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Universidad del País Vasco Euskal Herriko Unibertsitatea



Sea lamprey (*Petromyzon marinus*) nests: a way for population estimate?



2021 – 2022
program



My thesis

Context

- Preliminary study financed by the OFB/INRAE/UPPA/AgroCampusOuest cluster carried out in spring 2019
- Objective : to initiate a new research axis for the laboratory **ECOBIOF** of **INRAE** in Saint-Pée-sur-Nivelle focused on the 3 species of lampreys present in France : **River lamprey, Brook lamprey and Sea lamprey**
- Several axes of study mainly focused on individual behaviour and population management, via laboratory and field studies

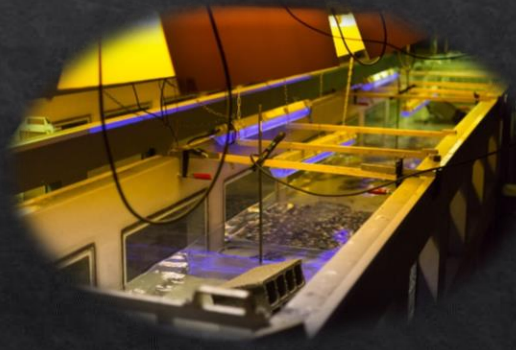


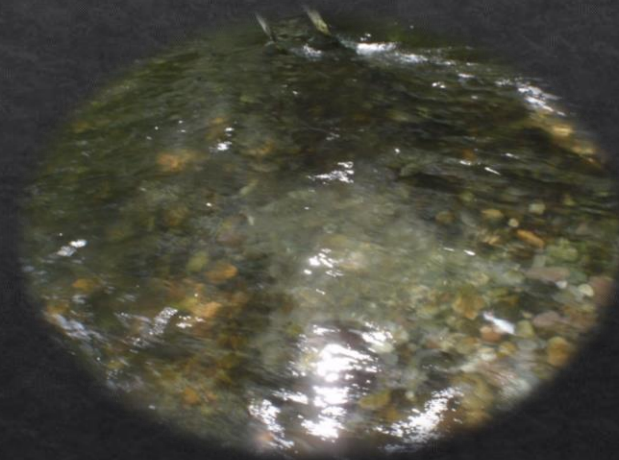
Photo credit: Stéphane Glise, INRAE

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My thesis

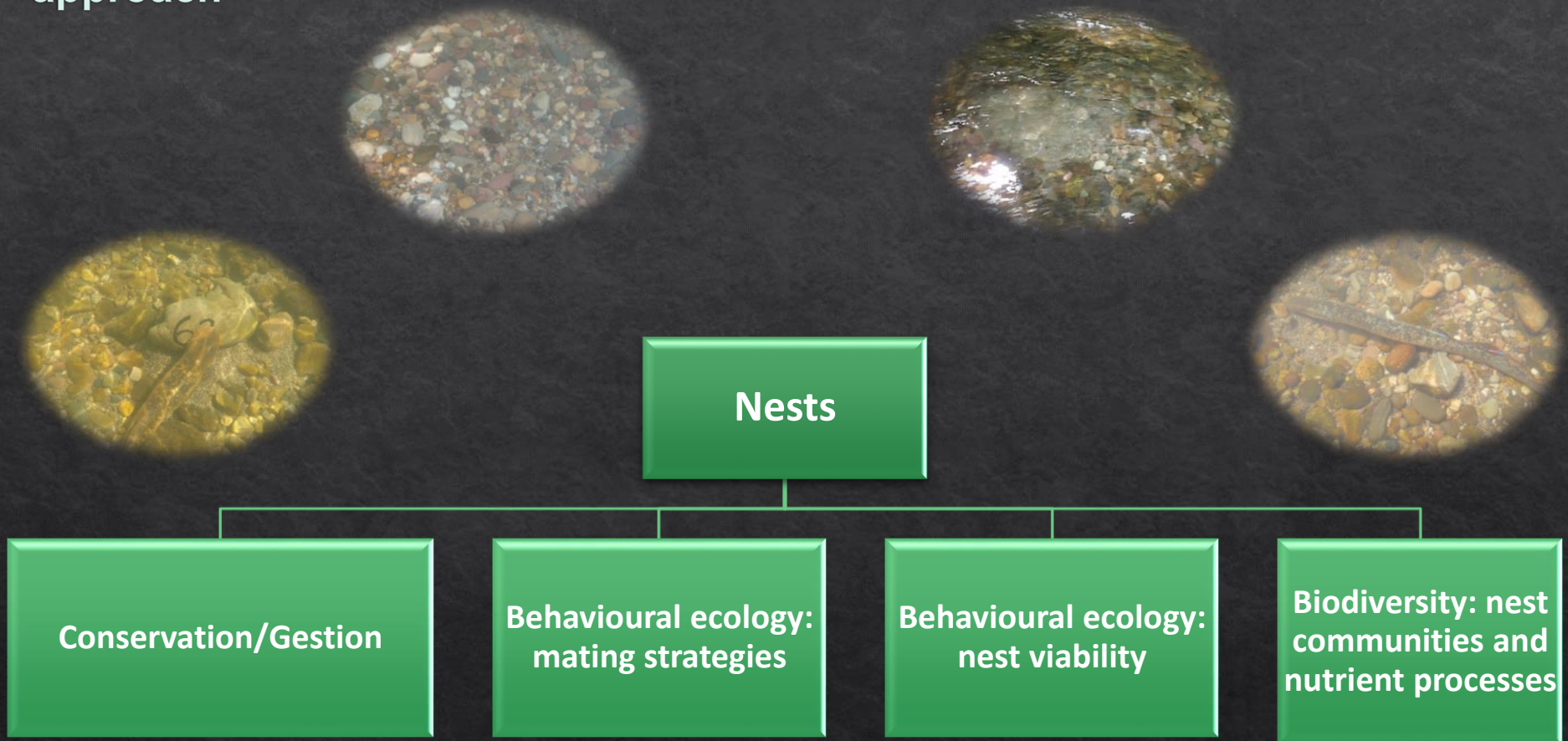
Context: lack of knowledge of sea lamprey reproductive strategies and reproductive success

