Session 2 - Habitats

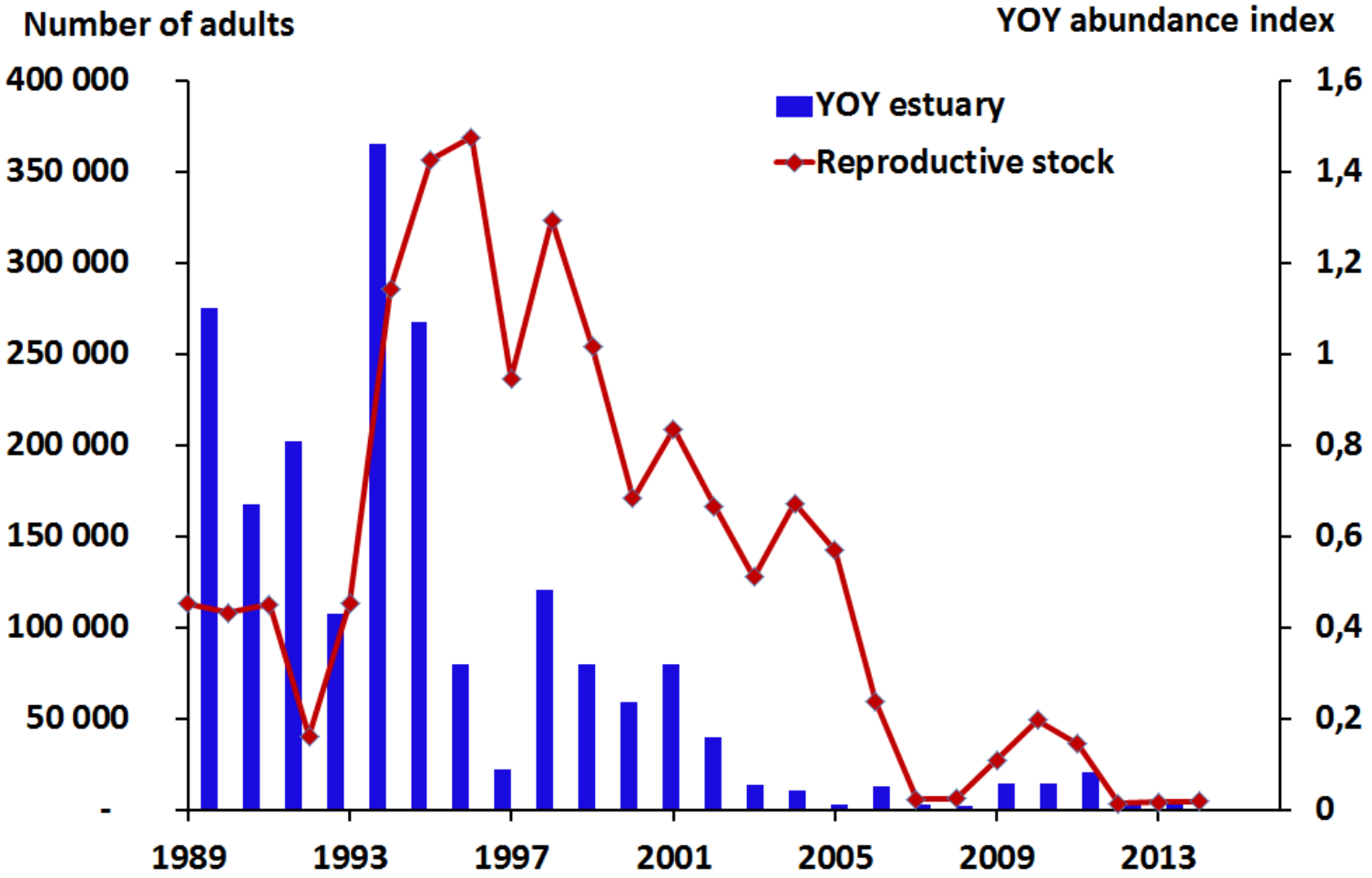
Oxygen and temperature sensibility of Allis shad embryos, larvae and juveniles

Jatteau Ph, Lambert P.

