



SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *MARGARITIFERA MARGARITIFERA*: AN INTEGRATIVE APPROACH USING POPULATION DYNAMICS AND HABITAT CHARACTERIZATION.

Joaquim Reis, Daniel Garrido, J. Pedroso
de Lima, I. Pedroso de Lima, João
Abrantes, José Almeida, Sofia Mendes,
Carla Sousa Santos, Cristina Lima, Daniel



UNIVERSITY OF
COPENHAGEN



UNIVERSIDADE DE
COIMBRA

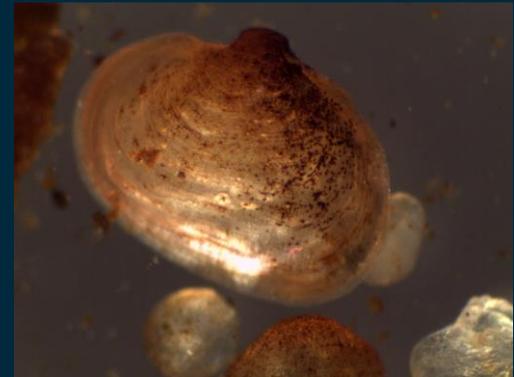


UNIVERSIDADE DE ÉVORA
ESCOLA DE CIÊNCIAS E TECNOLOGIA
DEPARTAMENTO DE PAISAGEM, AMBIENTE E ORDENAMENTO



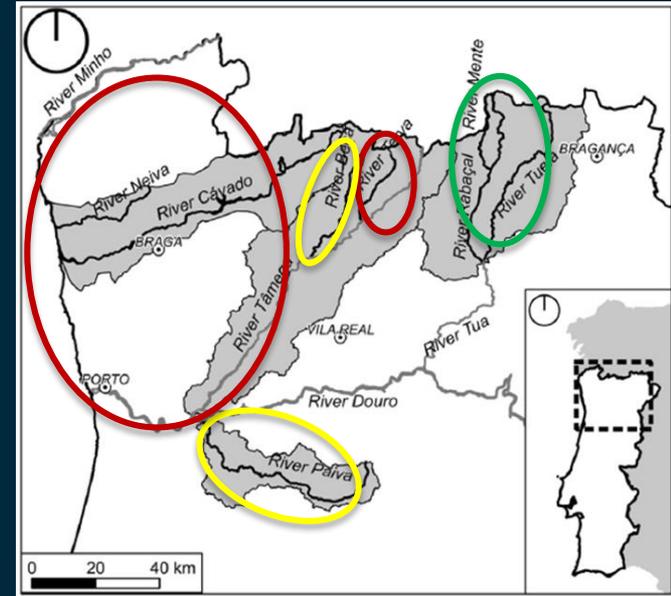
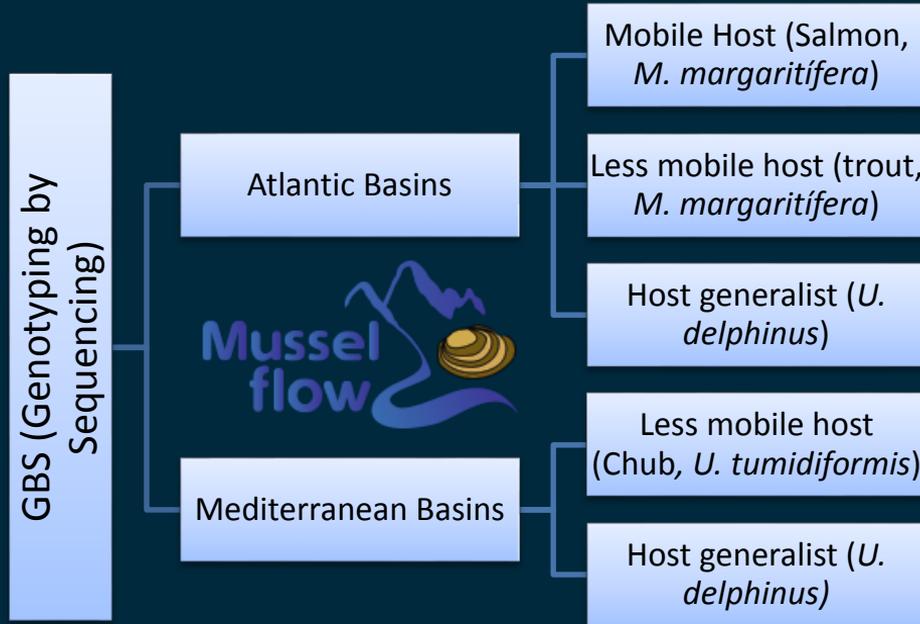
SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Captive Rearing of *M. margaritifera*



SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Inter-population approach



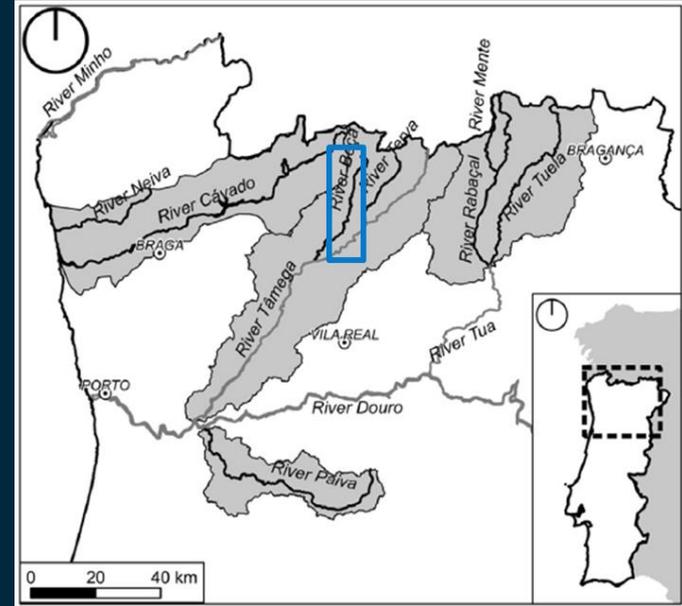
Modified from Sousa et al. (2014)



SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Intra-Population

Case Study: River Beça



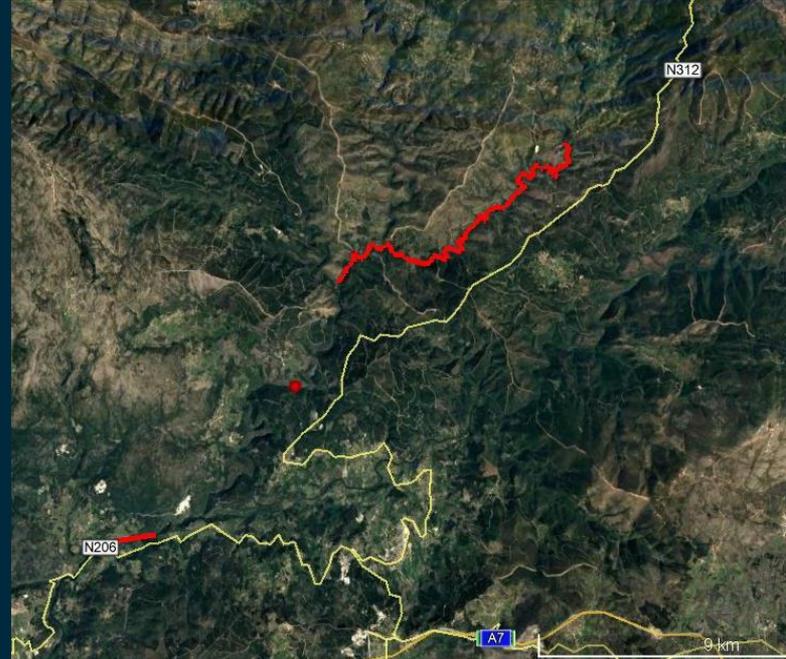
Modified from Sousa et al. (2014)



SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Intra-Population

- 1000+ specimens in 10 Km upstream;
- 47 specimens found downstream;
- 2 specimens found in between.







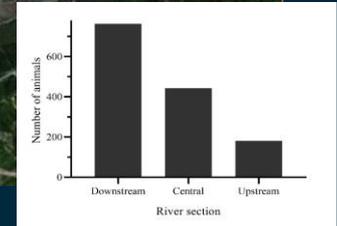
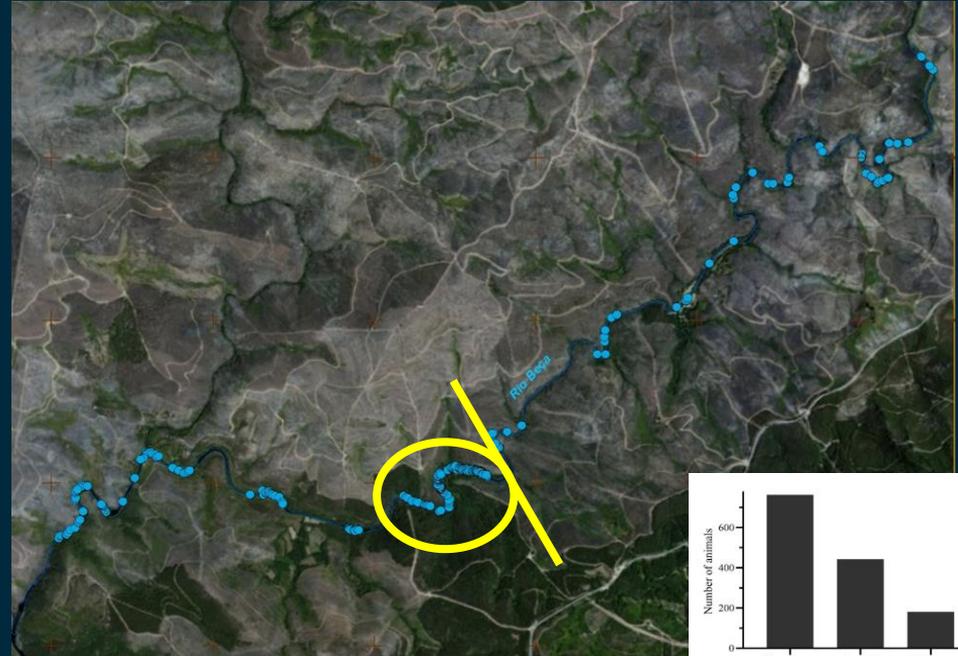




SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Intra-Population

- Upstream: Low density (30 mussels / km);
- Central: High density (260 mussels / km);
- Downstream: Intermediate density (120 mussels / km).









SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Intra-Population

Capture-Recapture Study

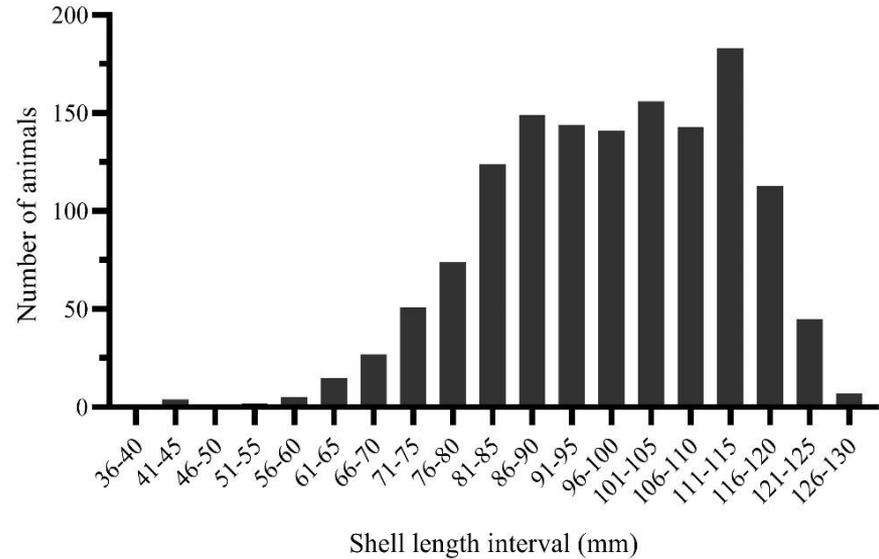
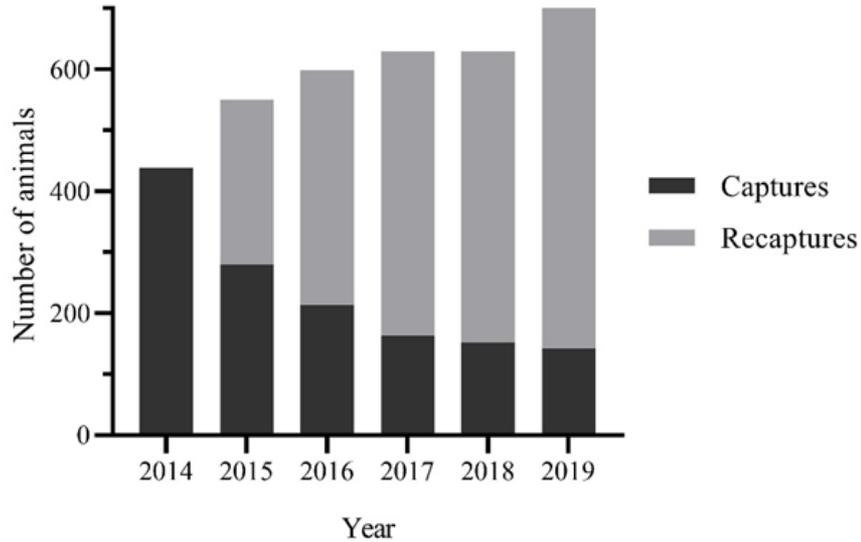
- Annual exhaustive sampling (summer);
- All unmarked mussels are fitted with individual tags (Hallmark Inc. shellfish tags attached with cyanoacrylate);
- All mussels measured (Shell length);
- Cormack-Jolly-Seber (CJS) models for Survival (S) and recapture probability (p);
- Pradel models for Population growth rate (λ)
- Data analysed using MARK software





SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Capture-Recapture





SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Capture-Recapture

<i>SURVIVAL</i>		Estimate	SE	CI (95%)	
Downstream	2014-2015	0.9398	0.0119	0.9110	0.9589
	2015-2016	0.8947	0.0126	0.8671	0.9170
	2016-2017	0.9190	0.0132	0.8888	0.9412
	2017-2018	0.8880	0.0164	0.8514	0.9163
	2018-2019	0.7692	0.1836	0.3544	0.9570
Central	2014-2015	0.9331	0.0141	0.8988	0.9556
	2015-2016	0.8839	0.0157	0.8493	0.9113
	2016-2017	0.9104	0.0155	0.8747	0.9363
	2017-2018	0.8767	0.0190	0.8344	0.9092
	2018-2019	0.7507	0.1837	0.3517	0.9488
Upstream	2014-2015	0.9537	0.0106	0.9274	0.9705
	2015-2016	0.9176	0.0133	0.8876	0.9402
	2016-2017	0.9372	0.0127	0.9069	0.9579
	2017-2018	0.9122	0.0167	0.8735	0.9398
	2018-2019	0.8121	0.1719	0.3761	0.9712



SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Capture-Recapture

<i>RECRUITMENT</i>		Estimate	SE	CI (95%)	
Downstream	2014-2015	0.7130	0.2214	0.3086	0.9610
	2015-2016	0.2477	0.0317	0.1909	0.3147
	2016-2017	0.1468	0.0215	0.1094	0.1941
	2017-2018	0.1412	0.0184	0.1088	0.1813
	2018-2019	0.0881	0.0195	0.0582	0.1371
Central	2014-2015	0.9530	0.2926	0.2633	1.0625
	2015-2016	0.3317	0.0436	0.2523	0.4220
	2016-2017	0.1965	0.0294	0.1452	0.2604
	2017-2018	0.1891	0.0254	0.1442	0.2440
	2018-2019	0.1180	0.0267	0.0769	0.1844
Upstream	2014-2015	0.3797	0.1405	0.1879	0.6744
	2015-2016	0.1304	0.0224	0.0925	0.1809
	2016-2017	0.0773	0.0144	0.0534	0.1107
	2017-2018	0.0743	0.0126	0.0531	0.1032
	2018-2019	0.0466	0.0111	0.0299	0.0755



SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Habitat

8 study sections:

- Upstream, no mussels;
- Upstream, low density;
- Central, high density;
- Downstream, intermediate;
- Downstream, relict.





SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Habitat

At each section:

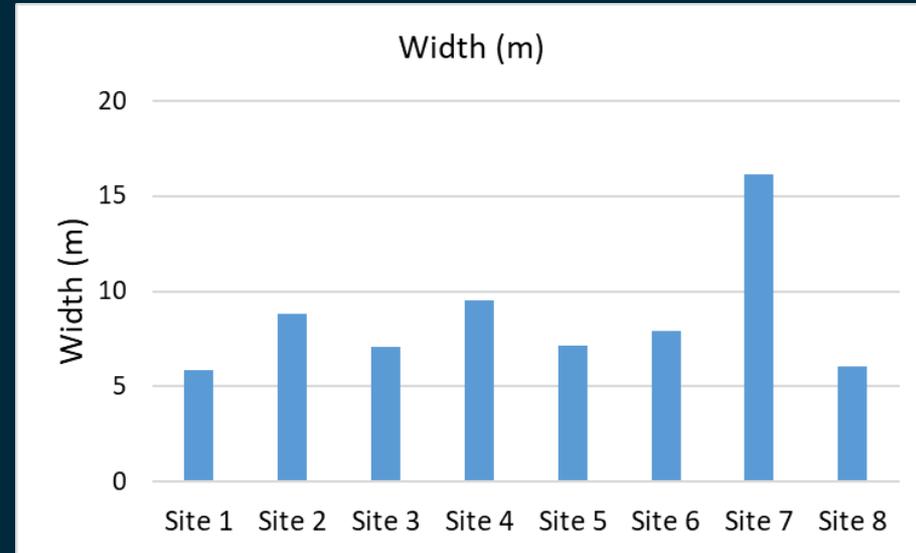
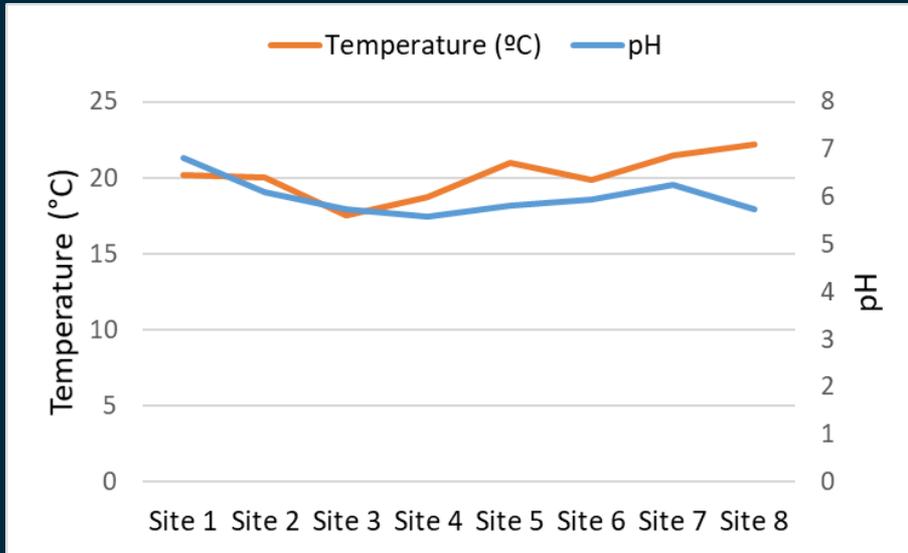
- Temperature and pH;
- 6 bank-to-bank transects;
- Cover measured at each transect;
- Every meter at each transect:
Depth; Current Velocity; Substrate;
Redox Potential (surface and 5 cm)





SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Habitat

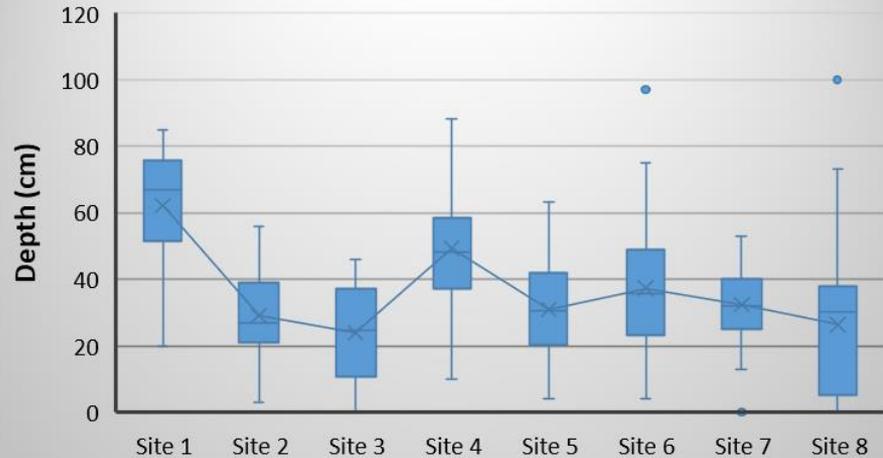




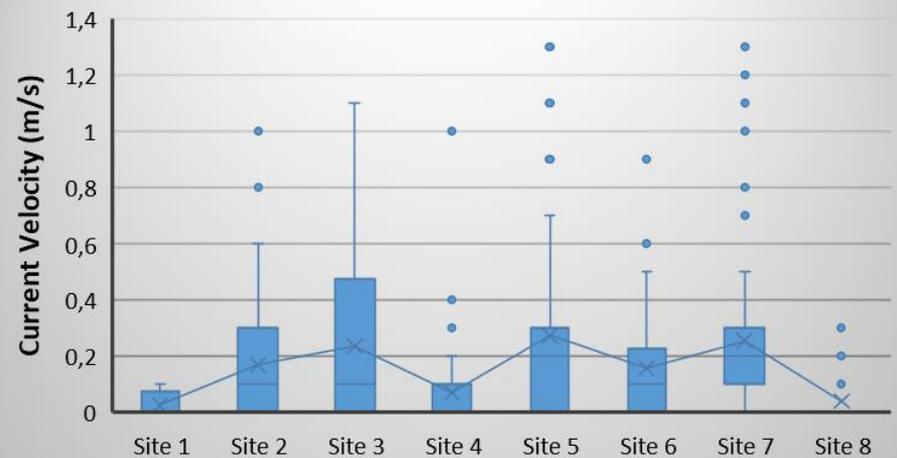
SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Habitat

