TAXA GENOMICS

Environmental DNA on the Isle of Man

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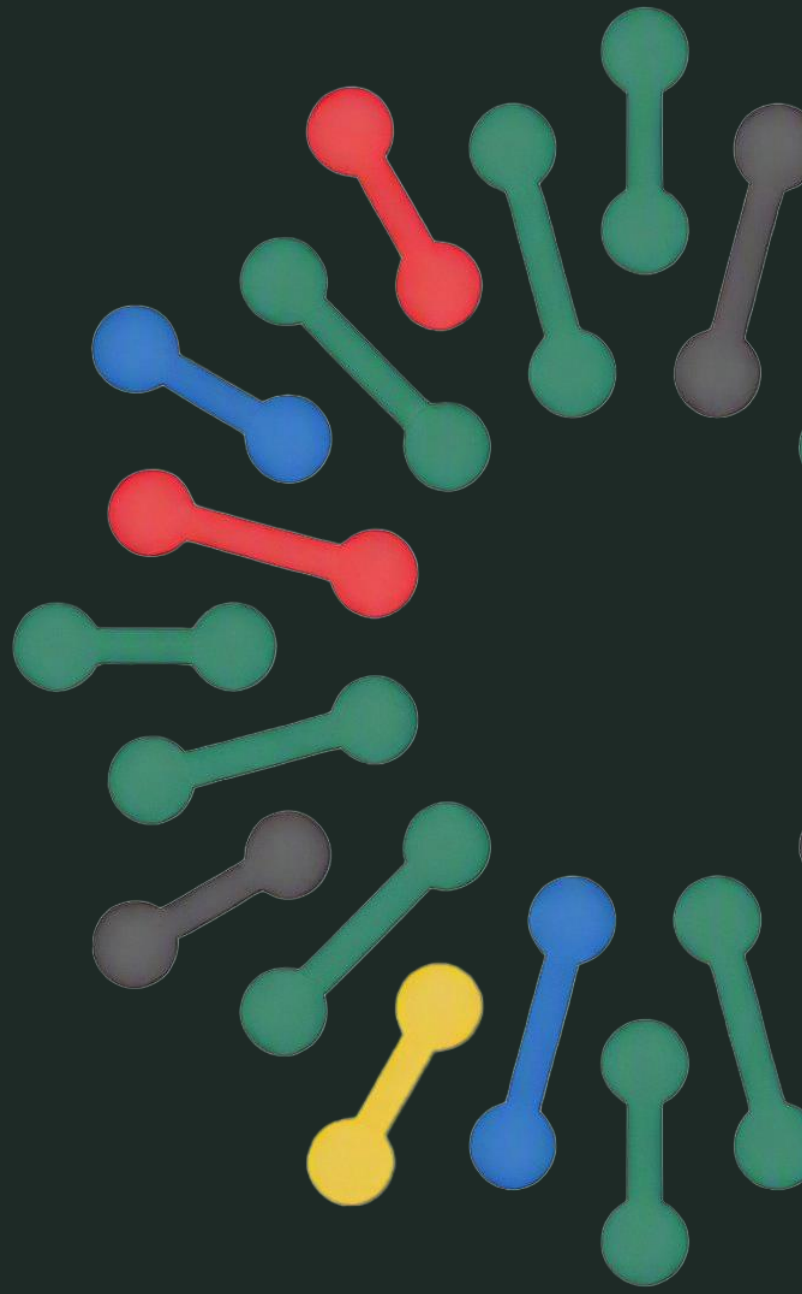
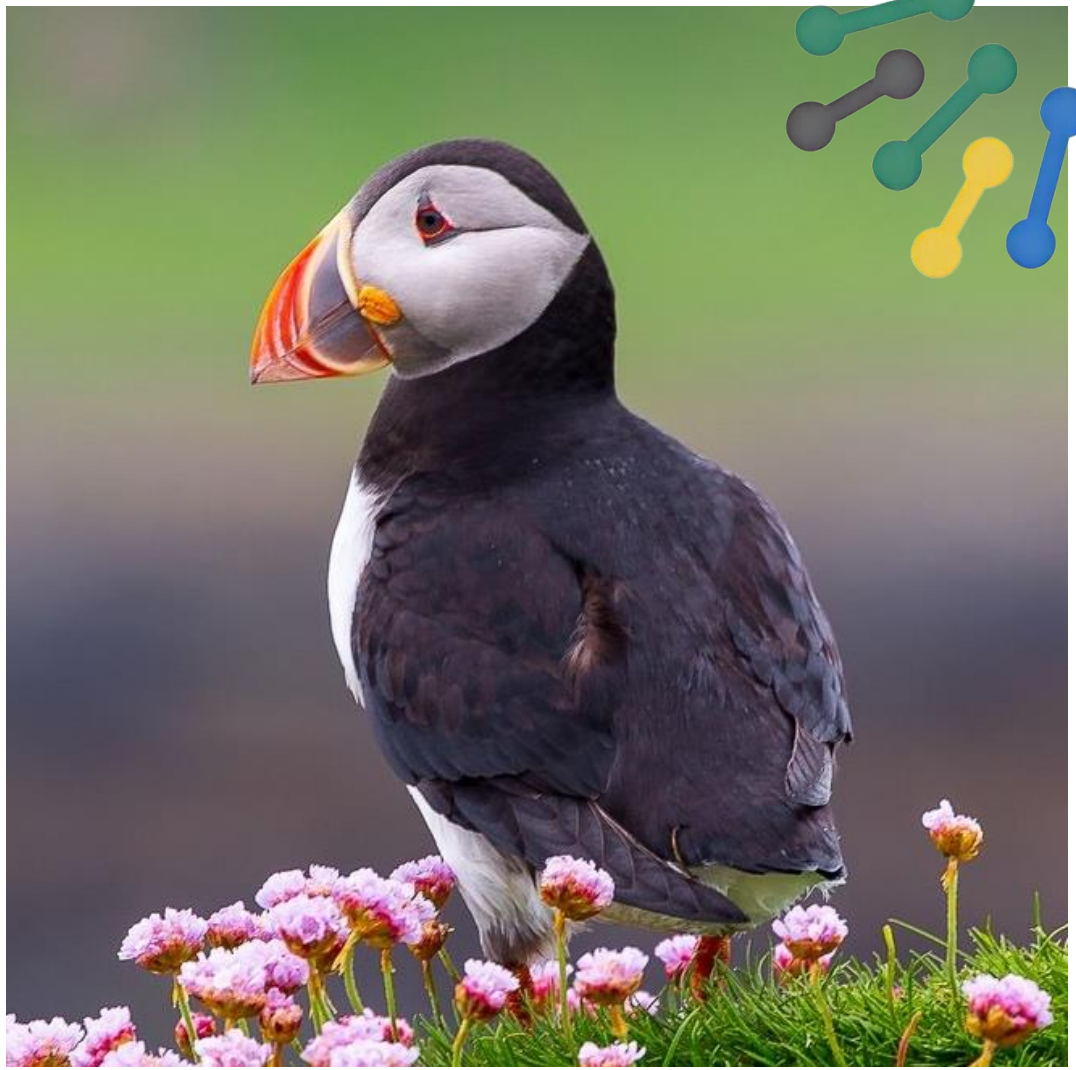
UCM Research Festival · 23 October 2026



Why monitor biodiversity?

- Establish a baseline for current biodiversity
- Monitor environmental changes consistently
  - Track improvements
  - Identify declines
- Target protection



Traditional surveys

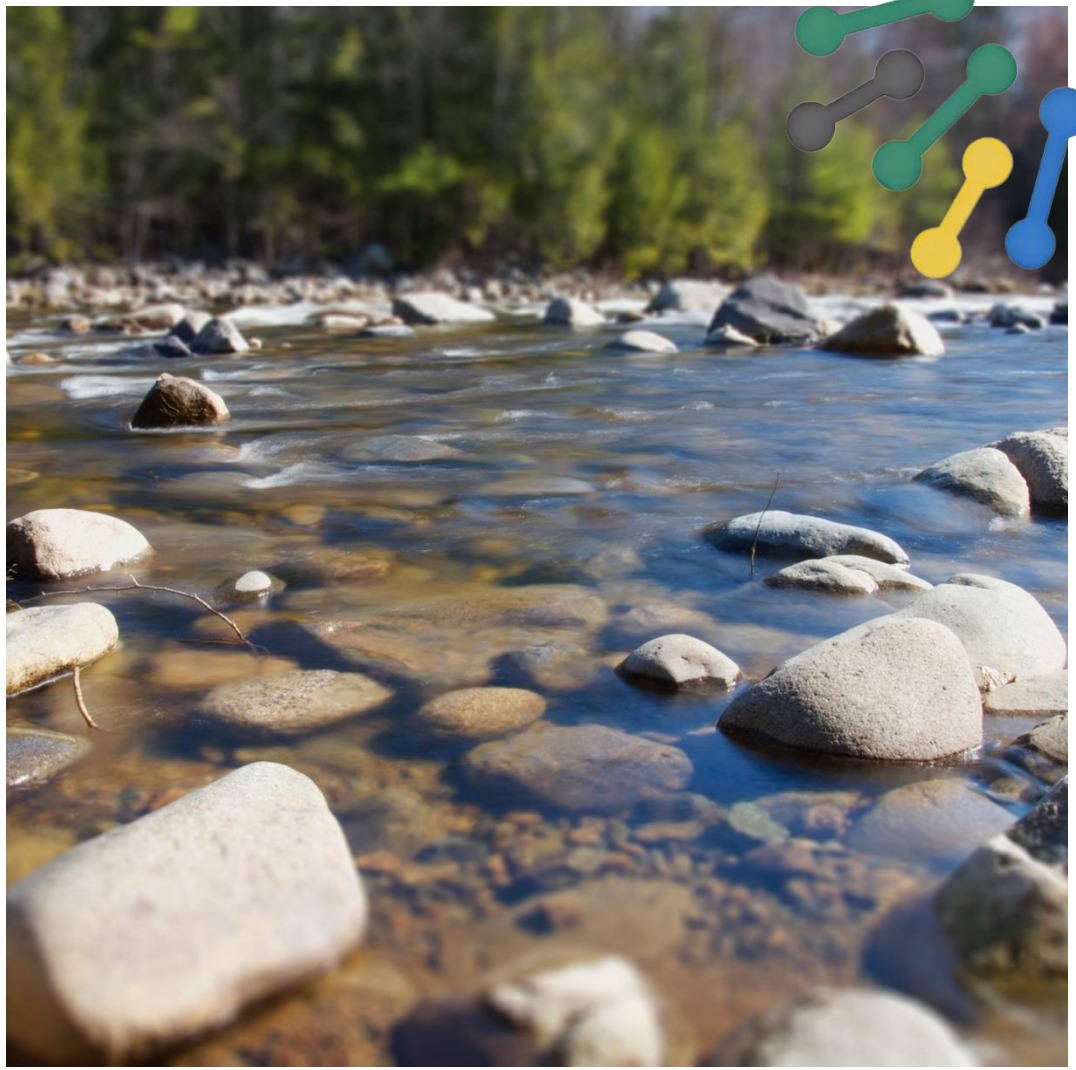
- Different methods for different taxons
- Common limitations
  - Invasive
  - Risk causing harm
  - Rely on expertise for reproducibility

