ECIMAT

Estación de Ciencias Mariñas de Toralla

Effect of decrease in salinity on the scope for growth of bivalves of commercial interest

Rula Domínguez[1], Celia Olabarria[1], Gonzalo Macho[1], Laura G. Peteiro[1], Sarah A. Woodin[2], David S. Wethey[2], Elsa Vázquez[1]

1-Departamento de Ecoloxía e Bioloxía Animal and Estación de Ciencias Mariñas Illa de Toralla (ECIMAT), Universidade de Vigo, Vigo (Spain)

2-Department of Biological Sciences, University of South Carolina, Columbia, South Carolina (USA)

*Corresponding author: rula.domgz@gmail.com

Introduction: According to regional climate projections, on the Atlantic coast of Europe there will be an increase in the intensity and frequency of extreme rainfalls. Acute fluctuations in salinity may have significant impacts not only in mortality but also on physiological condition of species. This is of special concern when the affected species support important fisheries like in Galicia (NW Iberian Peninsula), where the native clams *Ruditapes decussatus* and *Venerupis corrugata*, the introduced *R. philippinarum* and the cockle *Cerastoderma edule* represent around 80% of total bivalve landings. These species live in the intertidal and shallow subtidal sediments so extreme fluctuations of salinity result in high mortalities (e.g. episodes occurred in autumn-winter 2000-2001) that prevent these resources from being exploited. Environmental stress also may have sub-lethal effects on individuals, reducing the Scope for Growth (SFG) with consequences for recruitment of juveniles and replenishment of shellfish beds. The aim of this experiment was to compare the SFG during the whole experiment to test the hypotheses that:

1) low salinity events of different intensity will have negative effects on the four species, and
2) the four species will show different ability to resist salinity fluctuations.

Methodology

Experimental design:

Mesocosm experiment in December 2015. Typical autumn conditions were simulated in the laboratory according to available historical records and models from www.meteogalicia.es

8 tanks, 4 salinity ramps:

5-20 10-25 15-30 30-30

Individual physiological measurements of 12 replicates measured before (**Day 0**), during (**Day 4** and **Day 6***) and after (**Day 9**) the salinity stress treatments.

*Measurements at Day4 were done at low tide (lowest salinity ramp values) and at Day6 at high tide (highest salinity ramp values)

- Respiration rate
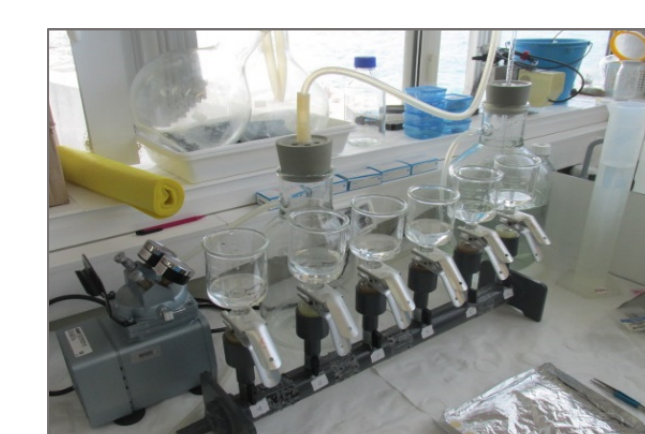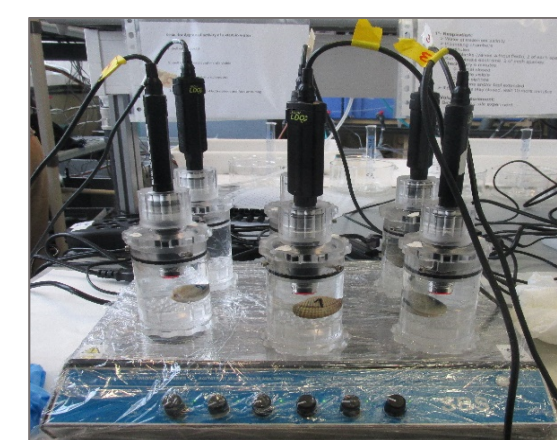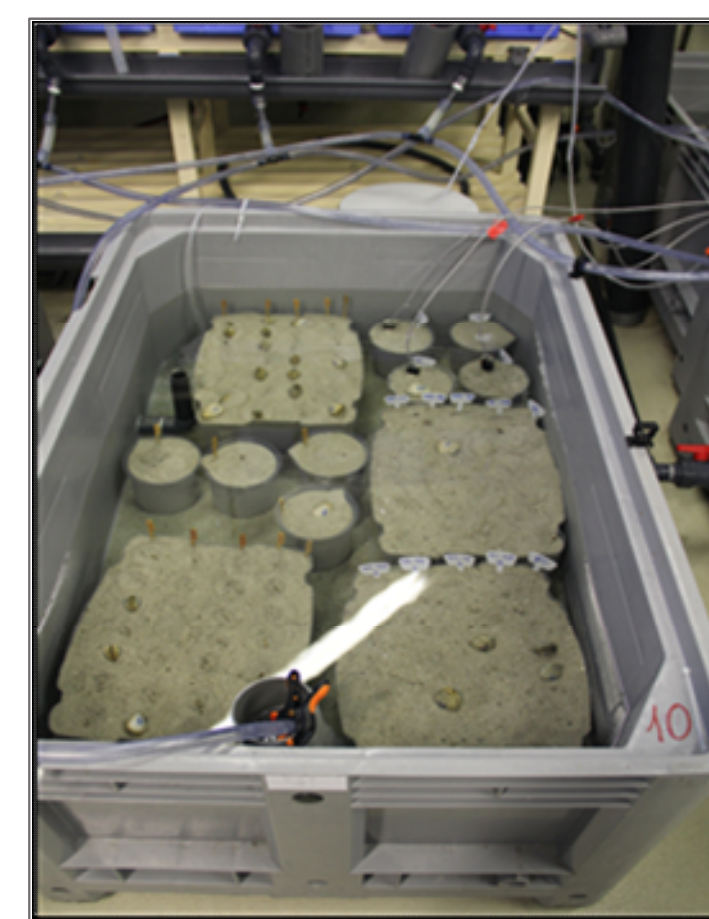- Clearance rate
- Excretion: Ammonia and faeces

