HOST-DEPENDENT EVOLUTION, ECOLOGY AND CONSERVATION OF FRESHWATER MUSSELS UNDER VARYING HYDROLOGICAL CONDITIONS: CONSEQUENCES OF CLIMATE CHANGE

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THE PROJECT

Objectives:

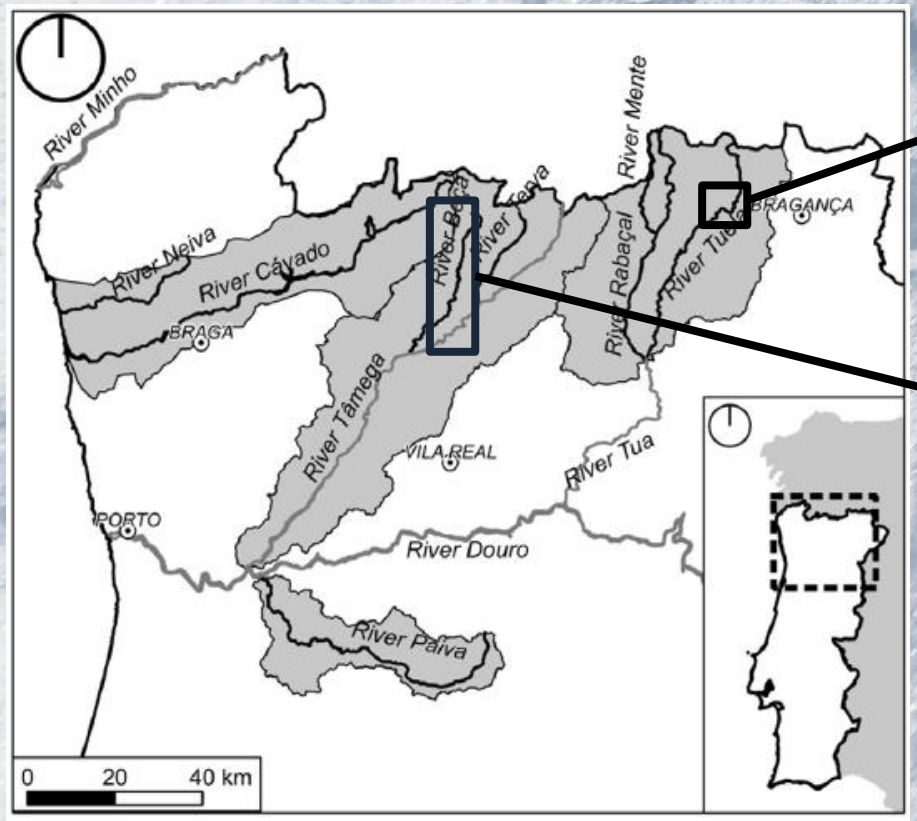
To clarify the relative role of host-fish and hydrological patterns of rivers in dispersal and evolutionary paths of freshwater mussels and potential impacts of climate change.

Approach:

Multidisciplinary approach: population genetics, observational and experimental hydraulic studies, ecological modeling.

BACKGROUND

Margaritifera margaritifera



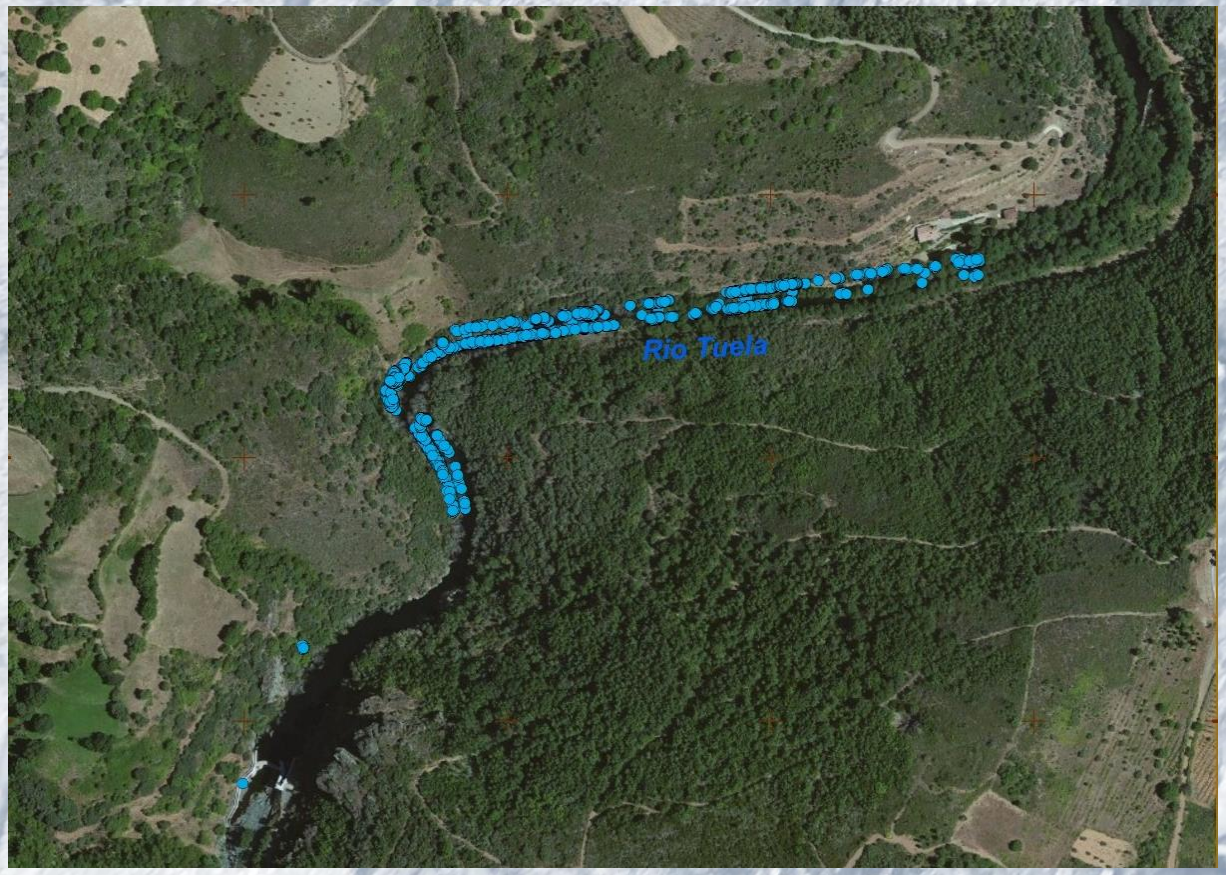
River Tuela
Parcial Survey
800m / 4000 mussels

