



HAL
open science

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

Alexis Paumier, Hilaire Drouineau, Patrick Lambert

► To cite this version:

Alexis Paumier, Hilaire Drouineau, Patrick Lambert. Assessing the environmental control on fish life cycle: case of temperature, discharge and photoperiod control on shad reproduction (*Alosa alosa*). Fish on the move 2019 annual meeting, Feb 2019, Poughkeepsie, United States. pp.1, 2019. hal-02609631

HAL Id: hal-02609631

<https://hal.inrae.fr/hal-02609631>

Submitted on 16 May 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



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

PhD student
Alexis Paumier
alexis.paumier@irstea.fr

Paumier Alexis, Drouineau Hilaire, Lambert Patrick
Iristea, UR EABX, 50 avenue de Verdun, 33 612 Cestas Cedex, France



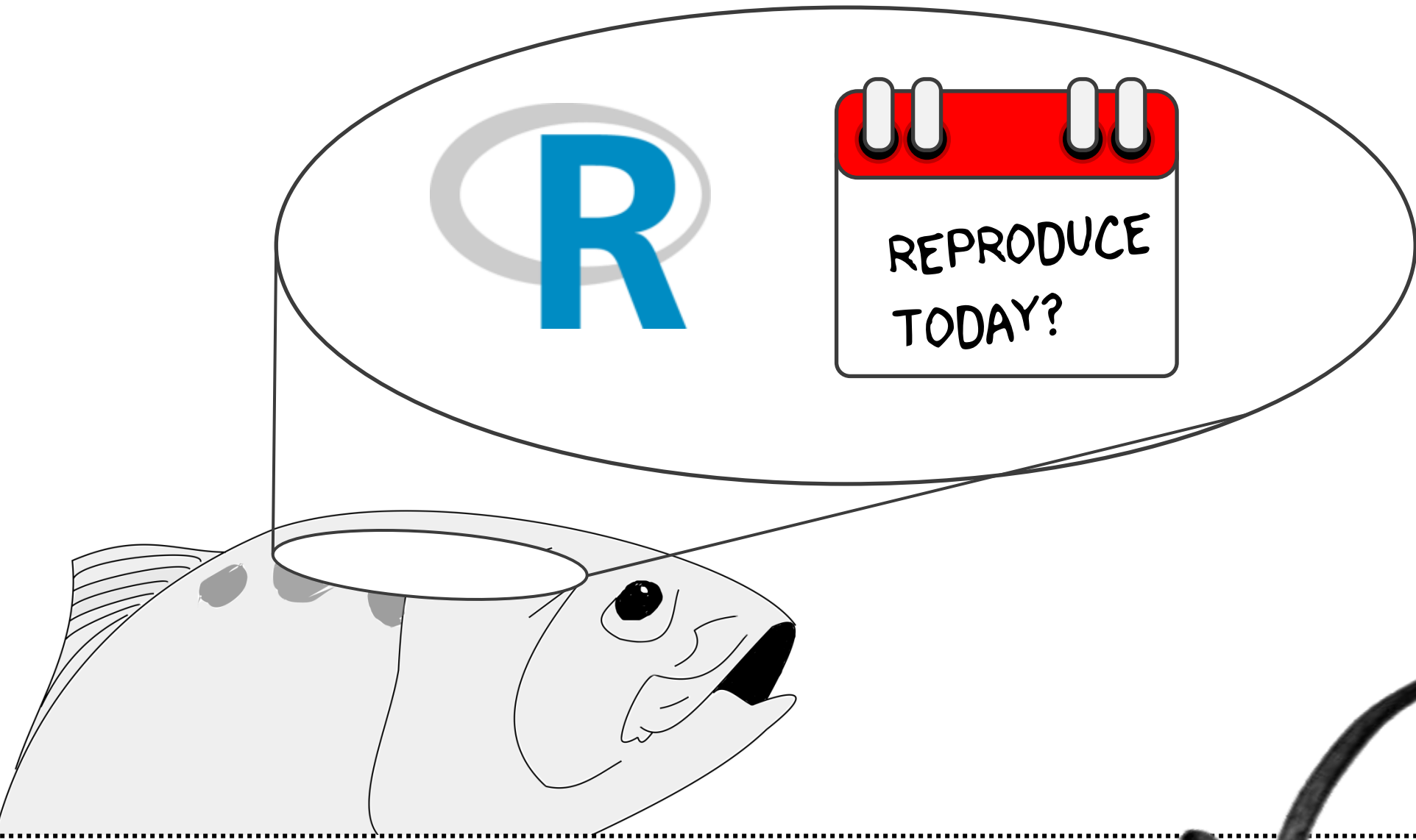
Presenter, PhD
Patrick Lambert
patrick.lambert@irstea.fr