Context

Decrease of recruitment indicators

- Since the begining of the 2 000s
- Even when high level of reproduction remained



Context

Decrease of recruitment indicators

- Since the begining of the 2 000s
- Even when high level of reproduction remained

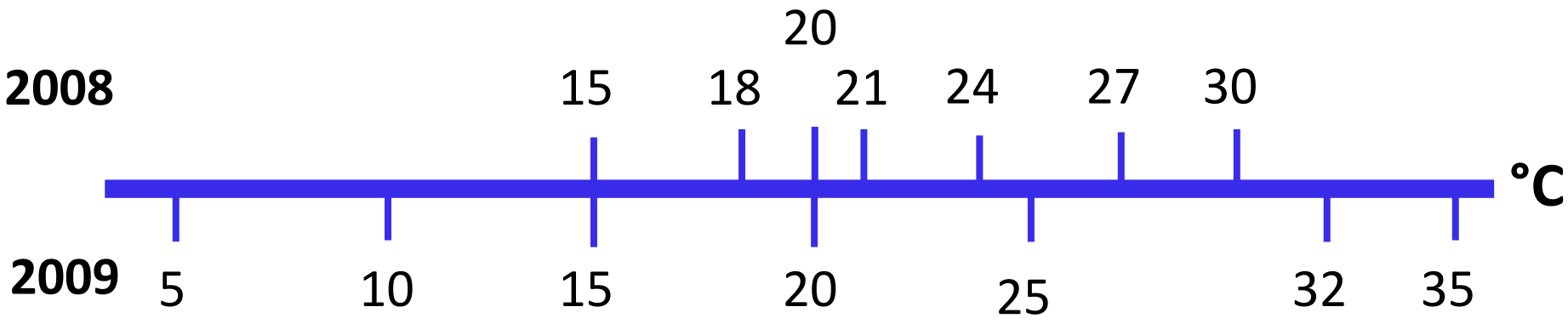
What could be the factors affecting survival ?

- Predation, feeding resources, habitat, muddy plug ……
- Studies focused on the 2 main abiotic factors
  - Temperature → embryos and larvae
  - Temperature and oxygen → juveniles

Effects of temperature on embryos and larvae

Experimental study

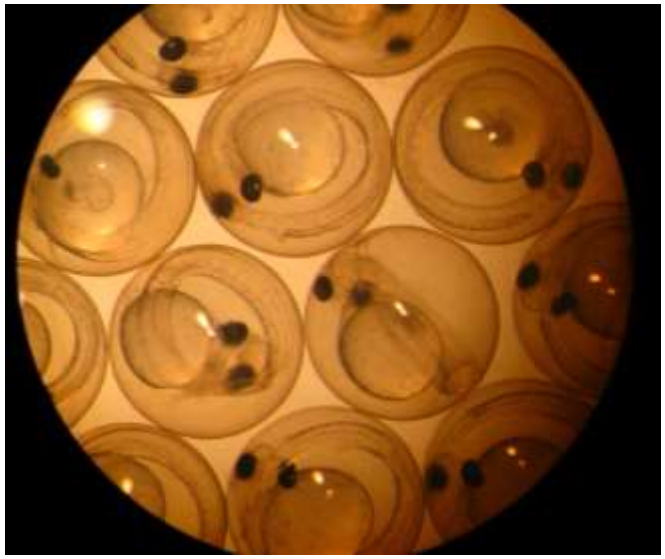
- 2 years
- 2 replicats per temperature – recirculated system
- Targeted temperatures reach progessively (0.1°C^{-1})
- 7 temperatures each year