- Factors influencing sea lamprey reproductive success (nest characteristics, number of nests, number of mates)
- Existence of strategies among individuals for males and females



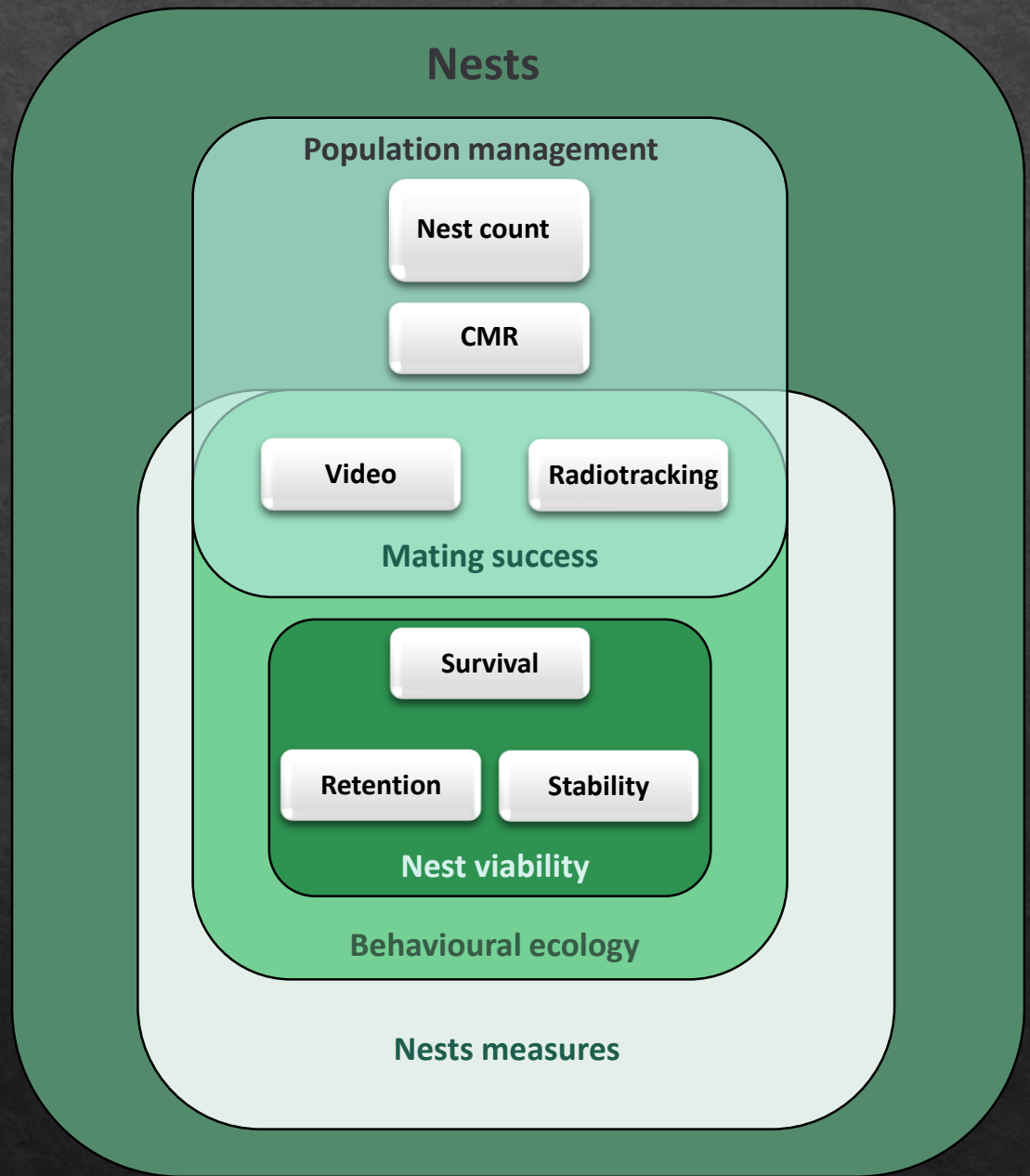
My thesis

Major axes: a nest-centered approach



My thesis

Major axes: a nest-centered approach



My thesis

Context: sea lamprey conservation status

World IUCN red list: Least Concern

LC

Europe IUCN red list: Least Concern