Context

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

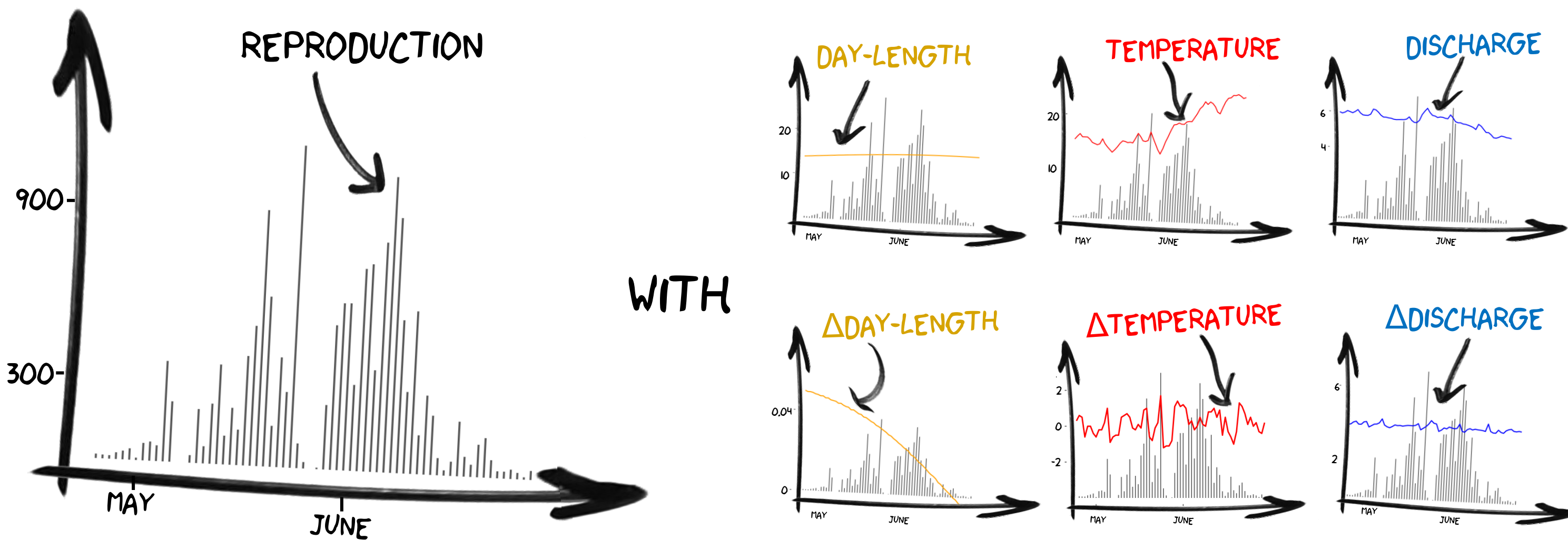
IS SHAD REPRODUCTION TRIGGERED BY ENVIRONMENTAL CUES THAT MAY BE DISRUPTED BY GLOBAL WARMING?



