Mondego case study – an overview

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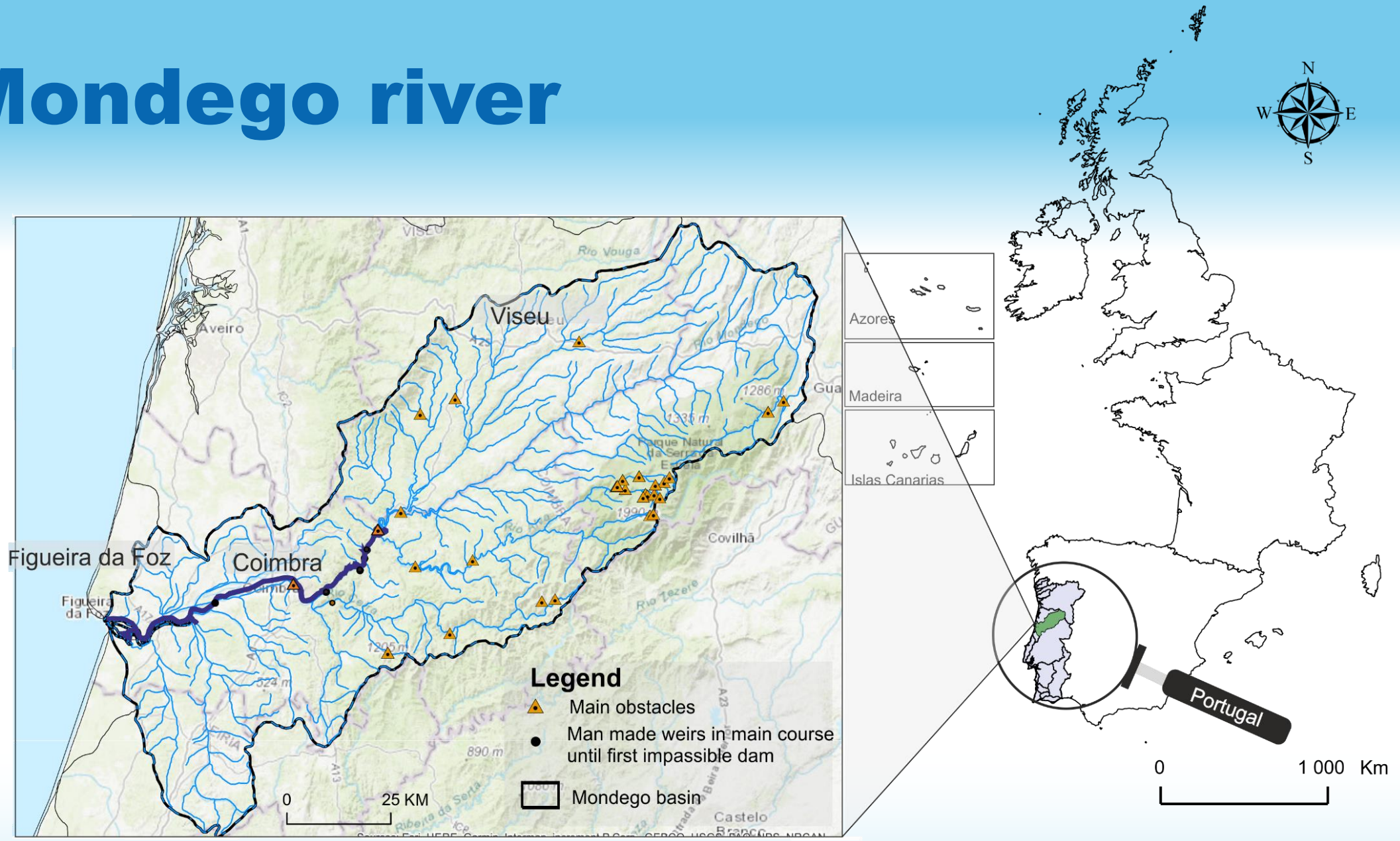
LOCAL AND GLOBAL INITIATIVES:

HOW SCIENCE SUPPORTS MANAGEMENT ACTIONS ON DIADROMOUS FISH

Mondego river



Mondego case study

- **Thin-lipped mullet (*Chelon ramada*):**
  - **Reconstruction of spatiotemporal dynamics and ontogenetic movements of mullet using otolith microchemistry approach.**

- **Allis shad (*Alosa alosa*):**
  - **Population dynamics on the Mondego River and basin of origin.**
  - **Hybrid detection through genetic analysis.**

- **Trout (*Salmo trutta*):**
  - **Migration patterns and behaviour;**
  - **Population genetic structure;**
  - **Evaluation of recreational fisheries.**

Migration patterns and behaviour of trout in Portugal

Objectives

- To analyse the movement patterns and habitat use of *S. trutta* in the Mondego river.