Effects of temperature on embryos and larvae

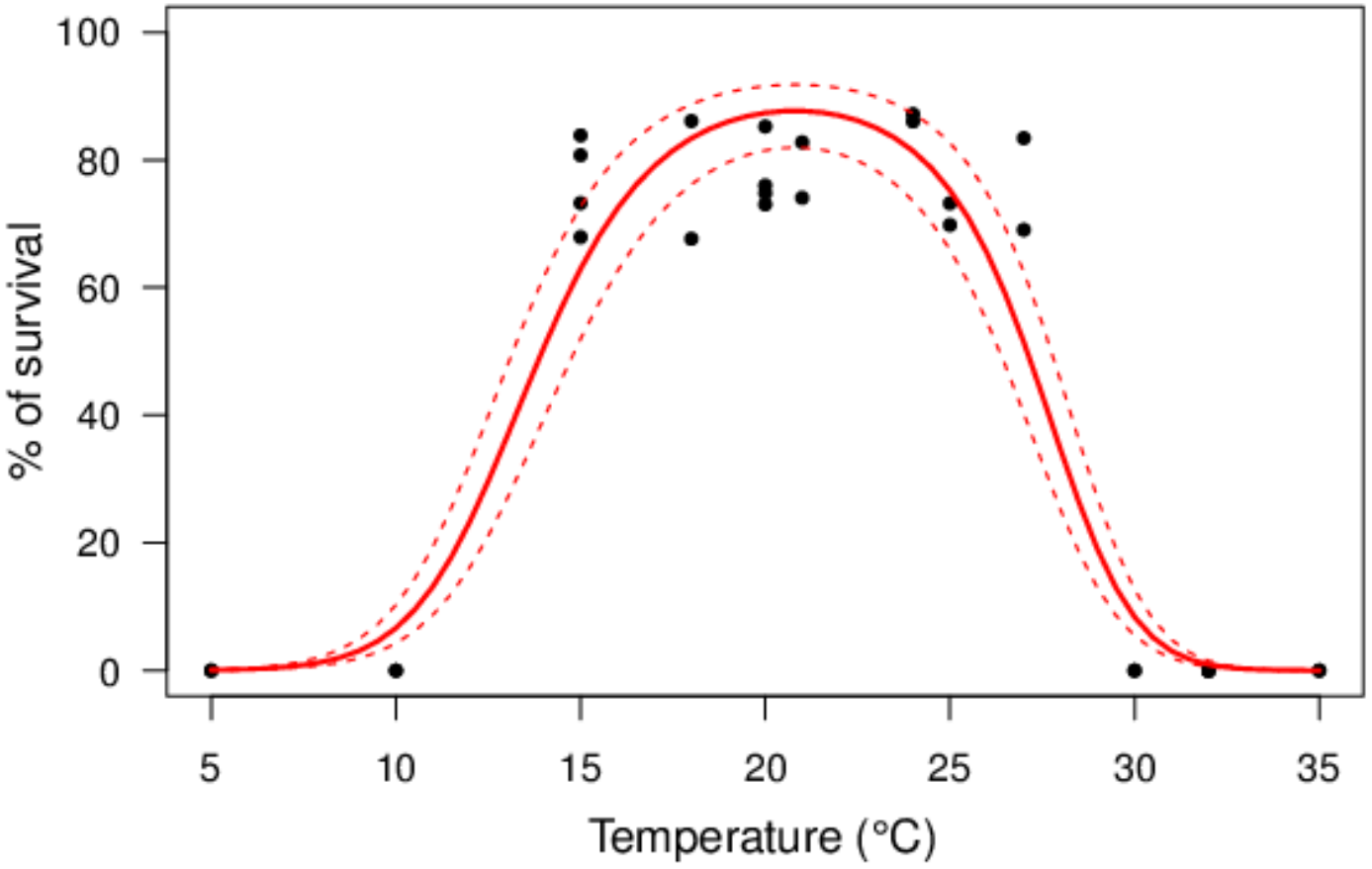
A. Embryo experiment

- 25 g of eggs per incubator (about 2 500 embryos)
- Survival assessment just before hatching
- Application of a survival model