LC

France IUCN (The Red List of threatened species in France): Endangered

EN



Habitat loss



Invasive species (?)

Obstacles



Overfishing



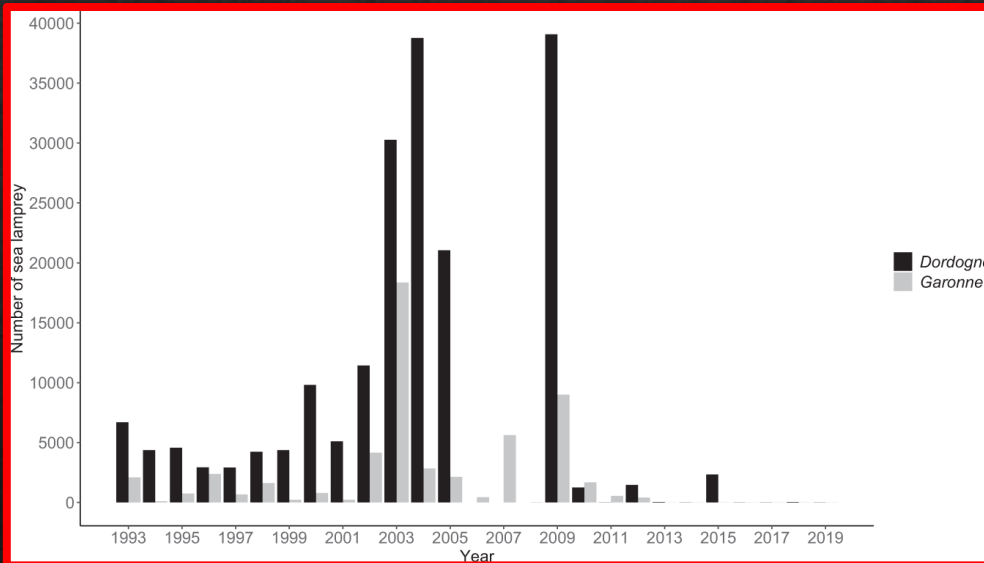
Pollution



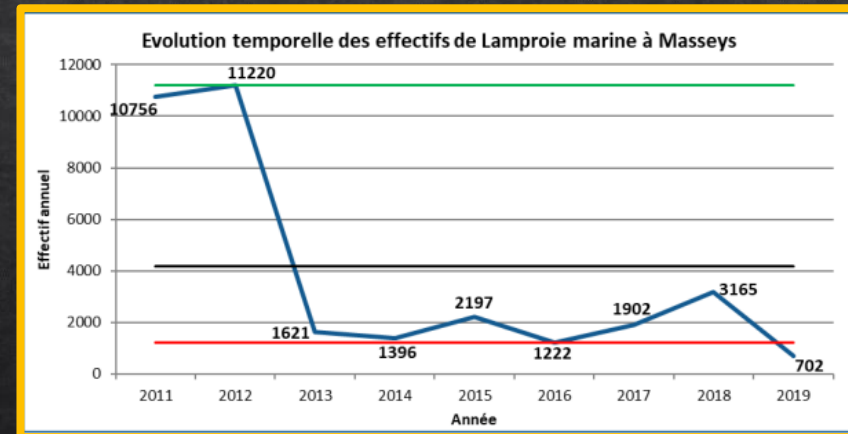
My thesis

Context: sea lamprey conservation status

- General observation in France: a sharp decline in sea lamprey stocks
- Locally, a drop is observed in **Garonne/Dordogne** and **Adour** basin



