

Using eDNA to identify presence of key species in the Upper Eden catchment

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Outline

- **Background** – how and why the project came about?
- **Target species** – white-clawed crayfish, water vole and American mink
- **Environmental DNA (eDNA)** – what is it?
- **Aims and objectives**
- **Methodology**
- **Findings** (autumn 2025), discussion and limitations
- **Measuring success**

Background

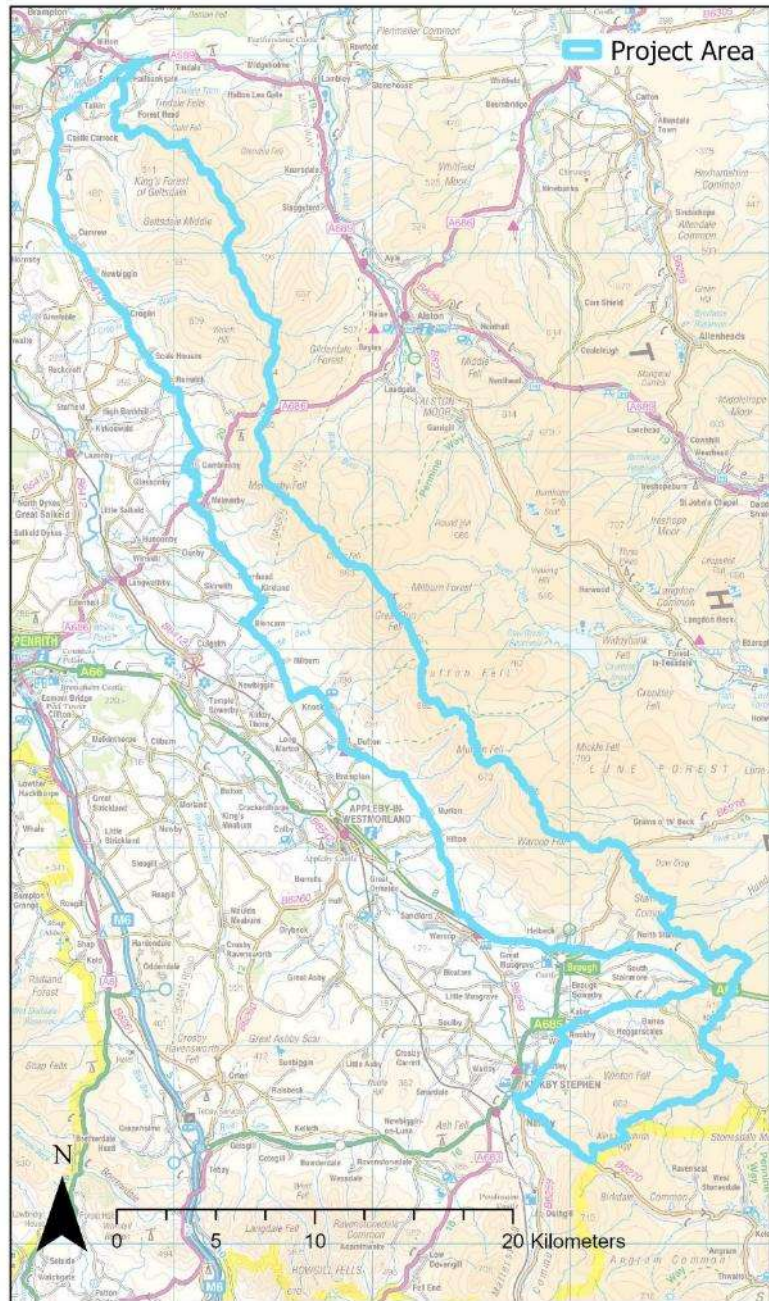
This project is funded by the DEFRA Farming in Protected Landscapes Programme administered by the North Pennines National Landscape



Department
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North
Pennines
National
Landscape



Where?

- The Upper Eden catchment within the North Pennine National Landscape

What?

- White-clawed crayfish
- Water vole
- American mink

How?

- eDNA, a novel survey technique

Why?