Effects of temperature on embryos and larvae

A. Embryo experiment – Survival



Good survival between 15 and 27°C

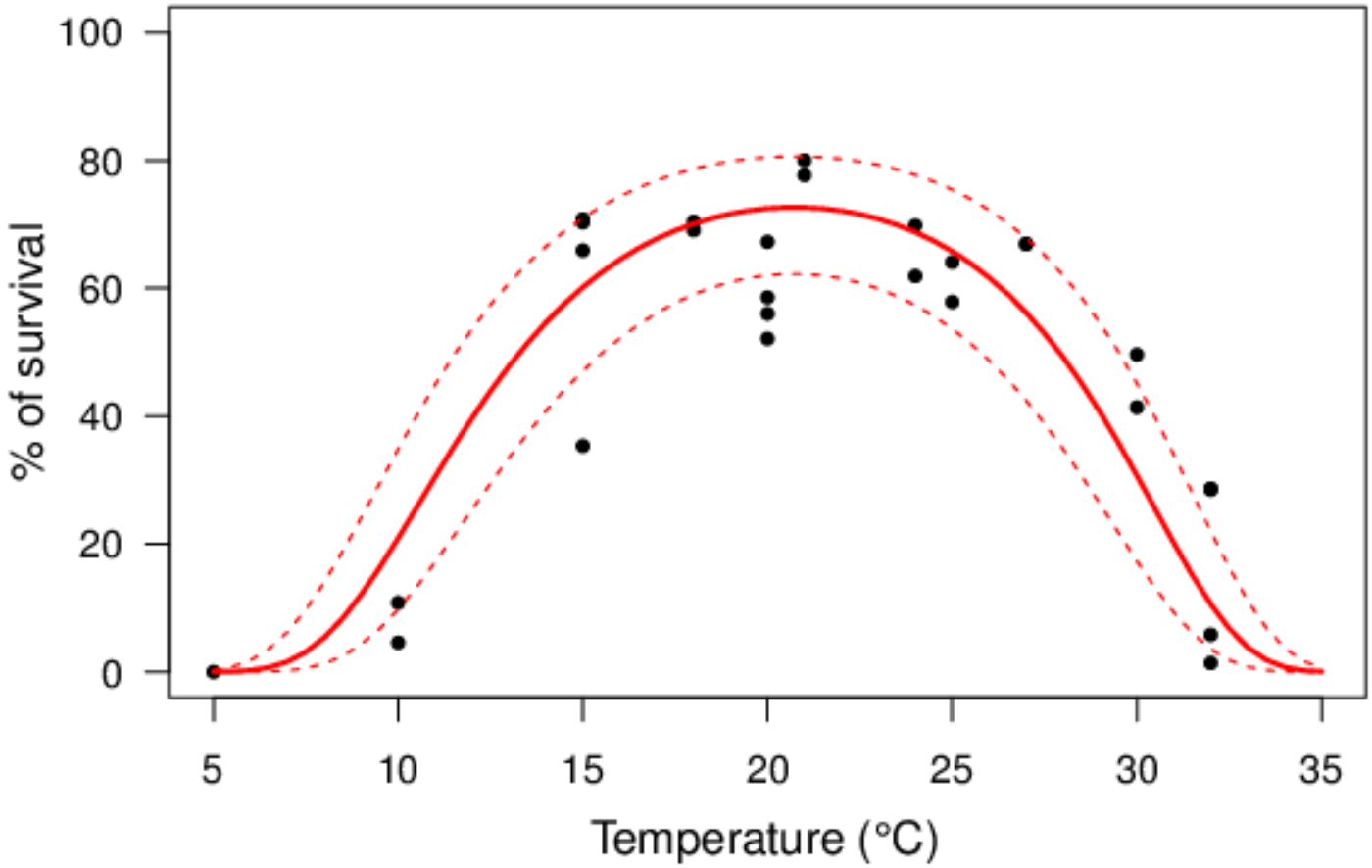
Effects of temperature on embryos and larvae

B. Larvae experiment

- 300 larvae per tank
- Mortality recorded daily
- From Day-3 to 14 (dph)
- Application of a survival model