(Boulêtreau et al., 2020)

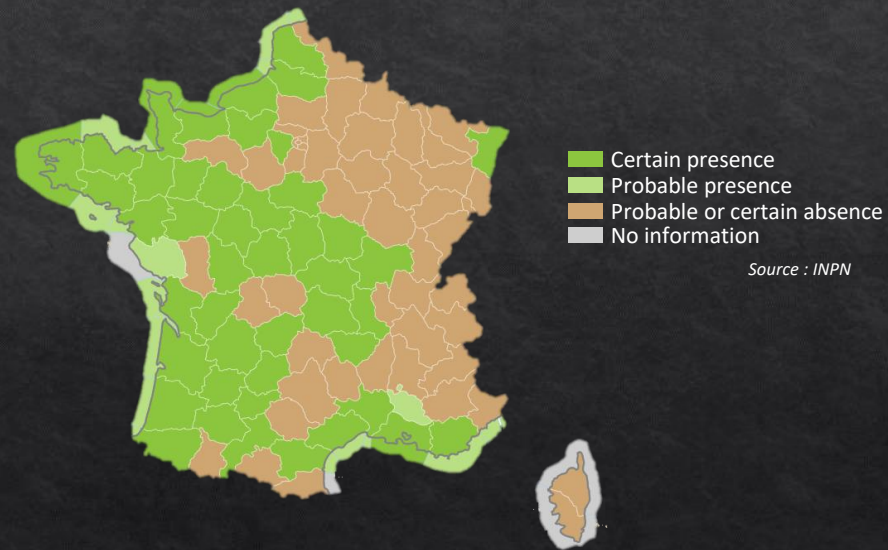


(Migradour, 2019)

My thesis

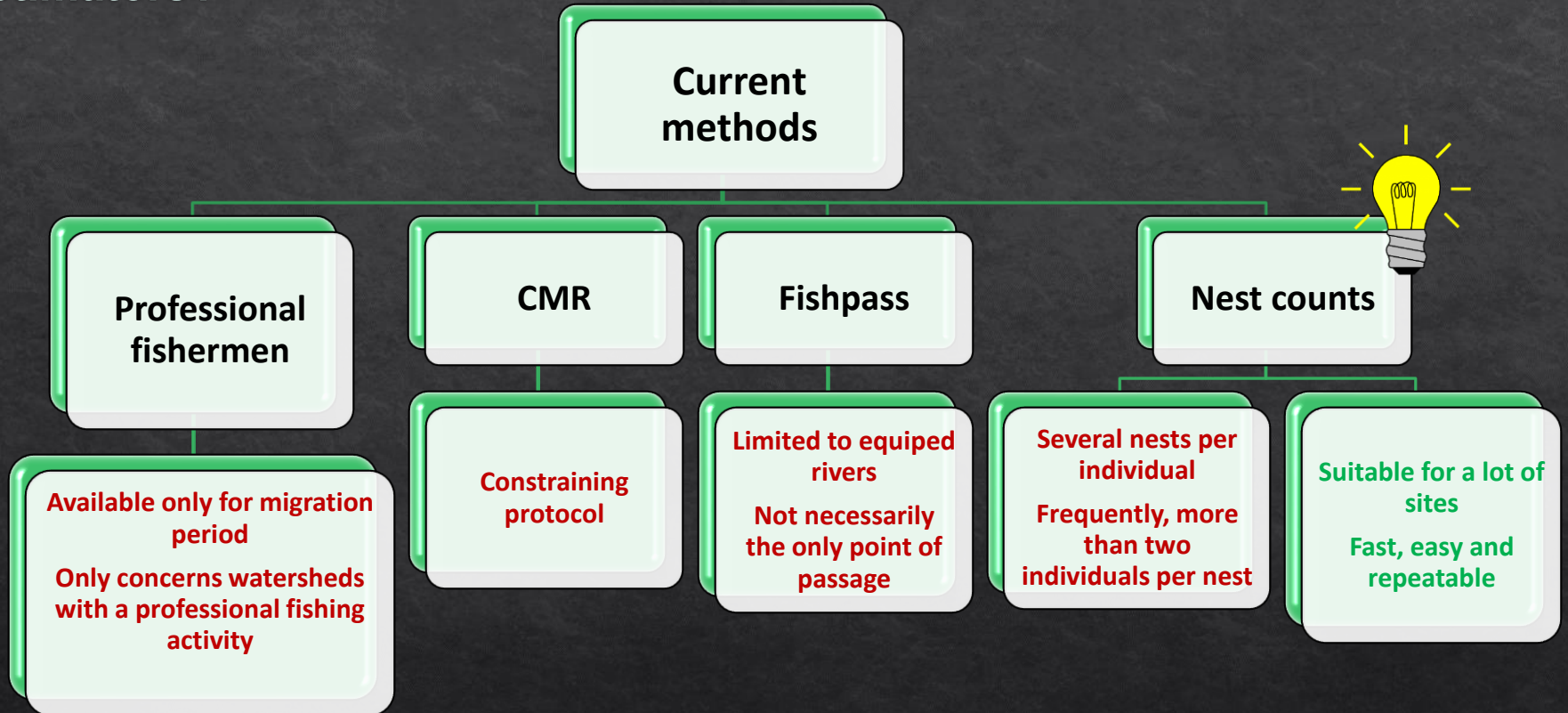
Context: sea lamprey conservation status