River Beça
Total Survey
10.000m / 450 mussels

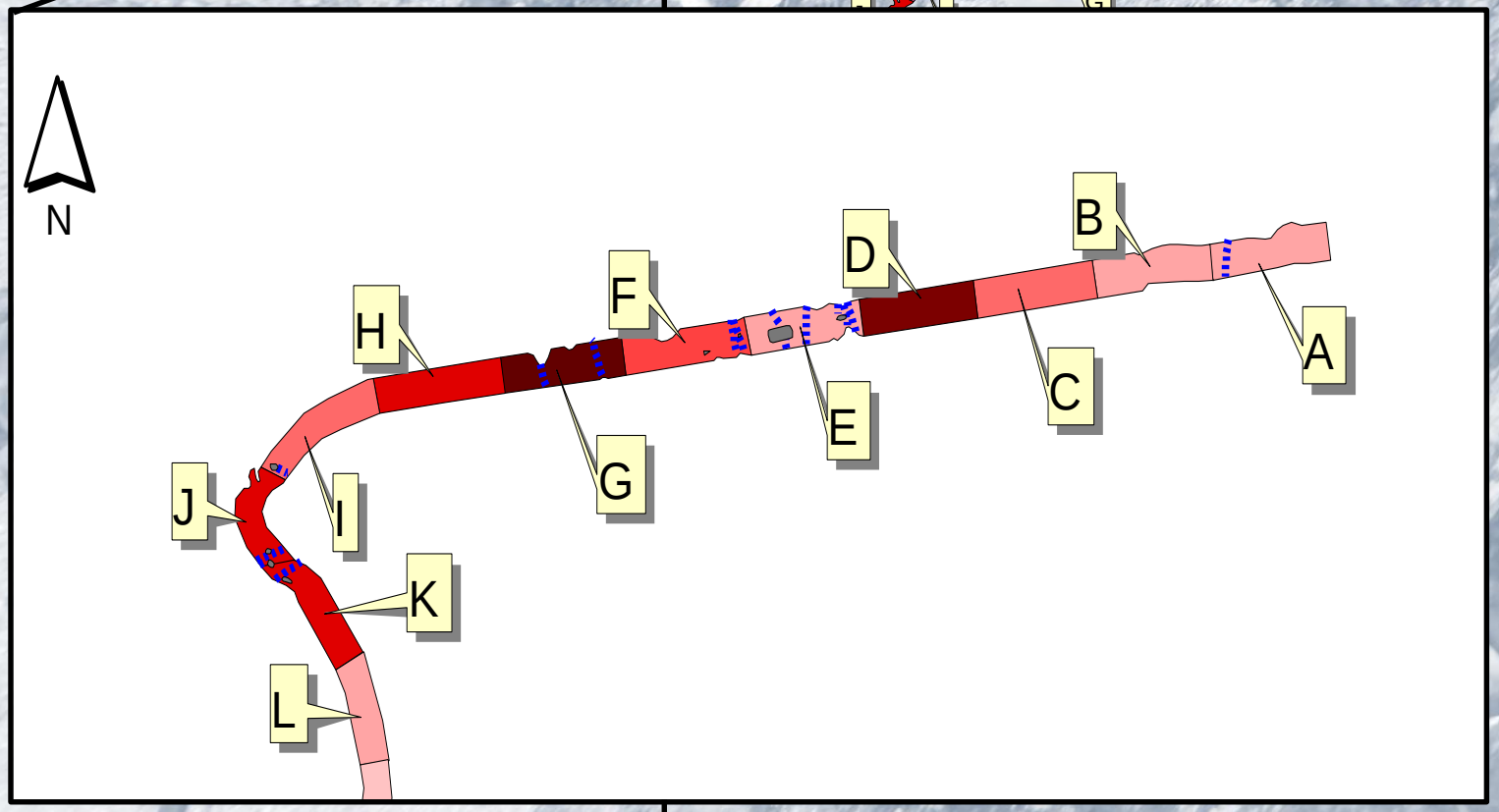
Modified from Sousa et al. (2014)