Data and Method

14 years of field monitoring in two French rivers

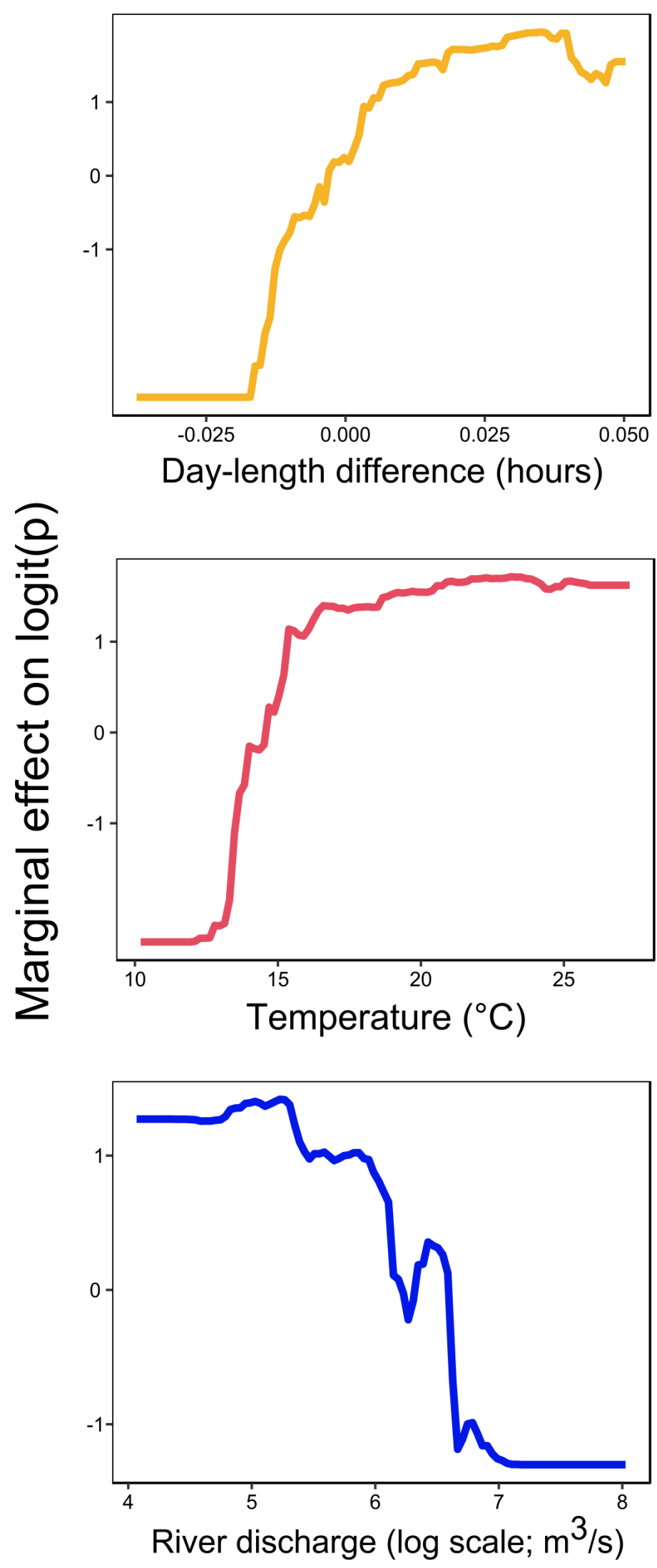
EXAMPLE IN THE GARONNE RIVER IN 2003



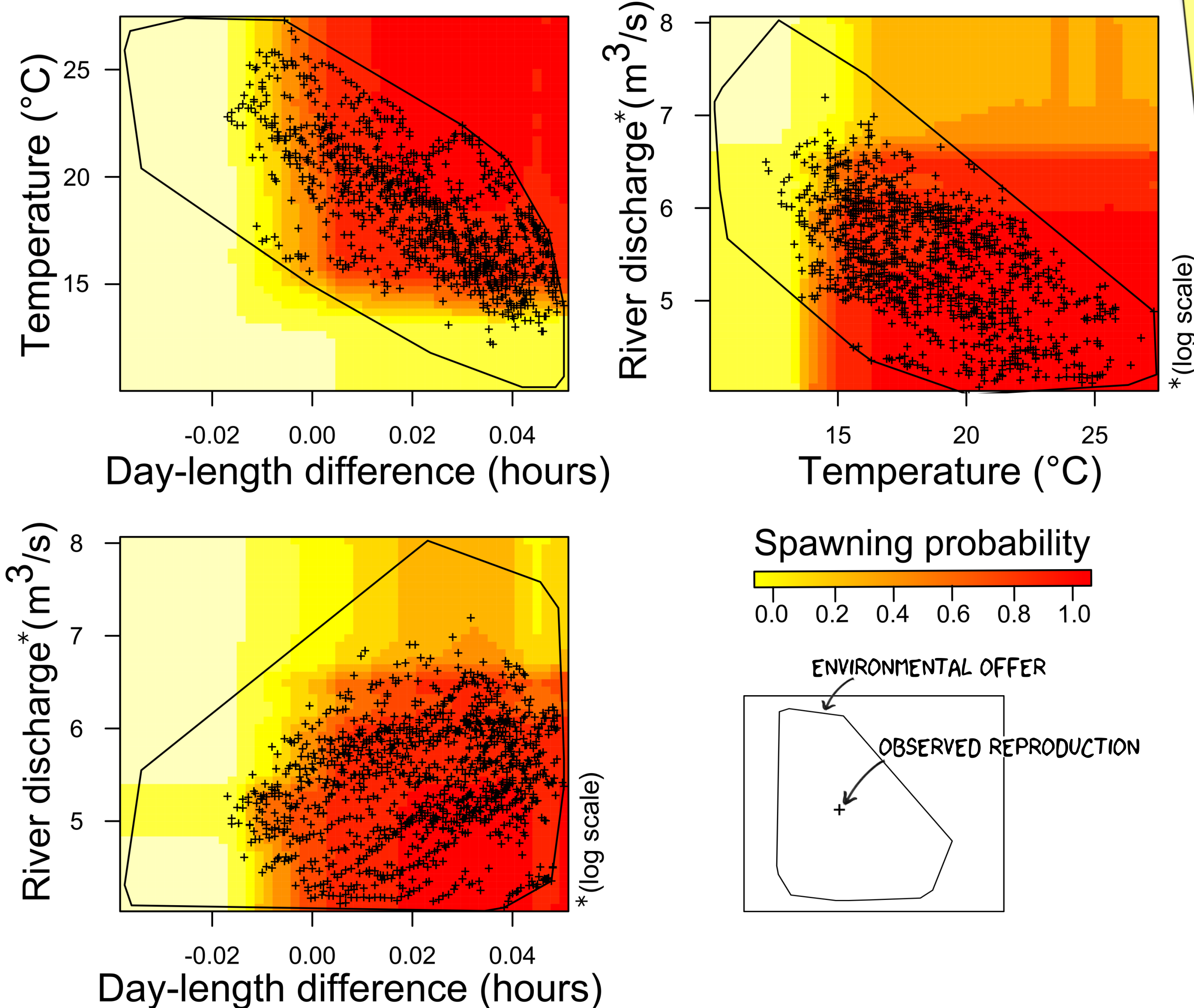
Ecological niche modeling to define the occupied niche (Pearson, 2010) during the reproduction