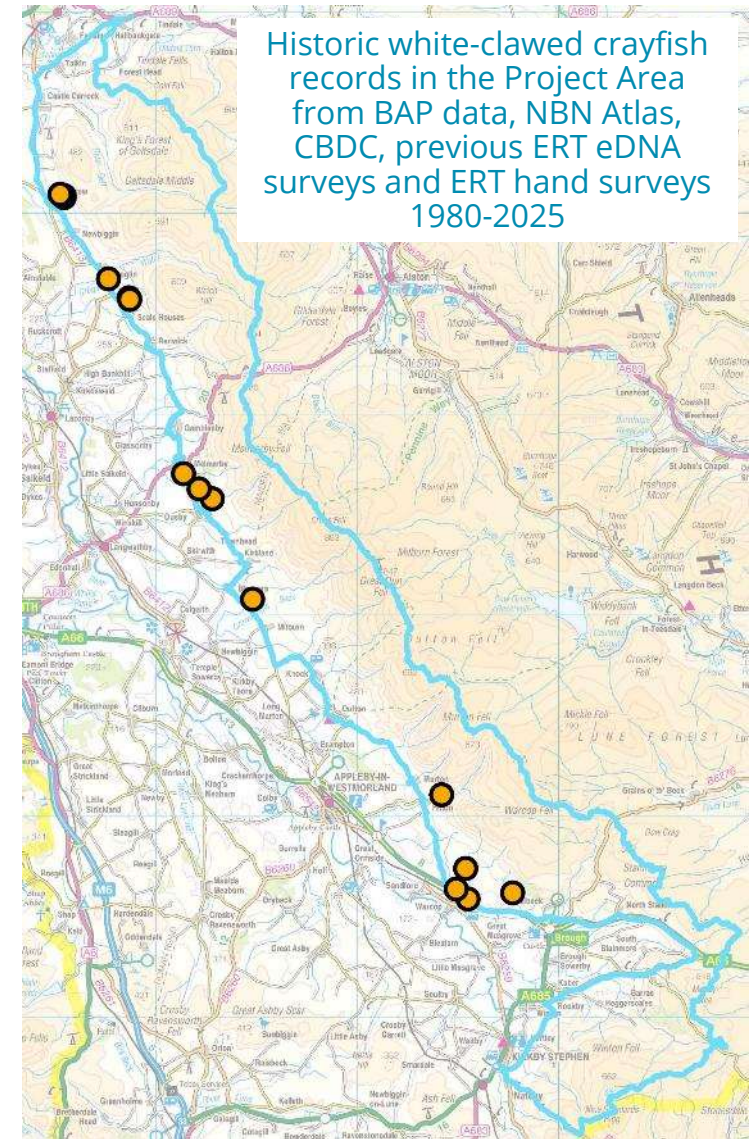
- A rare national stronghold for white-clawed crayfish and water vole
- Limited survey efforts historically
- Map presence or absence over large areas in a cost and time effective way

Target Species: White-clawed crayfish

*Austropotamobius
pallipes*



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Endangered,
native, freshwater
crustacean

Cumbria is one of
the last
strongholds in the
UK

What is the problem?