Effects of temperature on embryos and larvae

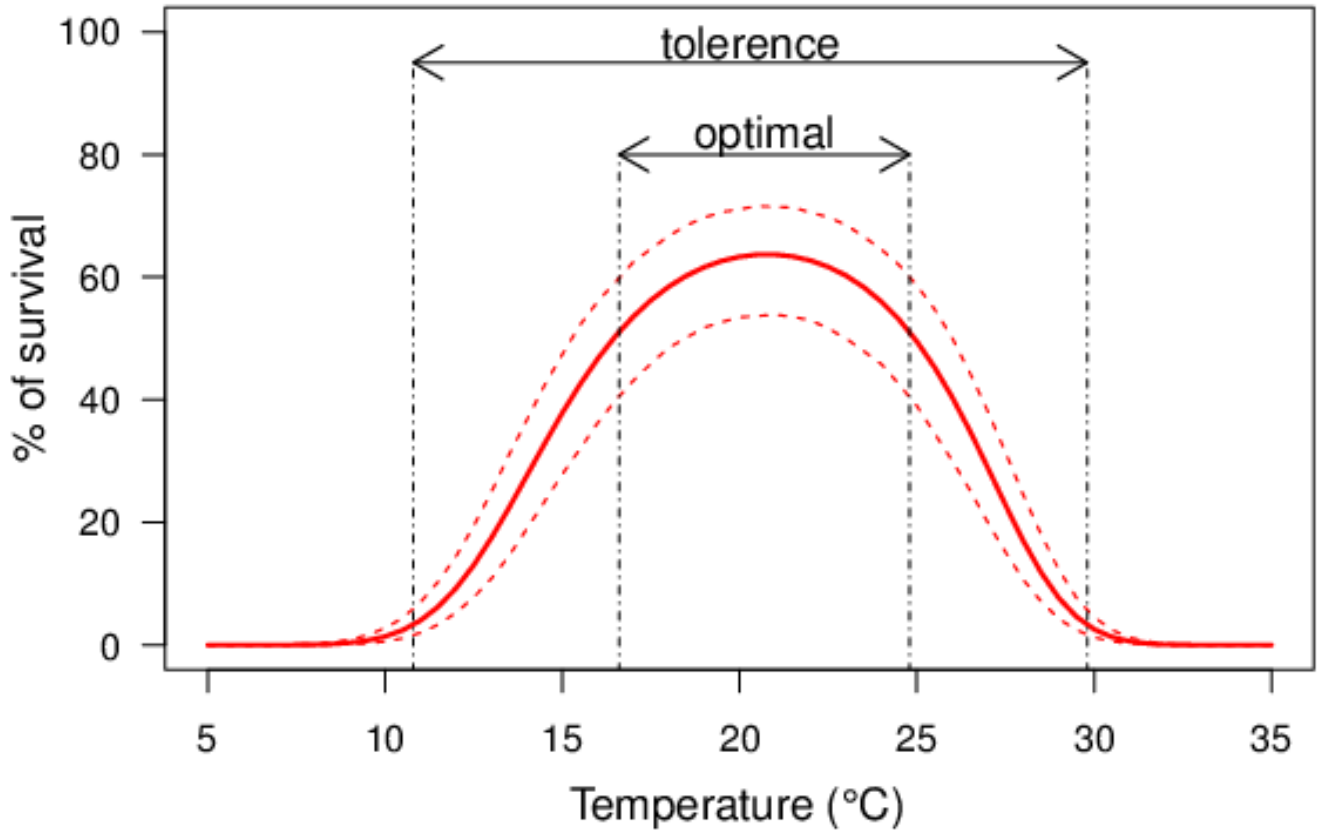
B. Larvae experiment – Survival



Survival until 10 and 32°C

Effects of temperature on embryos and larvae

C. Aggregated Survival (embryo and larvae)



Optimal range (80% survival) from 16.6 to 24.8 °C

Oxygen tolerance of juveniles