- Fish: Electrofishing & trapping
- Macroinvertebrates: Kick sampling

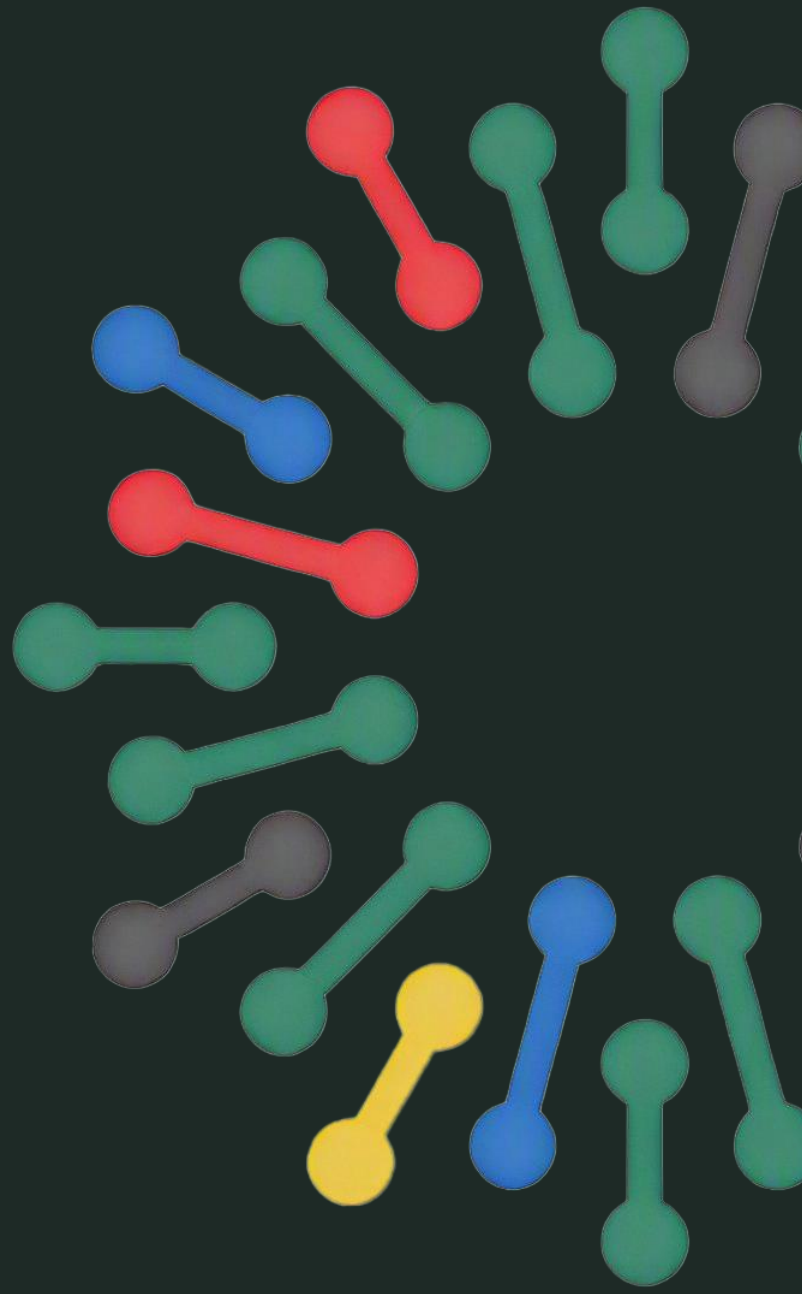


What is eDNA?

- DNA left behind in an environment by organisms
- Skin cells, mucous, gametes
- Animals, plants, fungi, bacteria, viruses



Testing methods



PCR testing

- Widely used genetic method
  - Detect DNA / target genes
- Presence / absence data
  - Covid testing
- DNA sequencing methods



DNA barcoding

- Barcode of Life Project
  - Universal barcode gene for species ID
  - CO1 and ITS

- Online Barcode of Life Database
  - 1.7 million barcodes and counting

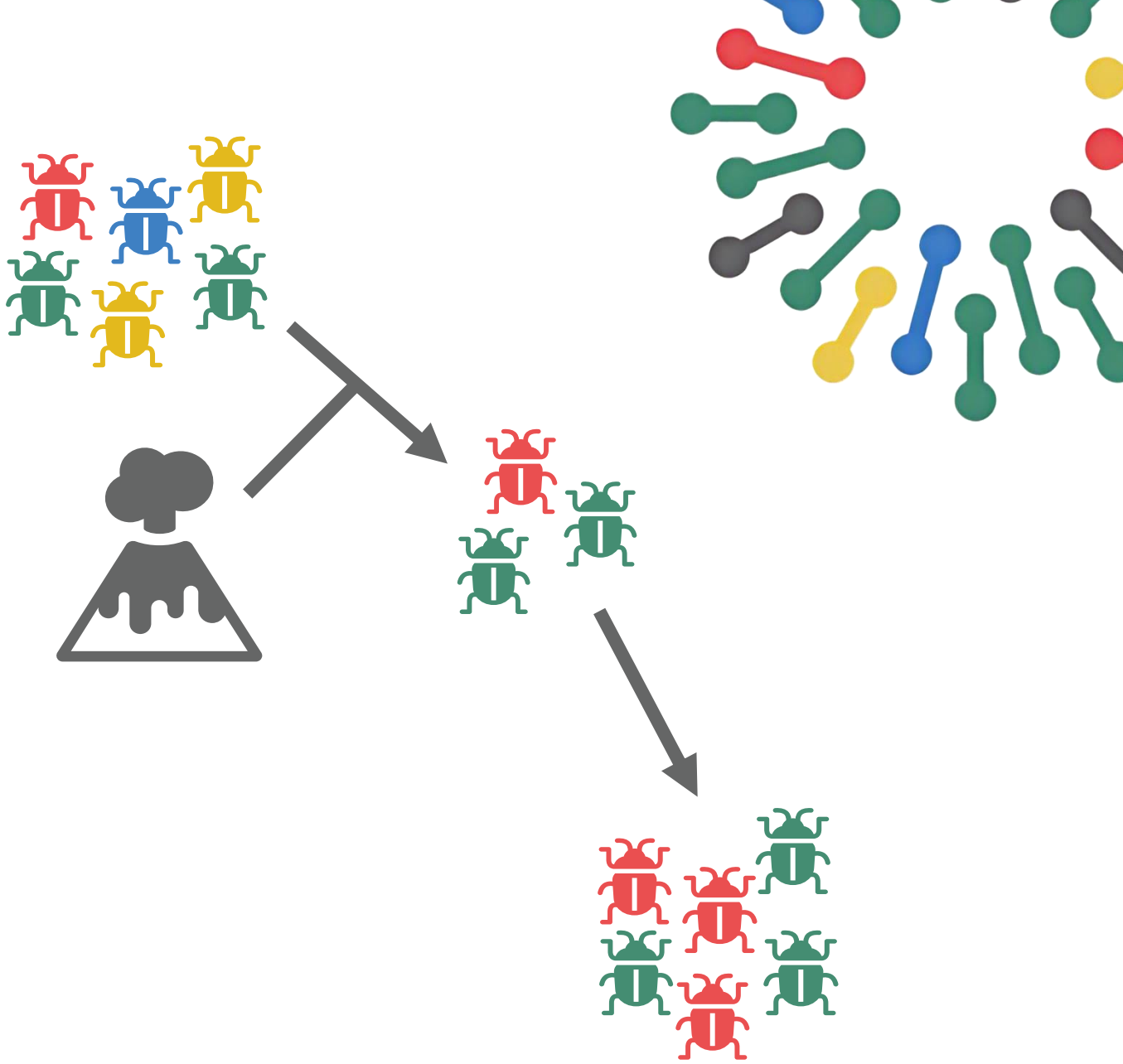
- DNA metabarcoding
  - Mixed samples
  - Result = full list of species