Depth



Current Velocity

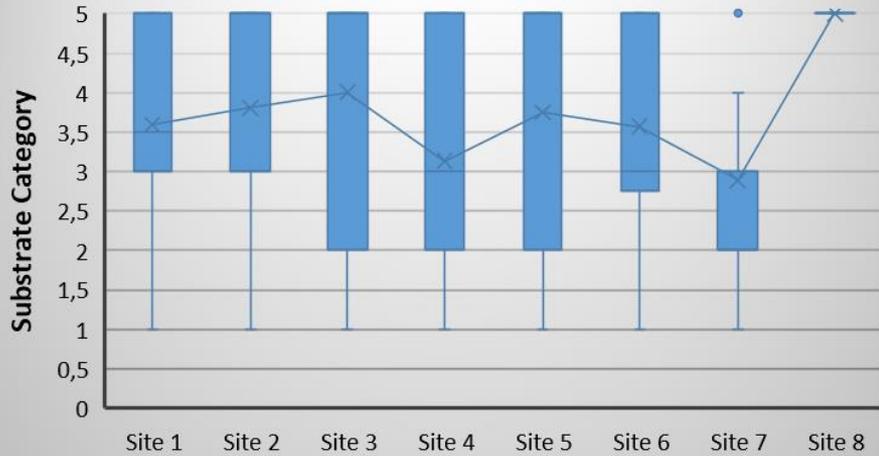




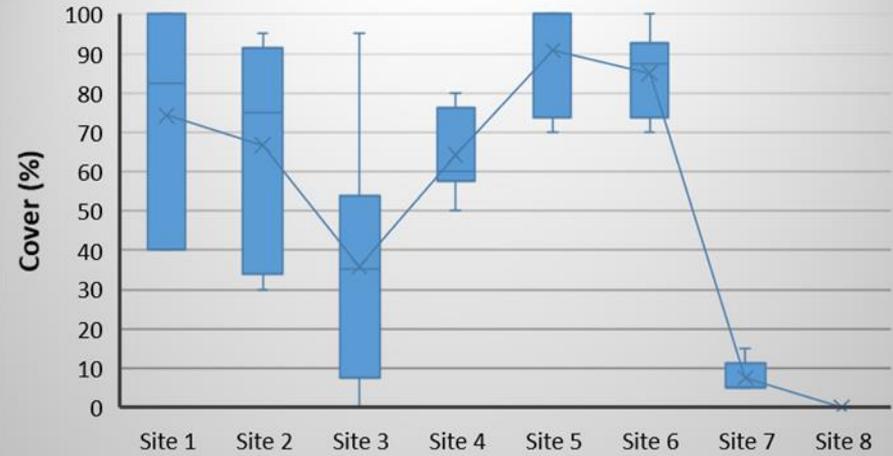
SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Habitat

Substrate



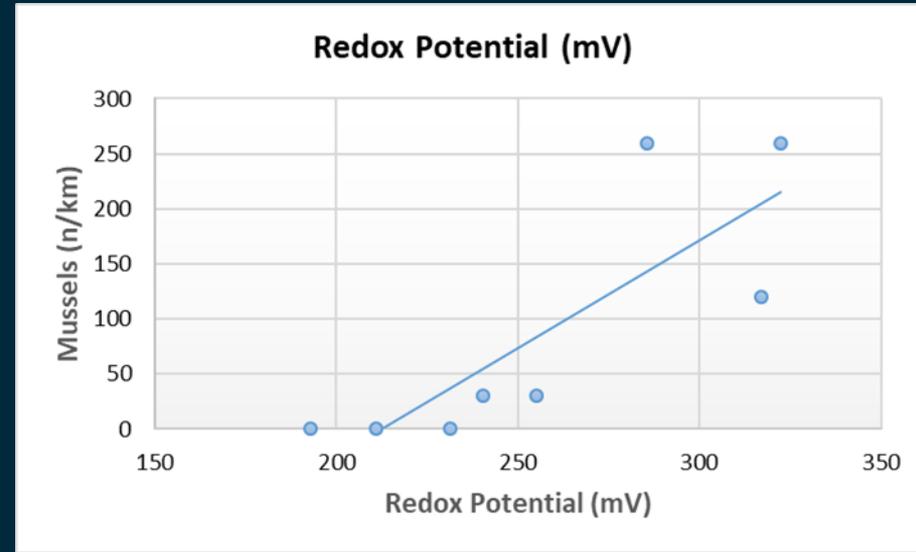
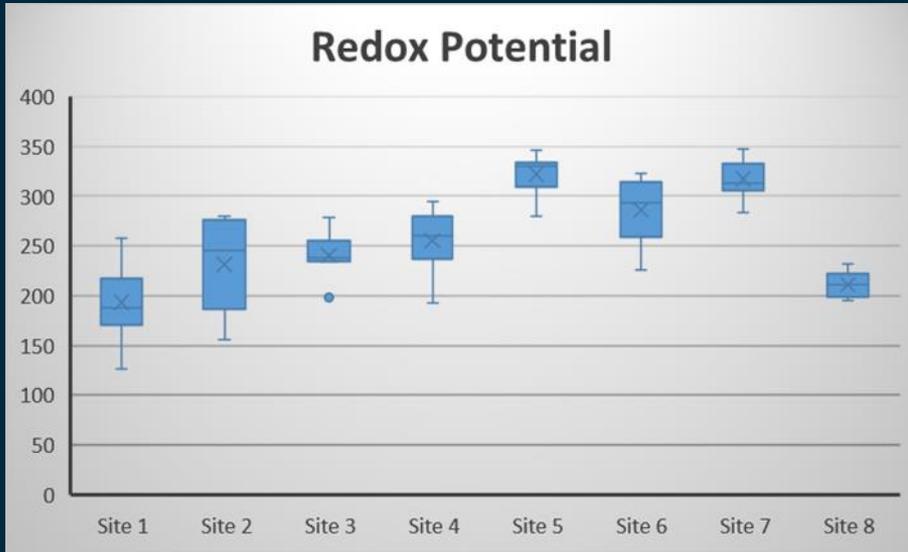
Cover