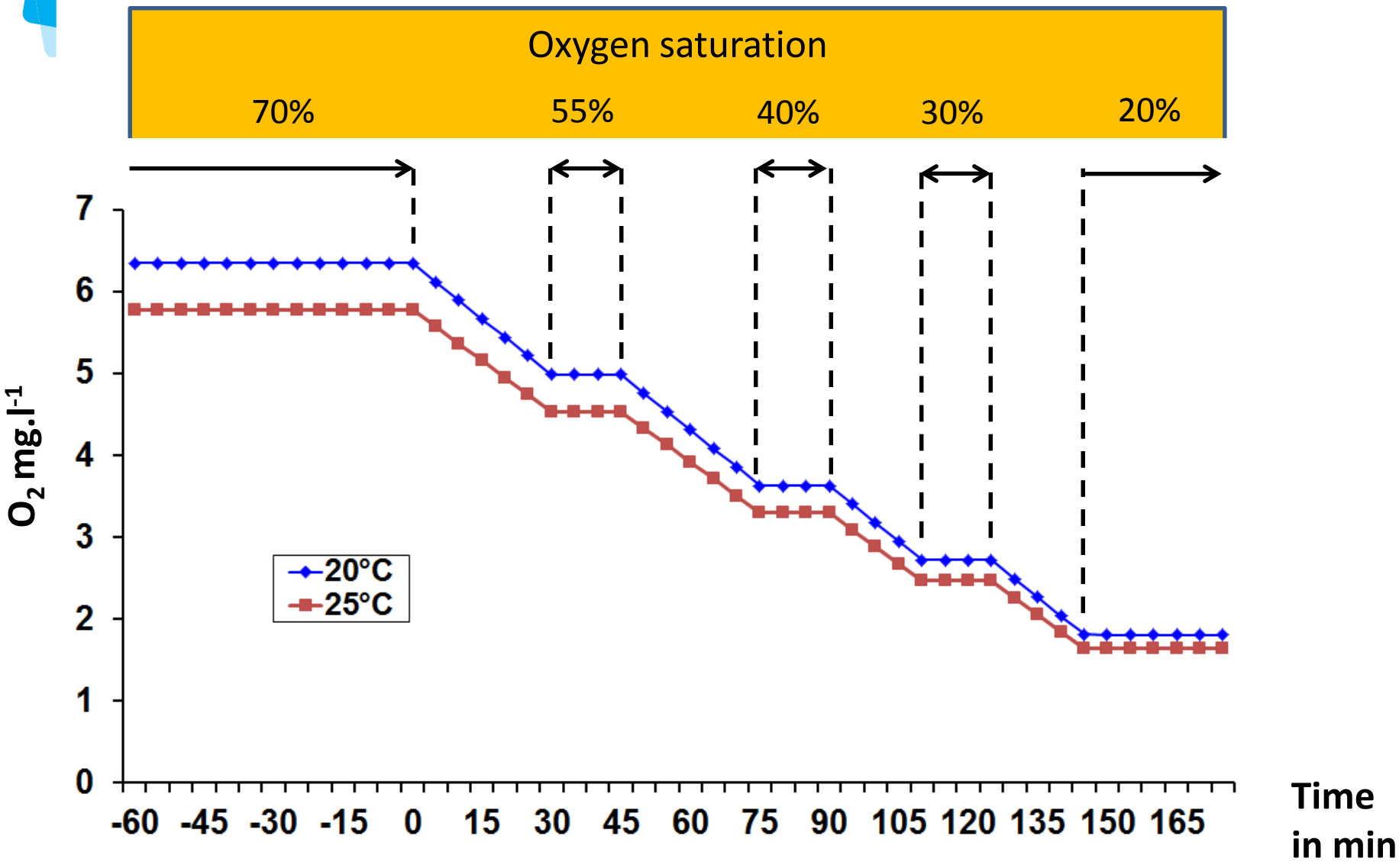
Experimental study

- 2 temperatures: 20 and 25°C
- 2 series per temperature – recirculated system
- Progressive decrease of the oxygen level
  (Beitinger et al., 2000 – Plaut 2001)

1 series =
3 *hypoxic* tanks
1 control tank

Oxygen tolerance of juveniles

Protocol of oxygen decrease