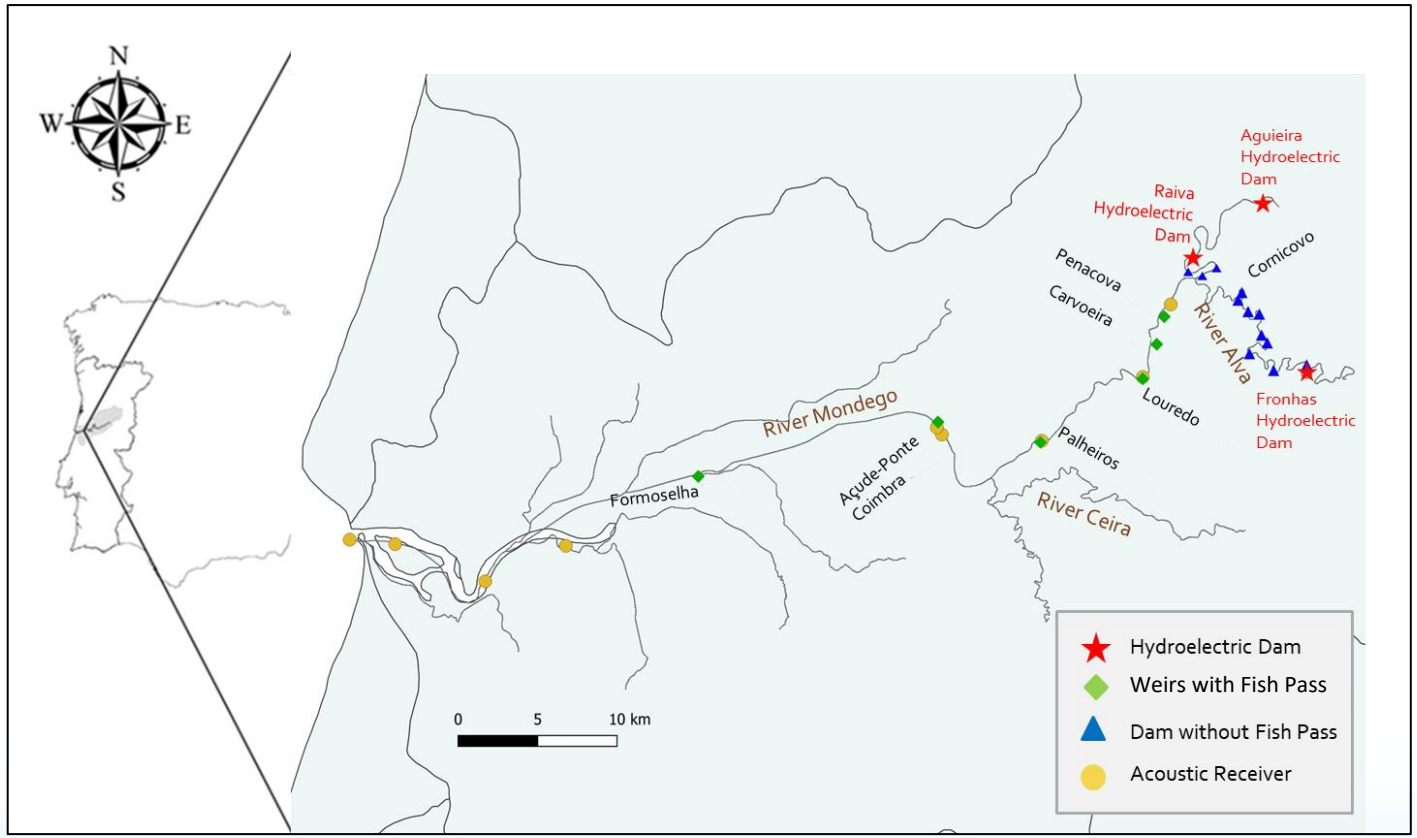
Brown trout

Bio-Telemetry

Migration patterns and behaviour of trout in Portugal

Study Area

Mondego represents the Southern Limit of sea trout distribution

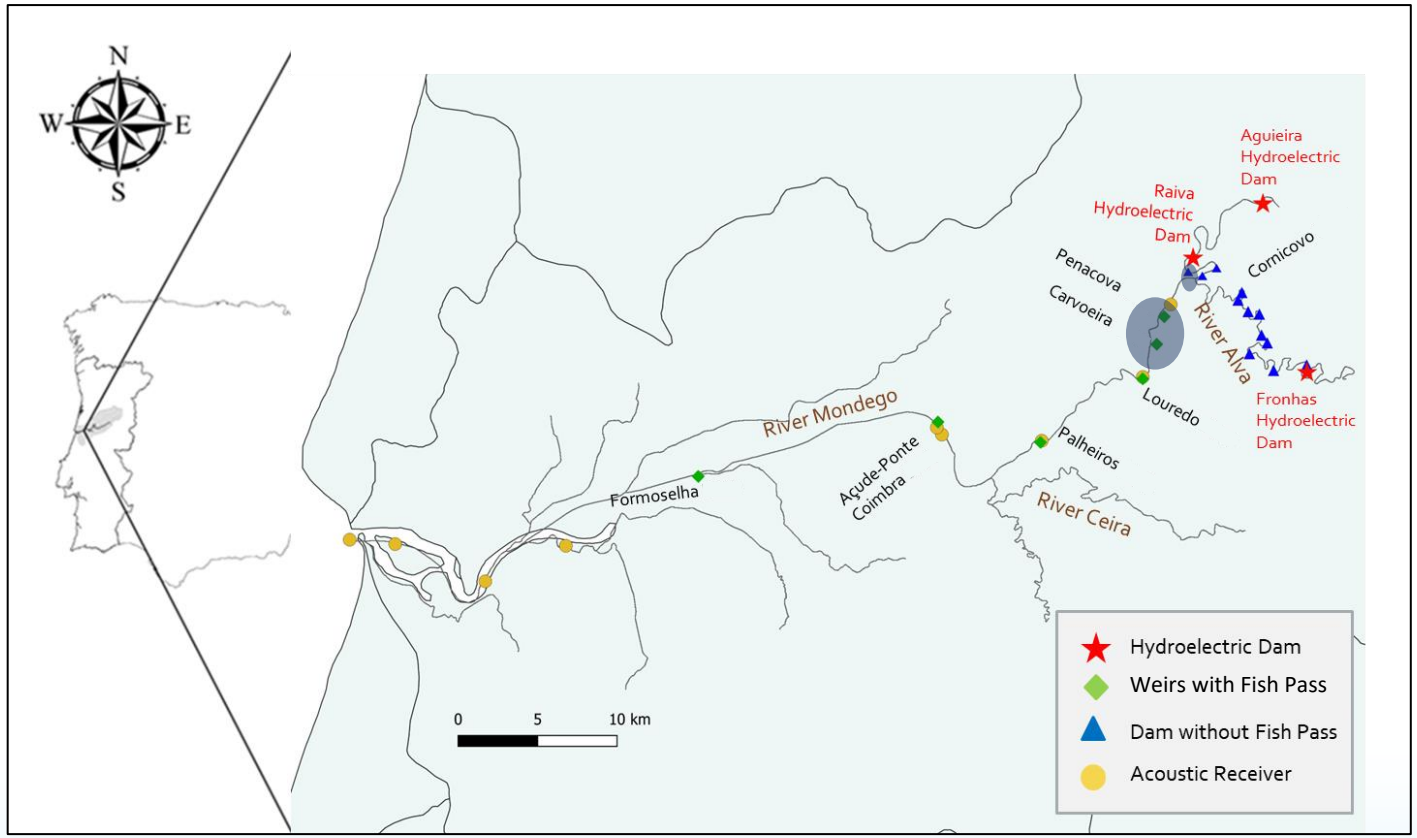


River Alva is an important tributary for trout, with adequate characteristics for spawning (course substrate, lower depths and rifles)

Rehabilitation work on the dams and weirs of Mondego river basin

Migration patterns and behaviour of trout in Portugal

Methodology



8 sampling campaigns:
(July 2020 to July 2021)

- Method of capture: Flyfishing (help of a recreational fisherman).

Migration patterns and behaviour of trout in Portugal

Methodology

Tagging:

- Up to date, 17 trout were tagged;