→ **Scope for Growth** J h⁻¹

Statistical analysis:
Multifactorial **ANOVAs of log transformed data**.

Mesocosm setup

Results:

Species x Treatment x Day
($F_{9,214}$ =2,615, p<0.01)

Day0 / Day9
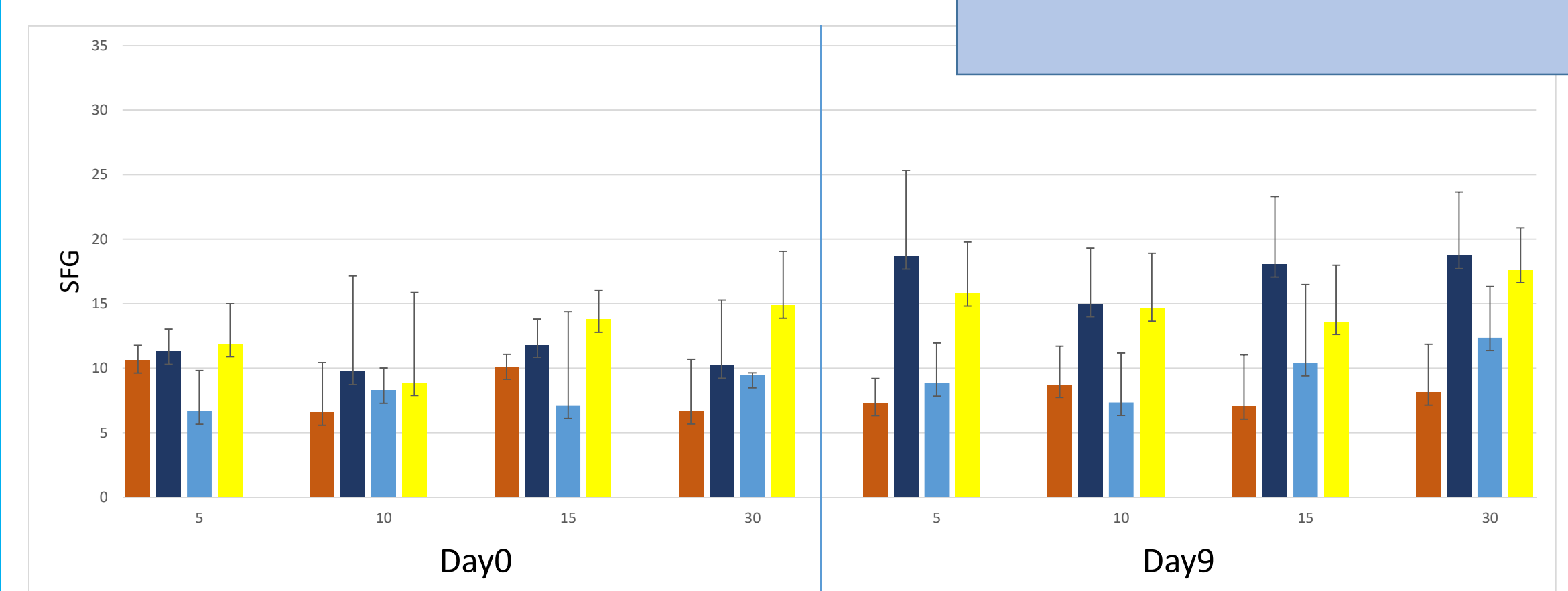
Treatment
($F_{3,4}$ =175.110, p<0.001)
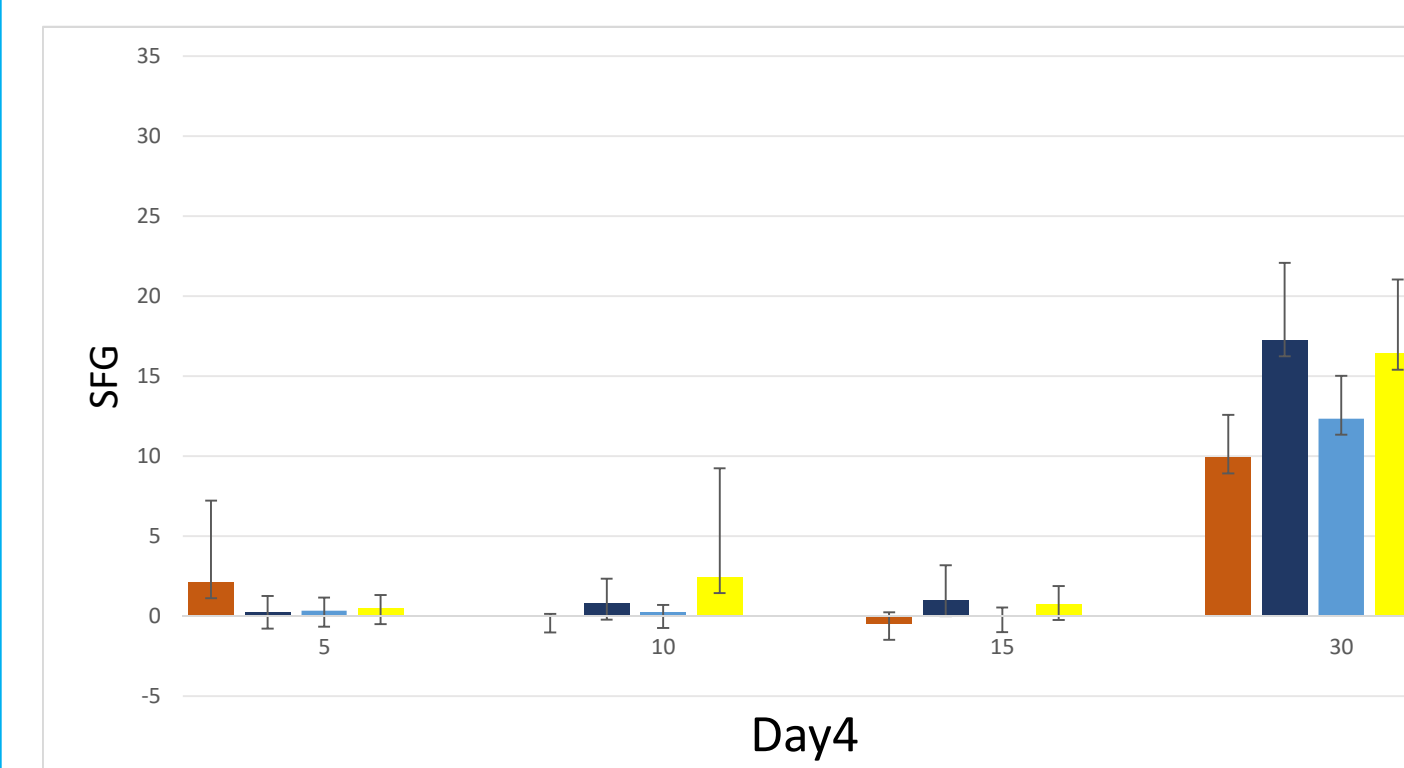
Day4