BACKGROUND

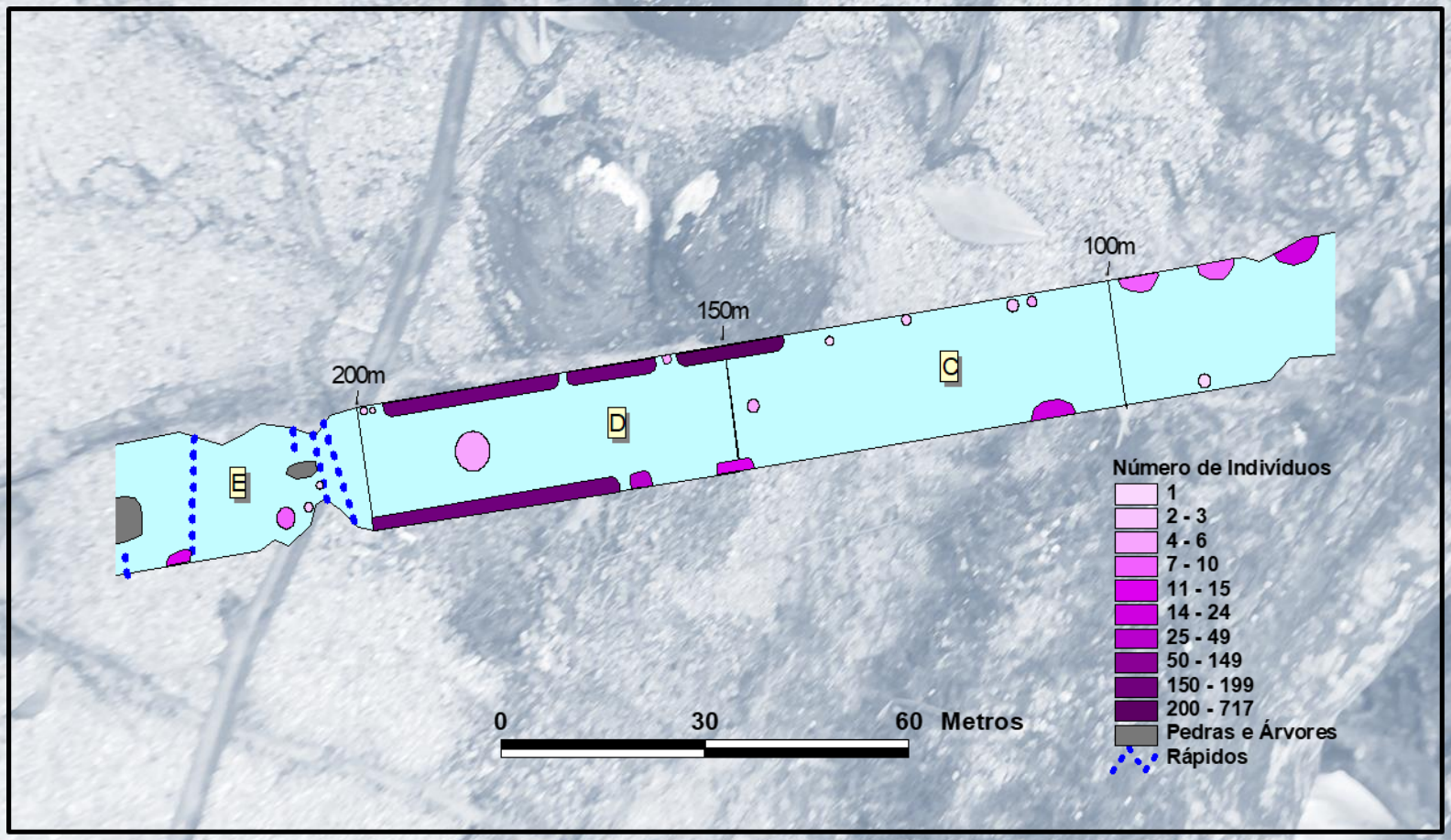
River Tuela



BACKGROUND



BACKGROUND


100m
150m
200m
C
D
E
Número de Indivíduos
1
2 - 3
4 - 6
7 - 10
11 - 15
14 - 24
25 - 49
50 - 149
150 - 199
200 - 717
Pedras e Árvores
Rápidos
0
30
60 Metros

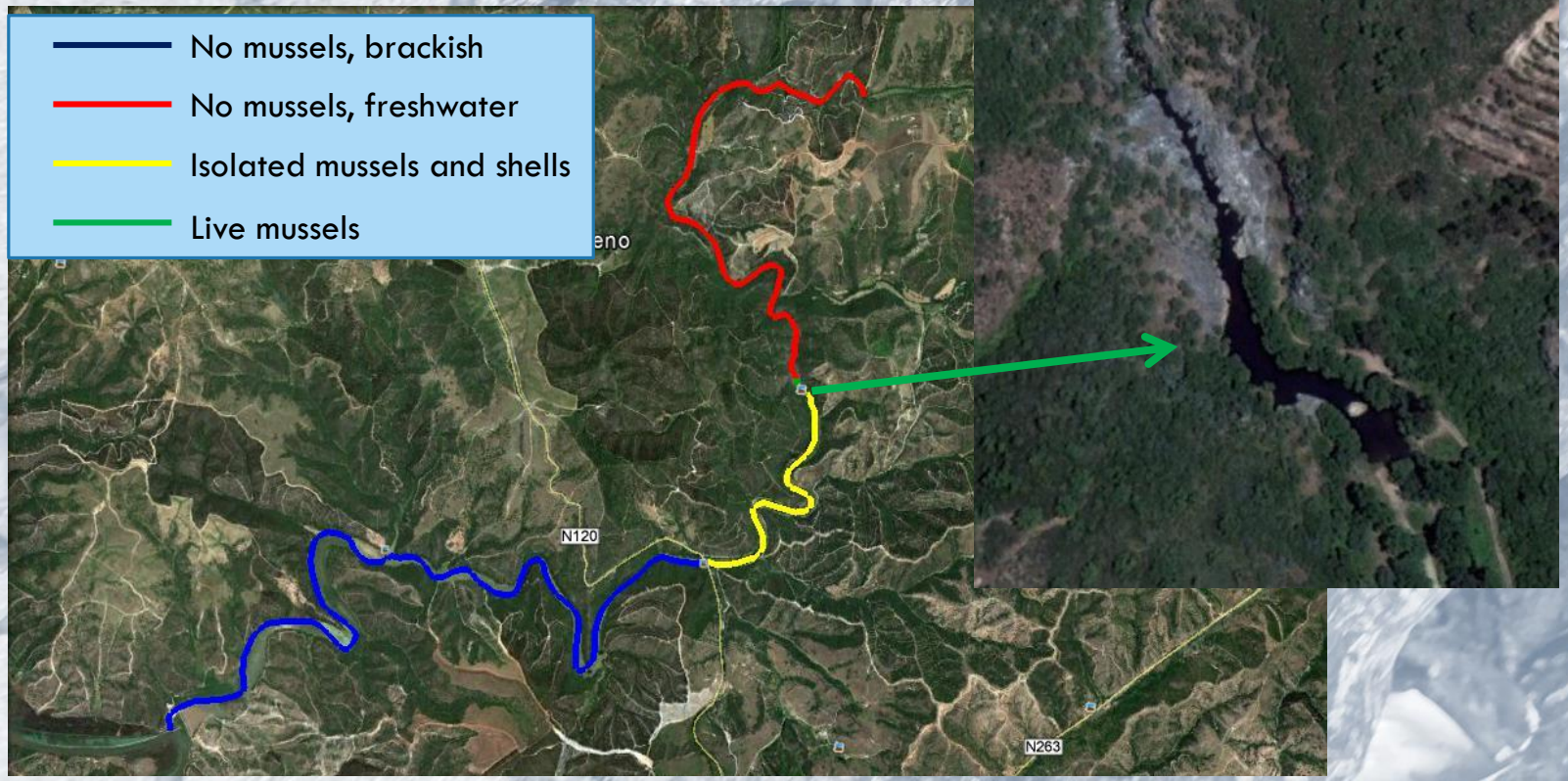
BACKGROUND

River Beça



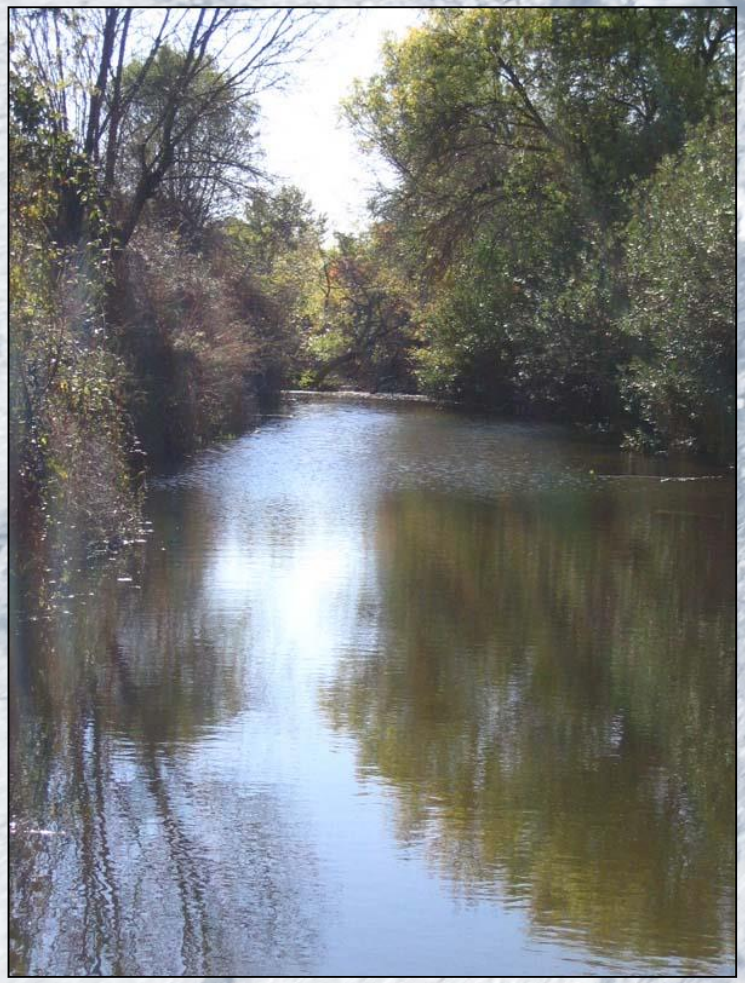
BACKGROUND

Anodonta anatina, *Potomida littoralis*, *Unio delphinus* and *U. tumidiformis*





BACKGROUND





BACKGROUND





400 Mussels!






128
127
126
125
215
214
213
212
211
209
210
239 m
© 2014 Google

HYDRAULICS

Objectives:

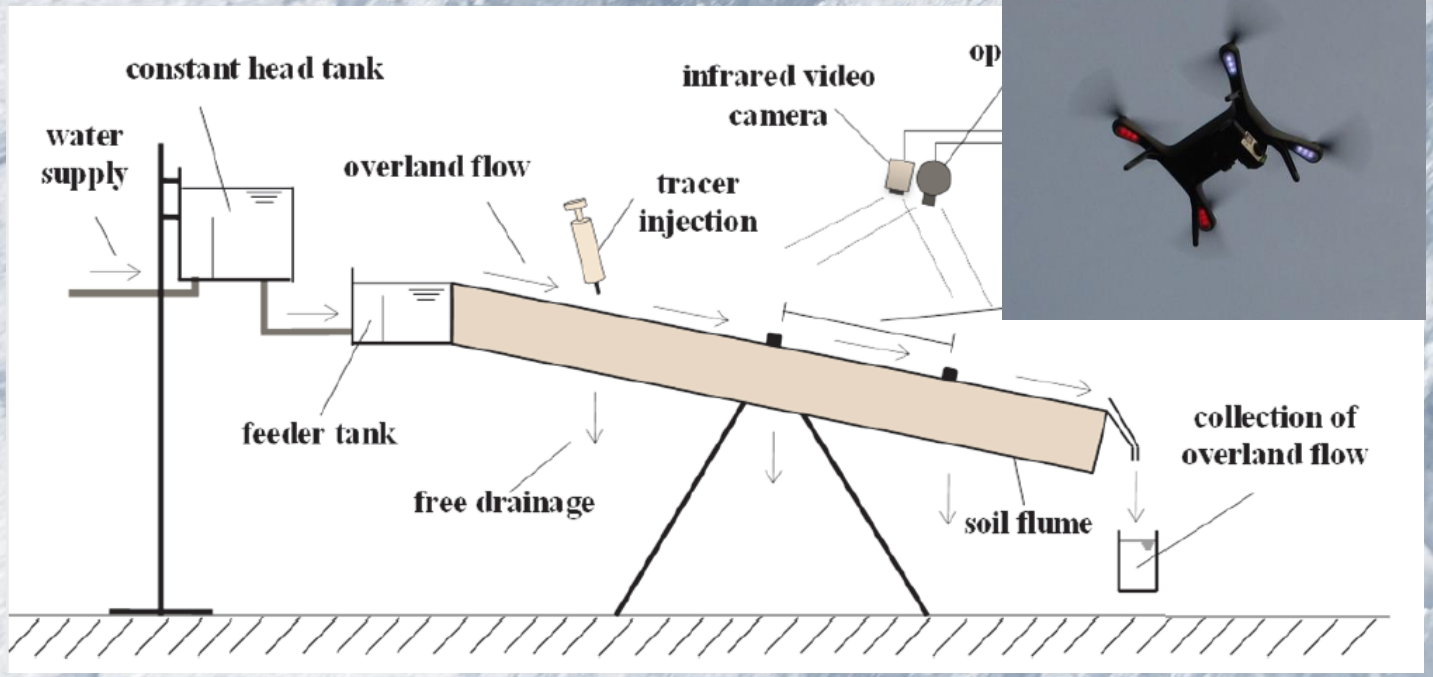
To test juvenile settling conditions;

To test juvenile displacement.

Approach:

Hydraulic flume experiments;

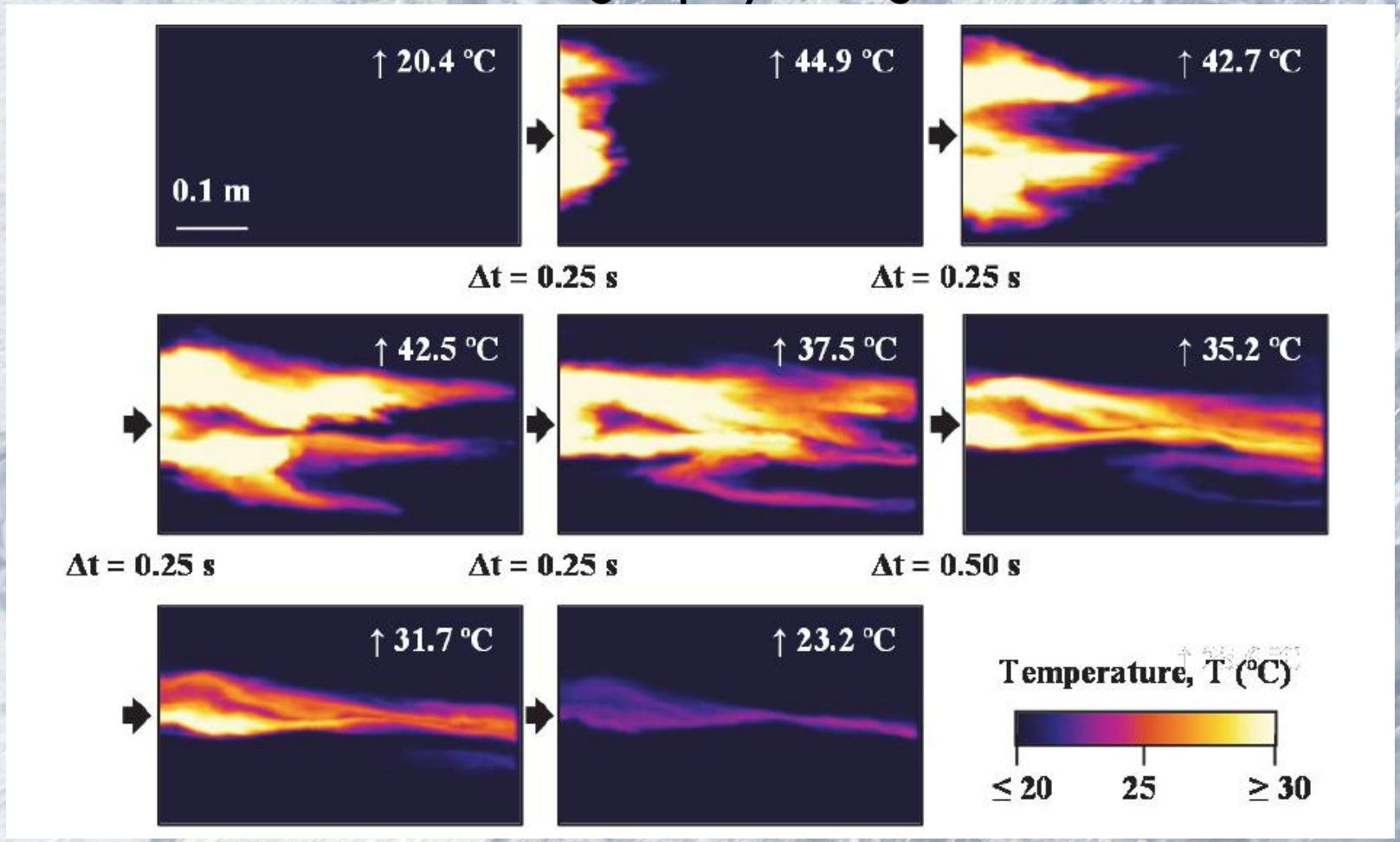
Termography field observations.