- Tag with Dual Mode Transmitter (with radio and acoustic signals).
- Surgical implanted in body cavity
- Release back to the capture site.

Migration patterns and behaviour of trout in Portugal

Methodology

Acoustic Telemetry

Acoustic receivers allow to continuously collect data on tagged animals.

Throughout Mondego river (80 km from river mouth to first unsurmountable large dam), it is installed an acoustic receiver array, within the Portuguese/European Tracking Network (PTN/ETN).

Radio Telemetry

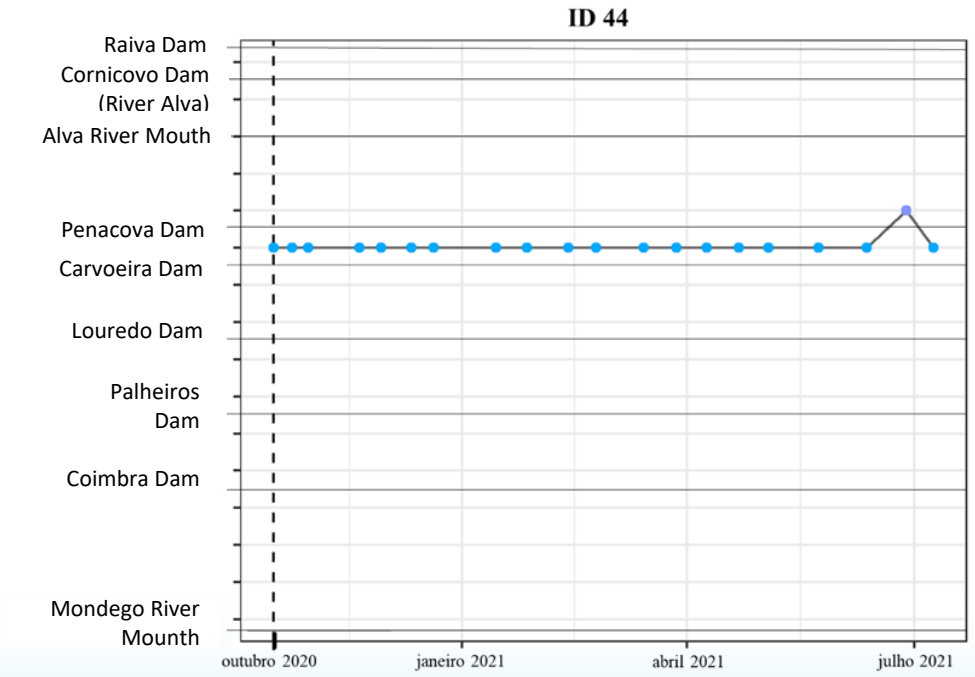
- Freshwater environments: upstream river sections and lower depths;
- Fortnightly, registration of trout positions along Mondego river basin.

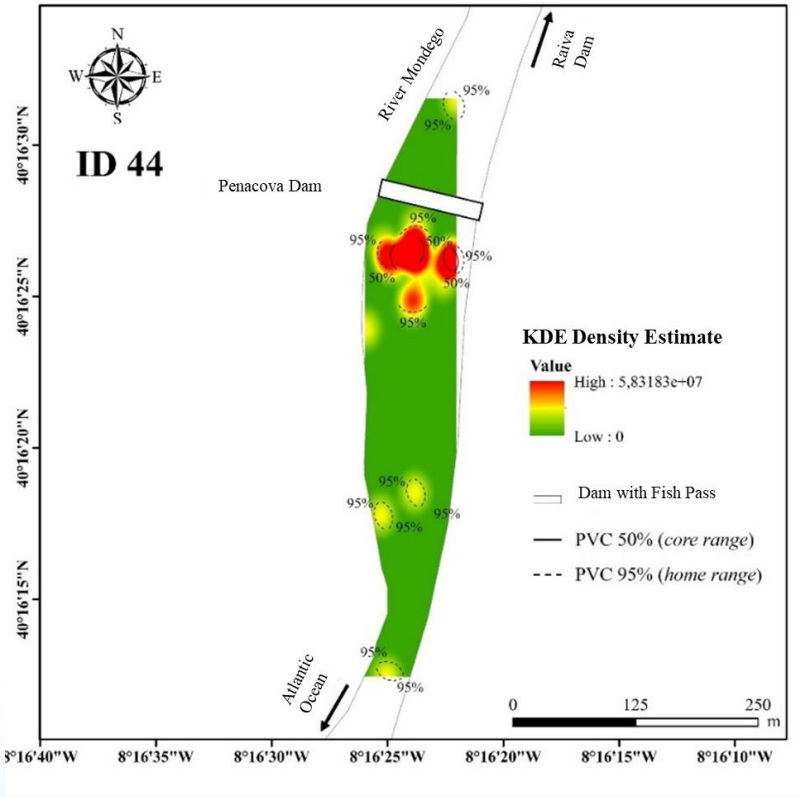
Migration patterns and behaviour of trout in Portugal