- Invasive non-native crayfish
- Crayfish plague
- Pollution
- Habitat loss

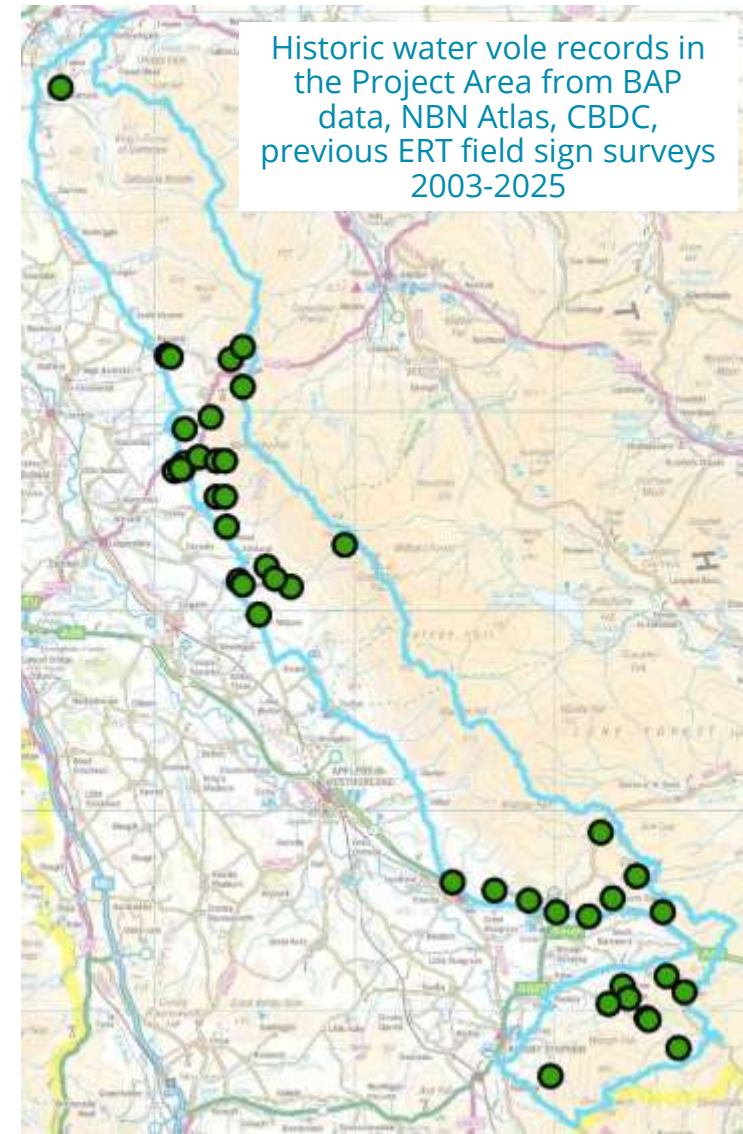
What can be done?

- Riparian buffers
- Biosecurity messaging
- Reduce bank erosion
- Identify ark sites

Target Species: Water vole *Arvicola amphibius*



©Margaret Holland



Catastrophic decline in populations over 20th century
Disappeared from 94% of previously inhabited sites

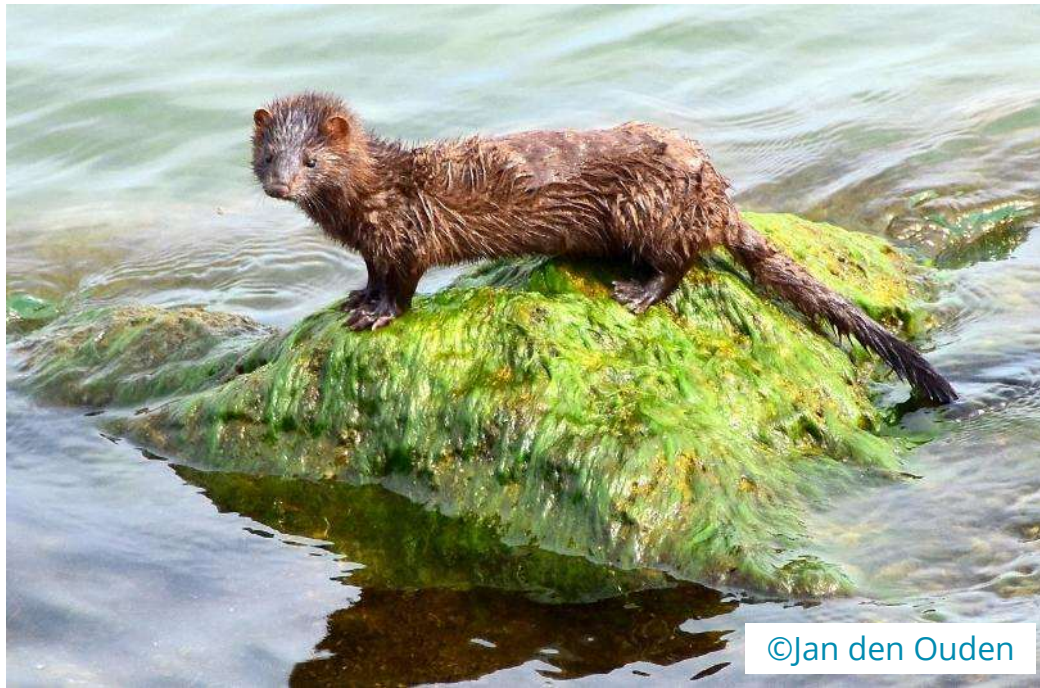
What is the problem?

- American mink
- Habitat loss
- Pollution
- Extreme weather events

What can be done?

