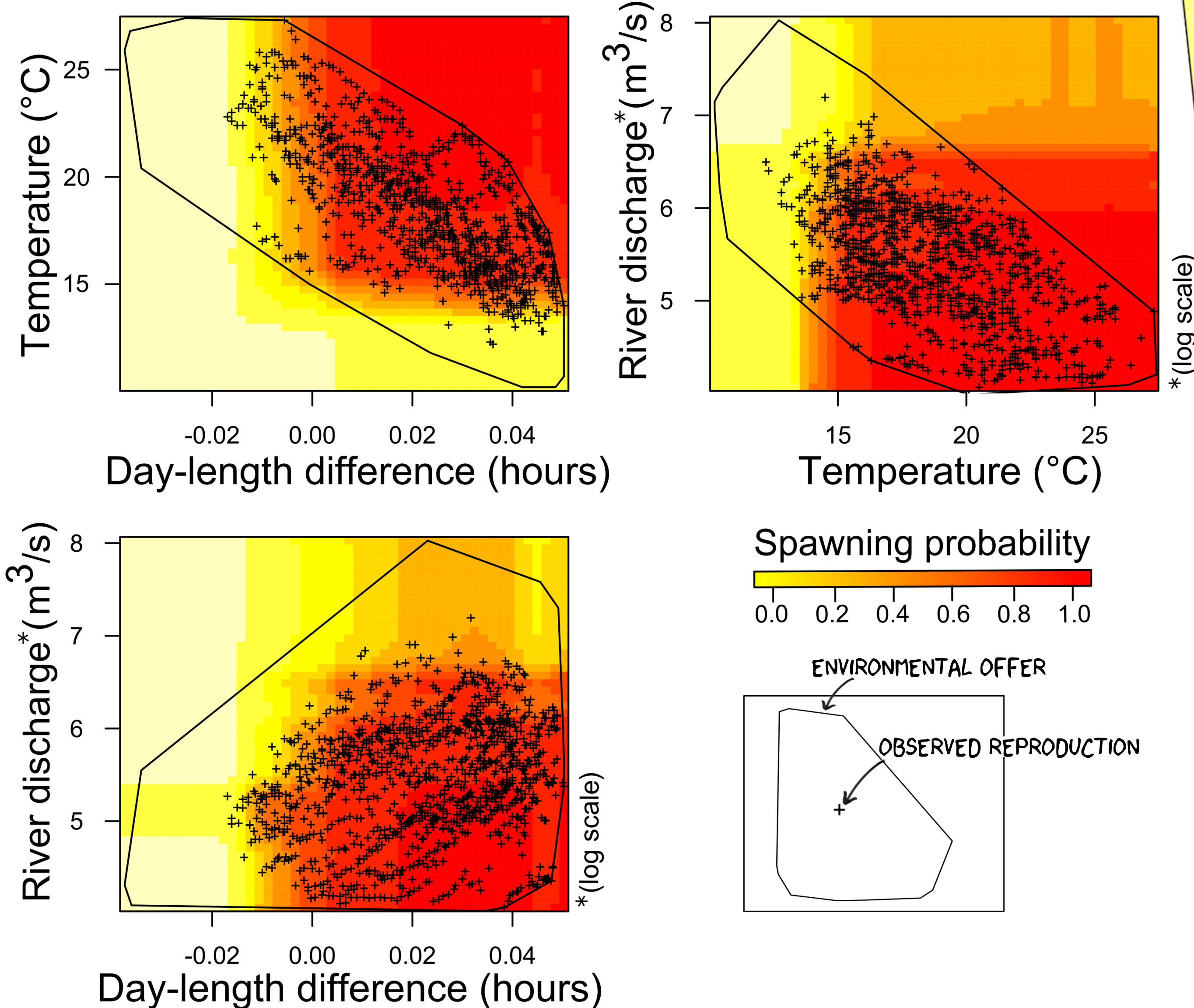
Ecological niche modeling to define the occupied niche (Pearson, 2010) during the reproduction

- A **Boosted Regression Trees (BRT)** computes spawning probability based on environmental factors
- Dependence plots were used to explore the environmental control on spawning probability considering the interactions (Elith et al., 2008)