Results

- **Variability in terms of migratory behaviour:**

  - Resident/territorial behaviour (restricted home and core ranges)



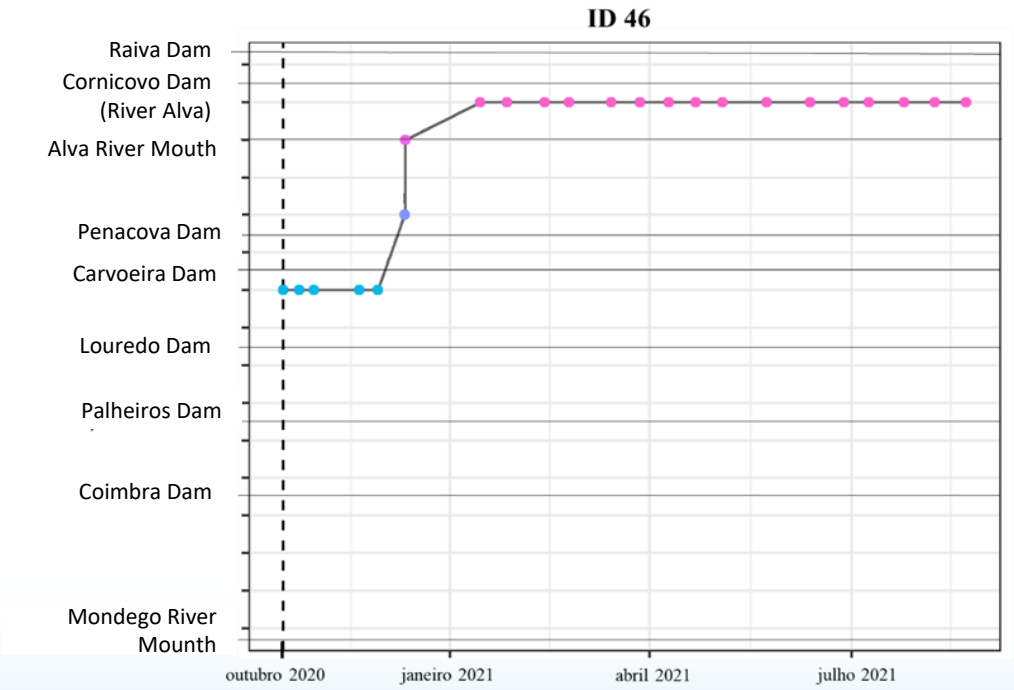


Migration patterns and behaviour of trout in Portugal

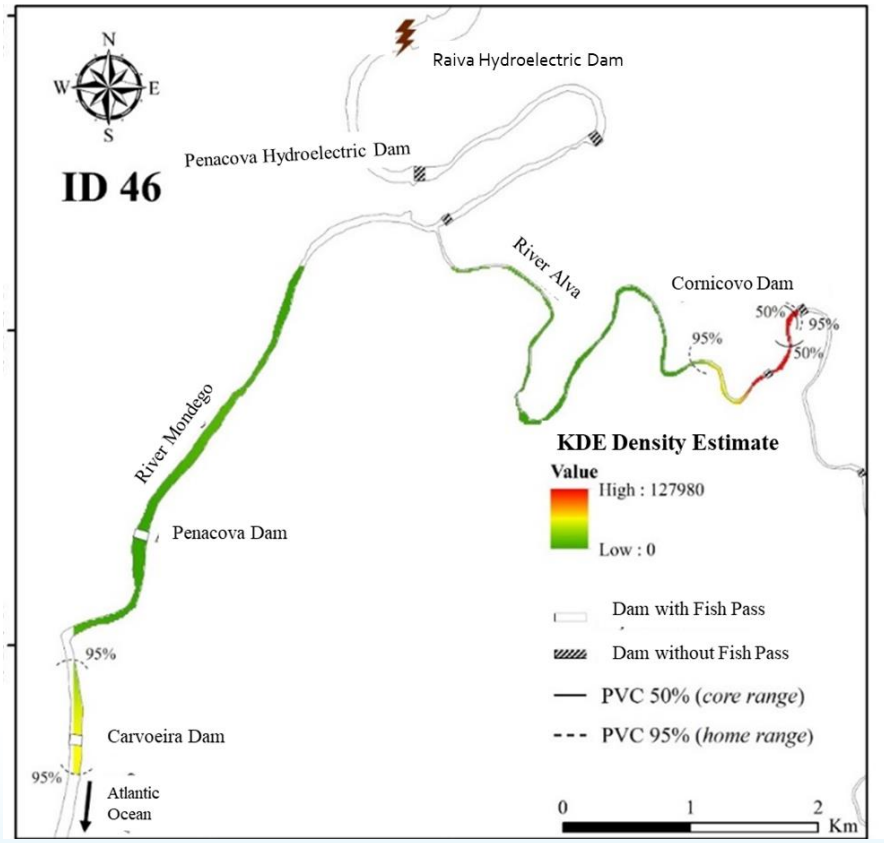
Results

- **Variability in terms of migratory behaviour:**

  - Upstream movement behaviour



Trout with the longest movement: 12 km

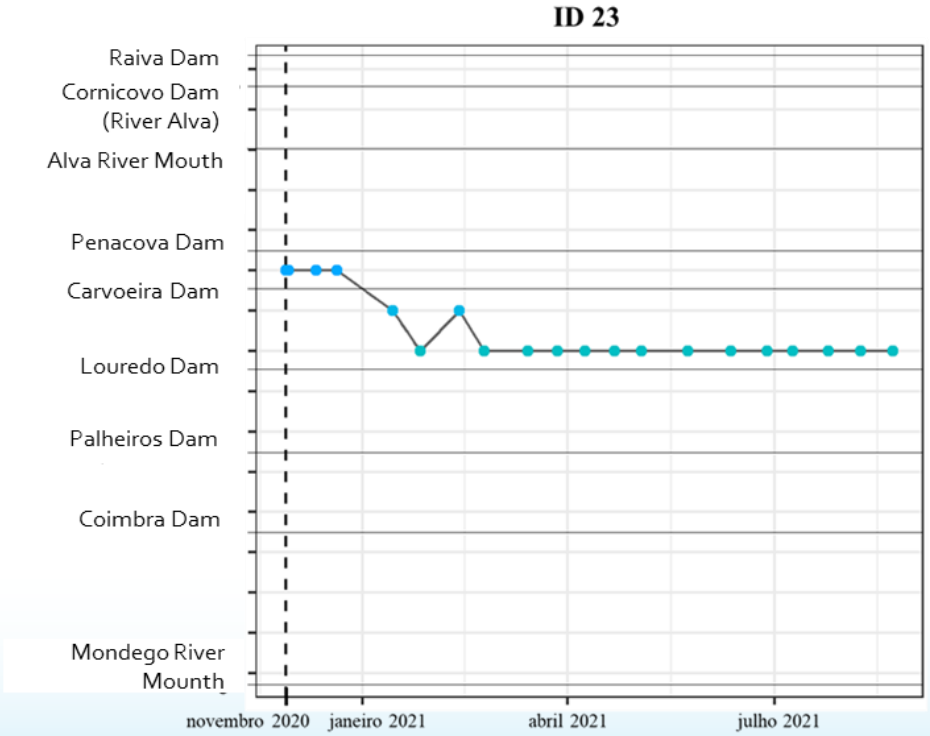


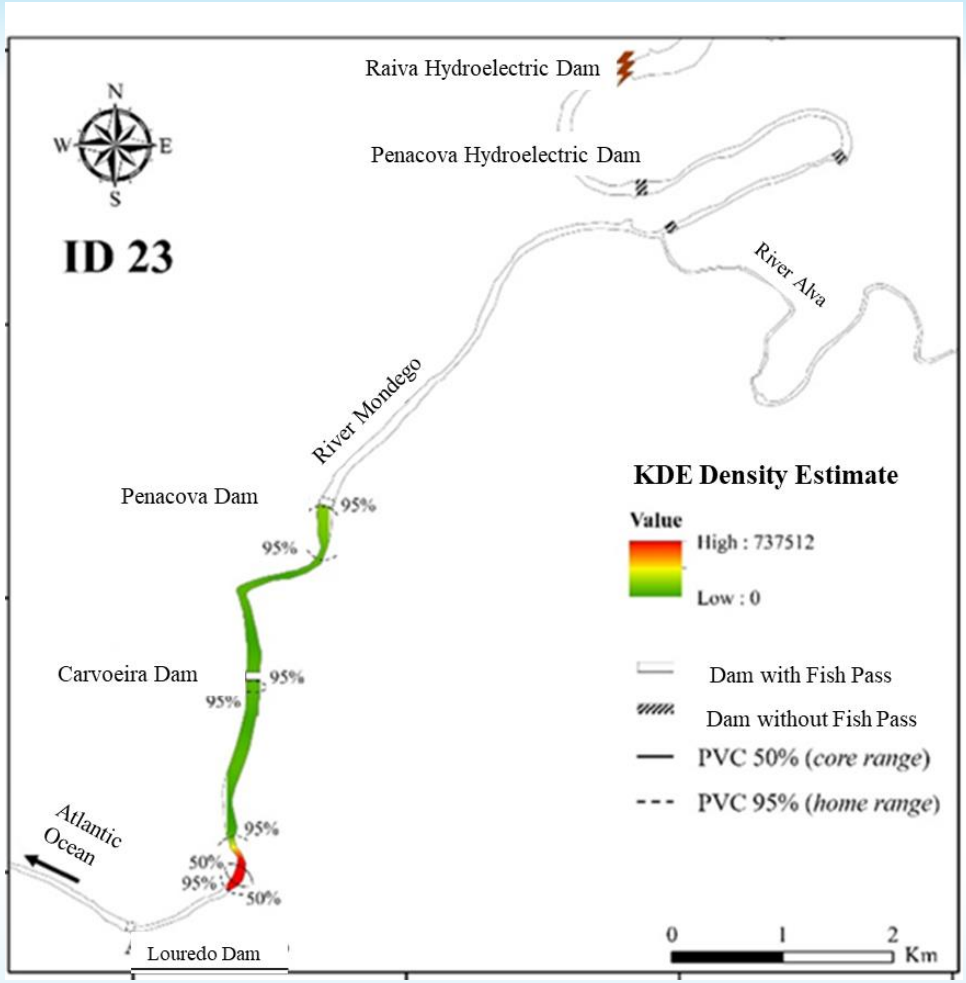
Migration patterns and behaviour of trout in Portugal

Results

- **Variability in terms of migratory behaviour:**

  - Downstream movement behaviour





Migration patterns and behaviour of trout in Portugal

Conclusions

Management

- Barrier permeabilization and dam removal → increase the available habitat;
- Promote fishing without death in species' home range;
- Review the limits and regulation of sport fishing concession;

Perspectives

- Expand the area covered with acoustic receivers ;
- Increase the sample size of tagged fish.