A necessity: to be able to determine precisely the populations and their dynamics in a maximum of sites



Sea lamprey nests/individuals relationship

Why use nests as population estimators?



Sea lamprey nests/individuals relationship

Two approaches: mechanistic and correlative

1

Approach

Principle

Necessary data

Mechanistic

Model simulating a lamprey population adopting an observed nesting behaviour and generating a number of nests

- *Number of nests per individual*
- *Number of individuals per nest*

2

Correlative

Correlate the number of individuals in zones with the number of nests observed within the same zones

- *Number of individuals in a zone*
- *Number of nests in the same zone*



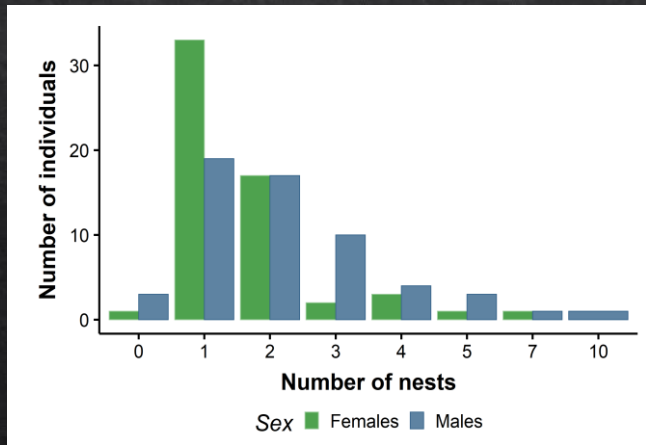
Mechanistic approach

Sea lamprey nests/individuals relationship

Mechanistic approach

Data collected in 2019

- 116 lampreys marked and recaptured during a spawning season
- 202 nests observed



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REGULAR PAPER

JOURNAL OF FISH BIOLOGY

Individual and group characteristics affecting nest building in sea lamprey (*Petromyzon marinus* L. 1758)

Marius Dhamelin court^{1,2} | Mathieu Buoro² | Jacques Rives^{1,2} | Stella Sebihi^{1,2} | Cédric Tentelier^{1,2}