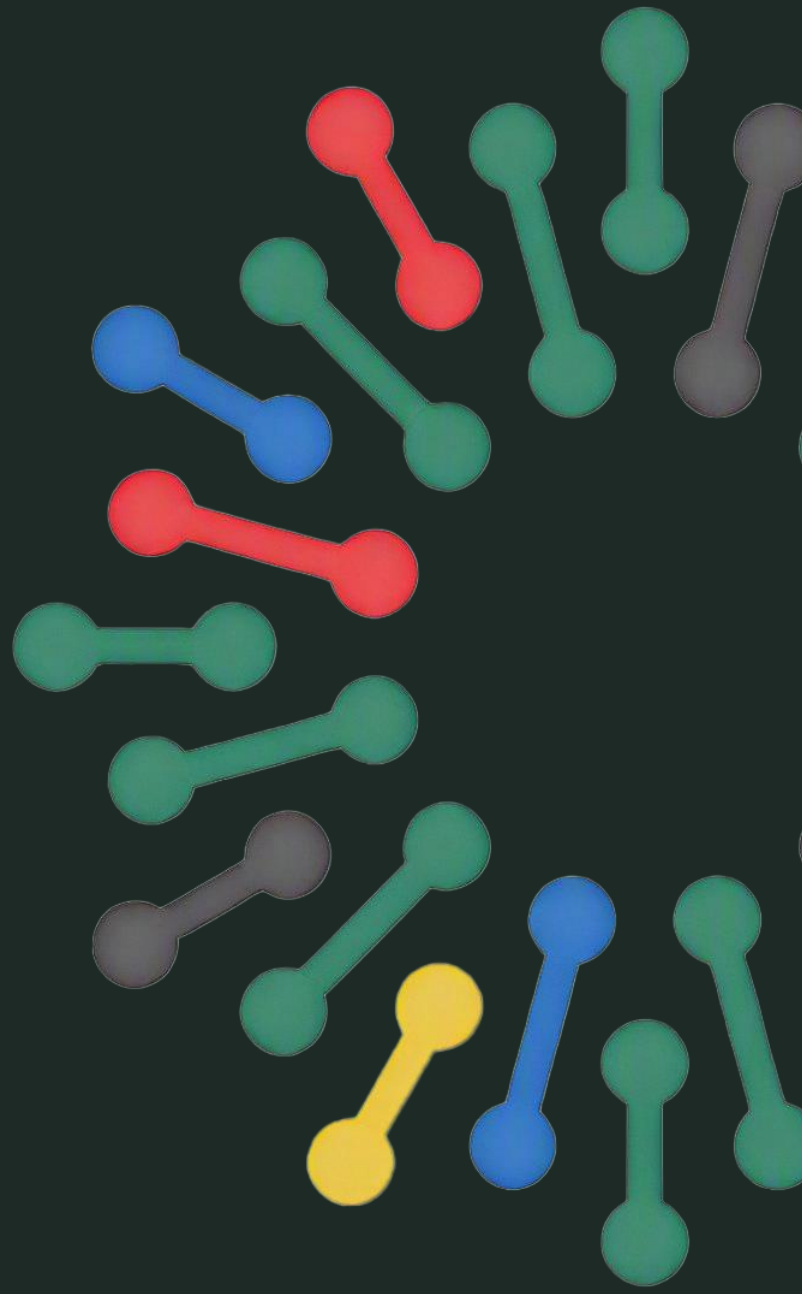
Population studies

- Test individuals from the same species
  - Genetic diversity
  - Gene transfer across locations
  - Population fragmentation
  - Genetic bottlenecks

- Manage isolated populations
  - Genetic rescue
  - Habitat connectivity



Sources of eDNA



eDNA water sampling

- Most well-known application
- Water filters collect genetic material
- Freshwater and sea water
- Biodiversity in waterbodies
- Bacterial surveys and water health



Soil & sediment sampling

- Sediment cores / soil cores
- Animals, plants and fungi
- Track changes over time



eDNA air sampling

- Air filters
- Still being validated
- Terrestrial biodiversity
- Fungi spores



eDNA surface sampling

- Specific terrestrial locations
- Nest occupancy
- Forensics
- Pathogens
- Swabs and tree rollers



Other DNA sources

- Individual animals
  - Tissue
  - Swabs
  - Fur
  - Scales
  - Droppings
  - Blood



Other DNA sources

- Environmental samples
  - Faeces and owl pellets
    - Dietary analysis
  - Honey
    - Plant-pollinator relationships
  - Blood meals
    - Terrestrial diversity
    - Disease transmission
  - Aquatic filter feeders
    - Eg. sea sponges, oysters
    - Museum collections



Recent Manx Projects



Peel Harbour 2023

- Testing bacterial metabarcoding
- Untreated sewage output in Peel
    - Nutrients and pathogens
- Over 3,500 bacteria species



Peel Harbour 2023

- Sewage and pollution
  - *Pelagibacter*
    - Recycles organic carbon
  - *Neptunomonas antarctica*
    - Linked to nutrient rich sediments
  - *Neptunomonas naphthovorans*
    - Linked to breaking down oil /hydrocarbons
- Gastrointestinal pathogens
  - *E. coli*
  - *Campylobacter*
  - *Salmonella*
- Disclaimer!