Genetic structure and diversity of trout in Portugal

Objectives

- To study the genetic structure of trout populations in Portugal;
- Analyse if there are different genetic groups between populations upstream and downstream of dams on the same river;
- Assess the contribution of anadromous ecotype to gene flow among trout populations.

Brown trout

- **Holobiotic Ecotype.**
- Conservation Status: Least Concern

Sea trout

- **Anadromous Ecotype.**
- Conservation Status: Critically Endangered.

Genetic structure and diversity of trout in Portugal

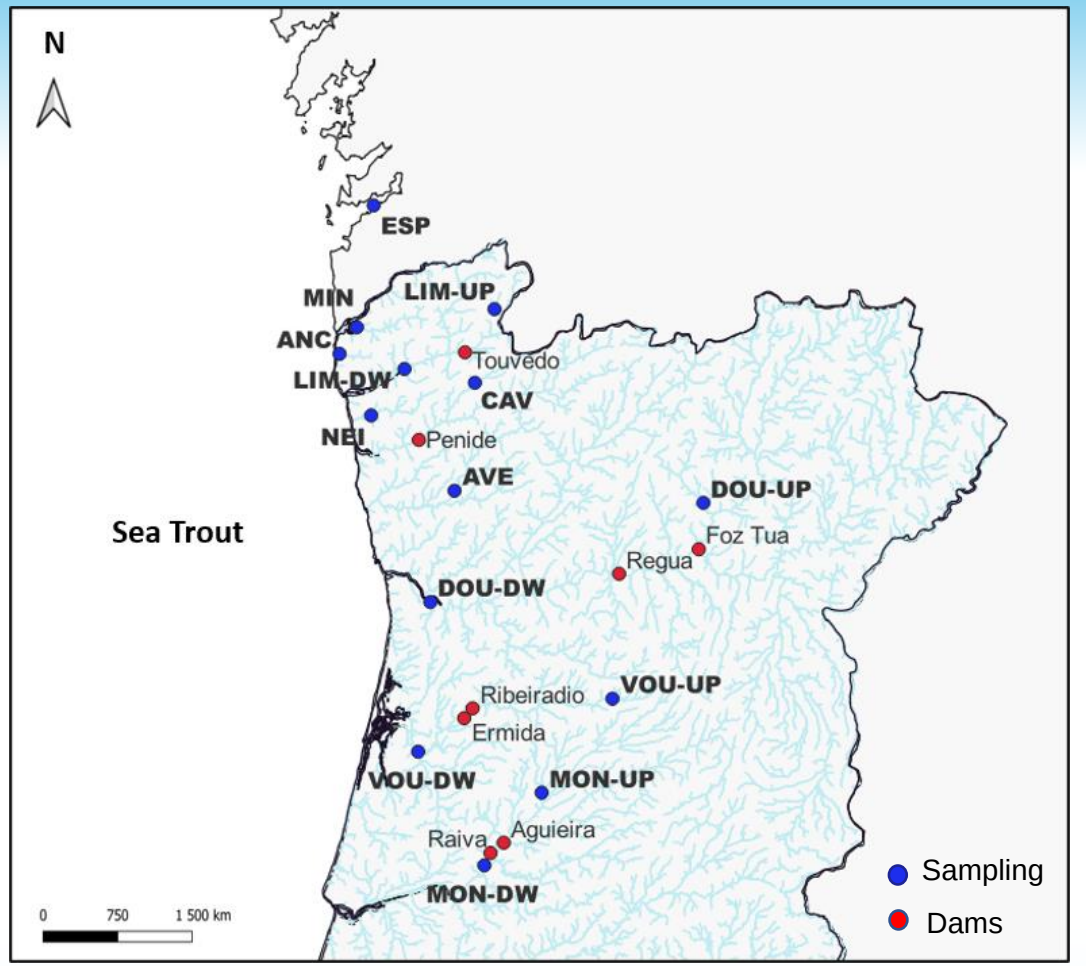
Sampling

- **14 sampling locations; 10 Watersheds**

Espanha (ESP-Galiza), Minho (MIN), Âncora (ANC), Lima (LIM-DW and LIM-UP), Neiva (NEI), Cávado (CAV), Ave (AVE), Douro (DOU-DW and DOU-UP), Vouga (VOU-DW and VOU-UP) and Mondego (MON-DW and MON-UP)

- **392 Samples were analysed:**

374 Brown trout
18 Sea trout

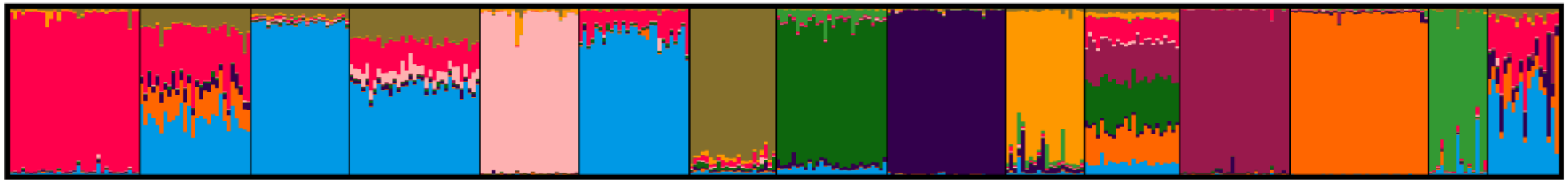


Mondego represents the Southern Limit of sea trout distribution

Genetic structure and diversity of trout in Portugal

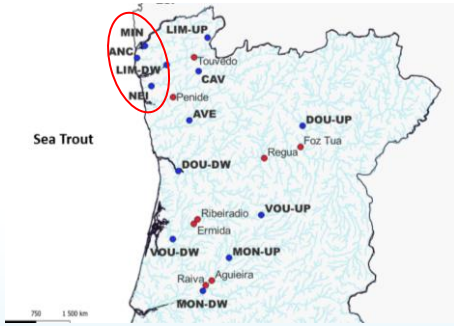
Results- genetic structure of trout populations