56

742 ± 48 cm

1019 ± 208 g

8.33 ± 1.02 days

2.26 ± 1.72 nests

2.33 ± 2.13 mates



58

695 ± 41 cm

887 ± 179 g

3.57 ± 1.04 days

1.67 ± 1.17 nests

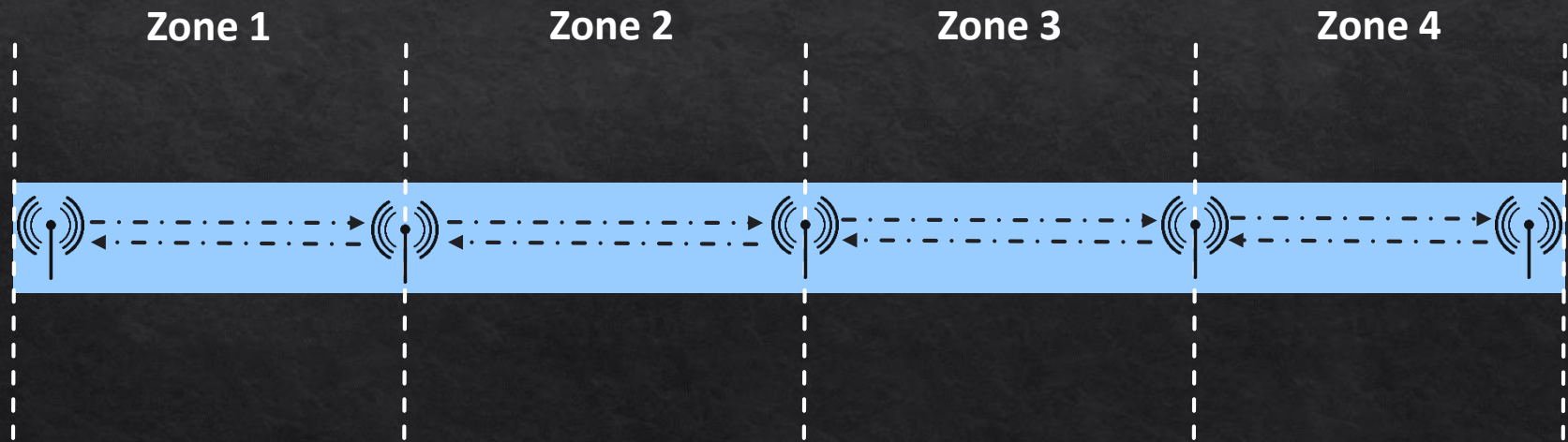
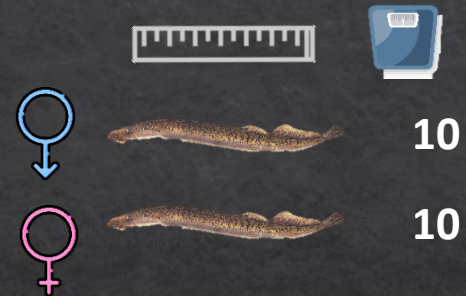
2.29 ± 1.32 mates

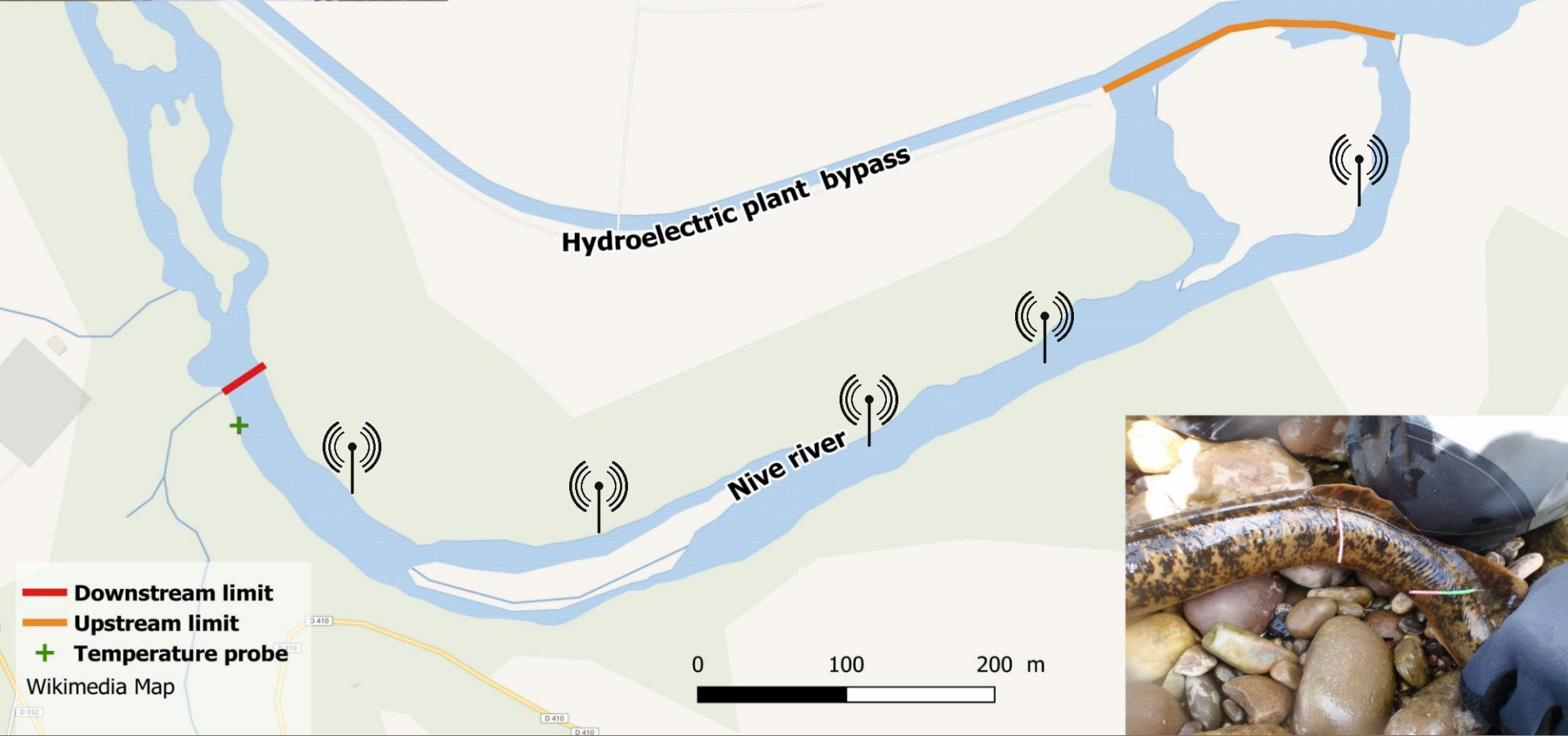
Sea lamprey nests/individuals relationship