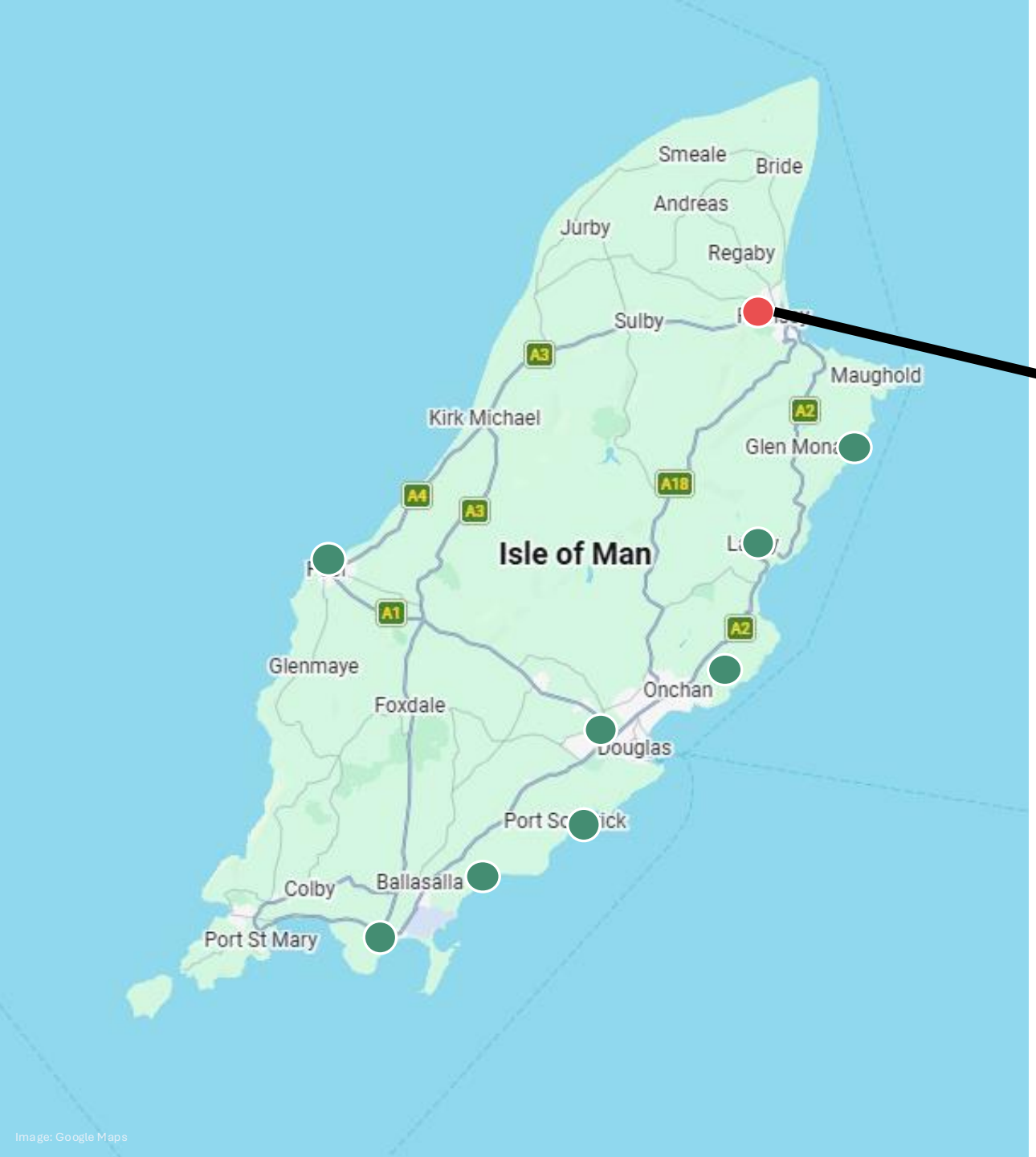
- Sewage treatment works from 2027



Freshwater survey 2024

- Atlantic Salmon
- European eel
- Rainbow trout
- Brown trout

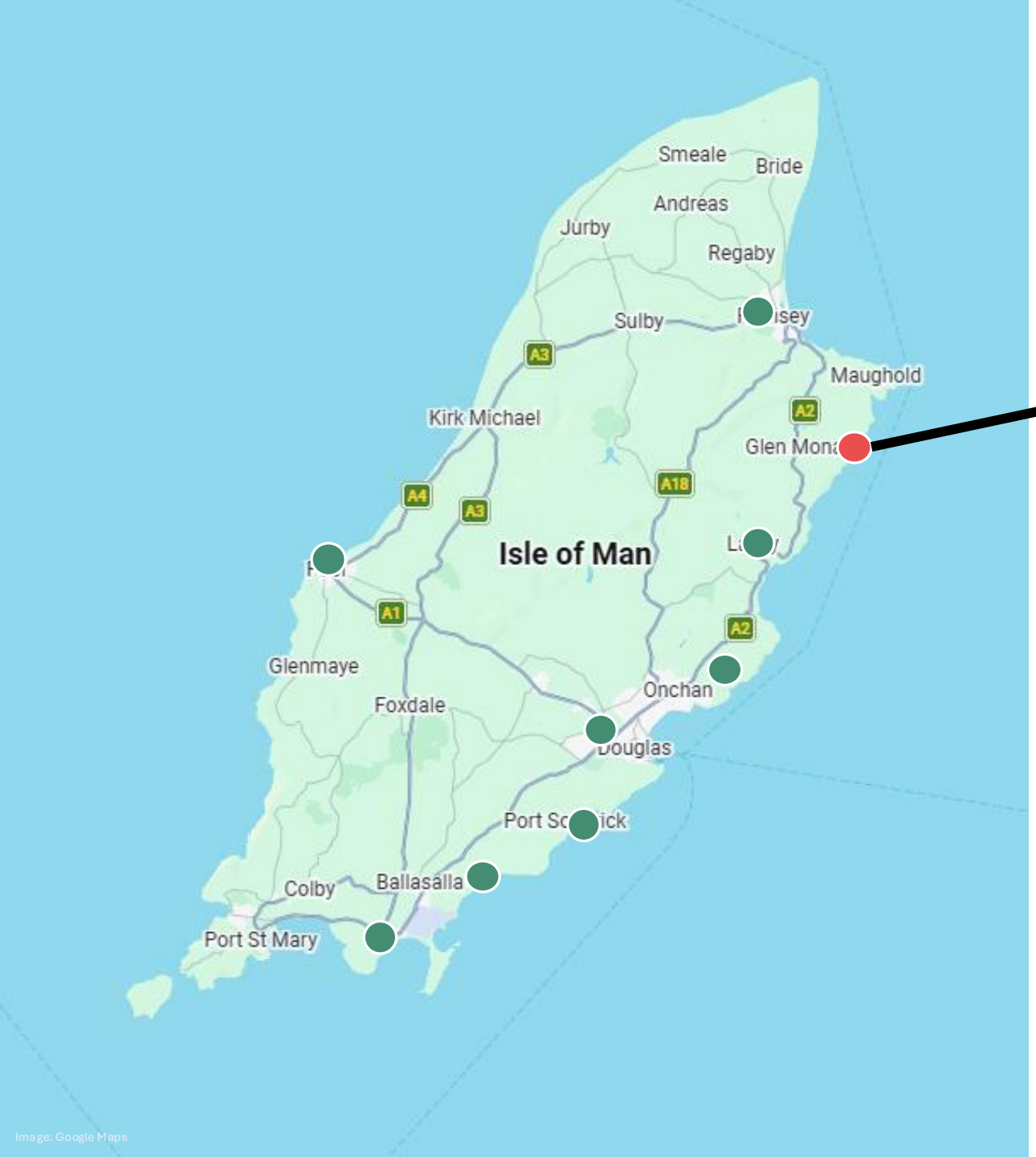
- Samples taken at end point of rivers
- A collection of samples taken for internal R&D purposes
- Not a designed and executed survey of Manx rivers



Freshwater survey 2024

Sulby River

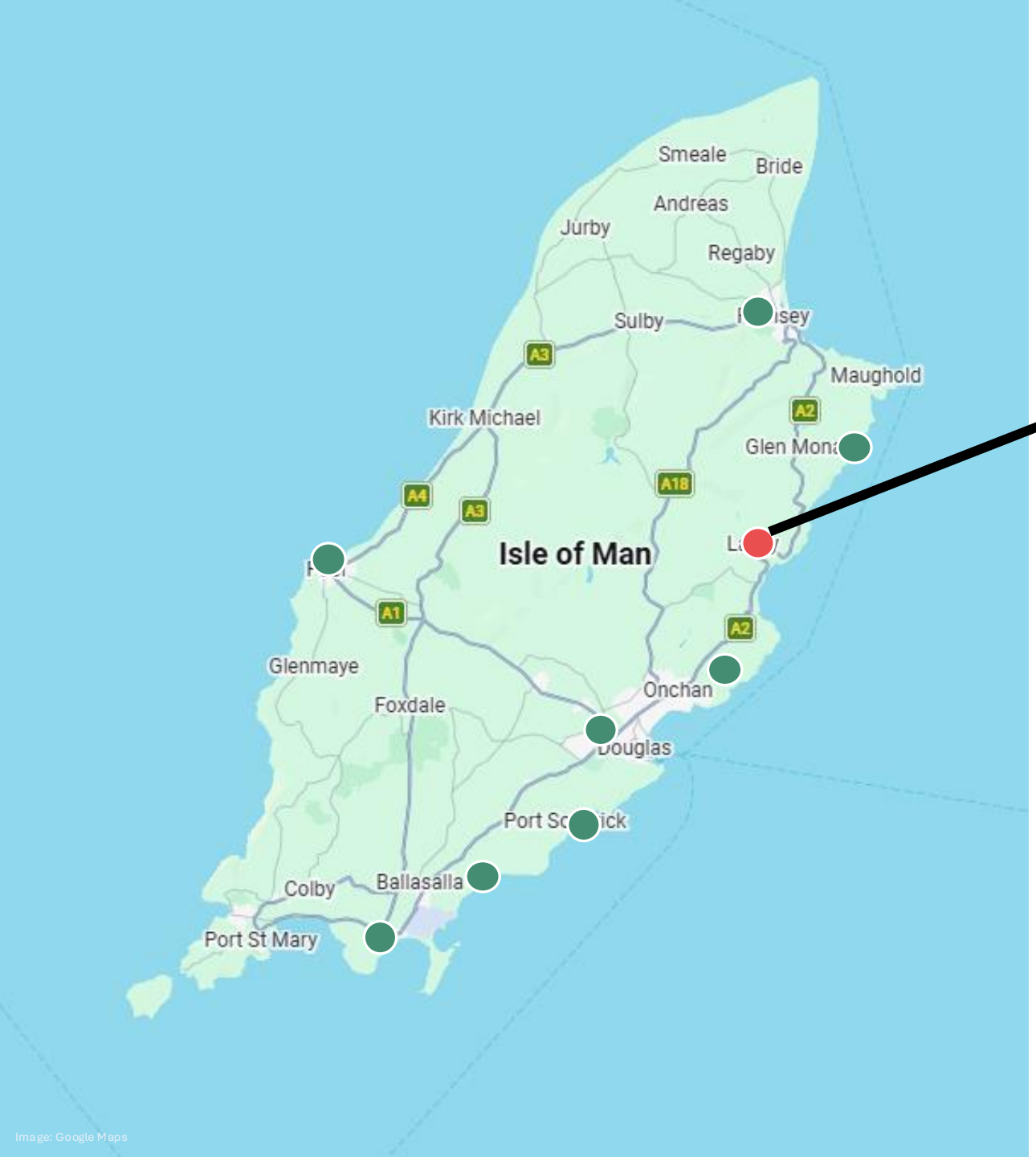
Salmon:	DETECTED
European eel:	DETECTED
Brown trout:	DETECTED
Rainbow trout:	NOT DETECTED



Freshwater survey 2024

Cornaa River

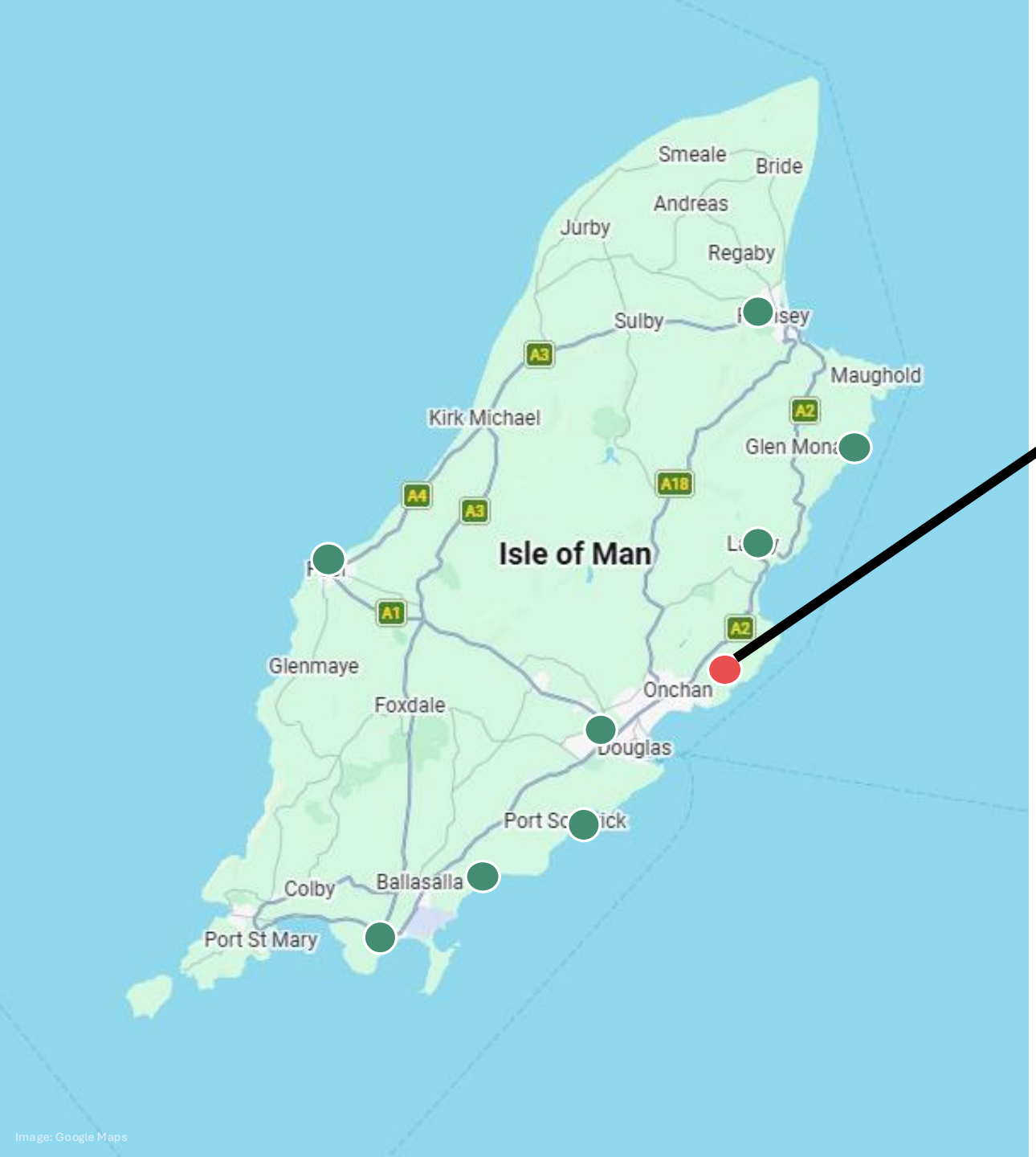
Salmon:	DETECTED
European eel:	DETECTED
Brown trout:	DETECTED
Rainbow trout:	DETECTED