Species
($F_{3,9}$ =21,050, p<0.001)
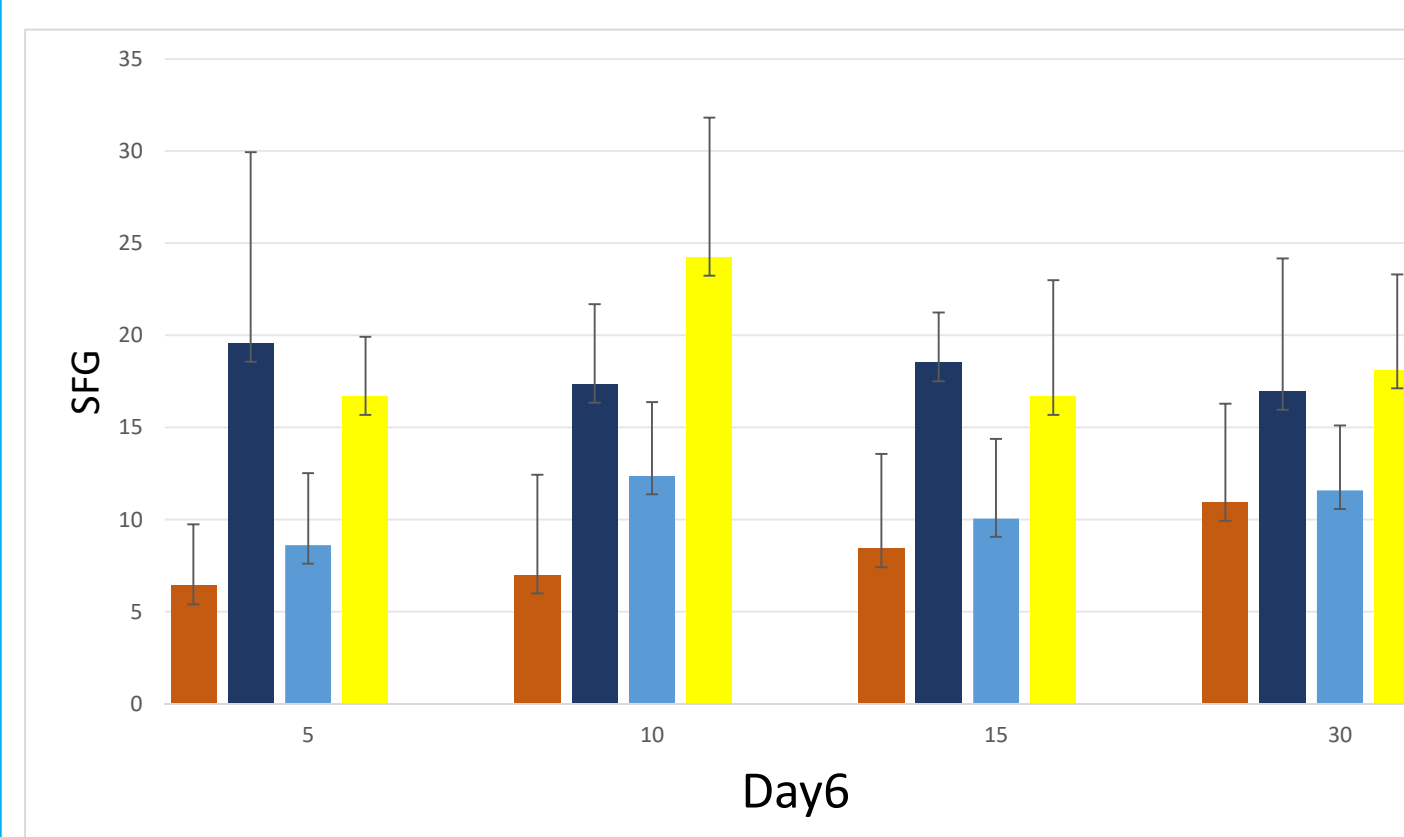
- *Venerupis corrugata*
- *Cerastoderma Edule*
- *Ruditapes decussatus*
- *Ruditapes philippinarum*

Day6

Conclusions

➤ Low salinities at Day 4 induced high stress levels in all species, so no physiological activity could be measured in most individuals.

➤ Significant diferences found between:

- **Treatments** at Day 4 ⟹ lower salinities (5, 10 and 15) caused strong and fast impact on the SFG compared to 30.
- **Species** at Day 6 ⟹ higher salinities (20, 25 and 30) showed no differences between treatments but species reacted differently to stress.
- **Day 0** and **Day 9**: Day, Species and Treatment interaction ⟹ recovery after treatment exists but differs among species and treatments.

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