Mechanistic approach

2021 protocol: radiotracking

- ✓ Tracking with fixed and mobile antennas
- ✓ Number of nests per individual
- ✓ Number of individuals per nest





An underwater photograph of a riverbed covered in smooth, rounded stones of various sizes and colors, including shades of brown, tan, and grey. A large, spotted fish, possibly a trout or salmon, is swimming in the foreground, its body angled towards the right. The water is clear, and sunlight filters through from above, creating dappled light patterns on the stones. A semi-transparent dark grey rectangular box is overlaid in the center of the image, containing the text "Correlative approach" in a white, bold, sans-serif font.

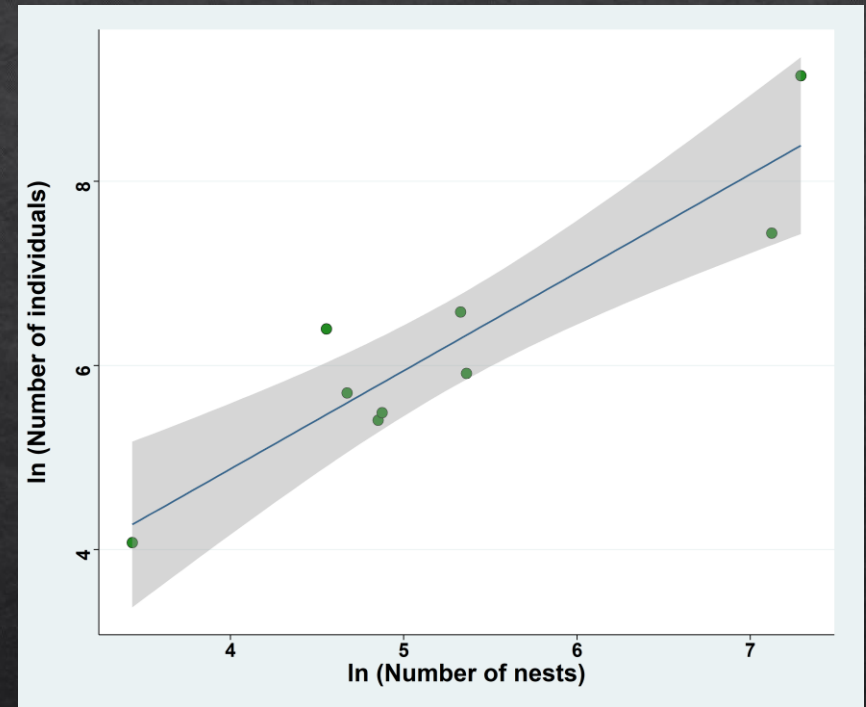
Correlative approach

Sea lamprey nests/individuals relationship

Correlative approach

Relationship between the number of individuals on a zone and the number of nests

Number of individuals	Number of nests	River	Reference
600	95	Big Garlic (USA)	Hanson & Manion 1978
1700	1240	-	Chiotti in Purvis & McDonald (1987)
9390	1468	Cayuga (USA)	Wigley (1959)
722	206	Big Garlic (USA)	Manion & McLain (1971)
300	107	Big Garlic (USA)	Manion et al (1988)
370	213	Big Garlic (USA)	Hanson & Manion (1980)
59, 223, 242	31, 128, 131	Sedgeunkedunk (USA)	(R. Hogg, Coghlan, et Zydlewski 2013)