K=10



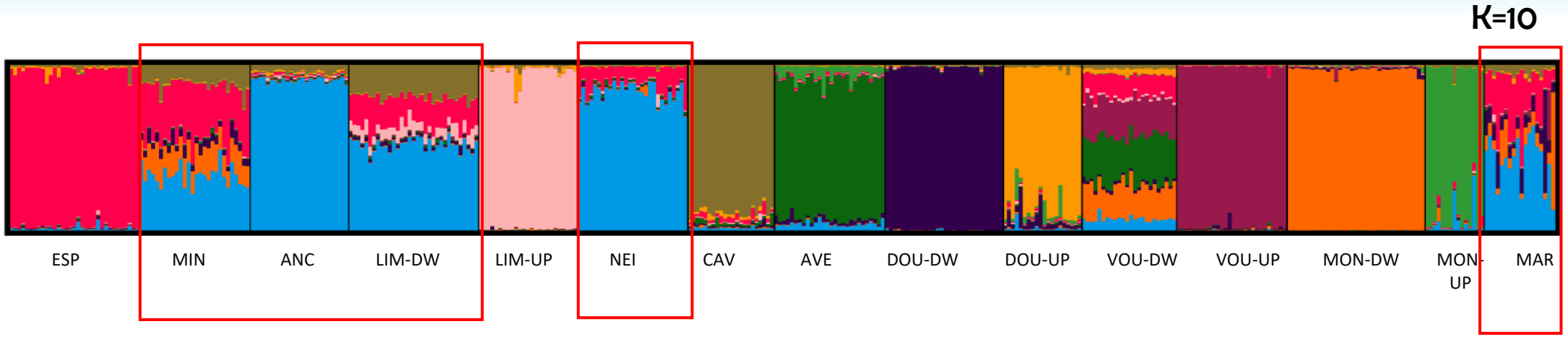
Results suggested the existence of **ELEVEN** genetic groups for the 15 populations of *Salmo trutta* :

1 = ESP
2 = MIN, ANC, LIM-DW, NEI and MAR
3 = LIM-UP
4 = CAV
5 = AVE
6 = DOU-DW
7 = DOU-UP
8 = VOU-DW
9 = VOU-UP
10 = MON-DW
11 = MON-UP



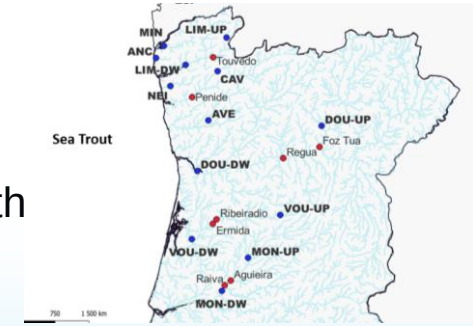
Genetic structure and diversity of trout in Portugal

Results- anadromous ecotype' effect



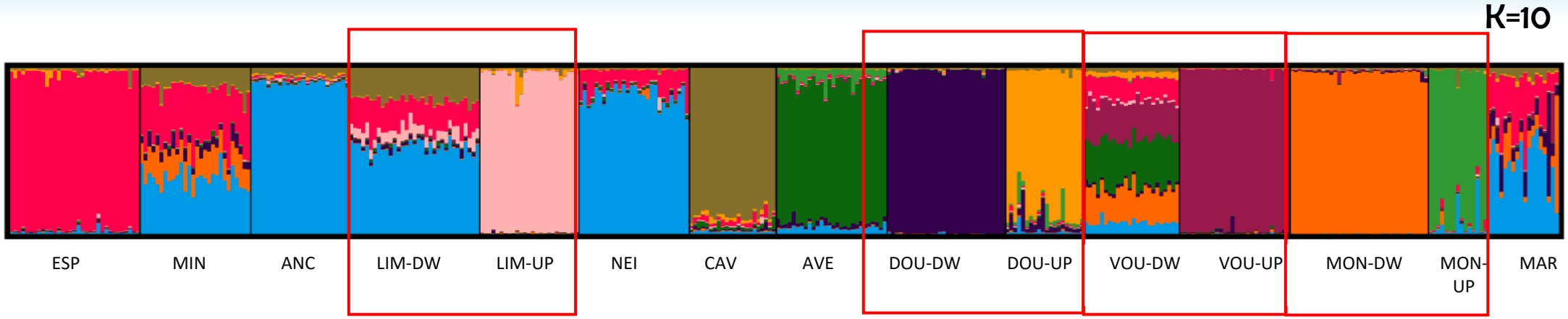
Mixture of genetic profiles between the MAR group (sea trout) and the northern groups (MIN, ANC, LIM-DW, NEI)

Sea trout may contribute to the maintenance of gene flow in populations further north



Genetic structure and diversity of trout in Portugal

Results- Dams' effect



Within the same basin: there is a genetic differentiation between upstream and downstream populations

Genetic structure and diversity of trout in Portugal

Conclusions

Management

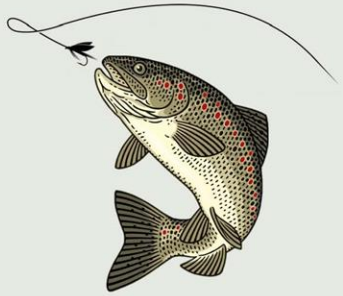
- Barrier permeabilization and dam removal → to promote gene flow;
- Management measures that protect the anadromous ecotype:
  - fishing restrictions in downstream areas (may-July)
  - Recreational fisheries without death