Freshwater survey 2024

Laxey River

Salmon:	NOT DETECTED
European eel:	DETECTED
Brown trout:	DETECTED
Rainbow trout:	DETECTED



Freshwater survey 2024

Groudle River

Salmon:	NOT DETECTED
European eel:	DETECTED
Brown trout:	DETECTED
Rainbow trout:	DETECTED

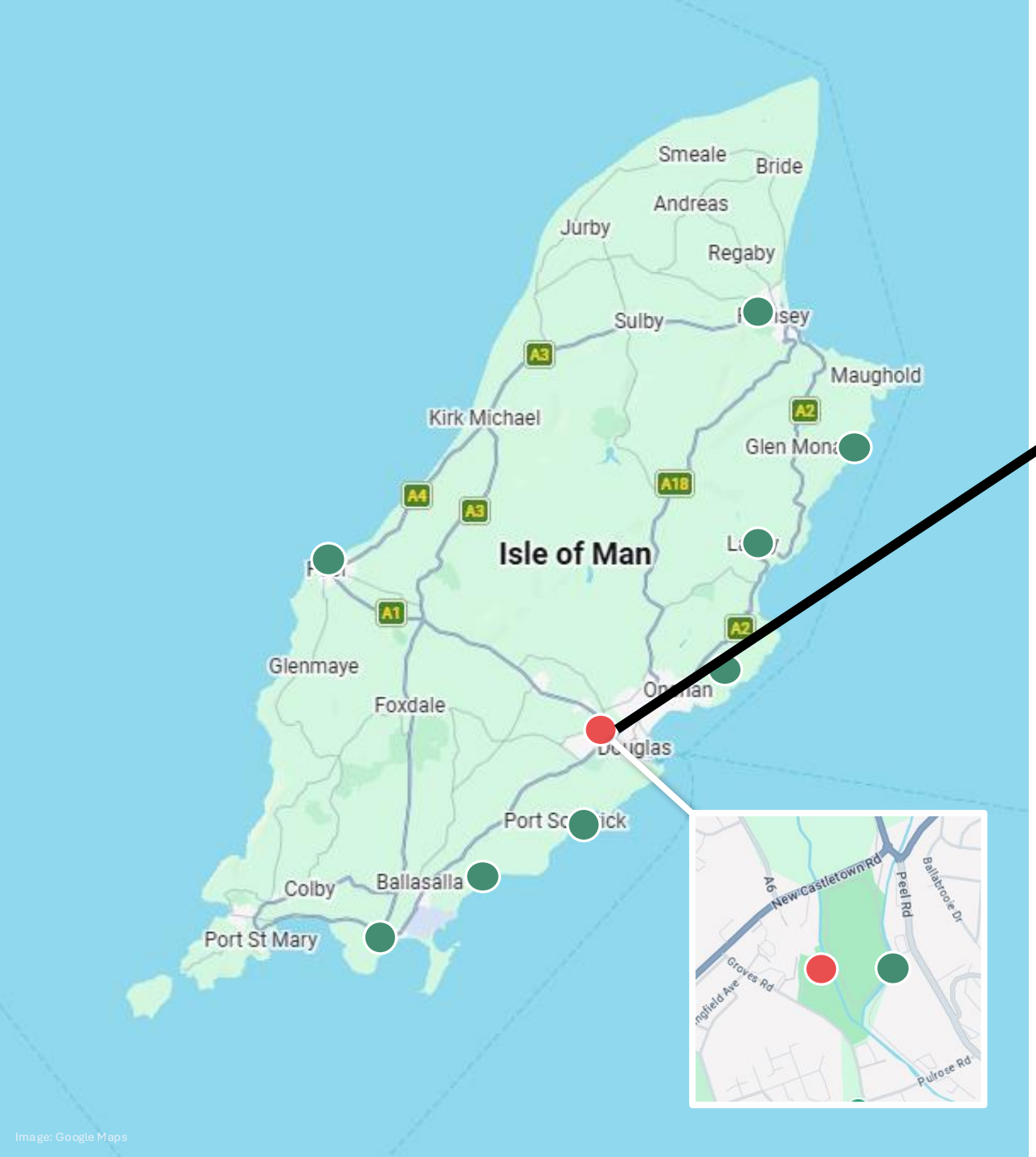
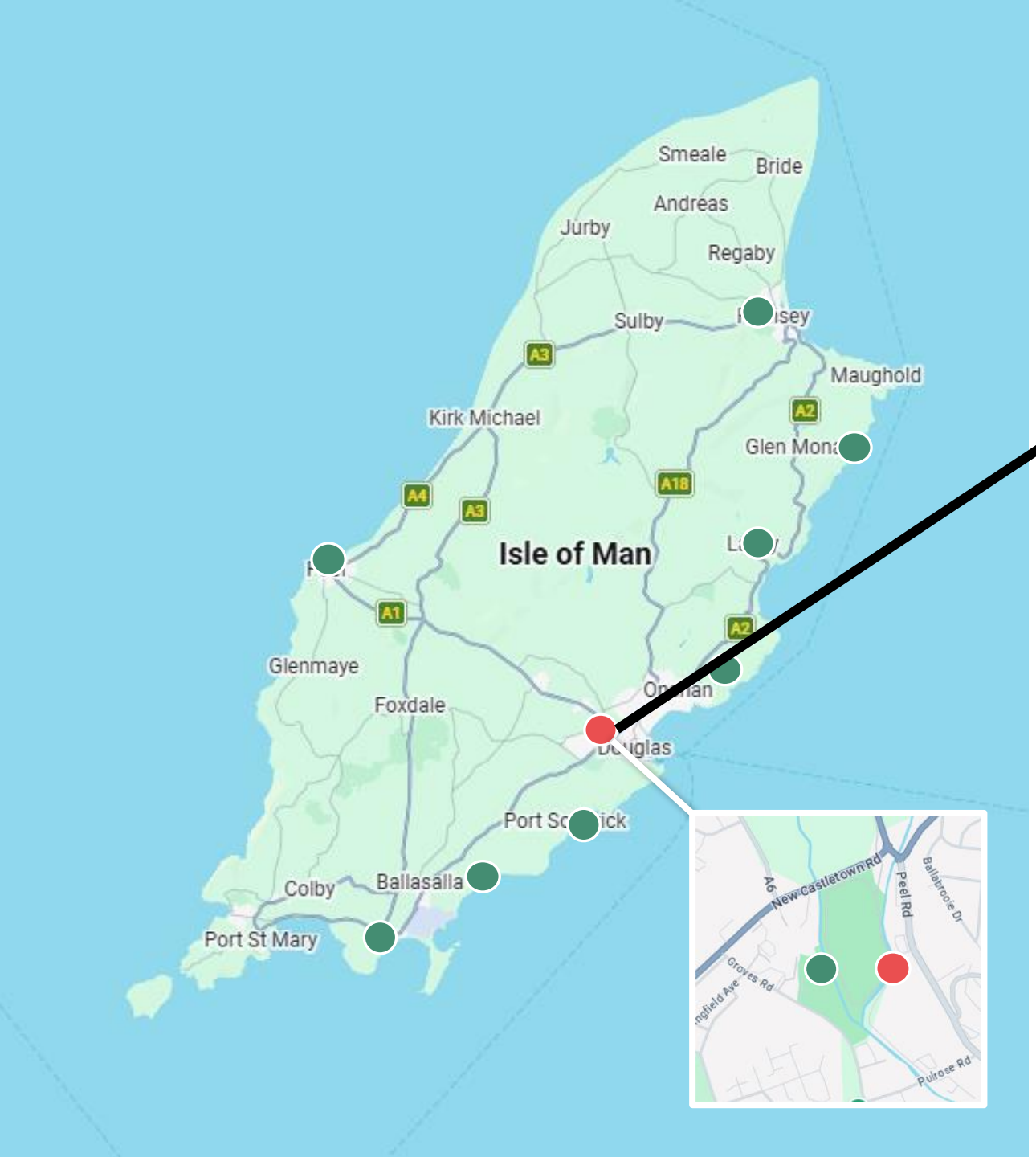