Oxygen tolerance of juveniles

Experimental study

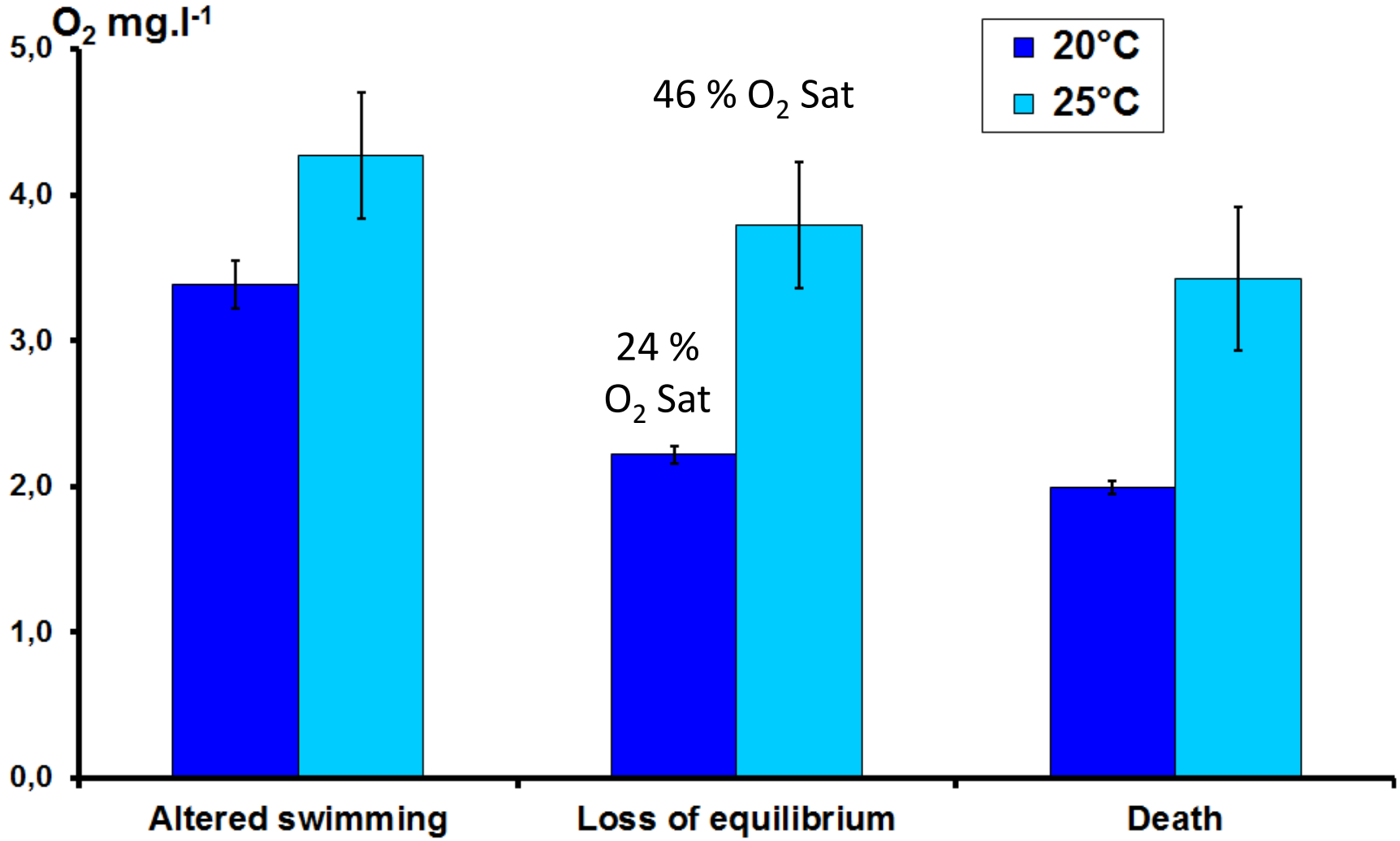
- 2 temperatures: 20 and 25°C
- 2 series per temperature – recirculated system
- Progressive decrease of the oxygen level
  (Beitinger et al., 2000 – Plaut 2001)
- 3 behavioral indicators:
  - altered swimming
  - Loss of equilibrium
  - Death