- Mink eradication
- Reintroductions
- Habitat improvement works

Target Species:
American mink
Neovison vison



©Jan den Ouden

Invasive, non-native species from North America

Released/escaped from fur farms



©ERT

Why are mink such a threat to native wildlife?

What is being done?

eDNA

Genetic material is shed by all organisms into their surrounding environment.

This DNA can be detected by taking samples from the environment.

For aquatic and semi-aquatic organisms, such as the target species in this project, water provides a good source of eDNA.



- Cost effective
- Time effective
- Less invasive
- Highly accurate
- Cover wide areas



- False-positives: cross-contamination, historic eDNA
- False-negatives: seasonality, weather, DNA degradation
- Analysis



Aims and Objectives

Aim:

To explore the distribution of white-clawed crayfish, water vole and American mink within the Upper Eden catchment of the NPNL.

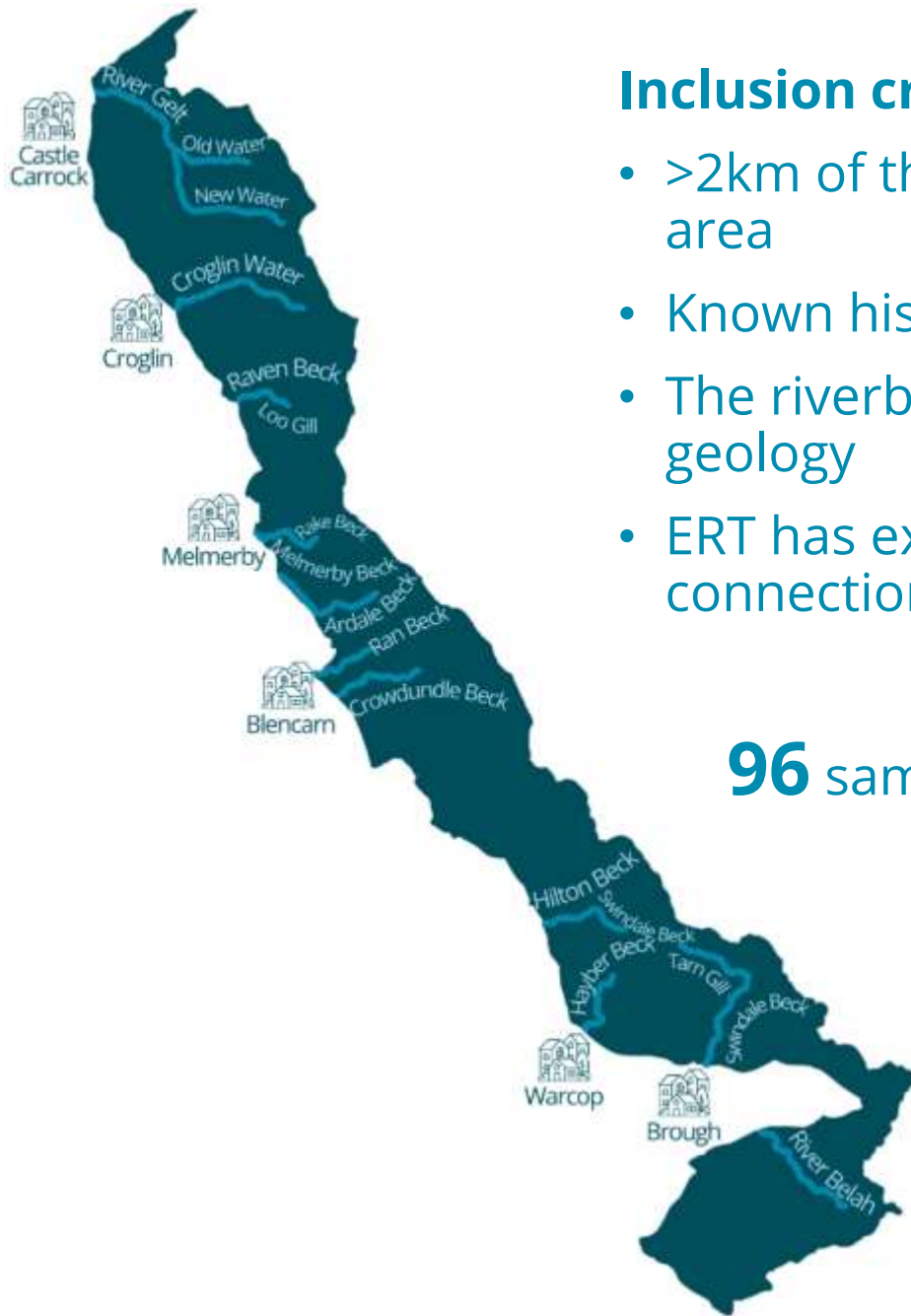


Objectives:

1. Use eDNA sampling techniques to survey seventeen watercourses,
2. Reaffirm the presence of known populations of white-clawed crayfish and water vole,
3. Identify new populations of white-clawed crayfish and water vole,
4. Map American mink presence, leading to the deployment of mink traps,
5. Engage with farmers, landowners and managers,
6. Engage and train Eden Rivers Trust volunteers in eDNA sampling,
7. Disseminate results to a broad but relevant audience.

Methodology

Site selection Permissions



Inclusion criteria

- >2km of the watercourse is within the project area
- Known historical populations of the target species
- The riverbed substrate features calcareous geology
- ERT has existing farmer and landowner/manager connections

96 sample points across **17** watercourses
and **66**km of watercourses

Methodology

Sampling
Health and safety
Biosecurity



Methodology

Habitat survey Analysis

WATER VOLE SURVEY FORM

BACKGROUND INFORMATION

Site name/river

Site number 10km square Grid ref

County Water Authority

Recorder Date

HABITAT INFORMATION (mark features on map)

Survey distance km

Habitat

Ditch

Dyke

Gravel pit

Pond

Lowland lake

Upland loch

Reservoir

Running water

Marsh/bog

Canal

Shore/bank

Boulders

Stones

Gravel

Sand

Silt

Earth

Rock cliffs

Earth cliffs

Canalized

Poached

Reinforced (man-made)

Bordering land use

Upland grass

Permanent/temporary grass

Mixed broadleaf woodland

Conifer wood

Peat bog

Arable crop

Salt marsh

Urban/industrial

Park/garden

Heath

Fen

Cattle/grazing

Bank fenced?

Vegetation (DAFORN)

Bankside trees

Bushes

Herbs

Submerged weed

Reeds/sedges

Tall grass

Short grass

Disturbance:

Bank profile

Flat < 10°

Shallow < 45°

Steep > 45°

Vertical/undercut

Depth

< 0.5m

0.5–1m

1–2m

> 2m

Width

1m 1–2m 2–5m

5–10m 10–20m 20–40m > 40m

Current

Slow Rapid Fast

Sluggish Static



Findings and Discussion

In autumn 2025, **75** samples were taken across **17** water courses, working with **20** landowners and **7** volunteers (**70** volunteer hours)



Landowner/manager by type	Number
Farmer	14
Private estate owner	2
Gamekeeper	2
MoD	1
Conservation organisation	1