Only seven studies

Sea lamprey nests/individuals relationship

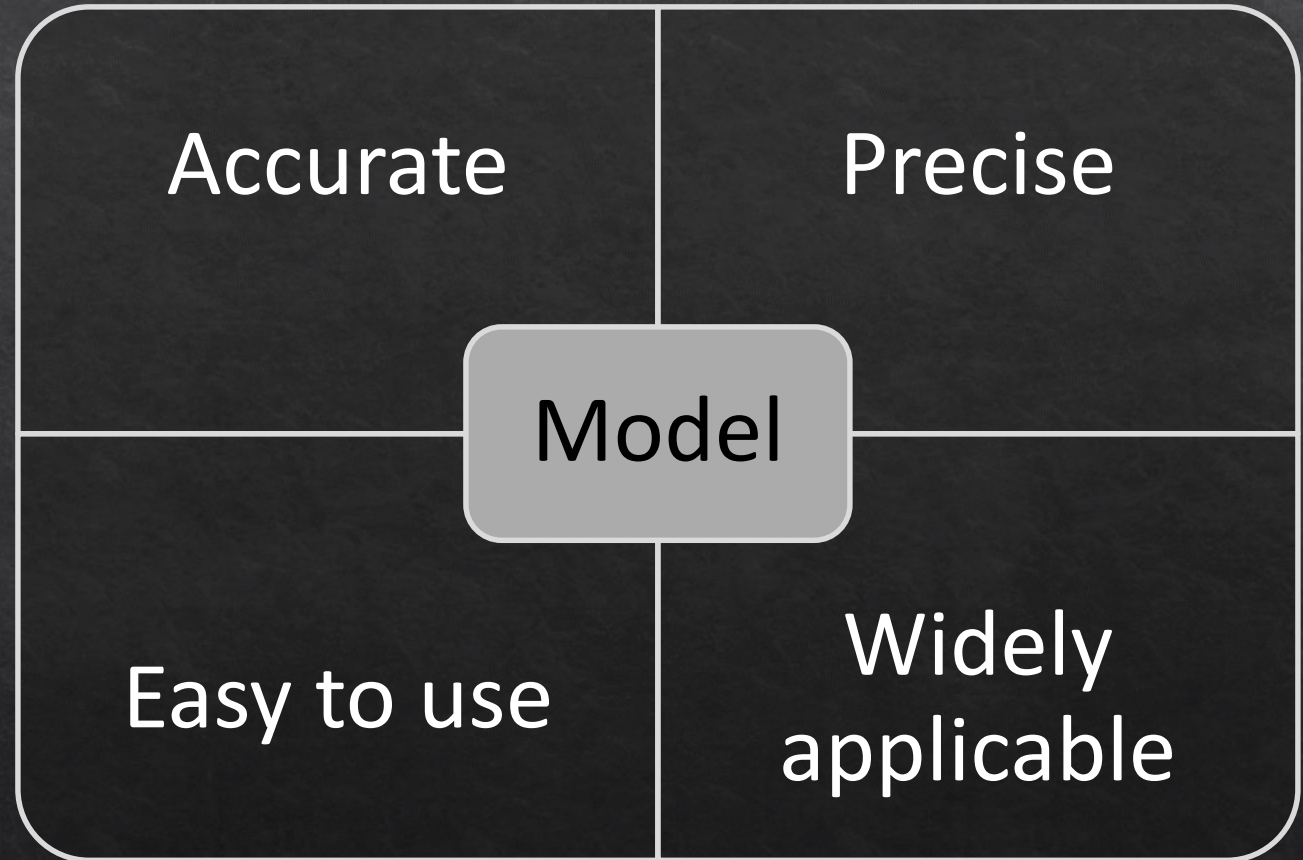
Correlative approach

Do you have any data to augment the dataset?



Sea lamprey nests/individuals relationship

Population estimation model



Thesis supervision and funding

Cotutelle thesis between *Université de Pau et des Pays de l'Adour (UPPA)*
and *Universidad del País Vasco (UPV)*

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**Thank you for your
attention!**