Perspectives

- Increase the spatial detail and sample size of sea trout

I Workshop of trout fishing in river Mondego
16 July 2022

I Workshop de Pesca à Truta
no Rio Mondego



16 de julho 2022
Penacova

Data limite de inscrição: 8 de julho
Link para inscrição: https://forms.gle/HRV1zacj3EsmebZC7

Projeto DiadES: www.diades.eu

- Inscrições gratuitas, limitadas a 20 participantes
- Inscrições até 8 de julho de 2022

Programa

Manhã – Auditório da Biblioteca Municipal de Penacova

- 09h00-09h30 – Receção dos participantes
- 09h30-10h00 – Abertura do workshop
- 10h00-10h20 - Ações nacionais de gestão e restauro de populações de peixes migradores: o projeto DiadES
- 10h20-10h40 - Gestão e conservação das espécies salmonícolas
- 10h40-11h00 - Monitorização do comportamento migratório das trutas no rio Mondego
- 11h00-11h20 - Coffee break
- 11h20-12h00 - A pesca à truta no rio Mondego
- 12h00-12h40 - Métodos e técnicas de pesca à truta

Tarde – Açude da Pista de Pesca de Penacova

- 13h00-14h30 - Almoço-convívio na pista de pesca de Penacova
- 14:30h-18h30 - Demonstração prática da pesca à truta e montagem de iscos

Special thanks

Sara Silva

DiadES

Interreg Atlantic Area
European Regional Development Fund
EUROPEAN UNION

We assess and enhance ecosystem services provided by diadromous fishes in a climate change context

03

NOVOS PARCEIROS NO CONSÓRCIO

Uma nova estudante de doutoramento incluída no DiadES

Sara Silva é uma nova estudante de doutoramento que integra a equipa da UÉvora/MARE e encontra-se a desenvolver tarefas sobre a ecologia da migração das trutas e o acompanhamento da atividade piscatória. Estas tarefas consistem no estudo das dinâmicas migratórias da truta na bacia hidrográfica do Mondego, mais especificamente, pretende-se analisar o seu comportamento migratório, investigar as possíveis diferenças entre o ecótipo anádromo (truta-marisca) e holobiótico (truta-de-rio), e os fatores ambientais associados a estes movimentos.

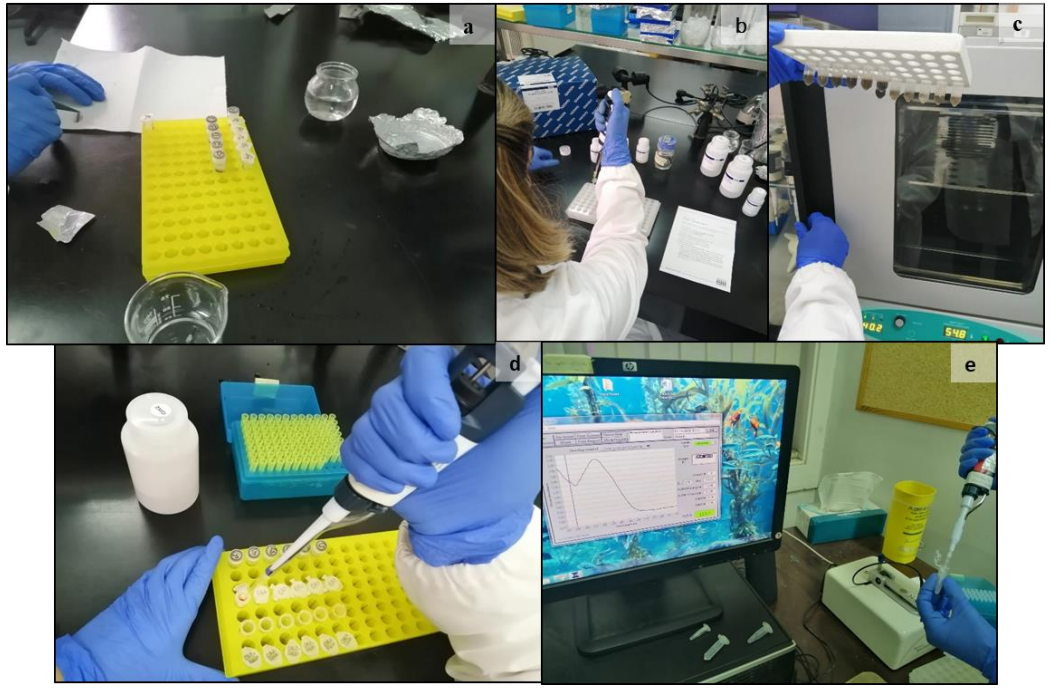
Quinzenalmente, têm sido realizadas sessões de tracking de radio-telemetria e, que ocorrerão durante, pelo menos, mais um ano. O comportamento das trutas está também a ser continuamente monitorizado através de um conjunto de recetores acústicos instalados na área de estudo, no âmbito das infraestruturas da COASTNET (***https://coastnet.pt/***) e da ETN – European Tracking Network (***https://www.europeantrackingnetwork.org/en***).

Para além da telemetria, a Sara tem vindo a acompanhar as atividades de pesca dirigidas à truta, em todo o país, através da realização de inquéritos a pescadores comerciais e recreativos, para avaliar o real impacto destas atividades na espécie, assim como as respetivas componentes socioeconómicas e culturais envolvidas.

Special thanks

Joana Pereira

Rita Almeida



Mondego case study

Beneficiary partner

UNIVERSIDADE DE ÉVORA

MARE

ARNET

Associated partners

apa agência portuguesa do ambiente

DGRM

ICNF Instituto da Conservação da Natureza e das Florestas

IPMA Instituto Português do Mar e da Atmosfera

Thank you for your attention!