HYDRAULICS

Mussel flow

Termography images

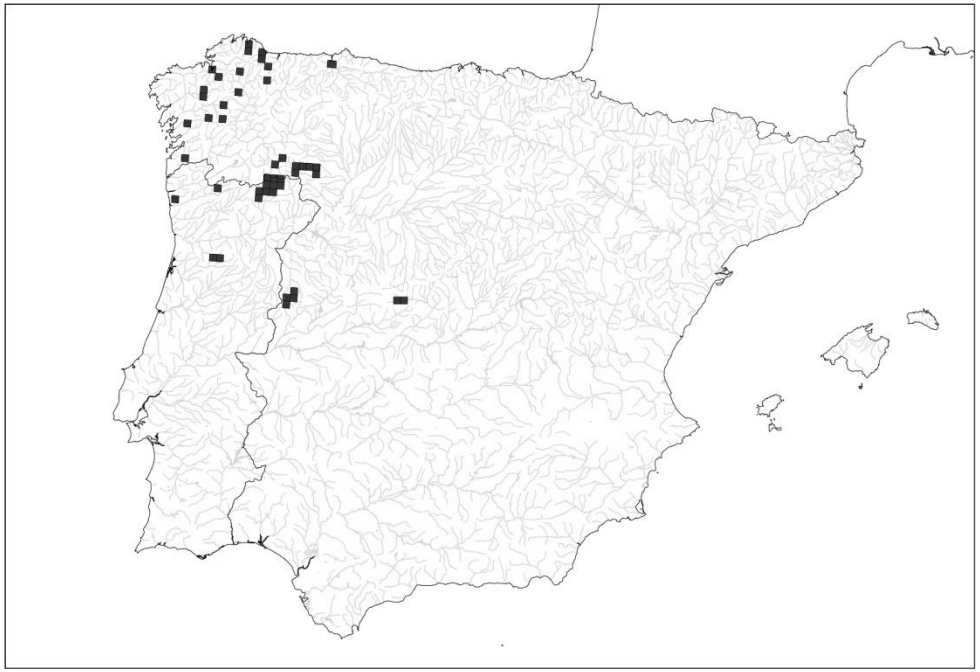


TARGET SPECIES

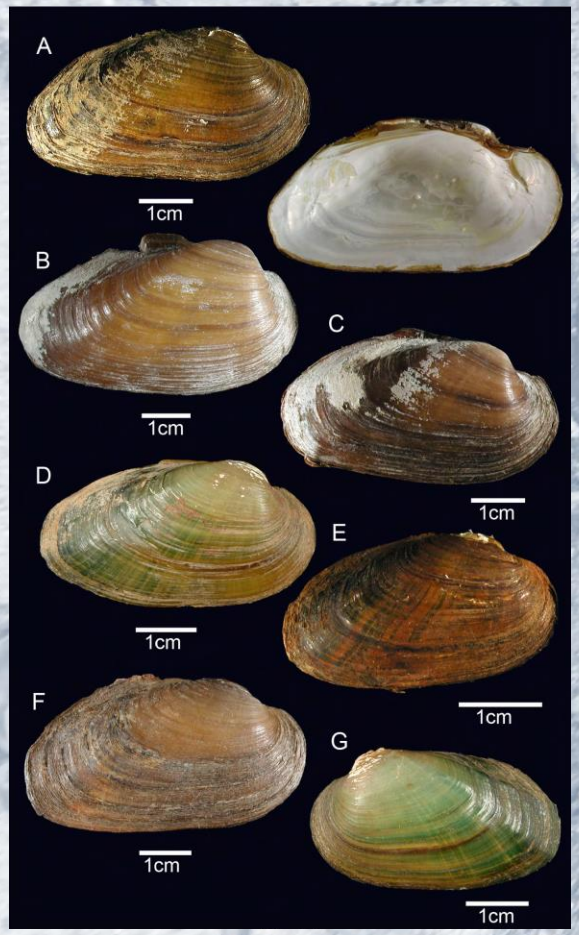


Margaritifera margaritifera

(Host: *Salmo salar* and *S. trutta*)