- 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

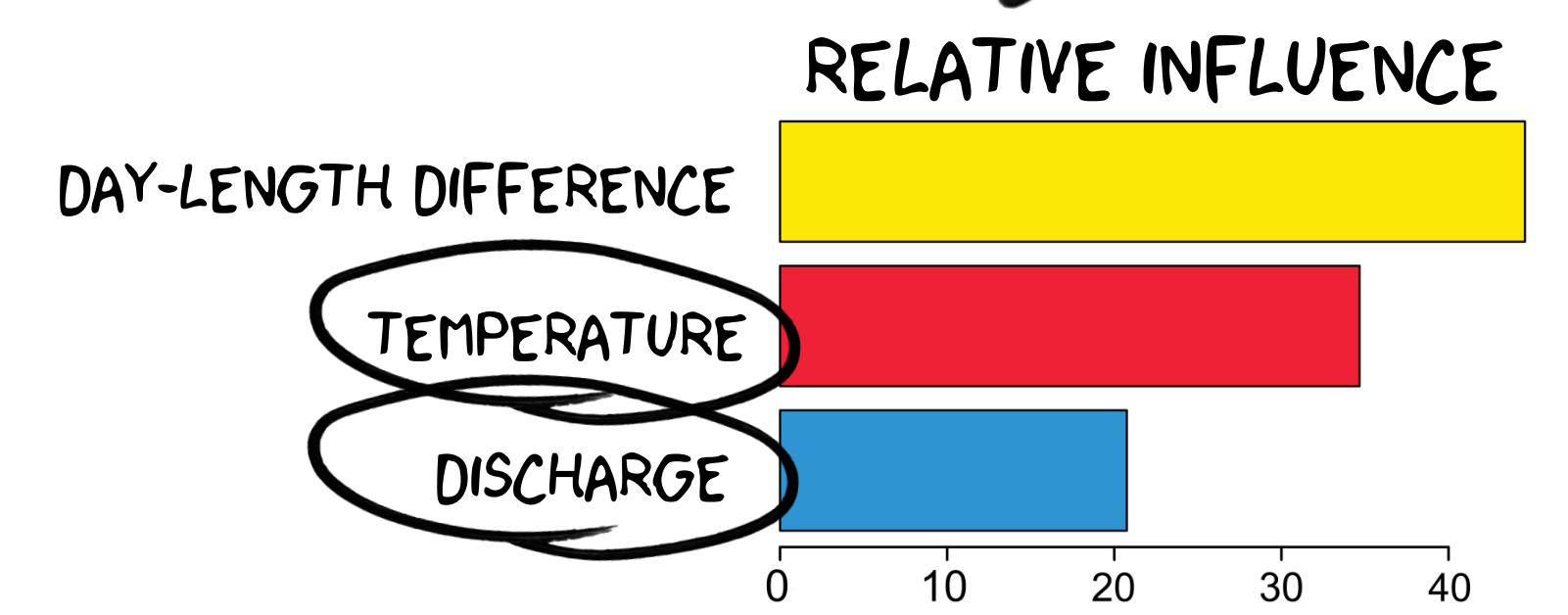


3D-DEPENDENCE PLOTS



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.