1 series =
3 *hypoxic* tanks
1 control tank

Oxygen tolerance of juveniles

Results

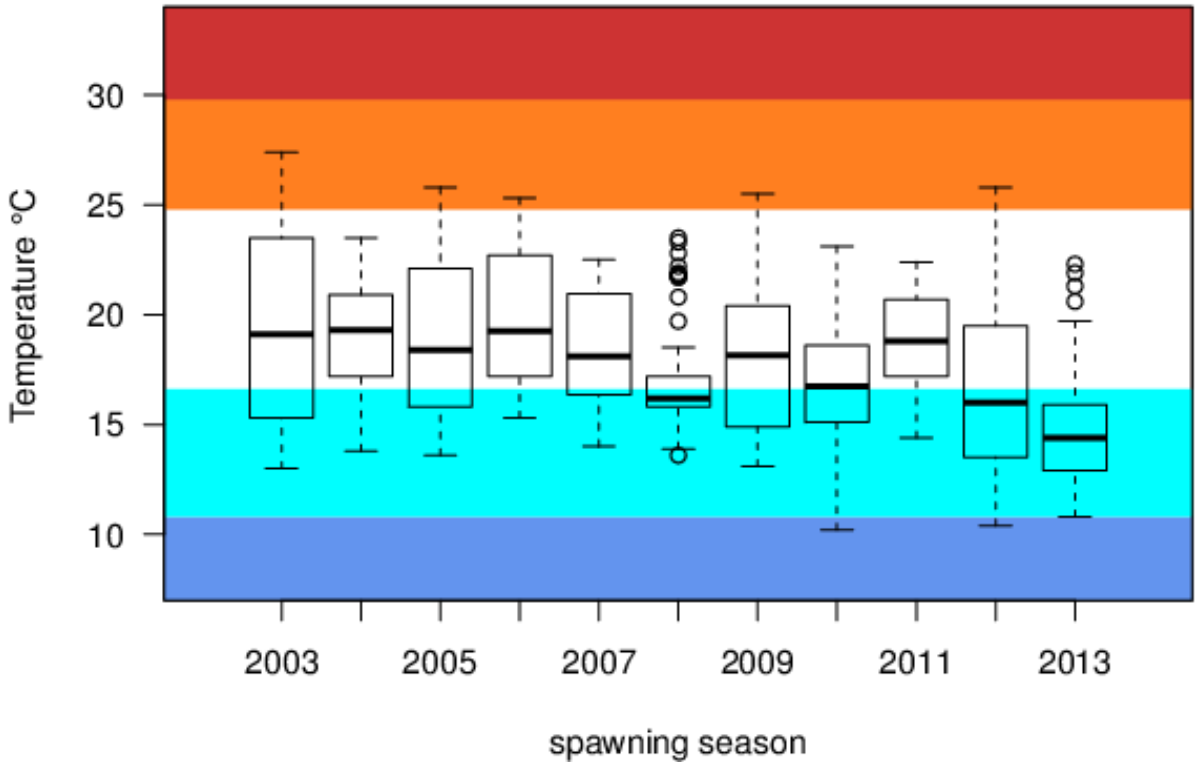
Thresholds appearance of the 3 criteria



Conclusion - Persectives

Embryo – larvae experiment

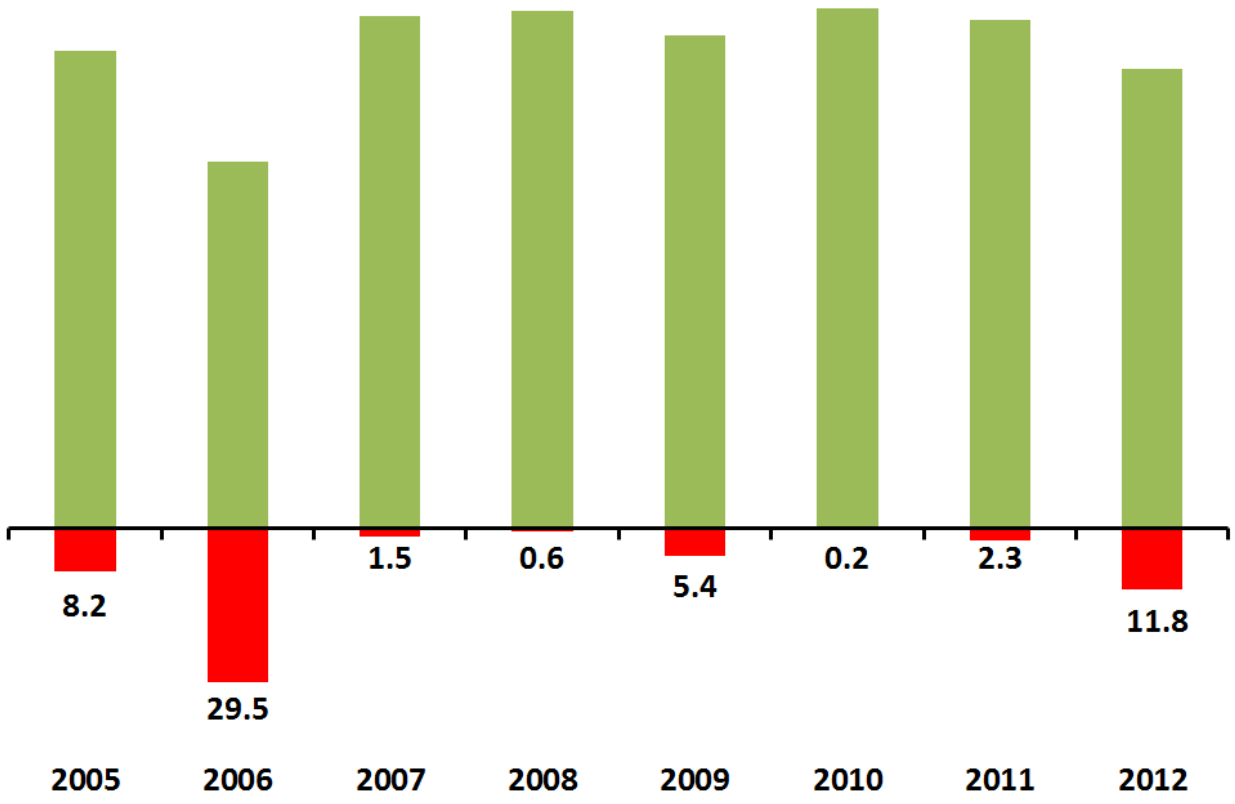
- Larvae have a wider optimal range for temperature
- Low field temperatures (especially during incubation) could have negative effects on survival



Conclusion - Perspectives

Juvenile experiment

- Higher sensibilty to hypoxia at 25°C
- Loss of equilibrium threshold regularly reached in the mud plug



Time spent under the LOE threshold (July to September)

Possible negative effects on:
- downstream migration
- survival

To be completed: taking into account the turbidity


Merci de votre attention
Thanks for your attention
Vielen Dank für Ihre Aufmerksamkeit