Findings and Discussion

14 samples tested positive for eDNA of a target species



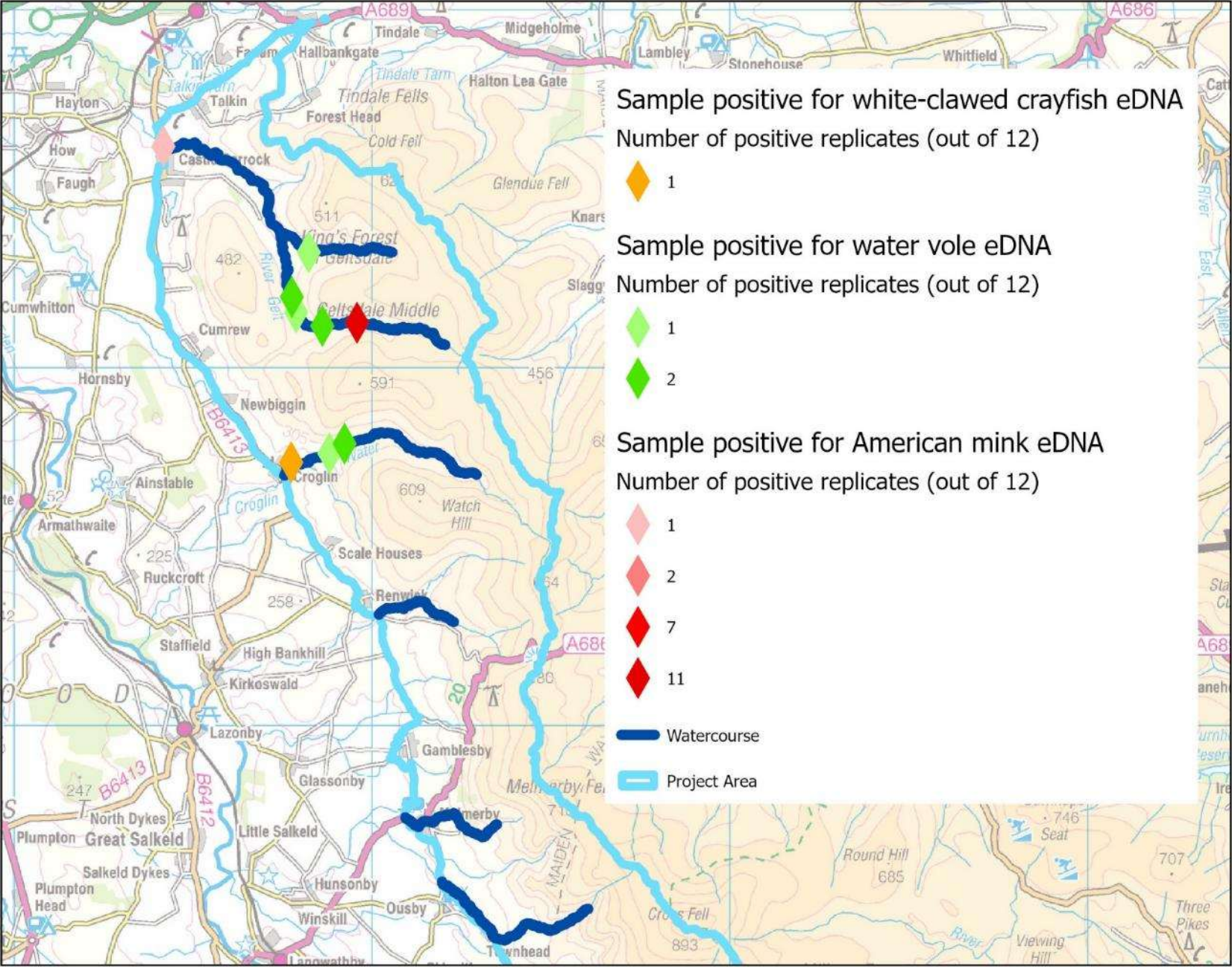
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Findings and Discussion