2D-DEPENDENCE PLOTS

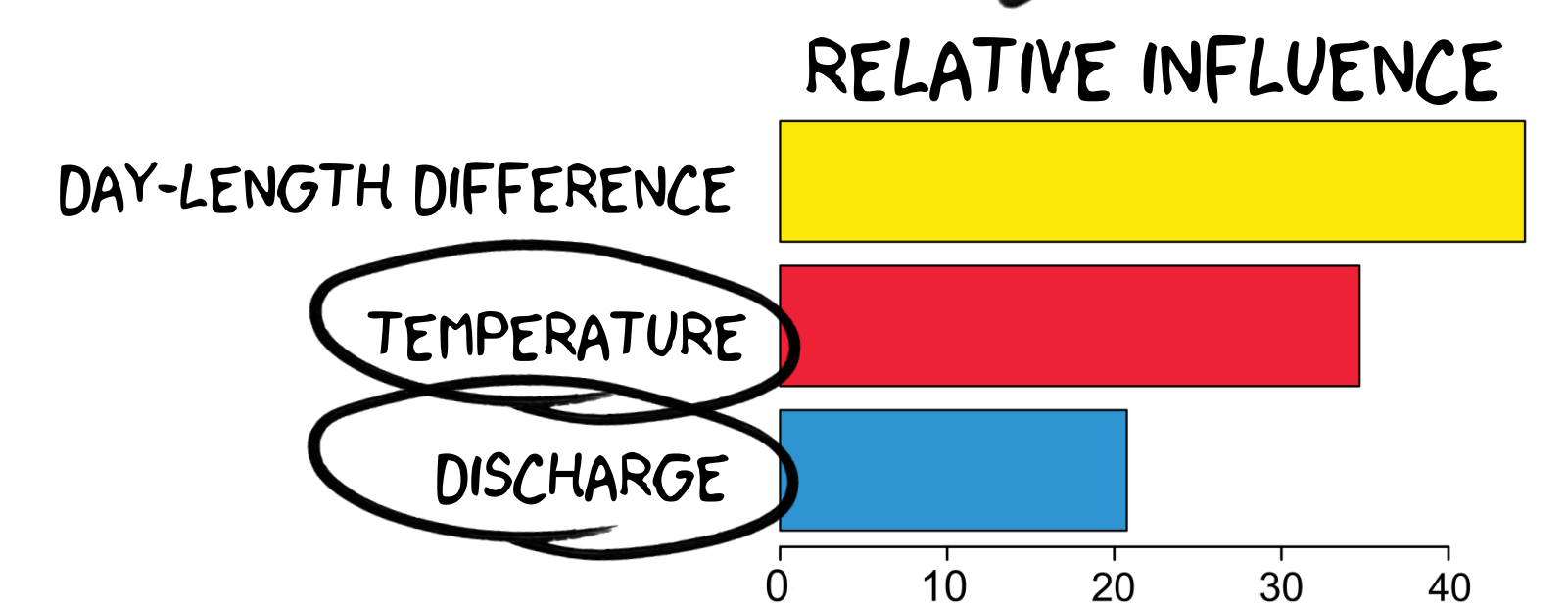


3D-DEPENDENCE PLOTS



CONCLUSION

- 3 MAIN TRIGGERS: DAY-LENGTH DIFFERENCE, TEMPERATURE AND DISCHARGE
- SHAD REPRODUCTION STARTS AT 15°C
- SHAD START TO REPRODUCE WITH HIGH AND POSITIVE DAY-LENGTH DIFFERENCE
- HIGH DISCHARGE STOPS REPRODUCTION
- STRONG CUMULATIVE INFLUENCE OF 2 ENVIRONMENTAL CUES POSSIBLY DISRUPTED BY THE GLOBAL WARMING



Perspectives

- Use the BRT model to predict the reproduction of shad under global warming scenario.
- Compare the niche during the reproduction for another **shad species or/and geographical area**, as the American shad (*Alosa sapidissima*).
- Post-doctoral position ☺



• Elith, J., Leathwick, J.R., Hastie, T., 2008. A working guide to boosted regression trees. *J. Anim. Ecol.* 77, 802–813.
 • Lassalle, G., Béguer, M., Beaulaton, L., Rochard, E., 2008. Diadromous fish conservation plans need to consider global warming issues: An approach using biogeographical models. *Biol. Conserv.* 141, 1105–1118.
 • Limburg, K.E., Waldman, J.R., 2009. Dramatic Declines in North Atlantic Diadromous Fishes. *BioScience* 59, 955–965
 • Pearson, R., 2010. Species' Distribution Modeling for conservation Educators and Practitioners. *Lessons Conserv.* 3, 54–89.