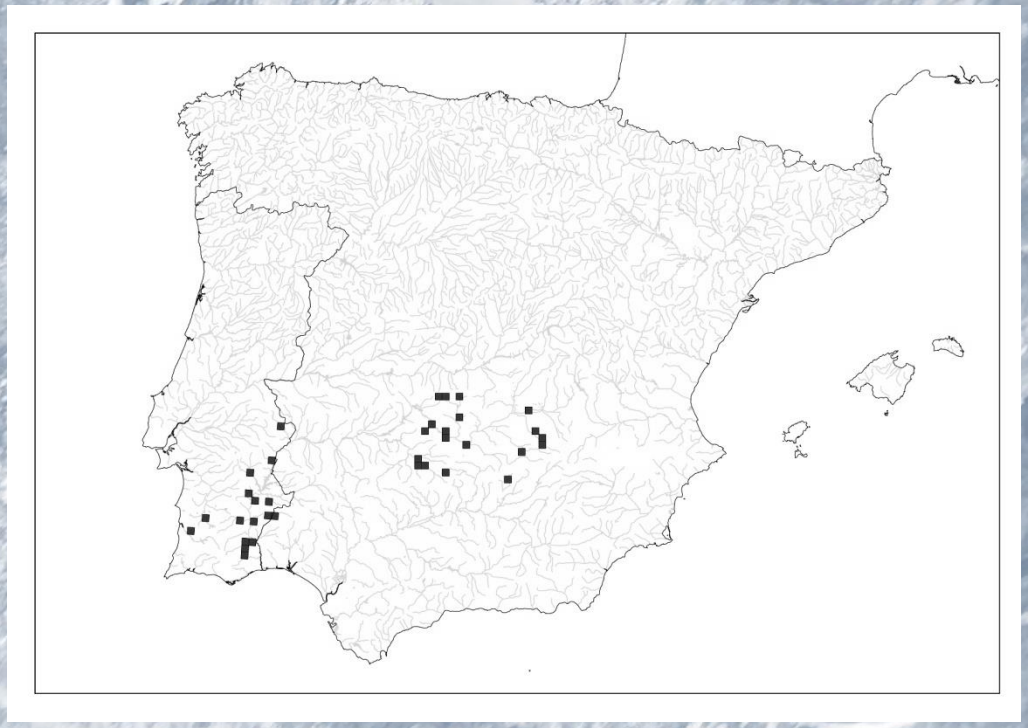


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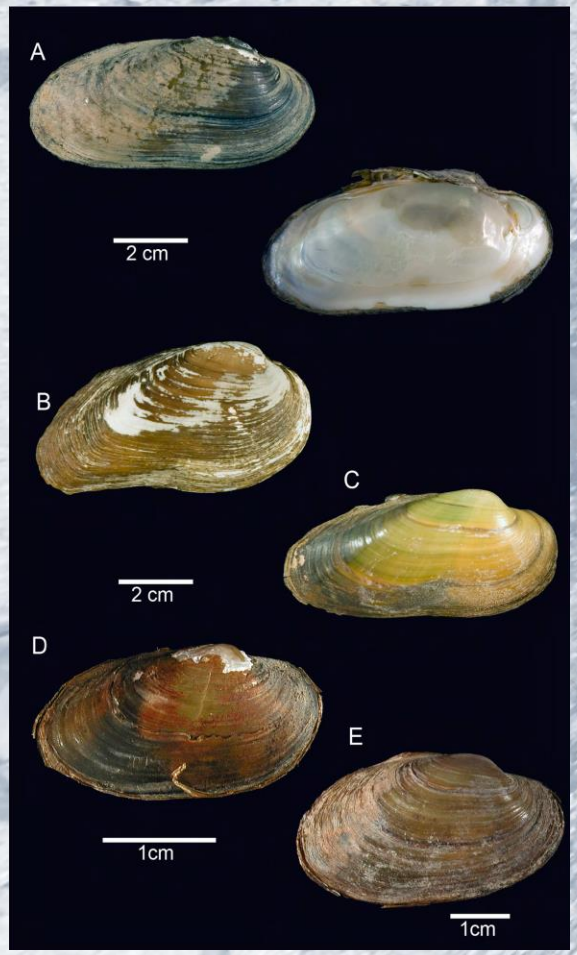


Unio tumidiformis

(Host: *Squalius spp.*)

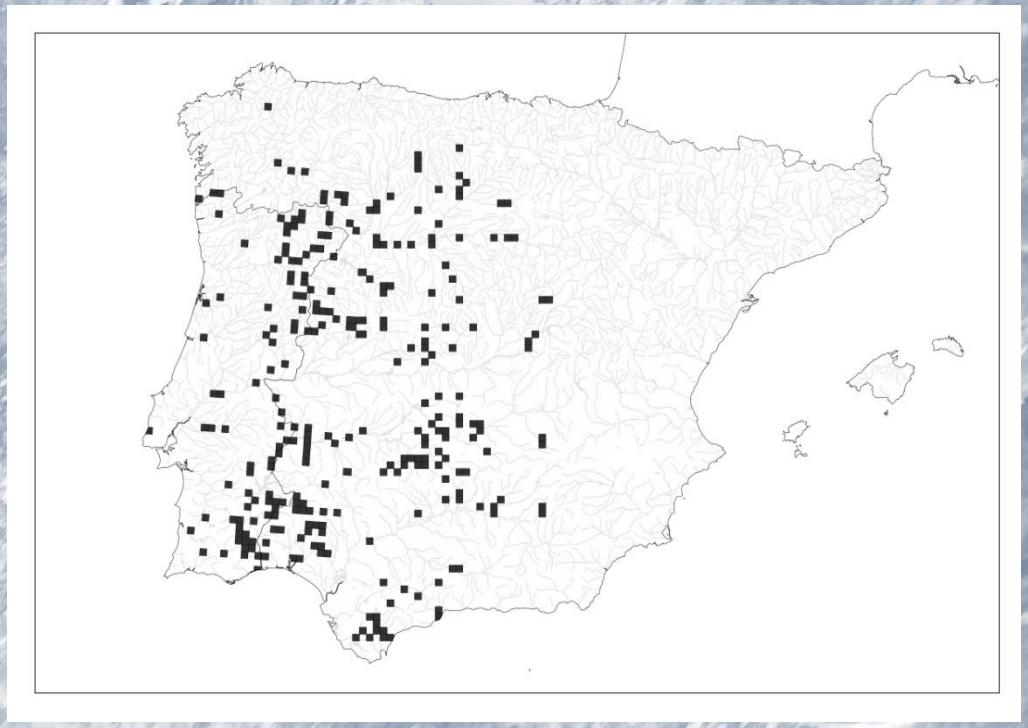


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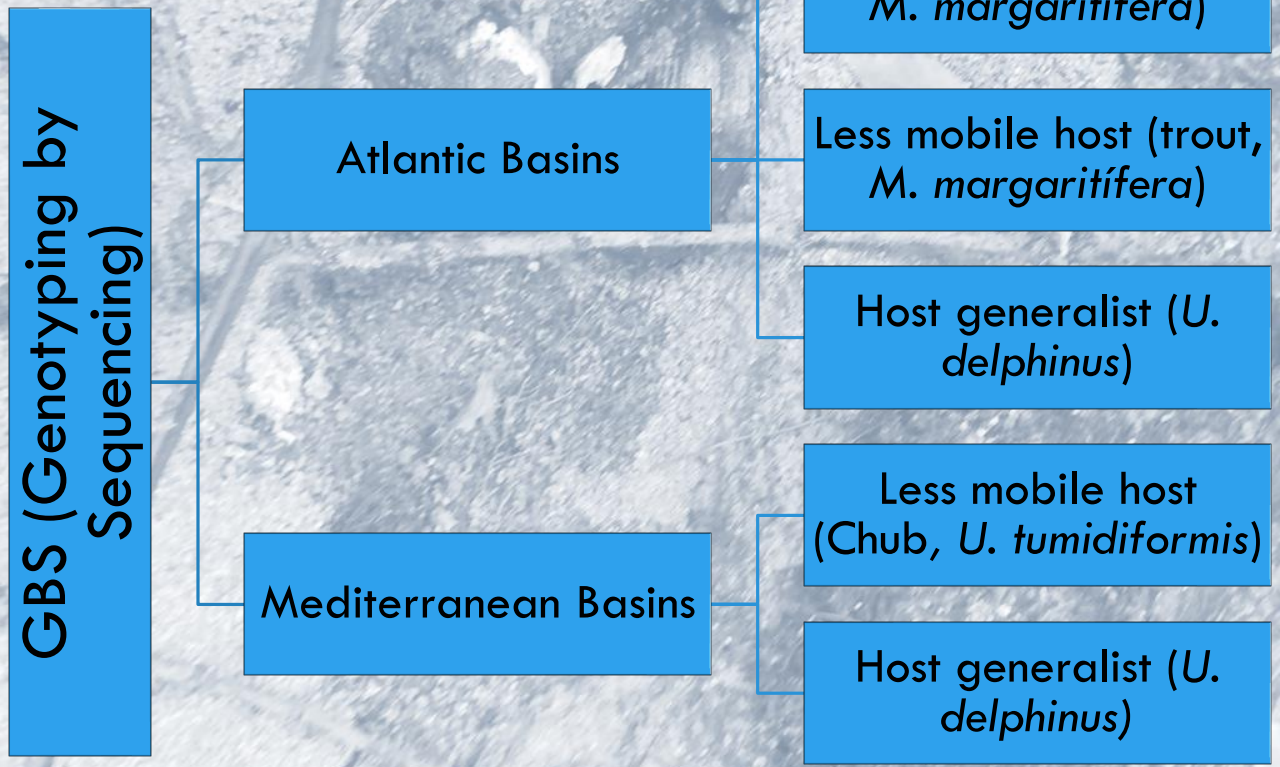
Unio delphinus