Image: Google Maps

Freshwater survey 2024

River Dhoo

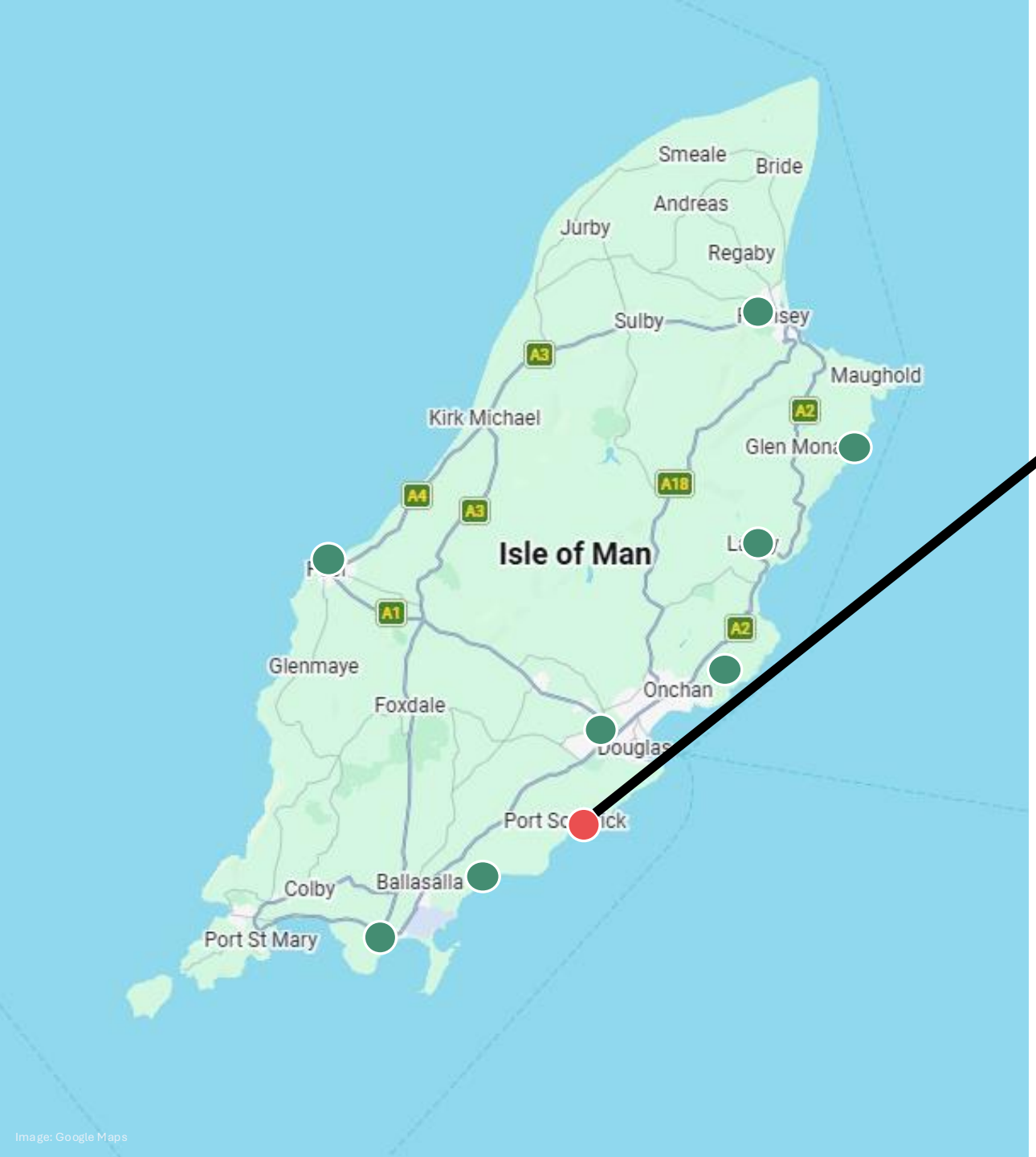
Salmon:	NOT DETECTED
European eel:	DETECTED
Brown trout:	DETECTED
Rainbow trout:	NOT DETECTED



Freshwater survey 2024

River Glass

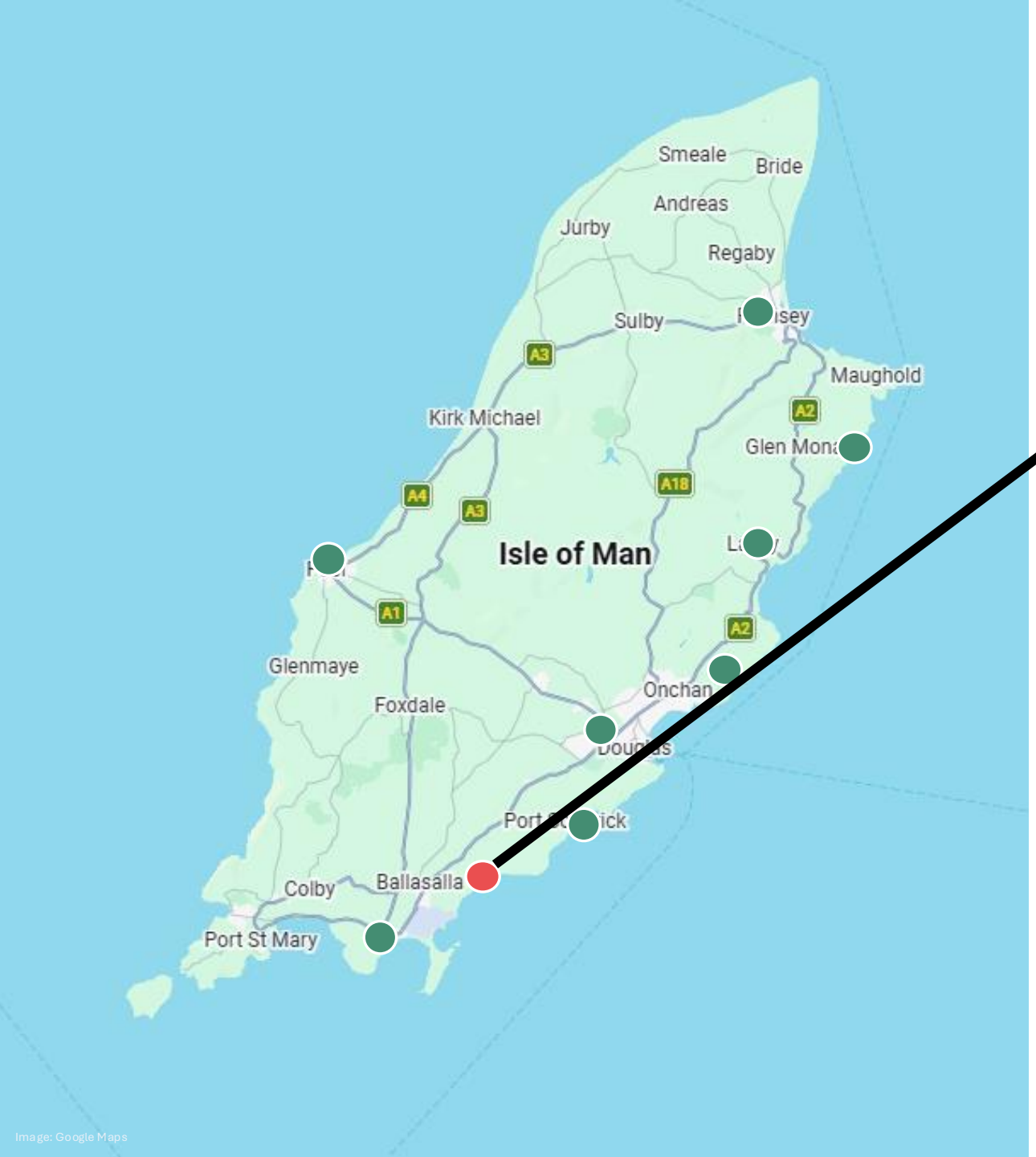
Salmon:	DETECTED
European eel:	DETECTED
Brown trout:	DETECTED
Rainbow trout:	DETECTED



Freshwater survey 2024

Port Soderick

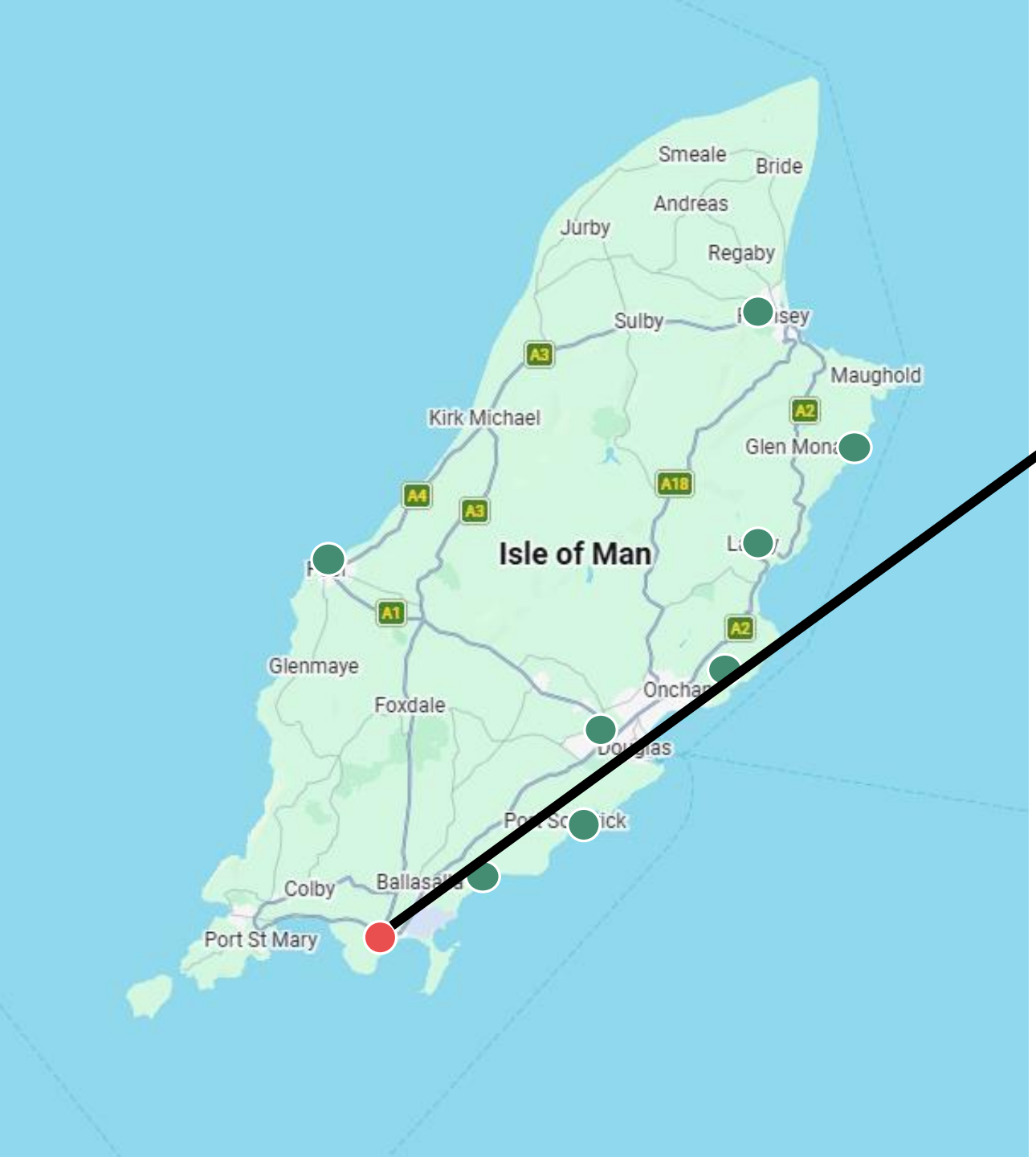
Salmon:	NOT DETECTED
European eel:	DETECTED
Brown trout:	DETECTED
Rainbow trout:	NOT DETECTED