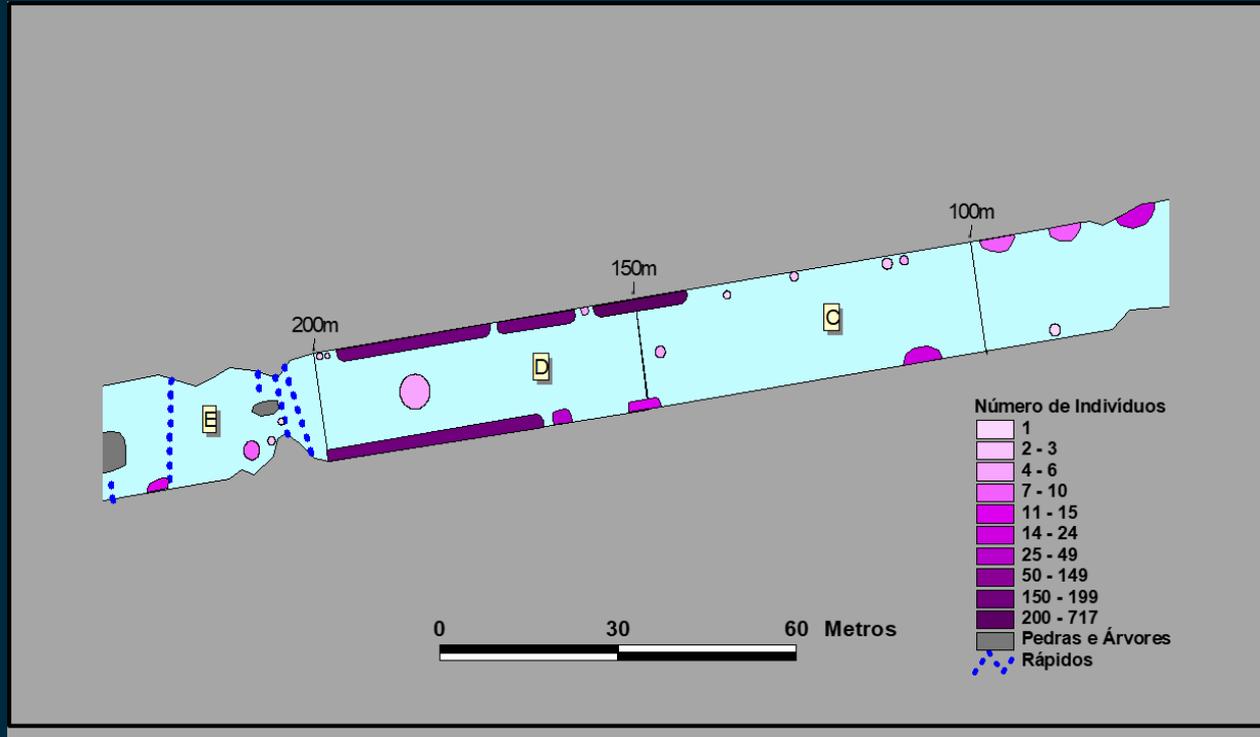
SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Habitat



SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Micro-Habitat





SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

Micro-Habitat

Point measurements:

- Distance to bank;
- Cover;
- Depth;
- Current Velocity;
- Substrate;
- Redox Potential (surface and 5 cm).





SEARCHING FOR ADEQUATE JUVENILE SETTLING LOCATIONS FOR *M. MARGARITIFERA*

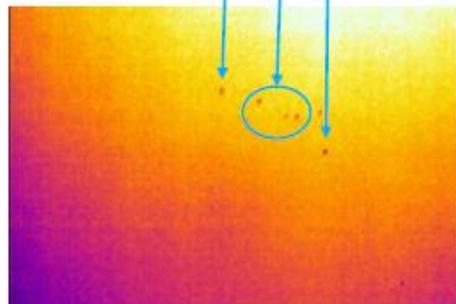
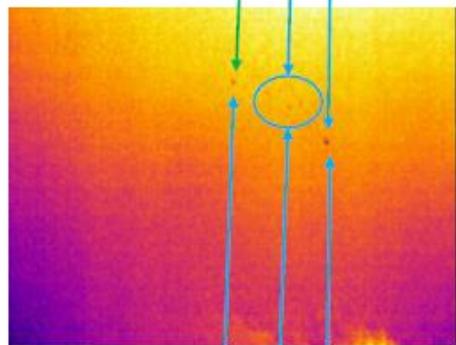
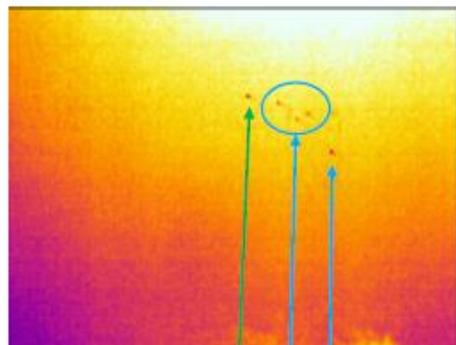
Micro-Habitat

Flow measurements:

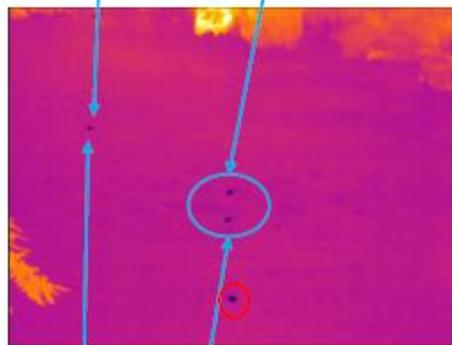
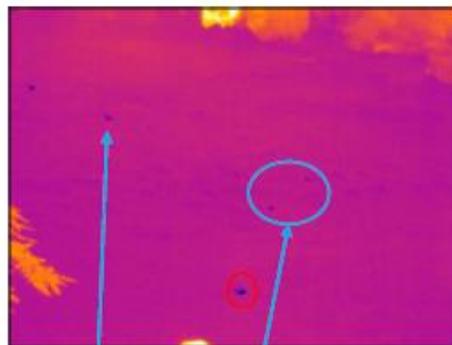
- In Spring (juvenile drop-off);
- At peak flow events (mussel displacement);
- Using thermographic analyses.



Section A

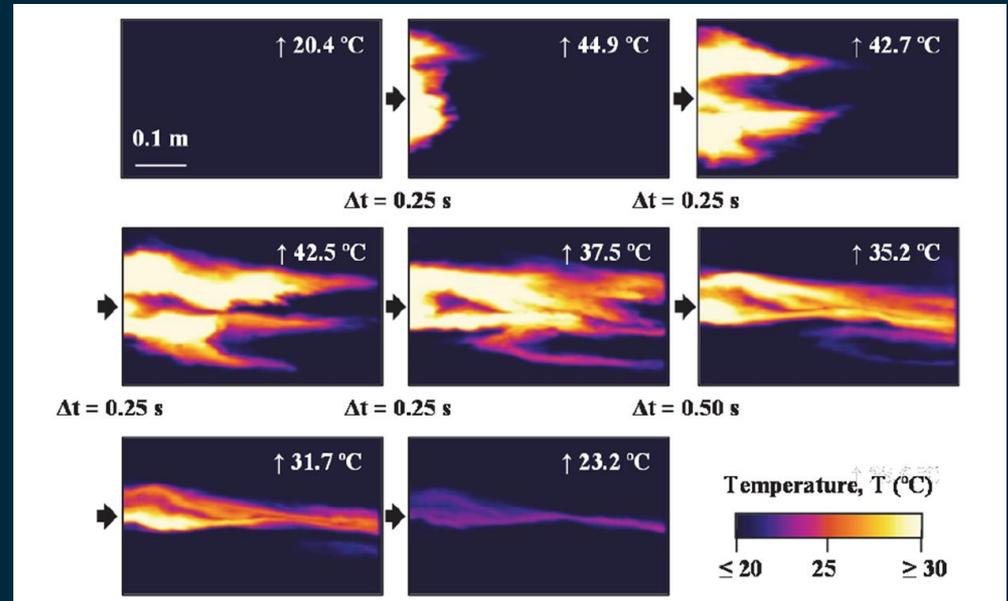


Section B



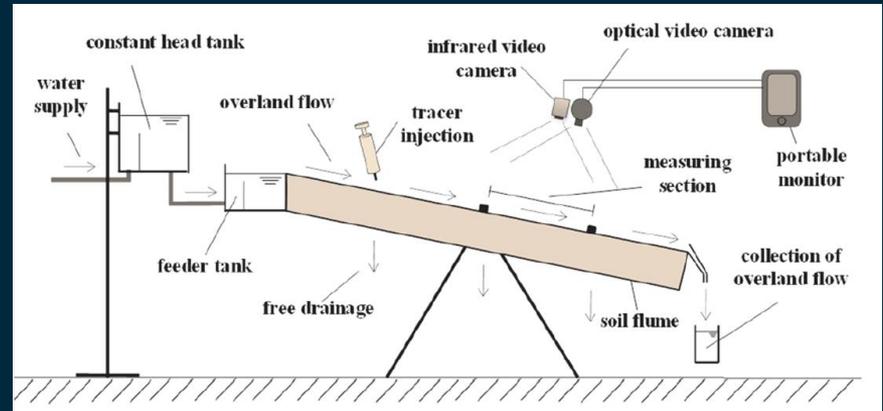
Flow measurements:

- Using thermographic analyses;
- In Spring (juvenile drop-off);
- At peak flow events (mussel displacement).



Flow measurements:

- Using thermographic analyses;
- In Spring (juvenile drop-off);
- At peak flow events (mussel displacement).



Experimental Setup using hydraulic flume

THANKS FOR WATCHING!

ACKNOWLEDGEMENTS

Nieves Rodriguez, Maria Garcia, Maria Gonzalez, Olivia Saez, Maria Vales and Filipe Rolo for assistance in field work.

All the staff at the genetic labs in the University of Lisbon and ISPA and at the hydraulic lab in the University of Coimbra

This project was funded by national funds from the FCT – Fundação para a Ciência e a Tecnologia, I.P.,