(Host generalist)



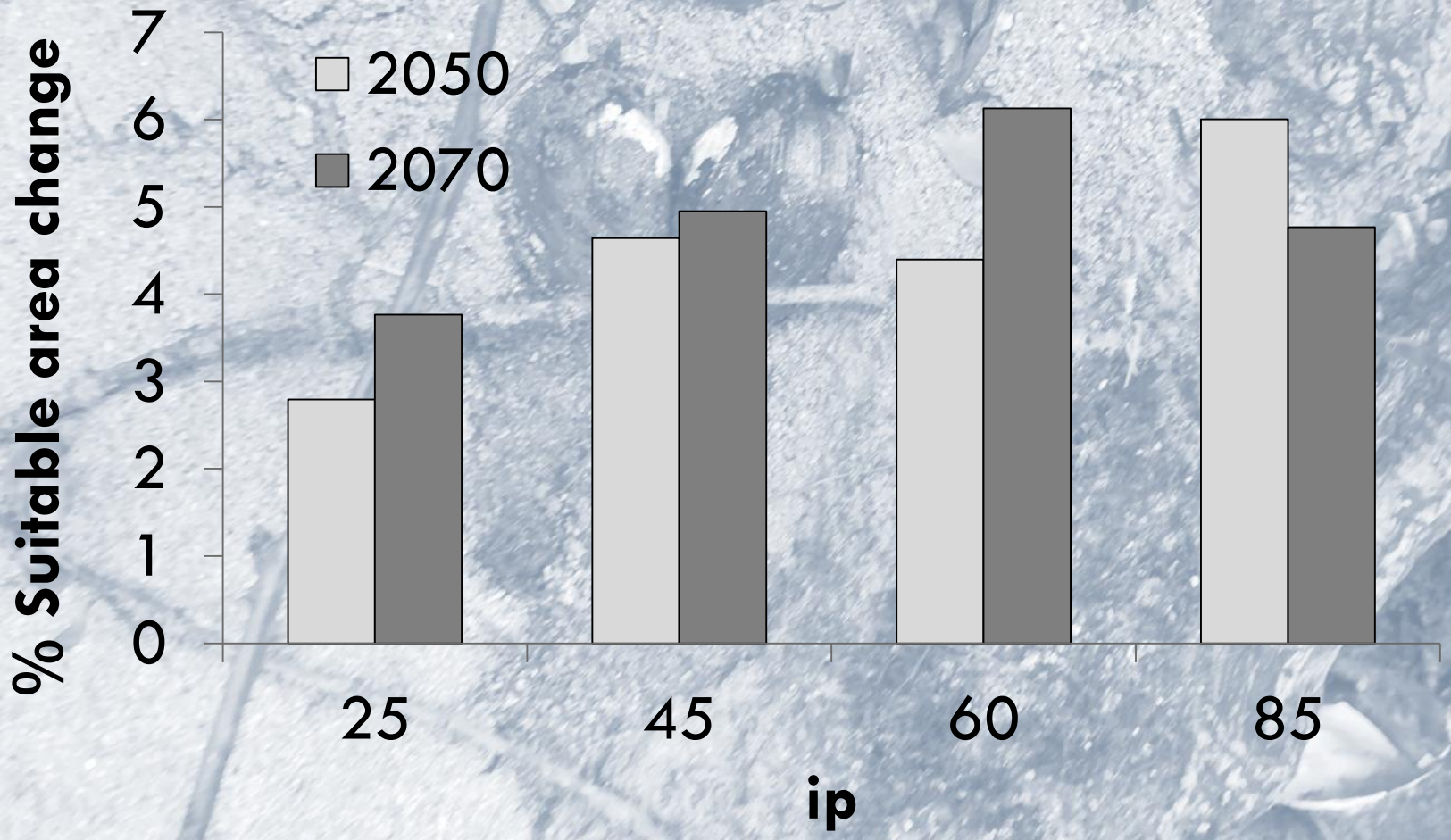
HOST FISH

Population Genetics



CLIMATE CHANGE

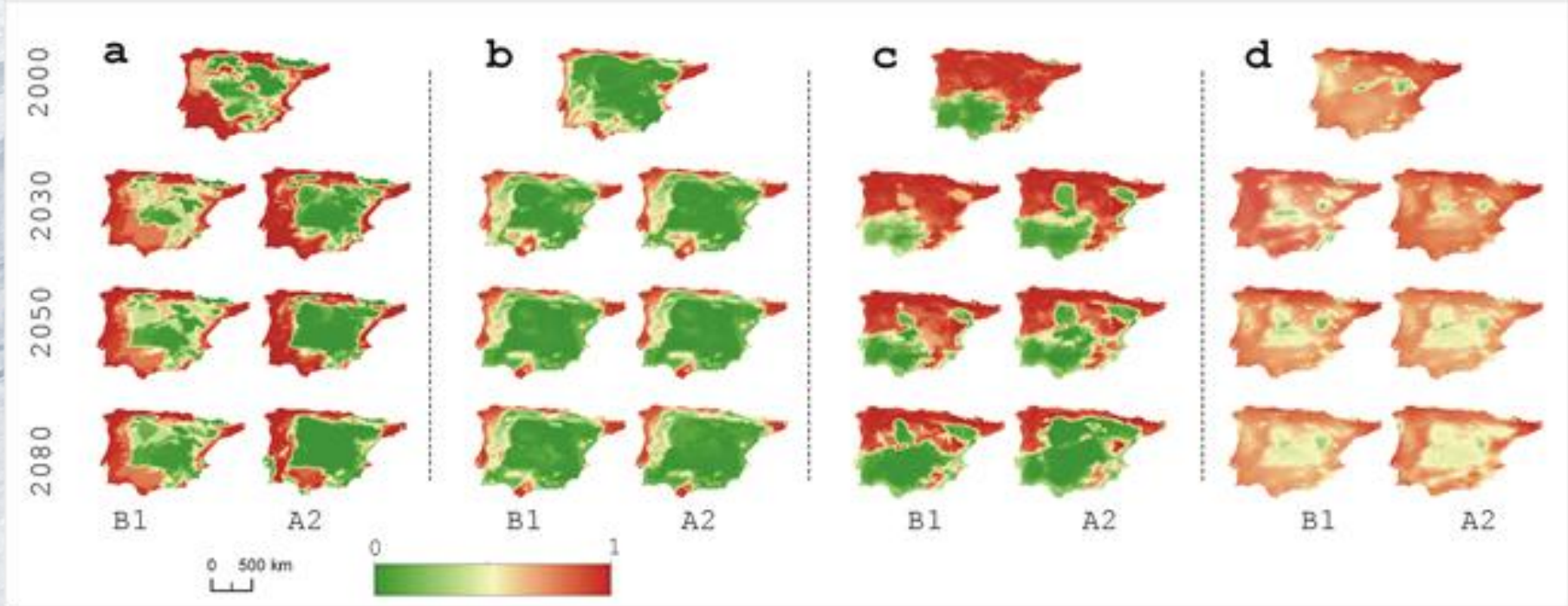
Ecological Modelling



CLIMATE CHANGE

Climatically suitable areas of the Iberian Peninsula for:

Cherax destructor *Eriocheir sinensis* *Pacifastacus leniusculus* *Procambarus clarkii*



(Capinha et al., 2012)

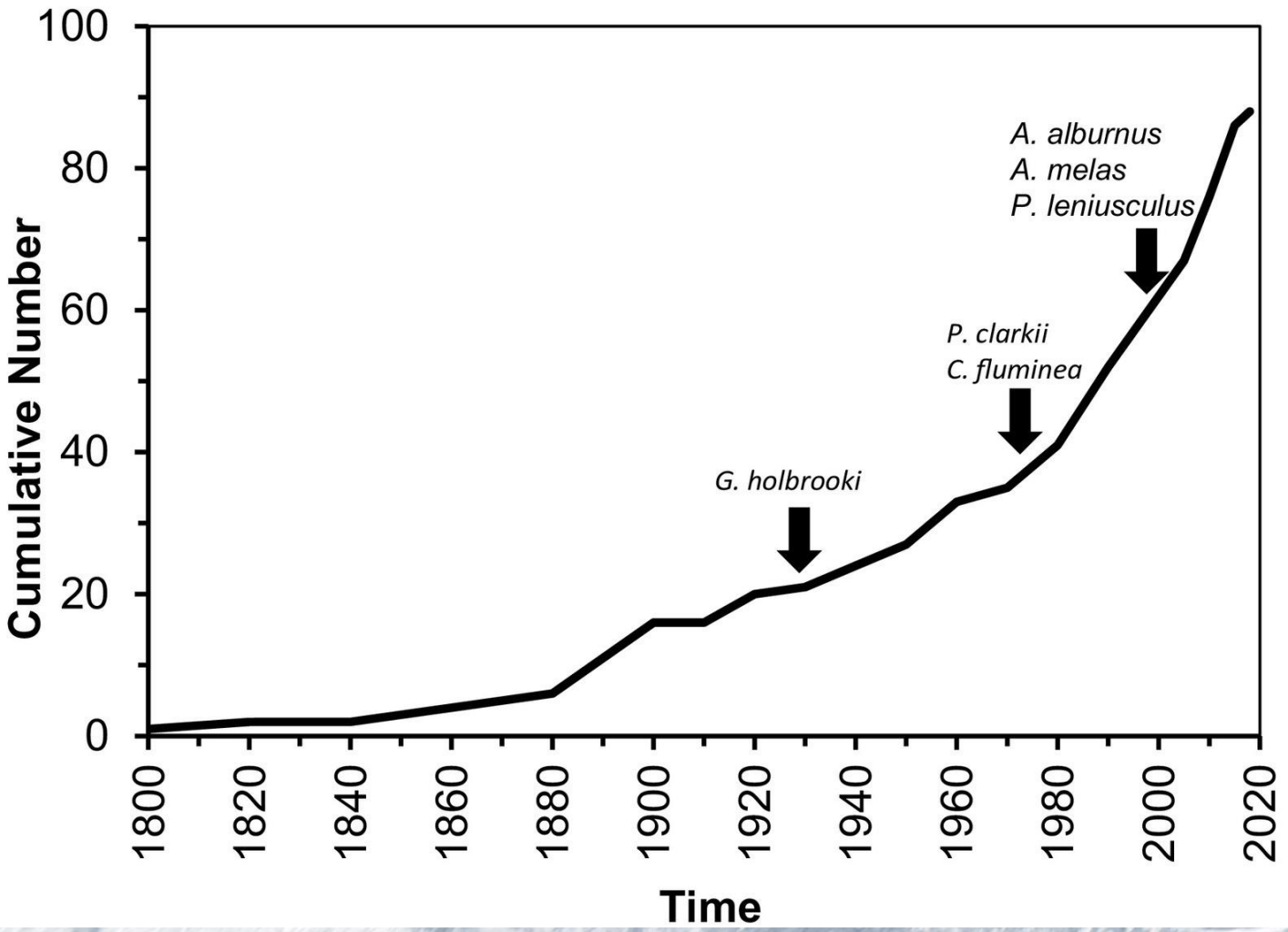
Current climate (2000) and projections for three future time periods (2030, 2050 and 2080) under a low (B1) and high (A2) greenhouse gases emission scenario.




1
2004
IP2
São
Manços
2 km


2015
IP2
São
Manços
750 m
2 km

INVASIVE SPECIES



Anastácio et al. 2019

USING THE RESULTS

ECOTONE – MANAGEMENT OF RIPARIAN HABITATS TOWARDS THE CONSERVATION OF ENDANGERED INVERTEBRATES (LIFE10 NAT/PT/000073)









USING THE RESULTS

Mussel Relocations (2015)

River	Reach	*Unio delphinus*				*Potomida littoralis*			
		% Recapture		% Dead		% Recapture		% Dead	
		2016	2017	2016	2017	2016	2017	2016	2017
A	1	22	6	0	0	14	26	0	0
	2	6	0	25	100	5	0	17	-
B	1	17	2	9	33	17	8	6	32
	2	22	2	13	92	19	6	6	44
	3	47	5	24	90	-	-	-	-



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THANK YOU!



REPÚBLICA PORTUGUESA

FCT Fundação para a Ciência e a Tecnologia

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