Freshwater survey 2024

Port Grenaugh

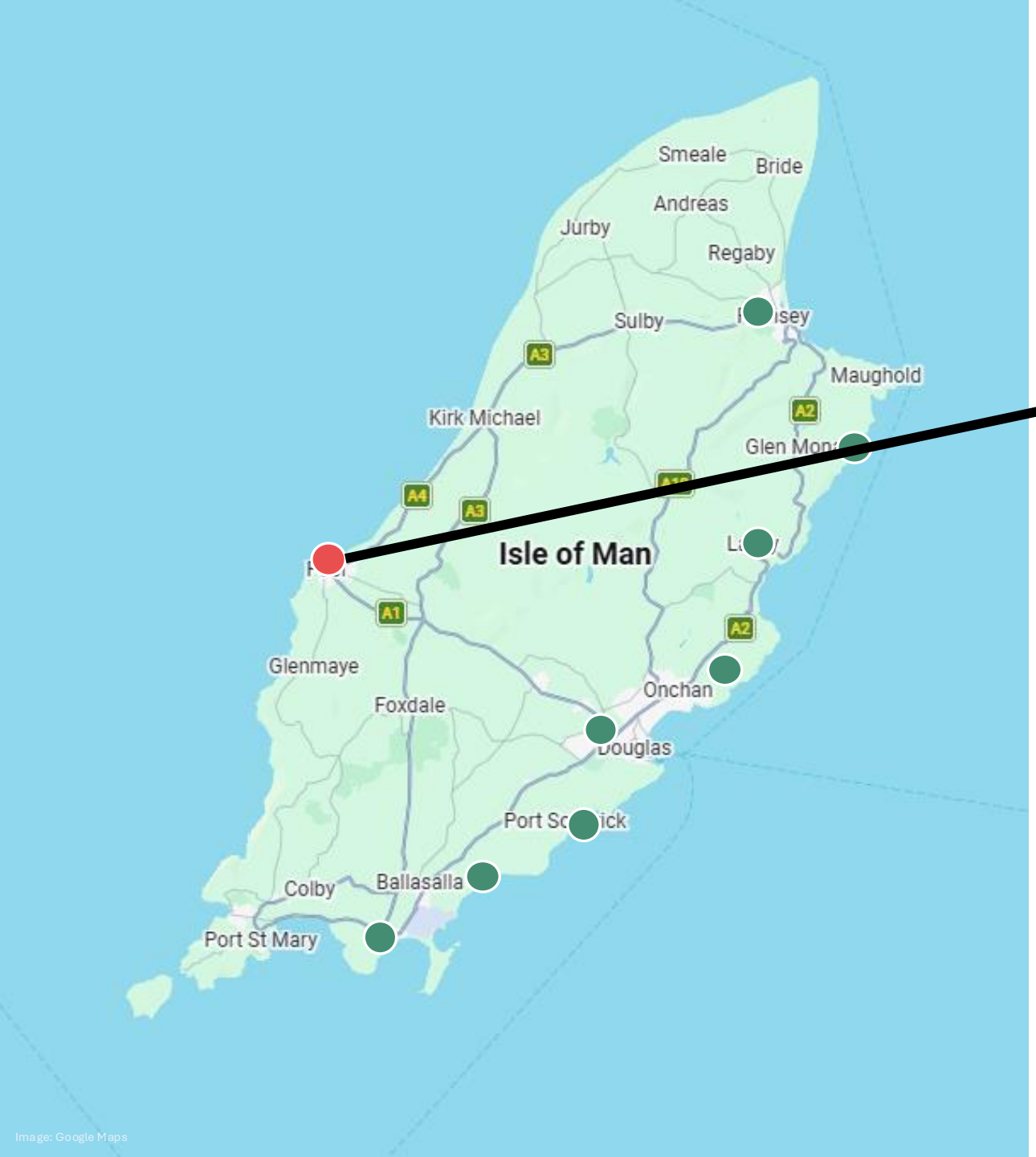
Salmon:	NOT DETECTED
European eel:	DETECTED
Brown trout:	DETECTED
Rainbow trout:	NOT DETECTED



Freshwater survey 2024

Silverburn River

Salmon:	NOT DETECTED
European eel:	DETECTED
Brown trout:	DETECTED
Rainbow trout:	NOT DETECTED



Freshwater survey 2024

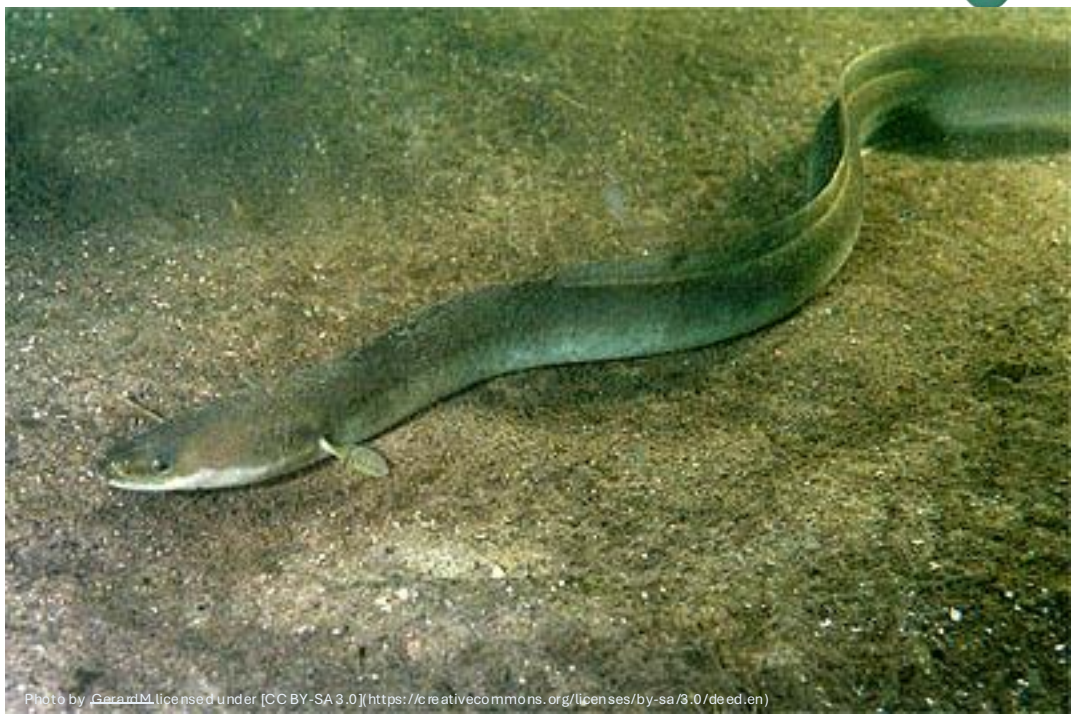
River Nebb

Salmon:	NOT DETECTED
European eel:	DETECTED
Brown trout:	DETECTED
Rainbow trout:	DETECTED



Findings

- Abundance of European eel on the IOM



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IOM Fungus Group

- Surveying globally important waxcap grasslands
  - Only occurs in a zone of NW Europe
  - Agricultural intensification
- Waxcaps, Pinkgills and Crazed caps
  - Difficult to identify

IOMFG
ISLE OF MAN FUNGUS GROUP


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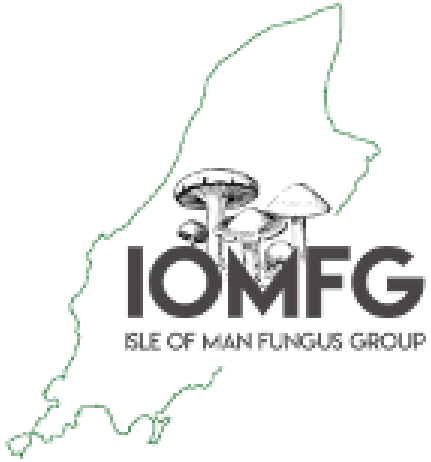
IOM Fungus Group