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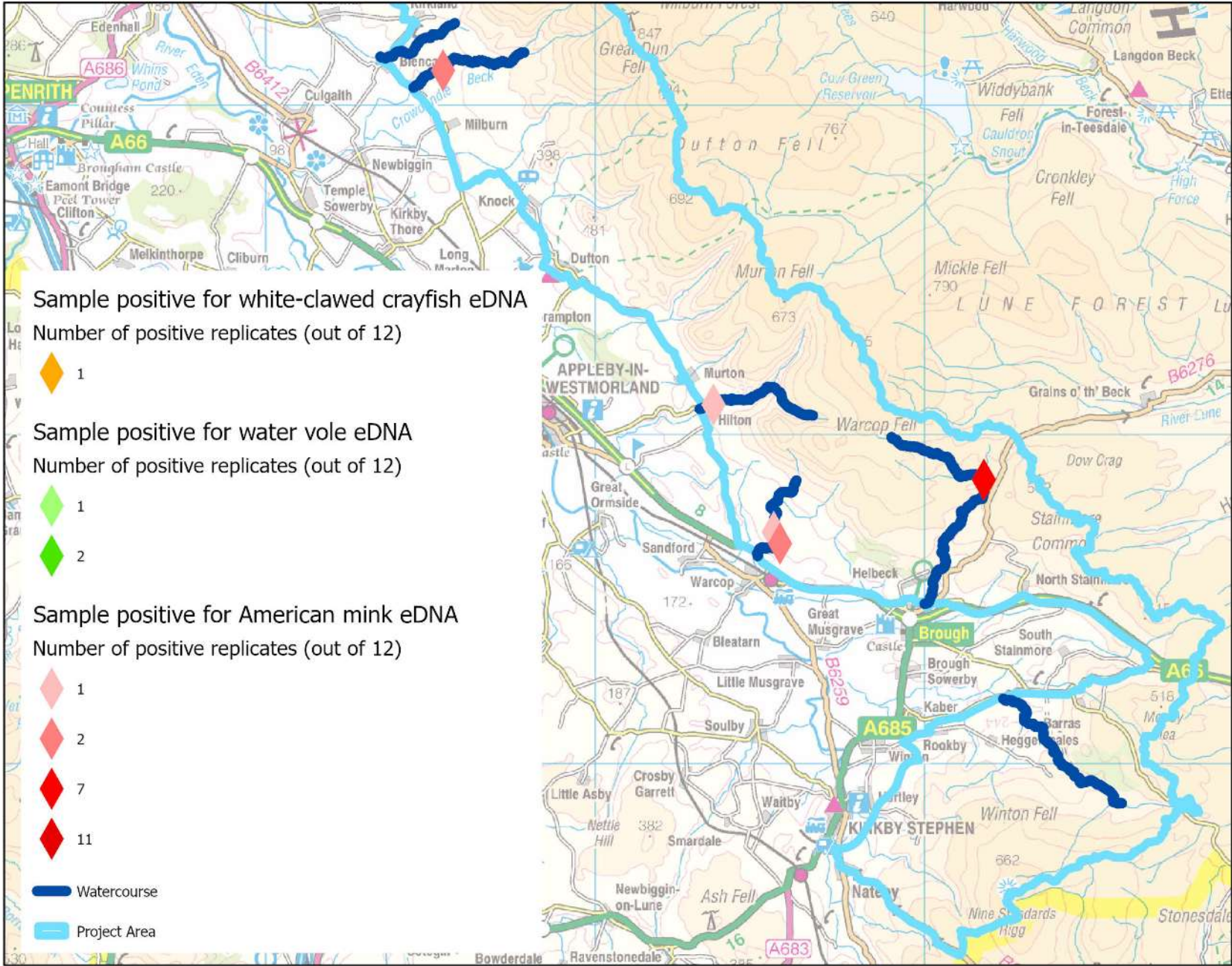
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Limitations

Seasonality

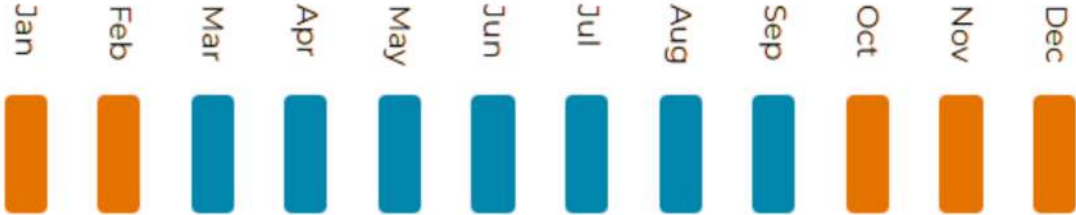
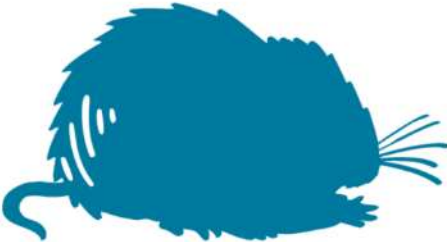
Multispecies survey

Heavy rain

Access and permissions

Sample frequency

Cross-contamination



Measuring success

Spring sampling still to come...

Use of eDNA sampling techniques to survey seventeen watercourses in the project area



Reaffirmation of the presence of known populations of white-clawed crayfish and water vole



Identification of new populations of white-clawed crayfish and water vole



Mapping of American mink presence, leading to the deployment of mink traps



Engagement with farmers, landowners and managers across the project area



Engagement and training of Eden Rivers Trust volunteers in eDNA sampling



Dissemination of results to a broad but relevant audience



Summary

- eDNA sampling is a novel survey technique, used to map baseline presence or absence of target species over large areas in a cost and time effective way
- eDNA sampling is not without its limitations
- New populations of water vole and white-clawed crayfish have been identified within the project area, leading to opportunities for landowner and manager engagement and habitat improvement projects
- The presence of mink in the Upper Eden catchment has been mapped resulting in trap deployments

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