- *Dermoloma magicum*
  - Crazed cap ‘Black magic’
  - Previously unknown to Isle of Man
- Wildlife Act Schedule 7 - protected ‘plants’
  - Illegal to pick, uproot or destroy



Isle of Man

Ellan Vannin

WILDLIFE ACT 1990

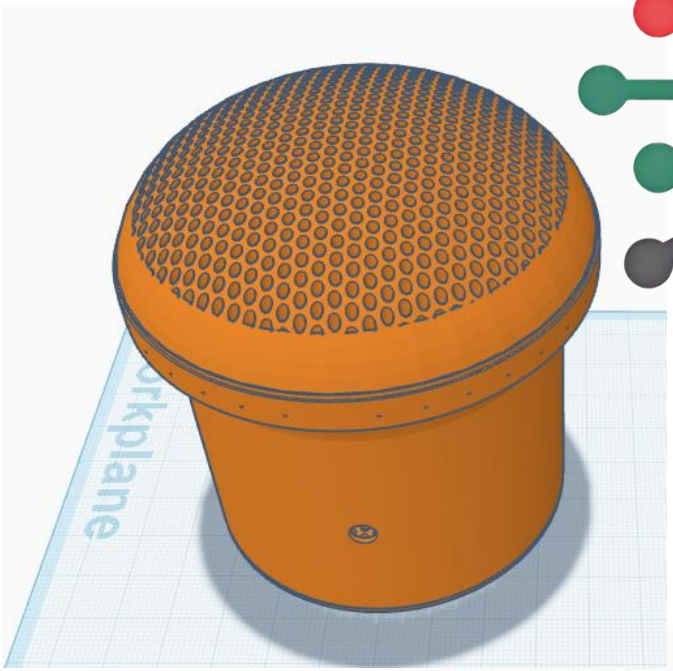
Passive eDNA sampling

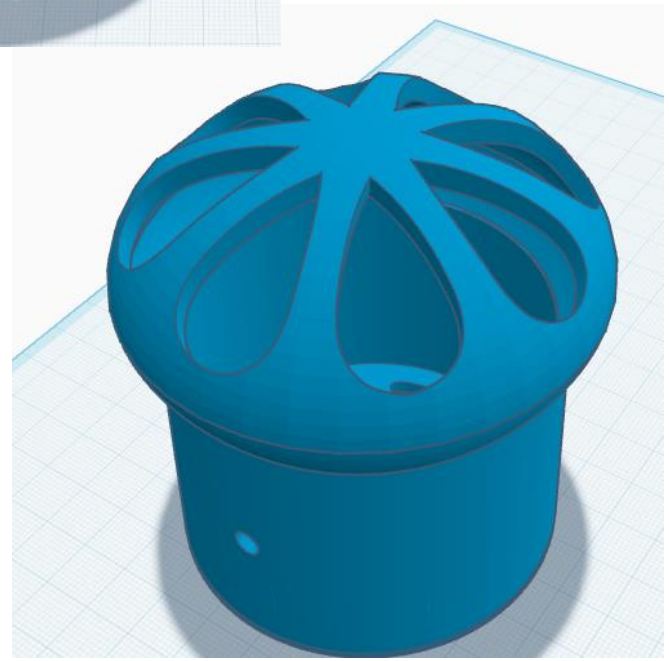
- Standard ‘active’ filtering
  - Snapshot of biodiversity
- Passive sampling devices
  - Long sampling window
  - Simple deployment
  - Accessible
  - Sustainable

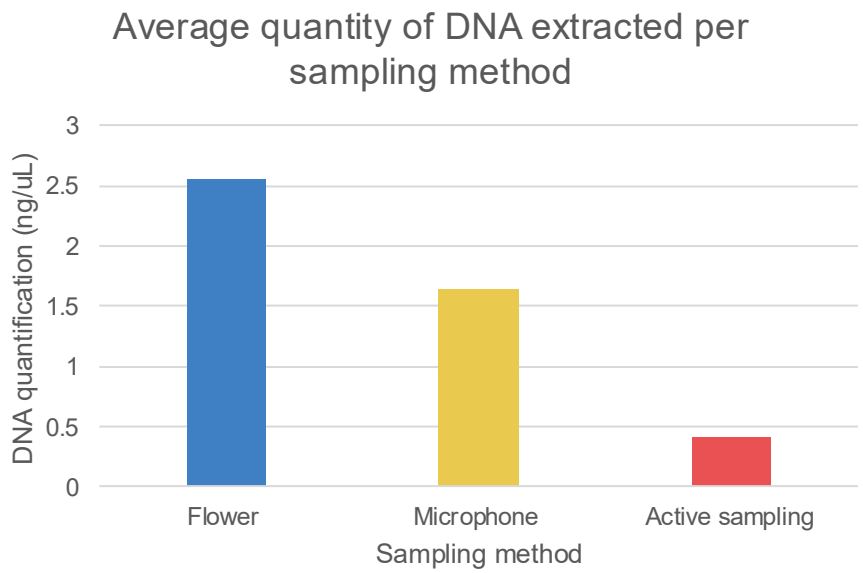


Passive sampling development

- 3D printed devices
  - Compared design
- 24-hour deployment time
- Collected more DNA than standard sampling







Biodiversity Grant

- Support biodiversity research on the Isle of Man
- Schools, students, charities, independent researchers, community groups
- First round announced June 2026
- £1000-£5000 worth of eDNA testing


Image: Unsplash

Biodiversity Grant

- Chose project from MNH, MWT and QE2
- Freshwater Forensics
- More on this from QE2 students later!

Manx National Heritage
Eiraght Ashoonagh Vannin

Manx
Wildlife Trust
Treisht Bea-Feie
Vannin

Queen Elizabeth II High School
a.d. 1979
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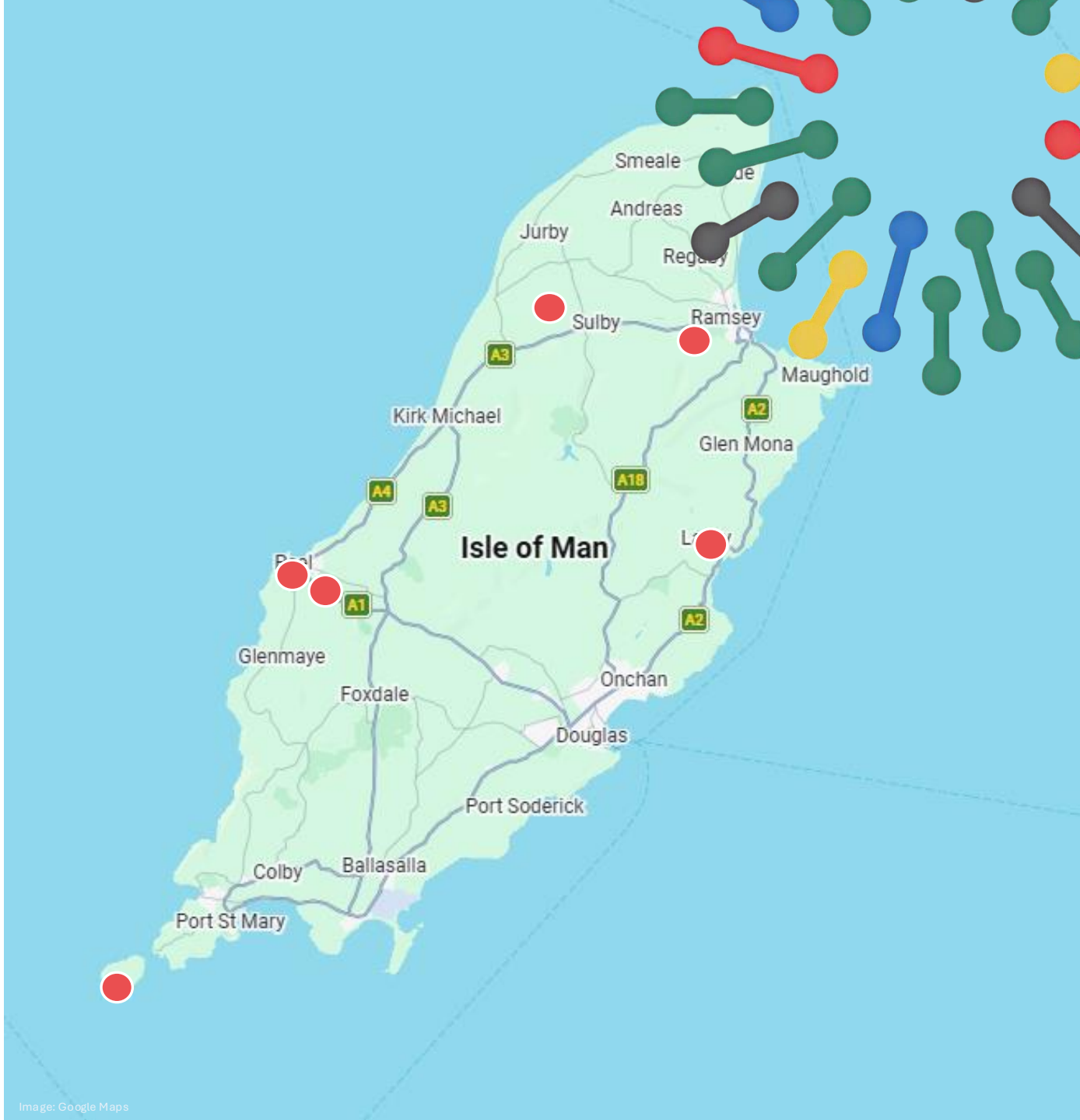

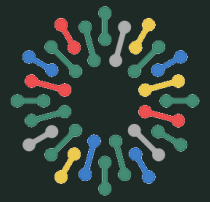

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Thank you. Any questions?

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